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Pension funds at a crossroads

Incremental greening or bold climate leadership?

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Summary

Focusing on Canadian pension funds, this paper investigates the forces constraining investors from taking a bolder leadership role in the **net-zero carbon energy transition**. It also examines the forces pushing in the opposite direction—those that, if amplified and synchronized, could lead to changes in investment decisions commensurate with the scale and urgency of the climate crisis. Lastly, it presents strategies to tip that balance that can be implemented by organizations, activists, and researchers working to accelerate pension fund leadership on climate change.

1. Background

1.1 A pandemic shock to the fossil fuel sector

Fossil fuel companies—and the financial markets that sustain them—have been hit hard by the COVID-19 pandemic and resulting economic downturn. Global demand for oil and gas plummeted in the early stages of the pandemic, with oil prices temporarily dipping into negative territory for the first time (Rapier 2020). Fueled by the ongoing price war between OPEC and Russia, the price collapse was the sector's third in twelve years (Barbosa et al. 2020). Meanwhile, the International Energy Agency (IEA) expects new investment in companies producing, refining, transporting, and building infrastructure for fossil fuels to decline by a fifth (nearly USD $400 billion) in 2020 compared with 2019—the largest one-year decrease on record (IEA 2020b). This tailspin is occurring alongside steady decreases in the cost of renewables, which have had higher total returns relative to fossil fuels over the last decade (*Ibid*).

These trends have led fossil fuel majors BP and Royal Dutch Shell to declare that peak oil demand may already be behind us (Ambrose 2020). Meanwhile, energy analysts argue that the oil, gas, and coal industries are in a state of terminal decline (Bond et al. 2020) or may even be entering a "death spiral" as their economic and political clout decline reciprocally (Strauch et al. 2020). For some, these developments offer a tiny glimmer of hope for the prospects of transitioning our energy system towards renewables, meeting our emission reduction targets defined in the Paris Agreement, and limiting global heating to 1.5 degrees Celsius above pre-industrial temperatures.

Despite these trends, fossil fuels still make up about 84 percent of primary energy in the global energy mix (BP 2020)[1] and institutional investors remain committed to the short- and long-term success of the fossil fuel sector. With all this momentum pointing towards the poor performance and escalating **climate risk** (Box 1) of fossil fuel investments, *why do the holdings of most large institutional investors reflect a future where fossil fuel companies (including those planning to significantly expand their operations) continue to produce handsome returns for investors into the 2030s and beyond?*

[1] While fossil fuels currently make up around 84 percent of primary energy, they represent only around 60 percent of useful "final energy" (Rathi 2020). Using primary energy data tends to slightly inflate the magnitude of the challenge of replacing fossil fuels with renewables.

Box 1: Climate risk

Canada's pension funds face three main types of climate risk (Shift 2019; Bank of England 2020):

Physical risk: Potential losses associated with the physical impacts of global heating, including sea level rise, drought, changing precipitation patterns, wildfires, hurricanes, floods, and other extreme weather.

Transition risk: Potential losses associated with failing to anticipate shifts in asset values caused by abrupt shifts in the regulatory environment or the general transition away from high-carbon sectors to low-carbon sectors. Sources of transition risk include the adoption of carbon pricing systems (like a carbon tax) and a decrease in global demand for fossil fuels.

Legal risk: Potential losses associated with individuals or groups seeking compensation for damages stemming from physical and transition risk.

While many investors are taking small, incremental steps to increase green investment and improve the assessment and disclosure of climate-related financial risk embedded within their portfolios, these actions do not come close to reflecting the magnitude and urgency of the climate crisis. Nor do they seem to grasp the risk associated with placing bad bets on fossil fuels and the tremendous opportunities associated with investing in a green economy that is capable of producing healthy returns for decades.

Institutional investors have come under growing scrutiny for their entanglement with the fossil fuel sector and their sluggish response to their climate risk. Divestment and disclosure campaigns have put pressure on pension funds and university endowments, in particular, to align their portfolios with the timeline emphasized by scientists to rapidly decarbonize the global economy and avoid the worst impacts of climate change. But fossil fuel assets are not the only source of climate risk. Aligning investment with the energy transition means that investors must rapidly reduce their exposure to climate risk across their entire portfolio.

Focusing on pension funds, this paper investigates the forces constraining investors from taking a bolder leadership role in the net-zero carbon energy transition. It also examines the forces pushing in the opposite direction—those that, if amplified and synchronized, could lead to changes in investment decisions commensurate with the scale and urgency of the climate crisis. Lastly, it presents strategies to tip that balance that can be implemented by organizations, activists, and researchers working to accelerate pension fund leadership on climate change.

1.2 Carbon entanglement: Pension funds and the net-zero carbon energy transition

Why pension funds?

Pension funds have the potential to be a **high-leverage intervention point** for accelerating the net-zero carbon energy transition. They are particularly important actors when it comes to the energy transition for three reasons. First, pension funds are enormously powerful. They are the largest class of institutional investor, accounting for USD $33 trillion (OECD 2020)—or 45 percent—of all the USD $74 trillion assets under

management globally (Waite et al. 2019).[2] The incredible magnitude of pension funds' collective assets means that they can exert great influence over global markets and produce tangible social and environmental impacts on a scale second only to governments.[3]

Due to the concentration of capital in a relatively small number of funds, Canada's pension funds are particularly influential globally. While Canada makes up only about half of a percent of the global population, it possesses three of the world's 20 largest public pension funds (SWFI Institute 2020).[4]

Fossil fuel companies raise the majority of their investment capital through bank loans and bonds—not through shares.[5] While most of the focus on pension funds' entanglement with fossil fuels focuses on equity (stocks) and real assets (ownership stakes in companies), investment in the bonds issued by fossil fuel companies and bank-issued debt wrapped into bank bonds is perhaps even more significant. A 2020 report from the University of Cambridge's Office of the Chief Financial Officer argues that institutional investors can have a greater effect on the energy transition by moving away from bank bonds laden with the debt of fossil fuel companies (thus discouraging banks from continuing to issue massive loans to fossil fuel companies) than by divesting from fossil fuels in other asset classes (Quigley et al. 2020).

Second, pension funds (particularly public pension funds) have a far clearer social mandate than other institutional investors like hedge funds and private equity funds. Pension funds have long-term investment horizons with a statutory duty to maximize returns in a way that does not compromise portfolio performance over the long-run. As a result, pension funds tend to be relatively risk-averse. In Canada, pension funds also have a statutory duty to manage their assets in the best interest of contributors and beneficiaries. Therefore, one might expect that Canadian pension funds would be particularly responsive to climate change—a problem that a majority of Canadians characterize as a "climate emergency" (Taylor 2019).

And third, pension funds belong to a special class of institutional investor known as **universal owners**, which also includes sovereign wealth funds and university endowments. The financial performance of universal owners is fundamentally intertwined with the performance of the economy at large (Quigley 2019; Hawley and Williams 2000). For example, pension funds require a consistent (and growing) stream of contributions to meet performance goals—but a significant dip in the economy or a prolonged spike in unemployment would compromise their ability to reliably produce positive returns.

Since the fate of pension funds is more or less tied to the fate of the global economy as a whole, they are unable to "diversify away" from systemic risks such as climate change that have significant impacts across all sectors (Quigley 2020). Moreover, the combination of their tremendous financial power and their twinned fate with the global economy has led scholars to argue that they *can* and *should* use that power to actively shape a more

[2] Another commonly referenced source estimates that pension funds managed "approximately half" of the 2018 global investment market valued at USD $85 trillion (Solheim 2018).
[3] One reason for their great influence is that pension funds are closely connected to the world's largest banks who are the primary source of funding for both fossil fuel and renewable energy projects (Quigley et al. 2020).
[4] Canada Pension Plan Investment Board (CPPIB), Caisse de depot et placement du Quebec (CDPQ), Ontario Teachers Pension Plan (OTPP).
[5] According to Cojoianu et al. (2019) 64 percent of new financing for fossil fuel companies comes from bank lending and 26 percent comes from bond issuance.

sustainable economy instead of merely following the timeline dictated by market signals (Williams 2020). The ability of funds to meet their obligation to pay out pensions to beneficiaries in the future is compromised by a failure to stay below the 1.5 degree limit defined by the Paris Agreement. The ability of funds to benefit from stable market growth in the long-term requires that we achieve this goal—which itself requires active participation from asset owners in rapidly shifting capital flows.

