

# **WORKERS' CLIMATE PLAN REPORT:**

**A BLUEPRINT FOR SUSTAINABLE  
JOBS AND ENERGY**



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EARTH**



## Abstract

Iron & Earth, a Canadian non-profit organization led by skilled trades workers with experience in Canada's oil industry, has developed a Workers' Climate Plan. This report describes how Canada can become a leader in renewable energy, and a net exporter of renewable energy products, services and technology, by harnessing the industrial trade skills of current energy sector workers. A growing number of oil and gas tradespeople support a transition to renewable energy so long as it provides a just transition for current energy sector workers. By utilising Canada's existing energy sector workforce, organizations and infrastructure, Canada can accelerate the transition to renewable energy, decrease the cost, and make Canada's renewable energy sector globally competitive. From June to October, Iron & Earth reached out to energy sector workers online, over the phone and in person to develop the Workers' Climate Plan. Iron & Earth also consulted with a range of energy sector stakeholders in partnership with the Alberta-based Energy Futures Lab in order to devise a set of policy recommendations based on worker demands. In this report we share insights from current energy sector workers for the consideration of the federal government as they finalize their pan-Canadian framework on clean growth and climate change, and prepare to enter global climate negotiation during the 22nd session of the Conference of the Parties (COP 22).



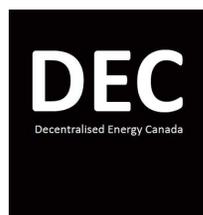
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## Supporting Organizations



# Executive Summary

Addressing climate change while developing our energy industry doesn't have to divide and polarize our country. As we look ahead, one thing is certain: Canada needs to come together around a national climate strategy that unites people and drives growth in a new energy economy.

Many oil sands workers are concerned about the environmental impact of fossil fuel development — but they're also concerned about losing jobs in this precarious industry. We face a difficult situation, and we don't want to be yet another example of a Canadian workforce that failed to proactively adapt to a changing world.<sup>1</sup>

This challenge inspired us, a group of oil sands workers, to establish Iron & Earth. We want our voices heard in this debate. We want good-paying jobs that will allow us to care for our families. But we also want to feel pride in the work we do, and to know that our daily actions are not contributing to a climate crisis that could dramatically alter the world our children inherit.

Today, we need bold strategic and visionary leadership — a kind of leadership that has been lacking under previous governments. While we are inspired by the recent ambitions of the current federal and provincial governments to view the challenge of climate change as an opportunity to create jobs and grow our economy, we must ensure that the voices of workers are adequately represented.

This is why we have taken the time to develop the Workers' Climate Plan (WCP), a step toward finding common ground and preparing our country for the future. We believe that the WCP can put Canada on the path to becoming a leader in renewable energy, and a net exporter of renewable energy products, services and technology. Most importantly, we have a tremendous opportunity to improve the quality of life of trades people, their families and the nation by reorienting labour toward new and diverse forms of energy production and energy efficiency retrofitting.

As we face mounting job losses in the oil and gas sector — with 40,000 jobs lost in 2015 alone — and uncertain international markets, it is prudent to invest in the future by training existing industrial trades workers to capitalize on this global shift. According to a report by Policy Horizons Canada, the plummeting cost of renewable energy means that "it is increasingly plausible to foresee a future in which cheap renewable electricity becomes the world's primary power source and fossil fuels are relegated to a minority status."<sup>2</sup> In order to realize this future, we will need the pre-existing skills and expertise of our country's workers.

Siemens Canada has stated that new energy policies in Alberta and Saskatchewan will generate up to \$50 billion in renewable energy investments over the next 14 years in these two provinces alone. However, many of these dollars will flow into countries with more established renewable energy industries if Canada fails to expand its own renewable manufacturing sector. With large scale renewable energy projects ramping up in Alberta and Saskatchewan in 2018, we only have a brief window to build up our workforce and manufacturing capacity for the next employment boom. Through Iron & Earth's Solar Skills Training Program and Renewable Energy Activation Programs, we look to help facilitate this transition and we enthusiastically support other organizations working on these critical issues.

For Canada to reconcile its unsustainable relationship with fossil fuels, it must also build a sustainable relationship with First Nations. We applaud the federal government's 2016/17 budget allocation of \$2.24 billion to green infrastructure on First Nations lands and \$139.5 million to energy efficiency and renewable energy development in First Nations communities.<sup>3</sup> As we advocate for a just transition of workers into the renewable energy sector, we must also uphold our obligations to First Nations by aligning our campaigns at Iron & Earth with the calls to action outlined in the Truth and Reconciliation Commission.<sup>4</sup>

The future of Canada's energy portfolio is and must be renewable. Whether it be through manufacturing and installing new renewable systems or upgrading existing systems to be more efficient, as energy-sector workers we want Canada to lead the transition away from carbon dependency – not lag behind it. Our worker-led membership and stakeholders cannot thrive unless the pan-Canadian climate strategy addresses the needs identified in our Workers' Climate Plan framework. We ask the federal government to listen to the voices of workers and include our concerns and solutions in their climate change strategies so we can avoid divisive debates and get to work transforming Canada into a renewable energy leader for the 21st century.

Sincerely,



Liam Hildebrand, Executive Director, Iron & Earth



# The Workers' Climate Plan Framework:

## Our Three Energy Development Priorities:

1. Energy development must ensure continued job opportunities for Canada's skilled workers.
2. Energy development must be aligned with climate commitments and the goal of nearing net zero emissions by 2050.
3. Build a thriving international export market of renewable energy products, electricity, and services.

## Our Four-Point Plan:

1. Build up Canada's renewable energy workforce by rapidly upskilling energy sector workers through short term training programs and expanding apprenticeship programs.
2. Build up the manufacturing capacity of renewable energy products through the retooling and advancement of existing manufacturing facilities.
3. Position existing energy sector unions, contractors, manufacturers and developers within the renewable energy sector through incubator programs and multi-stakeholder collaboration initiatives.
4. Integrate renewable energy technologies and industrial scale energy efficiency projects into existing non-renewable energy infrastructure.

# 1.0 Context:

## The State of the Canadian Economy and Environment

Right now workers in the traditional energy sector are dealing with some of the greatest struggles they'll face in their entire careers. Putting food on the table and providing stability for oneself or one's family should not be a challenge that so many face, but the reality affects more and more oil and gas workers every day.

One of the driving motivations behind Iron & Earth, and the reason why we launched the Workers' Climate Plan, is our desire to see workers and their families thrive. We want the green energy revolution to bring us closer to financial security and our climate targets — all at the same time.

We hear a lot of misinformation about renewables' economic value, so we're working hard to help Canadians understand the power and efficiency of modern clean energy. Renewable energy is becoming increasingly cost effective as investments in wind and solar outpace that of coal and gas by two to one.<sup>5</sup> Iron & Earth believes the time has come for Canada to harness the renewable energy resources available to our country, and this means a courageous and informed exploration of all forms of viable renewable energy development.<sup>6</sup>



## 1.1 Employment in Canada's Oil and Gas Sector

Every Canadian uses oil in some form on a day-to-day basis and it's an essential resource for our country at this moment in time. The oil sands is a key industry for the Canadian economy and adds to the wealth of individuals, families and business owners. Iron & Earth members deeply value the jobs that oil sands development has created, and realize that many of us will rely on these jobs well into the future.

The future of this sector, however, faces great uncertainty. In Canada, and Alberta in particular, unemployment rates are growing. Last year the oil slump triggered more than 40,000 layoffs in the oil and gas sector, making 2015 the worst year for job losses in Alberta since 1982.<sup>7</sup> It marks the greatest decline in the total number of hours worked in more than 30 years.<sup>8</sup> In April 2016, the trend continued hard and fast. Alberta lost more jobs than the rest of Canada combined, totalling

*"I've been working in the oil sector for years and am seeing my opportunities diminish. I would like to transition to alternative energy but don't know what to do."*

*Obadiah Creek, Industrial Electrician*

*"I was laid off for six months, never had I planned to be off for that long. I had to pull pretty much all my Registered Retirement Savings Plans just to cover my family's monthly expenses. I have three children and a wife who depend on me to work. Employment insurance barely paid my mortgage while I was unemployed."*

*Jason Kane, Construction Electrician*

20,800 new people without work.<sup>9</sup> The number of people without work is projected to rise by thousands before the end of 2016.<sup>10</sup>

In the province hit hardest by the downturn of oil and gas, 12 coal-fired generating units are also expected to retire before 2030. Under Alberta's new Climate Leadership Plan, there will be no pollution from coal-fired electricity generation by 2030.<sup>11</sup> By that same time, two thirds of that power will be replaced by renewable energy. Under the Climate Leadership Plan the government of Alberta also promises that in transition, "workers, communities and affected companies" will be "treated fairly in this process." That must mean workers are given the tools and training they need to transition in line with government and industry as the face of Alberta's energy landscape evolves.

*"I'm a landscaper and reasonably proficient in the operation of heavy equipment (excavators etc.) and some basic gardening/agricultural knowledge. My skills could be used to help in the reclamation of old industrial sites or mining pits and remaking those spaces into something suitable for green energy projects. I could, for example, be deployed as a part of a crew tasked with grading and levelling terrain to accommodate solar power infrastructure or excavating for geothermal projects."*

*Jerik Brown, Heavy Equipment Operator*

The impacts of uncertainty about the futures of both the petroleum and coal industries does not stop at Alberta's borders. Other oil producing regions are also feeling localized impacts of waning production. Canadian tradespeople from every corner of the country are heading home, with no expectation of going back to work any time soon.

## 1.2 Forecast for the Future of Work in the Energy Sector

Clean energy has already created more than 27,000 jobs in Canada and has the potential to create millions more.<sup>12</sup> Fortunately for workers affected by the ongoing boom and bust cycles of the oil sands, many renewable energy jobs require the same skills as used by tradespeople who are currently working in Canada's oil and gas industry.

There's lots of work to do to ensure the transition to renewable energy is fluid and does not neglect current energy workers. Skills-transfer programs should be streamlined to position existing energy sector workers in renewable energy. Initiatives like the Iron & Earth Solar Skills Training Program (section 3.5) can aid this process. Employing existing energy sector workers would empower Canada to rapidly diversify its energy sector, while developing the oil sands at a sustainable pace.

It is also crucial that, alongside our efforts to build up Canada's renewable energy capacity, we focus due attention on improving the efficiency of existing systems. Energy efficiency is key to

slowing energy demand growth so that rising renewable energy supplies can secure a foothold in the energy sector. It is crucial that we understand energy efficiency and renewable energy not as opposites vying for priority, but as co-essential elements in an integrative approach to building a sustainable future.<sup>13</sup> Making industrial operations more efficient through renewable integration, for example, is one way in which energy workers can both gain the skillsets for further work in renewables, as well as contribute to the lessening of overall demand for non-renewable energy.

*“My work history involves field level oil extraction jobs on drilling rigs and other field services for those drilling rigs. I have become an electrician so that I can participate in the world’s energy revolution.”*

*D. Lee, Unionized Trades Worker*

Clean energy is gaining increased momentum across the globe. With a 600% growth rate over the past decade, more money flowed into renewable energy than new investments in fossil fuels in 2015, with US \$325 billion being invested globally.<sup>14</sup> Presently, investments in wind and solar outpace coal and gas by two to one,<sup>15</sup> while renewable energy jobs rose by 5% while traditional energy jobs fell in most countries.<sup>16</sup>

At home in Alberta and across Canada, investors are excited at the massive market potential for renewable energy. Alberta is already on track to produce 2,000 MW (megawatt) of solar energy by 2025, with 385 MW in development right

*“I have been a boilermaker for over a decade and have proudly built a number of renewable energy projects with no retraining required. Give us the blueprints and steel and we will help Canada address climate change with our industrial trade skills!”*

*Lliam Hildebrand, Boilermaker*

now.<sup>17</sup> Geothermal alone could put thousands from Alberta’s oil and gas sector back to work as the number of orphaned oil wells increases daily out of 400,000 that have been drilled.<sup>18</sup> In the oil patch, industrial trades workers have the skills to harness the massive geothermal potential of existing wells – they just need support to make the switch.

Industry is well positioned to capitalize on this opportunity. The Canadian clean energy sector has already seen \$25 billion invested over the past 5 years, with a 37% growth in jobs.<sup>19</sup> It is estimated there are 144,000 potential jobs in renewable energy just waiting for Alberta.<sup>20</sup>

As renewable energy shifts into the mainstream, it becomes increasingly cost effective: Solar energy prices have already come down 83% over the past six years.<sup>21</sup> Iron & Earth’s Solar Skills Training Program

*“Global warming is real and we need to act immediately. I am an electrician and am in the middle of starting my own solar business. Funding and training opportunities would be a great help. Solar initiatives and incentives from the federal and provincial government would be a great boost to business and help more home and business owners to make the change to solar power and a cleaner, brighter future for all.”*

*Cathy Calahoo, Construction Electrician*



seeks to get 100 hands-on solar training programs in communities across Alberta. We want 1,000 workers trained in renewable energy installations and retrofiting, and we are working to implement high school curriculum materials to get future workers excited about the trades.

