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Fossil Fuel *Divestment*: Reviewing Arguments, Implications & Policy Opportunities

Justin Ritchie and Hadi Dowlatabadi

University of British Columbia

January 2015

The Pacific Institute for Climate Solutions gratefully acknowledges the generous endowment provided by the Province of British Columbia through the Ministry of Environment in 2008. This funding is enabling ongoing independent research aimed at developing innovative climate change solutions, opportunities for adaptation, and steps toward achieving a vibrant low-carbon economy.

PACIFIC INSTITUTE FOR CLIMATE SOLUTIONS

University of Victoria
PO Box 1700 STN CSC
Victoria, BC V8W 2Y2

Phone 250-853-3595
Fax 250-853-3597
E-mail pics@uvic.ca
Web pics.uvic.ca

Edited by Dr. Tom Pedersen, PICS Executive Director; Robyn Meyer, PICS Senior Communications Officer & Ami Kingdon, PICS Science Writer

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EXECUTIVE SUMMARY

If countries around the world implemented climate policies consistent with the science of limiting global average surface temperature warming to 2°C, the current business models of conventional energy companies would face deep structural changes. In particular, such policies would render large volumes of known coal, oil and gas reserves ‘unburnable’, lest the inevitable greenhouse gas (GHG) emissions they produced when burned would push warming above the 2° ceiling target. While such climate policy has been slow to materialize, grassroots campaigners have started asking institutions and individuals to divest their financial holdings in fossil fuel companies. Though many have dismissed the strategy, since 2012 investors around the globe managing nearly \$50 billion (US) in combined assets have committed to divest or are starting to review their options for removing their holdings in fossil fuel companies. If divestment campaigns were successful in moving large volumes of holdings out of fossil fuel companies, would climate change be effectively addressed?

This paper first evaluates three core assumptions of fossil fuel divestment campaigns: firstly, that divestment can protect investors from ‘unburnable carbon risk’ or a ‘carbon bubble’ whereby stocks lose value due to fossil fuel reserves becoming too expensive to extract because of climate policies or market conditions. Secondly, that divesting from publicly listed energy companies will keep fossil fuels in the ground. And thirdly that ‘green’ energy stocks can be substituted for fossil fuel companies in the portfolios of institutional investors. These assumptions are shown to be unfounded, or effects shown to be small.

The University of British Columbia’s (UBC) endowment is evaluated in the context of the ongoing campus divestment campaign. We estimate the greenhouse gas emissions exposure – or “carbon shadow” of UBC’s endowment returns and evaluate several paths for reducing that exposure. Overall, we find that substituting renewable energy companies for all oil and gas company equities in UBC’s endowment (which represent approximately 10 percent of the portfolio) would likely reduce its GHG exposure or “carbon shadow” by around 3 per cent. While this effect is not negligible, this result is lower than expected given these company holdings represent the heaviest carbon emitters among the portfolio’s assets and that renewable energy companies are generally viewed as low or zero carbon investment opportunities.

Though divestment will likely have limited quantitative success in directly reducing GHG emissions or a fund’s immediate exposure to unburnable carbon, it may gain momentum as a symbolic gesture that could change social expectations for investment practices. Divestment would be effective when funds are reinvested away from fossil fuel and its associated infrastructure into investments that actively seek to create a low carbon economy. Without a concerted effort, we suggest that the most likely recipient of divested funds will be banks and financial institutions as they output a low amount of carbon per dollar of investor earnings. In this case, at least a portion of the divested funds would be reinvested in projects that perpetuate fossil fuel use, through less direct means.

As more institutions consider and commit to divestment, there is a window for effective policy to create a safe home for investors who are seeking such funds. With this potential shift in mind, we offer the following recommendations to BC provincial & municipal policy makers, institutions considering divestment, and divestment campaigns themselves:

Provincial & municipal policy makers

1. **Establish a public finance entity:** Consider creating an ‘energy transition bank’, similar to the Clean Energy Finance and Investment Authority in Connecticut or existing programs in Massachusetts and Ontario. Such a bank could offer bonds and other financial tools to projects that seek to create a low carbon economy. This institution could also support the development of BC’s green tech sector.
2. **Review tax incentives:** A low-carbon-transition investment tax credit could attract private capital to domestic investments in a low carbon economy along the lines of energy, transportation and housing, similar to the 1996 Small Business Venture Capital Act, which provides 30 per cent cash-back refundable tax credits when investing in a qualifying value-added sector of the BC economy.
3. **Assess risk:** Review BC’s exposure to unburnable carbon risk. Support public fund managers in their potential decisions to invest in a low carbon transition. This may include revised language on risk consideration.

Universities and other institutions

1. **Begin an open conversation:** Commitments to divestment or action on carbon risk can be issued along a timeline set by the institution as part of a thorough review.
2. **Review:** Review sustainability goals and harmonize with other objectives. Revise the mandate of fund managers on how they screen investments to meet environmental, social and governance targets in order to report a portfolio’s carbon intensity and exposure to unburnable carbon. Re-evaluating benchmarks, such as those analyzed by leading financial studies on potential carbon bubble risks, can place current returns in a new context. Consider establishing positions on green funds or bonds.
3. **Research:** Engage and leverage on-campus expertise, such as that in business schools, to assess and research strategies for dealing with unburnable carbon risk. Issuing a detailed accounting of the specific services and initiatives supported by investment revenues could help to place earnings from fossil energy investments in context.

Divestment campaigns

1. **Propose a parallel endowment:** Consider working with the university to launch a separate low-carbon or fossil free endowment fund, creating the opportunity for comparing returns. Students could engage in alternative portfolio construction. Returns would be favorable in energy bear markets.
2. **Contribute:** Launch crowdfunding campaigns that allows students, faculty and/or staff to donate toward a fossil-free endowment to demonstrate support. These funds could be withheld from the target university or institution until further action had been taken.
3. **Plan:** Advance dialogue by developing a tangible timeline of divestment components, such as how to proceed after a statement that discloses oil, gas and coal investments would be received. Explore how investment returns fit into broader campus sustainability goals. Don’t shy away from emphasizing that at the current moment, divestment would primarily be a symbolic action.

1. INTRODUCTION

When campaigners from the 350.org climate action network launched the Go Fossil Free: Divest from Fossil Fuels movement in 2012, founder Bill McKibben stated: “If it is wrong to wreck the climate, then it is wrong to profit from the wreckage. We believe [...] organizations that serve the public good should divest from fossil fuels”.¹ Since 2012, nearly 1,000 divestment campaigns have launched at universities, cities and religious institutions, across North America, Europe & Australia.

While these campaigns have mostly focused on moral arguments, a parallel dialogue on fossil fuel investments developed by financial analysts and investment banks has outlined economic scenarios for a ‘carbon bubble’ in the asset prices of conventional energy companies, which has since become a key economic argument for divestment.ⁱ

In 2011, the Carbon Tracker Initiative (CTI) first described the rationale for a carbon bubble, arguing that strict regional or international climate policies would damage the financial valuations of fossil fuel companies.² Since then, a fast-moving debate has informed perspectives on what a carbon budgetⁱⁱ would mean for the bottom line of fossil fuel companies.⁶⁻⁸ The idea of a carbon bubble has found traction among those working to integrate an understanding of climate change into financial markets. Perspectives on stranded carbon asset risk - whereby accessible fossil fuel deposits have lost sufficient value so are left in the ground - are beginning to have an impact on decisions to allocate capital.

