



THE PROSPEROUS TRANSITION PLAN

Fossil Fuel Industry Workers Calling for a Managed Transition to a Net-Zero Carbon Economy

Date: August 4, 2021

ABOUT IRON & EARTH

Iron & Earth is a worker-led not-for-profit with a mission to empower fossil fuel industry and Indigenous workers to build and implement climate solutions. Since our launch in 2016, we have been in continuous conversation with workers and industry leaders about how to successfully transition Canada into a net-zero carbon economy. This policy document synthesizes these insights, proposing four broad-reaching national initiatives that upgrade our workforce, businesses, and infrastructure, while revitalizing our environment to meet the demands of this moment and the needs of future generations.

Our initiatives

Renewable Skills

This work built upon a successful pilot of this hands-on training program for fossil fuel industry and Indigenous workers installing a solar system at the Louis Bull Tribe in 2017, developed with the Energy Futures Lab and a number of partners. Throughout 2020-2021, Iron & Earth worked with the Louis Bull Tribe and a diverse team of subject matter experts to develop three rapid upskilling programs for fossil fuel industry and Indigenous workers. Upcoming programs for 2021 include 10-Day Community Solar Skills and 10-Day Community Wind Skills in partnership with Maskwacis Cultural College (MCC).

Iron & Earth will scale these training programs, and others to be developed soon, to train thousands of workers into the one million+ climate jobs forecasted as Canada pursues its net-zero targets.

Train the Trainer Program

In April and May 2021, we recruited and trained eight highly qualified and passionate instructors through our Train the Trainer program. The majority of Iron & Earth's new instructors have over a decade of relevant trades experience and multiple years in fossil fuel and renewable energy industries. Building this instructor network was an essential step towards scaling the delivery of our programs.

As the COVID-19 pandemic unfolded, we recognized the need to prepare ourselves for the potential need to deliver our programs remotely. While we can't deliver the hands-on components of our programs online, we saw the value in preparing our course-based work to be delivered online if necessary. This work is now complete, and our course-based materials are fully remote-ready.

Climate Career Portal

A central pillar of Iron & Earth is to help fossil fuel industry and Indigenous workers to develop careers in climate solutions. To accomplish this at scale, we have begun to create the Climate Career Portal: a digital platform that will help our members to understand and diversify into emerging careers in the net-zero carbon economy. The Climate Career Portal will accomplish this goal by clearly showing which occupations from oil and gas are transferable and required in emerging climate solutions. The portal will also provide job growth forecasts for these climate solutions. Additional features will include a comprehensive database of available training programs and financial supports.

Each of the features has been designed in response to questions Iron & Earth regularly receives from its constituency. This platform will allow Iron & Earth to provide guidance, at scale, to these workers who are looking for answers about the coming net-zero carbon economy.

Iron & Earth Industries

Iron & Earth Industries is a social enterprise that will allow Iron & Earth to scale the delivery of training programs and career support services in remote and Indigenous communities. As a first step towards this goal, Iron & Earth hired Alberta Community Cooperative Association (ACCA), Delphi Group, and McMillan-Evans Consulting to lead initial business planning development. The Iron & Earth team has worked closely with these consultants throughout the business planning process.

The initiative aims to understand the market for the products and services Iron & Earth Industries will offer, and a growth framework for achieving the scale believed required to support workers during the energy transition. Through in-depth data collection, interviews with industry leaders and business planning activities, we have affirmed some preliminary assumptions about the need for our services and identified new opportunities for our social enterprise.

Prosperous Transition Campaign

Through the Prosperous Transition Campaign, Iron & Earth is advancing a blueprint for a prosperous transition to a net-zero carbon economy, powered by the vision and voices of fossil fuel industry workers. This campaign is amplifying positive new narratives of hope by listening to the constituencies that need to be heard the most during the energy transition ahead. By doing so, Iron & Earth is catalyzing a significant increase in public support for an accelerated implementation of deep-reaching climate change solutions.

During the initial months of this campaign, Iron & Earth has:

- Developed and launched its policy priorities, including four-point plan
- Generated media coverage for the four-point plan in recent interviews and media coverage with Global News, Alberta Today, CBC and the Globe & Mail
- Met with multiple federal ministries, including the Federal Minister of Natural Resources, Seamus O'Regan, to explain the four-point plan for a Prosperous Transition
- Engaged with various organizations to gather preliminary feedback on the plan, including Unifor, Canadian Centre for Policy Alternatives, Pembina Institute, the Delphi Group and international organizations such as Agulhas
- Partnered with the Energy Futures Lab to get feedback from various energy industry stakeholders through a "Big Ideas" webinar hosted in 2020 and a 360 policy review event in January 2021

Iron & Earth is encouraged by the enthusiasm received in 2021 for its ideas put forward, and has seen elements of its policy recommendations in recent federal announcements, including the recent federal budget and the renewed federal commitments to implement a Just Transition Act.

ABOUT THE AUTHORS

Barend Dronkers

Barend is a clean energy consultant who works on energy efficiency and renewable energy policy and technology analysis. His services support market transformation for clean energy technologies by supporting decision-makers in navigating environmental, social and economic dimensions of their projects. He researches energy transitions topics, including energy efficiency, distributed energy resource technologies, and grid modernization. His expertise includes energy efficiency portfolio and program design, potential studies, technical reference manuals, cost-effectiveness testing, and benchmarking and financing programs. Barend has nearly 10 years of professional experience in engineering, policy, and energy transitioning planning from his positions at Energy Efficiency Alberta, the Pembina Institute, and Shell. He is also a fellow of the Energy Futures Lab. Barend has a Master of Sustainable Energy Technology from the Delft University of Technology and is a Waterloo engineering graduate.

Christopher Wiczorek

Chris is a researcher whose core interests include environmental sustainability and guaranteeing fair, safe, and decent employment for all workers. Chris has previously worked for several Ministers at the provincial level in government policy and communications. As well, he has business experience as a consultant for an energy company transitioning into the renewables market, and wide-ranging research experience on a number of academic and non-academic projects, including community-based research and participant surveys and interviews. Chris previously studied Political Science, History and Indigenous Studies at Dalhousie University in Halifax, and is currently finishing a Master of Science in Environmental Governance at the University of Oxford.

Contributors

Liam Hildebrand

Liam became a dual ticketed tradesman while building infrastructure for the fossil fuel industry. When he became more aware of global warming, he committed to use his trade skills to help build the renewable energy future. This decision led him to found Iron & Earth alongside a number of his co-workers and complete a master's degree focused on sustainability and organizational development.

Bruce Wilson

With over thirty years in the oil & gas industry, most recently as GM Asia-Pacific for Subsea & Pipelines Engineering with Shell International, Bruce has broad perspectives on the hydrocarbon and energy business. A supporter for many years of environmental causes, he left Shell in late 2018 to more directly focus on personal action to address the urgent challenges of climate change. He is determined to support a just and equitable transition for all and to align himself with like-minded, action-oriented individuals.

Adam Lynes-Ford

Adam has led campaign strategy, government relations, and communications for several advocacy organizations. As National Director of the Canadian Youth Climate Coalition, Adam met Indigenous and fossil fuel workers who were concerned about the dangers of global warming and who wanted to use their skills to help build a renewable energy economy and a safer future for their families and communities. It was clear that these workers needed to be at the forefront of building the new economy.

Rohan Nuttall

Growing up in Edmonton, Rohan established several youth initiatives advocating for greater environmental stewardship—from high school recycling programs to K-12 curriculum reform. Now, he is channeling his interests in programming, data science and platform-based solutions to help bring Iron & Earth's Climate Career Portal to life. Rohan & Sally Lin developed a transferability matching algorithm and research methodology executed by the Delphi Institute, Iron & Earth's research partner, and used in Iron & Earth's Climate Career Portal.

Sally Lin

Sally is a student leader with strong roots in community development initiatives and urban planning. She is a skilled graphic designer, dialogue facilitator and project coordinator. With experience ranging from student government to the United Nations, she is passionate about human wellbeing and sustainability, an issue that connects her deeply to the mission of Iron & Earth. Sally & Rohan Nuttall developed a transferability matching algorithm and research methodology executed by the Delphi Institute, Iron & Earth's research partner, and used in Iron & Earth's Climate Career Portal.

Rebecca McNeil

Rebecca is the owner of Together Strategy, a digital agency that services progressive organizations, including MoveUP, Nature Canada, the BC Lung Association, Telus STORYHIVE, the Alberta Federation of Labour, and more. She's a published academic author, including a publication for the UN's Environmental Programme, and co-founded a small theatre company, Reality Curve, with it's off-Broadway debut in 2019.

Reviewers

Bruce Wilson, Chairman of the Board, Iron & Earth

Luisa Da Silva, Executive Director, Iron & Earth

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EXECUTIVE SUMMARY

The **Prosperous Transition Plan** is a guide for the Federal Government of Canada to not only set a bold course towards net-zero by 2050 and meet or exceed interim 40 to 45% greenhouse gas (GHG) emissions reduction targets by 2030, but to do so while creating opportunities for Canada's existing workforce to participate and thrive in the net-zero carbon economy.

Iron & Earth's four-point plan is based on years of listening and working with fossil fuel industry and Indigenous workers since our launch in 2016. Our plan is further supported by worker interviews and 45 surveys conducted by Iron & Earth in 2021, and a third-party Abacus poll reaching over 300 workers across Canada. **We asked how workers see their role in a net-zero carbon economy and what they need to thrive – this plan is the culmination of these efforts and is supported by over 80% of workers surveyed.**

Fossil fuel industry and Indigenous workers want to work in the net-zero carbon economy – and many have already pivoted: 69% are interested in a career in the net-zero carbon economy, and over half think they will thrive in a Canadian economy that transitions to net-zero carbon emissions by 2050.¹ But the Abacus poll also showed many workers are worried they will not thrive in a net-zero carbon economy without rapid training and career supports.

Workers want, and need, skills training and development for jobs in the net-zero carbon economy, but face barriers to successfully transition. These barriers include reduced wages, losing their jobs or benefits, fewer working hours, and changing their employer or their career direction. Many are worried that they will be left behind in the transition, even with a deep desire to participate in the net-zero carbon economy. Workers participating in the Abacus Data poll ranked the solutions proposed for facilitating their transition, the results show that workers can make and desire to make a strong contribution in the net-zero carbon economy:

- **Career coaching:** 59% of workers are more likely to consider a job in the net-zero carbon economy if career coaching is provided
- **Learning about net-zero carbon economy jobs:** 68% of workers are more likely to consider a job in the net-zero carbon economy if they have the opportunity to learn about the variety of jobs available to them.
- **Understanding how skills translate:** 67% of workers are more likely to consider a job in the net-zero carbon economy if they have the opportunity to learn about and understand how their skills translate.
- **Paid job training:** 88% of fossil fuel industry workers are interested in skills training and development.
- **Baseline technical skills:** The majority of workers already have the baseline technical skills required, and believe they can transition with just 10 days of upskilling.

¹ From Abacus poll conducted with 300 workers across Canada in 2021.

Now is the time for bold federal policy to guide our economy into the future, by implementing the following four proposed national initiatives:

1. National Upskilling Initiative	Federal investment required
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Workforce

A *National **Upskilling** Initiative* to rapidly upskill fossil fuel industry and Indigenous workers for careers in the net-zero carbon economy.

\$10 billion over 10 years to support rapid upskilling of over 1 million workers @ \$10k per trainee on average.

Policy Gaps and Opportunities: Fossil fuel boom and bust cycles, and shifting demands for products and services worsened by the COVID-19 pandemic have taken a massive toll on Canadians’ lives and livelihoods, and unfortunately, the communities that have been hit the hardest are not receiving equal support. Economic recovery and a transition to net-zero needs to be bold; leapfrogging the Canadian economy while speaking to the middle working class, and making a direct effort to include fossil fuel industry and Indigenous workers. Many workers already have the foundational skills needed to work in a net-zero energy economy, but require upskilling and targeted training to transition their jobs.

Recommendations: Mission-oriented energy efficiency and renewable energy policy with supporting programs are needed at unprecedented scale and pace. When developing these programs, Canada must listen to and work directly with worker organizations. It must compliment these efforts with targeted and rapid upskilling programs to help workers transition their existing skill sets to net-zero carbon economy projects. Worker training budget must be allocated to workers based on the degree to which they are impacted and their skills are transferable to net-zero carbon careers.

2. National Repositioning Initiative

Federal investment required



Businesses

A *National **Repositioning** Initiative* to support businesses to retool manufacturing capacities and pivot business services to meet emerging demand in net-zero industries.

\$20 billion over 10 years to support the rapid repositioning of up to 10,000 Canadian Enterprises. A front-loaded provision to stimulate private sector funds.

Policy Gaps and Opportunities: The COVID-19 pandemic has shown that Canadian businesses are resilient and able to quickly pivot their business models to meet the needs of a new economy. At the same time, Canada must take immediate action to help businesses in materials extraction and process industries and manufacturers to pivot their products and services to meet the needs of a net-zero carbon economy. When businesses pivot, so do their workers – this is a massive opportunity for employed workers to transition their skills.

Recommendations: Identify product and service sectors that will emerge with high needs between now and 2030. For example, supporting businesses involved in growing Canada's hydrogen economy; and in Alberta, those developing lithium and geothermal energy resources. To de-risk these investments, Canada should work with diverse stakeholders, including worker and Indigenous organizations to define roadmaps for phasing out fossil fuel projects and build out net zero-carbon alternatives. Company support should have 'green strings' attached to ensure all projects are net-zero carbon by 2050 compatible.

81% of fossil fuel industry workers support a National Repositioning Initiative to support businesses with pivoting their business and retool manufacturing capacities to meet net-zero industries demands.



It's tough here right now. People are trying to save money, to put away what they can. A lot of people are out of work here, so the cost of retraining is a worry. People need to be retrained to transition but they may not be able to afford it on their own.

Justin Carter - Construction Electrician

National Retrofit & Repurpose Initiative

Federal investment required



Infrastructure

A *National **Retrofit & Repurpose Initiative*** to reduce the carbon intensity of long-term infrastructure and repurpose old infrastructure.