### 1.3 Embracing the Transition

In March of 2016, the Canadian first ministers released a declaration on clean growth and climate change from Vancouver. The declaration affirmed a national commitment to meet or exceed Canada's 2030 target of 30% reduction of emissions from 2005 levels, and recognized the kind of multi-level collaboration required to do so: "The level of ambition set by the Paris Agreement will require global emissions to approach zero by the second half of the century and that all governments, Indigenous peoples,

*"Electricity can be created by green means or by means with high carbon emissions. Canada needs to pivot away from all electricity generation with a high carbon footprint to green electricity. As an electrician I am prepared to be trained and work within the clean energy sector."*

*Daniel Lee, Construction Electrician*

as well as civil society, business and individual Canadians, should be mobilized in order to face this challenge, bringing their respective strengths and capabilities to enable Canada to maximize the economic growth and middle class job opportunities of a cleaner, more resilient future."<sup>22</sup> This statement acutely captures the mission of Iron & Earth, and we deeply encourage the federal government to act firmly in realizing the corresponding objectives of that declaration, including: "to foster investments in clean technologies to reduce the GHG emissions associated with the production and consumption of energy, including renewable and alternative energy, energy efficiency and storage, and other technologies;" "foster and encourage investment in clean technology solutions for Canada... that hold great promise for economic growth and long-term job creation;" "implement measures grounded in the view that clean growth and climate change policies are of net economic,

*"I am an Industrial Electrical Graduate struggling to find work in my field at the moment. I would really like to see more of a movement towards green energy, not only for future generations but also for the entire planet. Action needs to be taken now in order restore the damage done by ourselves and previous generations. We must be the change!"*

*Angus Crighton, Industrial Electrician*

environmental and social benefit to Canadians;” and “encourage the sharing of information, expertise and best practices in order to foster a business environment that favours investments in innovative clean technologies related to climate change.”<sup>23</sup> Iron & Earth believes that through these mandates, among others, meaningful action on climate change is possible, and through our four-point plan we are both prepared and motivated to do our part in helping Canada make a just transition to a sustainable and productive economy based on worker mobilization and renewable energy development.

Today in Canada, thousands of unemployed energy sector workers face difficult financial realities while local and global imperatives are driving our nation to develop a cleaner energy portfolio. To that end, the Workers’ Climate Plan is a blueprint for the creation of thousands of renewable jobs for industrial energy sector workers over the next four years as part of the National Climate Strategy. This plan has been shaped by over 200 submissions by Canada’s industrial energy sector workers, and is being developed collaboratively through the Energy Futures Lab. The consensus from these workers is that renewable energy development must ensure the health and equity of workers, their families and communities, as well as our shared economy and environment. This consensus is supported further by the additional 800+ survey submissions by fellow Canadians. At this juncture, given the economic realities of global oil markets, we believe it is prudent to invest in the future by retraining workers to be



*“The repeated collapse of the oil industry and its awful propping up by taxpayer subsidies led me to dive into renewables as a newly incorporated contractor where I can bring my values of caring and humanity and respect for science and the future to bear on my work. I care about adapting to the realities of climate change because it is too late to avoid a great portion of negative impacts now, and that means developing people’s minds along the right lines as workers and citizens every bit as much as developing policy and creating jobs.”*

*Mike Thomas, Journeyman Electrician*



*“I have always had a strong desire to do my part for the sustainability of our planet. With the skills I’ve learned in my trade I know I can be an integral part of new green energy projects. It’s also a great opportunity to get experience doing what I love and help Canada grow into a green energy leader.”*

*Justin Rovtar, Industrial Mechanic*

able to build and install infrastructure in the solar, wind, geothermal, biomass, biofuel, energy storage, and energy efficiency sectors.

We see a small window of opportunity to build the workforce and manufacturing capacity of Canada for the renewable energy infrastructure required to meet our climate commitments. We also see an opportunity to learn from other countries who have already been aggressively pursuing renewable energy. If this is accomplished, Canada could meet its climate commitments, ensure renewable energy development puts oil and gas workers to work, and help existing industrial sector contractors and clients within the renewable energy sector.

## “VOICES”

***“I’ve been a Jman electrician since 1999, and have worked everywhere but Calgary... Looking to get into the PV industry in Calgary and work where I live and make a good living! I have been on many major projects on the tools and as supervision, I’m also a power system electrical 4th year apprentice. I believe that PV and wind are going to be the next big industry and we need to ensure this work is done by qualified union electrical workers and other building trades!”***

***O. Bliss, Journeyman Electrician***



*“I have taken a job outside of the oil field for half the pay.”*

*Ray Baker, Machine Operator*



*“We have an incredible pool of innovators and self starters here in Alberta who have the ability to find and develop real solutions to the real problems we face. It's time to get down to business.”*

*Kerry Oxford, Mechanical Engineering Technologist and Journeyman Welder*

***“I’m a plumber and all I want is my job to be safe. I also need the climate to be stable and earth to be healthy so I can keep on working in the job that I love.”***

***Malina Hnatiw, Plumber***

## 2.0 Voices From the Oil Sands: Survey Results

### 2.1 Methodology of the Workers' Climate Plan

The Workers' Climate Plan was produced through a four-step research process. First, we conducted an extensive survey of energy sector workers and the general public to hear their opinions about action on climate change. Second, we analyzed what we learned to identify key demands of Iron & Earth's core constituency: energy sector workers who believe in a just transition to renewable energy. Third, we reached out to energy sector workers over the phone and in person to discuss the Workers' Climate Plan in more detail. Fourth, we consulted a wide range of industry stakeholders to determine how we can best represent worker demands in practice. This work is ongoing and we will continue this work as we develop future reports.

#### A. Workers' Climate Plan Survey

In June 2016, a comprehensive survey was launched to gauge the level and type of support from the public and energy sector workers for an ambitious National Climate Strategy. To date, there has been little research on the perspectives of Iron & Earth's worker-based membership, and little is known about the perceptions, needs and expectations of those that work in the energy sector. This survey obtained the necessary data and perspectives from this key cohort in order to shape the Workers' Climate Plan.

The survey, fielded from June 9 to August 15 2016, received responses from more than a thousand respondents. The survey was e-mailed to the Iron & Earth membership and made available online for users of laptop or desktop computers, tablets and mobile devices. The survey was shared extensively on Facebook, Twitter, through online search and display advertisements. It was also shared by



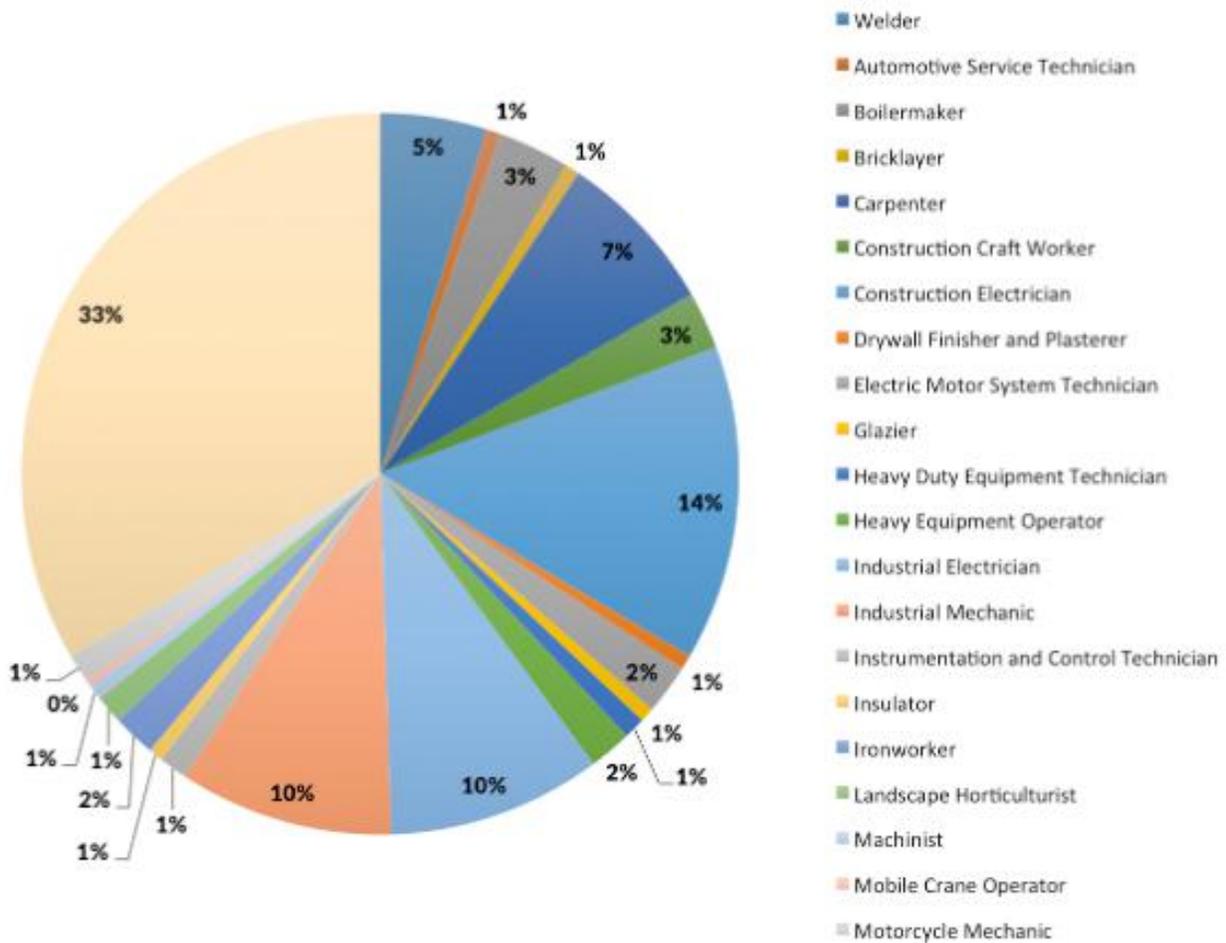
various allied organizations, businesses and unions.

Of more than 1,000 responses, 217 were submitted by skilled trades workers primarily with experience in the energy industry, and 824 were submitted by

members of the public (hereafter referred to as worker and non-worker respondents). Worker respondents included a number of different tradespeople in the energy sector including construction electricians (16.6%), industrial electricians (10.6%), carpenters (6.5%), welders (4.6%), boilermakers (3.7%) and industrial mechanics (3.2%) (see Figure 1).

A significant minority of non-worker survey respondents (44.3%) have a close friend, direct family member or spouse who works as a trades worker in the fossil fuel energy sector. Of those, 8% have a

spouse or significant other in the fossil fuel energy sector, 9% have a child in the sector, 16% people have a sibling, 7% have a parent, 64% know a friend and 35% know someone else working in the traditional energy sector. It was expected that we would receive a higher number of responses from non-skilled trades workers, as this is a much larger and more inclusive demographic. The survey responses provide critical insights into what current energy sector workers and other members of the public are thinking about when it comes to relevant to action on climate change in Canada.



**Figure 1. Occupation of Worker Survey Respondents**

The survey was designed to capture a range of perspectives around:

- Community
- Environment and Education
- Barriers to transitioning into renewable energy jobs
- Long-term economic sustainability

Survey questions asked workers about a wide selection of topics, including their experiences working in the energy sector, their opinions about a range of policy positions, and concerns about the economy and climate change. The survey was designed to ensure workers opinions were clearly stated. We consulted with survey specialists to ensure the survey enabled respondents to express a range of opinions and perspectives. Open ended questions allowed respondents to provide longer responses and tell us things we did not ask in the multiple choice survey questions. Long form answers provide greater detail about the lives and concerns of workers and their dependents.

It is important to note there is a potential selection bias in our data. Given budgetary limitations, we primarily promoted the survey through social

*“My extended family operates an oil field services company in west central Alberta. Two years ago I had to move to Calgary to find more work. My husband now works only part time in the company. We now live apart during the weeks and see each other on some weekends as we both have extra part time jobs. Our three young adult children are in university, college and working in BC outside of the family business. I wish we had economic opportunities here. I am wanting to start my own food processing business to provide us with income. Our income has decreased by 50%.”*

*Andrea Garnier*

media, existing supporter e-mails lists and word-of-mouth. Survey respondents are likely to have a direct or indirect connection to Iron & Earth prior to being presented with the survey. We do not claim that worker survey respondents are a representative sample of energy sector workers in general. We do claim that they represent a growing number of energy sector workers who realize that it is in our collective interest to proactively face the challenges of the future together. They are calling for ambitious action on climate change that prioritizes justice for workers. It’s these tradespeople who Iron & Earth represent. It’s their demands and the reasons behind them that we seek to fully understand. That’s why we are going beyond the survey results to build actual relationships by personally connecting with workers.

## **B. Oil Sands Worker Outreach**

Throughout September and October, Iron & Earth team members reached out to current energy sector workers to discuss the Workers' Climate Plan in more detail. We will continue this work by speaking with other energy sector workers in our

*“I am an electrician in the forestry industry in BC, I went to school for wind turbine technician training in Alberta and had a rough time finding work in the sector. In fact most of my classmates found work as electrical apprentices instead of wind tech jobs. We as Canadian citizens turning into conscientious workers need the work available for us coming out of school.”*

*Joel Phillips, Industrial Electrician*



*"I have been working in the oil sands off and on for the last 20 years. I'm an electrician and when I go to work it's in remote regions away from my pregnant wife and our three kids. I miss a lot of activities. I have applied for numerous electrical jobs in my region but have never been hired. I believe the oil sands have their purpose but feel guilty for working up there as I've seen the landscape change tremendously over the past 20 years. I would feel a lot better about bringing renewable energy into homes and businesses as the impact on our planet is nothing from using solar."*

*Jason Kane, Construction Electrician*

own communities and across Canada. Extended conversations in person and over the phone are helping us refine our understanding of the issues energy sector workers face. Together we developed a framework of what we believe is required to ensure a transition to renewable energy that is just for workers. Through this ongoing work, we will continue to learn about the many ways current energy sector workers can help Canada make a successful transition to renewable energy.



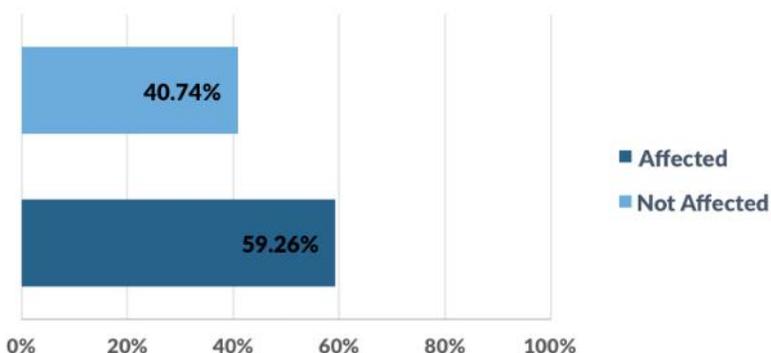
## C. Data Analysis

Iron & Earth has analyzed an extensive set of data collected through the Workers' Climate Plan survey. We have compared worker and non-worker responses to a variety of questions to identify the specific concerns, obstacles, and hopes of energy sector workers. Furthermore, we examined data from different professions within the broad demographic of skilled industrial trades people to consider in more detail the different roles a variety of skilled energy sector workers can play in an effective, just, and stable transition to renewable energy. The tables and graphs from these data sets highlight, compare, and draw inferences from key points from this survey.

