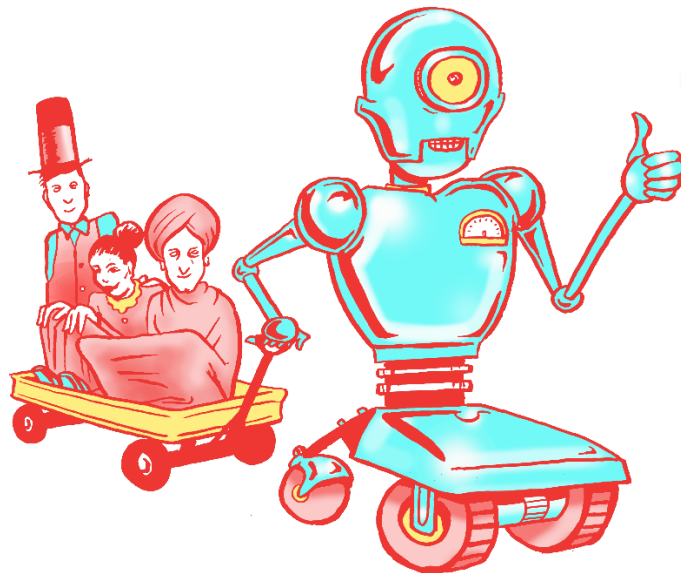


ESG in Business:

How Environmental, Social and Governance Practices are Changing the Purpose of Business©

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This publication is for my many supply chain colleagues, business associates, students, and other rule breakers that know we can make a difference.

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The author is not providing legal advice.

This publication will be updated on a regular basis as information, practices, and technologies evolve. Go to www.larryberglund.com

Foreword

You will likely never see this book in a library or academic journal. That is intentional on my part. Libraries, publishers, and academia want reading materials which follow established rules for publishing such as the MLA or APA Guidelines with formal citations and footnotes. I certainly respect these. I have cited the sources throughout this book, as plagiarism is unethical, unprofessional, and unnecessary to get a message across.

As soon as a book is written, it is out of date. While basic introductory business reference materials are not as subject to changes, the subject of environmental, social and governance (ESG) practices is constantly in flux. Technology is exploding; disruptive materials and designs are quickly being implemented; social values are being strategized and evolving as practices evolve; science and engineering is being listened to alongside the political chatter; global warming is being accepted as a reality based on actual research and the visible damages appearing in the forms of fires, floods, and levels of toxins in the water, air and the earth which impacts everyone. Stakeholders are much more aware of the purpose of business; the means to achieve their ends must meet stakeholder expectations.

I have worked with a great editor on previous publications but again, I intentionally did not want an editor on this book project. My research methodology is a constant scan of multiple sources of data, news stories, academic papers, and business publications to glean the nuanced thoughts and assess the potential outcomes. I draw from a variety of books and newsletters on ESG and cross-reference the ideas for trends. I seek input from colleagues, business owners and business associations on what they see happening and try to connect the dots.

I avoid sharing ideas on issues or businesses which do not have a scalable solution. While small acts and breakthroughs to reduce harmful emissions or toxic materials are good, these are also a distraction from adopting or adapting proven methods, products, or processes which are commercially scalable and available now.

When I listen to CEOs and other business leaders, there is a level of frustration from outdated government regulations and practices preventing new products from going on the market. There is a need for due diligence on the part of regulators, but there is also a need for expediency, as we see temperatures rising and increased levels of particulates compounding our global problems. Extending existing standards to protect markets or products, limits the investment opportunities and support for new ideas.

I could have chosen a newsletter format, with regular updates but then the reader has to try and see where each *episode* fits into the *noise of information* coming at them. I have tried to compile the emerging information into this single reference document. This is my legacy project and my give back, to help others make better informed decisions.

Prior to the 1st edition in March 2023, I spent a year+ drafting the materials based on research and my experience in the market on ESG and supply chains for the past 20-years. I've been involved in supply chain management, arguably too long; however, I continue to find it to be a useful conduit to exchange ideas and introduce tomorrow's solutions.

I hope you find this to be an insightful and professional compilation of ESG ideas to apply within your sphere of influence. That is the intention. I would like to hear about ESG in *your* business.

Larry Berglund

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Executive summary

If you are in a business involving goods and services, or a consumer, you are aware of supply chains. Major global events have been impacting supply chains for years: the shift from a fossil fuel energy supply to renewable energy; the digitalization of information; the electrification of transportation; the need for decarbonization in all sectors to reduce emissions; eliminating plastics and waste; the pandemic; the circular economy; global warming; and environmental, social, and governance (ESG) policies.

The pandemic exposed the lack of resilience in sourcing strategies. The circular economy is a decade old and is gaining traction to affect how we view resources and design. ESG is showing us that we can prosper with dignity and respect. Developing supply chains with responsible materials and labour practices is possible. Addressing environmental concerns in a sustainable business model requires challenging the status quo. These changes require national and international interventions by business and thought leaders and governments.

The ESG blueprints and road maps have been written and are being edited to reflect to new ideas and targets. We need more companies and governmental agencies to adopt the best and leading solutions to ensure a planet which is going to sustain our collective ecosystems. The solutions are not secrets. The United Nation's Sustainable Development Goals are readily available; the International Labour Organization conventions are market-tested; the 2007 United Nations Declaration on the Rights of Indigenous Peoples reflects the acknowledgement in social obligations; the ISO 14001 for environmental and 26000 social value standards are well known; leading brand managers and manufacturing companies are sharing their processes and technologies; industrial associations are advocates for better methodologies; investors and stakeholder voices are being heard; the principles of the circular economy are working; innovative logistics are driving down costs and improving services; disruptive technologies are shaking the status quo; and the expectations of consumers and customers demand affordability and availability.

Supply chain managers have been part of the transactional process in all sectors. As Artificial Intelligence and the Internet of Things expands exponentially, the role of supply chains needs to adapt to be relevant as well. There will always be a cost of goods to consider but it will be a much broader view with the total cost of ownership internalized as much as possible. See Addendum V for a TCO Worksheet.

This publication looks at the many touch points in supply chains in multiple sectors and discusses how ESG in changing the purpose of business. It looks at potential winners and losers in the markets and the shift in power by early adopters. The metrics for success in business must include objective financial and non-financial reports.

Whether your organization has embraced ESG or is considering on adopting many of the practices, the content is to support a continuum for ESG to flourish.

And ESG is not without its detractors. Counterpoints are important part of the discussions and debates.

What got us here won't get us to where we want to be going. We are leaving behind much of the traditional industrial strategies and forging new partnerships to achieve what is possible and necessary through supply chain strategies. This will result in massive investments to move to renewable energy sources. The risks are steep, as are the rewards to those who do so successfully.

ESG is a global shift affecting generations of peoples and facing the multiplicity of problems which can be attributed to anthropogenic actions. There is a burning necessity to correct our direction and get it right, in the time remaining. The clock is ticking.

The Purpose of business

Business decisions have been influenced by the theory of the *Invisible Hand*. The Invisible Hand is an economic term coined by Scottish economist Adam Smith over two hundred years ago. The basic premise is that people will do business with each other in a free market that best decides the price of goods and services. An unfettered free market does not want any government intervention. This concept upheld the idea that when everyone works for their own self-interest, we will collectively be better off.

We can now see the shortcomings of the Invisible Hand, which originated in a time with slave labour, a privileged few controlling commerce, harsh working conditions, child labour practices, and an absence of environmental responsibility. Natural resources were seen as being infinite but also worth fighting wars over. The Invisible Hand directed the expansion of the Industrial Revolution.

Fast forward to the 21st Century. Many of the shortcomings of the Invisible Hand have been eradicated in the marketplace – but not all. We acknowledge that government intervention is necessary to enforce responsible business practices. We complement the Invisible Hand with a term this author refers to as the *Indivisible Hand* of government. The Indivisible Hand guides and, out of necessity, monitors the Invisible Hand to stimulate social and economic interests being realized in a sustainable manner.

Any model which is primarily profit-based from a Supply side needs to be effectively balanced by the Demand side. Supply chain practices, built on the Invisible Hand values, were aimed at attaining the lowest cost. This theory seemed to make sense until we looked deeper into the supply chain and found that the lowest cost came at the expense of social values, environmental degradation, and the erosion of long-term economic development.

Until more recently, business management training was primarily based on Smith's theory that as long as a product was legally sold, the market would set the price and should not concern itself with the public welfare – that was the job of government. Public sector procurement also followed the Smith theory, where the lowest cost from a tendering process must deliver the best value. Procurement decisions were largely one-dimensional – with economic interests being the first choice.

However, in the 1980s, quality management started to drive value, which in turn affected costs. Investing in quality management practices was primarily a means to ensure economic benefits would accrue. Environmental interests followed quality management rather reluctantly – until we could connect environmental benefits with sustaining profits. Social procurement practices didn't hit the procurement radar until the early 2000s.

Procurement, which is a transactional tool of the Demand side, needed to redefine the value proposition to go beyond the lowest cost and be based on values of a larger stakeholder base. Procurement in private and public sectors began realizing that the lowest cost was not a sustainable model. The Indivisible Hand, through legislation and by supporting international standards, has been transformative in affecting how we think of value. We need a three-dimensional model with *economic* and *environmental* interests meeting the *expectations* of stakeholders.

The Invisible Hand favoured market transactions that benefited a small group of stakeholders. This led to the idea that profits should trump principles. The courts had to intervene to establish laws on conducting business. Business ethics and codes of conduct emerged to signal a change in behaviour and practices. The Indivisible Hand favours a market transformation that reflects the values of the majority of its stakeholders.

We could surmise that business created the problems we are trying to resolve today but that is too simple. We could also say that business will get us out of the problems we are in today. Again, not entirely true. There will be a constant push and pull by business as ESG issues surface, receive attention, and morph into newer challenges. It's how we as a people have progressed globally. Commerce created wealth and it can support sustainability and inclusivity. It will be an asynchronous movement between developed economies and emerging economies. Where the developed economies have benefited from a technical advantage, the emerging economies have the opportunities to access and accelerate these benefits.

It has been a decade since Harvard's Joseph Henrich coined the term, *WEIRD*. Western, Educated, Industrialized, Rich, and Democratic. This term captures the attributes of western business. If you are reading this, you are likely WEIRD. Being WEIRD is not good or bad. It's part of our evolutionary path. ESG is a stepping stone along the path. Within the WEIRD world is the conflict with First Nations' perspectives.

The shift in the purpose of business has gone from making profits at any cost to making profit with a sense of responsibility for all stakeholders, protecting environmental interests, and building social capital.

Supporting the shift to more responsible business practices is the United Nation's Sustainable Development Goals (SDG). These (17) goals act as a touchstone for actions to address global issues which we are all directly or indirectly connected with. We are either contributing to these problems or are recipients of the actions taken by others for which we have little control. Solutions require global cooperation focused on these outcomes which were developed in 2015 with 2030 as a major timeline for alignment. The UN SDGs are:

1. No poverty
2. Zero hunger
3. Good health and well-being
4. Quality education
5. Gender equality
6. Clean water and sanitation
7. Affordable and clean energy
8. Decent work and economic growth
9. Industry, innovation and infrastructure
10. Reduced inequalities
11. Sustainable cities and communities
12. Responsible consumption and production
13. Climate action
14. Life below water
15. Life on land
16. Peace, justice and strong institutions
17. Partnerships for the Goals

Addendum III provides a checklist for an organization to see how it aligns with the UN SDG goals.
<https://sdgs.un.org/goals>

The balance of this paper will weave through these themes from a supply chain and business perspective.

Introduction to the circular economy

The Ellen MacArthur Foundation has been accelerating the transition to a circular economy since its inception in 2010. The circular economy is based on the (3) principles:

1. Eliminating waste and pollution;
2. Circulating products and materials; and the
3. Regeneration of nature.

This is in stark contrast to the conventional linear model which is based on consumption of materials and resources rather than their conservation.

To remain competitive on a cost basis, leading companies recognize that with changes in legislation, consumer demand, technology and environmental standards, they must be looking ahead to remain financially viable. Our economy and quality of life has been based on unfettered consumption. Now we are looking at conservation of resources while coping with mutating viruses. The transportation sector functions in a global market with international agreements and extended supply chains, originally intended to supply goods at the lowest cost.

Circularity in supply chains is providing solutions to decades of myopic strategies where resources were seen as being infinite. A sustainable economy means we practice *economic decoupling* on a mass scale. Ergo, economic growth without a corresponding increase in consumption in energy and resources, nor in environmental stress. Greenhouse gases are killing profits and the planet. The circular economy is one of the means towards sustainability and is not a solution in itself. It is a framework to build from.

The widely referenced 7R Model, which forms the basis for design of products in the circular economy, includes:

1. Recycle
2. Repair
3. Reuse
4. Repurpose
5. Refurbish
6. Reduce
7. Rethink

We respectfully add a number 8, *Responsibility*. Addendum IV provides a self-assessment on alignment of an organization's products and values with the 7R Model.

Authors Velenturf and Purnell describe a sustainable circular *society*. This is one which maintains environmental quality and economic prosperity for current and future generations. Their value framework considers (3) components:

- A. Social and individual well-being: Create conditions that offer equity in realizing quality of life that at least meets human rights standards for all;
- B. Environmental quality: Using resources within planetary boundaries, enhancing natural capital within and across generations;
- C. Economic Prosperity: Collective organization of fair access to resources within and across

generations to enable social and individual well-being and enhance environmental quality.

Across all sectors is the presence of logistics to deliver raw materials and ship finished goods. In the areas of logistics, we can see many of the circular economy principled actions taking place within a complex business ecosystem. Logistics has been defined by the Canadian Manufacturers and Exporters (CME) as the management and coordination of transportation, inventory, strategic sourcing, global trade management, forecasting, compliance mandates and performance measurement across global value chain partners. Per CME, the sector is largely affected by six main factors: globalization, increasing logistics complexity, rising risk, increasing labour costs in the developing world, sustainability, and growing volatility.

Supply chains refer to the critical handling points in the production of goods or the delivery of services. The transactional side of the supply chain is when a buyer places an order with a supplier for a component or materials. The buying organization is part of the supply chain as is each of the directly affected *primary* suppliers locally or globally which are involved in this process. The value chain are those *secondary* suppliers, which supply labour and materials to the market. For example, if a company wants to erect a building, there are *primary* suppliers of concrete, lumber, glass, steel, and contracted labour which agree to the terms and conditions to complete the project. These suppliers are part of the supply chain. The value chain would be *secondary* organizations which provide training for workers; companies which provide blue prints; supply catering services for meetings; laundry services for cleaning uniforms; flagging companies for traffic control; or supply corporate schwag for promotions. The value chain benefits from general economic activities and adds to the social and economic development of a community. SEs and SMEs are important players in the value chain.

Plastics in circular economy

If you believe that recycling plastic waste is good for the planet, you might as well believe in unicorns, the tooth fairy, and Santa. Recycling plastic has been an illusion which arguably, led to increased use of plastics and the inability to recycle the massive volumes or contain their dispersion in the ecosystem. Plastic packaging is now a target for 2025 to be 100% reusable, recyclable or compostable according to the US Plastics Pact. In addition, the average recycled content or responsibly sourced bio-based content in plastic packaging will be 30%. Plant-based materials such as polylactic acid (PLA) and polyethylene furanoate (PEF) are showing promise as alternatives to PVC. Plant-based beer bottles came on the market in 2020 but it remains to be seen if these will become scalable solutions for many other food and beverage items.

Bottles made from paper have been on the market for a few years. Denmark's, The Carlsberg Group, was one of the first in 2019 with bottles made from paper and wood fibre. The bottle uses the PEF polymer film as a liner to contain liquids. Coca Cola has launched paper beverage bottles in Europe using PEF liners. Consumers play a big role in the acceptance of paper over glass containers. The paper bottles are fully biodegradable. If it's possible to stop the usage of PVC-based plastic bags from consumers, it may require an industry and governmental edict to increase the conversion to renewable paper containers.

Amazon, to its credit, has embarked on a strategy to eliminate as much packaging as possible. Amazon's Ships in Product Packaging program (SIPP) looks at how to ship products in the original packaging rather than repacking for further handling. Not all products can be shipped without further packaging – towels vs glassware, for example; however, Amazon is only shipping ~13% of orders in original packaging and want to see how much further they can reduce unnecessary packaging materials. One way to encourage less packaging and handling, is to provide more competitive fees with companies that participate in Amazon's SIPP program.

A good example of the SIPP program is the conversion from larger, plastic bottles of Tide detergent, with the handle on the side, to a bag-in-a-box design. This resulted in less plastic and a lighter weight product. Amazon worked with Procter & Gamble which agreed to redesign a rather iconic bottle into a more responsible form of packaging. Amazon ships the detergent in its new bag-in-a-box format without further packaging or handling requirements. Similar to wine being sold in boxes instead of glass bottles. <https://www.amazon-packaging.com/reinventing-an-american-icon>



According to the American Forest & Paper Association, recycling of paper and cardboard continues to be supported. The annual recycling of paper has moved from 47.6M tons in 2002 to 49.1M tons in 2022; while the rate of recycling has moved from 48.2% to 67.9% over this period. Cardboard recycling has moved from 23.2M tons to 34.0M tons; while the rate of cardboard recycling has gone from 69.9% to 93.6%. Paper and cardboard are renewable materials yet recycling avoids consuming more raw natural resources.

In late 2022, UBC's faculty of forestry created a bioplastic from grass which only uses the waste stalks. Corn, which is a food staple, has been used for many plant-based plastics, but the grass option has a lower impact on food supplies. Grasstic, the UBC product, holds great promise due to it being renewable, plentiful and biodegradable in soil and water in the form of a biopolymer called xylan. Grasstic has been made into packaging replacing single-use plastics. Other breakthroughs from UBC are bioplastics made from kelp and wood fibre. These are scalable, sustainable products which support the circular economy principles.

The use of plastics in packaging is complex and controversial. The shift towards *mono* plastics is seen as a bridge away from the multi-layer packaging materials. Mono is easier to recycle, requires less energy to produce, it can be repurposed, and requires less resources to manufacture. Mono packaging materials align with the circular economy values.

A significant Canadian government policy was announced in December 2022, to ban the manufacturing and import of many types of single use plastics. The food service and packaging industry's lack of concern due to perceived price imbalances, invited government intervention which creates the "even playing field" for all sellers of packaging products. Now there will be renewed investment into optional packaging products for the food sector and retailing in general for compliance. This will likely incur some price adjustments in order to address the importance of protecting our biodiversity and ecosystems. This strategy again, aligns with the circular economy values. Stopping the problem at the source through the responsible design of products and the use of biodegradable materials.

It is of note, that in the same week which the Canadian government announced the banning of single use plastics, fast food giant Tim Hortons announced it will be switching to wood and fibre cutlery in early 2023. Hortons is concurrently trialing redesigned food wrappers to reduce 75% of the material

requirements and hot beverage lids which are easier to recycle and repurpose. Great example of the circular economy principles and an acknowledgement of corporate ESG actions.

While many community stakeholders feel that the ban on plastics was long overdue there is another side to this argument. A group of plastic manufacturers successfully challenged this through a judicial review which led to dismissing the regulation banning single use plastics through the Canadian Environmental Protection Act (CEPA). The industry organization is the Responsible Plastic Use Coalition. In 2021, they challenged the term “toxic” under the CEPA and the late 2023 ruling means the ban can only apply to plastics which are determined to be *toxic*. Toxic is defined as being “immediate or long-term harmful effect on the environment or its biological diversity.”

Some progress has been made in late 2023 with the EU agreeing to ban the export of plastic waste to poor countries and non-OECD countries. “The EU will finally assume responsibility for its plastic waste by banning its export to non-OECD countries,” said Pernille Weiss, a Danish member of the European parliament with the centre-right EPP group, who was in charge of the proposal. “Once again, we follow our vision that waste is a resource when it is properly managed, but should not in any case be causing harm to the environment or human health.”

Studies in China and Japan have found airborne plastics in cloud formations. The spread of the nano particulates occurs through rain and snow fall. The troposphere can transport the plastics thousands of kms from their origin. <https://link.springer.com/article/10.1007/s10311-023-01626-x#Sec1>



TPX Image March 15, 2024. Tonnes of plastics and trash on fishing village beach in Indonesia.

Energy sources in circular economy

Electric and autonomous vehicles will complement the electrification of the mass transit systems in rural communities. One critical part of the electrification is the source of energy to charge batteries. If energy comes from a fossil fuel base (coal, oil) instead of a hydro (water), the emission reductions could be very low. Producing new batteries requires that mining operations be accelerated which contributes to increased emissions; accessing minerals invites environmental damages; displacing villages to access minerals has social costs. While the WEIRD world may reduce tailpipe emissions from ICE vehicles, there is an offset with increased *externality* costs. Externality costs are those which are borne by the communities and can't be directly charged to a producer or manufacturer in their industrial activities. Indirect externality costs can include decreased living standards, pollution, quality of health, or cultural

impacts.

The construction and excavating industry have plug-in cranes. These pieces of equipment have the same lifting capacity as their diesel-powered cousins. But, no emissions, quiet operating, 4-hour battery power when unplugged, keep on operating when plugged in, and with electric motors, fewer parts for maintenance. The circular economy is pushing all designs to be more responsible and affordable.

One significant downside to the current design of batteries in EVs is that in an accident, even slight damage to the battery pack can lead to the vehicle being written off by insurance companies. This is a significant cost to insurance companies which must be borne by the consumers. A March 2023 Reuter's article, by Sean Tucker, noted that while Ford and GM have taken steps to make battery packs easier to repair, Tesla with its Model Y is almost *unrepairable*. The entire car is often written off. As we get more and more EVs on the road and more accidents involving EVs, this is going to push insurance rates up and require some serious redesigns to solve the problem. An EV battery pack could cost 40-50% of the vehicle's sticker price. As more EVs enter the market, there will continue to be increased numbers of accidents. Insurance rates will increase in general and specifically cost EV owners more money, as compared to typical ICE vehicles rates. Repair costs are often thousands of dollars more for EVs.

There needs to be a balance between the economic interests of a few players and the larger interests of a healthy society. Transportation modes all contribute to the GHG emissions through some form of energy consumption either in manufacturing or operations. The consequential pollution impacts our air, water, and land resources as well as our health and well-being. Looking for ways to reduce the anthropogenic impact is in our collective interests.

The Global Logistics Emissions Council (GLEC) produced a 2019 Framework which indicates that emissions are tracking to greatly exceed current levels unless actions are taken to correct the trend. Their comparison from 2015 to 2050 is as follows:

Logistical Emissions Source	2015 %	2050 %
Inland waterways	2	2
Rail	3	2
Air	6	6
Sea	27	34
Road	62	55

In the bellwether state of California, there is pushback on the social side of autonomous vehicles. In February 2023, the VP of the International Brotherhood of Teamsters, which represents 500,000 commercial truck drivers, wants a national transportation policy which addresses potential job losses. California has legislation governing self-driving cars and delivery vehicles under 4536 Kgs. Now they are looking at rules which allow autonomous semitrucks up to 36,287 Kgs to operate on the roads.

According to Sylvain Rouche in a 2021 Supply Professional article, 80 per cent of global merchandise trade, by volume, moves via maritime transit and account for 3% of CO₂ emissions. Sea levels rising threaten 14% of the world's largest ports. Moving away from oil-based energy will require increased investment in technology and fuel option strategies.

Environmental, social, and governance policies are being deployed by progressive and purposeful organizations. ESG while not a panacea is seen as an effective means of transitioning from a fossil fuel-based economy to one based on more renewable based energy supplies and significantly reduced resource consumption. ESG and the circular economy are not opposing strategies – they are complementary strategies. This enables sustainable economic growth by decoupling production from the environmental impacts and social stress caused on a global basis as we acknowledge that resources

are finite and we only have one planet. Net zero strategies are an example of economic decoupling.

In July 2023, the European Parliament passed a hotly contested law to restore degraded natural ecosystems, salvaging environmental measures. The intention is to mandate 5% of land and sea restoration targets for 2030 to address biodiversity loss and to reduce the use of chemical pesticides by 50%. Restored ecosystems are able to absorb more GHG emissions.

The financial risk for investors of new technology must also be considered. While the circular economy is delivering scalable solutions to minimize environmental impacts in many products, not all investments in technical options are successful. Governments will need to incentivize industry and investors through more innovative funding and loan mechanisms. <https://ellenmacarthurfoundation.org/>

Resilience in supply chains

Business risks are something to avoid. In supply chains, risk is never completely removed. The number of touch points or links in a supply chain add to the potential risks, should one of these connections fail. As supply chains tighten, there is an increased level of interdependency on each link. As referenced earlier, car manufacturers are curtailing or delaying production because of the chip shortages on a global basis. Geo/political events add to the level of uncertainty which increases the challenges and risks but also invites opportunities. Resilience has been a void in the supply chain.

The prophetic Stanford University professor Hau Lee proclaimed in 2004 that cost effective and lean supply chains will not provide sufficient competitive advantages, which seems counterintuitive. Lee opined those successful operations require agility, adaptability and alignment-the essence of resilience. His Triple A theory was put to the test and found many takers at the time.

His message on resilience was lost as more companies sought more business from fewer suppliers to get the lowest cost. Single sourcing from the lowest cost producer became the mantra. Asian suppliers benefited from the outsourcing of products which increased the level of logistical challenges. A series of events caused a pause in the pursuit of the lowest cost. The 2020+ pandemic exposed the weakness of single sourcing as it was not resilient.

Inventory management has been the buffer for shortages, but historical patterns are not applicable or reliable for a post-pandemic recovery. Critical shortages literally halted production, such as in the micro-chip impact in the automotive manufacturing sector and computers. Long-term, there may be a requirement to balance offshore supply with domestic availability-which will make logistics more complex.

The trend of single sourcing from the lowest cost producer led to many shortages of supplies and materials during the 2020-22+ pandemic epoch. As we try to recover, we have to consider options which lead to a more *resilient* supply chain. While pandemics of that scale are rare, we have faced other issues from SARS to financial market turmoil to labour shortages in many sectors. It is probable we will face other market conditions which are beyond the control of an individual company or government to control. Leading organizations prepare and profit through the execution of effective planning across their operations to service their customers. The nascent circular economy strategy is becoming the conduit for success.

The demand side (buyers) can look to some of the large retail manufacturers (suppliers) and how they pivoted with omnichannels to distribute products and develop multiple sources. The hit to the economy due to a lack of a resilient supply chain strategy will have a ripple effect for a few years. Undoubtedly, resilience will be supported through onshoring and supported through the many technologies being

used. Resilience requires a combination of high-level technical investments for real time access to supply chains and pipelines as well as flexible manufacturing. The long-term availability of the supply of goods and services will have serious implications for IT security risks and geopolitical agreements affecting trade. Distribution channels, from a resilience and risk perspective, must be assessed for efficiencies and economic advantages. Those business partners which work out the new channels with the complexity of more robust technical solutions will gain market share, at the expense of their competitors. Resilience may beat lowest cost. An empty shelf of low-cost goods isn't as beneficial as a shelf full of actual products.

Resilient supply chains are using end-to-end visibility to be proactive in supply chain risk management. This requires the buyers, suppliers (and their suppliers), logistics, customers and consumers to be connected in real time. By being able to foresee where the cause of disruptions will probably occur, alternative solutions can be developed. Resilience correlates to diversity of supply. If you have all your eggs in one basket, the interdependency of the partners moves from a strength to a weakness.

For decades the supply chain strategy to meet demand was based on outsourcing of parts to suppliers with the expertise and capacity to meet production requirements for multiple manufacturers. This worked well until the pandemic exposed the lack of ability for many parts suppliers to meet the demand concurrent with the shift to EVs. In 2023 we are seeing resilience in supply chains by going back to vertical integration, where an EV manufacturer invests and maintains control from raw materials through to the finished goods for their specific needs.

This is a *180* from outsourcing. Canadian EV manufacturers Lion Electric and Taiga are targeting their production of battery packs to ensure supply and allow for relative ease to adapt to design changes. This is the opposite of what the traditional ICE manufacturers require. The complexity of the ever-evolving technologies in EV vehicles may lend itself to support vertical integration. It remains to be seen until there are more platforms for suppliers to competitively support electronic parts through mass customization realized through outsourcing.

Inventory buffers assist with resilience but have limitations. Only if there is enough stock on hand are they effective. We saw how inventories simply delayed the inevitable during the pandemic. One IT option to avoid outages is the development of *digital twins*. Digital twins are a virtual clone of a real supply chain system. It allows a firm to introduce problems and see how the firm could respond if it actually occurred. Twins allow for “what-ifs” before the real “ifs” happen. Engineers for example, design new products in 3 D images and can use alternate materials and see the results before going into production and have them fail. Twins allow supply chains a similar visibility, albeit, virtual to draw plans before actual problems are incurred when it may be too late.

From a non-technical perspective, breaking down managerial silos and having integrated teams from design, finance, operations, suppliers, and strategic sourcing greatly helps to build resilient supply chains. Increased accuracy of forecasting by teams reduces the costs of uncertainty. The VUCA era thrives on disconnected teams.

The 2020 Gartner report, *6 Strategies for a More Resilient Supply Chain*, has big implications for logistics companies. The strategies include:

1. Inventory as a buffer
2. Manufacturing diversification
3. Multi-Sourcing
4. Near shoring
5. Platform, product or plant harmonization

6. Ecosystem partnerships

Each of these strategies is going to make the supply chain more complex. Those carriers that have connectivity with their shippers in real time and can deliver on time, are going to be the winners. Efficiency is going to rely more and more on digital networks. 3PLs which invest in technical solutions will undoubtedly attract the attention of shippers with sharp pencils.

Outsourcing to 3PLs is a viable option for many companies which try to stay vertically integrated but cannot maintain the investment in all of their existing business operations. Finding the right 3PL partner allows companies to focus on their core business services.

The other side of resilient supply chains is unfolding in 2023 – the rapid decrease of online consumer spending and a slowing economy. Another chapter in adapting to market trends as quickly as possible and retaining customers. The 1st quarter of 2023 saw a significant retreat from online to in-store shopping. As COVID abated in the 2nd quarter of 2022, the social interaction of shopping is on the rise and a noticeable impact of inflation is slowing discretionary spending. Consequently, large distributors such as FedEx, UPS, and Amazon along with large retailers like Walmart are trying to adapt to the rather sudden decline in online shopping. Resilience was tested from too little on the shelves and is now facing too much on the shelves. This is not an unprecedented event as demand and supply seldom have perfect synchronicity and require vigilance to balance these factors.

Evidence of a move towards near shoring is seen with Mexico again becoming an advantage for importing direct to the US. Redwood Logistics is investing heavily in the shipping of automotive, appliances, aerospace, pharmaceuticals, HVAC, FMCG, food and beverage products into the US. According to the National Chamber of Cargo Transportation (CANACAR), the Mexican transportation industry body, they report substantial growth over the past year to address supply chain resiliency. One of the largest 3PLs, BlueGrace Logistics, is establishing a Mexican office in 2023, to respond to this renewed interest in near shoring of supplies to reduce lead times and support supplier diversity. Ocean freight costs and lengthy delays out of Asia, favour a Mexican shipping points. BlueGrace has its proprietary software, BlueShip®, to connect 10,000 customers with 250,000 carriers in the US. The US government is shifting its international trade policies and tariffs to wean itself off over reliance on China.

In early 2024, the US utility company Duke Energy was pressured by Congress to remove its Chinese manufactured CATL energy-storage batteries at a US Marine base, due to potential security issues. The CATL storage system was installed in April 2023. CATL products will be phased out at civilian projects managed by Duke as well. Duke will have supply chain challenges to replace the BEES with US-made products. Duke stated "By 2027, we are voluntarily moving away from specifying CATL battery energy storage technologies," the statement said, adding that the company supported a "robust American supply chain." <https://www.reuters.com/business/energy/duke-energy-remove-chinese-battery-giant-catl-marine-corps-base-2024-02-09/>

In November 2023, QIMA reported that Mexico had surpassed China as the largest trading partner to the US. *Mexico offers many benefits to US-based buyers, such as geographic proximity, zero tariffs, low labour costs, and a relatively mature manufacturing base. Buying from Mexico also allows American brands to reduce risks by shortening their supply chains.*

US clothing brand, DXL, as a further example, is sourcing from Mexico and Nicaragua. This was a strategic move away from China, Viet Nam, Bangladesh, Cambodia, and India to reduce supply chain risks. DXL's CEO, Kanter, cites the shipping advantages of 7 days from Mexico vs 45 days from Asia. This reduces inventory carrying costs and allows for flexible ordering cycles from design to production. To sustain this growth Mexico will need to invest in its infrastructure, security, and energy capacity.

Taiwan-based EV transmission supplier, Hota, is building a plant in New Mexico in part, due to the US

government financial and employment incentives. Hota produces 20 million transmission gears annually. The Hota plant will be located near one of the largest US-Mexico ports of entry at Santa Teresa, New Mexico. This enables Hota to service US and Mexican customers including Tesla.

Consolidation of suppliers to attain more competitive pricing can be undone by one supplier's inability to deliver on time. Having a contingency plan for business disruption will encourage near shoring of suppliers with technology being a key enabler. The United Nations uses the acronym, *ALAN*. As local as possible, as international as necessary.

Ryder System ships automotive and industrial products between the US and Mexico. As reported by David Taube in *Transport Dive*, in May 2023, Ryder's revenues have increased by ~40% while its customer base was reduced by ~20% between 2020 and 2022. Ryder CEO, Robert Sanchez, attributed their increase in revenues to an increase in near shoring activity.

The 2021 US\$31B consolidation of the Canadian Pacific and Kansas City (CPKC) railways was formed to provide competitive alternatives to truck freight between the US, Canada, and Mexico, as they saw near shoring a growth segment under CUSMA. Intermodal traffic increases as the efficiencies contribute to revenues for rail carriers.

2023 has been impacted by the reduction in online sales and having a resilient supply chain. As an example, Walgreens is closing a large distribution centre, which supported e-commerce business, in response to the slowed customer buying trend. This operation employed ~400 workers. Resiliency needs to adapt quickly to growth and shrinkage in demands.

Impediments to the ESG agenda

Throughout the discussions on ESG, we try to show that the value proposition for business is much greater where ESG is embedded in policies and practices. One question which comes to mind, if ESG is so great, why isn't everybody doing it? A fair comment and one to respond to in more depth. We talk about resistance from investors as they see ESG detracting from profitability, even in the short-term, while other market leaders are acting responsibly.

For supply chain management on the demand side, which converts the requirements into commercial terms and conditions, there must be clear and concise language. The inevitable question arises as to how to justify any incremental price differences in sourcing. For a public sector entity, how can any price increase be defended when spending public funds?

We need to look at the total cost of ownership (TCO) and not just the out-of-pocket costs. The latter is much easier to calculate; short-term cost projections are simpler than longer-term estimates. There are so many unknown variables, beyond the control of all parties, which cannot be predicted involving extended time frames.

Most decisions are not black and white on ESG issues. They are herring bone or gray at best. There can be a subjective interpretation of the issues. Organizations must convey the expected level of quality and performance as related to the TCO, inclusive of ESG values. Excuses contribute to the lack of action to deal with environmental, social and governance issues. Below are (11) reasons which contribute to the impediment of ESG in supply chains and organizational commitments.

1. Supply chain dysfunction

An assessable limitation to implementing ESG are organizational problems related to the effectiveness of a supply chain team to function strategically. Where there is disbursed authority amongst department heads or managers across the organization, they are more focused on their operational responsibilities than a broader commitment to ESG. ESG is a distraction away from their core services and need for performance-based outcomes and profits. Without having ESG in some form in their job description, it becomes a nice thing to do.

Where there is a designated supply chain team, that is not seen as a resource to the larger organization, the tendency is to try and offload ESG responsibility on the procurement group. This signals that the organization has an ESG plan within their supply chain but it is a token commitment – green washing. If the supply chain team is struggling with developing meaningful KPIs on basic functions, expecting ESG to be effectively managed would be a false hope. If the supply chain team lacks a policy which is comprehensive in scope and supported by the senior management team, ESG will be an “off-the-side-of-the-desk” workload issue.

When we see organizations deal with ESG head on and make it a part of their core values, we see supply chains that can provide the leadership and garner commitment from their supplier base and other stakeholders.

2. ESG costs too much

ESG compliance will be a cost of doing business. Responsible practices lead to reduced waste, less pollution, improved health, economic development, respect for diverse social interests, cultures, and supports increased profits, where the benefits outweigh the costs. There are costs of reporting out on standards or factory audits to prevent child labour. But your customers will want to know how your business operates through transparent reporting. We know that many countries have a different set of values for human rights and environmental standards but if they are in your supply chain, it's your problem now.

Arguably EVs are not affordable. Governments are subsidizing their manufacturing costs and providing incentives to potential buyers. The cost of *not* addressing environmental and social issues is not responsible nor affordable in the long-term.

A few years ago, we couldn't afford to take the lead out of gasoline. We couldn't afford not to, from an environmental perspective. At one time, we couldn't afford a public healthcare system. Now healthcare is seen as a mandatory component of all progressive government programs. It's complex.

3. Balance between the importance of financial costs vs ESG values

For many organizations, there is a great debate as to the weighting of the financial factors vs non-financial factors when entering into contracts with a supplier. What percentage of the decision should be weighted on the cost of the goods or services vs the ESG values which could be realized? Companies which favour the importance of the financial impact, use a model which leans towards the lowest cost, regardless of ESG factors. Many government policies state a maximum of 10-20% for social or environmental criteria. These arbitrary percentages, then are applied to all contracts involving some form of a competitive bid. The lower percentages imply that 80-90% will be based on the cost.

Some would argue that the financial importance should be at least 50% of the final decision, while others argue that 50% would minimize any ESG advantages in a deal. There is a great deal of debate on

how to weigh the financial costs vs ESG values. What if we didn't set a target or preferred maximum for financial factors? Could we still afford to do business? What types of controls would we need to prevent financial chaos?

One option is to use a *value-per-point* model. No debate is required to determine the weighting of financial vs non-financial criteria. The total value of points allocated for the non-financial criteria are divided into the total cost and the resulting value-per-point outcomes indicates the *best value*.

The following example will illustrate the difference between a conventional model weighting financials over non-financial criteria and the value-per-point model.

Your organization issues a competitive bid for landscaping services for its multiple locations. There are (4) potential bidders, A, B, C, and D. As part of the scope of work for the services to be delivered, your organization ensures that the *environment* is not being harmed in the landscaping operations (no gas-powered leaf blowers); the *design* should use endemic materials (local plants and materials); the *performance* of the bidders has been assessed through experience and reference checks; *social impact* to your organization means considering the hiring of Indigenous people and/or those facing systemic barriers to employment by the bidders; maintenance is important to address seasonal patterns (no pesticides, herbicides or fossil-based fertilizers); and the capacity of the bidders ensures their availability and ability to respond to service requests. The total points for the decision are a maximum of 50 points, with the each of the criterion being allocated predetermined weightings.

In Figure 1 we can see that the non-financial score favours bidder D with bidder C being a close 2nd.

Figure 1 Non-financial scoring

Criteria	A	B	C	D	Maximum points
Environmental experience	7.8	7	7.9	8.1	10
Design	5	5	5	5	5
Performance	7	7	8.4	8.5	10
Social impact	8	8	8	8.3	10
Maintenance	5	5	5	5	5
Capacity	6	7.4	8.5	8.5	10
Total value points	38.8	39.4	42.8	43.4	50

Figure 2 The objective value of the bids received

When your organization looks at the bids which were submitted, they were as follows:

Bidder price	A	B	C	D
\$	560,000	558,000	555,000	562,000

To quantify which bidder should receive the contract, simply divide each bidder's price by the total # of points per criterion. Therefore, **Bidder D** provides to be the best value (562,000/43.4) at \$12,949 per point. While Bidder C provides the 2nd best value at (555,000/42.8) at \$12,967 per point. Even though

Bidder C has the lowest bid, the best value for your organization is with Bidder D. Bidder D, with the *highest* bid, represents the higher ESG values which aligns with your corporate objectives, brand, and commitments to the community. As an organization, the value-per-point model allows you to assess the financial impact and have it balanced with other corporate commitments.

In this example, if Bidder D, had submitted a bid at \$563,000 that would represent a lesser value-per-point than Bidder C (563,000/43.4) at \$12,972 per point. This means that while you have set ESG as being important, when comparing the value-per-point between C and D, the best value shifts to C. The message here is that bidders, like D, must also be competitive in the market and can't expect customers to over pay on the value for money.

Figure 3 below, represents a conventional, financial weighted model. With pricing at 50% or greater, the lowest bid would have to be accepted with Bidder C. Your organization would have to be satisfied with lower expectations on ESG values. This sends a mixed message to the market. Pricing is more important than the ESG values.

Figure 3 Conventional, financial weighted model using 50%

Criteria	A	B	C	D	Total
Environmental experience	7.8	7	7.9	8.1	10
Design	5	5	5	5	5
Performance	7	7	8.4	8.5	10
Social impact	8	8	8	8.3	10
Maintenance	5	5	5	5	5
Capacity	6	7.4	8.5	8.5	10
Total value points	38.8	39.4	42.8	43.4	50
Pricing	560,000	558,000	555,000	562,000	
Score out of 50%	49.55	49.73	50	49.38	50
Total score	88.35	89.13	92.8	92.78	100

While the example above is very close in outcomes between C and D, it demonstrates how being *price-focused* can come at the expense of being *value-focused*. Setting arbitrary benchmarks such as a percentage for pricing, detracts from ESG values and always favours the low bidder.

The value-per-point model provides an objective means to assess ESG values and be well aware of the financial implications.

4. Complexity

Depending on the nature of the goods or services which an organization is involved in, the complexity of the issues around ESG can be overwhelming. Small service providers may only need to change one or two products within a short time span while others such as a larger manufacturing company will require

significant investments over a longer period of time to be able to align with more ESG values. Getting tier 1 and 2 suppliers to comply takes additional time. However, the learning curve is getting better as more companies and organizations are able to learn from the early adopters and share their success.

Eliminating the use of single-use plastic bags and using another type of plant-based container, is still going to impact the environment in some way. Knowing that PVC is causing massive environmental problems should be the impetus to move away from harmful plastics. But it doesn't. As long as a product is deemed by a government agency to be sold legally, consumers and customers will buy it. Changing behaviours is a social issue and often leads to charges for non-plastic or reusable packaging. Eliminating plastic is a technical, economic and environmental issue. Resolving problems related to the use of plastics defaults to a governmental responsibility and not to the producers of the plastics.

Allowing reusable tote bags and containers made from recycled plastics is not really making an improvement. Using lower emission E-Methanol is better than bunker diesel fuels, but it's still a problem. Glass can be recycled but many glass jars end up in the landfills after use. Plant-based packaging is sold on the market but there can be a slight premium to use it, therefore, we continue to allow Styrofoam packaging, which will never decompose but it's *cheaper*.

Carbon taxes, carbon offsets, and other means to mitigate GHGs are complex from a financial and policy perspective.

5. Lack of internal expertise

These are still early days in the implementation of ESG in most businesses and governmental operations. Workload is compounded by staffing shortages. Trying to juxtapose ESG values and practices into the decision-making, off the side-of-the-desk, exceeds the ability of staff to effectively take on this objective. Therefore, external expertise is required.

External expertise, for larger organizations will require cross-functional expertise to address the various operations which an organization maintains. Fleet management and inventory and distribution are common functions yet have a different ESG focus. Trade agreements, contract management and supplier development are concurrent areas of focus for implementing ESG. Larger organizations will need a team of experts to cover issues from technical performance, measuring and monitoring GHGs, to reporting standards.

The messaging from the C-Suite and to external and internal stakeholders is a critical part of the ESG journey. Finance must be able to develop the appropriate reporting metrics for credibility. Policies can be written and other initiatives can be conducted concurrent with adaptations to market opportunities. External expertise is used to develop strategies and enable their implementation.

Training requirements are essential to adapt to the new value proposition. Change management practices are as important as the priorities the organization chooses to address. Changing behaviours, shaped by decades of using price or quality as a limited determinant for a decision, requires some patience and reiteration of the purpose of business and its responsibilities. We know that greenwashing and bluewashing have been exhibited by the poor actors in various market segments – that only reiterates the skepticism by customers on a company's values.

External expertise becomes part of the equation of how to implement ESG. The supply chain management role is a great starting point but must be coordinated across the organization. While

bringing in external consultants will be viewed as an additional expense, the investment is to complement the managerial talent and for the management to be able to assimilate ESG into their overall performance planning. Competition will dictate the speed and ability to respond to the emerging issues.

6. Lack of awareness

It's important for senior management and Boards to be cognizant of the ESG shift in the expectations of all stakeholders. There is no excuse for saying ESG doesn't apply to us or it's only for the big companies. Someone will eat your lunch. There is a need for an ongoing scan of the markets and government legislation as to how these changes could directly or indirectly impact a business.

There are few goods, services, policies, or practices which have not been produced, provided, written or adapted by other organizations. There are few secrets to success with ESG. The mindset of being responsible and acting sustainably, is probably the biggest impediment or enabler. If we are limited by our conventional thinking, where fear of failure rules rather than exploring the opportunities, we continue to stay in our comfort zone. Emerging issues and interests are constant.

ESG is a Mindset with a Culture of Value

Conventional thinking	ESG thinking
Short-term costs	Long-term investments
Follow	Lead
Self interests	Community interests
Make good deals	Make deals that do good
Comfort and complacency	Courage and culture
Ethic of justice	Ethic of care
Consumption of resources	Conservation of resources

7. Competing interests

While adapting an ESG culture, many organizations will develop new products, services, and technologies. Companies are trying to enter new markets. These efforts will continue and profitability must be maintained for the financial sustainability of the company. Balancing the priorities becomes a more significant challenge; and again, is affected by how competitors are addressing their ESG priorities.

With respect to public sector entities, there can be elected officials wanting changes during their term. They will focus on targeted social or environmental or economic development concerns. Existing policies or bylaws may need to be adapted, which requires a shift in priorities.

Suppliers of status quo products which are being replaced by more responsible or less harmful products, can be reluctant to adapt. In some cases, this means cannibalizing their existing products and convincing

customers to switch. It means giving up their market position and competing against newer products on the market.

Time availability confines most staff to deal with the immediate needs and not the desired objectives, such as a policy. This requires external resources which also provide a fresh approach to ideas held by existing leadership and management.

8. Follow the leader

Many smaller organizations delay the foray into ESG and try to see how the larger organizations adapt first. It seems less risky. Or they wait for government legislation, which affects them and all their competitors and therefore must be undertaken. There are certainly pros and cons for waiting or delaying ESG strategies; yet again, your competitors may force the need to change. Senior management should be developing contingency plans for the inevitable ESG commitments.

9. Policy is an end, not a means

This occurs too often and results in platitudes and not the intended impact. Drafting an ESG policy without adequately changing practices, is another form of bluewashing. Continuing to source materials from countries or suppliers that do not respect the ILO standards, yet your policy implies that this is important, fails the ESG compliance test and damages the image of the company.

10. Reporting metrics are confusing

They can be. But they can be navigated. Select the ones which are most appropriate to the reporting company and align your organization accordingly. Drawing from the UN SDGs and circular economy principles is a good start towards reporting out. We learn as we go but we need to be seen to be going in the right direction.

11. Ensuring compliance with supplier codes of conduct

It sounds difficult to evaluate the commitments of a supplier factory across the globe but it's relatively easy. Companies such as QIMA specialize in providing credible audits on all types of inspections. Having supplier codes of conduct in place without being able to ensure compliance could be seen as bluewashing.

ESG in supply chains

The focus for supply chain management is in the (3) areas of ESG. Each is equally important, although the priorities of each are subject to competitive responses in the market and changing expectations of stakeholders. Corporate governance, generating profits, needs to be balanced with each of the ESG objectives for a sustainable business model.

Supply chain leadership must find the means to ensure competitiveness in product and service delivery with resilient sourcing partnerships. Juxtaposed on the profit and / or cost management objectives, are the ESG expectations which defines values. The values align with the corporate statements and commitments and need to be reflected in the business practices across the supply chain. Supply chain performance in the (3) ESG areas cannot be seen as exceeding corporate expectations, commitments or objectives.

Corporate leadership is ultimately responsible to its stakeholders and shareholders for the overall

conduct of the organization.

ESG Framework

Environmental	Social	Governance
Reduce waste	Fair/living wages	Policy
Decarbonization	Diversity, equity, inclusivity	Ethics and conduct
Emissions strategy	Employee well-being	Compliance
Responsible practices	Community benefits	Reporting
Climate change strategy	Respect labour laws	Leadership
Renewable energy	Fair trade product support	Stakeholder values

ESG requires that sourcing decisions be passed through a filter for their values, prior to determinations being taken. This exercise invites input from various stakeholders to ensure commitments align with organizational strategies. Governance practice leads to consistency and continuous improvements to demonstrate responsible actions.

Behind the ESG messaging, is the acknowledgement that the desired outcome is social justice for all. Social justice has not been adopted as a truly global value but is a value expressed and aspired to in the WEIRD economy. Social justice seeks to ensure a distribution of social benefits, not just in law but in spirit and voluntary actions. It's a melding of rights and responsibilities. For supply chain decisions it requires a scrutiny of how the material extraction, labour content, production and process methods support the well-being of all stakeholders. Even where social justice may not be recognized under various ideological/political regimes, this does not allow buyers a license to exploit these jurisdictions in terms of social and environmental values for economic advantages.

Factored into the resilient strategies is the need to ensure ESG policies and practices are effective. ESG practices are driven in the supply sector by the largest player on the demand side, public procurement. If the weighting on environmental and social values continues to be overshadowed by pricing, the supply side will not move the needle. Whether they are a small municipality or the Department of National Defence, if governments don't demand a higher commitment to achieving GHG reductions, waste free water supplies, or resource conservation, the supply side won't invest in more sustainable solutions.

Common references for sustainable practices in supply chains are the basic ILO conventions. These include:

- Freedom of association
- Right to collective bargaining
- Elimination of force and compulsory labour
- Abolition of child labour
- Elimination of discrimination

Many leading organizations use these ILO conventions as a framework for policy development. As an example, the global company, Unilever takes the ILO conventions and emboldens them in their Responsible Sourcing Program Principles. With 60,000 suppliers and 150,000 employees, its governance practices are commendable. Under a decade of leadership from CEO Paulus Polman, Unilever set a standard in advancing ESG which few other organizations have realized. Their sourcing principles are stated as:

1. Business is conducted lawfully and with integrity
2. Work is conducted on the basis of freely agreed and documented terms of employment
3. All workers are treated equally and with respect and dignity
4. Work is conducted on a voluntary basis
5. All workers are of an appropriate age
6. All workers are paid fair wages.
7. Working hours for all workers are reasonable
8. All workers are free to exercise their rights to form and/or join trade unions or to refrain from doing so and bargain collectively
9. Workers' health and safety are protected at work
10. Workers have access to fair procedures and remedies
11. Land rights of communities, including indigenous peoples, will be protected and promoted
12. Business is conducted in a manner which embraces sustainability and reduces environmental impact

Sustainable solutions don't necessarily translate into higher costs. They do contribute to environmental initiatives and social values being realized, which is the long-term desired outcome. We don't sacrifice safety over cost – why would we try to save money at the expense of other sustainable practices?

With respect to environmental issues, we know that many causes of our problems have reasonable solutions which we have agreed to undertake. i.e., the depletion of the ozone layer was attributed to aerosol propellants such as chlorofluorocarbon (CFC). As an industry, the producers of the aerosol products agreed in cooperation with the Canadian government, to phase out the use of CFCs 40+ years ago. During this phase out period, they then turned to the use of hydrofluorocarbon (HFC) as the propellant of choice. HFCs are not as harmful environmentally as CFCs but contribute to the GHG emissions causing global warming and have not resolved the ozone depletion. The industry again agreed to *phase* out HFCs which are common in HVAC systems. 40-50 years to phase out harmful emissions is a proxy for ignoring the problem in the first place.

The (6) main GHGs, as identified under the 1997 Kyoto Protocol, are:

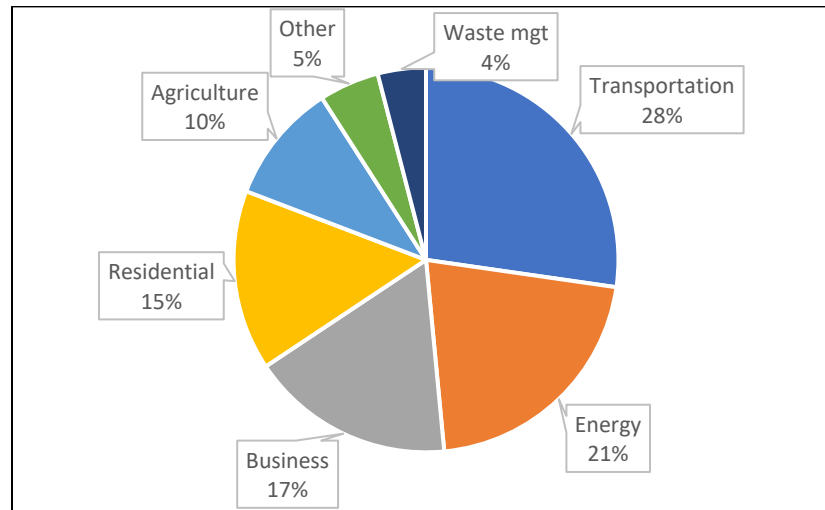
1. Carbon dioxide (CO₂)
2. Methane (CH₄)
3. Hydrofluorocarbons (HFCs)
4. Nitrous oxide (N₂O)

5. Perfluorocarbons (PFCs)
6. Sulphur hexafluoride (SF₆)

Nitrogen Trifluoride (NF₃), which used chemical in photovoltaic panels, LED screens and many other electronics is now considered a major contributor to harmful GHG emissions. NF₃ was not originally recognized in the Kyoto Protocol.

Measuring organizational GHGs can be a complex task requiring external expertise. There are a variety of sources which provide estimates as to the main drivers of GHGs. In Table 1, using the UK's Business, Energy, and Industrial Strategy data, the main emitters by sector are:

Table 1: UK BEIS GHG Source of Emissions by sector



In Table 2, the information from Our World in Data, provides the following summary by sector for GHGs:

Table 2: Our World in Data GHG Sources of Emissions by sector

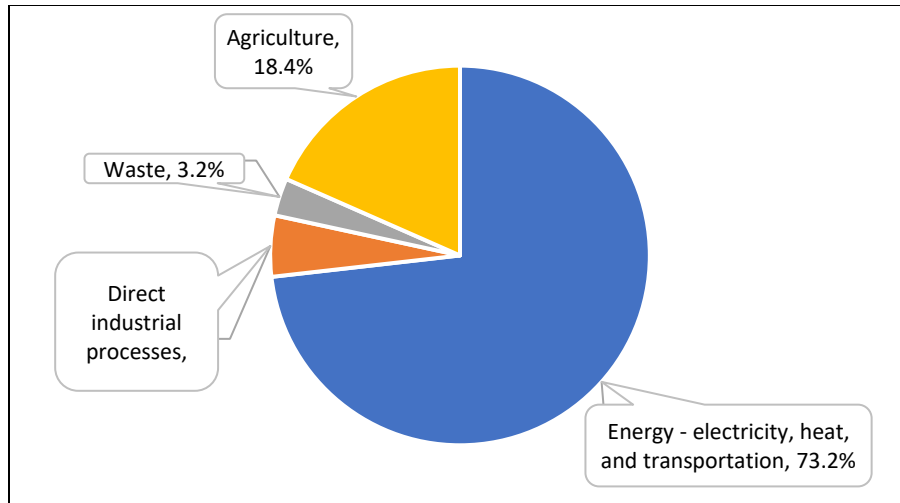


Table 3, 2018 data from US Climate Watch, provides the following summary of the top 10 tCO_{2e} by country:

Table 3: Climate Watch GHGs by country

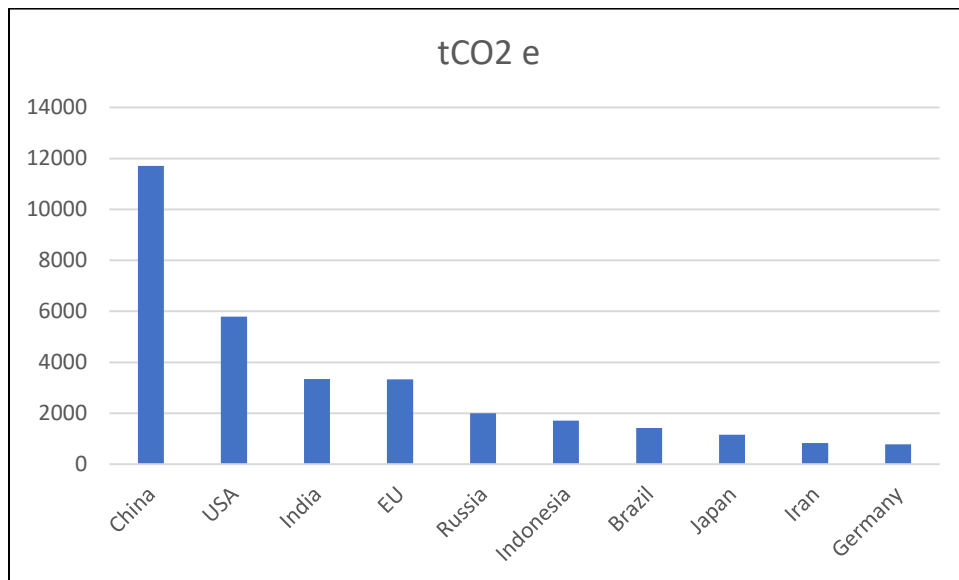


Table 4, 2021 data from US Environmental Protection Agency, provides the following summary of the 6.34 M metric tonnes of emissions generated annually in the USA. A cursory comparison of GHG emission sources between Canada and the USA shows them to be the same, by percentage, although the US volumes are far greater due to its larger industrial and manufacturing base.

Table 4: US Anthropogenic Caused Emissions

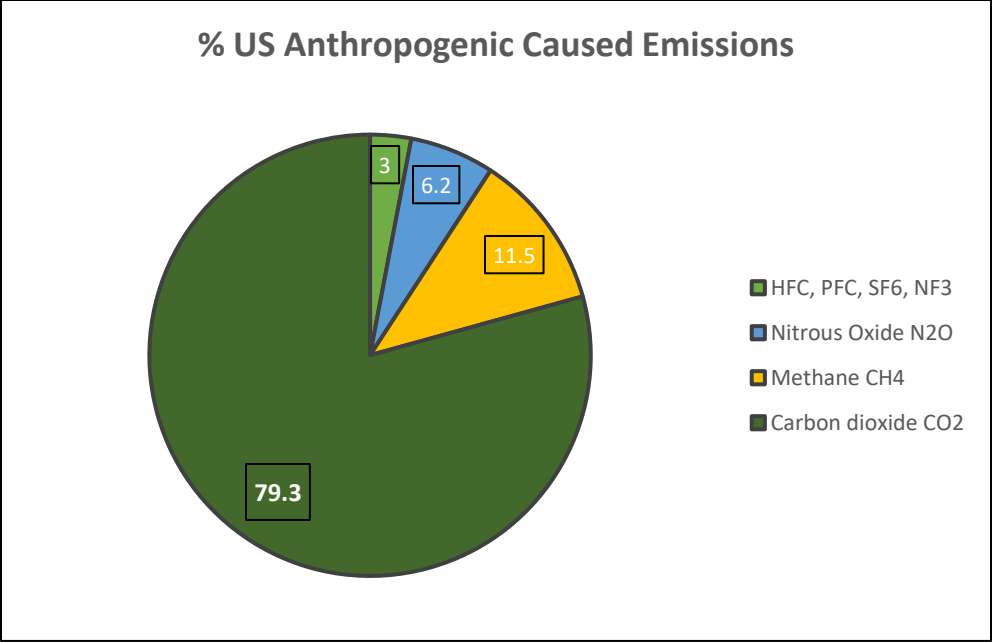


Table 5, 2023 data from Environment and Climate Change Canada, provides the following summary of the 670 Mt CO₂ Eq emissions generated annually in Canada

Table 5: Canadian Anthropogenic Caused Emissions

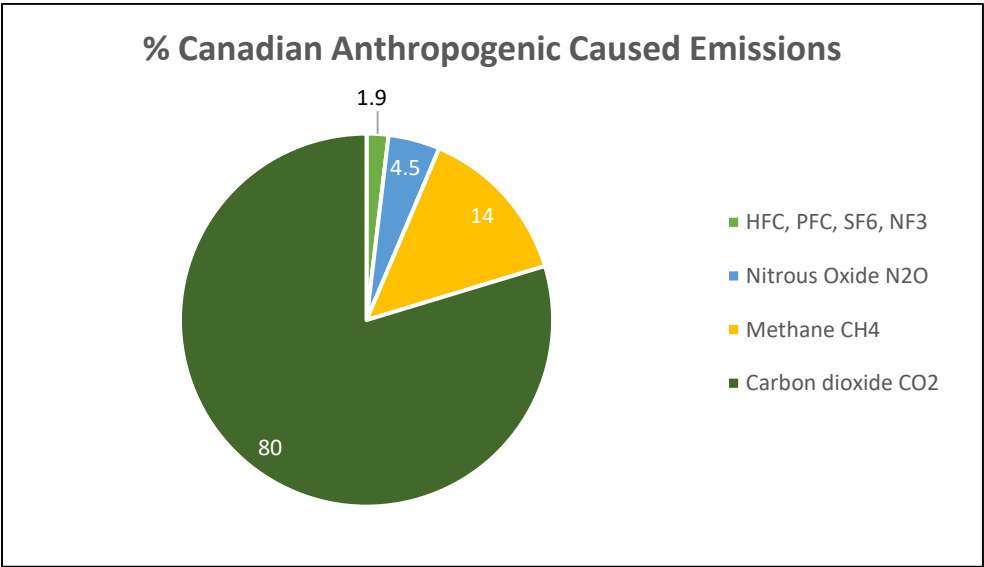
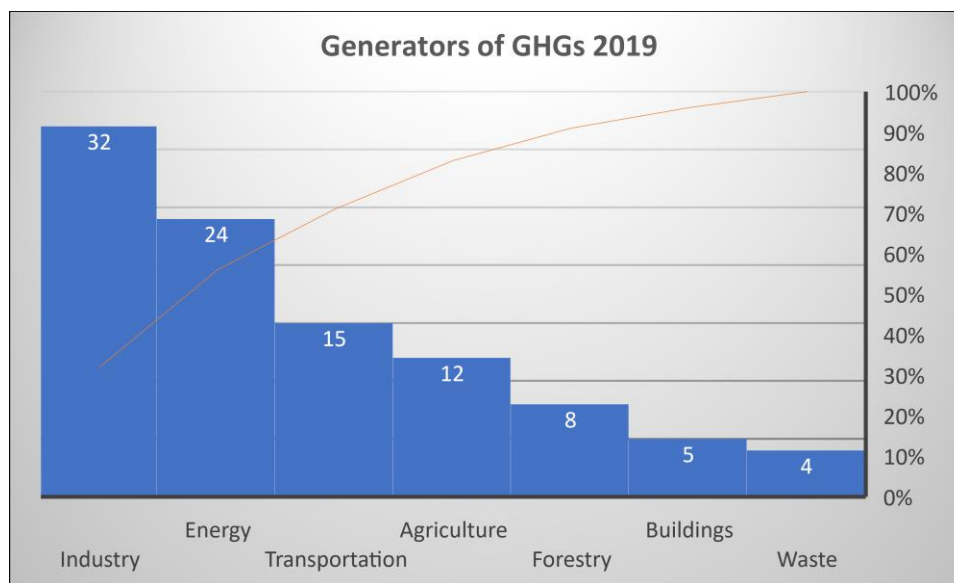


Table 6 indicates the primary sources of GHGs by the major emitters, from the Food and Agriculture

Table 6: 2019 data FAO



Stakeholder interests are growing in the private sector. The challenge is to leverage transference in favour of more sustainable solutions resides in governments ensuring ESG practices are included in the criteria evaluations with an appropriate level of weighting. As the need for increased efficiencies in logistics and distribution ramps up with new technologies, the balance to ensure ESG is concurrently being addressed is a challenge. Social costs are being incurred as technology replaces workers. Where earlier disruptive technologies created openings at new entry level points for workers, we are seeing robotics becoming the new entry level point where machines only need apply.

The status quo in organizations and within procurement teams can be self-limiting. What worked for us last week, is likely what we are going to continue with next week, until it doesn't work. If everyone is buying it and the government approves its use, it must be OK. With reference to the CFCs, HFCs, silica dust, hydrochloric / muriatic acid issues, the status quo is slow to change. The common default is we can't afford to change. At one time we couldn't afford to remove the lead from gasoline; we couldn't afford a health care system; and we couldn't afford to remove trans fats from food products. It turns out, we couldn't afford not to.

A rather innocuous appearing governmental procurement tool is the procurement card (P-card). The P-card was intended to reduce the administrative costs for buying low value goods. Enter Amazon. Based on conversations with procurement professionals in the public sector, they are seeing staff and managers searching the Amazon site for *deals*. Their only measure of value is their budget. If it costs less to buy an item from Amazon, they are doing a good job. Their time isn't included in the search. Shipping may be. Duties may be. It's what gets charged to their P-card that matters.

