

Unburnable Carbon and Stranded Assets

What investors need to know

Post Event Summary

January 2015





Table of contents

Introduction	1
Agenda	2
Session summaries	3
Climate change 101	3
Energy economics – lessons learned	3
Environmental and social issues that affect supply and demand for fossil fuels	4
Inflating versus deflating the carbon bubble	7
What energy investors need to know	9
Breakout discussions	10
Closing	12

Introduction

In 2011, a [thesis](#) was put forward that suggested only a fraction of the fossil fuel reserves of publicly-listed energy producers can be developed if dangerous levels of global warming is to be avoided. The implication of this thesis means a large proportion of fossil fuel reserves could be destined to become 'unburnable carbon' or stranded assets, and the share prices of fossil fuel producers may be overvalued. Although the concept of stranded assets in the resource and energy sector is not new, there is a range of perspectives on the investment risk associated with unburnable carbon.

While investors are aware of climate change risks, the absence of clear direction on CO2 regulations creates long-term uncertainty on the timing and magnitude of the risk. On one hand, investors recognise the important role of fossil fuels in our economy, while on the other hand we see growing concerns about new energy infrastructure projects and growing awareness of climate change issues in the mainstream media. These, and other forces that could affect whether some carbon indeed remains "unburnable", are not always well-understood. With a shared desire to seed a thoughtful and well-informed discourse on stranded carbon assets, on November 4, 2014, Royal Bank of Canada (RBC), Suncor Energy (Suncor), NEI Investments (NEI) hosted a day of learning to explore the science and economics of the energy sector and better understand the full range of environmental, social and economic factors that could result in stranded assets.

The event — which was facilitated by the Pembina Institute — brought together 80 participants from the financial sector, oil and gas companies, clean technology companies, sustainability experts, academics, and environmental groups from Canada and abroad who shared the desire to have an informed, balanced and thoughtful discussion on this important topic.

The meeting was held under the Chatham House Rule¹, which specifies "participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed." This empowered participants to speak frankly, and to explore issues and opportunities in greater depth than might be the case were they bound by the need to hold to pre-established organizational positions.

The following is a summary of the discussions that took place during the day of learning.

¹ Chatham House, "Chatham House Rule," 2012. www.chathamhouse.org/about-us/chathamhouserule

Agenda

Unburnable Carbon and Stranded Assets – What Investors Need to Know

November 4, 2014, RBC Plaza, 200 Bay Street, 40th Floor

Time	Activity
8:00 – 8:15	Welcoming Remarks <ul style="list-style-type: none">Sandra Odendahl, Director of Corporate Sustainability, RBC
8:15 – 8:30	Issue Introduction and Framing for the Day <ul style="list-style-type: none">Ed Whittingham, Executive Director, Pembina Institute
8:30 – 9:00	Climate Change 101 <ul style="list-style-type: none">Dr. John Stone, Professor of Geography and Environmental Studies at Carleton University
9:00-9:30	Energy Economics – Lessons Learned <ul style="list-style-type: none">Jeff Rubin, Author and Former Chief Economist with CIBC World Markets
9:30 – 10:00	Break
10:00 – 11:00	Environmental and Social Issues that Affect Supply and Demand for Fossil Fuels <ul style="list-style-type: none">Stewart Elgie, Professor of Economics and Law, University of OttawaKate Kempton, Partner, Olthuis Kleer & Townsend LLPTom Rand, Managing Director, ArcTern VenturesPaul Tsounis, Director of Resource Economics, Alberta Department of Energy Moderated by Peter MacConnachie, Sustainability Issues Manager, Suncor Energy
11:00 – 12:00	Inflating vs. Deflating the Carbon Bubble? <ul style="list-style-type: none">Paul Spedding, Advisor, Carbon TrackerNancy Meyer, Associate Director, I.H.S. Moderated by Ed Whittingham, Executive Director of Pembina
12:00 – 1:00	Lunch
1:00 – 2:00	What Energy Investors Need to Know <ul style="list-style-type: none">Mark Friesen, Energy Research, RBCJamie Bonham, Manager Extractives Research & Engagement, NEIPeter Knight, President, Generation Investment Management Moderated by Sandra Odendahl, Director of Corporate Sustainability, RBC
2:00 – 3:15	Gradient activities and Table Discussions
3:20 – 4:00	Table Discussion Report Back and Closing
4:00 – 6:30	Reception