### 2.2 Energy Sector Workers are Concerned about the Economy

Whether Canada takes action on climate change or not, energy sector workers are concerned about the economy. More than half of worker respondents to our Workers' Climate Plan survey have been

negatively impacted by the low price of oil as illustrated in Figure 2. Many workers tell us stories of unemployment and hardship in the current economy. They are concerned about their personal financial well-being and the financial well-being of their families. One piping designer and drafter with experience in natural gas told



**Figure 2: Has the changing job market negatively affected you or your family?**

us he has been unemployed since 2015 because his “line of work... has completely dried up and there are too many seeking employment for what little work there is, no matter the skill level.” He is the “single earner for a family of four”. Another carpenter who works “for a safety company that gets contracted out by the oil and gas industry in Fort St. John” reports that “[t]he fall in... prices has slowed the amount of work my company usually has for me and the other workers in my company.” The recent layoffs following the downturn in the price of oil are not an isolated occurrence, as long term energy sector workers know. Rather, the history of the oil and gas economy has been plagued by successive boom-and-

*“I’ve been working as an electrician for five years now, I am unemployed and have been for the last two years. I have a family – it’s extremely disappointing to have unreliable work. Government has subsidized a lot of training for a market that is not there.”*

*Colin Link, Electrician*

bust cycles, with devastating consequences for energy sector workers and their families. In our Workers' Climate Plan survey, the overwhelming majority of current energy sector workers tell us that high job security is either important (47%) or extremely important (27%). Many think having a job close to home is important (40%) or extremely important (25%). We cannot help but speculate that energy sector workers value job security and proximity to this pronounced extent because many have travelled across the country to work in notoriously insecure oil and gas industry jobs. It is revealing to note that of the non-worker survey respondents who have a spouse or significant other employed in the fossil fuel energy sector, more than half report their spouse is away from home over 50% of the time or between 25% and 50% of the time. 68% of non-worker survey respondents who have a spouse or significant other employed in fossil fuels claim that family participation of their spouse or significant other in a mobile labour force has impacted their relationship, with 46% saying it has been difficult at times and 25% saying it has put a strain on their relationship.

Energy sector workers are not only concerned about the current fossil fuel economy, they are also concerned about the potential economic consequences of a transition to renewable energy.



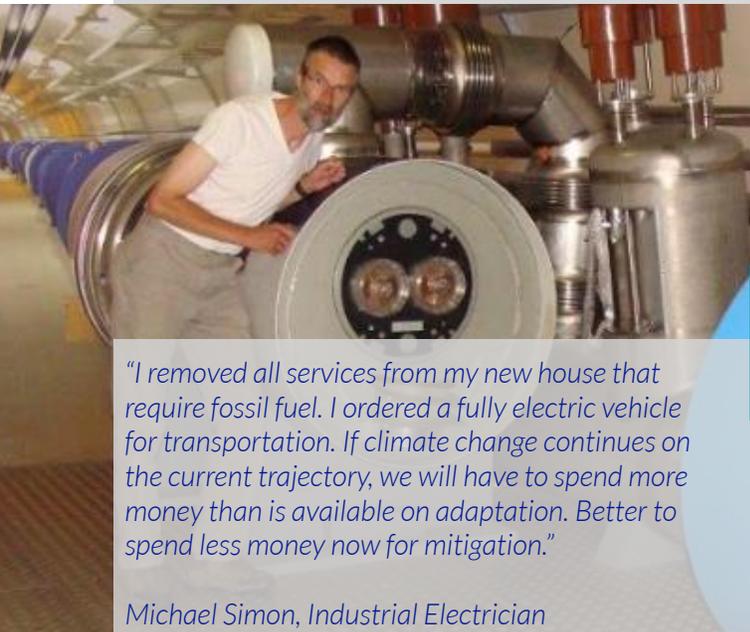
***"I lost my work due to cutbacks and restructuring. My wife lost her work due to cutbacks and restructuring. My son lost his work because of restructuring. All [this has happened] here in New Brunswick because of economics while the people who control the resources continue to evade paying taxes by putting their profits in foreign banks."***

**George Griffin**



*"Building is in my blood. My father is an architect and since childhood I participated in interesting discussions about the future of the industry and prospective solutions for the power supply. I got a bachelors in electronics in 1991 in Ukraine. In 2001 I built my house using green technologies and left there a room for solar panels and wind generator – ones the more efficient devices are designed. The crises in 2008 changed my plans and in 2012 I immigrated to Canada. My transit job was pipe insulation while taking power engineering course. I prefer to work in renewable energy industry and look for the opportunity to build my green dream home in Canada."*

**Andriy Yachminsky, Power Engineer**



*"I removed all services from my new house that require fossil fuel. I ordered a fully electric vehicle for transportation. If climate change continues on the current trajectory, we will have to spend more money than is available on adaptation. Better to spend less money now for mitigation."*

**Michael Simon, Industrial Electrician**

## **“ VOICES ”**

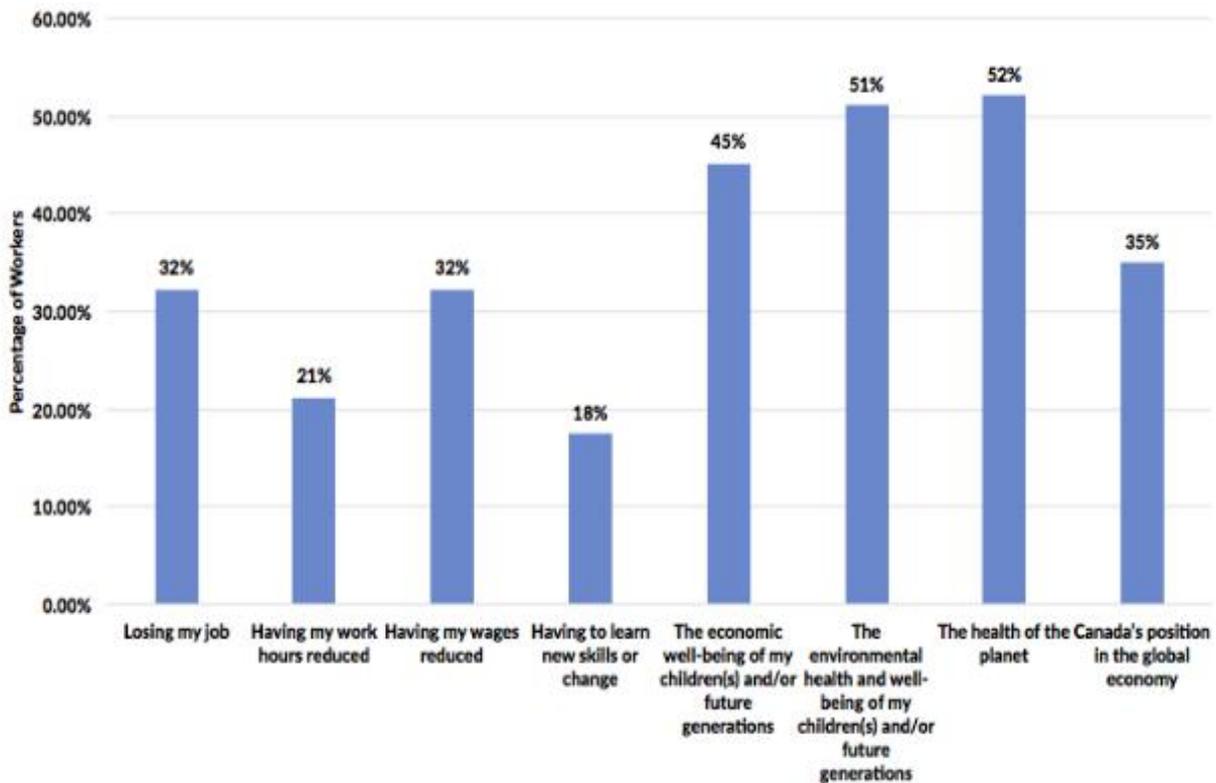
***"My son, a machinist, was laid off for approximately 7 months. Recently [he has been] recalled, but for how long – he isn't sure. He and his wife had a baby just prior to his layoff, but luckily I am proud to say they are both very careful budgeters and had prepared for the chance that this might happen. But of course, now their savings are reduced significantly and they have to start over to replenish that in case of another layoff. He is thinking of trying to find another trade but that is difficult, especially in Alberta."***

**Patricia Brown**



*"I am currently working at oil and gas production. I would like to be employed in renewables. I see first hand the effects of climate change."*

**Kevin Roll, Oil and Gas Production**



**Figure 3. In considering a steady transition to renewable energy, what worries you?**

An overhaul in Canada's energy system would affect energy sector workers through no fault of their own. Energy sector workers may not only lose their jobs, but the reliability of the sector itself. It's no surprise then to learn that worker respondents to the Workers' Climate Plan survey are concerned about losing their job (32%), having their wages reduced (32%), or about Canada's position in the global economy (35%) when considering a steady transition to renewable energy. Their well-being depends on Canada's energy sector, and this is true for all Canadians to a greater or lesser extent.



### 2.3 Energy Sector Workers are Concerned about Climate Change

Workers' Climate Plan survey responses show many energy sector workers are concerned about climate change. Minimizing the negative impacts to the planet is a major reason most energy sector workers think Canada should transition to renewable energy (77%). Indeed, most energy sector workers are actually willing to take some kind of pay cut to transition to renewable energy (59%). Significantly, most worker

respondents believe climate change is the biggest threat facing the global community and that we need to act now (71%).

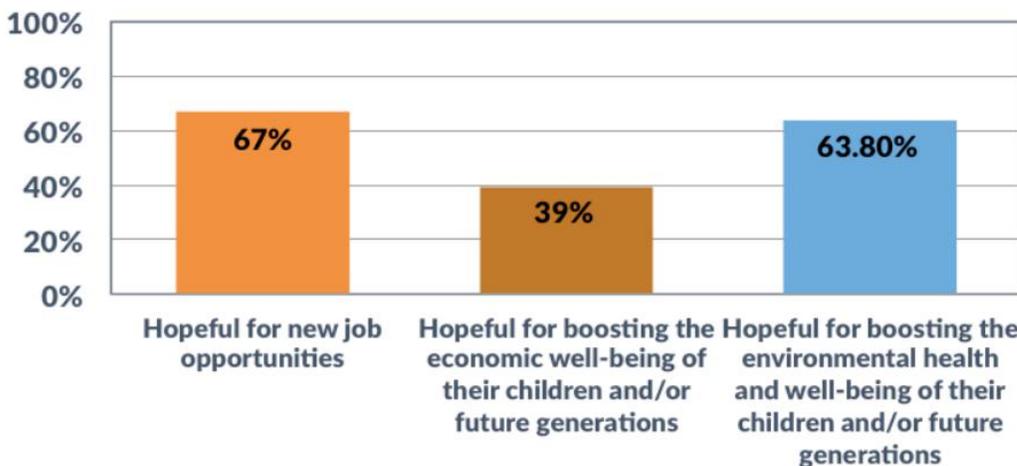
Energy sector workers are already making plans to take action on climate change. Worker survey respondents tell us they plan to adjust their future energy consumption by reducing their fossil fuel consumption (61%), by renovating their homes to make them more efficient (53%), by advocating and helping others reduce their own energy consumption (50%), and by generating some of their own energy (55%). Most energy sector worker respondents think having an employer who takes climate change seriously is either important (45%) or extremely important (36%). The commonly held assumption that oil and gas workers do not care about the environment needs to be re-examined. Our evidence suggests that the opposite is the case for most industrial tradespeople employed in fossil fuels.

*“As a mechanical engineering technologist with a background as a journeyman welder, I want to use my skills to make things better, not just less bad. Battling climate change is no longer optional. It is no longer possible to continue on the path we have traveled ignoring the obvious impacts our actions have created.”*

*Kerry Oxford, Mechanical Engineering Technologist & Journeyman Welder*

## 2.4 Energy Sector Workers Support a Just Transition to Renewable Energy

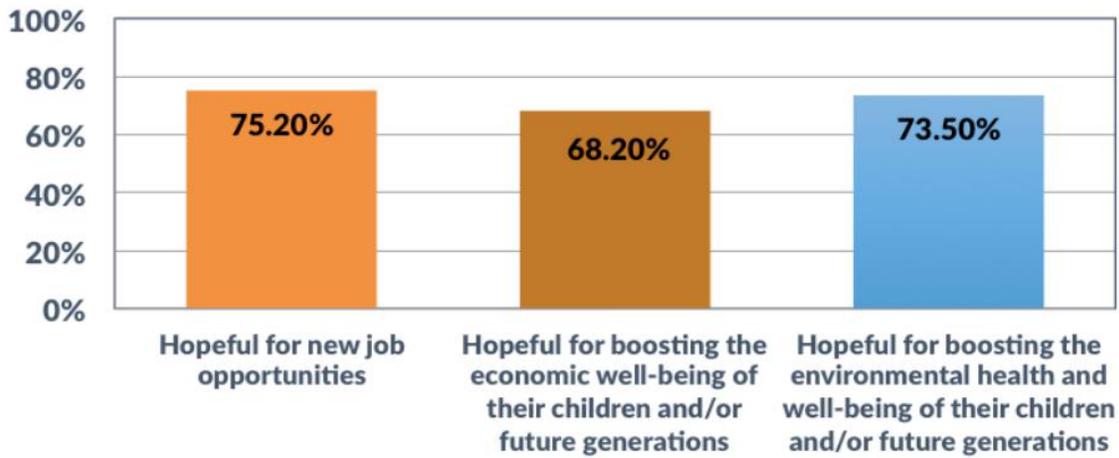
The Workers' Climate Plan survey data suggests a just transition to renewable energy is a source of hope for many energy sector workers in Canada today. Energy sector workers actually look forward to the environmental and economic benefits a transition to renewable energy could bring for themselves, their families and all Canadians. In considering the idea of a steady transition to renewable energy in Canada's future, energy sector workers look forward to boosting the environmental health and well-being of their children and/or future generations (74%). Furthermore, energy sector workers are hopeful for an increase in new



**Figure 4. How a steady transition to Canada's renewable energy future provides hope to workers**

*“I care deeply about the environment and feel that the future needs to be renewable energy. I also fundamentally believe in a just transition for oil sands workers.”*

*K. Lomack, Unionized Trade Worker*



**Figure 5. How a steady transition to Canada’s renewable energy future provides hope to non-workers**

job opportunities (75%) and look forward to boosting the economic well-being of their children and/or future generations (61%). Most powerfully, most energy sector workers agree (26%) or strongly agree (43%) that Canada should make a 100% transition to renewable energy by 2050.