While many divestment commitments have been announced, most have yet to actually reallocate investment capital. University endowments and pension funds, two types of institutional investors targeted by divestment campaigns, typically invest in pooled funds that consist of widely dispersed assets across multiple sectors of the economy. Thus for large investors bound under fiduciary law, choosing to entirely divest from fossil energy companies is difficult due to both the composition of contemporary financial products and the structure of the economy.

As more institutions explore divestment, their commitments could: (1) end up being a novel form of so-called ‘greenwash’ for investments, with plans for divestment amounting to little more than a parallel of the least effective approaches to ethical investing, or (2) divestment commitments could create a broader market in financial products that seek to create a low carbon economy while changing social perceptions on acceptable sources of financial earnings. In the second case, money that moves away from fossil fuel assets will create opportunities that would reward those who are prepared for such a scenario.

ⁱ A carbon bubble may burst causing stocks to lose value if fossil fuel reserves become too expensive to extract because of climate policies or market conditions. The reasons for a potential carbon bubble vary, from demand reductions, efficiency or diffusion of renewable energy sources, to carbon pricing schemes such as a carbon tax or cap-and-trade.

ⁱⁱ And emissions must be lowered: the need for a ‘carbon budget’ has been outlined by the Intergovernmental Panel on Climate Change (IPCC) in its 4th & 5th Assessment Reports and by the International Energy Agency (IEA) in the 2013 World Energy Outlook as necessary to keep global warming below the dangerous threshold of 2°C.³⁻⁵

In addition to potentially mitigating financial risks posed by a carbon bubble, there may be environmental benefits from divesting. Campaigners claim that divestment will reduce GHG emissions, since selling off investments in fossil fuels could keep the assets of energy companies in the ground through disrupting financing mechanisms for oil, gas and coal projects in the coming decades.

Organizations and fund managers may wish to reduce risk exposure and increase their climate-friendliness. But is divestment an effective or evidence-based strategy to accomplish these goals? While there are many ideologically driven answers, there are several insights available from the quantitative aspects that can be reasonably examined. The merits of fossil fuel divestment rest on several key assumptions about how financial capital interacts with energy systems. These assumptions are:

1. Divesting from publicly listed oil, gas and coal companies can protect an investor from exposure to the financial risks of ‘unburnable carbon’ whereby fossil fuel reserves become uneconomic or are no longer viable to process due to future climate policy or market conditions
2. Divesting from these companies can keep a substantial portion of fossil fuels in the ground
3. Large institutions can substitute high-carbon investments with low-carbon transition investments

This paper uses publicly available data on energy and the economy to model divestment scenarios that test these assumptions.

First, we will define and describe both the divestment movement, and the concept of stranded carbon. Next, we will test these three assumptions using existing studies. Finally, we apply this knowledge to several scenarios that a Canadian university could follow if it chose to use divestment to reduce the exposure of its endowment fund to greenhouse gas emissions. We conclude with several recommendations for key actors in the divestment dialogue.

2. REVIEWING THE DIALOGUE ON UNBURNABLE CARBON AND FOSSIL FUEL DIVESTMENT

The concept of divesting from a carbon bubble has rapidly gained mainstream acknowledgment. Bank of England Governor Mark Carney recently told a World Bank seminar “the vast majority of reserves are unburnable,” if we are to avoid catastrophic climate change.⁹

Divestment proponents and industry experts have raised concerns over the potential impacts of climate policy on the valuation of conventional energy companies. The dual concepts of fossil fuel divestment and unburnable carbon have evolved alongside each other, forming parallel narratives that seek to describe potential financial responses and impacts of climate change.

This section briefly chronicles the development of these two ideas and covers our own views on the unresolved logical flaws in these approaches to climate change.

2.1 The activist position

Fossil fuel divestment campaigners want to signal that investing in further oil, gas and coal infrastructure is no longer socially acceptable. Modeled after the perceived success of divestment and isolation campaigns against South African apartheid, the campaign wants to signal that fossil

fuel companies should become sustainable energy companies and that governments should enact meaningful climate legislation. Campaigners want to diminish the lobbying power of the oil, gas and coal industries on climate regulation by undermining their access to financing for further development projects.

Tactics used by these campaigns have included sit-ins, rallies, holding referenda to gauge support for divestment, disrupting campus recruiting events from stigmatized companies and promoting ongoing debates in university newspapers. The goal is usually to force a yes or no decision on a divestment commitment at a campus, city council or in a boardroom.

We summarize our estimate for the value of portfolios committed to fossil fuel divestment from October 2012 through September of 2014 (Figure 1). These commitments have been made by more than 180 institutions and local governments along with 656 wealthy individuals.¹⁰ This adds up to nearly \$50 billion (US) worldwide in investor portfolios pledging to go fossil fuel free, which could eventually result in as much as \$5 billion (US) that would be pulled out of oil, gas or coal companies.ⁱⁱⁱ

Total value of portfolios committed to fossil fuel divestment criteria

Note: The average university endowment or pension fund portfolio holds approximately < 10% in oil, gas and coal investments

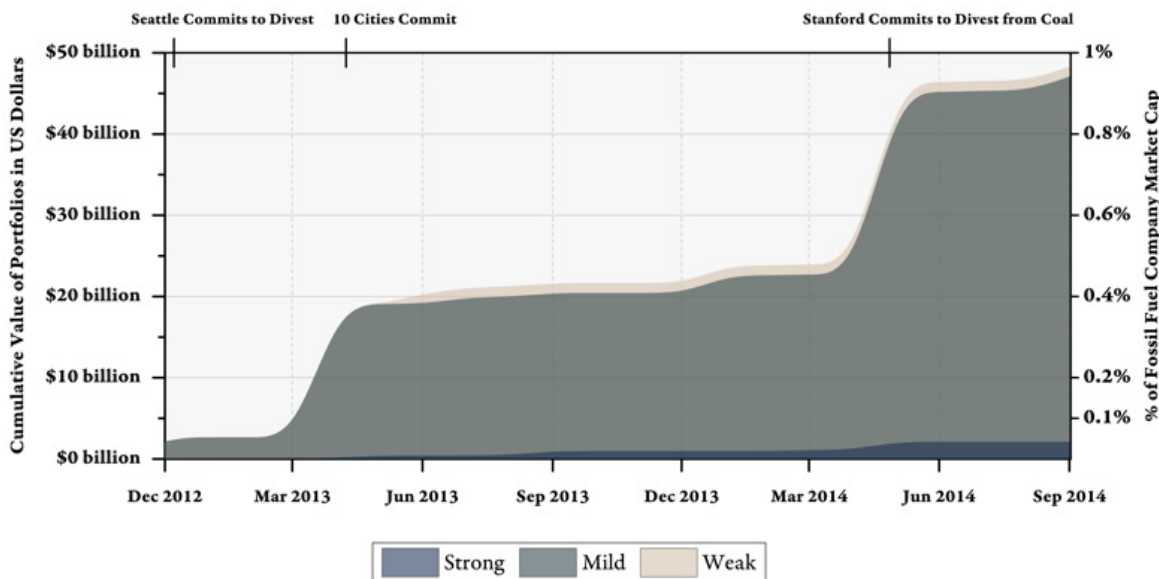


Figure 1. Cumulative value of portfolios (left-axis) committed to some form of oil, gas or coal divestment criteria through September 2014. Total portfolio value committed to divestment criteria as proportion of fossil fuel company market cap¹¹ (right-axis). Notes on classifications: [Weak]: commitments entail statements of approval with no clear pathway toward action; [Mild]: commitments represent the formation of exploratory committees or some form of stakeholder approval or partial divestment such as Stanford's divestment from coal; [Strong]: exhibits organizations which are: (a) beginning the process of divestment, (b) have moved money or (c) have stated that they have no oil, gas & coal investments remaining in their portfolio.

