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Keough, Noel; Ghitter, Geoff

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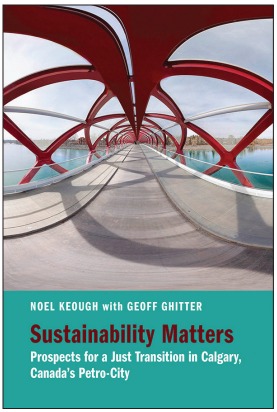

SUSTAINABILITY MATTERS: PROSPECTS FOR A JUST TRANSITION IN CALGARY, CANADA'S PETRO-CITY

by Noel Keough with Geoff Ghitter

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The Energy Question

We generally think of the flow of cheap (low-interest) money as the currency that drives our economy, but from a sustainability perspective, the vital currency is the flow of cheap energy. In this chapter, we explore the nexus of energy and sustainability with a particular focus on Alberta's fossil fuel economy.

We present a critical commentary on the politics and economics of pipeline projects like Keystone XL. We discuss what many people consider to be a squandering of the vast wealth that oil and gas has generated for Alberta, comparing our province to places like Norway, where government

management of the economy is an accepted and successful strategy. While many of our political and business leaders gush over the vastness of the tar sands reserves, in this chapter we argue that in many ways, the renewable energy potential in Alberta is far greater. We also discuss the role that subsidizing the fossil fuel industry plays in delaying the energy transition.

We outline the logic and math behind the "stranded assets" argument. An article in the journal *Nature* argues that to stabilize below 400 ppm of CO_2 in the atmosphere and to stay below 2°C warming, Canada can only burn a mere 15 percent of tar sands reserves.[1] This is indeed an inconvenient truth for fossil fuel–dependent economies. In "Do the Math," we investigate the implications of the growing fossil fuel–divestment strategies around the world.

In the essay "King Coal and the Carbon Calamity," we take a look at the prospects of the phase-out of coal, the most damaging of fossil fuels, in Canada's most coal-dependent province. While Alberta has made great strides toward coal phase-out in electricity production, it has embarked on yet another project of coal mining. We also take up the question of the ethics of the energy transition. What responsibility do citizens of communities who have grown rich on the exploitation of fossil fuels have to ensure a rapid transition to a low-carbon energy future?

A caveat to the numbers we present: Climate change research and technological innovation is moving so fast that any analysis more than a few months old is bound to be out of date. As new climate change research emerges, we see that historical modelling has been consistently conservative in comparison to actual change. Likewise, the renewables revolution seems to be moving more rapidly than most historical predictions. At the core of the energy question with respect to sustainability is the faceoff between conventional economics, which tells us we must burn fossil fuels, and ecology, which says that to do this is to court disaster.

DIVERSITY IS THE KEY: CONFRONTING OUR ENERGY HABITS

In late October 1973, the first global "oil shock" was triggered when Arab members of OPEC boycotted sales to specific industrialized nations—including Canada—to try to coerce them into changing their foreign policies

concerning the Arab-Israeli war then raging. Along with the embargo came a 25 percent cutback in production, which, within months, caused world oil prices to quadruple. The global economy descended into chaos.[2]

Experts warn that other oil shocks are inevitable, since wild price swings up or down are problematic.[3] But unlike in 1973, when the scarcity was artificially induced, in 2020 the increasing world demand, decreasing reserves, and poor prospects for large new discoveries mean that we can expect prices to rise in the long term.

This isn't an ideological statement. Given that reserves of liquid fossil fuels are finite and that a growing world population is stimulating accelerating demand, at some point the two streams must cross. Demand will exceed supply; the main question is when. Some think we will cross the threshold very soon—within a decade. Others believe there is more time, perhaps fifty or a hundred years. Still others believe it's already in the rearview mirror. In *The Citizen's Guide to Climate Success*, Mark Jaccard argues that it is a dangerous myth that there will be a peak-oil reckoning. Long before oil runs out, he contends, greenhouse gas levels and planetary heating will wreak havoc on civilization. He argues persuasively that we need to get on with economic diversification and the regulation of carbon.[4]

So if cheap energy is not in our future, why are we still building cities as though it is? Isolated, auto-dependent suburbs and the structures they contain are not only the costliest form of human habitation ever devised; to function properly, they demand significantly more energy per person than all other urban forms. In Calgary, virtually all our growth has been, and continues to be, planned for the suburbs.[5] Plan It (the city's blueprint for more sustainable development) notwithstanding, the suburban monoculture we're building not only lacks social resilience—it's energy-stupid.