Session summaries

Climate change 101

To open the day, Dr. John Stone, Professor of Geography and Environmental Studies at Carleton University, delivered a Climate Change 101 presentation to provide participants with the latest information on the science of climate change.

He described how life on this planet depends on greenhouse gases (GHGs) in the atmosphere that function as a blanket that traps heat and makes our planet warm enough to sustain life. Since the Industrial Revolution there has been an increase in the use of fossil fuels — coal, oil and natural gas — as a source of energy. The combustion of fossil fuels results in the release of GHG emissions, primarily carbon dioxide, into the atmosphere. The rate of GHG emissions has been increasing to the point where society is emitting GHGs faster than can be absorbed by oceans, forests and other ecosystems through natural processes. The difference stays in the atmosphere, where it has a warming effect. This has led to atmospheric concentrations of GHGs that are unprecedented in the last 800,000 years.

Future warming depends on two factors: the amount of future emissions and the sensitivity of the climate and other natural systems to increased concentrations of GHGs. Governments and scientists have set a goal to limit global warming to 2°C relative to pre-industrial levels to avoid dangerous impacts of climate change. According to the Intergovernmental Panel on Climate Change (IPCC), to have a more than even chance of meeting the 2°C target, global emission levels need to peak this decade and be reduced to at least 50 per cent of current levels by 2050. There is an almost linear relationship between the warming produced by GHG emissions and their cumulative emissions. This provides a limit on the fossil fuels that can be burned by society, and has been used to determine the “Carbon Budget”.

We have already used up over half of the carbon budget that is available toward the 2°C target limit. At current rates of emissions society will overshoot this budget in 50 years, 16 years if emissions keep rising. The inescapable consequence of this is that we cannot burn all known fossil fuel reserves. A significant portion will have to be left in the ground to avoid the more serious impacts of climate change.

When asked about the latest IPCC report, Dr. Stone said that it provided more certainty around the conclusions drawn in previous IPCC reports. In short: We can say unequivocally that climate change is real, and its impacts will be widespread, severe and irreversible.

Looking ahead to the next round of climate meetings in Paris in 2015, governments have agreed to strike a new deal to shape the global response to climate change. What happens in Paris in December 2015 will be critical as the economic, social and environmental costs of inaction continue to mount.

Energy economics – lessons learned

During the second session, Jeff Rubin, Author and former Chief Economist with CIBC World Markets, explained to participants the importance of price in predicting whether fossil fuel

reserves will be developed or stay in the ground. He described the lessons that can be learned from the coal industry, and how those may apply to the oil industry.

Mr. Rubin first addressed the decline in the fortunes of coal companies over the last few years. For many years, most analysts believed coal demand would remain strong and even increase because people would continue to want coal, and no global agreement would be reached on CO2. But over the past 3 years, 90% of the value of coal companies has been hollowed out as the goalposts moved. Specifically, Chinese GDP growth slowed, new US Environmental Protection Agency coal plant legislation made it difficult to build new coal plants, and there is a desire in China to reduce reliance on coal-fired electricity, driven primarily by the concern of health impacts from poor air quality in China's cities. All of these factors have combined to bring the valuation of coal companies a long way down from their past peaks.

Mr. Rubin acknowledged that even though many people view strict national carbon regulation as unlikely, China and the U.S. have been taking action to reduce their reliance on coal. Given the lessons learned from coal, the speaker felt that it was quite possible something similar could happen to oil companies over the coming years even without direct carbon regulation. China's growth is officially stated as 5 per cent, but that rate is lower than projections used to model future oil demand. The Chinese government recently ordered 6 million vehicles off the road in an attempt to address serious air quality challenges. Moves such as that will slow growth in car ownership. In North America, there is a trend toward dropping demand for cars, as people move to cities, and young people do not purchase cars at the same rate as their parents once did. In addition, increasing quantities of shale oil production are coming online, which has contributed to oil trading at four-year lows.

