GREEN JOBS POTENTIAL IN DIVERSIFYING ALBERTA’S ECONOMY
### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>4</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Green jobs in Alberta</td>
<td>6</td>
</tr>
<tr>
<td>Economic impact of the green economy</td>
<td>6</td>
</tr>
<tr>
<td>Challenges</td>
<td>7</td>
</tr>
<tr>
<td>Worker quality of life</td>
<td>7</td>
</tr>
<tr>
<td>Politics of emerging industries</td>
<td>7</td>
</tr>
<tr>
<td>Waste created in the supply chain</td>
<td>8</td>
</tr>
<tr>
<td>Unambitious regulatory achievements</td>
<td>8</td>
</tr>
<tr>
<td>Energy transformation</td>
<td>8</td>
</tr>
<tr>
<td>The world moving away from fossil fuels as a fuel source</td>
<td>8</td>
</tr>
<tr>
<td>Our biggest customer has become our biggest competitor</td>
<td>9</td>
</tr>
<tr>
<td>Oil and gas companies decreasing reliance on labour through automation</td>
<td>9</td>
</tr>
<tr>
<td>Transformation in Action: complimentary, not combative</td>
<td>10</td>
</tr>
<tr>
<td>Insulators efficiency report</td>
<td>10</td>
</tr>
<tr>
<td>California solar power using IBEW workers</td>
<td>10</td>
</tr>
<tr>
<td>Natural gas turbines</td>
<td>11</td>
</tr>
<tr>
<td>Cogeneration</td>
<td>11</td>
</tr>
<tr>
<td>Dry tailings ponds</td>
<td>11</td>
</tr>
<tr>
<td>Direct air capture</td>
<td>12</td>
</tr>
<tr>
<td>Green jobs in Alberta’s future</td>
<td>12</td>
</tr>
<tr>
<td>Renewable Electricity</td>
<td>13</td>
</tr>
<tr>
<td>Number of full-time positions by 2030: 9,300 - 31,300</td>
<td>13</td>
</tr>
<tr>
<td>Renewable Electricity Generation</td>
<td>14</td>
</tr>
<tr>
<td>Employment potential in grid modernization</td>
<td>15</td>
</tr>
<tr>
<td>Transportation and infrastructure</td>
<td>15</td>
</tr>
<tr>
<td>Number of full-time positions by 2030: 14,500</td>
<td>15</td>
</tr>
<tr>
<td>Urban LRT projects</td>
<td>15</td>
</tr>
<tr>
<td>Other public transit</td>
<td>16</td>
</tr>
<tr>
<td>Electric vehicle infrastructure</td>
<td>17</td>
</tr>
</tbody>
</table>
Energy efficiency in buildings and industry .................................. 18
Number of full-time positions by 2030: 14,500 ................................. 18
Energy efficiency in buildings .................................................. 19
Energy efficiency in industry .................................................. 19
Environmental cleanup and methane reduction in the oil and gas industry .................................................. 20
Number of full-time positions by 2030: 6,900 ................................. 20
Environmental cleanup in the oil and gas industry ......................... 21
Well cleanup ........................................................................ 22
Oilsands and coal mines reclamation ......................................... 23
Methane reduction ................................................................ 25
Alberta Federation of Labour actions supporting Green Jobs Blueprint .................................................. 26
Advocacy ............................................................................... 26
Government procurement and Community Benefit Agreements .................................................. 26
Labour market institutions ...................................................... 27
Innovation ........................................................................... 29
Government commitments to support green jobs growth .............. 31
Affiliate engagement .............................................................. 32
Working with unions to empower workers to green their jobs .......... 32
Conclusion ........................................................................... 33
Appendix A: Methodology ......................................................... 34
A.1 Job type definition and conversions .................................... 34
A.2 Renewable electricity ....................................................... 34
A.3 Transit ............................................................................. 35
A.4 Electric vehicle infrastructure ............................................ 35
A.5 Energy efficiency in buildings and industry ......................... 36
A.6 Cleanup of part oil and gas operations ................................. 36
A.7 Methane reduction .......................................................... 37
Appendix 2: Pembina’s specific policy recommendations to incent green jobs in Alberta .................. 38
EXECUTIVE SUMMARY

Albertans are skilled workers accustomed to a high quality of life resulting from long boom periods in the oil and gas industry. However, the global energy economy is changing and Alberta’s workers need to be prepared to adapt to the decreasing reliance on oil and gas and increased focus on green economies. The Alberta Federation of Labour’s (AFL) Green Jobs Blueprint presents a plan for how workers can use existing skills to ‘green’ current oil and gas jobs and enjoy a high quality of life as they transition into other emerging areas of the green economy.

The Pembina Institute has identified nearly 67,200 potential jobs that can be created between now and 2030 in Alberta’s green economy. This blueprint outlines where we think those are and how to turn these projections into the reality of high quality of life jobs. ‘Greening’ the oil and gas industry, decarbonizing electricity and infrastructure, transportation and infrastructure, improving buildings and creating new products from recycled waste offer the most immediate opportunities.

There are 4 key elements to this blueprint:

- Recognizing that an energy transformation is underway and the world is moving towards a low carbon energy mix which is emerging to reduce or replace the reliance on traditional fossil fuels;
- Making jobs in carbon intense industries greener through innovation and efficiency;
- Recognizing the value of workers’ current skills as they transition into green jobs; and
- Ensuring green jobs are high quality – offering comparable terms and conditions to boom time jobs – so workers can live and retire with dignity.

The AFL will engage government so impacted workers and unions can influence policy making by making our voice heard on key decisions regarding the transition into a greener economy.

Specific actions include lobbying the provincial government to:

1. Community Benefit Agreements that specify prevailing or fair wage rates should be in place anytime the government spends public money so project benefits go to the people paying the taxes that fund those projects.
2. Review labour market institutions so that transitional programs, skills training, and certification systems support barrier-free entry for current and new workers into green jobs. This includes removing eligibility of private, for-profit, training centers to qualify for grants or rebate programs.
3. Expand innovation funding to find new uses for waste products and non-combustion use of carbon resources.
4. Eliminate greenhouse gas emissions by repairing and improving oil and gas industry infrastructure (such as reducing methane emissions).
5. Upgrade industrial and residential buildings for state-of-the art energy efficiency, comfort, and safety.
6. Expand existing renewable power sources and deploy new production capacity with the goal of meeting 66% of provincial power demand through renewable energy.
7. Make green technology, industry, expertise, products, and services a major Albertan export, with the aim of becoming the undisputed Canadian leader in renewable energy.
8. Increase the qualification standards for contractors that want to be on preferred contractor lists on renewable programs.
9. Recognize that an undertaking of this sort requires greater engagement with labour to develop strong labour, workplace safety, and wage standards enforcement.

This plan will help ensure workers impacted by the transition into greener jobs can respond to that shift with resilience and retain their dignity as the nature of their work changes.
Introduction

The reality of oil and gas driven mega projects directly and indirectly employing many well-paid workers in Alberta is changing and workers need to position themselves to adapt. Local and global trends are driving this change and at the same time influencing the opportunity to grow Alberta’s green economy. Globally, the importance of the green economy is growing as institutions acknowledge they can use renewable energy to power the economic development needed to continue lifting billions of people out of extreme poverty. For example, the World Economic Forum identified that critical factors to achieving the economic growth necessary to reduce poverty are: access to energy, responsible resource management, and good governance.1 At the same time, the Alberta NDP government invested in alternative energy development to insulate itself from vulnerability to wildly fluctuating oil prices which impact investment and employment opportunities. These broad trends are converging with the broader energy transformation into a situation that will significantly impact Albertan workers.

This Alberta Federation of Labour Green Jobs report is a plan to ensure that workers are prepared for this transformation and are able to seize and make opportunities for themselves in the economy. The Blueprint begins by identifying what we mean by green jobs in Alberta’s unique context as the center of Canada’s oil and gas industry. There are inherent tensions between the idea of carbon intense industries and green jobs. This paper recognizes that, but understands the importance of Alberta’s oil and gas industry to its prosperity. Until the world is fully transitioned off of oil and gas as an energy source, we must focus on making that industry greener through efficiencies and diversification, and using the wealth that is extracted from it to position the province for greener jobs growth. This section also explores some estimates into the economic impact of the global and Albertan renewable energy industry that green jobs are typically associated with and an example of real jobs created in this industry. This section concludes by listing four broad challenges to transitioning Albertan workers into the green economy.

The next section focuses on defining and describing the elements of the energy transformation that is a fundamental driver behind the motivation of the shift into greener jobs. We argue that the transformation is happening now and that the early signs are not an anomaly, but the start of a long-term trend leading to wholesale change in the way the world works.

This transformation may appear scary to some workers who are deeply ingrained in their current career paths and do not see a place for themselves in the green economy. This Blueprint encourages those workers by showing them that the transformation can happen by building on their existing strengths. Previous skills and experience compliment the process, they do not become irrelevant as things change. The “Transformation in Action” section showcases several examples of how workers, companies, and unions leveraged existing skills and expertise to make worksites greener, implemented new technology, or developed new techniques to reduce the impact of carbon intense industries. This reinforces both that this change is happening and can be supported by existing skills.

To identify where those existing skills can be put to use, the AFL has partnered with the Pembina Institute to identify the biggest opportunities for future green jobs that can use existing skills. They have identified nearly 57,000 potential jobs that can be created between now and 2030 in Alberta’s green economy. Generally, these opportunities exist in taking action in the oil and gas industry, transportation and infrastructure, work in the electricity sector and on buildings. The paper also examines the potential impact of creating new products from recycled waste but a potential job calculation was not possible for that sector. Effective government policies and proactive industry action are needed to ensure that this job and economic growth are achieved.

The final section outlines the actions the AFL is committing to taking so that the green economy receives the political support necessary to ensure it grows and offers workers something to transition into. The AFL has two main levers it can pull to take action on helping workers: government advocacy and AFL affiliate engagement. The AFL has identified eight key actions they will lobby government to take to ensure workers are able to participate meaningfully in the green economy. The AFL will also work with affiliate members to ensure workers feel empowered in their workplaces to find efficiencies, reduce the environmental impact of their work, and make existing workplaces greener.

The transformation into a greener economy is an inevitability that we need to prepare for so that workers are positioned to participate. Our vision is that workers will be able to receive union wages supplemented with pensions through their participation in the green economy, so they can live and retire with dignity. This Blueprint aims to bring that vision into reality.

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1 https://www.weforum.org/agenda/2015/07/why-green-development-is-so-important/
Green jobs in Alberta

Green jobs are typically associated with the emerging renewable energy sector or energy efficiency measures. This report expands on that notion, identifying a green job as any job that reduces carbon emissions or any other negative environmental impact of an industry. While the world is changing, carbon intense industries are still an important part of Alberta’s economy. This report examines how we can make the most of the oil and gas industry by creating green jobs in it. For example, reclaiming abandoned oil wells and curbing methane emissions offer opportunities to green the oil and gas industry using existing workers skills. The report also examines steps other industries can take to increase efficiency, reduce waste and turn waste into other products that can be re-used.

The report promotes a vision that workers with today’s skills can change the way their jobs are done to make them greener by examining products and projects from start to finish. Through that lens there are many jobs in existing industries that can use current workers skills to “green” their job, have positive environmental impacts, and create sustained economic growth. Workers don’t need to wait for new jobs and industries to be created; they can act now to green their jobs by shifting their focus towards a greener path. Individuals can become empowered to challenge processes, material use, design standards, etc., so that their work is more efficient, wastes less resources, and is sustainable over the long–term as society’s needs change. For example, sourcing products locally and relying on local design, manufacture and production may help offset logistical carbon emissions involved in transporting products for use.

Collective action can be taken to help empowered individuals succeed in greening their jobs, because change is easier together. It will also help ensure workers retain union wages with pensions so they can retire with dignity as this shift occurs.

