Wealth Management

RBC Dominion Securities Inc.

Harmony Wealth Partners of RBC Dominion Securities

2023 Annual Letter

To the Clients of Harmony Wealth Partners,

At present the world seems to be a rather tumultuous place. Over the past twelve months, we witnessed the grinding on of a global pandemic, the execution of the Canadian Emergencies Act (successor to the War Measures Act), and war in Europe.

Today's risks range from:

- Record levels of inflation
- Escalation of war in Europe
- Complete bifurcation of the political and societal environment in the Western world

Hindsight is exact, precise, easy. The future is both predictable and random at the same time. For instance, if governments print too much money and spend too much, inflation is **reasonably** predictable. Also reasonably predictable was the eventual downfall of:

- *Esoteric speculative crypto currencies*
- *Stocks with limited earnings, revenue, or balance sheet*
    - *Marijuana stocks, electric vehicle stocks, theme stocks*

To help you understand our view of the world today, we wish to categorize the current environment into which risks we believe are somewhat predictable vs. those that are random.

As such, we will categorize risks into three buckets:

1. **Black swans**
    - *Events where the outcome and risks are unknowable, eg. World Trade Centre*
2. **Grey swans**
    - *Events where the risks are known but the inevitable outcome is unknowable, eg. nuclear war*
3. **White swans**
    - *Events where the risks are known and the outcome is somewhat knowable ex ante, eg. Inflation, Marijuana stocks, esoteric cryptocurrencies, electric vehicle stocks, energy crisis*

If you can avoid self evident white swans as defined above, you are avoiding many of the major risks many investors make. White swans become more obvious with the passage of time.

How do we work to avoid many of the white swans mentioned? Principles. Principles allow us to avoid short term speculation and focus on the big picture over the long term.

We wish to highlight in this letter:

1. Our conclusions regarding the current *ex ante* 'white swans,' namely
    a. Coming energy crisis
    b. Global food insecurity
    c. Government debt monetization
2. Risks we wish to avoid
3. What sort of opportunities this environment creates for you, the investor

TOPICS FOR DISCUSSION

1) Barriers to ~~Entry~~ Energy

i. *Cautionary note and preamble*
ii. *The ~~Carbon~~ inflation tax*
iii. *An analysis of the British Columbia energy infrastructure - A mosaic of the broader global problem regarding supply and demand*
iv. *A decade of discontent – The uncoupling of the Canadian economy as an energy producer*
v. *The benefits of Dutch disease*
vi. *LNG – A lost opportunity to significantly reduce global CO_2 emissions*

2) Global Food Insecurity

i. *Ammonia based fertilizer*
ii. *The case for agriculture*

3) ~~Inflation~~ Not Printing Money is Transitory

i. *Preamble*
ii. *Math on government debt*
iii. *Losses at the Bank of Canada, US Federal Reserve and other central banks*
iv. *Money printing supernova*
v. *German Producer Price Index*

4) Portfolio Considerations and Final Thoughts

Cautionary Note and Preamble

We are not physicists, six sigma supply chain experts, mechanical, electrical or chemical engineers. What we try to have is an abundance of common sense. You were not required to be a PhD in economics in 2020 to surmise we would experience inflation. Conversely, it was the central bank PhDs who missed inflation! It seems ridiculous to believe printing hundreds of billions, if not trillions, of dollars and crediting cash to the demographic with the highest propensity to spend would not cause inflation! Moreover, you were not required to be an expert in blockchain technology or cryptocurrency to determine in 2021 that Bitcoin behaved more like the Nasdaq (US Technology Index) on steroids than 'digital gold.' **What was required to avoid these white swans was a spoonful of math and two helpings of common sense.** When we look at the energy environment today, it appears bureaucratic rule makers, much like the central bankers of 2020 or the crypto experts at FTX in 2021, are throwing caution and common sense to the wind. **We try to unpack the externalities of the 'green energy transition' for you and your wealth, using common sense.**

"Show me the incentive and I will show you the outcome."

~ Charlie Munger

Economists would characterize the demand for crude oil or natural gas as inelastic. In other words, higher prices in the commodity do not result in a commensurate destruction in demand. This may not be the same outcome as another good with a lower cost substitute. Diesel oil is an inelastic good. We use diesel for everything from pulling a disc harrow with a tractor to fueling low RPM two-stroke engines in bulk container ships. Modern battery technology is not a substitute for diesel for heavy duty work.

While there is much excitement around the switch from traditional oil to electric, the reality is that the transition is further away than most appreciate and much less practical in the real world than it appears at first glance. For instance, **new battery electric light duty trucks have been found to operate with real world heavy towing distance of less than one hundred miles to a charge.** A recent article in *Motortrend* magazine highlighted the substandard real world towing capabilities of the new half ton battery electric pickup when towing a load (July 31, 2022 "Tow No! The Ford F-150 Lighting Struggled in Our Towing Test"). It's not the size of the battery. With the extended range option, the battery capacity in these trucks is a colossal 150+ kWh (approximately 1,800 lbs). Compounding the range issue, it may take an hour or more to charge, especially with the common 50 kW chargers.

Because current battery technology does not have the density to sustain heavy loads, it is not practical for an electric vehicle to push, pull, plow, ship, or tow.

That said, battery electric vehicles (BEVs) are more efficient.

BEVs avoid:

- *Heat loss*
- *Mechanical loss*
- *Non-combusted gasses (i.e. energy) exiting exhaust*

As it relates to vehicles, BEVs have regenerative braking that can recapture energy spent getting a vehicle to speed. All added together BEV achieve thermal efficiencies of roughly 90%.

Thermal efficiency is a measure of an engine's effectiveness at turning potential energy into mechanical energy (i.e. turning gasoline/diesel or energy in a battery into 'work'). Diesel engines are thought to be the most efficient common internal combustion engine design. Thermal efficiencies of low RPM diesel engines are conventionally thought to be in the 40-50% realm. By comparison, internal combustion gasoline vehicles have thermal efficiencies in the 20-35% range. Additionally, diesel has a higher energy density than gasoline (37.9 kWh vs 33.7 kWh per US gallon).

According to Q. Xin & C.F. Pinzon:

> *Current on-road diesel engines have approximately 42% brake thermal efficiency at full load, with 28% fuel energy wasted in exhaust gas (including 4% going to pumping loss), 28% of fuel energy dissipating to cooling media as heat rejections to the ambient (including 4% going to mechanical friction and parasitic accessory power), and 2% going to miscellaneous heat losses (*"Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance," *2014).*

Every gallon (US) of diesel energy contains an enormous amount of energy, roughly thirty-eight kilowatt hours of energy. Your standard one-ton diesel truck comes standard with a thirty-five-gallon tank. Said differently, it comes standard with 1,330 kWh of energy storage capacity! This is ~8.7 times more energy storage than the F150 Lightning with the extended range battery.

Figure 1 highlights the practical energy usability of a diesel truck vs. a BEV on a per tank/charge basis.

Fig. 1 | Practicality of Diesel truck vis-à-vis Electric truck

	Diesel Truck	Battery Electric Truck
Storage Capacity (kWh)	1330	153
Thermal Efficiency	42%	90%
Work per tank (kWh)	558.6	137.7
Time to Recharge/Refuel	10 minutes	30-180 minutes

Further undermining the underwhelming performance of BEVs as highlighted in figure 1 above is their performance in cold weather. According to the US Department of Energy, the fuel economy of BEVs can drop 41% in cold weather (-7°C vs. 25°C). This compares unfavourably to the 15% drop in fuel economy for internal combustion engines under the same circumstances. In Canada, we have an overabundance of cold weather.

Impractical solutions to fossil fuels are not the exclusive domain of the light truck auto segment. Battery-electric locomotives are being tested by major Canadian rail companies with 7,000 kWh of energy capacity. Your standard locomotive in North America carries diesel tanks with over 5,000 gallons of usable capacity, or more than 190,000 kWh of energy! There is no substitute currently with battery technology for diesel en masse.

The product required by farmers to grow our food, by machines to manufacture products, graders to plow snow or trucks to ship our goods is without substitute – it is diesel. As such, diesel has a low substitution effect. In other words, if the price of diesel rises the aggregate quantity demanded does not fall at an equal rate. Ubiquitous alternatives to diesel do not exist with the same product performance.

The ~~Carbon~~ Inflation Tax

Because there is not a common substitute for diesel, any reduction in supply translates into significantly higher prices. Hydrogen may be a substitute eventually; however, it is beyond the scope of this annual letter and its implementation at scale over the coming five years is purely hypothetical. Diesel is the input energy in the production of almost any food or good in our modern economy, **so the inflation caused by a tax on diesel is not contained in the commodity itself but is transferred to all goods.** The cost of tires or tomatoes rises because the manufacturing or agricultural industries that produce these goods have diesel as a significant variable cost input.

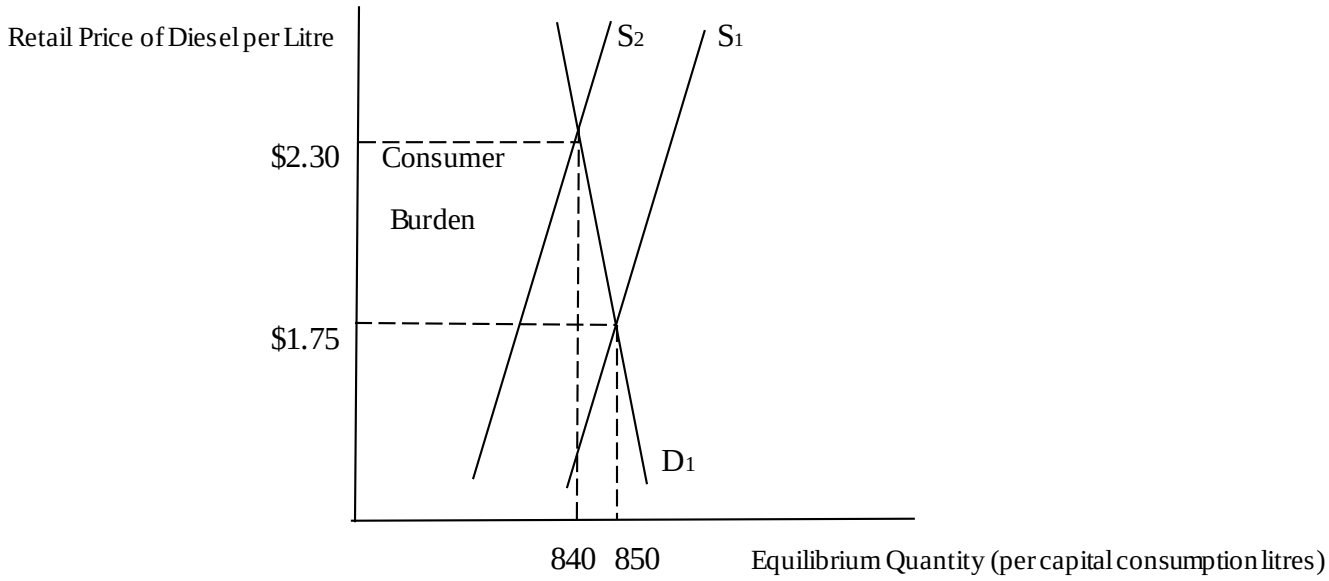
Take for instance the wildly simplified supply chain of a rubber tire. The latex may come from Indonesia, Brazil, West Africa and Thailand where it is cultivated with the assistance of diesel tractors. Once harvested from trees, the rubber is extracted from the latex using a process called coagulation that curdles or thickens the polyisoprene into a mass. This mass is often run through a crusher to break the coagulation into smaller pieces. These crushed pieces are then fed into a macerator. The macerated sheets are then fed into intermediate mills and eventually smooth mills to reduce the size of the rubber sheets. As any industrial process, the crusher, macerator or mills require large amounts of continuous energy, often supplied by diesel generators. Diesel trucks then transport the solidified rubber from local rubber plantations and manufacturers to a processor. These processing facilities then use large amounts of energy to convert the natural rubber concentrates into semi-finished products. The semi-finished products are then trained or shipped from the processing facilities in countries such as Liberia to tire manufacturers. The heavy work in this process uses diesel locomotives or diesel transport ships. According to the US Tire Manufactures Association, your average passenger or light truck tire contains only 19% natural rubber.