### 2.5 Energy Sector Workers Can Help us Build a Sustainable Future

Energy sector workers have the industrial trade skills Canada needs to build a sustainable, green and prosperous future. Worker respondents believe their current skillset could be transferred to build and maintain a renewable energy future directly with some training (63%) or without any training at all (16%). If the federal government commits to minimizing climate jobs and sustaining growth, worker survey respondents are overwhelmingly interested in training and development in renewables: 86% in solar PV, 74% in solar heating, 71% in wind, 76% in geothermal, 53% in energy efficient retrofitting, and far

*“My plans had always been to pay my debt down and then save up enough money to be able to go to school full time and become a mechanical engineer or electrical engineer and move into renewable energy.”*

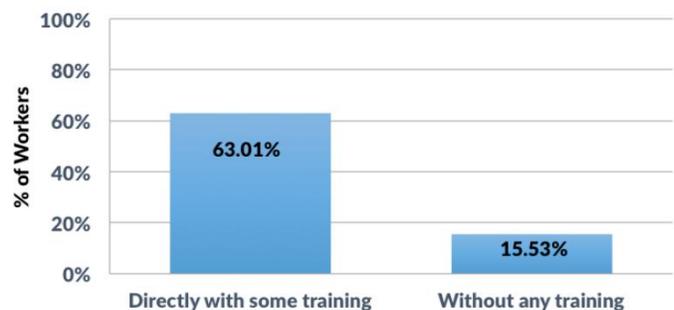
*Jordan Burkhart, Field Specialist*

*“I’m an out of work Journeyman Electrician. I believe we need to adopt these technologies faster and diversify our economy much more than Oil & Gas to avoid such devastating downturns and keep Canadians working.”*

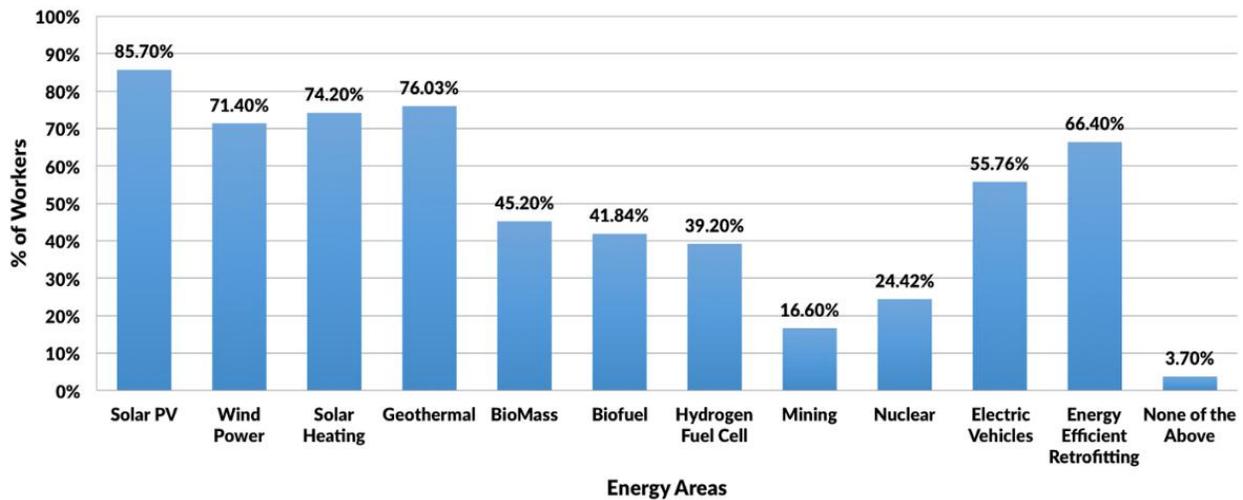
*Stephen Everett, Journeyman Electrician*

*“Welding is applicable to a very large variety of renewable infrastructure, including windmills, vessels and piping for geothermal and biofuel/biomass, and nuclear.”*

*Carson Toews, Natural Gas Trade-Worker*



**Figure 6. How well might your current skillset be applied to renewable energy?**



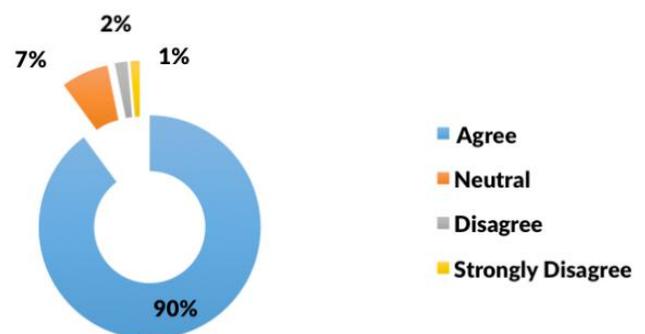
**Figure 7. If the government commits to climate action, sustaining jobs, and economic growth, what percentage of workers are interested in the following skills training?**

less in nuclear (17%). In addition, worker respondents tell us that Canada should reuse existing industrial infrastructure, such as brown field sites with closed mine pits and concrete pads, for future renewable projects (86%).

Workers' Climate Plan survey responses also show that members of the public (96%) overwhelmingly think Canada should retrain skilled workers to move into renewable energy: 84% strongly agree with this proposal and 12% of non-worker survey respondents agree. Furthermore, members of the public think Canada should make job opportunities more visible to an emerging workforce (79% strongly agree and 18% agree) and support the suggestion that Canada should reuse existing industrial infrastructure for future renewable projects (63% strongly agree and 25% agree).

## 2.6 A Just Transition for Workers is in Everyone's Interest

A just transition to renewable energy is in the interest of energy sectors workers and the general public. The majority of current energy sector workers have been adversely affected by the downturn in the price of oil as Figure 2 illustrates. The development of Canada's renewable energy manufacturing capacity presents an opportunity for these workers if appropriate action is taken. The overwhelming majority (92%) of energy sector workers we surveyed value the opportunity to progress in their career and learn new skills: 46% of worker respondents claim this is important and another 46% claim this is very important. Why not provide these workers with the



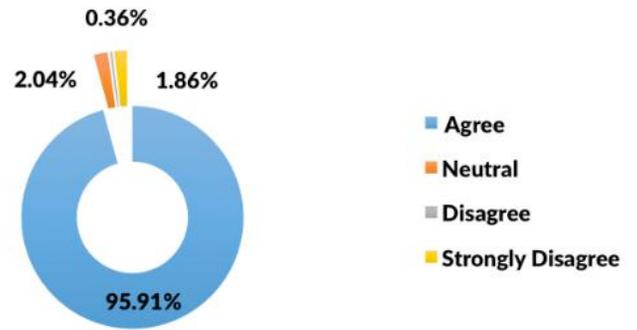
**Figure 8. Workers who support retraining the labour force**

opportunity to learn new skills and develop their careers in renewable energy? Indeed, 90% of worker survey respondents believe Canada should make job opportunities more visible to an emerging workforce and 64% believe Canada should retrain skilled workers for renewable energy.

Members of the public support oil and gas workers in this. Nearly all non-worker survey respondents (96%) support retraining skilled workers to move into renewable energy as illustrated in Figure 9. It is no wonder why. Positioning existing energy sector workers would not only benefit our environment, it would also benefit the economy. In the short term, it would employ an out-of-work labour force, boost the local economy, and save on Employment Insurance and other benefits. In the longer term, energy sector workers industrial trade skills could position Canada in becoming a global leader in renewable energy.

## 2.7 Canada Should Take Action

The message from worker and non-worker survey respondents is clear: Canada needs to take action to ensure a just transition to renewable energy. Respondents from the energy sector and members of the wider public agree on this point. They both believe Canada should make a 100% transition to renewable energy by 2050 (workers 69%; non-workers 92%) and retrain skilled workers to move into renewable energy (workers 90%; non-workers 96%). Both cohorts believe Canada should use tax credits, grants, or other incentives to help entrepreneurs innovate and develop the green jobs sector (workers 85%; non-



**Figure 9. Non-workers who support retraining the labour force**

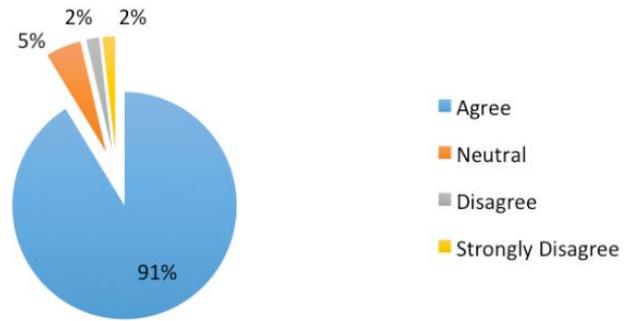


*“Education is the biggest thing the government can do. The other step the government can take is funding of research and development. They have to prioritize because if we continue down the path we are going, it will be too late to effectively control or stop*

*climate change. I teach courses in Environmental Studies. I am very concerned about climate change and the affect it will have on future generations. We have to switch to renewable resources for energy, away from oil, coal etc. to solar, wind, biomass and other means of energy.”*

*Ron Owens, Retired Construction Electrician*

workers 92%) and educate the public on renewables to help transition toward a carbon-free future (workers 88%; non-workers 96%). Workers and non-workers agree: Canada should create more jobs manufacturing renewable energy components and technologies (workers 91%; non-workers 95%) and make job opportunities more visible to an emerging workforce (workers 90%; non-workers 97%).



**Figure 10. Whether workers believe Canada should create more jobs manufacturing renewable energy components and technologies**

Economic hardship following a transition to renewable energy is not inevitable unless Canada fails to take urgent action to develop our renewable energy manufacturing capacity. Equally, if action on climate change does not prevent a rise above two degrees celsius, the cost to the global economy will be severe. As the cost of renewable technologies plummets and global demand for renewable energy grows spurred by international commitments to keep rising global temperatures below two degrees celsius above pre-industrial levels, Canada has a choice: will we become a leading producer or a net importer of renewable energy? We need to harness the expertise of our skilled industrial workforce and quickly develop a competitive renewable energy industry in Canada with urgency, so that the economic prospects of all Canadians don't diminish in the necessary transition to renewable energy.

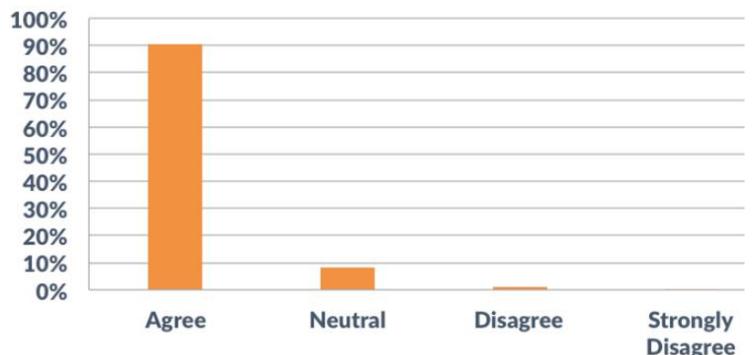
*"Layoffs have been threatening my husband and my job for about 18 months. So far we're lucky enough to have a job, but it definitely creates a lot of extra stress."*

*Nathalie Verhulst*

*"I was laid off for eight months because no one was hiring. Now I've finally found a job after looking for so long."*

*Rodney Martelks, Electrician*

An increasing number of energy sector workers are aware of these facts. A growing movement of energy sector workers are calling for a transition to renewable energy, because they realize if handled responsibly, it could be the answer to, and not a cause of, their concerns about the economy and the environment. A large number of these energy sector workers are ready to put their industrial trade skills to the task of making Canada's renewable energy future a reality, starting today. Canada would be foolish to miss this opportunity.



**Figure 11. Whether workers believe Canada should make job opportunities more visible to an emerging workforce**

*"I care because I like the smaller things in life. Music, family, and good food can all be had without ridiculous wealth. I'd rather be poor and healthy than have my oil money and lung cancer from working at Syncrude or Suncor. I don't have a family to support, I am young enough to retrain and I am well aware of how bad my job is for the environment. Take my job and kill it. I need clean water and air free of carcinogens – not another trip to Mexico."*

Kevin Marshall, Steamer & Pipefitter

*"I have two Journeyman Red Seal trade tickets, one being a Journeyman Millwright ticket and the other one being a Journeyman Welding ticket. I am presently working full time in the cement manufacturing industry for Lafarge Holcim. I feel renewable energy will be the major jobs creator in the next 10 years as the world economy transitions away from greenhouse gas emitting fossil fuels to help reduce the effects of climate change."*

K. Matthews, Journeyman Millwright & Journeyman Welder



***"I am an Architectural Sheet Metal worker, Painter, Carpenter, and I hope to one day be a private land-owner and farmer. I hope to own a home that is self-sustaining, to grow my own food and generate my own energy. I want to raise my future children in an environment free of industrial and urban pollution, but also to remain close to the community I have grown up in. I care because I want the best for my future children."***

***Joel Southwood, Sheet Metal Worker***

Energy Sector Workers	Agree	Neutral	Disagree
Canada should make a 100% transition to renewable energy by 2050	69%	15%	7%
Canada should retrain skilled workers to move into renewable energy	90%	7%	2%
Canada should educate public on renewables to help transition towards a carbon-free future	88%	6%	1%
Canada should make job opportunities more visible to an emerging workforce	90%	8%	1%
Canada should create more jobs manufacturing renewable energy components and technologies	91%	5%	2%
Canada should use tax credits, grants, or other incentives to help entrepreneurs innovate and develop the green jobs sector	84%	10%	2%

**Figure 12. Non-worker opinions on actions Canada could take on climate change**



**“I am not against development. I am against irresponsible, senseless or needless destruction of the environment when options have been presented but are not being considered. The environment is all that we have. If we do not care for it, we cannot maintain life on this planet.”**

**Leslie Gordon, Boilermaker**

“I'm a machinist millwright and I care about climate change because our future generations need us to.”

