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# THE FUTURE OF CANADA'S OIL SANDS IN A DECARBONIZING GLOBAL ECONOMY

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DECARBONIZING GLOBAL ECONOMY**

**Jeff Rubin**



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## **TABLE OF CONTENTS**

<b>iv</b>	About the Global Economy Program
<b>iv</b>	About the Author
<b>1</b>	Acronyms
<b>1</b>	Executive Summary
<b>1</b>	Introduction
<b>3</b>	The Oil Sands Face a Global Oil Glut — Not a World Boycott
<b>4</b>	Cut Production Now or Shut in Even More Later
<b>5</b>	The Global Oil Market in an Emissions-constrained World
<b>7</b>	Energy Security in a Decarbonizing World: Should We Care about OPEC’s Rising Market Share?
<b>8</b>	The Need for Greater Value Added
<b>9</b>	Macroeconomic Impact: Trading Short-term Pain for Long-term Sustainable Gain
<b>9</b>	Environmental Challenges from Industry Contraction
<b>10</b>	Policy Recommendations
<b>12</b>	Works Cited
<b>16</b>	About CIGI
<b>16</b>	CIGI Masthead

## ABOUT THE GLOBAL ECONOMY PROGRAM

Addressing limitations in the ways nations tackle shared economic challenges, the Global Economy Program at CIGI strives to inform and guide policy debates through world-leading research and sustained stakeholder engagement.

With experts from academia, national agencies, international institutions and the private sector, the Global Economy Program supports research in the following areas: management of severe sovereign debt crises; central banking and international financial regulation; China's role in the global economy; governance and policies of the Bretton Woods institutions; the Group of Twenty; global, plurilateral and regional trade agreements; and financing sustainable development. Each year, the Global Economy Program hosts, co-hosts and participates in many events worldwide, working with trusted international partners, which allows the program to disseminate policy recommendations to an international audience of policy makers.

Through its research, collaboration and publications, the Global Economy Program informs decision makers, fosters dialogue and debate on policy-relevant ideas and strengthens multilateral responses to the most pressing international governance issues.

## ABOUT THE AUTHOR



**Jeff Rubin** is a CIGI senior fellow. A Canadian economist and author, Jeff is a world-leading energy expert and former chief economist at CIBC World Markets. At CIGI, he is currently researching the impacts and opportunities for Canada in its transition toward a more sustainable economic model.

Jeff's work explores the future of Canada's oil sands in an emission-constrained world, the divestment of Canadian fossil fuels, the case for a national carbon tax and the evolving value of Canadian resources.

One of the world's most sought-after energy experts, Jeff was one of the first economists to accurately predict soaring oil prices back in 2000. His first book, *Why Your World Is About to Get a Whole Lot Smaller*, released in 2009, was an international bestseller and was favourably reviewed in both *Time* and *Newsweek*. It was the number-one-selling non-fiction book in Canada and won the National Business Book Award.

Jeff released two further bestselling books through Random House Canada: *The End of Growth* (2012), which examines the impact of triple-digit oil prices on global economic growth; and *The Carbon Bubble* (2015), which examines how climate change would impact the Canadian economy and, in particular, the country's ambitious energy plans.

## ACRONYMS

bpd	barrels per day
CAPP	Canadian Association of Petroleum Producers
CO <sub>2</sub>	carbon dioxide
COP21	twenty-first session of the Conference of the Parties
Gt	gigatonne
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MFSP	Mine Financial Security Program
Mt	megatonne
OPEC	Organization of Petroleum Exporting Countries
ppm	parts per million
UNFCCC	United Nations Framework Convention on Climate Change
WCS	Western Canadian Select

## EXECUTIVE SUMMARY

Canadian Prime Minister Justin Trudeau and Alberta premier Rachel Notley have both argued that improving Canada's emissions record will safeguard the future development of the oil sands.<sup>1</sup> The perspective offers little recognition of the current problems facing the country's largest energy resource, and even less recognition of the problems that the oil sands will encounter as a result of actions taken by other countries to limit their own carbon emissions as pledged recently at the twenty-first session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC). As climate change compels deep decarbonization of the global economy, emission restrictions around the world will destroy demand for billions of barrels of oil over the coming decades, severely impairing the economic viability of high-cost producers.

1 The oil sands refer to the mixture of sand, water, clay and bitumen found principally in three deposits in northern Alberta: Athabasca, Peace River and Cold Lake. At room temperature, the extracted bitumen has the consistency of a hockey puck and thus must be mixed with the diluent made up of ultra light oil or natural gas liquids in order to be transported in a pipeline. Deposits that are closer to the surface are typically mined, while deeper-lying deposits are retrieved through in situ production that involves injecting steam into oil sands formations and pumping up the released bitumen.

## INTRODUCTION

Newly elected Prime Minister Justin Trudeau, along with Rachel Notley, Alberta's first New Democratic Party premier, worked earnestly to rehabilitate Canada's badly tarnished environmental image in the lead-up to the UN climate change conference — COP21 — in Paris. For much of the last decade, the Canadian government's singular economic focus on promoting the rapid growth of bitumen production from the oil sands and its resultant lack of progress in reducing national carbon emissions has isolated the country in the global environmental community. Canada has frequently been singled out for criticism, and even been ridiculed at past climate change conferences.<sup>2</sup>

New governments in both Alberta and Ottawa have wasted little time in moving the country's environmental goal posts. In a dramatic effort to change international perceptions of her province as a laggard on climate change, Premier Notley recently announced sweeping changes to Alberta's carbon emission policies, including the creation of an economy-wide CDN\$30 per tonne carbon tax, the setting of a 100 megatonne (Mt) hard cap on annual carbon emissions from the oil sands, and the phase-out of all coal-fired generating plants, which currently account for more than 50 percent of power generation in the province. These measures are intended to restrain provincial emissions that were otherwise expected to soar by more than 30 percent over the next decade and a half (Giovannetti and Jones 2015).

Prime Minister Trudeau has in turn promised to hold a first ministers' meeting with the premiers to develop a climate change strategy with new national emissions reduction targets and a strategy for pricing carbon emissions within 90 days of the conclusion of COP21. The new Trudeau government has already announced that it considers the previous target set by the former Harper government of reducing national emissions by 30 percent below 2005 levels by 2030 as a bare minimum (Chase 2015). Furthermore, Prime Minister Trudeau endorsed a more stringent 1.5°C target for global warming at COP21 in deference to the plight of low-lying islands threatened by rising sea levels (McCarthy and Reguly 2015). The new Liberal government also announced a doubling in funding from the levels that the Conservative government had provided to developing countries to help them finance

2 At the 2013 meeting of the UNFCCC in Warsaw, the Climate Action Network, a global organization of connected non-governmental organizations dedicated to mitigating the risks of human-caused climate change, awarded Canada its Lifetime Unachievement Fossil Award in recognition of the country having won the award six years in row. Several years earlier, a number of prominent scientists and politicians were calling for the country's expulsion from the Commonwealth following Prime Minister Stephen Harper's decision in 2011 to withdraw Canada from its emissions reduction obligations under the Kyoto Accord.

their own climate mitigation programs as well as to adapt to the consequences of climate change (CBC News 2015).

Taken at face value, the new policy stances from both Alberta and Ottawa appear to be an abrupt reversal from the former Harper government's agenda of oil-sands-driven economic growth and its open skepticism of climate change. Certainly, in broad direction, they are. Yet both Trudeau and Notley have argued that their climate change initiatives are at least in part motivated by a desire to safeguard the future development of the oil sands resource.