How well are Canadian pension funds managing climate risk?

In Canada, pension funds are significantly entangled with the fossil fuel sector, but the total oil, gas, and coal holdings of any one pension fund are difficult to measure precisely. The lack of transparency around the fossil fuel holdings of Canadian pension funds is a well-documented issue (Rowe et al. 2019; Williams 2020; Shift 2019), despite the common claim by pension funds that their holdings are fully disclosed on their websites (e.g., CPPIB 2020). In Canada, pension funds are only legally required to disclose public equities, while other types of investments like private equities, fixed income securities, and investments managed through intermediary funds[6] remain more or less a mystery. For Canada's largest pension fund, the Canada Pension Plan Investment Board (CPPIB), this means that only roughly a third of its portfolio is freely disclosed to the public (Rowe et al. 2019).

Recent investigations into the CPPIB's portfolio have confirmed that the fund is still significantly invested in the fossil fuel sector and that these assets dwarf the marginal increase in green investment over the last few years—a pattern that is common across Canadian pension funds (Rowe et al. 2019; Williams 2020; Shift 2019). Within its public equities portfolio alone, the CPPIB has nearly CAD 12 billion invested in fossil fuels (Shift 2019). According to a recent study conducted by the Corporate Mapping Project, "since reserves are factored into current company valuations, this means the CPPIB has invested billions of dollars in companies whose financial worth depends on overshooting their carbon budget" (Rowe et al. 2019). Meanwhile, disclosed investments in renewables make up a mere 2.2 percent of the CPPIB's current portfolio (albeit with modest recent growth in that area) (FINA 2020).

But what might a pension fund portfolio that *is* aligned with the Paris Agreement commitment (to limiting the increase in global average temperature to well below 1.5 degrees Celsius above pre-industrial levels) look like?

One crude—but rather useful—way to measure this alignment is the extent to which a pension fund's relative share of fossil fuel and renewable energy holdings roughly reflects the energy mix in proposed schedules for ramping down emissions to stay within the remaining carbon budget (Figure 1).[7,8] For instance, in most scenarios consistent with limiting global heating to 1.5 degrees, fossil fuels—which accounted for 84 percent of the global energy mix in 2019 (BP 2020)—must be reduced to around 67 percent of the global primary energy supply by 2030 and to just 50 percent by 2040,[9] with renewables making up 33 percent and 50 percent respectively (Gambhir et al. 2019).

[6] Pension funds are often described as "funds of funds" (e.g. Quigley et al. 2020).
[7] This comparison doesn't account for differences in the energy return on investment (EROI) between fossil fuel and renewable energy investments, nor the fact that some companies' operations involve both fossil fuels and renewables.
[8] A "carbon budget" is the remaining amount of CO_2 that can be emitted while limiting global heating to a specific temperature target.
[9] Such scenarios also assume a significant amount of carbon removal from carbon capture and storage (CCS).

Such a transition requires a dramatic ramp-up of renewables like solar and wind, with annual build-outs in 2030 more than five times larger than the current rate (Henderson et al. 2020) propelled by at least a doubling of current investment (IEA 2020b). However, investment in renewable energy does not immediately translate into a corresponding shift in the global energy mix; it takes years for those projects to be built, integrated into the grid, and to begin producing low- or zero-carbon energy. Therefore, alignment with the 1.5 degree target would actually require that pension funds shift the energy mix in their portfolio several years "ahead of schedule." In other words, to be consistent with the 1.5 degree target, the energy portfolios of pension funds would need to start resembling the 2030 energy mix almost immediately.

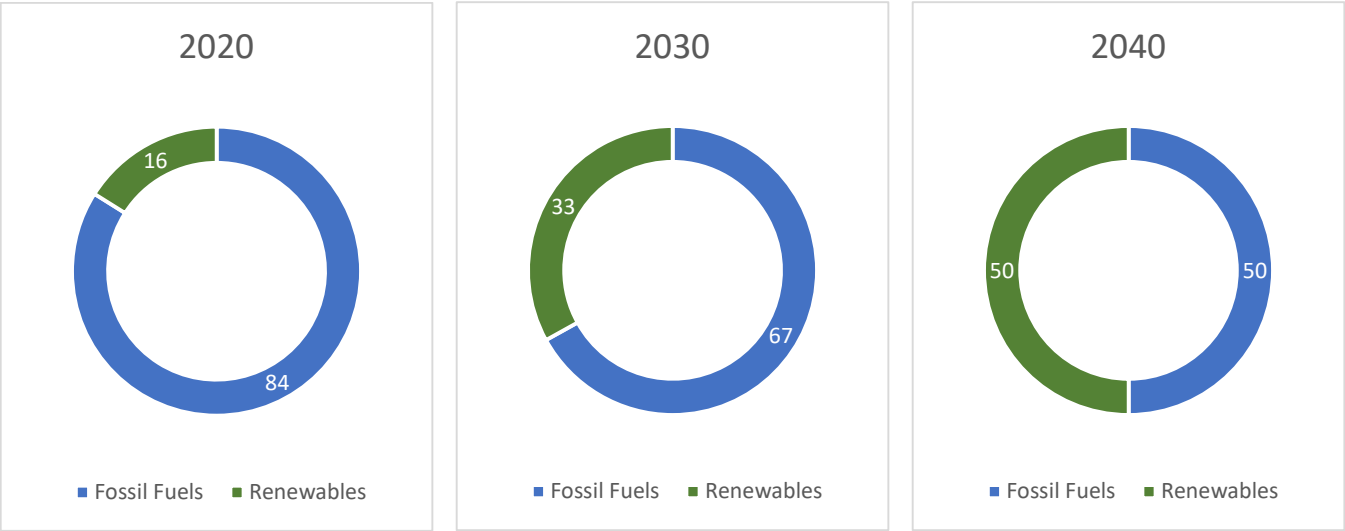

Figure 1: Energy mix allocation consistent with the remaining carbon budget (Gambhir et al. 2019)

According to the CPPIB's own numbers, approximately 2.8 percent of their CAD 409.5 billion portfolio is invested in fossil fuels (or what they refer to as "traditional energy"), while 2.2 percent is invested in renewables. That means that in 2020, approximately 56 percent of the CPPIB's disclosed energy investment is in fossil fuels and 44 percent is in renewables—which appears to put them well ahead of the 2030 target. However, those numbers severely underestimate the total amount of fossil fuel holdings buried in the other two-thirds of their holdings, including private equity, third-party funds, and—most importantly—their fixed income securities (including generic bank bonds packed full of fossil fuel debt). Determining the fund's *actual* fossil fuel holdings, and exposure to climate risk generally, is currently impossible to calculate due to the CPPIB's disclosure practices. But recent investigations show that the CPPIB has significant, undisclosed fossil fuel holdings in other asset classes.[10] Therefore, it is reasonable to assume that the true ratio of fossil fuels to renewables is far less balanced than what they claim.

Technically, aligning pension funds' energy investments with the 1.5 degree target using this rough energy mix benchmark does not *necessarily* require that they rapidly and significantly divest from fossil fuels—so long as investment in renewables grows dramatically. However, it is difficult to imagine a scenario where renewable

[10] Rowe et al. 2021 (*forthcoming*).

energy sources constitute 50 percent of the energy holdings in Canadian pension funds well before 2040 *without* a significant shift away from fossil fuels.

