
Article:
Dordi, Truzaar orcid.org/0000-0003-1634-2374, Weber, Olaf, Rhodes, Ekaterina et al. (1 more author) (2023) A voice for change? Capital markets as a key leverage point in Canada's fossil fuel industry. Energy Research and Social Science. 103189. ISSN 2214-6296

https://doi.org/10.1016/j.erss.2023.103189

Energy Research & Social Science 103 (2023) 103189

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Perspective

A voice for change? Capital markets as a key leverage point in Canada's fossil fuel industry

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ARTICLE INFO

Keywords:
Capital markets
Equity ownership
Fossil fuels
Canada
Network analysis

ABSTRACT

Canada as an oil and gas producing nation will play a definitive role in the transition to a carbon-constrained world. Yet, Canadian climate policy continues to prop the ailing oil and gas industry with supply-side policies that enables the continued expansion of fossil fuel production. This study examines the role of financial actors as high-leverage intervention points that may be used to limit the production and expansion of Canada's fossil fuel industry. Using a combination of network modelling, sensitivity analysis, and a novel scoring tool, we find that equity ownership in Canada's largest fossil fuel firms is increasingly concentrated among a small subset of predominantly foreign and corporate equity owners. Moreover, the high debt load of fixed assets make Canadian fossil fuel firms particularly sensitive to shareholder intervention. The findings suggest that prominent shareholders are unlikely to use their voice to curtail carbon emissions in Canada's fossil fuel industry, unless mandated to do so. Thus, the study concludes with important policy insights, to drive effective decision making and change.

1. Introduction

To limit global temperature rise to under 2 °C, the majority of economically proven fossil-fuel reserves should not be developed [1,2]. Yet, due to inertia of incumbent regimes, production, consumption, and financing of fossil fuels continue largely unperturbed. Given the urgency to restrict carbon emissions to mitigate global warming, climate scientists are calling for a ceiling limit on emissions - a "carbon-constrained" future driven by socio-technical limits to carbon production [3–5].

The low-carbon transition requires a fundamental transformation of the energy sector - and financial markets will play a key role in either enabling or constraining this transition [6]. While some seek to influence the behaviour of fossil fuel firms toward more sustainable practices, others may resist or ignore the environmental and social impacts of their investments [7]. Policy interventions that dissuade the financing of fossil fuel production will thus play an important role in the low-carbon transition [8].

Canada, as an oil and gas producing nation, will also play a definitive role in the transition to a carbon-constrained world. Though home to less than half a percent of the world's population, Canada's fossil fuel production scenarios (under current policy) are expected to emit an additional 36.2 billion tonnes of carbon in the atmosphere, exhausting nearly 16 % of the world's remaining carbon budget by 2050 [9]. Furthermore, fossil fuel production in Canada is highly concentrated; just five fossil fuel firms (colloquially referred to as the "Big Five") account for 79.3 % of Canada's bitumen productive capacity [10]. Thus, the Canadian oil and gas sector is a carbon bomb of global significance.

Though fossil fuel production and consumption is agreed to be among the leading sources of anthropogenic climate change, policy discourse in Canada remains dominated by demand-side solutions like carbon pricing, energy retrofits, and electrification [11]. In contrast, however, supply-side interventions in the fossil fuel industry may directly limit the exploration, extraction or transportation of fossil fuels, through, for example, production taxes or revoked subsidies, regulatory approaches like prohibitions or quotas [12–15]. Supply-side policies could also slow private investment in fossil fuel production, limiting carbon lock-in and reducing stranded asset risk [12,16]; yet, the potential of supply-side interventions is perhaps willfully ignored in Canadian climate policy [17,18].

This study examines an often-overlooked stakeholder in sustainability transitions research; the role of financial actors as a key leverage point in driving the low-carbon transition [19–22]. Specifically, we

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https://doi.org/10.1016/j.erss.2023.103189
Received 31 December 2022; Received in revised form 1 June 2023; Accepted 22 June 2023
Available online 15 July 2023

examine the potential for financial actors to bolster the low-carbon transition in Canada. We posit that although financial actors can aid in the low-carbon transition, it remains unclear whether financial actors' incentives are in line with the country's low-carbon transition. Current policy solutions in Canada have failed to disincentivize private capital investments in fossil fuel production [23], which contribute to carbon lock-in and threaten global efforts to mitigate anthropogenic warming. Investor interventions can be successful; however, this study finds that Canada's fossil fuel industry is largely devoid of financial actors that seek to intervene in the low-carbon transition. We thus call for more supply-side interventions to align the financial system with the low-carbon transition. To effectively design supply-side policy solutions for capital markets, however, we must first know who the most influential financial actors are. Thus, this paper asks three questions. How susceptible are Canada's largest fossil fuel firms to shareholder influence? How have the structures of equity ownership changed between firms and over time? Which owners have the greatest potential influence over the governance of Canada's fossil fuel firms? In answering these questions, this study will identify high-leverage intervention points that may be used to limit the production and expansion of Canada's fossil fuel industry.

2. Literature

2.1. Fossil fuel production and supply-side climate policy

Increased concentrations of the greenhouse gases most affiliated with fossil fuel use [24,25] continue to accumulate well beyond the safe operating space, raising global temperatures by over half of the globally accepted 2 °C target agreed upon at the Copenhagen Accord [26,27]. Nearly two-thirds of historical emissions can be traced to just 78 fossil fuel firms [28] – and their reserves alone would surpass our global carbon budget by 160 % [29]. Thus, just a handful of corporations have a disproportionate responsibility to curtail fossil fuel production and mitigate global warming. Consequently, there is an increasing need for imposed carbon constraints to mitigate the worst effects of climate change [12]. Though efforts to reduce emissions have historically operated within a paradigm of incremental emissions reductions from demand-side end-uses [30], our dwindling global carbon budget [1,2] has begun shifting climate discourse toward absolute emissions reductions by restricting fossil fuel supply [31].

While fossil fuel production is the leading cause of anthropogenic climate change [32,33], policy discourse remains dominated by solutions to reduce the demand for carbon [14,34]. However, effective climate solutions will require 'cutting with both arms of the scissors' [13], that is, also curtailing fossil fuel supply. Supply-side policies that limit the exploration, extraction or transportation of fossil fuels, can come in the form of economic instruments like production taxes or revoked subsidies, regulatory approaches like prohibitions or quotas, or through government provisions that restrict public financing or compensate, leaving reserves underground [12]. These policies may be more effective as well; Erickson et al. [15] estimate that simply stopping the issuance of new oil well permits could reduce 2030 oil production by about 70 %.

Much like the supply-side policy solutions above, access to capital plays a key and complementary role in sustaining or restricting unsustainable economic activities [35]. Divesting from and limiting future investments in fossil fuels can, for example, increase costs of new capital [36,37]; however, the technical and societal challenges of a sustainable transition [38] alongside policy uncertainty and short-termism [18,39] have perpetuated continued investments in fossil fuels. Supply-side policies could also slow investment in fossil fuel production, limiting carbon lock-in and reducing stranded asset risk; however, the potential of supply-side financing is often forgotten in policy solutions.

Markets have begun to respond to and reallocate capital toward emissions reduction solutions through, for example, reducing the carbon exposure of their portfolio through divestment or investing in renewable energy, energy efficiency, and low-carbon alternatives [31]. However, a reduction of carbon exposure without a reduction in production is simply not enough to mitigate the climate crisis [30]. Sustainability transitions will struggle to materialize without the active engagement of financial systems that shift economic activity toward sustainability [36]. Consequently, financing that perpetuate the exploration, extraction, or transportation of fossil fuels should be held responsible for the climate instability caused by said production [35,37,40].

2.2. Canadian climate policy

Canada is in many ways a leader and laggard in the transition to a low-carbon economy. The country has set ambitious national and provincial targets to both reduce its carbon emissions and invest in alternative sources of energy. However, Canadian climate policy continues to prop the ailing oil and gas industry with incentives and subsidies that maintain fossil fuel hegemony and enable the continued expansion of fossil fuel production in Canada [9,17,41]. Perverse incentives and conflicts of interest between policy and industry contribute to a willful blindness that threatens a just energy transition in Canada [17,18].

Much of Canada's low-carbon transition plan relies on a policy mix of demand-side interventions. Canada's landmark 2020 climate plan, "A healthy environment and a healthy economy" presents 64 national policy solutions, including a combination of energy-efficient retrofits, electrification and carbon pricing. Canada's national carbon pricing system, for example, covers nearly 85 % of economic output and is set to increase to $170 per tonne by 2030. Meanwhile, Canada's latest zero-emission vehicle mandate requires at least 20 % of new vehicles sold by 2026 to be zero-emission, which will rise to 60 % by 2030 and 100 % by 2035. Certainly, these policies demonstrate a concerted effort to meet Canada's nationally determined contributions, to reduce emissions by 45 % below 2005 levels.

Yet, under the semblance of climate action, Canada's federal government simultaneously continues to enable fossil fuel production and consumption through financial support and investments in technological climate solutions [42]. Canada provides more public funding to oil and gas exploration, production, refining, and transportation than any G20 country [43] estimated at 11 billion dollars per year [44]. Moreover, due to provincial tax incentives, it is estimated that 80 to 90 % of emissions from oil and gas companies are exempt from Canada's national carbon tax [45]. Finally, investments in hydrogen and carbon capture, utilization, and sequestration are designed to prolong fossil fuel production through investments in grey and blue hydrogen and carbon utilization for enhanced oil recovery [9].

In addition to strengthened regulations, there are also calls for additional investments in key priority areas like transportation, building retrofits, and clean energy, if we are to rapidly decarbonize the Canadian economy [46]. Canada's Covid-19 stimulus policies had the highest per capita spending in emissions reduction initiatives among G20 countries [47]. However, public finance alone will not meet the level of investment needed to address climate change [48].

Private capital will play a crucial role in allocating funds toward a low-carbon transition, however, a deeper understanding of Canada's investment horizon - where capital currently sits and where it needs to flow - is critically required. Research by the Canadian Institute for Sustainable Finance estimates that private capital could cover over half of the 128 billion dollars needed over the next ten years – and these investments are well underway [48]. Yet, little attention has been given to the former aspect of the investment horizon, how incumbent investments in carbon-intensive sectors can influence the energy transition [22]. Analogous to the reorientation of incumbent subsidies, we posit that we must first know where private capital is invested in order to reallocate capital toward low-carbon solutions.

2.3. Capital markets as a key leverage point for sustainability transitions

Capital markets can play an enabling role in the low-carbon transition through one of two key mechanisms – debt and equity financing. On the one hand, capital markets enable unsustainable production and consumption through bank loans, which, through investments in carbon-based infrastructure, contribute to carbon lock-in and climate instability [49]. Research by the Rainforest Action Network finds that loans to the fossil fuel industry have increased by over 4.6 trillion dollars since the Paris Agreement in 2015 [23]. On the other hand, capital markets hold equity in unsustainable firms, whereby shareholders can influence corporate governance through active ownership [50,51]. Equity ownership is often tied to a small and tightly-knit core of financial institutions [37,52], which can collectively exert influence on corporate governance strategy [50]. However, not all financial actors have the same incentives or interests in supporting the low-carbon transition. Some may seek to influence the behaviour of fossil fuel firms toward more sustainable practices, while others may resist or ignore the environmental and social impacts of their investments. This creates misaligned finance in markets, which not only gives rise to intermediaries with significant political influence but also fosters activities that do not contribute to social or environmental well-being [7]. Thus, as key brokers of misaligned finance, capital markets can play a central role in enabling a low-carbon transition.