Of course, it would not be the first time that a country has adopted green energy policies to safeguard its oil interests. Saudi Arabia's massive investment in solar energy is driven by a pressing need to prevent surging domestic oil consumption from cannibalizing the country's future petroleum exports.<sup>3</sup> In a similar vein, Canada's newfound commitment to improve its international image on battling carbon pollution is being pitched, at least to the country's oil patch, as an attempt to improve the oil sands' marketability to increasingly emissions-conscious world energy markets.

There is, of course, much to commend in these new carbon initiatives. The Alberta government's decision to tax economy-wide carbon emissions is both laudable, by encouraging Albertans to reduce their own carbon pollution, and fiscally prudent, in terms of generating billions of dollars of new carbon-based revenues that will be urgently needed to replace the billions lost in bitumen royalties from plunging oil prices and possibly plunging production soon as well. And, undoubtedly, more stringent Canadian carbon regulations and, even more importantly, actual reductions in the country's emissions, could only improve the oil sands' much-maligned image abroad.

Both Trudeau and Notley have even gone so far as to argue that Canada's notoriously poor record on carbon emissions under the Harper government actually hurt the oil sands' long-term expansion plans, which the former prime minister so famously championed. Premier Notley cited US President Barack Obama's recent rejection of the Keystone XL pipeline on climate change grounds as a prime example.

While that political narrative seems to be gaining traction in post-Harper Canada, its underlying assumption that the oil sands' commercial future is critically linked to the country improving its record on carbon emissions is dubious at best. The perspective offers little recognition of

the current problems plaguing the country's largest energy resource, and even less recognition of the problems that the oil sands would encounter as a result of actions taken by other countries to limit their own carbon emissions.

It is not Alberta's emissions, nor for that matter Canada's, that are relevant for the oil sands' future viability. The real threat that climate change poses to bitumen extraction from oil sands are the actions taken by the rest of the world to mitigate global carbon pollution and the consequences those actions hold for future world oil consumption. By destroying billions of barrels of potential future oil demand, policies designed to mitigate climate change will have the very opposite effect on the oil sands' prospects than either Notley or Trudeau have suggested. The closer COP21 and its aftermath bring the world to reducing the combustion of fossil fuels, either through taxing carbon emissions or through promoting the rapid use of green energy, the bleaker the outlook for the oil sands and other high-cost sources of oil supply.

In the final analysis, it is the oil sands' costs, not their carbon trail, that jeopardizes further development of the resource in an emissions-constrained world. Next to Arctic production, the oil sands rank as one of the most expensive sources of oil in the world, rendering them a marginal producer in the world supply chain. As such, the oil sands have stood to gain the most from rising prices, which have levered huge production growth and turned what was once thought to be commercially unrecoverable oil into the world's third-largest oil reserve.<sup>4</sup> But at the same time, as one of the most costly oil sources in the world, the resource is also one of the most vulnerable to plunging oil prices. Improvement, no matter how impressive, in either its own carbon emissions or in Canada's overall emissions performance, will not remedy that vulnerability in any meaningful sense.<sup>5</sup>

4 For decades, Alberta's oil sands were considered a marginal resource whose high extraction and upgrading costs did not justify large-scale commercial development. However, when oil prices started rising rapidly in the last decade, the International Energy Agency (IEA) suddenly reclassified this long-ignored resource as the world's third-largest oil reserve, holding an estimated 170 billion barrels of oil. Even more appealing was the fact that unlike the larger reserves in Saudi Arabia and Venezuela, the oil sands were open to private investment and ownership — making them the world's largest reserve accessible to the global oil industry. At one point during the recent reign of triple-digit oil prices, there was more planned investment in the oil sands than in any other oil-producing region of the world.

5 According to the US Congressional Research Service, the carbon trail from oil sands production is on average three to four times greater than the trail emitted from the production of conventional North American oil. However, on a full-cycle "wellbore to wheels" basis, oil sands' emissions are only 17 percent higher than conventional oil, since the bulk of emissions occur at the point of combustion, not extraction (United States Department of State Bureau of Oceans and International Environmental and Scientific Affairs 2014).

3 Saudi Arabia currently burns more than three million barrels a day, almost a third of its total oil production. Nearly half of that amount is used to power desalination plants. Among other objectives, the ambitious Saudi solar energy program is designed to replace oil-fired generators with solar energy to power its massive desalination plants (Ball 2015).

Even in today's still rapidly expanding global oil market, the oil sands are struggling to remain economically viable. Carving out a sustainable niche in tomorrow's emissions-constrained energy markets will be all the more challenging.

## THE OIL SANDS FACE A GLOBAL OIL GLUT — NOT A WORLD BOYCOTT

The oil sands have often been the target of environmental protests around the world, given their emissions profile and large environmental footprint; however, plunging oil prices, not a global environmental boycott, are the resource's real nemesis. No country has banned the importation of Canadian bitumen or otherwise imposed non-tariff barriers against it.<sup>6</sup> That includes the United States, to date its one and only export market. President Obama's recent decision to rule against the 830,000 barrel per day (bpd) Keystone XL pipeline and its "dirtier crude oil" may well pose a constraint on future bitumen exports to the United States, but more than two-thirds of what Alberta produces is already sent to American refineries.

Lost in President Obama's climate-based rejection of the pipeline is the stark reality of a saturated US oil market that has no need of further Canadian supply. Canada already commands the lion's share (45 percent) of US oil imports (Veenstra 2015). The real barrier the oil sands face in the United States is not discrimination against their carbon emissions, but rather rapidly shrinking American appetite for oil imports, which, as a result of soaring domestic production, have been halved over the last decade.

As we have already seen with the Obama administration's toughened emissions standards for American coal-fired power plants, the regime has been very opportunistic in raising the environmental bar on fuels the US economy no longer depends on. Just as the shale revolution has nearly doubled US natural gas production, and in the process driven down natural gas prices to the point where it now undercuts coal as the cheapest power source, it has done likewise for US oil production.

Hydraulic fracturing, or "fracking"<sup>7</sup> as it is more commonly known in the industry, has raised more than five million bpd of light tight oil from shale formations such as the Bakken in North Dakota and the Permian Basin and Eagle Ford in Texas. US oil production has almost doubled over the last decade and is approaching the record levels of the early 1970s. Shale production has changed the supply picture in the once import-dependent US oil market so dramatically that the Obama administration, at the urging of the American Petroleum Association, recently removed the ban on exporting US oil that was imposed after the first Organization of Petroleum Exporting Countries (OPEC) oil shock in the early 1970s.

As the shale revolution displaced the need for more Canadian bitumen in the United States, access to overseas oil markets suddenly became vital for oil sands production growth. Oil sands producers, along with the federal and Alberta governments, have emphasized the urgent need for new domestic pipelines to connect the landlocked bitumen deposits to tidewater.

Over the last five years, a network of domestic pipeline routes have been proposed that would crisscross the country carrying bitumen to both the Pacific and Atlantic coasts. They include Enbridge's Northern Gateway pipeline, which would take unprocessed bitumen from Bruderheim, Alberta, to the port of Kitimat, British Columbia, Kinder Morgan's twinning of the existing Trans Mountain pipeline, whose terminus is in Burnaby, British Columbia, just outside of Vancouver, and TransCanada's Energy East pipeline, which would run across the country to an export terminal on the Atlantic coast in Saint John, New Brunswick.