Many of Canada's pension funds advocate **engagement** with fossil fuel companies to improve their practices instead of divesting from them. They argue that divestment does not starve fossil fuel companies of capital but instead increases the likelihood that they will seek investment from less responsible investors or take their companies private, eliminating the opportunity to engage productively with them to improve the sustainability of their operations (Foley 2016). Research on the efficacy of divestment, however, shows that while divesting from public equities has little effect on share price (Hansen and Pollin 2020), the true value of divesting from fossil fuels is freeing up capital to invest in high-impact green investments and sending important signals to banks and governments (Quigley et al. 2020).[11] Proponents of engagement also argue that fossil fuel companies are, and will continue to be, crucial players in the renewable energy sector—a claim that has been strongly disputed by recent research (OCI 2020).[12] Pension funds have also expressed resistance to screening out fossil fuel companies and other high-carbon investments from future investments, again pointing to engagement as a cure-all.

However, a blanket commitment to engagement misses the mark. Clearly some companies—particularly those that are not transitioning to renewables or taking significant steps to decarbonize their operations—are not worth the significant resources required for effective engagement. For example, Crestone Peak Resources, a Colorado-based fracking company formed by the CPPIB, made over USD $600,000 in donations to Republican political action committees and candidates opposing fracking restrictions in 2018 (Williams 2020; Milstead and Curry 2020). It is difficult to reconcile investments like these with a genuine commitment to engagement and minimizing the fund's exposure to climate risk. When engagement *is* successful it requires that investees that are fully on board and supportive of investor engagement (Wagemans et al. 2018). However, the lack of transparency around pension funds' fossil fuel holdings and the nature of their engagement strategies with these companies makes it impossible to evaluate the quality of these relationships.

Therefore, the position taken in this paper is that pension fund alignment with the Paris Agreement target requires, at the very least:

1. Transparent engagement with good faith[13] fossil fuel companies the fund is already invested in (especially those with firm commitments and timelines for rapidly shifting their operations to renewables);
2. divestment from fossil fuel companies lobbying against climate change regulations and projects, and companies where productive engagement is unlikely or can not be scrutinized by contributors;

[11] For a thorough examination of the efficacy of engagement and divestment, see Appendix IV in Quigley et al. (2020).
[12] For a counterpoint, see Cohen et al.'s (2020) analysis of "green patent" trends that finds that oil and gas companies tend to produce more, and significantly higher quality, green innovation than other firms.
[13] Here, "good faith" is defined as: (1) establishing emission reduction goals and timelines that are aligned with the urgency of the climate crisis, (2) using targets and benchmarks that do not rely on unrealistic assumptions about carbon removal technologies, (3) avoiding capital expenditure that "locks in" fossil fuel production growth, (4) ceasing all lobbying activities against ambitious climate policy, regulations, and projects, and (4) earnestly engaging with investors to pursue these established goals.

3. screening out new fossil fuel investments entirely *unless* they have firm commitments and timelines for rapidly shifting their operations to renewables and can be engaged with transparently and in good faith;

4. rapid growth in renewable energy and green technology investment on a scale and timeline that mirrors the energy system transformation needed to stay within the remaining carbon budget; and

5. the expedited adoption of the TCFD's disclosure recommendations so that pension fund contributors and beneficiaries are able to (a) track growth in renewable energy and green technology investments, (b) track investment in fossil fuel companies and the quality of engagement, and (c) assess the fund's total exposure to climate risk.

It is worth noting that Canadian pension funds have made modest improvements over the last few years in the assessment and disclosure of climate risk—a movement led by the Task Force on Climate-related Financial Disclosure (TCFD). The TCFD has set out a series of recommendations for institutional investors to rapidly improve their governance structure, strategy, risk management tools, metrics, and transparency to enhance the assessment and reduction of climate risk in their portfolios. The degree to which these recommendations have been acknowledged and implemented by Canadian pension funds varies greatly (Table 1). While a fund like Caisse de dépôt et placement du Quebec (CDPQ) has shown promising (albeit incremental) progress towards improving its disclosure of climate risk, all of Canada's largest pension funds still lag far behind global leaders in the implementation of the TCFD's recommendations (Shift 2019). Promisingly, Canada's eight largest pension funds recently issued a joint call urging corporations to improve their disclosure of climate risk (Kiladze 2020).

Starting Line	Getting Started	Rising to the Challenge	Pulling Ahead
Ontario Municipal Employees Retirement Fund (OMERS)	British Columbia Investment Management Corp. (BCimc)	Ontario Public Service Employees Union Pension Board (OPTrust)	Caisse de dépôt et placement du Quebec (CDPQ)
Ontario Pension Board (OPB)	Alberta Investment Management Corp. (AIMco)	Public Sector Pension Plan (PSP)	
Hospital Employees of Ontario Pension Plan (HOOPP)	Canada Pension Plan Investment Board (CPPIB)	Ontario Teacher's Pension Plan (OTPP)	

Table 1: Evaluation of Canada's ten largest pension funds on their approach to climate change (reproduced from Shift 2019)

Overall, Canadian pension funds appear to be slowly drifting towards more sustainable investing practices—but at a pace that suggests a belief among pension fund managers that rapidly decarbonizing the global economy is either futile or not their responsibility. Both of these possibilities are explored in more detail in the Analysis section below.

A crossroads: Incremental greening or bold climate leadership

Canadian pension funds are at a crossroads. In one direction they can continue the **incremental greening** of their holdings. This status quo will likely expose these funds to significant climate risk as governments impose increasingly stringent climate policies, as energy markets tip towards renewables, and as fossil fuels become stranded assets.

In the other direction, Canadian pension funds can carve an alternative pathway towards **bold climate leadership**. Taking bold leadership on climate change means adopting a broader view of pension fund directors and managers' statutory and fiduciary duties towards beneficiaries, strengthening the commitment to intergenerational equity, and playing a leadership role in shaping markets instead of merely "playing" them. These two pathways are summarized in Table 2.

Incremental Greening	Bold Climate Leadership
1. Issuing public statements acknowledging climate change and climate risk 2. Gradual adoption of TCFD recommendations 3. Putting engagement with fossil fuel companies at the center of their strategy to reduce exposure to climate risk 4. Reacting to market signals (i.e, being a "market player")	1. Making bold, clear, specific statements acknowledging climate change and climate risk – and outlining a strategy with clear, specific actions and timelines to address it 2. Committing to an accelerated timeline for adopting TCFD recommendations 3. Acknowledging the special role pension funds must play in they decarbonization of the global economy as universal owners 4. Sending out market signals by proving that their portfolio can be aligned with the remaining carbon budget while also producing strong returns (i.e., being a "market shaper")

Table 2: Two pathways for pension fund participation in the net-zero carbon energy transition

2. Analysis: Assessing the prospects for bold climate leadership

This section analyzes the forces pulling on Canadian pension funds that will either lock them into their current pathway towards incremental greening or pull them onto a new trajectory towards bold climate leadership. While some of these factors are the direct result of the COVID-19 pandemic and its impact on energy markets in particular, most of them have been building for years. Figure 2 summarizes these constraining and accelerating forces using the metaphor of a tug-of-war. It also highlights three ambiguous forces could strengthen the factors on either side of the rope.

The tug-of-war metaphor is useful because it illustrates the possibility of two important complex system dynamics: (1) abrupt, nonlinear change and (2) hysteresis—or the inability of a system transformation to be rewound or undone along the same causal pathway. Once a participant loses their footing, loosens their grip on the rope, or raises their center of gravity, a tug-of-war can end abruptly. And once the momentum begins to shift, there is often no way to reestablish one's advantage.

Of course, none of these forces exist in a vacuum. Interactions between forces create the possibility for positive feedbacks and nonlinear change towards bold climate leadership. These interactions—and the possibility that they can be "triggered" or accelerated by current and future pension beneficiaries, activists, and researchers—are explored at the end of the section.