Which causes us to reflect on local sourcing opportunities and trade agreements. In discussions with procurement colleagues in the Lower Mainland of BC, conservatively there could be \$300M per year in spending through P-card programs within the public sector. We can't have local preference for suppliers under the trade agreements but when we think of the P-card flexibility, there are options. Referring to the Lower Mainland values, if only 10% of the P-card buying was redirected at *local* suppliers, it could

redistribute \$30M to locally owned and operated businesses. It doesn't negate trade agreement obligations. To an SME sector, \$30M is a meaningful amount of money. Public sector organizations may need to look at their P-card guidelines and ensure that *local* sourcing is the first option and foreign-online is not. Multiply the example dollars by the rest of the Canadian market and it becomes a significant dollar value. It does require a conscious change in spending practices. P-cards may bypass local suppliers and small-medium businesses which, ironically in part, pay the taxes which pay the government staff. Using the circular economy vernacular, time to rethink the use of P-cards.

The **S** in ESG invites a discussion on how the circular economy might impact jobs in general and social benefits. The transition will likely boost employment where there are more physical labour activities such as those related to extending product life involving repairing, remanufacturing, and repurposing products for other uses. A 2020 OECD publication, *Labour Market Consequences of a Transition to a Circular Economy: A Review Paper-Environmental Working Paper #165*, indicates that the circular economy could add 2% more workers which will help to offset job losses where increased production efficiency and technology is displacing workers.

The opposite of job creation is job destruction where labour is not required through a variety of actions such as banning products which are discontinued or not seen as being as responsible (aerosols); job substitution occurs where one labour activity is directly replaced by another (landfills to recycling). The transition to the circular economy would involve all types of job activities but the aggregated value appears to be slightly positive for labour roles.

Agricultural waste traditionally has been burned. There was no purpose for the tonnes of waste left behind after crops were harvested. It was a cheap disposal method which compounded the GHG problem. Vancouver-based Social Print Paper's founder and managing partner, Minto Roy, created a better solution to the residue waste from sugar cane – turn it into paper. The product is Sugar Sheets which serve the same function as pulp-based paper. Trees are valuable carbon sinks. The opportunity to repurpose agricultural waste instead of cutting trees, which are more important as a construction material, makes economic and social sense. Social Print Paper creates jobs and reduces the environmental stress. If we have to use paper, we now have alternatives to mitigate deforestation. Social Print is a good example of a company which sees ESG as a scalable opportunity and continues to attract customers for its Sugar Sheets. Repurposing waste into an advantage which mitigates environmental degradation and increases employment. <https://socialprint.com/>

Puma, the German sportswear company, has joined the *Deforestation-Free Call to Action for Leather*. The raising of cattle is one of largest contributors to deforestation. Cattle leather is a valuable by-product of the cattle industry. Puma, as part of their sourcing strategy will ensure, through reporting transparency, that the hides for leather will not be sourced where deforestation practices have been allowed. In turn, this will help to protect wildlife habitat and biodiversity, preserve carbon stocks to mitigate climate change, and protect human rights. An example of consciousness in capitalism. Deforestation occurs from a variety of agricultural-related harvesting operations including: timber, palm oil, cattle, soy, rubber, coffee, and cocoa. <https://textileexchange.org/leather-call-to-action/>

In late 2023, Cargill, one of the largest integrated food system companies, made a commitment to improve the trace sourcing of soy, corn, wheat, and cotton in South America. By 2030, Cargill wants to ensure the products they buy are not involving deforestation practices across South America. The commitment extends to the direct and indirect supply chain production of key row crops in Brazil, Argentina, and Uruguay and to protect endemic vegetation. Cargill will partner with NGOs and other stakeholders to monitor, report, and verify natural ecosystems and land use.

An alternative to cattle leather is on the market made from mushrooms. US-based MycoWorks, is building a mushroom biofibre operation. MycoWork's has been selling their products to Hermès and

General Motors to make handbags and upholstery. Most automotive companies are trying to stop the use of plastic-based faux leathers. The mushroom-based material could be a viable option.

ESG is growing in business practices as externalities increase. Externalities are such issues as GHG emissions, climate change, health and safety practices, inclusivity, equity, or continued use of toxic chemicals. The social license of a business is granted by its employees, stakeholders, regulators, customers, and the community at large. Companies which adapt a sense of purpose mitigate the risks of externalities through their policies and seek to build their social capital.

McKinsey & Company in an October 21, 2022 article, identified 5 steps towards prioritizing sustainable business opportunities.

Step 1. Assess the value prospects which make attractive investments;

Step 2. Identify important technology and infrastructure enablers which could be applied to existing assets and practices to give an advantage;

Step 3. Base priorities on climate impact and technological maturity where there are big wins which are attainable;

Step 4. Align with future policies and regulations set by leading countries with publicly declared commitments;

Step 5. Define a strong business case and plan for a 5–10-year window which factors uncertainty into the models.

VUCA, the acronym coined in 1985, captures the market conditions of today. Volatile, uncertain, complex, and ambiguity. Sustainability through the circular economy will not be a linear process but convoluted with many unintended consequences and unexpected breakthroughs along the way. As we approach 2024, we are facing a polycrises of events from wars to geopolitical instability.

Non-governmental organizations (NGOs) act as “global monitors” for international corporate behaviours. Where larger corporations evade or disregard ILO labour conventions or environmental standards, NGOs are capable of creating a lot of unwanted attention for CEOs. They do so through social media and through annual general meetings and in all sectors. Their intervention has led to dramatic changes in the fast fashion world. But far more is required on the social and environmental fronts.

CEO of BlackRock Inc., Larry Fink, stated “The power of capitalism is driven by mutually beneficial relationships between you and the employees, customers, suppliers, and the communities your company relies on.” BlackRock has well-defined principles on investing based on ESG and climate risk in their 2022 BlackRock Investment Stewardship outlining their global principles. Purposeful leadership, with accountability, will drive the changes in the market to achieve the intended outcomes. Blackrock manages US\$ 4.9 Trillion in assets.

In 2024, Blackrock, in a bold move, is allowing its retail shareholder accounts, which represents US\$200 Billion in managed asset funds to vote on Blackrock’s values. This will be a test of Blackrock’s commitment to stakeholder capitalism vs shareholder capitalism. Over the past year its CEO Fink and other business leaders, have been criticized for their stand on ESG.

https://markets.ft.com/data/announce/detail?dockey=600-202402130700BIZWIRE_USPRX_20240213_BW422764-1&tpcc=NL_Marketing

ESG readiness and its continuum

There is no substitution for homework. Engaging with key stakeholders such as interest groups, NGOs, Indigenous Peoples, community groups, social entrepreneurs, elected officials, government ministries, key suppliers, and other vested parties is part of the research. A literature review could be conducted and a synopsis of the pros and cons developed. Talking with leading organizations which have navigated the route successfully bear listening to.

An overview of a senior management reflection on ESG status has been included with a detailed questionnaire in Addendum I. Whether an organization has adopted ESG or is considering ESG, the questionnaire shares pragmatic ideas and ensuring success with ESG. Competing interests such as cost management, staffing, policies, sales and marketing, governance, and efficiency to impact social and economic development are taken into account.

The outcome of preparatory work is to draft the compelling narrative and business plan to move forward or to promote continuous improvement on the ESG journey. Boards of Directors will need buy-in and legal counsel is advisable.

A first-of-its-kind lawsuit, was launched by a European investor group against 11 of Shell's directors in an alleged climate mismanagement case. In February 2023, ClientEarth, an environmental law charity, filed the suit which could have implications for how companies address emissions. In this instance, it is for not factoring in Scope 3 emissions in its energy transition strategy. Shell has increased its investments in renewable energy and low-carbon technologies. The subsequent court rulings will be watched closely by many companies. Shell posted a \$40B profit in 2022.

Shareholders and stakeholders may have different views on ESG priorities. The common denominator is that all organizations understand that ESG strategies support existing business objectives and does not mean that profits are being sacrificed. Without profits, there is no further purpose for a business. Profits are critical to our economic development while ensuring environmental interests, social well-being, improved community benefits, and effective governance practices are how we sustain the profits.

In February 2023, long time coal producer Teck Resources, in a response to the Investment Industry Regulatory Organization of Canada and the New York Stock Exchange, stated it is considering spinning off its steelmaking coal investments. Teck was considering how it might reposition itself for resources which will be in demand in a lower emissions world. Teck divested its stake in Fort Hills oilsands to Suncor for ~\$1B. In August 2023, Teck confirmed its coal business is in play as an exit strategy. In November 2023, Teck sold its steelmaking coal interests to an international group including Glencore (Swiss), POSCO (S Korea), and Nippon Steel (Japan), subject to approval under the Investment Canada Act.

ArcelorMittal similarly invested \$1.8B in its Hamilton operation to remove coal in its manufacturing processes. ArcelorMittal, one of the largest steel producers has committed to replace coal-based ironmaking and associated steelmaking assets. It is using a technology referred to as direct reduced iron combined with clean hydrogen fueled electric arc furnaces. The DRI/EAF method is aimed at reducing CO₂ emissions by 60%. In June 2023, ArcelorMittal and GM signed an agreement whereby GM will buy steel with at least a 70% recycled content out of Hamilton, Ontario.

The strategies by Teck and ArcelorMittal are significant shifts in their business models to adapt to a lower carbon economy. Investment risks are considerable and must sustain profitability in the long term.

Supply chain policies

The G in ESG is addressed through a procurement policy as the framework. The policy represents the gravitas of the governance practices as to how an organization's strategies will be applied in decision-making. Policies which embrace ESG temper the traditional models which were price-based. ESG policies are value-based. Policies should be written as a comprehensive document as opposed to drafting an ESG component to add on to an existing procurement policy.

Effective policies are more *descriptive* than *prescriptive*. This implies that rather than having a policy refer to a specific outcome or identify with equity seeking groups, the policy is broad enough to ensure various ESG values can be attained. A policy is more effective where there are not targeted, time-limited constraints on annual deliverables, requiring a policy to be continuously amended, as new leadership is in place.

As an example, an organization, in a *prescriptive* policy, states they want to target youth-at-risk, between 19-28 years of age, for increased employment opportunities. In a *descriptive* policy, this objective could be addressed as ensuring people facing barriers to employment will have increased employment opportunities with our organization. The prescriptive model often falls victim to time, as objectives change or other equity seeking groups want their issues to take precedence. Policies should be reviewed at least within a 5-year period after being implemented. Stakeholder values and expectations are fluid and evolving.

An organizational policy should be inclusive of and convey:

- ESG values and objectives
- Community and cultural commitments
- Business ethics and professionalism
- Administrative and executive responsibilities
- Spending authorities
- Exceptions, exclusions or exemptions as per trade agreements
- Supplier performance and codes of conduct
- Definitions for internal and external stakeholders
- Fairness, integrity, accountability, and transparency
- Compliance with all legislative and / or Board requirements

Staff conduct and supplier code of conduct are codified within a policy. An adjunct within an ESG supply chain policy is to state the job title of the person responsible for the policy. This implies within that person's job *description*, ESG responsibilities are a part of their accountability for performance. Without an ESG reference or some acknowledgement of sustainability within a job description, it does not support a mandated commitment. The executive responsibility and reporting are denoted in the policy. The policy must align with corporate values and strategic objectives. Policies are a means of messaging to all stakeholders on an organization's values and expectations. Policies must be ratified by senior executives for effective governance.

Policies can be aspirational and inspirational and should align with organizational mission and value statements. The importance of policies is to set clear expectations around sourcing options. To support a procurement policy there should be a complementary policy guide. A guide provides details on how to interpret the policy with procedural instructions. Procedures are affected by leading practices or technical advancements, whereas, policies are more strategic. Procedures are relatively easy to amend, while policies are not. All the more reason to ensure policies are relevant to all stakeholders.

Staff codes of conduct needs to reflect the organizational values. These values can include customer service; respect for DEI; employee well-being; business ethics; conflicts of interest; gifts and gratuities; protection of assets and intellectual properties; insider trading; financial reporting; and records retention; entrepreneurship; accountability for one's actions; teamwork; safety; waiver process where applicable; and organizational objectives. Non-compliance by staff with a code of conduct should result in defined consequences. Without the latter we invite bending the rules to fit the situation and undermine the organizational reputation and ESG commitments.

Trade Agreements

Trade agreements are a sword and a shield. They enable the international exchange of goods and services, as well as commerce within a country. Trade agreements have reduced tariffs on imported goods for partners which want to increase trade; and higher tariffs and duties for trading partners that are not as welcome.

I would argue that there is no such thing as *free trade*. Free trade is a term bandied about in democracies and in marketing schemes, which implies open and fair market access for all countries. All trade is *managed* trade which is in a constant state of flux between partners, allies, ideologies, and other international and domestic interests. Free trade literally does not exist. The plethora of terms and conditions, hidden fees, fine print, ambiguous phrases, permits, licenses, and bills of lading, requires due diligence on the part of exporters, importers, and customers.

Democracies like the term free, which is almost the ultimate oxymoron. We refer to freeways, free markets, free parking, free shipping, free returns, free subscriptions, free maintenance, free installation, gluten free, sugar free, salt free, nut free, free elections, free speech, free trade zones, tax free, BOGO (buy one, get one free), a free lunch, the free world, free ride, get out of jail free, free rein, scot free, duty free, emission free, free health care, free range, free samples, free service, free trial period, free style, and it's a free country, to name a few. *Free* is an overused marketing catch phrase to free people from their money.

Canada, with a framework of provinces and territories, is involved in hundreds of trade agreements. There are limitations for Canadian citizens on bringing products from one province to another to protect various sellers. BC wine producers are not supposed to sell direct-to-customers in Alberta, as an example.

With respect to ESG and supply chain management, there are mandatory obligations when running competitive bids. However, there are clauses within all agreements which accommodate the desire for *government* entities to negotiate directly with equity deserving groups, such as social enterprises or Indigenous suppliers. This means that competitive bidding processes may be waived.

These clauses include:

New West Partnership Trade Agreement (NWPTA)

Part V (2)

Exceptions

2. Procurements:

(a) from philanthropic institutions, prison labour or persons with disabilities

Part V

EXCEPTIONS

ALL PARTIES

A. GENERAL EXCEPTIONS

1. Measures adopted or maintained related to:

(a) Aboriginal peoples;

Indigenous suppliers will increase to meet an expanding demand for their goods and services. The NWPTA and the adjunct Truth and Reconciliation Commission, supports this strategy. As with other suppliers in various markets, care should also be taken to develop these supplier assets and ensure competition is fair and transparent.

There could be a requirement to ensure that an Aboriginal business is certified as such. The CCAB uses the following criteria in their certification program:

1. *CCAB Membership*
2. *51% or more Aboriginal ownership and control*
3. *Proof of Aboriginal heritage of owner(s), acceptable documents include:*
 - *Indian Status Card, or valid identification provided by the following:*
 - *Métis National Council Governing Membership*
 - *Inuit Beneficiary Card*
 - *Congress of Aboriginal Peoples (CAP) Affiliate Membership*
 - *Northwest Territories Land Claim Settlement Beneficiaries*
 - *Confirmed Alberta Métis Settlement Members*
 - *Northwest Territory Métis Nation Membership*
 - *Membership in a historic Métis community recognized as independent and rights-bearing by a provincial or Canadian federal government.*
4. *Applicants must also provide:*
 - *Proof of ownership and control documents listed (based on the Ownership Structure Type) on our online application form.*

If there are sufficient Indigenous suppliers in a market, issuing a competitive bid could realize the best value; however, a lack of sufficient Indigenous suppliers could mean taking a negotiated process, as allowed by the NWPTA. Building the capacity of Indigenous suppliers should be part of the engagement strategy. http://www.newwestpartnershiptrade.ca/pdf/NewWest_Partnership_Trade_Agreement_2016.pdf

Comprehensive European Trade Agreement (CETA)

Exceptions

Article 19.3.2 (d) relating to goods or services of persons with disabilities, of philanthropic institutions or of prison labour

<https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/index.aspx?lang=eng>

Canadian Free Trade Agreement (CFTA)

CFTA 504s. 11 (v)

Non-Application

This Chapter does not apply to...

(i) procurement of goods and services...

(v) from philanthropic institutions, non-profit organizations, prison labour or natural persons with disabilities

Procurement exceptions specific to NFLD, PEI, NB and NS are referenced within the CFTA. Regional economic development or benefits may be *derogated* for NFLD, PEI, NB and NS as outlined with the CFTA. Derogation applies where the total value is estimated at \$1 million, or less; and is used to support small firms or employment opportunities in non-urban areas; it is noted that derogation cannot exceed

ten times in total per calendar year.

<https://www.canada.ca/en/intergovernmental-affairs/services/internal-trade/canadian-free-trade-agreement.html>

Canada USA Mexico agreement (CUSMA)

Section D – General Provisions

Article 1018: Exceptions

(d) relating to goods or services of handicapped persons, of philanthropic institutions or of prison labour. <https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/cusma-aceum/index.aspx?lang=eng>

Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)

Article III — Security and General Exceptions (GATT)

1. Nothing in this Agreement shall be construed to prevent any Party from taking any action or not disclosing any information that it considers necessary for the protection of its essential security interests relating to the procurement of arms, ammunition or war materials, or to procurement indispensable for national security or for national defence purposes.
2. Subject to the requirement that such measures are not applied in a manner that would constitute a means of arbitrary or unjustifiable discrimination between Parties where the same conditions prevail or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent any Party from imposing or enforcing measures:
 - a. necessary to protect public morals, order or safety;
 - b. necessary to protect human, animal or plant life or health;
 - c. necessary to protect intellectual property; or
 - d. relating to goods or services of persons with disabilities, philanthropic institutions or prison labour.

<https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/cptpp-ptpgp/index.aspx?lang=eng>

Trading between countries involves relationships based on local customs, international laws, commercial terms and conditions, traditions, accessibility, and many other factors aside from the actual goods or services being considered. One supply chain challenge is having a reasonable expectation that if an order is placed goods will be shipped and payments will be made.

An interesting loop hole on imports into the US has been found in the *de minimis* rule. Many Asian exporters are using lower value shipments to exploit the avoidance of duties on small shipments. Canada, as a major partner with the US and linked through various supply chain activities, may be importing goods from the US, which originated in Asia, with lower duties being applied. The intent is that using smaller shipments avoids duties and may be an unfair competitive advantage to domestic companies. As the Chinese company Shein and others account for over 600,000 packages per day into the US, this is likely a loop hole which will be investigated by the US government.

One organization which sheds some light on international trade and the propensity of 100s of countries to respect contract terms and avoid corruption, is Transparency International (TI). TI is a non-profit NGO which advocates to stop corruption. For decades TI has reported as to how countries rank in terms of their concern for corruption and justice. The UN SDG 16 expresses the need that corruption detracts from the value of trade for a country. Justice should be evidenced in effective, accountable and inclusive institutions at all levels of government and business. The rule of law contributes to economic and social development. Corruption only benefits certain individuals involved in committing illegal acts. Codifying a supplier code of conduct serves to protect human rights as a supply chain best practice.

TI's annual ranking of countries public sectors, provides some insights on the level of due diligence which may be required when exporting or importing products. Transparency International's Corruption

Perceptions Index ranks 180 countries in its 2023 Index and allows viewers to click on any country to check their Index ranking. Canada used to rank in the top 10 of the least corruptive countries and in 2023 ranked 12th. <https://www.transparency.org/en/cpi/2023>

Truth and Reconciliation

An adjunct to Canadian trade agreements is the Truth and Reconciliation Commission work on addressing historical injustices and harm to its Indigenous people.

Indigenous Truth and Reconciliation is about respectful relationships. The precursor to this was the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Corporations have a global presence and the UNDRIP impacts their strategies and cultures. Business ethics are a work-in-progress. For supply chains, sourcing of materials and labour and needs to be part of their procurement policy and practices. As Chief Cadmus Delorme, of the Cowessess First Nation in Saskatchewan says, “Indigenous people don’t want pity, they want parity.”

A summary of the UNDRIP declaration adopted by the United Nations member countries, is as follows:

The Declaration is the most comprehensive instrument detailing the rights of indigenous peoples in international law and policy, containing minimum standards for the recognition, protection and promotion of these rights. It establishes a universal framework of minimum standards for the survival, dignity, wellbeing and rights of the world's indigenous peoples.

The Declaration addresses both individual and collective rights; cultural rights and identity; rights to education, health, employment, language, and others. It outlaws discrimination against indigenous peoples and promotes their full and effective participation in all matters that concern them. It also ensures their right to remain distinct and to pursue their own priorities in economic, social and cultural development. The Declaration explicitly encourages harmonious and cooperative relations between States and indigenous peoples.

For business leaders, in Canada, the Truth and Reconciliation Commission has 94 Calls to Action. For supply chain management, there are several key areas which need immediate attention. The ones which directly affect supply chain decisions are Calls to Action #22, #23, #57, and #92. Some of these are directed at the public sector and others directly at the corporate sector. <https://www.rcaanc-cirnac.gc.ca/eng/1524494530110/1557511412801>

Calls to Action #22:

We call upon those who can effect change within the Canadian health-care system to recognize the value of Aboriginal healing practices and use them in the treatment of Aboriginal patients in collaboration with Aboriginal healers and Elders where requested by Aboriginal patients.

Calls to Action #23:

1. *Increase the number of Aboriginal professionals working in the health-care field.*
2. *Ensure the retention of Aboriginal health-care providers in Aboriginal communities.*
3. *Provide cultural competency training for all healthcare professionals.*

Calls to Action #22 and #23 were demonstrated through the strategy of a shared services buying group, Mohawk Medbuy Corporation, entering in to a long-term supply contract with Indigenous supplier, MSS. The Mohawk Medbuy group representing dozens of Canadian hospitals and health care services, negotiated an agreement with MSS to supply health care supplies across Canada.

<https://www.newswire.ca/news-releases/primed-recognizes-their-role-in-reconciliation-amp-partners-with-medical-surgical-amp-safety-supplies-ltd-mss-and-mohawk-medbuy-corporation-mmco-to-support-an-indigenous-value-based-supply-chain-822470569.html>

For public sector leadership, the Calls to Action #57 is important.

Professional Development and Training for Public Servants

We call upon federal, provincial, territorial, and municipal governments to provide education to public servants on the history of Aboriginal peoples, including the history and legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Aboriginal rights, Indigenous law, and Aboriginal–Crown relations. This will require skills based training in intercultural competency, conflict resolution, human rights, and anti-racism.

Calls to Action #92

Business and Reconciliation

We call upon the corporate sector in Canada to adopt the United Nations Declaration on the Rights of Indigenous Peoples as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources. This would include, but not be limited to, the following: i. Commit to meaningful consultation, building respectful relationships, and obtaining the free, prior, and informed consent of Indigenous peoples before proceeding with economic development projects. ii. Ensure that Aboriginal peoples have equitable access to jobs, training, and education opportunities in the corporate sector, and that Aboriginal communities gain long-term sustainable benefits from economic development projects. iii. Provide education for management and staff on the history of Aboriginal peoples, including the history and legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Aboriginal rights, Indigenous law, and Aboriginal–Crown relations. This will require skills based training in intercultural competency, conflict resolution, human rights, and anti-racism.

<https://www.rcaanc-cirnac.gc.ca/eng/1524506030545/1557513309443>

Chief Cadmus Delorme talks about truth as the first step towards reconciliation. There is an Indigenous world view which conflicts with the WEIRD world view. Until Indigenous people are fully recognized as rights holders, it's difficult to address reconciliation terms.

Supplier Codes of Conduct

Supplier codes of conduct are the external messaging by an organization on its values and the partnerships it seeks to form. Supplier codes of conduct support the core values of the contracting organization and should be reflected in its 3rd party relationships. Supplier codes of conduct are voluntary; however, if they are included in a contract, this grants the code legitimacy, meaning they are enforceable or could lead to termination if performance is not compliant with the code. Supplier codes of conduct can include: business ethics; environmental standards; labour laws and practices; employee well-being and safety; discrimination; harassment; violence; and conflicts of interest. The ILO labour conventions provide a good framework to draft supplier codes of conduct.

An example by a leading organization, with a supplier code of conduct, shared in a transparent format, is from Unilever. Unilever operate in global markets with a wide variety of products. Their supplier code of conduct is framed as a Responsible Sourcing Program using a principles-based commitment, as follows:

1. Business is conducted lawfully and with integrity
2. Work is conducted on the basis of freely agreed and documented terms of employment
3. All workers are treated equally and with respect and dignity
4. Work is conducted on a voluntary basis
5. All workers are of an appropriate age
6. All workers are paid fair wages

7. Working hours for all workers are reasonable
8. All workers are free to exercise their rights to form and/or join trade unions or to refrain from doing so and bargain collectively
9. Workers' health and safety are protected at work
10. Workers have access to fair procedures and remedies
11. Land rights of communities, including indigenous peoples, will be protected and promoted
12. Business is conducted in a manner which embraces sustainability and reduces environmental impact

Supplier *performance* evaluations can include an assessment of compliance with a code of conduct but are more focused on the qualitative and quantitative aspects of the materials and service expectations within a contract. The important part of supplier codes of conduct, is that where they form part of a contract, this gives a voluntary code, legitimacy. A supplier must agree to maintain the conditions of the supplier code of conduct with a customer or an infraction or non-compliance could be considered as a breach of contract.

Addendum VI provides a list of *definitions* which can be used when drafting policies and when issuing solicitation documents which support ESG strategies.

Business ethics

Trust is the engine of business. Deontological theory expects us to “do good.” The intent is captured in the phrase the Golden Rule, treat others as you would like others to treat you. We trust each other to act in ways which achieve the greatest amount of good because people benefit from the most good. Trust is the currency of a business professional.

ESG integrates deontological theory and stakeholder theory. Stakeholder theory requires that the interests of investors, employees, communities, and legal requirements be respected when making business decisions. Studies have shown that companies which perform well against their competitors often have a strong sense of commitment to values and ethics. As stated in *Good Company*, typically the best performing companies outperform the overall stock market. Over several years, companies within the same industry which adopted many of the trust-building attributes outperformed their competition. Corporations which put their staff and customers ahead of their shareholders are meeting shareholder expectations.

In his book *Level Three Leadership*, Professor James G. Clawson talks about an individual's VABEs. Our personal values, assumptions, beliefs and expectations which become a part of our view of what we think of as the way the world should be. These are well-defined by the time we enter the work place. Real world experiences can cause us to revise our VABEs in order to be more effective along our career path or when leading others. Personal conduct should be congruent with organizational values for long-term relationships.

The culture of an organization is its persona. Their persona is reflected in its corporate actions and is affected by the beliefs, values, vision, practices, behaviours, and messaging. The leadership is expected to ensure the culture is adaptive to meet the expectations of shareholders and stakeholders. The leadership's audio must sync with its video – what you heard should be seen in actions. What was acceptable in terms of social interactions between people even 10+ years ago was significantly and rightly challenged by the Me-Too movement.

Codes of conduct are a guide at best. They set acceptable parameters within which decisions should be made by individuals. The Supply Chain Canada's professional code reinforces the behaviour and conduct which a supply chain professional should exhibit in practice. The Code serves as guidance for its

members and reflects on the profession as a whole. While it may not prevent acts of indiscretion, it provides an appropriate level of response where the behaviour or conduct of an individual may detract from the integrity of the profession.

In 2015, Volkswagen disclosed that it had used software to intentionally cheat on emissions testing, involving 11M vehicles. VW settled the US civil and criminal actions by paying US\$20B+. Quite a message to the automotive market to address its ethical conduct. Yet, in late 2023, Cummins Inc. agreed to pay US\$1.675B for installing devices to cheat on emissions testing under the US Clean Air Act. Stellantis and Nissan which had used Cummins engines in their vehicles, was recalling thousands of vehicles to update its emission software. Cummins was looking at its internal controls in 2019 referencing this alleged problem. Cummins also supplies PACCAR and Daimler trucks. In August 2022, Stellantis paid US\$300M in a similar emissions scandal.

In April 2023, Daihatsu, the Toyota-owned car manufacturer, admitted to tampering with collision results in vehicles it exported. Daihatsu sells vehicles primarily in Malaysia and Thailand. In December 2023, Daihatsu admitted to altering safety tests on vehicles for 30+-years. Toyota's share price dropped 4% as it struggles to improve its image and vehicle sales. In early 2024, affiliate Toyota Motor Corp., is being charged with cheating on engine emission testing used in several other brands of vehicles. This type of unethical behaviour will likely persist in the "catch-us-if-you-can" regulator and fraudster cases. It would seem that car buyers are oblivious to this type of corruption and are apathetic to the cause. As long as it's legal to buy, they will vote with their wallets.

The intent of the EV battery vehicles is to reduce emissions. In a disappointing update from the European Court of Auditors in 2024, the real CO₂ emissions from passenger cars is about the same as it was in 2012! They concluded that the ability for automakers to bypass emission testing and the fact that vehicles are larger in mass, has not achieved the results they hoped for.

The electronics industry has its Electronics Industry Citizenship Coalition Code of Conduct. Many of the larger electronic brands are signatories to the code. While the intent of the EICC code is good, it has not prevented the questionable practices of sourcing raw materials such as coltan from the Democratic Republic of Congo (DRC). We could surmise that cost pressures necessitate securing the materials first and applying the code second. The Organization for Economic Co-Operation and Development (OECD) has condemned the artisanal mining practices being conducted in the DRC. The Canadian government participates on various OECD committees. In 2008 the OECD Guidelines for Multinational Enterprises states, "*observance of the Guidelines by enterprises is voluntary and not legally enforceable.*" It asks that MNCs meet the softer expectations of society while promoting commercial interests. Money versus morals. The sanctions for noncompliance of a code should serve as a deterrence to act more responsibly.

One of the critical metals for EVs is cobalt. It is estimated that the DRC contains 50% of the global supply of cobalt. Cobalt extraction in the DRC is fraught with human rights issues. ~15% of the cobalt extraction is provided by artisanal groups. Artisanal miners are individuals who earn less than \$10.00 per day and use their hands with no other equipment, health or safety protection in this dangerous work. Artisanal operations often use child labour. Amnesty International has been monitoring the DRC and little has changed to provide rights to cobalt mining workers even in larger mining operations. Amnesty reported that the Tesla mining supplier, Glencore, has not adequately addressed the concerns of its workers for safety and health, since it signed a contract in 2020. While Glencore does not buy from artisanal miners, conditions remain deplorable in most DRC operations. The DRC is one of the richest countries in the world in terms of precious and critical materials.

Adding to the complexity of accessing critical minerals is the play by China's CMOC Group to increase cobalt production at its DRC Kisanfu mine. Kisanfu, which has Chinese battery company CATL as an

investor, almost doubled its cobalt production in 2023, flooding the cobalt market. This has led to cobalt prices dropping from US\$ 40 per pound to US\$23 per pound over the past 2-years.

Zambia and the DRC are vying for the positions as major players in a global fight for critical minerals, such as cobalt and copper and using their leverage to gain infrastructure improvements. This adds to the geo/political strategies and tension between China and other EV, clean energy, and military equipment companies. Economic interests are gaining more favour than social interests in these two developing countries. The US-led Minerals Security Partnership formed with other Western countries, wants to reduce the dependency on critical metals being supplied by China and Russia. The DRC and Zambia are pawns in the game. <https://www.reuters.com/markets/commodities/west-challenges-chinas-critical-minerals-hold-africa-2024-02-16/>

Swedish battery maker Northvolt, in 2024, is considering buying cobalt from the DRC and has joined the Fair Cobalt Alliance. The FCA aims to *make artisanal mines safer, minimize their environmental impact and create suitable working conditions for miners*. <https://www.reuters.com/markets/commodities/battery-maker-northvolt-looks-sourcing-cobalt-congo-2024-01-19/>

Professor Leigh L. Thompson emphasizes that the presence of a formal ethics and compliance program in no way guarantees effective ethics management. Employees must believe that formal policies actually guide behaviour – they are not just platitudes in a manual. Interpersonal ethics is the way in which we treat others. Bullying behaviour or cheating directly harms others. People may feel uncomfortable speaking up during a meeting. Intimidation or the abuse of power are examples of unethical interpersonal behaviours.

Another example where government has had to intervene in the market, occurred in June 2023. The Federal government put into effect, the wage-fixing and no-poaching legislation. These are now illegal practices subject to criminal charges. Where two or more employers agree to fix, maintain, decrease or control wages, these will be found to fall under the Competition Act, Subsection 45 (1.1) (a) and (b), similar to price-fixing by competitors. Price-fixing and various forms of bid-rigging have fallen under the criminal code for many years. The no-poaching applies where two or more unaffiliated companies agree to not hire employees between their organizations. Wage-fixing and no-poaching have been found to lessen competition in the market.

David Montero, the author of *Kickback: Exposing the Global Corporate Bribery Network*, has a quote on bribery simply being the cost of doing business. “[Bribes] are like steroids – everyone’s doing it. And if you don’t do it, you fall behind.” Montero’s research quite clearly shows that bribery has become the hidden standard of doing global business. He referenced the case of Rolls-Royce. Rolls-Royce revenues increased exponentially between 1987 and 2016. Initially this was seen as the Rolls-Royce know how to marry technology and leading management practices. As it turned out, Rolls-Royce was found guilty of a global bribery scheme. Using a system of shell companies, they bribed foreign officials in Russia, China, India and in other countries before getting caught. Rolls-Royce settled lawsuits in the UK and USA by paying US \$800 Million in fines. But who really remembers? It’s just the cost of doing business and then promising to never do it (get caught) again.

In 2007 Harvard professor Max Bazerman’s research led to an acknowledgement that *once the ethical line has been crossed, an institutionalization of corruption can occur in which unethical acts become a part of daily activities and people often have a vested interest in remaining quiet*. Unequivocally the research showed that incremental steps of unethical behaviour largely went unnoticed. This may cause individuals to escalate these activities, unintentionally with no malice to defraud, until it must be dealt with. A former Imperial Tobacco employee admitted to a decade-long scheme to ship tax-free cigarettes into the US where they would be smuggled back into Canada for sale.

Jonathan Gratch, professor of computer science, University of Southern California, sees the rise of digital assistants adding to ethical concerns. His research is showing that people tend to be less ethical when interacting with virtual assistants. This can be attributed to less emotional bonds, less empathy, with diminishing social checks. Fairness and politeness are the usual norms with face-to-face contact – absent with *machines*. GAI bears much further research and governance oversight. <https://cams.mit.edu/wp-content/uploads/2023-05-15-WSJ-How-AI-Will-Change-the-Workplace.pdf>

In 2013 SNC Lavalin paid a significant price for its unethical conduct. The World Bank barred SNC and 100 of its subsidiaries from bidding on any of the Bank's development projects for the next ten-years! An unintended outcome of SNC bribing public officials in Cambodia. The RCMP was already probing the SNC activities in Libya, Algeria and Bangladesh. SNC knew about its ethical choices but chose to not make the right decisions at the right time. In 2018, the Canadian government introduced the use of deferred prosecution agreements. This waived the sanctions against SNC Lavalin. SNC Lavalin seems to regard illegal bidding practices as one of its standards of how business is done. Between 2003-2012 SNC settled bid rigging charges in Quebec with a payment of \$1.2M. Again, between 2002-2011, SNC was party to bid rigging with 6 other engineering companies in Quebec and paid a portion of the \$12M settlement.

In 2013, Canadian diamond mining company Rio Tinto, received approval from the Australian government to exploit a sacred Aboriginal site in the Juukan Gorge. Archeological evidence indicated that the cave has had human occupation for 46,000 years. Based on outdated Heritage laws from 1972, Rio Tinto proceeded to dynamite the site to expand their iron ore mine in 2020. At the time, Rio Tinto chief executive Salisbury stated that he had "taken into accountability that there clearly was a misunderstanding about the future of the Juukan Gorge." He said Rio Tinto would *overhaul* its heritage process and take a *leadership position* on the reform to the Aboriginal Heritage Act, which had been underway since 2018. This catastrophe to the loss of cultural and historical links speaks to the serious gap in ethical conduct and responsibility of business leaders. While Rio Tinto may eventually make a monetary settlement to the Puutu Kunti Kurrama and Pinikura peoples for this egregious act, it's another lesson which shows how economic interests can outweigh the environmental and social values of disenfranchised citizens. Rio Tinto gets 15 minutes of bad press and can move on. The site is destroyed forever.

In a February 2022 mea culpa statement, Rio Tinto published the findings and recommendations on its corporate behaviour conducted by Elizabeth Broderick, the former Australian Sex Discrimination Commissioner. The *Report into Workplace Culture at Rio Tinto*, was a scathing review of Rio Tinto's workplace culture which identified disturbing findings of bullying, sexual harassment, racism and other forms of discrimination throughout the company. The study surveyed 10,000 people which had been victims of this workplace violence. Rio Tinto's senior management group found the report unsettling and an embarrassment to their stakeholders. Rio Tinto has launched assertive actions to correct these deplorable practices. The Juukan Gorge incident could be viewed as an extension of a "win-at-any-cost" ethos at Rio Tinto. <https://www.riotinto.com/-/media/Content/Documents/Sustainability/People/RT-Everyday-respect-report.pdf>

In October 2023, Australians rejected to advance the status of its Aboriginal peoples by voting against this in a referendum. Setting the politics aside, this will be a set back for the reconciliation initiatives with the Aboriginal people, which comprise ~3.5% of the population. The rejection ends the opportunity to have an advisory role for the Aboriginal and Torres Strait Islanders on government policies and influence their self-determination. Imagine the knowledge the Aboriginals could share on the environment, with their collective experience as being the stewards of a continent for 60,000 years. The referendum is dismissive of UNDRIP intentions to recognize their unique culture and entrench further the discrimination, poor health and education, and economic inequities. It is probable that this movement towards Aboriginal recognition will take another political movement, as it out of sync with

the social values held by many of Australia's global trading partners. Fundamental rights should be enshrined in a country's constitution for all of its citizens.

Contrast this outcome with the progress in Canada with its commitments to Truth and Reconciliation. In October 2023, Canada had a First Nation's politician elected as premier of a province. In New Zealand, the Māori have been gaining recognition of their rights and have a Māori as their Minister of Foreign Affairs. There is growing favouritism to rename the country Aotearoa, reflecting its Māori heritage. Renaming public places and spaces with original First Nation names is part of the recognition of Indigenous values, as witnessed in Canada. Again, in October 2023, New Zealand elected a new Prime Minister and the recognition and expanding of the rights of the Māori will be watched by many.

Along with reconciliation of human rights with Indigenous peoples, comes the ability for them to participate in their economic development. Governmental policies, from the demand side, support increased commitments towards equity of working opportunities for Indigenous peoples and this is reflecting in the hiring and contracting with the private sector companies, on the supply side. These shifts can take years to come into normalized business relationships and practices and require political governance to ensure commitments are continued.

Responsible leaders set the ethical expectations of staff and communicate through ethical messaging and conduct. In the case of Timberland, CEO Jeff Swartz was made aware of the sourcing of hides for leather from the Amazon rainforest in 2009. Swartz worked with Green Peace to release a policy requiring its suppliers to not purchase cattle which were raised in newly deforested areas of the Amazon. This policy had a significant affect on leather, beef, and other products in Brazil. Any cost implications were completely secondary to doing the right thing to ensure brand protection and customer loyalty.

In 2024, Brazil has started a reforestation program to address the loss of biodiversity in the Amazon rainforest. Led by Indigenous chiefs, Raoni Metuktire of the Kayapó and Almir of the Suruí people. As stated in a Reuters report, the aim is to encourage dozens of villages in the Amazon and elsewhere to plant one million trees a year. The purpose is to recover degraded forest lands destroyed by illegal loggers and gold miners, land-grabbing invaders who cleared trees to make way for cattle pastures, and forest fires. Suruí Chief Almir said the program will start with 10 Indigenous territories, including the Xingu National Park, Brazil's first reservation that has been besieged by commercial farming, and the largest one, the Yanomami reservation bordering with Venezuela that has the most degraded lands due to mining.

In January 2024, the Nunavummiut people of the Nunavut Territory in Northern Canada, were given the official responsibility to govern themselves as well as control all of the administration, resources, including mining, public lands, and rights to waters. This devolution agreement was 25-years in the making and marks an historic day for the Indigenous people to self-govern their destiny. This is similar to the successful agreements signed with the Yukon Territory in 2003 and the Northwest Territories in 2014.

ESG requires that policies and business practices have strong governance and support at the most senior levels of the company including its board. Allowing indiscretions in ethical conduct undermines the integrity of the organization and its brand credibility. While any actions taken by a corporation may be within a legal right, it does not meet the ethical expectations of stakeholders on their conduct. In the case of Rio Tinto, we can see that the Australian government was also culpable in this avoidable desecration. By failing to provide governance leadership, as the UNDRIP recommendations declared, they chose to condone Rio Tinto's actions.

There is an ISO Anti Bribery Management System for further guidance: ISO 37001:2016

Supply chain strategies and technology

The advancement and adoption rate of GAI is having profound effects on supply chain practices. GAI is being applied in every aspect of supply chain activities. The practices which are being utilized include:

1. Demand forecasting. Traditionally one of the weakest links in the supply chain has been providing forecasts internally from planners to production and from buyers to their suppliers. Too many variables to possibly manage concurrently. Inventory levels have masked a lot of the inefficiencies. GAI is effective in modelling data derived from seasonality, trends, economic conditions, target marketing, to assist in optimizing inventory and resource planning. Customer input enables product design and development for adapting to trends or profitability. This combined with better predictability takes a lot of the guesswork out of the decisions.

2. Resilience. GAI enables more responsive routing of fleet vehicles, load management, dynamic routing in real time and driver resourcing. Data from traffic and weather conditions and fuel costs, as an example, can result in various scenarios being prepared and recommend which options concurrently address operational advantages for customer services, shortened lead times, and reduced costs.

3. Risk management. Supplier risks can involve screening for financial capacity, credit limits, cyber security, operations, ESG compliance, legal and regulatory mandates, geo/political events and performance ratings. Competitor pricing can be tracked and used to set yield pricing rates. GAI technologies, such as blockchain, can monitor and assess these risks more effectively, on a 24/7 basis.

4. Quality management. Early detection of anomalies reduces costs and improves productivity. This can include the parts being sent to the production floor but also logistical delays which allow for plans to mitigate the risks in a timely manner. <https://research.aimultiple.com/generative-ai-supply-chain/>

Supply chain management skills

STEM jobs (Science, Technology, Engineering, Mathematics) will increase in an attempt to transform businesses into circular economy models. As ESG and the circular economy continue to entwine in values and principles, this affects the skill sets required for individuals to be successful in managing more complex supply chain issues. Where the historic focus has been on transactional proficiencies, the future prerequisites will use a different set of attributes.

Robotics and AI will continue to displace low skilled and repetitive types of manual labour. These technologies will also impact professional services. Legal counsels are already applying AI, cognitive learning, and machine learning to conduct research and predict legal outcomes. In supply chains, jobs which are directly involved with optimization of materials; products which extend product life cycles; and logistical efficiencies will be in demand.

For supply chain professionals, based on numerous studies, including the *Circular Jobs Initiative*, there is a need to have effective *soft* skills. While soft skills are usually seen as lesser important than analytical skills, in the new economy there is a greater need to be able to adapt and respond quickly to changing dynamics in markets and relationships.

Supply chain leaders should have:

- Sound business acumen
- Ability to collaborate with multiple supply chain partners
- Strategic problem-solving skills
- Negotiation expertise

- Conflict resolution skills
- Team building skills
- Supplier development strategies
- Balanced emotional intelligence
- Systems thinking approach
- A total cost of ownership perspective
- Analytical and creative skills
- Green skills

Green skills are aimed at reducing the anthropogenic activities on the environment. Systems thinking is required in a circular economy to see how decisions connect with other direct or indirect outcomes; whereas, analytical skills were desirable in a linear economy to solve specific problems, which may not have considered other unintended consequences. Adapting to a hybrid set of skills which bridge technical and social values will be highly desirable.

Aside from the perfunctory supply chain skills, there will be a heightened awareness on how to:

- implement social procurement practices;
- navigate trade agreements to engage with social enterprises;
- adapt to environmental strategies;
- balance local and global economic development sourcing opportunities;
- utilize digitalized formats such as blockchain;
- operate cradle-to-cradle distribution for resource recovery; and
- align policies with operational responsibility and accountability.

AI bots, such as, ChatGPT could replace procurement staff responsible for drafting competitive bid documents, contract agreements, risk assessments, evaluations, and other types of business documents. It's only a matter of time, before ChatGPT and its imitators are implemented in more organizations requiring higher volumes of documentation.

With the focus on Net Zero, focusing on the lowest cost of supplies is rather moot. Not that affordability isn't important but will take a back seat to the higher need for reducing emissions. Net Zero is described as being the point where the volume of GHGs being released into the atmosphere is being offset by the volume of GHGs being removed. That is the aim of decarbonization. Lowering the earth's average temperature to below an average of 14°.

Implementing ESG within an organization

1. Create the business imperative narrative and embed ESG in policies and practices. Work with 3rd party experts in the various aspects of ESG where your internal resources may be lacking. Define what the organization wants to do such as Net Zero emissions for 2030. Assign roles and responsibilities for senior executives and the management team. Have a communication plan go out to all stakeholders. Ensure strategic operational and financial plans will be viewed through the ESG lens prior to actions being taken.
<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050/challenge.html>
2. Measure the current environmental footprint for a baseline to set targets. Develop a risk mitigation plan which aligns with the corporate governance and Net Zero targets. Set the KPIs and incentives which reward responsible behaviour across the organization.
3. Address where training of staff will be required and draft policies which support a Net Zero initiative. Set a timetable for how Net Zero strategies will impact jobs and processes. Get the buy-in from staff and look for the quick wins to encourage the replication of success.

4. Build relationships with governmental agencies, NGOs, industry competitors and partners to build the capacity for continued sustainability initiatives. Do what you can within your sphere of influence to positively impact your stakeholders.
5. Report out in an objective and transparent manner on all ESG metrics. This includes progress to date and gaps for continuous improvement as part of the governance commitment. Work with 3rd party experts to provide insights as to where more can be done. Look for international, industry, or bona fide standards of compliance to achieve and become a recognized leader.

Drawing from the Ellen MacArthur Foundation's *Building a circular supply chain* recommendations to transition to a circular supply chain, the following actions can be taken:

1. Develop a reporting structure which motivates the decision-making to support circular supply chain values.
2. Optimize network designs which prioritize the retention of values embedded in products and materials.
3. Engage with and reward like-minded suppliers which adopt circular economy practices.
4. Use technology to facilitate flows of information, materials and products, in a closed-loop model.
5. Revise performance assessments which support commitments by decision-makers to shift in favour of circular economy principles.
6. Design products and develop business models to focus on an efficient and effective flow of materials throughout their life cycle.
7. Customers should know how they play a role which supports the sales of responsible products and services, past the point of initial sale.
8. Invest where there is a connection to support circular economy benefits.
9. Ensure supply chain policies are revised to reflect the circular economy values in decision criteria.

An example of a large organization taking on a strategic Net Zero plan was unveiled by Walmart. This type of an approach applies to large and small initiatives where organizations are implementing ESG. Their approach recognizes that ESG requires a full supply chain effort and support when beginning the implementation to adapt practices and make a difference.

Walmart launched its Project Gigaton in 2017. An aggressive program requiring Walmart's suppliers and stakeholders to reduce 1B metrics tons (gigaton) of GHG emissions by 2030. They created a compelling vision and acknowledged their leadership role to drive change across the supply chain. This strategy includes providing suppliers with access to renewable energy with Schneider Electric and a supplier financing program with HSBC to enable early payment of invoices and lending advantages. The partnerships with its suppliers are tied to a supplier's ability to actually reduce their GHGs in operations using science-based targets (SBTi)

and their CDC scores.

Walmart's Project Gigaton is based on six pillars which its supplier partners can commit to where possible:

1. Energy – use renewable energy sources with little or no carbon emissions
2. Nature – reduce emissions at the farm level and mitigate deforestation practices
3. Waste – reduce all types of materials going to landfills
4. Product use and design – increase use of sustainable materials and recycled content
5. Packaging – to source sustainably and adopt circular economy production processes
6. Transportation – to reduce emissions and total miles of trucking

These commitments align with the circular economy principles and use disclosure as a key reporting mechanism to encourage continuous improvements.

By early 2024, Walmart's Project Gigaton had met the target of 1 billion tonnes of reduced emissions – 6-years earlier than expected. With a project involving 5000 suppliers, this is a great example of what can be achieved with the right mindset. Walmart leveraged their buying power to affect change and continues to operate within a very competitive retail market.

West Fraser Timber announced in April 2023, that SBTi has validated its scope 1, 2, and 3 emission reductions. West Fraser is committed to achieve near-term GHG reductions across all of its operations in the USA, Canada, the UK, and Europe. West Fraser operates 60 facilities to produce lumber, engineered wood, pulp, newsprint, wood chips and uses renewable energy.

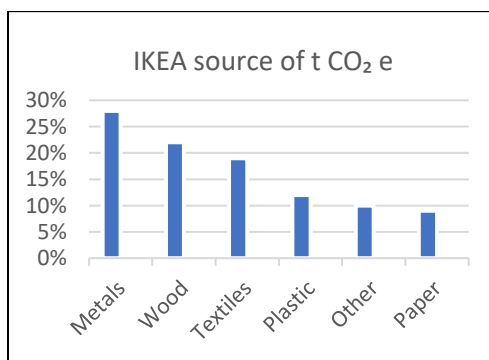
<https://www.westfraser.com/sustainability/sustainability-report>

Global CPG company, Post Holdings, has committed to reducing its Scope 1, 2 and 3 GHGs by 30% by 2030. The Scope 3 emissions largely come from the supply of ingredients and packaging materials.

<https://www.postholdings.com/post-holdings-sets-scope-3-ghg-emissions-reduction-target/>

Global retailer IKEA, in its Climate Report FY22, is aggressively reducing its carbon footprint by increasing the sourcing of renewable materials. IKEA reported a 12% reduction on its CO₂ emissions climate footprint from base year 2016 with a 15% reduction in total by 2030. Commitments include bio-based glues for wood-based products; 100% recycled content in key materials; cellulose-based textile fibres; and 100% renewable energy at our material suppliers, such as board factories and paper mills. IKEA uses the circular economy as its road map for designing problems out of its supply chain. The complexity for IKEA is to implement changes while operating 400+ stores in 49 countries with 9000+ products being produced from 40 factories with 1000 suppliers. IKEA's CEO, Torbjörn Lööf, reported in 2017 that it affects only 30% of emissions in its supply chain. Reducing Scope 3 emissions is an issue with their climate footprint. Finding alternative materials is a constant balancing act between availability, affordability, and quality.

IKEA's carbon footprint based on types of materials, which could model other similar home furnishing retailers, charts as follows:



<https://about.ikea.com/en/sustainability>

Sustainability leadership skills

Borrowing from the comprehensive Asahi Group Board of Directors skill matrix, we can adapt a set of sustainability skills which is transferable to any organization's leadership. Asahi categorizes the *expected* set of skills into two groups – decision-making and supervisory skills. Asahi names their respective Board members in this public document.

	Decision-making Skills				Supervisory Skills			
Executive	Strategy	Global	Sustainability	Discontinuous growth	Leadership	Finance	Risk & Governance	HR & Culture
Koji	x		x	x	x	x		x
Katsuki	x	x	x	x	x	x		
Tanimura		x	x				x	x
Sakita	x	x		x		x		
Ahmadjian		x	x				x	x
Sasae	x	x			x		x	
Ohashi	x	x		x	x	x		
Matsunaga				x	x		x	x

Drawing from their definitions of sustainability skills and abilities, they are as follows:

Strategy – ability to assess societal changes over the long-term;

Global – ability to make decisions from a global perspective and frame of reference; ability to optimize a blend of local and global;

Sustainability – ability to provide leadership for the creation of social impact through business; and provide managerial direction rooted in the knowledge and insight on ESG;

Discontinuous growth – ability to transform the business structure and earnings model; and encourage innovation and explore new areas of business;

Leadership – ability to assess the performance of business operations and raise related issues; and assess the leadership team’s business capabilities;

Finance – ability to assess the state of management from performance and management indices and raise related issues; and assess the resource allocation and raise related issues;

Risk & governance – ability assess risk control and raise related issues; and assess the state of governance for business execution and raise related issues;

Human resources & culture – ability evaluate a diverse set of human resources and their capabilities; and assess the corporate culture and raise related issues.

These skills and abilities should resonate with most organizations. The expectations of stakeholders and shareholders are balanced in this set of objective criteria for Board accountability. Senior management would need to successfully execute their responsibilities across a broad spectrum of activities.

ESG and executive compensation

A 2022 Conference Board Report, suggests that due to increased attention to ESG by multiple stakeholders and concurrent interests in stakeholder capitalism, Boards are linking executive compensation to financial and non-financial outcomes. Incentives are related to ESG performance

measures. Boards are also concerned that ESG can meet the expectations of shareholders and a company's performance. <https://www.conference-board.org/us/>

CNN business writer, Moira Ritter reported in July 2021, that the average S&P 500 CEO made ~300 times the average worker's salary, according to the AFL-CIO's annual Executive Paywatch report. This equates to an average US\$15.5 Million. Meanwhile the average production and nonsupervisory worker earned US\$43,512. Stakeholders continue to challenge this disparity which contributes to the apparent have and have-not perspective. A 2020 SHRM report talks about the executive pay difficulties and shareholder protection. Issues such as clawbacks and cause definitions to address nonfinancial performance issues; trying to adjust compensation for performance in volatile markets; and incentives to hit strategic goals such as improved performance under diversity, equity, and inclusion (DEI) objectives.

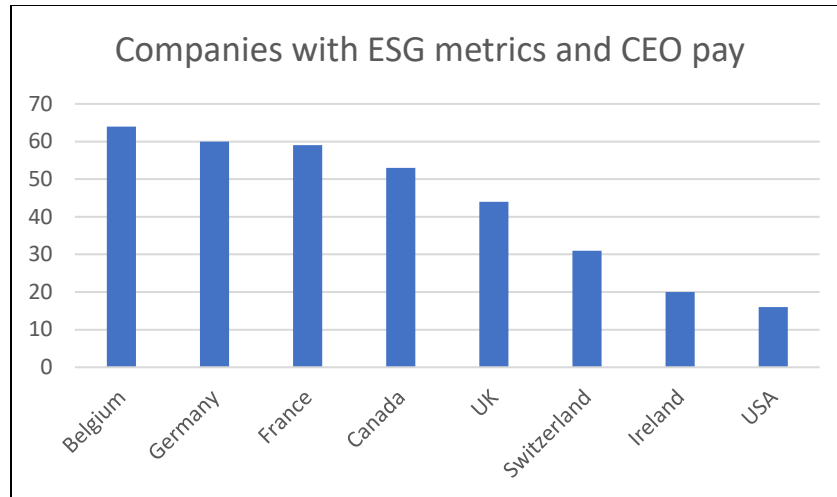
While executive compensation overall is rising at rates whereby, the average worker's wages pales in comparison to their CEO, this disparity has been steadily increasing since the 1980s. The shift towards outsourcing manufacturing and production to lower cost countries, meant a company could maintain sales, reduce labour costs, reduce production costs, and keep their customers. Robotics will support this same strategy and North American CEO pay in 2024 is on the same trajectory.

A 2023 Stanford study of 4400 companies in 21 countries, discusses the types of companies which do relate ESG to CEO pay. The number of companies which link ESG to CEO pay went from ~400 in 2017 to ~1200 in 2020. Their findings show that companies which have a strategy to reduce GHGs achieve these outcomes when CEOs are tied to that metric, which is intuitive. People behave in the way they are rewarded. ESG pay incentives which involve 3rd party measurements also impact CEO performance. The researchers also found that ESG did not have a positive impact on its bottom line or share prices; but did not have a strong correlation to negative results either. In other words, a mixed bag.

The Stanford study found common traits where ESG and CEO pay was more prevalent in countries with more stringent regulations; countries with a greater concern for social outcomes and sustainability. Industries with a larger carbon footprint were more likely to include ESG with CEO compensation; larger companies with independent directors; companies with more diverse boards; institutional investors have a greater propensity to favour companies with ESG incentives for CEOs where DEI and climate change is part of their operational agendas. This could be interpreted as seeing that a company which adopts a holistic view of their responsibilities for economics plus ESG will be better managed. The study supports the notion that the environmental factors such as emissions in Scope 1 and 2 sources are the easiest to assess. The governance factors range quite widely on the metrics and performance issues and are driven by the individual company's objectives.

The following chart from researchers Cohen, Kadach, Ormazabal, and Reichelstein (2023) from the Stanford study, reiterates that US companies have the lowest % linking ESG metrics to CEO pay. Belgium, Germany, France, and Canada are much more committed to these assessments. Big cultural differences, in part, between most of the countries and the USA business and political ideologies.

<https://www.gsb.stanford.edu/insights/does-it-pay-link-executive-compensation-esg-goals>



Other research suggests that companies should have at least 1-2 years of operational experience with ESG targets before using them to assess the executive's ability to deliver on them. It takes time to develop and compile appropriate data and determine the actual impact on ESG goals. Boards are also concerned that the reporting can be justified and demonstrate increased value by introducing ESG values. Some argue that ESG is not about impact but simply a risk management issue.

The trend appears that 65-70% of the S&P 500 are rewarding executives for achievements in reaching DEI goals; with only ~20% of the S&P 500 shifting attention to reducing the carbon footprint and emission reductions. While this is a slight increase, it is not a resounding endorsement. The US corporate perspective tends to have less interest in linking ESG goals as a performance indicator of their CEOs.

In a major rebrand, Nokia, the former Finnish phone seller, launched its new business platform in early 2023. CEO Pekka Lundmark, sees Nokia leading in the digital transformation and wants to *develop ESG into a competitive advantage*. Pekka got buy-in from Nokia's leadership team on its investment as a technology leader. The (5) core ESG objectives for Nokia are:

1. Climate and circularity
2. Industrial digitalization
3. Security and privacy
4. Bridging the digital divide
5. Responsible business

<https://www.nokia.com/about-us/sustainability/our-approach/#security--privacy>

Borrowing from the International Corporate Governance Network's (ICGN) investor engagement queries, we get a sense of the probity by investors into corporate ESG values. Adapting the ICGN questionnaire provides a model for assessing ESG leadership attributes and the connection to metrics. These questions could be applied to supplier selection processes.

1. What are the top 3 ESG considerations of your company?
2. How have you engaged with key stakeholders to determine these considerations? Who are the key stakeholders? Where is the process documented? How often is the consultation repeated?
3. How many of these ESG considerations are part of the strategy outlook over the next 5-10 years?
4. How does the company's mission get reflected on sustainability in its governance as well as metrics and KPIs?
5. Do you have a long-term incentive plan in place? What is the evaluation process and vesting

period?

6. Do executives have a share-ownership requirement? What multiple of their annual salary does this represent?
7. How do you entice responsibility for ownership of ESG in company governance, directors, executives and employees?
8. What makes your disclosure of issues credible and reliable?
9. How are these issues integrated in the compensation packages of executives and others?
10. Do you benchmark your remuneration practices against peers? How do you know which peers to look at for best practices?

These questions related to the Senior Management Reflection; Company Self-Assessment on ESG Commitments; and the Circular Economy Principles Self-Assessment templates in the Addendums in this book.

For further ICGN insights, hit <https://www.icgn.org/sites/default/files/2022-04/ICGN%20Global%20Governance%20Principles%202021.pdf>

Diversity

A model for global diversity and inclusion is provided by The Conference Board. The CFB suggests that the competencies be integrated into an organization's business operations. The competencies include:

- Change management
- Diversity, Inclusion and Global Perspective
- Business acumen
- Strategic external relations
- Integrity
- Visionary and strategic leadership
- HR disciplines

Professor Paul Larsen, from the University of Winnipeg, summarizes the motivators of supplier diversity as follows:

- Improves organization's community impact
- Improves organization's social standing
- Broadens the supplier base
- Improves corporate image/brand reputation
- Matches demographics of consumers in target markets
- Creates new business opportunities
- Improves organization's supply chain performance

Diversity in itself, is insufficient to drive values. The culture of the organization will need to demonstrate why diversity is important to its success in the future. Diversity in an organization is most effective where values are aligned across the workplace.

The key to diversity bringing advantages to the organization is to have a common agreement on what value means. If people within an organization do not have a common concept of value, their individual diversity can lead to incongruence or passive engagement. As individuals, they will interpret value as they personally define it. As an example, is spending to be focused on the lowest cost or is it on the best value?

Procurement practices need to ensure that best value is the organizational view and aligns with country-

based values. Without a common understanding of what value is, we invite bias in decision-making. Staff may choose to not buy products from a company because of a negative headline or internet story – regardless of what may actually have occurred. We lose the potential synergy found in diversity when we haven't clearly defined value. The divergence of opinion on what value means, detracts from the collective actions. Respect for diversity is one of criterion in change management

Diversity in the supplier base invites opportunities for 3rd party audits to ensure value for money. As discussed, NGOs provide monitoring but more intensive audits are often required for detailed inspections. There are many such service providers in the private sector, such as, Bureau Veritas, INTERTEK, QIMA, SGS, and UL. They provide factory inspections for compliance with standards, quality and the use of fund audits. <https://www.qima.com/>

At the risk of overstating the issues, a large part of the shortages in products over the past years can be attributed to single sourcing from major brands. Retailers are now rethinking sourcing strategies and are seeking smaller, diverse suppliers. There will be questions on quality and capacity but empty shelves are not working either.

This shift to what is referred to as “open calls” for new suppliers and products to make a pitch to retailers. Open calls are a shift in attitude that more ideas are needed. Breakthrough thinking comes from good competition in the market.

It also goes beyond marketing and encourages more local supply or near shoring of supplies which previously favoured low-cost, foreign suppliers. Long-term, it will be an interesting outcome from the pandemic to monitor as a trend or a one-off event.

As a definition of diversity, generally it's being an organization which is 51% owned, managed, and controlled by visible minorities or Aboriginal persons. Leadership in the indigenous supplier community is being led, in part, by the Canadian Council for Aboriginal Business (CCAB). The CCAB is aware of the under-representation of 60,000 Indigenous enterprises in Canada. Economic reconciliation is a desired goal of the CCAB with corporations and governmental agencies. They act as an intermediary for Aboriginal businesses. Suncor's COO, Mark Little, sees the participation by Aboriginal businesses in its supply chain as a means to build the communities it operates in. The CCAB see the opportunity to manage wealth instead of poverty for the Indigenous people. <https://www.ccab.com/membership/certified-aboriginal-business-cab/>

CCAB has created its Progressive Aboriginal Relations™ (PAR) as a certification program that confirms corporate performance in Aboriginal relations at the bronze, silver or gold level. Certified companies promote their level with a PAR logo signaling to communities that they are good business partners; great places to work, and are committed to prosperity in Aboriginal communities. PAR is the only Corporate Social Responsibility program with an emphasis on Aboriginal Relations. <https://www.ccab.com/programs/progressive-aboriginal-relations-par/>

The Canadian Aboriginal and Minority Supply Council (CAMSC) are a strong advocacy group which facilitates expansion of Aboriginal and minority-owned businesses. Since 2004, CAMSC as a not-for-profit organization, certifies and develops diverse suppliers to contract with corporate and government buyers. Concurrently, they help larger organizations connect with the certified suppliers they represent. <http://camsc.ca>

Notable Indigenous companies in Canada, with a purpose, include:

Ashfirewear – firefighting clothing designed for women, made with natural fibres and biodegradable materials, founded by Ashley O'Neil. <https://ashfirewear.com/>

Birch Bark Coffee Company – making clean, fresh water available to communities, founded by Mark Marsolais. <https://birchbarkcoffeecompany.com/>

Cheekbone Beauty Cosmetics INC – cosmetics company founded by Jenn Harper, to provide scholarships for First Nations youth. <https://www.cheekbonebeauty.com/>

Her Braids – making clean, fresh water available to communities and donations to the David Suzuki Foundation’s Blue Dot Movement, founded by Sunshine Tenasco. <https://www.beadeddreams.ca/blogs/news/62537797-her-braids-making-an-impact>

Hinaani Design – clothing sourced from northern and Canadian materials in a sustainable manner and, supports local social causes, founded by Nooks Lindell. <https://www.hinaani.ca/>

Medical, Surgical and Safety Supplies (MSS) Ltd. – is a certified aboriginal, not-for-profit, exclusive distributor of PRIMED gloves to Canadian hospital and health care facilities. <https://www.mssltd.com/>

Virtual Gurus – provide virtual assistants for businesses consisting of people facing barriers to employment, founded by Bobbie Racette. <https://thevirtualgurus.com/company/about>

In British Columbia, Indigenous-owned businesses can be found at BC Marketplace. Most cities provide a listing of Indigenous-owned businesses. Buying goods or services from these targeted groups, directly impacts their economic and social interests. <https://marketplacebc.ca/indigenous-owned/#marketplace>

Molson Coors began a strategic shift towards DEI in 2020. From their publication, *Diversity, Equity & Inclusion in 2023 (The Americas)*, they are aggressively targeting to improve their commitment to DEI as follows:

- Aspire to increase people of colour representation in the US by 25% reflective of market by the end of 2023.
- Aspire to increase representation of women reflective of market by the end of 2023.
- Achieve \$1 billion of spend with diverse suppliers in the Americas by the end of 2023.
- Invest in communities and organizations that promote social change.