Certainly, there is precedent for equity owners to play an enabling role in the low-carbon transition. First, transition risks emerging from technological, economic, political, or societal shifts will have important implications for fossil fuel firm valuation. Stringent supply-side climate policy in response to increased climate instability could lead to dramatic drops in stock prices and an increased prevalence of debt defaults [53]. Associated asset stranding is conservatively valued at over 28 trillion USD and is most concentrated in high-cost and high-carbon sources of production like Canada [54,55]. Second, there is increasing evidence indicating that continuing to invest in fossil fuel industries is not only contradictory to global carbon reduction targets but also a failing investment strategy [56–60].

Some equity owners, whether driven by a moral or financial cause, have divested their fossil fuel holdings to reduce exposure to transition risks; yet others maintain their investments in favour of engagement. The Canada Pension Plan and Investment Board, for example, has long stood behind its mandate to engage with rather than divest from the fossil fuel industry [61], citing that the pension fund can more effectively press for positive change as an engaged investor and that dropping a major sector from its portfolio would not be financially prudent.

For shareholders that choose to maintain investments with fossil fuel firms, there is an impetus for them to engage meaningfully in a manner that pressures firms to align with climate targets and mitigates the climate-related financial risk of inaction.

2.4. Shareholder engagement in the fossil fuel industry

To understand why shareholders may or may not engage with the fossil fuel industry in a manner that enables the low-carbon transition, we examine two theoretical approaches from management and political-economy literature.

First, agency theory presents a framework by which we understand how major shareholders can influence the governance of corporations through active engagement [62–64]. Shareholders can exert pressure through one of three mechanisms – exit, voice, and loyalty [65]. Namely, shareholders show loyalty by holding shares, express discontent by voicing their positions through direct (or the threat of) shareholder-sponsored proposals and shareholder voting, or exit by selling their shares [66]. The proportion of equity ownership held determines the shareholder's influence on the strategic decisions of the firm [67,68]. In light of the potential financial consequences of the low-carbon transition, major shareholders may be motivated to influence corporate governance in a manner that either mitigates emissions that contribute to climate instability or hedges against potential losses along the transition.

However, the question remains, will these shareholders use their influence to reduce emissions? Traditionally, agency theory would posit that shareholders would only exert influence on a corporation to increase shareholder returns - not decrease its productive capacity. More, evidence on proxy voting by shareholders indicates that many prominent investors continue to vote against climate-related shareholder resolutions [69], indicating that investors may in fact, not be meaningfully engaging with the fossil fuel industry.

Conversely, the capital as power theory [70], might provide context to why shareholder engagement with the fossil fuel industry might be misaligned. Under this framing, financial capital is a matter of an owner's ability to exert material and ideological power over a firm's governance [71]. The ownership of shares within this framework is a forward-looking indicator of future profit, namely that these investors anticipate the firm continues to grow to meet its future earnings targets [72]. The theory consequently asserts that shareholders might be motivated to maintain favourable market conditions as a means to mitigate against the financial risks of stranded assets. More, shareholders may also be motivated to maintain status quo in a larger effort to maintain control over the energy transition and more broadly, the energy systems they have historically governed [73]. Under this perspective, a few large shareholders stand to gain substantially through monetizing the destruction of the world's climate [74] and will continue to engage with the industry in a manner that contradicts effective climate solutions. However, capital can also be used to reshape society if the power is regulated accordingly by financial supervisors. Climate-related policy interventions might, for example, be able to direct capital toward a more sustainable direction that helps to both restrict economic activities that contribute to climate instability while also mitigating financial risks.

However, given the moral taint of oil money today, these actors are especially interested in the symbolic capital derived from "greening" this oil money by investing in sustainability and energy transition activities – which in turn might even allow them to retain control of global energy systems that they have dominated for so long.

We thus postulate that major shareholders can affect climate stability through intervention in fossil fuel firms [35]. However, the determinants of intervention depend on how sensitive the industry is to concentrated ownership [75,76]. In contrast to intervention, shareholders may choose to sell their shares if the firm's strategy diverges from the positions of its shareholders [77]. However, blockholders may not be able to easily divest from firms that do not meet their expectations without triggering a precipitous decline in the value of their holdings [62]. Given the salience of shareholder influence on corporate governance, these theories explain how shareholders influence corporate governance.

3. Method

The purpose of this study is to identify who the most influential shareholders are in Canada's fossil fuel firms and how ownership has changed over time. We adopt a network and sensitivity analysis to uncover the structures of ownership in Canada's most prominent fossil fuel companies. The analysis is divided into three parts to answer each of the three research questions; an examination of the fossil fuel industry, a network analysis of shareholder ownership in the industry, and a ranking of the most prominent and influential actors.

This study expands on three key publications that examine the role of shareholder ownership for climate action. Galaz et al. [35] were among the first studies to develop a methodology that linked financial actors to industries that contribute to climate instability. Using a combination of ownership size and sensitivity measures, the study identified the most influential shareholders in two key sectors, agriculture and forestry. The

study found that capital markets have considerable influence over the governance of these sectors, however, the extent of influence differs by sector and region. Carroll and Huijzer [78] subsequently examined shareholder ownership in Canada's fossil fuel industry examining ownership dynamics from 2010 to 2015. The study found that while ownership changed over time, foreign ownership in Canada's fossil fuel industry was substantial. Their study did not, however, consider how sensitive the industry is to shareholder influence, centrality of each shareholder, or the emissions potential of the firms in their sample. Finally, Dordi et al. [37] conducted a network analysis of the fossil fuel industry globally, developing a scoring methodology that blends network centrality and emissions potential. The study also found that ownership is consolidated among a few influential shareholders, however, sensitivity measures were not included in their scoring tool nor did the study examine changes in ownership over time. These three studies inform the methodology applied in this paper and findings are compared and contrasted in the discussion section.

3.1. Data

The sample of fossil fuel firms examined in this study is Suncor Energy, Canadian Natural Resources Limited (CNRL), Cenovus Energy, Imperial Oil, and Husky Energy. Emissions potential for these five firms are collected from the Fossil Free Fund's Carbon Underground 200 [79] and financial data is collected from the *Orbis* database. We assert that this sample of firms provides a comprehensive view of Canada's fossil fuel sector, as the five firms collectively account for 79.3 % of Canada's bitumen productive capacity [10]. The sample is also appropriate given the concentration of just 60 entities responsible for most of the carbon emissions globally [28]. Moreover, the industry has undergone a period of consolidation, resulting in many of Canada's smaller fossil fuel producers being acquired by the five largest firms. In fact, since collection of this data, Husky Energy has amalgamated with Cenovus Energy, resulting in further consolidation to just four fossil fuel majors. Finally, these corporations are important to the Canadian oil sands, due to their oligarchic influence [80]. Thus, the sample captures a significant portion of productive capacity in Canada relative to carbon emissions and climate impacts.

Ownership data of the fossil fuel companies is collected from the *Orbis* database, which provides a list of owners by the percentage of shares outstanding which they own. Ownership data is collected annually, spanning ten years from January 2009 to December 2018. Holdings with at least 0.01 % share in the company are included in the *Orbis* database, and thus, smaller shareholders are excluded from this analysis. We note one methodological amendment, whereby similarly named subsidiaries may appear to own several holdings in a company, that collectively amount to >100 % ownership. This is a noted artifact of the data collection process from the *Orbis* database, which must be manually cleaned [35,37]. In the few instances where a shareholder is reported in *Orbis* to have multiple holdings in a company (through different subsidiaries or because of diverging sources of data), we select the greater proportional ownership and exclude the rest.

3.2. Analysis

The results are presented in three sections, in line with each research question. Specifically, in this study, we ask:

Question 1: How susceptible are Canada's largest fossil fuel firms to shareholder influence?

Question 2: How has the structure of equity ownership changed between firms and over time?

Question 3: Which owners have the greatest potential influence over the governance of Canada's fossil fuel firms?

To answer the first research question, how susceptible are Canada's largest fossil fuel firms to shareholder influence, we present a brief description of the organizational characteristics of each of the five fossil fuel firms. We begin by highlighting key financial metrics including the firm's market capitalization, capital expenditures, and gross profits. An analysis of variance test is used to examine whether firms significantly differ in these measures. These findings are complemented by two sensitivity measures, based on the methodology adopted by Galaz et al. [35]. Sensitivity is measured using the Herfindahl-Hirschman Index and market debt to capital, as indicators of market concentration and sensitivity to financiers respectively. These measures evaluate the degree of collective influence of prevalent financial actors to directly affect climate stability through centralized stewardship and governance. We assert that beyond simply identifying major shareholders, it is equally important to examine how sensitive the industry is to concentrated ownership, through collective block holding power [75,76].

To answer the second research question, how have the structures of equity ownership changed between firms and over time, we present a bipartite network of shareholder ownership [37,78,81]. Based on Carroll and Huijzer [78], the analysis begins with an exposition of ownership characteristics by region, type, and over time. A stepwise reduction of ownership by region and type is also conducted to reveal the characteristics of large shareholders. Next, we adopt methods by Bajo et al. [81] and Dordi et al. [37] to conduct the network analysis linking shareholders to fossil fuel firms. We examine degree and closeness centrality measures to measure the density and distance of the networks of ownership.

Finally, to answer our third research question, which owners have the greatest potential influence over the governance of Canada's fossil fuel firms, findings on firm sensitivity and shareholder centrality are combined to present a novel ranking of the most prominent shareholders, not only by the size of their holdings but also by the firm's sensitivity and emissions potential. Expanding on the ranking methodology developed by Dordi et al. [37], this measure multiplies a shareholder's holdings by the firm's debt-to-capital ratio, Herfindahl-Hirschman Index, and potential gigatons of carbon emissions collected from the Carbon Underground 200 [79]. In line with Galaz et al. [35] and Dordi et al. [37] we assert that shareholders with holdings in firms with a higher sensitivity score and higher potential emissions have greater influence in the industry and consequently have greater impetus to shift corporate governance.

This analysis is conducted using the open-source R software and several packages including igraph [82] and network [83].

3.3. Limitations

The network analysis poses some methodological limitations. First, the data collection only includes shareholders with >0.01 % ownership in one of the five largest fossil fuel firms. We justify this based on the disproportionate influence of larger shareholders and larger firms relative to smaller players in Canada's fossil fuel industry. Second, we acknowledge that ownership data exported from *Orbis* may be imperfect. Due to the structures of parent companies and subsidiaries, shareholder ownership exported from *Orbis* frequently included duplicate holdings. Replicating Galaz et al. [35], shareholder ownership data is manually cleaned by including shareholders with greater proportional ownership and excluding the rest. In 2018 for example, Husky's major shareholders included Hutchison Whampoa Luxembourg Holdings Sarl (40.19 %), CK Hutchison Holdings Limited (40 %), and Hutchison Whampoa Limited (34 %). Thus, only one 'Hutchison Whampoa' (40.19 %) is included in the study. Relatedly, we acknowledge that ownership may change over time. To capture this change, ownership data is collected for the end of each quarter from 2009 to 2018. Finally, our scoring tool is intended to comparatively rank owners based on firm and shareholder characteristics and does not ascribe a value to the shareholder's ability to influence the industry. Rather the scoring tool can be read as shareholders with higher centrality and larger holdings in firms with greater sensitivity have higher relative influence.

4. Results

4.1. Firm characteristics

In line with the first research question, how susceptible are Canada's largest fossil fuel firms to shareholder influence, we begin with a brief description of the selected firms' organizational characteristics and sensitivity. Table 1a summarizes some key financial metrics of each of these corporations. As of 2018, the firms owned 273 billion CAD in total assets and $153 billion in market capitalization. Suncor and CNRL are among the largest of the five companies, followed closely by Imperial, Husky, and Cenovus. More, there is a considerable disparity between the capital expenditures and gross profits of the fossil fuel firms, as presented in Table 1b. An analysis of variance (ANOVA) identifies that there is a significant variation between gross profits and direct costs ($P > 0.01$, Cramer's $V = 0.341$). Pearson residuals attest that CNRL and Suncor have higher gross profits than direct costs whereas Imperial has higher direct costs than gross profits. The message holds that there is notable variation in operations and productive capacity between these five Canadian fossil fuel firms. Looking at trends over the past decade, revenues, capital expenditures, share prices, and dividends followed a trajectory similar to the commodity cycle of growth, contraction, and consolidation. On average, capital expenditures and revenues in the fossil fuel industry were greatest in 2012 and lowest in 2015 and 2016 respectively. These results indicate that the five fossil fuel firms differ in productive capacity and have evolved over time.