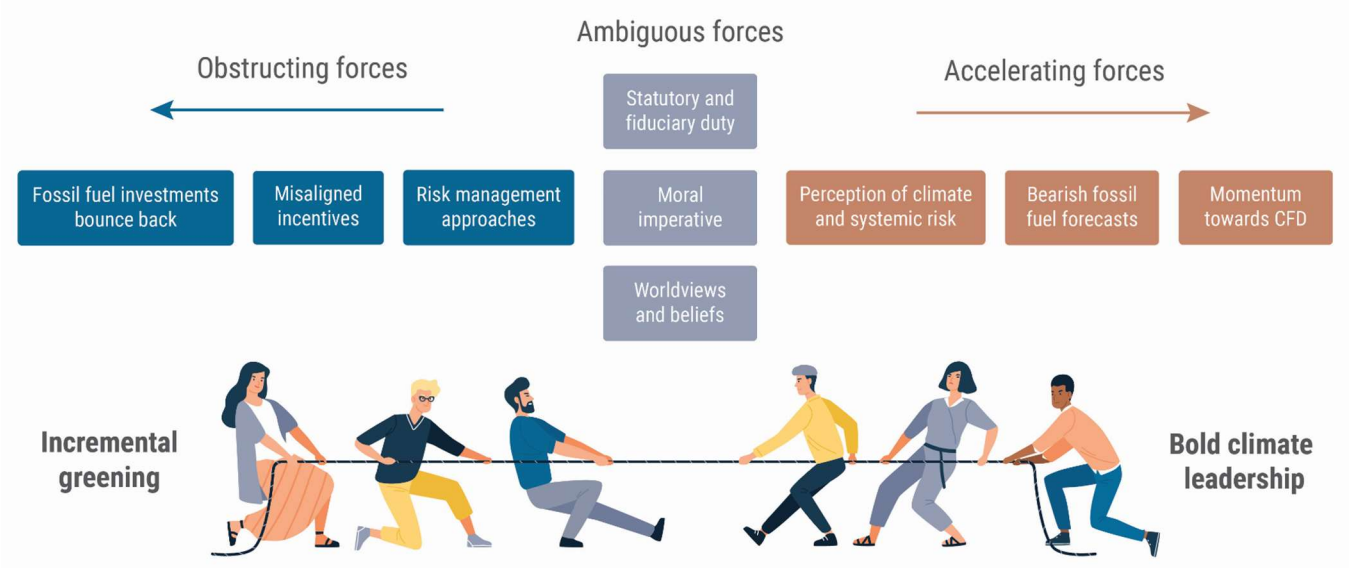

Figure 2: tug-of-war diagram illustrating key factors.

2.1 Forces obstructing bold climate leadership

1. Fossil fuel investments bounce back
2. Misaligned incentives
3. Inadequate risk assessment tools and approaches

Fossil fuel investments bounce back

Global energy demand is not expected to return to pre-pandemic levels until early-2023 (IEA 2020c) and Goldman Sachs suggested that global oil supply could follow an "L-shaped" path and may never fully recover to pre-pandemic levels (Sardana 2020). However, most Canadian pension funds still managed to meet their performance goals in 2020 despite a significant hit to their fossil fuel holdings. For example, CPPIB reported a 3.1 percent return for their last fiscal year despite a 23.4 percent hit to their Energy and Resources portfolio (Milstead 2020). Looking ahead, there is a distinct possibility that pension fund managers will be willing to wait

out another few years of volatile energy markets with the hope that their fossil fuel holdings will bounce back in the medium-to-long-term.

Recent comments made by pension funds appear to reflect this course of action. For example, the Global Head of Public Affairs and Communications at CPPIB, Michael Leduc, recently reaffirmed the fund's commitment to investing in—and working with—fossil fuel companies who they view as powerful "agents of change" and "instrumental players" in addressing the challenge of climate change (Kolivakis 2020). Leduc also commented on the CPPIB's goal to shape its portfolio "in step with the evolution from traditional to renewable sources over the *next decades*"[14]—suggesting a radically different timeline for the fund's disentanglement from fossil fuels than one that is consistent with a 1.5 degree target.

Misaligned incentives

A 2017 report released by the OECD summarizes the main obstacles facing institutional investors like pension funds to incorporate environmental, social, and governance (ESG) factors into their investment strategies and rapidly decarbonize their holdings. Among these obstacles, misaligned incentive systems are perhaps the most difficult to address. Institutional investors tend to evaluate the performance of executives and directors over three-to-five-year time horizons with manager remuneration incentives often tied to annual performance metrics (OECD 2017). These relatively short timeframes may incentivize fund managers to make decisions that prioritize short-term performance at the expense of de-risking their portfolio over a larger time horizon. Meanwhile, support for adjusting remuneration incentives remains low. A 2019 survey of signatories to the UN Principles for Responsible Investment found that only 32 percent of institutional investors describe the inclusion of ESG metrics in short-term incentive plans as "very important" (Morrow Sadali 2019).

Another factor constraining the ability of pension funds to make meaningful changes to their energy portfolios is the industry's reliance on relative performance evaluation incentive schemes. Compensation is often linked to the performance of other funds, which makes it difficult for managers to pursue less familiar investments not found in the portfolios of their competitors, such as those reflecting ESG factors (Himick 2011). Investors that are the first to identify and act on a climate risk (either by divesting from a risky asset or investing in a greener asset) will underperform the market until other investors follow suit (OECD 2017). This "first-mover disadvantage" is fundamentally at odds with leadership because it rarely pays for pension fund managers to stick their necks out. From this perspective, it is better for everyone to lose than for a single fund or fund manager to risk losing on their own.

The markets themselves also disincentivize the rapid investment in renewables and other investments that perform well on ESG metrics. New and unfamiliar "environmentally-focused asset classes" such as green bonds sometimes receive additional regulatory scrutiny, leading them to be classified as "alternative investments"—which adds another obstacle for risk-conscious investors (OECD 2017). Since most ESG investments are equities, funds attempting to de-risk their portfolios by turning towards high-grade bonds may avoid those investments altogether. Lastly, organizational dynamics within a particular fund may also play a disincentivizing role. While

[14] Emphasis added.

many pension funds in Canada are rapidly trying to develop internal expertise on emerging markets like renewables, they have built up their expertise on fossil fuels over decades. These voices within the organization may have a disproportionate influence on investment strategy.

Inadequate risk assessment tools and approaches

Pension funds' primary tool for managing risk is portfolio diversification. Modern Portfolio Theory (MPT)—the dominant ideology in institutional investing—asserts that (assuming reasonably good information) market prices reflect most risk that is material to the investor, including physical climate risks and risks stemming from an uncertain, shifting regulatory environment. From this perspective, investors will automatically make smart gambles with risky investments because that risk will be reflected in their price. The responsibility of the investor is, therefore, to "diversify away" security-specific risk by investing across the entire market (OECD 2017).

One common argument from investors is that decreasing fossil fuel holdings or moving too quickly into renewables hurts their ability to sufficiently diversify their portfolios and thus would actually serve to increase risk exposure, not decrease it. However, MPT has been criticized for its inability to account for abrupt, discontinuous risks like a sudden drop in the value of fossil fuel assets from the removal of subsidies or the implementation of a carbon pricing system (Beyhaghi and Hawley 2013). From this perspective, market prices ignore or underestimate much of the risk associated with fossil fuel assets and other assets misaligned with the energy transition—and therefore, it is up to investors to price that risk into their models.

Meanwhile, conventional risk assessment tools used by pension funds also struggle to integrate measurements of climate risk and other environmental factors. Standard value at risk (VaR) models have trouble with emerging or rapidly evolving sectors because they tend to extrapolate future performance using robust historical data—which does not exist for renewables or emerging technologies. Physical and regulatory risk associated with climate change is clouded by deep uncertainty and is thus difficult to precisely quantify and integrate into VaR models.