Economic impact of the green economy

While this report extends the definition of green jobs to encompass opportunities specific to the Albertan context, there are also many opportunities in other parts of the green economy. The global clean technology market, typically associated with green jobs, is estimated to grow to $2.2 trillion by 2022. It has been estimated up to $50 billion will be spent on renewable energy projects in Alberta and Saskatchewan by 2030. In terms of job growth, the Columbia Institute estimates that efforts to meet Canada’s climate goals could generate 3.3 million direct jobs in the building trades by 2050, and 17 million jobs if indirect, supply-chain, and induced jobs are included as well.

We are seeing some of those jobs materialize in Alberta as renewable energy infrastructure is built. For example, the Halkirk Wind Project, located in Alberta is rated at 150 megawatts (MW) of installed capacity and can produce enough power for 50,000 homes. Project construction, which included a communications tower and a power substation, resulted in 250,000 person-hours of work — or about 166 jobs. Halkirk’s construction employed electrical workers, masons, and ironworkers among many others. Now complete, the project continues to provide 18 permanent jobs for maintenance and operation. Project maintenance can be a useful source of future work. The Columbia Institute highlights approximately 20% of work across the building trades can be attributed to keeping existing facilities operational.

3 https://edmontonjournal.com/business/energy/alberta-oil-workers-want-retraining-for-renewable-energy-jobs
Challenges

The AFL Green Jobs Working Group identified challenges that are currently restraining workers transitioning into greener jobs. These include workers not wanting to transition to lower paying jobs which would impact quality of life; politics of emerging industries; waste created by the supply chain; and unambitious regulatory achievements slowing down action and meaning fewer green jobs.

Worker quality of life

Worker quality of life can be negatively impacted by the transition into a greener job and this can be exacerbated when moving from work which is unionized to work that is generally non-unionized. The Parkland Institute identified that wage growth in Alberta has been far lower than in other provinces with higher unionization rates; high unionization rates also put upward pressure on wages for non-union workers.\(^7\) The Canadian Centre for Policy Alternatives also identified that when union representation declines, upward mobility for the middle-class stalls and it inevitably shrinks over time.\(^8\)

In other words, unionization drives up wage rates for both union and non-union workers in that industry, and shifting workers into non-unionized green jobs has the potential to increase inequality and decrease their quality of life. For example, the median wage of an Electrician in Edmonton is $34.64 per hour\(^9\) and that does not include any additional benefits that might be included with the job. Meanwhile, the average wage for a “Solar Energy System Installer” is $17.18 per hour. This is only two dollars higher than the provincial minimum wage and is not even a living wage in Calgary or Grande Prairie according to Living Wage Canada.\(^10\) Only about 1% of the solar installations in Alberta are being done by Union contractors. This wage example points to how unionization has helped drive up wages for electricians, but non-unionized solar energy installers wages have not kept up. It is clearly a barrier to someone who wants to enter the green economy if they have to take a 50% wage cut to participate. This also has a negative impact on the economy as their purchasing power weakens. A worker with a good job should not have to reduce their quality of life to take a green job.

Politics of emerging industries

The next set of issues relate to the way governments have attempted to roll out the current supports to incent a greener economy. Governments have reached out to newly established groups instead of existing ones when trying to incent new industry growth, losing out on the expertise and skill of workers currently in similar industries. For example, reaching out to Solar Society instead of the organizations like the Electrical Contractors Association of Alberta (ECAA) and the Mechanical Contractors Association of Alberta (MCAA), on how to put together solar rebate programs. Existing organizations who have experience in related work and have a proven track record of success should be involved. The ECAA has monthly chapter meetings in Lethbridge, Calgary, Edmonton, Fort McMurray, and Grande Prairie. Attending these meetings are contractors, electrical inspectors, technical schools, electrical wholesalers, and many others connected to the electrical industry. It is the best way to get feedback for programs and to let the public know about upcoming rebate programs. The MCAA functions in the same way as the ECAA, but they deal with Plumbing and Heating and they do not have monthly chapter meetings. Still, they should be consulted with for the same reasons the ECAA should be consulted with.

Additionally, there is concern that monopolies have or might form in the renewable energy industry, creating barriers that contractors cannot surpass as they attempt to enter those industries. For example, SkyFire Energy bills itself as “Western Canada’s most experienced solar PV firm” responsible for designing and constructing some of the West’s largest and most complex solar projects. They have been able to significantly underbid other contractors, which could lead to a monopoly that will keep unionized contractors out of the industry.

\(^7\) https://www.parklandinstitute.ca/on_the_job
\(^8\) https://www.policyalternatives.ca/publications/reports/union-card
\(^9\) https://www.payscale.com/research/CA/Job=Electrician/Hourly_Rate/37dcfc7d/Edmonton-AB
\(^10\) http://livingwagecanada.ca/index.php/living-wage-communities/alberta/
**Waste created in the supply chain**

The working group identified that workers see a lot of waste being created on job sites and there is concern that unnecessary waste just ends up in landfills, especially in remote locations. Packaging and processes used to transport and supply goods, that workers need to do their jobs safely, may negatively impact the environment. For example, single use face masks to protect from dust individually wrapped in plastic create re-occurring opportunities for waste. In remote sites such as those in Northern Alberta, where infrastructure to recycle might be limited this is problematic. That is just one example of a larger problem whose solution requires collective action and creative problem solving that works with suppliers to ensure that supply chains are not contributing to negative environmental outcomes. There is also opportunity to incent new industries that use this waste as feedstock for new products that could be marketable and create greener jobs.

**Unambitious regulatory achievements**

Efforts to fully meet government targets they set could create green jobs in the oil and gas industry. The Pembina Institute identified that Alberta’s methane regulations will allow oil and gas companies to release far greater volumes of harmful methane pollution than if they followed the ‘federal methane regulations’ enacted earlier this year by Environment and Climate Change Canada (ECCC). In Alberta, the ECCC rules would reduce methane pollution by almost 35 million metric tonnes of carbon dioxide equivalent (CO$_2$e) by 2025. Meanwhile, the rules Alberta released will only reduce methane pollution by 22 million tonnes of CO$_2$e. This equals a reduction of 36%, clearly failing to achieve Alberta’s own 45% methane reduction commitment.11, 12

**Energy transformation**

Alberta is at the forefront of the global energy transformation as Canada’s largest oil and gas producer and one of the largest users of fossil fuels for electricity generation in the country. It will significantly impact our workforce which has built itself around servicing the needs of the oil and gas industry and associated spin-off jobs. This relationship is why the energy transformation is a significant driver pushing Albertan workers towards greener jobs. This transformation brings opportunities for workers to think about how they do their jobs in current industries differently, and participate in new career opportunities that may emerge in the green economy.

The energy transformation is characterized by three big changes: the world is moving away from fossil fuels as a fuel source; our biggest oil and gas customer has become our biggest competitor; and oil and gas companies are decreasing their reliance on labour through automation. The Government of Canada estimates the energy transition is already underway – and will continue to roll out over the course of a generation, roughly between now and 2040.13

**The world moving away from fossil fuels as a fuel source**

Oil and gas are Alberta’s most important exports but global demand is projected to peak around 2036, then start declining. Woods Mackenzie, a UK energy research and consultancy company, estimates that peak oil demand is expected to arrive around 2036 as the rise of electric and autonomous vehicles play an increasingly important role in the world’s transportation sector. Over the next ten years they anticipate fuel efficiency efforts will cause gasoline to be the first oil-based fuel to reach its peak around 2030, however, they acknowledge that other sources of oil demand, including petrochemicals, may grow stronger. These trends are being driven by legitimate concerns about climate change and technological innovations that are bringing down the prices for renewable alternatives. The global economy is slowly adopting the green energy technology necessary to transition off of a fossil fuel-based energy system and economy. This technology changes economies, which in turn change politics and culture.

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In Alberta, national and provincial government policies have shifted to meet global climate change targets. Alberta has taken steps under its Climate Leadership Plan to improve air quality and transition to cleaner sources of electricity by working to phase out all coal-fired electricity by 2020. The plan also sets a “30 by ’30” renewable energy target, in which 30% of electricity used by Albertans will come from renewable sources like solar, wind and hydro by 2030.14

The Government of Canada pledged under the Paris Agreement on Climate Change to substantially reduce its greenhouse gas emissions. To achieve this goal, the federal, territorial, and majority of provincial governments all agreed to the Pan-Canadian Framework on Clean Growth and Climate Change. The commitments in that plan include carbon pricing in all jurisdictions by 2018; accelerated nationwide coal phaseout by 2030; nationwide strategy for electric vehicles by 2018; accelerated deployment of charging infrastructure; implementation of a federal clean fuel standard; establishment of a nationwide net-zero energy building code by 2030; energy use labelling for buildings by 2019; renewed support for industrial efficiency, including the adoption of energy management systems; and a reduction in methane emissions from the oil and gas sector of 40-45 per cent by 2025.15

Even China, long considered a carbon-producing goliath and potential market for Alberta’s oil and gas, is leading the way globally in terms of building clean energy and turning away from coal-fired generation. In 2016, their government ordered 13 provinces to suspend approvals of new coal-fired power plants and another 15 provinces were ordered to delay new construction of projects that were already approved.16 They have also introduced a new “cap and trade system” making it harder to set up factories to make combustion-engine cars. This is part of a plan to aggressively pursue “New Energy Vehicles” – which includes electric and hybrid vehicles – to address pollution and build new industry.17

Our biggest customer has become our biggest competitor

The United States (US) has traditionally been Canada’s biggest customer for our oil and gas. The US Energy Information Administration (EIA) identifies that Canada is the largest source of US crude oil imports, providing 43% of total US crude oil imports in 2017. The EIA November 2018 Short-Term Energy Outlook also indicates that rising shale production resulting from the fracking boom has led to higher than expected crude oil production in the US. They were producing an average 11.4 million barrels per day of crude oil in October 2018, and that is expected to grow to over 12 million barrels per day by 2019. This increased production not only decreases the importance of Canadian oil exports to the US, it also puts downward pressure on oil prices by growing the global oil inventory. Finally, the removal of restrictions on exporting US crude in December 2015 has seen the total volumes of US crude exports, and number of destinations those exports go to, increase. For example, the US exported crude oil to 27 countries in the first half of 2017 compared with 19 countries in the first half of 2016. So not only are they able to produce more oil than us, they can reach more markets. These factors are worsened by transportation constraints related to limited pipeline access highlighting the significant competitive advantage the US has over Alberta’s oil industry.

Oil and gas companies decreasing reliance on labour through automation

In response to lower prices, oil companies are using automation and technology to drive down costs. Shale drilling used to require 30 rig hands operating diesel pumps, using heads to synchronize the throttle and pressure needed to break about rock formations to access crude. Now that job can be done by two people from a control station using automated electrified systems. In 2017, Suncor said it was able to slash engineering time for new steam-based oilsands well pads to 800 hours compared with about 9,100 hours between 2010 and 2015. Suncor is also taking other measures towards reducing labour cost such as implementing 150 driverless ore-hauling trucks which are anticipated to cut 400 high-paying jobs over the next six years.

The energy transformation will have profound impacts on our energy industry, provincial economy, and workforce. We need to acknowledge that this change is coming and invest in people, infrastructure, and workers’ rights to prepare. The good news is that people want the change to happen. For example, 380,000 people joined a national dialogue on Canada’s energy future in 2017 and told the government they think the transition to a low-carbon economy is underway, and want future energy systems to be clean, safe, reliable, accessible and affordable. The takeaway from that dialogue is that Canadian’s want investments in energy efficiency, clean energy and renewables, and zero-carbon transportation, a smart cross-country electricity grid and that energy expertise should be leveraged to decarbonize fossil fuel production.18

**Transformation in Action: complimentary, not combative**

Below are some examples of how workers, unions, and companies are leading the way to make jobs greener and reducing the footprint of carbon intense industries. The key takeaway is how existing skills and technology can be used to make jobs greener. We do not have to completely reimagine work to make the jobs greener, the transition is made easier by existing skills and knowledge.

**Insulators efficiency report**

Energy efficiency is an important part of greening a worksite by helping to reduce waste, and insulation is one of the unsung heroes of energy efficiency. The International Association of Heat and Frost Insulators and Allied Workers Union Local 110 have shared information on just how effective insulation can be. Salamander Inspections LTD performed an energy audit for them on a pharmaceutical building, identified a potential energy loss reduction of 6025.74 gigajoules (GJ) per year. This translates into an annual savings of $24,102.96 on that building from insulation fixes. The insulation costs for these updates would cost $12, 427.36 which leaves a net savings of $11,675.60 and approximately a six month return on investment. This is one example of how insulators could use their existing skills and talents to transform their work into a green job while helping clients realize cost savings of energy loss reduction.