ⁱⁱⁱ We estimated the value of portfolios committed to divestment from the websites of these institutions and municipalities through reviewing their annual reports and publications. Since very few disclose their full financial holdings, it is difficult to know the precise amount of fossil fuel investments. Based on our own research, this generally ranges from 5-10% of the portfolio for large institutional investors.

The Go Fossil Free campaign website provides ongoing updates on the organizations that have committed to divestment.^{iv} There are active divestment campaigns on nearly 500 university campuses and in more than 100 cities worldwide.^v As of October 2014, 14 universities & colleges, 31 towns & cities, 29 foundations, many churches and other organizations have made some form of commitment to divest, or at the least, to begin a serious exploration of divestment. To compare, oil and gas companies were valued at more than \$5 trillion (US) worldwide over 2014.^{vi}

2.2 Is there a carbon bubble? Analyzing risks to investing in energy

Where the divestment movement intends to motivate investor action through public pressure on a social issue, the carbon bubble hypothesis is an economic rationale for reducing exposure to fossil fuel companies.

The energy reserves held by the top 100 listed coal, oil and gas companies represent potential emissions of roughly 745 GtCO₂.² Burning this carbon would exceed a climate change limit of 2°C. The argument for a carbon bubble states that successful climate policy or a low-emissions energy economy would leave this carbon in the ground—a stranded asset—and fossil company valuations would drop, leading to financial losses for investors.

How would this work? Fossil fuel companies use capital expenditures (CAPEX) to develop their reserves into production.^{vii} The valuation of each company is tied to the production it can realize now and in the future. When investors and industry experts are assuming an ever-higher price for energy, valuations can be sky high, justifying higher CAPEX. If fossil fuel prices fall due to climate policy or other factors, development of expensive fields become a risky prospect. High levels of CAPEX can become a burden on company balance sheets and production growth slows.

Recent reports from the Carbon Tracker Initiative (CTI) have focused on the role of CAPEX used by fossil energy companies to maintain and develop their production output. From 2012 to 2013 the 200 largest coal, coal & gas companies spent \$674 billion (US) on CAPEX and issued \$126 billion (US) in dividends for shareholders.⁶ CTI wants shareholders to challenge fossil companies so that they return more money to investors, rather than investing in additional fossil fuel projects and infrastructure.

Were a large portion of oil, gas and coal industry assets to become too costly to justify, highly leveraged companies would experience a dramatic hit to their market valuations. For example, many US shale oil, LNG and heavy oil projects would no longer be viable should strictly enforced

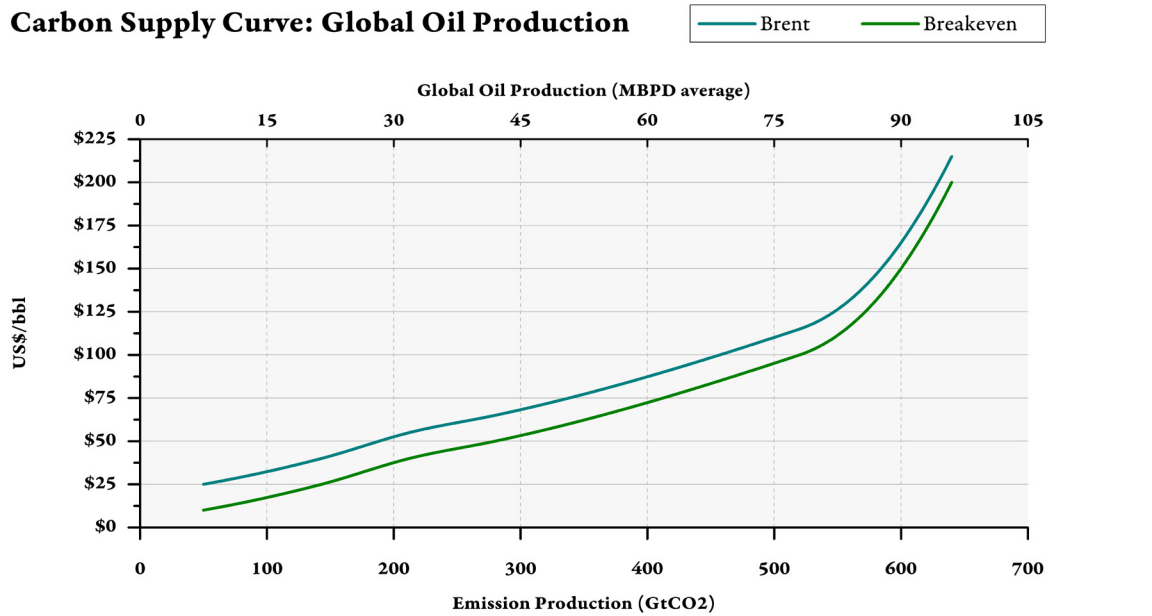
^{iv} The list of organizations committed to divestment is regularly updated and available at: <http://gofossil-free.org/commitments/>

^v The Go Fossil Free website lists active campaigns at <http://campaigns.gofossilfree.org/>

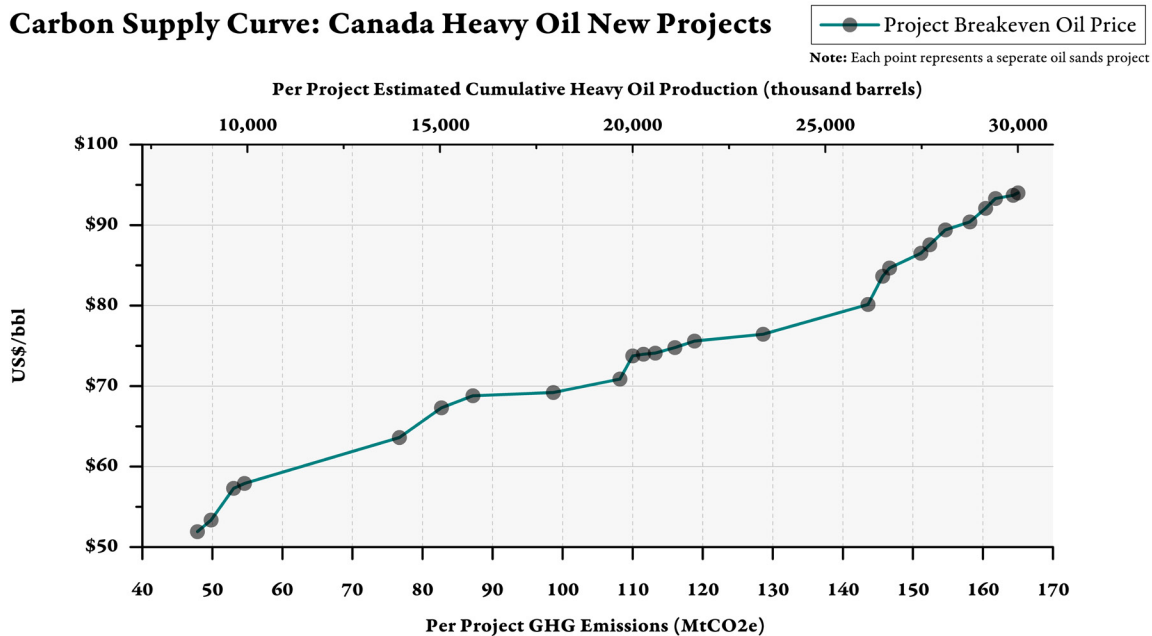
^{vi} Though it is important to note that at the time of publication of this white paper in early 2015, global prices for oil have fallen by more than 50% from their recent peak in June 2014; the cumulative market cap for oil and gas companies has fallen by 20% over this period, reaching approximately \$4 trillion (US).