\$10 billion equivalent in the form of incentives and tax offsets with *green strings* to carbon-intensive industries investing in net-zero technologies.

Policy gaps and opportunities: Canada has a large inventory of abandoned and orphaned wells, and oil and gas pipelines that can be repurposed to extract new resources like helium and lithium. It also has pipelines that can be retrofitted to transport clean fuels like hydrogen – all critical ingredients for a net-zero carbon economy. By removing red tape and designing policies that radically speed up approvals, clean technology projects can be built fast and at a lower cost.

Recommendation: Create an inventory of fossil fuel infrastructure that can be repurposed and retrofitted to support net-zero carbon economy projects. Work with provinces and regulators to remove red tape preventing the pace and scale required of projects like Alberta RenuWell community solar and Terrapin’s Alberta No. 1 geothermal energy. Retrofit infrastructure to reduce methane leaks and prepare fossil fuel facilities and pipelines to produce and transport clean fuels like hydrogen.

82% of fossil fuel industry workers surveyed support a national retrofit and repurpose initiative to reduce emissions from existing infrastructure and repurpose old infrastructure for new uses

4. National Nature-Based Solutions Initiative

Federal investment required



A National **Nature-Based Solutions** Initiative to prioritize green infrastructure solutions that address climate mitigation and adaptation while strengthening the earth's ecosystems, and natural carbon sinks. \$22 billion over 10 years to prioritize approaches to green infrastructure development and solutions, along with the expansion of carbon sinks, and revitalized ecosystems and biodiversity.

Policy gaps and opportunities: Countries around the world have already taken meaningful action to develop and fund Nature-Based Solutions (NBS) projects. Canada has made some positive steps, but more must be done to ensure NBS projects can achieve their full economic and ecological potential in our country.

Recommendation: Canada must commit funding and policy support for the rapid and long-term implementation of NBS and green infrastructure projects. Government should coordinate with industry to write guidelines and best practices ensuring fossil fuel workers and local communities reap the economic and environmental benefits of NBS projects, and to ensure that Indigenous nations can consent to and lead NBS projects in their traditional territories.

Iron & Earth's four-point plan for a Prosperous Transition is a \$61 billion federal investment in fossil fuel industry and Indigenous workers, and should be taken as part of Corporate Knights' \$110 billion green economic recovery plan "Building Back Better with a Bold Green Recovery" [1] endorsed by 40 prominent business leaders (including Suncor Energy, Teck Resources, and Siemens Canada). Of the federal \$61 billion investment, \$40 billion would be front-loaded in the first two years, and with half of the early funding earmarked to deliver broad and immediate job benefits.

Iron & Earth supports the aligned call to action from the Canadian Labour Congress, the largest labour organization in Canada which represents more than 3 million workers across the country, for a federal commitment of \$81 billion over five years to expand renewable energy, home and building retrofits, public transit, and Just Transition measures to support workers and their families. [2] These investments must come with "green strings" attached to ensure that investments align with Canada's climate and workforce priorities. We support the International Institute for Sustainable Development's principles and conditions for a green recovery. [3]



The environment means a lot. I love the great outdoors, and so do my kids. I want to keep it as clean and pristine as we can.

Justin Carter - Construction Electrician

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THE FOUR-POINT PLAN FOR A PROSPEROUS TRANSITION

INTRODUCTION TO THE PLAN

The Prosperous Transition Plan is based on years of listening and working with fossil fuel industry and Indigenous workers, starting in 2016 with the launch of Iron & Earth. This plan is further supported by worker interviews and surveys conducted by Iron & Earth in 2021, and a third-party Abacus poll reaching workers across Canada. **We asked how workers see their role in a net-zero carbon economy and what they need to thrive – this plan is the cumulation of these efforts.**

Workers Support the Prosperous Transition Plan²

- 80% of fossil fuel industry workers support a *National Upskilling Initiative* to rapidly upskill fossil fuel industry and Indigenous workers.
- 81% of fossil fuel industry workers support a *National Repositioning Initiative* to support businesses with pivoting their business and retool manufacturing capacities to meet net-zero industries demands.
- 82% of fossil fuel industry workers support a *National Retrofit & Repurpose Initiative* to reduce emissions from existing infrastructure and repurpose old infrastructure for new uses.
- 82% of fossil fuel industry workers support a *National Nature-Based Solutions Initiative* to support green infrastructure projects and prioritize these over grey infrastructure systems and strengthen ecosystems, carbon sinks and green infrastructure.

What is the Prosperous Transition Plan?

Canada's economy faces three challenges — recovering and moving forward from the COVID-19 pandemic, decarbonizing our economy, and addressing inequality to ensure a prosperous future for all. As fossil fuel industry workers, and friends and family of those in the energy industry, we know fossil fuels have contributed significantly to our lives and economy. **The Prosperous Transition Plan puts the needs of fossil fuel workers, their families and communities first, ensuring everyone is able to participate and benefit from a transition to a net-zero carbon economy.**

In order to mobilize workers, and to provide them with job opportunities and the training they need to succeed in a net-zero carbon economy, we need massive Federal Government investment now to prime the pump for private sector investment. We are asking the Federal Government to fund the Corporate Knights' \$110 billion recovery plan "Building Back Better with a Bold Green Recovery" [1] endorsed by 40 prominent business leaders (including Suncor Energy, Teck Resources, and Siemens Canada). This federal contribution would be front-loaded, with more than \$40 billion committed in the first two years and with half of the early funding earmarked to deliver broad and immediate job benefits. **Of this \$110 billion, \$61 billion should**

² As reported by 300 workers responding to a 2021 third party Abacus poll.

be invested directly in fossil fuel industry and Indigenous workers as per this Prosperous Transition Plan.

We have the skills needed to build the new, net-zero carbon economy and kick-start Canada’s recovery from the COVID-19 pandemic. That’s why the **Prosperous Transition Plan is a four-point plan designed to rapidly mobilize our workforce and upgrade our economy to meet the demands of this transition and recovery.**

To inform this generational opportunity for lasting change, feedback was collected from Canadian fossil fuel industry and Indigenous workers from across the country, with input from 300 Abacus Data poll participants, 45 survey respondents, worker interviews, and Iron & Earth regional chapters, complimented by credible and compelling recommendations from around the world for immediate consideration by the Federal Government of Canada. Read more about Iron & Earth engagements and feedback in **‘What We Heard from Fossil Fuel Industry Workers’**.

The Prosperous Transition Plan is a four-point plan

Economic upgrade	Policy recommendation	Federal investment required
 <p>1 - Workforce</p>	<p>A National Upskilling Initiative to rapidly upskill fossil fuel industry and Indigenous workers for careers in the net-zero carbon economy.</p>	<p>\$10 billion over 10 years to support rapid upskilling of over 1 million workers @ \$10k per trainee on average.</p>
 <p>2 - Businesses</p>	<p>A National Repositioning Initiative to support businesses to retool manufacturing capacities and pivot business services to meet emerging demand in net-zero industries.</p>	<p>\$20 billion over 10 years to support the rapid repositioning of up to 10,000 Canadian Enterprises. A front-loaded provision to stimulate private sector funds.</p>
 <p>3 - Infrastructure</p>	<p>A National Retrofit & Repurpose Initiative to reduce the carbon intensity of long-term infrastructure and repurpose old infrastructure.</p>	<p>\$10 billion equivalent in the form of incentives and tax offsets with <i>green strings</i> to carbon-intensive industries investing in net-zero technologies.</p>



4 - Environment

A National **Nature-Based Solutions Initiative** to build Canada's green infrastructure and natural technologies, and support and strengthen the earth's ecosystems.

\$22 billion over 10 years to expand green infrastructure solutions and carbon sinks, while revitalizing ecosystems and biodiversity.

Why is the Plan timely and important?

Canada must contribute to global actions to address climate change, while recovering from the COVID-19 pandemic and addressing inequality. In 2015, 196 international parties signed a global pact to limit global warming to 1.5 degrees Celsius compared to pre-industrial levels. [4]. The Prosperous Transition is part of this global effort, while ensuring fossil fuel industry and Indigenous workers, businesses and communities are part of the journey to net-zero by 2050.

The timing for a Prosperous Transition Plan is now to ensure Canada plays a leading role on the world stage to Build Back Better. As of 2021, 19% of global recovery spending has gone towards meeting net-zero by 2050 targets. Canada has already booked 40% of its recovery dollars against climate actions [5], twice the global average. But it can do even more to catalyze clean technology, develop its workforce, and position itself to take full advantage of the opportunities of the net-zero carbon economy. As Prime Minister Justin Trudeau has said, "Canadian workers and businesses [have the potential to] be among the leaders in the increasingly low-carbon global economy." [6] Support and strong action from government are needed if Canada is to harness this potential.

Canada's COVID-19 recovery must ensure fossil workers have options to return to work within their industries and create new opportunities to take part in a net-zero carbon economy. Compared to traditional fiscal stimuli, green recovery dollars create more jobs, deliver higher short-term economic returns per dollar spent, and deliver higher long-term cost savings. Energy efficiency and renewable energy projects create roughly three times more jobs per dollar spent than fossil fuels. [7]

As the world's fourth-largest oil and gas producer, Canada must play a leadership role in demonstrating how countries can rapidly mobilize their fossil fuel industry workforces to transition to a net-zero carbon economy. The Prosperous Transition Plan is timely because fossil fuel companies are at a tipping point. The COVID-19 pandemic in 2020 showed the world what happens when demand for fossil fuel dips. Fuel prices dove 60% with over-supplies and not enough demand. Many fossil fuel producers went bankrupt. [8] But industry troubles began long before the pandemic with investors armed with new environmental, social and governance (ESG) criteria pressuring fossil fuel companies to consider more immediate pathways to net-zero. Enbridge, TransAlta, Cenovus Energy, Canadian Natural Resources, and Suncor are just some of Canada's fossil fuel majors to announce net-zero targets [9]; [10]. Even the International Energy Agency, a global and fairly conservative institution, has prescribed no new oil, gas and coal projects from 2021 for net-zero by 2050. [11] Meanwhile, Shell and ExxonMobil are being driven by their investors, board, and courts to strengthen their own climate action plans and targets. [12]

In 2010, Canada signed the United Nations Declaration on the Rights of Indigenous Peoples affirming its commitment to Indigenous powers of resource and economic development. And in 2015, the Truth and Reconciliation Commission of Canada (TRC) published its findings investigating the devastating legacy of Canada's residential school system. According to the CBC, of the 94 calls to action published in the TRC report, only 14 are complete. The Prosperous Transition is an opportunity for Canada to recognize Indigenous peoples' rights to self-determination, act on TRC findings, and play a leadership role in Canada's transition to a net-zero carbon economy.

Indigenous Economic Leadership and Self-Determination: An opportunity to ground a Prosperous Transition in truth and reconciliation

The net-zero carbon economy must be grounded in recognition of Indigenous peoples' right to be self-determining over their own lands and resources. Indigenous and non-Indigenous communities have an opportunity to build a prosperous transition together, one that is based on a principled, rights-based approach —this includes ensuring that the new economy is grounded in recognition of Indigenous peoples' right to be self-determining over their own lands and resources. Indigenous communities draw on traditional knowledge about living in balance and abundance on the land while applying new skills and innovations to meet the challenges of our times. The journey to deliver decentralized, independent zero-emission energy offers an opportunity for Indigenous communities to attain 'energy sovereignty' and new prosperity grounded in self-determination.

FOSSIL FUEL INDUSTRY AND INDIGENOUS WORKERS SUPPORT THE PLAN



INTRODUCTION

Iron & Earth began its Prosperous Transition Campaign in Spring 2020, kicking it off with a members' survey, and in 2021 moving to include worker interviews and an Abacus poll reaching out across Canada and key demographic groups. Stakeholders engaged during the campaign include Unifor, Canadian Centre for Policy Alternatives, and Pembina Institute. With much encouragement, Iron & Earth also consulted the Federal Minister of Natural Resources, the Honorable Seamus O'Regan, to further develop the Prosperous Transition Plan as outlined in this report. And in January 2021, the Energy Futures Lab fellows were invited to provide their perspectives via its 360° Policy Lab. More than 300 fossil fuel workers were engaged between February 2021 and the time of writing this report: following are some of the worker perspectives, and how the data was collected as part of this constituency engagement.

WORKER INTERVIEWS

Over the course of 2021, Iron & Earth conducted interviews with fossil fuel workers to hear directly from them about their thoughts on a Prosperous Transition, and what is needed to make a transition to net-zero as successful as possible for workers, their families, and their communities. Each interview lasted between 30-45 minutes and was conducted by an official Iron & Earth representative.

In broad terms, many workers told us that climate change is a challenge that we must collectively address. What we heard from a large number of workers is that they would consider switching to a career in the net-zero carbon economy – and many are excited to do so – but, a lack of opportunities for further job training and career development is a concern from many workers that may otherwise hold them back from taking a job in the net-zero carbon economy. Key themes that workers expressed over the course of the Iron &

Earth interviews, and illustrative quotes and worker stories from these engagements, are included throughout this report.



James (Jim) McPhail *Organizational Consultant*

Jim's fossil fuel focus areas are in Organizational Development as a senior leader, internal consultant and external consultant, developing & delivering Total Quality strategies, processes and programs; strong focus on Organizational Effectiveness, major Change Management projects, development of leaders, High Potentials & frontline employees. Jim's oil and gas work has taken him all over Alberta. He lived in Tulsa, OK for a few years, and supported projects in Mexico from there. Companies include Williams Pipelines & Energy, TransCanada, FT Services/CNRL at Camp Horizon, ATCO Frontec, ATCO Noise Management, oil sands camp transportation. His experience in renewables includes numerous volunteer positions. Board Directorship, Alberta Environmental Network, and Mobilize Node of Calgary Climate Hub.



ED BROST *Chemical Engineer*

Ed is a Professional Chemical Engineer and holds an M.Sc. in Environment and Management from Royal Roads University. Ed has over 35 years of experience in the energy sector with Shell, Ontario Hydro, and Atomic Energy of Canada. After retiring from Shell Ed formed his own consulting company to pursue his passion for sustainable energy. Ed is currently Managing Director, Innovation and Sustainable Development, with Carbovate Development Corp. and volunteers his time as an Associate with a non-profit corporation, the Bowman Centre for Sustainable Energy.