**California solar power using IBEW workers**

The Columbia Institute reports that with the exception of some smaller commercial photovoltaic projects (between 0.25 and 1 MW), almost all of the large-scale renewable energy construction work in California in the past 14 years was done by union contractors — or non-union contractors paying union rates under project labour agreements. The average blue-collar wage on large renewable energy projects in California between 2002 and 2015 was $36.84 an hour, and these jobs contributed almost $340 million to worker pension funds; $400 million to health benefit plans; and $46 million to apprentice training programs.19

According to a report from the Environment America Research and Policy Center, Los Angeles now has the most installed solar power of any city in the U.S. and part of what pushed it to the No. 1 spot was an IBEW-installed 2.21-megawatt solar installation on the rooftop of the Los Angeles Convention Center. It took about six months for IBEW members, working for signatory contractor CSI Electric, to affix the array’s more than 6,000 panels to the top of the centers’ South Hall. The center is almost always in use, so a major challenge was coordinating the installation to work around the various events taking place inside with minimum disruption.20

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20 [http://www.ibew.org/articles/18ElectricalWorker/EW1806/index.html](http://www.ibew.org/articles/18ElectricalWorker/EW1806/index.html)
Natural gas turbines

Finding alternatives to traditional coal fired electricity generation can help create greener jobs in the oil and gas industry. Natural gas turbines are combustion engines that convert natural gas or other liquid fuels into mechanical energy. This method can offer a greener alternative to coal production and there are already examples of these turbines in use reducing carbon dioxide emissions. The Sheppard Energy Centre became operational in 2015 and uses combined cycle technology (two natural gas-fueled and one steam-powered turbine) to generate more than 860 MW of electricity to the Alberta’s electricity grid. This is enough to power nearly half of Calgary’s electricity needs while emitting less than half the carbon dioxide per megawatt of energy created by a conventional coal plant.

The Clover Bar Energy Centre in Edmonton is another example of natural gas turbines in action and offers insight into other green benefits. The facility generates 243 MW of power which is sold onto the open electricity market, and became fully operational in 2009. The facility uses approximately 85% less water per megawatt hour than the former Clover Bar facility and the new natural gas turbines produce about 70% less nitrogen oxides per megawatt hour of electricity generated at full capacity compared to the previous facility.

Cogeneration

Cogeneration is the simultaneous production of heat and electricity that increases efficiency and lowers fuel use to lower energy production costs and reduce greenhouse gas emissions. MIT supports the notion that cogeneration is a clean, efficient and cost-effective choice for power production whose benefits include pollutant and greenhouse gas reduction. Cogeneration is achieved when a generating plant is constructed in conjunction with an industrial facility (host) that has needs for both the power and heat energy that is produced.

Alberta has the most cogeneration capacity in Canada, with 32 industrial cogeneration facilities with an installed electricity of 4,528 MW in 2016. Of this total, 3, 343 MW was used in the oilsands, 942 MW was used in petrochemical operations and 243 MW was used by utilities and other operations. Alberta Electric System Operator (AESO) forecasts that cogeneration will likely grow in industrial development, specifically in the oilsands, because the Oil Sands Emissions Limit Act introduced a 100 Megatonnes (Mt) per year emission cap that has exemptions for cogeneration that act as an incentive to its use.

Dry tailings ponds

Tailings ponds are one of the most recognizable and controversial environmental impacts of bitumen extraction from the oilsands. Tailings are made up of sand, silt, clay and water found naturally in oil sands that remain following the mining and bitumen extraction processes. Tailings are transported by pipeline and deposited into ponds, where the majority of the solids settle to the bottom. The remaining fluid is called Fluid Tailings (FT). As the solids in the FT begin to settle, the FT densifies, turning into a mixture called Mature Fine Tailings (MFT). Some of the MFT remains in tailings ponds, trapping water and reducing the amount of water available for recycling.

24 https://www.capitalpower.com/operations/clover-bar-energy-centre/
26 https://www.capitalpower.com/operations/clover-bar-energy-centre/
28 https://powering.mit.edu/cogeneration-sustainable-choice
32 https://www.aeso.ca/download/listedfiles/2017-LTO-Information-Session-FINAL.pdf
In 2018 CNRL announced an in-pit extraction process to produce dry tailings and reduce carbon dioxide emissions. At CNRL’s Horizon mine, 70 kilometres north of Fort McMurray, they built a multi-level mobile platform that could separate bitumen from sand, leaving behind dry tailings. The platform would finish work in one location before being moved to a new area in the mine. The process — named the In-Pit Extraction Process — passed the first round of testing. Not only could the technology eliminate the need for tailings ponds, CNRL found it also shaved at least $2 off the cost to produce a barrel of oil. Moreover, it reduced greenhouse gas emissions by 40 per cent because energy wasn’t needed to truck or pipe mined oilsands back to a processing facility that was kilometres away.34

**Direct air capture**

Carbon Engineering in Squamish, B.C. is using a process they call “direct air capture” to pull about one-tonne of carbon a day from the air to produce two barrels of fuel. Direct air capture removes carbon dioxide from the atmosphere through a chemical process and then combines it with hydrogen and oxygen to create fuel.

They use commercially available components to build their technology, so believe they can scale it up quickly as special parts are not needed. Carbon engineering wants to build a full-scale plant and expects it to take 2.5 years to complete. The fuel created costs about 25% more than gasoline made from oil but they are working to reduce that. The fuel created has 70% less carbon footprint than fossil fuels. The plant currently uses some natural gas, so by the time the fuel it produces has been burned it has released half a tonne of carbon dioxide for every tonne removed from the air. They say the footprint would shrink further if the plant were all-electric. If it ran on wind- or solar-generated electricity, the fuel would be almost carbon neutral.

At least seven companies worldwide are working on similar ideas. Swiss-based Climeworks has already built a commercial-scale plant to do direct air capture but their costs are reportedly significantly higher than Carbon Engineering.

**Green jobs in Alberta’s future**

The Alberta Federation of Labour commissioned a report from the Pembina Institute to determine the number of potential jobs available in the green economy, and they determined with the right policy supports nearly 67,200 potential jobs could be created between now and 2030. Their report was based on the latest market studies, development plants, and growth projections looking forward to 2030. Taking action in the oil and gas industry, transportation and infrastructure, work in the electricity sector and on buildings could generate the most potential jobs. The Working Group also explored the potential opportunities in waste reduction and management to build up the recycling industry, but specific estimates for job potential were not available at this time. These types of activities involve a wide range of jobs including the construction of infrastructure, project management, engineering, information technology, trades people, and analysts.35 Many of these jobs already exist and people are trained to do them, using existing skills to shift into greener jobs.

Actualizing this employment potential will require continued implementation of supporting policies, investment in these sectors, and providing policy certainty. Effective government policies, along with proactive industry action, are needed to ensure that job and economic growth in the emerging economy are sustained. See appendix 2 for Pembina’s specific recommendations on policy actions to support this vision of growth in Alberta.

34 https://www.cbc.ca/news/canada/edmonton/in-pit-extraction-process-cnrl-1.4788480
Renewable Electricity

Number of full-time positions by 2030: 9,300 - 31,300

Alberta’s electricity sector has been transitioning from one that is dominated by coal-fired generation to one that is more diversified and decentralized, with significant growth in the use of renewable sources. Driven by the weak economics and negative health impacts of coal pollution, combined with low natural gas prices and the decreasing costs of renewables, coal plants are being decommissioned as other more economic generation sources come online.

When comparing the lifetime output from renewable energy sources against that generated at gas plants, it may come as a surprise for many to learn that renewable energy is cheaper. In fact, a portfolio of clean energy options including renewables, storage, energy efficiency and demand side response can provide the same services as a new gas plant while costing $9 to $24 less per megawatt hour than energy from new gas plants.36

It is important to note the role government plays in sending signals of policy certainty that encourage investments in renewables and increase the potential for employment growth in the electricity sector. Having a clear policy roadmap provides certainty to the industry and results in greater investments in construction, operation and maintenance, and manufacturing. A study by the Canadian Wind Energy Association (CANWEA) of Alberta’s wind energy supply chain found that having a clear policy roadmap to 2030 would create more jobs in renewables by attracting wind tower and blade manufacturing, as well as, component repairs and replacement.37, 38, 39

In 2019, the Alberta government cancelled its Renewable Electricity Program (REP).40 This program had been extremely successful in procuring the lowest cost energy option for the province, and resulted in over 1,300 MW of wind power.41 The Alberta government also put the $200 million Community Generation Program42 on hold until future notice.

FIGURE 1. JOBS POTENTIAL IN RENEWABLE ELECTRICITY

39 Considering the dominance of the foreign market in solar panel manufacturing, and the fact that 98% of Canada’s installed solar generation is located in Ontario, it is unlikely that a significant provincial or national solar manufacturing industry will arise in Alberta by 2030.
![](https://www.aeso.ca/market/renewable-electricity-program/rep-news-and-updates/)
Renewable Electricity Generation

The Alberta Electric System Operator (AESO) is the operator and manager of Alberta’s power grid. In 2019, it released a long-term outlook forecasting electricity demand and generation in the province to 2030 based on multiple energy demand scenarios. This report uses two of these scenarios to estimate job creation from renewable energy projects constructed by 2030: one scenario of high investment in renewables, and one of diversification into sectors completely new to Alberta such as blockchain.

Table 1 presents the job potential for each of these scenarios.

### TABLE 1. JOB POTENTIAL DERIVED FROM THE 2019 LONG-TERM OUTLOOK SCENARIOS

<table>
<thead>
<tr>
<th>FTEs generated until 2030</th>
<th>Alternate Renewable Policy Scenario</th>
<th>Diversification Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>3,600 (4,700)**</td>
<td>1,600 (2,100)</td>
</tr>
<tr>
<td>Solar</td>
<td>5,700</td>
<td>29,700</td>
</tr>
<tr>
<td>Total</td>
<td>9,300 (10,400)</td>
<td>31,300 (31,800)</td>
</tr>
</tbody>
</table>

* The long-term outlook does not forecast any new significant geothermal capacity coming online by 2030. There are 27 different technologies available to generate geothermal energy, but without policy clarity around geothermal energy’s future in Alberta it will be difficult to grow this market by 2030. New hydropower generation capacity does not come online in Alberta until 2034, so the job creation potential in the sector before 2030 is negligible. Hydropower development can be slow because it is geographically limited and resource intensive, and projects typically have long lifespans.

** Numbers in parentheses reflect jobs created in presence of a clear policy roadmap by 2030.

AESO’s forecast for wind development could result in the creation of 1,600 to 4,700 direct jobs in construction, operation and maintenance, and manufacturing, with the alternate renewable policy scenario leading to the higher jobs estimate. New generation capacity under this scenario is weighted toward the lowest-cost renewable generation technology, which is currently wind power generation.

The forecast for solar development could create between 5,700 and 29,700 direct jobs in construction, and operation and maintenance, with the diversification scenario leading to the higher jobs estimate. This scenario assumes a significant drop in the cost structure of solar power and a higher energy storage penetration relative to other scenarios. Under both scenarios, the job creation potential of solar development can significantly offset the 2,890 jobs lost from phasing out coal.

It should be noted that growth in renewables has been faster and often exceeded deployment projections made by international energy agencies. As renewables continue to become more cost-effective than gas-fired generation, there will likely be an increase in uptake of renewable projects in the province — resulting in increased job creation opportunities. Changes to the existing regulatory framework and market that allows renewable developers, energy efficiency specialists, and storage providers to monetize their contributions provided to the grid — such as being compensated for providing flexibility or efficiency — will help to create policy certainty for renewable investments in the province, and can create opportunities in construction, operation and maintenance, and manufacturing.

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44 These two scenarios were selected because they achieve Alberta’s target of 30% renewable energy by 2030, while the high and low energy demand growth scenarios in the AESO outlook do not; the business-as-usual estimates for 2030 have already been exceeded.