In an update from Molson Coors for Q2 2023, they are on target to achieve their DEI goals.

In other areas of its business operations, for 2025, Molson Coors targets:

- Use 22% less water in brewing
- Grow barley with 10% less water
- Reduce Scope 1 and 2 emissions by 50%
- Reduce Scope 1, 2 and 3 by 20% across its value chain
- Achieve zero landfill waste in all its operations

The emission reductions are verified through the SBTi model. Molson Coors, as part of its transparency, reports out using TCFD, SASB, GRI and CDP-Water Security metrics and subscribes to the UNSDG framework. <https://www.molsoncoors.com/goals-and-reporting>

Molson Coors has invested US\$4.5M in BIPOC organizations across Canada and the US. Their metrics track the change in the representation of women and BIPOC on the Board of Directors; Leadership Team; Vice President positions; and Total Workforce. <https://www.molsoncoors.com/diversity>

Intel’s Responsible, Inclusive, Sustainable, and Enabled (RISE) strategy for 2030 has been very assertively executed by its senior executives. As a long-time global technology leader, Intel, has invested strategically and successfully to date in a supplier diversity program. Their 2020-21 Corporate Responsibility Report noted that while they spent US\$1.0B in 2019 with diverse suppliers, they expected to double this to US\$2.0B by 2030. Intel achieved a US\$800M spend with minority-owned suppliers globally by 2023; US\$500M with women-owned suppliers outside of the US by 2025; and US\$250M with black-owned US-based suppliers by 2023. Intel has achieved their targets ~8-years ahead of schedule!

For more than 35-years, the Rick Hansen Foundation has been raising awareness and funding a shift which supports people with disabilities. The Foundation states that *more than 6.2M Canadians have some form of disability, and the numbers are growing. People with disabilities still face social and physical barriers that stop them from being a part of their communities. While we've made great strides towards creating an accessible and inclusive world, there's still more work to be done.*

In June 2019, The Canadian Federal government passed the Accessible Canada Act, Bill C-81. The purpose is to identify, remove, and prevent accessibility barriers in the following areas:

- Built environments, including buildings and public spaces
- Employment, including job opportunities and employment policies and practices
- Information and communication technologies, including digital content and technologies used to access it
- Procurement of goods and services
- Delivering programs and services
- Transportation, including air, rail, ferry, and bus carriers that operate across a provincial or federal border

The Bill provides principles, which guide how businesses can communicate the goals:

- Inherent dignity
- Equal opportunity
- Barrier-free government
- Autonomy
- Inclusive design
- Meaningful involvement

The Bill applies to organizations under federal jurisdiction such as:

- Parliament, including the Senate, the House of Commons, the Library of Parliament, and the Parliamentary Protective Service
- Government of Canada, including government departments, Crown Corporations, and agencies
- Federally regulated private sector, including organizations in the transportation sectors, broadcasting and telecommunications services, and the banking and financial sectors
- Canadian Forces and the Royal Canadian Mounted Police (RCMP)

There is considerable attention to enforceability and compliance processes within the Act which regulated bodies must adopt in their operations. Most provinces and local governments have similarly aligned accessibility legislation. <https://www.canada.ca/en/employment-social-development/programs/accessible-canada/act-summary.html>

Intel's workforce targets are a 40% representation by women in technical positions; double the number of women and underrepresented minorities in senior leadership roles; advance accessibility and increase the percentage of employees who self-identify as having a disability to 10% of our workforce – an increase from the 2020 assessment of 1.4%.; ensure that inclusive leadership practices and accountability are embedded in our culture. <https://www.intel.com/content/www/us/en/corporate-responsibility/2030-goals.html>

Countering the efforts of companies like Molson Coors and Intel in the US, are the anti-DEI hurdles being pushed by politicians such as the Governor of Florida, Ron DeSantis. DeSantis has barred Florida universities from spending state or federal funds which *promote, support or maintain any programs that advocate for diversity, equity, and inclusion, or promote or engage in political or social activism.* DEI is an evolving social strategy and will likely morph into a few versions of itself in various workplaces.

The demographics of the workforce in trucking are part of the resilient strategy discussions and the need for diversity. Driver shortages can impact capacity and service levels. Traditionally the trucking sector has been a male-dominated role. As in construction, women have a great opportunity to enter a relatively recent career path. Taking on the role of driving, with less focus on being able to physically handle cargo, drivers need to be tech savvy and ensure safety at all times. Amplify finds it challenging to attract and find higher quality drivers which meet their expectations when turnover occurs. The driving profession has been under rated as a career option. Amplify are actively trying to hire women for driving positions. The COO references that the average age of drivers in the industry is closer to 50 years of age. While at Amplify, the average age is ~28 years.

The Women's Trucking Federation of Canada (WTFC) was formed in 2015. The WTFC is evidence of the continued growth by women as truckers - be they drivers, mechanics, and executives. In February 2023, the BC Ministry of Social Development and Poverty Reduction announced \$1.6M in funding for a free truck driver training course for women. The 6-month program is open to women who are unemployed with a Class 5 licence through the YWCA's Changing Gears Program.

<https://www.womenstruckingfederationofcanada.net/>

A 2023 report by Dr. Naveed Khan of Centennial and George Brown Colleges, reports 3.5% of commercial drivers are female in Canada whereas there are 8% in the US. Canada has ~320,000 full and part time drivers with 27,000 retiring each year.

In 2023, the Federal government partnered with the non-profit, Trucking HR Canada, with a \$46M funding to recruit, train and subsidize wages for up to 1400 new drivers and 1200 other professionals that are in the trucking sector. This is intended to address the aging population of current truck drivers and is being filled by many immigrant drivers. ~17% of Canada's drivers are South Asian, with ~56% of Vancouver drivers being South Asian. <https://www.supplypro.ca/canadas-trucking-industry-needs-thousands-of-drivers/>

Employee well-being

Staff turnover rates and workers leaving the employment ranks is contributing in part to the inflation rate and supply shortages in late 2022. For those who stay in the workplace there is an increased level of stress. In a *Deloitte Insights Magazine* for Summer 2022, worker well-being is based on physical, mental, financial, and social aspects. A pre-pandemic poll by Gallup showed that 31.5% of employees are engaged in their jobs; 51% are not engaged; and 17.5% are actively disengaged. The workplace is not getting better with most complaints about the amount of workload and the extended workday hours being incurred.

This certainly adds to the cost of suppliers as a low employee well-being can be related to lower productivity and higher health care costs. Attracting and retaining good workers is critical. Studies show that the greater the affinity people have with their employer values and their personal values, they will make a greater commitment to the interests of the employer. The workers feel valued and have less turnover.

Employee well-being is part of the new ESG holistic. A 2014 study on well-being by Deloitte showed the top 5 triggers for retention include flexible scheduling, telecommuting (now referred to as working remotely), designated office space for wellness, reimbursement for well-being expenses, and healthy snacks. Fast forward to 2023 and we see that flexible scheduling and working remotely were necessitated by the pandemic.

The 2014 study concluded *"well-being is becoming a core responsibility of good corporate citizenship and a critical performance strategy to drive employee engagement, organization energy, and*

productivity.” One could conjecture, that today there can be a sense of complacency with employee well-being programs and when opportunities arise for them to move on, they jump at it. It may cost an employer an incremental amount for the retention tactics but it can cost far more when they walk out the door.

The well-being of employees is being tested in early 2023 as market conditions adjust to a slower demand. Google, which its founders Page and Brin went on record as saying in 2004 “expect us to add benefits rather than pare them down over time” dumped thousands of staff in January through a terse email and has been clawing back health benefits and other perks. Google has devolved from being the *new school* to going old *school* corporate-wise. Well-being just met its alter ego, affordability.

A 2023 report, *EQUITY, DIVERSITY & INCLUSION STRATEGY REPORT, A REVIEW OF LGBTQ+ WORKPLACE TRENDS IN NORTH AMERICA* by the Robert Walters Group, an international recruitment consultancy, addresses the potential for companies to improve their performance. This report summarily indicates that organizations are not attracting and retaining professional staff, largely due to the lack of a DEI transparent workplace. The LGBTQ+ professionals earned significantly lower incomes than other staffers in similar organizations. This was identified in lack of their pay equity, promotional opportunities, lesser benefits, low affinity for values with employers, less professional development and training, and less mentoring. Turnover rates amongst all staff were higher due to the disconnect on values and well-being where organizations were relatively silent on DEI. <https://www.robert-walters.ca/content/dam/robert-walters/country/united-states/files/2023-edi-report/EDI-NA-Gender-Report.pdf>

Well-being is a complex gauge on our quality of life and standard of living. In Canada, for decades, the Gross Domestic Product (GDP) was the gauge as to whether we were doing good or bad, as a general population. GDP increases through economic activities even those which have been related to disasters or are actual harmful. Floods, fires, train derailments, pollution, health problems, building jails, or hurricanes all add to the GDP, which is purely an economic indicator of annual spending. The opposite of the GDP, as an indicator of well-being, is the Canadian Index of Wellbeing (CIW). The CIW assesses the impact of volunteer work, a good education system, a sustainable environment, and improved social impact, among other beneficial factors. The GDP and CIW are both affected by health care. As an example, GDP increases with health care *treatments*; and the CIW increases with illness *prevention*. This validates the view that a strong economy does not mean we are better off. The main research for the CIW is provided by the Faculty of Health, University of Waterloo, in Ontario. Their composite index gives a sense as to whether our overall well-being is improving or not. Summarily, the GDP has far outpaced the CIW. <https://uwaterloo.ca/canadian-index-wellbeing/>

The CIW composite index includes:

1. Community vitality
2. Democratic engagement
3. Education
4. Environment
5. Healthy populations
6. Leisure and culture
7. Living standards
8. Time use

It’s important how we balance economic development with the perceived well-being of individuals in our communities. The lower income earners often bear the brunt of slower economic activity with a measurable reduction in their well-being. *The wealthiest top 20 per cent of households controlled more than two-thirds — nearly 68 per cent — of net worth in Canada in the first quarter of 2023, while the least wealthy bottom 40 per cent accounted for 2.7 per cent, according to Statistics Canada, as reported*

in the Toronto Star, July 2023, Business Reporter, Ghada Alsharif.

UPS combined employee well-being with their ability to attract and retain frontline workers at its Northern California operation. In a statement issued in October 2023, their pilot program for child care options was a scalable success. *In partnership with Patch Child Care Solutions, the UPS Emergency Child Care Initiative was piloted from August 2022 to January 2023 during the evening shift at a UPS facility in Northern California. With goals of reducing work absences because of child care challenges and increasing retention, the initiative was a first-of-its-kind for UPS, which has over 2,000 facilities and more than 500,000 employees worldwide.*

The pilot program offered emergency day care services onsite at the UPS facility, where parents would have the lowest possible barrier to using the new service. 80% percent of eligible employees participated and took advantage of the service more than once, avoiding more than 120 unplanned absences. Employee turnover among the pilot group dropped significantly, from 31% to 4%.

An interesting assessment of well-being is the model used by the country of Bhutan. They have developed and monitor their Gross Happiness Index (GHI). Several Canadian and US cities have adopted the GHI. Bhutan's government uses four factors to rate its GHI, which include:

1. Sustainable and equitable socio-economic development
2. Environmental conservation
3. Preservation and promotion of culture and
4. Good governance.

Economists also refer to the Gini coefficient to rate how *income inequality* affects the individuals in various countries. *Income is defined as household disposable income in a particular year. It consists of earnings, self-employment and capital income and public cash transfers; income taxes and social security contributions paid by households are deducted.*

Pay equity and pay gaps are two distinct metrics. *Equity* is the direct comparison of wage rates for the same work, without considering how these individuals may identify. *Pay gaps* are the average difference between wage rates for different groups of people, without consideration of the specific job.

Author Patrick Lencioni reiterates the need for *healthy* organizations as well as being *smart*. Ensuring the *healthy* organizational values such as good morale and low turnover among employees is as critical as having the *smart* attributes of effective technology, marketing, finance, and strategy. Sustaining a smart and healthy organization is no easy feat based on most corporate records to date, otherwise more companies would have lasting success.

There are two main types of staff turnover. *Voluntary*, where employees choose to work for another employer for increased personal or professional advantages; or *involuntary* where staff may be laid off due to economic issues, behavioural issues, restructuring or displacement through technology.

Turnover can certainly contribute to loss of profits and service impacts. A 2022 study by the Retail Council of Canada demonstrates the costs related to staffing turnover using a rate of \$13.00 per hour. The following table does not include loss of sales, errors or quality problems, or potential harm to the company image, for one employee.

The report provides good insights on onboarding new hires within an era of DEI practices and use of social media. Their review finds that 92% of companies use social media today for recruiting, while 29% of candidates use social media as their primary tool for job searches. The Retail Council of Canada are strong advocates for the hiring of people with systemic barriers to employment and the duty of employers to accommodate their needs. <https://www.retailcouncil.org/wp-content/uploads/2024/01/RCC-HR-toolkit-6-final.pdf>

Adapted from the Retail Council of Canada HR Tool Kit

Action	Hours	\$ Rate	\$ Cost	\$ Cumulative
Termination				
Administration	0.5	25.00	12.50	
Processing	2	30.00	60.00	
Exit interview	1	30.00	30.00	
				102.50
Hiring				
Advertise	2	30.00	60.00	
Average ad cost			250.00	
Review resumes	4	30.00	120.00	
Interviews	3	30.00	90.00	
Background check	1.5	30.00	45.00	
Job offer	0.5	30.00	15.00	
				580.00
Orientation/train				
Administration	1	25.00	25.00	
Orientation	2	30.00	60.00	
Training	12	13.00	156.00	
				241.00
Lost productivity				
Existing staff	80	13.00	1040.00	
Co-workers backfill	80	13.00	1040.00	
Administration	18	30.00	540.00	
Learning curve	40	13.00	520.00	
				3140.00
Total				4063.50

Using the table above, if a company had 100 employees, with a 10% turnover rate, this is costing the company ~\$40,000 – \$50,000 per year at a minimum to replace 10 employees. Larger organizations in the commercial and industrial sectors could be running average hourly wages of \$40.00 per hour. This would extrapolate to \$67,000 - \$77,000 per year in lost value. Well-being, recruitment and retention strategies have a payback. Skilled trades, technology, or senior executives would be considerably higher in the turnover costs as compared with lower wage or entry level staff.

A September 2023 report from Mercer, a human resource service company, stated the average *voluntary* turnover rate in Canada was ~15%, an increase of 25% over previous surveys. The average involuntary turnover rate was ~4%, down ~25% from earlier periods. The combined voluntary and involuntary turnover rates in Canada were highest in the following sectors:

- Retail and wholesale ~37%
- Health care services, other non-manufacturing, and consumer goods ~18%
- Services ~17%
- Logistics ~17%

The industries with the lowest average turnover rates include chemicals and energy at ~9%. Supply chain and transportation services were ~7%. <https://www.imercer.com/articleinsights/workforce-turnover-trends-canada#:~:text=The%20average%20voluntary%20turnover%20rate,dissatisfied%20with%20their%20current%20employers.>

Another estimate on the cost of turnover from the Workhuman® company, using a larger organization example, shows the annual cost of a 10% turnover rate, as follows:

Annual cost of replacing 10% of employees with a staff of 5000
<https://www.workhuman.com/blog/theridiculouslyhigh-cost-of-employee-turnover/>

	Support staff	Mid-Mgt	Senior Mgt
Average salary	\$30K	\$70K	\$150K
Replacement cost @ 75%	\$22.5K	\$52.5K	\$112.5K
Healthy turnover @ 10%	350 staff	100 staff	50 staff
Replacement cost	\$7.8M	\$5.3M	\$5.6M
Total cost of employee turnover		\$18.7M	

Business with a purpose

Interest in the environmental issues in general began in the mid-1960s. The attention to the social factors in business began ~20-years ago. The City of Vancouver enacted the first Ethical and Sustainable Procurement Policy in Canada in 2005. This action led to social procurement policies and practices in many sectors which saw the value of 3rd party service providers in the form of social enterprises. Social enterprises are *businesses with a purpose*.

Some of the more well-known examples of social entrepreneurs include:

- Bill Drayton, founder of Ashoka, which supports social entrepreneurs on a global basis;
- Blake Mycoskie, founder of TOMS, donating shoes, eyewear, water and community development programs;
- Dame Anita Roddick founder of The Body Shop, focused on sustainable ingredients and supporting small scale farmers;
- Jeffrey Hollender, founder of Seventh Generation, developed eco-friendly cleaning and hygiene products and donates 10% of profits to social and environmental programs;
- Mohammed Yunus, founder of the Grameen Bank, which began micro-credit loans aimed at women to start businesses in villages desperate for services and to develop their financial independence;
- Paul Newman who co-founded Newmans Own (1982) with profits donated to multiple social causes.

ESG is reliant on responsible and ethical businesses, be they for-profit or not-for-profit organizations. Their customers buy the brands and services and are loyal and trusting of their operations. Yvon Chouinard, co-founder of Patagonia, is a good example of a for-profit business, which voluntarily

contributes to communities. Patagonia donates 1% of its sales to support and address environmental issues.

Businesses with a purpose must also be financially viable. Social entrepreneurs are not dependent on grants or donations to sustain their operations. Charities are dependent on grants and donations. For-profit companies must meet the needs of its shareholders and investors. Social entrepreneurs are not profit motivated but fully understand that in order to do more good, they must also be successful business managers as they operate their social enterprise and often compete with for-profit companies.

Research Gate provides a comparative look at conventional business entrepreneurs and social entrepreneurs. <https://www.researchgate.net/>

	Business Entrepreneurs	Social Entrepreneurs
Goal	Capture a market securely	Fill a market gap; change the world
Objective	Build a business; earn profits	Create sustainable solutions for social change
Profit Motive	Maximize shareholder value; profit as an end	Advance social aims; profit as a means to financial sustainability
Risk	Basic business risk	Basic business risk plus social aspect
Links to social problems	Indirect	Direct
Feedback	Established consumer and market information sources	Need to be creative in obtaining market and responses
Competition	“Win” for one business over others in a market	Exists because no one else adequately solving problem, “win” for society
Growth	Competitive for one company	Collaborative for societal impact
Capital	Benefit from robust financial and managerial services	Contend with unpredictable and fragmented financing

Social procurement

Social procurement can include fair trade products; living wage programs; local economic development; apprenticeships; community enrichment; supplier diversity; business ethics; environmentally responsible products and services; and building social capital. Social procurement is *the shift from making good deals to making deals that do good*. Today more private sector, publicly traded companies and public sector organizations are embracing social purchasing practices.

Social procurement aligns with several of the UNSDG goals of 1. No poverty; 3. Good health and well-being; 8. Decent work and economic growth; and 10. Reduced inequalities.

ISO 26000 Social Responsibility guidelines use (7) core subjects for organizations to address to engage in ESG-based actions. These are:

1. Organizational governance
2. Human rights
3. Labour practices
4. Environment
5. Fair operating practices
6. Consumer issues and

7. Community involvement and development.

Where most ISO standards are *compliance-based*, these are *guidelines* only. ISO 26000 aligns with the UN SDG goals, similar to social procurement above, with the addition of 8. Gender equality; 9. Affordable and clean energy; and 13. Sustainable cities and communities. ISO 26000 sets an expectation of good governance in organizations which adopt the guidelines.

Social enterprises

Social enterprises are operated by business entrepreneurs. Social enterprises do not displace conventional, profit motivated suppliers in a community. Social enterprises complement the supply side in the market. Their role is to find ways in which people who are systemically barriered have opportunities to be represented in the workplace. Meaningful work is a basic human desire. Where a for-profit company trains and hires for efficiency in service delivery, they can be reluctant to hire individuals who potentially appear to be less efficient. Social enterprises are able to provide the skills and types of work best suited to the needs of a barriered individual. For-profit companies which do work with social enterprises, demonstrate their sense of care and commitment to a community through their business practices.

Social enterprises are a new supplier base for supply chains to work with for goods and services. With labour shortages in all sectors, SEs are filling the gap. In BC, Embers Staffing, also an SE, specializes in skills development and training, which connects workers with companies. Many of these workers were people facing systemic barriers to traditional employment. Founder, Marcia Nozick, began Embers in 2001 with a mission to create economic and employment opportunities for people in Vancouver's Downtown Eastside. In 2018, Embers employed 1900 people and paid \$6.5M in wages and benefits.

One of the stronger advocates for the advancement of social procurement is Buy Social Canada. It's Executive Director, David LePage, has built a credible program for implementing social procurement into organizations. Buy Social Canada offers training workshops for parties to gain expertise in engagement between social enterprises and buyers. <https://www.buysocialcanada.com/>

The BC Social Procurement Initiative was formed in 2019 by Presentations Plus Training & Consulting Inc., Buy Social Canada, Scale Collaborative, and the Vancouver Island Construction Association. BCSPi pioneered the development of training programs on social procurement in the BC public sector for several years. BCSPi was a catalyst for many cities and towns to implement social procurement practices across BC. <https://bcspi.ca/>

For 25-years, the Canadian Association for Supported Employment (CASE) based out of Nova Scotia, provides comprehensive programs for engaging employers with disabled individuals. CASE works with employment service providers, community agencies, and stakeholders working toward full participation in the labour market by offering resources, expertise and support. <https://supportedemployment.ca/>

A growing presence in the social procurement sector is Buy Social USA. Their mandate is to help corporations, government entities, universities, and other institutional buyers, *buy better*. Part of their program for sellers is a verification program using a curated list of social enterprises. <https://www.buysocialusa.org/>

Social enterprises (SEs) are not-for-profit organizations which represent the well-being of individuals which face systemic barriers to employment. Barriers may be attributed to being new immigrants, lack of transit, limited education, elder/child care needs, criminal records, availability for hours of work, Indigenous biases, or other impediments to being *interviewed for* or holding a job. The Accessibility for Manitobans Act has defined (5) types of barriers:

1. Attitudinal barriers where people think and act based on false assumptions

2. Informational and communication barriers where some the people receive what they need to know but not all
3. Technological barriers occurs where people with disabilities cannot access the site
4. Physical and architectural barriers are where obstacles prevent easy access
5. Systemic barriers are policies, practices or procedures that result in some people receiving unequal access or being excluded.

Would your organization hire an ex-convict? Likely not. However, Purpose Construction out of Winnipeg, does. As a social enterprise, Purpose Construction trains barriered individuals to qualify for construction work, pays them living wage rates, and helps them to return to full time work—often in the private sector. Purpose Construction builds social capital in a community. With a shortage of skilled trades, Purpose Construction can supply a pool of workers to meet the demand in the market without government subsidies. <https://www.purposeconstruction.ca/contact/>

Living wage rates are based on the local community costs to afford a living. It is based on (2) adults with (2) children; (1) child in FT Day care; (1) child in pre- and after-school care; adults each working 35-40 hours per week; (1) parent taking an education after work hours: groceries; transit pass; and rent. LW rates exclude: credit cards, loans or debts; retirement savings plan; owning a home; children education savings plans; elder care; and any costs “beyond the minimal required for recreational, entertainment or holidays.” Each community has a LW rate for its specific economic conditions. Many cities have adopted LW rates in Canada since 2011. The City of New Westminster, BC was the first to do so. The City of Vancouver initiated its LW policy in 2017 and abruptly stopped its LW program in January 2023. <https://www.livingwage.ca/>

It costs ~\$120,000 per year in Canada to incarcerate an individual, with an average age of 30, based on a variety of Federal government statistics and the Office of the Parliamentary Budget Officer. There is a 60% probability of recidivism, within one-year, if they have spent one term in prison. While social programs have difficulty finding adequate funds to deal with early *prevention* for youth at risk, we always find the \$120K for their *treatment*. This reiterates that our community resources tend to be focused on the cost of treatments rather than prevention when it comes to social interventions from bullying, racism, addiction, and to housing. Prevention has a payback.

In July 2013, a new type of corporation was introduced by the BC Government. Community Contribution Companies, or CCCs, are hybrid corporations that bridge the gap between for-profit companies and non-profit organizations. Similar to non-profits, CCC's are setup to achieve a social purpose and must adhere to BC government law related to this. However, unlike non-profits, CCC's can attract equity investment for growth and operate the same way as any other business. Non-profits and charities have restrictions as to owning and operating businesses and running social enterprises. The CCC model allows social enterprise businesses a legal structure to operate under.

CCC's must follow a number of BC government rules to ensure the majority of their profits and assets will always be directed toward a social purpose.

One of the early and continuing success stories in the social enterprise sector, is CleanStart Property Services CCC Inc. CleanStart was the idea of its founder Dylan Goggs, who took a new way of looking at how business can contribute to social values and community development. CleanStart began in 2010 with one truck and handful of employees, many of whom faced systemic barriers to employment.

CleanStart takes its role of accommodating people facing employment barriers very responsibly and with a sense of duty. CleanStart pay living wage rates and provide benefits. Where workers have reentered rehab, CleanStart has held their jobs open for their return to work. When an employee couldn't pay for their child's school supplies, CleanStart arranged for a donation to cover the cost and issued an interest-free loan. When one employee couldn't make their rent payment, CleanStart

provided a pay advance to avoid eviction. CleanStart has become a very successful business and has encouraged and resulted in many other social enterprises to be formed. <https://cleanstartbc.ca/>

In 2023, CleanStart provided 13,000+ supportive employment hours. The estimated *social return on investment* was \$613,000+. See SROI below.

Another successful social enterprise is Jonnon Designs. Jonnon is a team of Vancouver-based sewers and artists who face barriers to traditional employment, like new immigrants, new parents, people living with or recovering from mental illnesses, or people with physical barriers to full-time work, incorporating their skills and craft into the clothing designs. Many of the Jonnon group work from their homes, on their own schedules, with their preferred work loads. Jonnon Designs is a CCC and is owned by entrepreneur Azadeh Hessami. Azadeh took over the company, formerly known as Common Thread, and the staff, when its original owner retired. One of the key products which Jonnon creates is upcycling street banners into reusable bags. Another theme of the circular economy – repurposing. www.jonnon.ca

Colleague Chris Carter, likes how a local SE operates in the Tri-Cities area of BC. *DisDaBomb*, founded in 2010, by Angela Lusignan is a social enterprise now operated by the Community Ventures Society (CVS). DisDaBomb has a dedicated team which produces, promotes, and sells a wide array of colourful and creative bath bombs. What's different here is that this initiative employs seven individuals living with developmental disabilities. Not only are these individuals able to earn a wage, but this work delivers the pride, satisfaction, and the feeling of purpose delivered from meaningful employment. All funds raised at DisDaBomb are reinvested into the company. They sell ~200 bath bombs per day! This growth has led to an expansion of their team and the growth of influence in their social enterprise.

SEs play a vital role in providing employment opportunities, job training, and ensuring a safe work place for people facing disabilities.

Social return on investment

There is a social return on investment when disenfranchised people gain meaningful employment, as shown in an empirical study by Ernst & Young with Atira Property Management in 2017. A financial return of \$4 to \$1 is not uncommon. <https://atira.bc.ca/apmi-social-return-on-investment-report/>

The social return on investment, from the E&Y report, summarily found economic and social benefits through:


- Reduced social needs
- Taxes and benefits paid by employees
- Increased local spending
- Reduced shelter costs
- Reduced crime-related costs
- Reduced reliance on social subsidies
- Increased employability
- Increased self-esteem
- Improved health
- Improved quality of life

Social procurement, which is a progressive, value-based model for supply chain professionals, was referenced in the books, *Good Planets Are Hard to Buy* and *Plan It for Our Planet*, both by Larry Berglund. Watch an interview from 2021, *Buying Hope*, with an overview of the shift towards social procurement in Canada.

<https://www.youtube.com/watch?v=DG-MriOsSso>

Fair trade products



In Canada, Fair trade (FT) certified products are recognized by the federal government. This logo,  is the only one which can be applied to ensure the products are FT compliant. The FT strategy enables farmers and workers to have more control over their farming and production. This leads to an increased income with improved health and education in the families of the farmers. As a leader in the global movement to make trade fair, Fairtrade supports farmers and workers and connects with the consciousness of the customers who buy their products. <https://fairtrade.ca/>

There are literally hundreds of FT certified cities and towns globally. Many private sector organizations have agreed to buy FT products for their staff and understand that FT products are a voluntary way to support responsible sourcing. FT produce includes: bananas, cocoa, coffee, cotton, flowers, fruits, herbs, honey, nuts, oils, quinoa, rice, sugar, tea, veggies, textiles, and wine.

One of the myths about FT certified products is that FT costs more than conventional options. In October 2023, the price of a local, Canadian FT roasted coffee was \$.0308 per G, in my retail grocery store; while the price of a US brand regular coffee, at the same store, was ~8.5% more at \$.03354 per G. Buying the local FT contributes more to local employment, reduces the environmental costs associated with shipping, the *economic multiplier effect* is better for local companies, and it addresses the environmental interests outside of Canada where the coffee beans were grown. When I first got involved with FT coffee, 18 years ago, there was a ~20% premium for FT. The market acceptance of FT has increased the demand and appears to have made FT coffees more competitive.

Costco supports the Equitable Food Initiative (EFI) and FT by paying a premium for products which are labelled with the bona fide symbol.

FT certified products ensure:

- 3rd party audits are conducted on a regular basis
- Direct income for farmers which at prices better than open market prices
- Safe working conditions for workers
- Improved health and education for workers
- Environmentally responsible practices to grow FT products such as coffee and tea

The *economic multiplier effect*, using FT coffee as example, means that for every dollar spent locally, the money is redistributed into the local and / or Canadian economy, when buying locally roasted coffee beans. When we buy FT or regular coffee beans from a US-based company, there is less money redistributed locally, as the profits leave Canada, favouring the MNC.

Another example of the economic multiplier effect on office supplies has a similar outcome. A 2013 study, *The Power of Purchasing: The Economic Impacts of Local Procurement*, by Tony Pringle, showed that for every \$1.00 spent with a local office supply company, \$0.45 was reinvested locally. When a \$1.00 was spent with a MNC office supply company, only \$0.15 was reinvested locally. This study, and others, show the fallacy of primarily measuring out-of-pocket costs, rather than a total cost of ownership model, when making sourcing decisions. The long-term effect on the office supply market has shown a decline in local SME office product companies with the larger market share going to MNCs, over very small savings margins, for the past decade – almost irreversible now.

We could posit, that the larger governmental buyers have been supporting MNCs at the expense of Canadian SMEs in several sectors. The lack of consideration of the economic multiplier effect skews the decision-making. This is not to say there should be a bias for local but that best value is more complex than just simple quantifiable comparisons. <https://www.locobc.ca/blogs/the-power-of-purchasing>

Decarbonization practices

The 2015 Paris Agreement and the UN Framework Convention on Climate Change led to the target of 1.5°C limit above pre-industrial levels. The target supports the Net Zero campaigns and many businesses are trying to reduce their anthropogenic impacts on global warming. An April 2022 McKinsey Sustainability report highlighted (10) technologies to mitigate carbon emissions:

1. Renewable energy
2. Batteries and energy storage
3. Circular economy
4. Building technologies
5. Industrial-process innovation
6. Hydrogen
7. Sustainable fuels
8. Nature-based solutions
9. Carbon removal, capture and storage
10. Agriculture and food

Decarbonization is a two-fold strategy. First, significantly reduce the greenhouse gas emissions; and secondly, remove carbon from the biosphere by capturing emissions and increasing storage in agriculture and forests. Decarbonization should have energy security as part of the strategic plans.

We have been reliant on fossil fuels to drive industry and commerce for 1 ½ centuries. This source of cheap, plentiful energy allowed relatively unrestricted use of fossil fuels, replacing steam, until a couple decades ago. Hydro energy was developed shortly after the oil industry began. At one-time, England went all-in on gas lighting while electricity was available. Betting on one source of energy or fuel is risky. In the 1970s, the only threat was oil embargos and financial threats from OPEC. These were mitigated over time and a few geo/political events created economic stress but supply was assured. North America is now quite independent of fossil fuels from foreign nations. The G7 countries and other international organizations, such as the UN, are phasing out fossil fuels for cleaner sources of energy. Ensuring energy security will always be an important part of any country's strategy for economic and social development. Having fossil fuels available could make sense from a military defence position alongside the other forms of renewable energy. For the foreseeable future, other countries we compete with, are continuing to use fossil fuels while exploring cleaner types of energy.

Norway, which relies heavily on clean hydro power for its electricity grid, and has adopted EVs to displace ICE vehicles, continues to increase its export of crude oil to Europe. In December 2023 it produced 1.85 M bpd, which is a record output, and is increasing exploration of natural gas near the Arctic Ocean. Norway supports the 2015 Paris climate agreement and agrees with phasing out fossil fuels but acknowledges the demand for fossil fuel will continue for decades. And it generates considerable revenues to afford the transition to cleaner energies.

This will require rethinking how energy is created, how we maintain production and distribution of goods, and land management practices. The increased warming of the planet is largely attributed to power generation, industry, transport, buildings, and agriculture methods.

The electrification of society puts tremendous pressure on the demand for electricity. Currently, power generation from fossil fuels is accountable for 30% of the global CO₂.

This implies the need for more renewable energy sources. A serious challenge for industry is the production of steel, cement, and chemicals where they require 1600°C+ which fossil fuels can easily

achieve, whereas, electrical power cannot. Options include clustering of energy plants at concentrated sites for integration of processes. According to the Columbia Climate School, sustainable biomass can be used for some cement factories and steel plants. Steel is possible through charcoal combustion instead of coal, where charcoal is deemed to be a renewable energy source. In spite of the technical solutions to curb emissions, there is a note of positivity from CEMEX CEO, Fernando Gonzalez, “The transition of a hard-to-abate industry like cement to be a carbon-neutral economy is feasible. And, it is profitable.”

Biomass is an alternative, renewable source of energy, used in many global locations in the form of wood pellets. Wood pellets can be used to convert coal-fired energy operations to biomass energy. Burning wood is allowed under the Paris Climate Agreement as long as trees which are cut are replanted. Trees are a natural carbon sink. There are certainly debates over claims that burning wood releases less CO₂ than coal as an example. Pellets can be made from recycled pallet boards, forestry residues and tree branches, reducing landfill waste. Pellets are relatively easy to store and transport to rural areas with smaller populations and lack of other energy infrastructures for heat and power. There is a demand in the UK, Europe, Japan and South Korea to replace coal with wood pellet energy. Biomass and biofuel sources, in addition to wood, include garbage, foliage, food scraps, and waste cooking oils. Biogas is produced from animal manure and human sewage. The US Energy Information Administration estimates that biomass meets ~5% of the energy demands.

Assisted migration practices are being used by various jurisdictions to mitigate climate change problems in forests. As temperatures affect the ability of trees to take seed and mature, having people transplant trees from different locales is being seen as a means of ensuring forest cover. While not without controversy, this scientific led practice is a preemptive way to test longer term effects of climate change and assess species survival.

Test case on assisted migration from the Government of Canada site:

In an assisted migration trial in Claremont, Ontario, led by Natural Resources Canada and the Ontario Ministry of Natural Resources, six hardwood species were gathered from four different seed sources and replicated five times. Species and seed sources were selected from locations approximately 500 (Pennsylvania), 900 (Kentucky) and 1,400 (Tennessee) kilometres south of the Claremont planting site, using one local seedzone as a control. Trials such as these and older forest genetics trials are increasingly being used to help address the many questions raised by assisted migration.

As Co-Chair of the Glasgow Financial Alliance for Net Zero (GFANZ), Mark Carney stated in an interview with McKenzie & Company in December 2022, there will be substantial *stranded assets* in the conversion away from fossil-fuel based companies. Coal plants and other high-emission assets will require bridge financing in some form as a sectoral pathway to wind down these operations to achieve the 1.5°C temperature reduction targets. Many of the coal plants have 30-40 years of remaining operational time which will need to be incentivized to come to termination earlier than they originally intended. Financial institutions, under the guidance of GFANZ, will play a pivotal role in this economic transition. Phasing out fossil-based industries will require economic viability to ensure energy security. Financing options for energy infrastructures are not market ready.

In early 2024, Exxon Mobil and Chevron formally signed off to end of their California oil interests with the state of California, after 100+-years. This includes their offshore production assets. The value of the write down of their combined stranded assets is ~US\$5B. Bellwether California, will ban new ICE vehicles by 2035.

In a November 2023 report, *an affordable, reliable, competitive path to net zero*, McKenzie & Company summarized the concurrent, yet independent strategies for the transition to net zero as follows:

1. Reduce GHGs

2. Ensure companies can remain competitive and benefit during the transition, regardless of country or region
3. Ensure the affordability of energy, materials, and other products when compared to traditional options
4. Ensure that sourcing strategies address security and resilience across the supply chain

In October 2021, the Science Based Targets Initiative (SBTi) issued net zero targets and global temperature reductions to pre-industrial levels of 1.5° C. The SBTi set best practices of introducing transition plans to deal with Scope 1, 2, and 3 emissions, short-term milestones of achievement, Board governance responsibility and executive compensation tied to achieving results. The SBTi is funded by IKEA Foundation, Amazon, Bezos Earth Fund, We Mean Business coalition, Rockefeller Brothers Fund and UPS Foundation.

Scope 1 emissions are those which are *directly* controlled and generated from an organization-owned asset. Scope 1 emissions can include those from furnaces, boilers, facilities and company vehicles. Actions to consider are: retrofitting HVAC systems; fleet fuel options; heat pump installations; LED lighting options.

Scope 2 emissions are *indirectly* attributed to purchased energy, transportation, waste, business travel, employee commuting, and chemicals incurred by suppliers. Coal-fired vs hydropower GHGs would be vastly different in volumes, as an example.

Scope 3 are also indirectly generated by the suppliers to an organization through the supply chain materials being supplied, their transportation, excavation, end-of-life disposal, or use when sold in the market. Scope 2 and 3 indirect emissions are mutually exclusive by classification. Scope 3 emissions should be identified as being upstream or downstream in the supply chain process. Actions to take to reduce upstream emissions require sourcing of low-carbon materials which have large impacts such as metals and batteries; use of recycled or bio-based materials where production processes can be adapted; design products to for ease of recycling; use of alternative binder materials as found in concrete-free cement.

Upstream Scope 3 indirect emissions are: purchased goods and services; capital goods; fuel and energy related activities; transportation and distribution; waste generated from operations; business travel; employee travel; and leased assets. The upstream activities are the inbound actions incurred to acquire the goods and services from all suppliers to produce a product.

Downstream Scope 3 indirect emissions are: transportation and distribution; processing, use of sold products and their end-of-life treatment; leased assets; franchises; and investments. The downstream activities are the outbound actions required to get product to market for the sellers and eventual disposal by customers. Actions to take include converting ICE to EVs or buying EVs; work with customers who are like-minded to pursue DIR processing or expand their recycling capabilities; develop composite products from waste stream. An example from Nestlé, in 2024 they will move 50% of their global shipping needs with Hapag-Lloyd, Maersk, and CMA CGM on ocean freight using lower-carbon fuels. The estimated reduction is 200,000 tCO₂e per year from their Scope 3 emissions.

Luiz Amaral, CEO of SBTi, estimates that Scope 3 emissions are 11 times greater than Scope 1 emissions. Supply chain professionals are in a position of influence to affect Scope 3 emissions through targeted agreements using SBTi methods. See Addendum X.

The cost of decarbonization has yet to be faced head on. In late 2023, the Clean Energy Procurement Academy (CEPA) was formed by major players including Apple, Nike, Amazon, Meta, PepsiCo, and REI Co-op. CEPA estimate that 50% of GHGs are attributed to supply chain actions.

“To address the climate crisis, we need to act quickly to expand access to clean energy around the world. Businesses can help drive that change,” said Sarah Chandler, Apple’s Vice President of Environment and Supply Chain Innovation. “As we make progress to ensure every Apple product is carbon neutral by 2030, we will continue to work closely with our global suppliers to support their transition to renewable energy. We’re proud to collaborate with CEBA and others to expand those efforts beyond our supply chain and across industries.”

In a report by McKinsey, the transitioning to net zero emissions could require \$US 3.5 trillion a year! Who will pay for to reduce the Scope 3 emissions the buyers or the sellers? Will consumers be able to absorb the cost in the goods they need? The cost is equal to ~50% of the world’s global corporate profits. <https://www.supplychaindive.com/news/who-will-pay-to-decarbonize-the-supply-chain/690631/>

Carbon sequestration involves capturing CO₂, removal and storage from the atmosphere. The two types of sequestration include biological and geological. Biological uses the natural carbon sinks such as reforestation, restoration of mangroves and wetlands, soil and water. Geological relies on the technologies to store CO₂ in underground rock formations. Carbon capture and storage compresses the CO₂ and it is then injected into rock formations for permanent storage. Capturing CO₂ during the production process allows for increased scalable solutions. In addition, is direct air capture and storage (DACS).

The largest CO₂ DACS plant is located in Iceland. It has been operating since September 2021 to remove a targeted 36,000 tonnes of carbon per year from the atmosphere. This is a scalable solution with the US and other countries adapting similar technology. Swiss-based Climeworks developed this effective DACS process involving subsurface mineralization of carbon which is meeting ISO 14064-2 standards. <https://climeworks.com/direct-air-capture>

The federal government provides tax credits for companies which invest in equipment to capture CO₂ and for equipment to transport, store and use CO₂. Reducing industrial emissions through carbon capture, utilization and storage technology (CCUS) is a key governmental strategy to address climate change. An example is the 2023 start to the Heidelberg Materials cement plant in Edmonton. The \$1.4B project is designed to capture and store carbon which is the equivalent of 300,000 cars per year. This would be the first carbon neutral facility in North America. The CO₂ would be piped underground and stored near Edmonton.

CCUS is part of the strategy which creates CCUS hubs. The cluster of CCUS hubs is intended to allow the sharing of CO₂ transportation, storage or utilize the same infrastructure. This will reduce the significant barrier costs to expanding CCUS facilities. The number of gigatons required to reduce GHGs will require hundreds of CCUS hubs. Currently there are only a handful of hubs in the world but hundreds more are needed and being planned. A 2021 report, *Is carbon capture too expensive?* by Baylin-Stern and Berghout addresses the issue of the concentration of CO₂ emission streams. High concentration is found in the production of ethanol and ammonia which is ~70% of the emissions and are the lowest cost for a CCUS system. But these only account for 5% of the global emission volumes. Low concentration operations such as power generation, cement and petrochemicals represent 3 times the percentage of global emissions but are the most expensive to bring into a CCUS infrastructure.

In early 2024, under the US Inflation Reduction Act, existing US natural gas plants were required to reduce their CO₂ emissions through CCUS. This requirement was amended in 2024 to address economic interests, largely driven by political agendas as the US election looms.

In early 2024, Germany said they will allow CCUS with offshore storage for certain industrial sectors in order to realize their net zero 2045 goals. To do so means transporting CO₂ which could assist the cement industry in reducing emissions which are currently banned from land sequestration.

Enfinite, one of the largest CCUS energy storage players in Alberta, is bringing more capacity on line in early 2024. This will bring Enfinite's capacity up to 180MW, per Jason White, executive officer. Industry group, Energy Storage Canada says that there needs to be ~12,000MW of storage to achieve a net-zero electricity grid. In January 2024, the Alberta Electric System Operator (AESO) issued an emergency alert as there was not enough electricity to meet the demand due to extreme cold weather. Emergency services *urged Albertans to turn off unnecessary lights, avoid cooking with a stove and delay charging electric vehicles.*

In October 2022, global giant Apple signaled that it wants its supply chain to be carbon neutral by 2030. Apple chip supplier Taiwan Semiconductor Manufacturing Company, stated they will be using 100% renewable energy, as reported in Supply Chain Dive. When leading brands like Apple make these commitments, it's a game changer with a positive ripple effect across many sectors. The Boston Consulting Group estimates that only 10% of companies were measuring their emissions, up 1% from 2021.

Renewable energy is going to continue to target wind and solar development, which show promising results to date. Challenges for these alternative energy sources are serious. Land availability being one. Germany has only ~9% of its land available which would be considered prime for onshore wind farms. Morocco is leveraging the use of solar energy to displace imported energies. In a November 2022 report by E&Y, ~20% of Morocco's energy is powered from renewables such as solar and wind turbines. Solar has enabled this emerging economy to irrigate vast areas of its desert country and increasing its agricultural exports at a relatively low cost. India, Egypt, China, UAE, and Mexico operate some of the largest solar farms.

Solar energy technology is facing a dilemma in terms of which type of system should be installed. More conventional solar investments are based on photovoltaic (PV) panels while an emerging technology uses concentrated solar power (CSP). PV is a lower capital cost but lacks the ability to store energy; CSP is a much higher capital cost but can provide power at night. Investors and energy providers are mixed on these competing interests.

According to the China Electricity Council in 2024, grid-connected wind and solar power generation would provide ~40% of the energy, about equal to coal generation by the end of the year. Coal continues to supply 60% of China's overall energy demand.

Vehicle-to-grid technology is being trialed in 2024. The technology allows an energy grid to draw power from a battery when it is plugged in during a peak period and replenish the battery when demand is lower. This would be applicable for larger buses which sit idle for longer periods. In December 2023, BC Hydro along with Powertech Labs, and several other partners, successfully tested an E-bus to the grid through a 60KW charger. This is referred to as a bidirectional charging hub.

In the heart of Canada's oil and gas industry, Alberta is making strides in renewable energy. According to Nagwan Al-Guneid, Director of Business Renewables Centre Canada, says there is a surge with private energy developers into wind and solar projects. Southern Alberta and Saskatchewan have a propensity for high winds with an abundance of sunshine. Saskatchewan has a higher investment in solar projects. The increase in renewables is driven in part by the deregulation of the electricity market. Most provinces have control of energy rates.

AGT Foods out of Saskatchewan, is crushing canola seeds and producing zero carbon fuels to replace diesel fuel. The ability to replace diesel with a renewable, clean fuel source should cause pause to replace ICEs in E-trucks. Clean fuels can extend the life of existing resources and are renewable. In Canada, the Clean Fuel Regulations increase incentives for the development and adoption of clean fuels, technologies and processes. The goal of the Clean Fuel Regulations is to significantly reduce pollution by

making the fuels we use every day cleaner over time. The Clean Fuel Regulations require liquid fossil fuel (gasoline and diesel) suppliers to gradually reduce the carbon intensity – or the amount of pollution – from the fuels they produce and sell for use in Canada over time, leading to a decrease of approximately 15% (below 2016 levels) in the carbon intensity of gasoline and diesel used in Canada by 2030.

<https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-regulations/about.html>

In 2020, the Athabasca Chipewyan First Nation partnered with Concord Green Energy to build three solar-power farms in Southern Alberta. The \$145M investment will yield 150 gigawatt hours of clean electricity per year. This is significant as 1 gigawatt = 1B watts or capable of providing energy to ~300,000 homes. The project aligns with the Province of Alberta commitment to reduce dependency on coal-fired electricity generation; reduces need for diesel-powered generators for Chipewyan residences; demonstrates the leveraging opportunities with the UNDRIP for economic development and social well-being; and the commitment to the UN SD goal of clean and affordable energy; and the circular economy principles of energy and resource conservation. Scalable models can be used by BC First Nations-led clean energy projects to support Canada's net-zero targets.

Albertan coal companies are suing the province for \$10B in damages, for changing the legislation which in 2020 allowed for increased mining in mountainous regions and then reversing this allowance in 2022. The cases are expected to go court in early 2024. Previously, the province had been trying to attract coal mining corporations to expand the supply of metallurgical coal.

Newfoundland and Labrador, ended a moratorium on wind power in April 2023, and opened bids for wind energy projects a few months later, according to a Canadian Press article in August 2023. There will be no government subsidies involved and a potential for revenues of \$22M per year for the Provincial coffers. The site for the project involves 5M square Kms of Crown Land. The application process is expected to take ~18 months with environmental studies and 3rd party financial analysts reviewing the proposals.

Canada's Diavik mine, operated by Rio Tinto in the North Slave Region of the Northwest Territories, is constructing a solar power plant. The facility is designed on bi-facial panels which generate power from direct sunlight and light which is reflected off the year-round snow cover. It will be capable of producing 4200 mega-watt hours of electricity per year. The solar energy will displace 1M litres of diesel fuel per year, reduce 2900 tCO₂ e and will be completed in early 2024. The renewable solar power will complement Diavik's current wind diesel hybrid generation system. The ~4 M\$ funding is shared between the Government of the NWT and the Federal government's Large Emitters GHG Reducing Investment program.

In a 2023 Reuters report, Britain has successfully been harnessing wind power and brought the world's largest wind farm, Hornsea 2, online in August 2022. Wind power generates 26.8% of the country's electrical requirements. This resulted in a 5% reduction in importing electrical energy from France. However, gas-fired plants increased output by 1.8% over 2021-2022 to meet demand.

Germany is on target to achieve a conversion from fossil fuel energy to renewable energy supplying 80% of its power by 2030, which will require 50% more renewables than they are currently using. Their Economic Minister, Robert Habeck made this statement in early 2024. Germany is relying on wind power for 31.3%; solar for 12.0%; biomass for 8.4%; and other low carbon generation options at 3.4%. They have moved away from nuclear, are abandoning coal generation, and will use existing gas plants as a backup supply. Germany's CO₂ emissions are the lowest since the 1950's. Germany is going to invest in gas-powered generation systems to ensure adequate energy backup until renewable energy is reliable to service the demand. Germany will spend ~\$20B Cdn to subsidize existing gas plants to convert to hydrogen energy by 2035-2040.

The current EU leader in renewable energy is Portugal, at 61%. Their target is 85% by 2030. In part due to the Russian natural gas supply being curtailed, Portugal has transitioned electrical power to wind at 25%; hydro at 23%; solar at 7%; and biomass at 6%. It's natural gas demand dropped 21% in 2023 from 2022 with most of it being delivered via ship.

Spain reportedly is having renewable energy provide 50.8% through wind and solar and has targeted 80% by 2030. Gas is down to ~17% as an energy source. Spain's industrial activity has slowed and is reducing the demand for electricity, in a 2024 Reuter's report.

Solar panel supplies are dominated by Chinese manufacturers. The US and India are subsidizing domestic solar panel manufacturers as China supplied 80% of the market in 2023. China invested \$US130B last year in solar technology and capacity. China will be able to supply more than a terawatt of solar capacity in 2024. The US and India combined can product 200 gigawatts of solar capacity or 20% of the Chinese capability. <https://www.reuters.com/world/china/china-will-dominate-solar-supply-chain-years-wood-mackenzie-2023-11-07/>

European solar manufacturers are potentially facing production shutdowns or bankruptcies due to the glut of panels on the market in early 2024. The European Solar Mfg. Council is seeking government funding to protect their financial viability. The ESMC wants emergency measures including buying excess inventories, changes to regulations which favour local solar producers, or add tariffs and quotas to imported panels.

The IEA reiterated the position of China as the global leader in renewables in January 2024. They predict that China will account for 56% of the increases to renewable energy capacity between 2023-2028. This amounts to 2060 GW from China while the rest of the world, combined, will add 1574 GW. As an example, Australian billionaire, Andrew Forrest, in January 2024, announced a project to add 14 GW of clean energy by 2030, which would be 1/3 of Australia's renewable energy target. The IEA forecast a demand of 11,000 GW of renewable energy by 2030 to displace existing fossil fuel energy. Low-income countries in Africa, Asia and Latin America will be hard pressed to find investments to offset their fossil fuel needs. <https://www.reuters.com/sustainability/climate-energy/renewable-energy-growth-must-accelerate-reach-2030-goal-iea-2024-01-11/>

Many issues remain to harness wind power and other renewables to reduce fossil fuel dependencies. One is the technical expertise required to design and build wind and solar plants, operate and maintain them, facing labour shortages. Wind and solar energy compete for the supply of critical raw materials and rare earth metals which drive costs upwards. The International Renewable Energy Agency (IRENA) identified these problems in 2017. Juxtaposing the volatility of prices and governmental financial support compounds the transition options.

Thermal Energy Storage (TES) technology complements renewable energy sources. TES provides reserve power, energy storage, and increases the efficiencies where heating and cooling are necessary. TES can store heat or cold which can be accessed when required to balance the supply and demand of various forms of energy generation and technologies. Heating and cooling consume ~50% of energy requirements for buildings and in industry. Similarly, long-duration energy storage (LDES) ensures clean energy is available by capturing the waste or excess energy being produced and having the flexibility to draw from days, weeks, or months later. Solar and wind as energy sources have limitations dependent upon weather and seasonality. TES and LDES smooth the peaks and valleys associated with these forms of renewable energy and support decarbonization.

The 2022 US Inflation Reduction Act has significantly spurred investments and changed business practices through technology advancements. Battery energy storage systems (BESS) investments are growing significantly. While energy sources can be intermittent, such as solar or wind, BESS offers options to address capacity. There is the potential for BESS to replace backup diesel generators and

lead-acid batteries.

Renewable energy is dependent upon batteries to store energy. The emergence of vanadium as an alternative to lithium-ion batteries is on the market. Vancouver based Invinity Energy Systems is making shipping container sized batteries with the capacity to power 15-20 homes. The batteries enable solar and wind turbines to generate the power and store it when the sun goes down or the wind stops to provide reliable energy. The advantage of vanadium batteries is that they can be charged and discharged over 100s or 1000s of cycles; whereas, lithium-ion degrade much faster during the charging cycles. Invinity has productions centres in Scotland and Asia.

IRENA shared some interesting limitations on the use of hydrogen. Hydrogen is not an energy *source*; it is an energy *carrier*. Hydrogen must be manufactured as it does not appear naturally. Pipelines for hydrogen can cost 10-50% more than oil pipelines and currently there are few hydrogen pipelines for transporting the fuel. If hydrogen is produced from fossil-fuels, it adds to the GHGs – although it can be made from renewable electrical energy. The demand for low-carbon hydrogen is not strong. Hydrogen is primarily for road transit in fuel cell EVs (FCEV) and refueling stations. Some municipal fleets operate using hydrogen as they have a limited range of travel and can be fueled from a municipal station.

In contrast, Vietnam is investing in hydrogen production, including green hydrogen, by 2030. They are targeting an output of 10-20 M tons per year by 2050. The 2024 Reuters report states that the hydrogen will replace natural gas and coal-fired energy and be used for transport, fertilizer, steel and cement production.

One company which has harnessed hydrogen for warehousing logistics is Plug Power Inc. They have successfully innovated fuel cell technology for material handling equipment. One example is for forklifts running on green hydrogen fuel cells. A refueling takes less than 3 minutes; zero emissions; voltage never drops whereas batteries will; no PPE required when refueling; ideal for 24/7 operations. Plug Power have fuel cell products for stationary power products and fleet vehicles. Plug Power can build on site hydrogen filling stations and also have a distribution system consisting of high-pressure tube trailers. <https://www.plugpower.com/>

In 2023, the Province of BC launched its hydrogen strategy *to advance all aspects of hydrogen projects and facilitate hydrogen's role across British Columbia's energy systems. Priorities include hydrogen production, distribution, storage, end-uses, and export, as well as the setting of policy, regulatory, and other enabling frameworks.* Its Clean Energy and Major Projects Office will be supporting:

- Initial project concepts and investment facilitation for companies
- Regional hydrogen hub development
- Coordination of regulatory, permitting, and environment requirements
- Hydrogen policy and enabling frameworks
- Indigenous participation

In January 2024, BC-based, Teralta will take byproduct hydrogen from a sodium chlorate plant and refine them for use as hydrogen, clean power for a pulp and paper mill in Prince George. This conversion should reduce the use of natural gas by 25% at the mill. This is one of the first projects approved by the Clean Energy and Major Projects Office.

Prince George, BC is becoming a hydrogen hub with a refueling station for HD duty trucks; a proposed \$5B hydrogen project from Mitsubishi; and a \$2B hydrogen and ammonia plant from Australian company, Fortescue. The province announced \$36B to be invested in expanding the electrical grid by 2034 with clean energy. Currently 70% of the provincial energy demand is being met by conventional fossil fuels such as gasoline, diesel and natural gas.

Compressed natural gas (CNG) has had some success in the markets. Several fleet operators use CNG for

fuel and claim lower operating costs. The City of Hamilton runs ~130 buses on CNG to reduce emissions and save on operating costs. Ontario's Blue Water Recycling Assoc runs its fleet on Renewable natural gas (RNG) derived from cow manure. Innovative trucking company Hyliion, out of Austin Texas, is a leader in electrified powertrain options for Class 8 semi-trucks. In 2022, Hyliion partnered with Cummins Inc to utilize natural gas and electric engines in the Hypertruck ERX powertrain with onboard power generation to recharge batteries. CNG has not found favour with the general public commuters due in part to the price difference for a limited choice of CNG vehicles and fueling stations are not plentiful. Honda ceased the manufacturing of its Civic Natural Gas vehicles in 2015 due to low demand and lack of fueling stations.

The 2023 E-Bus financial debacle in Edmonton, casts doubt on the feasibility and affordability of EVs in public transit. This has a ripple effect of casting doubts on other government ventures, which start with a good story by the politicians and end with a nightmare for the taxpayer. In February 2024, Edmonton has filed an Cdn \$82M law suit for breach of contract and negligence against its bus supplier Proterra, who is in bankruptcy protection. Edmonton's fleet manager said that only 28 of the 60 buses are capable of running at any time. The initial purchase from Proterra was ~\$60M. Proterra sold its assets to Phoenix Motor Inc.

Looking at a successful and sustainable solution for e-buses can be seen at the Schiphol Airport in Amsterdam. For 6 years they have been operating 100 e-buses powered mainly by solar and wind energy. Canadian cities can learn from other successful e-bus systems and avoid further financial debacles.

Edmonton has begun using hydrogen powered buses. Edmonton concurrently operates diesel and electric buses in its transit system. The Edmonton E-buses have run into serious operating and maintenance problems since their 2020 installation. A November 2023 CBC report, states that many E-buses can't operate due to mechanical failures and the inability to get parts. The latter problem is compounded by the OEM, Proterra, filing for bankruptcy protection in the US and can't supply parts. The business case for the E-buses was to save ~30% on the cost of running diesel buses – those savings are long gone. <https://www.cbc.ca/news/canada/edmonton/edmonton-buses-proterra-1.7035186>

BC Transit also selected Proterra as its e-bus supplier in mid-2022. With Proterra now in bankruptcy and facing multiple law suits, it will be interesting to see how BC Transit can affordably move ahead with its transition to an e-bus fleet. BC Transit ordered 10 Proterra e-buses in a Cdn \$20M project. BC Transit does not have a mutually exclusive agreement with Proterra.

Meanwhile TransLink is forging ahead with E-buses in the face of a million-dollar deficit with its operations. TransLink is contracting with Canadian e-bus manufacturers. In late 2023, TransLink made public that it is projecting to be in financial stress over the next decade! A report by Transit's VP of Financial Services, states *TransLink's structural deficit starts becoming apparent in 2026, and grows progressively, as expenditures outpace existing revenue sources. For the years 2026 to 2033, based on the scope of 2022 Investment Plan and before any additional scope of the 10-Year Priorities is included, the total funding gap is \$4.7 billion. To fill this gap, TransLink would need approximately \$600 million per year in new revenues starting in 2026.* Affordability is a reality too.

In Q2 2023, Walmart ordered CNG-powered Class 8, heavy duty hauler trucks, using X15N Cummins engines in Freightliner standard models. The circular economy connection is that the CNG is produced from biomethane. Biomethane is captured from waste such as manure and landfills and processed into natural gas. Methane is 25 times more potent than CO₂ emissions. Chevron distributes the renewable CNG fuel. Walmart continues to integrate alternative fuels into its 10,000-vehicle fleet. The advantage is that CNG already has a distribution network and can be adapted to fuel conventional truck designs.

To reduce costs of electric trucks for fleets, is the use of electric *trailers*. Electric trailers can hook up to any type of truck which allows fleet operators to utilize existing tractor vehicles. US-based startup Range Energy, has secured funding and tested its electric trailers in 2023. Their powered trailers reduce emissions by 40%, reduce fuel costs and are intended to easily allow for operators to hook up with any type of tractor, be it diesel or all-electric. The electric trailer allows for a more affordable transition to all-electric or alternative powered tractor-trailer rigs.

Liquid natural gas (LNG) burns 40% fewer GHGs than coal when producing electricity. For many Asian countries, buying Canadian/American LNG could reduce their overall emissions. LNG is big contributor to our employment and the economy. LNG is used in some long-haul fleets but not for commuter vehicles due to onboard storage capacity, lack of filling stations, and ultimately insufficient sales. The caveat with LNG is that it emits much higher volumes of methane gases. In July 2023, the International Maritime Organization (IMO) completed stricter global emission standards. The IMO went so far as to say that while LNG will be allowed for marine shipping fuels in cruise ships and container ships, the long-term use of LNG does not meet new emissions standards. By 2025, the European Union is expected to issue new LNG standards aimed at decarbonizing the maritime sector, according to the IMO. LNG as a long-term alternative energy appears to have a much shorter shelf life for investors. This will also impact the oil and gas sectors.

The US *paused* LNG projects in early 2024, which sounds great for the climate. As a major exporter of LNG to the EU to displace Russian gas, this is more of a political move than an environmental commitment. The US government has stated that the *pause* would not harm allies, as supply is hinged on ensuring an exemption for any national security issues.

LNG demand is expected to grow by 50%+ by 2040. Countries such as China and South Asia use LNG for their economic growth. Reuters reports that LNG demand has eased in the EU, Japan, and Australia but China alone, will command much of the supply of LNG for decades. <https://www.reuters.com/business/energy/global-lng-demand-seen-rising-more-than-50-by-2040-shell-report-2024-02-14/>

In sharp contrast to many western markets reducing their fossil fuels, India is the largest coal-dependent economy and continues to expand its coal sector, which has grown 8%+ in 2023. Shares of mining operation Coal India and power generator NTPC have soared 55% and 78% respectively. Reuters sees coal demand dropping in the EU and the US by 20% in the same period. By comparison, shares of Australian coal miner Whitehaven have dropped 22% and South Korean power generator KEPCO, are also in negative territory. In 2023 India added 4 GW of coal-fired energy, which is 4 times the amount since 2019.

In 2021, Metro Vancouver noted that 90% of emissions from apartments, houses, offices, shops, schools, and industrial buildings is from natural gas. Natural gas was and is primarily the most affordable energy in the region as it has been promoted for decades due to the vast quantities of supply at a low cost. In 2023, there is a growing debate to *ban* natural gas and require new residential developments use electricity only. The town of Squamish took this step a couple years ago. Fortis BC, the major supplier of natural gas has gone on record that it does not want to accelerate the move away from fossil fuels in their massive distribution system. The Metro Vancouver climate board is pushing to move away from natural gas and renewable natural gas much quicker. Renewable natural gas is made from organic farm waste, land fill sites, and water treatment plants, which Fortis provides. The city of Nanaimo announced it will ban natural gas heating in new home construction effective July 1, 2024. This will have a ripple effect with reduced sales of natural gas fireplaces and appliances, affecting many SMEs in this sector. Restauranters will need to rethink their cooking options and locations if natural gas is not going to be available.

Germany's Chancellor Scholz wants to ban natural gas boilers in new residences starting in 2024, which

has created a debate. idea. Affordability is a key issue in these debates and a lack of infrastructure to support electricity as a viable option, in the shorter term.

In British Columbia, the provincial government has introduced *Step 1 of the BC Energy Code for Part 9 Buildings*. In 2023, this is voluntary, performance-based compliance model applies to new residential buildings. However, municipalities and towns can apply the Code to ensure energy efficiency in new construction exceeds the basic requirements of the BC Building Code. The Code states the energy efficiency which must be achieved and the builder decides how to construct it to meet and exceed these requirements. One of the recommendations is to incorporate at least one temperature-controlled room as reported by Andrea Woo, in the August 18, 2023 Globe and Mail. This room should not exceed 26°. The BC Energy Code *requires that all new buildings be net-zero energy ready by 2032*.

Another push towards net-zero is the conversion to heat pumps. It's complicated. Heat pumps are not without controversy as to their cost benefits in light of the affordability issues. Heat pumps can reduce GHGs more than most other forms of HVAC equipment.

An example, using the BC Hydro heat pump cost calculator:

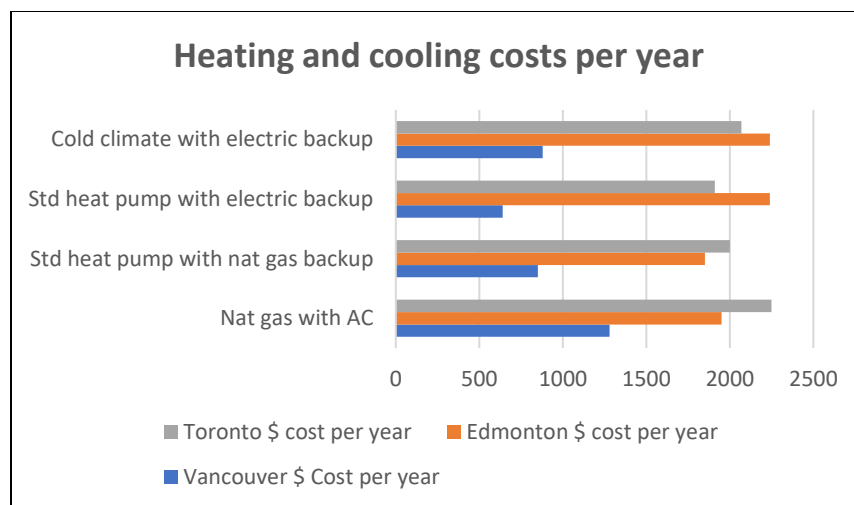
1. single detached home ~1500 ft²
2. *lower mainland region of BC*
3. current natural gas furnace 2-10 years old
4. heating seasonal performance factor (HSPF) of 11.5+

The results of this simple formula showed savings of \$107 per *year* for the life of the heat pump. Their useful life is predicted to be ~15 years with proper maintenance. Buying a unit and having it installed for \$5000, after rebates, which is doubtful given the rebate schemes on the market, that's an unacceptable payback period. In *Central and Northern BC*, replacing electric base board heating, could save \$619 per year, making it affordable in terms of payback.