In Canada, continued low oil prices may shift the discussion away from the inevitability of new development toward how to even maintain current levels of production. This also introduces an additional risk for proposed pipelines: they might be built but will they be running at capacity?

The speaker closed by suggesting oil is no longer a high growth sector, but rather a mature sector. He recommended the industry focus on other ways to create shareholder value such as stock buybacks and increasing dividends to shareholders.

Environmental and social issues that affect supply and demand for fossil fuels

The third session of the day brought together a panel of experts from various fields to discuss environmental and social issues that affect the supply and demand for fossil fuels. Peter MacConnachie, Sustainability Issues Manager at Suncor Energy, moderated the session.

The first speaker, Kate Kempton, Partner at Olthuis Kleer & Townshend LLP, discussed First Nations concerns. She flagged some key points regarding the difference in opinion on land rights between First Nations and the Crown. She emphasized that First Nations granted treaties to the Crown to enable the Crown to use the land. The Crown considers that the land was ceded by the treaties, while many if not all First Nations consider that the land was shared and never ceded (ie: under indigenous law, First Nations could not agree to cede and

surrender land). She also spoke about the challenges of the historical relationship between the Canadian government and First Nations that, in her view, has driven many First Nations communities into poverty and diminished their ability to engage as full partners.

Ms. Kempton suggested that in Canada, First Nations consent, or lack thereof, would, assuming Canadian law continues to develop in this way, determine whether or not fossil fuel resources get developed or stay in the ground. There is a general dissatisfaction with the current level and effectiveness of the consultation between government(s) and individual First Nations. This dissatisfaction has led to a growing call for the international law principle of free, prior and informed consent to be the legal standard in Canada for obtaining access to First Nations land. Furthermore, the Supreme Court of Canada has signaled that pending aboriginal title claims, if successful, could result in companies losing access to land or projects. She indicated that aboriginal title claims will likely start arising more frequently for land covered by treaties because the First Nation treaty parties do not believe that such treaties ceded aboriginal title or rights.

The second speaker, Tom Rand, Managing Partner of ArcTern Ventures, focused on disruptive clean energy technologies. Many of these technologies are now cost competitive with traditional sources of energy. A price on carbon would certainly help to accelerate these technologies to market, but is not needed for them to compete. This pool of emerging technologies is reaching commercial operation right now, but access to capital is seen as a major challenge to creating the scale required to truly be disruptive to future oil demand.

The third speaker, Paul Tsounis, Director of Resource Economics, Alberta Department of Energy, spoke to Alberta's approach to managing their resources. The province is rich in oil, gas and coal reserves. The province is taking its duty to develop those resources in a socially and environmentally responsible manner seriously.

The final speaker, Stewart Elgie, Professor of Law and Economics, University of Ottawa, began by discussing how the focus on pipelines by many environmental groups has a lot to do with concerns about the environmental footprint of the oil sands, and not just with the proposed pipelines themselves. Organized campaigns are now opposing pipelines in every direction and the oil sands have become the "poster child" for climate change concerns.

Mr. Elgie credited oilsands companies for taking these concerns more seriously in recent years, both individually and through the Canadian Oil Sands Innovation Alliance, although they still have a ways to go to lower their CO₂ footprint. The speaker noted that about one-half of the world's CO₂ emissions (including those of British Columbia, Alberta and Quebec) are subject to some kind of a price on carbon through regulation. To remain competitive, oil sands producers need to contain costs while continuing to decrease the environmental impacts, which will require accelerating clean innovation.

The speaker closed by pointing out electric cars are becoming more cost competitive relative to internal combustion engines. This could have a large impact on future oil demand curves, especially if growing economies such as China take on rapid adoption of electric vehicles – although that appears to be years away.