Employment potential in grid modernization

It is not only the mix of electricity generation sources on the grid that is changing. Alongside advances in technology, increasing demands from customers to manage their consumption, increasing adoption of EVs, and the growing desire for self-generation, will come a demand for a wide range of skilled workers in grid modernization, including cyber-security, customer support for service providers, and grid operation and management. No estimates of these job potentials were made for this report.

Transportation and infrastructure

Number of full-time positions by 2030: 14,500

After the industrial sector, transportation in Alberta is the second largest energy-intensive sector and accounts for 12% of the greenhouse gas emissions in the province. Investing in alternative transportation solutions like public transit will improve mobility and accessibility within cities, allowing workers to get to jobs affordably and opening up other job opportunities in other areas, all while reducing transportation GHG emissions associated with personal vehicle travel. It can also improve mobility between cities, allowing workers to access additional jobs in other markets.

Urban LRT projects

Public transit remains an essential public good for Albertans during the COVID-19 pandemic and will be essential to its economic recovery. During this time, essential service workers rely on public transit to get to work, and many people still depend on transit to access basic needs such as medical care and food. As Alberta’s population grows and cities become more dense, public demand for a wide range of affordable and low-carbon mobility options such as public transportation will be increasingly important to safely connect Albertans to their work and to each other.

47 “Provincial and Territorial Energy Profiles – Alberta,” Figure 8.
The Government of Alberta has approved four major public transportation projects that will be significant job contributors in the coming decade. These projects will result in construction, as well as, operation and maintenance (O&M) jobs, as shown in Table 2. In addition, expansion of public transportation will also result in greater employment opportunities for transit workers.

**Table 2. Number of Jobs Created from Major Public Transportation Projects in Alberta by 2030**

<table>
<thead>
<tr>
<th>Project</th>
<th>Direct jobs</th>
<th>Total jobs (direct and indirect)*</th>
<th>Average annual FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edmonton Valley Line West LRT**</td>
<td>12,000</td>
<td>20,000</td>
<td>2,500</td>
</tr>
<tr>
<td>Edmonton Metro Line NW LRT**</td>
<td>2,000</td>
<td>2,830</td>
<td>300</td>
</tr>
<tr>
<td>Edmonton Southeast Valley Line LRT**</td>
<td>10,000</td>
<td>17,150</td>
<td>1,400</td>
</tr>
<tr>
<td>Calgary Green Line LRT**</td>
<td>12,000</td>
<td>20,550</td>
<td>2,500</td>
</tr>
</tbody>
</table>

* reported in job-years not annual FTE

**Other public transit**

While the approved LRT projects will contribute a significant number of jobs in the coming decade, there is still plenty of capacity in Alberta for public transit expansion. Census data from 2016 shows that public transit still has significant growth potential as Alberta’s cities grow to match the size of large cities in other provinces. The proportion of workers commuting via public transit is 16% in Calgary and 11% in Edmonton, compared to 24% in Toronto and 20% in Vancouver. **Ridership, however, decreased in Calgary by 2% between 2011 and 2016, and plateaued in Edmonton at 11%,** often an indication that adequate and convenient transit options aren’t available.

In 2018, the Government of Alberta signed a bilateral agreement with the federal government under the **Investing in Canada** plan to provide $3.3 billion in long-term infrastructure investments that will create jobs in the transportation sector. These funds create the potential for municipalities to improve and electrify rapid bus transit systems, expand the coverage of the LRT in and outside city centres, and invest in on-demand transit solutions. These investments could lead to 1,300 direct and indirect jobs during construction, and 20 operation and maintenance jobs.

https://www.alberta.ca/release.cfm?xID=619261EB43F14-AA9B-4F5E-D7D0A00CB7891D3C
49 Ibid.
https://www.alberta.ca/release.cfm?xID=486085A66C446-A3FC-6222-8321F954FCB8599DD
https://www.alberta.ca/release.cfm?xID=47232F4AA59E8-5BEF-44F7-ABAD76007A8AC33
52 Statistics Canada, Journey to work: Key results from the 2016 Census (2017), 9.
54 Government of Canada, “Canada and Alberta to make significant investments that will improve the lives of Canadians,” media release, April 3, 2018.  
Connecting rural Alberta to opportunities in city centres

In 2016 the Government of Alberta set aside $1.4 million for six rural transit projects in the province as part of the Rural Transportation Pilot Program. The intent of this program is to expand existing public transportation services in rural communities and build new services where gaps exist — such as the one left when Greyhound ceased operations in Alberta on Oct. 31, 2018 — as well as improve connectivity to urban centres. By 2019, all six projects were operational. Some 40,000 Albertans who did not previously have access to transit service will benefit from this program, giving workers in rural Alberta who don’t own personal vehicles access to more jobs across a larger region.

The varied nature of projects enabled through this fund makes it difficult to estimate the number of jobs it generated.

Electric vehicle infrastructure

Electric vehicles (EVs) represent the next stage in the evolution of passenger and commercial vehicles. Opportunities include personal vehicles, transit vehicles, commercial fleets, industrial vehicles, garbage trucks and even off-road vehicles and farm equipment. The Government of Canada has invested $183 million in the public and private sectors to support the construction of refuelling stations for alternative fuels, such as coast-to-coast fast charging for electric vehicles and hydrogen stations in city centres, and is committed to developing a strategy to increase the number of zero-emission vehicles (ZEVs) on the road.

Through its Electric Vehicle Strategy, the City of Edmonton plans to have 85 publicly available EV charging stations installed by 2022, up from 19 in 2017. The City of Calgary launched its official EV strategy in 2019, and now has approximately 175 EV charging stations across the city.

Investments in EV charging infrastructure in Calgary and Edmonton alone have the potential to create 3,600 direct jobs and 2,900 indirect jobs in the province by 2030. Developing public charging infrastructure has the potential to create more jobs than installing residential EV chargers, because more skilled trades are required for more complicated installations, while the number of operation and maintenance jobs could increase with frequency of use. Charging stations need to be maintained yearly, and more frequently used chargers might need semi-annual or even quarterly maintenance.

Appendix 4 includes a brief discussion on the job potential of an EV manufacturing industry for Alberta, but currently EV manufacturing is concentrated in Ontario and Quebec, charger manufacturing happens predominantly in Quebec, and there are no indications of plans to create an auto manufacturing industry in Alberta. That is not to say Alberta

57 However, on April 10, 2020 the County Connector service in Grand Prairie was suspended until further notice due to risks surrounding COVID-19. Source: County of Grande Prairie No. 1, “County Connector Public Transit – Rural Transportation Pilot Program.” https://www.countygpa.ab.ca/EN/main/government/couny-projects/rural-transportation-pilot-program.html
59 Unlike Edmonton and Calgary’s projects, the Rural Transportation Pilot Program funds will not go into transportation infrastructure, so the same job factors will not apply. Program funding will go to regular shuttle bus services, regional transit services, family and community van services, and ride share programs.
60 Peter Campbell, “Electric car rivals revved up to challenge Tesla,” Financial Times, September 21, 2018. https://www.ft.com/content/3f5edd00-bd7d-11e8-8274-55b72926558f
cannot be a leader in the evolving EV industry: there are already efforts by several clean tech companies in Alberta to develop mineral extraction technologies and processes for EV components, for example extracting minerals for battery manufacturing from existing oil and gas infrastructure. Similarly, while conversations on the production and applications of hydrogen are increasing, manufacturing jobs for hydrogen in the transportation sector — specifically fuel cell and refuelling infrastructure manufacturing — are predominantly concentrated in British Columbia and Ontario.

**Energy efficiency in buildings and industry**

**Number of full-time positions by 2030: 14,500**

By 2038, the number of residential households in Alberta is expected to grow by 24% while the size of commercial and institutional space is expected to increase by 22%. As our building sector’s greenhouse gas emissions need to decline during that same time period, new building standards, as well as, upgrades to existing infrastructure, will require new expertise, in turn generating employment opportunities.

The obvious benefit of pursuing energy efficiency improvements is to reduce electricity and heating bills for homeowners and businesses. Savings potential in Alberta could add up to $2.5 billion in the residential sector, and $7.1 billion in the commercial and industrial sectors. Taking advantage of energy efficiency also creates new job opportunities. While designing and building residential and commercial spaces is well understood and relatively simple, industrial processes can be complex and challenging to adjust. Efficiency improvements for both industry and buildings are currently weighted heavily towards retrofits, so they are easier to implement, making it easier to create new jobs.

Energy efficiency is often a low priority for homeowners and businesses, due to high upfront costs and incremental annual returns, which means there is a need for policy drivers and financing mechanisms to enable job creation. In its first two years of operation, Energy Efficiency Alberta created 4,300 jobs in Alberta from energy efficiency programs, and generated $3.20 growth for every $1 invested in energy efficiency.

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**FIGURE 3. JOBS POTENTIAL IN ENERGY EFFICIENCY IN BUILDINGS AND INDUSTRY**

![Energy Efficiency Jobs Potential Chart]

- **Energy Efficiency**: 14,500
- **Residential Buildings**: 14,500
- **Commercial Buildings**: 2,000
- **Industrial Processes**: 10,800
- **Renewable Electricity**: 31,300
- **Oil and Gas**: 6,900
- **Transit and EV Infrastructure**: 14,500

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64 E3 Metals Corp, “Project Overview.” https://e3metalscorp.com/
65 Cedric Smith, Carolyn Kim, Ben Sharpe, Nic Lutsey, Power Play: Canada’s role in the electric vehicle transition (Pembina Institute and the International Council on Clean Transportation, 2020), 20. https://www.pembina.org/pub/power-play
**Energy efficiency in buildings**

Jobs in building efficiency are associated with design, construction, manufacturing and retail, and can sometimes involve reimagining how we live and do business. In addition to opportunities for new, specialized jobs, the buildings sector is well positioned to allow current practitioners to apply their skillsets to these new opportunities without the need for retraining. For example, construction of net-zero homes requires specialized building design, up-to-date insulation installation practices, and energy efficient fixtures and appliances.69

The EEA’s projections for reducing electricity and heating demand in Alberta will result in up to 1,700 jobs in residential energy efficiency, and up to 2,000 jobs in commercial energy efficiency by 2030.

**Recycling**

Waste diversion is another pathway to reducing energy consumption and emissions that could generate jobs in Alberta, but only with a re-imagining of the entire waste cycle. Until recently, Alberta relied heavily on shipping its waste internationally for recycling; for example, Calgary used to send all of its mixed paper and 50% of its plastics to be processed in China.70 However, countries that buy foreign recyclables are becoming stricter about what they accept, which means exporting recyclables is becoming less profitable, and more waste will likely end up in local landfills as a result.71

Recycling is a labour-intensive process that depends heavily on collection, sorting, processing, manufacturing and logistics, and presents a significant opportunity for creating new jobs that require minimal training and experience. To maximize the job creation and economic growth opportunity of recycling in Alberta, we need to develop a local industry that turns our waste into a profitable product.72

There is already strong interest within the province for diverting waste: In 2017, the City of Edmonton’s goal was to divert 90% of residential waste from landfills (although it only achieved 52%);73 the City of Calgary aims to divert 70% of its waste from landfills by 2025.74

Studies in the U.S. suggest that achieving 75% nation-wide waste diversion could create upwards of 2.3 million American jobs by 2030.75

**Energy efficiency in industry**

In addition to improvements for homes and commercial spaces, there are significant gains to be made in energy efficiency within industry processes. As a resource-based economy, Alberta’s industry is energy- and carbon-intensive. In 2017, industrial energy use accounted for 75% of Alberta’s energy demand (both electric and heating).76

As the world decarbonizes its energy systems, improving process efficiencies is one important lever to maintaining competitiveness — including carbon-competitiveness — of our industry, creating and retaining jobs, and improving the environmental performance of the industrial sector.

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76 “Provincial and Territorial Energy Profiles – Alberta,” Figure 6.
Improving industrial efficiency is complex: energy monitoring and verification is much more technical, and facilities can have varying production schedules. Industrial efficiency job opportunities range from service activities, such as monitoring and maintenance, to highly technical roles like energy modelling and process re-design, as well as, regulatory jobs in policy development, regulation, tracking and enforcement. Process optimization offers significant potential for energy efficiency improvements in the oil and gas industry.