The rebate schemes also consider the cooling requirements using the Seasonal Energy Efficiency Ratio (SEER) of a heat pump to qualify. Most installations require an inspection of a home, prior to qualifying for a grant. There are incentives available to convert to heat pumps from oil and propane, which has sparked a debate between various levels of government as to why natural gas was not included.

Getting off oil and propane fuels for heating homes does yield a dramatic difference in utility savings. For existing natural gas homes, it may be best to let the useful life of an existing furnace and AC unit lapse. The benefits vary widely depending upon geographical location, age of existing HVAC equipment, and the age of the owners. Part of the affordability considerations.

A comparison of the cost of heat pumps for residential heating and cooling shows that where you live, has a large impact on the costs and therefore any benefits. The Canadian Climate Institute has an interactive calculator which allows you to change the variables of type of energy and the type of backup equipment which is required. The backup equipment is a big factor when considering any heat pump. Using a 1980, ~1700 ft² period house, shows the differences in heating and cooling between the 3 cities of Vancouver, Edmonton, and Toronto. The *average* lowest cost is a standard heat pump with electric backup in Vancouver at \$640 per year, with the highest cost being a natural gas furnace with air conditioning in Toronto at \$2250 per year. A difference of \$610 per year. <https://climateinstitute.ca/reports/heat-pumps-canada/>



Eastern Canada has relied on heating oil and propane for decades and now must convert to heat pumps. This conversion would require the availability of large supplies of heat pumps and qualified contractors to install these units in a timely manner. As the Federal government announced the elimination of heating oils in Canada, several companies which have been supply heating oils, have already filed for bankruptcy in late 2023, as winter approaches.

It would be a good idea to tie extended producer responsibility to heat pumps as well, where we have government driven carbon pricing. Older furnaces have lasted 35 years while a 2023 heat pump has a ~15-20-year average life. That means consuming more resources to achieve marginal savings, in many instances, to replace the units more often. If manufacturers designed their heat pumps to last ~25-30 years, that would make more economic and environmental sense. Government intervention may require that only heat pumps with specific HSPF and SEER ratings be allowed to be sold in the market.

The VP of the Canadian Home Builders' Assoc of BC, Mark Bernhardt, supports the changes to the BC Building Code. As a builder and developer, he says the Code has encouraged designs which reduce the use of energy. The design changes can include extra insulation, larger roof overhangs on south-facing overhangs to provide shade, and exterior roller blinds on east- and west-facing windows. Vivian Loftness, a professor of architecture at the University of Pittsburgh, reiterates that home designs can reduce the indoor temperatures. *Cool roofs* which reflect more sunlight, strategic window placement, rainscreen facades which have a gap in the exterior cladding, high-efficiency heat pumps, transom and windows with exhaust fans, can reduce interior temperatures. These design nuances are most effective up to 30°-40°. Portable air conditioners are a band aid. Central AC adds to energy consumption. New construction will be affected by the changes to the Building Code, so long-term outcomes will take decades to be realized. The changes to the building code are an important signal that design, which is fundamental in the circular economy model, is at the heart of making a difference, within our sphere of influence. http://energystepcode.ca/app/uploads/sites/257/2019/08/BCEnergyStepCode_GuideDigital_v02July2019.pdf

The changes in the building code may be rooted in the success of the Passive House design. Originating in Germany in the late 1980s, passive buildings are ultra-low energy for heating or cooling. Passive designs are used in residential, commercial and in the construction of schools. Passive Buildings Canada characterizes passive houses as being air tight, no heat transferred from inside to outside, balanced ventilation, triple paned windows, super insulated, shaded and land placement considerations.

Related to the passive concept is the Centre for Interactive Research on Sustainability (CIRS) building at

the University of British Columbia. Conceived by Professor John Robinson, it opened in 2011. After challenges to the existing building codes were overcome, the CIRS building is net energy positive, utilizes 100% collected rain water, local building materials, reuses reclaimed waste water, designed to optimize natural lighting, and relies on natural air ventilation. The building is certified LEED Platinum.

E-Methanol produced from green hydrogen is another form of renewable energy which is low carbon. Where electrification may not be feasible in some industries such as cement and steel, e-Methanol could meet the technical requirements.

There is increased interest in the use of green-ammonia to compete with green-hydrogen. Ammonia has ~twice as much energy as liquid hydrogen by weight and ~nine times the energy density of lithium-ion batteries. With 90% of global trade linked to marine transport and the commitment by the International Maritime Organization to reduce emissions by 50% by 2050, from 2008 levels, greener energy could be the catalyst.

Energy, produced through nuclear *fission*, has been considered as a means of achieving carbon neutrality. Nuclear investments are included in the EU green Taxonomy. In Canada, Bruce Power and Ontario Power Generation (OPG) see nuclear energy as a key contributor to its Net Zero climate change goals. The companies have partnered to evaluate potential opportunities for deploying small modular reactors (SMRs).

In 2024, Alberta's Capital Power Corp. and Ontario Power Generation are collaborating to assess whether SMRs are feasible to supply clean electrical energy. The study will take a couple years to see if it is possible to build grid-scale SMRs in a network in Alberta. Ontario Power Generation is currently constructing SMRs at the Darlington nuclear site in Ontario and hopes to have it online by 2030 at a budget of \$12 B Cdn. Ontario will refurbish its 50-year-old Pickering nuclear station beginning in 2024 and plans to run it for ~30-years to meet electrical demand and meet clean electricity regulations set by the Federal government. The project is estimated to take ~11-years. Nuclear energy meets about 50% of Ontario's demand.

Of significant note in December 2022, was the historical, technological breakthrough to produce clean energy through nuclear *fusion*. This was achieved by scientists at the Lawrence Laboratory's facility in California. It will remain in an experimental mode until nuclear fusion becomes commercially viable as a carbon free, renewable energy source. Doug Lightfoot is an advocate for safe, nuclear energy. As an energy scientist, Lightfoot considers nuclear the safest form of energy and good for the environment. The emotional backlash by protesters against nuclear energy does not seem to be substantiated in scientific evidence. The Chernobyl and Fukushima disasters are the images which add to the skewed information on the benefits of nuclear. Technology in nuclear energy has advanced since the designs of the 1960s, as has our design of vehicles. Over 1 M people die *per year* from car accidents, while deaths from nuclear energy is a fraction of this. Ban cars? I don't think so.

One renewable energy gap which Canada has not closed relates to geothermal supply. Canada has very few geothermal energy generation installations or projects in place. We are one of the few Pacific Rim countries to not exploit geothermal as a renewable source. Consider that Iceland, 50-years ago was dependent on imported oil for energy and has now transitioned to geothermal energy. Reykjavik is supplied with direct use geothermal energy. Hot water near the surface is piped into buildings for heat and distributed through District heating systems for multiple types of buildings. Geothermal investment has not caught the attention of government or investors, who compete against other energy sources with lower upfront costs. But in the long-term, geothermal could be the cleanest and lowest cost renewable energy source for many parts of Canada.

One breakthrough for geothermal operation is underway in Hinton, Alberta. Novus Earth is addressing

the need to decarbonize energy through its innovative and pragmatic direct-use geothermal, closed loop design, to provide power to the nearby city of Hinton. With support from several levels of government, Novus Earth is enabling local agriculture, aquaculture, vertical farms, enhanced tourism and recreation as part of their Latitude 53 Project. The geothermal system can service forestry and pulp mill operations in a cleaner energy model and creates jobs in the community. A scalable design which will sustainably drive economic and social benefits while mitigating environmental impacts.

<https://novusearth.ca/latitude53project/>

The transition from international oil and gas energy supply to renewables will, in all likelihood, involve the major oil companies. Their balance sheets can afford the investment; they have a history of running complex projects; they have experience with hydrogen fuels; they will maintain the backstop of supply until the various renewables can affordably displace fossil fuels. The gas and oil companies have taken stakes in renewable energy and will be poised to be the suppliers of *new* forms of energy as they exit from their legacy models.

To prove this point, Exxon Mobil Corporation announced in November 2023, it will be a leading producer of lithium for EV batteries by 2030. Beginning in Arkansas, Mobil will start its mining operations using DLE technology for extraction. *"Lithium is essential to the energy transition, and ExxonMobil has a leading role to play in paving the way for electrification,"* said Dan Ammann, president of ExxonMobil Low Carbon Solutions. *"This landmark project applies decades of ExxonMobil expertise to unlock vast supplies of North American lithium with far fewer environmental impacts than traditional mining operations."*

International Battery Metals (IBAT) is providing portable DLE operations. The IBAT footprint is <3 acres (1.2 hectares) which is far less than the hundreds of acres required for evaporation ponds or open-pit sites. Chile, with some of the largest reserves of lithium, wants to phase out the use of evaporation ponds and replace it with DLE technology.

In a global conversation, the meeting of leaders at the 2023 COP 28 Summit, in Dubai, drafted a commitment addressing the need to move away from fossil fuels. The breakthrough agreement calls for *transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, so as to achieve net zero by 2050 in keeping with the science.* The draft agreement included:

- Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030;
- Rapidly phasing down unabated coal and limitations on permitting new and unabated coal power generation;
- Accelerating zero and low emissions technologies, including, renewables, nuclear, abatement and removal technologies, including such as carbon capture and utilization and storage, and low carbon hydrogen production, so as to enhance efforts towards substitution of unabated fossil fuels in energy systems.
- Reducing both consumption and production of fossil fuels, in a just, orderly and equitable manner so as to achieve net zero by, before, or around 2050 in keeping with the science;
- Accelerating and substantially reducing non-CO2 emissions, including, in particular, methane emissions globally by 2030;
- Accelerating emissions reductions from road transport through a range of pathways, including development of infrastructure and rapid deployment of zero and low emission vehicles;
- Phasing out of inefficient fossil fuel subsidies that encourage wasteful consumption and do not address energy poverty or just transitions, as soon as possible."

While words are not actions, it is important to note that there was a fear factor from fossil-fuel

dependent countries and regions that the COP 28 statement might state the phasing out of fossil fuels. Historically, these voluntary commitments to reduce GHGs or to reduce the global temperature, have not been fully honoured. An Associated Press summary of the last 25-years of climate talks, shows that we haven't moved the needle very much in the efforts to reduce the global temperature. The strategies to achieve the targeted GHG reductions are a Rubik's Cube of machinations with over 200 countries trying to protect their self-interests.

While the headlines say that coal is being phased out, China expects to increase its demand for coal until ~2030; and India will continue with coal energy until 2040.

The 1997 Kyoto Protocol was finally enacted in 2005 without China or the USA signing on to it. Canada pulled out of Kyoto in 2011. At the 2009 Copenhagen talks, the developed countries agreed to fund emerging economies with \$US 100B by 2020. This did not happen and most of the funds were attached to loans, adding to the debts of poorer countries. The 2015 Paris Accord was seen as the most effective with a non-binding agreement to slash GHGs, without sanctions for failing to do so. In 2021, at the COP 26 Glasgow summit talks, delegates agreed to phase down coal, not phase out coal. China and India, which are reliant on coal-fired energy, demanded a softening on the phase out of coal. The COP 2022 talks in Egypt led to more voluntary funding for damages caused in poorer countries due to climate change. As we approach 2024, coal emissions continue to rise with India expanding the use of coal. These examples of failed actions contribute to the apathy amongst citizens which are dependent upon leaders taking actions and having accountability. <https://www.cbc.ca/news/science/5-cop-decisions-1.7057734>

Carbon taxes

The successful use of the sulfur dioxide (SO₂) cap-and-trade system to reduce acid rain in the 1990s, resulted in 50% less SO₂ emissions with affordable compliance costs and helped to clean up the Great Lakes' region along the Canada/US border. This led to the development of the European Union's Emission Trading System, the world's largest cap-and-trade system. The two key components of Canada's carbon pricing strategy are the federal fuel charge; and a regulatory trading system for industry.

There are (5) carbon pricing models used by various global jurisdictions to deal with the carbon content, primarily from coal, petroleum, and natural gas:

- carbon taxes
- cap-and-trade
- emission reduction credits
- clean energy standards
- fossil fuel subsidies

The two standards for climate policies use either a technology-based standard or a performance-based standard. *Technology*-based require the use of specified equipment, processes or procedures where policies require particular forms of energy-efficient equipment, combustion methods, or methane gas collection practices. Due to the multiple types of GHGs from various sectors, any one technology would likely not meet the diverse requirements and lead to limited technical options. *Performance*-based standards set targeted levels of allowable emissions or emission rates, where regulated companies opt for a technical solution which fits their business financial needs and objectives. Examples could include reduced tCO₂e from production facilities or vehicle fuel efficiency per km. The inherent limitations of technical or performance solutions can be addressed through carbon pricing, most often referred to as carbon taxation.

An example of government climate policies changing on the *technology*-based standards was evident with the early 2024 revised US Inflation Reduction Act requirements for vehicles. The EPA adopted a *technology neutral* scheme that allows automakers to meet emission standards as they see fit. Automakers can use gas-electric hybrid designs or *advanced* ICE technologies to reduce fuel consumption such as turbo-charging, lighter vehicles or stop-start ignition systems. This compromise is upsetting to environmental interest groups and is seen as a deference to US automakers. Affordability is seen as a factor in getting consumers into greener vehicles. <https://www.cbc.ca/news/world/epa-tailpipe-rule-electric-vehicles-1.7150092>

Canada's decarbonization strategy includes an Output-based pricing system (OBPS) which took effect in Ontario, New Brunswick, Prince Edward Island and Saskatchewan in January 2019. The OBPS falls under the Greenhouse Gas Pollution Pricing Act. The OBPS was intended to get commitments from industrial facilities to reduce their GHGs. Under an OBPS industrial facilities pay on their emissions that *exceed* a target level. Those which emit less can earn carbon credits which they can bank or sell to other companies needing to offset emissions. <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system.html>

Carbon taxes are seen as the most efficient means of starting to meet the financial requirements of a decarbonized world. The tax on the volume of carbon emissions requires that producers factor this cost into their final goods. Therefore, everyone pays. Referred to as *internalized* costs as opposed to *externalized* – where society pays for the additional cost of disposal or cleaning up the air, water or land. The carbon tax implies an even playing field. When all producers pay, all their customers pay and there is no advantage or disadvantage.

A geopolitical challenge is where countries do not respect ESG goals and allow producers to be exempt from carbon taxes and simply pocket their profits. This *leakage* is not great; however, energy-intensive companies could be attracted to lower cost countries. Where mature markets push carbon taxes too high, they risk having companies relocate to more beneficial tax regimes.

Taxes tend to focus on the carbon content of upstream emitters such as gas and oil producers, coal mining, refineries and fuel importers, or LNG terminals. There are fewer companies to deal with than the downstream market. The latter involves the thousands of companies which burn fossil fuels for energy and driving, as an example. The upstream players pass along the increased costs which adds to the cost of doing business in order to reduce emissions. Tax incentives are provided for investing in emission reducing technologies or CCUS. Tax relief on higher energy costs is provided to lower income earners in the form of tax rebates.

In Canada, the carbon pricing has two sides to follow. The consumer and the industrial impact. A 2024 report from the Canadian Climate Institute shows that industrial emission reductions have been 3 times more effective than consumer-paid options. While the two strategies should achieve a 50% reduction by 2030, the consumer-paid options only accounts for ~10% with the balance through industrial adoptions. The carbon pricing has become more politically charged and based on emotions of affected groups rather than on scientifically based outcomes. <https://www.cbc.ca/news/politics/carbon-pricing-climate-report-1.7151139>

Cap-and-trade systems basically work by having governments set a cap or maximum volume of emissions across a market sector. Annual permits allow for a specified tCO₂e or other pollutants by each producer. Over time the government reduces the number of permits which incentivizes companies to reduce their emissions more efficiently. Companies which cannot meet the targets must pay a tax or buy credits from other emitters which have met their reduction targets.

The Province of British Columbia introduced one of the first carbon tax systems in Canada, in 2008, using a tax of \$10/tCO₂e. It is aimed at upstream providers and is legislated to be revenue neutral, through tax cuts for individuals and businesses. As of 2023, the carbon tax has increased to \$65/ tCO₂e. There are

also provisions for exemptions for specific types of energy and their purpose. For example, greenhouse operators can receive *partial* exemptions for *qualified* crops. Partial exemptions are applied on the use of natural gas and propane for an eligible purpose. Qualified crops include: Vegetables, fruits, bedding plants, ornamental plants, tree seedlings, and landscape plants. Eligible purpose refers to the fuel used to heat an eligible greenhouse in order to grow or produce plants. Quite a system to navigate for a small business owner.

The Province of Alberta implemented a performance model for large emitters, targeting a 12% reduction over 2007 baseline volumes. This encourages all players to reduce emissions regardless of the technology deployed to achieve the outcome. Alberta's model involves tradable credits to develop cleaner energy sources. In late 2023, the Federal government sought further emission reductions from the gas and oil sector which directly affects Alberta and Saskatchewan producers. Both provincial governments felt this was changing the goal posts and object so politically, as their oil and gas sector have committed to CCUS and other emission reductions, which would not impede production increases. In response to the increased emission reductions. Some oil and gas sector companies are dragging their feet on further emission reduction investments, in hopes that a change of federal government will provide tax relief in a 2025 election. <https://www.reuters.com/business/energy/some-canadian-oil-firms-await-trudeaus-fate-rather-than-cut-emissions-faster-2023-12-19/>

In 2010, the IEA estimated that eliminating fossil fuel subsidies, resulting in lower consumption, would reduce global tCO₂e by 2 gigatons per year by 2020. The fossil fuel subsidies were estimated to be valued at US\$660B by 2020 without policy reforms.

Danish farmers are concerned about the proposed about a proposed carbon emission tax which would contribute to Denmark's legally binding 2030 GHG reductions. The tax could lead to higher costs, loss of farms, and require a 20% reduction in volumes to achieve the goal. Reduced fees and extended time to implement are being considered. Adding taxes and compromising food supplies does not seem to be a reasonable tradeoff. New Zealand had considered this but pushed the agenda back to 2025 at the earliest.

The 2024+ global demand for oil and gas production indicates a growth in this sector. This will result in an increase in emissions, with little possibility to offset these emissions, as fast as they are being generated. An emissions cap is an option being argued by the influential International Institute for Sustainable Development and is not being welcomed by the industry sector. For 2024, the IEA forecasts the supply of oil to increase by 1.5 million bpd to a record 103.5 million bpd from outputs from the US, Brazil, Guyana, and Canada. The IEA reported that energy emissions reached 37.4 billion tonnes in 2023, or an increase of 1.1% in a March 2024 report. This is another signal that we have not been successful in our efforts to achieve targeted reductions as an aggregate value.

All forms of carbon pricing models are somewhat complex and not without controversy. Canada has a mix of federal/provincial/territory carbon pricing plans in effect. There are several regional carbon pricing models in effect as well. All try to balance the need to decarbonize operations in the long-term without crippling the economy in the short-term.

https://scholar.harvard.edu/files/stavins/files/aldy_stavins_pricing_carbon_in_jed.pdf

Food security

Food security is defined by the World Bank, drawing from the 1996 World Food Summit, under four main dimensions being met simultaneously:

1. Physical *availability* of food: Food availability addresses the “supply side” of food security and is determined by the level of food production, stock levels and net trade.
2. Economic and physical *access* to food: An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives.
3. Food *utilization*: Utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals are the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals.
4. *Stability* of the other three dimensions over time: Even if your food intake is adequate today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on your food security status.

The Food Policy for Canada is an aspirational model which aligns with the UNSGDs. The targets are:

SDG 2 (Zero Hunger), Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

SDG 3 (Good Health and Well-Being), Target 3.4: By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

SDG 12 (Responsible Production and Consumption), Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

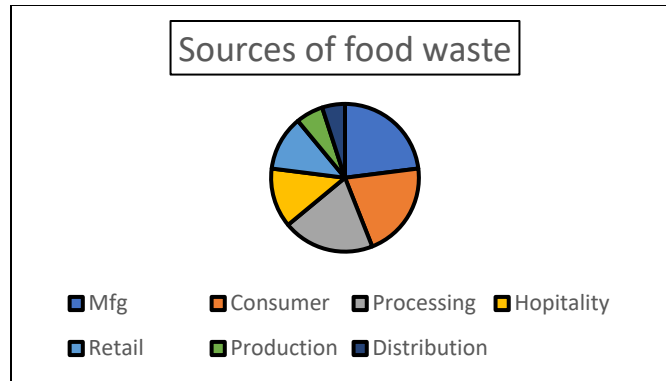
SDG 13 (Climate Action), Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

<https://agriculture.canada.ca/en/department/initiatives/food-policy/food-policy-canada>

These are aggressive targets and given the need for increased visits to food banks across Canada, may not be on track to achieve the intended outcomes.

One of the global paradoxes having enough food produced to feed the world, yet 1 billion people do not have enough food. The inequity in food distribution is a major contributor to this problem. The developed economies have a surplus of foods which leads to waste, while the developing countries go without, for reasons of political and economic difficulties. It’s been estimated that 40% of the entire food supply chain is being lost through waste.

The 2019 report *The Avoidable Crisis of Food Waste*, from Value Chain Management International, found that 66% of occurrences of food waste were from manufacturing, consumers, and processing; the hospitality sector accounted for 13%; and retail, production and distribution made up the balance of 23%.



Consumer behaviours, excess food production methods, and marketing campaigns have combined to create a lot of unnecessary food waste. The colours, sizes, and shapes of food influences our decisions as to what we should buy. Grocery stores set arbitrary standards as to what appears to appeal to consumers and culls perfectly nutritious foods due to their lower cosmetic image. Organic produce is more susceptible to artificial applications of selection criteria and increases costs. Waste which the circular economy sees as a resource, includes not only the products but the consumption of enormous quantities of water and nutrients to produce the goods.

Case in point: In December 2023, as they've done many times, the Heppell farm in BC, organized and gave away 15 tonnes of potatoes; 10 tonnes of carrots; 1 tonne of beets; and 2 tonnes of squash to anyone who could use the produce. Heppell asked that donations be made to a local food bank for the produce they gave out. Heppell could not sell the perfectly edible produce due to its appearance not meeting the cosmetic standards of larger produce retailers. Heppell calls this the Ugly Potato Day! Unsold produce typically ends up as animal feed.

The Province of Manitoba developed a Green Impact Bond Strategy to divert animal waste from landfills. In 2021, Innovative NRG was selected as the service provider to process organic waste such as animal byproducts and waste-water sludge through a patented gasification process. Their patented and proprietary Rapid Organic Conversion (ROC) which can vaporize carbon-based materials. The captured energy can be used as a source of energy, reducing GHGs, reduces transportation costs, and landfill waste.

In their 2023 McKinsey report, *Reducing food loss: What grocery retailers and manufacturers can do*, the authors noted that fruits and vegetables, cereals, roots and tubers incurred the greatest proportion of food loss. An astounding 50-75 M tons of tomatoes are lost during the during the harvest, postharvest handling and storage, and processing stages. In WEIRD countries, ~60-70% of tomatoes make it to a store shelf. In the developing world, only ~35 to 60% make it to the store. While it's inevitable some losses will occur, two-thirds of the loss is edible and could be safely redirected to human consumption. Meat and dairy account for ~8% of the food loss. Food security focus needs to be on reducing loss to the fruits, vegetables, cereals, roots and tubers which are global produce.

Consumer food trends in developed countries often favour *fast* foods. Fast foods temporarily sate a feeling of being hungry but lack the necessary nutrients of a balanced diet. Processed meats and cheeses are costly yet convenient. Health and nutritional benefits take 2nd place. Obesity is a growing health problem which experts correlate to poor eating habits. The Canadian government's Canadian Risk Factor Atlas reported in a 2015-2018 survey, that ~26% of adults are living with obesity. People have become disconnected to the importance of how foods are grown, processed, shipped and consumed.

Local sourcing shortens the food supply chain which will reduce some waste, reduce pollutants, reduce over use of fertilizers, reduce transportation and storage costs, and packaging. Food security is an

outstanding issue. According to the Food and Agricultural Organizations' definition, food security includes having consistent, reliable access to safe, nutritious food. When the availability, accessibility, nutritional quality and longer-term stability of food sources become strained or nonexistent, food insecurity exists. Reducing hunger is one of the 17 UN Sustainable Development Goals (UNSDG).

According to a Mordor Intelligence report, the organic meat sector, between 2023-2028, is expected to grow from US\$17.4B to US\$25.5B. This is a compounded annual growth rate of ~8%. This is in spite of a cost disparity of 67% over conventional meat products. Prices are supported due to consumer interests for health, on demand buying, quality, and sustainable practices in raising beef, poultry, fowl, lamb, and other animal proteins. There is concern that organics are being associated with *privileged* consumer choices. <https://www.mordorintelligence.com/industry-reports/organic-meat-market>

Kersia Canada, is a global food and beverage company focused on biosecurity and food safety. In 2016, Kersia recognized that sustainability in the food sector goes beyond supply and marketing. Leading by example, they have strategically adopted (9) of the UNSDG goals to address to contribute to sustainable business operations:

1. Zero Hunger (2)
2. Good health and well-being (3)
3. Quality education (4)
4. Clean water and sanitation (6)
5. Decent work and economic growth (8)
6. Industry, innovation, and infrastructure (9)
7. Responsible consumption and production (12)
8. Climate action (13)
9. Partnerships for the Goals (17)

An example of Kersia's *partnerships for the goals* is their membership in Ashoka Canada. Ashoka is aimed at affecting positive social change across communities by supporting social entrepreneurs and in education programs around diversity, language, culture, gender, and its expression.

Despite the problems associated with over use of fertilizers, there is the problem of attaining adequate supply of fertilizers due to geo/political problems. The agricultural industry is very dependent on fertilizers to maximize crop yields. A February 2023 report from Bloomberg Intelligence analyst, Alexis Maxwell, highlighted the reliance on Russia, Belarus and China for fertilizers. Canada's well-positioned to supply fertilizers from privately operated, Saskatchewan-based, Nutrien Limited but cannot meet the global demands which are required to sustain agricultural crops. Nutrien is looking at increasing production by another 40% by 2026.

Shortages of potash, phosphate, and nitrogen will continue to push food prices upwards. Morocco, with an estimated 70% of the phosphate reserves, is emerging as a global trading partner as the Russian-Ukraine war enters its 3rd year. While US farm labour costs are expected to increase by 17% by the end of 2024; fertilizers are projected to increase 70+%. Wheat and other agriculture crops in Canada and the US were hit by droughts in 2023. The war in the Ukraine has led to severe shortages. The Western Australian farmers in 2023 were poised to take advantage of another big year for their crops and substantial price increases. The poorest people tend to bear the brunt of the inflation on basic food stuffs. This shortage is going to add to the global starvation issues at least for another harvest year and have a ripple effect across the globe.

In 2023, India, which affects 40% of the global rice market, banned non-basmati white rice exports for fear of shortages for its people. This had an immediate impact with the hoarding of rice being reported where Indian populations in Canada, USA, and Australia reside. Retailers are seeing price inflations on

many rice products. The major buyers of Indian rice are China, Philippines and Nigeria.

Ecosystems need to thrive. Over-fishing or farm-fishing leads to serious upsets to the balance in the ecosystem. Consider the problem of eutrophication. Eutrophication occurs when excess nutrients, such as fertilizers, are flushed into waterways and harbours. Cambridge University zoologist, David Willer has written extensively on this subject. Left untreated, sea life is killed off by depleting oxygen levels. Thanks to nature's bivalves (oysters, clams, mussels, scallops) they can restore the health of the water and ensure part of the marine ecosystem is sustained. Bivalves continuously draw waste nutrients out of the water as part of their food supply. While western economies view bivalves as more expensive proteins, bivalves will be part of the solution in food security. A major focus is on larger fish and sea products for commercial purposes. Biodiversity in the circular economy is essential and our ability to harvest bivalves can feed us, reduce emissions, and protect the biosphere.

It is encouraging to see the results of NGOs such as the Aquaculture Seafood Council (ASC) and their mission to ensure a supply of sustainable seafood products. Costco Wholesale in Canada is a supporter of the ASC. A random purchase of Kirkland brand shrimp in October 2022 showed that it was from India and there was no ASC certification. ~70% of shrimp from India is rate AVOID. AVOID means that the sourcing is questionable and may be due to overfishing, caught or farmed with poor management practices, or may be harmful to other marine life. Caveat emptor.

In a Globe and Mail article, November 8, 2023, *China's little-known system of forced Uyghur labour gives the world much of its seafood*, by Ian Urbina, we can see that there are still significant gaps in tracing the sourcing of responsible seafood products. Of note was the reported use of forced labour by 10 large Chinese seafood companies. These companies shipped 47,000 tons of seafood to the US since 2018. In Canada, High Liner Foods from Nova Scotia purchased some of this product. High Liner's VP of communications stated that its plant had undergone a 3rd party audit in September 2022. In October 2023, following a damaging report published by The Outlaw Ocean Project, High Liner confirmed they no longer do business with Yantai Sanko Fisheries. Canada prohibits the import of good produced by forced labour. MSC acknowledged that companies are reliant on social audits, which have *significant limitations*.

The food industry can be characterized as being an oligopoly where a small group of companies have a large control over the supply, demand, and pricing of all the products. Often this can be from the farm to the fork. If major food producers and sellers adopt ESG policies and practices, it will alleviate some food security issues. On the other hand, without their commitment, we may need more intervention by government agencies, which nobody truly wants. In 2022 and throughout 2023, with food shortages the major food distribution companies are reporting record profits. That in itself is not bad, but these same companies have pled guilty in the past of pricing fixing on various items and commodities. Business ethics and corporate governance practices are inherently linked in food security discussions.

Loblaws, which pled guilty in 2015 to price fixing on bread prices for over a decade+, was found to be selling its own brand of potato chips with incorrect weights in 2023. Instead of containing 200 grams of product, when weighed, was found to only contain 103 grams. The solution from Loblaws was to issue \$20 worth of points to customers who complained, similar to their settlement on the bread price fixing scheme, to buy products from Loblaws. Canada's Competition Bureau will investigate along with the Canadian Food Inspection Agency.

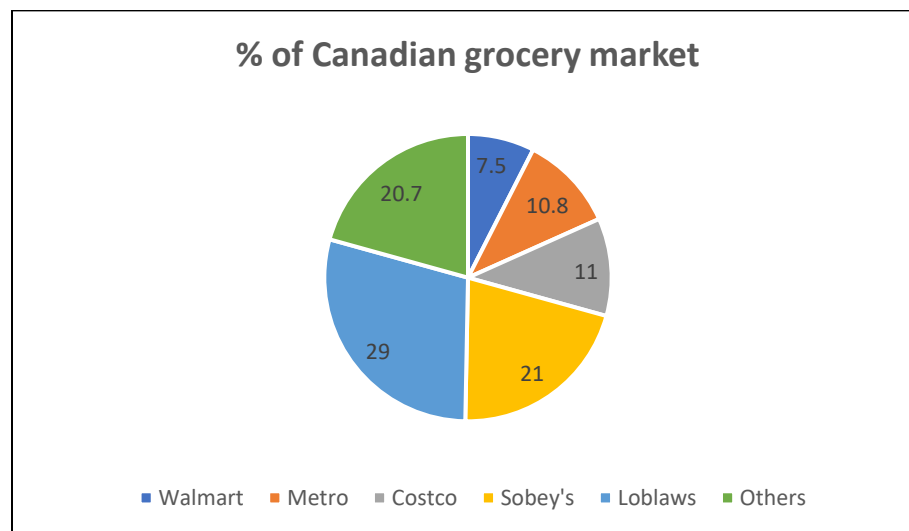
One of the players in the bread price fixing scheme, Grupo Bimbo, which owns Canada Bread, agreed to settle their case with a \$50M fine paid in July 2023 – nine years after participating in a scheme which began in 2001! <https://financialpost.com/news/retail-marketing/canada-bread-settles-bread-price-fixing-allegations>

The grocery industry is being asked to adopt a code of conduct in 2023. The Canadian government sees

a code of conduct as a means of controlling the price of foods through the actions of the grocery sector. The larger grocers are pushing back and arguing that a code of conduct will increase food costs, while other grocers have been asking for code of conduct. The Canadian Federation of Independent Grocers, with ~7000 members, want fair competition. Smaller grocers they argue, can't demand the pricing deals which larger retailers demand from their suppliers, such as imposing fees to get brands on store shelves.

The grocery sector skirts the definition of being legally compliant and misleading in its package labeling. When the fine print is where the compliance is found, yet the advertised benefits could be considered deceptive. Case in point, Kellogg's Vector, found in the cereal section in the grocery aisles, is not a cereal. Technically Vector is a *meal replacement*. In order to get the high level of protein from Vector, you must eat it with 200ml of skim milk. Kellogg's is in compliance with the regulatory requirements but creating the meal replacement category is a bit much. Yes, consumers are responsible to read the labels. Swimming Canada athlete, Kate Hulford, was duped into using Vector as the labels stated 13 grams of protein. In fact, Vector only contains 5.7 grams per serving. Kellogg's ability to meet the minimum requirement legally, is referred to as *the Ethics of Justice*; where Kellogg's should be considering the *Ethics of Care*. Contrasting views on the same product. Is there a need for a grocery industry code of conduct? This example, along with other issues, leans towards a code, as the industry does not seem to be able to separate profits from proteins. Bluewashing continues. <https://pubmed.ncbi.nlm.nih.gov/11114990/>

One of the louder protesters against the code is Loblaws. They are one of Canada's largest food and pharmaceutical retailers. Loblaws' retail chains and brands include: Zehrs, Your Independent Grocer, Provigo, Atlantic Superstore, Fortinos, Dominion, Independent City Market, Freshmart, Valu-mart, ARZ Fine Foods, Real Canadian Wholesale Club, T&T Supermarket, Real Canadian Liquorstore, Real Canadian Superstore, No Frills, Maxi, Extra Foods, Pharmaprix, Shoppers Drug Mart, No Name, Joe Fresh, President's Choice, and Life Brand. It may be some time before any voluntary code of conduct is accepted across the grocery sector.



Source: Competition Bureau

Canadian grocery retailers could take a lesson from the EU retailer Carrefour. In 2024, they announced they are not going to stock products from PepsiCo because of PepsiCo's unacceptable price increases. This could be a negotiating ploy but it certainly has potential to increase price competition in this sector. Grocers act as the agents for consumers and bring to the market products as essential as food and other items. Where grocers and other retailers can pass along price increases, the original producer, such as PepsiCo in this case, needs to be cognizant of its pricing to protect market share and customer loyalty.

Carrefour are sending a signal that it wants PepsiCo to be more competitive. Carrefour customers are liking this shift from the retailer telling its main supplier to sharpen its pencil. Any cost reductions from PepsiCo will need to be reflected in the reduced shelf price at Carrefour. This action from Carrefour adds to the transparency which is lacking in the retail sectors on markups and marketing fees to get brands in the stores.

One innovative food producer is changing agricultural practices on a global scale – AGT Foods, based out of Saskatchewan, Canada. Their visionary leader, Murad Al-Katib, saw the opportunity to convert fallow fields into a source of *pulse-based* foods. Pulses include legumes, dry beans, dry peas, chickpeas, and lentils. GHG emissions measured in CO₂ equivalents per kilogram of peas and beans is estimated to be 0.98 and 1.79 kg, vs 99.48, 23.88, and 12.31 kg of beef, cheese, and pork, respectively. One of the largest markets for pulses is China, which traditionally has relied on plant-based proteins, while the WEIRD has favoured animal-based proteins. Pulse crops naturally inject atmospheric nitrogen, eliminating the need for nitrogen fertilizer and require less water than most crops.

Indigenous communities have faced the issue of biopiracy for years. Biopiracy involves taking endemic plants or their seeds, used as a source of food or medicine, and monetizing them in the global market. Companies patent the new version of the plant or its genes without paying compensation in any form to the country of origin or its people. While biopiracy has been a gray area from a legal perspective, it is certainly a moral issue and a compromise on business ethics. The 2022 UN Biodiversity Summit drafted an historical framework to address biodiversity with the following recommendations being agreed to:

- Maintaining, enhancing and restoring ecosystems, including halting species extinction and maintaining genetic diversity
- "Sustainable use" of biodiversity - essentially ensuring that species and habitats can provide the services they provide for humanity, such as food and clean water
- Ensuring that the benefits of resources from nature, like medicines that come from plants, are shared fairly and equally and that indigenous peoples' rights are protected
- Paying for and putting resources into biodiversity: Ensuring that money and conservation efforts get to where they are needed.

A breakthrough in negotiations, as to how to care for our oceans, came about in March 2023 with the UN Convention on the Law of the Sea. After twenty years, a unified treat on protecting the high seas was reached. The high seas are those ocean areas outside of any one country's control. This is a turning point which acknowledges the need to curb the exploitation of the ocean's natural resources and how to share in this rich bounty. Mining of the ocean floor will eventually require an equivalent set of regulations similar to those for mining on the surface. While the real test will be on how to implement and monitor this policy, the step forward has been taken. For decades, commercial interests have chafed against the dependency of the sea to provide sustainable food supplies and protect marine biodiversity.

A November 2023 report published by Reuters, *The promise and risks of deep-sea mining*, by authors, Chung, Scheyder, and Trainor shows how the mining of the ocean bed is being driven by the need to find critical materials for EVs. Some mining of the ocean floor involves robots harvesting materials at depths of 5000 ft. Parts of the Pacific and Indian oceans contain significant quantities of metals and rare earths used to make lithium-ion batteries. These metals are contained in small rocks referred to as polymetallic nodules.

Several automakers and mining companies are calling for a ban on this type of mining as the removal the nodules could disrupt the ocean's ecosystem. The UN affiliated, International Seabed Authority (ISA) is drafting standards for acceptable sediment disturbance and noise for deep-sea mining. An advocate

for deep-sea mining, is Vancouver-based CEO Gerard Barron of the Metals Co. Metals Co, is backed by Glencore, the same company which acquired Teck Coal in November 2023. Barron says that to meet the demand there are no viable options but to explore the ocean.

In January 2024, Norway will be the 1st country to allow deep sea mining to secure critical materials. Norway will use a similar oversight process that it had in place for oil and gas exploration in the oceans.

A Global Diversity Framework Fund was established in August 2023 with 40 countries committing funds to address biodiversity losses. Biodiversity directly correlates to the economic, health and well-being of people and ecosystems. Climate change is affected by increasing temperatures. The Fund is aimed at reducing the average global temperature.

From an ethical perspective, when scientists discover a compound in the ocean that can treat a disease, who will profit from this type of discovery? In 2010, Japanese, European, and US pharmaceutical companies filed for a cancer treating drug derived from sea sponges. Developing countries usually don't have the resources or technologies to commercialize these findings, so should companies, within the Western economies control the rights because of their access to wealth?

Industrial agriculture with corporate farms continues to displace the small, family-owned farm businesses. Unfortunately, with the intent to reduce the cost of food products one of the trade-offs has been environmental degradation through concentrated animal feeding operations. Tonnes of animal waste seeps into the water table; air borne emissions are transferred to crops and can create E. coli infections. Antibiotics are required to keep CAFO animals healthy and promote growth.

Biosecurity practices are a method to prevent diseases in flocks of birds such as chickens, turkeys, ducks, and pheasants. The highly pathogenic avian influenza resulted in 43M egg-laying hens dying in 2022. The shortage of eggs caused a spike in egg prices of 267% in the US.

Food security faces a long-term problem in terms of labour shortages and ownership, largely due to demographics. Farmers are retiring with very little succession planning in place. Part of the solution will be to attract qualified, immigrant farm operators to take their place. Canadian education programs are trying to increase the interest in agribusiness as a viable career. In spite of this promotion, enrolment in agriculture programs remains at a chronic <2%. Technology has been a source of increasing production where labour remains an issue. A 2023 report from the BCG Centre for Canada's Future and the Arrell Food Institute at the University of Guelph provides good insights into the food security issues which must be addressed in the near future.

The Director of Purchasing for Growers Supply Co., Victoria Wakefield, shared her insights on food security or food *insecurity*, as she phrased it. Growers is a regional agricultural company which has been operating since 1937 in BC's Okanagan. They support local food production in three key areas:

1. Encouraging and supporting local farmers and food producers to increase the availability of fresh, healthy, and affordable food in the region. This is done by purchasing locally grown food at farmers' markets, joining community-supported agriculture programs, with local government support and a strong following in the region by consumers. The pandemic disrupted global supply chains and led to shortages of certain foods, which led to an increase in demand for local products.
2. Investing in sustainable agriculture: Supporting sustainable agriculture practices such as regenerative farming, organic farming, and permaculture ensures the long-term productivity of the land and its ability to produce food.
3. Increasing food literacy and education: Educating the community about healthy eating, cooking skills, and food preservation techniques helps to increase food security. Community centres, colleges and universities in the Okanagan region shifted to empowering individuals to make healthy food choices and

reducing food waste through education and prioritizing local sourcing. The COVID pandemic reiterated the importance of access to locally grown produce.

Vertical farms are now being constructed. Literally like high rise apartments with various crops being grown on the levels. Vertical farms are touted as being better for the planet by producing quality products with a much higher yield and saving on water and land space. As the global population nears the 8-billion-mark, vertical farms are seen as a means to address a part of the sustenance requirements.

In April 2023, Up Vertical Farms opened its 50,000 ft², 10-meter high, indoor greenhouse to grow leafy vegetables. This highly automated operation uses 99% less water, 99% less fertilizer and no pesticides or herbicides. Owners, the Rashti brothers, conceived of the idea when they saw the lack of quality vegetables in remote BC communities which had to truck vegetables in from California. The short-shelf life had high spoilage rate and costly. Up Vertical, which is located in Pitt Meadows, BC on a former hayfield. Up Vertical is turning out the equivalent of a 350-acre farm on about 1 acre of land. In 2022, the Province of BC amended the agriculture rules to allow vertical farms. A good step towards food security.

The future of farming is going to become more invested in technology to produce crops and manage costs. Researchers Murdoch and Sumner from the California Agricultural Issues Lab of the University of California, show that automation in farming operations definitely increases the revenue per acre. Pruning has a 15% up lift; Spraying a 5% up lift; Weeding and mowing a 5% up lift; Harvesting a 10% up lift. These values range from US\$ 200 – 800 per acre in economic benefits. The pressure will continue on sustainable practices and increased efficiencies to improve financial returns for farmers.

The June 2023 McKinsey & Company report, *the agricultural Transition: Building a sustainable future*, highlighted how decarbonization measures can mitigate GHGs and do so at relatively low costs. The exhaustive study had 28 recommendations for the agricultural sector to be more sustainable. There were 4 broad areas to affect GHGs: Animal proteins; Crops; Rice; and Energy.

The technical GHG mitigation recommendations to reduce millions of tCO₂e were to be realized by:

1. Increasing concentrate-to-forage ration
2. Use of biologicals
3. Direct seeding of rice
4. Reduced over-application of fertilizer
5. Expanded adoption of technologies that increase livestock production
6. Heat stress management
7. Electrification of on-farm machinery
8. Hydrogen power for on-farm machinery
9. Variable-rate fertilization
10. Improved rice paddy water management
11. Nitrogen inhibitors on crop fields
12. Improved rice straw management
13. Improved fuel efficiency in fishing vehicles
14. Use of biochar as a fertilizer
15. Improved animal health and disease treatments
16. GHG-focused breeding and genetic selection
17. Feed grain processing for digestibility
18. Conversion to hybrid and electric fishing vessels
19. Incorporation of cover crops
20. Sulfate fertilization of rice
21. Nitrogen inhibitors on pastures

22. Advanced feed additives
23. Conversion from flood to drip or sprinkler irrigation
24. Low-or no-tillage
25. Shift to a higher-fat diet
26. Large-scale anaerobic manure digestion
27. Enhanced efficiency fertilizers
28. Small-scale anaerobic manure digestion

When we review the circular economy 7R Model we can see the rethink in sourcing proteins. The primary source in most of the developed world is through the meat industry. In the US it requires 18% of the land mass to raise livestock with 80% of plant proteins going to animal feed. The trend to plant-based protein consumption began ~2010 when *Beyond Meat*, through science and innovation, created new lines of plant-based proteins. This has led to a growing industry ironically controlled by the meat producing companies. Plant-based proteins, while meeting nutritional requirements for health, do not require as many resources to produce an equivalent level of proteins as meats. According to the Beef Cattle Research Council, it requires ~16,000 litres of water to produce a KG of beef, in contrast to 50% less water for plant-based proteins. Cattle emit tonnes of methane gas which adds to the GHG problems. In an attempt to reduce methane from cows, farmers are breeding low-methane cattle. There could be unintended consequences, such as digestion problems, as generations of cattle are genetically modified. Marketing programs and financial subsidies continue to favour meat-protein diets; while plant-based proteins are slowly taking market share with a lesser environmental impact. For an in-depth study on methane emissions and effects, review the Food and Agriculture Organization of the UN, 2023 report: *Methane emissions in livestock and rice systems* at: <https://www.fao.org/3/cc7607en/cc7607en.pdf>

The Province of BC has a Perennial Crop Renewal program in place providing funding for producers to cull unproductive, diseased, or unmarketable cultivars; and to adopt growing systems which are better suited to handle environmental and weather conditions. Cultivars are plants which have been cultivated to produce unique traits as foods. Having resilient crops will be part of the ongoing strategy in agricultural products to be competitive in domestic and international markets.

Plant-based cheese products have attracted serious investors to Nobell Foods, including Bill Gates' Breakthrough Energy Ventures. Nobell has been able to produce casein from soybeans and is planning on launching a line of vegan mozzarella and cheddar cheeses. This is similar to the Beyond Meat technology where plant-based caseins can reproduce the tastes and textures of more conventional animal products. The soy-based cheeses will have a lesser environmental impact than dairy products, supporting the UN SDG of responsible consumption and production.

Plant-based products are facing increased pressure to reduce their cost when compared to conventional equivalent products. Beyond Meat has been dropped by several companies. Starbucks for one, in 2023, discontinued this plant-based option as consumers seek more affordable products. Inflation in the grocery sector is a growing concern. In October 2023, in BC, the cost of 1 kg of Beyond Meat was equal to the cost of 1 kg of tenderloin steak, at ~\$19.00 per kg. This puts the plant-based option out of reach financially for many families. Frozen plant-based chicken is on the market and could increase the competition for meat proteins.

Investigative reporter Ella Nilsen of CNN, in November 2022, found foreign-owned companies in Arizona are drawing vast quantities of water from the dwindling aquifer to grow alfalfa in Saudi Arabia as cattle feed. There is no legislation to limit the usage of water nor any way to track it. In 2018, Saudi Arabia banned the growing of crops for its cattle and dairy industry due to a drought. Buying crops from other countries, particularly the US, enables these Saudi industries to survive. This would appear to be an unsustainable means of providing food in the Middle East. Depending upon whom you ask, it would

conflict with the UN SDG of responsible consumption and production.

California, which has been dealing with drought for decades is now converting waste water into drinking water. Waste water has been used for making ice for hockey rinks, snow for skiing hills, and crop irrigation. Now they have the technology and legislation which allows the state to treat and convert waste water to drinking water for its population. Treated water is pumped into aquifers and mixed before being brought back into the water system. San Diego hopes to have 50% of its drinking water recovered from waste water in the next 10 years.

In October 2023, the Canadian Alliance for Net-Zero Agri-Food (CANZA) was formed. CANZA operates as an initiative of Natural Step Canada and has several leading food sector members on its executive and operating committees. Staff and contractors will address the daily work load issues. The staff are comprised of representatives of the Natural Step Canada, the Smart Prosperity Institute, and the University of Guelph, Arrell Food Institute. CANZA's initial focus will be on Climate-Smart Farming techniques to sequester carbon in farm soils and improve production; and a National Biodigester Network to develop scalable means to reduce emissions and generate renewable energy.

<https://canza.ca/initiatives/carbon-farming-initiative/>

The country of Colombia has a stratified social structure and has been mired in drug cartels, armed rebels, and a lack of human rights. In November 2023, the country of Colombia took the bold step to increase taxes aimed at "junk foods." While there have been taxes on tobacco products and sugary drinks elsewhere, this is a first step towards the processed foods category. The tax targets ultra-processed products defined as *industrially manufactured ready-to-eat foods, as well as those high in salt and saturated fat, such as chocolates or crisps*. The Colombian diet has always been high in sodium content but the increased health care problems of cardiovascular diseases has pushed the government to intervene. It has been reported that 1/3 of Colombia's population has high blood pressure.

"We want to avoid following the path of rich industrialized nations like the United States, where diet-linked diseases are a big problem," said Beatriz Champagne, executive director of the Coalition for Americas' Health, a Latin American advocacy group. "In terms of policies, Latin America is ahead of the curve."

Illegal gold mining in the Amazon basin remains on the rise. Added to the criminal element is the abhorrent use of mercury to separate the gold from the river dredging process. Thousands of kilos are dumped directly into the Amazon each month. Peruvian officials estimate 40,000 illegal miners are operating and destroying the natural habitat and Indigenous ways of life.

Mercury contamination is not new but due to a lack of provenance with the Peruvian gold, as an example, this will exacerbate the problems for generations. Japanese industry, in the 1950s, dumped mercury into the Minamata Bay, which was absorbed by fish and shellfish resulting in mercury poisoning for thousands of local people, termed the Minamata disease. In 2013, Canada signed on to the international Minamata convention to ban new mercury mines effective in 2017. Between 1962 to 1970, a pulp mill in northern Ontario dumped 10 tonnes of neurotoxins and mercury into the water near the Grassy Narrows First Nation. The levels of mercury in the blood of the local First Nation people were 8 times more than the safe level for people. The director of WWF Colombia, Sandra Valenzuela, says that Peru produced 125 tonnes of gold in 2022; Brazil produced 86 tonnes; Colombia 60 tonnes; and Bolivia 53 tonnes. All these countries signed the Minamata Convention. So much for the paper work to protect the people and the planet. With gold being so popular that even retailers like Costco are selling it, there should be greater assurance that the gold is produced meeting acceptable standards.

ESG and chemicals

Per Randy Whitaker, CFO and co-founder of Viridis Chemical, and Bhavesh Patel, senior manager at HELM AG, along with Patrick Long, director in Opportune LLP, chemical companies are responding to pressures from investors, employees, and advocacy groups to advance the agenda on renewable and biobased products. With the production of renewable ethyl acetate on the market it makes products more sustainable. Companies which are closest to the customer such as personal care, cosmetics, and paint products are most interested in this technical development. From an ESG perspective, Viridis sees its renewable chemical lines finding traction in the market. HELM, being a German-based chemical distributor, recognized that it had to pivot to respond to the stricter European standards which are aligning with decarbonization policies. Patel stated that their three main pillars are decarbonization, using the circular economy principles to recycle more efficiently, and partnering with leading companies.

Protocol Environmental Solutions, out of Vancouver, BC has been developing innovative chemical technologies for industry, eliminating the need for toxic products and dangerous methodologies. For the past decade, under its President and CEO Floyd Wandler, the patented product lines have targeted several critical sectors such as concrete, construction, commercial flooring, warehousing, welding, and marine industries. Protocol relies on new approaches to chemistry, science, and engineering to develop their *Smart Chemical Technologies*, proving that science can solve common industry problems, improving efficacy and reducing liability, while not compromising its ESG commitments.

Hydrofluoric acid remains a common toxic compound used to pickle and passivate stainless steel after welding. Hydrofluoric acid residue must be treated as a hazardous waste material. A drop in the eye will blind a person, while a drop on the skin results in horrific burns. A much safer alternative to the use of traditional, hydrofluoric acid products, is EnviroPaste™ or Elimitint™ (when sold under the Linde brand). Developed, manufactured and patented by Protocol Environmental Solutions, it is distributed by Linde and welding supply companies. The efficacy of EnviroPaste™/ Elimitint™ is better, safer and means less project liability. It has a ~50% lower total cost of ownership. Yet, the status quo supports the use of hydrofluoric acid.

At a case study review in early 2024, which my colleague Chris Carter and I facilitated, we invited business people from the private and public sector to critique the case. Some of the attendees were buyers, representing the demand side and others were from the business development sector, representing the supply side.

There was a discussion around the pushback to ideas which addressed ESG issues in products, and were more cost effective, yet the status quo of remaining with current suppliers, using old ideas remained. These situations can be further complicated by personal bias of decision-makers exceeding those of the larger organization.

One attendee from a lumber company said, that in spite of ESG commitments by the company, its procurement manager only considered the lowest cost, using conventional, out-of-pocket metrics. Changes to traditional sources were frowned upon. A sales company representative was only successful when they solved a problem at the direct request of a site engineer. The resolution involved using a more responsible technical solution and eliminating a labour intensive and unhealthy grinding process to remove old coatings on a tank liner. The procurement manager remained convinced it would not be successful without even trialing the technical solution. This story is not a “one off.” There are many examples of where an individual’s bias or personal views are dismissive of new options. Typically, an indication from leadership, that if the bottom line is not being affected, why change?

Concrete etching and mechanical preparation methods either result in the creation of hazardous silica dust or involve the use of toxic hydrochloric /muriatic acid. As per WorkSafeBC, “Silica is one of the most

common hazards on a worksite, particularly in the construction, oil and gas, manufacturing, and agriculture industries. Silica dust can cause silicosis, a serious and irreversible lung disease. It can also cause lung cancer. Cutting, breaking, crushing, drilling, grinding, or blasting concrete or stone releases the dust. As workers breathe in the dust the silica settles in their lungs. Again, from Protocol Environmental Solutions is WashAway Xtreme™. It is water-based and fully biodegradable. Most importantly, it eliminates the silica dust problem on job sites. And, it is a ~50% lower cost solution with no health hazards!

Protocol's products are easily and safely applied to ensure the integrity of the original materials and extend asset life with significant cost reductions throughout the process and in the maintenance. Protocol is appreciated by like-minded, conscientious business owners which enjoy the benefits of market differentiation, creating new jobs, addressing environmental concerns, work place safety and dramatically reducing operational costs. Rethinking how we solve technical challenges is a circular economy challenge which Protocol has overcome. <https://innercrete.com/>

Ammonia is the key ingredient required in the manufacturing of fertilizers. One of the largest producers of ammonia is CF Industries with operations in Canada, the US and UK. CF Industries acknowledges the contributions to emission problems related to production and is making serious investments in blue and green ammonia processes. Blue ammonia is a low carbon model which utilizes carbon capture and storage to contain carbon dioxide emissions. Green ammonia uses an electrolysis system to generate carbon-free hydrogen from water. CF Industries view these alternative production methods as interim solutions to the reliance on fossil-based fuels to produce fertilizers. The economies of scale are not yet there to make the blue and green ammonias sustainable.

Drycleaning has used toxic chemicals for decades. One of the more common chemicals is Perchloroethylene (Perc). According to the Government of Alberta's Workplace Health and Safety Bulletin, Perc causes irritation of the nose and throat and central nervous system depression. Symptoms include drowsiness, dizziness, giddiness, headache, nausea, loss of coordination, confusion and unconsciousness. The International Agency for Research on Cancer (IARC) has concluded that perchloroethylene is probably carcinogenic to humans. There are more responsible options such as liquid silicone. And yes, liquid silicone costs more than Perc and invites pushback on price.

Cookware and textile manufacturers need to ensure their products do not contain per- and poly-fluoroalkyl related substances (PFAS) in California, beginning in 2025. PFAS have wide spread use and have been sold for decades under the Teflon brand. PFAS are used in the military, medical equipment, and are used to put out fires that involve oil. PFAS can be used as a water repellant or in stain resistant clothing. PFAS have been linked to many health studies as they are bio accumulative and toxic. European Union member countries have proposed the ban of all PFAS unless it is "proven essential for society." PFAS are colloquially referred to as the "forever chemicals" because they stay in the environment for decades. In July 2023, the US Environmental Protection Agency issued new guidelines which require that any new PFSA products must ensure they are not harmful to human health or the environment *before* the chemicals can be sold to consumers. This is similar to the requirements for products related to the Precautionary Principle. The Precautionary Principle was given greater legitimacy out of the Earth Summit in 1992 under the Rio Declaration: *In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

The manufacture and import of products containing volatile organic compounds (VOCs) comes under increased scrutiny in January 2024 for most product categories. Environment and Climate Change Canada made the changes to be in effect January 2024. While there are no testing requirements, the

onus is on the manufacturer or importer to meet regulatory requirements.

Family-owned and 90-years old, Cloverdale Paint, based in BC, provides insight into the challenges to adapt more ESG practices. The post-pandemic period created product shortages and increased price pressure. Cloverdale Paint fights to carve out its space in the market and competes with much larger MNCs in the commercial, consumer, and industrial coating market. Larger MNCs can afford to trial newer product alternatives and tend to set the market prices in the various regions they operate in.

Cloverdale Paint has made commitments on the environmental and social front. Their Social Responsibility statements reads: *We will provide a safe and healthy work environment for our employees and customers while continuing to minimize our impact on the environment. We support and encourage active participation in our local communities.* The latter is reflected in the company and family contributing \$1 million to the multi-sensory unit to help reduce agitation and anxiety and stimulate and encourage communication, the first of its kind for children and youth in a hospital psychiatric unit at the Surrey Hospital & Outpatient Centre Foundation.

On the ESG front, Cloverdale Paint is implementing actions on more sustainable logistics, packaging, and raw materials. They are currently framing their reporting model for quantitative and qualitative benchmarking. In addition, they implemented a supplier code of conduct and partnered with EcoVadis on this strategy. <https://www.cloverdalepaint.com/>

Insurance and risk management

Risk management strategies are a key part of supply chain management and ESG. Under the larger corporate umbrella are a preponderance of issues. A shared risk for underwriters, cities, companies, communities, governments, and society in general, are issues which threaten sustainable operations.

Under the UN Environment Programme's Finance Initiative, in June 2020, a collaboration with global insurance industry companies developed its *Principles for Sustainable Insurance* (PSI). The subsequent guide distilled risk into (4) principles to be adopted:

1. We will embed in our decision-making environmental, social and governance issues relevant to our insurance business.
2. We will work together with our clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions.
3. We will work together with governments, regulators and other key stakeholders to promote widespread action across society on environmental, social and governance issues.
4. We will demonstrate accountability and transparency in regularly disclosing publicly our progress in implementing the principles.

At a high-level and from a supply chain perspective, the noted risk criteria included:

- Climate change
- Environmental degradation
- Protected sites/species
- Unsustainable practices
- Animal welfare/testing
- Human rights
- Bribery and corruption
- Poor corporate governance
- Poor product safety and quality

For each of the risk criteria the PSI guide provided detailed examples and references for mitigating the relevant risk.

An example of how a risk management strategy can be implemented is provided by Volkswagen. In March 2022, Volkswagen initiated a comprehensive risk management and mitigation strategy to comply with new German laws with respect to the sourcing of raw materials. It is called the Raw Materials Due Diligence Management System (RMDDMS) aimed at conducting human rights and environmental risk management. Volkswagen has put the onus on a Senior Level Steering Committee with oversight on each prioritized raw material.

Raw material extraction and production faces the highest risks at the mining sites in the various countries where there can be instances of forced labour, human trafficking and environmental degradation. With the RMDDMS plan, there must be an assessment and mitigation plan for each of the priority raw materials. These (16) include: lithium, cobalt, nickel, graphite, aluminium, copper, leather, mica, tin, tantalum, gold, platinum, rubber, rare earth metals, and steel. The RMDDMS is exhaustive in its methodology and can lead to cancellation of contracts. Volkswagen is on record as not supporting the mining of materials from the seabed. A part of their strategy is to ensure that all procurement staff have sustainability as a skill set. Volkswagen offers training sessions to its suppliers as part of the RMDDMS. As a global leader in the automotive industry, this could change operations for many suppliers and competitors to follow. Volkswagen is a member of the Initiative for Responsible Mining Assurance (IRMA).

Responsible investment

The Principles for Responsible Investment (PRI) were drafted in 2005 when the UN invited the largest global institutional investors, involving 12 countries and intergovernmental organizations, to sign on to a commitment to develop sustainable investment strategies. The PRI has (2) UN-based partners, the UN Environment Programme Finance Initiative and the UN Global Impact groups. The value of the assets managed by the PRI signatories is US\$80 trillion.

The (6) PRI principles to practice ESG factors in investment decisions are:

1. We will incorporate ESG issues into investment analysis and decision-making processes.
2. We will be active owners and incorporate ESG issues into our ownership policies and practices.
3. We will seek appropriate disclosure on ESG issues by the entities in which we invest.
4. We will promote acceptance and implementation of the principles within the investment industry.
5. We will work together to enhance our effectiveness in implementing the principles.
6. We will each report on our activities and progress towards implementing the principles.

In 2018, PRI launched the *Inevitable Policy Response* project to assess how actions announced by governments responding to the repeated *failure* to achieve global climate change goals may result in widespread policy action. The PRI predicted the aggressive government policies in the areas of: banning the use of coal; replacing ICE with zero-emission vehicles; GHG reduction from land-based operations; increased energy efficiencies; zero-carbon energy; increased implementation of carbon pricing models; and increased CCUS investments. All of these policies are in play today and targeting the 2030 milestone for Net Zero strategies.

The Insurance Institute of Canada supports the principles of the PRI and the subsequent Inevitable Policy Response for governments to address the climate change challenges and rising insurance rates.

A good example of a long-term organization which advocates for responsible investment is the US-based non-profit organization, CERES. CERES drives capital investments heavily weighted on electrical energy, oil and gas, transportation, banking, food and steel. Initially aimed at environmental risks, CERES broadened their influence by drafting the GRI standards for reporting corporate sustainability actions. CERES was a founding member of the Climate Action 100+. The latter group of investors manages US\$ 68 trillion by ~170 companies and ~700 members. <https://www.climateaction100.org/>

Responsible investment organizations screen for negative and positive factors. Negative screening excludes companies producing tobacco, alcohol, gambling, and weapons as an example; whereas, positive screening supports ESG leadership companies. Investments in projects which have potential social impact and a financial return are favoured which could involve microfinance, affordable housing, healthcare, education, and renewable energy. Socially responsible investing supports organizations which act in the best interests of their environment and society as a whole.

Social impact bonds (SIBs) are a financial instrument to affect social outcomes. SIBs have had limited success, based on the reported results from ~2010 to date. SIBs are partnerships between government agencies and private sector funders to address specific, critical social problems. The government agency selects an issue to be resolved and then finds an organization which commits to take on the challenge. The government avoids an upfront investment, and the service provider is paid out, only if successful, through the issuance of a bond. The value of the bond is based on the estimated costs, if the government were to provide the services through governmental services. This formula could include economic benefits or cost savings which could be delivered. The key part of an SIB is the defined, measurable and evidence-based outcomes to validate the process. Failure to achieve the targeted outcomes may allow the government agency to not pay out the funds.

In Canada, only the province of Saskatchewan undertook the SIB route to address a health issue. The *Sweet Dreams* project was to provide affordable housing to single mothers and their children, who may be at risk of entering foster care. The objective was that by 2019, 22 mothers and their children were to stay together for at least six months, for parents to complete educational requirements and prepare to find employment. Investors would only be reimbursed if 17 or more children did not enter foster care. The outcome was expected to save \$1.5M for Saskatchewan. Government reduces its investments and tax payers receive value for the outcomes, directly and indirectly.

Another SIB project in Saskatchewan, involved the Mosaic Company Foundation and the Mother Teresa Middle School in Regina. The school received a bond of \$1M for a 5-year term to support students facing high-risk due to their socio-economic status. The bond was to pay out the Foundation's investment at a 1.3% interest if 82%+ of the students graduated from Grade 12 on time. If only 75% graduated, then only 75% of the bond would be covered. The business case for the government was to save \$1.7M in health, social and justice costs. The Federal government initiated (2) SIBs to address strokes with the Heart & Stroke Foundation; and to expand college programs in BC, SK, ON, and QC.

Reading between the lines, SIBs have had some success but have not had a lot of uptakes to achieve the social outcomes. While over 11 countries have tried SIBs, from an investor perspective, there is a lot of risk to absorb, and from a governmental perspective, there is limited reporting of successful outcomes. <https://innovationsask.ca/news/the-sweet-dreams-initiative>

ESG in construction design, materials and labour

When we consider the expenditure of materials and usage of labour in the industrial, commercial and

residential construction sectors, these are among the largest drivers of emissions and consumption of resources. As the circular economy requires a rethink of designs, we can see progress in construction options.