Jason Mandujano, Machinist Millwright



“My background includes social sciences, welding, welding inspection, pressure vessel, pressure piping and boiler inspection. Government strategy for climate change needs to address development of renewable energy sources, locally available food sources, supplies of fresh clean water for our communities and emergency preparedness for ‘natural’ catastrophes such as flooding, forest fires and drought.”

Harold Smith, QA & QC Inspector

**“If you have to burn 10 litres of diesel to make eight litres of gas, it doesn't matter how clean the gas burns – it is not helping the environment. As electricians we need to be at the forefront in training regarding new technology and equipment. A huge component of clean energy involves generating equipment and higher efficiency devices to use this energy.”**

**Mitch Sharp, Electrician and Instrument Technician**

**Figure 13. Worker opinions on actions Canada could take on climate change**

Members of the Public	Agree	Neutral	Disagree
Canada should make a 100% transition to renewable energy by 2050	92%	3%	2%
Canada should retrain skilled workers to move into renewable energy	96%	2%	0%
Canada should educate public on renewables to help transition towards a carbon-free future	96%	1%	0%
Canada should make job opportunities more visible to an emerging workforce	97%	2%	0%
Canada should create more jobs manufacturing renewable energy components and technologies	95%	38%	0%
Canada should use tax credits, grants, or other incentives to help entrepreneurs innovate and develop the green jobs sector	92%	5%	1%



# 3.0 Recommendations:

## A Blueprint for Sustainable Jobs and Energy

At Iron & Earth, we believe that current energy sector workers should drive Canada's transition to renewable energy. We are not alone. For over a decade, labour and environmental organizations, energy sector developers and contractors, and, crucially, industrial trades workers themselves have promoted policy agendas that address fundamental difficulties in Canada's energy system. The Canadian Energy and Paperworkers Union (CEP), for example, originally drafted Energy Policy 917 in 2002 (quoted above). And although this policy has been revised a number of times – before and after the CEP merged into Unifor – the call on “decision makers” to “include and listen to workers, and in particular to energy workers” remains consistent.<sup>24</sup> However, successive governments have yet to adequately heed such recommendations. Today, the new federal government has a unique opportunity to collaborate with current energy workers, take

*“It is time that governments, companies and decision makers include and listen to workers, and in particular to energy workers. There can be no successful, meaningful or viable energy policy for Canada that does not respect the views and interests of the working people who produce, distribute and process this country's energy resources.”*

*Canadian Energy and Paperworkers Union, Just Transition to a Sustainable Economy in Energy: Policy 917*

unprecedented action to transform Canada's energy sector, and meet GHG reductions targets set at COP21. We commend the federal government on consulting Canadians about action on climate change and we hope this government will listen to energy sector workers, and take urgent and necessary action to transform Canada's energy system for the sake of our environment and economy.

Governmental support and investment in Canadian based renewable energy businesses will indeed pay off in the short term, but most significantly, it will pay off in the mid and long term unfolding of Canada's path to its 2050 target of net-zero. That the returns of this investment occur in a timeframe that exceeds Canada's four year political cycle complicates federal policy decisions, but we are confident that policy makers can look beyond the limited scope of their administration's term. We as energy-based stakeholders encourage the federal government to be forward thinking in their policy decisions, and we encourage the Canadian public to support the efforts of government to diversify the energy sector and meet Canada's climate targets.



Through conversation with energy workers and stakeholders, Iron & Earth has committed to three energy development priorities. These are:

1. Energy development must ensure **continued job opportunities for Canada's skilled workers.**
2. Energy development must be aligned **with climate commitments.**
3. Build a thriving international export market of renewable energy products, electricity, and services.



These developmental priorities are focused through Iron & Earth's four-point plan, encompassing the full scope of our campaign possibilities:

1. **Build up Canada's renewable energy workforce** by rapidly upskilling energy sector workers through short term training programs and updating apprenticeship programs.
2. **Build up the manufacturing capacity of renewable energy products** through the retooling and advancement of existing manufacturing facilities.
3. **Position existing energy sector unions, contractors, and developers** within the renewable energy sector through incubator programs and multi-stakeholder collaboration initiatives.
4. **Integrate renewable energy technologies and industrial scale energy efficiency projects** into existing carbon based infrastructure.

Iron & Earth has been consulting with a wide range of stakeholders — namely, industry, government, environmental organizations and the labour movement — and has benefitted from a partnership with the Energy Futures Lab, a multi-interest collaboration that is comprised of some 36 innovators and influencers in Alberta's energy sector (including representatives from local First Nations, science and technology companies, municipal and provincial governments, and large oil and gas multinationals) to help focus our four-point plan into concrete policy recommendations. The remainder of this chapter will delineate these recommendations.



### 3.1. Build up Canada's renewable energy workforce

Skilled industrial tradespeople are essential to an effective transformation of Canada's existing energy sector. As the Canadian Labour Congress, the Green Economy Network, Blue Green Canada and other key organizations note, effective action on climate change will require new "green" jobs in the direct production, installation and maintenance of renewable technologies, as well as



*"I'm a heavy equipment mechanic who has worked for several years on the front line of oil and gas carbon extraction. I've seen the impact that resource extraction has on the communities where the carbon deposits are, and I've been a part of the chaos that the up-and-down nature of the oil*

*business can bring to families."*

*Clayton Strang, Heavy Equipment Mechanic*

indirect and induced industries.<sup>25</sup> We stand behind the powerful statements of our key stakeholders: The Canadian Labour Council notes that "Around the world, taking action on climate change must also be inextricably linked to a just transition for workers, both to provide support to those workers and to build the skilled workforce we need for the emerging green economy."<sup>26</sup> The Canadian Geothermal Energy Association affirms that we must "prioritize the people who will be most negatively

*"I lost my job in the oil sands almost 2 years ago. I am now on the verge of bankruptcy and am struggling to pay the bills. I have been retraining in renewable energy, permaculture and natural buildings, but have not been able to make it into a career yet."*

*Brian Lavoie, Industrial Mechanic*

affected by de-carbonizing strategies and provide a new path for those people that allows them to use their expertise."<sup>27</sup>

Failing to support energy sector workers' transition into renewable production may have drastic consequences. Consider Alberta's shrinking energy sector, where the recent drop in oil prices has corresponded to one of the most severe recessions the province has ever endured.<sup>28</sup> According to a report by TD Economics, Alberta's GDP is anticipated to have posted a 3% contraction in 2016, adding up to a 6.5% loss since the downturn started in 2014. This has corresponded, of course, to significant job-losses most acutely felt by energy sector workers. In Canada, direct employment in oil and gas is projected to have decreased by up to 53,570 jobs by the end of 2016, based on 2014 levels, while indirect employment is projected to have decreased by over double that figure, around 110,000 jobs, over the same period.<sup>29</sup> It is not expected that employment numbers will return to pre-downturn levels over the next five years, if at all.<sup>30</sup> With the future of oil production looking unstable, and a growing number of oil and gas workers out of work or worried about their job security, it is incumbent on government and key stakeholders in Canada's energy sector to fund and create tangible programs and mechanisms for workers to

diversify their job scope, allowing them to lead Canada's transition away from dependency on nonrenewable energy toward a renewable energy horizon. Acting on this would contribute to the regeneration of the broader economies negatively impacted by the recent recession, and mitigate the volatility of the oil market. In the short term, investment in renewable energy would stimulate the economy by creating new jobs for the recently and soon-to-be unemployed, as well as revitalize the indirect and supportive sectors that develop alongside them. As Blue Green Canada notes, renewable energy and other low carbon sectors generate more jobs than the fossil fuel sector per dollar invested.<sup>31</sup> The Green Economy Network projects that a \$23 billion investment in renewable energy would amount to 290,000 direct jobs, greater than the cumulative number of workers employed in oil, gas and mining.<sup>32</sup> Employed workers not only boost growth in general, they also reduce the burden on government finances by lessening the demand on Employment Insurance, as well as other benefits and forms of assistance. In the long term, energy sector workers' expertise, experience and trade skills could give Canada a competitive edge as a future net exporter of renewable energy, manufacturing and technologies.

A majority of worker respondents reported that their current skillset could be applied to both build and maintain renewable infrastructure and technology with either some retraining (64%) or without any retraining at all (16%) (see Figure 6). The compatibility or near compatibility of existing skills with

renewables is extensive: electricians are needed to develop and install solar panels, welders are needed to build wind turbines, drillers and drilling engineers are needed to locate and maintain geothermal wells, and so on. Indeed, in the case of geothermal production, the compatibility is particularly acute. As the Canadian Geothermal Energy Association notes, "Because the exploration and development of geothermal reservoirs use techniques and technologies nearly



identical to the petroleum and mining industries, geothermal is the best way to redeploy existing Canadian subsurface geoscience expertise and associated services toward a sustainable energy future."<sup>33</sup> Not only are many of the existing skills of Canada's oil and gas workers transferable to renewable alternatives,, but many workers themselves are interested in expanding their capacities so they can begin to participate in a greener economy (see figure 7). It's our job to honour this interest by helping build opportunities to grow the renewable workforce.



Iron & Earth calls on the federal government to invest in, retrain and upskill Canada's workforce by providing specific training opportunities to help position skilled workers in the renewable energy sector. We propose the following three policy recommendations:

1. Research existing workforce demand with regards to renewable industries.
  - a. We support the Canadian Labour Congress' call for improving Canada's labour market information. In order to effectively build training programs and allocate training dollars, we must have a better grasp of the current labour market trends (wage-rates, working conditions, full-time jobs, etc.) in the green economy as it exists today and where it will be in the near future.<sup>34</sup>
2. Research skills gaps to locate where energy workers need specific upskilling to compete for jobs in renewables.
  - a. It is pivotal that upskilling initiatives are sympathetic to both the existing skill-sets of the unemployed workforce as well as the specific demands of emerging renewable industries. Disclosing these points of connection is the second step in identifying the needed composition and locality of productive upskilling programs. We reiterate the Canadian Labour Congress' recommendation for a "Green Economy and Skills Survey" that would provide reliable information on demand and supply of the labour market, and aid in identifying effective training initiatives.<sup>35</sup>
3. Develop and implement focused, short-term training programs designed to address the specific skills-gaps identified in (2) so skilled workers can begin work in renewables as soon as possible.
  - a. Whether training electricians to work on solar panel installation, boilermakers to construct wind towers and blades, or drill operators to repurpose orphaned wells for geothermal, it's clear we need tailored programs that will rapidly upskill currently unemployed workers to begin building our emerging renewable economy. Please see Iron & Earth's Solar Skills Training Program, section 3.5.

- b. Iron & Earth also supports the implementation of a Workplace Training Fund, as proposed by the Canadian Labour Congress. Maintaining a public fund allotted for training would ensure labour flexibility and help the Canadian economy adapt to structural and environmental factors with greater ease.<sup>36</sup>

### 3.2 Build up Canada's renewable energy manufacturing capacity

To meet our international climate objectives and to ensure Canada's long term future prosperity, it is critical that we build up Canada's renewable energy manufacturing capacity. Iron & Earth stands with a range of organizations on this point. The Canadian Labour Congress has voiced its support for "a green jobs strategy and an environmental economic development strategy which places manufacturing and trade policies at the center of the climate change agenda."<sup>37</sup> The Canadian Geothermal Energy Association notes battery manufacturing could offer Canada future opportunity as "no one country has cornered the market".<sup>38</sup> Prime Minister Justin Trudeau has stated that he seeks to encourage "investments in the research, development, and manufacturing of clean technology."<sup>39</sup>

Renewable energy has recently become competitive. Despite the low price of coal, natural gas and oil, the performance and cost of renewables supports greater investment.<sup>40</sup> However, there are significant barriers to developing localized



manufacturing in renewable energy technologies in Canada. As the Canadian Labour Congress and others have noted, international free trade agreements have continued to hollow out Canada's manufacturing base for years.<sup>41</sup>

The case is well illustrated by Ontario's 2009 Green Energy and Green Economy Act. The Green Energy Act permitted the minister to direct the Ontario Power Authority to develop a feed-in tariff program designed to promote the use of renewable energy sources. It also permitted the minister to encourage the use of domestically manufactured technologies. The Green Energy Act had mixed results. In December 2010, Siemens announced their plan to manufacture wind turbine blades in the town of Tillsonburg, Ontario. They were quickly swamped with local applicants, and the factory soon became the biggest employer in town.<sup>42</sup> However, as a result of the domestic content requirements, the Green Energy Act was challenged under the North American Free Trade Agreement (NAFTA) by the Texas-based

wind energy company Mesa Power and through the World Trade Organization's dispute resolution system by Japan.<sup>43</sup> When devising future energy policy, Canadian decision makers will need to look beyond government silos to evaluate suitable policy solutions in light of previous attempts to stimulate domestic renewable energy manufacturing capacity in Canada and elsewhere.