Based on the results of a recent study completed for the EEA, we project that by 2030 the oil and gas sector could save up to 2,250 Gigawatt hours (GWh) of electricity consumption and 69,120 Terajoules (TJ) of heating fuel consumption (see Appendix A.5). Looking at the province’s total potential energy efficiency improvements in both electricity and heating this accounts for 30% of the former and 80% of the latter, due to the sector’s dependence on thermal processing. The subsequent savings would be equivalent to powering 31,000 homes and heating 57,000 homes for 10 years while creating 8,500 jobs in Alberta’s oil and gas sector (see Appendix A.5).

The EEA study also projects other industries (chemical, pulp and paper, manufacturing and farming) can achieve an electricity reduction potential of 1,970 GWh and heating reduction potential of 6,840 TJ by 2030. These savings could power 27,400 homes and heat 5,700 homes for 10 years, and create up to 2,300 jobs in these industries.

Environmental cleanup and methane reduction in the oil and gas industry

Number of full-time positions by 2030: 6,900

The oil and gas industry faces deep challenges as the world strives to reach net-zero emissions by 2050 to limit warming to 1.5 degrees Celsius. But the sector has and will continue to play a role in meeting our energy needs, and in fuelling Alberta’s economy. Job creation that improves the sector’s environmental and climate performance will help Alberta’s economy remain competitive as the world moves to a 21st-century low-carbon economy. For this report, we specifically look at the job potential realistically achievable by 2030 in two areas: environmental cleanup and methane emissions reduction.

For decades, inadequate incentives and relaxed regulations have allowed oil and gas cleanup to be neglected in Alberta. While the Alberta Energy Regulator (AER) officially estimates total cleanup costs of the sector at $58 billion, unofficial analysis conducted by the regulator suggests the real, industry-wide cost may be closer to $260 billion. In order to realize job benefits, it is imperative the government deals with this growing backlog with more stringent regulations, and with policies that both facilitate and ensure that licensees and industry more aggressively tackle cleanup.

The oil and gas sector is a significant contributor to Alberta’s carbon emissions — in 2018 it comprised 51% of the province’s total greenhouse gas emissions. As the industry responds to global action on climate, and deploys innovative efforts to improve its competitiveness, investing in emerging opportunities will support the retention of jobs, while also improving both economic, environmental and climate performance.

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79 2019-2038 Energy Efficiency and Small-Scale Renewables Potential Study.
81 The Economic Impact of Improved Energy Efficiency in Canada, Table 8.
Environmental cleanup in the oil and gas industry

The oil and gas industry in Alberta includes conventional and unconventional oil and gas developments, with oilsands representing the largest share of hydrocarbons produced in Alberta today.

Cleanup, which includes decommissioning and reclaiming depleted oil, gas and oilsands sites, presents tremendous job creation opportunities. These opportunities have historically been dependent on operators themselves funding and performing cleanup activities; however, current policy does not ensure this occurs while companies are financially solvent.

The AER has developed specific regulations to guide the decommissioning and cleanup of oil and gas infrastructure that has reached its end of life, including reclamation requirements for the three types of fossil fuel development occurring in the province:85

1. **Oil and gas site reclamation requirements** apply to upstream oil and gas operations, including conventional wells, pipelines and natural gas plants.

2. **Mine reclamation requirements** apply to open-pit mines for coal and oilsands production, including processing plants.

3. **In-situ reclamation requirements** apply to oilsands wells producing bitumen using enhanced recovery techniques (also known as in-situ technologies).

Due to the similarities between in-situ well management and conventional well management, in-situ reclamation potential is usually grouped with conventional wells. Meanwhile, because the AER has similar reclamation requirements for coal and oilsands mining, jobs estimated to clean up coal mines are included in the oil and gas sector.

We have calculated that decommissioning and reclaiming past fossil fuels production sites could create as many as 6,100 jobs in Alberta, including both mine and well reclamation.

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Well cleanup

Out of the 336,000 existing wells in Alberta, the Government of Alberta estimates that 172,000 are active, 94,000 inactive\(^\text{86}\) and 73,000 abandoned (meaning they are permanently shut down, but the sites are still waiting to be fully reclaimed).\(^\text{87}\) This means that only half of the wells in Alberta are still producing, with the remaining waiting either to be brought back online, or to be decommissioned and reclaimed.

A weakness in the regulations allows producers to leave their wells sitting suspended indefinitely before the final steps of abandonment, remediation and reclamation (Figure 5). This is one of the reasons for a backlog of 94,000 inactive wells in Alberta, with the majority being in that state for more than five years.\(^\text{88}\)

The decommissioning, abandonment, remediation and reclamation of inactive wells has the potential to generate 3,700 direct jobs and 1,000 indirect jobs. This estimate is considered conservative, because it only focuses on the 94,000 currently inactive and suspended wells, while ignoring the portion of the 172,000 currently active wells, which will have to be cleaned up upon reaching their end of life in the next decade, and the remaining remediation and reclamation work still needed on the 73,000 wells that have already been abandoned.\(^\text{90}\)

Further, as noted above, the AER’s regulation extends beyond upstream well cleanup, and includes gas plants and pipeline reclamation. There is insufficient data to estimate how many new jobs could be created from cleaning up this additional infrastructure. However, the AER regulates more than 422,000 km of pipelines\(^\text{91}\) and 600 gas plants\(^\text{92}\) in the province, which reinforces the assumption that job opportunities related to cleaning up oil and gas infrastructure in Alberta are enormous.

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90 Methodology used to estimate cleanup jobs is outlined in Appendix A.6.
The fast-growing orphan wells problem

Among oil and gas liability issues is also the problem posed by orphan wells. A well becomes an orphan when it no longer has a company legally and financially responsible or able to deal with its closure and reclamation; for example, because the company that owned it went bankrupt. Such wells are then transferred to the Orphan Well Association (OWA), an organization historically funded by an industry levy. As of March 2020, there are more than 6,000 orphan wells (needing abandonment and/or reclamation), 3781 pipeline segments, and 297 facilities in the OWA’s inventory.

Traditionally, there were a limited number of orphan wells, but the number has grown rapidly over the past few years, leading the federal and Alberta governments to contribute $565 million in loans for orphan well cleanup over the past five years, in order to accelerate the reclamation of oil and gas well sites that no longer have a financially solvent owner.

A 2019 decision by the Supreme Court of Canada confirmed that, when companies go bankrupt, paying for cleanup costs should be prioritized before paying creditors. However, this decision does not fully clarify who will ultimately pay for cleanup, given that when companies go bankrupt, remaining assets are frequently insufficient to cover closure and reclamation costs.

Orphan wells are just the tip of the iceberg when it comes to the oil and gas liabilities, and raise serious concerns about funding this cleanup. Given current policies and the enormous price tag — estimates range from $58 billion to $260 billion for the eventual decommissioning and reclamation of all oil and gas infrastructure, there remains the possibility that a share of this cost will be borne by governments — that is, ultimately, taxpayers.

Oilsands and coal mines reclamation

While hundreds of thousands of conventional oil and gas wells dot Alberta’s landscape, and active drilling continues especially in the shale oil-rich areas in Northwest Alberta, the vast majority of the province’s oil reserves are found in oilsands — a naturally occurring mix of extra heavy crude oil (known as bitumen), sand, water and other impurities. While representing only 19% of Alberta’s bitumen reserves, open-pit mining currently accounts for just under half of Alberta’s crude bitumen production, with in-situ extraction making up the remaining half.

Open-pit mining is also used to extract coal burned for electricity, which still accounted for half of Alberta’s power generation in 2017. In 2016, the Government of Alberta officially began the phase-out of coal-fired electricity generation by 2030, creating both the motivation and the need to reclaim some coal mines. Even without regulations mandating the phase-out of coal, trends in the United States have indicated coal-fired power plants are shutting down due to poor economics.

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96 Statement from the Alberta Energy Regulator, November 1, 2018.
97 Alberta Energy Regulator, “Figure S3.1 Alberta crude bitumen production,” June, 2018. https://www2.aer.ca/t/Production/views/CrudeBitumenNarrativeGroupA_0/FigureS3_1Albertacrudebitumenproduction?embed=y&showShareOptions=true&display_count=no&showVizHome=no
100 Some mines will continue to operate for export and to supply coal for industrial purposes. Their future depends on the global trends in coal usage.
Over 200,000 acres of open-pit oilsands and coal mines will eventually require reclamation. The Alberta Energy Regulator regulations hold mine operators responsible for returning sites to their original condition. The AER officially estimates the environmental liabilities of oilsands and coal mines to be $31.4 billion as of June 2019, but their internal estimates suggest this could be higher. Based on the official estimate, there is potential for 800 direct jobs and 600 indirect jobs in mine reclamation in the next 40 years. These estimates exclude the reclamation of tailing ponds created by oilsands mines (see box below). With strong regulations and enforcement in place, a majority of these jobs would be created by operators.

Oilsands mine reclamation challenges

After 50 years of operations, the oilsands mining industry has not shown how to mitigate the long-term ecological impacts of treating and reclaiming fluid tailings. Far more intensive and transparent implementation and consultation with affected communities is required to address the technical, environmental and societal challenges related to fluid tailings treatment, reclamation approaches, and final landscape outcomes.

Securities collected for oilsands mines are only sufficient to cover 3% of the estimated reclamation costs. This exposes communities and Alberta taxpayers to fiscal and environmental risk, as bankruptcies in the sector could result in these cleanup costs falling to the public. Moreover, current regulations have proven inadequate to incent oilsands companies to progressively reclaim their sites. This has resulted in a significant backlog of cleanup obligations, with only 0.1% of land disturbed by oilsands mining over the last 50 years currently certified as reclaimed.

Without sufficient incentives and penalties to promote progressive reclamation of oilsands mines, this opportunity for job creation could be missed. Besides the policy and regulatory enforcement needed to drive more responsible oilsands reclamation, there remain technological barriers to treating tailings because of the uncertainty around the long-term ecological impacts of treated or untreated oilsands tailings on the landscape. Currently, there is no publicly available cost estimate for cleaning up a cubic metre of liquid tailings. Investing in addressing the tailings issue could, in fact, be a big contributor to creating highly technical jobs.
**Methane reduction**

Methane is the main component of natural gas and thus a valuable resource. It is also a greenhouse gas at least 84 times more potent than carbon dioxide over a 20-year period. As a result, it has a significant climate impact, especially in the short term.\(^{109}\) Methane emissions occur in all parts of the natural gas supply chain including extraction, processing and transporting natural gas, and both the intentional and unintentional release of methane are common.

Reducing methane emissions to meet the current federal reduction target of between 40% and 45% below 2012 levels is already the lowest cost method of lowering greenhouse gas emissions within the sector. Recent analysis shows Canada could go beyond that to achieve reductions of 75% — for less than $25/tonne CO\(_2\).\(^{110}\) There is a significant opportunity to address climate concerns and conserve a valuable resource while making the oil and gas sector more carbon competitive: methane represents 19% of total greenhouse gas emissions from Alberta’s oil and gas sector, worth over $100 million per year in conserved gas over the next decade.

In addition to conserving a valuable resource, bringing both environmental and climate benefits, efforts to reduce methane emissions hold significant jobs potential. The skills and qualifications required for eliminating methane leaks overlap with those of current oil and gas workers,\(^{111}\) and include jobs in leak detection and repair; equipment maintenance and replacement; creating and operating alert programs; technology pilot projects; training development and deployment; process development for surveying, monitoring, reporting and record-keeping; and policy development.\(^{112}\)

Data on Alberta’s energy-related methane emissions, which represented 55% of Canada’s total methane emissions in 2018,\(^{113}\) indicates a potential for 800 jobs created in methane management between 2020 and 2030.\(^{114, 115}\)

**Technology revolution in the oil and gas sector**

New technologies are transforming the way we produce oil and gas and it is expected each employee will produce on average 17% more oil and gas in 2021 than they did in 2010 (27% for the oilsands sector).\(^{116}\) These productivity gains are mostly due to the implementation of automation and digital technologies (e.g. development of sensors and remote control of production fields, driverless trucks for oilsands mining) in oil and gas fields, and particularly in the oilsands.