Stephen Buhler *Red Seal Machinist*



Stephen has been working in the oil and gas industry as a journeyman machinist for the past 13 years. Always keenly aware that a transition to a net-zero carbon economy was going to be required, he wanted a trade that would give him skills to work on infrastructure both in oil and gas, and renewables. After feeling that a transition to low-carbon energy was not happening with the urgency required, he got involved with grassroots climate organizations in Edmonton, where he used his experience as an oil and gas worker to help build connections between the work of young climate activists and fossil fuel workers. Now he is bringing the energy and passion from his experiences with youth climate organizers to help his fellow fossil fuel workers advocate for the support and investments needed to transition to a low-carbon future.

ABACUS POLL

Iron & Earth commissioned Abacus Data to conduct surveys with 300 Canadian fossil fuel workers between the dates of May 24 to June 11, 2021. A random sample of panelists was invited to complete the survey from a set of partner panels based on the Lucid exchange platform. These partners are typically double opt-in survey panels, blended to manage out potential skews in the data from a single source. The margin of error for a comparable probability-based random sample of the same size is +/- 5.7%, 19 times out of 20. The data were weighted according to census data to ensure that the sample matched Canada's population according to age, gender, educational attainment, and region. Totals in the results may not add up to 100 percent due to rounding error. The population sample, broken down by key demographic groups:

	Key Demographic Groups	Sample Size	% of Sample	Margin of Error
Province	AB	137	46%	8%
	ON	83	28%	11%
	Others	78	27%	11%
Gender	Male	218	73%	7%
	Female	80	27%	11%
Age	18-29	35	12%	17%
	30-44	162	54%	8%
	45-59	68	23%	12%
	60+	33	11%	17%
Type of work	Trades & Industrial work	165	55%	8%
	Office & Remote work	160	53%	8%
	Science, Technology, Engineering & Mathematics	122	41%	9%
	On-site supervision	87	29%	11%

Most fossil fuel industry workers in Canada recognize the threat of climate change and believe Canada should pivot to a net-zero carbon economy by 2050. 67% of fossil fuel industry workers believe climate change is a challenge we need to address.

Many workers want to work in the net-zero carbon economy. 69% of workers surveyed respondents are interested in a career in the net-zero carbon economy, and over half think they will thrive in a Canadian economy that transitions to net-zero emissions by 2050.

However, the majority of fossil fuel industry workers are worried about the transition to a net-zero carbon economy if they don't receive training and/or career support. To help workers transition, rapid upskilling and moderate training are preferred. 80% are interested in skills training and development, and 70% are prepared to pay for training to 'upskill' or retrain for a job in the net-zero carbon economy through rapid upskilling training (a 10- day program or shorter). Over half polled would pay for moderate training of up to a year.

Based on survey results, few fossil fuel workers think they can transition without training. Of all the net-zero projects, the top type of project where fossil fuel workers believe they are most likely to transfer their skills is into energy efficiency, however, this represents only 20% of workers.

The majority of concerns expressed around a transition to a net-zero carbon economy include:

- Getting left behind in the net-zero transition
- Needing to invest time into retraining
- Lack of opportunities to progress in a career
- Losing my job
- Having to change careers
- Needing to move home to find work
- Having to change companies
- Having my work hours reduced
- Having my wages or benefits reduced

Fossil fuel industry workers face many barriers to entering the net-zero carbon economy. Proposed solutions were ranked by workers. The results show workers can make a strong contribution:

- **Career coaching:** 59% of workers are more likely to consider a job in the net-zero carbon economy if career coaching was provided
- **Learning about net-zero carbon economy jobs:** 68% of workers are more likely to consider a job in the net-zero carbon economy if they had the opportunity to learn about the variety of jobs available to them.
- **Understanding how skills translate:** 67% of workers are more likely to consider a job in the net-zero carbon economy if they had the opportunity to learn and understand how their skills translate.
- **Paid job training:** 88% of fossil fuel industry workers are interested in skills training and development.
- **Baseline technical skills:** The majority of workers already have the baseline technical skills required, and believe they can transition with just 10 days of upskilling.

SURVEYS

Iron & Earth conducted membership surveys from February 1 to July 31, 2021. In February, the worker survey gathered over 50 compelling stories, quotes and perspectives from workers who have spent decades in the oil and gas industry who support a prosperous transition to net-zero. Iron & Earth will continue to engage with its members beyond the publishing of this Prosperous Transition Plan, with a goal of 500-600 total engaged.

The majority of the members surveyed are from Alberta, and have worked, or are working in, the fossil fuel industry. Those surveyed began working in the sector as early as 1974 and as recently as 2017. Most workers who participated in the survey are 40 years old or younger, meaning that the option of retiring as a solution to waning opportunities is not an option. Many older respondents mentioned retirement or early retirement when questioned about their next steps. A few of those surveyed are in the challenging position of feeling like re-training at this stage in their careers isn't worth it, but retirement is not yet an option.

Many of the workers surveyed agree that the fossil fuel industry offers interesting and challenging work, while acknowledging the benefit of high wages, though many respondents clarified that this is becoming less common and reliable. Lack of job security and having to work away from home were top concerns. Respondents were divided about work culture in the fossil fuel industry. Many people listed the work culture and people as a benefit, and an equal number listed it as a concern, highlighting that there is no universal worker experience in the industry. Though some workers listed negative environmental impacts as a concern of their jobs, this was not a leading issue. What we heard from workers about their priorities and motivations included a desire for stable, interesting and challenging work, and being close to family. Both of these considerations will be crucial to attracting workers to the net-zero carbon economy.

Two-thirds of respondents currently working in the industry are interested in making a career change into the net-zero carbon economy. (The few workers who didn't express support were nearing retirement.)



The need for a Just Transition isn't theoretical for me. I've seen the impacts of layoffs on families, and on kids, especially when people need to relocate.

Workers deserve good, stable jobs. But not everybody will have skills that are directly transferable – we need to get fossil fuel workers the support they need to prosper in the net-zero carbon economy.

Jim McPhail – Organizational Consultant

Most workers listed financial support for retraining as a key factor. For those interested in changing careers it is intimidating to go into debt after years of declining income. “It would require significant funding for career training, most retraining costs thousands of dollars that, after 5 years of declining income, and one year of no income (other than E.I.), all savings have been depleted and there is simply no money left for training”. Workers interested in changing careers want leadership and support from government, many fear being left behind in the energy transition.



I think oil and gas is a declining career opportunity for people when the world is changing.

The world is not going back to the energy systems that we had in the 20th century, and energy workers have an opportunity today. I'd skate to where the puck is going, not to where it's been.

Ed Brost – Chemical Engineer

Overall, most workers responding to the surveys are interested in a career change and support making that happen. Their priority is supporting themselves and their families in their community, having been impacted by fossil fuel industry instability - especially over the past decade. Valuing different motivations for participation in the energy transition, and meeting people where they're at, will be crucial to moving forward together and making changes proposed by the Prosperous Transition Plan.

ENERGY FUTURES LAB 360° POLICY REVIEW

The Energy Futures Lab (EFL) is an Alberta-based coalition of innovators and leading organizations working together to advance solutions aligned with a 2050 vision for Canada's energy future. In January 2021, the Energy Futures Lab hosted a 360° Policy Review workshop, providing EFL Fellows with an opportunity to offer feedback and input into Iron and Earth's Prosperous Transition Plan. The 360° Policy Review process was developed by the EFL and is offered as a means to provide multi-stakeholder input into the development of policy recommendations, to further support the advancement of energy transition in Alberta and Canada. While applied to review of the Prosperous Transition Plan, the EFL's 360° Policy Review has also been applied in other contexts. For example, it presents an opportunity for governments and other organizations to apply a systems lens, receive direct feedback from subject matter experts and diverse stakeholders, and test policy ideas in a way that considers how a policy concept can move towards implementation. The EFL has implemented the Policy 360° Review Initiative to support a number of provincial ministries, as well as to refine Emissions Reduction Alberta's Technology Roadmap and the City of Edmonton's Energy Transition Plan, among others. [13]

As part of the 360° policy review workshop hosted by the Energy Futures Lab, EFL Fellows were encouraged to look critically at Iron and Earth's Prosperous Transition Plan. Key input offered by Fellows included an emphasis on worker-centered, inclusive, and supportive policy. More specifically, Fellows expressed interest in prioritizing programs and policies that directly support upskilling efforts serving today's oil and gas workers. Others also underscored the need for a politically resilient policy that is able to withstand changes in government. Further feedback from those who reviewed the Plan includes:

- The Plan appears to embody a top-down approach, while also implementing ground-up recommendations with a focus on workers and their communities.
- The Plan must look beyond Alberta's oil and gas industry to incorporate a broader set of interests and needs in a way that fosters a more united approach to achieving economic and climate goals.
- The Plan should commit to diversity and inclusion in policy and program recommendations.
- The Plan should include stakeholder engagement with communities, unions, research institutes, and businesses.



#1: UPGRADING OUR WORKFORCE

THE NATIONAL UPSKILLING INITIATIVE



Photo courtesy of Joan Sullivan, with the Louis Bull Tribe during Iron & Earth's Renewable Skills Phase 1 Initiative

OVERVIEW

A National Upskilling Initiative would rapidly upskill fossil fuel industry and Indigenous workers for careers in the net-zero carbon economy in line with Canada’s 2020 commitment to invest \$1.5 billion in its people [14] with new worker training and assistance programs. Iron & Earth, and local workforce development organizations would offer training that enhances the skills of workers in the fossil fuel industry, while also prioritizing access for Indigenous workers and workers who currently face barriers to participating in the industry. Upskilling should be designed to match emerging demand in net-zero industries, ensuring the employability of the trainees while also ensuring employers have access to the skilled workforce they require for their projects.

A Prosperous Transition supported by a National Upskilling Initiative will make training available to 1 million workers. While this may seem ambitious, this call is born from labour market statistics and existing government policy. Recent statistics estimate that the total labour force working directly in oil and gas in Canada is just under 200,000 workers [15]. A broader view, however, reveals that over 830,000 workers were estimated to be employed, either directly or indirectly, in Canada’s energy sector in 2018 [16]. Further, the Federal Government’s 2020 speech from the throne made a concrete commitment to create one million jobs – and to do so while simultaneously investing in infrastructure development, worker retraining programs, and incentives for employers to hire and retain new workers [17]. Training is not just for workers seeking employment: many are already employed by companies pivoting to the net-zero carbon economy and need the same access to rapid upskilling and training to succeed in their new roles. When existing jobs, government commitments, and projections for growth in the net-zero carbon economy are taken together, Canada has a strong, empirically grounded case for training one million workers [18].

Of course, these jobs are not just statistics: they are current and future workers, each part of a family and a community. What benefits workers will also benefit their broader communities making a National Upskilling Initiative even more important and timely. Iron & Earth has already heard from many current fossil fuel workers who are excited for a career in the net-zero carbon economy, but who need support to make the transition. Although the Federal Government has promised to create one million jobs, we must ensure that these jobs are green jobs, creating careers and giving stability to the workers who will build the net-zero carbon economy and help meet Canada’s climate targets.

A National Upskilling Initiative is needed to ensure that 1 million workers can have a prosperous transition to the net-zero carbon economy, and to ensure a scale and pace in line with Canada’s climate goals. Support is needed to help existing energy workers transition, and to provide training for new jobs that will be created, ensuring that future workers will have a stable and prosperous career building and contributing to Canada’s clean energy solutions. To accomplish this, the National Upskilling Initiative needs buy-in from all sectors seeking skilled workers, including existing industries that are embracing technologies and practices for decarbonization and renewable energy companies. Each sector will be called upon to direct the type of skills workers require, and match these with new job opportunities.

Iron & Earth upskilling and training

Iron & Earth delivers a range of sustainable energy training programs to rapidly upskill fossil fuel industry and Indigenous workers into climate careers. These training programs are often integrated with hands-on sustainable energy installations – a proven model to be replicated and scaled.

Iron & Earth's four new 10-day rapid upskilling programs that are ready for delivery:

- Solar Skills for Electricians
- Community Solar Skills
- Community Wind Skills
- RenuWell Workforce Training Program

Unique elements of our 10-Day rapid upskilling programs include:

- Delivery of our programs in remote and Indigenous communities
- Designed for, and focused delivery for, fossil fuel industry workers and Indigenous community members
- Five days of hands-on experience: installing a working renewable energy system
- Indigenous ways of knowing reflected in the course structure and content
- Connections career mentorship program for program graduates

Studies point to the benefits of short, targeted training modules that enable workers to tailor their transition, creating waypoints in their personal journey. In order to be successful, the National Upskilling Initiative must also take the shifting geographies of job creation into account. Notably, we can expect job distribution to change as particular industries diminish, as we have seen in sectors such as coal where whole towns that were once centered around a local mine must adapt or disappear. Therefore, an additional challenge will be to introduce new vibrancy to existing communities through community energy projects and localization of services to replace fossil fuel sector jobs. It will be important to predict geographical growth areas and identify communities that are particularly at risk in the new economy.

OCCUPATIONAL TRANSFERABILITY AND SKILLS REQUIRED IN THE NET-ZERO CARBON ECONOMY

Along with 830,000 fossil fuel workers already employed by the fossil fuel sector – all of whom will be transitioning as companies pivot to the net-zero economy – Clean Energy Canada's The New Reality report estimates another 200,000 new green jobs will be added by 2030.³ The report projects 50% growth for clean energy jobs, hand-in-hand with a 58% boost to GDP from now to 2030. All this means many new workers will be needed in the clean energy sector, with many of those roles filled by fossil fuel workers with transferable skills. Building Back Better with a bold green recovery supports The New Reality's job growth

³ Iron & Earth calls for training 1 million workers, which includes those workers already employed by companies actively pivoting to the net zero carbon economy. 200,000 new jobs by 2030, and over 630,000 jobs by 2050 does not include existing positions filled by workers also needing training.

forecasts with scalable investments in homes, workplaces, a clean and affordable electricity grid, transportation systems, industry, and natural capital, with over 630,000 clean energy jobs planned through to 2050 in line with Clean Energy Canada expectations.