Not only would new pipelines running to both coasts connect oil sands producers to huge overseas oil markets such as China and India, they would also enable Alberta's heavy oil to capture far more favourable pricing offered by world benchmarks such as Brent. With existing pipeline connections constrained to only a handful of mostly mid-west US refineries, Canadian bitumen has sold at a huge discount to other grades of oil. Western Canadian Select (WCS), the benchmark price for oil sands producers,

<sup>6</sup> The closest the oil sands have come to encountering trade barriers was the European Union's threat to label refined products made from its bitumen as a "dirty fuel" (Hussain 2015). The European Union later backed down from this position in the face of intense Canadian lobbying and heightened political tension with Russia, its major energy supplier. Other than appealing to moral suasion through the dirty fuel label, there were never any plans to impose any other trade sanctions. In any event, without pipeline access to the Atlantic, bitumen exports to the European Union are virtually non-existent, rendering the labelling threat academic.

<sup>7</sup> Hydraulic fracturing or fracking refers to the process of injecting a solution of highly pressurized water, sand and a mixture of chemicals designed to create tiny cracks in shale rock and allow trapped natural gas and oil to escape. George Mitchell, a Texas oil man, is widely credited with marrying this technology to the practice of horizontal drilling, which allows multiple fracking of a formation from a central trunk line. Like oil sands production, fracking is an environmentally contentious form of energy extraction. Anywhere from four to 30 million litres of water and 150,000 litres of chemicals are required for each fracked well. Water contaminated in the process cannot be used for any other purpose. Methane gas and toxic chemicals often leak, contaminating both the air and ground water. The activity has even been found to induce seismic activity in Texas, Oklahoma, Alberta and, more recently, in northeastern British Columbia. In Canada, fracking is also permitted in Manitoba and Saskatchewan.

typically trades at anywhere from a 25 to more than 50 percent discount to world oil prices, rendering it the cheapest-priced oil in the world, with one of the highest production costs.

Pipelines, however, only have an economic context if they can deliver fuel to where it can be profitably sold. The oil sands industry's underlying assumption that there would be much stronger demand for its bitumen in overseas markets than in the US market has proven to be no more valid than the industry's original premise that there was unlimited demand for the fuel south of the border. Over the last two years, world oil markets have become as saturated as US markets. The IEA estimates the global supply glut, already the longest running in more than 30 years, is in the neighbourhood of three billion barrels. With global production continuing to outpace global demand by a good one million bpd, the glut will continue to grow until there are production cutbacks.

Brent, the tidewater price for crude that oil sands producers have been so desperately seeking, has already fallen more than 70 percent from its triple-digit perch in early 2014 to around the US\$30 a barrel mark, the lowest level in 12 years (Ngai 2016). At that price, pipelines to tidewater are no longer the panacea they once were thought to be. Why build pipelines to sell oil at prices that do not even cover the costs of getting it out of the ground? Like the production they were intended to carry, none of the proposed new pipelines have an economic context in today's oversupplied oil market.

Even elusive world oil prices — let alone the deeply discounted WCS price that oil sands producers receive — now cover little over half the hurdle prices needed to economically justify most future oil sands projects. Faced with collapsing prices, many of those projects that were intended to supply the new pipelines have already been axed.

Investment spending in the oil industry has fallen globally in the wake of collapsing oil prices, but as the highest-cost producers in the world supply chain, oil sands projects have been hit the hardest. Of the 33 largest oil and gas projects in the world that were cancelled in 2015, almost half were oil sands projects. An estimated US\$47 billion of oil sands projects containing 8.2 billion barrels of oil reserves have already been cancelled or indefinitely postponed, including Shell's decision to walk away from its 200,000 bpd Pierre River mine project as well as, more recently, its Carmon Creek steam project, incurring a US\$2 billion writedown in the process after having already begun construction (Lewis 2014). Norway's Statoil shelved its multi-billion-dollar Corner steam-driven oil sands project, while Suncor and Total had earlier announced they were no longer proceeding with their huge Joslyn North mine (Jones 2014). All told, as many as 17 oil sands projects have already been cancelled or indefinitely mothballed,

cancelling at least 1.3 million bpd of previously planned production growth.

Industry projections that once targeted more than six million bpd within the next two decades have been successively ratcheted down. In its most recent forecast in June 2015, the Canadian Association of Petroleum Producers (CAPP) revised down its 2030 production target to four million bpd, down almost 20 percent from its 2014 forecast of 4.8 million bpd and down even more so from its forecast of 5.2 million bpd back in 2013 (CAPP 2015). Most oil analysts doubt whether any significant production increases are tenable in light of today's oil prices.

By January 2016, WCS had fallen below US\$15 a barrel, not only a small fraction of the price needed for any of the new oil sands projects that underlie CAPP's growth projections, but less than half the average cost of current production. Today's depressed level of oil prices not only precludes new expansion projects, but also calls into question the very sustainability of current production levels of some 2.3 million bpd.

## CUT PRODUCTION NOW OR SHUT IN EVEN MORE LATER

The valuation of the oil-sands-dominated energy sub index of the Toronto Stock Exchange has already fallen by more than half since June 2014. With producers facing staggering financial losses, reserve writedowns on their balance sheets, dwindling cash resources and restricted access to capital markets, industry consolidation is already under way. A wave of merger and acquisition activity, both friendly and unfriendly, is sweeping across the sector. But even a consolidated industry will not be commercially sustainable without a sharp rebound in oil prices.

Near-term prospects for a sustained price recovery look less and less likely. As in most resource markets today, producers have been reluctant to cut supply even in the face of crippling price declines. Despite plunging oil prices signalling to producers all around the world to curtail production, virtually all have increased output, including the oil sands. While the huge decline in oil prices has triggered strong growth in world oil demand, it has perversely triggered even larger increases in world supply.<sup>8</sup>

Most of the blame for the price-depressing lack of production discipline in the oil industry has been laid with OPEC, which is no longer prepared to play its once-historic role as swing producer to stabilize prices. Whether the

8 The IEA (2015) estimates the world oil demand in 2015 grew at its fastest pace in five years, increasing by 1.8 million bpd. With most of the stimulus from plunging oil prices, as well as record stockpiling of China's strategic petroleum reserve, behind us, the IEA is forecasting a more modest 1.2 million bpd increase in global demand in 2016.

change in OPEC strategy is a conscious effort by the cartel to pre-empt further investment in shale and oil sands, and ultimately force high-cost North American supply from the marketplace or simply a willingness to now allow market forces to determine global oil production and price levels is open to debate. Either way, the cartel's decision not to cut its output in the face of a saturated global market takes away the one safety valve that marginal producers such as the oil sands could rely on for price protection. Without OPEC's backstop, there is no effective supply floor for oil prices in today's market.

At the same time, it is important to recognize that while OPEC is making no effort to clear the supply glut, it is not the cartel that has created it. More than 80 percent of the increase in global oil output in recent years has originated from outside OPEC (Smith 2015). Ironically, the bulk has come from the very high cost North American unconventional supply sources, such as shale formations and oil sands deposits, that are the most vulnerable to the recent plunge in oil prices. Although OPEC's refusal to cut its own production is frequently blamed for putting North American oil producers in an economically tenuous position, for the most part those producers are the architects of their own demise. It is the huge production gains from shale formations and oil sands that are primarily responsible for the supply glut and the subsequent collapse in oil prices that now threatens their commercial viability.

That has left oil sands producers facing a vexing existential dilemma. With at least half a million bpd of low-cost, embargoed Iranian oil soon to hit world markets with the removal of international sanctions against the country, there is little, if any, near-term prospect of the global supply glut lessening. As marginal suppliers, the route to the higher prices oil sands producers so desperately need requires that they, not OPEC, cut production. But if they do, lower-cost OPEC producers will be the beneficiaries, grabbing greater market share and the benefits of any subsequent price recovery.

