

# MORE BANG FOR OUR BUCK

**How Canada Can Create More  
Energy Jobs and Less Pollution**

**BLUEGREEN**  
CANADA

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BLUE GREEN CANADA is an alliance between Canadian labour unions, environmental and civil society organizations to advocate for working people and the environment by promoting solutions to environmental issues that have positive employment and economic impacts. The alliance is based upon the realization that a future sustainable economy must provide good jobs and protect the environment, not one or the other.

This report is the first in a series of reports exploring some of the less-examined aspects of Canada's resource development and the global transition to a green economy. These reports are part of Blue Green Canada's contribution to the discussions of a Canadian energy strategy.

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C A N A D A

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# MORE BANG FOR OUR BUCK

## How Canada Can Create More Energy Jobs and Less Pollution

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The world's energy system is undergoing a profound transformation: from high-carbon, centralised and insecure to low-carbon, distributed and robust. This brings immense opportunity coupled with commensurate risk.

– Bloomberg New Energy Finance<sup>116</sup>



# EXECUTIVE SUMMARY

Canadians care deeply about climate change and the environment. But, as an oil-producing nation, we are a conflicted group. Many Canadians believe that, given the role oil plays in our economy, we must make a choice between environmental protection and economic growth. Many express that, while they would like to see Canada clean up its act and its image, they cannot see an alternative to an economy driven by fossil fuels.

This report shows there is an alternative — one that is better both for our economy and our environment.

Canada's growing economic reliance on oil, driven by higher oil prices and increased oil production, has exposed us to a great deal of volatility caused by the large swings in global oil prices. This volatility is compounded by the economics of the oil sands themselves, which now supply over half of Canadian oil production. In addition, the rise of oil has led to job losses in other sectors due to the effects of turning the Canadian currency into a petrodollar. This reliance has also caused us to fall far short of our commitments to reduce emissions and prompted the removal of long-standing environmental protection measures.

This report shows that investments in efforts to reduce pollution create more jobs than comparable investments in fossil fuels. Analysis presented in this report shows 6-8 times more jobs could be created by investments in renewable energy, energy efficiency or public transit compared with similar investments in the oil and gas industry.

For a tangible example of how Canada can choose a different path, we looked at the \$1.3 billion of taxpayers' money the federal government gives to oil and gas companies each year in the form of subsidies. We asked what if, instead of investing that money in polluting forms of energy, the government invested that money in industries that could reduce pollution?

We explored three different scenarios for how this money could be used to spur the transition to clean energy and found that, in each scenario, between 18,000-20,000 jobs could be created. By comparison, according to government estimates, 2,340-2,860 jobs can be generated with \$1.3 billion invested in oil and gas production, refining or pipelines.

**Table 1. A Summary of the Job Creation Potential of \$1.3 billion Invested in Energy\***

Scenario	Jobs Created with \$1.3 billion
Oil & Gas Extraction <sup>1</sup>	2,340-2,860
Investments in Wind, Solar, Hydro and Biomass As Per Various Industry Targets	20,113
Investments in Energy Efficiency	18,296
Investments in Wind and Solar Power in Order to Meet Canada's Obligation to Limit Warming to a 2°C Target	18,947

\*The methodology and sources for the numbers included in this chart are provided in the body of the report.

Canada will continue to produce and use oil for some time to come, and that will have some economic benefits. But it's the wrong direction if we hope to tap into a growing share of the jobs and opportunity of the global transition towards renewable energy. Over the past eight years, the renewable energy sector experienced solid growth, despite a global economic collapse and subsequent challenges in the world's major economies. According to recent estimates, the renewable energy sector employs 5 million people worldwide. With investment in renewable energy now outpacing investment in fossil fuel infrastructure, this workforce is set to grow substantially in the years ahead.

At the same time, the warning signs that we need to get serious about tackling global warming have never been clearer. This year thousands of heat records were broken across the continent. And this summer, an area of Arctic sea ice was almost 700,000 square kilometres smaller than ever before, a loss equivalent to the size of Texas. The oil industry's plan to dramatically increase oil production will lead Canada in the wrong direction if we want to reduce pollution, ensure a healthy planet for our children and take advantage of the financial benefits of the renewable energy sector. And, while jobs will be created through oil sands expansion, the pace of development, as well as the location and type of jobs created, are not in the best interests of Canadian workers.