In addition to operational characteristics, we also consider how sensitive firms may be to shareholder influence. Based on Galaz et al. [35], we examine each firm's Herfindahl-Hirschman Index (HHI) and debt-to-capital ratio.

The HHI measures the concentration of equity ownership for each of the selected companies. Alternatively, the HHI can be understood as a measure of diversity in equity ownership. High concentrations of ownership equate to higher values on the HHI. We calculate the HHI over time to examine how the concentration of equity ownership has changed over the last commodity cycle. Table 2 shows that concentration varies considerably between the firms, with Husky and Imperial being highly concentrated. Changes in concentration were most prominent in Cenovus and Husky, which increased by 438 % and 230 % respectively from 2009 to 2019. In contrast, concentration fell by 27 % for Suncor over that period. On average, the HHI increased by 54 %, from under 1340.5 to over 2062.2 over our period of analysis, indicating an increasing concentration of ownership in Canada's fossil fuel industry.

The book debt to capital ratio, in contrast, is a measure of a company's financial leverage. It is a representation of how heavily the company relies on debt financing and consequently, how sensitive the company is to external financing [35]. Table 3 presents the total book debt to capital of the sample compared to the industry average. All five firms rely heavily on debt to finance their business operations, primarily to finance the high costs of plant and machinery associated with production. The debt-to-capital ratio of the five firms is considerably higher than the global average, suggesting that Canadian fossil fuel firms have a higher debt load than their international counterparts.

The HHI and debt-to-capital ratio indicates considerable heterogeneity across firms, both in how their ownership is structured and by how leveraged they are. The results of research question one thus indicate that firms differ not only by operational characteristics but by firm sensitivity as well. Thus, successful points of intervention will differ based on the firm.

4.2. Shareholder characteristics

To answer the second research question, how have the structures of equity ownership changed between firms and over time, we turn next to our sample of shareholders. The results begin with a stepwise reduction in ownership size, a bipartite network of ownership between firms and shareholders, and an examination of shareholder type, region, and time. We then turn to examine the collective influence of blockholders (denoted as shareholders with >5 % ownership in any firm) on the governance the fossil fuel firms.

First, a stepwise reduction of ownership, based off Carroll and Huijzer [78] is presented in Table 4. Approximately 80 % of shareholders own <1 % of any one fossil fuel company and consequently, significant proportions of ownership remain consolidated among a few shareholders. Owners with holdings >5 % (blockholders) account for between 3 and 5 % of shareholders in each firm.

Next, in line with Dordi et al. [37] the bipartite network in Fig. 1 visualizes the distribution of all shareholders across the sample. Collectively, the network is comprised of 3899 edges and 438 vertices. Several inferences can be made from this figure. First, there is a notable concentration of shareholders who have invested in all five fossil fuel firms (concentrated in the center). Second, there exist some shareholders who invest in several but not all five firms (for example the cluster concentrated between CNRL and Suncor). Finally, there exist some shareholders who strictly invest in just one firm (concentrated

Table 1
Financial fundamentals and metrics.

1a Financial fundamentals

Corporation	Cenovus	CNRL	Husky	Imperial	Suncor
Total assets	35,174	71,559	35,225	41,456	89,579
Market capitalization	11,795	39,728	14,182	27,163	60,813
Operating revenue	20,895	21,161	22,843	34,964	38,952
Net income	−2,669	2,591	1,422	2,314	3,293
Market price	9.6	32.94	14.11	34.59	38.13

1b Financial metrics as a proportion of gross revenue

Corporation	Cenovus	CNRL	Husky	Imperial	Suncor
Operating revenue	20,895	21,161	22,843	34,964	38,952
Gross profits	47.70 %	69.50 %	36.30 %	20.90 %	58.90 %
Direct costs	52.30 %	30.50 %	63.70 %	79.10 %	41.10 %
Depreciation & amortization	10.20 %	24.40 %	11.30 %	4.40 %	14.70 %
Net profits	−12.80 %	12.20 %	6.20 %	6.60 %	8.50 %

Financial fundamentals are exported from the *Orbis* database as of June 2019. Values for total assets are, market capitalization, operating revenue, net income, and market price, presented in 1a Financial Fundamentals, are in 1000 s of Canadian dollars. Values in 1b Financial Metrics as a Proportion of Gross Revenue are presented as a percentage of the firms operating revenue. Financial fundamentals indicate that there is substantial heterogeneity among the Big Five fossil fuel firms.

Table 2
Herfindahl-Hirschman Index over time.

Corporation	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Cenovus	259.7	275.7	461.3	337.0	298.6	183.7	166.3	266.1	191.4	304.5	221.8
CNRL	943.4	1076.9	591.5	208.5	322.5	257.6	357.1	208.0	233.6	274.6	175.4
Husky	4087.9	5244.9	5235.4	5243.3	1170.4	3596.9	1169.2	3565.8	3672.4	1253.9	1239.9
Imperial	4870.6	4874.9	4874.7	4874.9	4870.1	4869.4	4858.5	4854.8	2516.2	2520.3	4862.2
Suncor	149.2	264.4	175.5	200.1	246.1	260.7	297.1	220.6	260.9	289.9	203.4
Average	2062.2	2347.4	2267.7	2172.8	1381.5	1833.7	1369.6	1823.0	1374.9	928.7	1340.5

The Herfindahl-Hirschman Index (HHI) is calculated at the firm level for each of the Big Five in the sample, over the course of ten years. Higher HHI scores indicate greater concentration of ownership among few prominent shareholders.

Table 3
Market debt to capital ratio.

Corporation	Fixed assets	Current liabilities	Shareholder equity	Debt to capital
Cenovus	15,423	1,397	9,387	64 %
CNRL	34,695	2,559	17,183	68 %
Husky	13,865	2,684	10,541	61 %
Imperial	18,393	2,125	13,161	61 %
Suncor	30,193	5,540	23,649	60 %
Average	22,514	2,861	14,784	63 %
Market debt to capital in Oil/Gas (production and exploration) among global companies				29.18 %

The debt-to-capital ratio is calculated at the firm level for each of the Big Five firms in the sample. A high debt to capital ratio indicates that the firm is more highly leveraged, perhaps due to high fixed capital costs associated with infrastructure development. The debt-to-capital ratio is calculated by adding fixed and current liabilities and dividing that value by shareholder equity.

around the edges). This implies that ownership structures differ between fossil fuel firms, with some having more democratic ownership structures (many small owners with holdings in multiple firms) while others are owned by one or a few large firms. The measure of degree centrality is 0.563.

Ownership structures have changed over time. Over our period of analysis, the total number of shareholders with holdings >0.01 % increased slightly, from 159 in 2009 to 176 by 2018. However, the trends in the centrality measures (Table 5) varied considerably, closely following periods of growth and contraction within the industry. Between 2009 and 2011, and 2015 to 2017, the average degree centrality and closeness centrality of shareholders fell, indicating that shareholders may have divested their holdings from select firms during periods of contraction, as lower share values during periods of contraction provided lower returns. Conversely, degree and closeness centrality increased between 2012 and 2014, inferring that during periods of economic growth, there was also greater consolidation of ownership within the industry.

The number of owners with >5 % holdings also increased over that time, from 5 blockholders to 11, however, there is no consistency in measures of degree centrality or closeness (Table 6). Overall, over the period of analysis, the number of blockholders has increased and remained relatively fragmented.

In line with Carroll and Huijzer [78], ownership is further delineated by type and region. Shareholders' types are categorized by banks, corporate entities, mutual and pension funds, financial companies, and others. Regions are categorized by headquarters in Canada, the United States, or other foreign ownership outside of Canada and the United States. Banks, corporate entities, mutual and pension funds, and financial companies account for 80 % of all shareholders; and 76 % of shareholders are headquartered in either Canada or the United States. American and corporate entities make up the majority of blockholders. Fig. 2 presents the distribution of ownership of all shareholders over the past decade by region and business type. We find that a sizable portion of equity ownership is held by foreign firms, of which the United States is among the most prevalent.

We also find that Canadian ownership has declined substantially over time as foreign and corporate ownership has grown (Fig. 3). US ownership fell by 4 %, Canadian Ownership fell by 9 %, and foreign ownership increased by 13 % over the period of analysis. American shareholders account for a significant proportion of ownership, averaging 40 % of share ownership from 2009 to 2019. By type, bank ownership decreased by 9 % while corporate ownership increased by 13 %. Corporate ownership in 2019 accounts for the largest proportion (56 %) of share ownership.

Finally, in line with Galaz et al. [35] and Carroll and Huijzer [78], we turn our attention to the most "prevalent shareholders", denoted as shareholders with blockholding power and wide ownership breadth. In total, we identify 14 shareholders (delineated in Table 7) that have or had over 5 % ownership in any one or more of the five fossil fuel firms in our sample. Corporations are ranked by the number of companies in which they own shares (ownership breadth), the number of holdings >5 % (blockholding power), and the average ownership share.

Prevalent shareholders are comprised of a variety of business types across several regions. Six of these shareholders are based in the United States, three are based in Canada, and four are based in Europe. Thus, over 70 % of prevalent shareholders are based outside of Canada. Banks and corporations similarly encompass over 70 % of prominent

Table 4
Stepwise reduction of ownership in the big five.

Minimum ownership stake	Firms in network	Banks	Corporate	Mutual/pension funds	Financial company	Other	US	CA	Other
Total	273	102	45	53	24	49	109	98	66
1 %	62	25	13	11	7	6	26	26	10
2 %	38	14	12	9	2	1	18	14	6
3 %	22	7	10	4	1	0	11	7	4
4 %	15	3	10	1	1	0	8	3	4
5 %	12	2	9	0	1	0	6	2	4
6 %	10	1	8	0	1	0	5	1	4
7 %	9	0	8	0	1	0	5	1	3
8 %	9	0	8	0	1	0	5	1	3
9 %	9	0	8	0	1	0	5	1	3
10 %	8	0	7	0	1	0	4	1	3

The stepwise reduction table presents the number of owners by shareholder type that have at least a certain percent of ownership in the Big Five. Owners are delineated by their type and by their region of headquarters. We delineate owners with >5 % as block holders.