With cash flows already crippled from plunging crude prices and huge debt commitments to service, few, if any, oil sands producers can afford to cut back output, even if they were so inclined. Moreover, the massive scale of oil sands operations does not lend itself to shutting in production as readily as can be done with much smaller and nimbler shale operations, which are also subject to rapid depletion rates that in and of themselves act to lower output quickly over time. Given the huge start-up costs associated with many oil sands operations, the fear is that, once shut down, they may never be reopened. Yet without significant production cutbacks from outside OPEC, a growing world oil supply glut will continue to put downward pressure on prices, imposing even more staggering losses on high-cost producers until they are ultimately forced to withdraw from the market.

Low oil prices are already forcing shale producers in the United States to cut back production. US shale production has declined for seven consecutive months and is now 638,000 bpd below its March 2015 peak. The US Energy Information Administration is forecasting a further 570,000 bpd cut in production in 2016, principally from the Bakken and Eagle Ford formations (Murtaugh 2015). Oil sands projects, which are saddled with higher costs and receive little over half the price that shale operators get, have yet to hit the brakes on their production.

So far, only Nexen has shut in production, and only after an explosion sidelined its 50,000 bpd in situ Long Lake operation. The ability of oil sands operations to continue to produce more than two million bpd when facing losses of anywhere between US\$20 and US\$45 a barrel is increasingly in doubt.

Oil sands operators can only hope that, over a long enough time horizon, today's huge investment cutbacks in the global oil industry stunts future growth in world supply. When the millions of barrels from cancelled projects in the oil sands and other high-cost production sources around the world do not materialize, inexorable increases in global demand will ultimately force prices back up. But business-as-usual growth in global oil demand can no longer be counted on as it has been so reliably in the past. Looming on the longer-term time horizon, where oil sands producers can, at best, hope for a price recovery, is the challenge of mitigating emissions-driven climate change, which requires nothing short of profound changes in energy sources and energy usage.

Over 190 countries, including all the major oil-consuming ones, signed a historic global agreement at COP21 that pledges dramatic near-term action to hold climate change in check. The new agreement, which targets a less than 2°C and possibly as low as 1.5°C rise in average global temperature, raises the bar on previous international climate change accords. Coming into force by 2020, the Paris Agreement on carbon emissions mandates nothing less than huge and irreversible declines in the combustion of oil and other fossil fuels, with potentially fatal implications for high-cost fuels that depend on growing demand and rising prices.

## THE GLOBAL OIL MARKET IN AN EMISSIONS-CONSTRAINED WORLD

Record land temperatures, rising sea levels, warming oceans, and retreating glaciers and Arctic sea ice are all dramatic manifestations of the impact that rapidly increasing levels of atmospheric carbon are having on the global climate. After remaining stable for at least the preceding 10,000 years, carbon readings in the atmosphere have risen from 280 parts per million (ppm) at the advent of the Industrial Revolution to a recent reading of

400 ppm.<sup>9</sup> With record amounts of coal, oil and natural gas being combusted every year to support a global economy that still relies on fossil fuels for more than three-quarters of its energy needs, the rise in atmospheric carbon has accelerated in recent decades and is approaching critical thresholds, which the world's scientific community has warned would threaten the human population with potentially disastrous changes in global climate.

The overwhelming scientific consensus of the United Nations Intergovernmental Panel on Climate Change (IPCC) is that atmospheric carbon must not be allowed to exceed 450 ppm in the atmosphere — a threshold it estimates would hold the average increase in global temperatures to 2°C. Even that increase, as noted by many island nations attending COP21, would see rising sea levels at least partially inundate them. Any greater than a 2°C temperature rise would unleash a spectrum of feedback mechanisms that could overwhelm our capacity to adapt.

Capping atmospheric carbon at the 450 ppm level (or potentially lower, if the rise in average global temperature is to be held to 1.5°C) implies not only a dramatic but also an imminent change in the world economy's use of carbon-emitting fossil fuels. In its most recent general assessment report, the IPCC estimated that the world had a remaining carbon budget of roughly 1,000 gigatonnes (Gt) of CO<sub>2</sub> (or less, if the world adopts the 1.5°C temperature target) before emissions push atmospheric carbon concentrations to the critical 450 ppm threshold. Scaled to the size of recent annual global emissions (the IEA estimates current annual emissions at 32–34 Gt [Briggs 2015]), the global economy has less than three decades to burn carbon fuels. That horizon could be extended by reducing annual emissions (cutting them in half would give us six decades instead of three) but, either way, the world must soon head toward substantive and sustained reductions in emissions, either through decarbonizing economic growth (falling emissions per unit of GDP) or, less desirably, through much lower rates of economic growth itself.

Either route implies a very different future trajectory for carbon emissions, and hence global fuel consumption, than the rates of growth fossil fuel producers have become accustomed to and, more critically, are counting on to continue indefinitely. The carbon trail from business-as-usual growth in oil, coal and natural gas combustion would put carbon levels on course to hitting as high as 700 ppm by the end of the century, triggering a 6°C rise in average temperatures. The IPCC warns that anything close to those levels of atmospheric carbon and induced temperature changes would bring with it catastrophic changes in global climate and sea levels.

Avoiding those consequences by limiting the rise in atmospheric carbon to the level of 450 ppm (or less) through what is commonly referred to as deep decarbonization has both significant near-term as well as profound longer-term implications for the oil industry. Not only is there no room within the world's remaining carbon budget to accommodate business-as-usual growth in world oil demand, but the looming emissions reductions, recently reaffirmed by the COP21 agreement, will necessitate substantial reductions in world oil consumption over the next several decades.

The IEA (2010) estimated that in order to hold atmospheric carbon at the 450 ppm threshold (the “450 scenario”), global oil consumption would have to fall to less than 80 million bpd by 2030 and continue to decline to 74 million bpd by 2040 — a more than 20 percent reduction from today's roughly 96 million bpd production level. World oil demand would have to peak by 2020 before beginning a terminal decline over the balance of the century. Similarly, world coal consumption would have to fall by more than 30 percent during the next two decades. As coal and oil enter their sunset stage, more than 80 percent of the expected increase in energy demand over the next two decades will have to be met through renewable energy sources. By mid-century, virtually all increases in global energy demand would have to be satisfied by renewable power, while the combined use of all fossil fuels would have to decline.

The time frames for required cuts in global oil consumption are precisely those during which CAPP expects oil sands production to double. But instead of benefiting from another two decades of world oil demand growing at its trend rate of a little more than one million bpd in annual oil consumption, oil sands producers would be facing a contracting global market that — over the next two and a half decades — would shut in more than 20 million bpd of current world oil production.

The blueprint for that contracting global oil market is at least partially drafted through the existing emissions-reduction commitments of the largest oil-consuming countries, in both the developed and developing world. The United States, the world's largest oil-consuming nation, has pledged to reduce its emissions to 28 percent below 2005 levels by 2030. Brazil has pledged a 43 percent reduction in emissions below its 2005 level, while the European Union has pledged a 40 percent reduction in emissions within the same time frame. Japan, South Korea and Russia have also made significant pledges to reduce their emissions over the next decade and a half. And even China, the world's largest source of carbon pollution, has committed to reducing emissions per unit of GDP to more than 60 percent below 2005 levels by 2030 and to cap the actual level of carbon emissions by that year. Many analysts believe that with slowing economic growth,

<sup>9</sup> In the summer of 2013, atmospheric carbon was measured at the Mauna Loa testing station in Hawaii at 400 ppm (US Department of Commerce / National Oceanic & Atmospheric Administration 2016).

