ALBERTA FEDERATION OF LABOUR

OCTOBER 2022

SKATE TO WHERE THE PUCK IS GOING

Re-imagining Alberta's Energy Future: An Industrial Blueprint for Job Creation and Prosperity

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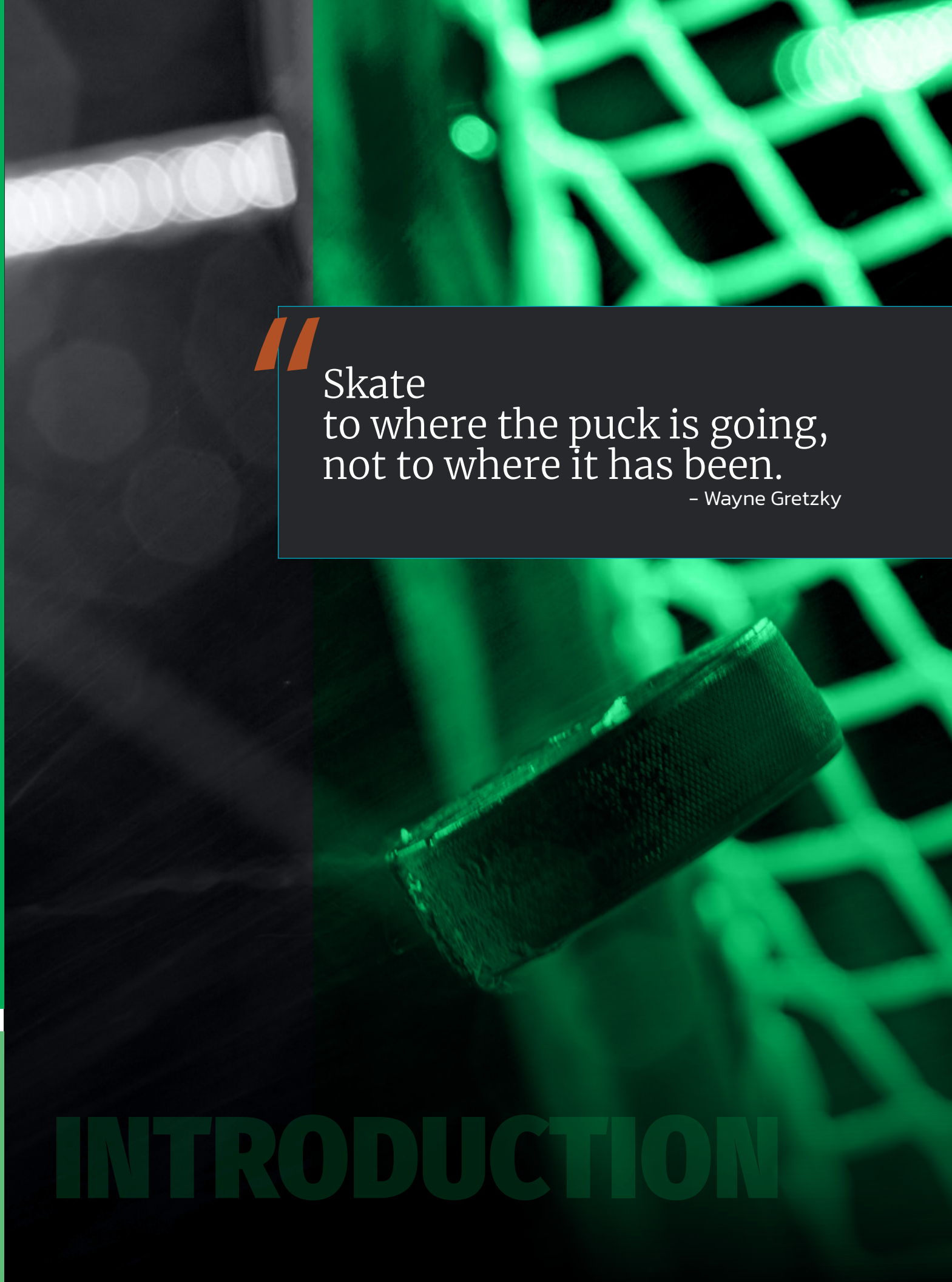

> Skate
> to where the puck is going,
> not to where it has been.
>
> – Wayne Gretzky

INTRODUCTION

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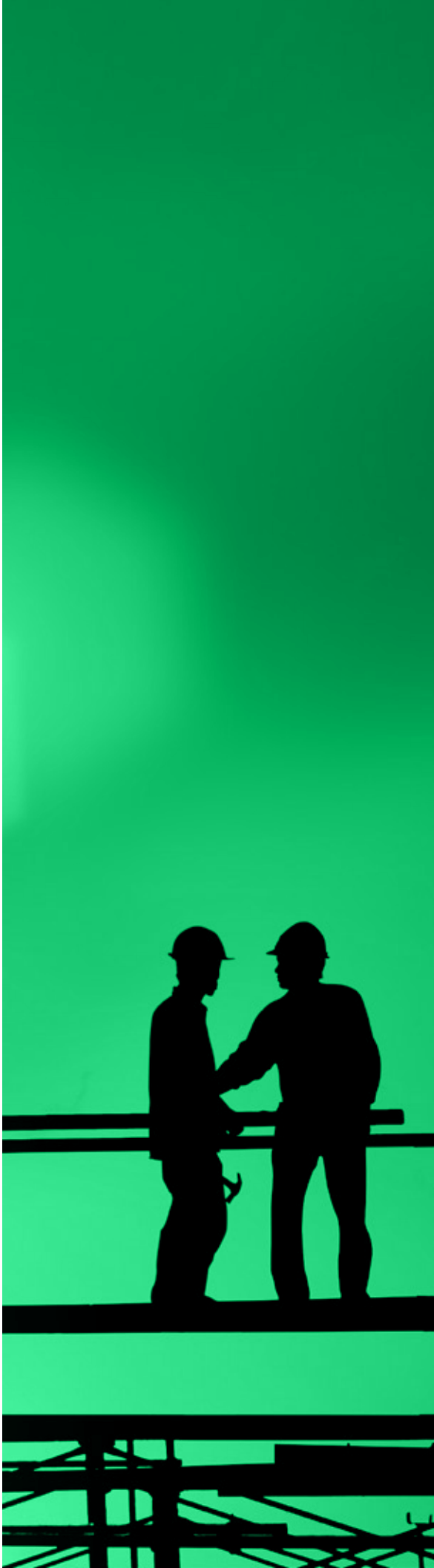
The energy system that powers the global economy is being profoundly disrupted. If the past was about coal, crude oil, and natural gas, then the future is about clean, abundant, low-cost electricity. The few activities that cannot be electrified by 2050, requiring hydrogen and other low-carbon fuels, will still require plenty of electricity to produce those fuels. To borrow shamelessly from the Gretzky family, the electric future is where the puck is headed. This report imagines an Alberta economy ready to accept that pass and put the puck in the net, which we think of as a thriving, diversified, post-combustion world. The report takes inspiration from former Alberta Premier Peter Lougheed and the lessons he taught us about the entrepreneurial state and the central role it needs to play in leading change and seizing opportunities. In the following pages, we set out seven "missions" supported by seven policies that the Alberta Federation of Labour (AFL) believes can guide municipal, provincial, and federal governments toward bold action that will support Alberta workers and communities by growing our economy.

The urgency of embracing and implementing an industrial plan like the one outlined in this report was highlighted in mid-August when President Joe Biden signed the USD$369 billion Inflation Reduction Act (IRA) into law. The Americans have finally acknowledged that China dominates the global clean energy economy. From solar panels to critical minerals to batteries and electric vehicle manufacturing, China's lead has seemed almost insurmountable. But with the historic passage of the IRA, the Americans are now embracing the all-hands-on-deck call to catch up and pass China by 2030, as Biden promised in his 2020 campaign platform. This means that our largest trading partner and the principal buyer of Alberta oil and gas has now committed itself to what amounts to a green Marshall Plan for North America. We now have a clear choice: get on board with the IRA and the rapidly accelerating energy transition or be left behind while pretending that "war rooms" and "sovereignty acts" can hold back the tides of change.

If global economic disruption and the Inflation Reduction Act are not enough to spur Alberta to action, the imperative to reduce greenhouse gas emissions and mitigate climate change should motivate even the most recalcitrant laggard. The climate disasters unfolding around the world and here at home mean that both people and governments – including our customers – will no longer accept denial or delay. As the largest emitting province in Canada, Alberta has an outsized obligation to do its part in the fight against the climate crisis. And the federal government has made clear its intentions to lower emissions, especially for the oil and gas sector, which contributes 26% of national emissions.



Even though this is not explicitly a net-zero emissions report, the need to decarbonize the provincial economy before mid-century underlies all its recommendations. There is no escaping decarbonization and the energy transition. The climate imperative is fundamental – and so is the economic imperative. And any political party promising a return to the good old days – to "Make Alberta Great Again" – is offering working people a false hope.

The signs are everywhere. Investors are moving their money. Governments around the world are setting timelines to phase out internal combustion vehicles. And all the big automakers have committed to switching to EVs. The changes are fundamental and they're coming fast.

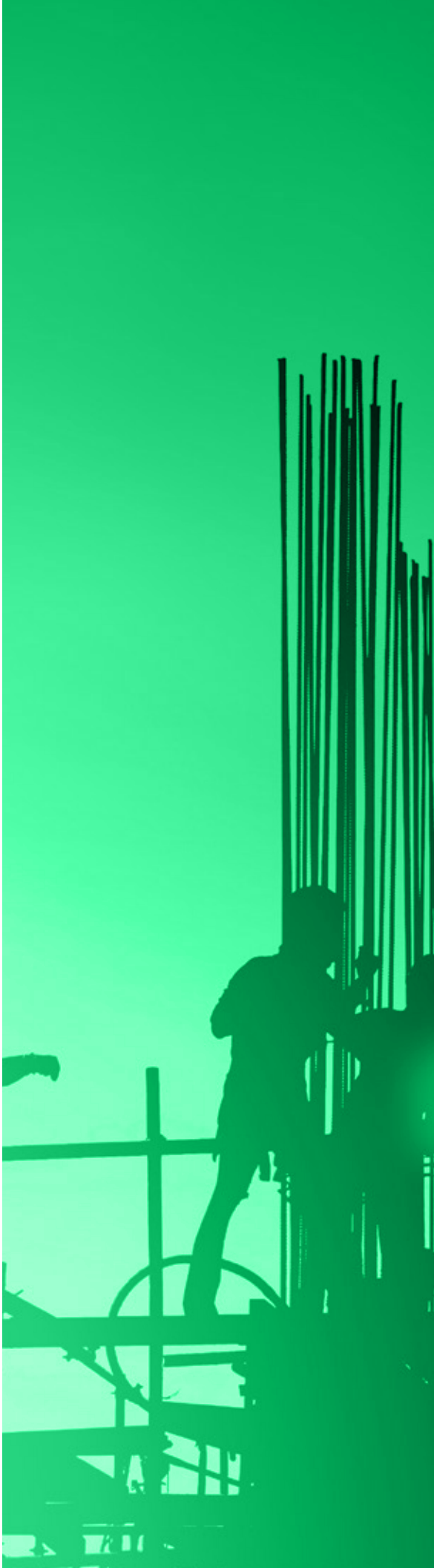
This doesn't mean a complete end for our oil and gas industries – but it does mean we have to pivot and adapt. It also means that our future prosperity depends on preparing for change.

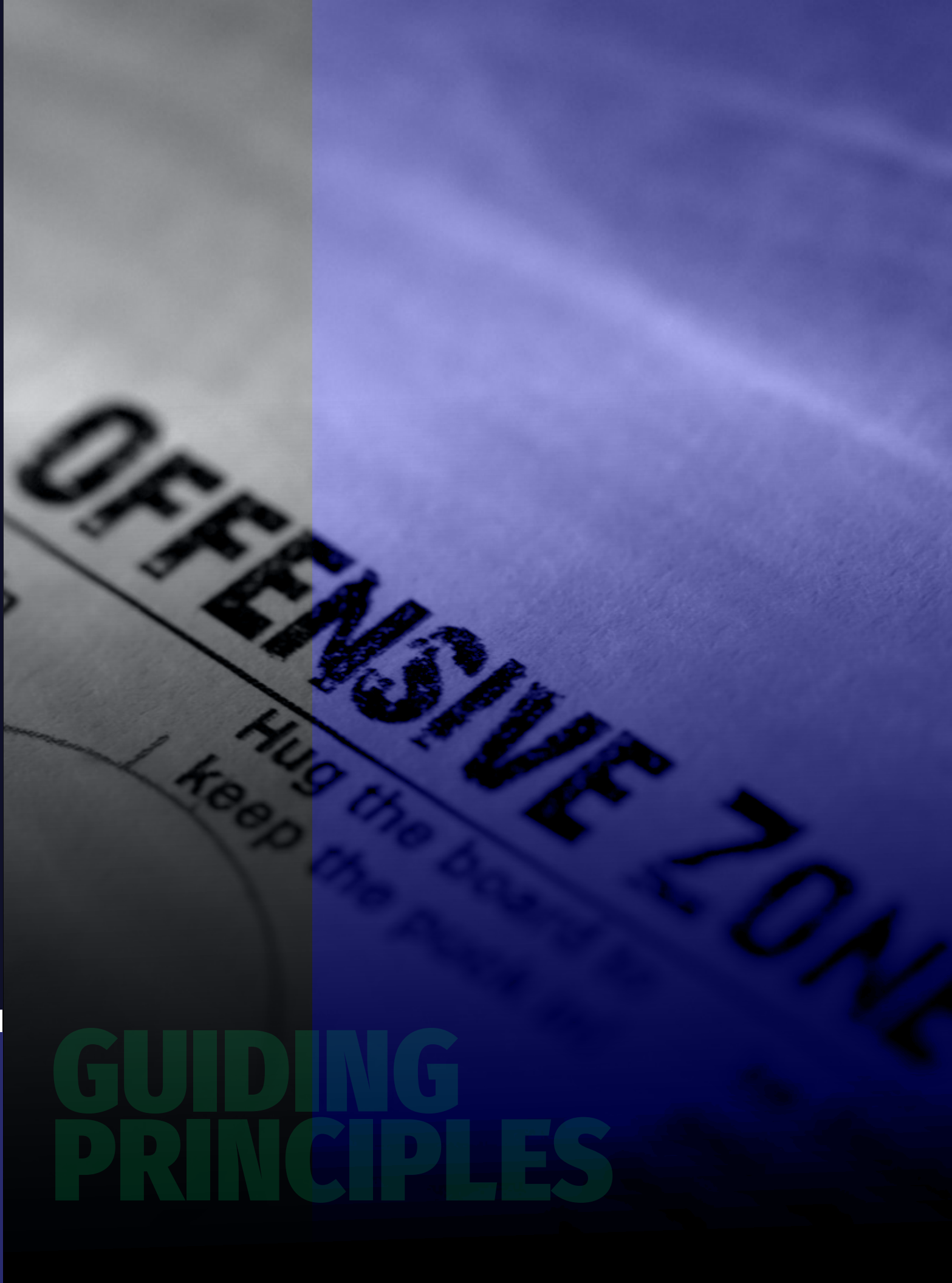
Denying these trends does NOT help Alberta workers – in fact, it hurts them. The good news is that the oil sands can be retooled for a low-carbon future by turning our focus from fuels to manufacturing materials like carbon fibre. That said, in the future, the oil sands will not be nearly as large a source of economic activity or employment. A bright future for Alberta workers lays elsewhere.

The electrification of our energy system will also require massive investments in infrastructure – which can lead to a boom in jobs and economic activity. But only if we play our cards right.

Instead of denial, what Alberta workers want to see from their politicians is a plan. Change may seem risky, but not changing when change is necessary is even riskier.

The stakes are high and the window of opportunity is closing. We need to act decisively or risk being left behind.





GUIDING PRINCIPLES

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WORKERS FRONT AND CENTRE

Workers must have a seat at the table when the Alberta government is making decisions about the province's future. And the erosion of worker rights and protections that has taken place over the past three years must be reversed. The ratification of ILO Convention 87 and 98 are Canada's commitment to the freedom of association, the right to organize, and the right to collective bargaining. As we imagine new projects and new sectors, we must include structures that ensure workers have a fair say and that they get a fair share of the prosperity generated by the massive investments that will accompany the unfolding energy transition. Far too often in Canadian history, corporations have been allowed to exploit our resource assets without adding lasting value and without adequately compensating workers, communities or governments. An outsized share of Alberta's income has been going to corporate profits over labour. This time, we can do it differently. As countries like Germany have demonstrated, collaborating with unions and their members is an effective way to advance economic development.

CARBON LEADER

The AFL believes that Alberta should become a global leader in carbon management related to energy systems. Leading means avoiding carbon emissions by significantly expanding renewable energy like wind, solar, geothermal, electricity storage, and green hydrogen. It also means removing carbon from legacy hydrocarbons (oil, gas) production so they can compete on global markets as long as there is demand.

Perhaps most importantly, it means beginning the transition from producing hydrocarbons as feedstock for fuel (e.g. gasoline, diesel, aviation fuel) to using them as feedstock for materials production (e.g. carbon fibre). Oil sands bitumen, in particular, is far more valuable as an input into manufacturing than it is when sold to a refinery. We envision that as much as possible of that manufacturing will be located in Alberta.

THINK BIG

We want Albertans to think big, to be more ambitious than ever before. The 2020s will be the "disruptive decade" of the global energy transition; a time when global supply chains will be in flux and opportunities will present themselves that will disappear within the decade. Alberta has the highly trained, experienced workforce to lead an economic transformation that more than ever before relies on the existing talents of Albertans for success. Workers in the current economy have many transferable skills; we must be careful not to deregulate the skilled trades that give us a huge competitive advantage in building the new economy. Many of the jobs of the future will require the skills our workers already have, some retraining or retooling may be necessary, but we must not abandon our current trades. We must improve training and increase job readiness for young people.

CIVIL SOCIETY

Economic strategies are too often focused on big corporations, investors, and small and medium-sized enterprises while ignoring civil society organizations like unions, non-profits and non-governmental organizations. This report assumes that civil society will play an important role in helping Alberta pivot to a low-carbon economy.

INTER-GENERATIONAL EQUITY

Younger Albertans must enjoy the same opportunities for job success as older generations. With house prices rising, inflation eating into consumer purchasing power, and the gig economy reducing job stability, many younger Albertans feel they will not have the same economic opportunities as their parents. The strategies described in this report are designed to create good-paying jobs, many of them union jobs, that will restore Albertans' faith in a brighter economic future for all.

INDIGENOUS PEOPLES

Indigenous communities are significant players in the Alberta energy sector. Their many companies and enterprises provide important services to oil and gas production, especially in northern Alberta to the oil sands. Indigenous communities must also be at the table when policies are discussed and decisions made about strategies for the energy transition, and appropriate economic returns should flow to Indigenous nations. The AFL believes that economic reconciliation is critical to the development of the 21st century Alberta energy economy.

"SAFE BET" VS. "WILD CARD" CLEAN ENERGY TECHNOLOGIES

"Safe bet" technologies are mature, or close to it, and competitive today. Examples include electric vehicles and renewable energy – especially solar and wind. The Alberta government should strongly support the adoption of new "safe bet" energy technologies.

"Wild card" technologies are immature and require years, perhaps decades, of further research and development. Examples include small modular reactors, hydrogen, and carbon capture and storage. The Alberta government should support "wild card" technology research and development, but not count on those technologies in the short to medium term.

Abundant, clean, reliable, low-cost electricity will be the foundation of the 21st century economy. Jurisdictions that build that foundation today will be the economic powerhouses of the future. Alberta has incredible wind, solar, and geothermal resources. Small modular nuclear reactors may also play a role eventually, though today they should be considered a "wild card" technology. Whatever the final zero-emission fuel mix, building an electricity system capable of powering Alberta's future is absolutely critical.

ALBERTA'S RELATIONSHIP WITH OTTAWA

Since winning the 2019 provincial election, Jason Kenney and The United Conservative Party (UCP) have aggressively pursued a "fight back strategy" with Ottawa that has resulted in needless and unproductive battles with the Government of Canada. Too often, instead of leading the Canadian conversation about the future of energy, the Alberta government has defended the energy status quo and opposed the federal government's climate and energy policies. This report argues that the relationship with Ottawa must change, and that federal funding, policies, and political support are critical to Alberta's economic success as the global economy restructures and the world transitions off fossil fuels.

INDUSTRIAL POLICY

The current federal and Alberta governments use a variety of policy tools to induce economic development, including tax cuts, subsidies, carbon pricing, and regulations. This report does not rely upon these policies. Instead, we make the case that the Alberta government must embrace industrial policy, commonly understood as more direct intervention by the state in the economy.[1]

American observers are already arguing that the IRA "shifts our industrial policy away from outsourcing to private industry and sets up government to lead on solving today's most urgent problems," according to the Roosevelt Institution. The Act reimagines "the role of government for an era of economic transformation not seen since FDR's time." We argue that the Alberta government must embrace this approach to lead our province's energy and economic transformation.

1 Allan, B., Eaton, D., Goldman, J., Islam, A., Augustine, T., Elgie, S., and Meadowcroft, J. (2022). Canada's Future in a Net-Zero World: Securing Canada's Place in the Global Green Economy. Smart Prosperity Institute, Transition Accelerator and Pacific Institute for Climate Solutions.

"Provincial Archives of Alberta, GR1989.0516.1675.0001"

> We were not a conservative government, never pretended to be. We were an activist government wanting to get things done.
>
> *– Peter Lougheed, 2006 interview.*

CHANNELLING PETER LOUGHEED

CHANNELLING PETER LOUGHEED

One of the reasons former Alberta Premier Lougheed's PC governments (1971 to 1986) wanted to "get things done" is that, like today, the 1970s was a time of disruption and change in the North American oil and gas industry. These disruptions included major energy crises in 1973 and 1979; significant investment in American refineries and petrochemical plants (instead of Canadian ones); the depletion of conventional oil and gas reserves in the Western Sedimentary Basin; and the scramble for new crude oil supply that led to the development of the oil sands.

Lougheed reminded Albertans that the province's vast natural resources belonged to them – and he famously urged them to "act like owners." This meant extracting as much value (royalties, profit, jobs, business activity, etc.) as possible from the province's hydrocarbon bounty at home instead of shipping raw to the US Midwest or Gulf Coast, where others would reap the benefits of adding value. He sold government intervention in the energy sector as an economic diversification and job creation strategy, which included taking the lead when privately-owned oil and gas companies' priorities conflicted with the resource owners' best interests.

The creation of Syncrude in the early 1970s gave the government an ownership stake in oil sands development and some infrastructure, including the pipeline that carried bitumen from the Fort McMurray area to Edmonton and an electric generating station. The Alberta Oil Sands Technology Research Authority (AOSTRA), funded with $100 million from the newly created Heritage Fund, was launched to research new technologies steam-assisted gravity drainage (SAG-D), which enabled the oil sands expansion of the past 20 years. Creating the Alberta Energy Company (AEC). Lougheed used public enterprise to build both natural gas collection network that supplied the petrochemical plants and the straddle plants that stripped the natural gas liquids (mostly ethane) that constituted the feedstock for those plants. He also enforced strong regulation that forced companies to make the NGLs available to Alberta-based manufacturers before they could be exported elsewhere. These regulations created the conditions to build a new industry in Alberta.

Lougheed's successes laid the foundation for the modern Alberta oil and gas sector. Neither our petrochemical industry nor the oilsands would exist had it not been for Lougheed's pioneering, creative and aggressive use of public vision, public investment, public ownership and regulation in the public interest. After he retired, Alberta governments drifted away from his vision. Successive premiers accepted a more passive role for the state as policymaker, regulator, and enabler of private sector development. Tax cuts and subsidies replaced equity stakes.

The time has come to relearn the lessons that Lougheed taught us half a century ago, applied to a zero-emission future. There are two of those lessons that inform this report.

THE ENTREPRENEURIAL STATE

The first lesson is that Alberta should again embrace the idea of an entrepreneurial state. Disruption caused by the energy transition, the COVID-19 pandemic, energy insecurity created by Russia's invasion of Ukraine, and the latest wave of technological innovation creates both risk and opportunity as new supply chains are created while existing ones evolve to serve restructuring industries. Alberta is ideally positioned to benefit from that disruption.

But the window to seize opportunities will likely be mostly closed by the end of this decade. Lougheed faced a similar situation 50 years ago and he acted with resolve and determination. The time has come for modern Alberta to again tap the historic spirit that built this province. And because the window of opportunity will only be open for a limited time, decisions cannot be left entirely to the private sector. The Alberta government must think like an owner and rediscover how to be entrepreneurial.

The rationale for modern governments to be entrepreneurial is provided by economists like Mariana Mazzucato: "... the US State has been the key driver of innovation-led growth—willing to invest in the most uncertain phase of the innovation cycle and let business hop on for the easier ride down the way. If the rest of the world wants to emulate the US model they should do as the United States actually did, not as it says it did: more State not less."[2]

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>
> *– Mazzucato, Mariana. The Entrepreneurial State (p. 1).*

REVITALIZING PUBLIC OWNERSHIP

Lougheed's second lesson lies in how the state should be entrepreneurial. Mazzucato argues for governments to de-risk innovation, enabling the private sector to focus on commercialization and scaling up operations.

Lougheed, however, took a different approach. He embraced state ownership, usually partnering with the private sector but prepared to act alone if necessary.

The AFL strategy described in this report incorporates Mazzucato's modern understanding of the entrepreneurial state, adds Lougheed's concept of state ownership, then incorporates vigorous industrial and labour market policies. We believe this well-rounded strategy will create the most benefits for Alberta workers and the most opportunities for innovators, including private companies, civil society organizations, and Indigenous communities.

The time has come for an activist government to manage Alberta's transition to a low-carbon energy economy. Private companies and investors alone are not enough.