Key questions:

Are First Nations legal challenges project based or are the groups looking for a way to be heard?

The speaker felt that, while acknowledging the risk of generalization, First Nations communities are more focused on sustainability and have traditional law that is more based on the circle of life, so it's a bit of both.

Another speaker suggested that from an economic perspective, it would be worth it for Canada to push to solve land claim issues. It costs a lot to NOT get oil across the country to the coast. He suggested that oil companies should consider pushing government to settle these issues.

What is Plan B for Alberta if access to markets remains challenging?

The speaker stated that plan A is to get oil to tidewater so that it can reach international markets, while plan B is provincial revenue diversification through supporting emerging markets in the province. It is difficult to see a global drop in long-term demand according to IEA and World Bank charts and data. Production is expected to grow because conventional production is declining and that gap will need to be made up. Other speakers pointed out that there is a major risk for government and industry, given the external perception that the environmental impact of oilsands is high. This presents an opportunity to double down on managing that impact.

How prevalent are the risks of civil liabilities from climate change?

This risk increases over time, but you have to prove causation so you can't sue until the damage happens. The speaker suggested that the fossil fuel industry should ask: What do the tobacco and alcohol industries wish they had done 25 years ago? There are three important lessons to be learned from those sectors:

1. encourage "responsible" use of your product
2. don't go near groups denying the science
3. don't invest any dollars in denying the problem

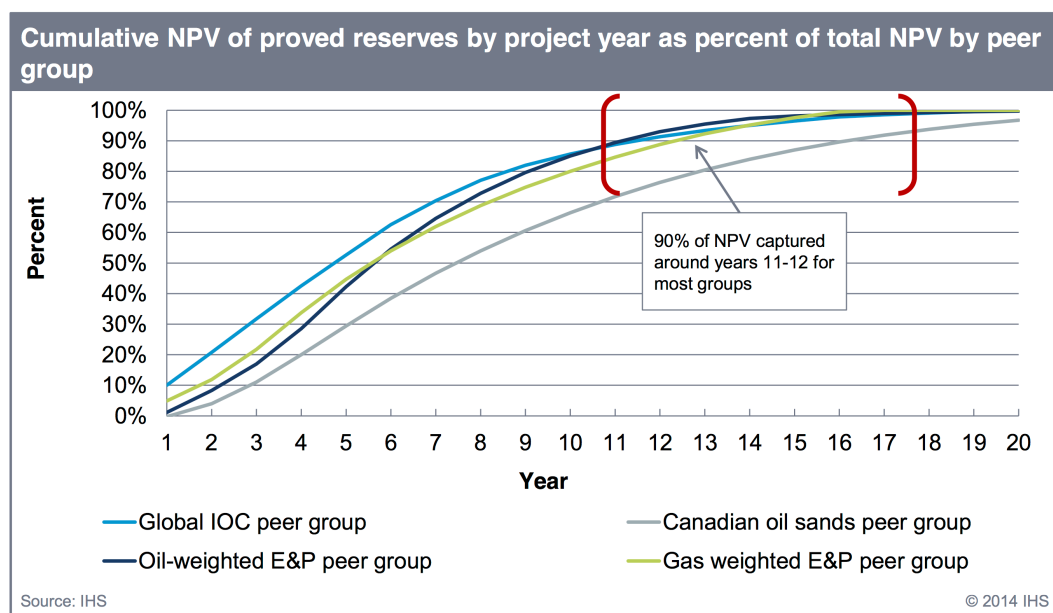
Why isn't there more investment in clean tech by oil companies?

The speaker acknowledged that oil companies do some dabbling in the space, and that is a huge win for most clean tech companies. But these investments are a small part of their portfolio, so they can easily pull their funding and support once the cash flow stops. What is needed is capital that is committed over the life-cycle of the early-stage company. Another speaker flagged the importance of government support as public investment has been behind almost every major innovation in Canada. They also noted that the Climate Change and Emissions Management Corporation in Alberta, and Sustainable Development Technology Canada were both functioning models that could be expanded.