China's carbon emissions could peak well before then (Xinhua 2015).

Current national pledges to reduce carbon emissions are a minimum starting point. While they already dictate significant reductions in future world oil and coal demand, they are still inadequate from a climate change mitigation standpoint. As critics at COP21 pointed out, even if all pledged national emissions reduction targets are met, global carbon emissions would still be on track to induce anywhere from a 2.7°C to a 3.5°C warming of the planet — almost double the level to which the Paris Agreement intends to hold global temperature change. It is widely anticipated that more aggressive commitments to reduce future emissions at the individual country level will be needed, pointing to a possibly even greater contraction in world oil consumption than was suggested in the IEA's 450 ppm scenario.

Whatever ultimate target for global warming is pursued, the route to keeping carbon out of the atmosphere is to keep fossil fuels in the ground. While, in theory, carbon capture and sequestration could allow us to continue to burn fossil fuels without increasing carbon pollution in the atmosphere, in practice, it is not likely to be a viable option for the scale required. First, it would require a minimum price of US\$100 a tonne on carbon emissions to make the practice commercially attractive. Second, the sheer amount of carbon emissions that would have to be sequestered, and hence the amount of subterranean storage space required, is staggering. For example, to capture and sequester even one-tenth of the world's coal-fired emissions would require pumping the same volume of CO<sub>2</sub> into the ground as the volume of oil the world currently pumps out (Nijhuis 2014).

If emissions cannot be sequestered on a massive scale, anywhere from two-thirds to three-quarters of all the proven reserves of fossil fuels will not be able to be burned if we are to adhere to a carbon threshold of 450 ppm, according to the IEA.<sup>10</sup> In effect, that would leave the bulk of the world's oil reserves as stranded assets with no economic value. According to Moody's, half of the world's coal reserves are already uneconomic to exploit at today's price for either thermal or metallurgical coal, both of which are trading at or near decade lows (Parker 2015).

Just as today's coal prices have already stranded coal reserves around the world, the same can be said for

today's oil prices stranding much of the world's proven oil reserves. Roughly one-third of current global oil production is no longer economically viable. In tomorrow's emissions-constrained oil market, an even greater percentage will no longer be viable. All but the lowest-cost reserves will be abandoned in a contracting world oil market, leaving most, if not all, of the oil sands' estimated 170 billion barrels of bitumen in the ground.

## ENERGY SECURITY IN A DECARBONIZING WORLD: SHOULD WE CARE ABOUT OPEC'S RISING MARKET SHARE?

The prospect of declining production levels from both the oil sands and shale formations will bring us full circle on the issue of energy security, which has been the principal preoccupation of North American energy policy since the OPEC oil shocks of the 1970s. Until now, the doctrine of energy security has championed the development of new sources of domestic oil supply that lessen the continent's reliance on imported oil from politically hostile or volatile areas of the world. Producing millions of barrels of oil per day from previously unrecoverable deposits trapped in shale formations and oil sands was heralded as the dawn of a new era of energy independence that would once and for all immunize North America from the risk of further OPEC oil shocks.

Shale and oil sands producers are already warning that without their now-threatened supply, North American energy consumers will once again become exposed to potential supply disruptions from the Middle East. Those sentiments were echoed by the IEA (2015), which noted in its recent *World Energy Outlook* that an extended period of low prices would trigger energy security concerns. That is likely to be all the more the case once emissions-reduction efforts around the world take their toll on global oil demand. Average production costs for Saudi Arabian and Iraqi oil are a quarter of those for North American crude, hence it seems reasonable to assume that most, if not all, of the production cutbacks forced by the required 20 million bpd or so cut in world oil demand over the next two decades will come from outside the cartel. OPEC's share of world production, which had fallen from almost 50 percent at the time of the oil shocks to around a third today, stands to regain its former dominance.

But energy security in a decarbonizing economy is a very different concept than energy security in an oil-dependent one. OPEC may regain its throne, but it will be in a sunset industry subject to ever-tightening global carbon regulations. Even Middle Eastern reserves will ultimately be stranded by climate mitigation efforts, leaving OPEC producers with a rapidly closing window on fully capturing resource rents before even their low-cost deposits lose value. They are more likely to want to

<sup>10</sup> The two-thirds threshold comes with a 50 percent chance of holding atmospheric carbon to 450 ppm. If we want better than a coin toss's odds of achieving that result, a greater proportion of reserves must stay in the ground. The IEA estimates that to ensure an 80 percent chance of holding atmospheric carbon to the 450 ppm threshold, more than three-quarters of proven fossil fuel reserves cannot be burned (see Scott 2013; *The Economist* 2013). If the world pursues a 1.5°C temperature rise target, as was suggested at COP21, then an even greater amount of fossil fuel reserves must stay in the ground.

maximize production than restrain it, within those sunset decades.

At the same time, increased reliance on renewable power will make oil-importing economies much less vulnerable to potential oil supply disruption. Promoting the rapid growth of renewable energy, not high-cost domestic oil, is North America's best insurance policy against increasing OPEC control of the market.

## THE NEED FOR GREATER VALUE ADDED

Bitumen from the oil sands is not only one of the world's highest-cost sources of oil. It is also one of the world's least-processed fuels. If the oil sands industry is to survive in a contracting world oil market, it will need to find a more sustainable business model than simply extracting the resource and selling it unprocessed to a narrow market of US refineries at huge discounts to world oil prices.

In 2014, Canada exported some 1.2 million bpd of unprocessed bitumen (roughly half the oil sands' total production) to US refineries, at prices anywhere from a quarter to a half less than those refineries were paying for alternative feedstock. At today's oil prices, that practice is no longer economically sustainable. Most in situ thermal steam projects, which access deeper-lying oil sands deposits, require between US\$45 and US\$67 to break even, three to four times the current trading range for the WCS. Today's prices leave Cenovus and MEG Energy's Christina Lake project, Imperial Oil's Cold Lake project, Suncor's Firebag and Mackey projects, Cenovus' Foster Creek project and Canadian Natural Resources' Primrose project all operating well below break-evens. At US\$15 WCS, even lower-cost mining projects that extract deposits closer to the surface, such as Imperial Oil's Kearl Lake mine, Canadian Natural Resources Horizon mine, Suncor's Millennium mine and the joint venture Syncrude are not able to recover operating costs. As operations at these locations hemorrhage losses, the share values of major oil sands producers have plummeted. Since the decline in oil prices began in 2014, Canadian Natural Resources and Cenovus have both lost more than 50 percent of their share value, while Suncor and Imperial Oil have lost roughly a third of their value.<sup>11</sup>

To survive mounting losses, the economic focus of oil sands operators will have to shift from production growth to finding ways of capturing more value added from what is already being extracted.

The most obvious way to achieve that objective is through greater processing of the resource, a call that many have urged the sector to make for some time. The same price discounts that have cost oil sands producers, as well as the Alberta government, billions of dollars in foregone

revenues and royalties would become an important asset for a more vertically integrated business. Crack spreads (the price difference between the cost of a refinery's feedstock, such as bitumen, and its finished product, such as gasoline or diesel), govern the basic economics of the refinery business. As the world's cheapest oil feedstock, Alberta bitumen, with its huge discount, offers potentially some of the most attractive refinery margins anywhere in the world.