The other components are:

- 14% Antioxidants, antiozonants, curing systems
- 26% fillers
- 4% textile
- 12% steel
- 24% synthetic polymers

Each one of these components also has their own discrete supply chain. Each one individually requires huge amounts of diesel in the transportation, manufacturing or production. From a truck tire to a bag of Cheetos, diesel is used at almost every node of the almost infinite intersections of our supply chains for all food, goods or services. There is no existing alternative technology available that can effectively, affordably and practically replace diesel. **Therefore, if you tax diesel, you create inflation.**

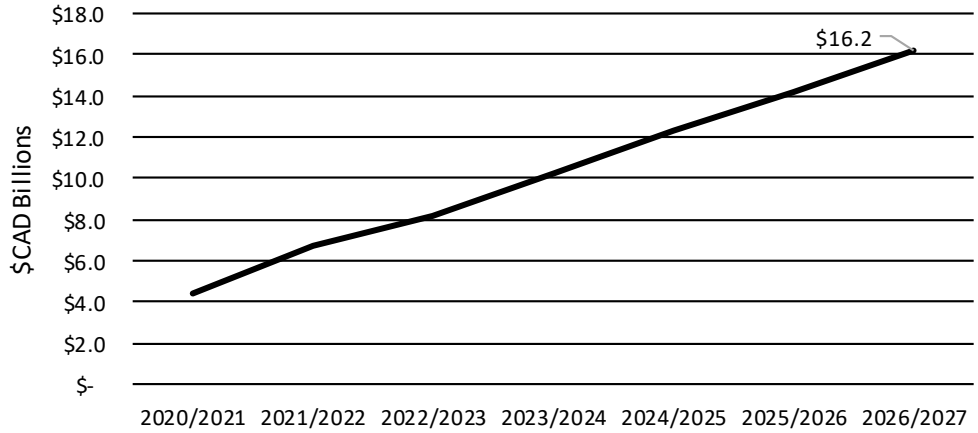
Fig. 2 | Hypothetical Impact of Tax on Inelastic Demand Curve | **$S_2 = S_1 + Tax$**



Because the demand curve for Diesel is inelastic (D_1 above), we can see that the aggregate demand for diesel doesn't change significantly based on a higher price of diesel (850 litres consumed vs 840 litres). The preponderance of the price increase because of a tax on diesel is felt by the consumer directly on diesel or indirectly in products that utilize diesel to manufacture or get to market. Goods with low substitution effects have steep demand curves meaning changes in prices do not result in lower demand. As a result of its inelastic demand curve, the carbon tax is essentially an inflation tax as it does not result in the desired substitution effect that is axiomatic to the thesis of the carbon tax.

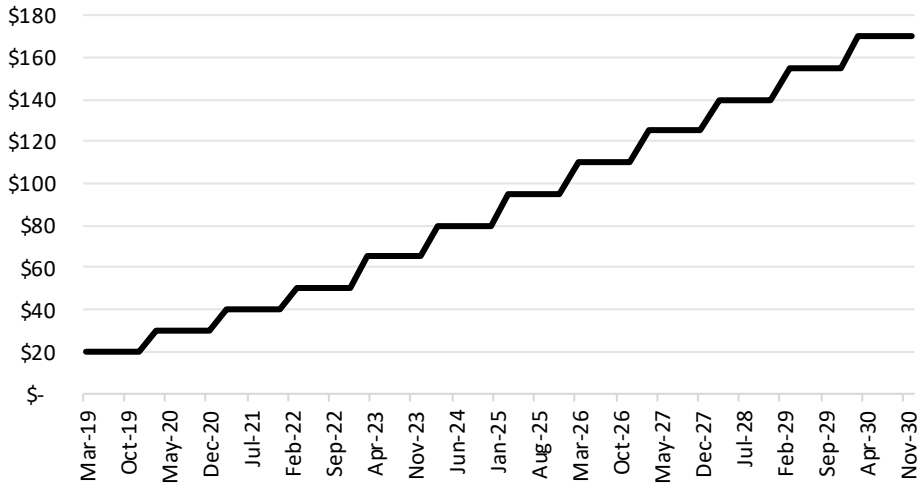
The carbon tax legislates inflation. This inconvenient truth occurs because there is no efficient scalable technology to replace hydrocarbons causing an inelastic demand for hydrocarbons such as diesel. As a result, the carbon tax simply causes higher end user prices for commodities. Any goods transported or produced using hydrocarbons will also see higher prices. According to the Government of Canada as highlighted in figure 3 below, the Carbon Tax Revenue will reach over $16 billion annually by 2026/2027.

Fig. 3| Government of Canada - Carbon Tax Revenue



Source: Government of Canada 2022 Budget, Outlook for Budgetary Revenues, P. 227

Fig. 4 | Federal Carbon Tax Rate Per Ton of CO_2



Climate Action Incentive Payment (CAIP)

The CAIP is a rebate from the Canadian federal government funded by the tax revenue collected under the carbon tax. Proponents of the carbon pricing program contend it is revenue neutral, with tax collected being reallocated directly to low-and middle-income residents.

Upon reviewing the 2022 Government of Canada budget one cannot find a clearly outlined expense (CAIP benefit to taxpayers) commensurate with the projected revenues collected by the Government through carbon taxes (Government of Canada Budget 2022 - https://budget.canada.ca/2022/home-accueil-en.html).

This is consistent with our concern that the carbon tax will become a working and middleclass tax that ends up lost in the nebulous of general revenue. There are substantial costs to administer this plan and those costs are borne directly by citizens. Government employees often earn wages and pension benefits in excess of the private sector. Pragmatism and common sense would suggest a significant cost borne directly or indirectly by the taxpayer to administer this plan.

Some of the winners and losers of the carbon tax are highlighted in figure 5 below

Fig. 5

Carbon Tax Beneficiaries	Carbon Tax Impacts Negatively
Urban Canadians	Rural Canadians
White collar occupations that do not require duty work	Blue collar occupations requiring duty work
Canadians living and working in mild climates	Canadians living and working in harsh climates
Wealthy Canadians that can take advantage of grants	Low and middle-income Canadians

In some circumstances electric vehicles can be an effective substitution for the internal combustion engine. With current technology, these electric vehicles are ideally suited to urban workers commuting from a suburban area to a central business district in milder climates, such as the BC coast. Had it been targeted correctly; we do believe that the carbon tax could reduce urban emissions without putting undue strain on citizens

The reality however, is that in many Canadian centres, the climate makes BEV ownership challenging.

Fig. 6

City	Average January High °C	Average January Low °C
Toronto	-1°	-7°
Montreal	-4°	-12°
Calgary	-3°	-14°
Edmonton	-7°	-16°

As we discussed above, the range of a BEV is reduced by roughly 41% at just -7°C. In other words, the average daily high in Edmonton's January would reduce the range by nearly half. This is notwithstanding a cold snap or driving during a daily low.

An Analysis of the British Columbia Energy Infrastructure

BC Hydro released a report in January 2022 which underscored record demand/loads both in summer and winter in 2021 ("2021: A record-breaking year for electricity demand and extreme weather"). BC Hydro has broken its all-time peak demand five times in the past five years. During the writing of this letter, BC Hydro again usurped its record 10,762-megawatt load in December 2021. On December 22, 2022, BC Hydro recorded a demand in excess of 10,900 megawatts. BC Hydro's resource plan highlights regional disparities between the South Coast, Vancouver Island and the North Coast ("The Integrated Resource Plan 2021"). Vancouver Island and the North Coast have ample surplus; the South Coast is forecast to be in a deficit in F2027 without more committed resources to BC Hydro. The report goes on to say, "The higher load growth in the South Coast region compared to the rest of the province is attributed, in part, to the adoption of electric vehicles." While the report does mention the waning demand growth in the forestry sector, it does also point out that "the North Coast region has the potential for considerable load growth as a result of liquified natural gas and mining developments."

There are many variables impacting hydro demand and production, ranging from power plants reaching end of life, or uncertainty of run of the river plan contract renewals. Our concerns about grid stability relate to the increase in demand without a proportionate increase in supply.

Significant Sources of Increased Demand:

1. *Battery Electric Vehicle and Plug in Hybrid vehicle adoption*
2. *New household formation*
3. *Heat Pump adoption*

Battery Electric Vehicle and Plug in Hybrid adoption

According to TransLink, vehicle kilometers traveled per day was roughly 18km per resident per day, with fifty five percent of the trips being single auto drivers (Translink "2017 Trip Diary Survey"). According to Statistics Canada, in 2019 the population in BC was just over five million residents. Using the Greater Vancouver Regional District travel data as a proxy for the overall province, the total daily aggregate single auto trips is fifty-four million kilometers driven. In 2021, roughly 4.6% of the vehicle fleet in British Columbia were zero emissions, up from ~2% in 2018 ("The state of EV adoption in British Columbia", Werner Antweiler). While this is a relatively small number, the compound annual growth rate over the time period is exponential. According to ICBC roughly one in five of the new vehicles sold in 2021were zero emission. In 2021, the Federal Government of Canada moved to ban internal combustion vehicles for sale by 2035.

If half of the auto fleet in BC is BEV by 2035, assuming no new growth in residents or trips travelled, this will require:

54,000,000 x 50% x 19/100 = 5,130,000 kWh

Aggregate Single Occupancy Daily VKT x % of BEVs x kWh required per 100 kms = Energy Required

One kilowatt-hour is equal to the amount of energy you would use if you kept a single 1,000-watt appliance running for one hour.

1,000,000 kWh = 1,000 mWh = 1 gWh

As such, the simple projection above for BEV energy requirement annually in BC is roughly 1,800 – 1,900 gWh (calculated as 5.13 daily gWh x 365). Currently, BC Hydro produces roughly 43,000 gWh annually. The following figure summarizes the production capacity growth of BC Hydro over the past 16 years.

Fig. 7 | BC Hydro Sources of Supply; Generating Capacity over Time

Power Type	Plant	Megawatts (MW) 2005	Megawatts (MW) 2021	Projected Meagwatts (MW) 2025
Hydroelectric	Bridge River	475	478	478
Hydroelectric	GM Shrum	2730	2857	2857
Hydroelectric	Kootnay Canal	580	583	583
Hydroelectric	Mica	1805	2747	2747
Hydroelectric	Peace Canyon	694	694	694
Hydroelectric	Revelstoke	1980	2480	2480
Hydroelectric	Seven Mile	790	805	805
Hydroelectric	Site C	0	0	1100
Hydroelectric	Other	1164	1383	1383
Thermal	Other	143	119	119
Thermal	Burrard	950	0	0
Diesel	Other	0	58	58
Total Capacity		11311	12204	13304

***Source**: BC Hydro Annual Reports, projections by Harmony Wealth of RBC DS assumes Site C Completion by 2025*

New Households

During the period 2005 to 2021, BC Hydro production capacity grew by 7.89%, (11,311 MW to 12,204 MW.) According to the Government of British Columbia, in 2005 BC had 4.254 million residents. In February 2022, BC Stats released a report estimating the population of BC at 5.214 million residents in 2021. So, the population grew by 22.56% over the period 2005 to 2021 and the capacity of BC Hydro grew by 7.89%. These trajectories will eventually cause power supply issues. In other words, you can not grow demand without a commensurate increase in supply in perpetuity. If you assume site C completion by 2025 and with no other major new projects, generating capacity will increase over the twenty year period from 2005 to 2025 by 17.62%. **This is an annualized capacity growth rate of 0.81%!** This includes the production from Site C!

According to the government of Canada, we are going to be adding roughly ½ million new immigrants annually over the coming years. This is more than the population of the Greater Victoria region making Canada their new home every year! We do need targeted immigration. We have a looming demographic bomb (the average baby boomer is roughly 65, with ½ retired and ½ retiring.) The great retirement compounds an already acute skilled labour shortage. That said, we also require the infrastructure to house, heat and provide power to these newcomers. As it relates to energy, just like with Battery Electric Vehicles, the demand cart is going before the infrastructure horse!

Heat Pumps

Daily consumption from heat pumps can average 30-60 kWh for a residence. Most of Canada is a very cold country. While heat pump efficiency has improved in recent years, efficiency at very cold temperatures (-20ºC or colder), drops dramatically. At these low temperatures, substantial amounts of energy are required to maintain an indoor temperature of 20 ºC. In 2021, StatsCan reported BC had 2,051,834 private dwellings occupied by residents. If we assumed by 2035, one quarter of these households converted to a heat pump from hydrocarbons with a low energy assumption of 15 kWh per day, this would require:

2,051,834 x 25% x 15 = 7,694,377.5 kWh daily

Private Dwellings Occupied by Usual Residents x % Heat Pump x kWh required per day = Energy Required Daily

This represents roughly 2,800 gWh of required power annually to heat ½ million households with heat pumps!