An important element of driving growth in Canada's renewable energy manufacturing sector is through ambitious deployment of renewable energy technologies. There are already notable examples of governments fostering renewable manufacturing at home. In Texas, for example, policy makers set specific mandates through the Renewable Portfolio Standard (RPS) program to stimulate the expansion of certain renewable energy technologies. Texas now has more than 16,000 MW of installed wind as compared to its 2025 goal of 10,000 MW.<sup>44</sup> A significant

*"I'm a mechanic and the automotive industry is moving toward electric vehicles. Canada needs the infrastructure to support them. I have seen charging stations etc. in Vancouver, but nowhere else."*

*Bradley Chown, Mechanic*

*"Renewable energy means jobs, jobs, jobs, and jobs you can feel good about doing knowing you're making a difference."*

*Chris Colins, Architectural Sheet Metal Worker*

portion of the products needed for these installations were built domestically, creating over 20,000 jobs across 43 states, and these jobs are beginning to attract workers from the oil and gas sector.<sup>45</sup><sup>46</sup> Moreover, Texas has invested "\$32.7 billion" in wind accounting for "nearly 25 percent of the entire nation's capital investment in wind."<sup>47</sup> Germany took a different approach with a feed-in-tariff program, comparable to the feed-in-tariff program enabled by Ontario's Green Energy Act (2009). This program set tariffs at which certain renewable energy technologies will be compensated, guaranteed through long term contracts. The aim was to incentivize the development of a variety of renewable technologies, rather than secure the cheapest renewable energy possible, thereby developing Germany's renewable energy manufacturing capacity specifically. In 2014, Germany reported 230,000 jobs in renewable manufacturing alone.<sup>48</sup> The program has resulted in more than 70,000 MW of new renewables since 2000.<sup>49</sup>

While ambitious renewable energy development is required to ensure the growth of a manufacturing base, Canada needs to take specific measures to ensure our manufacturing sector can compete with market competition. In this regard Iron & Earth proposes the following four recommendations to build up our national renewable energy manufacturing sector:

1. The support of Canadian manufacturing in renewables must be accomplished with adequate knowledge of our existing and potential manufacturing capacity. We

reiterate recommendations already made by the Canadian Labour Congress, CanWEA and CanSIA for comprehensive market analysis of Canada's green economy, and are calling for particular attention to the manufacturing sector.<sup>50</sup>

2. Alongside (1), we recommend further research toward identifying the specific manufacturing capacities required to build the necessary components and infrastructure for the production of renewable technologies. This involves the identification of existing infrastructure that is either already capable of producing components for renewable technology, or is capable of doing so with some retrofitting and upgrading.
  - a. For example, through our Solar Skills Training Program (see 3.5), Iron & Earth has already identified and established a working relationship with Metal Boss, an Alberta based manufacturing company capable of producing competitively priced, locally made PV racking and mounting systems for solar installation. With a minor investment from government, manufacturers like these will have the ability to retool and upgrade operations in order to directly compete with overseas manufacturers.
3. Develop sufficient and stable support mechanisms and policy that enable manufacturing companies to enter the competitive domestic and international renewable markets.
  - a. Implement policy that offers priority to products with the lowest lifecycle carbon footprint. This will help facilitate the alignment of consumption patterns with efforts to fight climate change by giving indirect priority to locally manufactured products, while also staying within international trade regulations.
  - b. Iron & Earth endorses the following wide-ranging support mechanisms already proposed by key stakeholders: implementation of carbon pricing; enhancement of tax treatment for renewable energy projects; investment in green infrastructure; implementation of government procurement policies for renewables.<sup>51</sup>
  - c. Iron & Earth supports the development of a thriving international export market of renewable energy products, services, design and electricity, and, specifically: (1) renewable energy products and components; (2) renewable energy specialists for design, installation, and maintenance of technologies; (3) exportable design and intelligence. This specialization could be tailored to retrofitting and re-tooling manufacturing sites as renewable producers.<sup>52</sup> (4) cross border export of electricity. Toward this, we reiterate CanWEA and CanSIA's call for the development of a Renewable Energy Export Strategy.<sup>53</sup>

### 3.3 Position existing energy sector developers, contractors and unions within the renewable energy sector

Canada already has a highly concentrated industrial sector specialized in developing, maintaining and exporting energy, related products and services. This expertise is an advantage as we realize our renewable energy manufacturing capacity. Sunk investments in oil and gas resource extraction need not commit Canada to petroleum production indefinitely. Nor should Canada write off existing infrastructure and expertise as no longer useful, a relic of a past energy system. Rather, we should take advantage of existing infrastructure and expertise to catapult Canada successfully into a flourishing renewable energy future. To do this, we must move beyond factionalism and foster cooperation between contractors, developers and unions. With vision and collaboration we can build the kinds of connections from which Canada has benefited so much in the past, though this time, for a sustainable future.<sup>54</sup> In order to clarify the role of various collaborators, we have outlined a summary of Canada's primary stakeholders below, along with an outline of why their specializations are transferable.

*"I am a 30 year plus member of IBEW. We can build anything presented to us that is engineered properly. What is currently missing is the incentives for new energy source development on a scale that can make a real difference."*

*Glen Wosnock, Master Electrician*

### Contractors

Contractors connect developers to unions, suppliers, technologies and tools, making it as easy as possible for those developers to access their needed energy-related inputs. They also provide structure to the way projects are managed by forecasting and distributing tasks, ordering solicitations, and implementing tools and processes to ensure projects are delivered smoothly through an efficient and streamlined approach. Contractors work with clients on project planning, feasibility/studies, cost-estimation, engineering, procurement, construction, construction management, implementation, and operations. Contractors, then, serve an essential service in the current energy economy, and any attempt to generate renewable energy projects will need to draw on the deep understanding and expertise of current energy sector contractors across a range of services. The wide variety of technical, geographic, legislative, and environmental challenges that face transition to renewables means long term planning will be necessary. The global influence, technical knowledge, and broad experience of current energy sector contractors must be utilized in the planning and implementation of this transition.<sup>55</sup>

In Alberta, the combined regional knowledge and international connections of existing energy sector contractors will be invaluable when the province seeks to wholeheartedly transition to renewable energy. As experts on the region's topology and

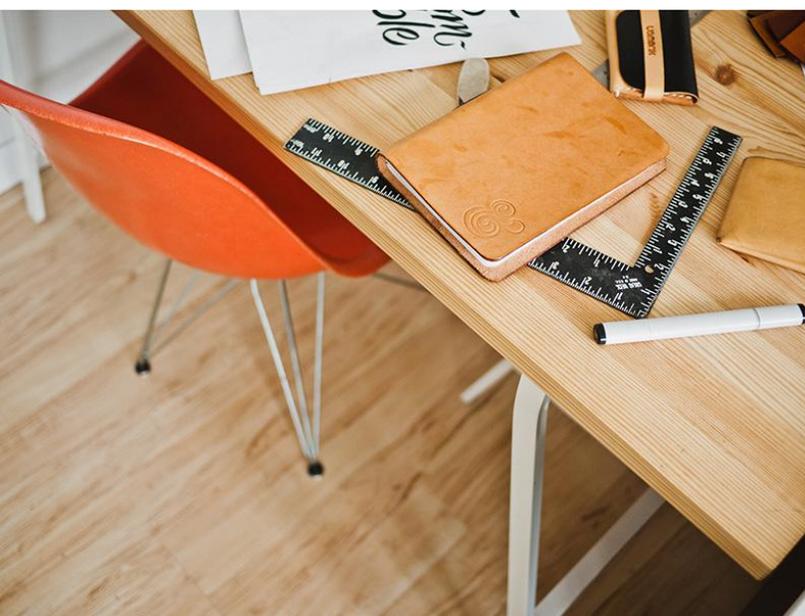
distinctive weather conditions, energy sector contractors in Alberta have managed projects located in remote areas and extreme environments. They have extensive experience working within provincial regulatory and legal frameworks. With pre-existing relationships in the area, they have intimate knowledge of local supply chains, available human and technical resources. Should they take up an earnest call to renewable production, then, contractors would be well poised to plan and implement successful renewable energy projects in Alberta which maximize the opportunity provided by the local geography, infrastructure and workforce. Moreover, leveraging international connections may help kick-start Alberta's renewable energy sector. Many energy contractors have local offices at a number of locations around the world, enabling collaboration and communication across geographic and disciplinary areas.



*"I work for a safety company that gets contracted out by the oil and gas industry in Fort St. John. The fall in these prices has slowed the amount of work my company usually has for me and the other workers in my company. I am trying to get ahead in life financially so that I can live a modest life with some financial security in the future."*

*Adam Wilton, Red Seal Carpenter*

At present the lack of renewable energy sector contractors in Alberta and Saskatchewan represents a potential major obstacle to Canada seeing the benefit of renewable energy development. Preliminary conversations with renewable energy developers has revealed that contractors from out of country may need to be hired for projects within Canada. For this work to go to contractors outside Canada would be a significant and irresponsibly missed opportunity. At the same time, many contractors find it hard to operate financially sustainable businesses in renewables. This is why a multi-pronged approach is needed to transition Canada's existing energy sector to renewables. Action by a range of stakeholders, including government, is required to effectively position existing energy sector contractors in renewable energy.



## Developers

Energy developers finance and oversee energy sector projects. They leverage capital, technology, and international trade contracts to maximise return on investment, develop resources, and provide energy sector jobs in the process. In Alberta, we are lucky to have a number of energy developers with an intimate knowledge of the province, its geography, people, infrastructure, and legal and regulatory frameworks. Suncor, the single largest synthetic crude oil producer in Alberta's oil sands, has operated in the region since commercial production of oil began in the oil sands in 1967. They are already diversifying their activities to include a range of renewable energy projects in their portfolio, including eight wind farms in Canada capable of generating nearly 200 MW.<sup>56</sup> They are not alone. Enbridge, an oil and gas pipeline company and proponent for the Northern Gateway Pipeline project, has invested nearly \$5 billion in renewable energy projects since 2002 including wind, solar, waste heat, and geothermal.<sup>57</sup> Chevron, a multinational oil industry company, is one of the largest providers of geothermal power internationally.<sup>58</sup> Iron & Earth commends energy developers for investing in renewable energy. Further action is required to position these companies fundamentally in renewable energy, making green resource development central rather than peripheral to each company's project portfolio.

Renewable energy offers these companies opportunity. In the face of volatile energy

*"I am an electrician. I love bringing power safely into the grid and into hospitals and major facilities. I love watching the lights come on and I'm looking forward to a future where there is zero guilt attached to energy usage."*

*Finn Phillips, Electrician*

markets and fast-changing input costs, developers can diversify energy products and services with renewable technologies. Energy sector developers' expertise in land acquisition, resource characterization, engineering, large-scale project management, and stakeholder engagement should help them successfully transition. Companies should explore opportunities in renewable energy from the perspective of their relative strengths. For example, companies with offshore platform expertise might take a lead in developing offshore wind farm capabilities,<sup>59</sup> or companies with experience in subsurface resource extraction might look to developing geothermal capacity.<sup>60</sup> Canada should work with existing energy sector developers to launch a propitious renewable energy industry in Canada.

## Unions

Unions have always been at the forefront of contentious issues affecting labour. Throughout their history, union organizations have engaged members in difficult questions concerning speed-ups, new technologies and sector reductions. The necessary transition to renewable energy is no different. In 2003, energy sector unions actually prompted the Canadian Labour Congress (CLC) to develop a comprehensive policy

statement to address the future of Canada's energy development in the context of global warming. In the words of Hussan Yussuf, president of the Canadian Labour Congress, "[t]his has been the tradition of our movement, it has been the history of our movement. We have never been fearful of the future. So it is critical for our members to see themselves as part of this process, as a necessary part of how we build a better world and a more sustainable world."<sup>61</sup>

At Iron & Earth we think it is vital that existing energy sector unions are positioned within Canada's developing renewable energy sector, and take a leading role in the design and implementation of Canada's transition to renewable energy. The views of unions and associations such as IBEW, IBB, UA, Unifor, USWA, CLC, CUPE, and CAW, among others, on a wide range of issues, including sector regulations, training and employment legislation, will be key in developing a viable strategy to position existing energy sector workers in renewable energy. Union experience handling labour market data and forecasts can help keep Alberta's labour market and skills training approaches on target, and ensure the success of the renewable energy sector as a whole.

Energy sector unions can also help ensure that those currently dependent on the existing energy sector, or the poorest and most disadvantaged in society, are not unfairly burdened with the costs of

transition. The Canadian Labour Congress has already outlined a number of specific policy proposals to assure a transition to renewable energy does not entrench existing inequalities. These include government investment to "improve access to Employment Insurance training opportunities and employment supports" and the creation of Labour Market Partners Council to engage constructive discussion around key workforce development issues.<sup>62</sup> The Green Economy network, comprised of twenty-four member organizations, including the United Steel Workers, Unifor and the International Association of Machinists & Aerospace Workers among others, has outlined a proposal to create one million climate jobs and "transition toward a more equitable and sustainable economy" in the process.<sup>63</sup> A renewal of our energy sector is an opportunity to engage wider societal transformations to further the sustainable long term prosperity of all Canadians.



## Recommendations

We see the collaborative mobilization of contractors, developers, and unions as imperative to the success of Canada's transition to renewables. In this, we are compelled and supported by the multi-stakeholder organizational development strategies outlined by the Natural Step, and implemented by the Alberta based Energy Futures Lab, which help to transcend the often debilitating divisiveness and factionalism that forms between

interested parties through collaborative and dialogical cooperation across a range of energy related issues. In accordance with the Natural Step's 'Theory of Change,' Iron & Earth believes that a sustainable future is generative within the very modes of relating and organizing amongst interested parties, and it's in that spirit that the federal government should consider actions to position existing energy sector contractors, developers and unions within the renewable energy sector through incubator and innovation programs. To this end, we propose the following three policy recommendations:



1. Research and analyze existing instances where contractors, developers, unions and government have successfully collaborated toward renewable initiatives.
  - a. In many provinces there is a lack of clarity around jurisdictional boundaries between trades. This tension can compromise the safety of workers and at Iron and Earth worker safety is a first order concern. As a mitigation strategy we recommend a robust and ongoing jurisdictional assignment plan such that new energy technologies can be rapidly adopted into the work scope of all applicable building trades.
2. Support the development and refinement of existing incubator programs specifically tailored to collaboration between contractors, developers and unions seeking renewable energy solutions.
  - a. An excellent example is Alberta-based Tundra Solutions' Accelerated Centre for Entrepreneurs (ACE), which connects tradespeople, engineers and entrepreneurs in economic transition with technology, developers, investors, as well as legal,

marketing and human resource support, in order to generate sustainable, profitable, and employable solutions to climate change.<sup>64</sup>

- b. Iron & Earth supports the proposal by the Energy Futures Lab to continue operations for another three years and into the future. This incubator program has proven its importance throughout its first year and now requires ongoing federal support to continue to cultivate spaces for the cross-pollination of ideas in across a polarized landscape as Canada moves toward a renewable energy future.
3. Support will be required for stakeholders to access incubator programs, and act upon opportunities identified through program involvement.