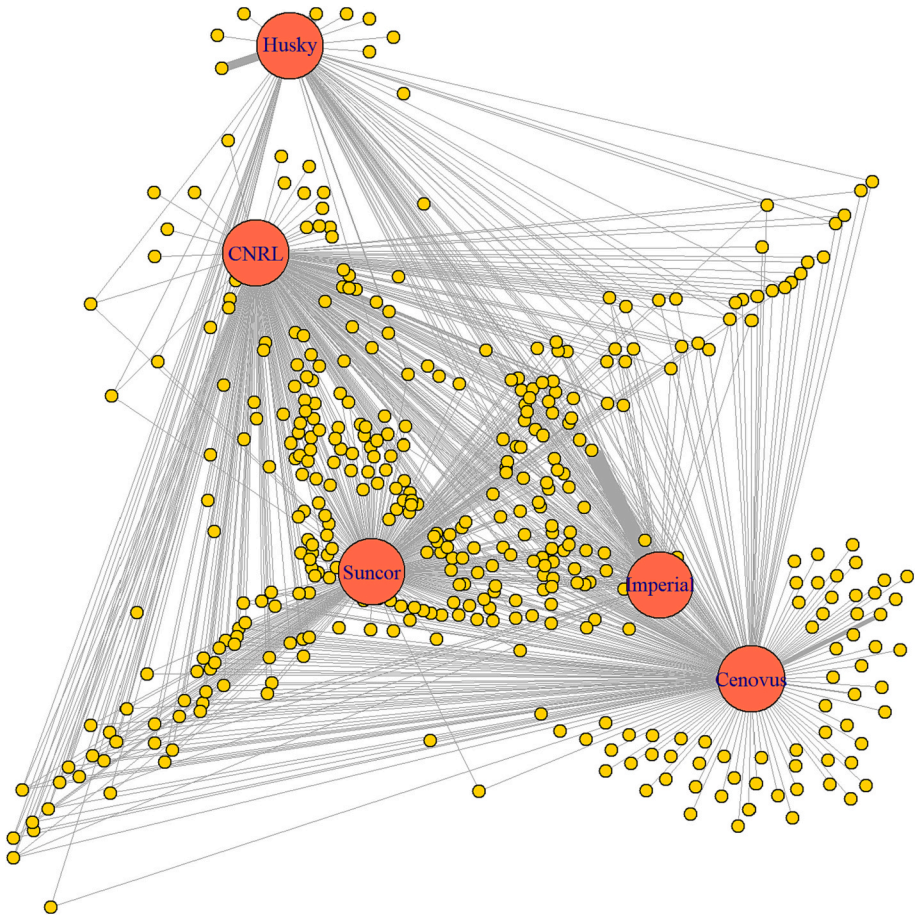

Fig. 1. Network model of all shareholders in the Big Five.
Network model of the Big Five fossil fuel firms in Canada. Ownership data is exported from the *Orbis* database as of June 2019. Fossil fuel corporations are denoted by the red nodes, and the shareholders are denoted by the yellow nodes. The size of the yellow nodes is proportional to the average percent of ownership in the respective firm over the sample period. Edge thickness represents the size of holdings. The purpose of this network is to demonstrate the complex interrelations between the Big Five and shareholders. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 5
Overview of investors and network centrality >0.01 %.

Year	Number of investors	Degree	Closeness
2009	159	0.649	0.378
2010	160	0.597	0.308
2011	166	0.541	0.277
2012	167	0.567	0.305
2013	168	0.598	0.330
2014	169	0.652	0.389
2015	164	0.636	0.349
2016	174	0.590	0.318
2017	166	0.553	0.284
2018	176	0.561	0.313

Ownership data is exported from the *Orbis* database as of June 2019. Data is collected at an annual interval, over the course of ten years. The number of investors column presents the total number of distinct investors with >0.01 % holding in any of the Big Five. The degree column presents the density of the network, based on the average number of edges each node has, divided by the total number of edges in the network. The closeness column presents the average distance between two nodes, aggregated by year.

shareholder types. Notably, three fossil fuel corporations, Exxon, ConocoPhillips, and Royal Dutch Shell also own sizeable portions of Imperial, Husky, and CNRL respectively. Six of the prevalent shareholders have ownership of all five companies, of which five have individual block holdings (>5 % of shares) in at least three companies. We denote the top five entities (Capital Group, FMR, Blackrock, Royal Bank of Canada, and Power Corporation of Canada) as the "financial giants", to further differentiate their leverage among the prevalent shareholders. These shareholders have the potential to coordinate their corporate control by voting to influence business operations in fossil fuel firms.

Prevalent shareholders can collectively influence the business operations of fossil fuel firms in favour of climate stability. Therefore, we calculate the aggregated ownership of these shareholders for each of the five firms. Following Galaz et al. [35] we select a 10 % ownership level to indicate considerable influence in corporate governance. Prominent shareholders collectively hold ownership above the 10 % threshold in all five corporations (Fig. 4). As of 2018, the top 14 shareholders identified above held 17 % of Suncor, 24 % of CNRL, 51 % of Cenovus, 72 % of Husky, and 73 % of Imperial. Moreover, the top 5 financial giants collectively hold over 10 % ownership in Cenovus, CNRL, and Suncor, at 28, 23, and 17 % respectively. The top shareholders of Cenovus, CNRL, Husky, and Imperial (ConocoPhillips at 17 %, Capital Research Global Investors at 11 %, Hutchison Holdings at 40 %, and ExxonMobil at 70 %) individually held over 10 % ownership in their respective corporations. Therefore, we infer that in all five fossil fuel firms, the collective influence of prominent shareholders can control the business operations and corporate governance of the companies, however, ownership dynamics do differ in who and how many shareholders hold influence.

There are some slight changes in control over time. The total share of ownership increased on all accounts for Cenovus, most recognizably through the purchase of ConocoPhillips' Canadian assets in 2017 [84]. Between 2009 and 2018, total ownership by prevalent shareholders increased by 26 %, suggesting that Cenovus saw more concentrated control of power among its shareholders. On the contrary, ownership in Suncor diversified over the period of 2009 to 2019, as the total share of ownership by prevalent shareholders fell by 11 %. On average, ownership by prevalent shareholders increased by 8 % across the five firms.

Table 6
Overview of investors and network centrality >5 %.

Year	Number of investors	Degree	Closeness	Blockholders
2009	5	0.233	0.083	Blackrock; Capital Group; Exxon Mobil; FMR; Hutchison Whampoa
2010	7	0.371	0.098	Blackrock; Capital Group; Exxon Mobil; Hutchison Whampoa; Power Corporation of Canada; Power Financial Corp; Royal Bank of Canada
2011	6	0.218	0.075	Blackrock; Capital Group; FMR; Hutchison Whampoa; L.F. Investments; Royal Bank of Canada
2012	6	0.236	0.033	Blackrock; Exxon Mobil; FMR; Hutchison Whampoa; L.F. Investments; Royal Bank of Canada
2013	6	0.218	0.092	Blackrock; Exxon Mobil; FMR; Hutchison Whampoa; Power Corporation of Canada; Royal Bank of Canada
2014	9	0.170	0.060	Capital Group; Desmarais Family Residuary Trust; Exxon Mobil; FMR; Hutchison Whampoa; L.F. Investments; Power Corporation of Canada; Royal Bank of Canada
2015	7	0.129	0.011	Capital Group; Exxon Mobil; FMR; Hutchison Whampoa; Power Corporation of Canada; Royal Bank of Canada; T. Rowe Price Group
2016	8	0.276	0.030	Capital Group; Exxon Mobil; FMR; Hutchison Whampoa; L.F. Investments; Royal Bank of Canada
2017	8	0.229	0.039	Capital Group; Capital Research Global Investors; Conocophilips; Exxon Mobil; FMR; Hutchison Whampoa; L.F. Investments; Royal Dutch Shell
2018	8	0.279	0.050	BPCE; Capital Group; Conocophilips; Exxon Mobil; FMR; Hutchison Whampoa; L.F. Investments; Royal Bank of Canada

Ownership data is exported from the *Orbis* database as of June 2019. Data is collected at an annual interval, over the course of ten years. The number of investors column presents the total number of distinct investors with >5 % holding in any of the Big Five. The degree column presents the density of the network, based on the average number of edges each node has, divided by the total number of edges in the network. The closeness column presents the average distance between two nodes, aggregated by year. The blockholders column presents owners with >5 % ownership, by year.

4.3. Ranking shareholders by influence

We conclude the results with a novel ranking method that combines equity ownership data with sensitivity and emissions data. This answers our final research question, who are the most influential shareholders in Canada's fossil fuel industry. The results inform where the most impactful points of leverage may lie in capital markets.

Our ranking method takes inspiration from Galaz et al. [35] and Dordi et al. [37], combining emissions potential, sensitivity, and shareholder ownership to identify the most influential shareholders. We assert based on Galaz et al. (2018), that owners with holdings in firms that are highly leveraged, highly concentrated, and with higher potential emissions are more susceptible to shareholder intervention - and thus, those factors have bearing on the efficacy of shareholder influence. In light of the wide disparity in sensitivity scores identified above, evaluating influence simply on the size of equity holdings or number of holdings would be misguided. Likewise, building on Dordi et al. [37], the emissions potential of the five firms also vary considerably, and thus, are incorporated as an additional factor in our score. Multiplying ownership in each firm by the firm's sensitivity scores and emissions potential provides a unique look at who the most influential shareholders are, not only by their ownership but by firm and climatic factors as well. Table 8 presents the list of shareholder rankings, based on this new measure.

Using this metric, Exxon Mobil is among the most influential shareholder, given their substantive and monopolistic holding in Imperial Oil, followed by Hutchinson Whampoa and LF Investment group for their holdings in Husky. Both Husky and Imperial have a higher firm sensitivity score, given their inordinately high HHI. This list is followed by Capital Group, ConocoPhillips, Royal Bank of Canada, Fidelity Management, Artisan Partners Asset Management, and First Eagle Investment Management. Notably, under this ranking, firms like Vanguard (ranked 10) and Blackrock (ranked 23), are perceived as less influential, due to smaller holdings in more democratically owned firms.

5. Discussion

The results of this study contribute to theory and practice on shareholder engagement and climate stability. It addresses a nascent research agenda about whether major shareholders can influence the governance of fossil fuel firms and consequently how those activities may bolster or impede climate change efforts. In this study, we identified major shareholders in Canada's fossil fuel industry and linked their holdings to anthropogenic climate change.

We find that equity ownership in Canada's fossil fuel firms is highly consolidated, increasingly by foreign owners. Through a stepwise reduction of ownership, we identified a total of 14 prevalent shareholders who together have significant leverage on the fossil fuel industry over the past decade. These shareholders together hold sizable holdings in all five corporations and can thus collectively influence the corporate governance of these companies, if they choose to do so. It is particularly noteworthy that in 2019, the single top shareholder of four of the five firms examined wields over 10 % ownership in the corporations, a level usually applied to identify "insiders" [35]. While there is some slight variation between the five fossil fuel firms, ownership by prevalent stockholders increased over the study period – indicating greater concentration and consolidation of power among prevalent shareholders. Notably, the rate of consolidation does not seem to follow the commodity cycle, indicating that ownership might not be influenced by this cycle. Rather, it seems the largest shareholders are simply gaining more control over Canada's fossil fuel industry.

Combining this with insights on firm sensitivity suggests that there is an intrinsic motivation for the industry and its shareholders to maintain the status quo, to mitigate against the climate-related financial risks of stranded assets. The results find that Canadian fossil fuel firms are highly leveraged, which consequently results in higher sensitivity to the influence of financiers. These firms also have a considerably higher debt load than their international counterparts, largely due to the immense size of their fixed assets (plants and machinery). High debt loads expose shareholders to higher financial risks associated with capital flight, diminishing asset values, and ultimately stranded assets; and thus, investors might be motivated to maintain favourable market conditions for those threatened assets. Moreover, equity ownership is primarily held outside of Canada, to investors who may be less scrupulous about achieving Canada's climate commitments. Consequently, the long-term nature of these fixed assets and increased consolidation of ownership among foreign shareholders indicates that industry and investors have "bet" on a carbon-based future and consequently, may not curtail their carbon emissions.

Consequently, we posit that it is doubtful that the industry will seriously commit to curtailing their production to mitigate climate change on their own accord. Moreover, given the enormity of blockholders in Canada's fossil fuel industry, it is doubtful that the many institutional investors who advocate for engagement will be able to influence corporate governance, especially without the intention to divest. However, while many shareholders may not have the capacity to influence corporate governance, all investors who maintain their holdings remain susceptible to the financial risks of the low-carbon transition.