BC Energy Infrastructure Conclusions

If the supply meeting demand math doesn't work when you hold household growth at zero, what does that mean if you have significant household formation? What does that mean if your average heat pump uses 40 kWh per day instead of 15 kWh per day? British Columbia matters because it is regularly hailed as a showpiece for the green energy transition. Most of British Columbia's energy is produced via legacy projects built in the 1960s and 1970s (WAC Bennet Dam, Mica and Revelstoke). These projects had massive externalities, caused horrendous environmental catastrophes and some had dark histories displacing indigenous communities. Yet today, we are living on the fumes of the benefits of these projects developed 50 or 60 years ago without serious plan for public infrastructure to meet demand growth. If the goal is a green energy transition, how do we incentivize demand without also incentivizing supply? How do we prevent the externalities of creating new electricity supply while still allowing for growth? Is it even possible? These are pragmatic questions we believe have been simply left unanswered.

One solution that we can pull hope from comes from the developing world. Jim Wyss pointed out in a recent article in Bloomberg, "A microgrid is a network of businesses or homes or both, usually in a tight geographic area, that creates power locally and can function independently from the larger grid… As electricity costs have soared and grid breakdowns continue, the use of solar panels, battery backups and generators has exploded" (Bloomberg: How a Solar Microgrid Became a Town's Lifeline in Blackout-Prone Puerto Rico. December 12, 2022). Communities helping communities, neighbours helping neighbours. Individuals and businesses working together providing solutions that are outside of the public infrastructure. We expect that stories like this will increase in frequency globally as stresses on the larger grids of many nations occur and local solutions are sought.

British Columbia only showcases a broader issue of incentivizing demand without a plan to increase the base load supply. These two things should not be mutually exclusive, and our current policy path will lead to shortages, higher prices or both. This is not a British Columbia issue or a Canada issue, this is a global issue. The Texas power crisis in 2021, the ongoing grid challenges in California or the full-blown energy crisis in Germany will, in our estimation become normalized. Just as inflation was not acute or painful in 2020, we believe this narrative of less supply and more demand for energy will be a major theme globally for the coming decade.

A Decade of Discontent - The decoupling of the Canadian Economy as an Energy Producer

Canada has become a hostile environment for energy infrastructure. Figure 8 lists the mothballed energy infrastructure projects in Canada over the past seven years. Roughly speaking (not adjusting for inflation) over $180 billion dollars of energy projects have been cancelled or mothballed in the past seven years. This figure does not include the critical Keystone XL pipeline that would have taken Canadian heavy crude from the pricing hub at Hardisty in eastern Alberta terminating in Steele City Nebraska.

This has created an environment that is hostile to the production and transportation of Canada's natural resources. This has real world impacts on Canada by reducing:

1. The purchasing power of our money – exacerbating inflation when we buy imported goods
2. The economic rents we can extract from our natural resources

Canada has the world's third largest oil reserves. This is a major natural advantage for Canada vis-à-vis countries that are forced to import energy such as Japan or Germany. Normally we would consider higher energy prices in Canada to benefit the country on balance. In our estimation, this is no longer the case.

Fig. 8 | Cancelled or Suspended Energy Projects in Canada

Project	Company	Proposed Capital Investment ($CAD Bil)
Grassy Point LNG	Woodside Petroleum	15
WCC LNG	Exxon Mobil and Imperial Oil	25
Aurora LNG	Nexen Energy	28
Prince Rupert LNG	Shell	11
Pacific NorthWest LNG	Petronas	11.4
Kwispaa LNG	Steelhead LNG	18
Frontier Oilsands Mine	Teck Resources	20.6
Aspen Oilsands	Imperial Oil	2.6
Dunkirk Oilsands SAGD	Koch Oil Sands	2.4
Muskwa SAGD	Koch Oil Sands	0.8
Carmon Creek Oilsands	Royal Dutch Shell	3
Frederick Brook Shale	Corridor Resources	0.07
Énergie Saguenay	Berkshire Hathaway	4
Mackenzie Valley Gas Pipeline	Imperial Oil	16.1
Energy East Pipeline	TC Energy	15.7
Northern Gateway Pipeline	Enbridge	7.9
Total	-	$181.57

In our 2021 annual letter we used a statistical tool R-squared to determine the relationship between the Nasdaq and Bitcoin. R-squared in statistics is a measurement of how well the returns of an independent variable (eg. Nasdaq) explain or model the returns of a dependent variable (eg. Bitcoin). An R-Squared of 1.0 means all the movements of the dependent variable are 'explained' by the independent variable. An R-squared of zero shows no relationship. An R-squared of 0.5 would mean some of the movements in the dependent variable are statistically explained by the independent variable.

R-Squared

Independent variable does not explain movement in dependent variable

Independent variable explains all movements in dependent variable

When we ran the statistical analysis, we determined that the movement in Bitcoin was explained at a very high degree by the movement in the Nasdaq (US technology stock index). We found based on 500+ daily observations that 70-80% of Bitcoin's movement was explained by movements in the Nasdaq. Moreover, we determined that Bitcoin had a very low correlation to gold. **We used this analysis to refute the supposition that Bitcoin was digital gold**. We supplanted it with the assertion that bitcoin was digital Nasdaq to the 7th power.

In our last annual letter we also made the assertion that:

> 'Cryptocurrencies exist to make the Dot Coms of the late 1990s, such as Pets.com or Astroturf.com look like prudent investing. This is gambling disguised as investing underwritten by central bank liquidity. It probably will end in tears for most 'investors' in the space.'

At the time of our letter's 2021 release, Bitcoin was over $80,000 Canadian dollars. As of January 2, 2023, Bitcoin is down roughly 70%+ from its November 2021 high. One would've been so lucky to own Bitcoin instead of the other Cryptocurrencies highlighted in the 2021 letter. Coins such as Cardano are down 90% as of writing from their all-time highs. FTX and Luna coin are flat out zeros and potential multi billion-dollar frauds. Meanwhile, the Canadian dollar value of gold is positive year over year: 7.38% (January 2, 2022 – January 2, 2023). In the context of a correction or bear market year in both stocks AND bonds, not too bad.

Why is this relevant to the price of oil and the Canadian dollar? Because we believe we can use this method to uncover meaningful economic relationships that are not self evident or that challenge the current paradigms, such as 'Bitcoin is digital gold' or that the 'Canadian dollar is correlated to oil.'

The price of oil and the Canadian dollar relationship seem to have decoupled based on our analysis. We used the price of oil as the independent variable and the value of the Canadian dollar as the dependent variable in two different time periods: fifteen years ago and today. The results were shocking.

March 29, 2006 – Jan 28, 2008

Regression Statistics	
X-Value	*$USD WTI*
Y-Value	*$USD/CAD*
R Square	0.7723985
Observations	479

June 1, 2021 – Nov 16, 2022

Regression Statistics	
X-Value	*$USD WTI*
Y-Value	*$USD/CAD*
R Square	0.040394268
Observations	382

What we found was that during the period 2006 – 2008 above, over seventy seven percent of the movement of the Canadian dollar was explained by the movement in oil. During the period 2021 – 2022 above **only 4% of the movement in the Canadian dollar was explained by the movement in oil!**

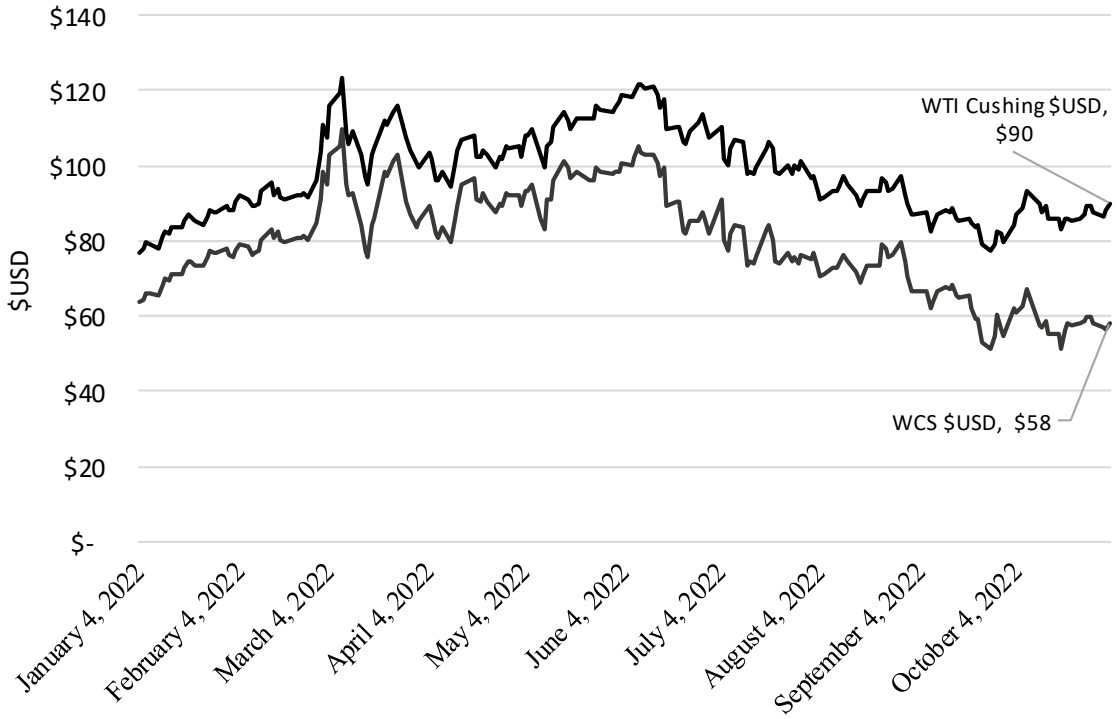
The Benefits of Dutch Disease

Dutch disease was a term to describe the negative consequences that can come from the spike in a nation's currency generally associated with the high prices of valuable natural resources. What we are experiencing in Canada today is stagflation caused by significantly higher energy prices coupled with no relief on import prices because of a weak Canadian dollar. It is a double whammy. In other words, imported goods such as Colgate-Palmolive toothpaste manufactured in Burlington, New Jersey rises because it is priced in $USD.

In 2022, the world does not view Canada as a net energy producer. This is borne out in the statistical data. We do not see currency inflows as a result of higher commodity prices. These inflows in times past helped to ameliorate periods of energy inflation as the price of crude and other energy products had a positive co-relationship with the Canadian dollar. Simply put, if the price of your gas went up, the price of your toothpaste went down. Today, when your home heating bill goes up, so does your Ben & Jerry's ice-cream manufactured in Waterbury, Vermont.

The lack of infrastructure or takeaway capacity exacerbates this issue. Given we are producing roughly 2.4 million barrels per day of heavy oil and roughly 2.25 million barrels per day of condensates and light oils, a $10-30 USD discount to WTI is not immaterial to our economy. This represents a roughly $45-140 mil. impact to our trade surplus daily! We are losing tens of millions a day as Canadians because we cannot get our energy and resources to market efficiently.

Fig.9 | Canadian Energy Discount, WCS vis-a-vis WTI



Source: Thomson Eikon, Dec 2022

Canada has the worlds:

- *largest potash reserves*
- *third largest oil reserves*
- *third largest forested area*
- *fourth largest renewable water resource*
- *sixth largest cultivated land base*

While Canada is roughly the 40th most populated nation, it has the 2nd largest landmass. Simply put, Canadians have an embarrassment of riches. **Our problems are policy problems.**

LNG – A Lost Opportunity to Significantly Reduce Global CO_2 Emissions

LNG infrastructure in Canada would:

1. *Strengthen Canada's currency, reducing the cost of imported goods and thus ameliorating domestic inflation*

2. *Provide royalties to the Crown to subsidize social programs such as healthcare and education*

3. *Reduce global CO_2 emissions*

As shown in figure 8, multiple LNG projects were mothballed or regulated into demise. The economics of Canadian liquified natural gas are compelling. Natural gas turns into a liquid at -160°C. It goes without saying, Canada is a cold country. This provides Canada with a sustainable competitive as the low-cost producer advantage **as it takes energy to cool natural gas**. Chevron and ExxonMobil own jointly a major operating LNG facility off the coast of Western Australia (Gorgon project.) The Gorgon facility is roughly 300 kilometers west of Marble Bar, the hottest town in Australia. Both Marble Bar and the Gorgon facility are located in the Pilbara, a thinly populated region in the north of Western Australia. For 161 consecutive days to April 20, 1924, the temperature of the Marble Bar never dipped below 37.8°C, a Guinness world record.