Figure 6 illustrates the increase in productivity since 2010, and expected productivity by 2021, indicating a further decoupling of oil production and number of workers — a trend that is particularly striking in the oilsands sector. This data shows that while oil production is expected to keep growing, the number of jobs in the sector will not necessarily increase. This further emphasizes the need for investing in the emerging economy, which has the potential to employ Albertans whose jobs have been replaced by automation.

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109 Calculations based on Pembina Institute analysis of Evar Umeazor et al., *Economic and Environmental Impacts of Methane Emissions Reduction in the Natural Gas Supply Chain* (Canadian Energy Research Institute, 2019).

110 Canadian Association of Petroleum Producers, “Methane plan can cut emissions by 45%, protect 7,000 jobs,” media release, October 30, 2017.
https://www.capp.ca/media/news-releases/methane-action-plan


112 Methodological notes are available in Appendix A.7.

Alberta Federation of Labour actions supporting Green Jobs Blueprint

The AFL has two levers it can pull to help workers transition into the green economy, advocacy and affiliate engagement. The primary work will focus on government advocacy, but it is important to encouraging unions to work with their members to identify grass roots strategies to green their jobs.

Advocacy

Advocacy will focus on encouraging the provincial government to take nine key actions under four general categories: government procurement and community benefit agreements; labour market institutions; innovation; and commitment to legislative and regulatory action to support green jobs.

Government procurement and Community Benefit Agreements

**ACTION:** Community Benefit Agreements (CBA) that specific prevailing or fair wage rates should be in place anytime the government spends public money so project benefits go to the people paying the taxes that fund those projects.

The Alberta Climate Leadership plan identifies “supporting the development of 600 MW worth of utility-scale renewable electricity at record-low prices” as one of its key accomplishments. While this is a huge accomplishment, not all the companies awarded the contracts are local companies. For example, EDP Renewables is a Portuguese company and Enel Green Power is a branch of a multinational company that spans 35 countries across five continents.

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117 “Exploration and production” includes conventional and unconventional crude oil, natural gas and condensates; these projects are planned on a shorter timeline and have lower production quantities, making them easier to ramp down. “Oilsands” refers to bitumen produced using conventional mining and in-situ methods, as well as, synthetic crude equivalent and diluent; these are large-scale projects with high bitumen production that are significantly harder to ramp down or cancel.

118 Labour Productivity in Canada’s Oil and Gas Industry, 2.

119 https://open.alberta.ca/dataset/da6433da-69b7-4d15-9123-0f176004f574/resource/b42b1443-7b9d-483d-a02a-d9b4290d81e/download/clp_implementation_plan-jun07.pdf
This is problematic because Albertans are paying the carbon levy but not reaping the full economic rewards of increased employment from their investment. Engineering, design and other related jobs get outsourced and the companies have limited-to-no relationship with local contractors, so they do not use their services. Government needs to involve unions as they pursue these projects. Several building trades unions provide their own training and act as labour providers for their contractors. If they know what projects the province is moving forward on, they can proactively make sure contractors have the skilled workers necessary to complete them. Additionally, if projects like a coal mine are being phased out, unions can get workers started on pre-apprenticeship programs like the IBEW PACT.

The lack of CBA’s and coordination is especially problematic in the context of high unemployment in certain trades and increasing inequality in Canada. The Conference Board of Canada indicates that income inequality has increased in Canada over the past 20 years. Since 1990, the richest group of Canadians has increased its share of total national income, while the lowest and middle-income groups have lost share. This is happening as Canadian corporations are posting record high profit margins as a result of falling labour costs, and capitalizing on opportunities opened by the relatively weak Canadian dollar. Instability related to Canada’s slowed economic performance, and part-time jobs which tend to pay close to or at minimum wage currently driving job growth across Canada are also contributing factors to increased profits. These trends are contributing to a context where CBAs are increasingly important to address inequality through fair wage clauses and other benefits.

CBAs should be in place anytime public money is spent on a project, such as renewable energy, to support workers transition into green jobs. The Mowat Centre defines CBAs as a strategic tool used in the process of building community wealth. CBAs are negotiated agreements between a private or public development agent and a coalition of community-based groups which may include neighbourhood representatives, single-issue advocates, labour unions and others. Together, they give a voice to people in infrastructure planning and land development processes – especially those individuals who have been historically excluded or marginalized from these processes and decisions that affect them.

We believe a government commitment to include CBAs in their procurement processes will ensure that Albertan’s will have opportunity to share in the prosperity generated by massive government investments that they pay for through taxes. The 2018 example of British Columbia committing to using CBAs in key public-sector infrastructure projects shows how CBAs prioritize local hiring’s, better wages and more opportunities for apprenticeship training. CBAs have clearly not stopped construction from happening in other provinces, and when you balance the increased cost with social benefits through triple bottom line accounting, CBAs don’t just encourage the lowest bid, they encourage the best bid.

Relevant Ministers to lobby: Infrastructure, Energy, Premier.

Labour market institutions

ACTION: Review labour market institutions so that transitional programs, skills training, and certification systems support barrier free entry for current and new workers into green jobs. This includes removing eligibility of private, for-profit, training centers to qualify for grants or rebate programs.

Governments use several institutions to help develop the labour market and they should structure these tools to ensure current and new workers are able to enter green jobs. The federal program Employment Insurance (EI) uses Labour Market Development Agreements (LMDA) with the provinces to offer skills training, and these programs are not helping workers transition into the green economy. Provincially, skills certifications and assessment efforts are creating barriers for existing workers. Both levels of government need to reassess the goals of their tools and make sure they support green jobs.

120 http://www.conferenceboard.ca/hcp/details/society/income-inequality.aspx
125 http://communitybenefitsagreements.ca/
126 https://news.gov.bc.ca/factsheets/community-benefits-agreement
The federal EI program consists of three main parts, regular income support for eligible unemployed contributors to the program while they look for new employment; special income support due to specific life circumstances (such as sickness, maternity, childbirth or providing care to family members); and employment services. The employment services include essential training and other adjustment programs for unemployed workers and these services are primarily managed by the provinces, territories, and Indigenous organizations through LMDA’s. The EI system puts the onus on the claimant, making them responsible for conducting reasonable job searches, documenting their job search activities and accepting any offer of suitable employment while receiving EI regular and fishing benefits. Suitable employment is determined by several factors including personal circumstances, working conditions/wages, and commuting time. This approach is problematic because it does not offer workers the support to connect to the green job market, or direct connections into the industry needed to secure green jobs. EI training should offer that clear path.

LMDA’s are part of EI’s employment and training services the federal government uses to fund skills training and job placement programs, which should be re-tooled to support workers transition into green jobs. Since 1996, the governments of Canada and Alberta have worked as partners to provide employment and training programs and services for Albertans through the Canada-Alberta LMDA. The federal government, through the Employment Insurance Program provides funding to the province under the LMDA to deliver program and services for eligible EI clients.

The LMDA’s stated vision is to create a strong, resilient and adaptable workforce with the skills needed to succeed in Canada’s economy. The goal is to increase the participation of Albertans in the labour force and help them develop the skills necessary to find and keep meaningful and long-term employment. The objectives are to:

A. Encourage greater employer involvement in training to ensure that skills are better aligned to job opportunities, particularly in sectors facing skills mismatches and shortages;

B. Make it as administratively easy as possible for eligible Albertans to get the help they need to develop the skills necessary to quickly find and maintain employment; and

C. Demonstrate to the public that public investments are achieving the best possible results through increased labour market participation of Eligible Beneficiaries.

These objectives highlight structural issues in the LMDA that make it difficult to support workers searching for green jobs. Focusing on skills mismatches and shortages focuses on projects of jobs needed to sustain the current economy. It doesn’t help prepare individual workers for jobs in emerging economies, or support the development of those economies. For example, the Alberta Short-Term Employment Forecast (STEF) indicates the six highest in demand occupations between 2018-2020 are retail and wholesale trade managers; property administrators; retail sales supervisors; food service supervisors; sales and account representatives – wholesale trade (non-technical); and machine operators, mineral, and metal processing. If the labour market instruments are focused on getting people into these jobs because they are areas of high demand (aka shortages of people to fill those jobs), it becomes evident that these tools will not help get people into green jobs until there is a shortage of workers in those industries.

Additionally, the Alberta Job Corps program is focused on people who have barriers to employment but which allows people on EI to participate. Trainees are hired and receive minimum wage while they learn and gain experience but there is no guarantee of anything. The program overview states “the Alberta Job Corps program can include work experience opportunities with employers” but does not specify what kind of work, it definitely does not have a focus on green jobs, nor provides a guaranteed connection with an employer and only offers minimum wage.

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127 http://www12.esdc.gc.ca/sqpe-pmps/servlet/sqpp-pmps-pub?lang=eng&curjsp=p.5bd.2t.1.3i3s@-eng.jsp&curactn=dwnld&pid=60616&did=5291
130 http://www.humanservices.alberta.ca/AWOnline/ETS/4356.html
132 https://open.alberta.ca/dataset/61843e6c-1254-4c93-81b2-36dbf03e6a31/resource/dd08b160-b1af-4bd4-91b8-647e85084116/download/stef-2018-report.pdf
133 http://www.humanservices.alberta.ca/AWOnline/ETS/4375.html
134 https://www.alberta.ca/alberta-job-corps.aspx#toc-1
Transition to Employment Services is another program that does offer job matching but is geared towards getting those on income support to “rapidly attach, or re-attach to the labour market.” These programs are not necessarily concerned with the type of job, just getting people back to work in any job. There is room to build on these programs to help provide direct paths to workers who want to participate in green jobs.

Provincially, skills recognition and assessments are also problematic. Workers with existing skills do not necessarily need a total retraining to participate in green jobs. The certification system should recognize transferable skills to ensure workers can smoothly transition into green jobs. Existing apprenticeship programming should also be updated to ensure it is providing newly skilled modern information including renewable practices. For example, rather than a specific new trade for solar panel installers, the apprenticeship stream for electricians can have a section that prepares electricians to do that kind of work up to current code. The ultimate goal should be to ensure that apprenticeship’s focus on skills workers need in a changing economy to create resilience instead of pigeon-holing workers in a single line of work. Additionally, private, for-profit training centers should not be eligible for grants or rebate programs to offer their training. These types of training institutions have no connection to Alberta Apprenticeship and Training and lack the regulation of a governing body to ensure students are receiving a high-quality education that is in the public interest. Workers can pay thousands of dollars to attend a course that offers no assurances that their instructor is qualified or that the training they are receiving is adequate.

Finally, the review should examine the effectiveness of inspection, and enforcement systems to ensure that workers on job sites have the necessary certifications and skills to be doing their work. A robust inspection and enforcement system will reduce costs in the long run, preventing the need to pay for labour twice in the form of bringing qualified skilled workers to come fix the mistakes less qualified workers made on their first attempt. The Government also needs to ensure adequate resourcing so that either there are enough dedicated Officers in the field to check certification or that Officers are cross function. For example, since Occupational Health and Safety Officers are now Peace Officers, they can also do certification checks while out on safety calls.

Relevant Ministers to lobby: Advanced Education, Labour.

Innovation

**ACTION:** Expand innovation funding to find new uses for waste products and non-combustion use of carbon resources.

Innovative use of resources will be an important part of the shift to the green economy and government should focus innovation dollars on companies whose vision and values align with the principles of zero waste and the circular economy. The circular economy is a shift away from the traditional economic model that focuses on making, using, and then disposing a product. The circular economy focuses on keeping resources in use for as long as possible, extracting maximum value from them while in use, and then recovering and regenerating products and materials at the end of their service life. This process starts at the design and manufacture stage with the intent that every product has an option for re-use or recycling at the end of its life cycle and goes all the way through the supply chain. This systemic approach to product design can help create jobs green jobs all across the supply chain and provide waste reduction environmental benefits. Incenting individual producer responsibility through innovation funding is the first step, but ultimately the government should move towards a regulatory framework through legislative requirements for product design and waste targets to support the circular economy.