### 3.4 Integrate renewable energy technologies and industrial scale energy efficiency projects into existing carbon based infrastructure

Through consultation with key stakeholders at the Energy Futures Lab, we have amended our earlier three-point plan to include the necessity of developing programs for oil, natural gas and coal companies to meet newly mandated emissions restrictions within existing operations.<sup>65</sup> This is a crucial industrial component in the wide-ranging need for increased energy efficiency and renewable integration across all sectors of the economy, and would both provide a means by which to offset carbon emissions in fossil-fuel based energy production in the short term, as well as generate the skills and capital with which these industries can begin to transition to a more robust renewable energy portfolio in the longer term. The in situ integration of renewables is an intermediary step in the process away from fossil-fuel dependency, yet one that provides important benefits – like in-house training and skill diversification – for



construction, installation, and development of renewable technologies.

Having recognized that renewables offer a means for diversification in the face of volatile energy input costs, a hedge against peaking oil demand in key markets, and way to tap into an increasing climate-conscious political environment, many oil and gas companies have already been developing their renewable energy portfolios. From 2000 to 2010, U.S.-based oil and gas companies invested roughly \$9 billion in renewable technologies – roughly one-fifth of the total U.S.

investment in renewables over the same period.<sup>66</sup> For example, solar PV systems have been successfully deployed in remote oil and gas operations to power monitoring systems, pipelines, compressors and pumping stations; companies like Encana and Suncor have been using solar-powered supervisory systems across the Canadian prairies, “representing the largest market for solar cells in Western Canada;”<sup>67</sup> BP has found that replacing glycol dehydrators with solar pumps paid for itself within three months in Wyoming; and in 2002 Shell developed offshore platforms that are fully powered by wind and solar energy, and have amounted to reduced cost and increases in safety.<sup>68</sup> While these are indications of the sort of integrative initiatives that will help transform the oil and gas industry and lessen our global demands on fossil fuels, a more significant and sustained uptake still seems forthcoming. As Pembina Institute puts it, there are a “host of on-site renewable energy possibilities that remain largely untapped by oil and gas companies, and scaling these up could transform both sectors for the better.”<sup>69</sup>

Beyond solar and wind application within existing carbon based infrastructure, there is also considerable geothermal

*“I am a Millwright by trade and live off the grid. I have built my own biodiesel system, solar power station, Earthship/Hempcrete house and permaculture site. I have about 10 years experience in personal clean energy projects. I have not worked in the industry, but I am ready to make the move now.”*

*Brian Lavoie, Industrial Mechanic*



potential with respect to existing oil wells, either in operation or abandoned.<sup>70</sup> In Canada, there have been over 400,000 wells drilled by oil and gas companies, and the number of those abandoned has quadrupled over the last year, presenting significant opportunities for geothermal development – an incredibly efficient and cost-effective energy source that is readily available within existing oil and gas skill-sets. And yet, as CanGEA and private geothermal developers have highlighted, Canada has yet to establish an appropriate economic climate for geothermal, driving companies, like Calgary’s Flashpoint Resources, to develop its programs and skills in other countries, like the U.S.<sup>71</sup> The economic and environmental opportunity provided by geothermal, in other words, is slipping out the door.

Pembina Institute notes that among the obstacles to a broader and more sustained integration of renewable technologies in existing carbon based projects include the lack of national political effort on climate change and renewables; the lack of renewable energy literacy among oil and gas engineers, encompassing both technology and current economics; and the ad-hoc and personality-driven approaches to renewable energy project development within the oil and gas sector.<sup>72</sup> In this regard, Iron & Earth emphasizes the need

for a robust commitment among government and oil and gas companies to address these shortcomings by facilitating and supporting innovation, training, and substantive research into the comprehensive integration of renewable technologies in industrial oil and gas production, and by providing opportunities for significant portfolio diversification and skills upgrades for companies and workers. And it is in response to these shortcomings that we propose the following three recommendations:

1. Research and comprehensive analysis of oil, natural gas and coal operations that could offset emissions through the use of viable renewable technologies. This research should include comparative analysis of similar applications in other countries seeking to meet climate targets while developing their energy sector.
2. Identify specific site locations and operations in Canada that are capable of integrating renewable technologies into existing operations.
3. Provide support for companies seeking to implement renewable technologies through on-site training programs and infrastructure funding.

## Iron & Earth Campaigns and the Four-Point Plan

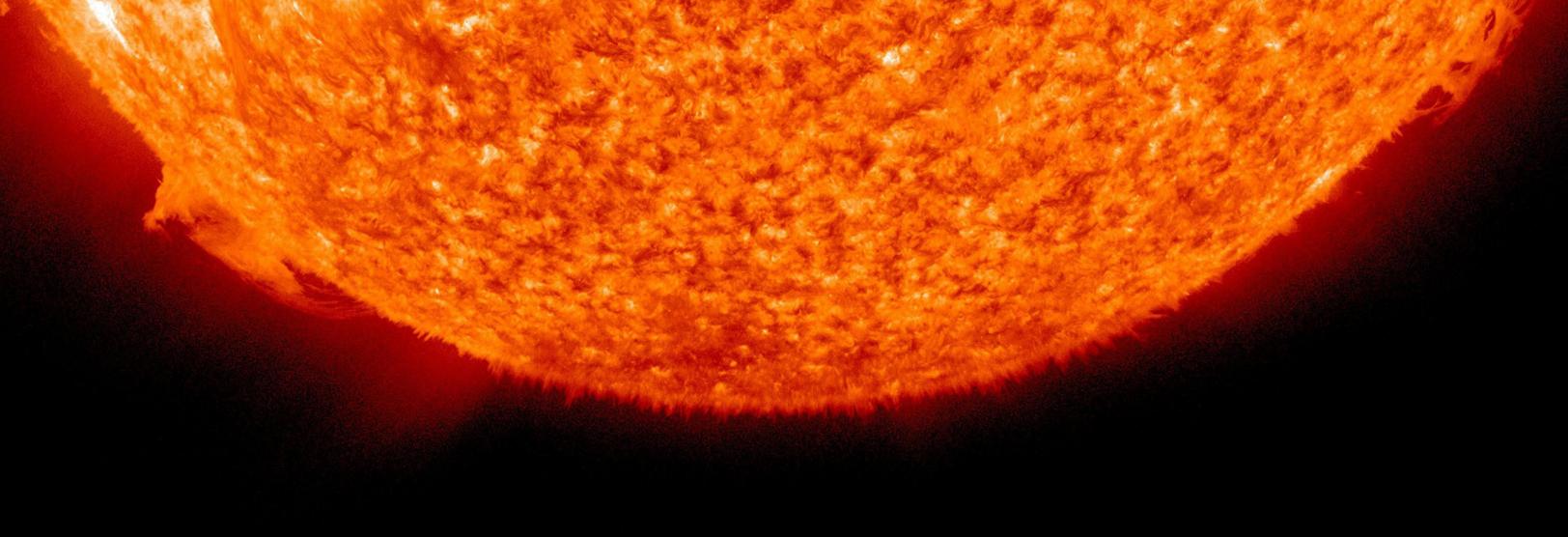


Iron & Earth is already spearheading projects to develop and implement our four-point plan. Currently, Iron & Earth is in the process of securing funding for both its Solar Skills Training Program and Renewable Energy Activation Programs. This section will summarize these campaigns, which by no means exhaust the types of projects possible as stakeholders identify solutions to fulfill the four-point plan. Indeed, one of the motivating features of the Workers' Climate Plan is to highlight the wide range of challenges and opportunities that require solution based projects and entrepreneurship led innovation. Iron & Earth still has considerable research,

collaboration, and development to undertake as we continue to work toward a just and sustainable transition for our worker members and the economy, and we look forward to ongoing discussions with stakeholders as we continue to build upon our policy recommendations and initiatives.

*"Lack of training in renewable energy production has caused loss of opportunities."*

*Kris Taylor, Electrician*



## The Iron & Earth Solar Skills Training Program

The goal of Iron & Earth's Solar Skills Training Program is to support the rapid upskilling of 1,000 Alberta tradespeople as renewable energy design and installation professionals through a range of five-day hands-on training programs, through the installation of solar PV, solar heat, energy efficiencies, and EV charging stations at high schools across Alberta. Phase One is focused on completing ten projects, which will train 400 workers in these technology fields. These programs will utilize existing training providers, but unlike existing programs, our training programs will be an on-the-job training experience. The significant advantage of this model is the elimination of labour costs.

### Seven Goals:

1. Train 1,000 tradespeople to become employable in four renewable energy project fields.
2. Develop a replicable model for the rapid training and deployment of industrial energy sector workers into renewables.
3. Establish an Alberta-based manufacturer of solar racking components.
4. Position an Alberta-based oil sands contractor in the solar industry.
5. Provide entrepreneurial tradespeople with information and opportunities to start their own businesses through a Solar X prize competition.
6. Introduce high school students to the opportunities in renewable energy trades and commerce through the high school curriculum.
7. Increase energy literacy within the general public.

Through a series of five-day programs, each student will become aware of the entrepreneurial opportunities available in solar PV, solar heat, energy efficiency, and EV charging stations. Some of these students will be awarded an opportunity to participate in a business incubator program. These training programs will also provide the skills necessary for commercial and utility-scale renewable energy installations. These high-visibility projects will put tradespeople back to work in their communities, building much-needed infrastructure and conducting energy efficiency upgrades in their

hometowns. The impact of these projects will be amplified by our public engagement initiatives and high school curriculums which will make the work visible and apparent in the everyday lives of community members.

As developer of this project, Iron & Earth will be responsible for bringing the necessary partners and stakeholders together to ensure the first 10 projects are completed successfully, while having a demonstrably positive impact on the lives of Albertans. We will also ensure these first 10 projects are effectively used as demonstration models for how hands-on training can be scaled up across the province and country for other trades, and within a broad range of renewable energy technologies.



In order to successfully carry out this ambitious program, Iron & Earth has assembled a team of some of Canada's leading renewable energy training providers, contractors, engineers, research institutes, and post-secondary institutions. We also recognize how the Solar Skills Training Program pilot project can inform long-term development of province-wide standards and a curriculum for trades people working with renewable energy technology.

## Concluding Remarks

Since Iron & Earth launched in the spring of 2015, we have received overwhelming support from an unprecedented range of stakeholders. Our organization was covered by more than 100 media outlets within two months of launching, including stories from Australia, Germany, most Canadian provinces and many national news outlets. Close to 5,000 individuals have signed our Solar Skills pledge, more than 450 of whom have identified as having trades experience. Most of these workers have, or continue to work in Alberta's oil and gas sector and have provided personal testimonials strongly advocating for the vision and initiatives of Iron & Earth.

Iron & Earth is led by oil sands workers. The excitement and support it has generated is evidence of its unique standing as an organization, and its potential to continue to grow and affect positive change toward job creation, economic growth, and sustainable

energy. The policy recommendations outlined in this chapter are delivered from the strength of workers who advocate for a sustainable and just transition to renewables, as well as the industries and unions of which they are members. These collaborations have given us confidence and enthusiasm in pursuing our campaigns and initiatives, and have instilled the desire to continue discovering and developing refined opportunities. Through the ongoing development of our Solar Skills Training Program and Renewable Energy Activation Program, Iron & Earth is committed to continued cooperation with all interested parties. It is our sincere hope that with the Workers' Climate Plan, you will stand beside us in realizing Canada's climate targets by supporting workers in building a more sustainable and equitable future for all Canadians, present and future.



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# Appendix A:

## Detailed Survey Results:

### 1) Worker Submissions

[http://www.123contactform.com/sfnew2.php?  
redirect=true&action=showreports&s=1959804&rid=38953](http://www.123contactform.com/sfnew2.php?redirect=true&action=showreports&s=1959804&rid=38953)

### 2) Non-worker Submissions

[http://www.123contactform.com/sfnew2.php?  
redirect=true&action=showreports&s=2020038&rid=41326](http://www.123contactform.com/sfnew2.php?redirect=true&action=showreports&s=2020038&rid=41326)

# Endnotes

<sup>1</sup> Prior to the total collapse of the Northwest Atlantic Cod Fishery, “There were 231 operational fish processing plants employing a workforce of 27,567 persons [in Canada]. There were also 28,830 DFO registered fishermen and 16,940 individual tax filers reporting a fishing income.” This is a stark example of a workforce that failed to adapt to a changing world; Canada’s energy sector workers do not have to follow the same path. “Northern Cod: a failure of Canadian fisheries management.” Government of Canada <<http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=2144982&File=21>>.

<sup>2</sup> Policy Horizons Canada. Canada in a Changing Global Energy Landscape. Draft for discussion, March 3, 2016, p.16.

<sup>3</sup> <<https://www.aadnc-aandc.gc.ca/eng/1458682313288/1458682419457>>

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<sup>5</sup> “Wind and Solar Are Crushing Fossil Fuels.” Bloomberg News, April 6, 2016 <<http://www.bloomberg.com/news/articles/2016-04-06/wind-and-solar-are-crushing-fossil-fuels>>.