Satan sat by the fires of Hell
As from endless time he's sat,
And he sniffed great draughts of the brimstone's smell
That came as the tongue-flames spat;
Then all at once the devil looked stern
For there in the depths of Hell
Was a fellow whom never a flame could burn
Or goad to an anguished yell;
So Satan stalked to the lonely scene
And growled with a stormy brow,
'Now, stranger, tell me what does this mean?
You should be well scorched by now.'
But the chappie replied with a laugh quite new;
'This place is too cold by far
Just chuck on an extra log or two
I'VE COME IN FROM MARBLE BAR!

- *The Man from Marble Bar, Victor Courtney*

Cheniere Energy's major operating LNG facilities located in Corpus Christie Texas or Sabine Pass Louisiana are also in relatively hot climates. According to Chevron, "Most of Chevron's LNG production from Australia is committed under binding long-term agreements with major utilities in Asia, with the remainder sold on the Asian spot LNG market." Relative to Australia or the lower 48, the Westcoast of Canada has another major advantage: geography. The northwest coast of Canada is the closest shipping route to many Asian ports. The point here: If the economics work in Australia or the southern 48 states, de facto they work in Canada due to lower shipping and lower energy costs.

As at the writing of this letter, Canadian spot natural gas prices at pricing hub West Coast Station 2 were roughly $3.80 USD per GJ (Thomson Eikon, Dec 2022). Station 2 is located near Chetwynd BC and is in the same general region as the Coastal GasLink pipeline bringing gas from the Montney gas basin to Chevrons Kitimat LNG facility under construction. In 2019, Cheniere energy's liquefaction fees were between $2.25 - $3.50 per MMBtu (million British thermal units is a unit of energy slightly more than a Gigajoule). Given the natural cost advantage of the Canadian climate when compared to Louisiana or Texas, we would reasonably expect the liquefaction cost for Canadian operators to be lower.

As at Dec 29, 2022, current waterborne landed prices per MMBtu for natural gas spot in China is $37.95 USD! If your liquefaction cost are roughly $2.25 USD and your commodity is roughly $3.80 USD and you are selling for $30+ USD that leaves a huge profit even after projected transportation costs! Fully committing to major LNG facilities that were cancelled or withdrawn, this would've helped to:

1. **Increase foreign currency flows into Canada**

    a. Reducing the current $11 billion current account deficit for Q3 2022 strengthening Canada's currency. This likely would cause imported goods such as fruits and vegetables to be more affordable for Canadians.

2. **Open new natural gas plays that are uneconomic due to the de facto stranded assets of Canadian dry gas such as the Horn River basin or the Liard River basin**

3. **Reduce the cost of Natural Gas for large CO_2 emitters, such as China. This would have provided a stable supply of natural gas to Asia and provided an economic substitute to coal.**

In 2018 ExxonMobil and Imperial Oil released a joint statement stating that they had withdrawn their environmental application for the eventual construction of the West Coast Canada LNG facility slated to be built near Prince Rupert.

This facility was estimated to have an annual production capacity of 30 million tons of LNG annually. Each ton of natural gas is roughly 55 GJs. As such, the facility was projected to ship 1.65 billion GJ of natural gas each year. One GJ of natural gas is equivalent to 277.8 kWh of energy. As highlighted in fig. 10 below, each kWh of natural gas produces 490 grams of CO_2, whereas each kWh of coal produces 820 grams of CO_2. This is apples to apples a 40% reduction in emissions per unit of energy**.** Assuming China utilized the gas shipped via the formerly proposed WCC LNG facility to substitute its base load energy needs from coal to gas, (as per figure 12, China generates 61% of its power from coal), this would have resulted in a global emissions reduction of over 150 million metric tons of CO_2!

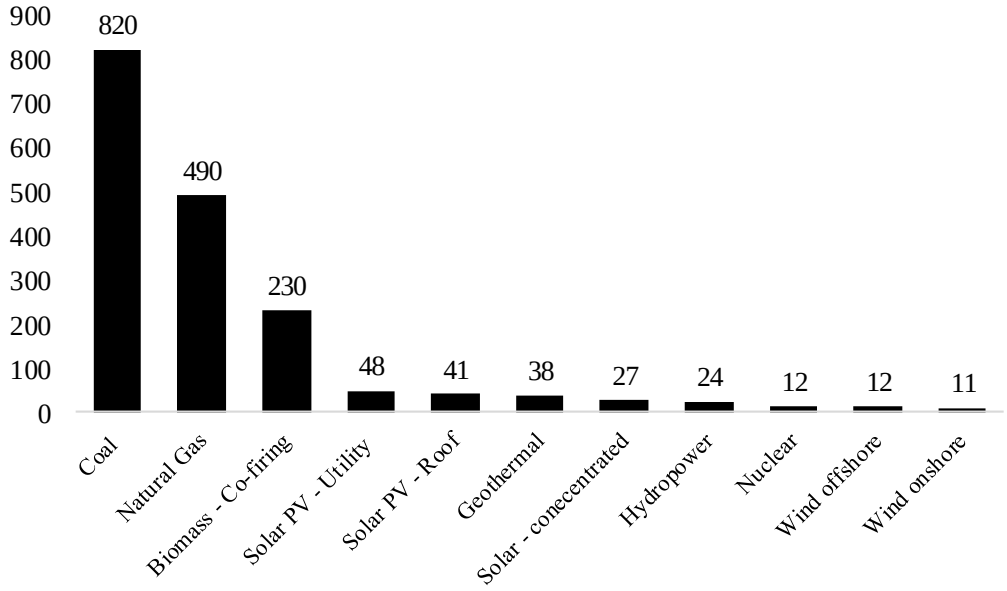
According to the Worldbank as highlighted in figure 11, Canada emits roughly 580 million metric tons per year in CO_2. For perspective, this project would have reduced global emissions by over 25% of Canada's current aggregate CO_2 emissions! Driving away these projects by government was low resolution thinking. Yes, natural gas is a hydrocarbon. But the world's challenges are multifaceted and require considering all stakeholders on a global scale.

Canadian LNG had the opportunity to:

- Create jobs for the middle class
- Reduce inflationary pressures
- Ensure social programs were sustainable
- Reduced global emissions

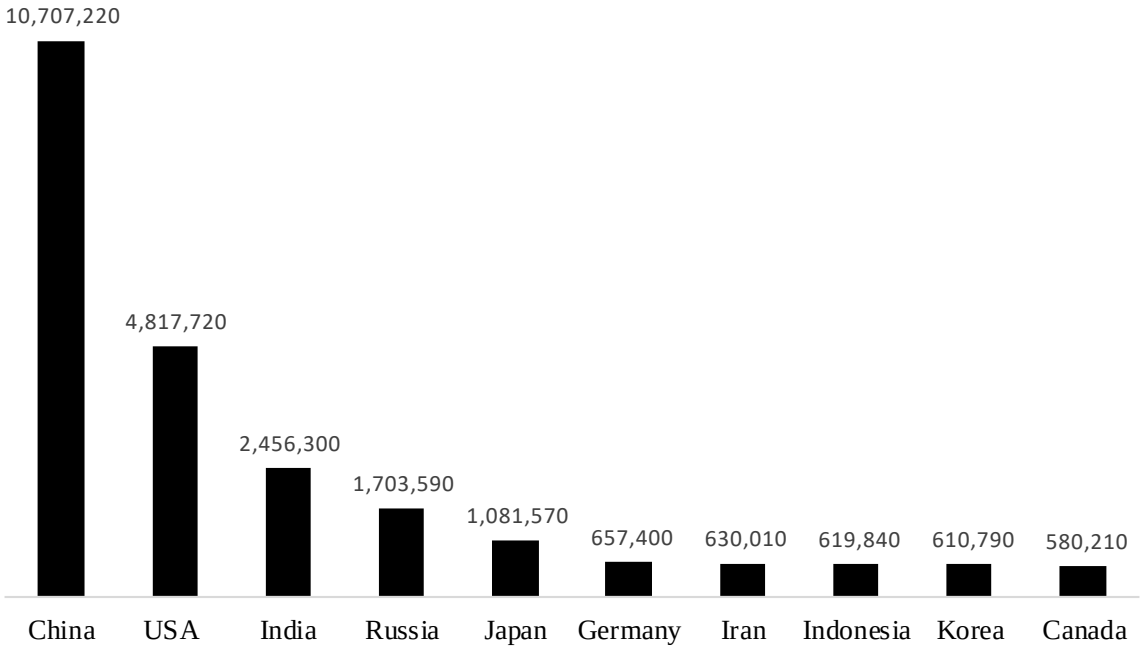
On its face it seems like a win-win-win. That said, the Canadian energy regulatory framework and by proxy the Canadian government made many of these projects untenable.

Fig. 10 | gCO_2 equivalent per kWh



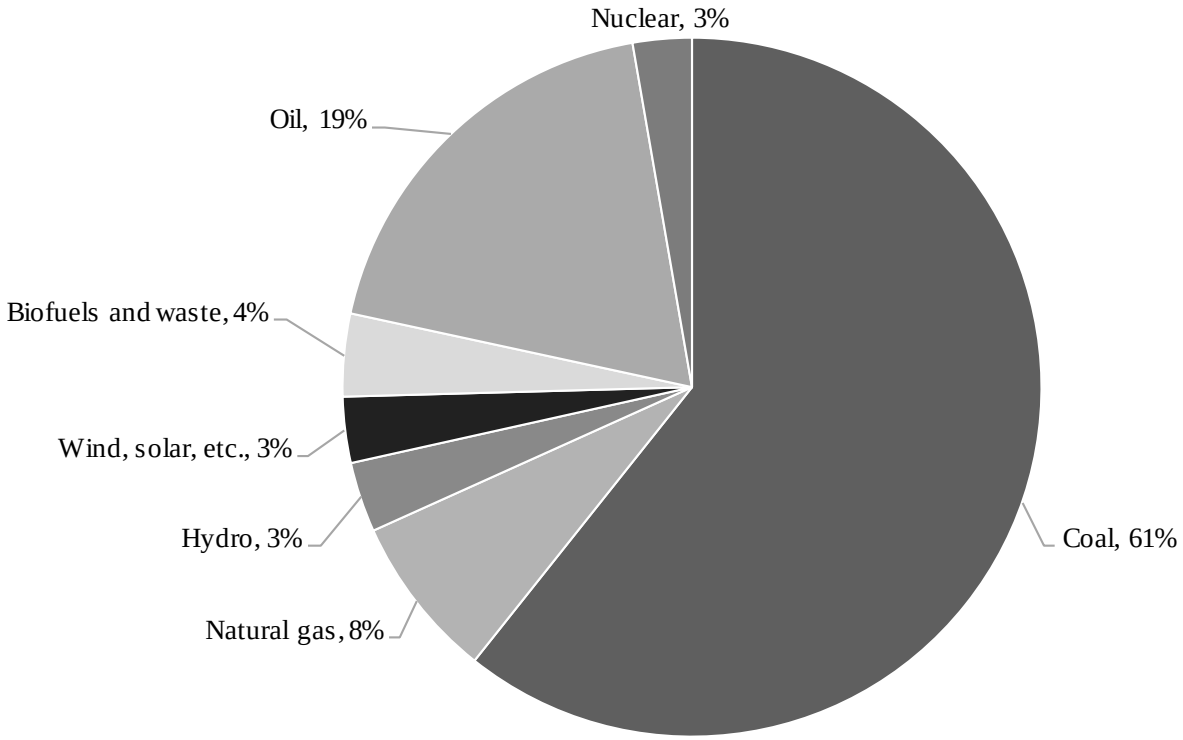
Source: UN Intergovernmental Panel on Climate Change

Fig. 11 | Top 10 Global CO_2 Emitters by Country (kt)