It is possible that technology will save us. We may find inexhaustible supplies of non-polluting energy alternatives, along with the means to store and deliver them to consumers. We may find ways to capture the emissions from coal-fired plants to keep pollution out of our lungs and carbon out of the atmosphere. We may find a way to extract natural gas from shale formations without ruining our drinking water. We may find ways to safely use up or store nuclear waste and methods to finance new plants and protect them from terrorism. We may find ways to live on Mars.

We may indeed, but is the promise enough, as they say in poker, to be going "all in"? We're betting the farm on the suburban model with a hand that's not exactly a pair of aces. Diversity, in all kinds of systems (not just cities), provides multiple pathways to choose from as conditions change. This is why diverse systems are more adaptable to new or unanticipated conditions. Diverse systems enable learning and evolution; they provide options. Uniform systems underperform or, if things get really bad, collapse.

The value of diversity was the lesson of the 1973 oil shock. The countries with the least energy resilience fared worst and took the longest to recover. Having learned this lesson, places like Denmark, Germany, and the Netherlands, which were among the hardest hit in the 1973 shock, began taking diversity seriously. Apart from diversifying their energy sources, these countries also began making heavy, long-term investments to reduce their urban energy footprint. Yes, the Europeans have suburbs too, but they invested in urban mass-transit systems and insisted that energy conservation be a core principle of their urban design and building construction. Germany has been a leader in building design with the Passivhaus brand, and cities like Oslo, Helsinki, and Paris have aggressive plans to make downtowns car-free and to build bicycle roadways.

Things are oddly upside down in Alberta. When the world suffers high-energy costs, we prosper. This muddles our thinking, causing us to flout both sense and prudence in our city-building habits. That's not to say there aren't some great things happening in our city. Some new communities are being built with sustainability features—The Bridges, East Village, Currie Barracks—but most are on the city's fringes, where alternatives to fossil fuel–powered car dependence don't exist. The sad truth is, progressive development projects constitute only a tiny fraction of Calgary's total development.

What about the next oil shock? Where would our urban form leave us if energy prices quadrupled tomorrow? To paraphrase acerbic suburban critic James Kunstler, "up cul-de-sac creek in a concrete canoe" is where.[6]

We know what's coming. It may not happen suddenly like it did in 1973, but we know that in the long term, energy prices are only going higher. We also know that, beyond a certain energy price threshold, suburbs become dysfunctional. The math is simple, so why don't we get it?

They tell us it's the market speaking. If so, it's operating with imperfect information. Or maybe it's that we don't want to know. Our prosperity bubble shields us, or seems to, for the present, and that's all that matters. Inside the bubble, we can pretend that energy is not a problem—at least not our problem.

PIPEDREAM NIGHTMARE: A CRISIS ENTIRELY OF OUR OWN MAKING

Throughout the 2010s, Calgarians witnessed a raging battle over approval and construction of pipelines to get Alberta's tar sands product to market. Keystone XL is on life support, but its boosters still dream. The Gateway project through northern BC seems dead in the water, as does Energy East, with fierce opposition from communities and governments along both routes. Whether or not Trans Mountain Pipeline is ultimately built, it is difficult to see a scenario in which Alberta comes out a winner. If the pipelines go ahead, we go further down the road of dependence on one of the most expensive, ecologically damaging, high-risk megaprojects on earth. If it is halted, Albertans are left to pick up the pieces of an economic development strategy in disarray.

Back in 2013, Alberta's premier, Alison Redford, bemoaned the $6 billion bitumen bubble that was forcing us to sell our resource at an almost 40 percent discount.[7] Knowing there were no secure routes to international markets, Conservative governments continued to lease the land that supported the $165 billion invested in tar sands development from 2000 to 2013. Stuck with what could turn out to be the biggest white elephant in history, the Redford government suddenly discovered that we have limited possibilities to get this product to market! If the various provincial Conservative governments saw this coming, they were spectacularly negligent to let it happen. If they did not see it coming (hard to believe), then they were merely spectacularly incompetent.