The Canada Green Building Council (CGBC) has been a long-time proponent of green buildings. For over 20-years the CGBC has adapted the US-borne Leadership in Energy and Environmental Design or LEED® standards for the Canadian market. CGBC estimates that buildings generate 30% of all GHGs, 35% of landfill waste, and deplete 70% of the municipal water capacity. LEED's holistic approach to the construction of buildings is to lower carbon emissions, conserve resources and reduce the operating costs through sustainable practices. While developmental costs may increase to achieve a LEED Silver, Gold or Platinum rating, the TCO is reduced to the owners and the community enjoys the benefits for generations. Certified LEED buildings are rated on 9 credit categories:

1. sustainable sites;
2. water efficiency;
3. indoor environmental quality;
4. energy and atmosphere;
5. Location and transportation;
6. Innovation;
7. Regional priority;
8. materials specifications; and
9. education and awareness.

Provincial governments are impacting residential construction practices by setting energy efficiency standards and goals for builders. BC set 20% more by 2022; 40% more by 2027; and 80% more by 2032, which is the net-zero energy ready standard.

The movement to the innovative *mass timber* designed projects uses composite wood products rather than only traditional steel and concrete. The environmental benefits stand out such as renewable resources and wood is a natural carbon sink. The engineered composite materials are fire resistant as they tend to char on the surfaces as opposed to igniting, when a fire occurs. Structures using the mass timber design complement the traditional steel and concrete components in the foundation. High rise designs up to 18 floors are in many urban centres and continue to attract architects and developers. The Canadian Wood Council (CWC) supports the tall wood building concept. The CWC recommends an integrated approach throughout the design and construction phase with early supplier involvement on the material side. One of the first tall wood buildings was completed at UBC in 2017, which led to building codes being revised to accommodate the designs. Long-term costs of tall wood buildings are less costly than conventional steel, concrete and wood, as the energy costs associated with steel and concrete continue to increase.

Vancouver Island Construction Association CEO, Rory Kulmala, is pleased to see how their sector is tackling ESG issues. While the production of concrete does emit GHGs, the internationally recognized CarbonCure™ project enables thousands of tonnes of CO₂ to be captured and injected into the fresh concrete. The mineralized CO₂ strengthens the concrete and remains permanently in the material even after demolition.

Kulmala references the work done by the Building Owners and Managers Association (BOMA) who advocate for sustainable buildings. Their expertise addresses energy, water, air, comfort, health and wellness, custodial, waste, sites, stakeholder engagement, pandemic responses, and purchasing to maintain and operate the buildings. BOMA's guidance is based on Canadian-wide knowhow for the categories of Office, Enclosed Shopping Centres, Industrial, Open Air Retail, Health Care, Multi-Unit Residential Buildings and Universal structures.

Within the lower mainland of BC is an organization which deconstructs houses and buildings. Unbuilders Deconstruction Inc. has diverted 4M+ tonnes of salvaged construction materials for reuse; resells reclaimed lumber with carbon intact; creates 6 jobs vs 1 when demolition is used; and protects the heritage of a community. The cost of deconstruction is about ½ of the cost of a demolition. Rethinking how we replace older buildings is part of the circular economy principles.

From a labour perspective, construction projects are experiencing a chronic shortage of skilled trades. Looking at social enterprises as a source of labour, Canadian-based Chandos Construction has successfully partnered with SEs to provide subtrades and qualified trades people on many projects. Further, Chandos endorses the Integrated Project Delivery Finance, Operate and Maintain model to build projects with a 10% social procurement commitment. The IPD FOM provides better scheduling, cost controls and increased local labour for the project owners, which are often small to medium-sized communities.

In 2024, David LePage, of Buy Social Canada, shared collaborative results with the construction industry, local employment, social enterprises, and the City of Vancouver's community benefit agreement (CBA). A CBA is designed to create specific social benefits on construction and development projects. The new St. Paul's Hospital development in Vancouver, valued at ~\$2B+ has commitments from its design-builder, PCL Construction, to ensure 10% local hiring from equity-deserving groups, plus 10% local and 10% social purchasing. Local businesses and social enterprises involved include EMBERS, CleanStart, Demolition Impossible, Finch's Tea House, and Agro Roasters, to name a few. More details can be accessed through: <https://www.buysocialcanada.com/posts/update/city-of-vancouver-cba-policy-boosts-construction-sector-impact-on-local-projects/>

Nicole Burgess, CEO of Saskatoon & Region Home Builders' Association, (SRHBA) has been a key advocate for ESG initiatives within the residential construction industry. One notable example is through its ongoing engagement and delivery of the Canadian Home Builders' Association's (CHBA) Net Zero & Net Zero Ready program, which supports builders in constructing homes that are energy efficient and capable of producing as much energy as they consume. By providing a clear certification program for these homes, the CHBA has made it easier for consumers to identify and choose sustainable homes that align with their values and needs. The program has also helped to incentivize builders to adopt sustainable practices, which has been crucial in driving the industry's overall commitment to ESG considerations.

Increasingly builders and developers are adopting environmentally sustainable practices, such as green building materials and designs, installing renewable energy systems, and implementing sustainable landscaping. They are also reducing waste through recycling and reusing materials, as well as implementing eco-friendly waste disposal practices. The industry is committed to social sustainability, with builders designing homes and communities to accommodate diverse populations, integrating affordable housing units into their developments, and fostering social cohesion through features like parks, walking trails, and community centres. By taking a holistic approach to sustainability, the industry is demonstrating a commitment to addressing ESG challenges in a comprehensive and meaningful way.

As of May 2023, the BC Building Code requires 20% more energy efficiency for most new buildings. Part of the intended outcomes are for buildings to use less energy and reduce carbon emissions, even if a home is heated with natural gas. The cost of construction will be higher than existing building codes.

One organization which has successfully overcome a big challenge in the construction sector is Outside the Box Materials (OTBM). OTBM provides scalable alternatives to conventional materials. Their TechCement™ replaces ordinary Portland cement by using an innovative *geopolymer* cement. Portland cement requires high temperatures in its production and is one of the main reasons why it is one of the largest emitters of CO₂. TechCement™ reduces the CO₂ emissions by ~65% at a comparable cost.

TechCement™ can be used in construction, landscape materials, pavers, and precast products. One of its advantages is the ability to withstand extreme weather conditions, whereas traditional products will degrade with freeze/thaw cycles. TechCement™ uses recycled concrete as an aggregate and can be recycled and used as an aggregate itself. Having a lower permeability rating makes it ideal for marine projects and water treatment facilities. OTBM has also introduced SulfCrete™ which is in a pelletized form, replacing cement-concrete. OTBM's products are a good example where industry has embraced the circular economy principles to reduce waste and recycle resources in a systems thinking model.

OTBM's TechCement™ is being used with 3D printers to reduce housing costs. US-based, Alquist 3D has been building houses for the past couple years using print-on-demand technology. Although this construction method has been successful, Alquist's founder and CEO, Zack Mannheimer, acknowledged that using traditional concrete was "far from the most environmentally friendly material." Alquist partnered with OTBM and uses their TechCement™ to replace concrete. The use of 3D reduces waste, reduces energy costs, is storm-resistant, and competitive, as the construction time is substantially reduced. Habitat for Humanity was one of the first customers to contract for a 3D built, 1200 sq ft home. Sustainability was an important factor for Habitat for Humanity when selecting Alquist.

<https://www.otbmaterials.com/techcement>

In July 2023 another breakthrough material to replace conventional Portland cement in concrete was poured in Seattle, called C-Crete. C-Crete is a "cement-free" product designed by C-Crete Technologies. The *binder* ingredient eliminates most of the CO₂ in the process, making C-Crete a direct competitor for concrete from a sustainability perspective. According to C-Crete's founder and president, Rouzbeh Savary, PhD. "Our binder is a drop-in replacement for Portland cement that drastically reduces carbon emissions. Given that our product meets industry standards and has cost-parity with conventional concrete, it opens up an entirely new era in construction." C-Crete is a scalable solution which may revolutionize the construction industry and building code standards. <https://ccretetech.com/news/c-cretes-groundbreaking-cement-free-concrete-gets-inaugural-pour-in-seattle/>

Construction-scale 3D home building is being used successfully by ICON, a construction-tech company out of Texas. They have built more than 100 houses in the US and Mexico by 2023. They continue to build affordable, communities using 3D house designs and construction. This type of disruptive technology could signal a big trend for the availability of low cost, durable housing. ICON has also partnered with NASA to construct facilities and habitats on the moon, using the moon's endemic surface materials. <https://www.iconbuild.com/>

Arup, an organization of global engineers and designers, is focused on the next generation of development and construction. Arup, along with the Ellen MacArthur Foundation, has produced a short video on their philosophy and approach to construction. As a synopsis, it gets down to addressing the Built Environment with 4 basic *rules*:

1. Build only what you need
2. Build with the right materials
3. Build efficiently
4. Build for the long-term

The essence of their message is, we need construction and can do so by following the principles of the circular economy and save resources and reduce GHGs. <https://www.youtube.com/watch?v=rWFkLa-QIOs>

E-waste and product stewardship programs

Electronic waste continues to grow in all countries as devices reach their often short, end-of-life cycle. Electronic products are discarded, recycled, but can be refurbished. As volumes of e-waste increase, so does the demand for their material content or for these expired devices to be repurposed, as the

circular economy supports.

The US Environmental Protection Agency (EPA) has 10 categories for e-waste:

- Large household appliances
- Small household appliances
- IT equipment
- Consumer electronics
- Light fixtures
- Toys
- Tools
- Medical devices
- Monitoring devices
- Automated dispensers

The 2019 World Economic Forum report, *A New Circular Vision for Electronics*, estimated that only 20% of the annually generated, 50 M tonnes of e-waste, is properly recycled. The value of this e-waste is ~US\$62B. There is 100 times more gold in a tonne of mobile phones than in a tonne of gold ore. The other 80% of the e-waste ends up in landfills, incinerated, or shipped to developing markets for hand sorting and recovery by *dismantlers*. The long-term effects to health and the environment are considerable due to the toxic and hazardous materials. E-waste can be defined as any electronic or electrical device that has reached its end-of-life, including batteries and related equipment.

Many companies and governmental offices schedule and budget to *refresh* their IT systems. This can be motivated by their leasing agreements to ensure the latest technologies are installed, whether the entire system requires this or not. The leasing companies encourage these upgrades similar to automobile leasing programs to generate sales revenues and profitability through consumption. It's estimated that manufacturing 1 tonne of laptops generates 10 tonnes of CO₂.

TechTarget, a US digital marketing company, in a 2021 recommendation for e-waste suggests refurbish, resell, recycle, and responsible disposal. These 4 steps require that the service providers be bona fide and reputable. IT asset disposition (ITAD) companies can be the conduits for much of the e-waste disposal and refurbishing. Buying factory recertified drives can be cost effective, reduces consumption, and can be warranted. ITAD companies should meet R2 standards as defined by the Sustainable Electronics Recycling International (SERI) for responsible practices in accredited certification programs. Old electronic devices can also be donated to schools, charities, or youth organizations, after ensuring a security check.

Dematerialization of electronics will occur concurrently with recycling and refurbishing. Cloud computing and IoT will be addressed through design of the technology and connectivity; while reverse logistics and producer responsibility strategies will promote recapturing materials and resources under a circular approach. There needs to be an increase in efficient recycling systems. European recycling claims to be at 35% which is much better than the 80% of many countries, according to the Geneva Environment Network. Other related information on recycling is covered below under Critical Materials.

<https://sustainableelectronics.org/r2/>

Product stewardship programs have been in effect for several decades under the Canada-wide Action Plan (CAP). Initially these were set up as deposit-refund programs for beverage containers to collect and recycle to reduce landfill waste and environmental problems. Most provinces use eco-fees to cover the cost to properly dispose of tires, electronic waste, paper products, products containing mercury, hazardous materials, and automotive products. CAP was supposed to have a Phase 2 where construction and demolition waste, furniture, textiles, carpets, appliances, and ozone depleting substances were to

be included.

Inherent in product design has been the issue of *planned obsolescence*. Consumer products have been designed to be constructed as efficiently as possible and at the end of their useful life, the products are expected to be thrown out. When we think of small home appliances like kettles and other gadgets, they are cheap to buy and are simply thrown into the garbage when they break down, within a relatively short period of time. Or consider the larger appliances such as stoves, fridges, air conditioners, washers, and dryers. These can have a relatively short life and are costly, if not impossible, to repair. Original equipment manufacturers (OEMs) have little interest in extending the life of these products. It's cheaper for them and generates more revenues to design-for-disposal. Energy Star rated items are built with lighter materials in their design and intended to use less energy when in service. Arguably, the lower quality leads to a shorter life and therefore, more consumption of materials to produce goods to replace the energy efficient items – it's not a net energy saving, it literally requires more energy to keep making new items to replace the previous models. Society pays for the disposal as much of it ends up in landfill sites. Consumers should demand better value but these requests get lost in the noise of marketing.

Little progress has been made on the CAP Phase 2 to date, according to the Economics and Environmental Policy Research Network working paper of October 2019, which is sponsored partially by Environment and Climate Change Canada. Provinces rely mainly on quasi-governmental agencies to manage the waste with little legal clout to hold producers responsible. Municipal collection programs are a main source for used products and materials where it is up to households to sort their waste according to being organics, recyclables, or garbage, in their opinion. The summary of the working paper sees more potential for stewardship programs in terms of efficiency and effectiveness, but not as they are currently being managed.

Contrast our Canadian situation to that of Europe. Specifically, in France where they require that labels are an integral part of their Extended Producer Responsibility plan. Producers *must* use the approved logo on labels to inform end consumers that the product and/or its packaging can be recycled. The legislated mandate applies to household packaging; printed paper; electric and electronic equipment; batteries; tires; vehicles' medicines; furniture and furnishings; apparel, footwear, home textiles; sport and leisure boats; chemicals; in-vitro diagnostics; tobacco products; toys; sport and leisure articles; DIY and gardening supplies; textile decoration; construction products and materials; and lubricants. Non-compliance is reinforced with steep financial penalties. <https://blog.qima.com/sustainability/france-triman-labeling-requirements>

The European Commission launched the *Right to Repair* in early 2023. The proposal will ensure consumers can buy products which are able to be repaired and thereby, reduce waste. It is intended to provide an incentive for manufacturers to design more durable products and where necessary, have parts and training provided to be able to extend their life. This is part of the EU Circular Economy Action Plan.

Role of the consumer in retail sectors

If we look at the fast fashion industry, we can see the sense of entitlement, we, as the WEIRD consumers have encouraged. As long as it is legal to buy, we will buy what we want with little regard for how the garment was made or for the individuals that made it or how it will be disposed of. Authors Naomi Klein, Elizabeth Cline, Sofi Thanhauser, and others have documented the global problems created by cheap clothing. The WEIRD American consumer buys ~60 items of clothing per year. Brands such as Adidas, Nike, Zara, H&M, and the Gap don't make anything but they have their product lines manufactured in *speed* factories or low-cost labour firms across the globe. Apparel and footwear are the source for 8% of

GHGs.

Reporting on working conditions and the use of supplier codes of conduct have not been overly effective to address the exploitation of garment workers on such a scale. The 2013 Rana Plaza collapse in Dhaka, Bangladesh, which killed 1100 and injured 2500, was the moment which exposed the lengths to which fast fashion had stooped to. Canadian brand Joe Fresh, a division of Loblaw's, distanced themselves from any responsibility in related law suits resulting from the Rana Plaza deaths, *as they do not operate the factories*. A \$2B law suit was dismissed by Canada's high court. Loblaw's paid relief and compensation of some \$5M to Bangladeshi workers and various social agencies following the favourable ruling. While many garment marketers conduct *social audits* where they have their brands made, the audits appear to have minimal impact on sincerely addressing the social problems.

In May 2023, Nike has been charged with *taking advantage of consumers interested in eco-friendly products*, as reported in Supply Chain Dive and several other investigative media outlets. A law suit allegedly claims that Nike *falsely and misleadingly markets products as sustainable and environmentally friendly*.

Dhaka is the home base for 5,000 garment factories which employs 80-90% women in patriarchal operations. ~18 million workers in Dhaka are women with ~11 million working in the agriculture industry. The 2018 ILO report states that most of the women in the garment sectors are in vulnerable positions but are dependent upon earning their meagre wages.

The 2022 ILO report, *Decent Work in the Garment Sector Supply Chains in Asia*, shows the continent employs 60 million workers and accounts for 55% of clothing and garment exports. While wages have risen, most workers remain in vulnerable conditions in the low skilled "cut and trim" operations.

For decades retail fashion brands hid behind the statement "it's not my problem because I don't own the production company." This has been exposed as being exploitive and illegal to deny workers their fair pay. The US Department of Labor came down hard again in December 2022 in its press release: "U.S. Department of Labor Wage and Hour Division investigators found Justar Fashion – a garment contractor that produces apparel for retailers such as Stitch Fix, Indigo and Evereve – failed to pay minimum wage and overtime as required by paying workers on a piece-rate basis and at straight-time rates regardless of the overtime hours they worked. The employer also failed to keep records of hours worked. Their actions violated minimum wage, overtime and recordkeeping provisions of the Fair Labor Standards Act. The Dept of Labor stated that 32 employees of Justar were owed US\$145,290 in back wages.

US clothing brand manager, PVH, is taking steps towards a more responsible commitment in the fashion sector. Even going so far as to tie financial support to its suppliers which meet sustainability criteria. In early 2023, PVH partnered with Standard Chartered Bank to benchmark PVH's suppliers against targeted ESG metrics. Those suppliers which meet the ESG targets will have access to more competitive financing. Standard Chartered Bank want to enable suppliers to have more resilient supply chains through investing in technologies. The ESG metrics put forward by PVH include a healthy and safe working environment; respect for human rights. PVH wants to have its operations 100% powered by renewable electricity by 2030; reduce supply chain emissions by 30% and zero waste by 2030. In the short-term, PVH want to filter out all harmful chemicals and micro-fibres in water discharge by 2025.

Further progress has been shown in the garment industry with dozens of major brands signing on to the 2021 International Accord (IA). Signatories to the IA commit to:

1. Disclosing all factories producing for them in countries with IA programs.
2. Ensuring all listed factories participate in the inspection, remediation, and safety training programs.
3. Supporting factories to ensure remediation is financially feasible.

4. Contributing to the operational costs of IA programs.

https://internationalaccord.org/signatories/?_signatory_categories=pakistan-accord-brands

The scope of the IA was strengthened in 2023 with the additional Pakistan Accord. Legally binding clauses to include fabric mills and go beyond health, safety, and fire regulations in buildings to address sexual harassment, gender-based violence, and excessive working hours. The Global Living Wage Coalition has estimated that there are ~75 million workers in the garment industry, *working 10-16 hours per day, 6 days per week, for poverty-level wages*. The 2022 World Bank's *extreme* poverty line was raised from US\$1.95 to US\$2.15 per person per *day*! Globally, this impacts ~2.6B people in the G20 groups of countries.

ESG in the fast fashion world has a long way to go. The over use of micro-fibres and chemicals contributes to carbon emissions and pollution from waste water discharge; the social issues remain largely unresolved. The marketing to the WEIRD world far exceeds the actions to address ESG issues. QIMA Senior Business Development Partner, Dory Lanenter, reported persistent non-compliance issues involving wages, lack of training related to the use of PPEs, and child labour in their traditional ethical audits of factories. For example, many Asian-based factories partner with local schools to send children to work in the factories as non-paid internships and often in sub-standard dormitories. Sadly, in a late 2022 global survey by QIMA, there was a substantial increase in child labour use in factories from 2019 levels. QIMA audits thousands of factories per year for its clients.

A transitory material alternative has been found in the use of recycled polyester (rPET). rPET reduces CO₂ by ~80% instead of using virgin polymers, according to German owned ALPLA Group. The carbon footprint is based on the ISO 14044 standard tracking from the collection of PET bottles, transportation, cleaning, processing, and granulating. ALPLA has been researching rPET for 20-years and has successfully used rPET for 7-years. rPET fibres can also be used in the production of clothing and textiles. QIMA has seen increasing interest in its lab testing of rPET to validate stated to actual content of recycled components.

Trade agreements allow Export Processing Zones (EPZ) to flourish legally with sovereign space allowing duty-free imports with no quotas on raw materials or the capital equipment to produce the exports. Host countries provide the EPZs with private security, private generators, avoidance of inbound/outbound taxation, and easy access to low wage labour pools from foreign multinationals. Asian factories subcontracted production to lower cost producing countries such as Honduras and controlled by the US. That's how cheap clothing gets to the WEIRD market.

Japan is witnessing a growing trend in buying 2nd hand clothing. As inflation worries rise with consumers and interest in sustainability is gaining traction, there has been increased buying of used fast fashion products. Uniqlo, a long-time Japanese brand, owned by Fast Retailing Co., began pop-up stores in Tokyo in late 2023. The Uniqlo brand items sell for ~1/3 of the original price and have been well received by consumers. Where previously consumers had an aversion due to hygiene and other social factors, the acceptance of buying 2nd hand clothing may be a signal of a change in this attitude. Japan's Minister of Environment says while 34% of clothing is recycled, a lot of that is donations to low-income countries, with incineration used to dispose on excess volumes. It's estimated that only ~6% of the \$75B market fashion market is 2nd hand. A popular Japanese site, Mercari, has shown an increase in online buying of used fashion products, as reported in December in the Japan Times newspaper.

The Ellen MacArthur Foundation and the Textiles Action Network support the circular economy principles of increased selling of reused clothing with materials designed to be circular and made from circular raw materials. This is a good step but will take decades to make a difference.

<https://ellenmacarthurfoundation.org/>

Transparency in fashion

The July 2023 Fashion Industry study authored by Dr. Sheng Lu Associate Professor Department of Fashion & Apparel Studies, at the University of Delaware, indicates a change in sourcing strategies. ~80% of the fashion executives are reducing their dependency on Chinese-produced apparel. This is attributed to deteriorating US-China relationships and the conditions of employment in many Chinese garment factories, such as the use of forced labour. The inflationary trend of materials has signaled that changes are necessary. The Dominican Republic appears to be a beneficiary in the change of sourcing. The Dominican Republic-Central America Free Trade Agreement is generating lower shipping and production costs.

Industria de Diseño Textil SA (Inditex), representing global brands like Zara, Bershka, H&M, Massimo Dutti, announced in July 2023, it will stop buying products made in Myanmar. This comes after the global campaign by IndustriALL convinced companies to divest from Myanmar due to unacceptable labour conditions which have been compounded since the 2021 political coup. IndustriALL Global Union represents ~50 million workers in 140 countries, according to its website. There is further controversy due to the European Union calling for continued sourcing from Myanmar with a focus on improving the nation's garment factories.

As per its supply chain disclosure report, H&M sources from 26 suppliers and 39 factories in Myanmar; 375 suppliers and 421 factories in China; and 137 suppliers and 227 factories in Bangladesh. When brands such as H&M make a strategic sourcing shift, along with other brands, there is a ripple effect across the globe, impacting thousands of workers.

The Worldwide Responsible Accredited Production (WRAP) is the largest factory-based certification program for clothing and footwear manufacturers. WRAP principles align with the ILO labour conventions and provide an auditable process for certification compliance.

A February 2023 report from the Federal Government's Canadian Ombudsperson for Responsible Enterprise (CORE) found that Canadian clothing companies have limited awareness about whether child labour could be in their supply chains. Legislation under Bill S-211 was passed by parliament in May 2023, to curb child and forced labour, which will come into effect in January 2024. Bill S-211 will be referred to as the *New Forced Labour and Supply Chain Reporting Law*. The Act goes beyond clothing to include all imported products and could envelope mining industries. The Act can apply to companies with \$20M in assets; \$40M in revenues; and/or 250+ employees. CORE was formed and mandated in January 2018 to investigate human rights abuses by Canadian companies operating abroad in the oil and gas, mining and garment sectors.

In July 2023, CORE launched an investigation against Nike for allegedly using slave labour and has not sufficiently responded to these claims, according to CORE. CORE also launched a case against Ralph Lauren for alleged use of forced labour in its supply chains. CORE additionally is probing Vancouver-based Dynasty Gold for allegedly using forced labour at its gold mine in Kazakhstan, near a Chinese detention centre. The CORE report stated that Dynasty "appears to have deliberately avoided participating in and co-operating with the (office's) dispute resolution process without providing any explanation." Earlier in 2023, the US government requested information from Nike, Adidas, and Shein over concerns regarding forced labour in garment sourcing practices involving the Uyghur region of China.

In 2024, the EU bloc of countries passed legislation requiring *large* companies to audit their supply chains for the use of forced labour. Large companies are defined as having more than 1000 employees and ~Cdn \$600M in revenues. The law will require companies to take remedial action where forced or child labour or environmental damages are identified. The law is referred to as the corporate

sustainability due diligence directive (CSDDD), to be phased in by 2025. This has been a prolonged negotiation but is a big step forward in addressing social and environmental issues. Fines for non-compliance could be up to 5% of revenues.

In 2024, the need for increased transparency in sourcing in the fashion sector has been raised by various investor groups. Investors in publicly traded brands such as Inditex (Zara brand) want full disclosure of their suppliers which rivals H&M, Adidas, Puma, HugoBoss, M&S, and Primark have agreed to. Inditex is pushing back. In the EU there are ongoing debates that would require all “big” companies to disclose more information on supply chain compliance related to environmental and child labour issues. Fines could be up to 5% of revenues. Inditex currently only shares that it sources from 12 main countries but no individual supplier information is provided. A Reuters report shows that Inditex has reduced sourcing in China, Spain, Portugal and India, while increasing its sourcing from Morocco, Bangladesh, and Pakistan. *Know the Chain*, which is a benchmarking initiative for brands and suppliers to increase full disclosure beyond partial sourcing information.

Fast fashion brands Shein and Temu are shipping 600,000 packages *per day* to the US. Their low cost, popular clothing items, are being shipped in lower valued shipments to avoid taxation under the trade exemption, de minimis rule. According to Cargo Facts Consulting, in a 2024 update, Temu ships ~4,000 tonnes per day; Shein 5,000 tonnes; Alibaba 1,000 tonnes; and TikTok 800 tonnes. A November 2023 report from the Coresight Research group estimated that Shein and Inditex accounts for ~40% of the global fast fashion market. <https://www.reuters.com/business/retail-consumer/rise-fast-fashion-shein-temu-roils-global-air-cargo-industry-2024-02-21/>

Of note for supply chain professionals, ensuring that a supply chain partner is not involved with child labour or slavery, work with the services of companies like QIMA. QIMA provide these types of audits as part of their standard suite of services for suppliers in Canada and elsewhere.

According to Anthony Goerzen, Sobey Professor of International Business at Queens University, Smith School of Business, CORE is well-intentioned but largely ineffective. CORE lacks the power to subpoena corporate documents or testimony. Companies are opting to ignore CORE requests. CORE’s biggest leverage is public embarrassment of bad actors. In an interview with writer, Kristy Strauss, in September 2023, Goerzen sees (3) barriers to CORE’s success in international investigations.

1. Wrongdoing is difficult to define. A government clerk seeking a bribe to clear a shipment, when the clerk hasn’t been paid for a few months, would be punishing the wrong party.
2. What right do WEIRD countries have to impose their values on foreign players and tell them what the rules are? Goerzen says this can come across as old-world colonialism.
3. If CORE shames a company operating in a developing market, and the company opts to leave that country, this only adds to problems by deterring others from investing or hiring for fear of being accused of being anti-social or anti-environmental. Promoting trade and not aid is the challenge. In Goerzen’s words, the whole world is in the same boat and there is no government or regulator that has figured it out yet. I would say many of the European Union countries are more attuned and maybe have started to take a few more steps towards addressing some of these issues. But nobody knows how to do this. No one has the answer yet.

How effective can CORE be without the legitimacy of power?

The volume of unsold garments is a major global problem. In April 2020, the scientific journal, *Nature Reviews Earth & Environment*, researched that 92 M tons of waste garments result each year with 1% being recycled. The 2016 World Economic Forum estimated 150 B garments are manufactured per year. The message here is that we can’t possibly recycle or repurpose those volumes responsibly. There is a delusion that it is possible. To manage the fast fashion waste garment problem brands such as H&M,

Burberry and Richemont (Cartier and Montblanc) have been incinerating their surplus inventories. In part, so they don't have to compete with discounted labels in the market. The value of the unsold inventories is in the billions of dollars and is encouraged through tax laws. In the US, 99% of duties are refunded for exporting or disposing of unsold garments. France banned the burning of unsold garments in January 2021; Spain will ban this practice in 2024.

Product labels

Confirmation bias is commonly used to describe how individuals are partial to or influenced by existing beliefs or expectations. If we read that a product is *eco-friendly*, and we are trying to be environmentally conscientious, we will tend to favour that product over one which does not provide any environmental differentiation, or states its actual chemical properties. The latter is seen as being harmful in our bias. A growing trend favours green and sustainable products.

Eco-friendly, sustainable, or organic products are ambiguous terms. These labels have become known as *greenwashing*. They sound good and resonate with customers but lack any evidence. ESG could be subject to greenwashing. Companies could state their vehicle fuel efficiency was higher than other companies, which Volkswagen was caught doing in 2015. In 2022, coffee maker Keurig paid a \$3M fine for falsely claiming their single use K pods could be recycled. Setting green targets sounds good from a CSR perspective but may not actually be achievable.

In a CBC Marketplace report in late 2023, a Nike basketball jersey was labeled with a *Move to Zero* tag, implying a responsible product. However, the clothing item was made from 100% fossil-based materials. Greenwashing continues to plague the fast fashion sector. <https://www.cbc.ca/news/business/marketplace-recycled-clothing-garbage-1.7009225>

In February 2023, the Competition Bureau launched an investigation as to whether Canadian forests are being sustainably managed as claimed under the Sustainable Forestry Initiative (SFI). SFI is the largest certification system in North America and has been recognized since 1998. Several NGOs have launched the claim that SFI is being misrepresenting its methods and outcomes. It remains to be seen if this is a form of greenwashing but reiterates the importance of legitimacy in 3rd party labels and certifications.

Many consumers like to support Canadian made products. However, the labeling requirements require an understanding of the difference between a *Product of Canada* and *Made in Canada*. A Product of Canada, under the guidelines, applies to all or virtually all of the significant ingredients, components, processing and labour used in the food product must be Canadian. Food products claiming Product of Canada must contain very little or no foreign content, with the exception of minor food additives, spices, vitamins, minerals and flavouring preparations. Products labeled as Made in Canada, may be used when the food product is manufactured or processed in Canada regardless of whether the ingredients are imported or domestic or a mix of both. However, this claim must always be qualified with either Made in Canada from domestic and imported ingredients or Made in Canada from imported ingredients. To use these qualified claims, the last substantial transformation of the product must have occurred in Canada. Companies risk their consumer and ESG reputation when attempting greenwashing. In the bigger picture, false product or service claims taint all companies where there is an absence of trust.

Case study - Promoting a more sustainable diet

The following case citation is from the Behavioral Economics newsletter, *Information, Insights, Inspiration* | Winter 2022-23 Newsletter, by Katie De-loyde and edited by Mariliis Öeren:

One way to promote a more sustainable diet is to label food products with information about sustainability (eco-labelling), for example by providing details of water and land usage, as well as greenhouse gas emissions, using a traffic light system. Another option is the use of social nudging, such as telling consumers that a particular menu option is the most popular choice.

My co-authors and I wanted to discover if increasing the awareness of the impacts of different meals would influence consumers to choose a more sustainable option. To do this, we used an eco-label (Figure 1) and a social nudge label (Figure 2) to investigate whether adding these labels would influence food choice compared to a control group with no label. We conducted the study online with UK adults who were 18 years or older. These people were randomised to one of three different groups, each showing three burrito options with different accompanying menu information.



Figure 1: Eco-label.



Figure 2: Social Nudge Label.

All menus contained a photo of each burrito as well as the calorie content, a Fairtrade logo, a spice indicator, and the price, which was the same for all options. But on one menu, each burrito was also given an eco-label, with the beef option scoring ‘5’ in red, highlighting it is unsustainable. The chicken option had a yellow ‘3’, indicating it was neither sustainable nor unsustainable, and the vegetarian option got a green ‘1’ for sustainable. Another menu featured a ‘social nudge’ – an indicator encouraging people to act according to the most sustainable option. This resembled a gold star, including the words ‘Most Popular’ placed alongside the vegetarian burrito. Participants were randomly shown one of the three menus and asked to pick a burrito option, as if they were normally ordering food

online. They were also asked follow-up questions designed to measure their level of motivation to act sustainably and meat consumption.

Eco-labels vs Social Nudge

We found that both the eco-label and social nudge label were effective at influencing more sustainable food choices, and although both labels produced promising results, the eco-label was the most effective. Additionally, we found that a third of the participants who were given the 'control' menu – without a social nudge or eco-label – went for the beef burrito. However, this dropped to 29 per cent for those who saw the social nudge labelled menu, and to 16 per cent for those who saw the eco-labelled menu.

Considering that reducing beef intake is a specific component of many sustainability strategies, eco-labelling and/or social nudging could provide an effective method to achieve this. A mandatory eco-label could help to address some of the information gaps consumers have concerning the sustainability of the products they are buying and enable people to choose sustainably if they wish. The eco-label was particularly effective among those people who reported a high level of motivation to act sustainably. This suggests that these kinds of labels help people make dietary decisions which are in line with their personal values. However, considering we observed relatively high motivation to act sustainably among our participants, but the reported mean consumption of meat was six times per week, this suggests consumers would benefit from having information that could assist them in their goals of acting more sustainably. Currently, sustainability information about our food is not made freely available in the UK, contributing to a lack of freedom to choose for those individuals who are motivated to do so.

Furthermore, and somewhat surprisingly, participants were positive about the eco-label, with a huge 90 per cent of participants supporting the idea of an eco-label, compared to only 52 per cent of participants supporting the social nudge.

Implications

More research in real-world settings (rather than online) is essential. However initial results from our study suggests that future policy could include eco-labelling and/or a social nudge in both real-world and online settings to reduce meat consumption and help to meet global climate change targets. End of case.

Bluwashing refers to the practice of claiming social benefits without providing evidence or being verifiable. One of the reasons for bona fide 3rd party labels on products is to establish credence. The contents or labour conditions can be assessed objectively. In 2021, the Dyson group of companies was charged with alleged forced labour practices by its Asian contractor, ATA IMS Bhd. To its credit, Dyson cancelled its contract with the contractor. Dyson likely contracted with ATA as being a low-cost producer and accepted that their labour practices met international standards.

While, non-binding, the UN Global Compact to address corporate sustainability is based on 10 principles:

1. Businesses should support and respect the protection of internationally proclaimed human rights and
2. Make sure they are not complicit in human rights abuses
3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining
4. Elimination of all forms of forced and compulsory labour
5. Effective abolition of child labour
6. Elimination of discrimination in respect of employment and occupation

7. Businesses should support a precautionary approach to environmental challenges
8. Undertake initiatives to promote greater environmental responsibility
9. Encourage the development and diffusion of environmentally friendly technologies
10. Businesses should work against corruption in all its forms, including extortion and bribery

Canada participates through the *UN Global Compact Network Canada* (UNGC). There has been criticism of the UNGC such as lack of enforcement and independent monitoring, which opens it up to bluewashing claims. <https://unglobalcompact.org/news/5098-06-06-2023>

Long-term brand damage is seldom experienced by companies which have used greenwashing or bluewashing. The above case study shows the reverse effect of bluewashing or greenwashing, where labels actually promote a healthier diet in an economic and sustainable manner.

The labeling of many products currently, is heavily weighted on its marketing and sales. Labels are a means of both informing and influencing our decisions. Costco must face a lawsuit for allegedly labeling its Kirkland branded tuna as being *dolphin safe*. While Costco sought dismissal of the case, in early 2023, a judge ruled that the labeling would infer to customers that the tuna met safe seafood fishing practices but it may not be able to be verified in practice.

Bottled water is mired in myths about it being healthier than tap water. Pepsi and Coca-Cola brands have acknowledged that their water source is municipal tap water. The Evian brand is sourced from natural spring waters. Spring waters contain nutrients and actually taste different than *purified* water. Bottled water in North America and elsewhere is primarily a convenience item. This requires a large number of plastic containers to store, ship and dispose of adding to environmental issues. Further, bottled water containers in every size, shape and form add to the pollution problems. We could take a lesson from the city of Paris, France. Make good, clean water easily available in as many public spaces as possible.

In January 2024, a New York judge ruled that Danone must defend its use of *carbon neutral* claims on bottles of Evian water. The judge felt that the term carbon neutral was ambiguous and confusing to consumers. Plaintiffs perceive the label to mean that the water was more environmentally friendly, yet Danone releases CO₂s during the production process.

Under USA 2022 guidelines, food products with less than 0.5 grams of trans fat, which may be stated in its ingredients as partially hydrogenated oils, can have labels which claim 0%. Canada banned the use of trans fats in 2020. According to a 2019 International Food Beverage Alliance release, international food brands will *phase out* the use of trans fat to 2 grams per 100 grams of fat or oil to comply with a World Health Organization guideline. The IFBA was founded in 2008 by Coca-Cola, Danone, Ferrero, General Mills, Grupo Bimbo, Kellogg, Mars Wrigley, McDonald's, Mondalez International (formerly Kraft), Nestlé, PepsiCo, and Unilever.

Europe has been using the ISO 14024 *voluntary* labelling system for a few years. This is another means to reduce greenwashing claims. Companies which choose to use the ISO 14024 labels are able to differentiate their product benefits and provide an audit process which verifies their claims of being environmentally responsible.

Consumers are entitled to buy whichever products are legally sold in the market and must accept that the labels are accurate as stated. Consumers are responsible for their personal decisions to make tradeoffs between cost, quality, and convenience.

ESG reporting metrics

Governance reporting frameworks use different matrix for different purposes. Originally intended for

financial investors, audiences, and an accounting narrative on the materiality of outcomes. The 2019 NYU Stern Center for Sustainable Business provided a synopsis on the use matrices. Reporting should consistently follow a framework which meets the corporate governance needs. Reporting metrics include:

The 2017 **Accounting for Sustainability** (A4S) launched by the Canadian Chapter of A4S which works with the Chief Financial Officers to integrate economic, environmental and social factors into business decisions. This is aimed at implementing social and human capital accounting.

CDP (formerly climate disclosure project) focuses on key environmental data. CDP, as a not-for-profit, runs the disclosure system for investors, corporations, cities, states, and regions to manage their environmental impact. There is a CDP Supply Chain membership program. <https://www.cdp.net/en/supply-chain>

CDP-Water Security – At the request of investors, purchasers and city stakeholders, CDP-Water reports out on managing the risks associated with climate change, water security and deforestation.

<https://www.cdp.net/en/>

Canadian Sustainability Standards Board (CSSB) is being formed in 2023 to address accounting standards in Canada, as reported in the July/August 2023 CPA publication *Moving Target*.

<https://www.frascanada.ca/en/cssb>

EcoVadis has been providing corporate non-financial ratings since 2007 to public and private sector organizations using industry peer comparisons. Their mission is to support sustainable, ethical and responsible organizations. <https://ecovadis.com/>

Global Reporting Initiative (GRI) is aimed at environmental, economic, and social impacts. The International Integrated Reporting Council (IIRC) targets the ability of an organization to generate value largely for European international stakeholders, with lesser attention on IIRC in the USA.

<https://www.globalreporting.org/>

International Standard on Assurance Engagement (ISAE) guidelines for an organization's ethical behaviour, quality management, and performance of an ISAE 3000 engagement.

https://www.ifac.org/-/flysystem/azure-private/publications/files/B005%202013%20IAASB%20Handbook%20ISAE%203000_0.pdf

International Sustainability Standards Board (ISSB) are sustainability disclosures focused on the needs of investors and the financial markets. <https://www.ifrs.org/groups/international-sustainability-standards-board/>

The **Sustainability Accounting Standards Board (SASB)** is based on US materiality definitions from security laws aimed at sustainability factors which could affect performance and operations.

<https://sasb.org/>

The **Task Force on Climate-related Financial Disclosures (TCFD)** reports disclosures from governance, strategy, risk management, metrics and targets for investors. <https://www.fsb-tcfd.org/>

The **UN Global Compact (UNG)** looks for companies to make commitments to its sustainability principles related to human rights, labour, environment and anti-corruption on an annual basis.

<https://unglobalcompact.org/>

Social Accountability International developed an international standard, **SA 8000**, which helps organizations to use socially acceptable business practices and can be applied to any company, of any size. For over 20-years, their certifications examine forced and child labour, freedom of association and collective bargaining, discrimination, workplace discipline, hours of work, pay rates, and management systems. <https://sa-intl.org/programs/sa8000/>

The **EU Taxonomy** is a European classification system which establishes a list of environmentally sustainable economic activities. The intent is to provide investors, companies, and policy makers with how to interpret sustainable economic activities. The Taxonomy Regulation has six environmental objectives:

1. Climate change mitigation
2. Climate change adaptation
3. The sustainable use and protection of water and marine objectives
4. The transition to a circular economy
5. Pollution prevention and control
6. The protection and restoration of biodiversity and ecosystems

https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

There are many rating agencies which provide ESG scores to the investment community. From a supply chain perspective this is important. If a company says it is committed to ESG practices, the rating agencies provide additional scrutiny to validate corporate claims. A 2023 report by the SustainAbility Institute referred to some of the most widely recognized ESG rating firms. In the ranking for quality and usefulness, the top (5) firms included: CDP; S&P Global ESG; Sustain analytics; MSCI; and ISS-ESG.

Many companies subscribe to the **B Corp** criteria model. B Corp has thousands of small, medium businesses which voluntarily commit to meet B Corp certification. Formed in 2006, B Corp is a not-for-profit organization with a philosophy to encourage businesses to address ESG issues. B Corp has optional assessment tools, standards, and baseline requirements. The latter are defined as being for a parent company with \$5B+ in annual revenues including Patagonia. Canadian-based B Corp companies include BDC, Cheekbone Beauty, Coast Capital Savings, Fairware, Salt Spring Coffee, and hundreds of other responsible businesses which continue to demonstrate their commitment to ESG.

<https://www.bcorporation.net/en-us/>

The Canadian Federal government, in April 2023, mandated the reporting on emissions involving federally regulated banks and insurance companies to comply with the TCFD framework disclosure guidelines from 2022. Further will be a requirement for ESG considerations and climate-related risks for federally regulated pension plans. New legislation requires all federal contracts over \$25M can only be awarded where the companies agree to publish their annual GHG emissions and their mitigation plans. These requirements are part of the federal 2030 Emissions Reduction Plan.

European based and global malting company Axereal, weaves the UN SDG into their company's core values, operations, and reports out through their annual sustainability report. Boortmalt tell their outcomes in a story board fashion with extra visibility into their company based on SBTi and the GRI standards. They operate on 5 continents, with 27 processing plants, with a 3M tonne production capacity. Boortmalt operate in Canada and are part of the larger Axereal Group of companies and are a great example of how to include ESG practices within a profitable business.

Boortmalt build their values around (4) core objectives to achieve sustainability:

1. Health and safety
2. Sustainable farming
3. Energy and emissions and
4. Water conservation

Boortmalt have (5) support objectives:

1. Community engagement
2. Equality, inclusivity and diversity
3. Business ethics and Code of Conduct
4. Waste reduction and
5. Traceability & transparency

<https://www.boortmalt.com/sustainability-report-2023>

The Carlsberg Group has a very comprehensive approach to Net Zero across their entire supply chain by 2040. They have targeted (5) key areas of their business:

1. Agriculture and Processing. Ensuring that their raw materials are being grown using regenerative agricultural practices leading to soils being able to capture and store carbon neutrally.
2. Packaging. Materials are to be fully aligned with the circular economy principles and their production is decarbonized. As referenced earlier in the book, Carlsberg introduced paper beverage bottles.
3. Cooling. Cooling systems run on renewable electricity to optimize efficiencies. Any additional renewable electricity comes from on-site renewable sources of power or is procured through Power Purchase Agreements.
4. Brewing. Converting boilers from using natural gas to using renewable thermal fuels or electrification.
5. Transportation and Distribution. Short haul vehicles should be electrified while long haul vehicles should be running on renewable fuels. <https://www.carlsberggroup.com/>

The Japan-headquartered, century old, Asahi group of companies published a most comprehensive, integrated and detailed sustainability report in June 2023. Their report addresses: philosophical and cultural perspectives, policies, performance, and as well as their governance, risk management, strategies, and metrics and targets. Asahi went so far as to name their Board of Directors and indicate each person's set of skills in a matrix, which they are expected to exhibit, along with the defined skills required for a Board member.

The key issues covered in their report are:

- Sustainability management
- Human capital
- Environment
- Communities
- Responsible drinking
- Health
- Human rights

Asahi reports out using the GRI and ISSB standards.

It's worth noting that within the Asahi sustainability report they have identified their Board of Directors Skill Matrix and defined the skill expectations of Board members in a matrix.

Part of their commitment is to affect the current industry average of ~4 litres of water per litre of beer. Asahi typically consume 2.82 litres of water per litre of beer but have attained 2.55 litres at their most water-efficient brewery located in the Czech Republic. By 2030, Asahi breweries:

- will be carbon neutral
- all the packaging will be from recyclable materials and be fully recyclable
- ingredients coming from sustainable source
- all electricity will be from renewable sources

https://www.asahigroup-holdings.com/sustainability/pdf/sustainabilityreport_en.pdf

The O-I group of companies, which manufacture glass packaging products, provide another good example of how businesses are demonstrating values for shareholders and stakeholders. O-I uses the UNSDG relevant to their company's operations. In their 2022 O-I Sustainability report they compiled their sustainability goals and targets for a Net Zero program by 2030, as follows:

- Recycled content increase by 50%

- Renewable electricity increases of 40% and a total energy reduction of 9%
- Zero injuries with 50% improvement to their total recordable incident rates
- Supply chain practices align with sustainability visions and goals
- DEI increasing in all aspects across O-I teams
- R&D to reinvent and reimagine glass making with a circularity focus
- Zero waste including the consumption of natural resources, reduce, reuse, and recycle with a 25% lower rate of water usage
- Social impact improved by partnering with NGOS, suppliers and making glass recycling available wherever O-I operates
- 25% GHG reduction following an SBTi model

The primary reporting metrics used by O-I follow the CDP, SBTi and EcoVadis. www.o-i.com

One of the larger sectors which buys silver and gold has moved to stop buying mined gold. Jewelers, such as the Danish company, Pandora uses a chain of custody to ensure the provenance of the materials meets the Responsible Jewellery Council standards. Pandora buys ~340 tonnes of silver and 1 tonne of gold each year, according to their 2022 annual report. This generated 264K tonnes of CO₂. While there is a premium for suppliers to segregate recycled materials and undergo audits, it is being absorbed by Pandora. Pandora estimates that they will reduce emissions by 58,000 tonnes beginning in 2023. Metal refineries source recycled materials from industrial waste, X-ray films, electronics, and old silverware and jewelry. This is an example of how companies can reduce their upstream Scope 3 emissions.

Home Depot has a very comprehensive ESG report which it publishes with full transparency. Home Depot reports, in detail, on all emissions, labour practices, sourcing strategies, green materials, 3rd party certifications, and uses the GRI, SASB, TCFD, and EEO formats. <https://corporate.homedepot.com/news/company/2023-esg-highlights-doing-our-part>

The International Standards Organization has many standards which support ESG initiatives. Some are *guides* only while others are *compliance-based*. These include:

- ISO 14000 environmental management
- ISO 14024 labelling
- ISO 14046 water footprint
- ISO 15270 recovery and recycling of plastic waste
- ISO 20762 electric vehicle power
- ISO 22000 food safety management
- ISO 26000 social responsibility
- ISO 50000 energy management systems
- ISO 71000 chemical protection

KPIs for supply chain management

There is limited consensus by supply chain professionals as to which KPIs are the best to assess progress with ESG strategies. This makes sense when we think about the variety of organizational structures and corporate goals.

Supply chain KPIs should be tailored to the organizational strategies, policy statements, and be reflected in its practices. The reason for measuring and reporting is to add to the level of accountability. Take commitments to the next level of performance.

Some of the more common KPIs applied by supply chain managers in private and / or public sectors include:

A. Environmental

1. GHG emissions
2. Freshwater consumption
3. Resource circularity
4. Waste management
5. Energy consumption
6. Renewable energy sources

B. Social

1. Supplier/employee diversity, equity and inclusivity
2. Supplier/employee health and safety
3. Employee training
4. Employee pay equality
5. Employee turnover rate
6. Employee code of ethics
7. Supplier code of conduct

For each metric, depending on the type of organization or industry sector, there are many variations for each of the metrics. Metrics are not a one-size-fits-all. Formulas and definitions for each metric will need to be expanded in relative detail as various stakeholders look for different values when interpreting reports.

C. Governance

Governance metrics can often be assessed answering in a simple yes or no when referring to supply chain management actions. The responses lead to discussions on where the gaps are and how these gaps can be closed.

Questions to apply to an assessment of governance metrics:

1. Is there a supply chain policy for DEI?
2. Is there a supply chain policy requiring supplier codes of conduct?
3. Are supply chain KPIs reported out on a regular basis?
4. Is there a social procurement strategy in place?
5. Is there an annual comprehensive report on overall sustainability of a supplier?

Examples of more detailed metrics:

GHG emissions:

- Scope 1, 2 and 3 emissions by tCO₂e for each category
- tCO₂e for corporate travel
- tCO₂e for staff commuting
- value of carbon offsets purchased each year

Fresh water:

- volume of freshwater consumed on a year-over-year basis
- % of water recycled
- % of water saved post implementation of initiatives.

Resource circularity:

- % of renewable materials
- % of recycled content
- % of certified sustainable material
- % of compostable packaging

Waste management:

- Tonnes of waste by type
- Tonnes reduced post implementation of initiatives
- Tonnes of PVC taken out of packaging
- Tonnes of recyclable content of packing for inbound and outbound shipments

Energy consumption:

- # of KWh/year
- # of KWh/saved per year after implementing new systems
- # of hours provided through renewable energy sources

Social:

- # of contracts with social value outcomes
- # of hours of employment for people facing systemic barriers to employment
- # of contracts with SEs
- # of contracts with SMEs
- # of contracts with Indigenous suppliers
- # of suppliers with codes of conduct
- # of non-compliance issues by suppliers
- Annual spend with SMEs, SEs, or Indigenous suppliers

ESG as a misguided direction

For all of the positive outcomes attributed to ESG, this VUCA period has sounded alarm bells. One of the loudest complaints comes from Elon Musk, credited with restarting the EV movement. In May 2022, after poor labour relation reports, poor handling of traffic deaths, and alleged racial misconduct, Tesla was removed from the S&P's ESG Index. Musk retorted ESG is a scam and claimed that ratings agencies lost their integrity.

The private sector is cognizant of stakeholder capitalism; however, post pandemic pressures such as extreme inflation and across-the-board shortages are downplaying ESG as a priority. Globe and Mail writer Jeff Jones, stated in a July 2022 article that "in good times, we can afford everything; in tough times, we reset our priorities." We are facing wars, inflation, economic uncertainty, political polarization and therefore, ESG interest abates.

Compounding the challenges to ESG from a private sector perspective, is the lack of evidence that there is a correlation between improved financial performance and ESG policies being in place. There are a few claims of shareholders having satisfactory returns where companies have adopted ESG policies but they are the few, not the many. Stated another way, investors want their corporate governance expectations to continue and environmental and social issues are a distraction.

Adding to the ESG perplexity are the reporting metrics. Self-appointed, 3rd party agencies use their own methods for calculating results. Without a recognized set of reporting outcomes or definitions, it is difficult to find credibility in reports and support increased pressure for the supply side to improve.

Scope 1, 2, and 3 emissions, supplier diversity, green products, green operations, anti-corruption, or carbon offset project returns can all be part of this reporting miasma.

Professors Cornell and Damodaran, in their 2020 paper, *Valuing ESG: Doing Good or Sounding Good?* found that Bloomberg's ESG data covers 120 environmental, social, and governance indicators. While all the raters include the most highly publicized indicators in their ratings yet still fail to agree on how these indicators are to be measured. The professors go on to conclude the hype regarding ESG has vastly outrun the reality of both what it is and what it can deliver.

ESG doubters had suspicions confirmed when, after a lengthy investigation by the British Guardian, German Die Zeit and non-profit SourceMaterial, found that one of the largest voluntary carbon markets (VCM) investment companies, Verra, was not meeting expectations. Verra was allegedly over-issuing carbon credits involving major companies such as BHP, Shell, and Gucci. The challenge is that Verra's baseline calculations are flawed. As this involves billions of dollars there is definitely a shadow being cast over the use of VCM funds to offset GHGs and the credibility of the VCM companies. Charges of greenwashing have been made by Fossil Free Netherlands against KLM Airlines, which it is defending in court.

Concerns in the VCM were further confirmed in a Reuters report by writers Twidale and Mcfarlane in August 2023. VCMs are receding for the first time in 7-years as doubts as to their carbon claims become more dubious. Nestlé and Gucci continue to withdraw from the offset credits and look for reductions in their own operations. Many of the carbon investments are aimed at forest protection offset credits but the results are not meeting expectations. Offsets prices have fallen ~80% in the cost per tonne for carbon contracts in the past two-years.

Another example of carbon credit offsets struggling in the volunteer market can be seen in BC's *Great Bear Rainforest*. An Indigenous-led group of stewards, called the Guardian Watchmen, monitor a vast coastal area helping distressed boaters, survey levels of ocean crabs, prevent illegal fishing, hunting, and logging, among other duties. The funding for the services is intended to be through the sale of carbon offsets. The offsets are sold by a group of (9) First Nations to protect forests that would otherwise be logged. The offsets are a critical part of their revenues. This 6-year agreement, however, is struggling to maintain its financial viability. The Province of BC has been the main buyer of the offsets to date and has only contributed 50% of the anticipated revenue. While the agreement has curbed logging, it has led to continued logging of more valuable timber.

The hope for this program may be linked to increased mandates for private companies to offset their emissions and use this Indigenous program to buy their credits. It was initially thought that this innovative funding would lead to more examples, but since being launched in 2016, it is still a doubtful model, without further government intervention.

The 2023 COP 28 discussions failed to agree on an agreement to establish a central system to enable countries and companies to offset and trade emissions. An offsetting system had been recommended at the Paris talks, 8-years earlier.

In the US, it was expected that their Security Exchange Commission (SEC) would require detailed disclosure in 2023 by publicly traded companies on carbon emissions and climate risk mitigation plans. The Sarbanes-Oxley Act will necessitate those Canadian branches of US-based companies to report. Politicians in several US states have turned up the backlash and have stated that companies such as BlackRock will be barred from handling state pension funds if they use ESG benchmarks. Texas announced it will not allow Barclay's Bank to underwrite municipal bonds due to ESG conflicts in early 2024.

In 2024, the SEC appears to be readying to revise its disclosure requirements and exclude Scope 3

reporting for many corporations. For MNCs this will complicate their international obligations, as the EU requires Scope 3 disclosure, and if the US backtracks on this commitment, it will be confusing. At present this is a political tussle but likely will lead to a watered down voluntary reporting of Scope 3 emissions.

A Financial Post article, citing Assistant Professor at Carleton's Sprott School of Business, Leanne Keddie, stated there is no evidence ESG leads to sustainability. "Until people wrap their heads around this distinction, we are going to continue to have confusion on this point. ESG ratings will continue to tell investors about the risks/opportunities they face on ESG topics but not on how a firm contributes towards a sustainable world." Charles Cho, professor of sustainability accounting at York University's Schulich School of Business, said a mini-industry has sprung up to measure and catalogue environmental, social and governance impacts, with a money-making motive that hurts credibility. "ESG ratings have evolved to become a product to sell," he said, adding that they can be hard to compare, biased and misleading. "So, they don't really mean much."

Countering the fog of reporting is fiduciary investment leader BlackRock Inc. They are committed to full disclosure and encourage the use of the TCFD and / or the SASB frameworks. BlackRock supports industry reporting out on specific and operational standards or to state which global standards any company has found to be appropriate – but make full disclosure.

In March 2022, a Harvard Business Review article by Professor Sanjai Bhagat, concluded that *investing in sustainable funds that prioritize ESG goals is supposed to help improve the environmental and social sustainability of business practices. Unfortunately, close analysis suggests that it's not only not making much difference to companies' actual ESG performance, it may actually be directing capital into poor business performers. The article further stated: Why are ESG funds doing so badly? Part of the explanation may simply be that an express focus on ESG is redundant: in competitive labor markets and product markets, corporate managers trying to maximize long-term shareholder value should of their own accord pay attention to employee, customer, community, and environmental interests. On this basis, setting ESG targets may actually distort decision making.* <https://hbr.org/2022/03/an-inconvenient-truth-about-esg-investing>

Warren Buffet, who manages US\$500B in market capitalization, is on record as saying that Berkshire Hathaway hires managers to *do the right things* when running their various businesses. However, Buffet also says that tracking and reporting ESG metrics is of no value to running a company and they do not do it. Responding to questionnaires from 3rd parties does not add value. One of their utilities, in Iowa, was designed to use sell 100% wind power and was done so because it makes good business sense over other energy options. But he is not going to report out on the GHGs etc., to other interested stakeholders. Hard to argue with success.

Adding to the debate on ESG strategies, and with CCUS as the target, is Australian businessman, Andrew Forrest, executive chairman of Fortescue Metals. Forrest stated the carbon capture systems were greenwashing and further, "There's a simple question from business leaders...when do we stop burning fossil fuels?" "If you want to drive capital...we must have clear and obvious disincentives for what is doing harm and clear incentives for what is doing good." He made these remarks at the IEA conference in February 2024.

There are definitely arguments to be made to ESG practices affecting profitability and reducing emissions. If corporate managers are supposed find the balance in their oversight roles, by targeting outcomes as described in the circular economy principles and the UNSDG, then a litmus test would be a lowering of global temperatures. Everyone loses if the latter doesn't occur.

Last Mile Innovations

A 2023 report produced by Frayt, which has an online delivery platform, with input from ~100 supply professionals, reiterates the attention being paid to the last mile of business. This is where the customer experience is really being felt according to the Fortune 1000 companies which participated in the survey. 80% of businesses see the last mile as the critical piece to solve from a service and a cost perspective. 35% of the respondents focus their logistics operations on the last mile specifically. One of the biggest barriers is capacity of the carriers to right size the delivery. The other key operational problems to accommodate are: traffic, weather, road conditions; inaccurate addresses or ability to contact the recipient; and theft, tampering or damage of the goods. Selection of the last mile partner was deemed an essential component for success.

A May 2023 *Supply Chain Insights* report, from *Project 44*, shows that the click-to-delivery time has been reduced from 6.8 days in December 2020 to 4.8 days in April 2023. The labour and materials shortages have been addressed by warehousing and shipping operations. A 30% decrease in wait times for customers is a significant change. On time *promised* performance has slipped by 3% over the past year where shippers are trying to meet the next-day expectations set by Amazon. The volume of shipments increased by 4.4% year-over-year.

Service issues still remain to be addressed. Over this time period customer complaint patterns are summarized as: delays 25%; delivered but missing 23%; damaged 21%; and specific carrier complaints 19%. Many shippers have increased the number of carriers they utilize to improve the last mile of service. www.project44.com

Trucking¹

Outsourcing of logistics, warehousing, and distribution (LWD) services is a growing trend for its reduction of investment by customers and the access to expertise provided by the 3PL service providers. The primary activities of service providers are customer service, planning/demand forecasting, inventory management, warehousing, logistics communications, material handling, packaging, and transportation.

Transportation plays an integral role in our economy and will continue to do so. The infrastructure investments and maintenance costs require government and private sector attention. AI, the IoT, Big Data, telematics and algorithms are the means of improving logistics practices.

Manitoulin Transport invests in technology where there is a measurable improvement in productivity and efficiency. According to Jeffrey Smith, off-the-shelf software lacks the technical capabilities and requires in-house software to be developed to meet customer demands. Other carriers echoed Smith's view. Higher fulfillment rates with an ease of data flow between suppliers to address the last mile of delivery costs is one of the targets. In a 2021 Business Insider article, it argues that the last mile is the costliest in logistics at 53%. The LTL boom from ecommerce sees more smaller packages getting into the hands of the end customer.

Manitoulin rely on the PeopleNet fleet onboard truck system. This system offers end-to-end vehicle tracking with a focus on pre/post trip inspections, travel logging, navigation and routing, fleet performance monitoring, safety, and compliance. The software was initially developed for small to medium sized businesses which own a number of trucks. It has a custom designed GPS receiver device coupled with vehicle telematics. <https://manitoulintransport.com/>

In Canada, 3rd party certified ELD or electronic logging devices are a mandatory requirement as of 2021

¹ Thanks to Eric Beckwitt, CEO, Freightera; Jeff Smith, Ex VP, Manitoulin Group; Cory Thorn, Dir of Ops, Canada Cartage; and Matt Zarzycki, COO, Amplify Logistics for sharing their industry insights and experience in a series of interviews in 2021.

in all commercial motor vehicles, to ensure safer operating conditions. The Canadian ELD system aligns with US regulations for use in both countries. Infractions for noncompliance were deferred until June 2022.

Application Programming Interface (API) is becoming more popular with shippers who wish to provide electronic information on bills of lading (BoL). API enables automatic uploading of all BoL data without clerical intervention to manually enter the information which increases accuracy and saves time. Similarly, customer portals allow BoLs to be completed, uploaded into the shipper's system, labels printed, and shipments can be tracked throughout the route.

Faxes have been superseded by sending PDF files via email to any customer's broker for any shipment. Manitoulin as an example, uses this in a centralized manner through their Customs Help Desk. They created a database for all customs brokers which includes their own customs brokers Summit Customs Brokers and Near North Customs Brokers.

Pre-Arrival Review Systems (PARS) allow customers brokers to notify the Canada Border Services Agency (CBSA) in advance of a shipments arrival to expedite its release. The carrier will affix a PARS sticker/label to the commercial documents and forward them to the customs brokers so they may set up the shipment with the CBSA in advance. Previously when faxing the broker, the shipper must also advise CBSA what port to cross, an estimated date and time of arrival, as well as the contact information in case the customs broker need to contact the shipper. Manitoulin uses a performance metric of 99.2% for successful clearance of PARS shipments. Their 2021 actual performance was 99.7% YTD.

One target at Manitoulin was a 60% reduction in the use of paper by 2023. An observation during the pandemic was the increase in staff working from home which led to far less paper being required. New document scanning and retention tools eliminate printing with reduced non-value clerical support. Manitoulin recently eliminated paper-checking and paper manifests and now scan all shipments. Each handling unit has a specific label with a unique identifier. Shipments are scanned throughout their network with electronic signature at the point of delivery.

Canadian-based Amplify Logistics has a leadership team with a CEO in his early 20s. Technology is an important means for them to stay competitive. Amplify uses Samsara Fleet telematics to track its operations. They provide refrigerated carrier services and can activate the trailers remotely to save energy. Amplify use BorderConnect software to coordinate with their customers' brokers.

A challenge for Amplify is in partnering with smaller truckers on the use of technology. To create mutual benefits, Amplify allows smaller carriers access to Amplify's system to reduce the cost of doing business where they need to have a smaller carrier do a contracted delivery. New technology ideas often come from their drivers with suggestions on how to increase efficiencies. Amplify use bots to handle their order entry data to save manual intervention of data.

Amplify measures its performance through customer satisfaction surveys; pulse checks; and freight growth trends. When capacity becomes an issue, they reach out to 3rd parties to support service.

<https://amplifylogistics.com/>

A BC-based lubricant company invested in the SAP Business One as their ERP system; SPS Commerce for its EDI connections; Valogix for MRP procurement functions; and Fabric as its website/ecommerce platform. Outcome? A 65% reduction in its client care team with an increase in productivity of 2.4 times. With national sales of ~\$90M per year, this lean organization budgets an average of \$250K per year for technology solutions. 95% of their logistical requirements are outsourced.

A relatively new, US-based multi-modal company with a significant investment in a variety of logistics' technologies is Stord. They claim to partner with 15,000 carriers across the US. Stord runs a cloud-based transportation management system and embraces technology as a market differentiation strategy. They

have heavily invested in a full suite of digital network services. <https://www.stord.com/>

The phasing out of the highest polluting vehicles is being led by IKEA, Unilever, A.P. Moller-Maersk, JSW Steel Limited and the GeoPost/DPDgroup. These players have signed on to the EV100 pledge targeting medium- and heavy-duty trucks which account for 4% of all vehicles but emit 40% of road transportation emissions and 33% of all transport fuel consumption. 2040 is the goal as announced by the environmental organization Climate Group in 2022 to convert fleets to EVs under the EV100 Initiative. They also want all new trucks to be designed as zero emission vehicles in larger markets.

Technology and the circular economy are enabling more resiliency in supply chains and optimizing the economic decoupling. Real time data sharing between business partners is a must.

FedEx is converting to Bluetooth Low Energy (BLE) sensors from GPS scanning of packages which tells the driver where to store the package on-board. Tracking information is sent every two seconds to update shippers. This is FedEx's SenseAwareID™. With ever-increasing ecommerce and consumer online habits, the "peak season" for the last mile appears to be mid-August to mid-October. FedEx and Mercedes have developed an auto scan system so as a package is placed in a delivery van, it tells the driver the optimum location to place it-referred to as a "CoRos" or cargo recognition and organization system. Lights designate the on-board location in a pick-and-put protocol to efficiently load and unload packages.