Net-zero carbon economy projects require many of the same roles and underlying skillsets of oil, gas and coal industry projects over the course of their lifetime, including initial assessment, design, construction, operation and maintenance, and finally end-of-life. Fossil fuel industry workers' jobs include on-site roles such as boilermakers, pipefitters, plumbers, sheet metal workers., on-site supervision and management. Off-site roles include office roles such as design, planning, governance and legal, finance and administration; and science, technology, engineering, and math (STEM) roles.

While fossil fuel workers' skills and expertise will be required to build the net-zero carbon economy, there is a major research gap in understanding the skills currently held by fossil fuel workers and how these will transfer to renewable energy solutions. This is a serious challenge for many workers who are excited for a career in the net-zero carbon economy, but who are not sure how to best take advantage of their current skills and expertise in the growing renewables sectors.

In order to remedy this research gap, Iron & Earth's Climate Career Portal (CPP) team contracted the Delphi group to examine training market gaps and provide an understanding of where Iron & Earth could develop micro-training opportunities. As well, an inventory of key work duties needed in the five quickest growing solutions in renewable energy, across the entire project lifecycle, was produced. These sectors are Wind, Solar, Geothermal, Energy Storage, and EV Charging. Iron & Earth plans to expand the sectors included in this portal to include more aspects of the net-zero carbon economy such as nature-based solutions, hydrogen, energy efficiency, hydro, and nuclear.

Case Study: Electrical powerline and cable workers transitioning to geothermal and solar

Electrical powerline and cable workers (NOC 7244) have high skills transferability (measured as multiple relevant skills and duties) to renewable energy projects, particularly for the construction and operations phases of the project life cycle of solar and geothermal.

In solar, the top duties transferable skills include:

- Test and observe electrical, electronic and mechanical components and systems using testing and measuring instruments
- Drive special purpose trucks such as tow, dump, hydrovac or cement mixing trucks.

In geothermal, skills may be minimally transferred for the following top duties:

- Test system for leaks using testing equipment
- Drive special purpose trucks like tow, dump, hydrovac or cement mixing trucks
- Measure, cut, shape, assemble and join materials made of wood, wood substitutes, lightweight steel and other materials
- Assist in repairing, maintaining and installing industrial machinery and equipment

To advance this process, the Climate Career Portal team developed the following methodology. No Canadian-specific information on the transferability of fossil fuel skills to renewable energy or other climate related occupations currently exists. To bridge this significant data gap, the CCP project pulled from two U.S. datasets: O*Net occupation database from the U.S. Department of Labour and the Green Careers Information from the U.S. Bureau of Labour Statistics to identify what occupations were needed during which stage of any renewable energy project life cycle. The project life cycles are Development, Construction, Operations & Maintenance.

Using the Brookfield Institute's open-source cross-walk of O*Net occupation codes to the Canadian National Occupation Code (NOC) dataset [19], the CCP was able to identify which occupations (and their skills) were needed at various stages of the project life cycle. Relying on the expertise of the Delphi Group, skills from NOCs relevant to climate solutions were assigned to the five short-listed climate solutions and each of the project life cycles. Through this, the CCP team and the Delphi Group created the first ever, Canadian-specific dataset of skills relevant to renewable energy projects. This work shows that fossil fuel workers can transfer their skills to thrive in a net-zero carbon economy and scale the climate solutions we need to achieve our emissions reduction goals - if workers are connected to the job opportunities, companies, and training and upskilling programs they need to succeed.

This dataset is a key part of the Climate Career Portal, which will help fossil fuel workers understand and diversify into emerging careers in the net-zero carbon economy. This short case study, and the one above, illustrate the capabilities and the potential of the CCP to clearly show which fossil fuel occupations are needed in emerging climate solutions and explaining why these occupational skills are transferrable.

Cast Study: Welders transitioning to wind infrastructure construction

Welders and Related Occupations (NOC 7327) have many transferrable skills that are directly needed to build infrastructure to support renewable wind energy. These include:

- Operate manual or semi-automatic welding equipment to fuse metal segments using processes such as gas tungsten arc welding (GTAW), gas metal arc welding (GMAW), flux-cored arc welding (FCAW), plasma arc welding (PAW), shielded metal arc welding (SMAW), oxy-acetylene welding (OAW), resistance welding and submerged arc welding (SAW)
- Read blueprints, diagrams and schematic drawings to determine work procedures
- Assist heavy equipment operators to secure special attachments to equipment, signal operators to guide them in moving equipment and provide assistance in other activities

These brief examples demonstrate the flexibility and breadth of fossil fuel workers' skills that may be transferred to renewable energy sector jobs. The Climate Career Portal includes many more using a matching algorithm for over 150 oil and gas occupations matched to five renewable energy solutions. The CCP will be continually improved by leveraging human resources data for each climate solution and providing more detailed career pathway data for workers looking to transition. This includes analyzing job postings from each industry, extracting in-demand skills, and recommending jobs and training

programs directly to workers based on user-created skills profiles, career interests and geographic considerations.

FEDERAL GOVERNMENT COMMITMENTS

In its 2021 budget, the Federal Government of Canada announced and proposed many new programs and policies to fund clean energy projects that create jobs, either directly, indirectly or are induced by a growing net-zero carbon economy. These jobs leverage the existing skill sets of Canadian fossil fuel workers, and the manufacturing capabilities of businesses from across the country. The spending proposed in Canada's budget builds on its November 2020 announcement adding \$1.5 billion to existing Workforce Development Agreements with provinces and territories. [14] These agreements help underrepresented groups and sectors hit hardest by the pandemic, including construction and transportation, access skills and on-the-job training, and expanding employment services.

Upgrading worker skills for new net-zero carbon economy industries

The 2021 Federal Budget proposes various investments via Employment and Social Development Canada to support upskilling, and training of new workers. These include:

- \$250 million over 3 years to support workers in transferring skills, and connecting workers with new opportunities with matching skills needs. [20, p. 21]
- \$55 million over 3 years to fund a Community Workforce Development Program to connect growing local organizations with training providers to deliver upskilling and reskilling for in-demand workers.
- \$960M over 3 years to fund a Sectoral Workforce Solutions Program: for training support for small medium sized business to support worker training, with at least 40% of support directed to under-represented groups (including women and Indigenous peoples). [20, p. 21]
- \$470 million over 3 years to establish an Apprenticeship Service to establish new apprentices in construction and manufacturing trades at small and medium-sized employers
- \$298 million over 3 years for a Skills for Success program that teaches new literacy and digital skills, highly transferable across employers, community organizations, etc. This will include online training resources and assessments available for free to all Canadians.

These announcements follow existing programs and policies in place:

- "Skills Boost" 3-year pilot to provide top-up grants for adult learners
- Canada Training Benefit of up to \$5,000 for every Canadian to gain new skills, though these benefits may only be accessed by workers already employed
- Future Skills Program that provides tools needed for workers to grow and succeed. These tools are delivered through many local and regional organizations across the country
- \$150 million to help affected communities diversify their economies and help workers develop new skills including a "Canada Coal Transition Initiative worth \$35 million to support skills development in Canada's coal regions. [20, p. 21]

Renewable and clean electricity: creating net-zero energy jobs

The renewable energy sector creates 77 direct and indirect jobs per \$10 million of spending, and many of the skills required are directly transferable from fossil fuel industries. This far exceeds an estimated 27 fossil fuel jobs per \$10 million of project spending. [21]

The Federal Government has played a leadership role in partnership with provinces to phase out coal power. [22]. Canadian provinces are meanwhile developing renewable energy resources to substitute coal, with wind, solar, geothermal, bio- and hydro projects. Announcements include:

- All Federal Government buildings to be powered by renewable energy starting with a \$14.9 million investment. [20]
- Canada's Emerging Renewable Power Program supports emerging technologies including geothermal, bi-facial solar PV, and tidal energy. [23]
- Northern Responsible Energy Approach for Community Heat and Electricity programs support developing renewables in Northern, predominantly Indigenous communities. [24]

Energy Efficiency: creating retrofit job opportunities

Energy efficiency projects create 75 jobs per \$10 million of spending. Federal Government-related spending commitments to support building and industry efficiency retrofits include: ([25] and [20])

- Canada Infrastructure Bank to invest \$2 billion in commercial and large-scale building retrofits.
- Three-quarters of Canada's federal building's floor space will be net-zero by 2030, with all new buildings to be net-zero starting today.
- \$950 million to the Federation of Canadian Municipalities' Green Municipal Fund (GMF) to support affordable, social, market housing units and large community buildings with energy efficiency retrofits.
- Invest \$1.5 billion over three years for green and inclusive community buildings through retrofits, repairs, upgrades and new builds, 10% of which is reserved for First Nations, Inuit and Metis community buildings.

The Greener Homes Program is Canada's newest energy efficiency retrofit program, providing Canadian homeowners up to \$5,600 in rebates to retrofit their home with energy efficiency and renewable energy technologies. [26]. While a commendable cross-national effort, the program requires homeowners to pay for all costs upfront and first conduct an energy evaluation of their home. And, its funding limit is not close to covering the total cost of the deep retrofits required which may run up to \$100,000 depending on the home.

The government has also committed to further developing model building codes and a roadmap to net-zero energy ready buildings by 2030, but without a roadmap to support industry workers in meeting new requirements.

POLICY GAPS AND OPPORTUNITIES

The Federal Government must proactively offer all Canadians, regardless of their employment status, race, religion, gender, or background, opportunities for paid training and development, ensuring communities have the right workers with the right skills to meet the needs of net-zero carbon economy jobs.



I've already done four years of technical training and I have 15 years doing electrical work already.

I want to work in the net-zero carbon economy, but the biggest thing is now I have to go back and do another year or two of training on top of this. As a father and having a family it's like, how do you afford all this?

Kaine Prince – Electrician

A Bold Recovery with No One Left Behind

The COVID-19 pandemic has taken a massive toll on Canadians' lives and livelihoods, and unfortunately, the communities that have been hit the hardest are not receiving equal support. The COVID-19 recovery and transition to net-zero needs to be bold; leapfrogging the Canadian economy while speaking to the middle working class, and making a direct effort to include fossil fuel industry and Indigenous workers. [27]

Historically, in the 1980s, 250,000 jobs were lost across Northern England's coal-producing regions. With no policies in place to help workers find new employment, with many communities falling into deprivation. 43 percent of all former coalfield neighbourhoods are among the most deprived areas in Britain [28] and [29]. **Job losses from Canadian fossil fuel phase-out can and must be avoided: a recovery must ensure all workers recover and that policy and program supports are available for all able to reenter the workforce.** This especially applies to low-wage, Indigenous, and new Canadians, adversely affected by the pandemic. [30]

Abacus statistic: over 4 in 5 workers believe they'll need retraining to switch to the net-zero carbon economy, and 76 percent of workers said paid job training would encourage them to transition

To ensure Canadian policies and supporting programs do not fail fossil fuel workers, the Federal Government's programs must aid each individual worker's planning, taking into account their career stages. Programs must offer substantial retraining and funding for those in mid-career, and for those early and just

entering the workforce, offer training and revision of existing programs. [31]. These programs may leverage and guide labour market forces. Typically, up to 10% of the labour market experiences a turnover every year with workers moving between sectors, retiring, or otherwise moving on. It is imperative that government works with companies and labour organizations to ensure new entrants shy away from new fossil fuel jobs, turning instead to opportunities in the growing net-zero carbon economy. [31].

Support for Existing Industry Workforce

Large investments in existing industries being made and announced by the Federal Government may seem to be reinforcing existing disparity gaps. Investments in incumbent industries must either directly or indirectly support workers. It cannot appear (or equate) to investments to profit the firms on their own. [27, p. 360]. When support is given to existing fossil fuel industries, these should support workers directly with upskilling, and create new opportunities to work on net-zero energy projects in other company divisions.

“

It’s tough here right now. People are trying to save money, to put away what they can. A lot of people are out of work here, so the cost of retraining is a worry. People need to be retrained to transition but they may not be able to afford it on their own.

Justin Carter – Construction Electrician

Abacus statistic: 3 out of every 4 workers would do retraining of up to 12 months on a full scholarship – compared to only 56 percent of workers who said they would if they needed to pay

Workforce support for existing workers, and those new or wishing to enter the net-zero carbon economy, must consider community health. For example, coal miner black lung, and other local environmental issues that may have long-term adverse effects, must not be neglected once workers are transferred to net-zero carbon economy jobs.

Case Study: Examples of transition funds and retraining initiatives

Scotland’s Oil Worker Transition Training Fund was established by the Scottish Government in 2016 to help transition oil and gas workers affected by recent facility closures to clean economy jobs by funding reskilling and training. The 14 million euro (22 million CAD) fund, available to workers from 2016 to 2019,

was supported by a national skills agency aligned with already-known labour market needs [32]. The program was extremely successful: 89% of participants found work after completing the reskilling program, and each worker required only half of the originally planned training budget. [33]

Ireland's Skills Transition Fund was established by government after announcing its phase-out of peat production in the Irish Midlands Region in 2019. The 27 million euro (43 million CAD) fund is used to reskill workers and help communities adjust; so far 47 projects have been provisionally funded under this initiative. [34]

Spain's Framework Agreement for a Just Transition of Coal Mining and Sustainable Development of Mining includes comprehensive funding for re-training programs that support coal workers transitioning to clean economy jobs. [32] The 260 million euro (400 million CAD) fund was agreed by government in a deal with trade unions in alignment with government plans to shut down most of Spain's coal mines by 2028, and includes early retirement packages and employment opportunities via environmental restoration and reskilling programs for young workers. [34]

Listen to and work with Labour Organizations and fossil fuel workers

The Federal Government must listen to and work with labour organizations such as Blue Green Canada and the Canadian Labour Congress [34], and set aside substantive long-term financial support for workforce development to be negotiated between regional, provincial and federal governments, corporations and worker unions. Working with unions is an important indicator of success for many of these negotiations. [31]

Further, the presence of institutional mechanisms for skills and job training doesn't always translate to the involvement of employers and workers and trade unions in skills policies, so this should always actively be encouraged. [35]. The BlueGreen Alliance, representing fossil fuel and heavy industry workers in the United States and Canada, stresses the role that unions play in creating and maintaining high-quality jobs for workers: unions are the "primary vehicle to confront the economic insecurity most Americans face". Attention must be given to the role unions can play to support marginalized communities and their workers who have been excluded from economic development and training opportunities. [36]. Iron & Earth remains dedicated to developing strong relationships with unions, and engaging them in all current and future conversations that involve and will impact workers.