2 Mazzucato, Mariana. The Entrepreneurial State (p. 1). - Mazzucato, Mariana. The Entrepreneurial State (p. 1).

> "A new energy economy is emerging around the world as solar, wind, electric vehicles and other low-carbon technologies flourish.
>
> *- the International Energy Agency*

THE EVIDENCE FOR THE GLOBAL DISRUPTION

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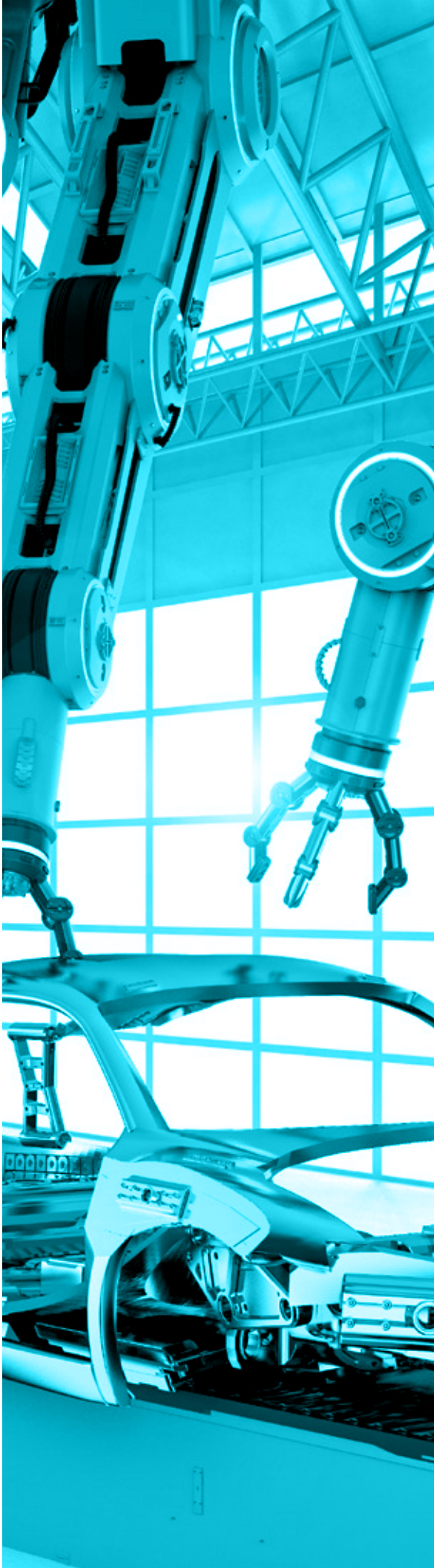
– the International Energy Agency[3]

Many economists believe that the global economy is being disrupted by the 6th long wave of innovation (see figure 1).[4] An innovation wave begins when new technologies are introduced to markets, disrupting existing business models.[5] The current wave is likely to be shorter and more intense because of the volume and sophistication of innovations like artificial intelligence, robotics, automation and clean tech. These innovations will accelerate the impact of new energy technologies like wind and solar power, battery storage, smart grids, and e-mobility that underpin the energy transition.

The greatest degree of disruption will likely occur during the 2020s as many of the new technologies pass the inflection point on their S-curves (see page 16 for an explanation of S-curves). Disruption in one sector will reinforce disruption in other sectors. For example, artificial intelligence will enable more efficient power grids, autonomous vehicles, and the digitalization of oil and gas operations. This will lead to geometric innovation supported by the unprecedented stock of human capital (science, engineering, patents, technical expertise, etc.) that characterizes the 6th wave.



3 The international Energy Agency (October 13, 2021) https://www.iea.org/news/world-energy-outlook-2021-shows-a-new-energy-economy-is-emerging-but-not-yet-quickly-enough-to-reach-net-zero-by-2050

4 Karlson 'Charlie' Hargroves and Michael H. Smith, ed., The Natural Advantage of Nations (London: Earthscan, 2005), 17.

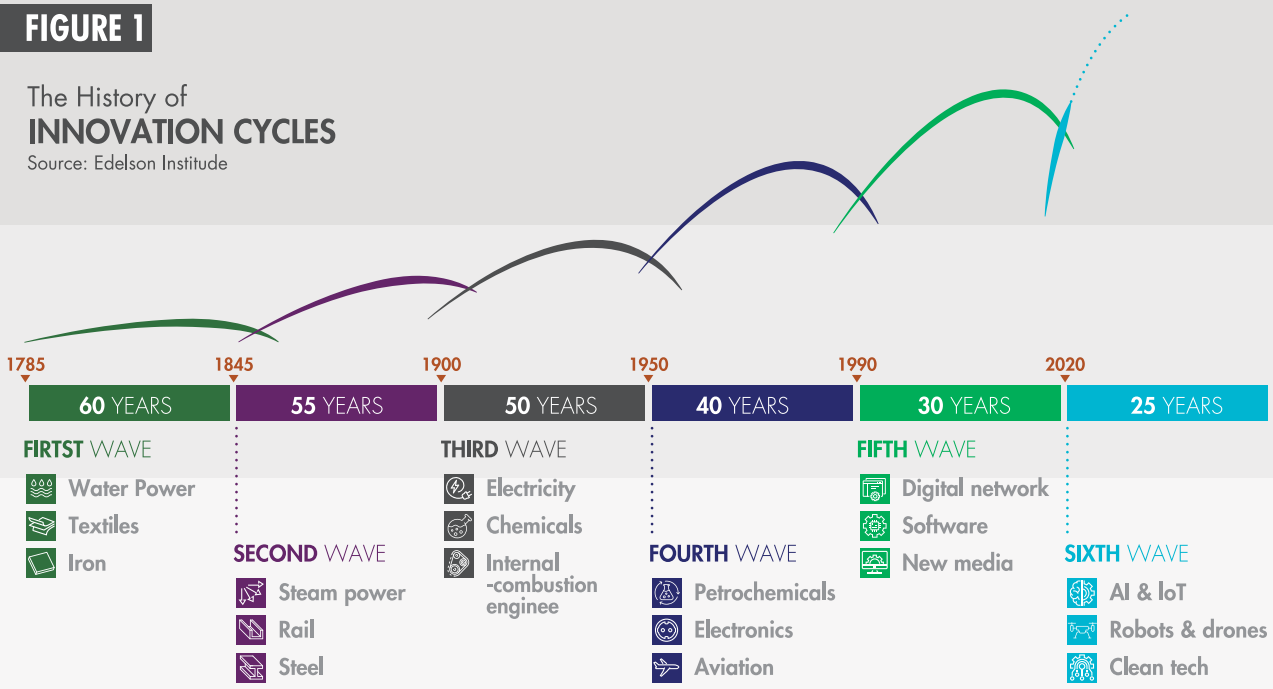
5 For more on long waves of innovation, please see Joseph Schumpeter, Capitalism, Socialism, and Democracy (London: Routledge, 2010).

The takeaway for Alberta is that the two sectors most germane to the provincial economy, energy and transportation,[6] are arguably the most disrupted at this stage of the 6th wave. The rise of low-cost, abundant, cheap electricity will ensure there is enough fuel to support the electrification of transportation.[7] And smart grid innovations will help utilities build out the infrastructure needed to supply that clean energy where and when it's needed. Disruptive battery innovations like new chemistries will dramatically improve the range and lower the cost of EVs while supporting the diffusion of many new forms of e-mobility, like robo-taxis.[8]

Alberta oil and gas leaders believe they have decades to surf the innovation waves of the energy transition. In fact, they have only years, a decade at most. The disruption unleashed by the 6th wave of innovation will almost surely catch them by surprise. The COVID-19 pandemic and Russia's invasion of Ukraine are shocks that will further accentuate and accelerate the 6th wave.

FIGURE 1

The History of
INNOVATION CYCLES
Source: Edelson Institude



6 "Gross Domestic Product," Economic Dashboard, Government of Alberta, accessed June 17, 2022, https://economicdashboard.alberta.ca/grossdomesticproduct#type.

7 Dmitrii Bogdanov et. al, "Low-cost renewable electricity as the key driver of the global energy transition towards sustainability," Energy 227 (2021).

8 "The Future of EV Batteries," GreenCars, June 22, 2022, https://www.greencars.com/guides/the-future-of-ev-batteries.

ENERGY, TRANSPORTATION SECTOR DISRUPTION

In the simplest sense, an energy transition is the substitution of one source of energy for another. For example, cheap petroleum and the internal combustion engine displaced steam and animal-power during the first half of the 20th century while new energy sources (natural gas, nuclear) were added during the second half. The current energy transition involves switching from coal, oil, and gas to clean electricity and low-carbon fuels like hydrogen.

This energy transition is different from the previous one for three reasons. The first is the climate emergency imperative to transition off fossil fuels and achieve net-zero greenhouse gas emissions by 2050. Government policy will play a much bigger role in this transition. The second is the shift from energy as a commodity to energy as a technology means energy costs should fall over time – as demonstrated by wind and solar – and become less volatile. Third, the scope and complexity of the global energy system is so much greater than in the past.

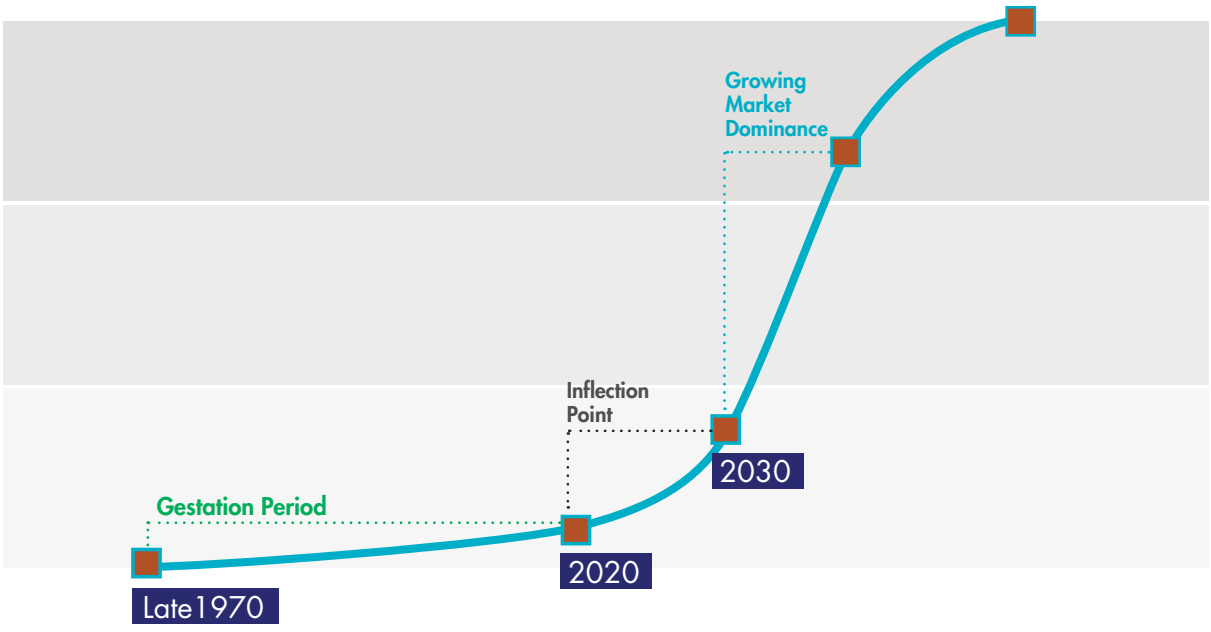
HOW DO ENERGY TRANSITIONS WORK?

Energy transitions start when a new group of technologies emerges whose costs are significantly lower (often by one-quarter to one-tenth) than existing technologies. These technologies also offer significantly more value for adopters.

Transitions follow a pattern that looks like an S-curve[9]: 1) adoption of new technologies is very slow at first because they are expensive and unreliable; 2) when the technologies eventually become competitive, there is a decade of intense disruption as the new technologies begin to displace the old ones; 3) The disruptive decade is then followed by decades of less disruptive growth as the new technologies push the old ones mostly or completely out of the market.

We cannot emphasize this enough: the gestation phase of this transition is already mostly completed and the disruptive phase has begun. Wind, solar, and storage (primarily batteries) are disrupting the power sector. Light duty electric cars and trucks are disrupting the transportation sector, with medium duty (e.g. buses, delivery vans) EVs already being adopted in large numbers. Heat pumps and ground source geothermal are set to disrupt building heating and cooling.

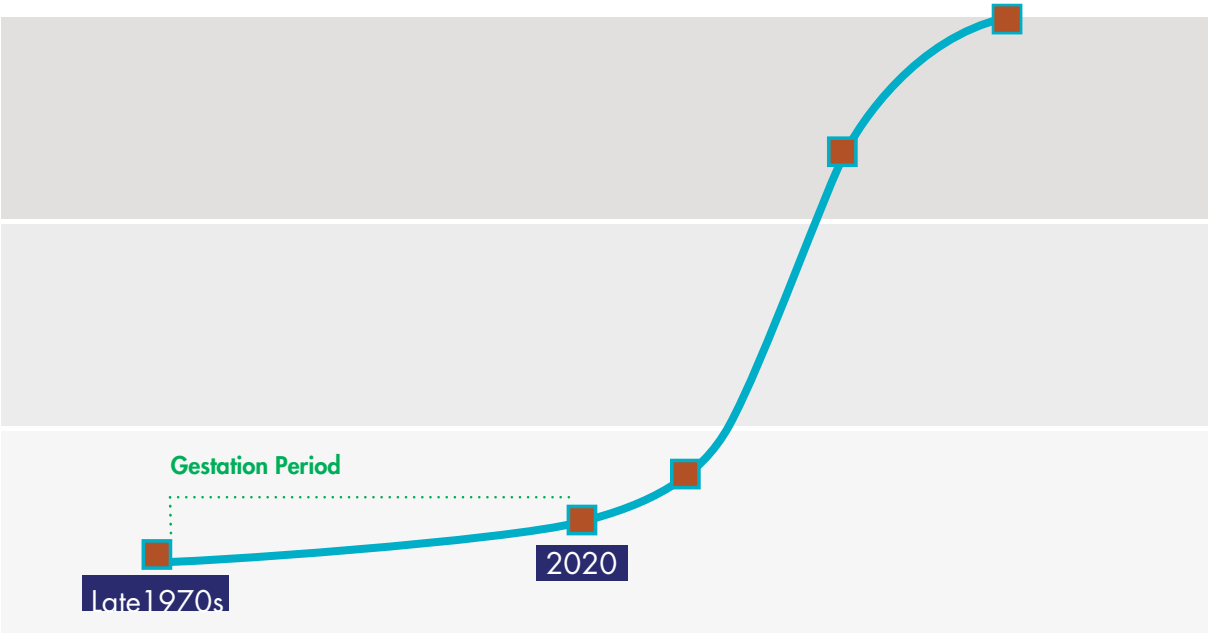
The 2020s are the disruptive decade of this transition.



9 Everett M. Rogers, Diffusion of Innovations (Toronto: Free Press, 2003), 5th ed., 254.

THE GESTATION PHASE

This phase is very slow and characterized by plenty of experimentation and failure. The types of adopters that buy the new technologies during this phase include Innovators (think kids camping out for three days in front of the Apple store to get the latest iPhone) and Early Adopters (also buying the latest iPhone, just not camping out to be first in line). These two groups make up about 15% of all consumers.[10]



WHEN KEY TECHNOLOGIES WERE INTRODUCED TO MARKET

1. Building heat pumps: 1970s

2. Commercial solar panels: late 1970s

3. Commercial wind turbines: 1980s

4. Hydrogen fuel cell: late 1980s

5. Lithium-ion battery: 1991

6. GM EV "Impact" concept car: 1990

10 Rogers, Diffusion of Innovations, 260-264.

THE DISRUPTIVE PHASE

This is when change begins in earnest. Think of crude oil in the modern context. Public opinion is against it because of climate change and opposition from environmentalists.[11] Investors hesitate to commit capital.[12] And governments pass policies that favour oil's competitor, clean electricity, and penalize hydrocarbons because of greenhouse gas emissions.

Approximate Inflection Points for Key Technologies

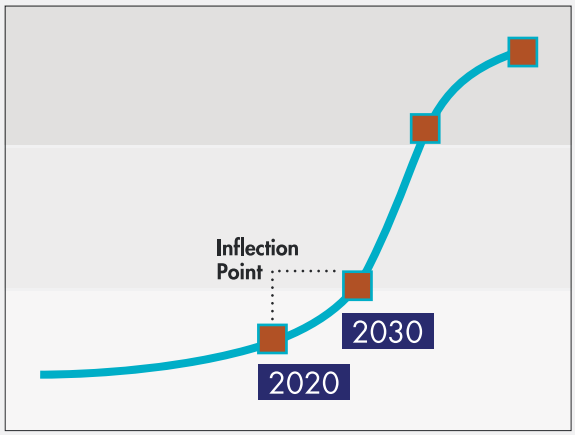
1. Lithium-ion battery packs for EVs: early to mid-2020s
2. Commercial solar panels: 2020
3. Commercial wind turbines: 2020
4. Hydrogen fuel cell: 2030
5. Light duty cars and trucks: 2022 to mid-2020s
6. Building heat pumps: 2020s

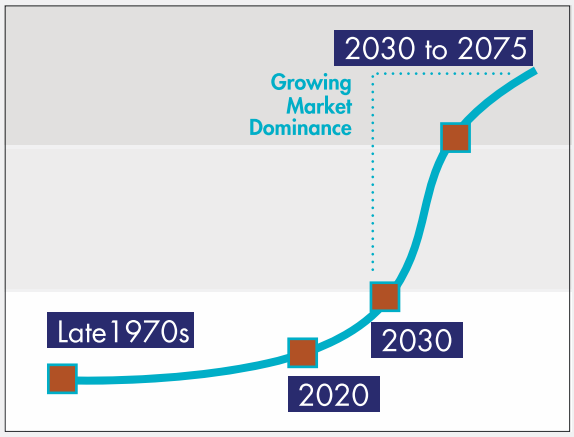
When Key Technologies are Likely to Dominate Market

1. Lithium-ion battery packs for EVs: early to mid-2020s
2. Commercial solar panels: from late 2020s
3. Commercial wind turbines: from late 2020s
4. Hydrogen: 2030 to 2040
5. Electric vehicles: from late 2020s
6. Building heat pumps: 2030s

Market Dominance Phase

Eventually, the new energy technologies push out the old technologies and dominate their markets. The speed of this process varies depending upon the technology. For example, demand for natural gas is expected to last longer than oil because it burns cleaner than coal and oil, and it is used to heat buildings, something electric technology isn't as good at yet.





11 "What do Canadians think about climate change and climate action?" Abacus Data public opinion poll, Oct. 28, 2021.

12 Oil and gas investment in Alberta peaked in 2014 at approximately $61 billion. Investment has significantly declined since then, falling to $18 billion in 2021 — representing a decline of 70% in only 7 years. "Investment," Economic Dashboard, Government of Alberta, accessed June 17, 2022, https://economicdashboard.alberta.ca/Investment#type.

Transportation is All In On Electricity

Until the past few years, the combination of the internal combustion engine (ICE) and petroleum was more economical than the combination of the electric motor and batteries because of the incredibly high energy density of gasoline and diesel. But the rising energy density and falling costs of batteries have eroded the ICE advantage to the point where the cost per kilometre driven is much lower for an EV.[14] Energy density is forecast to continue rising for the next decade or more thanks to vigorous innovation that will also cause EV battery packs to fall from their current $132 per kilowatt hour (kWh)[15] to under $70 within a decade.[16]

If capex is destiny, then the message from transportation manufacturers to the oil industry couldn't be more clear: we prefer electricity as a fuel.

No wonder most major automakers have said they will abandon the internal combustion engine between 2030 and 2035.[17] The major manufacturers have committed $336 billion by 2026 and $411 billion by 2030 to the switch to electric.[18] This list doesn't include smaller manufacturing companies like Volvo or countries like China and India that have large automobile manufacturing sectors. Nor does it include medium-duty (think delivery vans and garbage trucks) and heavy-duty (think semi-trucks) vehicles. Or buses, two and three-wheeled vehicles, and autonomous vehicles like robo-taxis.

If capex is destiny, then the message from transportation manufacturers to the oil industry couldn't be more clear: we prefer electricity as a fuel.

> "...the strategy for most OEMs [original equipment manufacturers] is clear; there is no alternative but to fully commit to electrification.
>
> *– IHS Markit/S&P Global* [12]

13 Pivoting to an Electrified Future: The Automotive Industry Amps Up, IHS Markit, April 2021, 8, https://ihsmarkit.com/Info/0421/auto-industry-privots-to-electrification.html

14 The Electric Vehicle Association of Alberta calculates a $2,205 annual cost difference between EVs and ICEs, assuming a driver travels 15,000 km a year, energy costs 12.138¢/kWh, and gas costs 1.891$/L. These numbers are based on the current costs of electricity and gas at the time of writing. Even the relatively conservative estimates released by the Government of Canada demonstrates a clear and growing price difference in the cost per kilometre between ICE and EV.

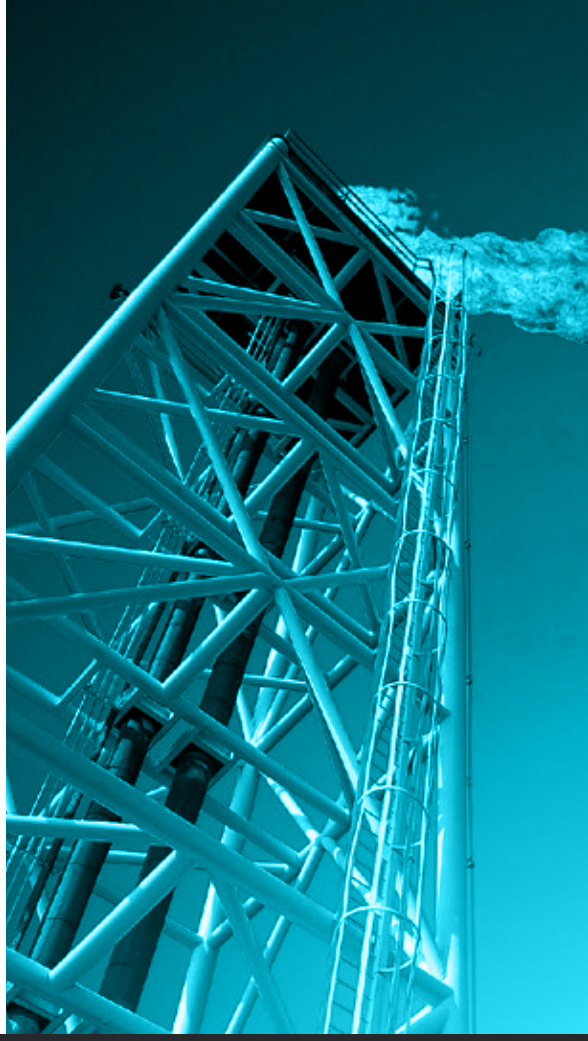
15 "Battery Pack Prices Fall to an Average of $132/kWh, But Rising Commodity Prices Start to Bite," BloombergNEF, November 30, 2021, https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/.

16 A timeline of when every automaker says it's going electric, Driving.ca, Sept. 1, 2021. https://driving.ca/features/feature-story/a-timeline-of-when-every-automaker-says-its-going-electric

17 Data compiled by Sandy Garossino and Markham Hislop.

18 Data compiled by Sandy Garossino and Markham Hislop.

ALBERTA'S RESPONSE TO GLOBAL DISRUPTION: **BECOMING LEADERS IN CARBON MANAGEMENT**



Alberta is home to some of the most carbon-intense oil in the world. The province is responsible for 38% of Canada's greenhouse gas emissions; the oil sands alone account for 11%. While CEOs brag about reducing emissions-intensity per barrel, increases in production mean that absolute emissions either continue to rise or, at best, plateau. As long as supply grows, history says emissions rise, too. With oil sands supply forecast to continue growing, reducing emissions from Alberta's hydrocarbon extraction industry will be very difficult, if not impossible.

Carbon is a huge problem for Alberta, especially since the Government of Canada is publicly committed to capping oil and gas emissions in the near future, then lowering them every year thereafter. A recently released federal government discussion paper proposes one of two options: creating a cap-and-trade system or strengthening the existing large emitter carbon pricing. In Alberta, that is called the TIER (Technology Innovation and Emissions Reduction) Regulation. TIER incorporates output-based pricing, in which companies receive a significant discount on the carbon price (in the neighbourhood of 80% to 90%) as a hedge against carbon leakage.

A reasonable assumption is that an emissions cap will force oil and gas producers to embrace carbon capture and storage (CCS) as the primary means of reducing emissions. The Oil Sands Net-Zero Pathways Initiative, which includes all the major bitumen producers, estimates that CCS will account for two-thirds of emissions reductions by 2050.

> "We're once again in a position where geopolitics are absolutely rupturing global energy markets, and just as then, Alberta can be part of the solution with that, but there's challenges...I would argue those challenges are not as great as the original challenges of turning the oilsands into commercial viability."
>
> *- Mark Carney, Calgary Herald, June 28, 2022*

Storing carbon dioxide (CO_2) underground, however, is not a silver bullet, and the technology is far from proven. Alberta faces the danger that relying upon CCS entrenches the economic status quo, making adaptation and change more difficult in the future. Even though Alberta is a global leader in CCS, most notably with Shell's Quest project and the Alberta Carbon Trunk Line, the technology has never been implemented at the scale Alberta requires. The Trans Mountain Expansion pipeline (TMX) and the Site C hydroelectric dam in British Columbia, both of which are suffering significant cost overruns, are a cautionary tale about the financial risks of megaprojects. In the case of TMX and Site C, the technologies involved are well known and Canada has extensive experience with them, but that has not prevented costs from ballooning. And global organizations like the Intergovernmental Panel on Climate Change (IPCC) have cautioned against relying too

heavily upon CCS because its scalability has not yet been proven. This report argues for a different approach to carbon: instead of paying to avoid it, embrace it. Become the world's best managers of CO2 emissions by using carbon to create new products, primarily materials.

This is a strategy built on innovation. There is no province better equipped to lead a Canadian carbon revolution. Alberta's long history of profitably exploiting difficult, high-cost hydrocarbon resources has made it an innovation leader. A well-developed innovation ecosystem exists within Alberta universities, research facilities, oil and gas companies, and the hydrocarbon supply chain. Most importantly, Alberta is home to an educated, experienced, and entrepreneurial innovation workforce.

The AFL's strategy is to use that innovation as a foundation to reposition Alberta as a global leader in the carbon revolution. In the process, Alberta will finally enjoy the "diversification" that has been the goal – and rallying cry during elections – of governments for decades.