Source: Worldbank, Climatewatch 2020

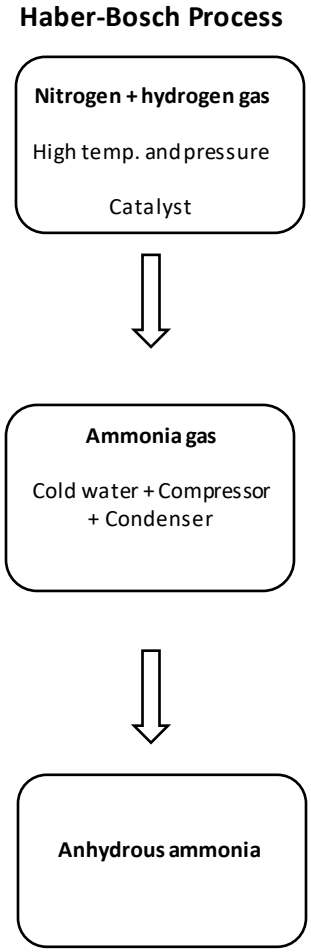
Fig. 12 | China Sources of Energy 2020,



Source: IEA World Energy Balances, 2022

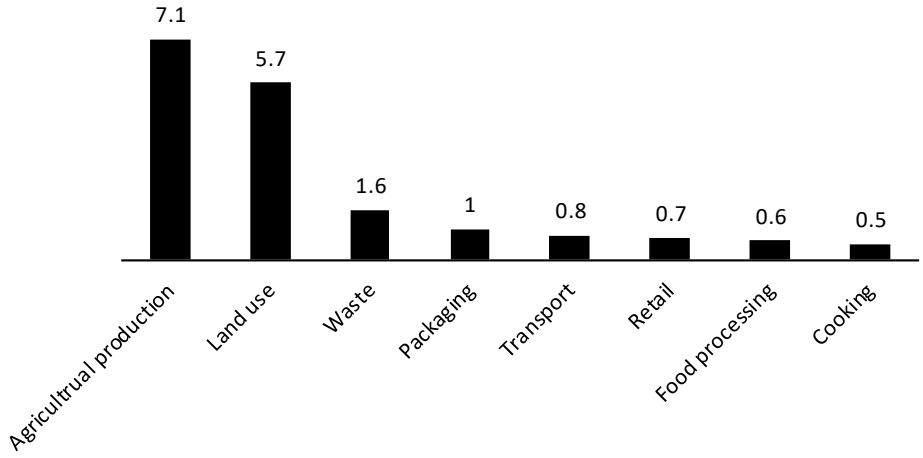
Ammonia Based Fertilitzer

According to the USDA, population growth and rising incomes will cause demand for food globally to rise between 70% and 100% by the year 2050. Moreover, the United Nations estimates developing countries will need to double production of food over this same period. With the global population cresting eight billion in November 2022, the need to feed the world is as acute as ever. A significant contributor to the relative success and abundance of calories globally is the use and implimentation of nitrogen fertilizer. In 1908 German chemist Fritz Haber developed a process to synthesize ammonia from nitrogen and hydrogen gas. What is ammonia? According to the Fertilizer Insitute, most of the natural ammonia in the environment comes from the natural breakdown of manure, dead plants and animals. Nitrogen is required for growing plants and ammonia has the highest concentration of nitrogen of any commercial fertilizer. Vaclav Smil, Professor Emeritus at the University of Manitoba points out that roughly one-third of food production globally uses ammonia from the Haber-Bosch process ("Enriching the Earth," 2004). Moreover, it is estmated that this food production supports roughly half of the world's population. Because of his work, Haber won the Nobel Prize in 1918. Colleagues such as the fellow laureate Max von Laue commented, "[Haber] extracted bread from air."



Anhydrous ammonia is a highly effective fertilizer that helps farmers feed the population and replenish nutrients in the soil. According to Leigh Krietsch Boerner in C&EN, the "Haber-Bosch process…[has] always been an energy-hungry one. The reaction, which runs at temperatures around 500 C and at pressures up to about 20 MPa, sucks up about 1% of the world's total energy production. It belched up to about 451 million tons of C02 in 2010, according to the Institute for Industrial Productivity" (https://cen.acs.org/). The challenge with the process that Haber deveoped is that it requires enormous inputs of oil as Martin Sieff discusses in his work, 'Seven Billion Humans: The World Fritz Haber Made.' Douglas MacFarlane, an Electrochemist from Monash University said, "Most of our food comes from fertilizers. Therefore, our food is effectively a fossil-fuel product. And that's not sustainable" (https://cen.acs.org/).

Fig. 13 | Food Systems Generate One - Third of Global Greenhouse Gas Emissions



Source: *Bloomberg, Our World in Data, Crippa et al (2021), Billion Tons of C02*

The commentary above on ammonia, ferterlizers and CO_2 emmissions is germane because global commitments to reduce CO_2/GHG at events such as COP 27 ultimately puts individual farmers in the crosshairs of multilateral policy to reduce the impact of climate change. Said differently, we can feed people or create less CO_2, **and practically speaking these two items are mutually exclusive.**

The Netherlands is the worlds 2nd largest food exporter according to an article in the Washington Post titled, Cutting-edge tech made this tiny country a major exporter of food. The Dutch have asked their argricultural community to reduce nitrogen emmissions by up to 70% over the coming years. In November of 2022, the Dutch governement offered to de facto seize as many as 3,000 farms setting aside €24.3 billion to fund the property seizure. Facing an excistential crisis, the Dutch farmers turned protestors have plastered government buildings with maneur and set hay bales ablaze. Climate protests not disimilar to the Dutch protests have sprung up in New Zealand, Germany, Italy, Poland and Sri Lanka among others.

The perhaps well intentioned efforts of governments globally to reduce emmissions could potentially, in our estimate, produce very sinister outcomes. Many of the countries most impacted by climate change are also those most impacted by a reduction in global food security. Countries such as those in Sub-Saharan Africa are currently suffering from both drought and famine. Many of the citizens in these countries struggle with abject poverty and are the most vulnerable to rising food prices. The UN Food and Agriculture Organization estimates that the global Food Price Index has moved from a level of 98.1 in 2020 to 135.7 in November 2022: an over 38% increase in two years. The food price index includes five commodity groups: meat, dairy, cereals, vegetables/oils, sugar. While this substantial price increase is frustrating for most in the developed world, it is devastating for all in the emerging economies.

We believe that governments reducing ammonia ferterlizers by fiat will:

1. Reduce the aggregate food production by significantly reducing crop yields
2. Increase food prices as farmers simply pass these higher prices onto consumers

We introduced the concept of price inelasticility above with diesel: higher prices do not necessarily translate to lower demand if the good is essential and does not have adequate substitutes. Food as a category would have a very high price inelasticity of demand. In economic terms, at near zero consumption your marginal utilitiy of food is very high. **Said plainly, those who have the means will do whatever nessessary to eat and survive.**

As a result, any tax on agricultural production, directly or indirectly, will be passed onto the consumer. Those consumers who can afford the higher price for food will of course pay and those who can not will not. We are beginning to see what we believe is just the tip of the iceberg at even Canadian food banks. Food Banks Canada (FBC) reported that in March 2022 "there were nearly 1.5 million visits to food banks in Canada, the highest March usage on record" (*Hunger Count*, 2022). According to FBC, 485,041 of the nearly 1.5 million were children. In Canada, year over year food bank usage is up 15% from 2021. Ironically, the unemployement rate in Canada is historically low during this time, highlighting that wages are not keeping up with the cost of living. **It is modern day financial repression.** The working and middle class spend a disproportionate percentage of their incomes on food and energy, the precise goods we anticipate higher costs on over the coming decade. We expect further carbon tax increases and potential restrictions in ammonia based fertilizers will only exacerbate this issue.

According to the United Nations, food security analysis in countries such as Benin, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Sierra Leone, and Togo found that food insecurity rose 20% in these regions for the last quarter of 2022 vis-à-vis the same period in 2021. We believe many countries on the margin are at risk of famines rivaling those of the Chalisa, Great Leap Forward or the Holodomor. These are the countries most sensitive to changes in energy and food pricing.

Just like owning refineries producing diesel with signficant cash flows, owning the businesses that produce the inputs to food production seems like a good long term relatively safe opportunity. Like a diesel refinery, building a new industrial ammonia plant is likely to encounter signficant regulatory difficulties. Ironically, this faux barrier to entry only serves to make the existing plants more valuable as the inelasticity of the demand for anhydrous ammonia is likely even more signifcant at the extremes than the demand for diesel.

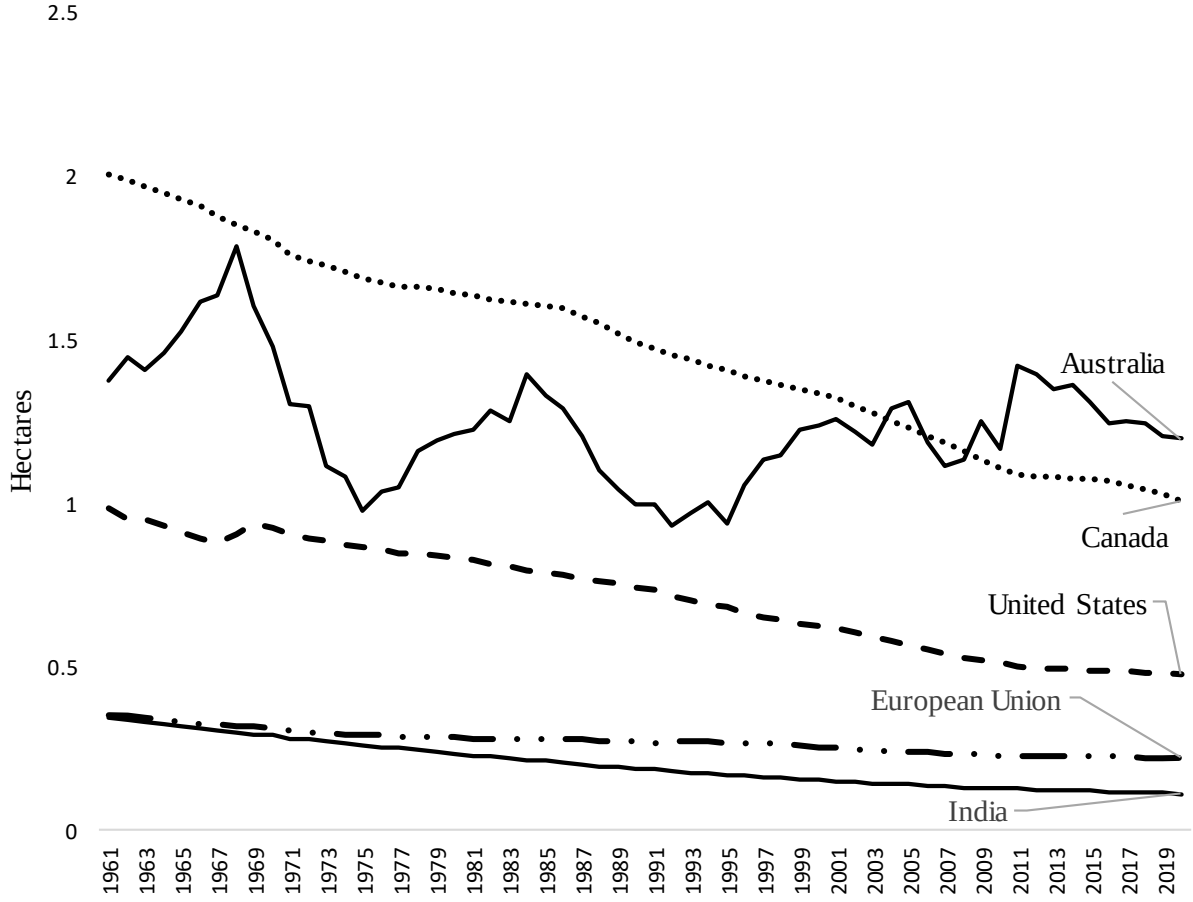
To summarize, we do not expect the global quantity demanded of these fertilizers to reduce, but we do believe policy will cause their price to rise.

The Case for Agriculture

As highlighted in figure 14 below, the world's food is supplied from an ever shrinking land bank per capita. As underscored above, hydrocarbons and ammonia based fertilizers allowed the global population to grow from roughly three billion in 1961 to over eight billion today. Farmland, like gold or a railroad, is an immutable asset. Regardless of how much money governments print to fund unsustainable spending, they can not print farmland. If we juxtapose the money supply in Canada against a hectare of arable farmland, we get the perverse figure on the following page. Said plainly, in 1961 Canada had $281 of cash per hectare of farmland. In 2021, that figure had ballooned to $40,266.49! What asset do you want to own, the cash or the farmland!?