Workers deserve good, stable jobs. But not everybody will have the skills that are directly transferable. We need to get fossil fuel workers the support they need to prosper in the net-zero carbon economy

Jim McPhail – Organizational Consultant

Mission-oriented energy efficiency and renewable energy policy

Recent Federal programs that support jobs in the energy efficiency and renewable energy industries are just the beginnings of what's needed to scale and establish a pace of change for net-zero by 2050. Unfortunately, programs like the Federal Greener Homes Grant program do not address the problem of upfront costs, limit rebates to shallow to medium retrofit projects, and do not address worker training and reskilling needs. More so, the pace established for energy efficiency retrofits means it would take 142 years to retrofit all low-rise residential buildings -- as opposed to the less than 30 years available. [37]. **The current policy environment must be mission-oriented to match the need at hand.**

A National Roadmap to achieve mission-oriented economic and societal change

Federal funding announcements intend to create an industry pull for jobs across the energy efficiency supply chain, from manufacturing to distribution, installation and maintenance of building energy retrofits are commendable, but need a national roadmap to support workers in transition.

Canada's 2021 Federal budget proposes many training, upskilling and development programs; but without substantive commitments needed to help upskill and train workers for the net-zero carbon economy. A substantive national roadmap (or plans to develop provincial roadmaps) should be developed with key employment milestones for companies and workers. This roadmap, or series of provincial roadmaps, should include a well-thought-out analysis of the net-zero carbon economy jobs, skills required, and come with funded programs to bridge worker gaps – leveraging Iron & Earth's preliminary assessment of existing skills, gaps and their transferability to net-zero carbon economy jobs. Fortunately, fossil fuel workers possess many of the skills required of a net-zero carbon economy, and need limited upskilling to translate those skills to new net-zero energy technologies and projects.

Case Study: Transition in Coal Intensive Regions (TRACER) in Europe

Transition in Coal Intensive Regions (TRACER) is a European project that helps 41 EU regions with active coal mines to transition with: engagement with regional actors, share roadmaps, investigate challenges, etc. It offers a great example of how communities and workers may be engaged by governments and companies to develop roadmaps for transitioning fossil fuel-dependent regions, while accounting for worker needs. [38] The Just Transition Unit formed in New Zealand in 2017 also includes a successful roadmap component. [34]

Roadmaps must align with net-zero transition and related policy goals. For example, building step code and pathway to zero-carbon electricity must account for the jobs and skills requirements needed to realize milestone goals. The Federal Government must work with industry to map out the kinds of jobs and skills that will be required to achieve each milestone. This includes work to identify the industries that will grow versus those that will contract. Use knowledge to collaborate with worker organizations, workers, communities (regions) to map out transition.

New jobs planned and included in roadmaps are well-paid and secure, offering more permanent employment versus short-term contracts or seasonal-only work.

RECOMMENDATIONS

- **Mission-oriented policies and fast-paced programs with sufficient scale to support net-zero energy projects and jobs** resulting in rapid building retrofits with energy efficiency and renewable energy installations.
- **Map job sectors and required skillsets** forecasted to emerge over the next decade as a consequence of government policies and programs, and expected private sector investment across the full value-chain of the net-zero carbon economy from now to 2030, and a long-term forecast to 2050.
- **Identify transferable skill sets** in the fossil fuel industry that map onto new jobs and skill classifications that will be created in existing industries.
- **Develop and deliver short-duration upskilling programs** to prepare fossil fuel industry and Indigenous workers for roles in the net-zero carbon economy.



#2: UPGRADING OUR BUSINESSES

THE NATIONAL REPOSITIONING INITIATIVE



Photo courtesy of Lliam Hildebrand

OVERVIEW

A National Repositioning Initiative will help pivot Canadian businesses to participate in a net-zero carbon economy while supporting supply chain retooling of manufacturing, critical material extraction and materials processing capabilities. A transition to a net-zero carbon economy by 2050 requires pivoting many of Canada's existing industries to help them take advantage of low-carbon processes, clean technologies, while leveraging fossil fuel worker experience and skills.

The Canadian Institute for Climate Choices outlines several reduction pathways for industrial sectors that require retooling of manufacturing and resource extraction capabilities while pivoting their businesses in a way that supports a net-zero carbon economy. These pathways include changes in their production processes, significant increases in energy efficiency, electrification, fuel switching to renewable natural gas and hydrogen, and investing in Carbon Capture, Utilization and Storage (CCUS) technologies. [39] All of these pathways offer companies opportunities for pivoting and retooling their manufacturing capability.

Pivoting Canadian businesses and heavy industries

Pivoting means assisting Canadian businesses in identifying new demand for materials, products and services in the net-zero carbon economy, and positioning their business to meet those needs while sustaining or growing their bottom line. This includes developing the supply chains for clean building retrofits and transportation infrastructure, manufacturing capability, extraction of new raw materials, and production of clean fuels like hydrogen and renewable electricity – all examples of how businesses and heavy industry can pivot to benefit from the net-zero carbon economy for decades to come.

The International Energy Agency's recently published a net-zero by 2050 roadmap that illustrates the global-scale pivot needed. Actions include no new oil and gas field development approvals, coal mines or extensions beyond 2021, electrification of transportation and building energy uses, and switching to hydrogen-based or other clean fuels. [11]. Shell, one of the world's leading oil and gas companies, exemplifies what it means to transition from fossil fuels to electricity. Its Sky 1.5 transition scenario to 2050 includes massive electrification while acknowledging a need for clean gaseous and liquid fuels for heavy freight, aviation, and some industries. [40] Its acquisitions so far include the Greenlots electric vehicle charging network, Sonnen, a German energy storage developer, and various micro-grid developers such as Solar Now and Husk Power. [41]

The COVID-19 pandemic has shown that Canadian businesses are resilient and able to quickly pivot their business models to meet the needs of a new reality. Just as auto manufacturers in Ontario can retool their plants from gas to electric-powered vehicles, so can oil and gas producers pivot to producing geothermal energy and lithium, and equipment manufacturers from producing pressure vessels to wind turbine towers.

Pivoting supply chains to support deep energy efficiency retrofits and renewable energy

Canada's net-zero carbon economy supply chain for critical green building components needs to be prepared with manufacturing and distribution capabilities to support the rapid pace of energy efficiency retrofit projects. These capabilities are required across the country and include products and services for building insulation, windows, doors, and HVAC-related equipment like ducting, piping, controls, etc. [42]

Canada also has a unique opportunity to develop a domestic renewable energy service industry. Its provinces have some of the most extensive supplies of renewable electricity globally, representing 16% of its total energy supply -- compare this to the OECD average of about 10%. [43], and excellent resources for continuing to develop new supplies in all parts of the country. Especially in Alberta, where the grid is still reliant on fossil fuels, developers actively build wind, solar, geothermal, and biomass energy projects. Solas Energy Consulting projects over 3.2 GW of solar -- that's 8,000 job-years for solar installers -- by 2030 in Alberta alone, one of the key growth areas for solar in Canada. [44]

Canada's Business Renewables Centre is also helping Canadian businesses pivot to renewables by striking up large-scale investments that leverage long-term power purchase agreements (PPAs) that support project developers. In its first three years, the Centre helped pivot businesses with more than 680 MW of clean power procured. [45]

Switching to hydrogen and clean fuels to power heavy industry and the economy

Hydrogen is gaining momentum across the prairie provinces, with many businesses, nonprofits, and government stakeholders hailing its central role in pivoting existing fossil fuel businesses to the net-zero carbon economy. Clean fuels like hydrogen are critical to decarbonizing industries like steelmaking and chemicals, and unlike natural gas, hydrogen produces zero carbon emissions. Fortunately, Canada has many existing oil and gas assets that can be repurposed to produce and transport hydrogen fuel – see how federal investments can scale these solutions in the *National Repurposing Initiative* section of this report.

Case Study: Blue hydrogen and clean fuels

One popular way of producing hydrogen today uses natural gas, typically known as 'blue hydrogen', where carbon released from the process is captured and stored. Air Products Canada is building such a hydrogen plant near Edmonton, Alberta with the help of federal and provincial investments. The plant is scheduled to be operating by 2024 and "create about 2,500 jobs in the construction and engineering phase". [46]

Other examples of oil and gas pivoting to clean fuels include the Phillips 66 oil refinery conversion to biofuel facility in the United States, and Alberta-based Suncor and Husky Energy companies partnering to build and operate new biofuel facilities. [39]

Retooling manufacturing and materials industries

Retooling the manufacturing capability of existing industries to meet the needs of a net-zero carbon economy means making adjustments to workers' technical capabilities and the tools used in the manufacturing process. In many cases, the tools already exist but need to be reconfigured, or plant designs need to be modified, and capabilities expanded. Retooled plants and skilled workers can then produce the necessary components when shifting industries like chemical, steel, and cement to net-zero carbon.



Not making the transition means that a lot of workers like myself are going to be stuck with jobs that aren't in demand the way that they were before.

Stephen Buhler - Machinist

Buhler is confident he can transition with little training. Because “whether it’s building a part for a pipeline or building a part for a wind turbine, it’s really no different for me.” **Abacus statistic:** 81% of fossil fuel workers surveyed support a national repositioning initiative to help businesses retool manufacturing capacities and pivot business services to meet emerging demand in net-zero industries

Retooling existing and building new facilities for net-zero carbon technologies

Net-zero carbon technology manufacturing requires many of the same building blocks of fossil fuel equivalents, such as sheet metal working, welding, and power electronics equipment. Two immediate opportunities for manufacturers to service both the oil and gas and net-zero energy market are wind turbines and solar PV components:

Wind turbines: Alberta has existing expertise in manufacturing transformers, sub-station controls systems, and other power electronics. Specific expertise transferable from the oil and gas sector includes pressure vessel manufacturing, and off-site, prefabrication and modularization capabilities. can retool to build wind turbine towers. For example, Alberta companies like KNM Process Equipment, Dacro Industries and Cessco Fabrication and Engineering all have transferrable capability and machinery for rolling thick steel plating into wind turbine tower sections. Off-site prefabrication and modularized manufacturing are also directly transferable from oil and gas to renewable projects. This does not mean all wind turbine components can be economically manufactured in Canada, specifically those backed by robust international supply chains and research capabilities – notable examples include, nacelles, machine heads, hubs, gearboxes, and generators. [47]

Case study: Retooling manufacturing in Michigan, US for wind turbines [48]

To meet the demands of a growing wind energy industry in Michigan state, more than 30 manufacturers, traditionally servicing the automotive sector, have pivoted and retooled their facilities to produce parts for and service wind turbines. Three M Tool & Machine and Allegheny Technologies are just two examples of manufacturers that invested in retooling:

Three M Tool & Machine benefited from diversification by winning a five-year, \$7 million contract to produce gearbox housings and forward housings for California-based Clipper Windpower. To retool its production facility, Three M bought a 42,000-square-foot building in nearby Wixom equipped with a pair of 30-ton cranes, along with new milling and turning machines large enough to handle the massive cast-iron gearbox and forward housing castings. Facility owner, Michael Medwid, said the new facility and equipment enabled the company to machine the parts much faster than before and hire new workers.

Allegheny Technologies Inc. based in Pittsburgh spent \$15 million (US) to upgrade its foundry in Alpena, Michigan to cast and machine large iron hubs and baseplates for large wind turbine makers based in the U.S. and Europe. The project was expected to create 150 jobs.

Solar PV: Ontario, when initially launching its Feed-in-Tariff program, had an enforced local content requirement, which created a demand for some in-Canada solar PV module manufacturing, including silicon cells.⁴ However, the recent dominance of Chinese solar panels means panels are unlikely to be manufactured in Canada in the future. Other components that round out the balance of a solar power plant are still good candidates for retooling fossil fuel manufacturing capabilities, because existing local manufacturers already have many of the required machinery and skilled workers. Immediate opportunities include manufacturing of module racking equipment, metering systems, transformers, combiners, optimizers, and electrical conduits. [44] Iron & Earth has a working relationship with Metal Boss, an Alberta-based manufacturing company capable of producing competitively priced, locally made racking systems. With a minor investment from government, manufacturers like these will have the ability to retool their capabilities to directly compete with overseas component manufacturers.

Other opportunities include manufacturing of essential industrial equipment such as pressure vessels, piping, ducting, and electrical conduits; electric vehicles and their components; building envelope components (e.g., windows, doors, and insulation); and building HVAC (e.g., boilers, furnaces, heat recovery units, and ducts, pipes, and packaging).

In Ontario, the automotive industry is also in a prime position to transition to the net-zero carbon economy with rapid scale-up of electric vehicle manufacturing capabilities.

⁴ It should be noted that while Ontario's local content provision contained within its Green Energy Act was a boon for local manufacturers, it was challenged under the North American Free Trade Agreement and through the World Trade Organization's dispute resolution system.