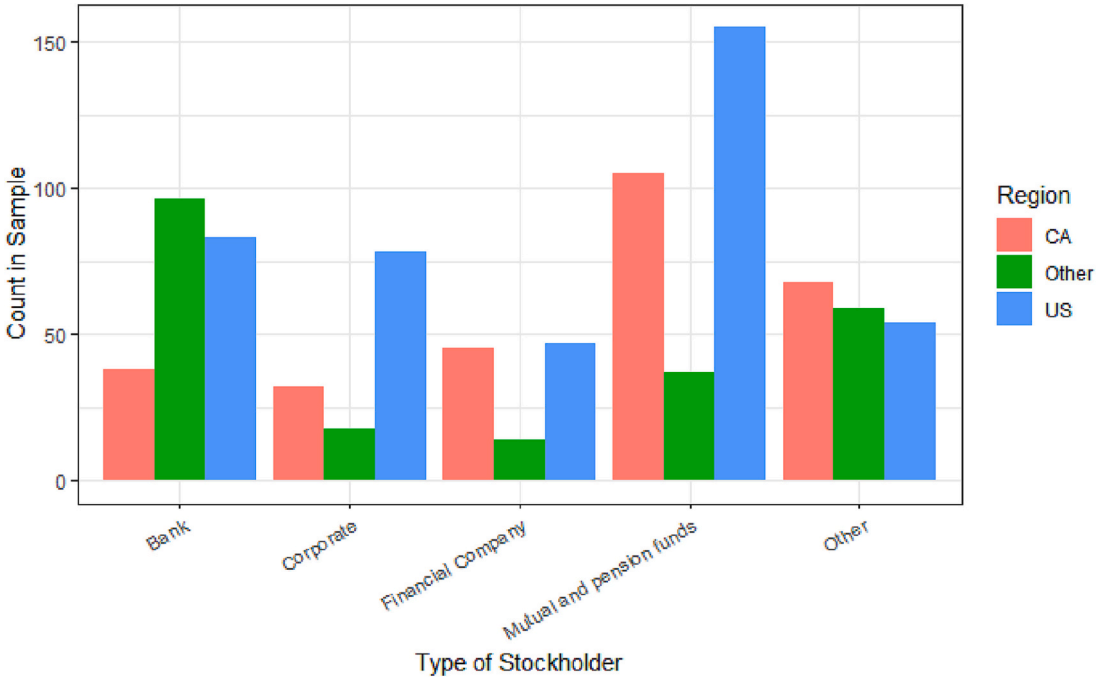

Fig. 2. Shareholder attributes by region and by type.
Distribution of stockholders by type and region. Data on stockholders is exported from the *Orbis* database as of June 2019.

This study extends research on shareholder engagement by Galaz et al. [35], Carroll and Huijzer [78], and Dordi et al. [37]. Complementing findings from Galaz et al. [35], prevalent shareholders collectively have an inordinate influence on all firms in our sample. High concentrations of equity ownership (delineated by the Herfindahl-Hirschman index) further indicate that concentration, though varied, is substantial across all firms. Lastly, the debt-to-capital ratio of Canada's fossil fuel firms is generally higher than the agricultural and forestry sectors examined by Galaz et al. [35], indicative of longer-term investments in the fossil fuel industry. In contrast, however, to Carroll and Huijzer [78], ownership does appear to differ between the largest fossil fuel firms and smaller firms. We find that larger fossil fuel firms may be significantly more exposed to global markets than smaller companies, which are more frequently owned by a range of domestic shareholders. The findings are even starker when ranking ownership based on firm sensitivity and emissions potential. Here, just one Canadian shareholder, the Royal Bank of Canada, appears in the list of the top ten most influential shareholders. Finally, in contrast to Dordi et al. [37], Canadian fossil fuel firms are frequently subsidiaries of larger fossil fuel corporations like Exxon Mobil, ConocoPhillips, and Royal Dutch Shell. This study also diverges from Dordi et al. [37] in its measure of influential shareholders, incorporating firm sensitivity as a key factor in how influential a shareholder may be.

5.1. Shareholder engagement in practice

Certainly, recent commitments by shareholders indicate that capital markets are not playing an enabling role in the low-carbon transition. Unsurprisingly, many blockholders identified in this study maintain a position of engagement over divestment. Capital Group explicitly cites that the "world's energy needs cannot be met with alternative sources alone [and] more conventional forms of energy will still be needed" [85]. Yet, Share Action's 'Voting Matters 2020' report found that Capital Group voted against 52 % of climate-related shareholder resolutions [86]. Blackrock in contrast had taken a clear position on divesting from climate change laggards [87] but remains a major investor in all five fossil fuel firms. Blackrock also voted against 87 % of shareholder resolutions examined by Share Action in 2020. Fidelity similarly voted against 57 % of these shareholder resolutions.

In Canada, the Royal Bank of Canada maintains that the best approach to support the transition to a low-carbon economy is through active stewardship [88]. Power Corporation of Canada similarly maintains their position, asserting that ownership enables them to contribute positively to the investee companies' ESG progress, while divestiture may not allow meeting this goal [89]. T Rowe Price Group offers fossil-free funds for investors who are more environmentally conscious, yet voted in favour of a paltry 16 % of climate-related shareholder resolutions [90]. Three shareholders on the list are fossil fuel firms, including Exxon Mobil, which has a long history of climate disinformation and denial [91,92]. Other, blockholders like the Desmarais Family Trust do not take a formal position on divestment or engagement but are tightly knit to the Power Corporation of Canada, where Paul Desmarais served as the chair. Collectively, it appears that even where climate change risk is acknowledged, common rhetoric of delay through criticisms of divestment and reference to energy demand, continue to be used to maintain their positions of influence within the five fossil fuel firms.

5.2. Contribution to theory

Relating back to the literature on engagement, agency theory provides one explanation as to why a shareholder may intervene in a firm's operations [62]. Shareholders may intervene in corporate governance if share prices fall, yet, even as the industry continues to underperform, proxy votes indicate that investors continue to vote against climate-related shareholder resolutions [86]. Consequently, agency theory may be inadequate in explaining why major shareholders maintain their investments during periods of underperformance and why they may not effectively engage in the fossil fuel industry.

The capital as power theory [70] in contrast asserts that investments are a forward-looking indicator of future profit and consequently, investors may be motivated to maintain favourable market conditions for their firms, to mitigate against the financial risks of stranded assets. Capital may thus be used in a manner that safeguards the industry's future profitability and contradicts effective climate solutions if those

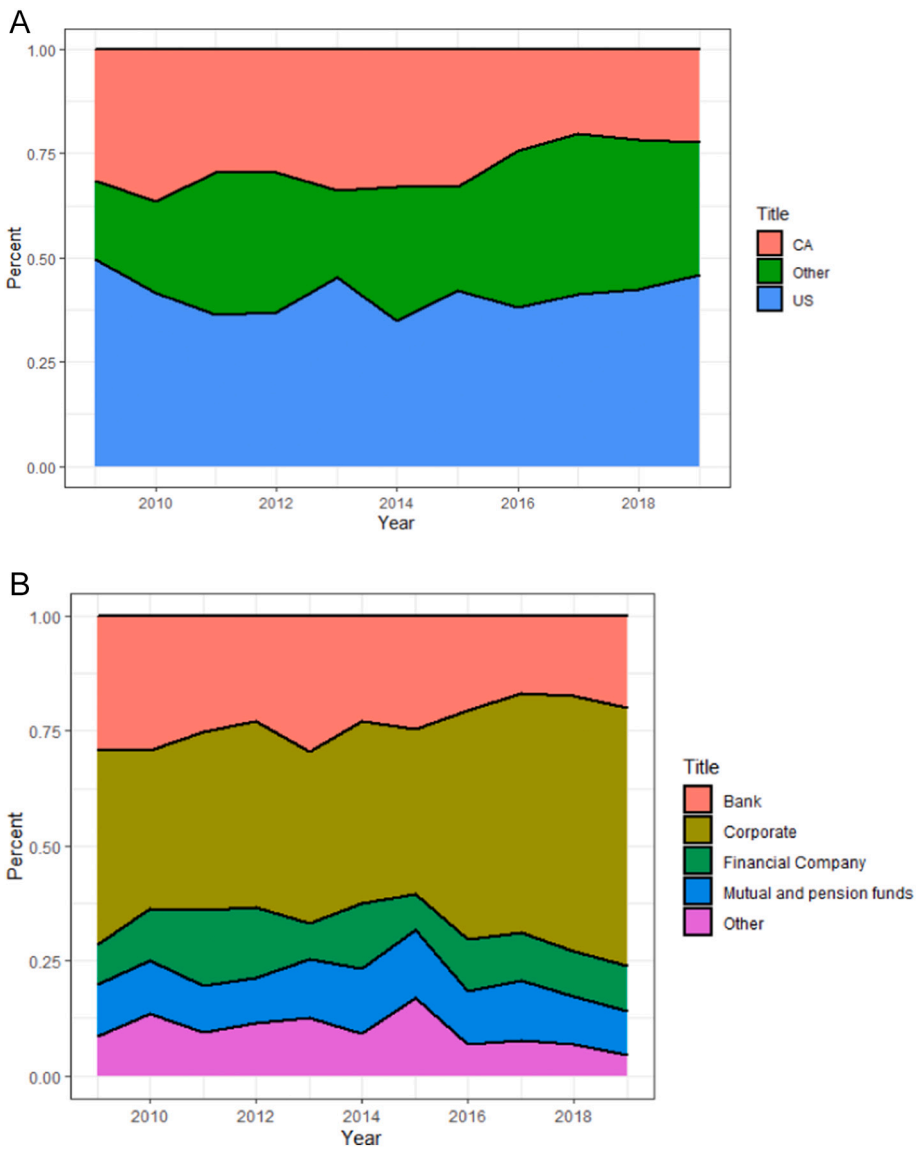

Fig. 3. [a] Evolution of shareholder ownership by region.
Distribution of stockholders by region over time. Data on stockholders is exported from the *Orbis* database as of June 2019.
[b] Evolution of shareholder ownership by business type.
Distribution of stockholders by type over time. Data on stockholders is exported from the *Orbis* database as of June 2019.

Table 7
List of prevalent shareholders denoted by holdings >5 %.

	Stockholder	Location	Category of stockholder	Ownership breadth	Number of holdings > 5 % Companies	Average ownership share
1	Capital Group	US	Corporate	5	(3) Cenovus, CNRL, Suncor	4.64 %
2	FMR	US	Corporate	5	(3) Cenovus, CNRL, Suncor	3.59 %
3	Blackrock	US	Bank	5	(3) Cenovus, CNRL, Suncor	2.87 %
4	Royal Bank of Canada	CA	Bank	5	(3) Cenovus, CNRL, Suncor	3.46 %
5	Power Corporation of Canada	CA	Financial company	5	(3) Cenovus, CNRL, Suncor	2.14 %
6	Desmarais Family Residuary Trust	CA	Mutual and pension fund	5	(1) Cenovus	3.02 %
7	T. Rowe Price Group	US	Bank	4	(1) CNRL	1.08 %
8	BPCE	FR	Bank	2	(1) Cenovus	2.34 %
9	Exxon Mobil	US	Corporate	1	(1) Imperial	66.04 %
10	Hutchison Whampoa	LU	Corporate	1	(1) Husky	36.46 %
11	L.F. Investments	LU	Financial company	1	(1) Husky	32.06 %
12	Conocophillips	US	Corporate	1	(1) Cenovus	16.93 %
13	Capital Research Global Investors	US	Mutual and pension fund	1	(1) CNRL	11.70 %
14	Royal Dutch Shell	GB	Corporate	1	(1) CNRL	8.86 %

The top influential shareholders are measured using a combination of ownership breadth (the number of firms the stockholder has a holding of at least 0.01 %) and by their blockholding power (the number of firms the stockholder has a holding of at least 5 %. Average ownership share is calculated based on the stockholder's holdings in all five companies. The stockholder's location and stakeholder type are also presented.