Even though FedEx has been operating 24/7 for several years, it is revamping its logistics in 2023. CEO Raj Subramaniam, says it will partner with 3rd party carriers to move lower priority shipments, referred to as deferred traffic. As part of their cost reduction strategy, FedEx will bring its operations under one business unit called the Federal Express Corporation. While FedEx is handling 6+million packages per day, it wants to cut its costs by US\$4 billion by 2025. Through its DRIVE strategy to increase efficiencies, they will move to higher density routing with daily shipments having more packages per delivery vehicle. In a 2022 earnings call, FedEx stated that their operating income was down 64% year-over-year. FedEx expects downsizing of its air freight to contribute the largest savings in response to slower demand.

In Canada, FedEx is converting its *last mile* fleet of parcel, pickup and delivery (PUD) vehicles to the Zevo 600 built by GM with a range of ~400Kms on a full charge. FedEx is investing in a charging infrastructure for its Canadian operations to accommodate 2500 vehicles. They plan to have all zero emission vehicles by 2040.

Large US retailers have changed their business models for the post-pandemic period which is a response to customer behaviours. Online ordering and omnichannels require a new response. Home Depot and Wal-Mart (US) joined forces to deliver Home Depot products for same-day and next-day service. Customers don't care what name is on the carrier – just the goodies inside. In 2017 Home Depot launched a successful campaign to reach 90% of the population with next-day or same-day delivery for a competitive advantage. In 2021, Wal-Mart launched *GoLocal* utilizing gig drivers from their Spark Driver program. Wal-Mart is targeting 30M household deliveries by 2023. This is part of the Wal-Mart delivery-as-a-service (DaaS) strategy.

In October 2022, Loblaws introduced a fleet of multi-temperature autonomous box trucks utilizing Gatik technology. This follows a 3-year trial with a 3rd party safety compliance audit. Loblaws can make deliveries 7-days per week to select customers using driverless vehicles over fixed, repetitive and predictable routes.

As reported in Supply Chain Dive in October 2022, Walmart acquired Alert Innovation to deploy their Alphabot system to store, retrieve, and dispense grocery orders using robots. No need for lifts or conveyors with these omnidirectional bots reducing space constraints and allowing for scalable applications. Walmart now has access to 90% of the US population within 10 miles for storage and

fulfillment.

In mid-2023, Lowes (US) announced it is expanding same day and next day delivery for consumers and contractors by partnering with OneRail. OneRail is an omnichannel company which integrates software with logistics-as-a-service (LaaS). OneRail's network connects with 12M carriers with real time tracking on a 24/7 basis.

Amazon has been expanding the use of the all-electric Rivian delivery vehicles in its packaged delivery services, since mid-2022. Amazon have announced that they will deploy 100,000 Rivian vehicles by 2030 as part of their 2019 Climate Pledge commitments. In early 2024 Rivian's sales E-truck sales have fallen dramatically and their ramp up costs are growing. Whether this brand will be sustainable economically, remains to be seen.

NorthStar Digital Solutions was launched in 2019 and developed an integrated application called *FR8Focus* to share information on LTL shipments. "Deploying FR8Focus to a real asset-based company that moves 300,000-500,000 pieces of freight annually gave FR8Focus a real good run for the investment. Results included \$25,000 monthly revenue increase; 100% decrease in missed invoices due to lost/incomplete paperwork; 95% decrease in quality assurance audit needs; 90% straight-through automation of invoicing; 75% decrease in document handling; 50% decrease in customer disputes (with real-time invoicing); 40% acceleration of accounts receivable payment cycles (from weeks to days)," according to North Star Digital Solutions. <https://northstardigital.solutions/>

Last-Mile solutions are going to be rooted in technology solutions. Automated dispatching replaces manual calling for its efficiencies in scheduling routes, driver availability and proximity to the final address. Optimization of routing utilizes algorithms which factor traffic patterns and conditions, traffic lights, and even eliminating most left turns. The latter problem was identified a decade ago as bottlenecks in urban areas costing too much time. Through the application of electronic proof of delivery (ePOD) tracking in real time lets customers and delivery drivers avoid missed delivery times and adjust trips to inadvertent occurrences. Other options include e-bikes and scooters for smaller packages in city centres; sharing the cost of supplying Smart lockers in key locations for fewer deliveries and access by customers. In 2021, Bluemyth Technologies, installed lockers in Vancouver, BC via BlueBox Smart Lockers. This mitigates the first attempt delivery rate (FADR) costs and allows for flexible delivery times for drivers and customers.

Founded in 2018, Locomotion, from Carnegie Mellon's National Robotics Engineering Center and trucking industry leaders, uses human-guided and AI which enables two trucks and two drivers in a leader and follower concept. While driving, one driver controls the lead truck while the following truck follows in autonomous mode, allowing the second driver to rest. This operation addresses working hour limitations, increases the load capacity by time, and has a smaller carbon footprint.

The counterpoint to the last mile cost is the use of reverse logistics. Reverse logistics goes beyond simply returning goods which have been purchased. Reverse logistics incurs operational costs associated with reusing products and materials, recycling, reclamation of raw materials, refurbishment and reselling. While online shoppers were drawn to the buy it, try it, and return it at no charge, this practice is waning as retailers realize it is becoming financially unsustainable. More sellers are imposing restocking and handling fees. Larger retailers such as the Walmarts may be able to afford the return of goods in the short-term, but SMEs who have a limited line of goods and face heavy inventory carrying costs cannot. The National Retail Federation estimates that the cost to retailers to return goods from consumers amounts to ~21%, which is up from 18.0% in 2020. The National Retail Federation estimates that returned goods cost sellers ~16% of the sales. In November 2023, Amazon partnered with ReturnGo's SaaS system to automate their return and exchange process.

Nabil Malouli, Senior VP of Global eCommerce at DHL estimates the cost of returned goods ~\$750B on 2021 data. Further Malouli says that “return abuse”, often from impulse fashion purchases, is from 1% of the online customers and accounts for 40% of the problem. Some companies like Zara, have tried to impose a modest return fee for online returns and not apply the fees to in-store returns. Amazon has refunded the purchase price and told the customer to keep the goods, as the cost of return logistics is excessive. Retailers are going to need to be more creative to resolve cost issues. Reverse logistics must be affordable to avoid unnecessary waste or write-downs of finished goods and surplus inventory problems.

UPS estimates the 2022-2023 returns from the peak season (Nov 20 – Jan 21, 2023) at 70 million packages – that’s just for UPS. This is the majority of returned gifts over the US Holiday season. The UPS VP of Retail and Business Development summarizes the trend as customers wanting to buy online and return in-store. In October 2023, UPS acquired Happy Returns from PayPal. The strategy is to help UPS with the 2023 holiday season and offers box-free returns to more than 800 merchant customers. UPS handles ~24M packages and documents per day!

FedEx is beginning its Consolidated Returns program in 2023 to allow a broader segment of customers to return items without a box or shipping label to its ~2000 FedEx office locations. These small packages will be brought into LTL return shipments from multiple sellers and sent back to the shipper. Addressing the skyrocketing increases in reverse logistics’ costs becomes a much higher priority.

In early 2024, Walmart USA reported it has reduced its last mile costs by 20% over the past year. Increased demand and consolidating shipments have led to these efficiencies. Stores provide parcel stations in fulfilment centres and deliveries can be made inbound through Walmart vehicles and outbound through 3rd parties.

The practice of *recommerce* has evolved to address the reverse logistics problems. Recommerce is the reselling of returned goods with acceptable margins without destroying the merchandise. Larger brands are turning to 2nd hand outlets to resell in traditional store fronts.

In the e-commerce, ocean freight logistics world, reverse logistics is a more complex and costly undertaking. The sheer volumes of containerized goods and rerouting can cost 3-5% of the total revenues. While this is a considerable expense, the circular economy relies heavily on ensuring products at their end-of-life can be recovered for extracting critical materials, precious metals, and be repurposed wherever possible.

Although the last mile will always entail emissions, buying carbon offsets is an emerging circular economy practice to act as responsibly as possible. In 2007, Harbour Air out of Vancouver introduced carbon offsets for its passenger flights. A nominal fee which gave environmentally conscientious travelers the ability to reduce their impact. The carbon offset fees collected are aggregated and invested in global projects. These have provided efficient wood cook stoves in Uganda to protecting wildlife habitats in Zambezi. A 3rd party company, Offsetters, manages the carbon offset aggregation for Harbour Air, measured in tonnes by tCO₂e.

There are several sites to measure the number of tonnes of emissions, based on your life style. Vancouver-based Ostrom Climate© has an online tool to calculate air travel and automobile emissions, in order to buy carbon offsets. Using their tool, one person flying economy class from Vancouver to Edmonton return, would generate 0.26 tCO₂e requiring carbon offsets of \$6.76 @ 26.00 Cdn/tonne; and driving a 2001 Honda Accord, 6-cylinder, automatic car for 20,000 Kms per year would generate 4.342 tCO₂e requiring offsets of \$112.92 per year. <https://ostromclimate.com/calculate-emissions/>

Another simple to use site for estimating the number of tCO₂e one generates per year is <https://www.carbonfootprint.com/calculator.aspx>. This site will calculate the various types of generation by home,

flights, vehicles, bus/rail, and secondary emissions. You can calculate as an aggregate value or by type and determine the # of carbon offsets to buy.

Other transportation companies are buying carbon offsets to address GHG emissions. DHL, FedEx, and as reported in Transport Dive, April 2022. JB Hunt is advising its intermodal shippers the volume of offsets required for a carbon neutral shipment. While carbon offsets are voluntary in nature, progressive companies see this as their way of participating in the circular economy and mitigating their environmental impact where their type of business operations make them unavoidable.

Digital logistics

The essence of LTL freight is finding the best rate to move goods from point A to B, based on the weight, distance, freight classification, and the commodity. Currently, this requires an inordinate amount of human intervention to search through thousands of carriers to manage these transactions. While technology to digitize transportation is unfolding, the majority of transactions are paper-based with phones and faxes.

What was needed was a means to aggregate dynamic data into a simple model for shippers to select carriers. In 2014, Vancouver-based Freightera figured this out. CEO Eric Beckwitt leveraged this gap and filled the void. Freightera connects 13,000 plus logistical companies on their hosted platform which allows shippers/carriers to select the best rate along with environmental considerations, if they choose. Their proprietary software uses a transaction fee-based service where lane options can be transacted within minutes-including the printing of labelling and waybills. Carriers have 15 minutes to respond to a query from a shipper as to their capacity to handle an order.

Freightera focuses on the small, medium business sector and is growing at a rate of 74% year-over-year, which is a sign their services are in high demand. They have taken a lot of the guesswork out of trying to find the best rate for shipping. Carriers have been pushed to the limit on rates by large shippers and try to carve out better rates from smaller shippers. Freightera serves the US, Canada, and cross border markets.

Freightera's software allows the carriers/shippers to select the best fit based on a load basis. Customers enter basic shipping information including postal codes and Freightera identifies their carrier options and decide which one best fits their needs. Invoicing is automated.

As an SaaS (Software as a service) provider, Freightera was recognized with the 2020 Deloitte Technology Fast 50™ award. In part, as a result of their 678% revenue growth from 2016-2019. The circular economy requires that we optimize the use of energy in the LWD sector to support production without adding more emissions. www.freightera.com

Robotics

Warehouses have been transformed into fulfillment centres and involve *RaaS*-Robotics as a service. RaaS has accelerated their presence in warehousing, in part due to the demand created through the COVID pandemic. The rush by consumers to adopt online ordering and businesses increasing their ecommerce activities, required forward thinking to invest in CMRs. Order fulfillment speed and accuracy are the characteristics of CMRs. The productivity of CMRs has a definite payback to warehouse operators. Amazon currently operates more than 100,000 robots in its fulfillment centres.

Amazon announced in November 2023, it is now utilizing robots with the lifting capacity of ~1200 Kgs. These robots will be able to move appliances and pallets of products. Amazon is also testing a 2-legged robot called Digit in its Seattle research and development location.

One caveat to the growth of fulfillment centres by major players such as Amazon, is the reduced level of consumer buying in early 2023. Amazon is making big cuts to its operating costs said CEO Andy Jassy, in

a February earnings call. The slower economy hits the distributors after retail and online sales slump. Another example of having a resilient supply chain. Being able to manage the boom and the bust cycles in the market.

In July 2023, Amazon and UPS are both responding to reduced orders and are curtailing their mutual services. Amazon is shifting towards building its own logistics network and relying less on 3rd parties such as UPS. UPS has seen substantial reductions in its Amazon business and UPS will look replace the Amazon reductions by serving smaller businesses with higher yield rates, according to CFO Brian Newman in an earnings call. FedEx is also adjusting its network to adapt to reduced parcel demand in 2023.

It has been estimated that 70% of warehouse operating costs are attributed to labour. A case study published by 6 River Systems indicates a return on investment over 15 months with a net present value of US \$7.1M when using CMRs to replace a manual cart and RF picking method. The savings were attributed to 2.5 times increase in pick rate; reduced supervisory time; reduced training time; reduced operational supply costs; reduced licensing and hardware costs; and reduced replenishment costs.

A January 2023 report from Supply Chain Dive, order picking costs run at 55% of warehouse operating costs. Walgreen's is expanding its micro-fulfillment centres by using robots to fill pharmacy orders and address the shortage of pharmacists. The robots target repetitive tasks which can be easily replicated by robotics. Their Chief Supply Chain Officer, Roxanne Flanagan says that 60% of its 2022 prescriptions were filled through automation.

Smart sorting systems using machine vision technology are now being used where bots select the correct package size for a specific product. In part, this can increase the load capacity in a trailer with the right-sized package. Small-item sorting through bots in a distribution centre adds to the efficiency in the handling processes.

Warehouse Management Systems (WMS) enable batch order picking; pick-to-light; inventory cycle counts; and AutoCAD to optimize locations. Carousel systems are now competing against Loop sorters which can process 50,000 pieces per hour. DHL has invested US \$300M for (2) Loop sorters in one of its distribution centres with a 30% labour saving costs.

In a January 2023, 4th quarter market call with investors, food products and spice company, McCormick & Co. announced a 10% US labour force cut which will largely be addressed through automation. As a result of declining profits and labour shortages, increasing investment in automation to replace ~1400 workers, has McCormick on track to achieve the labour savings and its long-term operating cost structure. If labour shortages continue, we can expect more and more automation wherever possible across most sectors.

Order management systems (OMS) complement the WMS. OMS use visibility throughout an ordering process as the key value. Tracking in real time from the sales order through to fulfillment can be done from any location by the parties involved, depending upon security requirements for access. Checking on an order status, packing, processing, shipping, return goods, inventory levels, product details, and supplier contact information, all easily accessible, when required.

Pet food online retailer, Chewy, reports that its automated fulfillment centres handled 30% of the sales orders in Q3 2022, up from 10% in 2021. Shipping distances were reduced by 25% with 18-20% lower processing costs than Chewy's previous labour-intensive distribution system. Based on their success, they plan on two more automated fulfillments centres over the next 2 years. Concurrently, Chewy is planning two import routing facilities, expected to handle 90% by early 2023.

Walmart's US president and CEO Doug McMillon, is on the record to reduce store-level wage

investments through increased automation of picking orders. This will entail retrofitting existing facilities and upgrading with multiple technologies to automate storage and retrieval systems. The retrofit will reduce the need to build new facilities. Walmart's new Chicago high-tech fulfillment centre does not require a "lot of human engagement." Micro fulfillment centres (MFC) will complement existing operations and address grocery order picking. McMillon's vision is to be an omni-channel organization.

The warehouse connectivity systems such as the Mobility Edge™ from Honeywell utilize voice automation with voice and visual picking; voice and autonomous mobile robots (AMR); voice guided work solutions; voice enabled workflows; voice activated maintenance; with real time locations.

Wearable devices have been used in warehouses but are becoming more of a standard requirement to achieve the next level of efficiency in operations. Wearables are the enabler of augmented reality warehousing operations. Hands-free devices offer increased productivity for picking and packing operations and increased safety for workers. Training and onboarding of new staff has been shown to be improved through the use of wearables. Wearables include voice-activated headsets, light-weight wrist and ring scanners, smart glasses with HUD scanning capability, exoskeleton suits designed for ergonomic advantages, which all contribute to increased accuracy. Wearables can advise on trouble shooting and maintenance instructions to reduce downtime on equipment. Frito-Lay partnered with Kinetic Reflex to trial wearable devices. The results were reported as achieving a ~20% reduction in repetitive strain injuries across (9) Frito-Lay warehouse operations.

Simbe Robotics has a grocery store robot named *Tally*. Tally travels throughout a store scanning digital tag and QR codes for JIT replenishment. Saves labour and a claimed 30% reduction in stockouts.

In California, Fulfil Solutions has partnered with the Save Mart companies to fully automate the picking and packing of all types of grocery product categories. Within minutes of receiving an order, robots fill the order and have it ready for delivery. Fulfil's proprietary system uses computer-vision and a series of algorithms to sequence the picking efficiencies and updates the inventory on demand. Their database monitors locations, origin and expiry dates in real time to build order accuracy and is meeting customer service requests. Save Mart operates 200 stores and is currently one of the few successful, fully automated grocery services.

Emerging robotics companies which bear following are: 6 River Systems (Shopify); Fetch Robotics; Geek+; Locus Robotics; RightHand Robotics; and Fabric. Harnessing technology is a key part of the circular economy being efficient with energy consumption and waste reduction.

RFID

RFID means radio frequency identification wireless technology. While CMRs are taking on larger roles, RFID still has its place in the market. The key feature is the ability to track and identify items in real time and is used commonly for inventory control. RFID tags or chips transmit data to a central database to affect inventory levels and locations. Each tag represents a SKU in the system. RFID have replaced barcodes due to the line-of-sight limitations which barcodes require. An RFID negates the need to manually inspect each shipment and enables items to be scanned and catalogued even if it hidden by other goods. The RF signal is the key. RFID tags or RFID transponders include passive, semi-passive and active forms.

Passive, which are the most common, have no power source and only interact with the RFID reader or scanner. *Semi-passive*, have battery power but rely on the RFID reader to transmit data to the reader. *Active*, have battery power which enables the tag to transmit signals to the reader up to ~30 metres.

RFID smart labels use an embedded technology in an adhesive label. These are often used where there is a need for a person to read the tag to know what the product is and to have it readable by a scanner. Retailers often have the smart label for customers ease of viewing on the contents. Smart tags differ

from smart labels. The advanced smart tags are usually appropriate where a level of security is necessary. The advanced smart tags have built in processors and can therefore be quite costly.

In a February 2023 earnings call, UPS said it will invest US\$140M to implement its smart package initiative in ~900 US sites. UPS trialed the RFID tag program in ~100 of its facilities where employees wear scanning devices to accelerate parcel handling and reduce misloads. CEO Carol Tomé says this will eliminate 20 million manual scans across the UPS system.

RFID benefits include accuracy, response time improvement, and efficiency. In a Canadian health care operation, they went from an ~80% accuracy and fill rate to 99% accuracy and fill rates. When RFID was combined with a horizontal carousel system, there was also a 50% reduction in staffing for similar work volumes. The payback on the RFID and carousel system was 1.5 years on a \$400K investment, at the time.

QR codes

A quick response (QR) code is a two-dimensional barcode. The QR function is to inform the reader about the item. They can contain data for location, identification or links to a website or application. During the pandemic, restaurants provided menus in QR format for diners. Post-COVID, the QR codes seem to be staying as customers can use their smart phones easily to access menus and order. QR codes are replacing the UPC barcodes commonly used in the grocery industry.

QR codes are becoming more common to provide information on the *provenance of products* across a supply chain. They can inform as to where the product was grown, harvested, manufactured, processed, repaired, and a host of other data for customers, consumers, and inspection services. QR codes serve as business cards, discount coupons, provide video content and many other marketing and service functions without the use of a print format.

2D bar codes are the next generation of QR codes. 2D codes can contain far more information. Having easily accessible data and an error correction capability makes them valuable for connecting with consumers and customers. 2Ds can advise on expiration dates, batch/lot numbers, serial numbers, shipping dates or other details of an order.

Blockchain

Blockchain technology is changing supply chain practices with the ability to share data, its security, and the smart capabilities. The provenance of materials and labour will enable a transparency which can prevent fraud, eliminate intermediaries, and automate processing. Authors Köhler and Pizzol, in their publication, *Technology Assessment of Blockchain-Based Technologies in the Food Supply Chain*, summarized the elimination of staff intervention in perfunctory clerical roles to try and address these issues. People can't adequately cope with the volume of information on the traceability of labour and materials and hope to stop illegal practices, spoiled good in-transit, or lost shipments. Blockchain is meeting the challenge where consumers and customers expect accelerated delivery times with reduced handling costs.

In 2018, Maersk and IBM partnered to apply blockchain solutions for international supply chains sharing data among their decentralized trading partners with digitized record keeping. It was felt that the blockchain platform, TradeLens, would become the standard for tracing and accessing product-related information, including labour. In late 2022, Maersk and IBM shut down their joint blockchain venture as it failed to reach commercial viability. They don't see this as a blockchain problem but one of a lack of mass adoption across the shipping ecosystem system.

Walmart had deployed blockchain as a solution to the last mile traffic jams. It's patented *Smart Package*

utilizes a blockchain-formulated application to scan environmental conditions, locations, and private key addresses of shippers, carriers, and customers.

Blockchain is being used to trace the source and embedded carbon levels in EV batteries. In Europe, starting in 2024, batteries must disclose their carbon footprint. British-based Circular, is the service provider to French battery maker ACC, which makes batteries for Stellantis, Mercedes Benz and other EV auto makers. Circular provides trace services of materials for many sectors to ensure ESG commitments are validated and to address risk management issues in raw materials and finished goods from critical materials to plastics and recycled content.

Proof of delivery (PoD) has been a pervasive problem for all companies shipping products for many years. The hours of time spent to confirm deliveries or locate missing packages is overwhelming from a staffing perspective, for just the PoD portion of a shipment. Ensuring refrigerated goods are kept at the correct temperature is difficult to communicate expeditiously in a paper-based world. Again, blockchain can ensure real time data is transferred to the parties involved to meet shipping specifications, facilitate transactions, and complete the record keeping within a secure, distributed ledger, efficiently.

The Achilles' heel for technology is cyber security. The preponderance of invasive malware remains a real threat to all parties and can easily be transferred between supply chain partners. Meat producer JBS USA paid US\$11M for a 2021 ransomware attack. In early 2023, Dole plc, which is one of the largest fruit and vegetable producers, briefly shut down its production and distribution operations when hit with ransomware. US Technology provider, MKS Instruments, stated that February 2023 ransomware attack led to a \$200M loss. While MKS had \$3.0+ B in revenues, the attack required MKS to cease production for customers and has resumed operations. Since August 2023, Clorox, MGM, and Caesars casinos, have been reportedly hacked by *Scattered Spider*, a nefarious group running cyber-attacks. Clorox incurred substantial 1st quarter losses due to the hacking of its IT infrastructure, as reported by Reuters. Clorox had to resort to manual processing of orders as a result of the hack. S&P Global Ratings lowered its outlook to negative for Clorox in November 2023, as the cyber-attack has compromised the financial performance of Clorox.

Several Canadian hospitals and health service providers have been hit with ransomware, accessing personal patient records. Australia's port operator, DP World, had to close its operations for a few days in November 2023 due to a cyber security breach. Surreptitious blockchain technologies may be able to address the cyber security dilemmas.

Cryptocurrency

Built off blockchain technology, cryptocurrencies are both a speculative commodity and a means of making payments between supply chain partners. Walmart and DLT Labs in Canada have been using the distributed ledger technology to track, trace, and process payments and reconciliations since early 2020. This involves 60 of Walmart's carriers, 500,000 shipments per year, and its 400 Canadian retail outlets, leading to substantially reduced massive numbers of transactions requiring clerical staff to try and manage. One carrier reported a 97% reduction in invoicing discrepancies. One of the root causes of the previous system was the fact that Walmart had to deal with multiple information systems. Blockchain brings them all onto one platform.

Walmart's Global Chief Technology Officer, Suresh Kumar, says that "Crypto will become an important part of how customers transact." Large retailers and trucking companies will likely follow suit and adopt similar blockchain with cryptocurrency options now that Walmart has proven its viability.

The infamous collapse of FTX in November 2022, after only 3-years in operation, added to the perceived levels of risk with cryptocurrencies as a secure form of payment and investment. In late 2023, the IMF encourages public sector financial organizations to continue to draft regulations on the use of central

bank digital currencies (CBDC). ~60 countries are looking at how CBDCs can replace the use of cash and still have secure funds, while supporting cross border payments. Financial inclusion is an important aspect of retailing in emerging and low-income countries. <https://www.imf.org/en/Topics/fintech/central-bank-digital-currency/virtual-handbook>

In November 2023, *Binance*, the largest crypto currency exchange, pled guilty for failure to comply with the US Bank Secrecy Act, and paid a fine of US\$4B. Binance failed to maintain an effective anti-money laundering program and its founder, Canadian national Changpeng Zhao, participated in illegal transactions with Iran, Cuba, Syria, and Russia. This adds to the complexity of trying to reign in cryptocurrency transactions in a lawful manner. <https://www.justice.gov/opa/pr/binance-and-ceo-plead-guilty-federal-charges-4b-resolution>

In early 2024, several exchange-traded funds (ETF), tied to the spot price of bitcoin, were approved for trading by the US SEC. While cryptocurrencies are still viewed as risky, it will be interesting to track these volatile assets.

Drones

Drones are being used to reduce warehouse staffing. Drones can perform inspection services for construction, petrochemical, oil and gas, and power generation industries. Drones can inspect roofing, racks, pallet locations, and physical structures. Drones can also deliver materials from inventory to staging or internal work process stations, which is referred to as intra-logistics. For inventory management activities drones can increase the inventory count accuracy, decrease labour costs, and provide a safer workplace.

Erez Agmoni, VP with Maersk, confirmed in January 2023, that they are deploying Verity drones to collect 3-dimensional data inventory data via high-res cameras. The e-drones run off a battery charging pad and usually operate at nights or on weekends without overhead lighting required. The drone data is reconciled with the WMS data from the pallets to identify SKU or location errors.

Emerging technologies for indoor use of drones is being developed concurrently with several companies using a variety of systems. Warehouses which can benefit from drones typically are >50,000 ²ft; > 5 metre shelving; >50 metre corridors; and single depth pallet racking.

Drone technologies in use or being piloted are SLAM – simultaneous localization and mapping algorithm; LiDAR – light detection and ranging; UWB – Ultrawide Band. The use of drone technology is expanding exponentially year-over-year.

In 2022, Walmart completed 6000+ drone deliveries out of 36 stores through drone delivery hubs. These hubs are operated by DroneUp, Flytrex and Zipline in seven states. This promising service is targeting a goal of 1M packages per year, per Vik Gopalakrishnan, Walmart US VP of Innovation and Automation. In 2024, Walmart was given approval by the FAA to use drone deliveries out to 10 miles, up from the previous 6-mile limit from store sites in the Dallas-Fort Worth area in Texas. Orders for household goods and groceries will be completed by Wing and Zipline websites. Zipline and Wing are subsidiaries of Google parent company Alphabet.

Amazon has been using drones to deliver pharmaceuticals to customers. Their drones fly between 40-120 meters above ground and has sensors to avoid people, pets, and power lines. The customers retrieve their package without any direct contact with a drone. Amazon is going to launch same day delivery services through drones in Italy, UK and more US communities, it said in late 2023. For the past year, Amazon has delivered thousands of packages of household products, weighing up to 2.5Kgs. It will replace its existing drones with an MK30 model capable of further distances by the end of 2024.

Marine freight

Real time transportation visibility (RTTV) is the focus of many ocean shippers and carriers to improve efficiencies. In a 2021 survey, sponsored by software company Fourkites, they report that 50% of international shipments are conducted on a manual system with paper-documents being faxed and emailed around the globe. The desire for greater visibility requires technology investments. Where are the paybacks? Significant operational savings and improved customer services such as on time, in full (OTIF) and less dwell time. Dwell time is the # of days containers sit at a terminal after being unloaded. Dwell is a KPI for terminal operational efficiency. Delays can be attributed to many different factors beyond the control of the terminal but can also provide a sense of their capabilities and resilience. A single RTTV platform connects freight forwarders shippers and carriers with less staff intervention to trace and expedite orders. In March 2021, the container ship *Ever Given* blocked the Suez Canal, with months of delays as a ripple effect. Those shippers which had a RTTV platform were able to reroute much faster than those that depended on individual staff to intervene during the crisis.

In 2024, shipping through the Red Sea continues to be compromised due to armed conflicts in the region related to the Israeli-Hamas wars. With capacity curtailed in the Panama Canal due to droughts, this will exacerbate the ability to move goods globally and add to the rising costs and risks of ocean freight. This supports the ideas for more onshoring or nearshoring of supplies. An energy related problem with reduced shipping through the Panama and the Red Sea, is the fact that 1/3 of oil supplies are seaborne, according to the IEA.

Large terminal operators are investing in dock scheduling systems to increase their supply chain visibility. Cross docking operations are very complex and scheduling systems are aimed at driving efficiencies to coordinate multiple products, from multiple carriers going to multiple destinations out of a warehouse or terminal.

Norway launched the first all-electric ferry with rechargeable battery system, in 2019, claiming 90% reductions in emissions and 80% reductions in cost. Electric ferries run much quieter when compared with the traditional diesel engine powered designs. Two electric propulsion ferries were ordered for operating in Ontario in 2021. In 2021, New York ordered its first, 150 passenger electric ferry for commuters. It would seem that all-electric ferries could replace many of the diesel-powered fleets as a scalable solution.

British Columbia announced in 2021, it would be accelerating the conversion of its fleet to electrify (6) ferries. However, this \$135 M plan was contingent upon federal and provincial funds. In October 2023, they had to pull back on their e-ferry plans, as funding was *not* provided. The BC ferry fleet has failed to deliver the promised reduction of emissions, using a 2008 benchmark level, and it is doubtful it will meet the 2030 targets. This was reported by Rochelle Baker, through the *Local Journalism Initiative*.

The waters off British Columbia saw the first all-electric tugboat in July 2023. The *Wamis*, the first of 3 tugs, will be deployed in Kitimat to service the LNG ship operations. With 100% electric power and a total of 5000 kWh of battery capacity.

While the e-ferry systems will continue to grow, there is still going to be a need for renewable fuels to displace the bunker fuel for large container and cruise ships. Methanol engines are now in use. E-Methanol can be made from CO₂ derived from biomass and green hydrogen. This requires a scalable carbon capture process for industrial sources of biogenic CO₂. The Methanol Institute reports that AP Moller-Maersk has ordered dual-fueled ships to address the decarbonization of international shipping. The supply of e-Methanol at major shipping ports would be required to support the fuel distribution system. Methanol is used in household products, automotive components, and in the production of chemicals.

In September 2023, Moller-Maersk and Amazon renewed their commitments to decarbonization of

ocean freight by agreeing to use methanol fueled container ships. This replaces the need for traditional bunker fuel and is estimated to save 44,600 tCO₂ e when shipping 20,000 FFE containers. Moller-Maersk's terminology refers to its ECO Delivery shipments where it defines certified *green fuels* as low to very low GHG emissions. Moller-Maersk complies with the ISAE 3000 guidelines.

Biofuels for marine transportation will reduce emissions by ~20%. One of the scalability issues is that currently marine biofuels cost significantly more than bunker oils. The marine industry consumes 330 M tonnes of fuel per year, which is primarily from crude oil products. One of the largest marine hubs is Singapore. At present Singapore forecasts that its biofuel demand could reach 1M tonnes by 2025. A drop in the bucket comparatively to the supply availability of biofuel.

Air Freight

This sector handles less volumes than the other modes of transport and is usually the fastest means of moving goods with a higher cost. Air freight is catching up with digitalization of its services. One of the leaders in air freight is FedEx. Their fully integrated logistics systems arguably set the bar. FedEx is one of the largest air freight airlines in the world. FedEx operates 281 aircraft to reportedly handle the shipment of 13M packages per day. Amazon, for comparison operates 73 aircraft and ships 3M packages per day. One could make the case that without the technical tools of the buyers, sellers, and logistical connections, these volumes would not have been possible. The relative ease of ordering through to the fulfilment processes is only feasible because of the technologies being deployed in mature markets. Emerging economies are much more labour intensive and have fundamental problems where the demand side and the supply side are not as connected, which adds costs but does not increase the value.

With the loss of passenger flights through the pandemic, the cost and capacity of air freight was a challenge for passenger airlines which focus on people rather than packages. The biggest customers of airlines are freight forwarders. The integration of freight forwarding services into larger logistics network companies may reduce the need for independent freight forwarders. Forwarders advise on costs, documentation, insurance, customs clearance, labelling, scheduling and arrange intermodal services. Forwarders don't own transportation assets. They historically rely on their expertise. Digital integration tools may negate some of the forwarder's niche in the market where the soft skills compete with technology.

In early 2024 Chinese e-commerce, fast fashion companies are consuming as much air cargo space as possible. Reuters reported that Shein and Temo account for 600,000 packages per day, being shipped to the US.

Rail

Rail services do utilize many of the aforementioned technologies for safety, scheduling, track inspections and are also looking at the redesigning of rail cars. Hazmat materials are a common commodity on a rail line. Compartmentalizing flammable liquids as an example where a single puncture does not affect the entire contents. Drones inspect track and rail bridges routinely. Crew scheduling is provided through SaaS as a mobile solution to employee assignments, seniority rights, allows manual adding of trains, and hours of service data. An innovator of SaaS for rail is PS Technology.

The inspection of rail cars has been a labour intensive process for decades. Norfolk Southern reimagined safety inspections by installing Digital Train Inspection Portals (DTIP) across its network. This is machine vision coupled with AI and multiple, 360-degree high-resolution cameras, identifies problems the human eye can't detect while a train is moving at 70 MPH. The DTIP captures the images and converts them into algorithms where rail safety and maintenance experts are able to find potential problems before

accidents occur. The system has very low false-positive readings. The railroad plans on having 24 DTIPs in place by the end of 2024.

As per the International Energy Agency (IEA) CO₂ emission statistics, the transport sector is tagged with ¼ of our global emissions. For freight transport, rail produces 36 grams of CO₂ per ton km, compared to 96 grams by long haul trucking and 946 grams for aviation.

Idling reduction technologies are a part of the SmartWay verified services for locomotives. These include: Automatic Engine Shut-Down/Start-Up Systems (AESS); Auxiliary Power Units and Generator Sets (APU/GS); Fuel Operated Heaters aka Direct Fired Heaters (FOHakaDFH); Shore Connection Systems (SCS).

SmartWay offers a Green Freight Assessment to Canadian companies to apply for funding to hire a 3rd party to conduct a fleet energy assessment. The review would provide a carrier with recommendations on how a company could improve fuel efficiencies through retrofits and using different fuel types.

<https://natural-resources.canada.ca/energy-efficiency/transportation-alternative-fuels/greening-freight-programs/smartway-fuel-efficient-freight-transportation/21050>

One of the more interesting technical disruptors in rail transit is the use of hyd rail-hydrogen energy for power. Mass transit is trialing various vehicle designs to look for scalable outcomes for the types of vehicles best suited for hydrogen-based fuels. Most Canadian railways use diesel and diesel-electric propulsion systems. Biofuels have not been welcomed due to potential problems in the diesel engines in Canada, whereas, biofuels are a source of fuel for several European diesel train engines. LNG has been used but is not seen as a large-scale alternative fuel.

Zero-emission passenger trains are operating in Germany using 100% hydrogen. The French engineering firm Alstom designed the trains which only emit steam and condensed water. The engines are refueled daily from an industrial gas company Linde hydrogen generation depot with an 1800 Kg storage capacity. The operator, LNVG, will replace its fleet of (15) diesel-powered units. The trains will attain a speed of 140 Kms with a range of 1000 Kms. It's estimated that 1 Kg of hydrogen will replace 4.5L of diesel.

Canadian Pacific is heavily investing in hydrogen-fueled freight locomotives with Provincial government funding. Ballard Power Systems will develop the hydrogen-electric powertrains to convert the diesel-electric powertrains which most rail lines have used for decades in North America. Retro-fitting existing locomotives is part of the circular economy strategy of decarbonization. CP is trialing their hydrogen-fueled trains in early 2023 through the Rocky Mountain pass which will be a critical test area with the variations in grade and temperatures.

Mass transit has used magnetic levitation (Maglev) technology successfully in China and Japan. While Maglev enables high speeds it has limited scalability. There are US projects which are assessing the use of Maglev but have not moved forward. The French TGV, electric-powered trains have been in service for 30 years and the TGV technology has been used on other European countries, which is a scalable solution.

Electrification of transportation

In 2018 Rolls Royce and FinFerries² launched the first fully autonomous car ferry. The cost advantages of using autonomous trucks in B2C (business to customer) last mile delivery is substantial, with potential of reducing delivery costs by 10% comparing to traditional delivery method (McKinsey,2018). The design of the fastest route reduced the pollutants created by shipping vehicles, especially for overseas shipping,

² <https://www.finferries.fi/en/>

while autonomous delivery acts as a solution to effective, low manual input delivery, allowing more funds and human resources to be devoted to more productive usage.

According to a 2023 BC Automobile Association article, *Leading the Charge*, the average Canadian drives ~15,000 Kms per year with ~7500 of these Kms for commuting to work. The more Kms one drives, there is greater arguments to have some type of EV. It could be a BEV, HEV, PHEV or an FCEV, depending on needs such as personal, business or lifestyle choices. A December 2023 Report on Business articles summarized EV sales in 2023 as having (44) BEV models for sale in Canada and (33) PHEVs of the (77) models available.

Along with an EV is the need for charging. Level 1 AC chargers provide 8 Kms of range per hour of charging off a 120 V outlet at an average cost of \$900; Level 2 AC chargers provide 97 Kms of range per hour of charging off a 208 or 240 V outlet at an average cost of \$1300 plus installation; Level 3 DC chargers are the fastest which most public and business accesses provide, with adapter for Level 1.

The good news for EV batteries is they should last an average of 300,000 Kms. The bad news for EV batteries is their replacement costs run between \$6,500 and \$28,000 but are more plentiful in the aftermarket. Newer EVs have an average driving range of 400 Kms per charge. Weather temperatures and the use of AC can affect the length of driving range.

The historic drought being felt in Western Canada adds a further concern as BC Hydro is having to buy electricity to meet the demand in the province. Hydro spokesperson, Kevin Aquino, says the province imported ~20% of its electricity to meet the demand in 2023. River and reservoir levels are down considerably. If EVs are dependent on electrical charging stations, there needs to be an adequate supply of water to support the system.

In 2024 the drought in Alberta continues, requiring farmers to truck in water to feed animals as river capacities are down to below 30% of normal levels. Cattle ranchers are considering smaller herds as the lack of water may not sustain their herds. Unless there is much more snow or rainfall, the prairies will not have a good yield for their food crops.

There will be increased pressure on BC Hydro to ensure adequate electrical supply as the push for EVs and banning natural gas will lead to problems during cold weather. In January 2024, BC experienced arctic outflow conditions with several hundreds of homes without electricity. Can't cook, drive, or heat without adequate electrical supply. The source of 40% of BC's water is from two reservoirs, which are below historical levels for 2-years in a row in 2024. Where BC exported \$1Billion in power in 2022 it imported \$500M in 2023. More imports will be likely as the drought continues and demand increases. This is not a sustainable market condition and either relaxing electricity regulations or policies may be required. <https://vancouversun.com/news/local-news/water-levels-at-two-key-eastern-b-c-dams-below-normal-for-second-year-straight>

The Canadian government has invested \$13B+ to support the conversion from internal combustion engines to plug-in vehicles by funding Stellantis, Ford, GM, Honda and Toyota facilities. Investments include producing and processing critical materials to make batteries and related research. To bolster the strategy, the Federal government announced that it will ban the sale of new internal combustion engines (ICE) in passenger vehicles by 2035. Stellantis and LG Energy have committed \$5B to build an EV battery plant in Brampton, Ontario. This project was put on hold shortly after this announcement. Stellantis went back to the government and wanted a similar tax break being offered to US companies under the Inflation Reduction Act – which the Canadian government conceded to do in the form of \$15B in tax breaks. As Flavio Volpe, from the Automotive Parts Manufacturers' Association cautions, if the legacy automakers can't meet this target quota of 2035, the Chinese EV companies could fill the gap.

In March 2023, Canada received its first shipment of 780 VinFast E-SUVs from Viet Nam. While Viet Nam is a trading partner of Canada, VinFast E-vehicles are imported to compete with Stellantis, Ford, GM et

al, which have been heavily subsidized to make them affordable. VinFast may add an element of competition on pricing to the made in Canada vehicles but there is likely a limit as to how many can be imported per year. This was the strategy a few decades ago to encourage Honda, Toyota, and other Asian manufacturers to move production to Canada and the US to create employment and economic development. VinFast is launching in the US market. While shipping only 3000 vehicles to the US in 2023, VinFast are building a plant in North Carolina with its partner Leith Automotive Group. VinFast is going to use the direct-to-customer sales model created by Tesla, along with dealerships. VinFast is part of the Viet Nam conglomerate, Vingroup JSC.

Norway has been the leader in the number of EVs per capita. With new fully electric car sales at 79% of sales in 2022 and 82% in 2023; and ICE and hybrids at 18%. This has been encouraged by having no taxes on new or imported battery EVs until the end of 2022; no road toll fees for EVs; use of bus lanes in city centres; and higher taxes on ICEs. Norway plans on ending ICE sales by 2025. In 2023 Norway began taxing EVs. The estimated loss of sales taxes through the exemption period was ~39.4 billion kr or US\$4B.

In December 2022, the first all-electric delivery trucks rolled out of the GM Cami plant in Ingersoll, Ontario. After closing the former Chevy Equinox plant in April, the plant was retrofitted to a full-scale electric vehicle plant. Orders for the BrightDrop vehicles have been placed by DHL, Walmart and FedEx. The Cami plant is designed to produce 50,000 vehicles by 2025. GM is planning to produce 400K EV motors per year out of its St. Catherine's facility for its e-vehicles. FedEx began rolling out its first 50 BrightDrop Zevo 600 vans in June 2023.

GM acquired the gigacasting supplier, Tooling & Equipment International (TEI), in November 2023. TEI was a major supplier to Tesla. Gigacasting allows for faster production of automobile frames, which can significantly reduce the costs of EVs. This will be an interesting strategy to watch as GM makes a more competitive marketplace. Making the affordability factor much less for EVs and getting more consumers into their vehicles could be a game changer for GM. Time will tell.

The first South Korean investment in Canada took place in August 2023. Quebec will benefit from EcoProBM and SK ON's battery parts plant operation. The estimated cost is \$1.2B and will be owned by Ford and the two South Korean industrial companies. The Federal government is backing the investment with \$644M.

Quebec-based Lion Electric is producing electric school buses (ESB). Their purpose-built ESBs are zero emission vehicles. Lion design and manufacture e-trucks, mini-buses, refuse and utility trucks. Lion has taken the design of its products as the first step in reducing emissions. <https://thelionelectric.com/en>

Sweden's battery manufacturer, Northvolt, announced it is locating a new plant Quebec. One of the reasons for Northvolt's investment is the access to hydro power over coal power for electric vehicle battery production. Their claim is that they can produce batteries with 90% less CO₂. The province and the federal government are providing financial support valued at ~\$4.2B Cdn for the \$7B gigafactory. It is expected to generate 30 gigawatt hours of cell manufacturing per year by 2026. This capacity is expected to power 1M EVs per year. The facility will provide 3000 jobs and eventually generate \$1.6B in economic benefits. <https://www.supplypro.ca/northvolt-to-build-7-biloion-battery-factory-near-montreal/>

Vancouver-based RiSE EV company is rethinking the electrification of many types of vehicles, including the everyday school bus. RiSE EV has opted to go where few others have gone. Retrofitting and converting gas and diesel buses and shuttles to electric power. They also apply their know-how to sports and classic cars, fleet and utility vehicles. <https://riiseev.com/>

Electrification of school buses has a tremendous impact to address GHG reduction targets. When we consider the millions of buses and trucks currently reliant on fossil fuels, the conversion should be cause

to reflect and rethink how we move people and products. An August 2023, Pembina Institute report estimates that the average ICE school bus emits 27 tCO₂e per year. Diesel exhaust-related health costs are ~\$2.3B per year.

The RiiSE EV strategy aligns with the circular economy value which states that everything begins with the design. Taking existing resources and repurposing them for other uses, substantially reduces the consumption of new raw materials and enables a sustainable economic model with a lower environmental impact over the life of the vehicles. However, RiiSE EV faces some political and legal hurdles intentionally placed to prevent the conversions.

The school bus sector is an oligopoly operating in Canada and the US. The school bus market is controlled by ~6 manufacturers. In Canada the committee which oversees the sector has a potentially conflicting mix of owners and other administrators controlling the design and electrification transition. So much so, that the committee had their sector rules, referred to as the *D250 regs*, to disallow the conversion of ICE buses to other fuels. It began with the trials of hydrogen fuel conversions which were disallowed, mainly because it did not support selling new vehicles. Case in point, in 2023 a BC school District announced it was replacing its fleet of diesel buses with Lion Electric ESBs. The economics of this decision are rooted more in politics than science. The average price of an e-bus is \$395,000 (after federal subsidies) and the cost of a diesel school bus is \$202,500, as stated by the school district. The district will save \$15,000 per year in fuel and maintenance. This realizes a payback of $(\$192,500/15,000) = 12.8$ years. The school district said they replaced their diesel buses every 12 years and *hoped* that the e-buses lasted longer. Affordability is a real factor for taxpayers.

In late 2023, Lion has announced layoffs of ~10% of its workforce as profitability is not being realized. While revenues have doubled over 2022, Lion has reported losses of ~US\$37M over the past two years.

There are about 60 school districts in the Province of BC which will all want to make the transition to ESBs. The price tag will be in the multi-millions without considering the infrastructure investments for power. If, the school bus committee and the politicians were objective, they would allow the conversion of existing school buses to e-buses. Leasing these buses could be done at a cost of ~\$50,000 per year for 4-years; after which the lease rate would be reduced as the cost of conversion is recovered. If we look at the Canadian school bus market, we could save \$billions with conversion of existing ICEs to e-buses.

The Canadian school bus market operates 40,000 – 50,000 school buses. While Ontario has invested in battery plants and other EV parts strategies, it has not invested in ESBs. This is largely due to the political ideology of its Premier Doug Ford. Ford cancelled all EV subsidies when first elected as it was largely an exercise *where public money was wasted on millionaires*. The global ESB market is estimated at US\$3 B by 2030. The potential job growth if Ontario decided to build ESBs, could result in 13,000 new jobs with Cdn \$2B in economic output, along with 350 K tCO₂e removed from emissions, per Toronto Star, climate change reporter, Marco Oved, in September 2023.

The BC government also funds the Go Electric School Bus Program. Incentive rebates are available for school bus fleet operators such as school districts, private contractors, independent and indigenous school fleets. Rebates are up to \$150,000 to buy a new ESB; up to \$6,000 to buy and install a Level 2 charging station; and \$5,000 towards infrastructure assessment plans. No funding mentioned for the *conversion* of existing vehicles.

Most governments are quick to support the transition to EVs of any type. In British Columbia, there is a Go Electric Rebates Program administered through the Fraser Basin Council. Rebates are open to individuals, businesses, non-profits and all BC-based public sector organizations. The targeted electric vehicles are motor vehicles, cargo e-bikes, airport, port and utility vehicles. Vehicles which do not qualify for the rebate program are those where the manufacturer-suggested retail price is >\$55,000 for cars

and >\$70,000 for larger vehicles. All applications are subject to the availability of funds. No funding for the *conversion* of existing vehicles.

The BC Provincial government ZEV targets for new light duty vehicle sales and leases are 26% by 2026; 90% by 2030; and 100% by 2035. Governmental mandates are required to make the shift for electrification. The 2023 Federal government mandate requires 20% of passenger, SUVs, crossovers, and light trucks must be ZEVs by 2026; 60% by 2030; and 100% by 2035.

In November 2023, the Province of BC and the Federal government announced funding of \$284.5 M for a new battery plant in Maple Ridge, BC operated by Moli Energy. The plant is expected to produce 135 million lithium-ion batteries annually, starting in 2028. The batteries are for medical devices and consumer products such as vacuums and gardening tools. It is anticipated that this will create 450 jobs in the small community.

We can take the next step of designing all new e-everything; or, we have the potential to *convert* tonnes of resources, such as school buses and other utility and service vehicles, which we currently own and operate to avoid or defer further financial risks and perpetuate material shortages. Over time, manufacturers will discontinue ICEs and conversions will no longer be an option.

For 2024, Toyota will begin recovering cathode active material, anode copper foil, and batteries from aging Prius EVs. In a November press release, Toyota forecasts 5M operating units in its battery ecosystem can be recycled, remanufactured and repurposed by harvesting components from older vehicles. Toyota has partnered with Redwood Materials to supply the recovered materials for its battery production facility in North Carolina, which should be operational for 2025. This creates the closed loop system, which is the basis for design in the circular economy model.

GM is investing US\$50M in Energy Exploration Technologies Inc (EnergyX) to develop lithium extraction and refinery technology. This will enable GM to control the costs from raw materials through to full battery cell production. EnergyX's direct lithium extraction process (DLE) can produce lithium metal directly from brine and into an anode-ready for EV batteries. DLE could replace the slower and more costly traditional evaporation ponds, which require more energy, land, water usage said GM in its 2023 press release. GM is also buying 32,000+ tonnes of manganese sulfate from Australian mineral company Element 25. As part of the deal, GM will help finance a new facility in Louisiana to produce battery grade manganese sulfate from Element 25, which qualifies for EV tax credits under the US Inflation Reduction Act. In early 2024 GM invested US\$150M in Canadian mining company Nouveau Monde Graphite to acquire 18,000 tonnes of graphite for battery anodes over a 6-year deal.

In early 2023, the first battery-powered public transit bus line was initiated in Vancouver with four Canadian-made Nova LFS+ brand vehicles and two charging stations. The announcement from the operator, TransLink, stated the buses cost \$1.1M each and are expected to save \$40K each per year when compared to diesel units. There was no indication as to the cost of the charging stations, which will likely be in the multiple-millions. An additional 11 BEV buses are on order with another 385 to be delivered by 2030. The four older diesel vehicles they replaced emit 280 tonnes more than the BEVs. If we use \$50 per tonne as the cost of GHGs that's a further savings of \$14k per year. It's a payback of ~25 years even with reduced GHGs. Therein lies the rub with affordable and clean energy. Currently it is difficult to get one without the other.

The *Catch 22* for EVs in Canada, is the lack of adequate infrastructures to support charging. In 2022, with EVs now only representing a small % of the market share, the charging networks cannot meet demands. If our wishes come true and we can all buy affordable EVs, the investment in open standards to charge any vehicle anywhere, on interoperable systems, will require strategic energy management programs that are currently unattainable. In late December 2023, the Canadian Federal government announced

that it wants all cars sold by 2035 to be EVs. In 2023, there were 77 different EV models for sale in Canada – only the Chrysler Pacifica Hybrid was built in Canada, according to a Report on Business article.

IKEA expressed concerns at a Toronto Region Board of Trade event with EVs in an article from *Supply Professional* in early 2024, by Ritika Dubey, The Canadian Press. The IKEA caveats focused on the battery charging time. “We have to take into consideration the charging time to bring a battery up to 80 or 100 per cent overnight,” Crystal Rasa, who is leading IKEA Canada’s EV fleet transition, said in an interview following the event. What time can the vehicle be ready to be loaded and leave for deliveries? What time will the vehicle be back?”

IKEA uses electric delivery vehicles of various sizes and has a dedicated team to optimize their efficiency and algorithm-based delivery routes. “There’s a never-ending analysis of what is the optimal configuration between the vehicle size, the type of order our customers are choosing to purchase,” Rasa said. “Seasonality (also) comes into effect (deciding) how much product can go on a truck.” Other roadblocks include obtaining electrification permits, choosing efficient chargers and adapting to the lower battery life of cold weather.

The company started small with 10 trucks deployed in Montreal and Vancouver. Since then, IKEA’s electric delivery fleet has expanded 15 per cent in the past two years to include Toronto and Ottawa, with plans to be in Calgary, Edmonton, Winnipeg, Halifax and Quebec City. The company has set a goal of having its delivery fleet in major cities be 100 per cent zero-emission by 2025. Another delivery company, Mycourier, at the event, said they can’t fully give up gas-powered vehicles until charging infrastructure improves.

As we are witnessing increased droughts in various parts of Canada and when winter storms can take down electricity grids, PHEV vehicles make a lot of sense. They are affordable and provide a power option. Hydro power is dependent on sufficient water supplies. Completely moving 100% away from ICE vehicles, could be a risk that it unnecessary to take over the next decade. PHEVs are low emission vehicles and not zero emission vehicles. Only allowing sales of zero emission vehicles invites unnecessary risk.

According to a reference in December 2023 *AutoTrader*, 40% of Canadians considering an EV see the price as the biggest barrier. A 2023 internal combustion engine (ICE) Hyundai Kona starts at ~\$25,000 while its EV version is ~\$47,000. The ICE 2023 Blazer starts at \$44,000 and is \$63,000 for the EV version. If we use an operating cost for fuel and maintenance of \$.40 per km for the Kona ICE and only \$.06 for charging and maintenance for the EV Kona, it would take 4.3 years to break-even on the purchase price. For the Blazers, using the same cost structure, it would take 3.7 years before any savings are realized. While government incentives can reduce the purchase price, it is still a subsidy which has to be paid back by taxpayers at some point. As we gain more experience with EVs we will be able to objectively estimate the various charging and operating costs between EVs and other fuel types.

These estimates suggest that an ICE vehicle costs 6.5 times more to operate than an EV but unless you are driving more than 15,000 KMs per year, the payback is questionable. The average price of a used vehicle is \$37,700 which is a 3% increase year-over-year; while an average new vehicle is \$67,491 which is 15.4% year-over-year. In other words, affordability is a real issue. Requiring more people to buy higher priced vehicles will add to inflation just as mortgage rates are primed to be increasing in Canada. Emissions and emotions are on a collision course. <https://vancouver.sun.com/news/canada/electric-vehicle-interest-down-autotrader/wcm/b3dab43b-89d2-45d8-96ff-b93e17edb034>

Break-even costs comparing ICE vs EV models

Model	Purchase price	Operating cost per km
Kona ICE	\$25000	\$0.40
Kona EV	\$47000	\$0.06

Kona models break-even:

Purchase price savings $47,000 - 25,000 = 22,000$ in favour of ICE

Operating costs savings $.40 - .06 = .34$ savings in favour of EV

Break-even savings of $22,000 / .34 = 64,705$ kms / 15,000 kms per year = **4.3 years**

Model	Purchase price	Operating cost per km
Blazer ICE	\$44000	\$0.40
Blazer EV	\$63000	\$0.06

Blazer models break-even:

Purchase price savings $63,000 - 44,000 = 19,000$ in favour of ICE

Operating costs savings $.40 - .06 = .34$ savings in favour of EV

Break-even savings of $19,000 / .34 = 55,882$ kms / 15,000 kms per year = **3.7 years**

The total number of vehicles sold in the US in 2023 was 15.5M with EVs accounting for ~10% of the market. According to a Cox Automotive report in February 2024, Tesla had ~50% of the US market in EV sales. In Canada, in 2023, the total number of vehicle sales was 177,000, with EVs accounting for 10% of the sales. An S&P Mobility report in 2024 stated that 99% of Tesla Ys and Model 3s were built in Tesla's Giga Shanghai facility. <https://driveteslacanada.ca/news/tesla-model-y-maintains-top-spot-for-canadian-ev-sales-in-q3/>

BYD, the Chinese EV car manufacturer, in a 2023 Reuters report, sells ~640,000 EVs per year, in China; Tesla sells ~130,000, in China, using 2022 stats. BYD ceased manufacturing ICE models in early 2022. Canada had total EV sales of 55,000+ in the same period. In Canada, EVs account for only ~10% of the new car sales. BYD is producing EVs in Europe, Australia, USA, Brazil, India and will be selling into Japan in 2023 and Indonesia in 2024. BYD has a full range of EV vehicles including buses. Global competition in the EV market is just heating up. In 2024, Nissan plans to export China-developed EVs to compete with BYD. Nissan would include ICEs, PHEVs, and EVs developed in China, according to Nissan's VP Matsuyama. Another EV made in China is coming to the market in 2024 – the SU7 built by smartphone maker Xiaomi. The SU7 is aimed at the high-end Tesla and Porsche EV niche customer.

BYD is building an EV charging network in 8 major cities in Brazil beginning in 2024, with 600 charging stations. BYD sees Brazil and Latin America as big investment opportunities. EV sales in Latin America were up ~100% in 2023 over 2022 to 94,000 vehicles. BYD held ~20% of the market. Concurrently, Tesla opened its first dealership in Chile. Chile wants only EVs to be sold by 2035, although cost pressures and limited charging stations remain a barrier.

BYD announced it is opening production facilities in Hungary and will look at the feasibility of manufacturing in Mexico. Both these locations give greater access to more *free trade* access to EV customers within recognized trading blocs. The BYD plant in Mexico could allow their highly competitive EVs to enter the Canadian and US markets through the CUSMA agreement. This also reduces import tariffs for BYD by being part of the CUSMA bloc. Import tariffs on BYDs run ~27% which makes them less competitive than vehicles made by existing companies located within the CUSMA countries. In March 2024, the US government further threatened to limit Chinese EVs as they *could pose a national security*

risk due to concerns about data being collected from *connected car* technology.

The US government stepped up to the plate with its October 2022 announcement of US \$2.8 B in grants to expand its domestic production of EV batteries. Concurrently, announcing the American Battery Materials Initiative to secure reliable supplies of critical materials and not be dependent upon imports. China has been a major supplier of EV batteries and critical materials which were supplied under “unfair subsidies and trade practices” according to US government sources.

It's been shown that without heavy investment and tax benefits by government, EVs could not continue to grow as fast as the market and officials want. By June 2023, less than 10% of light duty vehicle sales in Canada are EVs. In June 2023, CEO of GM, Marissa West, was quoted as encouraging the Canadian federal and provincial governments to offer more consistent incentives (subsidies) to compete with the US government investment strategy. CEO West earned ~US\$28M in 2022.

In February 2024, to hinder the threat of more Chinese vehicles entering the US, the US government is considering restricting imports from China. This would apply to EVs and related components and parts. The intent is to prevent any imports through *third countries* such as Mexico. Part of the US government concern is security risks associated with data collection.

Assessing the impact of affordability can be determined by the cost per family in Canada. In 2024, Canada has a population of ~40M people. Of that, there are ~11M families. If the Federal government provides ~\$13B in subsidies, over 10 years, to support the EV manufacturers, using 11M as the denominator, that equates to \$182 per year, per family, over this period. For every dollar the Federal government spends, we can use the 11M to see what the financial impact could be per family.

Germany announced it is ending its EV subsidy program in late 2023, one-year earlier than planned, due to budget constraints. Germany has provided \$14B Cdn in EV subsidies since 2016. In response to the subsidy cuts, Audi, Mercedes-Benz, Stellantis, and VW will fund the government shortfall with phased in cost reductions. Likely, all car manufacturers will follow suit and this could create a ripple effect in other countries, as governments face increasing budget pressures. The CEO of Volvo went on record at a 2024 Davos conference for Reuters Global Markets Forum, that he was bullish about their EVs. His comments rubbed against the affordability of EVs when he said “*We have much more pricing power and **people have got more disposable income so they can afford it if they want to drive an EV.***”

Canada at present continues with heavy subsidies to try and promote EVs, as they remain unaffordable without government interventions. This forces lower income families to buy a higher cost EV as ICE models are being discouraged.

Research firm, Canalys, forecasts lower global EV sales in 2024 due to further government subsidy cuts. 2023 growth in EVs was stated as 29%, in part by a 20% lower average sticker price. 2024 may come in at ~27%. Growth in EU and North America is hampered by *insufficient product choices and inconvenient charging experiences*. We've also seen more competitive pricing from Chinese car manufacturers taking market share. China continues to expand EV sales with 78% of new sales in EVs being Chinese brands. Legacy auto manufacturers such as Ford, GM, VW, and Stellantis, must continue to support ICE models while transitioning to EV products. Newer EV manufacturers are not burdened with the legacy costs and are able to make larger investments to grow their market share. <https://www.reuters.com/business/autos-transportation/global-ev-market-growth-slow-this-year-lower-subsidies-report-2024-01-08/>

In January 2024, luxury brand Swedish EV automaker Polestar Automotive announced trimming its workforce by 15% due to lower demand forecasts for EVs, heavy price cuts, reduced subsidies, and supply chain issues. By February Polestar, financed by Volvo, was facing more serious financial problems and will be managed by Chinese automaker Zhejiang Geely Holding Group. Geely is one of China's top 10 automakers in terms of volume of sales and is the major shareholder in Volvo. Polestar may be the

canary in the coal mine for EVs, starting in 2024.

Reuters reported GM's CEO Barra, says they will build EVs to demand. Ford announced production cut backs due to slower demand for EVs. Ford will push for more PHEVs as they are lower in price and offer greater assurance of operations which EVs face with limited range and charging. Renault cancelled its IPO offering on its EV business Ampere. S. Korea's battery maker LG Energy Solution predicts a slower demand in 2024. Morgan Stanley analyst Adam Jonas says the EV market is *over-supplied vs demand*. The German auto association, VDA, said EVs including hybrids fell 16% in 2024. In the UK, Lordstown Motors, Proterra, and Sweden's Volta trucks have gone bankrupt.

"We know the EV market is not going to grow linearly," GM CFO Paul Jacobson said Tuesday. "We are prepared to flex between ICE and EV production." GM has realized "spending US \$36M per day trying to be the 'next Tesla' isn't working," Morgan Stanley analyst Adam Jonas said in February 2024.

Another signal that lithium prices have collapsed over the past year is indicated by the pull back of US-based Albemarle. Albemarle are is one of the largest lithium producers in the world. The company says that supply has exceeded the demand, which was driven by EV batteries, which have slowed down in sales. In part, lower cost options to lithium are being designed into batteries to reduce their costs.

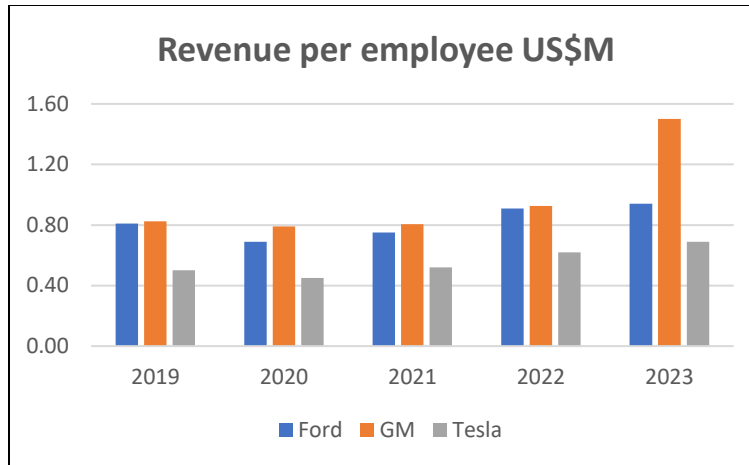
<https://www.reuters.com/markets/commodities/lithium-producer-albemarle-cut-workforce-lower-spending-2024-2024-01-17/>

Tesla CEO Musk, fears that Chinese automakers will demolish global rivals without trade barriers. He went on to say Chinese car companies were the "most competitive" and "will have significant success outside of China, depending on what kind of tariffs or trade barriers are established." In a Reuters report, Tesla plans to start producing a cheaper, mass market compact crossover codenamed "Redwood" mid-2025 to compete with inexpensive rivals.

Tesla demand in California fell by 10% in late 2023 – the first fall since 2020 pandemic. California accounts for ~10% of Tesla's global market. In a January Reuters report, California EV competition for Tesla came from Chevrolet, Hyundai, Mercedes-Benz, and BMW.

Setting aside the sales and marketing competition between ICE and EVs is their productivity metrics. A February 2024 Reuters report compared the revenue per employee between Ford, GM, and Tesla. All automakers are trying to reduce costs and optimize their respective workforce. Tesla, as an EV company is only ~20 years old, as compared to the other two 100+-year old legacy car makers.

Tesla's employed 140,000 workers in 2023 to generate US\$690K in revenue per employee; Ford employed 173,000 workers generating US\$940,000 each; and GM employed 163,000 workers with a revenue of US\$1.5M per employee – twice that of Tesla. As EV sales cool in 2024, profits and retained earnings will get more attention in a crowded market with relentless competition from foreign automakers.



Stellantis is investing ~Cdn \$140M in expanding its electric drive module (EDM) plant in Hungary to support EVs and PHEV vehicle production. Concurrently, Stellantis is increasing production of the advanced, electrified dual-clutch transmissions (eDCT) for hybrid and EV production at its facility in Italy. The eDCT design integrates the electric motor, transmission and power electronics to increase power and maintain efficiency in the vehicles.