Case study: Automotive majors are retooling their Ontario plants to build electric vehicles

In 2020, Ford Motors and their union, Unifor, struck an agreement to build EV's at its Oakville Assembly Complex – a \$1.8 B retooling initiative. Later the same year, Fiat Chrysler announced plans for a \$1.5 billion venture in Windsor, Ontario. [49] And in 2021, General Motors unveiled plans to manufacture its BrightDrop EV600 electric commercial vehicle at its CAMI plant in Ingersoll, Ont. The BrightDrop is a leading last-mile delivery vehicle that can go over 400 kilometers on a full charge. [50]

Supporting a growing Canadian raw minerals extraction and materials production industry

The global materials industry must reduce emissions by at least 25% by 2030 on a pathway towards net-zero by 2050 [51]. Iron and steel, chemicals, and cement industries all must reduce their emissions to zero by this date to accomplish a full net-zero transition. Fortunately, there are many examples around the world of commercially viable technology being piloted and scaled-up, some in Canada:

- **CarbonCure (Nova Scotia)** is making a process to inject carbon directly into fresh concrete. [52]
- **Cemex's Vertua Ultra (UK)** replaces limestone-based clinker with an alkali-activated alumina-silicate polymer matrix. It doesn't require high temperatures and doesn't release CO₂, reducing emissions by 70% compared to standard concrete. [53]
- **SSAB (Sweden)** with Hybrit and LKAB (iron ore supplier) announced in 2016 with electricity supplier (Vattenfall) to demonstrate the use of hydrogen instead of coal to make steel. [54]

Published net-zero by 2050 scenarios such as Shell Sky 1.5 [40], Net-Zero by 2050 [11], and Climate Choices [39] all conclude that due to rapidly declining costs of renewable electricity, electrification is a viable pathway for the materials industry. Canada is particularly well-positioned with vast renewable resources: a recent NREL study confirms the provinces could source 95% of electricity from renewables by 2050. [55] If not with electricity, materials may also require clean fuels like hydrogen – an opportunity for oil and gas companies to pivot and be developed via Canada's Hydrogen Strategy.

While basic materials like steel and cement are critical ingredients for Canada's basic infrastructure, other new materials will play an increasingly important role in a net-zero carbon economy. These include material for batteries (lithium), wiring (copper), permanent magnets (neodymium), and many other rare minerals for electric motors, wind, and solar generators. [56]. While China and other countries like DRC currently dominate the extraction and processing of these materials (like cobalt) there are solutions to these supply chain challenges [57]. As researchers and companies find ways to replace current rare earth minerals used by net-zero technologies with other more available materials, foreign minerals may become less critical and allow domestic alternatives to flourish. An immediate opportunity includes retooling local recycling facilities to recover essential minerals and materials, while reducing reliance on new production. At the same time, companies like E3 Metals in Alberta are already developing projects to locally extract lithium. [58]

FEDERAL GOVERNMENT COMMITMENTS

Clean technology manufacturing and industrial decarbonization

The Federal Government has committed to growing clean technology manufacturing and industrial decarbonization through its new Net-zero Accelerator [59], and is developing strategies and supports for hydrogen, CCUS, and electric mobility (including manufacturing of EV's and charging infrastructure deployment).

Net-zero Accelerator to decarbonize industries

Canada's Strategic Innovation Fund – Net-zero Accelerator (NZA) is the centerpiece announcement of an additional \$3 billion over five years to expedite decarbonization for large carbon emitters – the Net-zero Accelerator now extends to 7 years with \$8 billion total funding. [20, p. 21]

The accelerator is currently seeking 'S statement of Interests (SOIs) from companies wanting to reduce their environmental footprint, establish metrics, targets, and timelines for clean technology development. [59]. Specific target areas include adopting industrial clean technology solutions, supporting aerospace and automotive sectors, and battery ecosystem support like mineral extraction, cell manufacturing, and export. [60] Related Federal initiatives supporting industry decarbonization include:

- **The Canada Hydrogen Strategy:** a national strategic roadmap to produce blue and green hydrogen while developing their end-use applications in cement, steel manufacturing, pulp and paper, and other processes relying on high-temperature heat and steam. Other uses include reducing the footprint of oil and gas operations. [61] While the strategy is a good starting point, capturing broad industry perspectives, immediate action is required to define specific opportunities and coordinate their supports. Some of these opportunities include building new and retrofitting existing pipelines to handle hydrogen, and creating new hydrogen applications in heavy industry and transport sectors. And later, market expansion of hydrogen production and use.
- **Carbon Capture, Utilization and Storage (CCUS):** \$319 million funding over seven years for CCUS research, development, and commercialization, including a capital investment tax credit. [20]

"Made in Canada" clean technology development and manufacturing

The Government's "Made in Canada" initiative emphasizes local technology development and production, including materials and technologies used in energy efficiency retrofits. [25] It includes regulatory and tax measures that help companies pivot to new technologies by de-risking and crowding in new private capital. Related announcements include:

- **Clean technology manufacturing:** A proposed 50% tax cut for corporations and small businesses that invest in clean technology manufacturing, including wind turbine, solar PV, hydro, geothermal, and bio-energy systems. [62]

- **Battery technology investment:** A proposed Critical Battery Minerals Centre of Excellence at Natural Resources Canada with nearly a \$10 million investment to bolster mineral supply for clean technology -- and reduce reliance on global imports. [62]

Building a robust Canadian supply chain

The government intends to work with the building materials sector to develop a robust Canadian supply chain for building retrofits, including low-carbon cement, energy-efficient windows, and insulation. [25] The government's plan matches this strengthened supply chain with rapid scaling of building energy efficiency retrofits.

Meanwhile, supply chain retooling builds off Canada's 2018 Market Transformation roadmap for energy-using equipment in the building sector, emphasizing space and water heating technologies. The roadmap's primary objectives are establishing a timeline, stakeholder roles and responsibilities, and removing market barriers. [63]

Mining for clean technology minerals

Through a 'mines to mobility' approach, Canada plans to build on its competitive advantage in mining, building the Canadian battery and critical mineral supply chains needed for EV and net-zero energy technology manufacturing. This initiative includes \$10 million in federal funding over three years for the Critical Battery Minerals Centre of Excellence at NRCan, and \$37M for advanced battery mineral processing research. [20, p. 21] The government also recently launched a new partnership with the EU to secure new mineral supply chains that do not rely on China. [64]

POLICY GAPS AND OPPORTUNITIES

Invest in a net-zero carbon industry accelerator and research authority

Like the Alberta Oil Sands Technology and Research Authority (AOSTRA), a net-zero industry authority would guide research and development activities and rapid scale-up of low and zero-carbon technologies. [65] Canada's Net-zero Accelerator (NZA) is a good starting point, but a well-thought-out and transparent strategy is lacking around what sectors and type of projects the \$8 billion fund will target. If the fund's intention is to aid clean technology projects in quickly securing investment at scale from traditional investors, then it should think openly about how to select winning projects in a way that successfully pivots companies towards net-zero carbon solutions. Funding criteria should not only include traditional metrics like carbon abatement cost, but the ability to pivot company business models, retool manufacturing capabilities, and support worker on-the-job upskilling and training.

There is an immediate opportunity for Canada to define pivoting and retooling criteria and carve out NZA funding that targets specific sectors with the most decarbonization potential like manufacturing of renewable energy components and electric vehicles. Strategic allocation avoids offering a large funding pool that is a "lobbyist's dream [and could be] very subject to political capture" as critiqued by Robert Asselin at the Business Council of Canada. [66]

National industry decarbonization roadmap with defined fossil fuel phase-out

The Federal Government faces a critical window to work with fossil fuel and heavy industries to create a well-funded roadmap that pivots and retools fossil fuel industry supply chains and products to meet the needs of a net-zero carbon economy.

Since plants such as cement and steel plants are expensive to build and last 50 to 70 years, this means a pro-active approach is needed to retrofit or build new net-zero carbon facilities. [51] Phase-out dates, just like with coal power generation, means heavy and materials industries know what to expect and can plan accordingly.

Case study: Roadmaps for a just transition

Just Transition Unit (New Zealand) formed in 2017 includes a roadmap to move to a net-zero carbon economy [34], while the Europe Transition in Coal Intensive Regions (TRACER) project is a model for managing transition in fossil fuel regions while phasing in new net-zero carbon economy opportunities. TRACER works with 41 targeted regions that have active coal mines with phasing out and transition to clean resources through regional stakeholder engagement, developing localized roadmaps and investigating worker challenges. [38]

Consider public ownership of target industries to help them transition

Canada could establish an economic diversification crown corporation with a mandate to invest in alternative industries linked to its defined clean technology roadmap, and supported by NZA's \$8 billion fund. [34] . Public ownership of some industries may be necessary to achieve large-buy-in and facilitate planning and mobility with the required speed and efficiency. [31] Planning for public ownership must be supported by the private sector. Today's public-private ownership models as instituted by Public-Private Partnerships (P3) Canada offer a good template for how shared ownership of industries in transition could work. Examples of projects funded in this way include Calgary, Alberta's low carbon compressed natural gas bus storage and transit facility, and the organics biofuels facility in Surrey, BC. [67]

Target support for fossil fuel workers and disadvantaged communities

Net-zero carbon economy jobs should actively attempt to benefit historically disadvantaged populations. [34] Specifically, fossil fuel-dependent geographic regions require a clear industrial strategy to guide pivoting of their fossil fuel projects towards clean alternatives. [34] While transitions are in progress, all levels of governments should work together to pivot, and where needed, retool fossil fuel companies to become market competitive on their own, while targeting solutions in ways that support all Canadians, especially communities who have been historically disadvantaged and previously excluded from economic opportunities. [31] While it is necessary to transition our energy system to net-zero, this alone is not sufficient: the net-zero transition must ensure that all workers and their communities are equipped to share the prosperity that this transition promises. Targeted support for disadvantaged communities, so that they are equal partners in the net-zero transition, will not only create a stronger and more prosperous transition: it will create a stronger and more prosperous Canada.

Case Study: California’s Decarbonization Strategy targets climate solutions in historically disadvantaged communities [68]

California began its climate planning process early with its first law passed in 2006 that legislated its carbon reduction goal. Guiding and enforcing this and subsequent plans is the California Air Resources Board, whose Environmental Justice Advisory Committee was created specifically to advise how climate planning can directly involve and benefit disadvantaged communities. Actions included setting aside 50% of funds for disadvantaged community projects like low-carbon transportation and urban forestry.

Green Strings attached for any government support and bailouts of private sector

Canada’s government support should always come with ‘green strings’, meaning government supports, including bailouts, should require struggling industries to reduce carbon emissions. [69]

Case study: Economic recovery plans in France and Germany both include significant ‘green strings’ to their struggling industries.

In France, Air France agreed to reduce its emissions, and the European Commission approved a loan for automaker Renault on the basis that its next generation of vehicles meet EU climate goals. And in Germany, much support is given to companies supporting the build-out of a hydrogen economy, incentives for electric vehicles and other green stimulus resulting in one the world’s greenest economic recovery plans. [70]

RECOMMENDATIONS

Pivoting programs and policies would support workers and companies to position themselves competitively in the net-zero carbon economy. When designing and implementing these programs, the Federal Government should:

- **Identify service sectors that will emerge** to prominence between 2020 and 2035 and map probable trajectories for the various sectors. Immediate opportunities include helping pivot oil and gas producers and service companies to meet the needs of a growing hydrogen economy. In Alberta, lithium and geothermal energy production are other good examples of industries that may grow rapidly.
- **Identify the stakeholder mix that will serve the needs of an emerging net-zero carbon economy market.** Identify fossil fuel industry and Indigenous organizations that have existing expertise needed to pivot towards delivering products and services to meet the needs of a net-zero carbon economy.
- **Develop and implement a national decarbonization roadmap with phase-outs** and implement targeted policies and support programs to help companies meet phase-out targets. Ensure that companies have sufficient ‘green strings’ support, research and development guidance, and, where necessary transitioning to public ownership.

Retooling programs and policies would support manufacturers to retool and upgrade their facilities to extend production capability into the net-zero markets. When designing and implementing these programs, the Federal Government should:

- **Identify projected growth areas in manufacturing** between now and 2035. Define the emerging supply chain in detail, including projected growth in demand for strategic production to achieve national resilience. Growth areas to consider include manufacturing components of the wind and solar PV supply chains; hydrogen and CCUS technologies; EV batteries; clean public transit; and material production like steel and cement.
- **Develop a national inventory of manufacturing capability** to identify and classify manufacturers with existing technology, equipment, and infrastructure that is either transition-ready or able to respond to the emerging market through different degrees of retooling and upgrading. Work with industry associations like the Alberta Clean Tech Industry Alliance to identify these capabilities.
- **Work with manufacturers to identify equipment and technology upgrades required** to compete locally and globally in new manufacturing sectors.
- **Establish policy incentives, retooling grants, and financing programs** to support the country's strategic retooling of manufacturing capacity.



#3: UPGRADING OUR INFRASTRUCTURE

THE NATIONAL RETROFIT AND REPURPOSING INITIATIVE.



Photo courtesy of Skyfire Energy

OVERVIEW

A National Retrofit and Repurposing Initiative envisions creating the conditions and commitments to advance near and mid-term goals for the energy transition by building on existing infrastructure to reduce operational assets' emissions footprint or put redundant or at-risk assets into use in the net-zero carbon economy.

As the gradual decline of the oil and gas industry unfolds, there will be an increased need to repurpose assets for the net-zero carbon economy. Existing pipeline networks are examples of potential early-stage repurposing — companies can use these pipelines to transport hydrogen to decarbonize steel and cement-making industries and truck refueling nodes. Other examples include repurposing of abandoned well pads for solar energy projects, thereby enabling the use of otherwise fallow land and focusing on the remediation of inactive wells.

Repurposing

Repurposing oil and gas assets means either the direct reuse of existing assets or repurposing of the disturbed land before reclamation. In many cases, this means postponing reclamation but also avoiding the disturbance of new land. Oil and gas assets that clean technology companies may repurpose include existing licensed oil and gas sites, wells, facilities or infrastructure for non-oil and gas-related use that defer, while still upholding, responsibilities for their reclamation. Repurposing creates direct jobs for fossil fuel workers with skills immediately transferable to a net-zero carbon economy project. It also strongly aligns with federal and provincial diversification priorities, such as scaling up geothermal energy and hydrogen production.

Case Study: RenuWell is repurposing Oil and Gas assets for community solar energy

Declining production from conventional oil and gas fields has left more than 199,000 inactive wells and 160,000 hectares of disturbed land in Alberta. Consequently, oil and gas producers owe municipalities across Alberta more than \$240 million in unpaid property taxes. Iron & Earth has helped develop an innovative model to turn these obstacles into economic opportunities. RenuWell, supported by the Energy Futures Lab and Iron & Earth, aims to accelerate the clean-up of these sites while also utilizing existing roads, powerlines, and disturbed lands to reduce costs and provide efficiencies for renewable energy projects.