Former Premier Peter Lougheed is the inspiration for this strategy. He often said that Albertans own the oil and gas resources and they should think like owners. What is the strategy that will create the most value, the most benefit for the working people of the province? Not, we hasten to add, the most value for shareholders of oil and gas companies, who are in reality leasors of the resource, not owners.

This is an exciting time in our history. The global energy system is undergoing a once-in-a-hundred years transformation thanks to new technologies and government policies, setting the stage for Alberta's transition to the next stage in the evolution of the provincial energy economy. Carbon is front and centre in that transformation.

But with innovation comes risk. As a small, open economy, Canada doesn't generate enough domestic capital to fund the large-scale innovation envisioned by this report. This is a particular problem for that part of the innovation cycle called the "valley of death." A company, especially a start up, has proven the technology in the laboratory and perhaps with a demonstration project, but has exhausted initial stage capital. Private investors need to see more progress before risking more capital. Many innovations languish in the "valley of death" and don't survive. Federal and provincial funding programs target this problem, yet it continues to persist.

The rarely used solution is public investment in return for equity in the innovating company. If the Alberta government provides funds to a commercial entity, why should it not receive profits if that company succeeds? Surely this is better than simply giving the tax dollars of hard-working Albertans to private investors? Once the government is an equity owner, then it has further incentive to help that company scale up and successfully commercialize its innovations.

And is it in the owners' best interest to let oil and gas wind down as global demand falls and Alberta hydrocarbons become less and less competitive? Or is their interest better served by exploring alternative uses for those hydrocarbons – like turning bitumen into carbon fibre, for example – that extend the life of the sector? And is it not in the owners' interest to act even if oil and gas producers have other priorities?

Some observers, like the Public Policy Forum, argue that governments should subsidize decarbonizing the oil sands to help companies remain competitive as long as possible, after which the sector will be naturally phased out by market forces. That strategy will benefit both the producers and the resource "owner" (royalties, taxes, jobs) for another decade or two, but ignores opportunities, such as Bitumen Beyond Combustion, to extend the life of the resource beyond 2100.

This report argues that the interests of the Alberta hydrocarbon owners, the people of the province, are best served by extending the life of a net-zero, environmentally sustainable resource as long as possible and extracting as much value as possible from each and every barrel. Alberta Innovates estimated that when a barrel of bitumen fetches $30, turning it into carbon fibre would create $217 of value, while other forms of non-combustion use like asphalt binder or activated carbon would add $50 to $100.

7 MISSIONS TO TRANSFORM ALBERTA'S ENERGY ECONOMY

7 MISSIONS TO TRANSFORM ALBERTA'S ENERGY ECONOMY

"Energy" has become synonymous with oil and gas in Alberta. In this report, we think of energy in a broader sense as hydrocarbons, electricity, and low-carbon fuels.

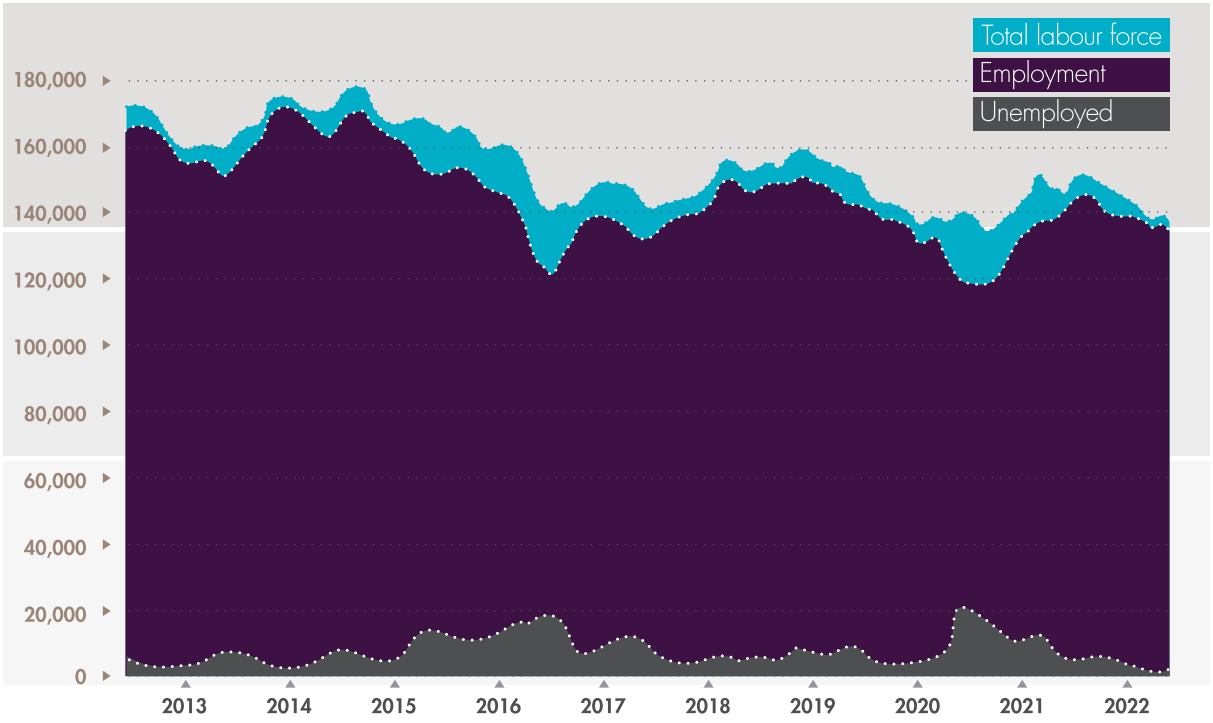
The strategy we recommend has three parts: one, preserve as much of traditional oil and gas extraction as is consistent with a net-zero future; two, transition as much of bitumen and natural gas (augmented with captured CO2) as possible into materials manufacturing; three, expand the provincial clean energy economy (by which we mean electricity, hydrogen, and other low-carbon fuels) by a factor of five to 10 times.

OIL AND GAS BACKGROUND

Oil and gas lead Canada's exports by a wide margin (more than double auto manufacturing) and Alberta accounts for roughly 80% of national oil production and 75% of natural gas output. Canada is the fourth largest oil producer in the world and has the third largest reserves thanks to the oil sands. Canada is the fifth largest gas producer, ranking 18th in total proven reserves.

But the evidence suggests that the oil and gas industry has matured, with growth slowing because of lower capital expenditures (see chart below). S&P Global's annual oil sands forecast foresees a supply growth of 500,000 barrels per day by 2030, from 3 million barrels per day to 3.5 million but down 400,000 from the 2019 forecast. The Alberta Energy Regulator anticipates modest increases in capital spending over the next decade, indicating that the era of rapid growth is over despite the high prices caused by tight supply globally.

Alberta Oil and Gas Employment



Source: PetroLMI/Energy Safety Canada

Workers should expect a significant impact on Alberta oil and gas jobs. The provincial industry has already lost almost 40,000 positions, down from 171,000 at the peak in late 2013. The impact was especially pronounced in well servicing, with employment plummeting from 80,000 to just under 40,000 in June, 2022. This trend is likely to continue.

Digital technologies that improve efficiencies and lower costs, often by eliminating jobs, have taken hold over the past five years. Consulting firm EY estimated in 2020 that Canada would lose 30% of its oil and gas workforce by 2040, which would likely bring the total under 100,000 positions, with most of the job losses occurring in Alberta. Automation analysts working in the Alberta oil patch say the switch to digital is happening faster than expected and they think the job losses anticipated by EY will occur well before 2030.

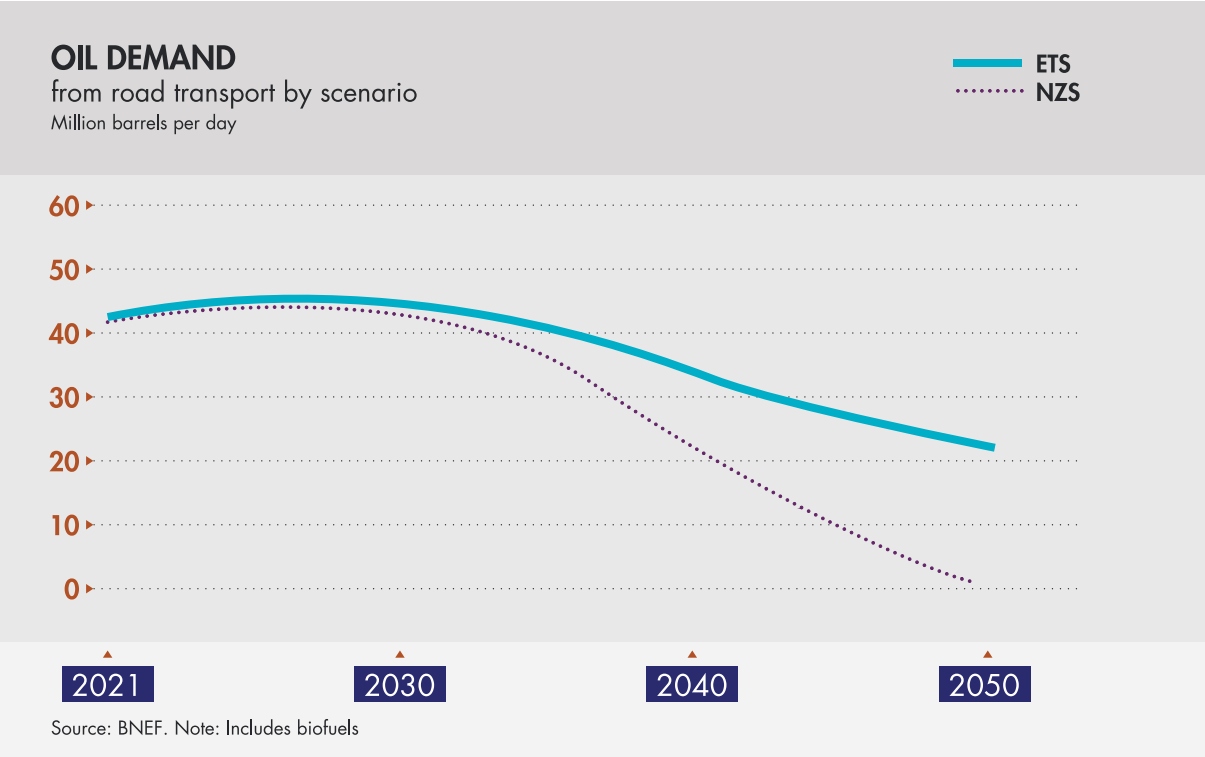
Alberta must finally accept that the traditional oil and gas industry is no longer the job creation engine it once was. Like most industries, hydrocarbon extraction is being transformed by new technologies. From automated drilling rigs to predictive maintenance using artificial intelligence to remote monitoring of well sites, those technologies are displacing workers. And the jobs are not coming back.

The pain, however, will not be shared by corporate executives or shareholders. Companies are committing in their five-year strategies to returning most of their profits back to shareholders through higher dividends and share buybacks. This trend is not unique to Canada. Oil and gas corporate returns have performed poorly relative to other sectors, like tech, and investors are demanding higher returns. Suncor, for example, promised investors it will give back 75% of free cash flow and seriously consider doing the same for the remaining 25%. The corporations are making these commitments at the same time they are laying off workers and underfunding their environmental obligations. Their shareholder buy-backs also dwarf their investments in renewable energy.

Albertans should expect this situation to continue for the rest of the 2020s because the global industry is not investing enough capital to adequately replenish supply. In fact, exploration and production investments have been down for years. The press release from an August 3, 2022 gathering of OPEC and non-OPEC members "noted that chronic underinvestment in the oil sector has reduced excess capacities along the value chain (upstream/midstream/downstream)." The cartel warned that "insufficient investment into the upstream sector" will limit supply growth after 2023. Consulting firms like Wood Mackenize have predicted high prices for the rest of the decade, followed by decline after electric transportation begins to destroy oil demand beginning in the early 2030s.

Based upon this evidence, a reasonable assumption is that Alberta has roughly a decade of high oil revenues to finance its energy transition strategy. There are three important caveats to that assumption.

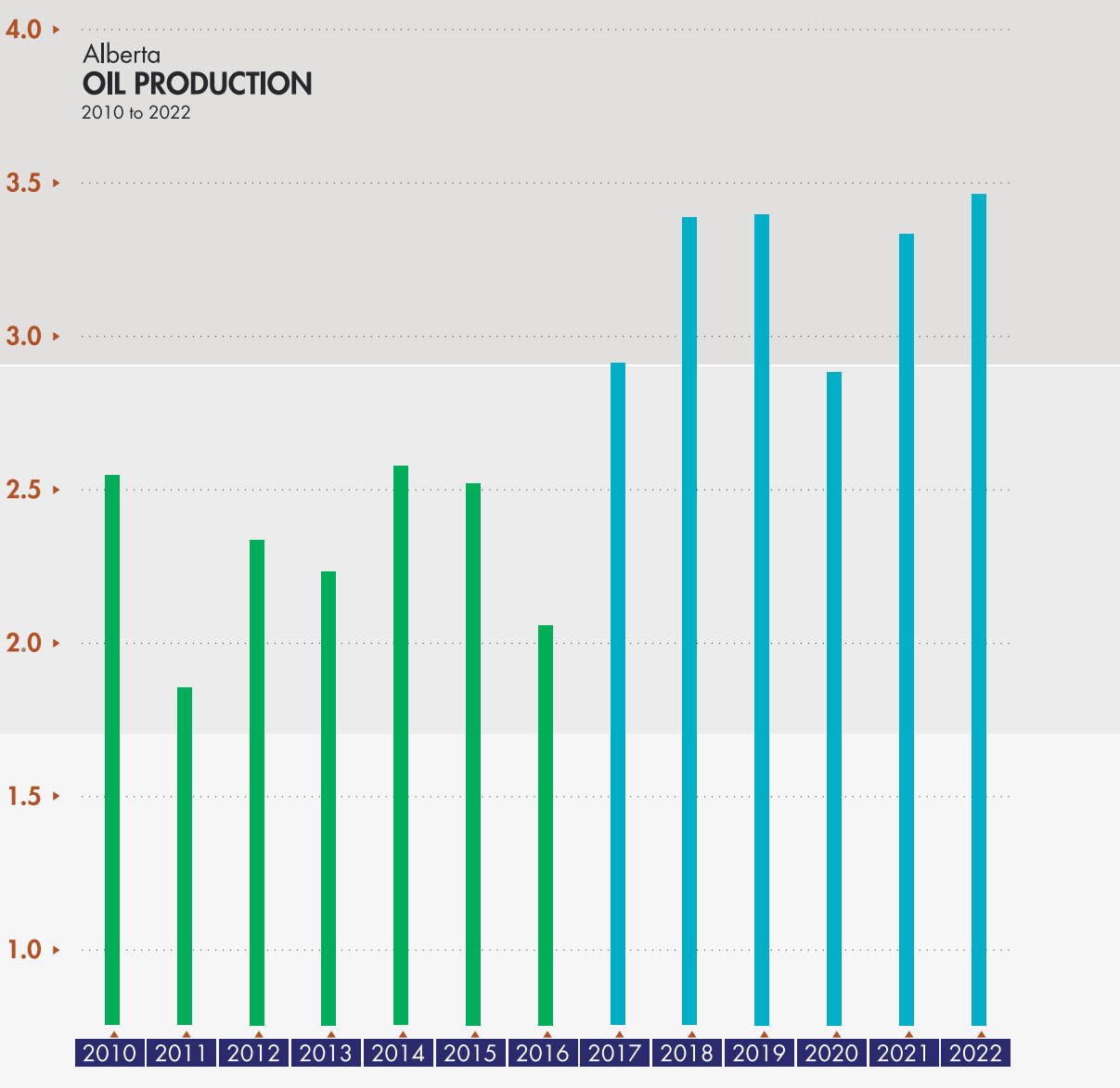
The first is the Inflation Reduction Act in the United States. President Joe Biden promised that American Greenhouse emissions would be halved by 2030. Modelling from Princeton University's REPEAT Project estimates that emissions from ground transportation, power generation, and industry, all of which are big oil and gas consumers, will account for 52% of the Act's reduction targets, about a quarter of total US emissions. Since almost all Canadian oil and gas exports are destined for American markets, this could have an outsized effect on demand for Alberta output.



The second is the more rapid than expected shift by the global auto industry from the internal combustion engine to electric. The major manufacturers (excluding China, India, and smaller automakers) have committed $341 billion by 2026 for the switch to electric vehicles. BloombergNEF notes that it has to regularly update its EV sales forecasts because the industry is transforming so rapidly.

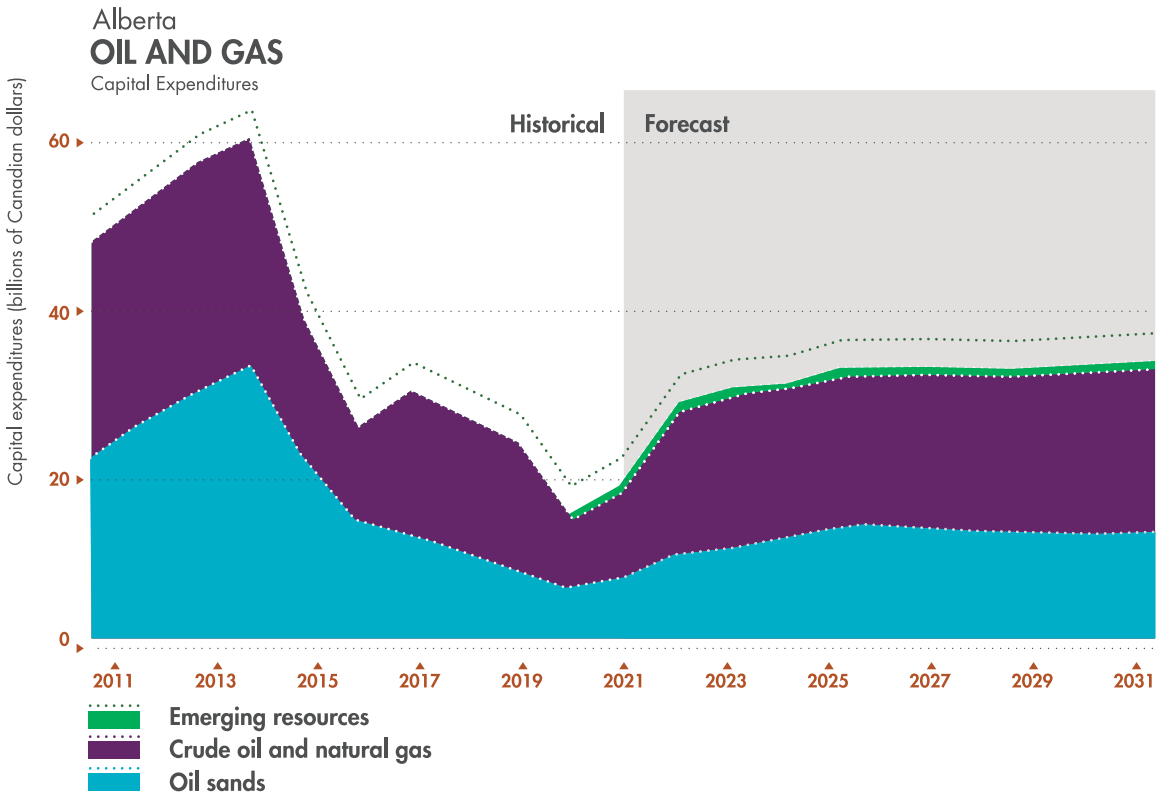
The third is the shock to the global energy system caused by Russia's invasion of Ukraine. The resulting energy crisis drove oil and gas prices through the roof, spiked inflation rates, and raised concerns about energy security around the world. But the threat also caused Europe to double down on the energy transition. The European Union passed the REPowerEU Plan, which accelerates the switch to renewable energy and encourages greater energy efficiency. If the EU strategy works, a major oil and gas market will shrink even quicker than expected.

Therefore, a more reasonable assumption about the Alberta oil patch's future is that the last boom has started but it will be over well before 2030. A prudent provincial government should plan for the worst case scenario, not the best.



Source: ATB Economics.

atb.com/theowl



Source: Alberta Energy Regulator.

ENERGY TRANSITION LEADERSHIP FROM OIL AND GAS SECTOR?

Diversification of energy sources rather than transition. Pourbaix's comment is a perfect example of energy transition "slow walking" (if you can't deny change, claim it will take a very long time). Many Alberta industry leaders argued for years that the energy transition wasn't a thing. When the evidence for the transition became undeniable, they switched to the slow-walking narrative. Either way, the objective is the same: defend the status quo as long as possible.

A big reason oil sands CEOs oppose change is because since 2014 they have ruthlessly driven down their production costs. An oil sands project requires a very high upfront capital investment, but the low decline rate means little sustaining capital is needed over the 30 to 50-year life of the project. Almost all projects break even now between $30 and $40 per barrel, with some operations headed toward $20. Despite the oil sands' reputation as a high-cost, marginal barrel of production, in fact the opposite is now true. Economists expect oil sands crude will remain a competitive barrel for a long time, but that doesn't mean that the sector will continue to create jobs. In fact, the jobs boom associated with the oil sands between 2004-2014 was a construction jobs boom, not an energy jobs boom. With little new investment planned -- and profits being used to pay down debt and pay out dividends, the oil sands will never be the engine for job creation it once was, even if it continues to make huge profits. From 1995 to 2014, there were 6,000 to 15,000 permanent layoffs recorded each year. And of those workers aged 55 and older with high tenure, they were far less likely to find a new job.[19]

19 Statistics Canada (December 1, 2020), Job displacement in the oil and gas industry in Canada. https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2020068-eng.htm

The big Alberta oil companies have become lean profit-maximizing machines. When oil prices are over $100, the riches are almost embarrassing – in the tens of billions last year. Wood Mackenzie expects high profits to continue for the rest of the 2020s because of chronic under-investment in exploration and production. Small wonder that CEOs see little reason to change. Nevertheless, considerable pressure to change comes from government climate policy, rapid technology advances, investors concerned about stranded assets while flocking into cleantech, and the changing preferences of consumers, who prefer electric vehicles and heat pumps for their homes.

That pressure will only intensify in the future, which is partly why the Oil Sands Net-Zero Pathways Alliance was created in 2021. Alliance members – Canadian Natural, Cenovus Energy, ConocoPhillips Canada, Imperial, MEG and Suncor Energy – represent 95% of oil sands production.

The strategy is to become "cost and carbon-competitive" – a phrase heard frequently in downtown Calgary boardrooms – well past peak oil demand. The companies have modelled oil and gas consumption to mid-century and concluded that being better at the status quo is more profitable than innovating for a different future.

The exception is Suncor, which is unique because it is the only oil sands company not committing to grow production. Instead, it will pursue a "value over volume" approach. Suncor has also invested in many energy technology start-ups, such as Enerkem (Quebec) and Lanzajet (USA). The company has long been a supporter of Alberta Innovates' Bitumen Beyond Combustion research. But for Suncor, this is just tinkering around the edges of the oil sands business model, not a fundamental rethinking of that model.

Nor is it ever likely to re-engineer that business model. The oil and gas sector innovates extraordinarily well "inside the box" of industry norms, developing new technical solutions, raising efficiencies, and lowering costs. The sector does less well "outside the box," in part because the corporate culture is intensely risk-averse.

Low-cost production and high prices, which international consulting firm Wood Mackenzie thinks will persist throughout the 2020s, further dampens the incentive for Alberta companies to lead the provincial energy transition. Instead, those companies (including Suncor) are telling investors that they plan to give back almost all of their profits in the form of bigger dividends and share buy-back plans.

As the Pourbaix quote demonstrates, however, the oil company CEOs are trying to position themselves as energy transition leaders. Former Suncor chief executive Mark Little even penned a 2020 op-ed in which he argued that the oil sands can lead Canada's energy transition. This should be seen for what it really is, self-serving rhetoric designed to blunt federal emissions reduction policies the companies believe will raise operating costs.

Albertans should not expect energy transition leadership from the oil and gas sector.

WHO SHOULD LEAD THE TRANSITION?

Albertans often forget that the oil and gas industry vigorously opposed Peter Lougheed's terms for Alberta's participation in the Syncrude consortium, as well as the creation of AOSTRA (Alberta Oil Sands Technology Research Authority). CEOs claimed excessive state intervention and interference in the private sector. Lougheed, however, stuck to his guns. He negotiated for equity in the company, generous royalty and profit sharing, and ownership of key infrastructure. When a consortium member pulled out in 1975 because of ballooning construction costs, Lougheed brought the Canada and Ontario governments to the table and put together a rescue package.

What Lougheed thought of as province-building, the CEOs called socialism and communism, political labels that are today applied in some quarters to even mild government policy and regulation – and would no doubt be trotted out again if an Alberta premier were to emulate Lougheed.

But it is Lougheed's active province-building, thinking about Alberta's hydrocarbon resources like an owner, and entrepreneurial state policies that the AFL believes are needed today.

A NEW MODEL FOR ALBERTA HYDROCARBONS

The global oil industry is already being disrupted and consumption is set to decline by at least a quarter (but likely much more) by 2050, likely followed by ever lower natural gas consumption sometime after mid-century.[20] There are three general views about how Canada and Alberta should respond to this disruption.

1. Status quo forever: plenty of Albertans, including many oil and gas executives, believe hydrocarbon demand will never fall and may, in fact, increase as consumers in developing economies become middle class and buy automobiles. Russia's invasion of Ukraine and serious European energy security concerns have put wind in the sails of this argument, whose proponents think governments should subsidize hydrocarbon infrastructure because "the world needs more Canadian oil and gas."

2. Decarbonized market phase out: Governments should generously subsidize lowering oil and gas emissions, primarily through carbon capture utilization and storage, and allow supply to be determined by market forces. If demand is destroyed faster than expected, then production will fall over time, theoretically until it reaches zero. The industry will be phased out by market forces, not government policy.

3. Government mandated phase-out: many environmentalists argue that the climate crisis is so severe that hydrocarbons, especially high emissions-intensity Canadian crude oils like bitumen, should be phased out by government actions within a decade, whether they are competitive or not.