In a 2012 speech delivered at the University of Calgary, Carl Pope, who was with Sierra Club USA for thirty years, warned that the tar sands–anchored economic strategy was based on a hope and prayer. For this to turn out well for Albertans, he said, seven different trends would all have to break our way. He warned us about all the things with which we now

find ourselves besieged—public opinion on climate change, market access, and price fluctuations that create a constant flailing from profitable to not profitable.[8]

Prime Minister Harper's Conservatives were largely to blame for the firestorm that erupted south of the border over Keystone (and smolders to this day) and for the controversy in the west over Gateway. Think of it as bad karma. Abroad, Canada, the honest broker and global citizen, had morphed into an arrogant bully and environmental pariah leading the pack in Fossil of the Day awards at global climate change meetings. Former Green Party leader Elizabeth May accused the government not only of indifference but of "sabotage." According to May, "Canada continues to be a country that pushes other countries to do less. Our role is not just an embarrassment, it's reckless and brings our once good national reputation into disrepute."[9]

At the height of the Keystone debate, in January 2012, the Conservatives went into their trademark attack mode with an open letter to Canadians from Natural Resources Minister Joe Oliver, in which he warned of "environmental and other radical groups" whose goal was "to stop any major project no matter what the cost to Canadian families."[10]

Six months later, in June 2012, with NGOs and environmentalists on the defensive, the Conservatives, under cover of the 420-page omnibus budget Bill C-38, gutted a raft of federal laws, including the Canadian Environmental Assessment Act (CEAA) and Fisheries Act, and abolished the National Round Table on the Environment and the Economy. In March 2012, a few months before Bill C-38 was passed, the hardly radical Canadian Environmental Law Association released an assessment of the CEAA review on which the bill was based, writing that the review "to date has been ineffectual, unduly limited by arbitrary timing, and largely driven by ideology rather than rational, evidence-based analysis" and that the government's rewrite would "effectively eviscerate the CEAA."[11] In June, after the bill had been passed, Ed Whittingham, executive director of the environmental research group Pembina Institute, said, "The passing of this bill is a significant step backward and will result in unnecessary damage to Canada's land, freshwater, and fish habitat."[12]

In September 2012, the federal Conservatives softened already drafted coal plant emissions rules to allow Canada's oldest and dirtiest plants, and

those to be built before 2015, to operate outside of the new regulations for forty-five years. In November 2012, the Conservatives' Bill C-45 targeted the Navigable Waters Act and the Hazardous Materials Review Act, removing protection from all but ninety-seven of Canada's thirty-two thousand lakes.

Perhaps the crowning achievement of this six-month legislative wrecking ball was the repeal of the Kyoto Protocol Implementation Act, included in Bill C-38.[13] Canada was the only country to do so at the time.[14]

The governing parties, both provincially and federally, have changed since 2012. The Trudeau Liberal government purchased Trans Mountain to keep it alive when market forces could not, and we are still figuring out how much that purchase actually cost. Related court challenges from First Nations across BC have still not played out. Meanwhile, in February 2020, incredibly, the Liberal government was on the verge of giving a green light to another massive and damaging open pit tar sands mine, the Frontier Project, when proponent Teck Resources withdrew the application. The Conservative provincial government remains in attack mode on anyone who dares express opposition to these projects, stirring dangerous nationalist furor if such projects are not approved.[15]

In Alberta, we have burned through most of our conventional oil reserves, and the Alberta Heritage Fund, created in 1976, sits at a paltry $16.3 billion in 2020. The source of the fund is drying up, and our provincial government is in a state of what the *Globe and Mail* called "political desperation" over this crisis of its own making.[16] Meanwhile, Norway, comparable in population and oil reserves to Alberta but with a hands-on economic development policy, ranks number one on the Human Development Index.[17] Its future is secure, with more than $1 trillion from oil royalties in its Sovereign Wealth Fund.[18] Norway's fund started at zero in 1996, when Alberta's Heritage Fund was at $12 billion. The State of Alaska Permanent Fund, also derived from oil royalties, started the same year as the Heritage Fund and, in November 2020, was valued at $69.7 billion.[19]

Norway and Alaska have used their oil and gas resource as a path to prosperity. Alberta has allowed the oil and gas industry to use our province as a fast lane to profit while rerouting its citizens onto a road to ruin. Calgarians, whether they work in oil and gas or not—perhaps more so

if they do—should be mad as hell. And not at those who object to these recurring pipedream nightmares.