Inflating versus deflating the carbon bubble

The fourth session tackled a discussion of the factors inflating a carbon bubble versus those deflating the carbon bubble.

The first speaker, Nancy Meyer, Associate Director from IHS Energy addressed the valuation of companies, and how important proven reserves are in that valuation. Their analysis showed that proven reserves — those with committed capital expenditures — make up most of the valuation, but since these are monetized over 10 to 15 years, there is limited risk. When analyzing how the value of those proven reserves is captured over time, companies with greater weighting of oilsands took slightly longer to fully monetize the value of those



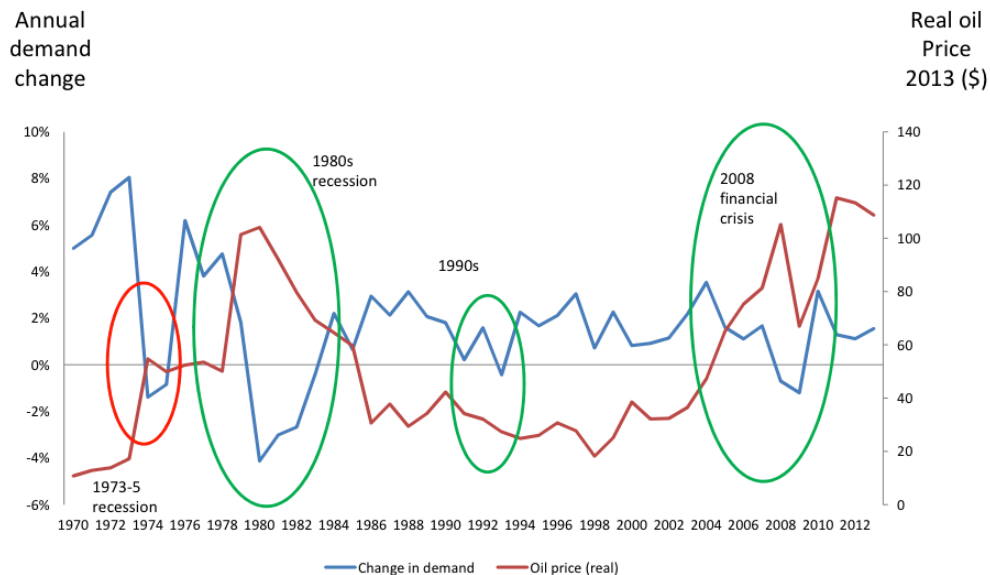
resources.

In IHS's view, oil companies are trading at a discount even with oil at \$85 per barrel, therefore they feel the industry is not overvalued and thus there is no bubble. In addition, a carbon price of \$40/tonne would only add \$3-4 per barrel for the producer, and they don't believe that building carbon regulation is likely to be implemented soon on a global scale. Bursting a "carbon bubble" would require an abrupt change in the global energy system, but energy transitions are slow, IHS does not expect to see a massive shift away from fossil fuels in the next 10 to 15 years.

The second speaker, Paul Spedding, Advisor, Carbon Tracker Initiative, agreed with the assessment that reserves are monetized quickly, but felt the challenge is companies continue to reinvest cash flow in new projects. That rolls the risk forward and over time increases the risk exposure.

Mr. Spedding also noted while a company may still be producing from their assets, the investor may have lost much of their money depending on their investment horizon. Coal companies haven't stopped producing coal, but they have lost 50% of their market capitalization.

The International Energy Agency (IEA) scenarios predicting energy use begin diverging in the next five years, and all but the business-as-usual scenario show a decrease in oil demand. Looking historically, when year-over-year demand goes down there is typically a sharp drop in oil prices. A price on carbon isn't likely to be material to producers, but it could be material to consumers, which could have a large impact on demand for oil.