^{vii} Capital expenditures are outlays made by a company to increase or maintain their operations and are listed on the company balance sheet.

policies establish a 2°C carbon budget. Parallel analysis from HSBC Global Research agrees that in a low carbon world, high cost projects would be deferred or cancelled by oil and gas majors, and unburnable carbon would range from 1% of British Gas’ reserves, up to 17% for Statoil.¹²



Sources: p.10 Carbon Tracker Initiative. Carbon supply cost curves: Evaluating financial risk to oil capital expenditures. carbontracker.org (2014).



Sources: JP Morgan via source data from Goldman Sachs, "380 projects to change the world", April 2013 & Leaton, James et al. Carbon Supply Cost Curves. Carbon Tracker Initiative, 2014.

Figure 2. Carbon Supply Curve for Global Oil Production (above) and Carbon Supply Curve for Canada Heavy Oil New Projects (below), adapted from Ref. #13.

According to CTT's oil supply cost curves by region, summarized in Figure 2, Alberta is identified as carrying the highest investment risk because the cost of further developing oil sands reserves falls almost entirely above the projected high-risk threshold.¹³ Recent research by Christophe McGlade and Paul Ekins at University College London model these scenarios in one of the first peer-reviewed studies on this topic. Their model is consistent with CTT's projections, estimating that effective 2°C climate policies could possibly leave more than 74% of Canada's reserves unburnable before 2050, with or without the deployment of carbon capture.¹⁴

The primary case outlined for a carbon bubble has focused on a 'downside' scenario, where carbon policies reduce demand and the market price for fossil fuels. However, European financial services firm Kepler Cheuvreux has also explored an 'upside' carbon bubble, where higher cost fossil fuels lead to substitution with renewables, and efficiency improvements further undermine the long-term market value of fossil fuel energy.¹⁵

Dialogue on unburnable carbon risk is growing. Ceres^{viii} recently submitted letters requesting climate risk disclosure to 45 global oil, gas, coal and electric utility companies on behalf of institutional investors that collectively represented more than \$3 trillion (US) in assets. The letters outlined investor concerns and called on these companies to explain how their future plans would fare in low carbon transition scenarios.¹⁶

In March of 2014 ExxonMobil responded first, stating that none of their hydrocarbon reserves will be stranded because they project 35 per cent growth in global energy consumption by 2040 to meet the needs of a larger and more prosperous global population.^{ix} Exxon cites the need to enable energy consumption in developing economies and expects cost limitations to persist for renewables. Shell followed in May of 2014 with a similar response, while also emphasizing its investments in lower carbon fuel sources like natural gas, biofuels, carbon capture and energy efficiency. Since 60 per cent of Shell's disclosed resource base is under construction or in operation, it expects to be less exposed to regulatory changes over the next few decades. Both companies assert that the concept of the carbon bubble is a distraction^x from the increased energy demands of growing populations and aspirations of prosperity.¹⁷

2.3 Limits to divestment and unburnable carbon narratives

Divestment as a strategy to fight climate change rests on three assumptions, which we have tested below using a review of reports, data, and our own research.

^{viii} Ceres is a Boston, MA based sustainability advocacy organization that works to implement sustainable business practices.

^{ix} ExxonMobil cites its Outlook for Energy report that projects global GDP will expand to \$150 trillion (US) by 2040.

^x ExxonMobil and Shell argue in support of energy prosperity for a growing global population without acknowledging that a 2°C climate change limit would eliminate the expansion of fossil energy production without carbon capture and sequestration.

Assumption 1: Divesting from oil, gas and coal companies can help to protect an investor from exposure to the financial risks of unburnable carbon

Both campaigners for divestment and advocates of the unburnable carbon hypothesis have recommended that investors draw down their investments in fossil energy companies to reduce exposure to a potential carbon bubble. To gauge this risk, we measure the total exposure of an investor's holdings to greenhouse gas emissions as the 'carbon shadow' of their portfolio. Our recent work attempts to calculate the carbon shadow reductions that may result for a university endowment choosing to divest.¹⁸ We found that replacing approximately 10% of a Canadian university's fossil fuel investments with randomly selected renewable energy companies would reduce exposure of annual endowment returns to GHGs emissions by much less than 1%.^{xi} This is a smaller reduction than would be expected because fossil fuel combustion comprised 90% of total global emissions from 2003-2012¹⁹ and renewable energy is generally considered as a low or zero carbon energy source.

Though the symbolic nature of a decision to divest shouldn't be underestimated or dismissed, this low level of reduction to an investor's carbon shadow occurs because: (1) holdings of fossil fuel companies usually comprise a small portion of endowments (roughly <10%)²⁰; and (2) renewable energy companies are still part of a broader fossil fuel economy. Divestment places money back into an economy that is structured around high emissions throughout the supply chain, even in the manufacture, transport and installation of wind turbines.

Investment holdings are claims on future income streams and their potential to be disrupted by climate change or climate policy is not negligible. If a financial carbon bubble were to burst due to climate policy, causing financial hardship for investors, this would occur in an economy that is simultaneously transforming itself to less fossil dependence. While a reallocation of financial capital from oil, gas and coal companies does have the potential to re-shape the economy, the financial impact of a carbon bubble burst in the next few decades would extend to the whole economy, suggesting that renewables do not necessarily provide a significant safe haven for investors.

Reducing exposure to losses from a carbon bubble would require a more holistic approach and broader strategy than solely divesting from fossil fuel production to channel endowment or pension investments into renewable energy production.

Assumption 2: Divesting from publicly listed energy companies will keep fossil fuels in the ground

While campaigners have repeatedly stated that divestment is necessary to keep fossil fuels in the ground, publicly traded energy companies have been playing a diminishing role in global energy production. From 2006-2011, the world liquid fuel output from publicly listed companies

^{xi} Ten percent of the endowment's fossil fuel companies were modeled because they were directly reported on endowment statements. We refer to the exposure of an investor's holdings to full-economy greenhouse gas emissions as the 'carbon shadow' of their portfolio. A carbon shadow describes an investor's exposure to environmental impacts since these holdings obtain their earnings from economic activities that currently rely on various forms of emissions, pollutants, resources or patterns of energy use. Further detail is provided in Section 3 of this paper.

has actually declined by more than 4%; growth in conventional oil output came from listed companies that are under full or partial state control such as Brazil's Petrobras or Saudi Arabia's Aramco.²¹ Roughly 5% of the globally proven oil reserves rest with wholly public companies, whereas 23% lie with fully nationalized oil companies and 47% with publicly listed national oil companies. Governments and government-owned companies are projected to receive nearly 87% of the net present value of future oil production between 2014 and 2050.²²