OSTRICH ALBERTA: OUR HEADS IN THE TAR SANDS

Back in 2012, we conducted a scan of climate change policies—humanity's most profound challenge—and of renewable energy—the world's fastest growing energy sector—to see where they fit into Alberta's 2012 provincial election platforms. The result: "Reader has finished searching the document; no matches were found."

Eight years later, a lot has changed. Climate change was actually a pivotal issue in the 2019 federal election. All parties proposed policies to tackle the issue. The Conservatives really had nothing to offer, the major initiative being to actually cut the carbon tax. The Liberals had lofty goals (net zero carbon by 2050, for example) but no credible plan to reach them in the face of expanding fossil fuel infrastructure like pipelines. The New Democrats had a more ambitious policy and firm opposition to new pipelines but were short on implementation. Only the Green Party platform could credibly claim to present policies that would actually meet our global commitments and respond to the scale of the climate change emergency. Provincially, the policy platforms of the four parties in the 2019 provincial election were similar to those of their federal counterparts, the most notable difference being the New Democrats, who were staunch supporters of the Trans Mountain Pipeline.

Defenders of current energy policy rightly point out that the 165.4 billion barrels of recoverable oil currently under Alberta is enormous—the third-largest recoverable reserve in the world.[20] But if we take our heads out of the sand for just a moment, we can see that even this impressive reserve pales in comparison to the carbon-free energy contained in the sunshine that bathes us and in the winds blowing through our hair day, after day, after day—forever.

We typically talk about energy in units of joules, megawatt hours, or barrels of oil. Let's start with barrels of oil. According to Sustainable Calgary's *State of Our City 2020*, Calgarians' total energy use—for heating and lighting our homes, driving our automobiles, and running our economy—is the equivalent of approximately seventy-eight barrels per person

per year.[21] Imagine a family of three with their yearly stock of 234 barrels of oil in the back yard. That's a lot of energy. But when you crunch the numbers, you find that a typical twenty-five–foot infill lot in inner city Calgary has the equivalent of 240 barrels of oil in the form of solar energy raining down on it every year. At current efficiencies of 20 percent for solar panels, harvesting that energy alone would cover 20 percent of the heat, electric, and gasoline energy requirements of that same family.

That's pretty impressive. Now imagine how much energy falls on southern Alberta—let's say the land use districts of the South Saskatchewan and Red Deer Regions (104,000 km^2). If you do the math, what you discover is that over a mere eleven months, those two districts receive the solar energy equivalent of the total recoverable tar sands oil. Not all of this energy will ever be harvested, of course, but according to Alberta Solar Energy Society, as of 2020, the projects that are completed, under construction, or in some stage of planning would deliver almost four thousand megawatts of solar energy—enough to power approximately 750,000 Alberta households.[22]

Wind energy, though not quite as plentiful, is also very impressive and, as of 2020, the cheapest source of electricity in Alberta. With wind turbines covering 10 percent of the South Saskatchewan Region and generating energy a modest 30 percent of the time, we could harvest the equivalent of the recoverable tar sand reserves in about eight years and a month. According to the Canadian Wind Energy Association, Alberta now has 1,685 megawatts of installed wind energy capacity across thirty-eight wind projects, enough to power more than 431,000 average homes for as little as 3.7 cents a kilowatt hour.[23]

Do we have the capacity to realize this energy bonanza right now? The answer is a resounding yes. Here's a perfect example close to home. The City of Calgary has saved millions of dollars in the last ten years by contracting with Enmax to run our LRT on wind energy generated in southern Alberta. In 2001 the City of Calgary contracted with Enmax for twenty-one thousand megawatt hours of wind power a year, and Enmax erected twelve wind turbines in southern Alberta to meet the contract.[24]

As for solar, in some parts of the world where it is really sunny and conventional energy is relatively expensive, solar is already the cheapest alternative. For years, residents of Freiburg, Germany, have been receiving cheques in the mail for the excess energy their solar panel–adorned