RenuWell repurposes existing oil and gas well sites for community solar power projects to avoid the use and disturbance of agricultural land. The first two RenuWell pilot projects utilize orphan well locations in the Municipal District of Taber as brownfield sites for solar development, and are being built in collaboration with the MD of Taber. Funding has been provided by Municipal Climate Change Action Centre (a partnership of the Alberta Urban Municipalities Association, Rural Municipalities of Alberta, and the Government of Alberta), Alberta Innovates, and the Irrigation Canal Power Co-operative Ltd (IRRICAN). The 2 MW solar power project is expected to begin operations in 2021. [71]

Iron & Earth has also partnered with Medicine Hat College to develop a 10-day RenuWell Workforce Training Program for fossil fuel industry and Indigenous workers to learn the basics of solar before transforming the well sites themselves. The development of this training program is now complete and ready for delivery during our pilot projects. RenuWell project partners have worked for the past year to identify sites for further solar installations. We're working together on a suite of about 10 or 20 sites tagged for commercialization if the pilot succeeds.

Unfortunately, it took RenuWell over five years to navigate the regulatory hurdles involving the Alberta Energy Regulator (AER), Orphaned Well Association, Alberta Environment and Parks, and the Alberta Utilities Commission (AUC) - Alberta's electric and retail gas regulator. Many parties are involved because the project requires AER approvals and reclamation activities, AUC permits building an electric generator, and much coordination and negotiating with all parties. Though RenuWell's solar project in the MD of Taber managed to successfully navigate these barriers, future projects like it require a significantly streamlined regulatory process to economically repurpose oil and gas assets at a rapid pace and scale. [72] [73]. Along with regulatory changes, new policies and programs need to cut red tape to make repurposing of oil and gas infrastructure much easier.

Alberta's economic engine for the last few decades has been its gas, oil, and oil sands resources. These resources have left a mark on its landscape -- both good and bad. It has created unprecedented wealth and opportunities for many to participate in the economy. But oil and gas development has also resulted in over 95,000 inactive wells, more than 7,000 of them considered "orphaned" or without an owner responsible for their reclamation. [71] Fortunately, clean technology companies can repurpose many of these assets and reclaim them at the end of their lives.

The Energy Futures Lab's Leveraging our Energy Assets for Diversification (LEAD) project surveyed 90 fossil fuel industry stakeholders, asking them why it was essential to solve the orphaned well problem. The top answer was economic diversification and driving forward the energy transition. Closely following was reducing risk to taxpayers to deal with orphaned well liabilities. The project also documents several asset repurposing opportunities, including geothermal, micro-solar, hydrogen, recovery of lithium or other minerals, or carbon capture and storage. The LEAD project details some of these opportunities with existing barriers and proposed solutions in their 2021 report.



A process-change approach within the current regulatory framework, as this report outlines, enables the repurposing of well sites for alternate uses to occur in a timely and effective manner while considering all stakeholders.

Jenny Yermiy – Liability Management Specialist

Abacus statistic: 82% of fossil fuel workers surveyed support a national retrofit and repurpose initiative to reduce emissions from existing infrastructure and repurpose old infrastructure for new uses.

Many of the same stakeholders are involved in repurposing infrastructure as for traditional oil and gas projects. Workers involved in these projects can directly move over to support net-zero technology, including those involved in environmental reclamation, landowner and stakeholder engagement, and oilfield service companies -- many that can transition with minimal reskilling.

Case Study: Alberta No. 1 is using inactive oil and gas well pads to access geothermal energy

Terrapin is building the Alberta No.1 geothermal project, which will be the first conventional large-scale deep geothermal facility in Alberta, generating 10MW of power and 35MW of heat when constructed. The project repurposes inactive well pads, which first require regulatory approval; because the geothermal company doesn't own the Petroleum and Natural Gas rights to the subsurface formations. And without owning these formation rights, it is difficult to assume responsibility for the well. By working with the regulators, the project aims to remove red tape and streamline the repurposing of future oil and gas assets for clean energy projects.

Alberta No. 1 is not the only geothermal project being developed in the province. There are many other projects at various stages, but the geothermal industry association (CanGEA) can't support all of them without additional capacity. The federal and provincial governments should adequately fund CanGEA to help its member companies with regulatory approval, skill-building, awareness, and direct project support. [27]

Retrofits

Retrofitting oil and gas infrastructure should focus on three areas: managing methane emissions, supporting capture and utilization of carbon infrastructure, and developing the hydrogen economy.⁵

Managing methane emissions in oil and gas and heavy industry

Methane emissions are 24 times more potent than carbon in terms of their global warming effect. Canada and the US have both committed to reducing methane emissions through 2035. Though oil and gas industry costs for managing these emissions by regulation are estimated at \$3.3 billion over the 2018 to 2035 period. These costs relate to detecting and repairing methane leaks, monitoring emissions, and large capital projects to comply with regulations. [74]

Supporting carbon capture, storage, and utilization

While many carbon emissions reductions are made possible by mass electrification of end-uses and industrial processes, not all can feasibly or economically electrify. Whereas some industrial processes can fully fuel switch to hydrogen, some may require carbon to be captured and stored. In some cases, this includes the economical production of blue hydrogen at scale. In the short to medium term, these CCUS technologies will require significant investments to keep costs low.

Project examples include Shell's QUEST facility and the Alberta Carbon Trunk Line projects. Technology and expertise developed for these projects are marketable, e.g., the Government of Alberta is involved in knowledge sharing and supporting further development of CCUS infrastructure. [75]

Developing a hydrogen economy

Most oil and gas companies can retrofit their pipeline infrastructure to support hydrogen. Avoidance of hydrogen embrittlement of metals involved is an issue but not an insurmountable problem. See *Upgrading Our Businesses: Repositioning for more details on how the Federal Government can support Canada's hydrogen economy.*

Federal support and guidance among many stakeholders have led to a Canadian Hydrogen Strategy [61]. Recommendations need to be followed through, including developing necessary partnerships, codes and standards, supporting policies and regulations to help repurpose existing assets in the short term, and then scale infrastructure to meet industry needs in 2030 and beyond.

⁵ This plan also acknowledged the roles of other infrastructure retrofits such as modernizing the electric grid and transportation systems, but these are not strongly tied to fossil fuel sectors, and will not be discussed further.

FEDERAL GOVERNMENT COMMITMENTS

Methane emissions management

Transitioning to a net-zero carbon economy by 2050 includes significantly reducing upstream and midstream methane emissions from all oil and gas operations. Methane leak detection and repair projects require many of the same skill sets existing in the oil and gas industry. Net-zero technologies and skills that manage, monitor, and detect methane include satellite and remote sensing [76], all of which translate well to other sectors where methane is an equally significant problem. These new sectors include agriculture, livestock, and waste management.

Canada has committed to alignment with the United States to reduce methane emissions by 36 percent below 2005 levels by 2030. [20] To support this commitment, a \$750 million Emissions Reduction Fund was launched in 2020 for onshore and offshore oil and gas projects to reduce methane and related GHG emissions. Funding goes towards eliminating and reducing, though funds used to reduce emissions are loans. Projects include reducing vented and flared emissions, as well as detecting and repairing leaks. [77]

Carbon capture, utilization and storage

Canada has several domestic projects capturing 4 Mt of total carbon annually with technical capabilities to capture much more. The 2021 Federal budget proposes an investment tax credit for CCUS projects to reduce emissions by at least 15 Mt of carbon annually. The credit will not be available for Enhanced Oil Recovery but will include direct air capture. [20]

The 2021 budget also proposes \$319 million over seven years to further develop CCUS technology through Natural Resources Canada. [20]

Building a hydrogen economy

Canada's Hydrogen Strategy [61] is bolstered by a mix of proposals, though not all committed. These include:

- A reduction in 2021 corporate income tax rates for eligible clean technology manufacturing and processing, including for projects that repurpose oil and gas infrastructure such as geothermal energy and lithium extraction, systems for hydrogen refueling, and 'green' hydrogen production.
- \$1.5 billion over five years for a Low-carbon and Zero-emissions Fuels Fund to produce and distribute clean fuels, including hydrogen. [20]
- Direct federal and provincial investment in CCUS demonstration projects such as Air Products Canada's hydrogen plant. The Edmonton plant will be operating by 2024 and "create about 2,500 jobs in the construction and engineering phase". [46]

POLICY GAPS AND OPPORTUNITIES

Achieving a net-zero world will call for a vast array of technologies and nature-based solutions, from emerging zero-emission energy sources to 'negative emission technologies' that remove existing atmospheric carbon. Many transformational technology and policy solutions are already available to us, including those rigorously vetted by Project Drawdown. [78] In addition, the Energy Futures Lab has identified five 'shovel-worthy' technologies well-suited to mobilize fossil fuel industry workers, stakeholders and infrastructure as a foundation of the transition. [79] Although many of these solutions are being implemented around the world, they require policies, strategies, and above all vision and leadership, to introduce them into the mainstream at scale. One of these strategies revolves around repurposing and retrofitting the infrastructure we already have, some of which can be used almost immediately without major new investments. Infrastructure that was built over decades can be reused and retrofitted for new mineral extraction, renewable energy projects, and transporting hydrogen and other clean fuels.

Facilitate repurposing of oil and gas infrastructure

A lack of funding for oil and gas companies to repurpose infrastructure as they pivot their business

The funding program is modeled on the 2009 federal pulp and paper transformation program, as recommended by the Pembina Institute. This will ensure approved oil and gas projects will move forward with the latest clean technologies, associated benefits of reduced emissions, energy efficiency, and renewable energy jobs. [80]

Proactively address abandoned well liabilities

Provide funding and repayable loans to oil and gas companies with proven track records to proactively address liabilities from abandoned wells, and fund the direct clean-up of orphan wells.

Increase pace and scale of oil and gas infrastructure retrofits

Bolster funding to manage methane emissions

The Federal Government should bolster funding to develop an inventory for methane leaks and opportunities to address them, including support for monitoring and mitigation measures beyond current regulatory requirements. Funding should target zero-emission projects rather than incremental improvements, and support innovative startups like Highwood Emissions Management (see below).

Case Study: Highwood Emissions Management and a growing methane monitoring industry

In a burgeoning methane monitoring economy, a Calgary startup called Highwood Emissions Management is supporting Canadian oil and gas companies to put a cork in their methane emissions profile. But they are far from alone. Highwood recently did a market analysis and saw that over 100 companies are working in this space – many of them new in the last year or two. There is a race to develop the best drone, fixed sensor, truck-mounted, aircraft, etc., to monitor and reduce methane emissions. Many provinces, including BC, Alberta, and Saskatchewan, require frequent methane monitoring (leak detection and repair), so the need for methane expertise is growing and transferable to all kinds of industrial projects involving carbon and low carbon fuels. The skill sets required to work in these areas include engineers, programmers, technicians, and field personal to run the technology -- many of the same skills required of fossil fuel workers.

One of the areas where Highwood is taking the lead is with methane emissions modeling. Its LDAR-Sim for leak detection and repair is a critical tool used as a first step for companies to break into the methane emissions management market. LDAR-Sim is already being used by a number of clients across Canada and the US for regulatory approvals and modeling LDAR scenarios. [81]

Increase support for carbon capture, utilization, and storage technology development

Refer to projects such as Shell's QUEST facility and the Alberta Carbon Trunk Line projects for examples. Technology and expertise developed for these projects are marketable, e.g., the Government of Alberta is involved in knowledge sharing and supporting further development of CCUS infrastructure. [75]

Commit to a hydrogen economy

The current Hydrogen Strategy is a strong starting point for Canada, but it needs teeth and strong federal funding to be successful. The strategy, as is, lays out a vision along with opportunities framed as loose short, medium, and long-term targets. Also lacking is a detailed roadmap for leveraging hydrogen as a fuel to facilitate industrial decarbonization, specifically in the materials industry.

RECOMMENDATIONS

- **Determine what existing fossil fuel industry infrastructure could be re-utilized** building on existing projects and knowledge of abandoned oil and gas or mine infrastructure.
- **Support LEAD by passing required legislation and revising regulations** that remove red tape for oil and gas companies to quickly repurpose their existing assets for net-zero energy projects.
- **Develop policies and programs to mandate and facilitate reuse of existing fossil fuel infrastructure** for climate mitigation projects. These mandates would ensure all oil and gas liabilities are quickly resolved while minimizing environmental disturbances for new clean technology projects, such as solar and wind power or new mining for net-zero carbon economy minerals.



#4: REVITALIZING OUR ENVIRONMENT

THE NATIONAL NATURE-BASED INITIATIVE



OVERVIEW

A National Nature-Based Solutions Initiative would scale up all forms of projects that incorporate and work with natural ecosystems to help the environment, while also providing numerous benefits for workers and their communities. Nature-Based Solutions (NBS) protect, sustainably manage, and restore our ecosystems, encompassing a wide variety of projects: they can range from projects that incorporate natural ecosystems into industrial operations and the construction of green infrastructure, to forest protection and restoration initiatives, to environmental remediation [82]. NBS projects are grounded in the knowledge that healthy natural and managed ecosystems generate many services on which human wellbeing depends, including storing carbon, controlling floods, improving energy efficiency, and providing clean air and water for our communities. [83] Implemented at a large scale and supported with appropriate funding, NBS can support sustainable economic development while simultaneously safeguarding and improving the health of our ecosystems.

Canada is well-suited to implement a range of NBS projects because fossil fuel industries in Canada have, for many decades, been mandated to reclaim and restore natural areas following the extraction of natural resources. The Government of Alberta requires that 100 percent of land involved in oil sands development be remediated and reclaimed after extraction is complete. Reclamation means that the land is returned to a self-sustaining ecosystem with local vegetation and wildlife. [84] Further, under Alberta's Environmental Enhancement and Protection Act, energy companies must do everything they can to return the land they develop to a state functionally equivalent to what it was before development took place. This includes a duty to minimize land disturbance; salvage, store and replace soil; restore drainage, and revegetate areas following specific reclamation criteria. [85]

Abacus Data (in a graphic): 82% of workers surveyed support a national Nature-Based Solutions initiative to support and strengthen ecosystems, carbon sinks, and green infrastructure.