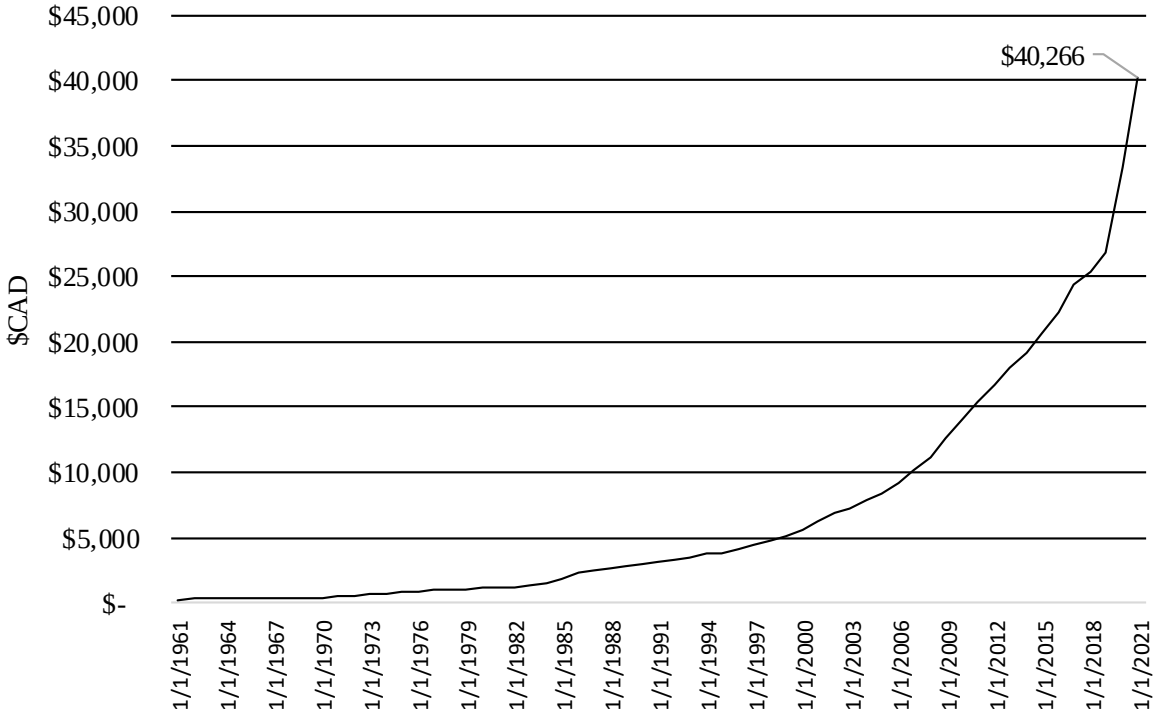
Given the existential nature of agriculture and the inelasticity of demand for food as highlighted above, in times of tumult **we believe having exposure to this asset class directly or indirectly will help to preserve the real dollar purchasing power of your wealth over time.**

Fig. 14 | Ariable Land Per Capita (Hectares)



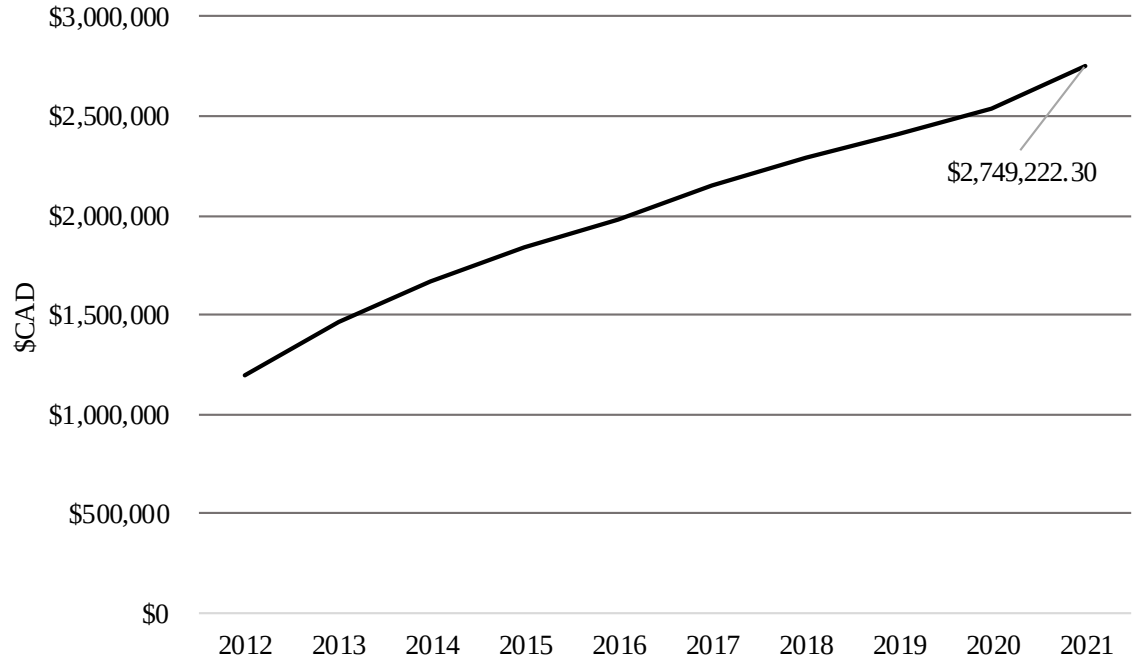
Source: Worldbank, Arable land (hectares per person)

Fig. 15 | M1 Money Supply per Hectare of Arable Farmland



Source: *Worldbank, Arable land (hectares per person), Statscan Population of Canada FRED M1 Money Supply Annual Frequency, Worldbank data for 2021 substituted from 2020 as not yet released, Money supply growth 21% yoy from 2020 to 2021*

Fig. 16 | $1,000,000 Invested in Canadian Farmland Beginning in 2012



Source: 2021 FCC Farmland Values Report

Preamble

In late 2021, we wrote the following in our Annual Letter:

> Here are the options for central banks such as the US Federal Reserve or the Bank of Canada:
>
> 1. Do not raise rates and continue to fan inflation
> 2. Raise rates and cause:
>   a. Increased government deficits or program spending cuts
>   b. Increased corporate bankruptcies
>   c. Increased personal bankruptcies
>
> Perhaps Buck Owens and the Buckaroos accurately summarized this predicament in their 1960s song *Tiger by the Tail*:
>
> "I've got a tiger by the tail, it's plain to see
> I won't be much when you get through with me
> Well, I'm a losing weight and a turnin' mighty pale
> Looks like I've got a tiger by the tail"

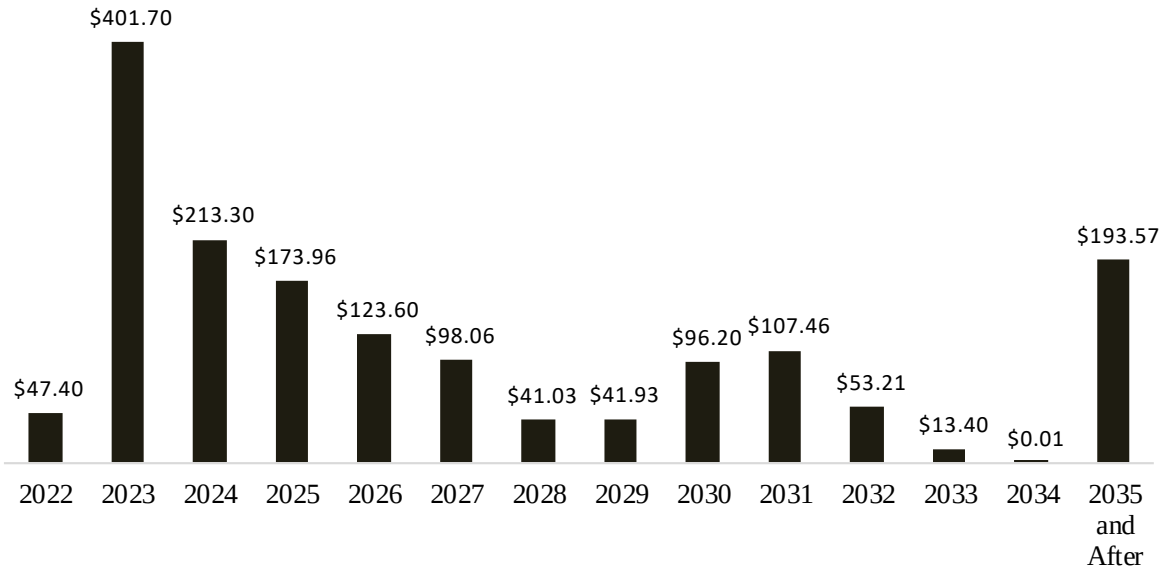
As we highlighted in 2021, the Central banks are in a lose/lose situation: that the potential of raising rates to a long-term average on a sustained basis would cause the USA to effectively default. According to the US Treasury, the current US unfunded liabilities including social security (Medicare parts A, B and D), Federal Debt, Federal employee and veteran benefits, notwithstanding the roughly forty US states with unfunded pension liability was $173 Trillion dollars! On a roughly $24 Trillion dollar GDP, this is 720% of GDP! **These liabilities will be printed.**

The Canadian system faces the same challenges as its southern neighbour, an inability to carry the weight of higher interest rates for a prolonged period of time.

Math on Government Debt

The aggregate Provincial and Federal Government Debt combined is roughly $2,516 billion Canadian dollars (see fig. 17 &18 below). According to the Worldbank, Canada had a population of 38.25 million residents as at 2021. Per capital, Canadians have each individually $65,777.78 of Federal and Provincial debt. This works out to $263,111.11 for a household of four. This does not include municipal debt.

Figure 17 | Government of Canada - Term Structure of Outstanding Gross Debt ($Billions) CAD*



Source: Thomson Eikon, Dec 2, 2022, includes subsidiaries & crown corps such as CMHC, EDC

Fig. 18 | Aggregate Provincial Debt in Billions $CAD

Province or Territory	Total Public and Non-Public Debt ($CAD Billions)
Ontario	$426.50
Québec	$218.96
British Columbia	$91.99
Alberta	$56.97
Manitoba	$28.50
New Brunswick	$21.91
Newfoundland and Labrador	$21.73
Saskatchewan	$15.17
Nova Scotia	$15.33
Yukon	$9.92
Prince Edward Island	$2.34
Northwest Territories	$0.34
Nunavut	n/a
Total	$909.66

According to the *Quarterly Credit Trends* report issued by Equifax as of September 6, 2022, the total consumer debt in Canada has climbed to $2.32 Trillion for Q2 2022. This represents $60,653.59 per capita or $242,614.38 for a household of four. **Total Federal, Provincial and consumer debt in Canada measure on a per capita basis is $126,431.38 or $505,725.52 for a household of four.**

According to the Canadian Income survey conducted in 2020 by Statistics Canada, the median after-tax income of Canadian families and unattached individuals was $66,800. Figure 19 below highlights the percentage of the median family income ($66,800) in Canada required to service additional interest on the household and government debt outstanding ($505,725.52) due to higher rates. We include Government debt in the calculation because ultimately it is the taxpayer who is responsible for the government debt.