Ironically, the price discount on WCS that furnishes such attractive crack spreads for US refineries is largely the result of a lack of refinery capacity in Canada. Despite a more than tenfold increase in oil exports over the last 45 years, the amount of petroleum refined in the country has hardly grown (Mendleson 2012). The 260,000 bpd of refining capacity for heavy oil in western Canada represents only 15 percent of daily oil sands production (CAPP 2015). Over half of the bitumen extracted from the oil sands is not even upgraded into oil, let alone processed into refined products such as diesel, gasoline or petrochemicals. Instead, it is exported in raw form to be upgraded across the border (McCarthy and Lewis 2016). That practice, and the subsidy that it provides to US refineries through the discount pricing on WCS, runs between US\$20 and \$50 billion a year.

North West Upgrading's Sturgeon refinery, slated to begin operating in 2017, will be the first new refinery built in Canada since 1984 and even it has required the direct involvement of the Alberta government.<sup>12</sup> Over the last three and a half decades, more than half the operating refineries in the country have been closed.

As is so often the case in Canada's resource sector, the lack of processing reflects, in large measure, the high degree of foreign ownership in the industry. Many major oil sands players are multinational oil companies that already have refinery capacity configured to handling heavy oil in the Gulf region, where refineries are also supplied by similar feedstocks from Mexico and Venezuela. Sending unprocessed bitumen through pipelines to existing US refineries has made more sense for those companies than building new ones in Alberta.

But the sustainability of that business strategy at today's level of oil prices is highly questionable. With the price of WCS no longer recovering operational costs, many multinationals are pulling up stakes and selling their oil sands assets. In past oil cycles in Alberta, the exodus of global players has often been the cue for emergent domestic producers to fill the gap. Whether a shift to greater domestic ownership of the resource will provide a

11 See [www.theglobeandmail.com/globe-investor/](http://www.theglobeandmail.com/globe-investor/).

12 The Alberta government is providing three-quarters of the bitumen feedstock from its royalties-in-kind program and will be paying a pre-negotiated price for refining it into diesel fuel, diluent and other finished products.

more amenable context for greater processing of Alberta's bitumen remains to be seen. The huge capital costs of building new refinery capacity (in the CDN\$8–\$10 billion range) will remain a formidable hurdle. And the pricing of carbon emissions will be a factor, since refining is an emissions-intensive activity. But to the extent that there will be a sustainable niche for the oil sands in tomorrow's energy markets, it is more likely to be found through greater processing, not greater extraction, of the high-cost resource.

## MACROECONOMIC IMPACT: TRADING SHORT-TERM PAIN FOR LONG-TERM SUSTAINABLE GAIN

Previous governments in Canada have argued that the oil sands are strategically important to both the country's short- and longer-term prospects for economic growth.<sup>13</sup> The sentiment was not without some foundation. Massive investment in the oil sands, much of it from around the world, was a key factor that enabled the Canadian economy to bounce back from the global financial crisis quicker than most. Seldom, if ever, had the economy been so leveraged, either in terms of exports or investment, to a single sector as it had become to the massive development of the oil sands over the last decade. Although bitumen and related production represents a small slice of the country's GDP, the oil sands' dominant presence in both business investment and exports has allowed the sector to punch far above its weight in terms of macroeconomic impact.

The very prospect of hundreds of billions of dollars of capital expenditure pouring into the economy to produce as much as six million bpd of oil catapulted the rapid development of the oil sands to the top of the Harper government's list of priorities. The Conservative government not only saw oil sands production as an engine of short-term growth, but considered the development of the resource key to the country's longer-term economic prospects. But that engine of economic growth could only run on high oil prices. Without those prices, not only would growth soon come to a grinding halt, but given the sector's oversized weight in business investment spending in the country, the oil sands industry would quickly become an albatross around the whole Canadian economy.

With the crash in oil prices triggering a 40 percent decline in the sector's capital spending and the loss of as many as 40,000 jobs in the industry, the oil sands suddenly morphed from an engine of national economic growth into the epicentre of a made-in-Canada recession over the first half

of 2015. The collapse in capital expenditure spending in the energy sector has led to the steepest decline in national business investment since the 2009 global financial crisis. Although the Canadian recession technically ended in the third quarter, further substantive cuts in investment in the energy sector are expected to pose further setbacks for an already sputtering Canadian economy.

Bank of Canada Governor Stephen Poloz has already warned that plunging investment levels in the oil sands will continue to act as a major drag on the pace of national economic growth, leading the central bank to revise down its growth forecasts for the next two years and warning that the Canadian economy's future potential growth rate may be lower as a result of an imploding energy sector (McKenna 2015). Aside from an expected further 25 percent decline in oil sands investment spending, there is a growing risk that there may soon be significant production shutdowns of oil sands operations, which, without a sharp recovery in oil prices, could become permanent.

As much as cancelled multi-billion-dollar oil sands mega projects and potentially significant production cutbacks threaten the country's near-term economic performance, in the longer term, the downsizing of bitumen production puts the Canadian economy on a far more sustainable footing for the future. By avoiding the misallocation of economic resources to developing oil sands reserves that would not be commercially viable in tomorrow's emissions-constrained world, investment cutbacks today spare potentially massive writedowns tomorrow. The longer-term consequences could easily outweigh the impact of plunging investment, and possibly production as well, on near-term GDP growth.

Investing in additional oil sands capacity would be the polar opposite direction that the rest of the world economy will be taking in response to climate change. Countries that refuse to transition away from their past reliance on fossil fuels, but instead bank ever more heavily on them, run the risk of becoming obsolete and non-competitive in a world economy that will instead be turning toward renewables to provide the bulk of its energy needs.

## ENVIRONMENTAL CHALLENGES FROM INDUSTRY CONTRACTION

Environmental regulation of the oil sands has always been moulded to meet the needs of an expanding industry. Emissions targets, which were framed in terms of reducing emissions per barrel, were designed to accommodate huge increases in actual emissions levels that were inevitable with rapid production growth. Even Alberta's newly imposed 100 Mt hard cap on annual oil sands emissions, while for the first time placing an explicit environmental limit on production growth, is still designed to accommodate a more than 40 percent increase in absolute emissions levels and another 1.3 million bpd of production. Coincidentally

<sup>13</sup> As noted in many of the speeches of former Prime Minister Harper, the rapid development of oil sand production would catapult the country into the very front ranks of world oil producers and brought with it the potential of transforming Canada into an "energy superpower."

or not, that cap room accommodates most of the industry's projected four million bpd future production target by 2030. It could still be possible, of course, to expand production beyond that level if the emissions cap is successful in encouraging technological innovation that lowers emissions per barrel.

But, like production itself, oil sands emissions are tied to high oil prices. So is the relevance of Alberta's new regulations. Without a strong recovery in oil prices, production increases are not economically viable and neither is the emissions trail that would follow from them, with or without Alberta's new regulatory emissions cap for the sector.

Plunging oil prices are not only a game changer for oil sands production, they are equally a game changer for the future course of the country's carbon emissions. The emissions trail from the oil sands has posed the single-greatest obstacle standing in the way of Canada achieving its near-term 2020 target of reducing economy-wide emissions to 17 percent below 2005 levels and its longer-term target of reducing emissions to 30 percent lower than that level by 2030 (Government of Canada 2015).

The projected rise in oil sands emissions, from 34 million tonnes in 2005 to 100 million tonnes in 2020, is expected to more than offset all the emission reductions that have occurred elsewhere in the Canadian economy, including Ontario's move to close or convert all its coal-fired electricity-generating plants. Documents filed by the Ministry of the Environment with the UNFCCC indicate that Canada will be hard pressed to lower its 2020 emissions much below 2005 levels. While carbon emissions fell significantly during the 2008-2009 global financial crisis, they have more recently rebounded, largely as a result of production growth in the oil sands.