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135 http://www.humanservices.alberta.ca/AWOnline/ETS/6838.html
Countries like Germany, Singapore, and Norway have taken the lead on the waste-to-energy side of the circular economy for various reasons ranging from running out of space for landfills to trying to offset reliance on imported energy and other costly materials. There are also examples of companies turning waste into other products besides energy such as clothing created from plastic recovered from the ocean. For example, Adidas has partnered with an organization called Parley for the Oceans to create a shoe made from ocean plastic using a zero-waste 3D printing process, and G-Star Raw is a line of clothing created by ocean plastic to fiber technology from the company Bionic Yarn. These are exciting prospects, but it is important to note that some research suggests clothing made from recycled plastics poses the environmental challenge of introducing micro plastics into water ways as the clothing gets washed. The important take-away is that innovative practices must be conscious of unintended consequences and ensure they are not doing additional harm as new products are being designed.

However, this doesn’t mean we should not pursue innovative product design with the resources available to us. Specifically, our most ample resource, bitumen, can have other uses that might help green that industry while there are still uses for carbon-based products. The 2018 Energy Diversification Advisory Committee’s Report to the Minister indicates that “developing non-combustion uses for bitumen and creating products that economically utilize carbon dioxide will be essential to preserving Alberta’s prosperity.”

The Beyond Bitumen Combustion – Phase 2 Report prepared for Alberta Innovates by Stantec consulting identifies high potential non-combustion products that could be manufactured from oilsands, and assess the market potential for these products up to 2030. They identified that bitumen can be used to create carbon fibre and vanadium can potentially be removed from bitumen and processed into useable electrolytes to make flow batteries for stationary large-scale energy storage solutions. We encourage the government to continue funding innovative research on how to find non-combustion use for carbon resources to find alternate uses for our biggest resource that don’t release as many emissions.

**Relevant Ministers to lobby:** Advanced Education, Economic Development and Trade, Energy.

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137 https://library.fes.de/pdf-files/wiso/12622.pdf
142 https://library.fes.de/pdf-files/wiso/12622.pdf
144 http://bionic.is/aboutus.html
145 https://eluxemagazine.com/culture/articles/recycled-plastic-clothing/
146 http://www.earthisland.org/journal/index.php/articles/entry/recycled_plastic_clothing_solution_or_threat/
Government commitments to support green jobs growth

The next set of actions are a set of policy commitments the AFL would like to see any government adopt to secure the support of organized labour. These have been informed by the proposed Green New Deal\(^\text{150}\) from the United States and modified for an Albertan context. The goal would be to set government policy to support and incent a green economy at a faster rate to ensure that the current and next generation of workers are able to participate in a robust green economy. As the 2018 New Climate Economy report indicates, we are on the cusp of a new economic era where growth is driven by the interaction between rapid technological innovation, sustainable infrastructure investment, and increased resource productivity.\(^\text{151}\) The following actions will make sure Alberta stays relevant in that new economic era.

**ACTION:** Eliminate greenhouse gas emissions by repairing and improving oil and gas industry infrastructure (such as reducing methane emissions).

**ACTION:** Upgrade every industrial and residential building for state-of-the-art energy efficiency, comfort, and safety.

**ACTION:** Expand existing renewable power sources and deploy new production capacity with the goal of meeting 66% of provincial power demand through renewable energy.\(^\text{152}\)

**ACTION:** Make green technology, industry, expertise, products, and services a major Albertan export, with the aim of becoming the undisputed Canadian leader in renewable energy.

**ACTION:** Increase the qualification standards for contractors that want to be on preferred contractor lists on renewable rebate programs.

It is too easy for a contractor to qualify for the solar rebate program. Contractors should be required to join the ECAA and be a Professional Electrical Contractor (PEC), as well as, have at least 2 people on staff with their CSA certification in Solar to ensure all installers are following a common standard.

**ACTION:** Recognize that an undertaking of this sort requires greater engagement with labour to develop strong labour, workplace safety, and wage standards enforcement.

**Relevant Ministers to lobby:** Environment, Energy, Transportation and Infrastructure, Labour, Premier.

\(^{150}\) [https://www.dataforprogress.org/green-new-deal/](https://www.dataforprogress.org/green-new-deal/)

\(^{151}\) [https://newclimateeconomy.report/2018/key-findings/](https://newclimateeconomy.report/2018/key-findings/)

\(^{152}\) 66% represents Canada’s renewable electricity generation in 2016 according to the NEB ([https://www.neb-one.gc.ca/nrg/sttstc/lctrct/rprt/2017cndnrltwelw/cndnrvrwr-eng.html](https://www.neb-one.gc.ca/nrg/sttstc/lctrct/rprt/2017cndnrltwelw/cndnrvrwr-eng.html)), and is a 36% increase from the current 30 by 30 goal.
Affiliate engagement

*Working with unions to empower workers to green their jobs*

While a concentrated effort will be required to ensure government takes the necessary steps to set workers up for success transitioning into greener jobs, there are actions we can take ourselves in the meantime. The AFL will encourage affiliated union leaders to work with their members to identify the actions they can take to make their current jobs greener. This might involve changing suppliers, challenging processes, introducing new ideas or methods, but will certainly mean change. Since change can be difficult and employers might be resistant to changing, we encourage union leaders to support sensible actions their members have to make their current jobs greener.

**COAL TRANSITION COALITION.**

*Example of union engagement to support workers transition.*

After the 2015 announcement that coal-fired electricity would be phased out in Alberta and across Canada by 2030, the Alberta Federation of Labour and nine coal unions came together as the Coal Transition Coalition to begin planning for how to protect workers from job loss and ensure that workers and communities would have a meaningful just transition plan.

In the fall of 2017, the Government of Alberta announced their Just Transition Plan including support for workers affected by the phase out of coal-fired electricity. The plan for coal workers includes worksite-based adjustment committees, onsite career counselling and training services, offsite employment services, tuition vouchers, a moving allowance, First Nations training to employment, and financial support programs including a bridge to re-employment and a bridge to retirement. There is also support for municipalities for economic development projects. This is the most comprehensive just transition plan we have seen in Canada. None of this would have been possible without the hard work and persistence of the Coal Transition Coalition. This transition plan is a hard fought victory for Alberta coal workers.

The just transition work that has been done here in Alberta is truly ground breaking. Many lessons were learned through this long and bumpy process, which could improve the results for workers and communities in future transitions. A lot of media and academic interests have been looking at what Alberta has done, including a recognition of the unique work done by the Coal Transition Coalition here. As the world continues the move away from a carbon heavy economy, this kind of collaborative Just Transition work will become more crucial for labour, especially here in Alberta.
Conclusion

Alberta has started on a path of diversification that is resulting in the growth of different emerging sectors. However, oil and gas still plays an important role in Alberta’s economy and there is action we can take to reduce the environmental impact of that and other industries. By taking action to ensure the collective voice of workers are heard at the decision-making table we can ensure workers are able to participate meaningfully in the green economy.

With the right set of policies and actions, Alberta can realize the nearly 57,000 greener jobs. This is equal to almost half (45%) of the total workforce of the mining and oil and gas extraction industry. Activities in the oil and gas sector are still the highest potential contributor to jobs in Alberta’s emerging economy, followed by the electricity sector, transportation, and then buildings. Besides creating jobs, investing in these emerging industries also helps reduce greenhouse gas emissions, improve Albertans’ health by reducing air pollution, reduce costs to industry and consumers, and improve wealth equity among Albertans.

Realizing this employment potential will require continued implementation of supporting policies, investment in these sectors, and providing policy certainty. The sooner concerted efforts and ambitions are directed at growing these sectors, the sooner working Albertans — and all Albertans — will be able to benefit from these opportunities.

153 Industry Profiles 2018, 2.
Appendix A: Methodology

A.1 Job type definition and conversions

Direct jobs — on-site and off-site jobs that involve working directly on a project or at a facility. These include jobs related to design, development, construction, management, administration, finance, ongoing operations and maintenance.

Indirect jobs — supporting services and goods needed to enable direct jobs. These include activities along the supply chain, such as manufacturing and third-party equipment procurement.

Job-years vs. annual full-time equivalents (FTE) — different ways of measuring jobs. Job-years are the total years worked on a project across multiple employees; 50 job-years could mean 10 employees working for five years, or two employees working for 25 years. FTE jobs are the amount of time worked by employees in a full-time job; 10 FTEs means you employ 10 people full-time, or 20 people on a half-time basis. Job-years are considered less precise than FTEs because they don’t consider employment period, and are often used to represent temporary jobs.

Job factor — an economic multiplier that describes how many jobs are created from every unit of investment. These units could be dollars invested or another comparable unit such as the size of a renewable project in megawatts.

A.2 Renewable electricity

The electricity sector’s growth potential is based on AESO’s 2019 Long-Term Outlook, which forecasts electricity demand and generation in the province to 2030.

The growth of renewables could be much higher than the AESO forecast, if policies and programs are implemented beyond current commitments by the Alberta government.

The job potential in decarbonizing the electricity sector is calculated using the job factors in Table A2.1 below.

TABLE A2.1. JOB FACTORS FOR RENEWABLE ELECTRICITY GENERATION

<table>
<thead>
<tr>
<th>Generation type</th>
<th>Job factor (FTE/MW for direct jobs)</th>
<th>O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar, utility scale, &gt;15MW&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10</td>
<td>0.2</td>
</tr>
<tr>
<td>Solar commercial&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td>Solar residential&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Solar blended&lt;sup&gt;**&lt;/sup&gt;</td>
<td>12.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Wind&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.37</td>
<td>0.17</td>
</tr>
<tr>
<td>Wind manufacturing&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.96**</td>
<td>0.070</td>
</tr>
<tr>
<td>Conventional hydro&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.87</td>
<td>0.08</td>
</tr>
<tr>
<td>Run-of-river hydro&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.76</td>
<td>0.04</td>
</tr>
<tr>
<td>Hydro blended&lt;sup&gt;**&lt;/sup&gt;</td>
<td>8.09</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<sup>a</sup> Pembina Institute<sup>154</sup>
<sup>b</sup> Delphi Group for CanWEA<sup>115</sup>
<sup>**</sup> blended factors assume a 1:3:6 ratio of residential to commercial to utility-scale generation for solar, and a 1:3 ratio of run-of-river to conventional generation for hydropower

** without policy clarity in Alberta this is zero

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<sup>154</sup> Job Growth in Clean Energy, 15-17.
<sup>155</sup> Alberta Wind Energy Supply Chain Study.
A.3 Transit

The total number of jobs expected from each of Alberta’s expanding public transportation projects are reported directly by the Government of Alberta. The breakdown into construction, and operation and maintenance jobs, where not explicitly stated, was calculated to be the same fractions as those jobs reported for the Calgary Green Line LRT. Job factors were not used to fill these gaps because assumptions inherent in the calculations would add up to a total number of jobs different than those in the official reports.

The job factors in Table A3.1 were based on the Calgary LRT Green Line expansion.

<table>
<thead>
<tr>
<th>Job-years/$ billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction (direct/indirect)</td>
</tr>
<tr>
<td>Operations and maintenance</td>
</tr>
</tbody>
</table>

Data source: Government of Alberta

A.4 Electric vehicle infrastructure

The number of publicly available EV charging stations that could be installed in Calgary and Edmonton was extrapolated from the City of Edmonton’s goal of increasing publicly available EV charging stations installed from 19 in 2017 to 85 in 2022. This level of growth was extrapolated to 2030: based on the current numbers of publicly available chargers, 191 charging stations would be added in Edmonton and 198 charging stations in Calgary. It is estimated that an EV charger costs approximately $11,086 to install. The job factors for EV charger installation are shown in Table A4.1.

Manufacturing EVs and chargers would provide significantly more jobs, but there are no indications of plans to create such an industry in Alberta. For comparison, Table A4.1 also includes the jobs potential for manufacturing, and operations and maintenance, as estimated for Ontario, but these were not used in this report.