Passivhauses feed into the grid. A decade of government subsidies to pay above the market rate for non-carbon energy has helped bring solar energy almost to parity with conventional sources, and the German industrial powerhouse is poised to sell the world its twenty-first–century energy technology.[25]

The price of power generated from photovoltaic technology has fallen from about five dollars per kilowatt hour in 1978 to five cents today. Efficiency gains in the technology are a big part of the story. A typical solar panel in 2000 was 10 percent efficient. In 2020 efficiencies exceed 20 percent. And the main ingredient in the panels, silicon dioxide, is the second-most abundant element on earth.[26] The World Energy Outlook 2020 confirmed that "solar PV is consistently cheaper than new coal- or gasfired power plants in most countries, and solar projects now offer some of the lowest cost electricity ever seen."[27] Closer to home, the triumph of renewables is being heralded, with University of Calgary researchers reporting that "the era of cheap wind and solar has arrived."[28]

While we've been ploughing our windfall oil and gas profits back into the technology of yesterday, or giving it away as Ralph Bucks, as Alberta's premier Ralph Klein did in 2005, other countries have been developing the technology of tomorrow.[29] In 2019 the European Union installed more photovoltaic electric capacity than any other power source and more than double the 2018 number.[30] In 2018 China installed almost twenty-three gigawatts of wind energy—almost 50 percent of total global installation.[31] As these energy sources mature, will Europe and China still want to buy dirty oil? In February 2020, the announcement of an unprecedented $500 million in what will be Canada's largest solar energy project was almost invisible in the political discourse, smothered by the provincial government's shilling for the proposed Teck Resources Frontier Oil Sands mining operation.[32]

This generation has the potential to capitalize on the single biggest business opportunity in human history—the shift to a low-carbon economy. We have the opportunity to confront the biggest ethical challenge in the history of humanity—the irreversible altering of our climate to one that is hostile to human life. The challenge of converting but a fraction of that abundant clean energy into usable form is a challenge worthy of Albertans. But none of this will happen without bold and visionary public

policy. In order to realize the potential for a renewable future, our political parties need to pull their heads out of the tar sands and let the sun shine in.

THE 400 PPM THRESHOLD BREACHED—AND THE TRAGIC IRONY OF OUR PETRO-STATE

How many times have you fretted over something for days, weeks, maybe years, finally got up the nerve to just do it, and in retrospect thought to yourself, "That wasn't so hard!" Sometimes, it's a relatively minor hurdle and other times, a significant life milestone. Then we chastise ourselves for dithering and procrastinating.

I'm afraid that someday soon, we may face the same regret over climate change. In May 2013 we reached an ominous milestone when, for the first time, the Mauna Loa atmospheric monitoring station registered over 400 ppm (parts per million) daily average CO_2 concentration, already far beyond what is generally considered the safe target of 350 ppm.[33] In June 2020, Mauna Loa registered 417 ppm. CO_2 concentrations have not been this high in over three million years![34]

Far from raising any doubt about human-caused climate change, each new research report demonstrates that our estimates of the rate of change have been much too conservative. The earth's temperature is rising, and impacts like arctic ice melt are happening at a rate beyond what the models predicted.

At the same time, we've been underestimating the pace of a very different trend. According to the International Energy Agency, since 1975, solar panel prices have been falling about 7 percent annually, from over US$100 per kilowatt of installed capacity to under US$2 in 2020.[35] The US National Renewable Energy Laboratory calculated that the cost of solar electric energy fell from about fifty cents a kilowatt hour in 2010 to between three and five cents in 2020.[36] By 2019, utility scale solar PV, the rooftop solar you see on buildings, was at the lowest cost to consumers of any electricity source in the US.[37] In 2019 solar energy contracts were being signed in Alberta for under five cents a kilowatt hour.[38]

As a result of this dramatic cost decrease, the world's installed capacity of solar energy has increased by 490 times from 2000 to 2019, with Canada's production increasing by 442 times in that period.[39] In Europe,

as of 2018, 32.3 percent of electricity was supplied by renewables.[40] In a 2019 article in the *Globe and Mail*, writer Chris Turner did a ten-year retrospective on Germany's Energiewende—the name given to its renewable energy revolution.[41] He found it alive and well, with over 40 percent of electric energy now supplied by renewables, much of it owned by farmers and private citizens. The industry supports 340,000 jobs, five times more than are currently employed by coal. Ninety percent of Germans support the transition, with the Green Party harvesting the second-most votes in the recent European Parliament elections.