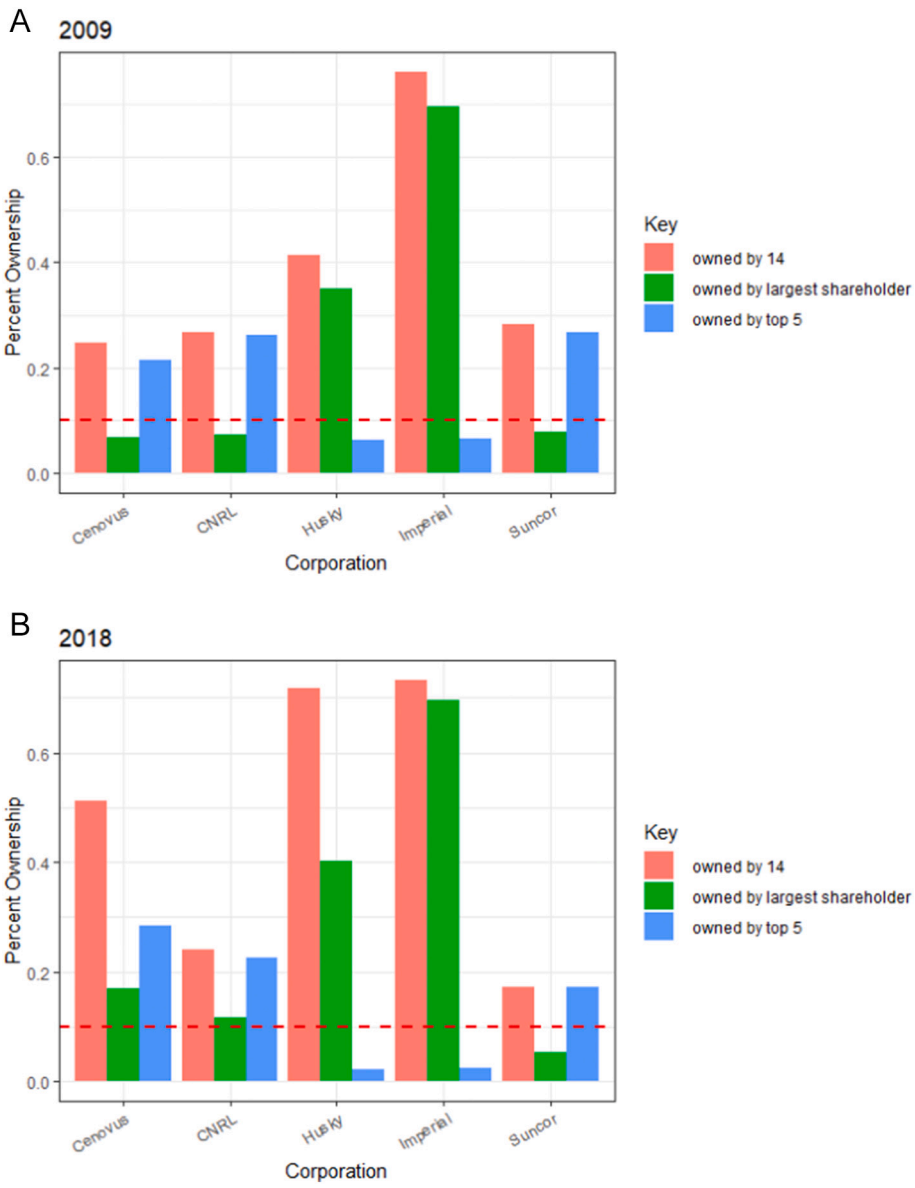

Fig. 4. [a] Prevalent shareholder influence over time (2009).
Total percent ownership in the Big Five by groups of stockholders in 2009. Data on stockholders is exported from the *Orbis* database as of June 2019. The Top 14 are identified in Table 5 as Capital Group, FMR, Blackrock, Royal Bank of Canada, Power Corporation of Canada, Desmarais Family Residuary Trust, T. Rowe Price Group, BPCE, Exxon Mobil, Hutchison Whampoa, L.F. Investments, Conocophillips, Capital Research Global Investors, and Royal Dutch Shell. The Top 5 are delineated as Capital Group, FMR, Blackrock, Royal Bank of Canada, and Power Corporation of Canada. As of 2009, the largest shareholder in Cenovus is Blackrock with 6.73 %. The largest shareholder in CNRL is Blackrock with 7.25 %. The largest shareholder in Husky is Hutchison Whampoa with 35 %. The largest shareholder in Imperial is Exxon Mobil with 69.6 %. The largest shareholder in Suncor is Capital Group with 7.89 %.
[b] Prevalent shareholder influence over time (2018).
Total percent ownership in the Big Five by groups of stockholders in 2018. Data on stockholders is exported from the *Orbis* database as of June 2019. The Top 14 are identified in Table 5 as Capital Group, FMR, Blackrock, Royal Bank of Canada, Power Corporation of Canada, Desmarais Family Residuary Trust, T. Rowe Price Group, BPCE, Exxon Mobil, Hutchison Whampoa, L.F. Investments, Conocophillips, Capital Research Global Investors, and Royal Dutch Shell. The Top 5 are delineated as Capital Group, FMR, Blackrock, Royal Bank of Canada, and Power Corporation of Canada. As of 2018, the largest shareholder in Cenovus is Conocophillips with 16.93 %. The largest shareholder in CNRL is Capital Group with 11.76 %. The largest shareholder in Husky is Hutchison Whampoa with 40.19 %. The largest shareholder in Imperial is Exxon Mobil with 69.59 %. The largest shareholder in Suncor is FMR with 5.22 %.

interventions are perceived to be of material financial risk to the investor or the stability of the industry. This may explain why prominent shareholders like Capital Group maintain a position of engagement and active stewardship while concurrently voting against climate-related shareholder resolutions.

Within this context, capital markets may pose formidable political constraints to the low-carbon transition [93]. The theory of economic regulation [94] asserts that industries with political power can influence regulators to design and enact ineffective policies. Supply-side constraints to fossil fuel production, for example, impose costs of climate change on a small group of politically influential emitters and shareholders, which makes such policies susceptible to regulatory capture [95]. Through lobbying efforts, these polluting industries may suppress effective climate policy, if these policies are perceived to be of material risk to the industry [96,97]. Thus, fossil fuel firms and shareholders are unlikely to restrict emissions alone, rather will likely work to subdue effective climate policies.

5.3. Contribution to policy

Our results and discussion assert that capital markets may not play an enabling role in Canada's fossil fuel industry unless it is disciplined to do so [36]. Climate-related financial interventions can direct capital in a more sustainable direction that restricts economic activities that contribute to climate instability while also mitigating financial risks. However, policy interventions must be amicable to avoid regulatory capture by fossil fuel firms and capital markets. We present three insights on how policy can incentivize capital markets to play an enabling role in the low-carbon transition.

First, policy uncertainty and short-termism are key drivers of continued investments in the fossil fuel industry [39]. Uncertainty around the durability of Canada's carbon-pricing system is frequently cited by investors as one of the greatest inhibitors to accelerating industrial decarbonization [98]. Regulators and capital markets alike agree that the most important driver to enable a low-carbon transition is clear and consistent national policy [20]. This uncertainty is particularly problematic in countries like Canada, where financial stability is paramount due to the vested interests of governments and financiers to

Table 8
Ranking of ownership influence by size of holding and firm sensitivity.

	Cenovus	CNRL	Husky	Imperial	Suncor
Debt-to-capital	0.64 %	0.68 %	0.61 %	0.61 %	0.61 %
HHI	943.41	259.70	4087.94	4870.61	149.23
Emissions potential	0.65 GT	1.72 GT	0.30	0.60 %	0.68

Firm	Cenovus	CNRL	Husky	Imperial	Suncor	Score
Exxon Mobil	0.00 %	0.00 %	0.00 %	69.59 %	0.00 %	124,782
Hutchison Whampoa	0.00 %	0.00 %	40.19 %	0.00 %	0.00 %	30,471
L.F. Investments	0.00 %	0.00 %	29.32 %	0.00 %	0.00 %	22,230
Capital Group	13.50 %	11.76 %	0.00 %	0.00 %	4.93 %	9259
Conocophillips	16.93 %	0.00 %	0.00 %	0.00 %	0.00 %	6714
Royal Bank of Canada	2.39 %	5.18 %	0.65 %	1.80 %	4.24 %	6518
FMR	9.29 %	2.97 %	0.84 %	0.53 %	5.22 %	6506
Artisan Partners Asset Management	0.00 %	0.00 %	0.00 %	3.45 %	0.00 %	6186
First Eagle Investment Management	2.13 %	0.00 %	0.00 %	2.87 %	0.00 %	5991
Vanguard Group	2.41 %	2.90 %	0.78 %	0.94 %	3.03 %	4309

The ranking of the most influential shareholders is measured using a combination firm dynamics and ownership size. Total ownership in each firm is multiplied by the debt to capital ratio, HHI, and emissions potential, to estimate how influential a shareholder might be, given the heterogeneity of firm characteristics. The higher the score the greater the influence.

maintain fossil fuel production [73]. Furthermore, in Canada, risk blindness increased as stakeholders became less certain about policy climate goals [18].

Second, policy interventions should differ based on shareholder type and region, and the organizational characteristics of the firm. We find, first, that corporations are among the most prevalent blockholder types - and thus may have a different fiduciary duty than banks or asset managers. We also find that Canadian fossil fuel firms are significantly more exposed to global markets, primarily the United States – and thus, policies that target domestic owners may prove to be counterproductive. Through international ownership, foreign shareholders can profit from Canadian fossil fuel production outside of federal jurisdiction. Consequently, supply-side policies that disincentivize fossil fuel investments overall, may be more effective than policies that seek to regulate domestic owners. Cross-national commitments like the Glasgow Summit pledge to phase out international public financing for fossil fuels may be examined for international private financing as well. Finally, there is a greater impetus to regulate Canada's fossil fuel industry, as high-debt load and oligarchic ownership structures make Canadian fossil fuel firms particularly sensitive to shareholder engagement.

Lastly, the pace of policy implementation is crucial to avoid regulatory capture. Drastic and unforeseen policy interventions might trigger financial risks resulting in lost revenue and potentially cascading losses across the economy [99]. As markets price current policy into financing decisions, long-term policy solutions with short-term targets may be better suited to incentivize a rapid but orderly transition [53].

5.4. Future research

The collective influence of capital markets in bolstering or impeding economic activities that contribute to climate instability is an area ripe for future research. Such methodologies could be applied, and results contrasted to other fossil-fuel-producing countries (with publicly listed companies) like the United States or Brazil. The spatial aspects of foreign ownership and carbon leakage remain relatively underdeveloped. The methodology could also be applied to other carbon-intensive sectors like transportation, agriculture, and manufacturing, as required for deep decarbonization. Furthermore, the confounding effect of coordinated engagement (indicated through higher centrality measures) may be taken into consideration when modelling capital market dynamics. Finally, a longer time horizon could be examined to capture the effects of recent climate policies, such as the requirement for climate stress tests by the Bank of Canada.

6. Conclusion

Our results present a view of firm and shareholder dynamics in Canada's fossil fuel industry, a necessary precursor to finding effective points of intervention. We find that Canadian fossil fuel firms are highly heterogeneous in their operations and ownership structures. Consequently, the influence of shareholders will depend not only on their holdings but on the firm that they wish to engage with as well. We maintain that shareholder engagement may be an effective leverage tool for addressing the climate crisis. However, as the climate crisis worsens, increased and accelerated policy responses can be expected, which can result in asset stranding for shareholders that maintain their investments. Capital can be used to reshape society if the power is regulated accordingly by financial supervisors. Climate-related financial interventions could direct capital in a more sustainable direction that helps both restrict economic activities that contribute to climate instability while also mitigating financial risks.