Fig. 19 | Percentage of After-Tax Family Income to Service Additional Interest on Government and Consumer Debt

Interest change	Additional Annual Interest Burden	Percentage of After-Tax Family Income to Service Additional Interest
1%	$5,057.26	8%
2%	$10,114.51	15%
3%	$15,171.77	23%
4%	$20,229.02	30%
5%	$25,286.28	38%

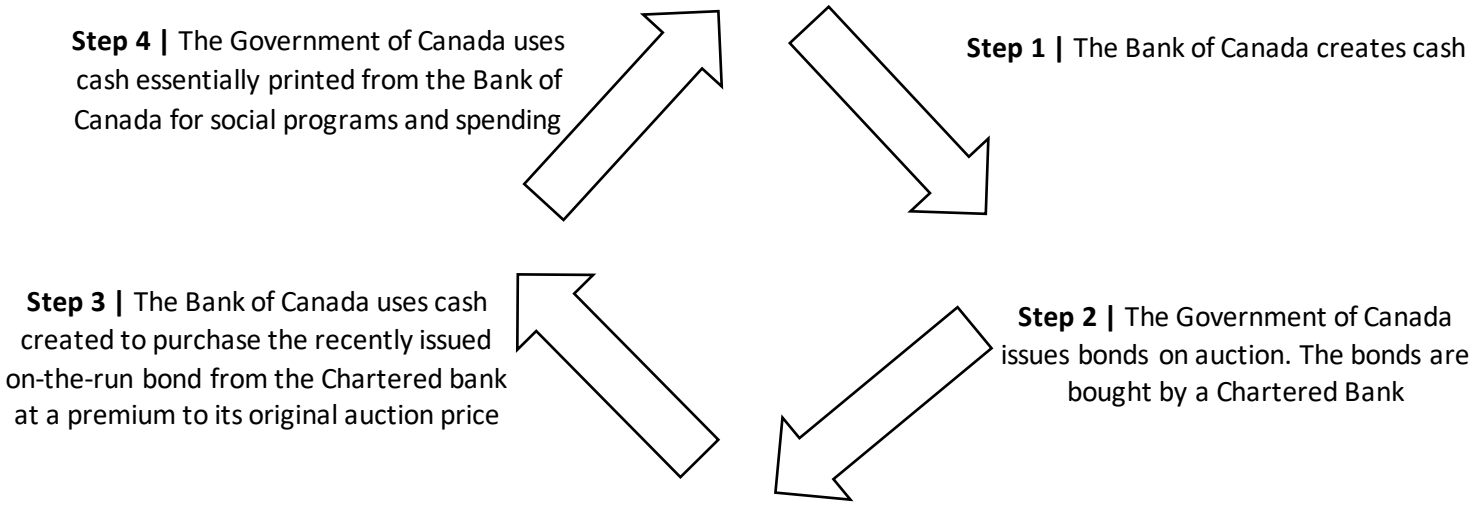
The current Bank of Canada overnight rate has risen dramatically to 4.25% from essentially 0% at the end of 2021. In other words, if the aggregate government debt and personal credit servicing obligation of the median Canadian household cost and additional 4% annually it would require an **additional 30% of their after-tax annual income** to service! According to an Ipsos poll conducted October 2022 for MNP, approximately 46% of Canadians report they are $200 or less away from not being able to meet all their financial obligations including three in ten who say they already do not make enough to cover their bills.

Canadian households are not able to service higher tax rates or consumer interest rates. Ultimately, we believe the Bank of Canada will eventually resort to underwriting the higher financing costs with printed money. **This is structural financial repression of the working and middle class and medium term it will cause inflation in assets, goods and services or both!**

Losses at the Bank of Canada, US Federal Reserve and other Central Banks

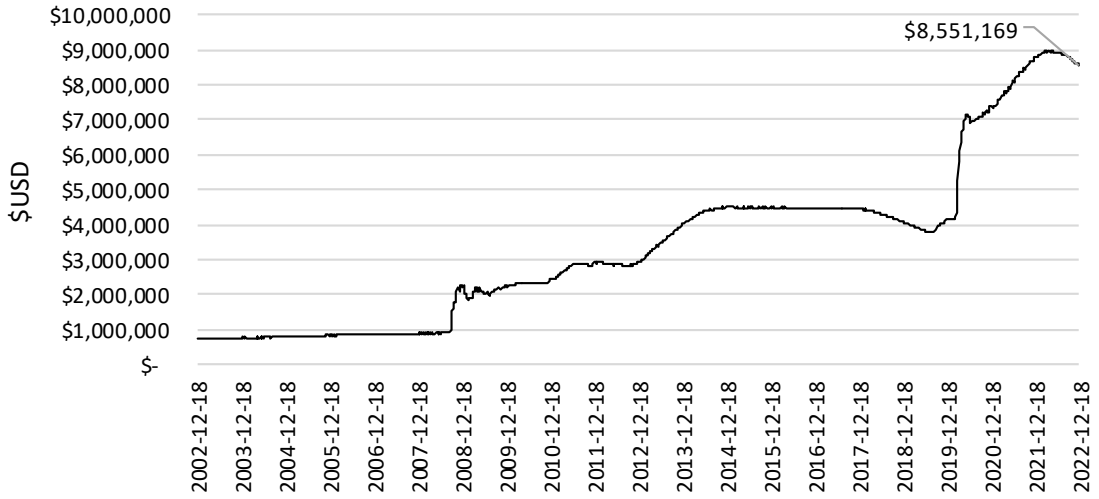
The unintended consequence of central banks printing money during Covid-19: inflation.

Fig. 20 | The Simplified Mechanics of Modern Money Printing



The pause in money printing as highlighted in figure 20 is transitory. Central banks raising rates not only creates problems for governments and households, **but it also creates problems for the central bank itself.** You may recall figure 21 below from our 2021 Annual Letter.

Fig. 21 | US Federal Reserve Total Asssets ($USD Millions)

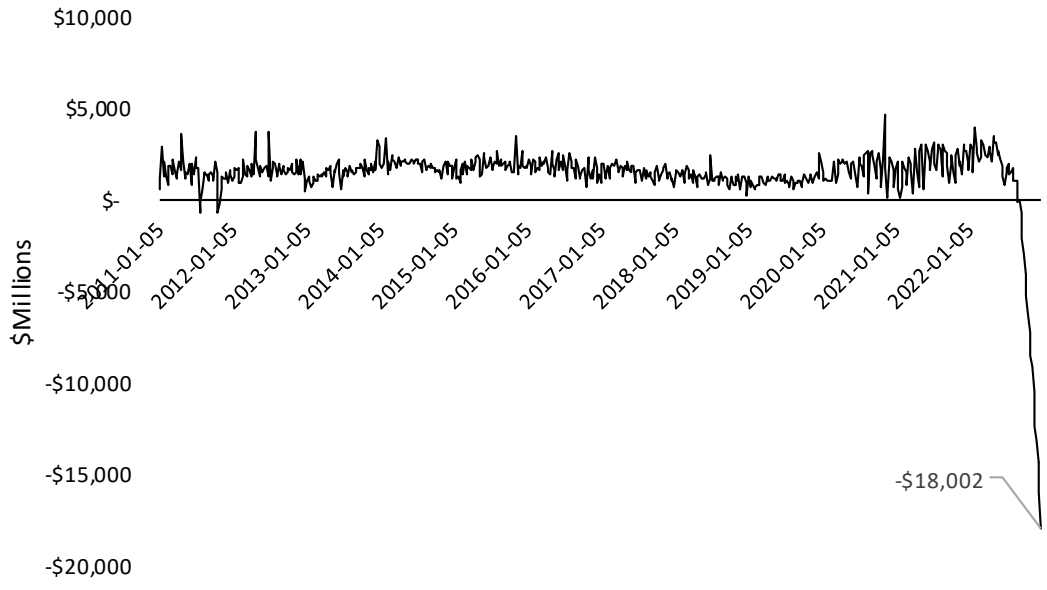


Source: FRED, Dec 2022

This is essentially a measurement of how much cash the Federal Reserve has printed over time. It peaked at roughly $9 trillion $USD in April of 2022. As of December 2022, it is roughly $8.6 trillion $USD. The problem now for the US Federal Reserve is higher interest rates. It is currently paying roughly 400 basis points on reserves and repos more than it was a year ago. The Fed's $8.6 trillion in bonds (assets) pay roughly 1% annually while it is paying roughly 4% annually on its liabilities! Historically, the US Federal Reserve handed the US government billions in profits as it had a positive carry on its bond portfolio vis-à-vis the paltry interest it paid on its overnight rate or repurchase agreements. This has all recently reversed with the Fed losing in excess of $10 billion a week!

Figure 22 below highlights this insane reversal of fortunes for the US Federal Reserve:

Fig. 22 | Weekly Earnings Remittances Due to the U.S. Treasury



Source: Fred, Dec 28, 2022

The Federal Reserve of the United States accounting would make Andy Fastow at Enron blush: The Federal Reserve is accumulating losses in an account labeled 'deferred asset?!' This account is highlighted in the December 14, 2022, release from the US Federal Reserve in note 8:

> The Federal Reserve Banks remit residual net earnings to the U.S. Treasury after providing for the costs of operations, payment of dividends, and the amount necessary to maintain each Federal Reserve Bank's allotted surplus cap. Positive amounts represent the estimated weekly remittances due to U.S. Treasury. Negative amounts **represent the cumulative deferred asset position,** which is incurred during a period when earnings are not sufficient to provide for the cost of operations, payment of dividends, and maintaining surplus. The **deferred asset is the amount of net earnings that the Federal Reserve Banks need to realize before remittances to the U.S. Treasury resume.**

We expect the chart in figure 22 above to continue to run significantly negative as the cumulative losses at the US Federal reserve will compound as a result of the massive negative carry on its Repo or overnight rate vis-à-vis its asset book. These losses may avoid being a political hot potato as they are for the time being accumulating in a Nick Leeson style account (Nick was a rogue trader that broke Barings Bank – worth a google search) and remaining somewhat nebulous to main street. This account may grow in excess of $250 billion should interest rates stay at current levels through 2023. $250 billion USD is more than China spent on defense in 2022 ($229 Billion $USD!). **These losses ultimately undermine trust in our systems and institutions.**

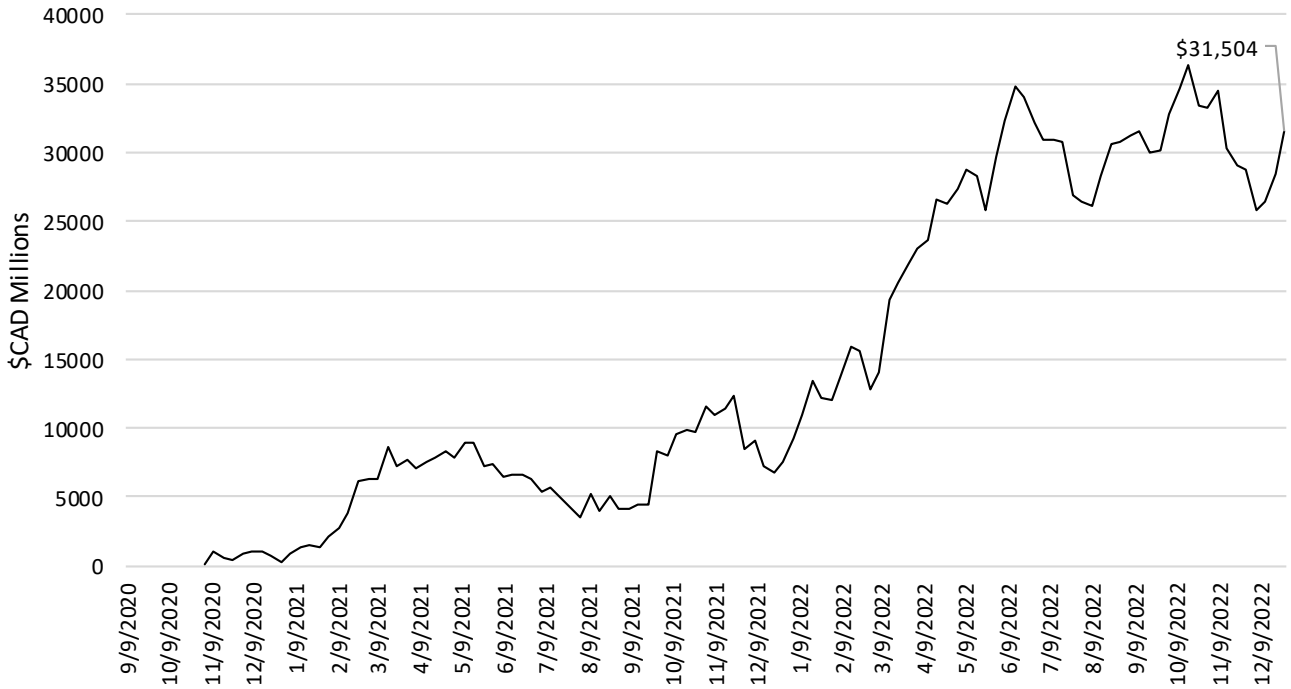
Losses are not exclusive to the Federal Reserve. The Bank of Canada reported a loss of $522 million in 3rd quarter of 2022. **This is a red herring as the Bank of Canada is rolling unrealized losses on its $350 billion bond portfolio into a derivative contract with the Federal Government labeled, 'Indemnity Agreements with the Government of Canada.'**

From the Bank of Canada:

'Indemnity agreements with the Government of Canada' Sept 2021: *"If the Bank decides to sell assets, any losses resulting from these sales within the Government Bond Purchase Program, Provincial Bond Purchase Program, Provincial Money Market Purchase Program, Commercial Paper Purchase Program and Corporate Bond Purchase Program are indemnified by the federal government.*

This account currently has an unrealized loss of $31.5 billion CAD. To contextualize the $30 billion dollar loss, the Federal government ran a $55.6 billion dollar loss in 2009/2010 during the global financial crisis. **The Bank of Canada is running a loss over 50% of the deficit during the global financial crisis through an esoteric derivative account!** As at September 30, 2022, the Bank of Canada was carrying $238 billion in bonds at fair value (with losses rolled into aforementioned account) and had yet to mark to market $114 billion in bonds!