Bloomberg's 2019 *New Energy Outlook* reported that the cost of solar, wind, and battery storage had decreased 85, 49, and 85 percent, respectively, since 2010.[42] With these kinds of cost curves, estimates of the pace of investment in low-carbon renewable energy production continue to be revised upwards.

As we enter the third decade of the millennium, we seem to have reached the holy grail: solar technology has become not only the cleanest but also the cheapest energy on the planet. At this point, everything changes, because solar energy will flow to us as long as the sun shines, with a fraction of the carbon footprint of fossil fuels. We are starting to see significant movement in financial markets and among the world's largest private investor groups. Conservative economists like Mark Carney, former governor of the Bank of Canada and the Bank of England, no crazy environmentalist, warned in the December 2019 edition of *The Guardian* that climate change is "a tragedy on the horizon" and that assets in the fossil fuel sector "could end up 'worthless.'"[43]

But if current trends continue, the day we reach that threshold will be bittersweet. By that time, we will probably have crossed the point of no return for climate change, and we will be powerless to reverse it. Imagine arriving at that day with the realization that the transition to low-carbon energy would not have been that hard at all, but with the full knowledge of the grim future our children and grandchildren face because we could not find the wherewithal to make the transition just a little sooner and avoid the climate change point of no return.

We may, as a species, muddle along, adapt, and survive but in a diminished state, having created a much more hostile climate for our species and the many others with whom we share the planet. On that day, the likes of

David Suzuki, Al Gore, and NASA climatologist James Hansen will take no pleasure in being able to say "I told you so."

In 2015 a research report by Will Steffen and the Climate Council of Australia found that in order to avoid 2°C warming, the world can burn no more than 12 percent of remaining coal reserves, 48 percent of its gas reserves, and 35 percent of its oil reserves.[44] In that same year, the journal *Nature* published a paper arguing that between 2015 and 2050, Canada can burn only about 25 percent of its conventional oil reserves, 76 percent of its gas reserves, and 1 percent of its bitumen reserves if we want to avoid catastrophic climate change.[45] Conventional economics tells us we must burn tar sands oil. The earth's ecology tells us that to do so is to court disaster.

The challenge of climate change will require the equivalent of World War II mobilization or the postwar Marshall Plan for the reconstruction of Europe.[46] But wherever we sit in relation to the point of no return, it is never too late to act—and act we must. Having reaped the treasure of the fossil fuel age, Calgarians have the moral obligation to do so. It will wreak havoc on the economy for years, you say. But the trade-off is wreaking havoc on the planet for millennia. Calgary has the wealth, the creative energy, and the intellectual and social capital to lead the transition. We are one of the wealthiest places on the planet. It is not more wealth we need. It is a planet that our children can inhabit.

The Poppy Plaza in inner city Calgary commemorates the heroic and selfless acts that Calgarians of a previous generation made for our freedoms. This historic crossroads at which we currently find ourselves requires a very different but no less crucial heroism and selflessness from our generation. What stuff are we made of?

DO THE MATH: FOSSIL FUEL DIVESTMENT, STRANDED ASSETS, AND THE DAWN OF THE SOLAR AGE

In 2014 Alberta premier Jim Prentice voiced two truths that had been obvious for some time: environmental concerns threaten to cancel the oil patch's social licence to operate, and faltering oil prices wreak havoc with our provincial economy. Subsequent premiers Notley and Kenney have faced the same dilemma. But these mundane political talking points are

being upstaged in a big way by two emerging phenomena. Fossil fuel divestment and the stranded asset trap could make for the economic version of one of those increasingly frequent superstorms, right in our back yard.