Therefore, a large and existing workforce of environmental remediation and restoration service providers can diversify and pivot into a range of growing NBS projects, with increasing opportunities for fossil fuel workers to enter this sector as well. Indeed, the growing potential of NBS projects, if properly supported and funded through a national initiative, can positively impact workers who have been affected by Covid-19, economic downturns, and structural shifts in the economy. A recent report by the Alberta Liabilities Disclosure Project found that over 10,000 full-time jobs could be created, at minimum, through the environmental remediation and reclamation of currently unreclaimed oil and gas wells – but this economic boom is contingent on a properly funded and supported initiative [86]. Successfully implementing a national Nature-Based Solutions Initiative would also benefit communities that will experience reduced unemployment among residents and reduced pollution and environmental risks from the application of NBS practices on nearby projects. At the same time, a national initiative would support businesses and employers already working in or looking to enter this space, as they will gain access to a wider labour pool with relevant skillsets and knowledge of this emerging field of work while simultaneously helping transition Canada to net-zero by 2050.

Explainer: Opportunities for fossil fuel workers in environmental remediation and reclamation

Fossil fuel industry workers are well-positioned to play a key role in the environmental remediation and reclamation sector, and can take advantage of expanding opportunities in NBS. For example, many different skills are needed across the reclamation lifecycle for oil and gas wells, which encompasses Stage 1 and 2 assessments, sealing the well and tidying the site, remediating any damage that has been done, and reclaiming the land to a near-original state.

Work done by the Alberta Liability Disclosure Project found numerous opportunities for current fossil fuel workers to transfer their skills directly to the remediation and reclamation of former well sites. Heavy equipment operators and soil scientists are needed in the remediation and reclamation stages, and project managers and health and safety personnel are required at all stages of the project lifecycle. Truck drivers, environmental engineers, hydrologists, and drilling and service rig managers – to name just a few more occupations – are also all directly involved in the project lifecycle of well remediation and reclamation. [86]

Further, the report found that an environmental “reclamation boom” would not only be a massive full-time job creator: it could also spark an annual economic boom of over \$700 million in employment income and contribute nearly \$2 billion to Alberta’s GDP for the next 25 years. Importantly, much of this economic activity would take place locally, with work in this sector directly benefitting the workers and communities where fossil fuel development has taken already taken place and where environmental remediation and restoration is now required.

WHAT IS WORKING IN OTHER COUNTRIES

NBS are increasingly gaining attention and galvanizing action on the world stage. At the international scale, the IPCC (2019) reports that boosting the total area of the world’s forests, woodlands, and savannahs could store around 25 percent of the atmospheric carbon necessary to limit global warming to 1.5 °C above pre-industrial levels. Further, there’s often a strong economic rationale for NBS projects: as an example, NBS solutions to coastal flooding are 2-5 times more cost-effective than other solutions. But not only are NBS projects often economically efficient: they can also be a major job generator. For every \$1 million invested in coastal habitat restoration in the United States, 40 new jobs are created - compared to 19 for investment in the aviation industry, 7 for investment in finance, and 5 for investment in oil and gas. [87]

In response to this significant opportunity to clean up our environment while creating good jobs at the same time, countries around the world have already taken meaningful action. The International Bonn Challenge, signed by 42 countries, commits to 350 million hectares of reforestation by 2030. The United Kingdom has already launched a Nature for Climate Fund with over \$1 billion (CAD) in funding, and the Philippines has launched a National Greening Program, prioritizing afforestation and other NBS projects. Within Europe, the European Union has committed \$30 billion a year to a host of environmental initiatives, including NBS initiatives like tree planting, river reclamation, and environmental remediation of areas that have been damaged through resource extraction [88]. Finally, as a sign of its clear and growing importance, NBS will also be one of the five major action tracks at the upcoming COP26 in November 2021.

Importantly, there is a large role for governments to play in catalyzing innovative NBS projects. Sufficient funding is key to project success: despite consensus on the threats to the global economy posed by climate change, researchers from the University of Oxford have found that less than 5% of climate finance goes towards dealing with climate impacts, and less than 1% goes towards NBS projects [83], [89]. This lack of investment in Nature-Based Solutions is a key challenge that must be met by Government, as the availability of sufficient funding can catalyze much-needed action and investment in this space. At the same time, since ecosystems and NBS projects are based locally, these projects can and must benefit the local communities in which they take place, and the involvement of businesses and communities is key to the success of these projects. As an example, a NBS project to restore and replant 9000 ha of grasslands in northwest Minnesota successfully mitigated flooding, improved water quality, and re-established native vegetation in the area. However, the leaders of the project cited their engagement with local communities (creating partnerships with over 30 organizations) and the availability of steady and predictable financing as keys to the success of the project, producing positive ecological and social outcomes for those involved [90]. Moving forward, it is imperative that NBS projects involve and benefit the communities where they are located, and that these projects receive the necessary funding to make them viable.



We only have one planet, one earth. And until we find something else we have to take care of and preserve what we have.

Kaine Prince - Electrician

WHAT IS WORKING IN CANADA

Abacus stat: nearly 7 in 10 workers surveyed are concerned about climate change and care about protecting our environment.

Significant expertise in environmental remediation and reclamation already exists in Canada because fossil fuel companies are mandated to reclaim and restore natural areas following the extraction of natural resources, requiring workers with numerous skill sets and experience as detailed above in the “explainer” section. One example of a successful reclamation project is the former Whitewood coal mine, a 1900-hectare site located 65 kilometers west of Edmonton. After 48 years of operation, the Whitewood Mine closed in 2010 and extensive reclamation work began. The site has now been fully reclaimed, with a variety of

agriculture, wildlife, and wetland habitats now existing in the former mine site footprint. More than 280,000 trees have been planted on the reclaimed land since the closure of the mine, and portions of the land are now leased to local farmers and ranchers in the region. [91], [92]

On a larger scale, recent studies have also demonstrated the impressive promise of NBS projects throughout Canada. If NBS projects are implemented to their full potential, a recent report by Nature United found that this would be able to offset the equivalent of all emissions from heavy industry in Canada at 2018 levels [93]. Critical to achieving this full potential, however, is political and financial support from all levels of government starting as soon as possible, as well as support from landowners and communities.

Some positive progress has been made on these fronts already. The Government of Canada has announced \$1.7 billion to clean up orphaned and abandoned oil wells, with the potential to create over 5,000 jobs across BC, Alberta, and Saskatchewan. [94] In recognition of the wide range of economic, social and environmental benefits that forests provide, Canada has also committed to planting two billion trees over the next ten years, in partnership with local communities, Indigenous nations, and private and non-governmental organizations. [95] Additionally, the Federal Government has promised the equivalent of \$63 million a year for 10 years to restore and enhance wetlands, grasslands, and agricultural lands in order to store and capture carbon [96].

While these are positive steps, there is still much work to be done, and policy around NBS must continue to develop while paying attention to the unique circumstances experienced by different communities across Canada. It is vitally important that NBS projects occurring on Indigenous peoples' territory have the consent of, and are led by, the Indigenous communities of that territory. The inclusion of Indigenous knowledge and Indigenous-led NBS projects provides an opportunity to advance reconciliation, if done correctly. [93] But just as NBS hold great potential, it is also possible that some NBS projects may negatively impact Indigenous Peoples if not designed with Indigenous participation and consent. Given that the inclusion of Indigenous Peoples in the development of NBS and climate change policy has been lacking to date – and that many Indigenous nations in Canada are interested in advancing NBS in their traditional territories [97] – a National NBS Initiative must authentically work with Indigenous nations and communities, providing space for Indigenous leadership of NBS projects. A national initiative funded by the Federal Government and attuned to these issues could support Indigenous nations and communities in this work by providing training and upskilling to community members who may currently be lacking the skills to work on NBS projects but who wish to work in this field. Technical advice and best practices could also be provided – at the request of Indigenous-led NBS projects – via a government-funded National Initiative to ensure optimal project outcomes that benefit communities and the environment.



The environment means a lot. I love the great outdoors, and so do my kids. I want to keep it as clean and pristine as we can.

Justin Carter - Electrician

It is also imperative that more is done to consider how fossil fuel workers can use their unique skillsets to play a role in NBS projects and, more broadly, to ensure that local communities and workers are well-positioned to capitalize on the economic benefits of NBS projects. More investment is needed to rapidly remediate and reclaim areas that have been negatively impacted over time, and oil and gas workers can and must play a key role in this work. As well, there are exciting opportunities in constructing green infrastructure and other NBS-inspired engineering and technological developments. As detailed in the re-skilling section, this is a knowledge gap for many workers who are excited for a career in the net-zero carbon economy, but who are not sure how to best take advantage of their skills and expertise. A successful, worker-focused NBS initiative must carefully consider the skillsets of fossil fuel workers, and how their expertise can be included and leveraged to maximize the economic and environmental benefits of NBS projects. This is especially important because many of the sites for environmental remediation and other NBS projects are geographically close to the communities where fossil fuel workers and their families already live [31]. As such, increased government investment via a national NBS initiative can create new jobs in communities that have been hit hardest by the economic downturn and the net-zero transition [65].

RECOMMENDATIONS

Green and Blue Infrastructure

- **Develop formal structures and solidify best practices** to ensure that fossil fuel workers and Indigenous Nations benefit economically and environmentally from NBS projects within a National NBS Initiative. These should ensure that Indigenous nations are able to consent to and lead NBS projects in their traditional territories, and that fossil fuel workers can harness their existing skillsets to meaningfully contribute to NBS projects.
- **Commit funding** to support rapid and long-term implementation of green infrastructure projects and related programs. Include funding for diverse pilot projects that create incentives to adopt existing green infrastructure techniques and innovative solutions.
- **Provide opportunity mapping support** for businesses to embed nature-based solutions within

corporate operating philosophies, creating legislation and incentive to choose green/blue infrastructure over grey.

- **Identify levers that will motivate** cities, municipalities, and private companies to adopt nature-based solutions that effectively mitigate climate factors.

Ecosystem stewardship

- **Develop a database of potential projects** through a call for proposals that would outline the scope, cost and estimated benefits of specific ecosystem stewardship projects.
- **Determine projects** for which workers and businesses can be rapidly upskilled and diversified to deliver ecosystem stewardship projects
- **Commit funding** to support rapid and long-term implementation of ecosystem stewardship projects.

CONCLUSION

A PROSPEROUS TRANSITION FOR EVERYONE

A **Prosperous Transition** is needed to upgrade Canada's economy and achieve multi-generational prosperity for people and the planet. This transition must strive for equity, fairness and well-being for all workers, families, communities *and* the natural environment. Many of the solutions required to power the transition are already available and ready to scale, including existing worker skillsets. Our challenge is to create and implement a blueprint to rapidly upgrade Canada's workforce manufacturing facilities, businesses, infrastructure and environment to support these solutions and streamline the transition. Along the way, we must ensure that those who are currently the most vulnerable and marginalized within our current energy economy can meaningfully participate in, and benefit from, this transition.

Achieving a net-zero world will call for a vast array of technologies that are readily available. Nature-based solutions also play an important role in storing and removing atmospheric carbon. But transforming markets for these technologies, and manufacturing and installing them quickly and at scale, will require strong government leadership.

Net-zero by 2050 means understanding the interconnectedness of social and economic factors and the varied characteristics of our geographic regions. The pathway to net-zero must be built with realistic, pragmatic, and intersecting steps as illustrated in Corporate Knight's Building Back Better roadmap [1] and Canadian Institute for Climate Choices' Net-zero Future report [39]. The journey will span three decades, but feel like a war-time effort in terms of investment in technology, infrastructure and manufacturing. But most importantly, **Canada's transition to net-zero by 2050 must ensure prosperity for fossil fuel workers, Indigenous workers, and all Canadian families and communities.**

Prosperity for All Workers

Re-envisioning and re-shaping the world's energy infrastructure to deliver net-zero by 2050 calls for bold action that will create millions of new jobs, even as jobs in the traditional fossil fuel sector are gradually phased out. The drive toward net-zero will also create demand for expertise in new sectors with entirely new job descriptions, requiring workers to adjust to this dynamic environment. As such, it is critical to illuminate pathways for change, supporting workers undergoing transition, and enabling them to thrive and support others, in turn, to make the switch. The urgent nature of the transition cannot rely solely on 'organic' job growth or purely market-driven mechanisms — net-zero energy roles must instead be created by a series of measures that are calibrated, cooperative and comprehensive.

Prosperity for All Families

The global pandemic has given us fresh insights into the value of the diverse skills that contribute to our economy and we must strive to ensure that all workers earn a fair, living wage that is sufficient to support a family. In a transforming economy, we must adopt new and more relevant metrics to assess the well-being of society, measures that give us insights of far greater value than gross domestic product. And, as jobs

evolve, we must ensure prioritization of continuous skill development, along with equal opportunity and access to secure, well-paid and durable jobs, so that no family gets left behind. Existing studies point to the potential marginalization of Indigenous, immigrant, and racialized groups, and also of women, unless equity is made a central priority of social and economic transition from the outset. It bears repeating that 'equity for all' is a lens through which we must view all proposed recovery measures.

Prosperity for All Communities

A prosperous transition would enhance the quality of life and the cohesion of communities through projects providing decentralized power, localized agriculture, urban greening, zero-emission transportation and more. Development planning should ensure that knowledge and skills are imparted to community members to a degree that enables members to secure employment on projects within or near their community. Additionally, projects should include community benefits agreements and provisions for community ownership where possible. The energy transition can potentially enable a more uniform distribution of opportunity that builds resilience and restores community pride.

The COVID-19 pandemic has exposed the fragility of our globalized supply chains. In order to ensure that the global economy will not break under the strain of future global emergencies, the supply chains of individual regions need to be diversified and strengthened. Therefore, national and community resilience must be at the forefront of our planning for the net-zero carbon economy.

CANADA'S A CALL TO ACTION

"[Canada has] hundreds of thousands of workers who know how to build energy infrastructure," according to Minister of Natural Resources Seamus O'Regan. "These are the same people who will lower emissions, the same people who will build renewables, the same people who will meet our targets." [98] **We agree, and call on the Federal Government to invest in our four-point plan to upskill and train our workers – Indigenous and non-Indigenous; pivot our businesses; repurpose and retrofit our infrastructure, and invest in nature-based solutions – all critically important for a Prosperous Transition to a net-zero carbon economy.**

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