The balance and distribution of world liquid fuel production is slowly shifting away from the recognizable 'brand name' oil companies of the 20th century such as ExxonMobil or Shell. Sovereign nation balance sheets along with international debt and debtor relationships virtually assure that these national oil company (NOC) resources will be extracted. We suggest that until Saudi Arabia's national revenues are supported by non-oil income, their oil will find ways of exiting the ground.^{xii}

The fiscal policies pursued by Organization of Petroleum Exporting Countries (OPEC) members have established high break-even prices for their oil sales, building long-term dependencies on continued fossil fuel extraction into their national budgets. Recent modeling in this area estimates that governments of Libya, Venezuela, Ecuador, Iraq, Nigeria, Algeria and Iran all need more than \$90 per barrel of oil to break-even on their national budgets.²³

Governments are also among the largest investors in fossil fuel extraction. The Government of India holds \$38 billion (16%) of global coal investments. The largest 25 investors in oil and gas firms control nearly \$1 trillion (20%) of top global oil and gas holdings, 30% of which is held by governments such as Russia, Colombia, Norway, India and China.¹¹

A recent study by the Climate Policy Initiative (CPI) estimates a value of \$25 trillion for oil and gas stranded asset risk. These losses would primarily be on the books of governments since they own 50-70% of global fossil resources and collect taxes on the operations of private sector energy companies.²² CPI's models estimate that most of the potential for reducing emissions exists from reducing the use of coal but 75% of the stranded asset value is in oil reserves. A carbon bubble exposure scenario was compiled for Canada in a 2013 Canadian Center for Policy Alternatives study, suggesting that TSX-listed fossil fuel companies face carbon liabilities far in excess of their collective market value under a 2°C policy scenario.²⁴

While the rapid withdrawal of investments from public companies could result in their reserves being left underground, state controlled companies have sovereign funds that can continually support extractive activities. International debt markets for these countries would work to ensure their national ability to finance oil, gas and coal company activities.

However, divestment does have an aim of forcing a political hand on climate policy to introduce a carbon tax: 'net consumption' nations such as China or the US could essentially divest from the 'net producer' nations through drawing down their demand for fossil fuel resources.

^{xii} Saudi Arabia would be able to maintain its status as a profitable producer even in an upside scenario because its oil production costs are estimated to be lower than \$20/Bbl, less than one third the oil price at which analysts have posited that the "upside" carbon bubble would drive privately held companies to ruin.

Assumption 3: Large institutions can substitute high carbon investments with low carbon transition investments

As the Divest-Invest^{xiii} movement states in the header of its website: “Divest from fossil fuels, invest in climate solutions.” A stated aim of fossil fuel divestment campaigners has been to remove funds from fossil energy companies and to invest them in projects that reduce greenhouse gas emissions or are low carbon, as part of building a new energy economy. There are two major obstacles to this shift: (1) The disparate characteristics of fossil fuel investments and renewables, and (2) the ease of shifting investments to sectors that appear low-carbon but still heavily support a marketplace for fossil fuels.

In our view, given the composition and policy constraints on institutional investment funds, university endowments would find it easy to appear fossil fuel free by simply moving funds away from conventional energy companies and into economic sectors that end up creating the demand for fossil energy use throughout the economy. Investment managers under pressure from a divestment campaign will then be able to appear responsive, without making an impact on a sustainable energy transition. One main industry may pick up this slack: our recent research suggests that because of the apparent low GHG impacts of financial institutions, they will be a prime target for allocation of so-called ex-fossil free funds.¹⁸ Divestment strategies that intend to optimize investor earnings per unit of carbon will naturally be biased to re-invest in financial institutions.

Earlier in 2014 the National Resources Defense Council partnered with FTSE^{xiv} and BlackRock Investments to create a branded ‘ex-fossil free’ index, a move hailed by 350.org.²⁵ A recent prospectus from this fund notes that it invests more than 2 percent of its assets in the oil & gas sector and one of its 10 largest holdings is JP Morgan, a bank heavily invested in coal, providing \$2.1 billion (US) as the leading role in financing coal-fired power companies.^{26,27}

Competition in financial products branded as ‘low carbon’ grew in late 2014 when State Street and iShares both submitted Securities and Exchange Commission (SEC) documentation to launch Low Carbon Target ETFs or “exchange-traded funds”.²⁸ These two ETFs intend to emphasize investment in, “companies with low carbon emissions relative to sales and per dollar of market capitalization”. Though integrating carbon emission metrics into ETF construction should be hailed as a positive development, this logic will naturally bias investments in financial institutions.

Could institutional investors shift investments directly to renewables and green companies? The industry for renewable energy companies is currently developing, showing the potential for growth. Their securities are different from those of conventional energy companies, especially in the context of investors seeking yield.

Pension and university endowment funds exist to provide an income stream that supports the initiatives and priorities of their stakeholders and trustees. From a financial perspective, institutional investors would select fossil fuel companies for their portfolios because they offer four

^{xiii} Divest-Invest launched in January 2014 when seventeen foundations pledged to divest from fossil fuels and to use their capital for investing in climate solutions. Visit <http://www.divestinvest.org>

^{xiv} FTSE is a British provider of stock market indices such as the widely known FTSE 100

desirable characteristics: scale, liquidity, growth and yield. In terms of scale, in the third-quarter of 2014, valuations (in USD) for high-carbon equities combined to more than \$5 trillion: fossil energy (\$4.5 trillion) and the fossil components of utility companies (more than \$1 trillion).^{xv} This was second only to the financial sector at \$9.3 trillion. With more than one billion shares of these energy companies traded each day, equities in oil, gas and coal are also desirable for their liquidity. Growth has also been consistent over the last half-decade. Though individual companies certainly deviate from aggregate sector performance, a study by Bloomberg New Energy Finance points out that oil and gas company equities have grown in value by 25 per cent over the last five years – though coal equities have lost more than 50 per cent of their value since July 2012. Regarding yield, fossil fuel companies have consistently rank among the highest performers on global capital markets, with average dividends of more than 2 per cent.¹¹

To evaluate how a range of green investments could stand up as alternative investments for funds that might move out of fossil fuel companies, we evaluated equities for 280 green companies^{xvi} which provide products and services that would be considered as part of a low carbon economy: solar and wind energy production, energy storage, biomass or biofuel production, energy efficiency equipment, low carbon transportation, smart grid technologies, water re-use, green building, geothermal and fuel cells. Our results are summarized in Figure 3 and are compared to similar performance metrics of scale, growth and yield for 185 oil and gas companies.^{xvii} The top 100 green equities outperformed the total price returns for the top 100 oil and gas companies in six out of the last eleven years. However, if fund managers can stomach the roller coaster ride for picking among a highly disparate pool filled with price gains and crashes, they would be likely to find concerns in terms of the scale and yield of green equities. In regards to liquidity, over a randomly selected one-week trading period in May 2014, the top 100 green equities showed an 8% lower trading volume when compared to the top 100 oil and gas companies under review.

Pension or endowment managers may attempt to institute socially responsible investment policies that try to reduce holdings of fossil fuel companies but conventional perspectives on risk tolerance and manager-of-manager approaches^{xviii} used by the understandably conservative culture of funds with fiduciary responsibility are currently unable to directly substitute fossil fuel company holdings for green economy investments in the majority of cases.