Source: BP Statistical Review of World Energy 2013



Mr. Spedding summarised the three ways in which carbon assets could be “stranded”: new taxes, new costs (such as carbon capture), or lower oil prices.

Oilsands projects typically target a 15 per cent internal rate of return (IRR) compared to 30 to 50 per cent for other oil and gas developments. This low IRR means they are more exposed to risks associated with stranded assets, and an over-focus on oilsands increases the risk profile of companies.

Key questions:

Did either speaker assess the risk associated with access to water?

Each speaker said that they had not examined this issue specifically. IHS said they were planning to investigate it in future.

Was the risk of being able to transport the product included in the analysis?

Rail has been serving the transportation needs of oil in the absence of new pipelines in Canada. In general, there is more than enough oil reaching market to produce emissions in excess of the carbon budget. The other speaker added that any transportation risks would be regional.

Which of the IEA scenarios were modeled in the analysis?

The first speaker had used projections that showed flattening demand by 2030, and a range of oil prices.

What do you see as the most likely to change the demand side?

One speaker reiterated the point about a price on carbon not being material to producers, but definitely impacting consumers.

What energy investors need to know

For the final panel the moderator, Sandra Odendahl, Director of Corporate Sustainability at RBC, presented a number of questions to the panellists.

Carbon Tracker International says that; *“Stranded assets are fuel energy and generation resources which, at some time prior to the end of their economic life — as assumed at the investment decision point — are no longer able to earn an economic return as a result of changes in the market and regulatory environment associated with the transition to a low-carbon economy.”* Do you worry about this? If not, what do you think the most worrisome factors are for causing stranded fossil fuel assets?

The first speaker, Jamie Bonham, Manager of Extractives Research and Engagement at NEI Investments, felt that the risks are real, but wasn't sure what timeframe they would become material in or how best to mitigate the risk. He did not believe such changes were likely to happen within the year, but is concerned companies may not be managing or internalizing the risks effectively. In addition, investors may be sending the wrong message by rewarding behaviour that would increase these risks while de-incenting behaviour, like diversifying, that would lessen it. He believes companies and investors have an opportunity to collaborate to move this forward.

The second speaker, Mark Friesen, Energy Research Analyst at RBC Capital Markets, felt it was a long-term risk. He views the issue in terms of risks and costs, not necessarily “carbon risks” and “carbon costs”. He explained that he believes demand for oil will continue to go up as there is no macro substitute and carbon has been the backbone of our economy since the industrial revolution. He pointed out that there may be significant social implications of a switch away from fossil fuels as an energy source in developing countries, and cautioned that we should watch for unintended consequences. Mr. Friesen expressed concern about the lack of political will, both in terms of policies to drive energy conservation and policies to support pipeline development.

The third speaker, Peter Knight, President, Generation Investment Management, considered the risk of stranded assets a key risk their firm seeks to manage, and said that we can't continue to consume oil, coal and natural gas at current rates. Mr. Knight felt it was unlikely carbon would be directly regulated at a large scale, but we are likely to see indirect regulation through things like clean electricity standards, feed-in tariffs, or regulations like the US Environmental Protection Agency's coal regulations.

The speakers also flagged that there are socio-political risks. Groups like the Investor Network on Climate Risk and 350.org are driving dialogue around the divest/invest options. In addition, there are disruptive market forces like Solar City, Tesla, and NEST coming online.

Why do you think some portfolio managers resist formal environmental, social and governance (ESG) integration?

Speakers noted that it's important to remember there are very different styles of investing, from fundamentals-based to carbon risk management and ESG integration, to news or events-based. In addition, varying time horizons are used, from day trading to five or more years. This means different investors view ESG in different ways. For some it's seen as a way to earn returns while having a positive impact; for others it's a method of gaining better insight; and for others it's extra noise.

Does fossil fuel divestment make sense?

The speakers felt that some investors are pulling out of fossil fuels for ideological reasons, but this was mostly a tool for influencing politicians and the public. Other investors are moving their money because they view fossil fuel investment as having higher risk and lower returns.