In contrast to increasing EV usage, in early 2024, Hertz Global Holdings is selling of 20,000 EVs in their fleet and reverting to ICEs. Hertz rationale was higher expenses related to collision and damage. GM and Ford are carefully watching their EV production schedules as the EV demand softens. Ford has cut the price of its Mustang Mach E as sales dropped over 50% in January 2024. The Mach E also lost its rebate status due to too many parts being non-US manufactured. This is a requirement under the US government incentive plan. Ford plans to slow the production of its F150 Lightning model as sales lag.

The Canadian government wants ~65,000 charging stations across Canada by 2027 while the industry argues there should be hundreds of 1000's more to meet the demand. Norway, which has one of the highest ratios of EVs per capita, has 8000 chargers for its population of 5.3 million, in a climate similar to Canada. This would extrapolate to ~64,000 chargers required for Canada.

Canada has mandated that 50% of new cars be emission free by 2030. In Europe the target is one public charger for every 10 EVs. This extrapolates to Canada requiring ~4 M public chargers by 2050. As of August 2023, a charging station database maintained by Natural Resources Canada lists ~23,000 in ~9100 public locations, with ~25% between Montreal and Vancouver. ~45% of EVs are registered in Quebec and BC has ~26%. EV infrastructure needs to stay in sync to encourage conversion of the sector.

Canada offers rebates for new EVs at \$5000 and for hybrids at \$2500. The market signals in early 2024, are challenging the Canadian government policy of subsidizing EVs. In the EU and other markets where subsidies are being reduced or eliminated, EV sales are dropping significantly. The fact that governments have kept the EV market going through subsidies, invites further financial risk for EV producers and governments. Hybrid models are taking up some of the sales slack, as they are more affordable and less prone to problems with electricity dependency. Whether that dependency is from weather or lack of infrastructure, PHEVs are a viable option. <https://www.reuters.com/business/autos-transportation/global-ev-sales-up-69-yy-jan-down-26-vs-dec-rho-motion-2024-02-14/>

The EV charging systems are going to need to be standardized to reduce the cost of the infrastructure for consumers and commercial customers to recharge batteries. Tesla, as one of the first manufacturers out of the gate with their proprietary system, are allowing Ford and GM to design their EVs to be able to

charge vehicles through the Tesla-type of connector. Tesla has the largest charging system and having multiple types of connectors could be chaotic and unaffordable to expand the EV market. As we have seen with many electronic devices, the industry needs to agree on a standard to create a scalable network, rather than try and have a captive audience for only brand specific users. There could be fees for non-Tesla EV owners to access the Tesla charging network.

The US Postal Service has ordered 66,000 battery EVs for service by 2028. This type of demand will assist manufacturers to achieve economies of scale. The supply side can invest in the latest battery technologies and vehicle designs. The Postal Service will buy a further 106,000 new vehicles to replace its existing fleet. The investment by the Postal Service is based primarily on the US Government's passage of the Inflation Reduction Act which secured funding aimed at reducing GHGs and environmental impact. The strategy is to completely move to an electric fleet as announced by the US Postmaster General Louis DeJoy in December 2022.

Canada's Parliamentary Budget Office (PBO) reported in November 2023, that government subsidies for EV batteries have been understated. The PBO stated, "We estimate the total cost of government support for EV battery manufacturing by Northvolt, Volkswagen and Stellantis-LGES to be \$43.6 billion over 2022-23 to 2032-33, which is \$5.8 billion higher than the \$37.7 billion in announced costs," Giroux (PBO Officer) noted in its press release. The Northvolt plant was expected to payback the government within 9 years but the PBO says it is closer to 11 years when tax considerations are factored into the deal. An engineering professor at McMaster University, and the former GM of Toyota Canada, said in 2023 that the government subsidies, to attract investment, are "over-the-top."

<https://distribution-a617274656661637473.pbo-dpb.ca/eaafeb418199ab141962f0b62dae824e9ab2efa95e5badd1fb5ad774a3fe984>

EV battery costs and EV competition

In late 2023, the CEO of Mazda stated *"EV is absolutely important technology, and we are developing it. But [in the U.S.] EVs last year [were] about 6% of the market. This year it is 8%. And out of that 8%, 57% was Tesla. Other EVs are not taking off, inventory is piling up."*

All automakers are vying for their share of the EV market. It is getting crowded and financially risky for the companies and the governmental programs which support the transition of ICEs. With the push for zero emission vehicles stalling in early 2024, as incentives in the form of subsidies are being phased out, EVs are still unaffordable. PHEVs are a good option but are not net zero.

Governmental targets such as no ICE sales by 2035 will be revisited to protect the interests of automakers and their thousands of workers. Only allowing EVs and not allowing PHEVs seems unreasonable. Governmental intervention is exceeding the markets' ability to adapt as fast as some politicians would like. In February 2024, the US government has acknowledged that its aggressive emission reduction targets and the ability of automakers to achieve them is not sustainable. These targets are being revised and will be less aggressive for EV makers to adapt in the US market. The changes will favour hybrid vehicles, which are more affordable, and allow North American automakers to be profitable. In turn, buyers will have more affordable vehicles. While this is a big compromise from an environmental perspective, causing more economic chaos could be a bigger issue.

Affordability on the part of consumers to buy EVs and for automakers to adapt and make profits is a barrier. Canada, being a significantly smaller market, will likely see its Federal and Provincial net zero targets being revised in light of the economic barriers. Reducing the average temperature is the real target. Amending net zero targets may be an economic and environmental compromise but blindly staying the course may be irresponsible. <https://www.reuters.com/business/autos-transportation/biden-administration-relax-ev-rule-tailpipe-emissions-ny-times-2024-02-18/>

In 2024, the thinking on EV vehicles is not greater range, it's to get their costs down. EVs, at present, are not affordable to encourage scalable demand. The weak link in the chain is the cost of the batteries. China is shaking up the market with its ability to deliver far cheaper models and faster than other countries can produce. JATO Dynamics, an auto research firm, reported that the average retail price of an EV in Europe was 65,000 Euros (\$95,000 Cdn) in early 2023 while the average Chinese EV was 31,000 Euros (\$45,000 Cdn). In late 2023, Renault is launching its EV Legend model at 20,000 Euros (29,000 \$Cdn) in order to drive mass EV sales.

As reported in Reuters, December 2023, by Nick Carey in London, the costliest component is the battery. Renault is targeting 40% cost reductions to make its vehicles more affordable. Stellantis is partnering with Chinese battery maker, CATL in Europe, to make cheaper Lithium iron phosphate (LFP) batteries. Citroen is selling EVs at \$33,000 Cdn. Volkswagen and Tesla are selling EVs in Europe at \$35,000 Cdn, to try and compete with Chinese manufactured EVs. Chinese car maker BYD is selling EVs in Europe at 30% less than VW for similar models.

In February 2024, in response to the Chinese EVs in Europe, Tesla discounted its model Y vehicles by ~7-10% in Germany, France, Denmark and Netherlands, to be more competitive on pricing, as incentive subsidies are removed. BYD opened its first BYD only dealership in Berlin in early 2024. BYD is also moving into the Greek EV market in 2024. Paraphrasing Stellantis CEO, Carlos Taveres, in January 2024, that they must avoid a price war – which would be a race to the bottom and puts many automakers at risk of being takeover targets. In February 2024, BYD announced it will be bringing its Dolphin EV hatchback to the market at a price of less than Cdn ~\$20,000. And in a reversal pricing strategy, Tesla has announced price *increases* on its Model Y models in the US in April 2024.

Europe continues to be a hot spot for Chinese EV automakers. Chery is moving into Italy, Spain, UK, and Poland with lower priced EVs in 2024. Stellantis partner, Leapmotor is shipping semi-knocked down (SKD) EV car kits to Poland for assembly. Leapmotor is also moving into the German, French, Spanish and Italian lower end EV markets. While EU governments are concerned that Chinese government EV subsidies may be unfair, it will be a difficult problem to defend the EU subsidies to EU EV automakers and say that Chinese subsidies are unfair. Protectionism is a slippery slope.

France has subsidized EVs for lower income people (~Cdn \$20,000 per year) to afford to lease an EV for Cdn ~\$150 per month. In February 2024, France *paused* these subsidies as there were not enough French cars which qualified for the subsidy program. The French government had budgeted ~Cdn 1 billion+ for the program. In a subtle form of protectionism, for vehicles to be eligible for the subsidy program, they had to be manufactured within certain tolerances as to the amount of carbon which was generated in their manufacturing and shipping. This was intended to exclude cheaper Chinese-made vehicles and the Tesla Model 3. The subsidy program favoured a variety of Stellantis and Renault models. At the same time, France is reducing the subsidies by 20% for the highest-income electric vehicle buyers; and phasing out subsidies to replace older ICE vehicles with newer ICE vehicles.

<https://www.reuters.com/business/autos-transportation/france-halts-subsidised-ev-lease-programme-after-strong-demand-2024-02-12/>

In early 2024, European auto parts supplier Forvia, announced reducing their work force due to falling demand for EVs, over capacity in the market, and increased competition from Chinese vehicles in Europe. Forvia is one of the largest parts suppliers and sells to Stellantis, Ford, VW, and to China. Mercedes-Benz is delaying its commitments on 50% EVs by 2025 to 2030 due to slow sales and increased costs. Mercedes is going to continue to manufacture ICE models for the next decade, according to CEO Ola Kaelleni, in February 2024.

Hybrid vehicles sales in 2024 are increasing dramatically over all electric vehicles. EVs have proven to be too costly for consumers and the charging networks are not available enough to support larger demands. Hybrids are an affordable option. Toyota hybrids cost about the same as their ICE vehicles.

Ford's F-150 hybrids are competitive with the F-150 ICE models. The hybrid versions also provide a hedge for changes in government legislation around emission targets.

In 2024, Chinese automaker SAIC Motor Corp. announced it will begin exporting more than 1.3 million EVs and will increase to 1.5 million EVs in 2025. SAIC sells into the South East Asia, Mexico, South America and Europe, with plans to build a plant in Europe. SAIC exported 1.2 million EVs in 2023. To add to the competition in EVs, China is looking at production of the Windrose electric heavy trucks in Europe with testing beginning in France in mid-2024. SAIC will offer its hybrid, low emission model MG3 hatchback in 2024, as EV sales continue to slow. Chinese automakers are more vertically integrated in their supply chain than other EU rivals. The integration allows for lower production costs, closely tied to demand.

In 2024, Chipmaker, Nvidia, which is a US-based MNC has been able to secure EV business in China with (4) automakers – Li Auto, Great Wall Motor, Zeekr and Xiaomi. This is a complex agreement which creates significant growth for Nvidia, while remaining in compliance with the US controls on exports of advanced semiconductors to China. Other US-based chip suppliers such as Intel and Qualcomm are also expanding market opportunities in China's automotive and communication device sectors.

US-based OneD, has designed graphite batteries with silicon wires saving US \$281 per unit vs graphite-only batteries. GM has invested in OneD, as this technology reduces the battery weight by 20%. GM is using LFP batteries for its 2025 model Bolt, making it more affordable and bringing it to the market 2-years ahead of schedule. Ford is aggressively trying to reduce its battery costs by 50% through its sourcing strategies. BMW is using LFP batteries which reduces its costs by 60%.

S. Korean, SK On, an EV battery company is poised to mass produce LFP batteries for the 2026 market. Again, the intent is to reduce dependency on higher cost materials such as cobalt. LFP batteries will also be supplied by S. Korea's LG Energy and Samsung SDI, as they pursue the EV battery market and try to rival China as competition.

Cellink design replaced wire harnessing in vehicles by using laminated sheets, which are substantially lower in cost and are made and installed using robots rather than labour. Addionics uses 60% less copper than other EV batteries. Most automakers are designing out the need for rare earths due to geo/political sourcing issues. Germany-based Veekim is designing EV motors with magnets using a form of iron powder and 3D printed copper wire to reduce motor costs by 20% and avoid rare earths. GM's CFO, Paul Jacobson, wants its 2024 fixed costs per EV to be reduced by ~US\$20,000 over 2023, including battery production tax credits and GHG reduction benefits.

In 2024, Stellantis invested in sodium-ion battery technology through the French startup Tiamat. Stellantis wants to reduce its exposure to scarce resources. Tiamat states that sodium is far more plentiful and cheaper than lithium.

The ability for EV manufacturers to be able to pivot to respond to lower cost production and technology advantages will be key to their financial success. Building a new facility and infrastructures around designs that are 6-months old, is inviting increased risks. Getting new EV models out to the market quickly and affordably will be a race won by those companies which can run lean operations in a continuously improving milieu. Signing long term contracts for critical materials that could be quickly designed out of the final products, will require some good negotiations and creative exit clauses in contracts. To this point, Renault has exited its common purchasing agreement with Nissan and Mitsubishi in order to make decisions in a more agile manner. European EV markets are becoming regionalized due to regulatory requirements and infrastructure systems.

EV strategies 2024+

Under the supply chain strategy of "if you can't beat 'em, buy 'em" Stellantis is buying 21% of the

smaller Chinese EV automaker, Leapmotor. This gives Stellantis increased access to the Chinese market and could well open up access for Chinese made EVs into EU and North America. These types of partnerships will likely shake out the race-to-the-bottom price wars between the various EV brands. The culling of the EV herd may be well underway.

Car wars include the subsidy probe in EU with Chinese EV imports and the call for increased protection for US manufactured EVs. VW has partnered with Chinese automaker Xpeng in a similar game plan to Stellantis with Leapmotor. Drive down costs and increase global markets. For Stellantis and VW it's a sign that trying to compete against the innovative and low-cost Chinese brands is not working. Buying into their ownership keeps cash flows and investment opportunities alive. VW would brand the Xpeng but the essential design and technology is from Xpeng. VW is also partnering with the other major Chinese EV automaker SAIC. <https://www.reuters.com/business/autos-transportation/china-gives-green-light-stellantis-leapmotor-joint-venture-sources-2024-03-06/>

Xpeng is expected to launch a new line of economy-priced EVs in 2024, as EV sales continue to slow. This will have a ripple effect on EV vehicle prices with its competitors in the Chinese market but will likely affect EU and North American markets too. Xpeng announced prices to be in the range of Cdn\$ 20,000 – 30,000.

Electric construction equipment

Most major construction equipment manufacturers have rolled out new product lines which are fully electric. These models eliminate the need for diesel fuels, have equivalent payload capacities, operate quieter, and need less maintenance. Volvo reported a savings of \$2400 when operating an electric machine for 400 hours as compared to a diesel machine. Volvo ceased the manufacturing of compact wheel loaders and compactors in 2019 as it launched its electric versions. In a city such as Toronto, as an example, noise from conventional construction equipment requires that it shut down between 7pm and 7am. Quieter electric equipment could extend the work day in these situations, increasing productivity. Swiss-based Kuhn-Gruppe converted a 40-tonne Komatsu HB 605-7 rock truck into an eDumper. It's capable of carrying 59 tonnes of material without stopping. In a mining application the eDumper uses a regenerative braking system which recharges its 600 kw per hour batteries when going downhill. The battery pack weighs 4082Kgs. The conversion capability supports the circular economy principles of refurbishing existing equipment and rethinking how we use manufactured products. A December 2023 MoneyWeek report is giving stiff competition to Caterpillar in the mining sector. Komatsu's autonomous mining trucks operate in 5 countries with reduced operational costs; increased production; reduced maintenance costs; and reduced accident risks.

Caterpillar has done test trials to prove the viability of its 793 all electric mine haul truck. Fully loaded, it can reach a speed of 60 kmh. It too recaptures the energy on a down slope to recharge the battery. Caterpillar also has an autonomous, 100-Ton 777 off-highway truck. The MoneyWeek report stated Caterpillar has 580+ autonomous haulage vehicles operating in 24 mining sites. Cat has developed software to enable a single machine to operate remotely; or multiple vehicles concurrently; or operate a completely autonomous fleet of mining trucks with no human intervention.

An example of Caterpillar innovation with autonomous vehicles is at the Côté Gold mine near Timmins, Ontario. The mine currently operates 14 electric trucks, with a 200-tonne load capacity, and another 9 expected for full production. The vehicles provide a ~30% increase in productivity. The communication systems allow for only (2) operators to control the mine trucks.

Electric first responder vehicles

The cities of Vancouver, Los Angeles, and Brampton have ordered electric fire service trucks from

Austrian-based manufacturer, Rosenbauer Group. These trucks have the benefits seen in other EVs such as less maintenance requirements and lower fuel costs. The chassis design allows a lower profile for fire fighters to access equipment and board the vehicle. The height can also be raised to travel over debris. The Rosenbauer design uses a BMW diesel engine for pumping operations and charging when required. The fire trucks will be built in the US by Rosenbauer supplying training and spare parts.

<https://www.rosenbauer.com/en/ca/rosenbauer-group>

BC Emergency Health Services (BCEHS) will use the Ford Mach E for paramedics to respond to calls. Quebec-based Demers Ambulances and Lion Electric have developed a fully electric eFX ambulance. The all-electric ambulance will have a range of up to 200 Kms on a single charge. The design allows for a much lower chassis height making patient care easier.

The first fully electric RCMP cruiser was put into service in February 2023 in Langford, BC. This is part of a national trial to test the functionality, capabilities, and limitations with EVs for the RCMP across Canada. The Tesla Y model is suitable for milder climates while it may not be viable for northern communities. Other EVs such as the Ford Mach-E SUV and Ford F-150 are on order.

Vancouver-based Helijet International ordered an Alia electric vertical-takeoff aircraft for its fleet in late 2023. The eVTOL has wings but responds like a helicopter, carrying 5 passengers and a pilot. Alia is built by US-based Beta Technologies.

Airlines

Vancouver-based Harbour Air converted a 1955 aircraft to run on an H55 battery and will have a magniX electric propulsion unit (EPU). Under a proof of concept, Harbour Air is targeting a 2023 inaugural flight.

<https://harbourair.com/>

Seattle-based Eviation, is producing its version of an electric commuter aircraft. In 2022, Eviation received an order for 75 of these 9-passenger, zero emission craft. Eviation uses similar technology to Harbour Air in its e-plane. The planes have the capability of flying for ~1-hour after 30 minutes of charging. United Airlines has ordered 100, 19-seater Swedish-manufactured electric planes from Heart Aerospace. <https://www.eviation.com/>

United is researching the use electric vertical takeoff and landing (eVTOL) aircraft to move passengers who now drive ~250 miles or less to fly instead, according to its VP of Corporate Development Mike Leskinen. In an *ESG Impact* report in October 2022, by rethinking short flight demands, eVTOL could fill a gap in the market that is currently taken by automobiles. Consumer versions of 2–4-person electric aircraft are on the market in the form of eVTOL models. Aircraft contribute ~3% of the global CO₂ emissions.

Airlines are trialing sustainable aviation fuels (SAF). SAF emit much lower CO₂ levels but not zero. Airlines speculate that electric planes could serve small markets; hydrogen-fueled planes for medium-sized markets; and SAF-powered jet engines required for major cities. The International Air Transport Association (IATA) reports that in 2022, the production of SAF was forecast to reach 300M litres. However, IATA estimates that a production of 450B litres will be required annually to achieve Net Zero targets for 2050. Airlines have increased their commitments to SAF by entering into *offtake* agreements with SAF producers. This will support the financial commitments from the supply side for the demand side. SAF can be produced from cooking oil, corn, waste or hydrogen.

In late 2023, US-based corn farmers and ethanol producers were successful in their lobby for tax credits from the US government to be applied to promote the use of SAF and bio-based fuels in the airline industry. SAF cost 3-5 times the price of fossil-fuel based jet fuels. The final approval on credits will require a model which measures emissions similar to the ICAO methodology. The increased use of corn for fuels, again, pits food against energy as an option.

SAF production should increase with the startup of a new facility in Spain to provide biofuels and SAF. Cepsa and Apical Group's Bio-Oils will produce 2.5 M tons of biofuels of which, 800,000 tons will be SAF, by 2030. The facility will convert waste cooking oils and other organic materials into a renewable energy source.

A Reuters 2024 report indicates that airlines contribute 2-3% of global emissions. To transition to SAF fuels by 2030 it would cost airline companies US\$ 1.45 – 3.2 trillion, making it a questionable investment, at this time. Ticket prices would soar first. <https://www.reuters.com/sustainability/un-led-talks-weigh-goal-reduce-aviation-emissions-thorough-less-polluting-fuels-2023-11-24/>

In 2024, DHL and air carrier, Mytheresa, partnered for 5-years to use SAF as part of the GoGreen Plus service. DHL customers could reduce their Scope 3 emissions by routing goods through the GoGreen Plus service.

Rolls Royce has converted a conventional fossil-fuel aircraft engine into a green-hydrogen fueled engine for European short-haul air carrier EasyJet. Rolls Royce has been electrifying its products and is on a path to decarbonize on its path towards zero carbon. This prototype engine increases the possibilities for expanded hydrogen fuel options.

The impact on jobs

The *Paul Bunyan* effect in business is taking place. The story of Paul Bunyan is based upon the giant logger who competes against another smaller person with a power saw to cut logs. Paul can't produce as many logs as the power saw and acknowledges he has lost his place in this market. This is the analogy that artificial intelligence could exceed that of humans. The long-term effects of AI are unfolding with mixed signals. AI is having an asynchronous impact across all industries and sectors.

In their paper, *Artificial intelligence, services globalisation and income inequality* by Giulio Cornelli, Jon Frost and Saurabh Mishra, they looked at the impact on various jobs and investments involving AI. In their definition of AI, it includes machine learning, big data analytics, computer vision, speech processing, languages, reasoning, knowledge, and robotics, without people required for the output. They identified (4) themes in AI:

1. Shift to higher productivity and higher incomes in modern services, without necessarily a change elsewhere. Modern services being research and development; business services; IT, finance.
2. Skill-biased technical changes which favours skilled workers earning higher incomes. This is skill-complementary AI which differs from skills-replacement AI resulting in displacement.
3. Increased market concentration with leading companies accelerating their AI investments to be early winners at the expense of the followers. Increased revenues to the company and its work force.
4. AI displaces traditional skilled labour and entry positions reducing the demand for those skills resulting in lower incomes or job losses. Those affected would require retraining in order to gain employment. <https://www.bis.org/publ/work1135.pdf>

With apologies to Pete Seeger, *where have all the hours gone?* The post pandemic period saw literally millions of people leave or *shift* jobs. As commented earlier, entry level positions have been eroded by robotics in many production and service roles. A 2023 McKinsey Global Institute research report, *Generative AI and the future of work in America*, shares their thoughts and insights on labour market conditions and adaptations. With Canada being about 1/10th the size of the US market, we can make some extrapolations for comparison. <https://www.mckinsey.com/~media/mckinsey/mckinsey%20global%20institute/our%20research/generative%20ai%20and%20the%20future%20of%20work%20in%20america/generative-ai-and-the-future-of-work-in-america-f.pdf>

First is the issue of Generative AI (GAI). Where AI applications such as ChatGPT are focused on text, GAI algorithms can generate images and movies, music, design products, accelerate scientific research, exercise predictive power, and other creations, once limited to humans. GAI may keep people in the loop but it is revolutionizing the future of labour.

The research indicates that 30% of the hours today could be replaced by GAI and other forms of technology by 2030. The good news is that there will be an offsetting increase in job opportunities due to the need for clean and renewable energies; increased infrastructure investment and development requires more jobs; increased domestic sourcing for resilient supplies; an aging population requiring health care services. Summarily, these actions will result in 12M job *shifts*.

Where entry level, clerical and administrative support, routine manual production work, and hospitality service jobs will take deeper cuts, offsets will require job training to meet the demands in other jobs. The *shift* from basic skills to more advanced skills for STEM, healthcare, construction, and professional careers will grow. Digitalization in healthcare, banking, insurance, pharmaceuticals, and other sectors will require higher skill sets and new types of jobs. The transportation sector plays an important role in the economy and drivers will continue to be in demand.

GAI and other technologies could see an increase in productivity of ~20% by 2030. This astounding increase would be tempered by the actions to address skill shortages and meet labour demands in the growth industrial sectors. Part of the solution will see increased opportunities for remote work, hiring back retirees, hiring barriered individuals, and employment where post-high school degrees are not necessary but complement work experience. Examples of the latter could be food service workers or manual labourers previously displaced. One of the trends appears to be a lessening of low- and middle-wage jobs as more higher paying, skilled jobs are required.

A mid-2023 report by the OECD shows that member country unemployment rates vary from a high of ~12% in Spain to <3% in the Czech Republic. Canada’s unemployment rate was reported at 5.4%. The average unemployment is 4.8%. The growth in real wages between Q1 2022 and Q1 2023 shows ~15% decline in Latvia to an increase of 3% in Belgium. Canada’s real wage growth was -2%. The average real wage growth is -3.8%. These figures use the difference between the growth rates of wages and salary components of the Labour Cost Index and the Consumer Price Index for most countries. The OECD report estimates that 27% of jobs will be impacted by GAI.

Responses from the manufacturing sector are retraining internal workers 71%; outsourcing services 53%; hiring new workers 48%; and allowing attrition 14%. The OECD highlights three key strategies where governments can adapt to GAI and other technologies.

- 1. Support low wage workers – wage and collective bargaining policies are effective; energy regulations with temporary and targeted adjustments
- 2. Ensure workers’ rights, health, and well-being within inclusive markets – AI workplace policies are transparent and trustworthy
- 3. Provide incentives and encourage training of low-skilled and older workers – incentives to retrain and upskill the workforce and prepare them to adapt to new roles

<https://www.oecd.org/employment-outlook/2023/>

The table below shows the % of full-time equivalent jobs which will likely be affected with GAI in some form. The table is adapted from the Goldman Sachs Global Investment Research March 2023.

Job category	% of FTEs impacted
Office and Admin	46

Legal	44
Architecture and Eng	37
Life, physical and social science	36
Business and finance	35
Community and social services	33
Management	32
Sales related	31
Computer and math	29
Farming, fishing and forestry	28
Education and library	27
Healthcare support	26
Arts, design, sports, media and entertainment	26
All industries	25
Personal care and services	19
Food prep and serving	12
Transportation and materials handling	11
Production	9
Construction and extractions	6
Installation, maintenance and repairs	4
Building and grounds maintenance	1

2023 is seeing historically low unemployment records. Any increases in productivity will require strategies which embrace technology and the well-being of people. Immigration policies need to be adjusted to reflect the labour shortages across the board. While these are still early days as GAI is being introduced into the workplace, the general feeling from workers is that GAI and other technologies are being welcomed.

ESG governance policies need to take into account this transition and shift across all sectors. Issues such as hiring, retaining, retraining, and employee well-being are going to be a higher priority as organizations compete for talent and sufficient levels of staffing. Workers will have greater leverage in their workplace conditions and benefits. Collective bargaining agreements may see GAI as a potential threat where the more vulnerable categories of work will be targeted.

Weather events as impetus

Daily weather forecasts are a visual and physical clue on local conditions. The common expression, “It’s a nice day” may be subject to debate as we deal with global warming. A nice day used to mean no rain during a wet season; or rainfall when crops needed it; or a sunny day during the usual sun, cloud, and rain cycles. The recent perplexities in global weather patterns give rise to new levels of uncertainty. Record rainfalls in some areas with debilitating droughts in other areas, creating unprecedented risks for food supplies and fresh water. Increasing temperatures threatening glacial ice packs and growing seasons for crops are definitely going to impact business operations and societies at large. Insurance companies are bracing for massive financial exposures which will need to be factored into the cost of most goods. Inflation will be incurred across the board as weather events are equally disruptive to all organizations. The circular economy will require a rethink of energy and land use. How food, water, and

people will be sustained for a healthy lifestyle has still not been answered.

The 2011 tsunami in Japan disrupted Honda's production capacity for months. With ~20,000 parts in a vehicle, the odds of a few parts not being available was considerable. Japanese parts manufacturers which went down due to the tsunami, also affected other vehicle manufacturers which sourced similar parts. In 2011, floods in Thailand caused Ford to shut down production in this profitable market, which in turn, caused chip maker Intel, to reduce its revenue projections. Ford's supply chain reportedly involves 35 billion parts!

Within a couple years, Ford analyzed the potential impact on its production by categorizing the risks of parts availability. Ford identified about 10% of their North American sites were vulnerable to disruption due to weather events. Long story short, they looked at multiple sources and redesigning parts to avoid the risks of disruption. They bet on resiliency for availability of parts rather than the lowest price.

Rainfall in most urban areas is seen as a problem. The excess water is collected in storm drains and diverted back to the ocean, streams, or lakes as quickly as possible. This flushes a lot of surface contaminants into the water supply. Rethinking the rainfall problem could lead to diverting and temporary storage for drier periods or finding other uses for the non-potable water.

Effective May 27, 2023, in response to the California wildfire risk and high construction costs, State Farm General Insurance is not accepting new applicants for business and personal property and casualty insurance. A State Farm spokesperson stated "The factors driving the decision are beyond our control, including climate change, reinsurance costs affecting the entire industry and global inflation." Car and home insurance policies in Florida are no longer being written by Farmers Insurance.

The Insurance Bureau of Canada said severe weather caused \$3.1B in insured damages in 2022, which was the 3rd worst year on record. No single major events contributed to the claims. The costs were spread out across Canada from coast to coast from floods, fires and hurricanes. The Insurance Institute of Canada supports the PRI principles as a means of mitigating insurance costs associated with extreme weather which has been occurring with more frequency. <https://www.insuranceinstitute.ca/en/resources/insights-research/Climate-risks-report>

The US-based, Aon PLC insurance company president, Eric Andersen, told a Senate committee "that climate change is injecting uncertainty into an industry built on risk prediction and has created "a crisis of confidence around the ability to predict loss." Reinsurance companies, which help insurers pay catastrophic losses, have been withdrawing from high-risk areas around wildfires and floods in particular.

Major hurricanes and wildfires have driven insurance markets into crisis in Florida, Louisiana, California and are weakening insurers in other Western states such as Colorado and Oregon. These are early days yet in the insurance of properties and assets which rub against weather-related events. Again, another factor in the debate over affordability being borne by taxpayers.

Extreme weather conditions have prompted the Canadian Federal Government to link funding for disasters to mitigation plans by provinces and territories, which will translate down to cities and towns. The categories in the plan address: disaster resilience; health and well-being; nature and biodiversity; infrastructure and disaster aid. By 2026, there will be upgraded codes for buildings, electricity, highway, and bridge design, based on the catastrophic costs which have been incurred due to fires, floods, and heat. This multi-million-dollar plan will require the levels of government to have climate resilience strategies in place to receive Federal funds for disaster relief and recovery by 2026.

A June 2023 report by the World Meteorological Organization (WMO) reiterates that the El Nino phenomenon will have the *opposite* effect on many regions in the form of changing weather and climate patterns. WMO assessments indicate that we have experienced 8-years of warmer temperatures. The

spike in El Nino has a higher probability of triggering global temperature records over the next year. The Panama Canal is limiting the size and number of ships due to a drought lowering the level of the Gatun Lake, which affects the canal system. The Panama Canal handles ~50% of the container traffic from north east Asia to the USA, according to SEKO Logistics. The summer of 2023 is one of the hottest on record across the continent of Europe. In 2024, shippers are looking at moving goods across Panama via rail as an option to the shipping congestion. In early 2024, the Panama Canal operations are further reducing the volume of ships passing by a further ~30% due to low water levels. This could continue until at least April 2024 when their rainy season begins.

The evidence of the changing patterns was demonstrated on July 5, 2023 in Kuujuaq, in Northern Quebec. The recorded temperature was 34° C. The same day in Miami, Florida it was 33.3° C. The average July temperature in Kuujuaq is 15.6° C. The rapid loss of permafrost in the Arctic is changing the landscape and releasing tonnes of GHGs. As the permafrost melts it releases gases which contribute to higher temperatures with lakes are disappearing into deeper channels. The incidents of heat domes and atmospheric rivers are impacting humans, plants and animals in ways which are not sustainable.

It seems like all of Canada was on fire in mid-August 2023. Evacuations of families from large urban areas from north to south and east to west. The destruction of homes, infrastructure, loss of wild life and animals, crops, and natural resources is on a scale we have not faced before. The costs of these events will not be reported for some time. Insurance companies will be developing strategies to decide which risks will be covered and at what cost.

The varying nature of weather patterns which is now shifting between *normal* and extreme, adds to the level of unpredictability. However, the financial and social impacts can be catastrophic. Traditional crops may be planted and the yield can be far less than expected. Lower incomes, lower food harvests, increased costs to growers and consumers are inevitable. The increased average temperatures, if they become the new normal will require research into more weather sustainable crops – which can take a decade to assess with the temperature fluctuations. Larger companies, with groups of investors, may be able to withstand the weather-related variances but smaller producers and farmers could be taken out of the market in a shorter period of time.

Critical materials

The July 2023 update from McKinsey, *The Net-Zero Materials Transition*, highlights the formidable problems when sourcing the necessary materials for the energy transformation from fossil fuels. Decarbonization has shown that the concentration of rare-earth metals favours China; the DRC has the cobalt; and Indonesia has nickel. Geo/political tensions and trade agreements will require increased diplomacy from global countries to access sufficient materials. The economic pressures to have affordable materials and sustainable supply is daunting. Compromises will be made between respecting human rights and accessing materials. The competing interests between economic, social, and environmental interests will test governance policies and practices.

The largest supply of nickel globally is from Indonesia and is controlled by China. The island of Sulawesi, which focuses on nickel processing, employs 70,000 workers. The December 2023 fire at Tsingshan Stainless Steel, killed 19 people, with dozens injured as reported by Reuters. Workers staged rallies to improve working conditions with threats of strike action. While fashion gets a lot of attention for poor working conditions, the industrial side of the labour markets in foreign countries gets less attention. Supply is the main focus for manufacturers.

A common denominator in every sector is the severe shortages of critical metals to meet the demand in chips for electronics, as one example. The circular economy can provide part of the solution. Canadian-

based Li-Cycle Holdings Corp has innovative technology to extract metals from e-waste. Traditionally e-waste has been burned which emits noxious fluorine chemicals and is every inefficient. Li-Cycle shreds tonnes of e-waste in a water-solution which eliminates emissions and recovers 95% of the critical materials vs ~50% through the burning method.

Recovering critical metals is much cheaper than mining raw materials. Li-Cycle estimate that 75% of EV batteries could be provided by recycling old end-of-life batteries. With global shortages of nickel, lithium, and cobalt across the globe, the circular economy is rethinking how we get the materials we need. Volume is one of the issues that recovery of critical metals and minerals needs to overcome to reduce the mining of materials.

Li-Cycle, while not fully operational, will create jobs to produce the *black mass* used as the main component in electric vehicle batteries. Other companies which are mining e-waste are Redwood Materials, BASF (Germany) and Electra Battery Materials Corp. This will divert millions of tonnes of e-waste from going to landfills and be a source of production materials³. Potentially providing ~15% of the requisite battery materials by 2025, per investment analysts.

The recycling and recovery of critical metals will require a substantial, networked collection system using a hub and spoke model, as per Li-Cycle's co-founder Tim Johnston. The circular economy effectively reduces consumption and supports conservation practices. Robotics will play a large role in the recovery of critical metals and other materials as outlined in the section on Digitalization and the Circular Economy which follows. <https://li-cycle.com/>

In Europe in 2024, Italian truck and bus manufacturer Iveco Group, as part of an extended producer responsibility program, will partner with BASF to recycle lithium-ion batteries. This aligns with the extended producer responsibility requirement where manufacturers are responsible for products they introduce to a market and in the post-consumer and end-of-life stage. BASF will convert the collected batteries into *black mass* to recover critical materials for further use.

In 2023, Ascend Elements out of Massachusetts, entered into an agreement with US Honda Motor Co, Ltd. to process recovered lithium-ion battery materials for new EV batteries. Ascend refer to this as a *closed-loop* process which will include other critical materials such as cobalt and nickel. <https://ascendelements.com/>

The 2023 report from the University of Waterloo, *Journal of Hazardous Materials*, showed that the amount of e-waste generated annually globally is ~2.5 M tonnes and is forecast to be ~70 M tonnes by 2030. Canada creates 1 M tonnes per year with less than 20% being collected and recycled. The researchers, supporting the circular economy model, suggest that attention should be on designs of electronic devices and equipment to enable repairs, refurbishments and product life extension as opposed to only recycling and recovery methods. This could lead to urban mining for the extraction of critical metals.

Canada is the only country in the Western Hemisphere with most of the minerals and metals required to product EV batteries; however, the quantities are low. A 2023 Globe and Mail reports summarized Canada's lithium supply as *tiny* when compared to the production and reserves in Argentina, Australia, and Chile. Canada is one of the (3) largest producers of battery grade nickel but its major nickel producers were sold to foreign companies years ago. Canada has less than 3% of cobalt reserves whereas the DRC produces 70% of the world's supply. According to Natural Resources Canada, Canada's graphite reserves are less than 2%, all of which comes from Quebec – China meets 80% of the global demand. In Canada, manganese, which is another critical EV battery material, is only available through

³ Li-Cycle leapfrogs miners in green transition. Gabriel Friedman. Financial Post. April 30, 2022

imports from South Africa, Australia, and China.

Canada is in a good trade position for socio and geopolitical interests. The investment opportunities to develop this market will attract leading mining and manufacturing companies. The tenuous relationships with Russia and China, which both have considerable critical and rare mineral resources, will require diplomacy to ensure global supplies. Canada ordered (3) Chinese mining companies operating in Canada, to divest of their investments in critical materials, citing national security, in late 2022.

The July 2023 Critical Minerals Market Review by the IEA, raised three concerns:

1. Can future supplies keep up with the rapid pace of demand growth in climate-driven scenarios?
2. Can those supplies come from diversified sources?
3. Can those volumes be supplied from clean and responsible sources?

The answers are mixed and will require further global collaboration within a tense geo/political market to address these pressing questions. Estimates show that China has 2/3 of the critical minerals. There is more concentration of sources with limited options to diversity. There is mixed progress on the environmental and social sourcing conditions. www.iea.org/Data-and-statistics/data-tools/critical-minerals-data-explorer

This is in contrast to the Canada allowing Chinese state-owned Zijin Mining Group to acquire Canadian lithium mining company Neo Lithium Corp in early 2022 for \$960M. At present Canada has minimal refining processes for critical battery minerals and the environmental approval process for a new mine can take 5-10 years. The James Bay Lithium Mine project was approved in early 2023, with 270+ conditions, after a 5-year environmental impact study and is expected to open in 2025. The only active lithium mine in Canada as of February 2023 is the Chinese owned Sinomine Resource Group in Northern Manitoba and the lithium ore is refined in China. <http://en.sinomine.cn/>

In October 2023, Canada's Supreme Court ruled that Bill C69, the Impact Assessment Act of 2019, was in large part, unconstitutional. This will reduce the redundant federal over reach imposed by Bill C69 on construction, resource mining, and gas and oil projects, as examples. The provinces can conduct their own due diligence on environmental impact assessments, as they have been doing, and ensure that projects will be compliant. There is no need for further Federal governmental reviews which will likely attract more investment into pipelines and other resource-based projects. As witnessed previously, the additional federal oversight has mainly added costs and unreasonable delays to projects, deterring investors. The ruling by the Supreme Court signals that the Court is not overly biased to the left or right on constitutional matters. Projects solely confined to Federal lands will still have Federal environmental reviews. Bill C69 has been a politically-charged, and controversial act which appears to be struck down, enabling greater opportunities for investment with effective governance still in place.

Another potential test to the Canadian government's position on preventing "non-like-minded" nations to own or invest in Canada's critical minerals sector, occurred in October 2023. Canadian mining company Solaris Resources Inc., is open to having Chinese investors in its Ecuador copper mine. Copper being a *critical* material, could trigger the Canadian government from preventing this type of a deal. In January 2024, Zijin Mining wants a \$130M position in Solaris Mining. Solaris is mainly a copper and gold mining company operating in Central and South America. This deal must pass a security review before being approved.

The mining of critical materials creates tension between environmental, social, and economic interests. A case in point is the potential mining of vast nickel reserves in northern Ontario. This could take place in what is referred to as the Ring of Fire, with an estimated worth of Cdn \$ 90B over 20-years. A sensitive ecological area where local Indigenous peoples are concerned with contamination of waterways and long-term environmental degradation. The main mining company is Wyloo Metals, controlled by Australian businessman, Andrew Forrest. Forrest has several ongoing investments in other

parts of Canada. Two of the nine Indigenous groups in the Ring of Fire have signed MOUs with Wyloo. Others need more time and completion of an environmental impact study before deciding.

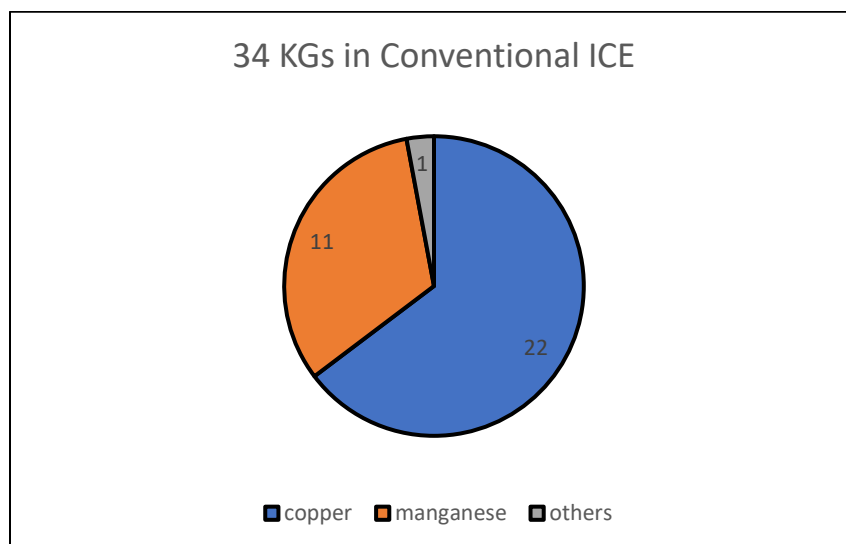
<https://www.cbc.ca/news/canada/thunder-bay/wyloo-metals-ceo-update-1.7092369>

It would not be out of the question to see cartels for rare and critical minerals being formed as OPEC leveraged its fortuitous role in the oil market, decades ago. The transition away from fossil fuels to other energy options needs economic strategies and policies to make it sustainable. The March 2023 USA and Japan Critical Materials Agreement includes no duties to be imposed on critical materials; and promotes many of the 7R circular economy practices to reduce the demand for virgin material extraction.

According to the International Energy Agency the world will need twice the volume of metals currently being used to produce EVs by 2040, with a projected volume up to 4 times to achieve net zero goals.

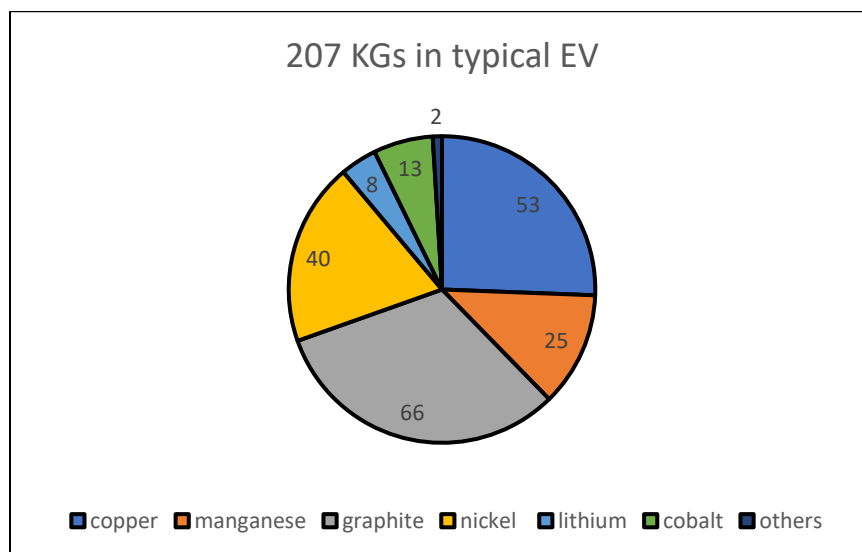
<https://www.reuters.com/graphics/MINING-DEEPSEA/CLIMATE/zipqezqzlpz/>

Metal content in an ICE



Source IEA (2021)

Metal content in an EV



In mid-2023, Ford Motors secured its supply of lithium in multiple deals which will run into 2034, with suppliers located in the USA, Canada, and Chile. Ford has targeted the production of 600,000 EVs for 2023-2024 and wants to ramp up to 2 million units per year by 2026. The risk of locking up supply is shown in early 2024 as the price of critical battery materials has plummeted from their heights. As chronicled by Financial Post writer, Thomas Biesheuvel, in January's paper, lithium prices are down 80% from 2021; cobalt down 66%; nickel down 45%. Opening new mines can take decades. Investors are subject to the EV market slowing and the demand for critical materials cooling.

Taking another page from the circular economy, Caterpillar is investing in *Nth Cycle* to recover nickel and cobalt from scrap, batteries and mined rock using an electrochemical process.

Digitalization and the Circular Economy⁴

Knowing about digital technology and the need to transform business is no longer good enough. As companies across all industries embrace the changes of our increasingly digital work, we are seeing leaders at the helm of these companies dive deeper into how technology is being implemented.

For the organization to succeed as a Digital Enterprise it has to transform itself to meet the challenges of our post-industrial Digital Age, by embracing an adaptive culture, employing technology at its core, and creating new business models.

Employing technology at the core of the business is called Tech@Core. Determining whether the organization is Tech@Core requires an assessment and positive yes on the following aspects:

- Leaders understand the critical nature of tech to their business and are increasingly technology savvy
- Leaders depend on technology to create innovative customer journeys
- Customer value replaces cost as primary performance measure
- Speed and ability replace cost and efficiency as technology drivers
- Technology knowledge and experience are continuously evolving
- Leaders promote fast, frequent experimentation and learning, while maintaining the discipline to select and evaluate the right experiments
- Reducing cycle time maximizes the value from learning

To strengthen the organization's technology capabilities, the following steps could be taken:

- Shift the technology fitness function to speed and adaptability
- Accelerate technology edge over competitors
- Maintain awareness and take advantage of technology shifts and trends
- Develop and maintain a digital technology platform strategy
- Reduce technical debt to increase speed and adaptability
- Get key technology staff involved and constantly improve their capability

Organizations with successful digital transformation will likely use more sophisticated technologies such

⁴ A special thanks to **Andries Jacobs** Ph.D, [M.Com](#), CMC Controls Assurance and Systems Transformation. PDO Solutions Ltd. for the digitalization notes

as artificial intelligence, the Internet of Things, and advanced neural machine-learning techniques.

For organizations to generate a technology shift and follow or lead trends, information and intelligence regarding the following six guiding principles must be gathered, analyzed, and formulated:

1. Signals: What are you seeing that is indicative of this shift?
2. Business input: How might this shift impact your business?
3. Horizon: What is the time horizon for the trends within the shift?
4. Urgency: How urgently do you need to react to the trend?
5. Technical impact: What capabilities will you need to implement your strategies?
6. Actionable advice: What advice will you offer your organization on how to approach and use the shifts and trends?

The organization's capability to adapt to value driven digital transformation practices, based on an understanding of the six guiding principles, will be critical to success.

What is digital transformation?

Rather than thinking about digital transformation as a trend with a clearly defined beginning and end, think of it instead as a series of waves in the ocean, each of which makes an impact before giving way to the next one. But, as is always the case, as one wave crests others form behind it. And even though many of us are still adjusting to the changes brought by its predecessor, the next wave of digital transformation is already upon us.

To ride the individual waves and take advantage of the extraordinary productivity growth each wave brings, and understanding of the technology makeup of the wave.

- First wave – Digitalization: Arise from adoption of personal computers, use of mainframe and mini-computers, desktop publishing, communication applications, and computer-aided design.
- Second Wave - The internet: Arise from US military network (ARPANET), National Science Foundation Network as internet backbone (NSFNET) linking of emerging internet services (ISP), Hypertext transfer protocol (HTTP), world-wide web (WWW), and Internet (commercialization of NSFNET).
- Third Wave – Digital transformation: Known as the Fourth Industrial Revolution, or the Second Machine Age. Arise from the intersection of cloud computing, big data, Internet of Things, Artificial Intelligence, across the market.

To date, the current wave, also known as the third wave, is profoundly more disruptive than what happened in waves one and two. The third Wave or Digital transformation wave comprises the following technologies:

- Cloud computing: As a model of accessing shared pools of configurable hardware and software resources, that can be rapidly positioned with minimal management effort via the internet.
- Big data: Big data is critical important for training Artificial Intelligence (AI) algorithms. Digital transformation initiatives require the capability to manage data at petabyte scale.
- Internet of Things (IoT): Connecting any device equipped with adequate processing and communication capabilities to the internet for sending and receiving data.
- Artificial Intelligence: The science and engineering of making intelligent machines and computer programs capable of learning and problem solving in way that normally require human intelligence. With machine learning as a subset of AI learning from example and experience,

rather than depending on pre-coded or pre-defined rules that characterize traditional algorithms.

As digital transformation is a disruptive force, it has rapidly become a household name and the focus of the corporate world. Business leaders who focus on digital transformation understand that to survive, their organization will have to go through fundamental change.

AI as universal engine of execution

Within the Third Wave AI is the most advanced and disruptive. As digital technology increasingly shapes “what we do” and enables a rapidly growing number of tasks and processes. AI is becoming the new operational foundation of the business, the core of the company’s operating model, defining how the company drives the execution of tasks. AI is not only displacing human activity; it is changing the very concept of the organization.

We have to be clear in understanding AI is not a standalone technology, rather the *science of making inanimate objects smart*. AI helps to solve problems through performing tasks which involve skills such as pattern recognition, prediction, optimization, and recommendation generation, based on data from videos, images, audio, numerics, text and more.

The value of an organization is shaped by its business and operating models. The business model encompasses the strategy of the organization: how it seeks to differentiate itself from competitors by providing and monetizing its unique set of goods and services. The operating model encompasses the systems, processes, and capabilities that enable the delivery of goods and services to the organization’s customers.

The operating model delivers the value promised to customers. Whereas the business model creates a goal for value creation and capture, the operating model is the plan to fulfill the goal. As such the operating model is critical in shaping the actual value of the organization. Ultimately the goal of the operating model is to deliver value of scale, to achieve sufficient scope, and to respond to change by engaging in sufficient learning.

Managing scale is about designing an operating model to deliver as much value to as many customers as possible at the lowest cost. Improving scale involves efficiently increasing the production volume or the number of customers served.

The organization’s scope is defined as the range of activities it performs. Economics of scope is an important enabler to establish multiple lines of business, manage multiple business units and create true conglomerates. AI could be used as an enabler to increase or optimize the variety of products and services the organization offers to its customers. AI driven assets and capabilities can help the organization reach economics across diverse business.

The learning function of an AI driven operating model is driving the continuous improvement, increasing operating performance over time, and developing new products and services.

AI and the circular economy

The circular economy refers to all the efforts in seeking a systematic and scientific method to transform the traditional “take-make-waste” one way flow of resources to a circular based approach. It is not simply about recycling, but also rebuilding the environment that we have disrupted, as well as trying to design a new system such that the externalities we exert on the environment as we produce and consume are mitigated.

Let’s have a look how organizations are using AI achieving their Circular Economy targets.

ZenRobotics⁵, founded in 2007 was the first company to leverage AI and robotics in a demanding waste processing environment. The company used AI and robotics to recover recyclables from waste. Robotics adopt as a technology allows greater flexibility in waste sorting, enabling operators to react quickly to changes in a waste stream and increasing the rate of recovery and purity of secondary materials. Using AI, the waste is monitored by cameras and sensors. The robots make autonomous decisions on which objects to pick, separating the waste fractions quickly with high precision.

Tomra⁶ is renowned for developing the world's first high-capacity near infrared (NIR) sensor for waste sorting applications. The organization creates solutions for optimal resource productivity. They designed an algorithm that can analyze images to identify non-uniform produce that does not sell in grocery. It can arrange goods into grades so it can be put to best use, thus reducing waste.

NotCo⁷ developed a robust process by using AI algorithms to originate plant-based foods that replace meat, fish, dairy and egg-based products. A similar approach is being taken by New Age Meats⁸, which uses AI to model and optimize the conditions for producing lab-grown meat. The machine learning algorithm identifies new plant-based foods and compiles food formulas by detecting patterns at a molecular level and analyzing flavour molecules.

Conclusion of digitalization and the circular economy

With the advancement of AI and the real possibilities it can offer us, there is no doubt that it will be a very great asset for helping us to achieve a truly circular economy. The endless data solutions that are relevant across all industries can enable us to see the fruition of our circular economy ideals become a reality in a much faster period of time.

As more industries realize the importance of changing from a linear economy to a circular one, it is hoped that further development in this field will persuade these industries that not only does it make moral sense but also an economic revenue growing sense, to embrace the change. Here is to hoping that AI will be the solution to building a cleaner, less wasteful and successful new world.

⁵ <https://zenrobotics.com/>

⁶ <https://www.tomra.com/en/about-us>

⁷ <https://notco.com/us/products/notmilk>

⁸ <https://newagemeats.com/>

Actions to advance the ESG agenda

Advocating actions are best and easier where there are formal policies in place. However, many organizations do not have corporate policies and are still able to affect changes which consider ESG values. Exercising one's professional fortitude is always an expected form of behaviour and we don't need a policy to state that-it's implicit. Realizing value for money is implicit. Doing good is implicit.

Actions speak louder than words. Actions motivate others to take up like challenges. It's a great idea if there is not a lot of experience to start with small steps-but start! Going out and making a difference builds self-esteem, confidence, and is fulfilling from a personal and professional perspective.

Regardless, we can always do more within our respective spheres of influence. If you haven't yet, consider:

1. Advocate to senior management on raising the ESG profile
2. Talk with key suppliers as to their transition plans for ESG success
3. Keep key stakeholders informed
4. Support buying local for economic development and increased social opportunities
5. Work with social enterprises in terms of hiring individuals and buying goods
6. Engage with not-for-profit organizations to increase their capacity and your awareness
7. Volunteer your managerial expertise or time
8. Encourage volunteerism by staff
9. Allocate a % of your requirements to ensure local assurance of supplies
10. Buy Fair Trade certified products to complement sourcing requirements
11. Review your product commodities and identify where resource conservation could apply
12. Ensure responsible recycling of used goods
13. Get involved at the design stage of products to identify responsible options
14. Consider living wage programs
15. For larger organizations and public sector groups, look at unbundling large contracts to increase opportunities for SMEs and SEs
16. Measure your Scope 1 and 2 emissions and look for reductions
17. Work with suppliers to reduce Scope 3 emissions
18. Ensure your supply chain has conflict free materials
19. Revise job descriptions to include ESG responsibility
20. Assess how to deconstruct vs demolition of buildings and structures for replacement or removal
21. Encourage staff to display international flags which represent their diversity
22. Host local food days to showcase suppliers
23. Organize clothing donations and cover shipping costs
24. Host events which showcase ethnicity and diversity of cultures
25. Share information across multiple networks
26. Eliminate waste through design and practices
27. Weight the total cost of ownership when decision-making
28. Ensure policies reflect stakeholder interests and practices follow accordingly
29. Adopt a supplier code of conduct
30. Ensure business ethics are meeting or exceeding expectations
31. Develop KPIs and report out
32. Support community gardens
33. Install a vermiculture container for waste foods
34. Hire co-op students

35. Consider gift matching by company with employee causes
36. Reimburse staff for taking public transit
37. Denounce discrimination and harassment
38. Support products which align with the circular economy principles
39. Use P-cards to support local businesses
40. Think beyond the lowest cost
41. Affect and accept professional responsibility
42. Challenge the status quo in practices
43. Offset GHGs from corporate travel
44. Support local artisans when buying corporate schwag
45. Share best practices with suppliers
46. Implement a decarbonization strategy
47. Take actions within your sphere of influence
48. Be a discerning consumer
49. Be a responsible customer
50. Build a leading ESG organization
51. Hire Larry!

Coda comments

Rationale supporting ESG

Environmental, social and governance practices are a means to demonstrate a commitment to do good for all stakeholders, which includes the natural ecosystem. We will continue to extract resources to sustain our lives but we know we can do so in a more responsible manner. Business operations can be sustainable and profitable without doing harm. To continue supply chain operations which knowingly are not aligned with internationally recognized standards is willful blindness. Willful blindness is a conscious decision to avoid acting responsibly as it conflicts with one's self-interests where the end cannot be justified by the means.

The need for due diligence in business investments will continue to challenge business and government leaders. Infrastructure improvements in all transportation modes is a basic requirement to sustain competitiveness as a country. Technology will play a larger role in business solutions aimed at efficiency gains. There is as much risk with inaction as there is in a risk of a poor investment.

Sustaining success in business has moved beyond simply making profits. Stakeholder capitalism wants to know how those profits are being achieved. A combination of environmental, economic and social values is required to provide a balanced solution. The ratio between these three elements will change as conditions and practices are revised through technical advances and as stakeholder expectations are raised. Stakeholder capitalism is the acknowledgement that values are multi-dimensional. Whereas, shareholder capitalism was one-dimensional, we have seen that a broader set of values, which ESG encompasses, brings the economic, environmental and social interests into a common framework for value. Each of the components must be addressed to ensure a sustainable organization and the communities which it serves-either directly or indirectly. ESG is not a philosophy, it is a value proposition which concurrently addresses the needs of all stakeholders, not just investors.

While we are trying collectively to reduce the average global temperatures to survive as a people, we would prefer to do so without any economic sacrifices. The WEIRD world is concerned about the damage to the environment and natural ecosystems but argues over what might be a reasonable time frame to achieve the scientific targets. Affordability is confronted by economic investment in a circular economy to be able to attain the desired objectives.

Circular economy

Repurposing resources through design innovations allows us to save existing resources and materials and support continued economic activities. This foray into the circular economy encourages and requires many sectors to rethink how they are going to function in the years ahead. Appropriate compromises need to be made as society cannot continue to absorb tonnes of waste materials, which are increasing year-over-year.

The fate of paper bottles may land in the reluctance of consumers to change their buying habits from what they know. Until there are E-vehicles which are more affordable, due to technical advancements, tax subsidies will continue for the foreseeable future. The ban on the manufacture and import of many plastic products required legislation as the industry stuck with the status quo due to the fear of increased costs. More investments in circular economy designs of products may require some type of legislation to make them viable where there is a good scientific case for long-term economic, social and environmental benefits. Legal challenges to legislated requirements, such as the ban on plastics, should be expected in a democracy. Moral responsibility requires legitimacy to be enforceable.

The data from various studies showing a net increase in employment may help to alleviate the fear of large job losses in the transition to the circular economy. There will be asymmetrical shifts based on

market sectors, technology, and how each are affected by the circular economy. Supply chains will need to prepare and adapt in order to remain economically viable and socially responsible.

The positivity related to the outcomes by leading companies which have adopted the circular economy principles and practices, should encourage and embolden other organizations to do so. When we can realize savings in energy, resources, labour, and offset the impact to climate change, we are on the right track.

Energy

Doug Lightfoot, referred to as the *Yoda of Energy Reality*, and an esteemed Mechanical Engineer (retired), has spent a career studying energy. Lightfoot says *all fuels are not equal*. His summary considers oil, as currently the most valuable for its ability to be liquified for fuel to support transportation, as a source of plastics, and for its petrochemical properties; Coal is still a major source of electricity and can be liquified; Natural gas for heating, ability to formulate with hydrogen and for fertilizers; Wind and solar for electricity can be costly with needs for storage; Nuclear is seen as the safest and most reliable; and biomass is entering the markets but may compete with foods. Fossil fuels still powers 80% of the energy needs of 2023.

Energy and fuel alternatives must continue to be developed in scalable formats to make meaningful reductions in GHGs. Scientists reiterate the criticality of the 2030 reduction target of 1.5° C to achieve the mean global average temperature of 13.6° C. This will approximate the period of 1850-1890, being the preindustrial period benchmark, as agreed in the 2015 Paris Climate Agreement. Different geographical locations will need to find which type of energy is affordable for their needs as compared to other countries. The European Union's climate monitoring service reported that in 2023, the world experienced temperatures which averaged more than 1.5C.

Hydroelectricity will compete with hydrogen fuels in some sectors. Renewable energies will be multifaceted. It will take decades, and is highly improbable that a single renewable energy source will dominate all sectors. Much as today, where fossil fuels dominate the commercial, industrial and transportation sectors alongside other forms of energy. According to Lightfoot, the US burns ~200 tons of coal per second!

LNG which appeared to be a good option in the energy markets due to its lower CO₂ emissions, has shown to be a *greater* problem due to its higher methane emissions. The infrastructure investments and engine conversions to adapt to LNG may need to be scaled back dramatically with high financial losses attached. As science is able to measure the impact of various fuels and assess their global impact, this invites more risk in the market for investors, making renewable energy more attractive.

Environment

The environment is quite literally a global problem and will require collaboration between international players on where priorities should be focused. One of the root causes to environmental problems is the design of products. We will transition to a circular economy which will have at its centre, a reduction in consumption of materials and resource conservation. Reducing the burning of coal in countries like the US, India and China will have a large impact on the reduction of GHG emissions.

The environment has been on our radar for 50-years and we have only recently realized how ineffective our tactics have been to mitigate our collective impact. The clock is ticking and more urgency is necessary to address our common problems. The WEIRD economy used the emerging economy countries as dumping grounds for our waste products for decades. This allowed the continued design-for-disposal strategy in the production of goods. The consumption of water, a necessity for survival, was seen as an infinite supply and could never run out. Global warming is melting glaciers at a rate that threatens water supplies. In spite of these signs, we wait for government edicts to curb our thirst for

water in production and attaining natural resources to sustain a life style which conflicts with the balance of the ecosystem. Yes, EVs may be good but they will also entail an increased toll on the environment as we hasten to extract the ore required to make the batteries and other components.

The environment gets more attention when it affects potential economic interests or social values. The voice of science should have a stronger presence in boardrooms, as there are more responsible solutions. Some of these solutions will not have the same ROI but can be more sustainable. Science needs to be present at the government policy planning stage to have the long-term perspective as to how we transition away from the fossil fuel economy. Science and research will need to make the case for which technologies should be supported in design and marketing and which, just because we can make it, should be given closer scrutiny. Science gave us plastics and Teflon, arguably a benefit in the short-term for economics and consumer convenience but turned out to be an environmental catastrophe in the long term.

Technology

Digitalization enables the transformation from an economy based on massive consumption to one based on strategic conservation of resources. Supply chain resilience will embrace technical advancements to solve logistical problems. Electrification and decarbonization will require massive investments for scalable solutions. As the example of Maersk and IBM's partnership with TradeLens failed due to a lack of uptake in the shipping sector, this reiterates the need that any solutions must meet the interests of at least a mass of customers which makes commercialization viable.

Disruptive technologies will continue changing how we do business and how we move goods for resilient sourcing in an economy framed around circularity. As new pharmaceutical products may be discovered in our oceans, it will create debates as to who benefits from these breakthroughs. Sharing of land resources has largely been determined by the companies that buy the rights to control. Agreements, such as the UN Convention on the Law of the Sea, are causing a pause and reflection as to how to manage the wealth of the oceans, where there are few sovereign rights. Developing countries will want an equitable share or access to these relatively new resources.

Role of governments

Governments come in three forms: Federal, Provincial, and Municipal. Other governmental entities are Crown corporations, Universities, Schools, and Hospitals. In a democracy we are open to new politicians every few years to try and get the correct monetary, fiscal and social policies in place. The uncertainty of newly elected officials contributes to a reluctance on the part of private sector businesses to respond to the various edicts and legislation, as their shelf life is often tied to a political ideology. Each variation of a government entity will have its own procurement policy and practice. While ideas may be shared, they often are buying the same goods and services, from the same suppliers, under separate contracts, and different sets of criteria. In the smaller communities and towns, government spending has minimal oversight and is influenced directly by its local elected officials.

Carbon taxes or some form of internalizing the cost of decarbonization will require fiscal policies by many governments to address inequities in geopolitical locales. If country A offers a lower taxation rate than country B, it will attract some producers who intentionally avoid the carbon taxes. Transparency of operations and the provenance of goods will require a robust monitoring and auditing process. Transparency is a critical component of the governance commitments. Carbon tax revenues must be used by governments to address climate problems and not be used for other purposes or risk the charge of a lack of credibility.

The complexity of government intervention has been shown with trying to amend Bill C234, the Greenhouse Gas Pollution Pricing Act. The amendment is to relieve farmers of the carbon tax for

operating equipment *on* their farms – not off farms. These operations are necessary for the harvest and storage of grain and feed when drying, preparing, irrigating and heating barns. Difficult for farmers to avoid the GHG emissions with a lack of affordable and available alternatives. The lobbyists for the farmers, the Agriculture Carbon Alliance, argue that exempting the farmers will reduce their costs and therefore, not result in further inflated food prices. The farmers will be able to adopt sustainable practices and ensure food security. Debating Bill C234 is the advocacy group Environmental Defence. This group sees the amendment as a further weakening of government response to climate change, which will only result in more sectors lobbying for decreases or avoidance of carbon taxes. In early 2024, the Bill was approved by the Senate and is back to the House of Commons for debate. If it passes, will there be a flood of requests for GHG exemptions by other sectors?