However, pension funds are trying to counteract the biases and limitations of conventional risk assessment tools. New tools advocated by the TCFD (TCFD 2020), such as carbon footprinting and scenario analyses are increasingly being developed and deployed to assess climate risk. However, the mainstream implementation of these tools is limited by the lack of standardized data and risk metrics and the "non-monetary" or qualitative nature of climate risk (OECD 2017). Consequently, climate risk is typically integrated into financial risk assessments as a qualitative "score" that is paired with a quantitative assessment of financial risk. The separation of these assessments can have the effect of relegating the assessment of climate risk to a mere "check-box" exercise. Lastly, disciples of MPT may believe that climate risk assessment serves to skew the true risk value of the asset because if climate risk is already reflected in the market price, a separate climate risk assessment would essentially "double count" the risk.

2.2 Forces for accelerating bold climate leadership

1. Evolving perception of climate and systemic risk
2. Bearish fossil fuel market forecasts
3. Momentum towards climate-related financial disclosure

Evolving perception of climate and systemic risk

The most powerful force pushing pension funds towards bold climate leadership is the increasingly urgent and material reality of climate change itself. While the decrease in global economic activity during the pandemic has led to a notable decrease in global emissions (Le Quéré et al. 2020), scientists believe that this temporary dip[15] is unlikely to buy us any more time to spend the remaining carbon budget (Forster et al. 2020; Weber et al. 2020).

Since the Paris Agreement took effect in 2016, several developments have raised the already daunting stakes and urgency of the climate crisis. With the publication of a Special Report in 2018, the Intergovernmental Panel on Climate Change described how the impacts of limiting global heating to 2 degrees would be *significantly worse* than limiting global heating to 1.5 degrees (IPCC 2018). Research on climate tipping elements—like the ice-albedo feedback activated by the collapse of the Western Antarctic and Greenland ice sheets—has become much more sophisticated over the last four years. Scientists now warn that such tipping events may be triggered at an increase in global temperature of just 2 degrees (Steffen et al. 2018). Meanwhile, optimistic projections of global heating with existing emissions reduction commitments (that most countries seem unlikely to meet) have us on pace to exceed 3 degrees above pre-industrial temperatures by 2100 (Hausfather and Peters 2020).

As states scramble (and mostly fail) to implement sufficiently ambitious plans for meeting emissions reduction goals, climate change is already wreaking havoc around the world. The mounting human and financial toll from climate change-induced droughts, hurricanes, wildfires, and rising sea levels poses immediate physical risks to pension fund holdings and presents them with a sneak preview of the hostile investing environment they will be facing in coming decades if bold steps are not taken.

Meanwhile, the opportunity window for an orderly, "managed decline" of oil and gas production may have already closed (Strauch et al. 2020), producing transition risks from an even less predictable regulatory environment. With US President-elect Joe Biden's pledge to reenter the Paris Agreement and enact policies to achieve net-zero emissions by 2050 (Regan 2020), the global climate change governance regime could change drastically over the next few years. Investors like pension funds face deep uncertainty around the regulations that will be implemented in major economies like the United States, and thus face significant risk around stranded assets and abrupt changes in the value of key investments.

Like the 2007-2009 financial crisis, the COVID-19 pandemic was yet another "black swan" event that broke conventional risk models. Abrupt, discontinuous risk is increasingly becoming the new normal—and therefore, claims by investors of being blindsided by economic shocks are increasingly disingenuous. If the models used by institutional investors are incapable of effectively factoring in climate risk, then investors urgently need new,

[15] This statement makes a rather large assumption that the global economy will return to pre-COVID levels of activity and energy consumption in the next few years. For a discussion on recent claims that we may be headed for a prolonged "Greater Depression," see Lawrence and Homer-Dixon (2020).

more sophisticated models. Some might view the fact that pension funds were able to weather the COVID-19 crisis relatively unscathed—despite major losses in fossil fuels—as proof that broad portfolio diversification is a sufficient strategy for managing climate risk. However, climate change impacts and regulatory shocks will soon have profound impacts on every sector of the economy. The only effective risk management strategy is to rapidly move away from the riskiest assets and towards investments like renewables whose success is a *necessary condition* for reducing systemic climate risk across the entire economy.

Bearish fossil fuel market forecasts

Major oil companies predict a ramp-down in the global production of oil with big write-offs of assets deemed profitable only a year or two ago. At the very least, investors will need to increasingly scrutinize the operations of fossil fuel companies and abandon the riskiest (and most carbon-intensive) classes of oil and gas. The pandemic has also negatively impacted the global supply of renewables as a result of construction delays and the decrease in global energy demand. However, the IEA expects the sector to rebound strongly in 2021 (IEA 2020a). It remains a possibility that, as long as the fossil fuel sector continues to trend downwards, the markets will make pension funds' decision to shift away relatively easy. However, there is certainly no guarantee that the markets will send sufficiently strong signals to pension funds to give up on an increasingly hopeless sector.

Momentum towards climate-related financial disclosure

Despite this paper's criticism about the pace at which Canadian pension funds are implementing the TCFD's recommendations around disclosure and governance, we know that these conversations—around ESG, climate risk, and climate-related financial disclosure—are finally happening at the water coolers and Bloomberg terminals of most of these funds. Over the last few years, the conversation has shifted from encouraging pension funds to simply acknowledge the concept of climate risk to taking actions to measure and report it. That is incremental—albeit promising—progress. However, bold climate leadership requires that pension funds go a step beyond measurement and reporting, and reduce climate risk on a timeline that squares with a 1.5 degree target.

While it is tempting to dismiss the incremental progress of Canadian pension funds around adopting the TCFD recommendations as "way too little, way too late," the cultural shift taking place within these organizations could be important. Organizations are themselves complex adaptive systems—their practices, incentive systems, and culture are all interconnected. Shifting how an organization operates requires key "champions" in leadership positions and a base level of "topic literacy" at all levels of the organization (Janzwood and Piereder 2019). While the implementation of the TCFD's recommendations will not automatically translate into bold climate leadership, these cultural shifts could increase internal receptivity to modernizing incentive systems and risk management tools to increase their capacity to cope with the evolving risk landscape.

Meanwhile, pension contributors and beneficiaries are increasingly advocating for bolder climate leadership from the individuals managing their retirement savings. Going forward pension funds, who are ultimately accountable to these individuals, will face mounting pressure to disclose their fossil fuel and renewable energy holdings, improve how they measure and report climate risk across their portfolio, and implement an

investment strategy that does not merely capitalize on but *shapes* a green economy capable of protecting the retirement savings of Canadians for generations.

2.3 Ambiguous forces

1. Interpretation of statutory and fiduciary duty
2. A moral imperative
3. Worldviews and beliefs of fund directors and managers

Interpretation of statutory and fiduciary duty

Canadian pension fund managers are bound by statutory and fiduciary duties that protect beneficiaries.[16] Fund managers are statutorily obliged to maximize returns and minimize risk, while managing their assets in a way that is consistent with the best interests of current and future beneficiaries. They must also meet their fiduciary duties of prudence (to exercise the care, skill, diligence and judgment that a prudent investor would exercise in making investments) and loyalty (to act honestly, avoid conflicts of interest, and not behave criminally). However, broader or narrower interpretations of these duties result in very different implications for pension fund managers' legal responsibilities towards beneficiaries with respect to managing climate risk.

Some legal scholars have advocated a broader interpretation of the legal duties of pension fund managers than that conventionally adopted within the industry. They argue that a "reasonably prudent person" would be aware of the broad consensus that climate change is a real and imminent crisis and should be making investments that align with that reality (e.g., Hansell LLP 2020). Further, they argue that it is clearly in the "best interest" of future beneficiaries to stop propping up a version of the economy that will reduce the prospects for reliable returns in the long run.