The Alberta Federation of Labour believes that none of these viewpoints is in the long-term economic interest of Alberta's resource owners. The "status quo forever" risks leaving us completely unprepared for the energy transition. The "government mandated phase-out" shuts-in a valuable resource with no thought to the role of hydrocarbons in a low-carbon future and the "decarbonized market phase-out" suffers from the same defect, while committing government to huge costs with no returns.

20 Electric Vehicle Outlook 2022, BloombergNEF, https://bnef.turtl.co/story/evo-2022/page/7/2?teaser=yes


AFL
PROPOSES
NEW STRATEGY

AFL PROPOSES NEW STRATEGY

Instead of following any of the paths listed above, the Alberta Federation of Labour proposes that our oil and gas sector be transitioned over the next 30 years from producing feedstock for fuels to primarily producing feedstock for materials manufacturing.

The AFL recognizes that capital-intensive industries like oil and gas don't turn on a dime. Alberta companies have customer relationships and contracts, and some have extensive facilities, like refineries, in the United States. Changing the basic structure of the midstream and downstream segments of the industry will take time and planning.

Nevertheless, the AFL believes such a transition is in Alberta's best interests for three reasons:

1. As the resource owner, Albertans have an obligation to mitigate risk caused by global oil and gas demand destruction. International markets are changing rapidly, the pace of that change sped up by shocks like the COVID-19 pandemic and Russia's invasion of Ukraine.

2. Albertans also have an obligation to maximize the economic benefits, both in the short run and for future generations, of the resource. Industry leadership has not demonstrated that it is willing or able to spearhead change. As a rule, industry incumbents do not lead change.

3. Alberta has by far the highest greenhouse gas emissions of any province, caused primarily by oil and gas extraction. Decarbonizing production while transitioning to materials manufacturing will significantly lower, if not eliminate, lifecycle emissions associated with Alberta hydrocarbons.

In the face of disruption and rapid transition, Alberta can continue to deny and delay, reluctant to do more than tinker with the status quo. Then, in the not-too-distant future, probably before the end of this decade, the province can scramble to catch up as it realizes how radically and rapidly the global energy system is transforming. If present trends continue, a messy, traumatic, disorderly transition looms, with ordinary Albertans bearing the brunt of the unpleasant consequences.

Or Alberta can respond now and design an orderly transition that matches the urgency of the moment. With the second objective in mind, the AFL describes below the seven energy and economic missions and the seven policies necessary to achieve a successful outcome.

MISSION #1:
HYDROCARBONS AND CO2-BASED MANUFACTURING

The challenge:

- Transition hydrocarbon sector from producing feedstock for fuels to feedstock for materials manufacturing and low-carbon fuels.
- Use captured CO2 as a feedstock for materials manufacturing.

The mission:

- Significantly expand the funding for research and development of new processes for manufacturing products and low-carbon fuels from bitumen and captured CO2.
- Establish a world class bitumen and CO2-based manufacturing sector in Alberta.

Expand Alberta's world class petrochemicals cluster, especially the production of recyclable plastics and other environmentally-friendly products.

"By looking beyond convention, we can set in motion the next evolution of our resource industry."
– Laura Kilcrease, CEO, Alberta Innovates.

Laura Kilcrease wrote those words in 2021 about the potential of transforming bitumen into a long list of high-value materials instead of fuels. But the principle also applies to petrochemicals because Alberta already has the second largest petrochemical cluster in North America behind the US Gulf Coast. It also applies to captured CO2 because Alberta is a world leader in CCUS technology and has made tentative steps toward turning carbon dioxide into precursors and materials that hint at the potential.

The AFL's vision for the Alberta hydrocarbon sector is that these three carbon resources – bitumen, natural gas, captured CO2 – form the basis for a new post-combustion manufacturing industry that eventually creates more jobs than the 177,000 workers employed in the Alberta oil and gas industry at its peak in 2014.

> By looking beyond convention, we can set in motion the next evolution of our resource industry.
>
> *– Laura Kilcrease, CEO, Alberta Innovates.*

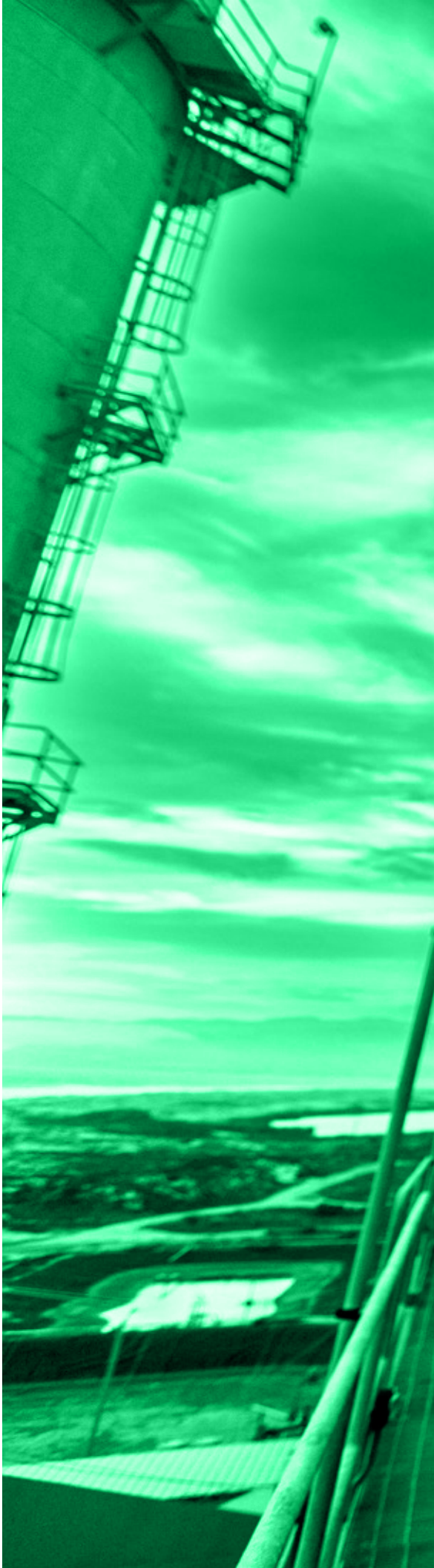
Additional benefits of this vision include:

- Higher value created from the resource.
- Higher government revenues to support public services for Albertans.
- More stable economy. This strategy could finally end the boom-bust cycle that has bedevilled Alberta for generations.
- A significant reduction in, and possibly the end of, Scope 1, 2, and 3 emissions from Alberta oil and gas production.

Putting the new vision into action starts with research and development, just as it did when Lougheed founded AOSTRA in 1973.

Alberta Innovates

The first Alberta research council was created in 1921, undergoing a variety of name and mandate changes before becoming Alberta Innovates in 2010. The agency's annual revenue fell from $290 million in 2018–19 to $184 million in 2021–22 even as it was asked to do ever more research and development. Shifting the oil and gas industry from feedstock for fuels to feedstock for materials manufacturing and low-carbon fuels will require an enormous effort over the next decade or two, in much the same way AOSTRA supported the development of the oil sands industry. Alberta Innovates is the logical organization to lead the research.



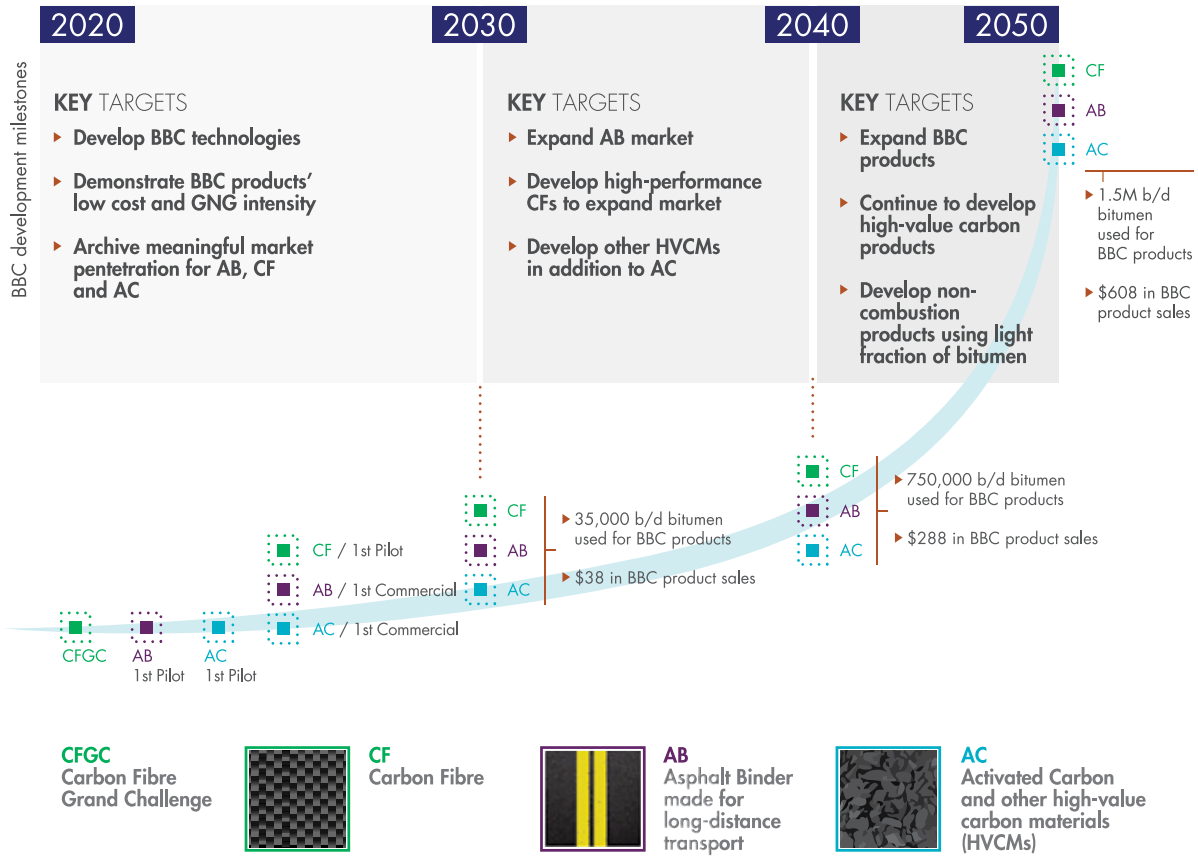
Bitumen Beyond Combustion

Alberta Innovates launched the Bitumen Beyond Combustion research program in 2017 to identify advanced materials opportunities from the carbon-rich oil sands product. Leading BBC candidates include carbon fibre, asphalt binder, and high-value carbon materials such as activated carbon, graphene, carbon nanotubes, metal carbides and synthetic graphite.

Turning bitumen into carbon fibre adds an estimated $179 of value to a barrel. Alberta Innovates introduced a Carbon Fibre Grand Challenge in 2021. A number of teams – composed of scientists, engineers, and other technical experts – are competing to develop a process to turn bitumen, with a consistency like peanut butter, into filaments thinner than a hair, which then become the input into carbon fibre manufacturing.

A plentiful supply of inexpensive (perhaps as low as half the current cost) carbon fibre would be a game changer for the North American materials industry. The most obvious application is electric vehicles, where "light weighting" to offset the extra kilograms of the battery pack is an industry priority. Other uses include construction materials and adding it to cement to increase strength.

Carbon fibre may be the most advanced of Alberta Innovates' materials research, but it is far from the only one. Preliminary estimates show that using bitumen to make asphalt binder adds $50 of value to a barrel of bitumen and "high-value carbon materials" could add $100.



CO2-based Manufacturing

Turning captured CO2 into materials is a nascent industry. The IEA noted in a 2019 report that the market for CO2-based materials will be small in the short-term, but is expected to scale up rapidly. A 2022 Nature article reports that more than "80 firms are working on new approaches to using CO2." The market has grown to US$1 billion, but is expected to grow to $70 billion by 2030 and as much as $550 billion by 2040.

Alberta-based Capital Power is breaking into the industry. The utility has commissioned the engineering and design work for a carbon capture system at the Genesee 1 and 2 power plants. The captured CO2 will be turned into carbon nanotubes, tiny building blocks that can be added to many types of material, such as carbon fibre. The utility plans to have the CCUS operating by 2026. The 2,500 tonnes of nanotubes per year will make the operation one of the largest in the world. Capital Power is already soliciting orders for nanotubes. Applications for the nanotubes include batteries, building materials like cement and steel, and polymers and coatings.

The IEA notes that scaling CO2-based manufacturing will require extensive government policy and financial support. As the CCUS network grows in Alberta, the province will have plentiful access to CO2 feedstock. The Capital Power example demonstrates the potential for growth in this early-stage industry.

Recommendation:

- Create the Alberta Carbon Fibre Corporation for the specific purpose of advancing the production of carbon fibre precursor and the manufacturing of carbon fibre within the province. Whether the Corporation owns 100% of an operation or partners with the private sector, the goal should be to build a world class carbon fibre manufacturing industry in Alberta.
- Accelerate Alberta Innovate's timeline in the graphic above by ramping up Alberta Innovates' research and development capacity commensurate with the strategies outlined in this report by allocating between $500 million and $1 billion per year to the budget. Lobby the federal government to pay a substantial portion of this budget. But, if Ottawa refuses or contributes a smaller amount than expected, the Alberta government should fund the expanded budget from its own budget surpluses, from the industrial emitter carbon price program (TIER), and the Heritage Fund if necessary.
- The Alberta Government should retain ownership of the intellectual property created by Alberta Innovates and use it to best advantage when partnering with the private sector or creating crown corporations to exploit opportunities.
- Create the Alberta CO2 Manufacturing Corporation for the specific purpose of advancing the production of captured CO2-based inputs (e.g. carbon nanotubes) and the manufacturing of materials within the province. Whether the Corporation owns 100% of an operation or partners with the private sector, the goal should be to lay the foundation for a world class CO2-based materials manufacturing industry.

MISSION #2:
OIL AND GAS PRODUCTION

The challenge:

- Adapt oil and gas production to the low-carbon future while lowering emissions to achieve net-zero by 2050 or sooner. [Given the flags you rightly raise above about the reliability of CCS, should you not name here that lowering emisisons will require a ramping down of oil and gas production?
- Mitigate industry environmental liabilities
- Preserve as many existing jobs as possible.

The mission:

- Assist the sector with efforts to lower costs and remain competitive while also paying reasonable taxes and royalties.
- Compel the sector to achieve Net-zero by 2050.
- Compel the sector to post adequate funds to reclaim the oil sands tailings ponds and all inactive and orphan wells in Alberta.

The Go Forward Strategy for Existing Extraction Industry

Some vocal environmental groups demand a planned phase-out of Canadian oil and gas production. Some influential industry boosters, many of them prominent Alberta supporters, demand a significant expansion of oil and gas exports, arguing that Canadian hydrocarbons are somehow more "ethical" than those produced in other countries. This report stakes out a middle ground in the debate.

Will there be demand for oil after 2050? Of course. Even if oil is no longer refined into fuel for ground, aviation, and maritime transportation, there will still be demand for non-combustion purposes like petrochemicals. Some plants, such as the Hengli refinery and petrochemical complex in China, often use less costly lower grades of crude like Alberta's heavy crude and bitumen.[21] Natural gas is expected to be a bridge fuel, with global demand lasting well beyond mid-century, although certainly not at current levels if global temperature raise is to be kept at a safe level.

The AFL takes the position that Alberta producers should be allowed to compete in those markets, with two conditions.

The first is that Alberta oil and gas achieve net-zero emissions, preferably long before 2050. The industry's ambition must be raised much higher than it has to date. The second condition is that the industry must properly fund its environmental liabilities. A conservative estimate for oil sands tailings ponds alone is $31 billion (with only $900 million currently pledged as security), while estimates for the entire sector range as high as $260 billion.

If the industry refuses to accept these conditions, then the Alberta government should use all the tools at its disposal (policy, regulations, access to funding, etc.) to force compliance. Governments and oil companies have for decades prioritized profits over the environment and that must end. Executives must be held to higher standards now while there is still time – and while they're still swimming in profits.

21 Florence Tan, "Chinese refiner Hengli to receive first Saudi crude oil by July: source," Reuters, May 30, 2018. https://www.reuters.com/article/us-china-saudi-oil-refinery-idUSKCN1IV138

Net-zero Emissions: Carbon Capture, Utilization, Storage (CCUS)

The big oil sands producers (Suncor, Imperial Oil, Cenovus, CNRL, MEG Energy) have been working on emissions-reducing technologies for decades. Substituting solvent for steam in SAG-D production is just one example. Unfortunately, these technologies have not been widely adopted in the field.

Therefore, lowering emissions rapidly, especially with the introduction of the new federal oil and gas emissions cap, will require extensive use of CCUS. The oil sands Pathway Alliance estimates that two-thirds of reductions will come from carbon capture.

Canada is a global leader in CCUS. Of the 40 megatonnes (Mt) of CCUS in existence, seven Mt are located in Canada, with the Alberta Carbon Trunk Like (1.5 to 2 Mt per annum) and Quest (1.2 Mt per annum) leading the way. In 2021, Shell Canada announced the Polaris project, another CCUS project at its Scotford refinery and chemicals plant, which it says will not require public subsidies, unlike the company's Quest project that cost Alberta $865 million.

Despite the progress with CCUS in Alberta, there are still concerns that the technology may not scale economically. A recent report from the Inter-governmental Panel on Climate Change (IPCC) suggests that the potential benefits of CCUS are much less than proponents claim. "Carbon capture technologies are at the other end of the spectrum, ranking among the highest-cost options with the lowest mitigation potential," according to one analysis of the report.

This is not necessarily proof that CCUS is impractical and should be abandoned, but that the technology should be treated as a "wild card" that needs further research and development instead of a "safe bet" that is proven and scalable.

The Oil Sands Net-zero by 2050 Pathway Alliance estimates that about two-thirds of the sector's 70 Mt per year of greenhouse gas emissions will be abated by CCUS. Oil sands CEOs think that decarbonization will cost $75 billion over the next 30 years and expect governments to contribute $50 billion. The cost of CCUS should be primarily borne by the private sector. At a time when large Canadian oil companies are returning tens of billions in free cash flow to investors in the form of higher dividends and share buybacks, the taxpayer cannot be expected to subsidise private capital.

The 2021/22 federal budget committed Ottawa to spend $319 million to help develop CCUS technologies. A refundable tax credit is expected to cost $2.6 billion over five years starting in 2022-23, with an annual cost of about $1.5 billion annually beginning in 2026-27 through to 2030. The credit is not exclusively for oil and gas production. It remains to be seen how much of the funding is allocated to non-oil and gas projects. In any event, the credit is less than the industry was expecting.

The Alberta government, as the owner of the bitumen resource, does admittedly have an incentive to invest prudently and strategically in infrastructure that will extend the life of oil sands assets capable of pivoting to materials feedstock. CCUS is also critical to the development of a hydrogen economy and decarbonizing difficult to abate sectors like cement production.

But CCUS must not be just about decarbonizing assets that may or may not be competitive as hydrocarbon consumption declines over time. The Alberta government has limited capital to invest and cannot afford to waste it on assets that may become stranded as global energy markets change. That capital is better spent preserving bitumen production that can become materials manufacturing feedstock or whose CO2 can be processed into materials.

Furthermore, the CCUS gathering network must be designed to facilitate and support the use of captured CO2 for materials manufacturing. The infrastructure must not be primarily built with the intention of burying all or most of the CO2 underground. Carbon dioxide must be viewed as a valuable resource, the foundation of hydrocarbon-based manufacturing in the province.

Cleaning Up Environmental Liabilities

Alberta has strict rules requiring oil and gas operators to clean up inactive and abandoned wells, remediate tailings ponds, and generally plan for the end-of-life of assets. Unfortunately, industry doesn't always follow those rules and the Alberta Energy Regulator doesn't always enforce them. We must also demand worker representation with AER, to ensure that they can be involved in decision making and highlight areas where enforcement is needed. Decades of lax enforcement have left Alberta with hundreds of billions in environmental liabilities. If action is not taken soon, taxpayers may be on the hook for the clean up.

This report will focus on two urgent and significant issues, but there are others that must also be addressed in the near future.

Inactive and Orphan Wells

The Pembina Institute estimates that there are 164,000 inactive or abandoned wells in Alberta. Some of them have fallen to the Orphan Well Association, the organization of last resort, to reclaim. The Alberta government loaned the Association over $200 million and Ottawa contributed $1 billion toward well clean up as part of its COVID-19 job creation programs. There have been accusations that the companies used the funding to remediate wells they would have paid for anyway. The entire process has been opaque and lacks transparency and accountability.

One thing is certain, there are far too many inactive and abandoned wells for the current system to clean up by the early 2030s. The only remediation of those assets will take place in a timely manner is if the Alberta government requires operators to clean up their wells and penalizes them if they do not.

Oil Sands Tailings Ponds

There are now 37 ponds containing 1.3 trillion litres of oil sands tailings composed of sand, silt and toxic compounds. The ponds have grown as scientists and industry researchers have struggled to devise a method for reclaiming them. The Secretariat of the Commission for Environmental Cooperation – an independent organization set up by Canada, the United States and Mexico to research environmental issues – found in 2020 that the tailings ponds are leaking. The Commission also found that there is no evidence environmental monitoring data does not inform federal Fisheries Act enforcement. Problems with federal-provincial coordination were also noted.

The issues described above are extensively documented. While the oil sands operators have poured hundreds of millions into research and the Alberta government and its energy regulator talk a good game, there is still no widely accepted method for cleaning up the tailings ponds. And the security deposited against those costs are a small fraction of the estimated reclamation cost.

Given the robust oil company earnings expected during the 2020s and the distinct possibility earnings will be much lower after the early 2030s, this may be Alberta's last chance to clean up a looming environmental tragedy.

Recommendations:

- That employment in the Alberta oil and gas upstream and midstream be maintained at the highest level possible.
- The Alberta government should instruct the oil and gas industry that financial support for decarbonization and transition to low-carbon business models is contingent upon achieving federal targets yet to be determined for the oil and gas emissions cap.
- The Alberta government should enforce existing regulations requiring reclamation of inactive and abandoned wells, oil sands tailings ponds. The regulations should be strengthened if necessary.
- Appoint a labour/industry/expert committee to advise the Alberta government on the best design of a CO2 gathering network that will support decarbonization and hydrocarbon-based manufacturing. Engage the Government of Canada about funding a substantial portion of the network.

MISSION #3:
ALBERTA POWER SECTOR IN THE 2ND AGE OF ELECTRICITY

The challenge:

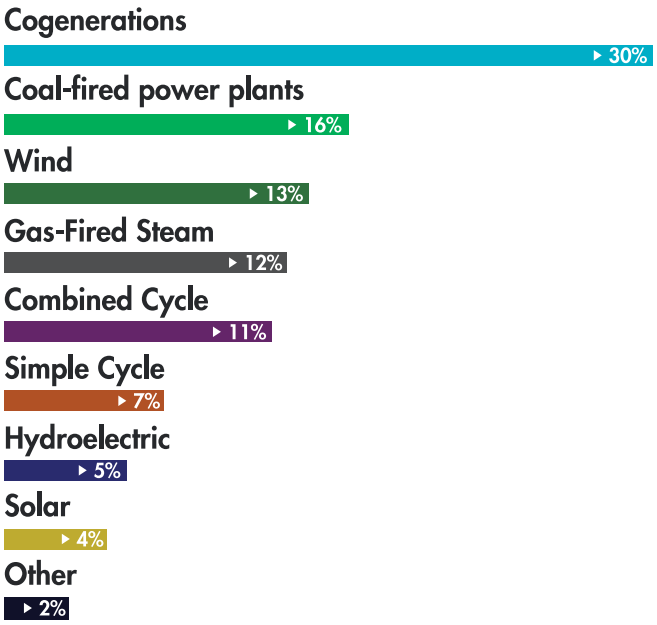
- Build the electricity system Alberta needs to support a 21st century economy.

The mission:

- Expand electricity generation by two to three times (at a minimum) by 2050, with a focus on renewables.
- Build out east-west transmission with other provinces while advocating for a Western Canadian regional electricity market.
- Decarbonize the grid while expanding generation and transmission.
- Use abundant, low-cost, clean electricity as leverage to build and attract new industries.
- Invest in "wild card" electricity technologies like deep geo-thermal.

The Alberta Electricity System

Alberta has a generating capacity of 18,286 megawatts that generates 81 terawatt hours of electricity annually. The Alberta Electric System Operator manages the privately-owned transmission system, operates the provincial wholesale electricity market, and plan for the future of the power grid. Large utilities include TransAlta, Heartland Generation, ENMAX, and Capital Power.



2021 AESO Annual Market Statticsis

The issues

As fossil fuel consumption declines over the course of this century, electricity and low-carbon fuels whose production relies upon electricity will comprise an ever greater share of global primary energy consumption. The timeline for this switch is uncertain, but the general trends are clear.

On the supply side, three-quarters of new global electricity generation by 2030 will be renewable energy – primarily wind, solar, and storage – according to the IEA. There are other promising energy technologies, like geothermal and small modular reactors, being developed. Doubling or tripling Canadian power generation is a daunting task, but it appears from our vantage point in 2022 that there will be enough generation technologies available to get the job done.

On the demand side, a great deal has changed in just a few years. Light duty vehicles have already passed the inflection point on the adoption curve. Medium and heavy-duty vehicles are expected to be competitive later in the decade as batteries improve and their prices fall. Heat pump adoption is accelerating because of government policies and record-breaking heat waves around the world. And some industrial processes like steel making, which was expected to rely on hydrogen for decarbonization, are already switching to electricity.

The 2nd Age of Electricity is upon us.[22] The 1st Age of Electricity, according to economist Professor Werner Antweiler, began with the initial development of the power sector starting in the late 19th century, then was driven by a remarkable post-war expansion largely completed by the 1970s. The modern power grid has not experienced major innovation for 50 years, but that is about to change as the 2nd Age of Electricity gathers momentum.

A combination of low-cost abundant power, distributed energy resources like wind and solar, the ability to store intermittent generation (e.g. compressed air, flow batteries), the greater use of markets to price electricity, new policies and regulations, and new grid technologies are transforming the old cost-of-service, vertically-integrated utility model. New business models are evolving depending on regional circumstances. Some American utilities, for example, are moving to a distributed energy platform model in which there are many power generators (e.g. rooftop solar, commercial self-generation) and many consumers, all trading electricity and related services through the utility.