<table>
<thead>
<tr>
<th>Electric vehicle jobs</th>
<th>Job-years/$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure (charger installation and maintenance)</td>
<td>Direct jobs</td>
</tr>
<tr>
<td></td>
<td>Indirect jobs</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Direct jobs</td>
</tr>
<tr>
<td></td>
<td>Indirect jobs</td>
</tr>
<tr>
<td>O&amp;M (regular EV maintenance jobs, not infrastructure maintenance)</td>
<td>Direct jobs</td>
</tr>
<tr>
<td></td>
<td>Indirect and induced jobs</td>
</tr>
</tbody>
</table>

Note: Based on a study of the electric vehicle industry in Ontario; Alberta job factors are expected to be roughly similar.

Data source: Kopperson et al.

156 “Province commits to the Calgary Green Line.”
158 These numbers were calculated before the release of the City of Calgary’s EV strategy in 2019, which does not include a plan for how many total chargers the municipality aims to install.
159 Costs were $10,000 per installation in 2011, or $11,086 in 2018 dollars. B. Kopperson et al., GT80 Electric Vehicle Adoption Study (2014), 83.
160 GT80 Electric Vehicle Adoption Study, Table 7, Table 12, and Table 19.
A.5 Energy efficiency in buildings and industry

A recent Energy Efficiency Alberta study estimates the available electrical and heating reduction potential in Alberta over the period of 2019 to 2038 for residential, commercial and industrial sectors (oil and gas, and non-oil and gas).\textsuperscript{161} The electricity and heating demand for each sector was estimated by multiplying the energy intensity of each sector with the stock forecast for that sector (Tables 2-11 to 2-15 in the EEA report). Both the energy intensity and the stock forecasts were interpolated back from 2038 to 2030.

The available electricity and natural gas savings potential total were estimated in the report (Tables 5-12 and 5-13). The potential reductions available in the residential, commercial, and non-oil-and-gas sectors are calculated as the same fraction of each sector’s demand by 2030. The reduction potential of the oil and gas sector is the difference between the two columns in Tables 5-12 and 5-13 titled “Total (excludes Oil & Gas)” and “Total (includes Oil & Gas).” Similarly, the reduction potentials were interpolated from 2038 to 2030.

Finally, using rows 2 and 4 of Table 5-11, we calculated the program spending required to achieve these reductions. The job factor used to calculate the number of jobs created by energy efficiency improvements came from a study of the economic impacts of energy efficiency investments under the pan-Canadian framework, which reported 30 job-years per $1 million of program spending.\textsuperscript{162} The actual job factors for Alberta may be different depending on the supply chain for the materials used for the efficiency upgrades.

A.6 Cleanup of part oil and gas operations

The jobs potential of cleanup activities was calculated using job factors from Alberta — or closest applicable jurisdiction — multiplied by the amount of reclamation work required. The calculations here assume that regulations and investments are in place to conduct all activities over the next 40 years.

The jobs estimates for oilsands and coal mines only consider disturbed open-pits, and the land surface area covered by tailings ponds, but do not include the treatment of tailings liquids. Oilsands mines differ from coal mines because of the need to reclaim tailing ponds. Tailings are not included in the environmental liability estimates of oilsands mines because they present significantly different reclamation challenges from those oil and gas wells or coal mines. Table A6.1 shows the total job potential estimated for all coal, oil and gas facilities in the province.

### TABLE A6.1 TOTAL JOB CREATION POTENTIAL IN CLEANUP ACTIVITIES

<table>
<thead>
<tr>
<th>Job factor</th>
<th>Reclamation work required</th>
<th>FTE/year until 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 direct FTE per well\textsuperscript{163}</td>
<td>94,000 inactive wells\textsuperscript{164}</td>
<td>3,700</td>
</tr>
<tr>
<td>1.254 indirect FTE per direct FTE\textsuperscript{165}</td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td>7.4 direct FTE per $1 million CAD\textsuperscript{166} of spending</td>
<td>$4 billion in environmental liabilities\textsuperscript{*}\textsuperscript{168}</td>
<td>800</td>
</tr>
<tr>
<td>6 indirect FTE per $1 million CAD of spending\textsuperscript{169}</td>
<td></td>
<td>600</td>
</tr>
</tbody>
</table>

* excludes the cost of cleaning up tailings pond liquids

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\textsuperscript{162} The Economic Impact of Improved Energy Efficiency in Canada.

\textsuperscript{163} The job factor is derived from a 2019 Petroleum Services Association of Canada (PSAC) study and assumes the following distribution of the 91,000 inactive wells: 51% are single wells and 49% median wells. In the absence of data on cleanup work required on each of the 91,000 inactive wells, it is assumed that no well requires more complex reclamation and remediation work (“Complex well” category in the PSAC study), which makes this analysis conservative. Cleanup activities considered include: suspension, decommissioning, abandonment, remediation and reclamation of the site.


\textsuperscript{164} “Addressing Upstream Oil and Gas Liability and Orphan Well Inventory.”

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36
A.7 Methane reduction

The jobs potential in methane reduction is calculated based on estimates from Blue Green Canada, which in June 2017 reported the job potential in methane management in Canada at 1,500 jobs/year.170 This is the most recent methane job potential estimate in Canada.

The methane reduction potential in Alberta’s energy sector is estimated by calculating the fraction of methane emissions from the province relative to total Canadian methane emissions. The latest National Inventory Report prepared by Canada for the United Nations Framework Convention on Climate Change earlier this year estimates 26,000 Mt CO$_2$e of methane emissions from Alberta’s energy sector,171 which comprises 55% of the total Canadian methane emissions related to energy (47 Mt).172 As a result, the estimated job potential of methane in Alberta from 2020 to 2030 is calculated to be 830 jobs/year.

166 Calculations have been made after adjusting from $USD in 2014 to $CAD in 2020.
169 “Employment after Coal: Creating New Jobs in Eastern Kentucky.”
171 “Reducing methane emissions.”
Appendix 2: Pembina’s specific policy recommendations to incent green jobs in Alberta

Several global trends — including changing economics, consumer demand, climate action and awareness of health impacts — are contributing to the emerging economy described in this report. However, to ensure these sectors have sustained and significant growth in Alberta, a variety of policies need to be in place. The policies described below help create both incentives and certainty for investors and businesses to engage with the opportunities in these sectors and create jobs.

1. **Pricing pollution** – economists agree that carbon pricing is the most effective lever for reducing carbon emissions. In 2007, Alberta became the first jurisdiction in North America to put a price on carbon pollution from large industrial emitters. In 2017, Alberta introduced an economy-wide carbon tax. The revenue from carbon pricing funded several programs for economic diversification — such as Energy Efficiency Alberta, Emissions Reduction Alberta and REP — as well as, rebates for households. Alberta’s carbon pricing system resulted in investments in clean technologies in the electricity and oil and gas industries.

In 2019, the Government of Alberta repealed the carbon tax and the federal backstop came into effect in January 2020. At the same time, the province redesigned and weakened the existing carbon pricing system for industrial emitters. Continuing to increase the carbon price, along with increasing the standards of federal methane regulations over time, is necessary to drive further innovation, and to ensure Alberta industries stay competitive with evolving industries worldwide.

2. **Renewable energy policy certainty** – policy roadmaps — such as the (now-cancelled) REP, setting renewable energy targets, and modifying the regulatory framework and market to allow alternative energy providers (renewable energy, efficiency, storage, etc.) to monetize the contributions they provide to the overall grid — create certainty around the long-term plans for renewable investments in Alberta. This certainty sends a signal to investors and the local industry that renewable projects and related manufacturing are less risky investments, leading to more installed capacity, and enabling more construction, operation and maintenance, and manufacturing jobs. Programs to support distributed generation, including community generation, also have the potential to increase renewable energy jobs in the province, since distributed generation projects with associated community benefit agreements create more jobs per megawatt than centralized generation projects.

In addition, even greater penetration of renewable energy can be reached under policies that support investment in transmission infrastructure.

3. **Residential, commercial and community renewable energy programs** – renewable energy programs that support installation costs, such as rebates for solar energy systems, or provide long-term revenue certainty, increase the uptake of renewable energy and subsequently create more sector jobs. Community solar generation in particular also allows greater participation by citizens, with many different financing models that make it easier for people to participate and share the benefits from the system. These solar projects also create more local jobs than large-scale projects. This focus on solar is due to the underdevelopment of solar power in Alberta and the high job creation potential of solar power.

4. **Coal power phase-out** – the Alberta and Canadian governments have committed to phasing out coal-generated electricity by 2030. This longer-term strategy provides long-term certainty to affected workers, communities and industry to plan for a transition away from coal.

5. **Just transition** – as the jobs potential increases in emerging sectors it is important to ensure that these opportunities enable a just transition. This implies having policies and programs in place that support workers and communities impacted by industries that are vulnerable to an energy transition, providing reskilling opportunities to enable workers to transition to the emerging jobs, and ensuring that the jobs created are well-paid jobs that protect workers’ rights.

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6. **Investment in transit infrastructure** – transit infrastructure projects are large job-creation opportunities. Improving connectivity between communities also means residents have access to more job opportunities across all sectors and within broader regions. The Government of Alberta introduced legislation at the end of 2019 that allows them to cancel the LRT expansions in Calgary and Edmonton with 90 days’ notice. Ensuring that these projects proceed to completion locks in the job creation potential and the long-term emissions reductions that will come as a result of their operation. Continuing to invest in rural transportation options similar to the Rural Transportation Pilot Program will make sure Albertans are not left behind if traditional inter-city transportation providers cease operations.

7. **Energy efficiency standards and funding** – more efficient building standards and rebate programs encourage investment in energy efficiency and create related jobs. In addition, financing programs such as Property Assessed Clean Energy, which make it easier to invest in longer-term efficiency upgrades, can increase the demand for associated services. Some jurisdictions are also incorporating efficiency into their legislation. For example, the Government of British Columbia’s Clean Energy Act dictates that public utilities must offer energy efficiency financing to eligible businesses, while the Utilities Commission Act’s Demand-Side Measures Regulation requires efforts to address public awareness of ways to increase energy efficiency.

8. **Oil and gas cleanup** – policy options and job opportunities to address the environmental liabilities of oil and gas have not been effectively implemented in Alberta. Current policies fail to ensure that oil and gas wells are not left inactive indefinitely, and that companies contribute a form of adequate financial security before they are at risk of insolvency (especially in the case of oil and gas wells and oilsands mine development). As the industry-wide cost is so significant, in order to realize the majority of potential job benefits, it is essential that new policies are put in place to ensure the companies responsible for cleanup ultimately pay for this work. This includes requiring companies to fulfill their reclamation obligations in a timely manner — including decommissioning infrastructure and reclaiming land to its original state within a few years of ceasing production — and ensuring funds are available to undertake these efforts, for example, in the form of securities, bonds, or insurance.

On May 1, 2020, the Government of Alberta launched the **Site Rehabilitation Program**, which provides oilfield service contractors with grants to perform environmental cleanup. This $1-billion program is being funded by the Government of Canada’s COVID-19 Economic Response Plan with the intention of creating new jobs during a time of economic uncertainty.174

This program demonstrates that environmental cleanup can be an avenue for creating jobs within the oil and gas industry while improving environmental conditions in the province. However, government funding is not a sustainable model to ensure this work is done. Policies that ensure operators are financially accountable to reclaim their operations need to be considered proactively, especially outside moments of crisis, because of their proven job creation potential.

9. **Methane** – There is both domestic and international pressure to limit the climate impacts of Alberta’s oil and gas industry. Methane reduction is one of the most cost-effective ways to achieve this, while improving the carbon-competitiveness of the oil and gas sector and creating jobs. Alberta has committed to reducing methane emissions by 45% below 2012 levels by 2025. If the province is to achieve its desire of maintaining provincial jurisdiction over methane regulations, it will have to improve its rules to achieve the same outcome as the federal regulation, similar to B.C. and Saskatchewan.

Technology is improving rapidly and there is an opportunity for Alberta and Canada to increase ambition and exceed the current targets. Alberta has the ability to drive innovative technology solutions developed by Alberta businesses to help the oil and gas sector achieve methane reductions globally, as well as, to improve the carbon competitiveness of oil and gas produced in the province.

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