However, the narrower interpretation asks far less of the investor and focuses solely on familiar and quantifiable financial risks and benefits. Climate risk—whether physical or regulatory—tends to be difficult to quantify and is shrouded in the type of deep (or Knightian) uncertainty that the finance industry has always struggled to manage.[17] Therefore, attempts to integrate unruly climate risk into financial risk assessments—while probably a good idea—would fall outside of the scope of prudent investment. Investors are simply expected to adopt standard risk management approaches such as diversification, which can result in herding behavior and the underestimation of systemic risk (Dawson 2015; Rajan 2012).

Meanwhile, some investors with a narrow view of their fiduciary duty argue that if a "reasonably prudent person" had reason to believe that fossil fuel investments would rebound in 2021, a failure to capitalize on it

[16] Statutory duties are within the realm of public law (emerging from the legislature) and fiduciary duties are within the realm of civil law (emerging from equitable principles).

[17] The term Knightian uncertainty refers to situations where one lacks confidence that all possible outcomes have been identified and lacks confidence in the relative likelihood of those outcomes. For investors, this means that they can't be completely confident that they understand all the possible scenarios around how the impacts of climate change will unfold, how the regulatory environment will evolve, and how investments will perform in this dynamic context. Therefore, they are unable to confidently assign probability estimates to various scenarios. Knightian uncertainty is particularly pernicious with unprecedented and systemic risks.

and maximize short-term returns would constitute a breach of fiduciary duty (e.g., Kolivakis 2020). This claim is rather tenuous since courts and regulators have ruled that investors can look beyond financial criteria to inform their investment decisions (OECD 2017). Further, there is the possibility that by maximizing short-term returns (by staying locked into fossil fuels, for example), the fund could dramatically increase its exposure to mid-to-long-term climate risk and thus fail to meet its duty to minimize risk (and possibly constrain its ability to maximize returns in the future). However, to date, the courts have offered little clarification on such tradeoffs between short- and long-term risks and returns and many investors continue to see legal duties as an obstacle to ESG integration (PRI 2015).

It remains unclear whether attempts to sue slow-moving pension funds for breach of fiduciary duty—even those that appear hostile towards calls to reconcile their investments with the climate crisis—will be successful. However, even if Canadian pension funds are found to have breached their fiduciary duty—a process that would likely play out over several years in the courts—it is unlikely that such legal action would lead to bold climate leadership on its own. While there may not be a compelling case that Canadian pension funds *must* rapidly improve their management of climate risk, there may be a more compelling case that they *should.*

A moral imperative

A common refrain from leaders in the financial sector is that transforming the economy to address climate change—while perhaps desirable—is not their responsibility. From this "market player" perspective, governments are supposed to shape the expectations, incentives, and behavior of corporations and financial actors, which in turn shape markets and investment patterns. Apolitical investors simply play the markets to maximize returns for their beneficiaries. Importantly, investors at Canada's public pension funds emphasize the arms-length relationship between government and pension funds as a crucial buffer against political influence over investment decisions. From this perspective, government initiatives—like Canada's commitment to achieving net-zero emissions by 2050—should only influence investment decisions insofar as concrete policies like a carbon tax or the removal of subsidies to fossil fuel companies have an impact on markets.

One problem with this perspective is that it ignores the overlap between government initiatives and the desires of the present and future beneficiaries to which pension funds are accountable. In theory, governments are supposed to articulate and execute the collective will of the electorate. There is, without a doubt, a significant overlap between the goals of Canadians expressed through the actions of their democratic institutions and the goals of public pension funds' beneficiaries. While this windbreak between the governments and pension funds is there for a reason, foisting responsibility for addressing climate change entirely on the government is unlikely to satisfy many Canadian pension beneficiaries.

More fundamentally, if pension funds take their statutory duty to maximize returns and minimize risk for *future* beneficiaries seriously—that is, their investment strategies reflect the **principle of intergenerational equity**—then it seems rather obvious that they should be doing everything they can to protect the capacity of the fund to produce positive returns decades from now. Mainstream models of the economic impact of climate change in the latter half of the twenty-first century project that we are currently on a path towards a significant

contraction of the global economy.[18] The current approach that combines (1) a blanket policy of engaging with fossil fuel companies, (2) tentatively pursuing green investments, (3) gradually adopting TCFD recommendations, and (4) making vague statements about decreasing exposure to climate risk—all while waiting for governments to trigger stronger market signals—is completely inconsistent with intergenerational equity.

One counterargument from investors might be that maximizing short-term returns—even if that involves a heavy dose of fossil fuels and other carbon-intensive investments—ultimately serves to increase the size of the pie and improve the pension fund's investment position in the future. In other words, short-termism grows the pie, which can help feed more mouths down the line, thus serving to protect the principle of intergenerational equity. Paired with the argument that climate change is the government's problem to solve, this idea might strike some pension fund managers as a compelling argument for keeping their heads down and continuing to do their best to carry out the already daunting task of reliably out-performing the market without adding additional hurdles.

However, baking the pie using rotten, risky ingredients is, ultimately, a recipe for disaster. More importantly, it will become increasingly difficult to bake the pie in an oven badly in need of repair. A climate-imperiled global economy will be a hostile investment environment for even the savviest of institutional investors. While universal owners like pension funds are extremely vulnerable to macroeconomic forces and systemic risk, they also possess the resources and financial power to shape the global economy and steer it away from the worst outcomes. If the world's pension funds decide to align their USD $33 trillion of collective holdings with the Paris Agreement target, our probability of staying within the remaining carbon budget would jump appreciably. Canadian pension funds possess the tools to repair the oven—and perhaps that comes with a parallel duty to use them.

Worldviews and beliefs of fund directors and managers

Lastly, it is worth considering the current state of the worldviews and beliefs of managers and directors of Canadian pension funds. There is plenty of evidence that the individuals working for pension funds care about climate change and believe it should have some influence on their investment strategy. For example, Mark Machin, the President and CEO of the CPPIB recently told the House of Commons Standing Committee on Finance that: "Climate change is happening. We believe in the energy transition. The energy transition will be under way towards a low-carbon economy over time" (FINA 2020). However, he also clarified that the CPPIB investment strategy around fossil fuels is based off of projections of how the energy transition is proceeding—projections that he admits are "probably not consistent with a great climate outcome." This sort of resigned acceptance that that the market is not going to move fast enough to achieve our emissions reduction goals shows that many pension funds still see themselves as incrementalist market players—not bold climate leaders.

We also know that most pension fund directors and managers do not see their funds as universal owners—and in some sense, that is correct. A single pension fund moving on its own to rapidly reallocate capital from fossil

[18] For example, a model by Burke et al. (2015) defines the probability of a "more than 20 percent" contraction in global GDP at 51 percent, a "more than 10 percent" contraction at 63 percent, and a "more than 0 percent" contraction at 71 percent.

fuels to other investments cannot shift the market on its own. All of Canada's pension funds acting in concert, however, would send a very powerful signal—both to the market, as well as banks and governments. Thus, pension funds face a familiar collective action problem where a single actor loses by acting alone but everyone wins if a critical mass of actors act together.

However, there is much we do not know about the individual worldviews and beliefs of the people working at these organizations. Pressing research questions on the worldviews and belief systems of pension fund managers and directors include:

- To what extent do pension fund managers and directors feel a moral duty to minimize climate risk and prioritize the protection of fund performance in the 2030s and beyond?
- To what extent do pension fund managers and directors feel that their investments have an impact on the climate crisis?
- Are there notable differences in beliefs and the level of "climate risk literacy" within these organizations?
- And to what extent do they feel constrained by expectations and incentives angled towards the short-term performance of the fund?

2.4 Mechanisms for accelerating pension fund leadership on climate change

This section highlights five key interactions between the forces pulling Canada's pension funds towards incremental greening or bold climate leadership. In particular, it shows how ambiguous forces may be "tipped" to disrupt the self-reinforcing feedbacks currently locking pension funds to the status quo.