The divestment campaign has been gathering steam for some time. On more than five hundred campuses all around the globe, students are demanding that their universities divest of fossil fuels. Stanford University has decided to divest of coal and is considering other fossil fuels.[47] Three Quebec universities have pledged to divest from all fossil fuels (Laval, Université du Québec à Montréal, and Concordia).[48] University of British Columbia has announced its intention to partially divest, while McGill and University of Toronto continue to resist calls from student and faculty coalitions for divestment.[49]

Calls for divestment, like the anti-apartheid campaign in the 1980s, are founded on a moral argument. Campaigns such as these typically emerge out of faith communities and activist citizen groups. The World Council of Churches, representing 590 million people in 150 countries, announced its divestment plans in 2014.[50] The report *$11 Trillion and Counting*, detailing the state of the global divestment campaign, was released by 350.org in 2019.[51] In January 2020, New York mayor Bill de Blasio and London mayor Sadiq Khan called on all cities of the world to follow their lead and divest city pension funds from fossil fuels.[52]

As with the anti-apartheid movement of the 1980s, divestment campaigns, initially anchored in ethical concerns, have gained momentum through the economic logic of the market. Ethically motivated divestment creates the conditions for economically motivated investors who begin to see the economic risk of a morally tainted investment. The Rockefeller family, who for the past 150 years has made its fortune from oil, made headlines in 2016 by announcing its decision to divest of $860 million in fossil fuel assets.[53] In 2020, following a 2014 coal divestment decision, a Swedish pension fund, Första AP-fonden (AP1), announced its decision to divest of all fossil fuel investments due to "a substantial uncertainty for companies involved in coal, oil and natural gas activities." AP1's chair described the decision as being "in line with the Paris Agreement."[54]

The investment risk is summed up in the story of stranded assets and unburnable carbon being told by Carbon Tracker—a savvy group of investment professionals using their skills to confront climate change.

The story is based on the single climate change target for which we have achieved global consensus—beyond 2°C lies catastrophe.

Putting another 565 gigatonnes of CO_2 into the atmosphere gets us to 2°C. Burning all the declared reserves of the world's major oil companies would produce almost three thousand gigatonnes—five times the limit.[55] It's simple arithmetic: 80 percent of the assets of the global oil companies must stay in the ground. It's unburnable! Carbon Tracker's strategy is to disturb money managers with this simple truth.

In 2014 a Carbon Tracker press release warned that "investors in Canadian oil sands are at a heightened risk of companies wasting $271 billion of capital on projects in the next decade [including those of Suncor, CNRL, and Cenovus] that need high oil prices of more than $95 a barrel to give a decent return."[56] Between 2016 and 2018, over $78 billion was actually invested.[57] In its 2018 report *Mind the Gap*, Carbon Trackers warns of the growing risk of $1.6 trillion in investments in the sector, with $110 billion of future investments in Canada's tar sands highly exposed.[58] By 2019, the number of institutional investors divesting of fossil fuels had risen from 180, with assets of $5.2 billion in 2014, to 1,244, with assets of $14.61 trillion.[59]

As Alberta dithers, the world is transitioning to the solar economy. Albertans should be wary of the assurances we receive from our political and economic leaders. Case in point: Are assurances from industry leaders credible when up to 79 percent of the compensation packages of the largest oil and gas companies in Calgary are based on share value?[60] They have a considerable vested interest in distracting us from investment forecasts that put share values in question and that place the industry that floats our economy in peril.

The long reign of fossil fuels has left a quagmire of perverse subsidies that mask its real state of competitiveness. The International Energy Agency reported that in 2018 annual global fossil fuel subsidies had actually increased to a total of over $400 billion, 40 percent more than the entire investment in renewables.[61] Part of the problem, according to Carbon Trackers' accountability report is that "current financial reporting standards, stock market listing requirements, [and] industry reporting framework . . . do not alert investors to the risks of reserves associated with climate change."[62] But that is changing, and Albertans need to be listening.

I'm pretty sure that not even the staunchest supporters of the oil industry would claim that oil, coal, or gas (especially sour gas) are pleasant substances to work with. Most of the world is aching to get off fossil fuels. But we put up with them because of the service they provide—compact, inexpensive energy. As soon as consumers of energy see that there is an alternative that does not carry the health and environmental costs of fossil fuels, even if it entails a marginal cost, they will ditch fossil fuels in a heartbeat. It will be game over for those two thousand gigatonnes of stranded reserves. Albertans need to do the math.