<sup>6</sup> By “renewable energy” we follow Natural Resource Canada’s definition: “energy that is obtained from natural resources that can be naturally replenished or renewed within a human lifespan, that is, the resource is a sustainable source of energy.” These include energy sourced from wind, solar, biomass (pending sustainable harvesting), geothermal and ocean/tidal. (See: Natural Resources Canada: About Renewable Energy <http://www.nrcan.gc.ca/energy/renewable-electricity/7295>).

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<sup>8</sup> “Alberta unemployment rate surges to 7.8% with largest decline in hours worked in 30 years,” CBC News, June 10, 2016 <<http://www.cbc.ca/news/canada/calgary/alberta-job-losses-may-2016-1.3628424>>.

<sup>9</sup> “Canada sheds 2,100 jobs in April,” CBC News, May 2, 2016 <<http://www.cbc.ca/news/business/canada-jobs-march-employment-1.3569704>>.

<sup>10</sup> Petroleum Labour Market Information (PetroLMI). Labour Market Outlook 2016 to 2020: Canada’s Oil and Gas Industry. April 2016.

<sup>11</sup> Government of Alberta. “Alberta takes next steps to phase-out coal pollution under Climate Leadership Plan.” March 16, 2016; Government of Alberta. “Ending Coal Pollution,” c. 2016 <<http://www.alberta.ca/climate-coal-electricity.aspx>>.

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<sup>13</sup> American Council for an Energy-Efficient Economy; American Council on Renewable Energy: The Twin Pillars of Sustainable Energy: Synergies Between Energy Efficiency and Renewable Energy Technology 2007 <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.545.4606&rep=rep1&type=pdf>>.

<sup>14</sup> Clean Energy Canada. A Year for the Record Books: Tracking the Energy Revolution: Global 2016. February 2016 <[http://cleanenergycanada.org/wp-content/uploads/2016/02/A-Year-for-the-Record-Books\\_April.pdf](http://cleanenergycanada.org/wp-content/uploads/2016/02/A-Year-for-the-Record-Books_April.pdf)>.

<sup>15</sup> “Wind and Solar Are Crushing Fossil Fuels.” Bloomberg News, April 6, 2016 <<http://www.bloomberg.com/news/articles/2016-04-06/wind-and-solar-are-crushing-fossil-fuels>>.

<sup>16</sup> Clean Energy Canada. A Year for the Record Books: Tracking the Energy Revolution: Global 2016. February 2016 <[http://cleanenergycanada.org/wp-content/uploads/2016/02/A-Year-for-the-Record-Books\\_April.pdf](http://cleanenergycanada.org/wp-content/uploads/2016/02/A-Year-for-the-Record-Books_April.pdf)>.

<sup>17</sup> “An Alberta solar boom is coming: Almost a billion dollars worth of projects are in development,” Progress Alberta, March 23, 2016 <[http://www.progressalberta.ca/alberta\\_solar\\_boom](http://www.progressalberta.ca/alberta_solar_boom)>.

<sup>18</sup> “Geothermal Could Put Thousands from Alberta’s Oil and Gas Sector Back to Work,” DeSmog, May 3, 2016 <<http://www.desmog.ca/2016/05/03/geothermal-could-put-thousands-alberta-s-oil-and-gas-sector-back-work>>.

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<sup>20</sup> “Jobs report shows Alberta’s employment prospects could skyrocket through green economy investments” Greenpeace, April 22, 2016 <<http://www.greenpeace.org/canada/Global/canada/pr/2016/04/GreenJobsreport.pdf>>.

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<sup>23</sup> Ibid.

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<sup>25</sup> See: Canadian Labour Congress. July 28, 2016. Green Jobs for Tomorrow: Submission By the Canadian Labour Congress To the Working Group on Clean Technology, Innovation and Jobs; Blue Green Canada. July 27, 2016. Submission to the Government of Canada’s Conversation on Climate Change; Green Economy Network. July 2016. One Million Climate Jobs: A Plan for a Sustainable and Equitable Economy: Green Economy Network Submission to the Working Group on Clean Technology, Innovation and Jobs.

<sup>26</sup> Ibid, 14.

<sup>27</sup> Canadian Geothermal Energy Association: Pre-Budget 2016 Submission to the House of Commons Standing Committee on Finance. 2016, p. 3.

<sup>28</sup> “Alberta recession one of the most severe ever, TD Economics report finds,” CBC News, July 18, 2016 <<http://www.cbc.ca/news/canada/calgary/td-economics-report-alberta-recession-gdp-forecast-1.368405>>.

<sup>29</sup> “Labour Market Outlook 2016-2020: Canada’s Oil and Gas Industry.” Petro LMI & Enform, April 2016, <<http://www.careersinoilandgas.com/media/243771/canada-wide-labour-market-outlook-final.pdf>> Accessed October 10, 2016.

<sup>30</sup> Ibid.

<sup>31</sup> Blue Green Canada. Submission to the Government of Canada’s Conversation on Climate Change. July 27, 2016, p.3.

<sup>32</sup> Green Economy Network. One Million Climate Jobs: A Plan for a Sustainable and Equitable Economy: Green Economy Network Submission to the Working Group on Clean Technology, Innovation and Jobs. July 2016.

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<sup>34</sup> Canadian Labour Congress. Green Jobs for Tomorrow: Submission By the Canadian Labour Congress To the Working Group on Clean Technology, Innovation and Jobs, July 28, 2016, p. 17.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid. 19.

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<sup>38</sup> Canadian Geothermal Energy Association. CanGEA’s position and recommendations for specific climate change mitigation strategies and carbon pricing, June 21 2016, p.4.

<sup>39</sup> Rt. Hon. Justin Trudeau, P.C., M.P, Prime Minister of Canada. Minister of Natural Resources Mandate Letter, 2015 <<http://pm.gc.ca/eng/minister-natural-resources-mandate-letter>>.

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<sup>41</sup> Canadian Labour Congress. Green Jobs for Tomorrow: Submission By the Canadian Labour Congress To the Working Group on Clean Technology, Innovation and Jobs, July 28, 2016.

<sup>42</sup> “116. Tillsonburg: From tobacco farming to building wind turbine blades,” Green Energy Futures, July 13, 2015 <<http://www.greenenergyfutures.ca/episode/tillsonburg-wind-turbine-blade-manufacturing>>.

<sup>43</sup> Meghan Cowan. Ontario's Green Energy Act: Two Years Later, July 2011 <<http://airdberlis.com/Templates/Articles/articleFiles/746/Ontario's%20Green%20Energy%20Act%20Two%20Years%20Later.pdf>>.

<sup>44</sup> It should be noted this was also because West Texas has very good wind conditions. Wind also received two federal subsidies in Texas: the Federal Production Tax credit and the Investment Tax Credit. Different provinces in Canada should consider geographic advantages when investing in renewable energy capacity. (See: London Economics International LLC. Case studies of policy options for reducing greenhouse gases and increasing renewable energy capacity, September 29, 2015 <[http://www.transalta.com/sites/default/files/TransAlta\\_submission\\_appendix2.pdf](http://www.transalta.com/sites/default/files/TransAlta_submission_appendix2.pdf)>

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<sup>46</sup> Oil and Gas 360: Wind Sector Job Boom Could Offer Shelter to Displaced Oil & Gas Employees. April 25, 2016. <<http://www.oilandgas360.com/wind-sector-job-boom-could-offer-shelter-to-displaced-oil-gas-employees/>>.

<sup>47</sup> “Why Texas is a Clean Energy Leader: 6 Reasons.” Clean Technica. July 1, 2016. Web. <<https://cleantechnica.com/2016/07/21/texas-wind-energy-leader-6-reasons/>>.

<sup>48</sup> “371,400 jobs gross in Germany from renewables.” Renewables International. May 25, 2014. <http://www.renewablesinternational.net/371400-jobs-gross-in-germany-from-renewables/150/537/79099/>>

<sup>49</sup> See: London Economics International LLC. Case studies of policy options for reducing greenhouse gases and increasing renewable energy capacity, September 29, 2015 <[http://www.transalta.com/sites/default/files/TransAlta\\_submission\\_appendix2.pdf](http://www.transalta.com/sites/default/files/TransAlta_submission_appendix2.pdf)>.

<sup>50</sup> CanWEA and CanSIA: Policy Recommendations from Canada's Solar and Wind Energy Industries with Respect to Canada's Approach to Climate Change. June 2, 2016.

<sup>51</sup> See: CanWEA and CanSIA: Policy Recommendations from Canada's Solar and Wind Energy Industries with Respect to Canada's Approach to Climate Change. June 2, 2016. Pg. 12; Canadian Labour Congress: Canadian Labour Congress. Green Jobs for Tomorrow: Submission By the Canadian Labour Congress To the Working Group on Clean Technology, Innovation and Jobs, July 28, 2016. Pg 15.

<sup>52</sup> Some Canadian companies are already expanding into the global market. Toronto's SkyPower has announced \$8 billion worth of deals to build solar projects in Bangladesh, Kenya, Panama, Mexico, Djibouti, and India. (See: Canada's Solar Companies Expanding Abroad. Cleantech Canada. Oct 22, 2015. Web. <<http://www.canadianmanufacturing.com/manufacturing/canadas-solar-companies-expanding-abroad-156397/>>.

<sup>53</sup> See: CanWEA and CanSIA: Policy Recommendations from Canada's Solar and Wind Energy Industries with Respect to Canada's Approach to Climate Change. June 2, 2016. Pg. 16.

<sup>54</sup> See: Pembina Institute. Renewable energy opportunities in the oil and gas sector, January 8, 2013 <<https://www.pembina.org/pub/2411>>.

<sup>55</sup> Jacobs, for example, is one of many contractors who provide services to Canada's petroleum industry. You can learn more about their services at their website <<http://www.jacobs.com/>>.

<sup>56</sup> “Big Oil” Leads in Innovations and Renewable Energy,” Canada's Energy Citizens, January 5, 2016 <[http://www.energycitizens.ca/\\_big\\_oil\\_leads\\_in\\_innovations\\_and\\_clean\\_energy](http://www.energycitizens.ca/_big_oil_leads_in_innovations_and_clean_energy)>.

<sup>57</sup> “Big Oil” Leads in Innovations and Renewable Energy,” Canada's Energy Citizens, January 5, 2016 <[http://www.energycitizens.ca/\\_big\\_oil\\_leads\\_in\\_innovations\\_and\\_clean\\_energy](http://www.energycitizens.ca/_big_oil_leads_in_innovations_and_clean_energy)>.

<sup>58</sup> “How Traditional Energy Companies Are Building a Viable Future for Renewables,” Alberta Oil, July 18, 2016 <<http://www.albertaoilmagazine.com/2016/07/oil-gas-companies-moving-towards-viable-renewable-energy-future/>>.

<sup>59</sup> Pembina Institute. Renewable energy opportunities in the oil and gas sector, January 8, 2013 <<https://www.pembina.org/pub/2411>>.

<sup>60</sup> See: Canadian Geothermal Energy Association. CanGEA's position and recommendations for specific climate change mitigation strategies and carbon pricing, June 21 2016.

<sup>61</sup> Canadian Labour Congress. Climate Change: A Just Transition is Possible, November 22, 2015 <<https://www.youtube.com/watch?v=pz3xWUKQQDY>>.

<sup>62</sup> Canadian Labour Congress. Green Jobs for Tomorrow: Submission By the Canadian Labour Congress To the Working Group on Clean Technology, Innovation and Jobs, July 28, 2016, p. 27.

<sup>63</sup> Green Economy Network. One Million Climate Jobs: A Plan for a Sustainable and Equitable Economy: Green Economy Network Submission to the Working Group on Clean Technology, Innovation and Jobs, July 2016, p.2.

<sup>64</sup> Kelly Cryderman: Tundra Tank offers opportunity to Alberta's idle talent. The Globe and Mail. Sept 19, 2016. <[http://www.theglobeandmail.com/report-on-business/small-business/startups/tundra-tank-offers-opportunity-to-albertas-idle-talent/article31948269/?utm\\_source=Shared+Article+Sent+to+User&utm\\_medium=E-mail%3A+Newsletters+%2F+E-Blasts+%2F+etc.&utm\\_campaign=Shared+Web+Article+Links](http://www.theglobeandmail.com/report-on-business/small-business/startups/tundra-tank-offers-opportunity-to-albertas-idle-talent/article31948269/?utm_source=Shared+Article+Sent+to+User&utm_medium=E-mail%3A+Newsletters+%2F+E-Blasts+%2F+etc.&utm_campaign=Shared+Web+Article+Links)>. See Also: <http://tundraace.com/>>

<sup>65</sup> For example, "A \$30/tonne carbon price will be applied to oil sands facilities based on results already achieved by high performing facilities — to drive towards reduced emissions and carbon competitiveness, rather than rewarding past intensity levels." (Government of Alberta. "Capping Oil Sands Emissions: Transitioning to performance-based standards and a legislated limit to oil sands emissions." <<http://www.alberta.ca/climate-oilsands-emissions.aspx>>).

<sup>66</sup> "When Renewables Meet Oil and Gas Industry, Opposites Attract." Renewable Energy World. April, 2014. Web. <<http://www.renewableenergyworld.com/articles/2014/04/when-renewables-meet-the-oil-and-gas-industry-opposites-attract.html>>.

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

<sup>69</sup> Ibid.

<sup>70</sup> "Geothermal Could Put Thousands from Alberta's Oil and Gas Sector Back to Work." DeSmog Canada. May 3, 2016. <<http://www.desmog.ca/2016/05/03/geothermal-could-put-thousands-alberta-s-oil-and-gas-sector-back-work>>.

<sup>71</sup> DeSmog Canada. Geothermal Could Put Thousands from Alberta's Oil and Gas Sector Back to Work. May 3, 2016. <<http://www.desmog.ca/2016/05/03/geothermal-could-put-thousands-alberta-s-oil-and-gas-sector-back-work>>.

<sup>72</sup> "When Renewables Meet Oil and Gas Industry, Opposites Attract." Renewable Energy World. April, 2014. <<http://www.renewableenergyworld.com/articles/2014/04/when-renewables-meet-the-oil-and-gas-industry-opposites-attract.html>>.