Similarly, the projected rise in oil sands emissions between 2020 and 2030 renders the achievement of the country's 2030 target even more unlikely. Not only would the emissions trail from the planned growth of oil sands production continue to offset all the emission reductions in the rest of the Canadian economy, but the huge planned expansion in oil sands production would also raise national emissions to well over 800 Mt by 2030 (Fekete 2016), a more than 10 percent increase from projected 2020 levels and an almost 40 percent increase from the 1990 level, which served as the base year for the Kyoto Accord that Canada signed but later, in 2011, withdrew from.

While the market's derailment of the oil sands expansion plans fundamentally improves both the short-term and especially the longer-term outlook for the country's carbon emissions, the growing threat of production cutbacks raises new environment challenges that are no less daunting. A contracting industry will leave a fainter carbon trail in the

atmosphere, but it may leave a much larger footprint on the ground.

Each barrel of oil mined in the oil sands leaves more than a barrel of tailings as residue to be held in storage ponds. Tailings, which consist of water, clay, heavy metals, residual bitumen and other compounds, are the by-product of oil sands mining extraction, which accounts for almost half of total oil sands production. An archipelago of tailing ponds are spread over 220 km<sup>2</sup> of Alberta wilderness and contain more than 976 million m<sup>3</sup> of tailing waste (Grant, Angen and Dyer 2013). While operators are required to pay into a provincially administered reclamation fund, current payments are a fraction of actual reclamation costs, potentially leaving billions of dollars of reclamation costs effectively unfunded. If global demand destruction from climate change mitigation policies forces shutdowns of high-cost production such as oil sands mines, reclamation costs from remediating tailings ponds and other sources of ground and water contamination may quickly replace carbon emissions as the industry's greatest environmental challenge.

## POLICY RECOMMENDATIONS

Few countries have pursued a course of economic development that so blatantly ignored climate change as Canada, even though, as a high-latitude country, it has already experienced temperature increases that are a multiple of the global average. Denying scientific evidence of climate change became an economic policy imperative in Ottawa as the Harper government attempted to safeguard what it saw as the country's greatest economic opportunity — massive-scale extraction of bitumen from Alberta's vast oil sands.

Transitioning from a strategy of oil-driven, carbon-intensive growth to a more sustainable model in a rapidly decarbonizing world will require significant changes and adjustments in the Canadian economy. Not only can we expect to see profound shifts in the composition of the economy, but also, as we are already witnessing, equally significant regional shifts in economic activity.

Putting a meaningful price on carbon emissions that impacts economic behaviour across all sectors of the economy must be the top priority at the upcoming federal-provincial summit on carbon policy. The federal government must work to ensure that among the patchwork of existing provincial regulations, there is a uniform and significant price on carbon emissions across all sectors of the Canadian economy, with no exceptions.

In addition to that central task, the federal government, as well as the Alberta government, should consider a number of policy initiatives that will help ease the transition to a more sustainable model of economic growth and minimize

some of the adjustment costs as the country moves away from its former economic dependence on the oil sands.

**Recommendation 1: The Bank of Canada should be prepared to offset further economic drag from the oil sands with monetary stimulus, delivered through both interest rates and the exchange rate.**

The Bank of Canada should also follow the recent initiative of the Bank of England and examine the broad implications that stranded oil assets may pose for the country's financial institutions. Do lending institutions have adequate safeguards in place to protect their loan exposure to the oil sands and potential bankruptcies in the sector? How exposed are Canadian pensions, including the Canada Pension Plan, to the risk of stranded oil sands assets in their portfolios?

**Recommendation 2: In the absence of oil sands expansion, future Canadian emissions should be re-estimated and emissions reduction targets possibly reset.**

Since the oil sands are the country's single-largest source of carbon pollution, the growing list of cancelled oil sands projects is rapidly changing the country's emissions outlook.

The federal government has already committed to re-estimating future national emissions ahead of the environmental summit and has called with the provinces to thrash out a cohesive national strategy on carbon emissions. Downsizing expectations of production growth in the oil sands, in line with current market conditions and future constraints on global carbon emissions, would give both the federal government and the provinces a more realistic assessment of what will be required to achieve existing national emissions-reduction commitments. The possibility of production cuts in the oil sands may even open the door to setting more stringent national reduction targets — a direction the new Trudeau government earlier indicated an interest in doing.

**Recommendation 3: The National Energy Board must consider climate change and its impact on future world oil demand in its approval of proposed pipelines.**

The National Energy Board needs to formally consider climate change, and its impact on future oil demand, in its assessment of proposed new pipeline routes. Are the new oil sands projects that underpin shipper agreements to fill proposed new pipelines, such as Kinder Morgan's twinning of its existing Trans Mountain pipeline or TransCanada's Energy East pipeline, viable in the market conditions that are likely to follow from emissions-reduction programs and policies around the world? If the production projects themselves are deemed to be no longer viable, can the pipelines designed to serve them be any more so?

**Recommendation 4: Alberta's continued fiscal reliance on bitumen royalties should be stress tested.**

Alberta's overwhelming fiscal dependence on bitumen-based non-renewable royalty revenue is no longer tenable in today's oil market and will become even less so in tomorrow's emissions-constrained one. Plunging oil prices have already turned a CDN\$1.1 billion provincial budget surplus into a more than CDN\$6 billion deficit. Without a significant rebound in energy royalties, huge budget deficits will persist, leading to steadily rising levels of provincial debt. Projections from the most recent Alberta budget show that the province is still treating current oil market difficulties as a largely self-correcting cyclical correction, predicting both a recovery in oil prices and continued growth in bitumen production over the next two years (Alberta Government 2015, 56).

The Alberta government needs to prudently consider the possibility that bitumen production in the province may decline as global oil consumption is adversely impacted by carbon-emissions reduction programs around the world, consistent with countries' obligations under the COP21 climate agreement.

If so, Alberta could be facing long-term erosion of royalty revenues from both falling production levels and falling prices. In the world environment painted by the recent COP21 climate change agreement, the province will need to generate new revenues to offset the fiscal impact of a secular decline in bitumen royalties.

**Recommendation 5: Adequate corporate funding to cover decommissioning costs of oil sands mines must be ensured.**

In theory, Alberta's Mine Financial Security Program (MFSP) is designed to ensure that oil sands and coal mine operators pledge financial security to cover the full reclamation costs at the end of their projects' economic lifetime, hence immunizing taxpayers from potentially huge decommissioning costs. Managed by the Alberta Energy Regulator, industry contributions are scaled according to the ratio of mine assets to ultimate MFSP-estimated mine liability costs. But with economic lifetimes of these mines spanning decades, actual holdings in the fund are a small fraction of estimated costs.

Alberta's auditor general has already warned that the fund's CDN\$1.6 billion balance is grossly inadequate to cover what is an estimated CDN\$21 billion cleanup liability. Industry payments to the reclamation fund are based on the notion that oil sands mines are long-term assets and that reclamation costs could accordingly be funded gradually over decades. But if plunging oil prices soon force mines to shut down, reclamation costs will suddenly become a here-and-now problem. Unless industry contributions are significantly ramped up, the MFSP is

grossly underfunded to cover the decommissioning costs of oil sands mines. While the industry will undoubtedly argue that increased payments into the MFSP program at a time of financial hardship is the wrong prescription for the times, it is precisely in such times that such protection is needed to ensure that decommissioning costs are not transferred onto the shoulders of unsuspecting provincial taxpayers.

**Recommendation 6: More value added should be generated from the oil sands resource.**

The “staples model”<sup>14</sup> of development for the oil sands, characterized by the export of largely unprocessed bitumen, has failed to capture anywhere close to the full economic value of the resource. Not only has the lack of domestic refining capacity left oil sands producers short-changed billions of dollars through the huge discount they are forced to accept for the unprocessed fuel they sell to US refineries, but they have also forgone very attractive refinery margins that are also captured across the border.