How this trend will play out is open to debate. But what is clear is that the power sector status quo is being disrupted by a plethora of innovations. In short, by 2050 the Canadian power grid must be bigger, cleaner, and smarter.

Alberta is well positioned to build the type of grid required for the provincial economy to thrive in the future. Deregulation that began in the 1990s has created a system in which prices are determined by a wholesale electricity market, qualified developers can build generation and be assured they will be connected to the grid in a timely manner (not the case in many other provinces), the transmission and distribution system is privately owned while prices are regulated by the Alberta Utilities Commission, and regulated retailers set consumer rates.

The system is not perfect. For example, consumers have been complaining recently about high transmission and distribution fees that inflate their bills. Also, generators have taken advantage of high wholesale prices to charge more to customers. At some point, the government and the regulator must address these serious concerns.

22 Markham Hislop interviews economist Werner Antweiler from the UBC Sauder School of Business, "The 2nd Age of Electricity…this time we're electrifying EVERYTHING!" Energi Media: https://youtu.be/vB97CaTBrHk

Future of Alberta Power Generation

The Alberta system has a significant advantage over other provinces: the ability to quickly integrate renewable energy into the power grid. Alberta accounted for over 60 per cent of the one gigawatt of wind and solar power installed in Canada last year. In 2022 and 2023, three gigawatts per year will be added nationally, with Alberta again accounting for more than half of new generation capacity.

The renewables surge is being driven by power purchase agreements between wind and solar developers and corporations (including international behemoths like Amazon and Microsoft) seeking abundant supplies of clean electricity to meet their climate commitments. Given that Alberta and Saskatchewan have the best renewable energy resources in Canada, this trend is expected to continue for some time.

Wind and solar are now "safe bet" energy technologies that are being deployed at utility-scale and on building tops around the world. But there are several "wild card" technologies that Alberta should continue to invest in that may prove to be economic later this decade or sometime in the 2030s.

The first is geothermal energy. There are several varieties of geothermal being developed in Alberta – including the Eavor Technologies closed-loop system that generates electricity and heat – that show promise. Deep geothermal, which drills kilometres into the Earth's surface to tap high temperatures, is at an early stage of development but shows excellent potential. Geothermal creates dispatchable power that can offset intermittent wind and solar. And the sector uses technology and drilling techniques from the oil and gas industry, providing opportunities for displaced workers. Geothermal seems to be close to scaling up at competitive costs, in part because firms are incorporating enabling digital technologies like artificial intelligence, data analytics, and cloud computing to surmount technical obstacles.

The second is small modular nuclear reactors. The current Alberta government has signed an MOU with three other Canadian provinces to develop SMR technology. SMRs may be suitable to help decarbonize the oil sands, which require a great deal of process heat, something nuclear reactors generate in abundance. There are, however, concerns that SMRs are still an unproven business model that are likely to suffer the huge cost overruns that are a feature of nuclear power reactors. Alberta is likely to be a minor player in the research and development of SMRs, but the technology holds enough promise that it should not be abandoned, even if it doesn't fulfil that promise until the 2030s or even the 2040s.

Role of storage

If we assume that wind and solar will be the primary means by which the Alberta power grid is decarbonized and expanded over the next decade or more, then storage becomes an important issue. Some components of utility-scale storage have recently become "safe bet" technologies, while others are at various levels of development. For example, lithium-ion batteries are economical now for 4-hour storage and have been deployed at scale in California, but flow batteries from 8 to 16 hours won't be ready for a few years yet. Compressed air storage (e.g., Canadian company Hydro Stor) is another technology that is making great strides but is not quite ready for prime time.

The form of storage that is ready for prime time is hydro dam reservoirs. Specifically, the 80 dams that service British Columbia's 31 hydroelectric facilities.

Hydro and markets as storage

Hydro dam reservoirs can function essentially as batteries for intermittent renewables. When the sun is shining and the wind is blowing, Alberta can send electricity to the West and BC can throttle back the amount of water it flows through its generators. As renewables decline because of the time of day or lack of wind, BC can open the throttle, generate more power and trade with Alberta. Ideally, the four Western provinces would form one regional electricity market, with the two wind and solar provinces (Alberta and Saskatchewan) bookended by the two hydro provinces (BC and Manitoba).

To make this model work requires two things. One, more transmission inter-ties between the provinces. The federal government has allocated billions of dollars to subsidize the necessary infrastructure. Two, east-west electricity markets. All the Western provinces trade electricity into American markets but very little to neighbouring provinces. Designing those markets won't be easy. Alberta's system design is very different from the vertically-integrated crown corporations in the other three provinces.

This model has been talked about for years, with little progress to date. The federal government does not have the constitutional authority to impose east-west electricity trade on the provinces, but it can cajole and offer inducements. Natural Resources Minister Jonathan Wilkinson has been tasked with establishing " a Pan-Canadian Grid Council to promote infrastructure investments, smart grids, grid integration and electricity sector innovation."

Alberta could reap substantial benefits by becoming an enthusiastic supporter of the Council and more extensive grid integration.

Hydrogen as storage, methane substitute for generation

Alberta may be ideally suited to use hydrogen as storage for intermittent renewables, according to a University of Calgary research paper. When wind and solar produce excess electricity, it would be used to create hydrogen (blue at first, then green later on as electrolyser costs fall). The hydrogen would be stored in enormous salt caverns that are relatively plentiful in Alberta and capable of providing inexpensive storage. Power plant gas turbines would be retrofitted to burn hydrogen. If they are not able to be retrofitted, the Alberta government should consider subsidizing the installation of new turbines that are hydrogen-capable.

Low-cost, abundant, clean electricity as a competitive advantage

The power purchase agreements that are currently driving renewable energy investment only hint at Alberta's clean energy potential. With a levelized cost of energy for wind and solar in Alberta between 3 cents and 4 cents per kilowatt hour, the province can use low-cost, abundant, clean electricity to attract new industry, especially the types of manufacturing envisioned in the Hydrocarbon-based Manufacturing section of this report.

Not having enough clean electricity can cost a region important capital expenditures. A case in point is the decision earlier this year by LG Chem to not build a $2.5 billion battery plant in Windsor, Ont. because there was not sufficient clean electricity available from the regional power grid. Invest Windsor-Essex CEO Stephen Mackenzie told media that the company is "annoyed that something as basic as electricity infrastructure is hindering the further expansion of our automobility cluster."

Abundant clean electricity is often a top consideration for many companies evaluating where to build new plants. Meeting investor expectations means more than building a few solar farms or shutting down old coal plants. This report envisions an Alberta economy much more focused on manufacturing and processing, which would require significant upgrades to the provincial power grid.

A recent Alberta Electricity System Operator (AESO) report about what is required to achieve net-zero emissions by 2050 estimates a cost of $44 billion to $52 billion, most of which would be paid for by the private sector. The AFL's strategy would likely require even more clean power and infrastructure than considered by AESO.

The Alberta government should ask AESO to redo its economic modelling to include the bigger vision and then set aside the capital required for the province's share of the cost. An expert committee should be formed to consider this issue and make recommendations to the government.

Ottawa a partner in Alberta grid build-out?

The Government of Canada has legislated a national net-zero power grid by 2035 and implemented a number of programs to help pay for decarbonizing and expanding provincial power grids. The Prime Minister speaks often of electrifying regional economies, transit, industry, and transportation. This report is aligned with those goals. The current Alberta government should abandon its pugilistic approach to Ottawa and, instead, work closely and collaboratively to dramatically expand Alberta's power grid.

The federal government has established a number of programs and funds to help provinces pay for decarbonizing and growing provincial power grids. Alberta should take advantage of federal funding and lobby Ottawa for additional funds to help pay for the ambitious plan set out in this report.

Recommendations:

- Establish as a general principle that the Alberta power grid must become bigger, cleaner, and smarter as the provincial economy electrifies.
- Establish a labour/industry/expert committee to advise the Alberta government about how to build the provincial power grid needed to support the strategy outlined in this report.
- Wherever possible, partner with the Government of Canada and use federal capital to reduce the burden on Alberta taxpayers.
- Invest heavily in geothermal research and commercialization through Alberta Innovates.
- Continue with Alberta's participation in the four-province small modular nuclear reactor group but scale back expectations.
- Alberta to take a leadership role at the Pan-Canadian Grid Council, actively negotiating with Western provinces to build more transmission inter-ties and to create a Western regional electricity market designed to significantly increase east-west trade.
- Set aside capital from the Heritage Fund or general revenues to pay for construction of more transmission lines, as well as upgrading the existing distribution system. Consider having a crown corporation own the infrastructure paid for by public money.
- Encourage the private sector to build all new generation capacity but be prepared for the government to de-risk new technologies (e.g., geothermal) if necessary.
- Task Alberta Innovates with the research and development needed to substitute hydrogen for methane in Alberta's natural gas power plants.

MISSION #4:
HYDROGEN/SUSTAINABLE FUELS

The challenge:

- Develop a world class hydrogen industry in Alberta.
- Create a world class low-carbon fuels industry in Alberta to serve Canadian and US markets.

The mission:

- Significantly expand hydrogen production, transitioning from blue to green hydrogen by early 2030s.
- Expanding hydrogen's role in the electricity system (Conversion of gas power plants to hydrogen).
- Continued development of hydrogen hubs.
- Establishing a role for hydrogen in long-ZZZhaul trucking (includes building hydrogen fueling infrastructure).
- Establish a sustainable aviation fuel industry in Alberta.

Alberta Hydrogen Roadmap

The Alberta government released its hydrogen roadmap in late 2021. The strategy is a good start for the expansion of the hydrogen industry. Highlights of the roadmap include:

- Alberta can produce blue hydrogen for approximately $1.50 per kilogram, which is a competitive price.
- The global supply chain is immature, which presents a tremendous opportunity for Alberta to gain a first mover advantage.
- Scaling hydrogen production and demand at the same time is a competitive advantage for Alberta.
- With available technology, small amounts of hydrogen can be mixed with natural gas today, creating significant demand in the short-term.
- Alberta's CCUS strategy supports blue hydrogen production.
- A global hydrogen market is expected to quickly develop.
- Alberta has the innovation ecosystem to support the required research and development.
- Alberta's high ESG rating will help attract hydrogen investment.

What Can Be Done Better?

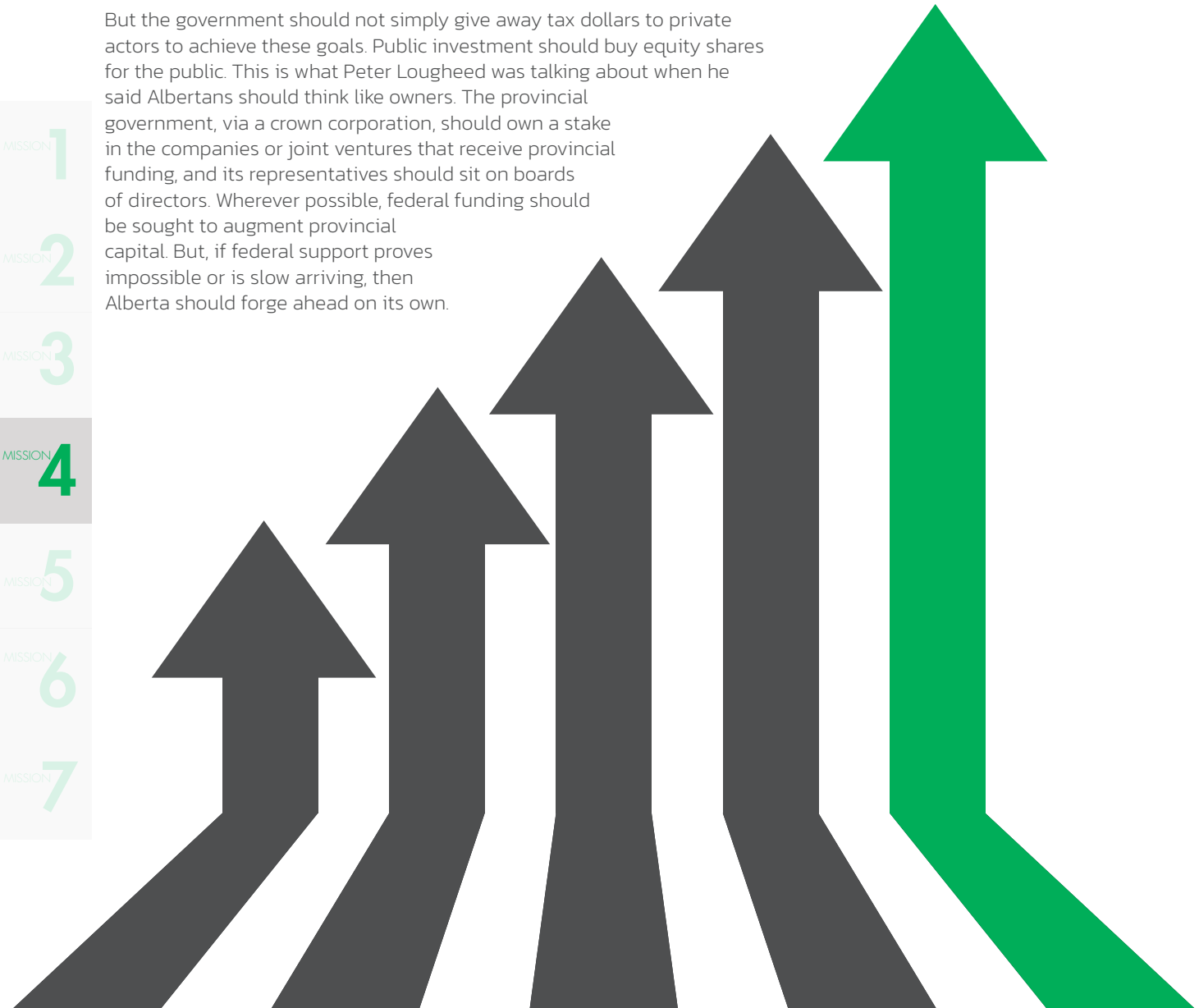
The UCP government is relying upon the tired, passive strategy of tax cuts, investment incentives, and supportive policy to establish and grow an Alberta hydrogen economy. Given Alberta's competitive advantage in blue hydrogen, the strategy will no doubt yield results over time. But, will relying upon market forces and private capital create the best outcomes within the short time available to Alberta? This report argues that it will not.

The missing ingredient is the entrepreneurial state.

The economic and climate benefits of creating a hydrogen economy are very high and distributed among a wide variety of industries. For example, using hydrogen as storage for wind and solar power could facilitate a more rapid build out of low-carbon carbon electricity, lowering emissions and making Alberta a more competitive jurisdiction for clean energy investments; hydrogen could lower emissions from long-haul trucking, a notoriously difficult sector to decarbonize; building a hydrogen sector would support expanding CCUS infrastructure; and hydrogen could be a huge export for Alberta.

The provincial roadmap notes that "[l]ong-term investment certainty and funding are required as hydrogen is an emerging opportunity with challenging economics," and that the Alberta government should play a leading role to de-risk that investment. Since there is a strong public interest argument to be made for accelerating the growth of the hydrogen economy within the province, this report agrees that public capital should be invested to help emerging technologies and companies, build necessary infrastructure, subsidize initial demand, and scale-up operations in the shortest possible time.

But the government should not simply give away tax dollars to private actors to achieve these goals. Public investment should buy equity shares for the public. This is what Peter Lougheed was talking about when he said Albertans should think like owners. The provincial government, via a crown corporation, should own a stake in the companies or joint ventures that receive provincial funding, and its representatives should sit on boards of directors. Wherever possible, federal funding should be sought to augment provincial capital. But, if federal support proves impossible or is slow arriving, then Alberta should forge ahead on its own.



Sustainable Fuels

There are other low-carbon fuels on the cusp of becoming commercially viable.

US-based LanzaTech, in which Suncor is an investor, has developed a microbial process that uses captured CO2 and low-cost clean electricity to produce sustainable aviation fuels. The company announced a pilot project with partners that include Swedish airline SAS and a Swedish utility. When the plant opens in 2026 it will supply 25% of SAS aviation fuel.

Enerkem, a Canadian company in which Suncor is also an investor, recently won "The Sky's the Limit Challenge" hosted by Natural Resources Canada with a new process to produce sustainable aviation fuel from forest biomass carbon. The company says that "the process to certify aviation fuel produced from forest biomass is already underway in Canadian, U.S. and European jurisdictions" and it is working with Shell in the Netherlands. This is the same company behind the innovative waste-to-biofuels facility in Edmonton.

These two examples demonstrate the rapid innovation taking place in the low-carbon fuels space.

Recommendations:

- Appoint a labour/industry/ expert committee to identify the best pathway, based upon the Alberta Hydrogen Roadmap, for accelerating development and the role required of public capital to de-risk key sectors of the emerging Alberta hydrogen economy.
- Create the Alberta Hydrogen Corporation to strategically invest in the hydrogen economy, including production and fueling infrastructure.
- Partner with sustainable fuels companies to establish operations in Alberta.

MISSION #5:
ELECTRIC TRANSPORTATION, BATTERIES, CRITICAL MINERALS/METALS

The challenge:

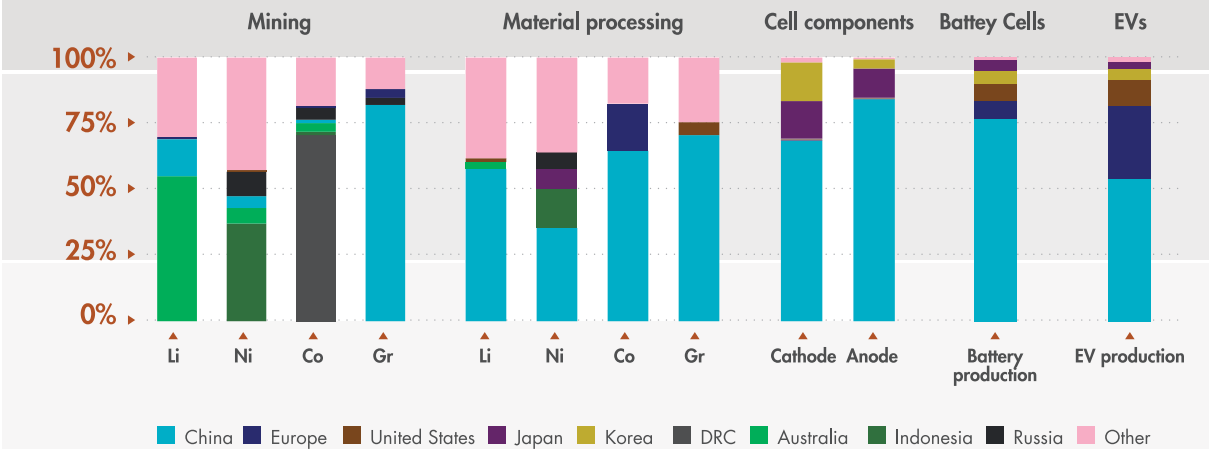
To take advantage of opportunities created by the growth of electric vehicle manufacturing, EV supply chain growth, and battery storage expansion that will be created as North American transportation is electrified and renewable energy capacity grows exponentially over the next 30 years.

The mission:

- Support growth of an electric vehicle supply chain in Alberta (e.g. critical minerals extraction, battery metals refining and processing, cell component manufacturing, etc.)
- Electrify Alberta transportation as part of lowering emissions, but also to support demand-pull a nascent Alberta EV supply chain.
- Support the emergence of new personal and public transportation models, especially in the province's cities where public transit already exists.
- Build out provincial electric vehicle charging infrastructure, encourage adoption of light, medium, and heavy-duty electric vehicles

The backbone of the electric future will be storage, especially batteries, and North America is in trouble. China currently manufactures 80% of the world's EV batteries and is home to 77% of the critical material processing sector. North America lags far behind, but President Joe Biden has pledged that the United States will catch China by 2030 (see the section on the Inflation Reduction Act below). That's a tall order, but also a huge opportunity for Alberta. The White House is already looking to Canada to supply critical minerals for batteries.

GEOGRAPHICAL DISTRIBUTION
of the global EV battery supply chain



Source: Global Supply Chains of EV Batteries, IEA, 2022. P. 5.

The Alberta Government has compiled a list of 30 critical minerals that can be produced in Alberta. The minerals can be found in rocks and sediments, oil and gas produced water, and in industrial waste. Government and industry are exploring opportunities to mine and process those minerals. The Government of Canada recently adopted a national critical minerals strategy.[23]

The opportunity that is not often discussed in Alberta is processing the minerals. This is the important midstream part of battery manufacturing that China currently dominates, but which North America must create if it is to develop a robust electric vehicle and utility-storage industry. By moving quickly in this sector, Alberta can establish itself as the processing centre for the battery sector. Experts have warned that Alberta only has until mid-decade to act or the opportunity will be lost.

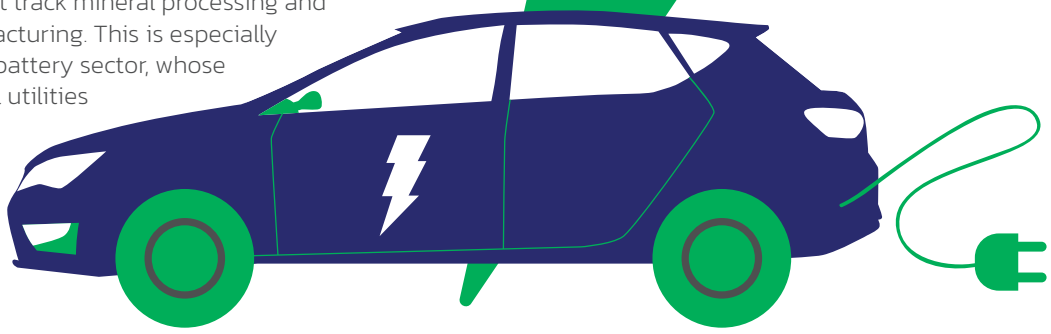
Can Alberta also build battery gigafactories? In 2021, Benchmark Mineral Intelligence was "tracking 200 super-sized lithium-ion battery cell plants in the pipeline to 2030," but only 11 are intended for North America. A small number of battery plants have been announced since then for Canada and the United States, but North America is still far behind China despite American EV ambitions. Creating a battery minerals processing sector would go a long way to making Alberta competitive for more higher value parts of the supply chain.

Unifor's recently released strategy to rebuild the Canadian auto sector includes aggressively pursuing critical minerals mining and battery metals refining and processing.[24] The country's largest private sector union makes the argument, one with which the AFL agrees, that Canada should pursue opportunities in every stage of the electric vehicle supply chain. This would open the door for Alberta to play a new, vigorous role in that supply chain.

Alberta should emulate the American approach of using both demand-pull and supply-push policies.

On the demand side, Alberta could build out utility-scale battery storage to help support rapid growth of wind and solar power generation. The electrification of transportation in Alberta can also be part of this strategy, though the link is more indirect because EVs are not likely to be manufactured in Alberta, at least not at scale by an OEM, though manufacturing for medium and heavy-duty niche markets is a possibility.

On the supply side, a crown corporation with a mandate to partner with existing suppliers could fast track mineral processing and battery component manufacturing. This is especially true for the emerging flow battery sector, whose primary market is electrical utilities looking for more than the 4-hour capacity of Lithium-ion batteries.



23 Allan, Bentley. A Roadmap for Canada's Battery Value Chain, The Transition Accelerator, 2022.
24 Navigating the Road Ahead: Rebuilding Canada's Powerhouse Auto Sector, Unifor, August, 2022.

Some firms have reached 12-hour capacity and are pushing for 16 hours within a year or two. Tying mineral supply and processing to a battery manufacturing strategy could quickly build out Alberta's storage manufacturing industry.

Alberta must avoid the Ontario mistake of providing no incentives to buy light, medium or heavy-duty electric vehicles while at the same time chasing manufacturers to build plants in the province. Ontario can get away with such a strategy because it is already home to Canada's automotive industry. Alberta, however, has almost no auto manufacturing capacity.

The better strategy is for Alberta to provide incentives, adopt a zero-emissions vehicle sales mandate,[25] subsidize the installation of significant charging stations, and then leverage a growing electric fleet and infrastructure to attract companies. Public investment can be used where needed to de-risk private investments.

Alberta should also consider new e-mobility models. The introduction of new, inexpensive e-micro mobility devices like e-scooters, e-skateboards, and e-bikes has enabled consumers to rethink their personal transportation models. E-micro mobility means travellers can more easily access public transportation like buses and light rail. This trend will gain more momentum in Alberta cities in the near future as autonomous robo-taxis and automated shuttles provide even more mobility choice.

And, it goes without saying, electrifying transportation would reduce Alberta's sky high greenhouse gas emissions.

Recommendations:

- Appoint a labour/industry/ expert committee to:
- Investigate how to grow Alberta critical minerals extraction;
- Investigate the feasibility of establishing a critical minerals processing industry to service battery manufacturers in Canada and the United States;
- Investigate the feasibility of attracting battery manufacturers to take advantage of the supply of processed minerals;
- Create a skills passport for workers to know what current skills exist and can be transferred to this new sector.
- If the expert committee's report is positive, create the Critical Minerals Crown corporation to expedite development of the industry.
- Provide financial incentives, adopt a zero-emission vehicle sales mandate, subsidize the installation of significant EV charging infrastructure, including for medium and heavy-duty electric trucks;
- Consider introducing a provincial e-mobility strategy (the City of New Westminster's strategy could be a model) while encouraging cities and towns to do the same.

25 Similar position have been taken in other jurisdiction across the globe, for example the EU has committed to end the sale of gas cars by 2035 (https://ieefa.org/articles/european-parliament-votes-end-sale-gas-powered-cars-2035)

MISSION #6:
RETROFIT RESIDENTIAL, COMMERCIAL BUILDINGS

The challenge:

- Decarbonize Alberta's new and existing building stock, creating thousands of jobs in the construction and related industries.

The mission:

- Develop new business models to incentivize deep retrofits of residential and commercial buildings
- Incentivize homeowners, landlords, and owners of commercial builders to adopt more efficient heating and cooling technologies, such as the cold climate heat pump.
- Restore full funding for energy efficiency programs.

GHGs from all buildings in the province accounted for 12% of total provincial emissions. Economists and analysts agree that decarbonizing Canada's building stock is a difficult and expensive job that will take decades. The Alberta situation is complicated by the severity of the climate.