If a lot of money suddenly started to move into renewable energy companies, there currently wouldn't be enough revenues or earnings to support the resulting valuations. A renewable energy bubble would be created without concerted market development. Given the absence of a strong

^{xv} Global energy prices have fallen significantly in Q4 2014 and into early 2015, impacting the valuations of fossil energy companies. A cursory examination appears to indicate that renewable energy companies have not provided fewer losses for investors in comparison to fossil energy companies over this time period, i.e. a major solar ETF (TAN) is down about 20% where the Dow Jones US Integrated Oil & Gas Index is down 15% from September 2014 to January 2015.

^{xvi} A larger series of green companies were considered rather than simply evaluating renewable energy companies in wind and solar (a notably smaller market).

^{xvii} The 185 equities evaluated in these data include all companies listed on North American exchanges as a) 'Integrated Oil and Gas', i.e. major oil companies that combine upstream, midstream and downstream deliver of oil & gas production and b) companies pursuing exploration and production.

Equity Scale: Green v. Oil & Gas
 Comparing market capitalization (in USD trillions)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Green Equities 280 wind, solar, etc...	0.36	0.35	0.46	0.57	0.65	0.40	0.78	0.84	0.72	0.74	0.94
Oil & Gas Equities 187 integrated and E&P	1.46	1.95	2.11	2.64	3.38	2.06	2.95	3.81	3.46	3.22	3.49

Equity Growth: Green v. Oil & Gas
 Comparing average rates of total price return

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Green Equities Top 100 in market cap	6%	-5%	19%	13%	-10%	-14%	4%	11%	15%	10%	12%
Oil & Gas Equities Top 100 in market cap	7%	15%	8%	2%	-1%	-5%	2%	16%	7%	5%	2%

Equity Yield: Green v. Oil & Gas
 Comparing average rates of dividend yield

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Green Equities Top 100 in market cap	1.24%	1.23%	1.44%	0.85%	1.05%	2.06%	1.14%	1.33%	1.53%	1.29%	1.11%
Oil & Gas Equities Top 100 in market cap	2.27%	1.95%	1.80%	1.90%	2.06%	4.34%	2.27%	1.81%	2.18%	2.00%	2.06%

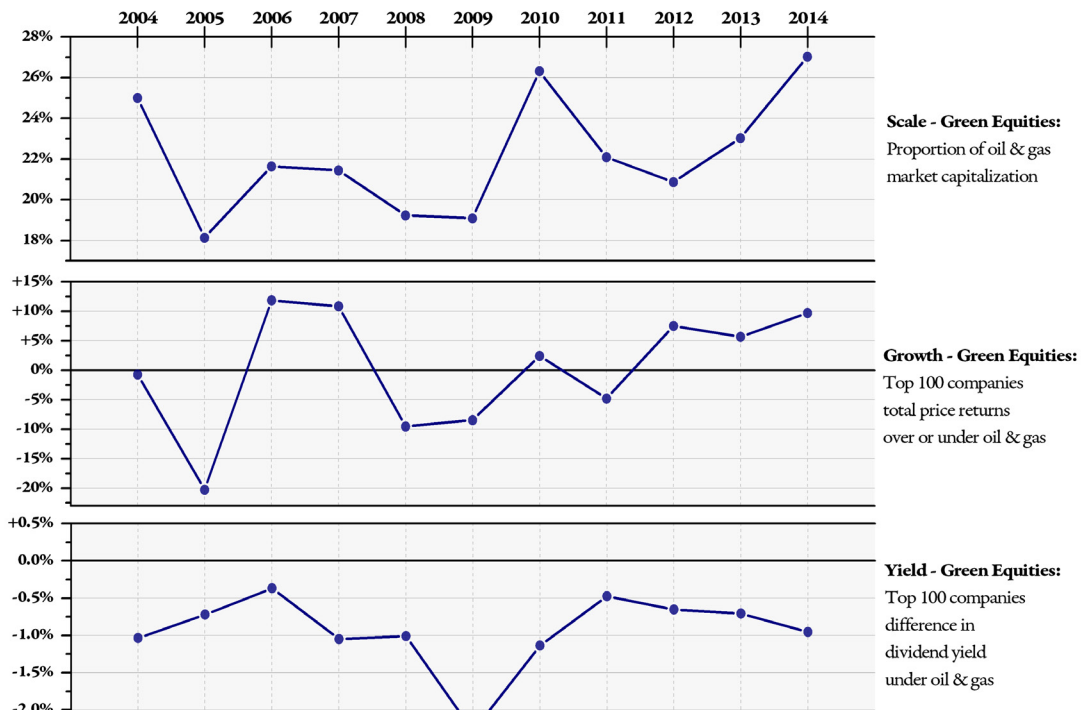


Figure 3. Comparing Equity Performance - Green Companies v. Oil & Gas; data on scale, growth and yield (top) and trend-lines over the last decade (bottom)..

Canadian renewable energy market, the resulting post-divestment market would expose investors to high risks. A rapid boom-bust cycle in renewables would serve to sour investor sentiment, potentially impairing investment in these sectors for many years.

Because renewable energy projects have a structure of operations that are radically different from those of oil, gas and coal projects, could we expect that substituting investments in fossil fuel companies for renewable energy companies would be straightforward? The timing of capital needed to support renewable energy development requires a high up-front investment. However, once that investment is made, a solar cell or wind turbine has access to regularly available low-cost fuel. Because of this, renewable energy investments are more likely to resemble the characteristics of a fixed-income product that provide returns through a sustainable yield, rather than in the form of holding an equity which returns a varying range of dividends or capital gains.

Investments with a ‘low carbon’ label are likely to spread, as governments and financial institutions begin to understand that there is demand from people who are seeking a financial response to potential risks from energy transitions toward sustainability. Divestment will help to signal this. However, many of these funds and securities are likely to be little more than a label. For low carbon funds to actually aid in the development of a low carbon economy, they will need to look beyond simply substituting renewable energy for fossil fuel energy and into the forms of infrastructure, specifically transportation infrastructure, that create our dependencies on unsustainable levels of oil, gas and coal use.

Divestment may not theoretically reduce investor risk to a future carbon bubble, significantly lower the production of fossil fuels, or be easily replaced with renewable energy investments. To paint a more practical picture, we will examine the case of a major Canadian university considering divestment.

3. WOULD A CANADIAN UNIVERSITY’S ENDOWMENT REDUCE ITS GHG EXPOSURE BY DIVESTING?

In April of 2014, UBC issued a revised responsible investment policy, responding to a student vote that supported fossil fuel divestment on campus. UBC stated it would consider divestment only when: (1) it had proven social, political, economic or environmental rationale; (2) there is reasonable evidence that divestment is an effective way to achieve the desired outcome; (3) there is an absence of alternative policies; (4) there is a consistency with the university’s legal obligations as a trustee to its constituents and (5) it is consistent with the university’s relationships.²⁹ Can the endowment of a major Canadian university reduce its exposure to greenhouse gas emissions by divesting from fossil fuel companies and reinvesting in renewable energy companies?

^{xviii} Institutions use manager-of-manager (MOM) approaches when they hire a series of professional investment managers to oversee portions of an investment fund. For example, a \$1 billion dollar investment fund could be assigned to ten or more specialist fund managers who invest in wide ranges of the economy. The original institution will then avoid the selection of individual companies and review each manager based on metrics such as total returns.

To explore questions like those posed by UBC's investment policies and the claims of divestment campaigns, we developed a shadow impact calculator (SIC) to model the changes that various asset allocation decisions would make to an investor's aggregated GHG exposure.¹⁸ The greenhouse gas exposure of a portfolio represents the carbon emissions released in providing returns to an investor and varies based on their asset allocation decisions. Thus, we posit that a fund with a large GHG exposure would face more of an impact from scenarios that lead to significantly lower emissions, whether driven by policy or other factors. However, the magnitude of such impacts would vary based on the specific sources of these emissions.