1. A self-reinforcing relationship between incentives, standard risk management approaches, and a narrow interpretation of legal duties ties pension funds to the status quo.

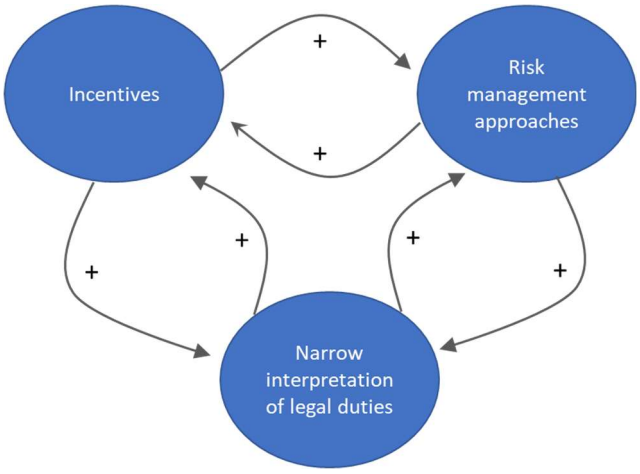

Figure 3

Incentive systems and standard risk management approaches interact in a positive or self-reinforcing feedback system, where incentives to maximize short-term returns, outperform similar funds, and not "rock the boat" serve to further entrench the use of conventional risk management approaches (like sector-agnostic portfolio diversification) and tools (like VaR models). Collectively, these forces encourage a narrow interpretation of fiduciary duty that prioritizes maximizing short-term returns and minimizing the most easily quantified financial risks. Since these duties can be met without changing incentive systems and approaches to managing risk, a narrow interpretation of legal duties strengthens resistance within the organization to adopting new practices. The interactions between these three forces trap pension funds into a market "player" role that allows them to ignore their vulnerability to systemic risk—and their responsibility to address it as universal owners.

Takeaway #1: Effective strategies to disrupt this self-reinforcing relationship must target at least two (or ideally, all three) of these forces simultaneously.

2. Emphasizing the moral imperative of pension funds as universal owners leads to a broader interpretation of legal duties.

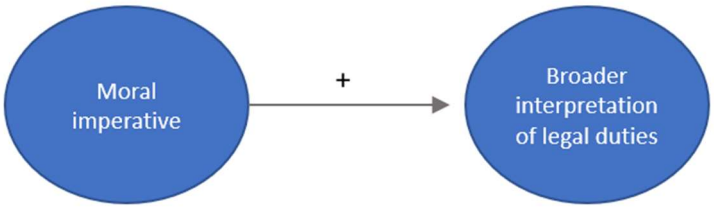

Figure 4

While taking bold actions to protect the retirement savings of future beneficiaries from climate risk may not be a clearly defined *legal* obligation, pension funds may soon realize that it is a *moral* one. By realizing the unique vulnerabilities and responsibilities that come with universal ownership, pension funds must reconcile tradeoffs between short-term return maximization and long-term risk minimization. A true commitment to intergenerational equity means that pension funds must play a more active role in *shaping* the investing conditions that they will be operating in for decades to come.

Broadening the interpretation of legal duties disrupts the positive feedback in Figure 3 by increasing the demand for more sophisticated risk management approaches that can better account for long-term, discontinuous, and difficult-to-quantify risks. To a lesser extent, this broader interpretation could also soften the organization's commitment to relative remuneration practices since it will become increasingly difficult to meet the broader duties of a universal owner while also tying financial incentives to competitors that interpret their duties more narrowly.

Takeaway #2: Pension fund contributors, activists, and researchers must find creative ways to persuade pension fund directors and managers of their moral duty to play a leadership role as universal owners.

3. Changing hearts and minds or removing obstacles?

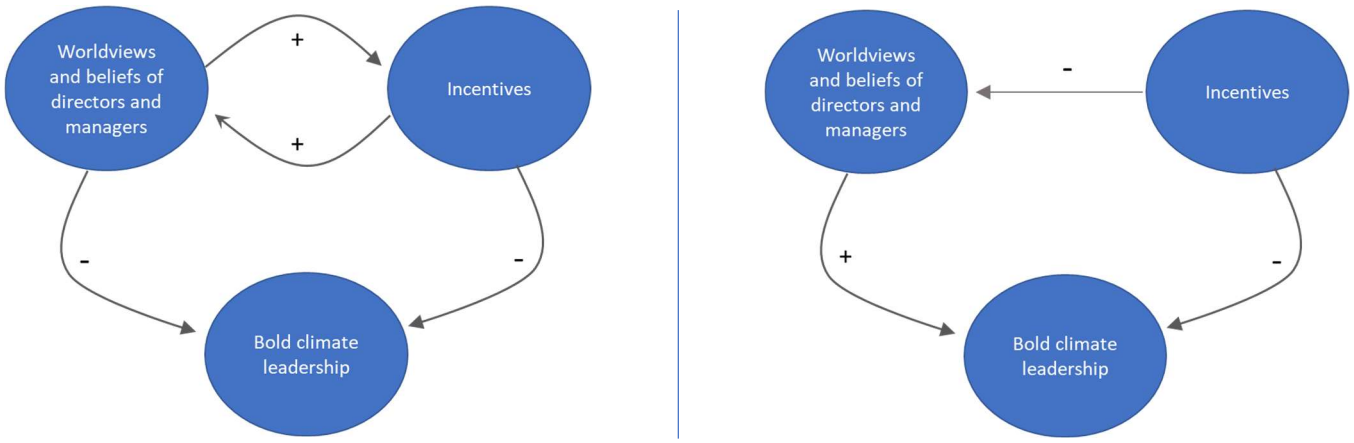

Figure 5

It remains an open empirical question whether the dominant beliefs of directors and managers within Canada's pension funds are generally aligned with their funds' incremental approach to greening their portfolios or whether we underestimate the level of support for bolder action. If the first hypothesis is correct, then proponents of ambitious action on climate change face a rather steep hill to climb in order to persuade fund directors and managers to take bolder steps. Such a scenario could also indicate that the level of climate risk literacy within these organizations is surprisingly low. However, if there is already a base level of support that is being stifled by misaligned incentives and practices, pension fund contributors and activists must tailor their messaging to a more receptive audience.

Takeaway #3: A clearer picture of the current worldviews and beliefs of pension fund directors and managers would strengthen strategies for advocating for pension fund leadership on climate change.

4. The implementation of TCFD recommendations undermines the standard risk management approaches used by pension funds.

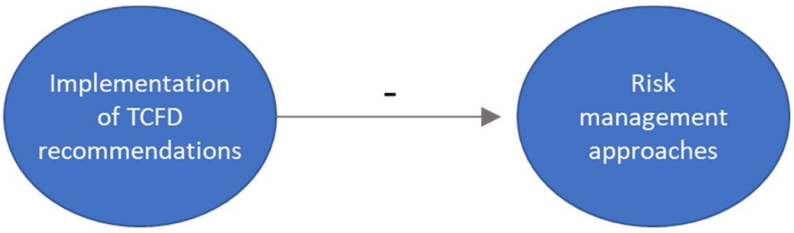

Figure 6

By increasing pension funds' (and their contributors') awareness of their exposure to climate risk, the accelerated adoption of TCFD recommendations would also expose the inadequacy of standard risk management approaches and could hasten the adoption of new tools for measuring and managing it, such as those advocated by the TCFD itself. The sooner that TCFD recommendations are adopted, the sooner both

beneficiaries and pension funds themselves will understand the extent of their exposure to climate risk, which will further expose the inadequacy of current practices for managing it.

Takeaway #4: Accelerate the implementation of TCFD recommendations.