Fig. 23 | Bank of Canada Losses - Indemnity Agreements with the Government of Canada



Source: Bank of Canada, Dec 2022

Other global central bank losses:

1. **Reserve Bank of Australia** recorded a net $36.7 Billion loss, marking to market its bond portfolio
    a. Australia's central bank is technically insolvent as it is in a negative net equity position of -A$12.4 billion. Of course, central banks can bail themselves out with printed money.
2. **Eurozone:** Some economists, such as Daniel Gros, a board member of the Centre for European Policy Studies, have estimated that the European Central Bank (ECB) could lose up to €600 billion over the coming nine years if interest rates rise to just 3% (Politico, Fallen heroes: Central banks face credibility crisis as losses pile up).

Money Printing Supernova and Other Observations

In our 2020 annual letter we discussed the following:

> It's easy to understand why policymakers would want to run massive deficits and bail out both businesses and consumers – it pushes pain, or perhaps responsibility, down the road where perhaps the laissez-faire approach would be too unbearable. The painful experience of the Great Depression still echoes through generations, so much so that its lessons have become the modus operandi of the current global central bank elite."

We opined that the modern central bankers were suffering from endowment bias - fighting the wrong battle. In other words, massive money creation and liquidity injections to keep credit markets functioning in March of 2020 until early 2022 would have long term unintended consequences. Consequences generally of the type that can cause the central bank immense difficulty – inflation.

In the depths of the Covid crisis in early to mid 2020, Central bankers were perhaps too focused on preventing a deflationary crisis such as the Great Depression. The Dow Jones Industrial Average peaked at 381 points in September of 1929 and bottomed at 41 points in the summer of 1932. In other words, the broad stock market index suffered an 89% capital loss from top to bottom. Because you had earned roughly 4% on the index in dividends at the time, and deflation was rampant at roughly 7% annually from 1930 to 1933, the real return after deflation and dividends may have been roughly negative 75% on the Dow Jones Industrial Average. It wasn't until 1954 that the US stock market had earned back its capital loss nominally from the great depression – 25 years after the stock market crashed in '29. The numbers alone buttress the fears of Central bankers in March 2020.

That said, the money printing that occurred in 2020 and 2021 was the greatest policy error in the history of central banking. It resulted in a system that is essentially insolvent. Much of what causes inflation is based on producer and consumer expectations. In past annual letters we purported that inflation was unanchored. This was during a time when the global central bankers were either not talking about inflation or calling inflation transitory.

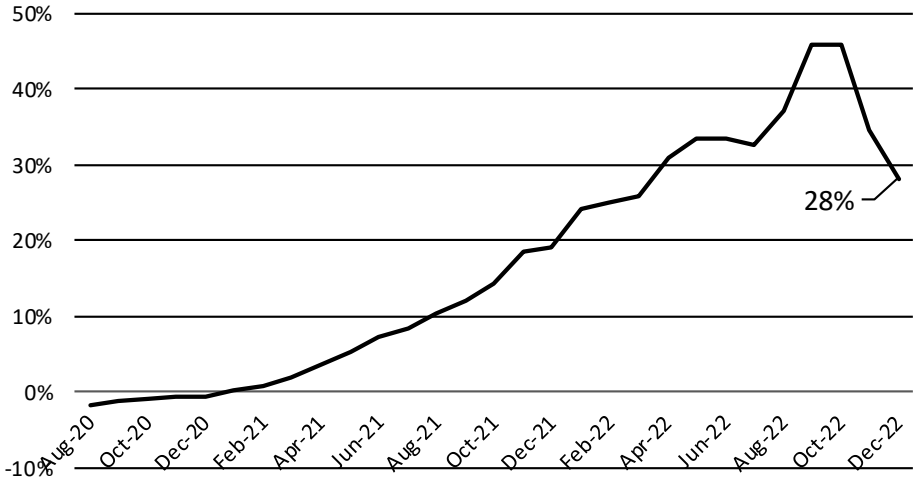
We believe that inflation will be structural because:

1. Central banks requirement to finance insolvent government social programs
2. Taxes on carbon and fertilizers legislate inflation in core goods such as energy or food
3. Higher energy costs due to the restriction of energy infrastructure and investment

Other observations | German Producer Prices

Producer prices are a measure of wholesale inflation. Year over year producer price inflation in Germany peaked at 45.8% in August and September of 2022. Germany is not Argentina or Zimbabwe, countries with consistent and recent histories of hyperinflation. Germany is one of the most advanced economies in the world. Germany has one of the most sophisticated financial systems. So, what happened? An energy crisis.

Fig. 24| German Producer Prices YOY



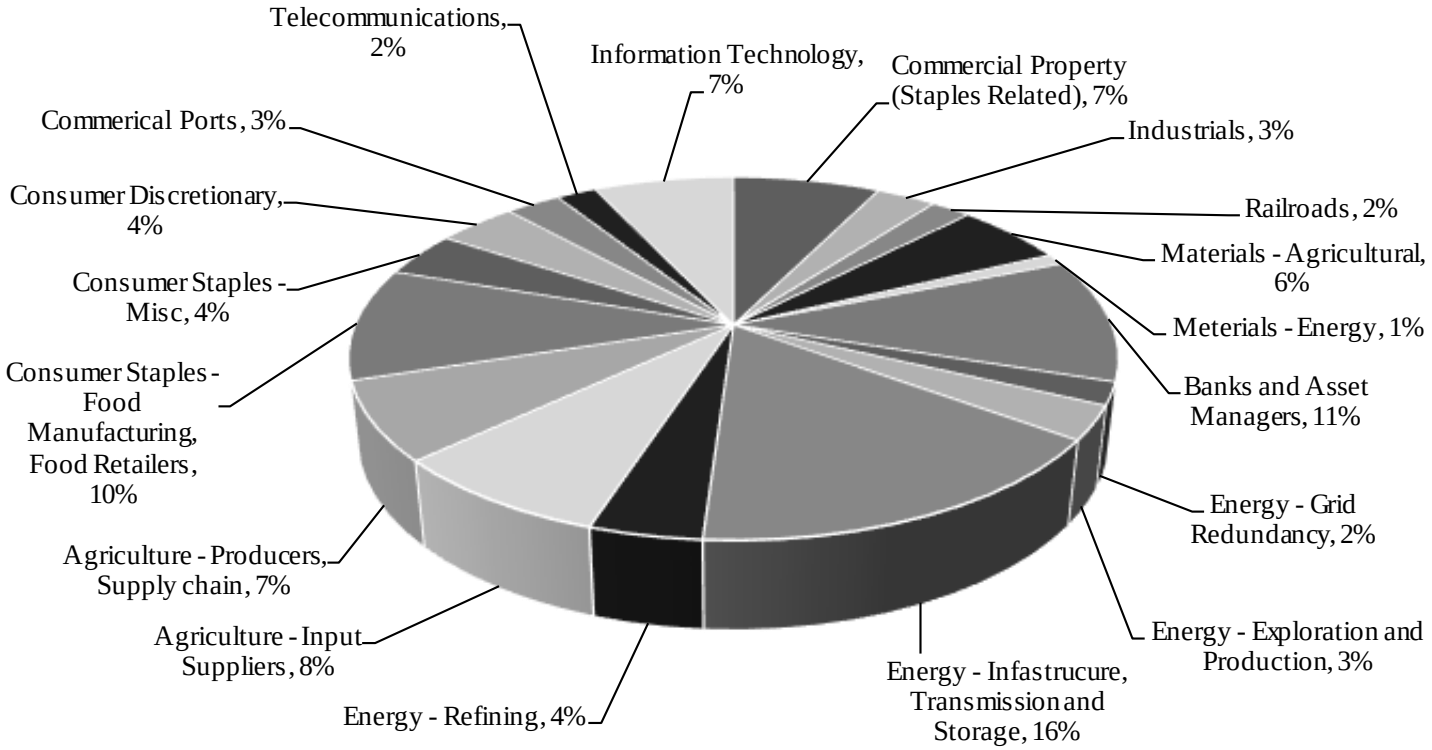
Source: *German PPI, Thomson Eikon, Dec 2022*

The secret sauce of the German export economy was suppressing the Euro by adding countries that were fiscally less prudent (eg. Greece and Italy, among others). This allowed the German manufacturing to benefit from a weaker currency. As a result, BMW or Mercedes became relatively more affordable in North America than had the Reichsmark floated. Also, axiomatic to the success of the German green transition was the dirty secret: Russian energy. Russian energy provided Germany with a base load. Germany could boast about meeting its climate goals, building solar and wind farms across the countryside in Saxony. Meanwhile, this German green transition was underwritten by the natural gas flowing through the Brotherhood gas pipeline network, with production originating at the Yamburg gas field, ultimately reaching end users in Frankfurt. **Cheap Russian energy is over and so is German manufacturing dominance.**

The world is becoming an increasingly complex place. Financial and social systems are, prima facie, completely unsustainable. Food and energy supply chains are undergoing a transition by fiat. We believe these transitions will not materially impact the aggregate quantity demanded of essential goods and services to life. We believe these policy errors will accomplish a structural and sustainable cost of living increase that will materially shrink the middle class. Governments are becoming a larger component of the economy. For instance, the MLI Institute recently estimated the true size of government including tax expenditures and price regulation at 64% of GDP! The government, not just Canada, is also becoming more unsustainable. The wealth gap in Canada and other countries will continue to expand as those with the immutable means of production will have their assets 're-rate' in currencies that are losing both trust and value over time. The longer-term implications of this is beyond the scope of our letter. That said, the nefarious externalities of the wealth gap will likely materialize as extreme populism on either side of the political spectrum. This bifurcation of society will accelerate its own feedback loop, exacerbating the loss of trust in currencies, sustainability of government and institutions.

We cannot fix these issues; we can only observe them and react to them. Our job is to keep you on the right side of the expanding wealth gap by owning real assets that will be able to protect the purchasing power of your wealth over time. Businesses with these assets can raise prices because their customers are simply price takers and must accept the higher prices. If the products are literally existential to the customer, no price is too high. The following highlights how we believe we should be positioning a general portfolio given the commentary and themes in this letter.

The following offers a visual guide to help understand our general philosophy for equity allocation given the themes outlined in this letter. It is not a call to immediate action, but a reflection of the thought process behind portfolios. The allotments can be viewed as a guide while each client's portfolio will always be personalized to their unique situation. We also recommend clients consider appropriate allocations to physical gold, preferred shares and fixed income based on their particular circumstance.



Thank you to our Harmony Team: Michelle, Meagen, Niki, Shelby, Veronika, Anne, Kamran, Julia, and Natalia. We could not be more proud of, or grateful for this passionate group that is relentlessly and tirelessly committed to serving our clients.

Many Thanks To:

Our RBC Portfolio Advisory Team and members of the 3rd party research firm Veritas specifically:

- *Mikhail Pasic, CFA, RBC PAG*

Our partners who continue to add so much value to our clients every day:

- *High Net Worth Specialist/Business Owner Planners*
- *Will and Estate Consultants*
- *Financial Planning Specialists*
- *Estate Planners*

Thank you for the time and energy that you put into thoroughly looking through our client's financial lives to look for areas of improvement and providing peace of mind through life's transitions.

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A special thanks to the lawyers and accountants that help serve our clients - thank you for your flexibility, diligence, and the amazing work you do every day.

Despite the world's turmoil, the focus of our team remains unchanged. We will continue to build and champion an ethical practice focused on:

1. Understanding each client
2. Having an attention to cost and eliminating perceived or potential conflicts of interest
3. Executing on our wealth management promise to provide personalized tax, estate and financial planning

Most importantly, we thank you, our clients, for allowing us to be the financial stewards of your monetized life's work. Your long-term orientation will allow us to help you achieve those goals most important to you.

Grounded by strong sense of ethics and responsibility, we work every day to preserve your wealth. Thank you for your continued confidence.
Please do not hesitate to reach out if you have questions.

Yours Truly,

James K. Law, CFA Jason Gifford, CPA, CMA Kinny Dhaliwal, CFA Chris Weiers, CPA, CMA

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