Compliance with ethical standards

The authors declare this study has no sources of funding, no potential conflicts of interest (financial or non-financial), and no human participants.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

This research was funded by the Social Sciences and Humanities Research Council Doctoral Fellowship (752-2021-1579) and New Frontiers in Research Grant (NFRFE-338-2018).

References

[1] M. Meinshausen, N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, D. J. Frame, M.R. Allen, Greenhouse-gas emission targets for limiting global warming to 2 °C, Nature. 458 (2009) 1158–1162, https://doi.org/10.1038/nature08017.

[2] M.R. Allen, D.J. Frame, C. Huntingford, C.D. Jones, J.A. Lowe, M. Meinshausen, N. Meinshausen, Warming caused by cumulative carbon emissions towards the trillionth tonne, Nature. 458 (2009) 1163–1166, https://doi.org/10.1038/nature08019.

[3] M. Jaccard, J. Hoffele, T. Jaccard, Global carbon budgets and the viability of new fossil fuel projects, Clim. Chang. 150 (2018) 15–28, https://doi.org/10.1007/s10584-018-2206-2.

[4] F.W. Geels, B.K. Sovacool, T. Schwanen, S. Sorrell, Sociotechnical transitions for deep decarbonization, Science 357 (2017) 1242–1244, https://doi.org/10.1126/SCIENCE.AAO3760.

[5] R. York, S.E. Bell, Energy transitions or additions?: why a transition from fossil fuels requires more than the growth of renewable energy, Energy Res. Soc. Sci. 51 (2019) 40–43, https://doi.org/10.1016/J.ERSS.2019.01.008.

[6] C. Louche, T. Busch, P. Crifo, A. Marcus, Financial markets and the transition to a low-carbon economy: challenging the dominant logics, Organ. Environ. 32 (2019) 3–17, https://doi.org/10.1177/1086026619831516.

[7] R. Clements, Misaligned Incentives in Markets: Envisioning Finance That Benefits All of Society (2021), https://doi.org/10.2139/ssrn.3802178.

[8] B. Ryszawska, Sustainability transition needs sustainable finance, Copernican Journal of Finance & Accounting. 5 (2016) 185–194, https://doi.org/10.12775/CJFA.2016.011.

[9] A.V. Carter, T. Dordi, Correcting Canada's "One Eye Shut" Climate Policy, Cascade Institute. https://cascadeinstitute.org/technical-paper/correcting-canadas-one-eye-shut-climate-policy/, 2021. (Accessed 5 August 2021).

[10] I. Hussey, E. Pineault, E. Jackson, S. Cake, Boom, Bust, and Consolidation: Corporate Restructuring in the Alberta Oil Sands, Parkland Institute, 2018.

[11] Environment and Climate Change Canada, a Healthy Environment and a Healthy Economy, Environment and Climate Change Canada, 2020.

[12] M. Lazarus, H. van Asselt, Fossil fuel supply and climate policy: exploring the road less taken, Clim. Chang. 150 (2018), https://doi.org/10.1007/s10584-018-2266-3.

[13] F. Green, R. Denniss, Cutting with both arms of the scissors: the economic and political case for restrictive supply-side climate policies, Clim. Chang. 150 (2018) 73–87, https://doi.org/10.1007/s10584-018-2162-x.

[14] R. Kemp, H. Van Lente, The dual challenge of sustainability transitions, Environmental Innovation and Societal Transitions 1 (2011) 121–124, https://doi.org/10.1016/j.eist.2011.04.001.

[15] P. Erickson, M. Lazarus, G. Piggot, Limiting fossil fuel production as the next big step in climate policy, Nat. Clim. Chang. 8 (2018) 1037–1043, https://doi.org/10.1038/s41558-018-0337-0.

[16] K. Bos, J. Gupta, Stranded assets and stranded resources: implications for climate change mitigation and global sustainable development, Energy Res. Soc. Sci. (2019), https://doi.org/10.1016/j.erss.2019.05.025.

[17] N. Viens, Racing to the last barrel: linking oil and gas industry interests to climate inaction in Canada, Energy Res. Soc. Sci. 91 (2022), 102748, https://doi.org/10.1016/J.ERSS.2022.102748.

[18] L.D. Virla, D.J. van de Ven, J. Sampedro, O. van Vliet, A. Smith, H. Pollitt, J. Lieu, Risk blindness in local perspectives about the Alberta oil sands hinders Canada's decarbonization, Environmental Innovation and Societal Transitions. 40 (2021), https://doi.org/10.1016/j.eist.2021.10.008.

[19] J. Köhler, F.W. Geels, F. Kern, J. Markard, E. Onsongo, A. Wieczorek, F. Alkemade, F. Avelino, A. Bergek, F. Boons, L. Fünfschilling, D. Hess, G. Holtz, S. Hyysalo, K. Jenkins, P. Kivimaa, M. Martiskainen, A. McMeekin, M.S. Mühlemeier, B. Nykvist, B. Pel, R. Raven, H. Rohracher, B. Sandén, J. Schot, B. Sovacool, B. Turnheim, D. Welch, P. Wells, An agenda for sustainability transitions research: state of the art and future directions, Environmental Innovation and Societal Transitions. 31 (2019) 1–32, https://doi.org/10.1016/J.EIST.2019.01.004.

[20] B. Nykvist, A. Maltais, Too risky – the role of finance as a driver of sustainability transitions, Environmental Innovation and Societal Transitions. 42 (2022), https://doi.org/10.1016/j.eist.2022.01.001.

[21] D.J. Abson, J. Fischer, J. Leventon, J. Newig, T. Schomerus, U. Vilsmaier, H. von Wehrden, P. Abernethy, C.D. Ives, N.W. Jager, D.J. Lang, Leverage points for sustainability transformation, Ambio. 46 (2017) 30–39, https://doi.org/10.1007/S13280-016-0800-Y/TABLES/2.

[22] C. McDonnell, A. Rempel, J. Gupta, Climate action or distraction? Exploring investor initiatives and implications for unextractable fossil fuels, Energy Research & Social Science 92 (2022), 102769, https://doi.org/10.1016/J.ERSS.2022.102769.

[23] Rainforest Action Network, Banking on Climate Chaos. https://priceofoil.org/2022/03/30/banking-on-climate-chaos-2022, 2022. (Accessed 5 August 2021).

[24] C.L. Quéré, R.J. Andres, T. Boden, T. Conway, R.A. Houghton, J.I. House, G. Marland, G.P. Peters, G.R. der Werf, A. Ahlström, Others, The global carbon budget 1959–2011, Earth System Science Data. 5 (2013) 165–185.

[25] J. Hansen, M. Sato, P. Kharecha, D. Beerling, R. Berner, V. Masson-Delmotte, M. Pagani, M. Raymo, D.L. Royer, J.C. Zachos, Target atmospheric CO2: where should humanity aim? The Open Atmospheric Science Journal. 2 (2008) 217–231, https://doi.org/10.2174/1874282300802010217.

[26] C. Accord, Draft decision-/CP. 15, Conference of the Parties to the L NFCC, Fifteenth Session, Copenhagen. 7 (2009) 18. All.

[27] IPCC, IPCC, 2022: Summary for Policy Makers, in: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2022.

[28] R. Heede, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010, Clim. Chang. 122 (2014) 229–241, https://doi.org/10.1007/s10584-013-0986-y.

[29] R. Heede, N. Oreskes, Potential emissions of CO2 and methane from proved reserves of fossil fuels: an alternative analysis, Glob. Environ. Chang. 36 (2016) 12–20, https://doi.org/10.1016/j.gloenvcha.2015.10.005.

[30] W. Steffen, J. Rockström, K. Richardson, T.M. Lenton, C. Folke, D. Liverman, C. P. Summerhayes, A.D. Barnosky, S.E. Cornell, M. Crucifix, J.F. Donges, I. Fetzer, S. J. Lade, M. Scheffer, R. Winkelmann, H.J. Schellnhuber, Trajectories of the earth system in the Anthropocene, Proc. Natl. Acad. Sci. 115 (2018) 8252–8259, https://doi.org/10.1073/PNAS.1810141115.

[31] Y. Strauch, T. Dordi, A. Carter, Constraining fossil fuels based on 2 °C carbon budgets: the rapid adoption of a transformative concept in politics and finance, Clim. Chang. 160 (2020), https://doi.org/10.1007/s10584-020-02695-5.

[32] B. Ekwurzel, J. Boneham, M.W. Dalton, R. Heede, R.J. Mera, M.R. Allen, P. C. Frumhoff, The rise in global atmospheric CO2, surface temperature, and sea level from emissions traced to major carbon producers, Clim. Chang. 144 (2017) 579–590, https://doi.org/10.1007/s10584-017-1978-0.

[33] P.C. Frumhoff, R. Heede, N. Oreskes, The climate responsibilities of industrial carbon producers, Clim. Chang. 132 (2015) 157–171, https://doi.org/10.1007/s10584-015-1472-5.

[34] G. Piggot, P. Erickson, H. van Asselt, M. Lazarus, Swimming upstream: addressing fossil fuel supply under the UNFCCC, Clim. Pol. 18 (2018) 1189–1202, https://doi.org/10.1080/14693062.2018.1494535.

[35] V. Galaz, B. Crona, A. Dauriach, B. Scholtens, W. Steffen, Finance and the earth system – exploring the links between financial actors and non-linear changes in the climate system, Glob. Environ. Chang. 53 (2018) 296–302, https://doi.org/10.1016/J.GLOENVCHA.2018.09.008.

[36] C.P. Naidoo, Relating financial systems to sustainability transitions: challenges, demands and design features, Environmental Innovation and Societal Transitions. 36 (2020) 270–290, https://doi.org/10.1016/j.eist.2019.10.004.

[37] T. Dordi, S.A. Gehricke, A. Naef, O. Weber, Ten financial actors can accelerate a transition away from fossil fuels, Environmental Innovation and Societal Transitions. 44 (2022) 60–78, https://doi.org/10.1016/J.EIST.2022.05.006.

[38] J.P. Horne, Climate change and economic growth enigma: an investment suggestion from wall street, Environmental Innovation and Societal Transitions. 9 (2013) 26–32, https://doi.org/10.1016/j.eist.2013.09.004.

[39] S. Hafner, A. Jones, A. Anger-Kraavi, J. Pohl, Closing the green finance gap – a systems perspective, Environmental Innovation and Societal Transitions. 34 (2020) 26–60, https://doi.org/10.1016/j.eist.2019.11.007.

[40] M.A. Urban, D. Wójcik, Dirty banking: probing the gap in sustainable finance, Sustainability (Switzerland). 11 (2019), https://doi.org/10.3390/su11061745.

[41] N. Kraushaar-Friesen, H. Busch, Of pipe dreams and fossil fools: advancing Canadian fossil fuel hegemony through the Trans Mountain pipeline, Energy Res. Soc. Sci. 69 (2020), 101695, https://doi.org/10.1016/J.ERSS.2020.101695.

[42] J. Dion, A. Kanduth, J. Moorhouse, D. Beugin, Canada's net zero future: finding our way in the global transition, Canadian institute for climate Choices 1 (2021) 1–132.

[43] A. Geddes, I. Gerasimchuk, B. Viswanathan, A. Suharsono, V. Corkal, J. Roth, A. Picciariello, B. Tucker, A. Doukas, I. Gençsü, Doubling back and doubling down: G20 scorecard on fossil fuel funding, International Institute for Sustainable Development 1 (2020) 1–57. https://www.iisd.org/publications/g20-scorecard.

[44] V. Corkal, P. Gass, J. Levin. Canada's Federal Fossil Fuel Subsidies in 2020, International Institute for Sustainable Development, 2020. https://www.iisd.org/publications/canadas-federal-fossil-fuel-subsidies-2020.