5. Synchronizing the activities of pension funds can eliminate incentives to maintain the status quo.

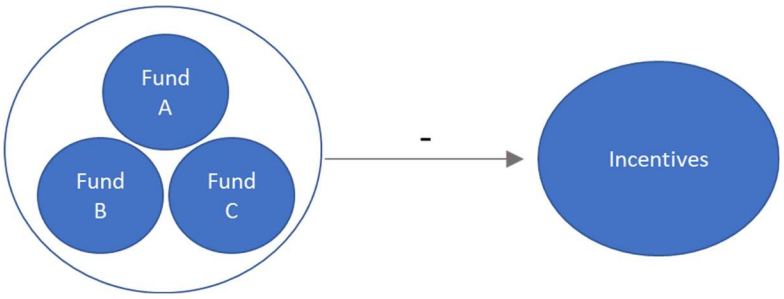

Figure 7

Pension funds are held hostage by the "first mover disadvantage." Leadership is rarely rewarded by the market. Pension funds would be much less tentative to adjust their current investment strategies if there was a synchronized, simultaneous movement of many funds away from risky fossil fuel assets and towards climate change solutions. Fortunately, this movement already has a vanguard. European pension funds like Fjärde AP-Fonden (AP4) in Sweden and Stichting Pensioenfonds (ABP) in the Netherlands are already leading the global shift in capital towards a net-zero carbon economy.

Takeaway #5: Activities that target multiple pension funds and encourage them to act in concert are more likely to succeed than campaigns targeted at individual funds.

3. Implications for action

A growing number of organizations and researchers in Canada are working with Canadian pension funds and their beneficiaries to more effectively respond to the climate crisis. To date, their recommendations have largely focused on how beneficiaries can better hold pension funds accountable for responsibly and transparently managing their retirement savings, how the Canadian government can clarify the duties and expectations of pension funds, and how the pension funds themselves can rise to the challenge before them. Box 2 and Box 3 summarize the recommendations of two groups central to this dialogue: Shift (2019) and the Corporate Mapping Project (Rowe et al. 2019).

Box 2: Shift's recommendations for contributors and beneficiaries to effectively engage with pension funds:

1. Emphasize the disclosure of climate risk
2. Understand the governance structure and opportunity structure of the particular fund you are engaging with
3. Engage constructively by assuming the good intentions of fund directors and managers
4. Build support among other contributors and beneficiaries
5. Communicate with pension funds regularly
6. Communications should emphasize:
   a. Disclosure of climate risk
   b. Cutting high-carbon investments from portfolios
   c. Shifting investments to climate change solutions

Box 3: The Corporate Mapping Project's recommendations for pension funds and governments

Pension funds:

1. Carry out portfolio-wide climate risk analysis
2. Freeze new fossil fuel investment, divest from the highest-risk fossil fuel assets already in the portfolio and reinvest capital into renewable energy and other climate solutions
3. Advocate for stronger climate policy to decrease regulatory uncertainty and transition risk

Governments:

1. Require full disclosure of fossil fuel holdings and climate risk
2. Clarify the statutory and fiduciary duties of pension funds to protect the long-term interests of future beneficiariesShifting investments to climate change solutions

The strategies that emerge from the mechanisms identified in the previous section apply more broadly to the growing movement of organizations, activists, and researchers working to accelerate pension fund leadership on climate change. These strategies all serve to disrupt the self-reinforcing feedback between incentives, risk management approaches, and the narrow interpretation of legal duties locking pension funds to the status quo (mechanism #1 identified in Section 2.4). They also complement and strengthen the recommendations proposed by other groups since effective strategies to disrupt this self-reinforcing relationship must target this feedback loop from multiple angles simultaneously.

Pension fund contributors, activists, and researchers must find creative ways to persuade pension fund directors and managers of their moral duty to play a leadership role as universal owners.

- **Emphasize universal ownership**. Attempts to anchor lobbying efforts to a divestment "framing" have been met with resistance from Canadian pension funds. While freezing new investment in risky fossil fuel assets and removing the riskiest assets from their portfolios are part and parcel with universal ownership, the universal ownership framing may be met with less resistance than a divestment framing. Universal ownership emphasizes the responsibilities and opportunities facing pension funds—rather than emphasizing unethical investments that need to be eliminated. When coupled with increasingly stark projections of what the world will look like without bold leadership from the financial sector, the

universal ownership framing could lead to a more energized and productive dialogue that won't be met with knee-jerk resistance from pension funds.

- **Engage youth climate leaders** in efforts to pressure pension funds to protect intergenerational equity. So far, current contributors have led efforts to engage Canadian pension funds on climate change. However, these efforts could be significantly amplified by *future* (or new) contributors. Canadian youth possess a unique level of moral authority because of the asymmetry between their limited political and financial power on the one hand and the extent to which they will disproportionately bear the burden of climate change on the other. They are similarly disenfranchised by pension funds that are making investment decisions today that have big implications for both the state of the global economy that today's youth will inherit, as well as their ability to retire comfortably decades from now.

  The core challenge will be finding creative ways to energize youth around such a complex, abstract, and—frankly—rather unexciting lever for accelerating the net-zero carbon energy transition. However, the importance of pension fund leadership in the fight against climate change is undeniable and youth climate leaders are eager to direct their energy towards intervention points with the highest leverage.

A clearer picture of the current worldviews and beliefs of pension fund directors and managers would strengthen strategies for advocating for pension fund leadership on climate change.

- **Clarify the normative landscape within pension funds**. Efforts to engage with Canada's pension funds would be boosted by a clearer picture of the current worldviews and beliefs of directors and managers. Many of these individuals are concerned parents, community leaders, and passionate advocates for change. These individuals are also tasked with the enormous challenge of protecting and growing the retirement savings of Canadians for decades to come—a responsibility that they do not take lightly. However, we do not know the extent to which they are informed about the urgency of the climate crisis and the particular vulnerability of pension funds to systemic risk (and their unique capacity to address it). Nor do we know the extent to which pension fund directors and managers support shifting the incentive systems, risk management approaches, and disclosure practices of their organizations. Empirical research in these areas could provide pension fund contributors and activists with new and more effective strategies for engaging with pension funds.

Accelerate the implementation of TCFD recommendations.

- **Disclose pension funds' climate risk for them**. While pension funds have been reluctant to increase transparency around their exposure to climate risk, particularly in the asset classes that matter most, researchers can begin piecing this data together themselves. By revealing the extent of these funds' exposure to climate risk for them, researchers can motivate pension funds to seize control of this process themselves. Unfortunately, the disclosure of many key sources of climate risk—such as bank bonds laden with high-carbon debt and funds managed by other investors—require cooperation between multiple financial actors and must be led by pension funds themselves.

- **"Trade" engagement for improved climate risk reporting**. Pension funds continue to advocate engagement as their primary strategy for managing climate risk despite a lack of compelling evidence supporting its effectiveness. If pension funds are to be given the benefit of the doubt that their engagement activities will result in tangible and rapid decreases in both the climate risk and carbon footprint of their fossil fuel investments, they must provide contributors with a way to verify the effectiveness of these activities. The accelerated implementation of the TCFD's disclosure recommendations should be framed as a *necessary condition* for contributors' continued acceptance of the engagement strategy. The onus is now on pension funds to prove to their contributors that engagement is consistent with bold climate leadership.

Activities that target multiple pension funds and encourage them to act in concert are more likely to succeed than campaigns targeted at individual funds.

- **Bring multiple pension funds to the same table at the same time.** In order to overcome many of the misaligned incentives that are tying Canadian pension funds to the status quo, they need to move in tandem with other large investors both in Canada and around the world. Most of the current engagement efforts with pension funds focus on improving the dialogue between contributors and the specific pension funds that are accountable to them. However, new strategies need to be developed that bring these isolated conversations together. One example is the UN's Net-Zero Asset Owner Alliance. The challenge is now to expand these conversations beyond the handful of actors that are already global leaders in managing climate risk. Such efforts to synchronize a largescale shift away from fossil fuels could also be strengthened by a common moral framing around universal ownership.

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