Legislation, based on scientific research, is the best means to affect the requisite change. Industry seldom is capable of voluntarily reducing emissions and consumptions without governmental intervention or incentives. Consumers are at the receiving end of the problem and it is the source which needs to be corrected for designs, materials, production, health, and economic sustainability. Government intervention was required to shift to LED bulbs from incandescent. E-vehicles require substantial tax breaks to manufacturers to encourage more people to buy them and build an affordable market.

The rapid acceptance and growth of GAI and other technologies in all sectors will need to be monitored closely. While expanding jobs there will typically be winners and losers in these asynchronous events. Adapting policies and ensuring the right incentives are in place to protect economic development and social values will be an important role for governments to play.

In 2018, the government of Canada finally banned asbestos, 30-years after the World Health Organization declared it a carcinogen. The lobbying by the Quebec-based asbestos mining and exporting companies continued unabated for decades. Only in January 2024, will there be a requirement to have government approved licenses in order to work on sites containing asbestos in British Columbia. WorkSafe BC has stated that there have been 1200 asbestos-related deaths since 2002. Even within the legislated ban on asbestos, there remains many exemptions. This type of foot dragging by governments undermines the credibility with other government edicts to address environmental and health issues.

The social procurement strategies deployed by governmental agencies at all levels must continue and be amplified. It is creating meaningful employment for people facing systemic barriers to employment, which represent the disenfranchised in our communities. When they are engaged in work the studies show that there is a drop in crime, improved physical and mental health, less dependency on social programs, improved self-esteem, increased local spending, and reduced shelter costs. Social procurement does NOT cost government agencies more to train and hire these individuals. It's a win-win for all parties. Private sector companies are facing a labour shortage for the balance of the decade for a variety of reasons. One of the labour pools which is available to tap, is those potential workers who typically face barriers to employment. Every community has them and employers should be encouraged to *accommodate* their needs to build the social capital and meet growing labour demands. The World Health Organization estimates that 15% of the global population is dealing with some form of a disability. That equates to 6M+ people in Canada.

Weather-related disasters and long-term climate change strategies will require major funding by the Federal government to assist the other levels of government to become more resilient. This financial support will take place on a global scale. As money moves without being hampered by borders, so do the effects of global warming. As the PRI stated in their *Inevitable Policy Response* report, governments must be aggressive in ensuring industry and consumers change their practices for a sustainable future.

In 2023, world leaders met in Morocco to look at where developed countries should focus their

attention to eliminate poverty with concurrent interests in prosperity. The multiple global challenges are high inflation and debt, rising poverty, inequality, and widening disparities between access to basic health services and standards of living.

In 2024, the US is preparing for another contentious election. With opposing views on economic, environmental and social values, investors are going to be uncertain as to whether a left or right leaning ideology will win an election. If it remains in the hands of the Democrats, likely continued investment in renewable energies, as an example; if it changes again to the Republicans, many of the recent legislative acts could be over turned out of spite. This can only add to the angst and the ultimate confusion with 4-year, seesaw agendas. Similar to the situation in Canada, the left leaning Liberal's carbon tax and heavy betting on EVs could be stalled or undone by a right leaning Conservative party. More uncertainty to investors on ESG issues, amongst others, on this side of the border.

These discussions reiterate that there are no secrets as to what needs to be done to have a more sustainable world. ESG is at the heart of the issue where business can play an important role through their responsible actions, supported by governmental policies.

The existential threats of climate change along with increased geopolitical conflicts led to the leaders drafting the **4 Marrakech Principles for Global Cooperation**:

1. Reinvigorating Inclusive and Sustainable Growth

- Promoting growth-enhancing structural reforms aimed at strengthening governance, the rule of law, trade, and the business environment to attract new investment and generate jobs.
- Expanding financing sources by boosting domestic resource mobilization, upscaling the provision and effective use of concessional resources, leveraging donor resources, fostering foreign direct investment, and catalyzing private sector finance, while improving public expenditure efficiency.
- Addressing fragility by effectively utilizing mechanisms for supporting fragile and conflict-affected states and jointly addressing global sources of food and energy insecurity.

2. Building Resilience

- Strengthening institutional capacity by building stronger institutions and policy frameworks with support from international organizations.
- Maintaining external stability by pursuing sound macroeconomic policies and avoiding disruptive spillovers to other countries.
- Strengthening public debt management and resolution frameworks by enhancing external and domestic debt management and improving the efficiency and timeliness of debt restructuring processes.
- Enhancing global crisis preparedness and mitigation by increasing the resilience of supply chains, strengthening pandemic preparedness, strengthening financial sectors, undertaking timely macroeconomic adjustments, building adaptive social protection, and reinforcing the Global Financial Safety Net.
- Decoupling growth from climate risk by developing capacities to manage and implement cost-effective strategies for disaster risk reduction and planning, enabling construction and maintenance of climate and disaster shock resilient infrastructure, strengthening regional efforts against ecological challenges that might lead to forced migration, including by preserving biodiversity, and promoting sustainable land and water management practices.

3. Supporting Transformational Reforms

- Accelerating the green transition through determined efforts by all countries to advance decarbonization of their economies based on the principles the Paris Agreement, while ensuring energy security throughout the transition.
- Managing technological transformations to avoid digital fragmentation, narrow the digital divide, facilitate creation of modernized, efficient domestic and cross-border payment systems and foster financial inclusion. Internationally harmonized rules and regulations must also be developed in tandem on crypto assets, data protection, cyber security, and artificial intelligence.
- Enhancing health systems and preparedness through collaborative work towards enhancing global health security by improving universal health coverage, strengthening health systems, and establishing global mechanisms to ensure equitable access to vaccines and medications.
- Promoting equitable and quality education to advance global efforts toward inclusive and equitable quality education, broadening access to early childhood, primary, and secondary education, and boosting quality to ensure learning in the classroom.
- Building gender equality to expand and enable economic opportunities, empower, and engage women as leaders.”

4. Strengthening and Modernizing Global Cooperation

- Strengthening the international monetary system and its rules, conventions, and institutions to respond to countries’ needs and to facilitate cross-border trade, payments, and investment flows.
- Strengthening the multilateral trading system to support global economic cooperation and growth by ensuring that it is rules-based, non-discriminatory, fair, open, inclusive, sustainable, and transparent with effective dispute resolution mechanisms.
- Enhancing collaboration, as the IMF and the World Bank are committed to working closely together and with partners to help member countries address challenges and leverage opportunities.

Role of consumers

Consumers are customers, stakeholders, taxpayers, voters, and represent a significant portion of the demand side. Changing behaviours and habits will take science, education, and tradeoffs with health, convenience, and costs. Inflation costs will dictate priorities for family choices. Buying an EV may be put off for an ICE due to cost. Fast foods may address the convenience factor but not the long-term health issues. Vinyl siding on a house rather than wood may be faster for the builder and reduce construction costs to the owner but eventually the vinyl will fail. Buying plastic products is largely driven by an implication that disposable products can be fully recycled, which we now know is not entirely true. The unseen microplastics have contaminated every region on the planet. The collective conscience of consumer choices chafes against the collective self-interests of many sellers. The circular economy will assist through the initial design of items but may take further legislation for force change and alter consumptive habits.

In October 2023, Food Banks Canada released a report that food affordability has driven up the visits to food banks dramatically. ~20% of those needing to visit food banks have jobs. Many are children under 18-years of age. It’s not the lack of food, it’s the cost of the food. The marketing strategies of all goods, including food to consumers, must reset the balance between the need for sales, health, and consumption of resources. The production and distribution contribute to environmental problems while the actual health or safety of the consumer is sometimes an afterthought. Our look at packaging is the tip of the iceberg. We have to have continuous governmental interventions to assure the wellness of the

consumers, fish, animals, poultry, and plants are respected. <https://www.cbc.ca/news/canada/food-bank-use-highest-in-canadian-history-hunger-count-2023-report-1.7006464>

Consumers need to hold corporations responsible for their actions. This is done primarily by not buying their products or other brands when egregious acts are committed. The J&J (alleged) baby powder being contaminated and knowingly selling it long after this was known, is similar to the tobacco companies hiding, downplaying, and denying the effects on health for decades. In the end, write a cheque and continue on as if nothing has happened.

One of the world's most valuable companies, and one which has had tremendous impact on consumers globally, is Johnson & Johnson (J&J). For over 135 years, J&J products have been accepted into homes and hospitals based on a level of trust in their brands. J&J's annual sales are US\$ 98B+ and employ ~155,000 people. The darker side of J&J is being aired in their fight to avoid settlements with their baby powder and other talc products. Allegedly these products contained asbestos resulting in deaths due to mesothelioma, ovarian and other cancers. In 2021 J&J set up an LTL company and filed for bankruptcy to avoid paying billions of dollars in claims and cap the settlements. According to attorney Andy Birchfield, representing the cancer victims, involving 38,000 law suits, "J&J has spent two years trying to convince us that somehow a company worth a half-trillion dollars is bankrupt. It's time for the nonsense to stop and for J&J to accept responsibility." In 2020, J&J stopped selling its baby powder in Canada and the US but continued to allow sales elsewhere. Consumers and health care customers seem to have adopted an attitude of apathy for corporate misdeeds and default to a court making the decisions, with seldom any backlash for their favourite brands, in spite of being duped for decades - allegedly.

Consumers are entitled to their decisions. It will take more of a collective conscience to change conditions and acknowledge that cheap clothing should not come at the expense of the worker which made them. The same theory applies to paper-based packaging in general. If consumers know there is an environmental benefit for switching to paper from glass or PVC plastic, they will buy what is most responsible. Consumers can't afford to say they won't support it if there may be a slight premium for paper alternatives, as they can't afford not to. Consumers should be made aware of potential hazards when using any product and the company behind the brand needs to accept their responsibility for profits and liabilities when bringing it to market. E-vehicles come at a premium but are sold on the basis of their long-term environmental benefits. Consumers are literally in the driver's seat on responsible choices. Intuitively, consumers want to buy responsible products but the marketing noise obfuscates decisions.

Consumers are facing increasing affordability factors in Canada. With increases in carbon and property taxes, rising governmental service costs, recycling fees, energy and fuel taxes, along with inflation due to shortages of supplies, it is becoming more difficult to support long-term ESG decisions. While many favour the promising ESG solutions to address global warming and related issues, in the short-term, all programs are paid for by the same consumer through consumption taxes in some form. Affordability limitations are a real concern as to how far and how fast ESG practices can be rolled out. Plant-based proteins, which are arguably more sustainable, face resistance due to inflation affecting menu decisions by retailers and restaurants, reflecting their customer's waning demand. Countering the pressure on plant-based products is the sustained growth of organic products, including meats. Concern for health benefits of organic products is offsetting some of the rising prices.

The EV market is affected by consumers wanting to buy affordable EVs. There are cracks in this market which are compromising the development of the EVs and the ability to achieve net zero. The CEO of Enterprise Mobility, Taylor, stated in late 2023, on the adoption of EVs, *"Quite honestly, the demand has always been low. It's just slow. It's not where it needs to be. The demand is low because the infrastructure is low. For us, it is an evolution, and the customer has to drive it. We have not put a goal*

on it. We will move as fast as the customer. We never want to surprise them with new technology.” The CEO of Mazda, Moro, reiterated this point on EVs as well, “How we get to zero is up to consumer choice and social infrastructure.”

Consumers, in their dual role as the taxpayer, are seeing their governments subsidize billions to make the EV market successful in an effort to reduce emissions. EVs are not achieving the results which were expected to date. The government subsidy is actually the consumers paying for the government investment which will likely produce several financial collapses in the EV auto sector. As governments invested in e-buses, which have already gone bankrupt, the return on investment for taxpayers, through the government as proxy, may not achieve emission reductions and run down the funding options. With increased carbon taxes, failed EV and E-bus manufacturers, feverish mining of critical materials, and a higher cost of living, it may be time to stop and recalibrate the risks.

Role of private sector

Innovation on all fronts leads to the advancement of ESG goals. It will be an asymmetrical transition as some sectors will be able to adapt to new technologies while others will be on an exit trajectory. The EV boom aligns with circular economy goals but requires substantial investment in infrastructure to make these vehicles a viable option. Charging stations in cities and rural areas must prepare for the pending demand or it will constrain the growth. Research firm, Dunskey Energy and Climate, recommend Level 2 chargers which can recharge a BEV in ~8-hours and a HEV in ~4-hours.

Concurrent is the transition from the fossil fuel based economic development and dependency, to a decarbonized transportation structure. The use of zero emission (ZE) vehicles in all sectors are going to be advanced by continued investment in proven technologies. While vehicles currently are reliant on fossil-fuels, ZE vehicles will be successful with significant reduction in battery weight and costs; operational constraints must overcome the recharging times and limited travel distance; and infrastructure availability for the various green fuels and adequate and charging and refueling grid. All of these combined need to address commercial and economic viability.

The transition to electric cars for commuters faces similar challenges to get the masses out of traditional ICE vehicles and address the affordability gap. Increased government legislation and use of taxes as an incentive will support the transition. GAI is changing production processes from the drawing board to the shop floor. Introducing technologies that can maintain a healthy balance sheet and be respective of social interests will be a significant undertaking.

The lack of governance as to the claims of misuse of carbon offsets to reduce GHGs and improve the air quality is a concern. This does not mean that VCM programs are all part of a scam but it does rightfully challenge any statements being made as to their credibility and value to address global warming. The cloud of doubt will hang over the billion-dollar VCM market for some time.

Food security and fresh water should remain a top priority to protect. Without these we will not have a sustainable anything. The circular economy is addressing these issues but will require a rethinking of our food production processes throughout the supply chain.

Responsible investing is a growing market sector. To achieve the ESG goals, such as reducing the average global temperature, will require billions of dollars in investment by the private sector. It's encouraging when companies such as OTB Materials reinvent the building block for cement-free concrete and do so competitively.

As Dylan Goggs, CEO of CleanStart says, *socially responsible businesses shouldn't be a thing. Businesses should be socially responsible. They are a large engine in the world we live in, and we shouldn't rely on the benevolence of business owners to do what's right.*

Supply chain responsibilities

The anchoring effect of the status quo is difficult to overcome. New ideas invite risk. New ideas threaten existing products and services. New ideas imply that what we are doing may be wrong. Disruptive technologies can turn a business or sector on its head. But supply chain professionals need to be vigilant and be able to see around the corner at the next best thing. Keeping on top of the best and leading practices is a serious issue to remain competitive or relevant.

Policies are the starting point for adopting ESG practices. The governance which follows requires developing KPIs to be measured and monitored. Without good data analysis you are simply guessing or maintaining the status quo of “we’ve always done it this way.” Don’t be afraid to be humbled when inviting external advisors with expertise to complement internal resources. KPIs are primarily for the organizations’ external stakeholder’s information and internally to assess managerial progress and competencies. If it can be measured, it can be managed better.

While the cost of goods sold has been weighted on the lowest cost, having a resilient supply chain needs to have a balance between price, delivery, quality and service. Customer retention can be affected by availability of goods and the ease of ordering. Packaging is an important part of the customer interaction and we know it has an environmental impact. The last mile of distribution will likely remain the highest cost but will also be reduced from today’s cost factor of delivery as improvements in systems and materials are adopted. By using 3rd party certification standards which ensure conflict-free materials; environmentally responsible materials; safe working conditions; respect for human rights; validating the provenance of materials; supporting ethical business conduct across a supply chain; reducing Scope 1, 2, and 3 emissions; building a diverse supplier base; and meeting diversity, equity, and inclusivity expectations; the supply chain is being strategic and affecting value.

When we consider the loss of small, medium businesses and social enterprises to large big-box operations, there could be a case made to strategize for localized commitments. Larger organizations could scan for locally based companies to draw goods and services from, especially around discretionary spending practices. Corporate swag, artwork, cultural events, catering, subtrades, hiring people with employment barriers, or the inclusion of endemic materials in designs. Participation in recycling programs and being part of the reverse logistics cycles demonstrates that ESG can take many types of benefits, without adding significant costs.

Supply chains are immersed in every organization’s environmental and social footprint. Yet, a 2023 study by Efficio, a global supply chain consultancy, recaps that 93% of C-suites target revenues and profit maximization. This compares to 66% on net-zero plans and 71% on social impact. For supply chain professionals, 2/3 continue to assess financial strength and service capacity of their suppliers, with less than 1/3 looking at ethics and governance issues. About ½ of the supply chain decision-makers say that incentives do not include climate-related priorities. These self-limiting governance gaps impede the ESG agenda.

Public sector procurement organizations act as the conduit between government policies and the market and bear the responsibility to operationalize legislation. Their main tools are the competitive bidding and tendering documents which state the criteria and weighting. These documents must clearly send the message that ESG is the means to affect change in value. All trade agreements, whether domestic or international, allow for exemptions from competitive bidding processes, where *persons with disabilities, non-profit organizations, philanthropic institutions, or prison labour are involved*.

Cryptocurrencies may be embraced in supply chains as more organizations and Canadian banking institutions gain comfort with their credibility. The increased efficiencies and transparency with reduced transactional costs are too big to ignore. The business ethics and trust with cryptocurrencies now needs

more attention than the technology behind it.

Complicating the consideration of various types of currencies in general, is the push by Brazil, Russia, India, China, and South Africa (BRICS) to use local currencies for their cross-border transactions and exclude the US dollar. The BRICS want to support their economic growth using their national currencies for efficiency in international trade. BRICS is also considering how to create its own *international reserve currency*. The US\$ as the benchmark for international trade has slipped from 71% a few decades ago to 59% by 2023.

The G7 countries include the US, UK, France, Canada, Italy, Japan, and Germany. The G7 use the US\$ and Euro as their benchmark for international trade. While BRICS is comprised of more emerging economies, the G7 is mainly the WEIRD group. The BRICS and G7 have many ideological and ESG differences. In 2024, BRICS membership will expand to include Saudi Arabia, Iran, Ethiopia, Egypt, Argentina, and the United Arab Emirates.

The G20 countries contain members of both the G7 and BRICS. The G20 is comprised of Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, UK, US, the EU and the African Union. The G20 countries are the primary players in the reduction of emissions, although there is no agreed to strategy or time frame to do so.

Affordability

Affordability is a common problem at most times. Aspirational goals are often revised as the reality of the funding requirements becomes the reality. We are rolling the dice on a variety of renewable energy sources and EVs, in the hope that this will address environmental problems while not accelerating economic problems with additional social stress. We have options from nuclear to hydrogen to renewable fuels to convert existing ICE vehicles. The politics, marketing, and carbon taxation incentive models are all in favour of renewables and EVs at a less-than-a-decade pace to achieve. Let's hope it works because we aren't talking about many Plan Bs.

Reducing Scope 3 emissions has been estimated at US\$ 3+trillion dollars per year to achieve the net zero goals. These costs, if completed, will impact the inflation of most goods needed by consumers. Who will pay for these massive investments remains uncertain.

Governments must be cognizant of the need to make the transition in a means which is affordable to the same taxpayer base. Affordability encumbers taxpayers in all aspects of their lives. On the goods and services necessary for food, shelter, and clothing; for protection and mitigation of the environment on the land, sea, and in the air; for the protection of species of plants and animals; for basic municipal services; for defending legal rights; for the digitalization of public services; for law enforcement; for electrification of transportation; for entertainment; for social justice; for military defence; for infrastructure upgrades, maintenance, and installations; for education; for health care services; for insurance; and the list continues to expand. While the needs may be necessary so does the ability to afford the investments within an acceptable time period.

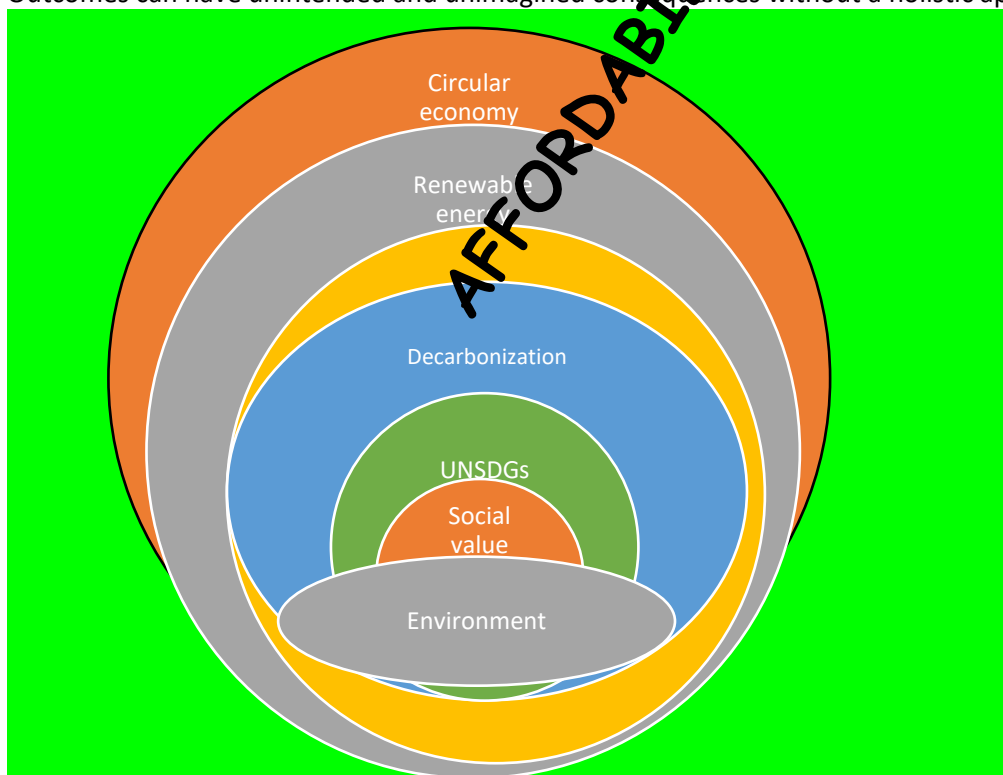
To address affordability in larger urban areas, housing densification is being touted as the affordable solution. This means taking the same land mass and allowing more to live within the same geographical footprint. This is achieved through building more high-rise units or allowing more housing units on the land which is available. In Vancouver, Canada this is changing the neighbourhoods which formerly for decades, allowed for single family, detached homes, with back and front yards. Children walked to local schools. There were wide open parks and even golf courses. This layout existed in most large cities across Canada until the early 2000s. This spacious living was one of Canada's unique assets where people could own their property and have a lifestyle with a yard, fence and pets to roam in. Canada was

the place *with miles and miles of miles and miles*. This abundance of space also shaped neighbourhood social values and cultures.

As we now compress more people into smaller housing units to find a more economically and environmentally sustainable option, we don't know the long-term impact on social values. We may all get along or we may find that lack of open spaces leads to increased stress. Lesser individual options. A more transient residential base. A decline in neighbourhood camaraderie and identities. Densification is still a social experiment yet to be determined across a spectrum of outcomes. The newer generations are resigning themselves to not owning a home and not owning a car. The difference is their lack of options, which previous generations enjoyed, based around the economic reality to find a means to live affordably.

Private sector companies are concurrently investing in viable options to address the requisite needs to be sustainable and responsible. They are part of the transition to a new economy based on renewable energy and concern for climate change. The affordability factor is a larger impediment to our ability to meet the expectations which can be identified and must be financially prioritized as well. ESG does not occur without the other *E* – economic sustainability.

Science, law, economics, and politics chafe against each other as we debate the best route to take towards sustainable solutions. It appears there are several paths, which lack certainty, as to where and how we will arrive. We will send many companies on ahead to research and invest around the obstacles. Some will be unsuccessful while others will find a niche. Others will find an El Dorado for their followers. This, however, is the perspective from the WEIRD world. Developing economies have competing interests, asynchronous timetables, traditional cultures, and accustomed ideologies which they apply to definition of sustainability. Their social tenets must be factored into the WEIRD world decisions. Outcomes can have unintended and unimagined consequences without a holistic approach.



Leadership

Business ethics and conduct needs a rethink. Every industry has had its bad actors. Tolerance of tactless personal behaviours such as misogyny, LGBTQ+ discrimination, racial bias, workplace harassment, intimidation, and bullying are recognized as conduct unworthy and unacceptable in leadership. Effective business leaders ensure the well-being of others and the importance of governance to drive results. Implementing DEI strategies into an organization and within its supplier base curbs these egregious behaviours. ESG strategies are part of good corporate values contributing to healthy communities. Issues such as greenwashing and bluewashing are a detriment to advancing the gravitas of ESG.

The sustainability skills as defined by Asahi for their Board are part of the mindset required to achieve the outcomes which align with the UNSDG, circular economy and ensure a resilient supply chain and business. Actions start at the top and people behave in the way they are rewarded.

Leaders are in a tough position as we morph from a carbon-based economy into a circular economy. There are going to be winners and losers. The investment opportunities invite risks with high rewards but also threaten the very existence of long-time companies in many industries. Leaders are going to face tougher questions from their Boards, Councils, and international partners as to how they will sustain their position or exit with dignity.

Paulus Polman stated in a 2022 Fortune article, following the COP27 climate talks, *there's no need to feel hopeless—but we must recognize that our politics is failing to deliver vital climate action. We must find other ways to close the ambition gap, get the money moving, get business driving urgent coalitions, and make sure young people are firmly in the driving seat. Then, it will be up to politics to catch up.*

Hypothetically, if we made a 2-year moratorium on buying new vehicles, we would probably achieve a reduction in energy consumption, a reduction in GHGs, a reduction in consumption of resources, a slowing of the earth's average temperature and be able to "get by" within our comfort zones.

If we couldn't buy new shoes or other discretionary comfort items and disposable goods for the same period, this could contribute to conservation of materials and resources and literally give us some breathing room. We saw of a glimpse of this at the peak of the pandemic with lower emission ratings. However, the economic shock would not make it sustainable from a global perspective.

So, we will continue to make new EVs, adapt to renewable sources of energy while burning fossil fuels, and introduce devices which appear to save energy in the long-term and hope that collectively this will do the intended job. We will convince each other that we have the time. Intervention by governments may take on a whole new set of rules if we start to sell waterfront properties as the Arctic Sea ice continues to melt.

Charles C. Mann, in his book *The Wizard and the Prophet*, captures the debates between technology and science as being the problem for the planet or the savior. Production and profitability are compatible with sustainable growth through the options presented in the circular economy. It takes awareness, which leads to advocacy, and most of all, actions.

My motivation for this publication was to encourage supply chain professionals and other leaders to exercise their professional fortitude. Take the risks as necessary. Break some rules. Colour outside the lines. As my colleague Maureen Sullivan says, *choose courage over comfort*. Perfection is not the goal and learning from failure, is healthy for all.

Do what you can, within your sphere of influence, to make the most responsible decisions.

About the Author

Larry Berglund's supply chain experience includes leadership positions in the forest industry, public health care, municipal government, university operations, academia, and consulting services. As a consultant he drafts procurement policies, templates, develops strategies, conducts audits and implements best and leading practices.

He facilitates online and classroom workshops on buying, business ethics, circular economy, competitive bidding, contract management, inventory management, leadership, risk management, social procurement, operations management, supplier performance evaluations, performance metrics, and supply chain policies and strategies. He provides on-site supply chain operational reviews.

Larry is an academic coach for supply chain courses in the Athabasca University Leadership & Management Development program, including environmental responsibility. He was the procurement advisor to the Auditor General for Local Government (BC). In 2017, 2018 and 2019 Larry presented on advanced supply chain strategies to the United Nations staff in Brindisi, Italy. He was a founding member and the procurement advisor to the BC Social Procurement Initiative. Larry also facilitates supply chain training workshops for The Procurement School. In 2020, he presented to the World Bank in Washington, DC on social procurement strategies and contributed to a World Bank research paper in 2021. He has developed supply chain and ESG courses for the University of Alberta.

He is a contributing writer to Supply Professional magazine. Larry has written several books on supply chain management:

- ***Food, Finance, and Philosophy***: A Role for Supply Management in Corporate Social Responsibility;
- ***Good Planets are Hard to Buy***: A Management Handbook for Creating Conscious Capitalism, Sustainability Principles and Supply Chain Excellence;
- ***Plan It for Our Planet***: Social Procurement Practices, Policies, Principles and Plans for the Supply Chain; and
- ***It's the People, Not the Paper***: Managing Contracts and Measuring Performance for Professionals

Larry holds an MBA, an SCMP and is a Fellow of Supply Chain Canada. He is an inductee to the Athabasca University, Faculty of Business, MBA Hall of Fame. In 2021 he received an Honourary Life Membership from the Supply Chain Canada, BC Institute.

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Abbreviations and Acronyms

7R Model	7 Principles of the Circular Economy
A4S	Accounting for Sustainability
AESS	Automatic Engine Shut-Down/Start-Up Systems
AI	Artificial intelligence
ALAN	As local as possible, as international as necessary
AMR	Autonomous mobile robots
API	Application Programming Interface
APU/GS	Auxiliary Power Units and Generator Sets
AR	Augmented reality
ASC	Aquaculture Seafood Council
BESS	Battery energy storage systems
BEV	Battery electric vehicle
BIPOC	Black, Indigenous, People of Colour
BLE	Bluetooth Low Energy
BOL	Bills of lading
BOMA	Building Owners and Managers Association
Bots	Software that operates and performs repetitive tasks
BRICS	Brazil, Russia, India, China and South Africa
CAFO	Confined Animal Feeding Operation
CAMSC	Canadian Aboriginal and Minority Supply Council
CAP	Canada-wide Action Plan
CBDC	Central bank digital currency
CCAB	Canadian Council for Aboriginal Business
CCC	Community Contribution Company
CCUS	Carbon capture, utilization and storage technology
CDC	Center for Disease Control
CEPA	Canadian Environmental Protection Act
CFC	Chlorofluorocarbon
CGBC	Canada Green Building Council
CHBA	Canadian Home Builders Association
CIRS	Centre for Interactive Research on Sustainability
CIW	Canadian Index of Wellbeing
CME	Canadian Manufacturers and Exporters
CNG	Compressed natural gas
CORE	Canadian Ombudsperson for Responsible Enterprise
CoRo	Cargo recognition
CPG	Consumer packaged goods
CSDDD	Corporate sustainability due diligence directive
CSP	Concentrated solar power
CUSMA	Canada United States Mexico trade Agreement
CWC	Canadian Wood Council
DaaS	Delivery-as-a-service
DACS	Direct air capture and storage
DEI	Diversity, Equity, Inclusivity

DLE	Direct lithium extraction
DRC	Democratic Republic of the Congo
DRI/EAF	Direct reduced iron/electric arc furnace
DTIP	Digital Train Inspection Portal
eDCT	Electrified dual-clutch transmission
EDM	Electric drive module
EEO	Equal employment opportunity
ELD	Electronic logging devices
EPU	Electric propulsion unit
EPZ	Export Processing Zones
ESB	Electric school bus
EV	Electric vehicle
eVTOL	Electric vertical takeoff and landing
FADR	First attempt delivery rate
FCA	Fair Cobalt Alliance
FCEV	Fuel cell electric vehicle
FFE	Forty-foot container Equivalent unit
FMEA	Failure Mode Effect Analysis
FOHakaDFH	Fuel Operated Heaters aka Direct Fired Heaters
FT	Fair trade
GAI	Generative AI
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Greenhouse gas
GHI	Gross Happiness Index
GLEC	Global Logistics Emissions Council
GRI	Global Reporting Initiative
GW	Gigawatt = 1,000,000,000 watts
HFC	Hydrofluorocarbon
HUD	Heads up display
IA	International Accord
IAASB	International Auditing and Assurance Standards Board
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICE	Internal combustion engine
ICGN	International Corporate Governance Network
IEA	International Energy Agency
IFBA	International Food Brands Alliance
ILO	International Labour Organization
IoT	Internet of Things
IRENA	International Renewable Energy Agency
IRMA	Initiative for Raw Materials Assurance
ISA	International Seabed Authority
ISAE	International Standard on Assurance Engagement 3000
ISO	International Standards Organization
ISSB	International Sustainability Standards Board

JIT	Just in time
KPI	Key Performance Indicator
KWh	Kilowatt hours
LaaS	Logistics-as-a-service
LDDES	Long-duration energy storage
LEED	Leadership in Energy and Environmental Design
LFP	Lithium iron phosphate
LiDAR	Light detection and ranging
LNG	Liquid natural gas
LTL	Less than truck load
LWD	Logistics, warehousing, and distribution
Maglev	Magnetic levitation
MFC	Micro fulfillment centres
MNC	Multi-national corporation
MSC	Marine Stewardship Council
Mt CO ₂ Eq	Total Emissions (MTCO ₂) = Emissions MTCO ₂ + CH ₄ Emissions (MTCO ₂ Eq.) + N ₂ O Emissions (MTCO ₂ Eq.)
NGO	Non-Governmental Organization
OBPS	Output-based pricing system
OECD	Organization for Economic Co-Operation and Development
OMS	Order Management System
OTIF	On time, in full
PARS	Pre-Arrival Review Systems
PEF	Polyethylene furanoate
PERC	Perchloroethylene
PESTEL	Political, economic, social, technical, environmental, legal
PET	PolyEthylene Terephthalate
PFAS	Perfluoroalkyl substances
PHEV	Plug-in hybrid electric vehicle
PLA	Polylactic acid
PoD	Proof of delivery
PRI	Principles for Responsible Investment
PSI	Principles for Sustainable Insurance
PUD	Parcel, pickup and delivery
PV	Photovoltaic
PVC	Polyvinyl chloride
QR	Quick Response
R2	Responsible recycling®
RaaS	Robotics as a service
RFID	Radio frequency identification
RNG	Renewable natural gas
rPET	Recycled PET
RPUC	Responsible Plastic Use Coalition
RTTV	Real time transportation visibility
SaaS	Software-as-a-service
SAF	Sustainable aviation fuel

SASB	Sustainability Accounting Standards Board
SBTi	Science Based Targets initiative
Scope 1 emissions	Directly caused from organization-owned resources
Scope 2 emissions	Indirectly caused by the production process used by an organization
Scope 3 emissions	Indirectly produced by 3 rd party supplier operations
SCS	Shore connection system
SDG	Sustainable development goals
SE	Social enterprise
SERI	Sustainable Environmental Recycling International
SFI	Sustainable Forestry Initiative
SIB	Social impact bond
SIPP	Ships in product packaging
SKD	Semi knocked down
SKU	Stock keeping unit
SLAM	Simultaneous localization and mapping algorithm
SME	Small, medium enterprise
SMR	Small modular reactor
SRHBA	Saskatoon & Region Home Builders' Association
SROI	Social Return on Investment
STEM	Science, Technology, Engineering, Mathematics
tCO ₂ e	Tonnes of CO ₂ emissions
TCFD	Task Force on Climate-related Financial Disclosures
TES	Thermal Energy Storage
TW	Terawatt = 1,000,000,000,000 watts (trillion)
UNDRIP	UN Declaration on the Rights of Indigenous Peoples
UNGC	UN Global Compact Network Canada
UWB	Ultrawide band
VABE	Values, Assumptions, Beliefs, Expectations
VCM	Voluntary Carbon Market
VOC	Volatile organic compound
VUCA	Volatile, Uncertain, Complex, Ambiguous
WEIRD	Western, Educated, Industrialized, Rich, and Democratic
WMO	World Meteorological Organization
WMS	Warehouse Management System
WRAP	Worldwide Responsible Accredited Production
WTFC	Women's Trucking Federation of Canada
ZEV	Zero emission vehicle

SENIOR MANAGEMENT REFLECTION ON ESG STATUS

Date _____

The set of questions below, are intended to create an in-house dialogue on what your organization is doing to demonstrate its commitments to ESG values in practice. This includes a scan of its upstream and downstream supply chain partners; the awareness of senior management on the importance of ESG to be part of the organizational commitments to the communities, customers, and clients it serves; the organization's ability to stay current with emerging ESG issues, which can affect its business, either directly or indirectly; a risk management assessment for potential liabilities for actions or inactions on ESG; the resources required to be successful in the deployment of ESG strategies; and how the organization can demonstrate leadership in the delivery of products and services in a competitive market. The questions are to prompt ideas and encourage an open debate on ESG. There isn't one model to consider, although the fundamental values are similar for all organizations to consider, prior to or having implemented ESG.

There are no right or wrong answers. The takeaways from this exercise are to provide senior management with the opportunity to bring increased value to all stakeholders and reinforce its brand, community esteem, and social impact. For public sector entities, the questions can be revised but essentially the same level of probity into ESG practices is required.

Those in attendance at this review should involve representatives from operations, finance, supply chain, sales/marketing, communications, quality management, and logistics. Bringing in external advisors or academics to share their views and provide unfiltered tenets to the discussions is healthy and necessary. Organizations which are trying to understand ESG want to get up to speed quickly and learn from the experience of other organizations.

The kickoff to this session should be provided by a senior C-Suite executive with their ideas and opinions on why or how ESG needs to be a business imperative. By having a senior executive start the session, this gives it the gravitas needed, which infers the criticality to get ESG right. This type of annual review will encourage continuous commitments to elevating ESG across the organization and to its stakeholders.

Various business analytical tools should be considered to support this objective review. Interviews with key stakeholders and interest groups should be factored into the led up to the kickoff. This would include quantitative and qualitative data to be presented or developed as an outcome.

There can be several levels of ESG experience within organizations. Some may have been involved for several years while others are still exploring ESG and wondering how to bring it inside their organization. The questions can be revised based on the maturity of the ESG strategy.

The outcomes to the questions will likely lead to other discussion threads and follow up detailed reports to validate or clarify the status of various issues. From this exercise, the senior team will need to look at priorities and timelines to develop an appropriate responsive strategy. This will undoubtedly trigger some compromises between stakeholder and organizational capacities and interests-similar to other strategic challenges.

The data gathered can be used to build a baseline to compare progress through annualized reviews. It should be expected that there will be some uncomfortable conversations and discussions. It's best to have these sensitive or open sessions within your own walls rather than reading about them in the

media.

The long-term is to ensure that the credibility and social license of the organization is deemed to be respectful and responsible. Perfection is not required nor expected. But an evidenced based approach should be conducted annually to be sure the ESG goals are actioned and on target. Supply chains are an effective means of sending signals to the market. And the market is always listening!

Questions to be discussed through the lens of ESG:

1. What market intelligence or insights have we gathered on ESG issues for our market?
2. How do our major stakeholders view ESG in the current market conditions?
3. How effective are we at adopting international 3rd party standards?
4. How do our strategies and practices align with the principles of the circular economy?
5. How do our strategies and practices align with the UN SDG goals?
6. Are our supply chain policies current with leading practices?
7. How do we monitor our suppliers for their ESG commitments?
8. How do our recruitment and retention strategies support DEI?
9. What types of ESG practices, from other leading organizations, could we apply to our practices?
10. Which natural resources are we consuming that could be conserved through changes in our design or processes or operations?
11. How do our customers deal with non-value-added costs associated with our products?
12. Which types of information, about our organization, might we be concerned with being exposed?
13. Which social enterprises are we engaged with in our supply chain operations?
14. Which community programs are we supporting?
15. How do we support small businesses in the communities we serve?
16. Where might liabilities be incurred within the next 3-5 years for our actions or inactions?
17. Which resources such as subject matter, operational, or financial investment might we need?
18. What is driving change in our industry?
19. Where can we demonstrate leadership or differentiate from others in our markets?
20. What types of reporting are we providing internally and externally?
21. What are we doing over the next year to advance our ESG commitments?
22. What if we do nothing?

Follow up actions:

Corporate Self-Assessment Template on ESG Commitments

The following self-assessment tool, is provided with the permission of Dale Neef, long-time supply chain consultant and fellow of Ernst & Young's Center for Business Innovation.

The senior management team can use the following information as a guide on their journey to implement ESG into company practices and share with its shareholders and stakeholders. The template is intended to provide insights into how ESG is integrated across the organization and with external stakeholders. Each section could be given a rating out of 10, as an example, and use this to build an objective tracking as to how well a company is improving over a timeline.

There are (3) main sections in this template: Environmental, Social, and Economic.

Environmental

1. Our company has a formal environmental policy which has been endorsed by the senior management team and is publicly available on our website.

Yes ☐ No ☐ Being developed ☐

2. How does our policy commit our company to adopt long-term strategic and operational environmental goals?

Provide examples:

3. We have established objectives and SMART metrics covering our environmental performance for reporting.

Yes ☐ No ☐ Being developed ☐

4. How does our company ensure that the environmental objectives and targets contribute to continuous improvement?

Provide examples:

5. Our employees are fully aware of our environmental policy and understand their roles and responsibilities in assisting our company to improve its environmental record.

Yes ☐ No ☐ Being developed ☐

6. How does our company engage our staff in improving our environmental record?

Provide examples:

7. Our company has established a compliance and review process to evaluate its environmental record.

Yes ☐ No ☐ Being developed ☐

8. How does our company use this review process to reduce or mitigate its environmental impacts?

Provide examples:

9. Our company regularly and consistently communicates its environmental performance to our stakeholders.

Yes ☐ No ☐ Being developed ☐

10. How does our company collect and use feedback from our stakeholders to manage and improve our environmental performance?

Yes ☐ No ☐ Being developed ☐

Social

1.Our company has a formal social policy making a commitment to achieving a positive social impact.

Yes ☐ No ☐ Being developed ☐

2.How does our policy promote an active involvement, dialogue, and engagement with the communities we operate within?

Provide examples:

3.Through stakeholder interactions and dialogue our company has established SMART metrics on a range of issues which demonstrates our commitment to social values in our business operations.

Provide examples:

4.How is social responsibility integrated into our company's business strategy and operational practices, including diversity, equity and inclusion of social enterprises, small, medium enterprises, minority-owned and Indigenous businesses? Provide examples:

5.Our employees are fully aware of our social policy and understand their roles and responsibilities in assisting our company to improve our social commitments.

Yes ☐ No ☐ Being developed ☐

6.How does our company support, encourage, and give recognition to staff for taking forward the commitment to social responsibility?

Provide examples:

7.Our company regularly reviews its commitments with its stakeholders and takes corrective actions where necessary.

Yes ☐ No ☐ Being developed ☐

8.How does our company build relationships with our staff, suppliers, customers, and other stakeholders to demonstrate our commitment to strong business ethics and conduct?

Provide examples:

9. Our social policy is made available to people within our company and external stakeholders.

Yes ☐ No ☐ Being developed ☐

10.How are our policies, objectives, and targets championed and rolled out across our company and to external parties?

Provide examples:

Economic

Profitability is critical to our success. Our customers expect and receive the best value for the products and services which we provide in a competitive market. Our customers have choices and we want them to choose us as a valued community supplier.

1.Our company has a long-term viability plan to achieve its financial goals and objectives which includes all aspects of our business operations as well as environmental and social commitments.

Yes ☐ No ☐ Being developed ☐

2.How does our company manage any conflicting views between economic interests and the environmental and social commitments?

Provide examples:

3. Our company has developed key processes which have an economic impact on society.

Yes ☐ No ☐ Being developed ☐

4.How does our company support local, regional, national or international economic development initiatives beyond what is necessary for our own growth?

Provide examples:

5. Our company has developed a model to invest in its employees to enhance our competitiveness.

Yes ☐ No ☐ Being developed ☐

6.How does our company identify the needs and concerns of our economic stakeholders?

Provide examples:

7.Our company shares knowledge and best practices in the interest of our community or region's economic success.

Yes ☐ No ☐ Being developed ☐

8.How does our company evaluate its business performance in terms of impact on society?

Provide examples:

9.Our company publicly reports on its economic contribution to the community or regions we are operating within.

Yes ☐ No ☐ Being developed ☐

10.How does our company evaluate awareness of and satisfaction with its economic contribution to the community or regions we are operating within?

ADDENDUM III

UN Sustainable Development Goals Self Assessment

DATE _____

RATING SCALE: 1 Low...10 High

Referring to the 17 UN SD Goals, how does your organization address, include, practice, demonstrate a concern, operationalize, strategize, quantify, or report out on these factors.

These actions may be done directly or indirectly through products or services which are provided to customers; through community programs which are supported; through policies; and some may not be applicable. A consensus-based rating involving senior management and key operational and finance staff mitigates bias. If some goals are not applicable, revise the rating accordingly.

Some goals may be pending or being planned for which they can also be rated.

	GOAL	RATING	COMMENT
1	No poverty		
2	Zero hunger		
3	Good health and well-being		
4	Quality education		
5	Gender equality		
6	Clean water and sanitation		
7	Affordable and clean energy		
8	Decent work and economic growth		
9	Industry, innovation and infrastructure		
10	Reduced inequalities		
11	Sustainable cities and communities		
12	Responsible consumption and production		
13	Climate action		
14	Life below water		
15	Life on land		
16	Peace, justice and strong institutions		
17	Partnerships for the Goals		
	MAXIMUM SCORE	170	

Follow up actions for improvement:

CIRCULAR ECONOMY PRINCIPLES Self Assessment

In your organization, rate the ability of the materials used in the production, application, or usage of the final product, including packaging, shipping, and waste to align with the circular economy principles. If a principle is not applicable, adjust the rating accordingly.

We are using the 7R model for the purpose of relating to the principles of the circular economy to the critical design phase.

A consensus-based rating involving senior management and key operational and finance staff mitigates bias.

DATE _____

RATING SCALE: 1 Low...10 High

	PRINCIPLE	RATING	COMMENT
1	Recyclable content		
2	Repairable after use		
3	Reusable for service		
4	Repurposable for service		
5	Refurbishable after use		
6	Reduces consumption of materials, energy		
7	Rethink if it can be better		
8	Responsible with leading practices		
	MAXIMUM SCORE	80	

Follow up actions for improvement:

Total Cost of Ownership Worksheet

Calculating or estimating the TCO is not easy. While many aspects are intuitive, as we have more familiarity or history with various cost drivers and ESG factors, there are assumptions which may not be valid or hard to validate. TCOs can be referred to as life cycle assessments as well.

The cost drivers are intended as a prompt to develop a more comprehensive perspective of the TCO.

The list is not exhaustive. Using the TCO worksheet as a guide, with a cross-section of staff and other stakeholders, try to determine the as-is costs associated for the sections which apply to your needs. The sections based on type of costs are:

- A. Acquisition
- B. Installation
- C. Operational
- D. Warehousing/Inventory
- E. End of life
- F. Risks
- G. Social procurement
- H. IT specific
- I. Productivity benefits
- J. Environmental benefits
- K. Business case synopsis

At best, you will have a more accurate projected TCO. As actual experience is gained, the variables associated with each of the types of costs can be validated and used as a baseline to compare incremental changes when materials, methods, technology, policies, practices, and other business influence impact the bottom-line.

Section I refers to looking at potential productivity benefits over the useful life of the equipment, project or process being considered. This is an important part of a business plan and estimating of TCO when looking at options on technology or design over the long-term.

Cost driver	Cost Cdn \$	Notes
SECTION A		
Acquisition cost		
Contract price (rent/lease/services)		Applicable standards, 3 rd party certifications, specifications, fair trade, LEED, capital, NPV
Customs clearance		Name of agency
Insurance		In transit, liability, political risk, export credit, self-insure, FMEA
Currency rates		Hedge fees, inflation risks, futures contracts
Air freight/ocean/rail		Lead times
Courier/trucking		Intermodal, load limits
Startup costs		One-time charges, testing, acceptance

Packaging/shoring		removal
Fuel storage and delivery		Cost to install and handling equip
Amortization/depreciation rate		# of years or within its useful life
Rental purchase option		Buy-out, first right of refusal options
Testing, inspection		3 rd party, in-house
Vendor experience		Probability of success; expected monetary value
Intellectual property rights		Legal fees; registration; escrow
Training		Include for probable upgrades x the # of affected staff; operational and maintenance; remote vs on site
Opportunity costs		NPV; ROI; payback hurdle; IRR
Restrictive covenants		Non-compete period of key personnel, relocation, mutually exclusive contracts
Cost to change supplier		One-time, standardization, training, support
INCO terms		Country of origin; certificate of origin; FOB;
Economic multiplier effect		Assess local social and economic development costs; local vs MNC

SECTION B		
Installation		
Labour		In-house cost with benefits, contractor, standards, permits, inspection
Materials		Direct and indirect
Equipment rental		Daily, weekly, monthly
Transportation		Permits, inspection, demurrage
Renovations		Permits, inspections, licensing, certification, Hazmat
Hours of access		Local by-laws
Pilot vehicles		Minimum # of hours
Time frame		Late penalties; early incentives
Temporary loss of production		Rate per hour, per shift, effect on ROI

SECTION C		
Operational costs		
Energy rate of consumption by source		Gas, diesel, propane, CNG, LNG, geothermal, solar, biomass
Emissions per tonne by source		Current and projected
Consumable materials		Renewable, recyclable
Maintenance – labour, parts, materials		SLA, in-house, training, OEM, after market, tooling

Water consumption rate		Incremental change
IT support		Software maintenance, labour, in-house, contract, license costs per # of licenses
IT energy		Incremental change
Warranties		Period of coverage; rates for exceeding; covenants
Fixed costs		Investment less residual
Variable costs		Cost per unit of production

SECTION D		
Warehouse/Inventory costs		
Security		Physical, electronic
Financial carrying costs		Weighted average cost of capital
Labour		Union, non-union
Materials		Packaging, pallets, film, plastics, degradable, recyclable
Equipment		Mobile, compactors, scanners
Space at current market rate per ² ft		Fixed term
Property tax		Current and projected
Insurance		Liability, fire, theft, earthquake, and restrictive covenants
3PL		Warehousing, distribution, customs
Technologies		Warehousing, logistics, last mile, drones, software apps

SECTION E		
End of life		
Disposal of parts/inventory		Write down costs based on book value
(trade-in value)		Residual value
Removal - labour		In situ
Removal - materials		In situ
Contract termination – lease/rental		Balance owing or buy out costs
Recyclable content		Segregation, sorting
Packaging		Collection, compacting
Landfill fees		Municipal, regional
Soil remediation		Cost per tonne, trucking, equipment
Decommissioning		Title transfer, liability insurance, waivers
Waste		By products for sale, salvage, asset recovery, waste

		audit
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SECTION F		
Risks		
Country of origin		Transparency International Index, political stability, provenance of labour, materials
Prototype		Certificate of destruction, learning curve
Network capability		Integrity of security
Emergency		Spare parts, service, availability, technical changes, contingency plans
Image, brand		Customer perception of value
Cost of non-performance/compliance		Correct defects, loss of market, customer defection
Technology		Competition; disruptive technology;
Contingency costs		Risk management assessment and mitigation plan
Legal counsel		Internal, 3 rd party, compliance with trade agreements, laws, and regulations
Failure Mode Effects Analysis (FMEA)		Assess level of risk impacts, costs, and early detection methods, Probability Index rating

SECTION G		
Social procurement		
Employment		Local employment, diversity of work force, # of FTE positions, temporary foreign labour, people facing barriers, social return on investment
Training		Skills upgrading, qualifications, certification, train-the-trainer programs, apprenticeships, course materials
Use of endemic materials		Replacement of imports, use of local foods, local material content, landscaping supplies
Telework		% of time, technical requirements, security, policy, practices, space reduction
Staff retention		Turnover rate
Teleconferencing		% of time, travel cost reduction, equipment, 3 rd party service provider, IT security
Wages		Incremental costs of living wage, fair wage, minimum wage, incentive programs, piece work
Change management		Time frame, training, culture
Health and safety		Base line measurement, employee well-being
Philanthropical issues		Sponsorships, grants, donations, gifts-in-kind, executive coaching, mentoring
Suppliers		# of SMEs, % of business with SMEs, # of social enterprises, % of business with SEs, key value indicators, Indigenous peoples, fair trade certified, target groups, ESG policy, local vs MNC, economic multiplier effect

SECTION H		
IT specific		
Hardware		Version; refresh dates;
Software		Applications and services
Licensing		Cost per license
Software code in escrow		3 rd party
Workstations		# of stations
Migration costs		# of months; penalties/bonuses
Version upgrades		# expected over contract period;
Installation		Shared responsibility; turnkey operation; NDA; go-live date
Network compatibility		Photocopier security integrity
Training		Train-the -trainer; off site or in-house
Energy		consumption
Server capacity		Data centres, location of server re: US Patriot Act
Testing		Responsibility; completion dates
Security		Ensure full levels of security
Intellectual property		NDA; patents; escrow; trademarks; copyrights
Legal advice		In-house; external
Maintenance		Turnkey; shared services;
Insurance		Performance agreement; bondable
Redundant systems		Back up; emergency
FTEs		Staffing level requirements
Interfaces		Existing; potential; costs
Performance guarantee		Uptime or minimum down time;
Service		3 rd party costs; response time; SLA
Telework		Security; accessibility
Digitalization		Opportunities

SECTION I		
Productivity benefits		Lower unit costs; increased output; improved quality; less waste; market share; reduced COGS
Expected useful life		Length of project; # of years, life of asset

SECTION J		
Environmental benefits		
Energy savings		Compared to baseline or current sources
Emission reductions		Compared to baseline or current sources
Emission offsets		Carbon tax, bona fide certification
Reduction in toxic materials		Tonnes, types, material substitution
Reduction in packaging		Tonnes, types
Reduction in waste generated		Tonnes, waste disposal bins
Reduction in travel costs		# of miles
Reduction in consumables		Incremental volume or costs
Renewable sourcing		Type of materials, content
Organic content		Certification
Cost to audit or monitor		Contracted service fees
Cost of reporting		Departmental, annual reports, personnel

SECTION K		
Business case synopsis		
Applicable taxes		Carbon taxes, carbon credits, carbon reduction incentives
Exemptions from governmental agencies		Qualify for funding
Inflation rate		Over life of the Project or its value to your org'n
Total cost of ownership		# of years, cost per year, cost of goods sold, cost per unit of production, cost per operational hours of service

Key Assumptions:

SWOT highlights:

PESTEL review

(Risk) FMEA Probability Index

Recommendations:

Definitions of terms

From a business perspective, within ESG policies, is the need to provide definitions. Definitions are part of the messaging to internal staff and the wide-variety of external stakeholders. Definitions reflect the organization values and intent which must be evidenced in their operational and administrative practices. If the definitions do not align with consistency in practices, it creates a contradiction and detracts from the gravitas of all strategies. Policies devolve into platitudes.

Effective governance requires staff training in order to have a common understanding of the values which are being espoused and shared, where definitions contribute to a greater understanding of the commitments. Policies reflect the *corporate* values and supersede those of the individuals which work for the organization. As values change over time, there is a need to review policies and the definitions used to describe values.

In 1987, the UN Brundtland Commission provided one of the first definitions for *sustainability* – “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” This broad definition was subject to interpretation yet paved the way for many governments and corporations to build on and adapt to demonstrate their commitments and align with their values.

Definitions often form part of a contractual agreement between buyers and sellers. Contractual terms and conditions are quite prescriptive and explicit. Policy definitions are more descriptive and implicit.

The following definitions are shared as a means of continuing to draft more effective business policies and support ESG. The definitions are intended to provide inspirational and aspirational motivation for subsequent definitions as we gain more experiential knowledge with governance strategies.

Barriered individual – A person facing *systemic* barriers to employment where accommodation may be required to enable their hiring and successful job performance. Barriers can include ethnicity, cultural differences, physical or mental incapacities, gender bias, limited access to public transit, elder/child care responsibilities, age discrimination, or other impediments to entering the work force.

Best value - To establish the best value of goods/services/construction, proposals may be evaluated not only on purchase price and associated life cycle costs, but also on cultural, ethical, environmental and/or social considerations, delivery, servicing, and the capacity of the bidder to meet other criteria, all stated in the bid/proposal documents.

Bluewashing – claiming or implying there are social benefits associated with a product or service but not being able to provide evidence to back up the statements.

Business ethics - A company’s set of values and behavioural expectations, to be reflected in the actions of its management and staff, when performing their responsibilities, for the best of interests of all stakeholders.

Economic governance – A company’s processes which contribute to its financial success while protecting their property and intellectual rights, physical assets, and ongoing operations through contractual obligations.

Environmental responsibility – The accepted duty by a company to take the necessary actions to mitigate or prevent impacts on the natural ecosystem throughout its supply chain and operations.

ESG – A company’s set of environmental, social, and governance policies and practices which support sustainability initiatives.

Fair Trade – Products which are certified by Fairtrade Canada©

Global Warming – Increasing the Earth’s average temperature due to GHGs from anthropogenic activity.

Greenwashing – claiming or implying there are environmental benefits attributed to the use of products without being able to provide evidence of the statements.

Life cycle cost – A cost analysis which may include but is not limited to the costs related to administrative, cultural, social, environmental and economic development, shipping, packaging, energy, warranty, consumable supplies, transition, training and the like.

Minority-owned business - A business which is at least 51% owned, operated, and controlled by women, Indigenous peoples, or a visible minority.

Net Zero – The difference between the GHG emissions and the ability of the biosphere to absorb the volume of carbon. Can be referred to as being carbon neutral.

Science based targets initiative - A collaborative group between the CDP, UN Global Compact, World Resources Institute and the World Wide Fund for Nature which sets targets to reduce emissions using the latest climate science methods.

Scope 1, 2, and 3 emissions – Scope 1: GHGs which are a direct result of sources controlled or owned by a company; Scope 2: GHGs related to all purchases of energy for power, steam, heat, or cooling; Scope 3: GHGs which are related to the activities from assets not controlled or owned by the *reporting* company but which indirectly impact its value chain.

Social enterprises – Not for profit organizations that operate as a business, with a purpose, to support social values in a financially sustainable model.

Social Impact – A measurable change on social issues or outcomes resulting from business decisions.

Social procurement – The contracting and spending practices which ensure the inclusion of cultural, economic, ethical, social values, and environmental outcomes being considered prior to any commitments being awarded.

Social responsibility – The commitment by an organization to all its stakeholders by adopting policies and practices which contribute to the well-being of society.

Social return on investment – A means of integrating social, environmental and economic values into decision-making, where outcomes can be quantitatively measured.

Supply chain – the *primary* company and its direct suppliers involved in the production or delivery of goods or services

Supplier diversity – A strategy which supports increased opportunities to contract with companies that may be minority-owned, women-owned, Indigenous-owned, nascent operations, LGBTQ+, or veteran-owned.

Sustainability - Products and services which meet or exceed environmental standards, labour, and safety codes, the wellness of people, respect biodiversity, and provide the best value, which can be responsibly provided.

Value chain – each activity across a supply chain, to produce a good or service, adds value, either through materials, labour or handling. Each *secondary* partner in the supply chain adds *value*.

3rd Party Certification Organizations

There are literally thousands of 3rd party for-profit and not-for-profit organizations, which interact with supply chains across Canada and the globe. These organizations provide standards, specifications, procedures, processes and monitoring on a wide variety of value chain and ESG actions. Receiving their certification of compliance or approval can often mean the difference between getting or losing an order.

Compliance can include human rights, emissions, social values, quality control, energy systems, environmental practices, reporting, resource extraction or harvesting, production, working conditions, and material specifications and designs. The 3rd parties are an important part of the stakeholders for any business and community. A company may operate in Canada, USA, or Europe, yet these 3rd parties could be monitoring their practices for compliance and consistency from anywhere.

Some of the more well-known organizations are:

- Amnesty International
- Canadian Aboriginal and Minority Supply Council
- Canadian Council for Aboriginal Business
- David Suzuki Foundation
- Ecologic labels
- Electronic Product Environmental Assessment Tool
- Energy Star
- Fair Labor Association
- Fair Trade International
- Forest Stewardship Council
- Green Peace
- Green Seal
- Human Rights Watch Canada
- International Organization for Standardization
- Leadership in Energy and Environmental Design
- Maquila Solidarity Network
- Marine Stewardship Council
- Mining Watch Canada
- Ocean Wise®
- Oxfam International
- Rain Forest Action Network
- Rain Forest Alliance
- Restriction of Hazardous Substances
- Sierra Club
- Social Accountability 8000

- Transparency International
- Verité
- Waste Electrical and Electronic Equipment Directive
- Worker Rights Consortium
- World Wild Life Fund
- Worldwide Responsible Apparel Production

Poem

Against Coercion by Commerce

Larry Berglund

Business is of a common purpose in three domains –
What we do is done by many;
Individually we seek to feel appreciated about our sway;
Collectively we affect value through the vessel of exchange.

But the richness of the colours is fading;
Once resonant harmonics are a cacophonic distraction;
Reflections have turned into rationalizations of perspective;
Time is consumed but not for respite.

Leaders are of the moment without concern there be a legacy –
With expeditious recompense, absent the trials of time;
These few make the choices for the many – with an air of virtuous satisfaction;
Apathy is the friend of their followers.
Power dependent on dominance, is of fleeting value.

The diversity of ideologies can be twisted into competing interests;
Ends are achieved though scant of worth;
The image of responsibility can be the mask for not;
Success is measured by consumptive excess.

Awareness of possibility is as essential as water;
Earnest endeavours exorcise entitlement;
Conscious capitalism is the enemy of greed;
Uncertainty is a friend to appease.

Perfection is not the purpose – nor the expectation;
Sincerity is the companion of effort;
Enacting one's beliefs is the start;
Outcomes are never certain, there is always more to see.

Choose to do well;
Don't fault the past;
Act for all;
We can all prosper with dignity and respect.

Seek goodness from the Universe;
We always receive;
Ask to receive;
The Universe will respond in kind.

Recommended Reading List

The recommended reading list I suggest below, is focused on business actions which are rooted in ESG, supply chain management and business practices. These are my personal preferences, which I have based on reading from a wide variety of sources. Undoubtedly, the reader will find that I have left off many other excellent publications, *which are a must read*. I will gladly consider other publications for future iterations; however, we need to get the 1st list out.

I began the initial listing a few decades ago and have edited it over time. Most of the students, colleagues, and clients I have had the pleasure to interact with, have found it helpful to point them in the right direction. Some of the references are from the initial list which I have expanded and edited, as emerging issues take precedence.

We learn from history and 1st hand experience. We learn about best and leading practices from people that have found success with the ideas in a workplace setting or market sector. This is why I have selected these readings. I have used the reading materials in case studies and have validated the ideas through trial and error in the real world.

A few of the authors are colleagues which I respect; others are also leading thinkers from the past and present, whose opinions, thoughts, and words I have found to be inspirational or add clarity to our discussions on ESG and supply chain management. Many ideas cause us to reflect on the status quo of conventional thinking and rethink our intent and purpose moving forward.

Of course, I have included the seminal work of Rachel Carson, *Silent Spring*. The 1962 book started many people on the journey to ask why are we allowing the indiscriminate marketing and selling of chemicals. Carson was among the first to call attention to the disastrous environmental problems being concocted by industry. Joni Mitchell was concerned about this when she sang *you don't know what you've got til it's gone*.

I share the list with you to expand our awareness of the multiple issues and the complexity we collectively face; and to provide hopeful solutions. Because we don't know what we've got til it's gone.

Subscriptions/Publications

- Financial Post
- Harvard Business Review
- Legal Edge
- McKinsey Insights
- Procura+ Manual 3rd edition
- Report on Business
- Reuters Canada
- Supply Chain Dive
- Supply Professional Magazine
- Want China Times

Books

1. 21 Lessons for the 21st Century
2. An Army of Problem Solvers
3. Blockchain Revolution
4. Brief History of the World

Publisher

National Post
Harvard University
The Procurement School.
McKinsey & Company
ICLEI
Globe and Mail
Thomson Reuters
Industry Dive Inc.
Annex Printing
wantchinatimes.com

Authors

Yuval Harari
Shaun Loney
Dan/Alex Tapscott
Yuval Harari

5. Cannibals with Forks
6. Civilization
7. Collapse
8. Corporation
9. Cradle to Cradle
10. Ecology of Commerce
11. Economics of Happiness
12. **ESG in Business**
13. **Food, Finance, and Philosophy**
14. Freakonomics
15. Freefall
16. **Good Planets Are Hard To Buy**
17. Green to Gold
18. Guide to Practical Procurement
19. Guns, Germs and Steel
20. Heat
21. Honest Truth About Dishonesty
22. Information System Implementations
23. **It's the People, Not the Paper**
24. Leadership Challenge
25. Leading Change
26. Level Three Leadership
27. Market for Virtue
28. Marketplace Revolution
29. Misbehaving
30. No Logo
31. Omnivore's Dilemma
32. **Plan It for Our Planet**
33. Reckoning
34. Sacred Balance
35. Silent Spring
36. Social Procurement Manual
37. Thinking Fast and Slow
38. Third Pillar
39. Why Nations Fail
40. Wizard and the Prophet
41. Work Like Nature
42. World is Hot, Flat and Crowded 2.0

John Elkington
 Niall Ferguson
 Jared Diamond
 Joel Bakan
 McDonough/Braungart
 Paul Hawken
 Mark Anielski
Larry Berglund
Larry Berglund
 Levitt/Dubner
 Joseph Stiglitz
Larry Berglund
 Daniel C. Esty
 Maureen Sullivan
 Jared Diamond
 George Monbiot
 Dan Ariely
 Andries Jacobs
Larry Berglund
 Kouzes/Posner
 John Kotter
 James Clawson
 David Vogel
 David LePage
 Richard Thaler
 Naomi Klein
 Michael Pollan
Larry Berglund
 David Halberstam
 David Suzuki
 Rachel Carson
 Yunus Social Business
 Daniel Kahneman
 Raghuram Rajan
 Acemoglu/Robinson
 Charles Mann
 Lea Elliott
 Thomas Friedman

SCOPE 1, 2 AND 3 EMISSIONS ON GREENHOUSE GASES