[45] J. Levin, B. Hayes, Buyer beware: fossil fuels subsidies and carbon capture fairy tales in Canada, Environmental Defence 1 (2022) 1–23.

[46] V. Corkal, E. Beedell, P. Gass, Investing for Tomorrow, Today: How Canada's Budget 2021 can enable critical climate action and a green recovery, International Institute for Sustainable Development (2021). https://www.iisd.org/publications/canada-budget-2021-climate-action-green-recovery.

[47] K. Andrew, B. Majerbi, E. Rhodes, Slouching or speeding toward net zero? Evidence from COVID-19 energy-related stimulus policies in the G20, Ecol. Econ. 201 (2022), 107586, https://doi.org/10.1016/J.ECOLECON.2022.107586.

[48] S. Martin, R. Riordan, Capital Mobilization Plan for a Canadian Low-Carbon Economy AUTHORS, Institute for Sustainable Finance, 2020.

[49] T.F. Cojoianu, A.G.F. Hoepner, F.I. Schneider, M. Urban, A. Vu, D. Wójcik, The city never sleeps: but when will investment banks wake up to the climate crisis? Reg. Stud. (2021) https://doi.org/10.1080/00343404.2021.1995601/SUPPL_FILE/CRES_A_1995601_SM6995.PDF.

[50] J. Fichtner, E.M. Heemskerk, J. Garcia-Bernardo, Hidden power of the Big Three? Passive index funds, re-concentration of corporate ownership, and new financial risk, Business and Politics 19 (2017) 298–326, https://doi.org/10.1017/bap.2017.6.

[51] S.L. Gillan, L.T. Starks, Corporate governance proposals and shareholder activism: the role of institutional investors, J. Financ. Econ. 57 (2000) 275–305.

[52] S. Vitali, J.B. Glattfelder, S. Battiston, The network of Global Corporate Control, PLoS One 6 (2011), e25995, https://doi.org/10.1371/journal.pone.0025995.

[53] I. Diaz-Rainey, S.A. Gehricke, H. Roberts, R. Zhang, Trump vs., Paris: the impact of climate policy on U.S. listed oil and gas firm returns and volatility, Int. Rev. Financ. Anal. 76 (2021), 101746, https://doi.org/10.1016/J.IRFA.2021.101746.

[54] M.C. Lewis, S. Voisin, S. Hazra, S. Mary, R. Walker, Stranded assets, fossilised revenues, energy transition & climate, Change. 24 (2014).

[55] T. Allen, M. Coffin, Unburnable Carbon: Ten Years On, Carbon Tracker Initiative, 2022. https://carbontracker.org/reports/unburnable-carbon-ten-years-on/ (accessed July 5, 2022).

[56] K.D. Arbuthnott, B. Dolter, Escalation of commitment to fossil fuels, Ecol. Econ. 89 (2013) 7–13, https://doi.org/10.1016/J.ECOLECON.2013.02.004.
[57] C. Hunt, O. Weber, Fossil fuel divestment strategies: financial and carbon related consequences, Organ. Environ. 32 (1) (2018) 41–61.
[58] A. Trinks, B. Scholtens, M. Mulder, L. Dam, Fossil fuel divestment and portfolio performance, Ecol. Econ. 146 (2018) 740–748.
[59] I. Henriques, P. Sadorsky, Investor implications of divesting from fossil fuels, Glob. Financ. J. 38 (2018) 30–44, https://doi.org/10.1016/J.GFJ.2017.10.004.
[60] T. Dordi, O. Weber, The impact of divestment announcements on the share price of fossil fuel stocks, Sustainability. 11 (2019) 3122, https://doi.org/10.3390/su11113122.
[61] J.K. Rowe, S. Glanzmann, J. Dempsey, Z. Yunker, Fossil Futures The Canada Pension Plan's failure to respect the 1.5-degree Celsius limit, 2019. www.policyalternatives.ca (accessed June 21, 2020).
[62] C.M. Daily, D.R. Dalton, N. Rajagopalan, Governance through ownership: centuries of practice, decades of research, Acad. Manag. J. 46 (2003) 151–158, https://doi.org/10.5465/30040611.
[63] E.F. Fama, M.C. Jensen, Separation of ownership and control, J. Law Econ. 26 (1983) 301–325, https://doi.org/10.1086/467037.
[64] M.C. Jensen, W.H. Meckling, Theory of the firm: managerial behavior, agency costs and ownership structure, J. Financ. Econ. 3 (1976) 305–360, https://doi.org/10.1016/0304-405X(76)90026-X.
[65] A.O. Hirschman, Exit, voice, and loyalty: responses to decline in firms, organizations, and states, 1970. https://books.google.ca/books?hl=en&lr=&id=vYO6sDvjvcgC&oi=fnd&pg=PA1&dq=Exit,+voice,+and+loyalty:+Responses+to+decline+in+firms,+organizations,+and+states&ots=Y8fSrkAar9&sig=AAXqr_4CqaRW2DJp7Ea8rXqaimI#v=onepage&q=Exit%2C voice%2C and loyalty%3A Response (accessed April 29, 2019).
[66] L.A. Gordon, J. Pound, Information, ownership structure, and shareholder voting: evidence from shareholder-sponsored corporate governance proposals, the, J. Financ. 48 (1993) 697–718, https://doi.org/10.1111/j.1540-6261.1993.tb04734.x.
[67] E. Dimson, O. Karakaş, X. Li, Active ownership, Rev. Financ. Stud. 28 (2015) 3225–3268, https://doi.org/10.1093/rfs/hhv044.
[68] I.R. Appel, T.A. Gormley, D.B. Keim, Passive investors, not passive owners, J. Financ. Econ. 121 (2016) 111–141, https://doi.org/10.1016/J.JFINECO.2016.03.003.
[69] J. Martin, L. Peacock, M. Buttle, R. Hargreaves, X. Lerin, Voting Matters 2020: Are Asset Managers Using their Proxy Votes for Action on Climate and Social Issues? Shareaction, London, 2020.
[70] J. Nitzan, S. Bichler, Capital as Power: A study of order and creorder, 2009. doi: https://doi.org/10.4324/9780203876329.
[71] S. Bichler, J. Nitzan, Unbridgeable: why political economists cannot accept capital as power, real-world economics, Review. (2021) 109–117.
[72] J. Baines, S.B. Hager, Financial Crisis, Inequality, and Capitalist Diversity: A Critique of the Capital as Power Model of the Stock Market, doi:https://doi.org/10.1080/13563467.2018.1562434. 25 (2019) 122–139. doi:https://doi.org/10.1080/13563467.2018.1562434.
[73] N. Koch, Greening oil money: the geopolitics of energy finance going green, Energy Res. Soc. Sci. 93 (2022), 102833, https://doi.org/10.1016/J.ERSS.2022.102833.
[74] T.D. Muzio, Energy, Capital as Power and World Order, The Palgrave Handbook of Critical International Political Economy, 2016, pp. 267–287, https://doi.org/10.1057/978-1-137-50018-2_14.
[75] A. Edmans, Blockholders and corporate governance, Annual Review of Financial Economics. 6 (2014) 23–50, https://doi.org/10.1146/annurev-financial-110613-034455.
[76] C.G. Holderness, A survey of blockholders and corporate control, SSRN Electron. J. (2005), https://doi.org/10.2139/ssrn.281952.
[77] J.A. McCahery, Z. Sautner, L.T. Starks, Behind the scenes: the corporate governance preferences of institutional investors, J. Financ. (2016), https://doi.org/10.1111/jofi.12393.
[78] W.K. Carroll, M.J. Huijzer, Who Owns Canada's Fossil-Fuel Sector?, Canadian Centre for Policy Alternatives, https://www.policyalternatives.ca/publications/reports/who-owns-canada%E2%80%99s-fossil-fuel-sector, 2018. (Accessed 12 June 2019).
[79] Fossil Free Funds, The Carbon Underground 200: The top 200 coal and oil/gas reserve owners in the world, Fossil Free Funds. (2020). https://fossilfreefunds.org/carbon-underground-200 (accessed April 4, 2021).
[80] W.K. Carroll, J.P. Sapinski, Organizing the 1%: How Corporate Power Works, 2018.
[81] E. Bajo, E. Croci, N. Marinelli, Institutional investor networks and firm value, J. Bus. Res. 112 (2020) 65–80, https://doi.org/10.1016/j.jbusres.2020.02.041.
[82] G. Csardi, T. Nepusz, The igraph software package for complex network research, InterJournal Complex Systems. (2006).
[83] C.T. Butts, network: A package for managing relational data in R, J. Stat. Softw. (2008), https://doi.org/10.18637/jss.v024.i02.
[84] G. Morgan, Cenovus to buy ConocoPhillips' Canadian assets for a massive $17.7 billion, Financial Post. (2017). business.financialpost.com/commodities/energy/cenovus-to-buy-conocophillips-canadian-assets-for-a-massive-17-7-billion.
[85] Capital Group, Investment Insights, Capital Group, 2016.
[86] J. Martin, J. Brooks, Voting Matters 2020: Are Asset Managers Using their Proxy Votes for Action on Climate and Social Issues? ShareAction, 2020.
[87] L. Fink, Larry Fink's letter to CEOs|BlackRock, Blackrock (2020). https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter?cid=ppc:CEOLetter:PMS:US:NA&gclid=EAIaIQobChMI0bqUxvyD5wIVCr7ACh3Taw9aEAAYASAAEgKSP_D_BwE&gclsrc=aw.ds (accessed January 15, 2020).
[88] Royal Bank of Canada, Climate change: Active stewardship vs. divestment, Royal Bank of Canada, 2021.
[89] Power Corporation of Canada, Corporate Social Responsibility Website, Power Corporation of Canada, 2018.
[90] R. Berridge, As climate change causes a maelstrom of financial risks and opportunities, is your money manager prepared to weather the storm?, Ceres. (2019). https://www.ceres.org/news-center/blog/climate-change-causes-maelstrom-financial-risks-and-opportunities-your-money (accessed September 10, 2021).
[91] G. Supran, N. Oreskes, Assessing ExxonMobil's climate change communications (1977–2014), Environ. Res. Lett. 12 (2017), 084019, https://doi.org/10.1088/1748-9326/aa815f.
[92] G. Supran, N. Oreskes, Rhetoric and frame analysis of ExxonMobil's climate change communications, One Earth. 4 (2021) 696–719, https://doi.org/10.1016/J.ONEEAR.2021.04.014.
[93] J.D. Jenkins, Political economy constraints on carbon pricing policies: what are the implications for economic efficiency, environmental efficacy, and climate policy design? Energy Policy 69 (2014) https://doi.org/10.1016/j.enpol.2014.02.003.
[94] G.J. Stigler, The theory of economic regulation, the Bell Journal of Economics and Management, Science. 2 (1971) 3, https://doi.org/10.2307/3003160.
[95] E. Tvinnereim, M. Mehling, Carbon pricing and deep decarbonisation, Energy Policy 121 (2018) 185–189, https://doi.org/10.1016/J.ENPOL.2018.06.020.
[96] M. Olson, Why nations rise and fall, Challenge. 27 (1984) 15–23, https://doi.org/10.1080/05775132.1984.11470904.
[97] M. Olson, Logic of Collective Action: Public Goods and the Theory of Groups, Harvard University Press, 1965.
[98] J. Clark, M. Bernstein, D. Beugin, B. Shaffer, J. Wadland, Closing the carbon-pricing certainty gap, Clean Prosperity 1 (2022) 1–69.
[99] L. Cahen-Fourot, E. Campiglio, E. Dawkins, A. Godin, E. Kemp-Benedict, Capital stranding cascades: the impact of decarbonisation on productive asset utilisation, Ecological Economic Papers. 18 (2019).