If the oil sands industry faces a sustainable future, its focus will have to shift to generating greater value-added from current or potentially even lower production levels than pursuing an expansion of already unprofitable extraction activity.

While the Sturgeon upgrader is a step in this direction, processing of the resource remains at minimal levels. Both the federal and Alberta governments need to explore what policies could best promote greater processing of the resource in Canada, including both refining and petrochemicals.

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<sup>14</sup> The staples model refers to the exploitation of a single resource and its export to world markets.

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# CIGI PUBLICATIONS

## ADVANCING POLICY IDEAS AND DEBATE



### The End of the Beginning: Paris COP 2015

*CIGI Special Report*  
David Runnalls

The Paris Conference of the Parties 2015 is designed to produce the next round of climate change action. There are reasons to believe that the chances for success at the multilateral level are better now than they were before, but even under the most optimistic scenarios, Paris will not be the end of the negotiations. The Paris summit will be crucial to maintaining the momentum that has been building in the private sector and civil society on the issue of climate change.



### Assessing the Governance Practices of Sustainability Reporting

*CIGI Policy Brief No. 71*  
Jason Thistlethwaite and Melissa Menzies

To promote climate change risk mitigation in financial markets, the Financial Stability Board recently proposed the creation of a Climate Disclosure Task Force, coordinated through the G20, to develop standards for companies to disclose their exposure to climate change risks. With more than 400 existing disclosure schemes, this task will be challenging. This brief identifies the key categories of governance practices that must be addressed, how these divergent practices challenge end-users, and how the establishment of criteria that define effective and efficient reporting is a critical first step for the Climate Disclosure Task Force.



### Growth, Innovation and COP 21: The Case for New Investment In Innovation Infrastructure

*CIGI Policy Brief No. 73*  
Céline Bak

Forged by private and public sector cooperation, Mission Innovation was announced at the twenty-first Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change as a commitment to doubling, by 2020, the investment in energy innovation by participating countries. Policy leaders will need to coordinate multiple policy interventions to backstop financial risk and to enable scale-up of innovations via fiscal policy, trade finance and public procurement policy for infrastructure, as well as through international development and climate finance.



### Fixing Climate Governance through Effective Technology Partnerships

*Fixing Climate Governance Paper No. 3*  
Arunabha Ghosh and Sudatta Ray

This paper describes three obstacles that have impeded climate-friendly technologies, namely, lack of appropriate financing, intellectual property restrictions and insufficient or underutilized capacity and outlines proposals for two new partnerships that could be designed to target these challenges and be more effective than previous efforts: a partnership on energy access and a partnership on energy storage and grid balancing.



### Uncovering the Implications of the Paris Agreement: Climate Change as a Catalyst for Transformative Sustainability in Cities

*CIGI Policy Brief No. 72*  
Sarah Burch

This policy brief examines the power of exploring synergies between responding to climate change and other development priorities in cities: in other words, can decision makers devise response strategies that are both adaptive and mitigative, while simultaneously creating healthy, vibrant, innovative communities? Using examples from communities around the world that take a holistic approach to sustainability rather than addressing climate change in isolation, this brief uncovers the roots of climate change co-benefits, and possible governance strategies for achieving them.



### Climate Technology Partnerships: Form, Function and Impact

*Fixing Climate Governance Paper No. 2*  
Arunabha Ghosh, Anupama Vijayakumar, and Sudatta Ray

With halting progress in climate negotiations, there are growing calls for partnerships among self-selected pools of countries, in the expectation that they would facilitate consensus (among both developed and developing countries) and result in faster decision making. In critically examining such a claim, this paper asks: what kinds of partnerships could facilitate coordinated climate-related action across several countries?

# CIGI PUBLICATIONS

## ADVANCING POLICY IDEAS AND DEBATE



### Assessing the Effects of the Multifibre Arrangement after Its Termination

*CIGI Paper No. 93*

*John Whalley and Daqing Yao*

This paper assesses the effects on trade of clothing and textiles following the termination of the Multifibre Arrangement (MFA) in 2005, using both world trade data and US trade data. Previous literature assesses its effects while in operation. The trade data analyzed provide mixed results and pose something of a paradox. The paper also finds the effects of the termination of the MFA on the clothing trade to be more significant than for the textiles trade.

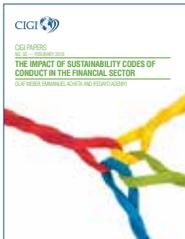


### The Final Few: Completing the Universal Membership of the IMF

*CIGI Paper No. 89*

*James M. Boughton*

The International Monetary Fund (IMF) has 188 member countries. The United Nations has 193. The difference is not economically or politically trivial. Although none of the members missing from the IMF is a large country, two of the five are potentially important in their regions: Cuba and North Korea. What would it take to complete the process to have both countries included as IMF member countries? What are the obstacles to becoming members, and how can they be overcome?



### The Impact of Sustainability Codes of Conduct in the Financial Sector

*CIGI Paper No. 92*

*Olaf Weber and Emmanuel Acheta and Ifedayo Adeniyi*

This paper analyzes the impact of four major financial sector sustainability codes of conduct, the UN Environmental Programme Finance Initiative, the UN Principles for Responsible Investment, the Equator Principles and the Global Alliance for Banking on Values with regard to their impact on the sustainability of their members.

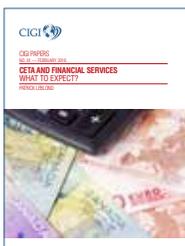


### Canadian Trade Negotiations in an Era of Deep Integration

*CIGI Paper No. 88*

*Patricia Goff*

The Canada-European Union Comprehensive Economic and Trade Agreement (CETA) is noteworthy for the Canadian provinces and territories' expanded role and unprecedented involvement in the negotiation, at the request of their European Union partners. Why were Canadian provinces at the negotiating table for the first time for CETA? This paper explores this question.



### CETA and Financial Services: What to Expect?

*CIGI Paper No. 91*

*Patrick Leblond*

One of the Canada-European Union Comprehensive Economic and Trade Agreement's (CETA's) main components is a chapter that seeks to liberalize trade and investment in financial services between the partners, while ensuring that markets and their agents will be properly regulated and protected through prudential regulation. Although some observers fear that CETA might undermine the high quality of financial regulations in Canada or the European Union, this paper demonstrates that such concerns are unfounded.



### Much Ado about Nothing? The RMB's Inclusion in the SDR Basket

*CIGI Paper No. 84*

*Hongying Wang*

The International Monetary Fund recently concluded its quinquennial review of the composition of the Special Drawing Right (SDR), accepting the Chinese currency into the SDR basket alongside four major international currencies — the US dollar, the euro, the British pound and the Japanese yen. The Chinese government has spent a great deal of energy and political capital to achieve this outcome. This policy paper explores the political and economic motivations underlying this initiative.

## ABOUT CIGI

The Centre for International Governance Innovation is an independent, non-partisan think tank on international governance. Led by experienced practitioners and distinguished academics, CIGI supports research, forms networks, advances policy debate and generates ideas for multilateral governance improvements. Conducting an active agenda of research, events and publications, CIGI's interdisciplinary work includes collaboration with policy, business and academic communities around the world.

CIGI's current research programs focus on three themes: the global economy; global security & politics; and international law.

CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion (BlackBerry). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

For more information, please visit [www.cigionline.org](http://www.cigionline.org).

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