But there is also tremendous opportunity to create thousands of jobs for unemployed or under-employed trades people and other workers. Growth in construction, renovation, and retrofitting could also be an important part of a transition strategy for fossil fuel workers, who often have skills and experience to work in these industries.

This report recommends developing and scaling innovative methods for retrofitting existing buildings based upon the work of Energy Efficiency Canada (EEC) in the 2021 report, "Canada's Climate Retrofit Mission." EEC advocates for deploying "retrofits at infrastructure scale" instead of the one-off building owner approach currently used. This means retrofitting dozens of buildings as part of a single project in a fraction of the time at half the cost.

Instead of focusing on new technologies like heat pumps, EEC recognizes that "new business models and organizational systems are likely to be most important. The new technological and organizational combinations in these retrofit solutions need to achieve larger GHG and energy savings, faster, at lower cost, while increasing the services buildings provide to occupants."

Based on EEC mission retrofit principles, we have suggested two models in this report, one for residential buildings and one for commercial buildings.

At-scale Residential Building Retrofits

Energy Efficiency Canada estimates that retrofitting Canadian residential buildings using the current approach will take 142 years. The think tank's "mission" approach to residential retrofitting includes:

- Integrated design and project delivery
- Pre-fabrication of building components
- Mass customization to deal with building specific challenges
- Aggregating similar buildings into large-scale projects
- Application of digital technologies
- Enhancing the customers' experience

The EEC uses the energiesprong model pioneered in the Netherlands as an example of how mission retrofitting could work: "This model combines many buildings into large-scale retrofit projects, coordinates the supply chain, uses mass-produced and standardized wall assemblies and mechanical pods, and provides long-term financing and performance guarantees for building owners."

Municipal governments and communities will decide upon the best model for their circumstances.

Energy-as-a-Service (EaaS) Commercial Building Retrofits

There are many different types of energy-as-a-service, but the basic concept is that an EaaS firm completes an energy audit of a building, determines where upgrades or retrofits are needed, then provides the upfront capital for the improvements. Customers pay monthly or sometimes the EaaS company is paid from the energy savings they create.

The advantage for the building owner is that capital investments, often the key barrier to retrofits, are minimized or eliminated. This also makes the model suitable for public buildings, like schools. The EaaS model is common in the United States, less so in Canada.

Scaling up EaaS in Alberta would require significant government policy and financial support, but the benefits could be considerable due to jobs created, energy saved, and improved building performance.

Energy Efficiency Alberta

Alberta is one of the few provinces without a stand-alone energy efficiency agency, after the UCP government cancelled most of the funding for Energy Efficiency Alberta, which was set up under the previous government to "promote and support energy efficiency and community energy systems (including micro-generation and small-scale generation) for homes, businesses and communities." The agency was funded with $645 million over five years from the provincial carbon levy.

This report envisions a more ambitious agenda that includes reviving Energy Efficiency Alberta as a crown corporation. The crown would administer both "mission-based" residential retrofit projects and EaaS programs geared to commercial and industrial buildings.

Recommendations:

- Appoint a labour/industry/expert committee to examine the best retrofit business models for decarbonizing Alberta's building stock. This report has suggested two that show promise, but an independent analysis may identify better approaches.
- Create a public enterprise, Energy Efficiency Alberta, to manage residential and commercial/industrial building retrofits programs. Advantages of public leadership include lowering costs by buying in bulk and better coordination with private contractors who are accustomed to the traditional one-off retrofit model. Negotiate with the federal government to fund a large portion of the residential and commercial/industrial programs.

MISSION #7:
INFRASTRUCTURE – NORTHERN ECONOMIC CORRIDOR

The challenge:

- To build the infrastructure needed for a 21st century energy economy.

The mission:

- Work with the federal government and provinces to develop a Northern Economic Corridor, with a focus on energy, containing:
    - Hydrogen pipelines (domestic consumption and export)
    - Power transmission lines
    - Rail lines
    - Roads and highways

Russia's invasion of Ukraine has changed perceptions of energy security. One of the world's biggest oil and gas producers, and the primary supplier to Europe, Russia is now an economic and political pariah. But concern about China's ambitions and its dominance of electricity-based technology supply chains (e.g. batteries) has also risen significantly. The Canadian government now talks about "friend-shoring" – supplying critical minerals, metals, and energy to friendly nations (the US) and regions (Europe) that share Canadian values (and, it goes without saying, political goals) instead of chasing markets in China and other potentially hostile countries.

This view suggests Alberta needs to ship more energy and related materials south to the US and to the coasts for export to Europe. But what types of energy should Alberta supply more of to those friends? 20th century energy like coal, oil, and gas? Or 21st century energy like renewable electricity, hydrogen, and sustainable aviation fuel? And how should Canada build the infrastructure needed to get that energy to market?

This report suggests a two-pronged approach.

One, Canada should optimize existing oil and gas infrastructure (e.g. pipelines, rail) to serve short-term demand that will likely ebb during the 2030s. At the same time, the country should invest heavily in 50 to 100-year infrastructure for zero and low-carbon energy for which global demand is expected to rise for the rest of the century and beyond. Canada requires significant investments to fuel its own energy requirements over the next 50 years and the federal government should be studying how much more infrastructure will be required to boost exports.

Two, as a land-locked province, Alberta should encourage Canada to spend heavily on infrastructure that supports development and export of low-carbon energy. In a best case scenario, that infrastructure

should also support Alberta exports of raw and processed critical minerals, and perhaps even finished products like batteries, to Eastern Canada.

This strategy will have the added benefit of creating social licence in other provinces for the short-term expansion of oil and gas needed to meet energy security requirements in the US and Europe. Loudly demanding more pipelines or LNG facilities while downplaying the energy transition and the climate crisis, the current strategy of the Alberta government and the hydrocarbon industry, does not build the broad-based support Alberta needs for the ambitious strategy set out in this report.

The Northern Canada Corridor

The School of Public Policy (SPP) at the University of Calgary has proposed the creation of a Northern Canada Corridor to move a variety of goods and services, including energy, east and west across the country. The types of infrastructure that would be built along the corridor include electricity transmission lines, rail, road transportation, and hydrogen pipelines. The SPP has published a special series of papers about the economic benefits of a Northern Canada Corridor strategy.

This AFL argues that such a corridor would be integral to the implementation of many of this report's proposals. For example, creating an Western Canadian electricity market will take extensive new transmission lines, which often meet with local resistance wherever they are proposed, extending the timelines for development. Similar difficulties can be anticipated for hydrogen pipelines, new rail lines, and new highways. Creating one corridor that can accommodate all the new infrastructure will accelerate the clean energy development envisioned in this report.

A corridor may also facilitate existing oil and gas exports by providing more options for new bitumen rail shipping technologies like DRUbit, which Gibson Energy claims is competitive with pipeline costs to the US Gulf Coast based on its 50,000 barrels per day project with Conoco. Other rail-based shipping methods under development, such as CN Rail's Canapux, would also benefit from a corridor. More rail capacity using these approaches could provide competitive shipping costs, more flexibility (prized by oil companies), all without building 50-year infrastructure.

Earlier in this report, we called for a more cooperative relationship between Alberta and the federal government. Getting agreement from other provinces to build a corridor would require considerable diplomacy that to date Premier Kenney and the UCP government have not demonstrated.

Recommendations:

- Appoint an expert committee to study the best options from Alberta's perspective for the Northern Canada Corridor.

7 POLICY TOOLS TO SUPPORT THE 7 ENERGY MISSIONS

7 POLICY TOOLS TO SUPPORT THE 7 ENERGY MISSIONS

The seven missions described above comprise the most ambitious economic development strategy in Alberta's history. They are bold and meant to inspire Albertans to both recognize the risk posed to their prosperity by the global energy transition and seize the many opportunities created by the rise of new industries.

The seven policy tools we propose to achieve the seven missions are equally bold and ambitious. In the case of policy tools that have been employed by governments in the past, we suggest that an entrepreneurial Alberta government wield them with renewed vigour and purpose.

POLICY # 1

POLICY # 2

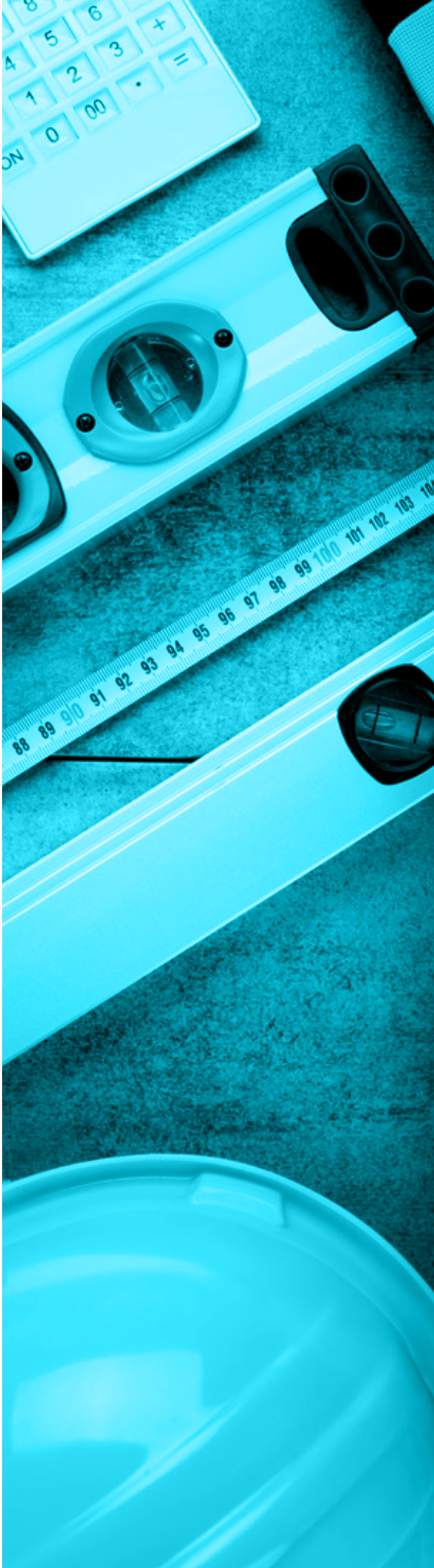
POLICY # 3

POLICY # 4

POLICY # 5

POLICY # 6

POLICY # 7



POLICY #1:
THE CASE FOR (A LOT) MORE PUBLIC OWNERSHIP

Renowned economist Marianna Mazzucatos says we need "a new way of talking and thinking about the State, in order to expand our vision of what it can do...from an inertial bureaucratic 'leviathan' to the very catalyst for new business investment, from market 'fixer' to market shaper and creator, from simply 'de-risking' the private sector to welcoming and taking on risk due to the opportunities it presents for future growth."[26]

According to Mazzucato, classical economists justify state intervention two ways. One, market failures – monopolies or negative externalities, for example – where "the State is simply remedying the wedge between private and social returns." Two, system failures where economic conditions are not supportive of innovation. She argues that simply fixing market and system failures is not enough. The State should instead be the "lead risk taker and market shaper."

In Alberta's case, there is a special circumstance that suggests the province should adopt a modified version of Mazzucato's view of State intervention: Alberta "owns" the oil and gas resources under Sect. 92 of the Constitution Act. Our province's most visionary leader, former Premier Peter Lougheed, often exhorted Albertans to think like owners, which means maximizing the economic benefits of the oil and gas industry for all Albertans, not just shareholders of the corporations that lease the mineral rights.

There is no better way for owners to protect their interests than by owning equity and sitting at board tables when decisions are made.

Writing about technologies to partially upgrade bitumen, University of Calgary economists Jennifer Winter, Victoria Goodday and G. Kent Fellows made the case for governments to support new technologies during the "valley of death" phase of innovation scale-up. This is the time when a new technology has been proven in the lab, perhaps also during a demonstration project, but needs capital to scale up to commercialization. Angel and early-stage capital is scarce in Canada. Based on the work of Winter et. al. and recommendations provided in the 2017 report of the Energy Diversification Advisory Committee, the NDP government introduced the $2.1 billion Partial Upgrading Program that provided grants and loan guarantees.

> Equity for the Alberta government is the cost to private capital of having the state de-risk investments.

The UCP government cancelled the program in late 2019, citing "higher financial risk to government." The same government went on to lose over $2 billion by cancelling an oil-by-rail contract and the $1.3 billion invested in the Keystone XL pipeline as a last ditch effort to sustain a project that was already on life support. This report argues that giving away public money to de-risk private investments and losing public money on politically-motivated financial support are both poor ways to support economic diversification.

Instead, Alberta should return to the Lougheed practice of requiring equity in return for taxpayer dollars. Equity for the Alberta government is the cost to private capital of having the state de-risk investments.

26 Mazzucato, Mariana. 2018. The Entrepreneurial State. Harlow, England: Penguin Books. Pages 15-17.

This approach may not be appropriate in all cases. Sometimes, more traditional government programs may be best suited to the job. But partnering with private companies to advance significant projects or technologies that have strategic value for the provincial economy should be the preferred option.

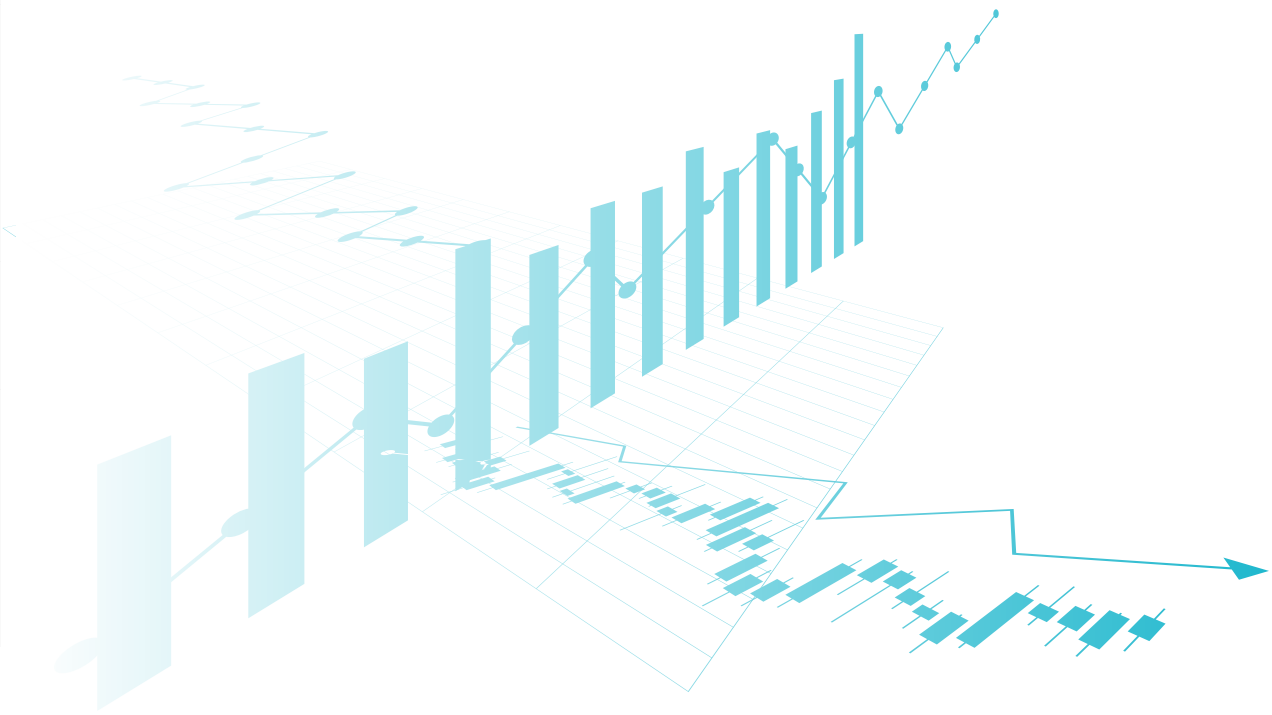
This was the path Lougheed chose when creating the Alberta Energy Company. AEC was the vehicle by which the PC government owned a 20% share in the huge Syncrude oil sands project, as well as stakes in some of the supporting infrastructure (e.g. an electric generating station, a pipeline). The company entered into a number of joint ventures with private companies. Ever the innovator, Lougheed made AEC a public company in 1975 while allowing Albertans to buy $75 million of shares, equal to the Alberta government's investment. The AEC eventually became a significant oil and gas producer before being sold during the 1990s.

That's one form of public ownership. The other is creating crown corporations that own 100% of a business or project. Canada, especially the Western provinces, has a long history of successful public ownership. The Alberta Treasury Board is just one example.

Consider this hypothetical case. In another section of this report, we call for tripling, at a minimum, the budget of Alberta Innovates to speed up the development of new technologies and processes, as well as bringing them to market faster. The provincial government will own the patents and other intellectual property created by that research. If the business case for an innovation is solid and the business model is consistent with public ownership, then we argue that a crown corporation should exploit that opportunity.

Whether a crown enters into a joint venture with a private company or creates a new wholly-owned business, that business should have a strong business case that will not require ongoing subsidies. It should also have a strong potential for generating returns within a reasonable time. The board of directors should be composed of experienced directors with a credible business background, as well as representatives from labour and other stakeholders. Time and again, the current government has demonstrated poor stewardship of tax dollars, a travesty that strongly argues for prudence by crown corporation management.

Finally, this report is not recommending the purchase or nationalization of existing private corporations operating in the oil and gas or electricity sectors. We view crown corporations as a vehicle to advance the 21st century energy economy in Alberta, not as a way to expend valuable public capital on 20th century corporations facing existential risk from the global energy transition.



POLICY #2:
INNOVATIVE FINANCING TOOLS

The strategies described in this report will require hundreds of billions of dollars in capital investment over the next two decades. For comparison's sake, total investment in the oil sands is just under $300 billion. The private sector will be expected to provide the majority of the necessary capital, but the Alberta government must also be ready to strategically and prudently invest, especially in new and innovative industries that require de-risking. Where Alberta does invest, it should receive equity. Alberta should also make generous use of federal funds and programs, including direct investment in projects with significant capital requirements.

In this report, we suggest five sources of funding for investment.

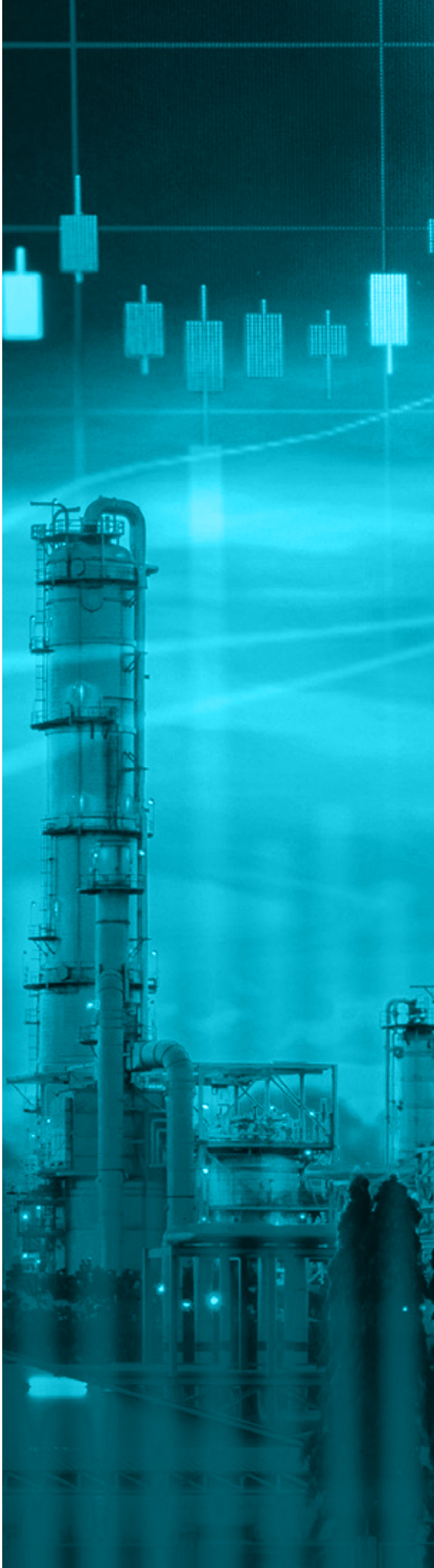
Budget Surpluses

The Government of Alberta enjoyed a $3.9 billion budget surplus for fiscal year 2021/22. And this summer as oil and gas prices skyrocketed to an increase of 788 per cent from the average revenue collected from 2018 to 2019.[27] The UCP's priorities, according to Finance Minister Jason Nixon, were paying down debt, saving for the future, and keeping public services affordable. These are priorities for normal times, not a time of economic disruption and transition away from Alberta's biggest natural resources, oil and gas. The 2020s require vision, boldness, and a willingness to invest in the future.

Almost all major projects are entering post-payout status, meaning that there is money to invest. This is a moment of unprecedented opportunity to act. For too long, governments have been burning through windfalls on day-to-day expenditures. A government that cares for working Albertans, would turn this wall of money into income-generating assets (bitumen) and other alternatives carbon fibre factories, bigger power grids, etc.).

This AFL recommends that future surpluses be invested in the seven missions described in this report.

We need to think of these funds as capital to be invested that will provide returns for Albertans that include jobs, tax revenue, and eventually dividends that can be reinvested in the missions.



27 Varcoe, Chris (August 24, 2022). Varcoe: 'Significan surplus' - Another royalty gusher coming in Alberta next week. https://calgaryherald.com/opinion/columnists/varcoe-significant-surplus-another-royalty-gusher-coming-in-alberta-next-week?r

Windfall Tax on Oil and Gas

Canadian oil and gas companies are generating record profits, $12.5 billion in the 2nd quarter of 2022 alone. If prices remain high throughout the 2020s, as many analysts anticipate, Alberta can expect those high earnings to continue. This has led to a call for a windfall tax on oil and gas profits.

There is a more compelling reason for a windfall tax: instead of using the extra revenue to fund clean up of abandoned wells and oil sands tailings ponds (whose liabilities are estimated at $31 billion) or reduce GHG emissions (oil and gas accounts for a whopping 26% of Canadian emissions), corporations have been returning profits to shareholders in the form of higher dividends and share buy-backs. Furthermore, they are telling investors that they intend to continue this practice indefinitely.

If peak oil demand occurs in 2030 and oil prices decline during the 2030s, leading to lower or no oil company profits, the window to set aside money for environmental liabilities and to invest in low-carbon business models will be lost forever. Taxpayers will then be burdened with the cost of remediating oil and gas assets, even as royalty and tax revenue from the industry declines.

Therefore, this report supports a windfall tax, with the proceeds being invested in the seven missions.

TIER

The Technology Innovation and Emissions Reduction (TIER) Regulation is Alberta's industrial emitter carbon tax, which uses an output-based pricing system designed to prevent carbon leakage. As a result, oil and gas producers are given a huge discount on the $50 per tonne carbon price, paying as little as 10% or 20% of the rate.

This report recommends ending output-based pricing and making emitters pay the full carbon price, which will rise to $170 per tonne by 2030. Alberta should continue funding low-emissions projects at current levels and use the extra revenue to invest in the seven missions.

This strategy will create the very desirable result of dramatically lowering GHG emissions while freeing up capital to be invested in Alberta's low-carbon economy.

POLICY # 2

Income and Corporate Tax Reform

Alberta's tax system has long favoured big corporations and the wealthy. For years, we remained the only province with a flat tax on income, meaning the government forced all Albertans to pay the same rate of taxation regardless of income. While the flat tax came to an end in 2015, the current progressive taxation system goes easy on high earners, with the top tax bracket rate remaining the third lowest in the country.[28] Our corporate tax system similarly benefits big CEOs and executives, with the general corporate rate remaining at a rate of 8 percent. [29] For context, this is lower than Alberta's tax rate under Ralph Klein in the 1990s.[30] Corporations aren't paying their fair share and it's time that we force them to do so.

The best way to address both these concerns is to raise taxes on the wealthiest Albertans and the big corporations that are making out like bandits. Alberta is in need of significant revenue reform and this industrial transformation marks a prime-time to conduct it. Specifically, the provincial government should look at making Alberta's personal income tax system more progressive by readjusting tax brackets and raising taxes on high income earners. We should also raise the general corporate tax rate, ensuring big businesses contribute financially to the success of this province. Neither of these moves would affect low-income earners or small businesses, who are already trying to survive financially. Instead, it asks those who can afford to contribute to a more just, inclusive, and fair economy to do so.

28 https://www.canada.ca/en/financial-consumer-agency/services/financial-toolkit/taxes-quebec/taxes-quebec-2/6.html.

29 https://www.alberta.ca/personal-income-tax.aspx.

30 Sean A. Cahill, Corporate Income Tax Rate Database: Canada and the Provinces, 1960-2005 (Ottawa, ON: Agriculture and Agri-Food Canada, March 2007), http://www5.agr.gc.ca/resources/prod/doc/pol/pub/itdat60-05/pdf/tax_e.pdf, A-5.

Federal Funds

The federal government has created numerous funding mechanisms to promote GHG emissions reductions and investments in clean energy. Many apply to Alberta. Alberta is a particular focus of federal policies because despite a population of only 4.5 million citizens, the province has the highest emissions by a wide margin (see graph below).