We analyzed \$1 billion (CAD) endowment (2013 mkt. value) of the University of British Columbia to find a carbon shadow of 550,000 tCO₂e in 2012.^{xix} Consequences were then explored for two fossil fuel divestment scenarios: (1) substituting the endowment's directly reported holdings of oil and gas companies (\$7.2 million) with renewable energy companies and (2) shifting holdings of exchange-traded funds (ETFs) and other pooled funds which hold the majority of the endowment's equity investments in oil and gas companies (a total of \$83.4 million) in an attempt to optimize for a lower carbon shadow.^{xx} These divestment scenarios are intended to test the GHG effects of various investment shifts, and for this reason strategic factors of return and risk aren't included.

3.1 Divestment Scenario One: Towards Renewable Energy

Six renewable energy companies were randomly selected to receive the endowment's stated investments in oil and gas companies. The new portfolio comprised three solar PV companies, a waste-to-energy company, a battery manufacturer and a wind turbine company. The original and new investments along with their amounts are represented in Table 1.

The original carbon shadows of these seven holdings totalled 7,620 tCO₂e in our selected year. The new carbon shadow for this divestment scenario would be 5,960 tCO₂e per year, representing a 22% reduction for this set of investments. The entire endowment's carbon shadow would be reduced by 0.3% in the divestment scenario outlined in this section.

^{xix} In 2012, the year of the endowment statements analyzed, the market value for the UBC endowment was \$952 million (CAD). Our values for the carbon shadow are presented in units of tonnes of carbon dioxide equivalent to include the impacts of other greenhouse gases such as methane. The university's on-campus scope 1 and 2 greenhouse gas emissions during 2012 were 60,715 tCO₂e. See PICS white paper "Lessons from British Columbia's Carbon Neutral Government" at <http://pics.uvic.ca/research/publications/white-papers>.

^{xx} It is important to note that in presenting these hypothetical divestment scenarios, we are attempting to model the potential for reducing the total emission exposure of UBC's endowment returns. We are not attempting to project the potential impacts of divestments on reducing greenhouse gas emissions of specific companies or sectors on a whole-economy basis. In this model, a smaller carbon shadow computed for a pooled fund does not necessarily result in carbon footprint reductions for particular sectors or companies across the economy.

Table 1**Divestment Scenario One: Oil & Gas into Renewable Energy Companies**

Value of Investment	Current Holdings	tCO ₂ e/mn\$inv	Divestment Scenario One Holdings	tCO ₂ e/mn\$inv
\$ 1.76	Cenovus (Oil & Gas)	1,600	EnerSys (Batteries)	350
\$ 1.36	Ensign Energy (Oilfield Services)	2,300	Broadwind (Wind)	360
\$ 1.16	Encana (Oil & Gas)	770	Canadian Solar (Solar)	1,200
\$ 1.03	Talisman Energy (Oil & Gas)	1,400	China Sunergy (Solar)	4,000
\$ 1.02	Baytex (Oil & Gas)	450	Solarcity (Solar)	40
\$ 0.85	Canadian Natural Resources (Oil & Gas)	1,100	China Recycling Energy (Waste-to-Energy)	10
\$7.18	Original annual carbon shadow	7,620	Scenario one annual carbon shadow	5,960

Outline of a divestment scenario where the endowment's investment funds in oil and gas are moved into randomly selected renewable energy equities for energy storage, wind, solar and waste-to-energy. Note that in the scenario, China Sunergy constitutes a significant amount of the new carbon shadow. While these scenario holdings could potentially be optimized to seek even lower carbon, this allocation reflects a random assignment and any series of asset choices will have face challenges in such a relatively thin market for potential renewable energy securities. Values for GHG emissions in units of tonnes of carbon dioxide equivalent per million investment dollars (tCO₂e/mn\$inv). All values in millions of US dollars accurate as of endowment disclosure on October 23rd, 2012.

The oil and gas companies in this scenario represented about 10% of UBC's holdings in these sectors. Substituting renewable energy companies in this scenario has reduced the overall endowment's carbon shadow by three-tenths of a percent. This leads us to estimate that using similar strategies to divest UBC's endowment from all oil and gas company equities would likely reduce its exposure to greenhouse gas emissions by around 3%. Perhaps a fund manager could screen renewable energy companies with poorly performing carbon shadows out of their selectable universe of equities, but it would still be likely that 3% is an optimistic ceiling for reductions when trying to trade oil and gas investments for renewables. The range of investible renewable energy companies is small: oil and gas company valuations are larger than wind, solar, geothermal and biomass companies by about 40-to-1 on global exchanges.

3.2 Divestment Scenario Two: Reducing the Carbon Shadow of Pooled Funds

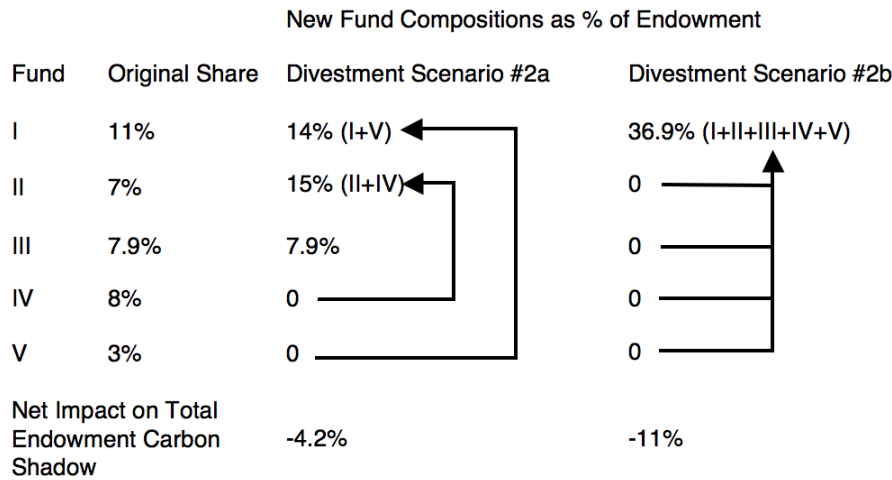
Roughly 80% of UBC's endowment holdings in the fossil fuel industry are in various ETFs. Table 2 summarizes the five largest ETFs in the selected portfolio. The carbon intensity of each fund is ranked by tonnes of carbon dioxide equivalent per million dollars invested (tCO₂e/mn\$inv).

Two scenarios are considered in Table 2 for the endowment's aggregated funds for optimizing the impacts of the university's carbon exposure: (2a) moves investment dollars from the funds with the highest carbon shadow (IV, V) to the two funds with the lowest carbon shadows (I,II); scenario (2b) moves the entire \$351.1 million in aggregated funds to the least carbon intensive fund to explore the impact of an extreme shift.