One speaker felt the decision not to invest can be made, but it is unlikely to shift the market. For substantive change we would need to see a demand shift, likely coupled with a mindset shift, and that likely requires a major event or other transition.

They all felt opportunities on the investment side of the debate were large. Solar is at grid cost parity in 12 states and 79 countries. Even at low penetration it impacts profitability of utilities. Tesla and Solar City are disrupting the electricity market.

Are you concerned some companies have too many eggs in one basket?

The speakers agreed there is a wide variation in how well companies in the oil and gas sector are managing their risk. Some companies are making riskier bets and have all their money tied up in highly capital-intensive projects, and are thus very risk exposed to oil prices. Others — particularly the major international players — are more diversified and making smarter bets.

One speaker noted that there is an opportunity for companies to use their current strong cash flows and project management skills to diversify into low-carbon technologies, or at least lay the groundwork for that transition.

Are ESG metrics important components of meeting fiduciary responsibility?

Some speakers felt that ESG metrics provide important and valuable insight; so ignoring it would be problematic. Others felt leaving oil companies out of investment portfolios is not meeting fiduciary responsibility.

Breakout discussions

The day closed with some breakout activities and table discussions. In the first activity, all participants stood up and then distributed themselves across the room to represent their agreement or disagreement with the following statements.

What time frame do you see the risk of stranded assets becoming material?

Participants were mostly clustered in the center, representing a five-year time horizon for the risk becoming material. A few positioned themselves to represent that it is currently a material risk and expressed the opinion that we are already seeing a transition away from fossil fuel.

Are you more concerned about the risk of stranded assets than you were this morning?

Most participants moved to the center and a number expressed the opinion that while they knew more, they were no more certain about the risk or the best course of action. Those who felt they were more concerned commented on having a broader list of potential reasons why assets could become stranded.

Is divestment the best approach to managing the risk of stranded assets?

The majority of participants felt that divestment was not the best approach, but that a range of invest-and-engage activities would be better. Those who felt that divestment was the best approach felt it was the change that needed to happen, and in one case expressed that their fossil-free investments had outperformed their other investments in the last year.

In the second activity, participants returned to their tables to tackle one of five discussion questions. These covered the role for banks, investment companies, energy companies and government; whether engagement or divestment is more effective, and the top two factors driving investment risk associated with stranded assets.

Some key observations coming out of the table discussions:

- Government should be seeking to minimize the risk of stranded assets by thinking long term and being proactive. Opportunities include intergenerational funds, incenting movement away from fossil fuels, pricing carbon, and retraining opportunities/job shifting. Some participants felt the government is betting the whole economy on oilsands and liquefied natural gas to the detriment of the rest of our economy. There is also an opportunity to push regulators to require more disclosure.
- There is a role for investors to play in engaging government about the need for climate policy. Even if investors don't hold oil and gas companies, climate change impacts will be felt across the entire economy.
- Participants felt energy companies needed to focus on maintaining a low-cost and low-impact operation to minimize the risks and to meet their responsibility to the shareholder to maximize value.
- The groups questioned if companies are rewarded for being better performers in terms of ESG metrics. Some felt that they weren't and highlighted the example that renewable investment is seen as outside of the core business of traditional energy companies and investors. Others felt companies were rewarded because they better managed risks over the long run.
- Mainstream pension funds may need to enhance engagement and awareness of stranded assets. Participants know the funds have long-term liabilities, but they don't necessarily have the information they need to make informed decisions or convey this information to their clients.

- Most participants felt the invest-and-engage approach is more effective than the divestment approach. By engaging, investors can push companies to be more cost conscious, especially with regards to capital projects, and ensure that management is evaluating the future risk of stranded assets properly.

Closing

There remains a wide range of views on whether stranded assets from unburnable carbon will become a material risk to investors, and even among those who see it as a significant risk there is a diversity of views on the timeframe. At the end of the day there was strong agreement that this is an important topic to explore and understand, and many participants encouraged the hosts to consider holding another event in the future.