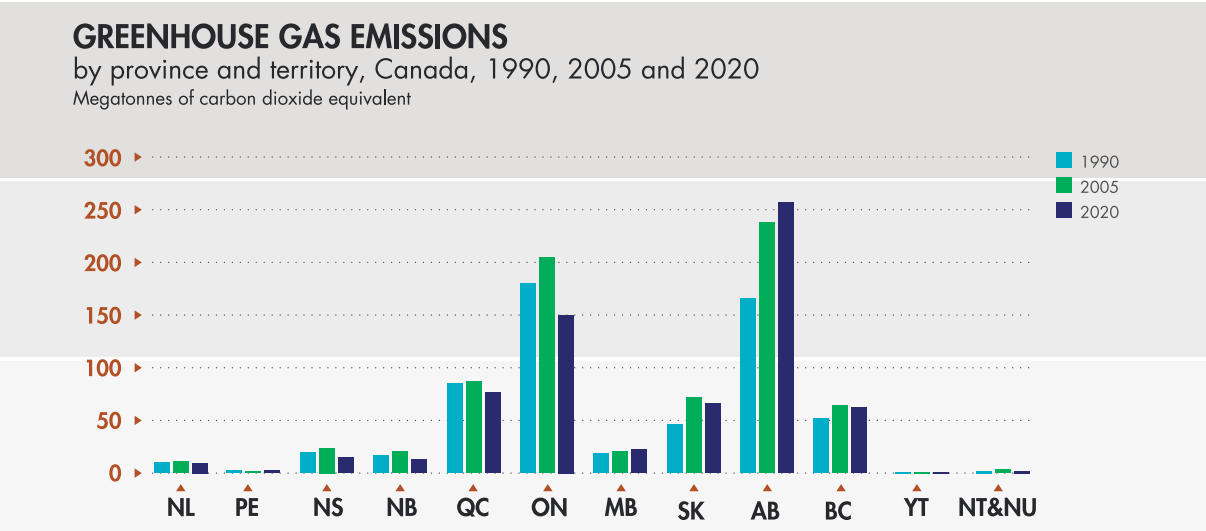
Importantly, the federal government should distribute funds in a manner which recognizes the provinces that have the most heavy lifting to do in terms of emissions reductions.

To this end, we propose the creation of a new federal–provincial transfer known as the "Climate Emergency Just Transition Transfer." We have previously proposed this transfer[31] alongside Seth Klein, who has further elaborated on the proposal in his book The Good War: Mobilizing Canada for the Climate Emergency.[32] The formula behind this transfer would have the federal government disburse funds to the provinces based on their current GHG levels; the higher the level of GHG emissions, the higher the funding for that province to invest in the clean energy economy. The formula would be time-limited so as not to incentivize provinces to keep GHG emissions high and receive more money. Another measure could be active employment in oil and gas, which would target federal funds towards a similar end.

The AFL recommends that Canada invest 1% to 2% of GDP into this fund. Based on the latest emissions data from Statistics Canada, Alberta accounts for 38% of Canada's total GHG emissions. Therefore, Alberta should receive 38% of the Climate Emergency Just Transition Transfer, approximately $10 billion to $20 billion per year. The Fund would help all provinces move towards a net-zero future, while recognizing that some provinces have more work to do than others. It could also capitalize some of the entrepreneurial state investments noted above.

After reported mishandling of federal COVID-19 pandemic funds by conservative provincial governments, it is clear that transfer disbursements must be properly supervised. In line with Klein's recommendations, the AFL argues for the creation of a just transition agency in each province whose board of directors would be drawn from appropriate stakeholders, including governments (federal, provincial, municipal, Indigenous), labour, business, NGOs, and academia. Broad representations will help ensure that the agencies invest federal funds in projects and industries that advance our collective economic interest.

Finally, the federal government could also tie the funding to other conditions. This could include creating a minimum amount of apprenticeship opportunities for marginalized communities or phasing out subsidies for oil and gas.



Source.

31 Klein, Seth and Gil McGowan, "Renewing confederation as we rise to the climate emergency: a modest proposal," National Observer, November 30, 2019.

32 Klein, Seth, "A Good War: Mobilizing Canada for the Climate Emergency," ECW Press, 2020.

POLICY #3: LABOUR MARKET POLICY

One of the largest impacts of the energy transition, as underlined repeatedly in this report, will be on Alberta's labour market. While disruptive technologies will undoubtedly cause job losses, they also bring an opportunity to expand and transform our labour market for the better. To seize these opportunities, Alberta must employ more active labour market policies (ALMP) [33] to guarantee all workers end up with high quality, well-paid, unionized jobs.

In Canada, most funding for labour market policies is provided through Labour Market Development Agreements (LMDAs) between federal and provincial/territorial governments. These bilateral labour market transfers, regularly evaluated by the government of Canada, provide funding for labour market policies and ensure provinces have the funding to provide specific programmes outlined in federal policy such as Employment Insurance-funded skills training. Importantly, provincial governments can also provide funding for additional programs if they wish.[34]

As we look towards the energy transition, we require further investments and targeted labour market policies for workers. Emerging economic industries are bound to displace many existing corporations, leaving an unprecedented shift in resource-dependent labour markets such as Alberta. To manage this transition, not only do governments need to deliver on the industrial policy outlined in this report but governments need to develop a workforce strategy that will support this economic development.

As a first step, provinces will require additional funding from the federal government to implement more targeted labour market policies. Despite the good intentions behind the LMDAs, one report concluded Canada spent only 0.2 percent of its GDP on active labour policies, placing them in the bottom half of spending among OECD countries.[35]

Significantly, the report notes this share of the GDP has declined over time, outside of one-off top-ups from the federal government to appease provinces and territories. For Alberta to succeed in the energy transition, we need the federal government to increase the funding offered through LMDAs. However, it isn't enough to transfer money to the provinces, for them to spend however they choose. This money should be directly connected to developing the workforce necessary to implement the strong industrial plan laid out in this report. Only by earmarking funding for this purpose can we guarantee that provincial governments will make the necessary investments necessary.

Outside of securing more federal funding, policymakers need to begin analyzing how the energy transition will impact existing and future jobs. Adapting a conceptual framework curated by the United Nations[36] and the International Labour Organization (ILO)[37], government should understand that the energy transition will have four impacts on jobs: (1) job creation, (2) job substitution, (3) job elimination, and (4) job transformation and redefinition. The first impact, job creation, focuses on how the transition to a low-carbon economy will create new jobs in emerging industries, such as renewable energy. Since these are new jobs, workers will require proper vocational and skills training to enter into these industries. The second impact, job substitution, focuses on how current jobs will be substituted by new jobs as a result of shifting from a high carbon to a low carbon economy. An example of job substitution could be shifting from internal combustion engine vehicle production to electric vehicle production. While there is considerable overlap between both jobs, workers will need assistance upskilling to properly work with these new technologies and materials. Job elimination, the third impact, focuses on how certain jobs in high-carbon industries will be permanently phased out or greatly reduced, without a direct replacement. One prominent example is coal mining.

33 For a backgrounder on ALMP, please read the Miguel Á. Malo's report Finding proactive features in labour market policies: A reflection based on the evidence (Geneva: International Labour Organization, 2018).

34 Organisation for Economic Co-operation and Development, Assessing Canada's System of Impact Evaluation of Active Labour Market Policies (Paris, France: OECD, June 28, 2022), https://www.oecd-ilibrary.org/employment/assessing-canada-s-system-of-impact-evaluation-of-active-labour-market-policies_27dfbd5f-en.

35 Ibid.

36 United Nations Framework Convention on Climate Change, Just Transition of the Workforce, and the Creation of Decent Work and Quality Jobs (New York, NY: United Nations), https://unfccc.int/sites/default/files/resource/Just%20transition.pdf, 15.

37 https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_543701.pdf.

For these jobs, governments need to put considerable support into providing financial support and retraining to direct these displaced workers to new jobs. The final impact, job transformation and redefinition, focuses on how the day-to-day work of many jobs will be transformed by the shift to a low carbon economy. Examples could include construction workers or electricians. These jobs will require minimal, but vital, reskilling to adapt new technologies, methodologies, and practices into their regular work.

Keeping this framework in mind, governments can begin planning for how to manage the impact that an energy transition will have on the labour market. To this end, provincial governments should create a labour market development strategy that explicitly aims to develop a strong workforce needed to support the industrial strategy outlined in this report. Specifically, this plan should lay out the impacts the energy transition will have on the existing labour market in their respective province, while also outlining the new employment opportunities created by their industrial policy. The plan should then outline the ALMP governments will implement to ensure we have a workforce ready to seize these opportunities.

We should note that seizing this opportunity does not mean simply filling labour market shortages with inexpensive, non-unionized labour. Decades of unregulated free market policies have demonstrated how the exploitation of cheap labour has eroded the working class, to our collective detriment. Much of the fear and anxiety around the energy transition is rooted in the idea that this transition will destroy existing jobs and replace them with deskilled, low-age jobs that are unfulilling, both financially and personally.

As such, any workforce strategy should include a proud commitment to creating high-quality, well-paid jobs. The energy transition should not become an opportunity for employers to deskill the trades and cut the cost of labour. Instead, any plan should recognize the inherent value of trades workers and commit that, while the energy transition may redefine parts of their job, trades jobs should always be high-skilled and well compensated.

Another commitment that should be a part of these development strategies is to better train, employ, and retain workers from historically marginalised communities. Our industrial policy and the workforce development strategy are opportunities to diversify our workforce and create economic prosperity for communities historically locked out of our success. This includes expanding more

employment and training opportunities to women, people of colour, Indigenous peoples, disabled people, and gender minorities. To create these opportunities, strategies should outline programs to conduct outreach and recruitment for new jobs in marginalised communities. Programs aimed at connecting workers to jobs or retraining existing workers should also provide specific strategies to retain marginalized workers already in the labour market.

Beyond these commitments, to ensure our provincial labour market is ready, this workforce strategy should have robust policies in place to deal with the four types of impacts that the energy transition will have on jobs. As mentioned earlier, these impacts are: job creation, job substitution ,job elimination, and job transformation and redefinition.

The best policy for job creation will be revamped vocational training to provide workers with the skills needed to succeed in new sectors. By providing comprehensive training up front, we can provide good jobs to new workers entering the labour market, as well as those seeking to change industries. Part of the solution can also be vocational guidance to assure that new workers do not enter into unsustainable industries and instead acquire a skill set that will serve them well into the future. Importantly, governments should provide a seat for relevant labour unions in the process of crafting vocational training and guidance programs, to ensure the input of workers are integrated into these services. Finally, part of the vocational training should be aimed towards demographics that currently experience barriers when attempting to enter Alberta's labour market, including marginalized populations and people living in rural areas. These approaches should be combined with other active labour market policies, such as wage subsidies, assistance in the job search process, and support for micro-entrepreneurs.

Where policies get more complex, however, is when we deal with job substitution and job elimination. While many policymakers mistakenly assume this involves the same vocational training as outlined in the previous paragraph, the fact is many trades workers already possess the skills we need for a successful energy transition. This is where job substitution comes in and, for many industries, this will be the predominant effect on jobs. A policy response to this problem isn't dramatic forms of retraining — the vast majority of Albertan workers are already highly skilled. Instead, governments should commit to offering new services and programs targeted at connecting workers to emerging industries, based on the ability of workers to transfer their existing skills into new jobs. This should allow for a more orderly, smooth substitution of existing jobs with new, high-quality jobs.

Programs for job elimination must go further, since these are workers with no clear alternative based on their skillset. Although few existing jobs will fall into this category where there's no transferable skills, it's still necessary for a workforce strategy to plan on how to deal with this impact. Investing in new vocational training, specifically targeted at displaced workers, is an important step in ensuring these workers don't fall behind. Wage subsidies should also be offered to those in emerging industries to employ and train displaced workers from extractive industries.

Finally, workplaces experiencing job transformation and redefinition should receive support in training their employees to use new technologies and methodologies. Relative to other impacts, dealing with job transformation is a minor piece of labour market policy but it is still a vital one to guarantee Canadians have the skillset to properly conduct their job for years into the future.

To ensure all of these programs align with the interests and needs of workers, governments should assure labour unions a seat at the table when designing ALMP. The labour movement is a core partner in creating supports that reach workers and create opportunities for them. Beyond designing these policies, labour unions should also deliver a significant portion of the training to workers, in collaboration with technical schools. Under the existing system of union training centres, most of the trades apprentices are already trained through their unions. As we prepare for an unprecedented shift in our labour market, no type of organization is better prepared to offer the training that Canadians need to succeed in the new economic industries.

Together, this combination of policies, along with union collaboration, should help guide the labour market and provide Albertans with decent, well-paid jobs.

POLICY #4:
COMMUNITY BENEFIT AGREEMENTS

Far too often in the past, governments and corporations shut out local workers and communities from meaningful participation in decisions around economic development. The result was an economy where Alberta workers and communities, especially those at the margins of our society, didn't get their fair share in exchange for their resources. As we build the economy of tomorrow, we must guarantee that new industries and investments improve the socioeconomic conditions of our local communities.

The industrial plan outlined in this report has the ability to transform Alberta's economy and make a more inclusive, just society. However, this won't be accomplished if funding is handed out without any guarantees for how local communities and workers will benefit from projects. Instead, this money should come with strings attached, in the form of upfront investments in communities, marginalized workers, and unionized jobs. All development that receives public funding or support must come with these strings that ensure the community benefits from development. Otherwise, these projects don't deserve our support.

One of the key policy tools to ensure local communities are at the forefront of economic development is Community Benefit Agreements (CBAs). These legal agreements cover a variety of policy areas, such as employment, social procurement, and the environment, with a focus on ensuring locally-based workers get tangible benefits out of development occurring within their communities. CBAs are typically negotiated between a combination of coalitions representing local organizations, private developers, and public institutions, such as governments.[38] Unlike many economic decisions in recent decades, CBAs ensure local workers have a voice and can participate in the decision-making process.

Notably, they prevent big companies from taking public dollars to build projects, while simultaneously replying on cheap, exploitative business practices. Instead, CBAs ensure investment leads to better jobs, better working conditions, more employment opportunities for marginalized communities, and heightened economic benefits for the community.

This primary way that CBAs achieve this end is by redistributing wealth back into the community through new employment opportunities and social procurement. There is a multitude of provisions that CBAs can (and should) include in their agreements around the makeup of a potential project's workforce. This includes quotas for hiring local workers and historically marginalized groups, such as women, gender minorities, and people of colour. CBAs can also stipulate that projects employ a unionized workforce, guaranteeing all workers the economic and social benefits that come with unionization. Other provisions could include the creation of job training programs tailored to attract local residents or commitments to more just terms of work, such as paying employees a living wage. Another important aspect CBAs can cover is the provision of local business contracts, ensuring projects source an appropriate amount of locally-produced goods and services.

However, there are other forms of investments that go beyond employment and procurement. To offset the impacts of development, developers can commit to communal infrastructure investments, such as the building of affordable housing or a local park. Other potential provisions include revenue-sharing mechanisms, increased decision-making powers for communities, and increased impact monitoring. These conditions guarantee that benefits go beyond those employed to complete the project and are felt by entire communities.

As governments begin investing in emergent industries and projects, CBAs are necessary tools to ensure Albertans can meaningfully participate in local economic development. Countless communities relied on the oil and gas sector, with entire towns and counties building much of their lifestyle around it. For emerging economic industries to be successful, Albertans must see themselves and their communities directly benefiting from new development. CBAs offer a clear pathway for Albertans to participate in this process and ensure that economic projects in their neighbourhood improve their collective wellbeing.

38 Anastasia Abrazhevich, "Community Benefit Agreements: A Framework for Participatory Planning for Toronto's Future Development" (master's thesis, York University, 2020),

With this importance in mind, governments should require CBAs when investing in new projects. A core way for the government to achieve this is mandating legally-binding CBAs for large-scale development projects. This gives community voices a seat at the table to make sure that new development serves the collective needs of local citizens, rather than the interests of private developers. As we undertake the largest economic transformation in Alberta's history, mandating CBAs ensures funding comes with strings attached that protect local communities and create more employment opportunities for more Albertans.

Given the regional diversity of Alberta, CBAs will (and should) differ in their content, depending on the context of each community.There should be no standardized template for CBAs prior to meaningful consultation with community residents. However, there are common practices and provisions that governments, communities, and industry should pay close attention to during negotiations.

First, the coalition of local organizations involved in negotiations should reflect the diversity of interests embedded within the community. One of the best ways to do this is by making broad coalitions that include numerous partners, such as community leagues and associations, local Indigenous nations, labour unions, environmental non-profits, and organizations representing equity-seeking groups. By making the coalition as inclusive and accessible as possible, community engagement will be much more substantive and will help CBAs work towards a multitude of communal benefits for all citizens, rather than only a select few. The engagement will contribute to an increased understanding of the existing challenges and opportunities within the local labour market, which can help shape provisions within the CBA.

Once at the negotiating table, parties should act to ensure CBAs are composed of provisions that are specific, measurable, and achievable.[39] The outcome of CBAs shouldn't be aspirational goals that become empty promises — the outcome should be real progress on jobs, training, and inclusion for the local community. To achieve this, targets must be tied to clear measurements and driven by data. Only through this can we achieve tangible outcomes and ensure provisions within the CBA are enforceable.

A final important aspect of CBAs is ensuring there are proper enforcement mechanisms in place. Without proper enforcement, we risk having provisions fall by the wayside and become forgotten. One of the first, and most important aspects, is making governments and companies legally bound to the provisions offered in the CBA which can be accomplished through legislation. However, further enforcement and monitoring is necessary to guarantee progress is occurring on CBA provisions. This could include hiring a liaison officer, to correspond with the parties involved in the CBA, and having an onsite representative for workers to observe their working conditions.

Beyond the process, there are numerous areas CBAs can cover and that negotiating parties should keep in mind.

One important impact of CBAs is creating more high-quality jobs for local workers. CBAs should hire local through mandating that a specific portion of the project's workforce consist of local workers. Agreements can further increase economic benefits for local employees by mandating the creation of targeted programs at crown corporations and private enterprises that aim to expand outreach to local citizens and providing vocational training to those who require it. Not only do these programs benefit individual workers but they help develop the local labour market, creating long-term benefits for the community.

Significantly, CBAs should stipulate that the entire workforce employed on development projects are unionized — otherwise, these projects should not go ahead. Unionization brings a range of benefits to workers, from higher wages to better working conditions. However, what is often less discussed, is the range of collective benefits that unions provide to communities. The labour movement is more than the fight for better jobs; it's the fight for better communities, strengthened by collective solidarity between workers, increased democratic engagement, and economic justice for all. By requiring a unionized workforce, CBAs ensure local workers and communities reap all these benefits, creating better socioeconomic conditions in the process.

39 Abrazhevich, 86.

The other important provision around local development, however, is in social procurement. Instead of relying on cheap goods and services, often from non-local sources, CBAs should force employers to utilize local suppliers for development projects. We can accomplish this through adding targeted quotas around the procurement of local goods and services. Procurement policies can go beyond benefitting local providers generally by including provisions around using suppliers lead by individuals from marginalized communities. This could look like a project subcontracting out to a local supplier lead by women or visible minorities. In the end, these provisions will benefit local economic development, while simultaneously supporting marginalized entrepreneurs who face additional barriers to economic participation.

The final outcome which CBAs should aim towards is the creation of a more inclusive and diverse labour force. Mandating that projects utilize local suppliers from marginalized communities is a positive start but it's only one piece of the puzzle. To accomplish more tangible outcomes, CBAs should mandate hiring a proportionate number of workers from historically oppressed social groups. This includes women, people of colour, disabled individuals, gender minorities, and sexual minorities. To do this, companies must implement more equitable hiring processes, as well as provide more outreach and training to marginalized groups to ensure a more diverse labour supply in the future. We already know these processes work by looking at places such as Newfoundland and Labrador, which has long used CBAs successfully. In the province, the number of women in the trades is at least triple the national average.[40] We can achieve similar outcomes in communities across Alberta if we use CBAs to their full effect.

As governments partner with private companies to invest in emerging industries, CBAs will ensure funding for economic projects come with strings attached to protect Albertan workers and their local economies. By giving local workers and community organizations a seat at the table to advocate for their collective needs, Albertans will become active participants in the transition to a new economy.

With this industrial blueprint for the energy transition in Alberta, we're proposing that literally billions of public dollars be spent on infrastructure and commercial projects. When it comes to CBAs, what we're proposing is that the money should come with strings attached -- strings that require the new public enterprises and their private sector partner to do things like hire locally, hire women and people of colour and always hire union, to make sure the jobs are good jobs, with good pay and good working conditions.

The outcome will be projects with clear commitments to hiring local workers, using local suppliers, creating a more diverse workforce, and ensuring workers reap the benefits of unionization. CBAs will, therefore, ensure emerging industries are more fair, just, and equitable than today's economic status quo.

40 Canada's Building Trade Unions, "Community Benefit Agreements," (Ottawa, ON: Canada's Building Trade Unions, February 2022), https://buildingtrades.ca/wp-content/uploads/2022/02/CBA-Report.pdf, 4.

POLICY #5:
INFRASTRUCTURE INVESTMENTS

To expand Alberta's involvement in seven pathways outlined in this report, we must be ready to invest heavily in high-quality, low-carbon infrastructure. We cannot successfully undergo an orderly energy transition without an expanded electrical grid, retrofitting existing buildings, expanding infrastructure for electric vehicles, and more, without sustainable government funding.

The first, and most notable, investment is in building the Northern Economic Corridor mentioned earlier in this report. This would be a long-term, multi-jurisdictional project that requires upfront investment from federal and provincial governments, as well as private industry. To encourage this, Alberta should be ready to offer partial funding for the project, as part of a consortium of governments.[41] The ability to transport Alberta-produced clean energy from coast, to coast, to coast, will ensure a massive return on investment. For years, the Alberta government has complained about our inability to transport energy across Canada; the Northern Economic Corridor's combination of electricity transmission lines, hydrogen pipelines, new rail lines, and highways, offers a permanent solution to this problem. Analysis by the University of Calgary School of Public Policy already shows Alberta would strongly benefit economically from the construction of the corridor.[42] Undoubtedly, this is a policy worth pursuing and partnering with other governments on.

Beyond building the Northern Economic Corridor, Alberta must invest in our own domestic electrical grid to expand transmission and distribution. As the transition from non-renewable to renewable energy increases, we'll need more infrastructure to ensure our grid has the capacity to reliably meet increased electrical demand. Part of the strategy for the electricity grid, of course, must be making more efficient use of existing infrastructure and increasing existing capacity.[43] However, we will need more transmission lines within Alberta and more energy storage infrastructure to ensure electricity is readily available when Albertans need it.

Another core investment must be in retrofitting existing residential and commercial buildings in Alberta. As mentioned earlier in this report, this requires funding for large-scale retrofit projects, moving away from the status quos where one-off retrofits are completed through individual building owners. This will require governments shifting funding away from individual retrofits and towards communal ones that seek to retrofit multiple houses in the same area. The government should also support energy-as-a-service (EaaS) firms which offer an ambitious and viable pathway to commercial retrofits. Finally, to ensure the government actively leads the private sector and de-risks these investments, it should create a crown corporation focused on energy efficiency which would offer many of the services mentioned above.

The last major infrastructure investment must be the expansion of electric vehicle (EV) charging stations across Alberta. While technological innovations will continue improving the range of EVs, we need more charging stations across the province to reliably drive to different regions of Alberta. Take, for example, trades workers who regularly commute from Edmonton to Fort McMurray for work or a family from Red Deer that visits loved ones in Southern Alberta. These trips will require more EV charging stations than are currently built. To complete this, the provincial government should commit to building more high-level EV charging infrastructure across urban and rural Alberta, as well as offering generous subsidies for installation of home charging stations.

41 Anthony Boardman et. al, "Financing and Funding Approaches for Establishment, Governance and Regulatory Oversight of the Canadian Northern Corridor," (Calgary, AB: University of Calgary School of Public Policy, October 2020), https://www.policyschool.ca/wp-content/uploads/2020/10/Funding-Approaches-CNC-Boardman-Moore-Vining.pdf, 4.

42 Trevor Tombe et. al, ""Implications of an Infrastructure Corridor for Alberta's Economy," (Calgary, AB: University of Calgary School of Public Policy, February 2021), https://www.policyschool.ca/wp-content/uploads/2021/02/Infrastructure-Corridor-Tombe-Munzur-Fellows.pdf.

43 Binnu Jeyakumar, Achieving a Net-Zero Canadian Electricity Grid by 2035 (Edmonton, AB: Pembina Institute, July 2022), https://www.pembina.org/reports/achieving-a-net-zero-canadian-power-grid-by-2035.pdf, 38-39.

POLICY #6:
LABOUR AND GOVERNMENT PARTNERSHIPS

For the industrial policy outlined in this report to succeed, governments cannot lead the energy transition alone. As we transition into the new economy, meaningful collaboration is central to ensuring that new industries create economic justice for all. For the energy transition to work, governments must pursue partnerships with all levels of government, Canadian workers, and the First Nations, Métis, and Inuit peoples whose land we reside on.

Importantly, these partnerships should not be mere consultation; governments must bring in each of these groups as individual, equal representatives in the decision-making process.

The rationale behind this policy is simple; when we exclude these groups from economic decisions and planning, we are left with damaging forms of inequality. When economic projects and policy are left to governments and industry, the outcome always favours big corporations at the expense of workers. This leaves everyday Albertans with worse jobs, less pay and unsafe working conditions.

Outcomes are even worse for Indigenous peoples, whom consecutive governments have excluded from meaningful economic participation since the start of confederacy. Throughout Canadian history, governments and industries marginalized Indigenous communities, while simultaneously exploiting their land for profit. The wealth from this development rarely went back to their communities but instead remained in the pockets of the powerful, who continued to perpetuate oppression against First Nations, Métis, and Inuit peoples. In recent decades, Canadian society has begun to reckon with our collective failure to live up to our responsibility as settlers but, even then, we still have not made enough progress on advancing reconciliation. Indigenous peoples continue to face numerous socioeconomic barriers, stemming from Canada's roots as a settler colonial country, that prevent them from equal participation in Canadian society.

The energy transition presents an opportunity to address these injustices with concrete policy solutions. It is also our opinion that the industrial policy laid out in this report cannot be successful without the participation of workers and Indigenous peoples. To this end, we recommend the government pursue economic partnerships with labour unions, Indigenous groups, industry, and municipalities to ensure that economic development works in the interests of all Canadians.

We can think of this framework almost as an extended form of tripartism. In tripartite systems, representatives from government, industry, and labour work together on economic projects, creating agreements that serve the collective interests of all involved. Across various countries, tripartite agreements have been successful in creating socioeconomic benefits for communities. However, instead of limiting participation exclusively to these three actors, our proposed framework would recognize the responsibility we have as settlers to advance reconciliation with Indigenous peoples and treat them as equal partners in economic development.

Prior to entering these partnerships, governments must take steps to build trust with workers and Indigenous peoples. This is especially the case for First Nations, Métis, and Inuit communities, where previous injustices have increased mistrust in federal and provincial governments. To repair this relationship, governments should take tangible steps towards decolonialization.