Table 2

Target Endowment’s Five Largest Exchange-Traded Funds with Shadow Impact Calculator Measured Carbon Exposure

ETF Name	Carbon Shadow (tCO ₂ e/mn\$ _{inv})	ETF Structure
I Leith Wheeler Canadian Equity Fund	430	Financials 33.3%, Energy 19%, Industrials 17.2%
II Blackrock Active Canadian Equity Fund	460	Financials 33.1%, Energy 27.3%, Materials 15.8%
III Leith Wheeler International Pool-A	630	Other 19.7%, Industrials 19.6%, Consumer Discretionary 14.3%
IV SSGA S&P 500 Index Fund	760	IT 18.0%, Financials 16.0%, Health Care 12.6%
V State Street S&P 400 Midcap	840	Financials 23.6%, Industrials 17.1%, IT 14.8%



This table shows the endowment’s five largest exchange-traded funds with carbon exposures as measured by the shadow impact calculator (top); attempting to reduce the endowment’s carbon exposure by optimizing across pooled funds could potentially lead to reductions of 4 to 11%. Scenario 2a moves the holdings of the two highest carbon shadow funds. Scenario 2b moves these holdings into the pooled fund with the lowest carbon shadow (bottom).

Limitations

Public institutions have to balance many different criteria and policies when investing their endowments. Notably, ubiquitous budgetary shortfalls steer endowment managers towards holdings that generate income while limiting the risks to the principal invested. This and other salient factors have not been reflected in these divestment scenarios. However, our shadow impact calculator model can be extended to include financial factors in its scope.

4. SUMMARY

If the emissions and economic benefits remain unclear, is there still a case for institutions to pursue divestment? The movement is not about purely financial logic – it does, in our view, have the potential to change social norms around the perceived acceptability of where financial capital is located and the impacts associated with its returns. This could produce signals that change the wider institutional landscape for investing in a low carbon future. Divestment can establish a broader dialogue on investing in a sustainable energy, and a holistic view of energy transition, while urging financial portfolios to reflect this. Reducing demand for fossil energy and reorganizing production processes in many sectors will require forward-looking investments, not just changing our mode of energy production. Reducing liquid fuel demand in transportation will be of prime importance. The development of energy efficient housing and sustainable food will also be needed.

In this paper we have provided an overview of the core assumptions driving fossil fuel divestment and unburnable carbon, as spearheaded at universities and academic institutions. Since these institutions are engines of innovation, these are an apt context for these questions. Acknowledging the conflicting data on each side of these arguments is difficult in the environment of a university, and even more complex in broader society.

The culture of finance has understandably clustered around trusted names and individuals, while a sustainable energy transition would require experimentation and innovation. There are few low-carbon options from which investment managers can choose. With the current policy constraints that guide returns and the renewable energy industry at an early stage of development, investors would be ‘sequestering’ their financial resources in a sector that is much less mature than oil and gas sectors. However, new low carbon financial products are being developed, as demonstrated by new low carbon ETFs.

Though invoking the imagery of a carbon bubble is suggestive of a sudden burst, there are a series of cumulative technological, social and economic factors that are likely to erode balance sheets of transitional energy companies by adding costs, threatening profit margins and undermining sales; even without climate policies. UBS, an international investment bank, has said that it is possible we could look back at divestment campaigns as inflection points upon which a new focus began to develop--low carbon investing:

*“We highlight the fossil fuel divestment campaign as a potentially effective movement, defined as one that will act as a catalyst for change. Why? Because many of those engaged in the debate are the consumers, votes and leaders of the next several decades. In our view, this single fact carries more weight than any other data point on the planet for this issue: time, youthful energy and stamina are on the side of the fossil fuel divestment campaign.”*³⁰

The significance of a symbolic divestment commitment shouldn’t be immediately dismissed. To see why, it is worthwhile to examine our own personal relationships to the symbolic powers that money and finance holds on our own motivations, perceptions and thoughts. Divestment could serve as a catalyst for reflecting on these associations and in changing our shared expectations.

If divestment is to rise above symbolism, a planned strategy for creating viable low carbon transition investment funds needs to include policy at the provincial level. Early actors in creating policy frameworks for these investment vehicles could benefit from becoming recipients of increasing amounts of investment dollars that are seeking to go fossil free. At the very least, the dialogue

on fossil fuel divestment has helped a new generation of climate action campaigners understand the importance of becoming more financially literate on energy investment issues.

Pondering the potential effects of this change can help one frame the possible roles for financial capital in shaping our global energy system over the coming decades.

5. ACTING ON DIVESTMENT: MORE THAN JUST A NIGHT AT THE OPERA

From our analysis of fossil fuel divestment and the carbon bubble thesis, we offer the following suggestions to provincial and municipal policy makers, institutions (academic or otherwise) and divestment campaigns on achieving more than a symbolic achievement for their efforts on divestment.

Provincial & Municipal Policy Makers

- 1. Establish a public finance entity:** Divestment is most effective when the funds can be invested in a transformation of the economy away from fossil fuels. Thus, BC could create an ‘energy transition bank’, similar to that of the Clean Energy Finance and Investment Authority in Connecticut or existing programs in Massachusetts³¹ and Ontario³². Such a bank could offer bonds and other financial instruments to municipalities, looking to facilitate transition to a low carbon economy. A green banking institution could also offer support for the continual development of BC’s green tech sector.
- 2. Review tax incentives:** A low-carbon-transition investment tax credit could be structured to help attract private capital to domestic investments in a low carbon economy along the lines of energy, transportation and housing, similar to the 1996 Small Business Venture Capital Act which provides 30% cashback refundable tax credits when investing in a qualifying value-added sector of the BC economy.³³
- 3. Assess risk:** Review BC’s exposure to unburnable carbon risk. Support public fund managers in their potential decisions to invest in a low carbon transition. This may include the need to revise language on risk consideration.

Universities and other institutions

- 1. Begin an open conversation:** Commitments to divestment or action on carbon risk can be issued along a timeline set by the institution, as part of a thorough review. Some form of commitment could signal demand for new types of low carbon financial products. Institutions that engage early in this process can become drivers of these opportunities.
- 2. Review:** Sustainability goals should be reviewed and harmonized with other institutional objectives. Revise the mandate of fund managers on how they screen investments to meet environmental, social and governance targets to report a portfolio’s carbon intensity and exposure to unburnable carbon. Re-evaluating benchmarks, such as those analyzed by leading financial studies on potential carbon bubble risks, can place current returns in a new context. Establish positions on green funds or bonds.
- 3. Research:** Engage and leverage on-campus expertise, such as that in business schools, to assess and research strategies for dealing with unburnable carbon risk. Issuing a detailed

accounting of the specific services and initiatives supported by investment revenues could help to place earnings from fossil energy investments in context.

Divestment Campaigns

- 1. Propose a parallel endowment:** Consider working with the university to launch a separate low-carbon or fossil free endowment fund, creating the opportunity for comparing returns. Students could engage in alternative portfolio construction. Returns would be favorable in energy bear markets.
- 2. Contribute:** Crowdfunding campaigns could be launched by divestment organizers to enable students, faculty or staff donations to a fossil-free endowment. This could help to demonstrate support for campaigners. These funds could be withheld from the target university or institution until further action had been taken.
- 3. Plan:** Move dialogue forward by focusing on components of a feasible divestment timeline, such as obtaining a clear statement on disclosure of oil, gas and coal investments of universities or other institutions, both direct and through equities. The next step of such a plan could include how to proceed after such a statement is obtained. Don't shy away from the emphasizing that at the current moment, divestment would primarily be a symbolic action.

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Pacific Institute for Climate Solutions

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University of Victoria
PO Box 1700 STN CSC
Victoria, BC V8W 2Y2

Phone 250-853-3595
E-mail pics@uvic.ca
Web pics.uvic.ca