KING COAL AND THE CARBON CALAMITY: TIME TO FACE OUR DIRTY LITTLE SECRETS

While tar sands production gets all the press, Albertans have another energy demon to face down. Our province is endowed—or cursed, depending on your perspective—with some of the biggest coal deposits in North America; it's one of the main reasons why we have enjoyed among the lowest electricity rates in the world. But as reports from the Pembina Institute have detailed, there are high costs for that cheap power.[63] It seems that for a long time, we were in the dark, at least figuratively, about this dirty little secret. Surveys have found that only one-third of Albertans realize that historically we generated almost 80 percent of our electricity from coal.[64]

In 2017 Alberta's four big coal power plants were among Canada's six largest greenhouse gas (GHG) emitters.[65] At forty-three megatonnes in 2017, GHGs generated from coal were second only to emissions from tar sands exploitation. We produce more GHGs per kilowatt hour of electricity than any other province—for example, about seven hundred times those of Quebec.[66] True, in part it is the hand we were dealt. Emissions from BC, Manitoba, Quebec, and Newfoundland's vast hydropower resources are a fraction of those emitted by coal burning. Yet other coal provinces are taking aggressive action. Ontario stopped producing electricity from coal in 2014.[67]

While Calgary-based TransAlta staked a claim as one of Canada's largest wind power generators, it was hard to avoid the conclusion that it was a laggard, not a leader, when it came to curbing GHG emissions from

the burning of coal. Prior to the federal government's 2012 coal phase-out legislation, TransAlta's five largest Alberta facilities, generating about forty-one hundred megawatts, were all coal fired. Its eleven wind facilities were its smallest, generating about five hundred megawatts.[68] TransAlta's vice-president for Sustainable Development, Don Wharton, seemed to be arguing against a coal phase-out in 2013 when he said that "cutting out coal could lead to a 30 to 50 per cent jump in the price of electricity."[69] TransAlta was, at the time, not entirely forthcoming about its motives and actions. It claimed to be playing by the rules, yet with its industry partners, it actively sought to weaken them, resulting in a weakening of regulations on coal phase-outs.[70]

While we may have "cheap" electricity, that artificially low price (artificial because it externalizes the costs of climate change and public health) makes us energy hogs. The Pembina Institute referred to Alberta as Canada's energy-efficiency "laggard."[71] Why conserve when we pay so little? Until 2017, Alberta was the only province without a renewable electricity policy.[72] That changed in 2017 with the start-up of the highly successful Energy Efficiency Alberta (EEA) funding project, with lifetime energy bill savings of $806 million and a 6.8 million tonne reduction in GHG emissions in just two years.[73] Unfortunately, EEA did not fit with the pro–fossil fuel ideology of the new UCP government, and its programs were scrapped in October 2019.[74]

In the meantime, thanks to the tireless work of a grassroots coal phase-out campaign in Alberta, led by Dr. Joe Vipond of the Canadian Association of Physicians for the Environment (CAPE), Dr. David Layzel and Dr. Mishka Lysack at the University of Calgary, and former Calgary MLA Dr. David Swann, in November 2015, the provincial NDP government announced a plan to phase out coal-fired electricity generation by 2030.[75] As of 2019, coal was the fuel source for less than half of our electricity, down from three-quarters twenty years ago, and the coal phase-out was being heralded as a Canadian success story.[76] Job well done, but not the end of the story.

By 2018, coal exports from Alberta had rebounded to near record levels, with older mines like the Grand Cache Coal Mine recommissioned and new mines like the Vista Coal Mine near Hinton opening for business, with up to seven more in the works.[77] Albertans will surely benefit

from the health impacts of reduced coal-burning, but Alberta coal will continue to put the world in climate peril, even after the 2030 coal phase-out. We are shuffling our coal production around like chairs on the deck of the Titanic. Alberta is in good company with China. China is aggressively moving to renewables, in large part to freshen the air in the capital, Beijing, while through its Belt and Road initiative, it uses its vast financial resources to finance coal-fired power-generation facilities around the world.[78]

The coal-fired electricity generation phase-out in Alberta shows that climate activism can work. The continued expansion of coal exports from Alberta shows that there is still work to be done. A good place to start is withdrawing coal's social licence to operate. It is time to end the reign of King Coal. Mark Jaccard, respected energy economist and former government advisor turned coal-train blockader, said that what propelled him into activism was the thought that decades down the road, we will be asked, "What did you do when there was still time to make a difference?"[79] It's a worthwhile question to ponder.

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