While we cannot outline all possible paths to decolonization in this report, an initial step that governments should take is enshrining the United Nations Declaration on the Rights of Indigenous peoples (UNDRIP) into law. UNDRIP is a document outlining the distinctive rights of Indigenous peoples, providing governments with a powerful framework on how to properly treat and create policies for Indigenous peoples. Sadly, to date, only two governments across Canada have taken this step: British Columbia's provincial government and the federal government. Alberta and all other provincial governments across Canada should follow their example. While this is only an initial step, enshrining UNDRIP in law signals to Indigenous communities that governments are ready to treat them as equal partners and are willingly to hold themselves legally accountable to these standards.

This step, followed by other substantive actions, will demonstrate to First Nations, Métis, and Inuit peoples that governments across Canada are ready to enter into a partnership of equals with them.

Once federal and provincial governments start rebuilding trust in these communities, they can begin formulating partnerships with unions and Indigenous organizations. There are a few common characteristics that these partnerships should possess.

First, governments should give labour unions and local Indigenous groups seats at the table when deciding what projects deserve public investment. The industrial policy laid out in this report requires the government and private corporations to invest billions of dollars into emerging sectors; we need to ensure this funding goes towards creating opportunities for workers and Indigenous communities. Partnerships that include the voices of labour unions and Indigenous people from the beginning will ensure development works in the interests of all Canadians, not just the powerful.

POLICY # 1

To ensure these partnerships are institutionalized in the decision-making process, governments should mandate that corporations give unions and Indigenous groups seats on their board of directors. This change should be mandated both for crown corporations and private corporations. The allocation of seats should also ensure that no group holds a majority of board seats, thereby forcing groups to work together towards collobration. This policy will ensure that, rather than offering weak forms of consultation, governments give labour unions and Indigenous groups a substantive role in economic planning.

POLICY # 2

Importantly, the decision-making process should also include all three levels of government in Canada, to guarantee that projects receive unanimous support. Albertans know too well what happens to development projects when federal and provincial governments don't work together. They either die due to lack of support or, too often, fail to serve the needs of their communities. To prevent this, it is vital that federal, provincial, and municipal governments join these partnerships and work together on pushing development forward. Similar to labour unions and Indigenous groups, governments should enshine this collaboration by requiring corporations to have representatives appointed by all three levels of government on their board of directors.

POLICY # 3

Beyond offering groups a seat at the table, these partnerships should also offer investments in community-led projects. For labour unions, this includes funding development projects identified by local workers as having unique benefits for the workforce. For Indigenous groups, this could include funding projects that are majority Indigenous-owned or offer positive developments for their communities.

POLICY # 4

To guarantee crown corporations and private entities possess funding for these projects, they should lay aside a portion of their budget to invest in community-led projects. By earmarking funds for these projects, development created through these partnerships will create better opportunities for communities, while simultaneously advancing reconciliation.

POLICY # 5

POLICY # 6

POLICY # 7

POLICY #7:
GOVERNMENT PROCUREMENT

Canadian governments are among the largest purchasers of goods and services in the country. Federal government, for example, buys approximately $200 billion of goods and services each year. Governments across the country already collaborate to lower procurement costs and reduce obstacles in the procurement process for small and medium-sized businesses.[44]

Renewable energy in Alberta is an example where both the provincial and federal governments have used procurement to stimulate development. Alberta awarded 12 power purchase agreements in 2017 and 2018 under the Alberta Renewable Electricity Program, which included an innovative "contract for differences" provision that saw the government actually earn $26 million as of March, 2021.[45] The UCP discontinued the program shortly after forming government in 2019. The Government of Canada indicated in 2020 that it intended to procure power purchase agreements for 200,000 to 280,000 MWh per year.

The success of the Renewable Electricity Program suggests that a similar strategy with a broader mandate could be an effective development tool. A Calgary Economic Development report on cleantech economic opportunities from 2021 noted that "government and crown corporation first-buyer programs and non-prescriptive, green procurement strategies can accelerate the adoption of new emerging technologies."[46]

Government procurement is one of the tools the United States is using to advance clean energy technology, including over $3 billion to buy electric vehicles for the US Postal Service.

INFLATION REDUCTION ACT AND ALBERTA

President Biden signed the $369 billion Inflation Reduction Act into law on August 16, 2022, dramatically increasing US spending on the clean energy economy and climate mitigation. The Canadian perception is mostly that the Act is about climate policy and GHG reductions. American analysts, however, correctly point out that the Act is designed to fulfil President Biden's promise to make America the number one clean energy and technology superpower, overtaking China, by 2030.

The IRA is a Green Marshall Plan for North America, a version of the strategy that helped rebuild Europe after the Second World War. Then, American leaders understood the importance of creating a robust economy out of the ashes of a global conflict, one that would be a significant market for booming US factories. Today, the economy that needs to be not so much rebuilt as re-engineered is the United States. Decades of off-shoring electronics R&D, manufacturing, and supply chains to Asia has left the US vulnerable as the global economy switches from energy as a commodity to energy from technology. The challenge of rebuilding American industrial capacity to compete with China is in many ways similar to the situation faced by Europe post-1945.

In a major departure from early proposed legislation, the US is now taking a North American approach. The IRA recognizes that Canada is a key partner in the success of America's clean energy transition. For example, it includes Canadian products and components (including Canadian-built vehicles and critical minerals for batteries) as eligible for the full $7,500 EV rebate. Canadian automakers have been preparing for exactly this moment, committing billions to retooling their facilities to make EVs. These investments are targeting the entire supply chain, from procuring the necessary minerals and metals within Canada to developing technologies that can help manage and recycle the influx of batteries in the waste system. Now, with clear direction from the US, Canada can move even faster to transform one of its largest economic engines.

44 Buying Better: Leveraging federal procurement to drive demand for Canadian cleantech, Smart Prosperity Institute, 2022.

45 Hastings-Simon, Sara and Blake Shaffer, Valuing Alberta's Renewable Electricity Program, The School of Public Policy, University of Calgary, March 2021.

46 Delphi Group, Alberta Energy Transition, commissioned by Calgary Economic Development, Nov. 2021.

Capital markets are now unleashed, flipping Canada's competitiveness challenge on its head. Instead of worrying about getting too far ahead of the US and creating a competitive disadvantage for Canadian industries, Canada is now behind. There is a strong argument for the federal government to accelerate the implementation of national climate policy. There is an even stronger argument for Alberta to once again lead on sub-national climate policy.

Emissions reductions aside, investors and capital markets need policy certainty before they will make the big bets in clean energy or climate tech. Clearer policy direction in Canada has helped, but global capital markets have been waiting for the U.S. to make its move. They need no longer wait. If Canada and Alberta don't keep up, there's a risk that flows of talent and capital could be pulled south of the border. Even as market opportunities in North America get bigger, Alberta companies may not have the financial and human capital required to scale and succeed.

How might specific regulations and incentives affect Canadian investment decisions? For example, will tax credits for sustainable aviation fuel stimulate investment in Alberta? Answers to this question and many others that will arise from implementation of the Act may influence strategies and recommendations contained in this report. Overall, the AFL believes that the Act will be a huge positive for Alberta's emerging clean energy economy. In fact, its passage makes swift action by Alberta policymakers, business community, and the labour movement even more important.

The AFL is concerned that proposals from UCP leadership candidates, like the Alberta Sovereignty Act, will damage policy certainty by creating political chaos. For example, will manufacturers invest in Alberta plants if the provincial government is advocating for secession from Confederation, which would very likely impede the transportation of exports from landlocked Alberta? How will Alberta negotiate with Canada and the other provinces for a northern economic corridor while it is busy trying to leave the country? The role of public capital envisioned by this report requires the unlocking of private capital into new and expanding industries, which is less likely to happen in the midst of political turmoil.

JOB CREATION ANALYSIS

JOB CREATION ANALYSIS

The AFL analysis suggests Alberta can conservatively create 200,000 new energy-related jobs by 2050, an estimate that is consistent with global trends. In September, 2022, the International Energy Agency released the World Energy Employment report, which affirmed the soundness of the strategy described in this report. "Energy employment is set to shift rapidly as countries and companies accelerate efforts to decarbonise and meet net zero emissions pledges," noted the organization.[47] Clean energy already employs over half of all energy workers. Of particular interest to Alberta is the observation that fossil fuel workers' skills are mostly transferrable to clean energy sectors. "There is tremendous growth for energy employment on the horizon, driven primarily by new investments to decarbonise," according to the IEA.

Three takeaways for Alberta:

Energy employed over 65 million people in 2019. The IEA estimates that another 14 million new clean energy jobs will be created by 2030 and an additional 16 million workers will migrate from fossil fuels to clean energy. Asia accounts for over half of all energy employment, with China (30%) leading the way, driven by the rapid construction of energy infrastructure. North America's newfound desire to compete with China for clean energy dominance, as evidenced by the Inflation Reduction Act and other American legislation, suggests that energy economies like Alberta will benefit from a similar capex-induced employment boom.

Energy requires higher-skilled workers than other industries. According to the IEA, 60% of new energy jobs will require some level of post-secondary education. Alberta has a tremendous pool of trained and experienced labour that clean energy projects can draw upon, which provides the province with a significant competitive advantage. The province also has the training and education institutions needed to rapidly expand that workforce.

The energy transition should be "people-centred." Energy work typically pays 15% to 50% higher wages than other sectors, mostly because traditional energy companies are unionized and workers enjoy better protection. Efforts should be made to ensure emerging clean energy industries are organized and that recent rolling back of worker protections is reversed.

47 World Energy Employment, The International Energy Agency, September, 2022.

ALBERTA'S ENERGY JOB CREATION OPPORTUNITY

Different organisations in Canada have published estimates of the number of clean energy jobs that may be created with the transition to a low carbon economy. This work has been primarily focused at the national level or at the sectoral level, but does not consider all of the missions recommended for Alberta in this report.

For example, a Royal Bank of Canada report suggests that the clean economy could create between 235,000 and 400,000 new jobs in Canada by 2030, and that by 2025, clean tech's contribution to Canada's GDP is expected to grow to $80 billion.

The Delphi Group's Alberta Energy Transition report indicates nearly 170,000 new clean technology jobs are possible and could contribute $61 billion in GDP to the province of Alberta's economy by 2050. For comparison, continuing on a business-as-usual path results in only 20,000 new jobs and contributes only $4 billion in GDP by 2050. The areas of fastest job growth (some of them identified as "missions" in this report) identified were for sustainable fuels, energy efficiency, non-thermal use of bitumen and sustainable materials, waste management and renewable energy production. The model employed however, is not an integrated economic model or an optimization model, it simply considers potential fixed long-term growth rate curves from both Canadian and global sources for 14 separate clean tech sectors and then adds them up. However, investment in clean tech and emission reduction technologies will have to compete in Alberta and their deployment depends on provincial policy development, skills and labour availability, technological readiness levels, competitive advantages and disadvantages, demand as well as the ability to attract investment – which are not taken into account in a comprehensive way. Simply adding up the expected growth in each sector does not account for these factors and an integrated modelling approach will be required to determine how these sectors can be expected to compete with each other.

Clean Energy Canada's The New Reality Report estimated that new low carbon jobs or clean energy jobs in Alberta were set to increase 164% over the next decade and reach 72,000 jobs in 2030 from 44,000 in 2020. The modelling is based on Navius Research's gTech model that is an integrated technology and economic model that accounts for competition of technologies and demand. However, it only includes Canadian climate policies announced before 2021 and is therefore not indicative of new announced policies or more appropriately a low-carbon industry scenario with much more stringent policy and significantly higher levels of investment in low-carbon sectors. For this reason, it almost certainly underestimates the job potential in 2030 and does not provide a longer-term view of the job opportunity that reflects the energy transition as envisioned in this report.

Economic modellers are continually improving their ability to estimate the economic and employment benefits of a low carbon transition. Important work is underway that we can expect will give us a much more detailed and integrated picture of the clean energy jobs opportunity for Alberta that reflects a net-zero pathway. Clean Energy Canada and other organizations will likely publish this work within the next year.

Still there is ample evidence to indicate that clean energy jobs have the potential in Alberta to both compensate for potential job loss in the traditional carbon-intensive oil and gas sector and create more employment (175,00 jobs) than existed at the height of the hydrocarbon investment boom circa 2014. Direct jobs in Alberta's oil and gas sector are currently estimated at approximately 140,000.[48] We are also starting to see the large-scale mobilization of private and public investment for the clean energy sector that is necessary to enable the energy transition. The required Canadian annual investment needs to grow rapidly from approximately $15-$25 billion annually to $125-$140 billion.[49]

Governments are currently adopting or considering large scale long-term public spending commitments for clean energy transitions. The United States Inflation Reduction Act (IRA) directs US$369 billion in public spending on climate and environment investments in an effort to meet 40% emission reduction targets by 2030. The UK has announced its aim to increase public and private sector R&D expenditures to 2.4% of GDP to deliver strategic advantage in science and technology, work alongside industry to leverage private investment as well as deliver on net-zero targets.

The government of Canada and the government of Alberta could also potentially commit similar scale public funding for R&D and clean energy investments. A 2% of GDP commitment for public funding for the clean energy transition from both governments could potentially raise public spending to reach $24 billion a year in Alberta. This large-scale public spending leveraged with additional private investment would likely be of sufficient scale to enable Alberta's energy transition.

The following sub-sections review the potential for clean energy job growth for each of the sub-sectors in Alberta that relate to the seven missions outlined in the report. The last sub-section provides an overall summary of the job creation opportunity for Alberta.

48 PetroLMI Initiative (2022). Careers in Energy. August 2022 Employment and Labour Data. https://careersinenergy.ca/employment-and-labour-data/

49 Government of Canada (2022). Federal Budget 2022. Chapter 3 Clean Air and a Strong Economy. https://budget.gc.ca/2022/report-rapport/chap3-en.html

Hydrocarbon and CO2 based Manufacturing

Alberta Innovates has developed a clean energy strategy[50] to transform bitumen from oil sands by utilizing the carbon in a value chain of advanced materials and products instead of releasing it through combustion in transportation fuels. The strategy focuses on the development and commercialization of carbon fibre, asphalt binder and high-value carbon material technologies, and supporting the market use of these products. They estimate that more than 35,000 barrels of heavy fraction bitumen per day can be diverted to these products and generate a $3-billion industry by 2030. Ultimately the strategy envisions that 100 per cent of bitumen will reach net zero from production to consumption by 2050, and that more than 1.5 million barrels of bitumen per day will be diverted to these products and a $60- billion industry is generated by 2050. Based on this evidence we estimate that the hydrocarbon and CO2-based manufacturing mission could create more than 85,000 direct jobs by 2050.

Hydrocarbons Extraction

Hydrocarbon extraction in Alberta will need to lower emissions rapidly to achieve net-zero emissions by 2050. The industry is expected to make extensive use of Carbon, Capture, Utilization and Storage (CCUS) to achieve these goals and the Oil Sands Pathway Alliance estimates two-thirds of reductions will come from CCUS. However, must forecasts consider that Alberta's oil and gas production in a net-zero scenario will fall significantly. At the same time, there is strong evidence that with greater automation and improved efficiency in the oil and gas sector there will be fewer and fewer jobs per unit of energy produced. Fewer jobs to produce more oil and gas has been a hallmark of the industry for the past eight years and that trend is expected to continue throughout the period covered by this report. The EY study[51] estimated that digitalization would lead to a 30% decline in oil and gas employment by 2040. That's a loss of 50,000 jobs, lowering Alberta O&G employment to ~95,000 jobs (even as oil sands production is forecast by IHS MarkIt to grow by 500,000 b/d) for a net loss of ~45,000.

There are no detailed estimates of the jobs that can be retained in the oil and gas sector by moving to low carbon hydrocarbon extraction using CCUS. However, the Delphi Group's Alberta Energy Transition report projects that CCUS technology by itself could generate 24,000 jobs by 2050, albeit for all industries in Alberta and not just for hydrocarbon extraction.

Based on this initial evidence, we consider that the net jobs retained in the oil and gas sector, including the estimated 85,000 jobs from the hydrocarbon and CO2 based manufacturing mission, would not likely be lower than 100,000 jobs, for a net loss of 40,000 jobs from existing employment.

50 Alberta Innovates (2021). Bitumen Beyond Combustion. How oil sands can help the world reach net-zero emissions and create economic opportunities for Alberta and Canada. https://albertainnovates.ca/impact/newsroom/bitumen-beyond-combustion-white-paper-clean-tech-making-carbon-an-economic-and-environmental-asset/

51 PetrolMI (2021). Preparing for the future now. Rethinking the oil and gas workforce in 2040. https://assets.ey.com/content/dam/ey-sites/ey-com/en_ca/topics/oil-and-gas/ey-rethinking-the-oil-and-gas-workforce-in-2040.pdf

Electricity

The Canadian Climate Institute's Big Switch report[52] explores the technical and policy changes required to align Canada's electricity systems with net zero. The report identifies that electricity will play a central role in the net-zero transition and that the installed electricity generation capacity will need to be 2.2 to 3.4 times larger in 2050 and contribute a much greater share to industry, transport, and building energy use then it does today. Numerous pathways are identified in the report that identify different mixes of technologies to achieve a net-zero transition while also growing generation at a rate of more than 5-6% per year to meet new demand.

The increase in electrification investments over today required by net-zero are significant. The Canadian Energy Outlook[53] published by the Institut de l'Énergie Trottier estimates that investment in electricity generation, transmission and distribution in their 2050 net-zero scenario needs to increase to an average of $30 billion per year between now and 2050. However, they also project that in the long-term net savings from avoided fuel expenditures will more than compensate the increased investment cost. Oher Canadian studies such as from the Electric Power Research Institute[54] have found similar requirements for investment.

Based on this initial evidence, we estimate that 20,000 jobs related to clean electricity generation, transmission and distribution could be created in Alberta in the longer-term by pursuing an electricity sector mission as outlined in this report.

Hydrogen and Sustainable Fuels

Clean Energy Canada's New Reality Report indicates that based on climate policy enacted before 2021 we were on track to generate roughly 7,000 new jobs in the hydrogen and sustainable fuels sector by 2030. With newly announced policies, including the CCUS investment tax credit we can expect greater growth. Enacting the net-zero strategy described in this report for hydrogen and sustainable fuels should set Canada on a path to create many more jobs in the sector.

Canada's Hydrogen Strategy estimated that the hydrogen economy in Canada could create 140,000 jobs by 2030 for an incremental scenario and 260,000 jobs for a transformative scenario. Provincial job estimates are not available in the report; however, Alberta is well situated as a competitive low-cost energy producer to capitalize on this potential opportunity. Modelling work based on the technical potential of blue and green hydrogen production in Alberta conducted by the Transition Accelerator suggests that the number of jobs created could range between 27,000 and 110,000 primarily depending on whether Alberta could develop export markets for low carbon hydrogen.

Based on this initial evidence, and Alberta's strong competitive advantages, we estimate that 70,000 jobs could be created in Alberta in the longer-term by pursuing a net-zero hydrogen and sustainable fuel mission as outlined in this report.

52 Canadian Climate Institute (2022). The Big Switch. Powering Canada's Net Zero Future. https://climateinstitute.ca/reports/big-switch/

53 Institut de l'Énergie (2021). Canadian Energy Outlook 2021. https://iet.polymtl.ca/wp-content/uploads/delightful-downloads/CEO2021_20211112.pdf

54 Electric Power Research Institute (2021). Canadian National Electrification Assessment: Electrification Opportunities for Canada's Energy Future. https://www.epri.com/research/products/000000003002022642

Electric Transportation, Batteries, Critical Minerals/Metals

There is a significant opportunity to build a domestic EV battery supply chain and electric vehicle manufacturing base in Canada. Clean Energy Canada identifies in a recent report[55] that by 2030 building out a supply chain from the mining of minerals and their refining and processing, manufacture of battery cells and components, assembly of Electric Vehicles and recycling of batteries, could contribute $24 billion in GDP and support 81,000 direct jobs in Canada.

While most of Canada's existing vehicle manufacturing and assembly base is located in Ontario and Quebec, Alberta can be expected to make significant contributions to all other parts of the supply chain, particularly related to mining of minerals and the manufacture of battery cells and components which were found in the Clean Energy Study to contribute 40,000 direct jobs nationally by 2030.

Significant investment will also be required for EV charging infrastructure in Alberta. Based on this initial evidence, and Alberta's competitive advantages in mining and battery cell and component development, we estimate that 8,000 jobs could be created in Alberta in the longer-term by pursuing electric transportation, batteries and critical minerals and metals mission as outlined in this report.

Buildings

The Pembina Institute published a recent paper[56] examining how Canada's buildings could be retrofitted over the next 20 years to meet net-zero climate targets. The study found that meeting national climate objectives in the residential and commercial sector will require an investment of approximately $20 billion per year between now and 2040 and create up to 200,000 jobs across Canada. Specifically for Alberta the study identifies the creation of 14,000 jobs in the residential and commercial building sectors.

These job creation numbers are somewhat greater than the estimate of 12,400 jobs in Alberta from Clean Energy Canada's The New Reality Report. However, this is understandable as the Clean Energy study only included Canadian climate policies announced before 2021 that are not net-zero compatible.

Based on this initial evidence, we estimate that 14,000 jobs could be created in Alberta in the longer-term by pursuing a net-zero buildings mission as outlined in this report.

55 Trillium Network for Advanced Manufacturing (2022). Developing Canada's Electric Vehicle Battery Supply Chain: Quantifying the Economic Impacts and Opportunities. Prepared for Clean Energy Canada. https://cleanenergycanada.org/wp-content/uploads/2022/09/Report_SupplyChainReport_vf_20220705.pdf

56 Kennedy, Madi and Tom-Pierre Frappé-Sénéclauze. Canada's renovation wave: A plan for jobs and climate. The Pembina Institute, 2021. https://www.pembina.org/reports/canadas-renovation-wave.pdf

Northern Economic Corridor

The Canadian Northern Corridor Research Program at the University of Calgary published a paper[57] to consider implications of an infrastructure corridor for Alberta's economy. The multimodal road, rail, utilities and communications corridor would be an essential part to getting Alberta's clean energy products to interprovincial and international markets and reducing overall trade costs. The study found that by making investments in an economic corridor, reduced trade costs substantially increased Alberta's real GDP through its effect on international and interprovincial trade flows. The results show that, in the short run, lower trade costs by one per cent increases real GDP by roughly 0.8 per cent and lower trade costs by five per cent increases real GDP by roughly 4.4 per cent. These correspond to approximately $3 billion to $15 billion per year in additional economic activity in Alberta.

There are no detailed estimates of the capital investment required to build a Northern Economic Corridor in Alberta that we can use to estimate clean energy job creation. However, the project would likely create hundreds of construction jobs in the short-term and provide the infrastructure to enable many of the other strategies outlined in this report including the production and trade of hydrogen, sustainable fuels, electricity as well as low emission intensity hydrocarbons and bitumen products.

57 Tombe, T., Munzur A., and Fellows K.G., (2021). Implications of an infrastructure corridor for Alberta's Economy. University of Calgary. School of Public Policy. https://doi.org/10.11575/sppp.v14i.70651

SUMMARY OF THE CLEAN ENERGY JOB CREATION OPPORTUNITY FOR ALBERTA

A review of the literature describing investment and job creation for the seven clean energy industry missions identified in the report provides a basis for making preliminary estimates of the clean energy jobs that could potentially be created in Alberta. The working assumption is that Alberta will implement clean energy industrial policy strategies and actions as roughly outlined in this report and that these are consistent with achieving an energy transition that creates a significant net gain in energy-related employment. The analysis considers only direct jobs related to the seven missions to avoid potentially double counting. Note also that that soon to be released modelling of the effect of the net-zero transition on job creation is expected to provide a much clearer, detailed and integrated picture of the clean energy opportunity in Alberta.

Totalling the clean energy jobs estimated for each of the seven Missions indicates that more than 200,000 clean energy jobs could potentially be created in Alberta over the longer-term. These are the number of jobs that could be created and sustained by and over the 2030-2050 time period. Given that existing oil and gas employment is approximately 140,000, the net-zero energy transition clearly offers Alberta an opportunity for job growth even as the traditional emission intensive oil and gas industry declines. Note that a much more detailed and integrated picture of the clean energy job potential in Alberta should also soon be available from new modelling studies that are expected to be released in the next year.

CONCLUSION

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> We have the potential to have the benefit of what's needed in reworking in the energy system, which is why we need to act with speed so we get the investments.
>
> – Mark Carney, Calgary Herald, June 28, *2022*

> Canada needs to take a more strategic approach to identifying opportunities and building industry before global value chains form.
>
> *– The Transition Accelerator, "Canada's Future In A Net-Zero World: Securing Canada's Place In The Global Green Economy", March, 2022*

This report describes where the energy system puck is going, but how quickly can Alberta skate there? The answer is not fast enough at the current pace. To take full advantage of the economic development and job creation opportunities created by energy system disruption, Alberta must act decisively by mid-decade. Just three short years. Unfortunately, the UCP government and the oil and gas leadership are too busy protecting the status quo to worry about the risks that come with lagging behind Alberta's economic competitors.

That's why Skate to Where the Puck is Going is such a critical effort. This is not the first report to offer a blueprint for Alberta's economic future. Calgary Economic Development and the Business Council of Alberta, to name several, have also released strategies. But no organization to date has proposed such a radical re-engineering of the Alberta economy as the appropriate response to global economic disruption and the energy transition.

Such an opportunity comes along only once every generation or two, perhaps only once in a century and Alberta must not miss its chance to build a bigger, more prosperous, and more equitable future for our children. Every year, every month, every day that we wait is lost time while the window to act slowly closes. The longer action is avoided or slow walked; the more difficult adaptation will be down the road.

Make no mistake, the AFL is not proposing to tinker at the edges. Nor is it suggesting that Alberta use the same conventional policy tools of the past 40 years. This report is proposing a moon-shot to restructure the Alberta economy and make it future-ready while there is still time. At the centre of that moon-shot is an entrepreneurial state channelling Alberta's activist premier, Peter Lougheed.

Mark Carney has already warned that Alberta needs to "act with speed." Economists are warning that disrupted global value chains are reforming around new and restructured industries. Will Alberta's CEOs and the current government heed those warnings? The evidence suggests they will not.

Albertans must look elsewhere for leadership: To workers and the labour movement, supported and aided by civil society and Indigenous communities.

The AFL has provided the blueprint. Now it is time to act. Alberta must skate where the puck is going or suffer dire consequences.

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