We know that Canadians care deeply about both the environment and the economy. The oil industry's plans to ramp up oil sands production to over 5 million barrels per day are not in the best interest of Canadians, economically or environmentally. In order to reduce global warming pollution and create good, sustainable jobs, Canada needs to:

1. **Eliminate fossil fuel subsidies:** Canada should stop handing taxpayer dollars to polluting fossil fuels industries. This creates a financial incentive to make the economic and environmental problems worse.
2. **Develop a Canadian energy strategy:** The strategy must prioritize the transition from fossil fuels to non-polluting, renewable energy. It also must identify strategies for the industries — like renewable energy and energy efficiency — to make the transition happen.
3. **Create green jobs:** The Canadian energy strategy needs to include a robust strategy to harness jobs in renewable energy and low-carbon industries, and include a just transition plan for current energy workers and others affected by the transition.
4. **Set national targets:** The federal government should develop targets for renewable energy, energy efficiency and transit and work with provinces to reach them.
5. **Educate:** Build awareness among the Canadian workforce about the green economy and ensure Canadians are trained to take advantage of the jobs created in it.

“...allowing an economy to centre its trade on high-carbon exports in the absence of a long-term transition plan can lead to long-term stagnation and economic malaise.”



# INTRODUCTION

Canada is not alone on its quest to become an “energy superpower.” But by relying on the unprecedented expansion of the oil sands, Canada is going in the opposite direction to many other countries that are harnessing the economic and environmental benefits of renewable energy.

Our reliance on fossil fuels has obvious environmental impacts. The climate-changing pollution created by oil sands extraction, transportation and combustion is undeniable. It also runs counter to Canadian commitments at successive international meetings to cut our emissions.

The pollution of water and land in the oil sands’ immediate vicinity is also growing. Remediation efforts pale in comparison to the immense scale of the pollution. Every day, 250 million litres of toxic tailings flow into unlined pits.<sup>2</sup> To put that in perspective, that’s about the same amount of liquid that flows over Niagara Falls in 93 seconds.

Then there are the pipeline spills that have happened and will continue to happen. Add to that the dangers of oil spills from supertankers the size of the Empire State Building, which could navigate the narrow, obstacle-strewn path from Kitimat, B.C. through some of the roughest waters on earth and the site of a recent earthquake.

Despite the existing pollution and the high risk of more pollution to come, Canadian energy policy increasingly revolves around the oil sands. Canada’s growing reliance on the oil sands brings both positive and negative economic impacts. But we need to remember it’s not the only option available for economic success. This report shows how embracing cleaner energy can help Canada create more jobs, and prevent and reduce pollution.

Other governments are taking advantage of the global trend towards using renewable energy. By shifting to renewable energy, they are reaping the benefits of economic growth and job creation. This report shows that clean energy investments result in more jobs per dollar invested than similar investments in fossil fuel energy sources. It also shows there are significant economic risks associated with a deepening reliance on oil sands, with their inevitable, unpredictable and uncontrollable ups and downs.

The report begins by describing the current trend to increase oil sands production as well as the associated economic downsides: unpredictable swings in employment, and royalty and tax revenue; an appreciation of the Canadian dollar; job losses in the manufacturing sector; and a loss of resilience in the Canadian economy on the whole.





“Environmental sustainability is not a job killer, as it is sometimes claimed. On the contrary, if properly managed, it can lead to more and better jobs, poverty reduction and social inclusion.”

– ILO Director-General Juan Somavia<sup>118</sup>

We contrast this with evidence of recent employment figures for the clean energy sector. We demonstrate the degree to which Canada is missing out on the clean energy revolution, and discuss the consequences of Canada’s failure to harness renewable energy.

The report concludes with evidence of the job creation potential that investments in clean energy options can deliver for Canada. We present results for three alternative clean energy scenarios. These results expose the one-sided nature of current energy debate, where environmental issues and job creation opportunities are overlooked in favour of expanded oil sands production. They show that Canadians do not need to choose between the environment and the economy.

Canada will continue to produce and use oil for some time to come, and that will have some economic benefits. But the fact is more jobs, a healthy economy and fewer emissions could be realized if Canada gets serious about the transition to clean energy rather than let oil sands expansion run the show.

# ALL ABOARD THE OIL ROLLERCOASTER

Since 2000, oil production in Canada has increased by approximately 850,000 barrels per day, or over 300 million barrels per year.<sup>3</sup> This growth has come almost entirely from the expansion of Alberta's oil sands. Over the last decade, conventional oil production declined while oil sands production increased by over 250 per cent.<sup>4</sup>

If the oil industry gets its way, this trend will continue, and even accelerate, with the oil sands playing an increasingly dominant role in Canada's economy. In 2010, the oil sands were responsible for just over half of Canadian oil production. By 2025, they are expected to be responsible for nearly 80 per cent of that total.<sup>5</sup> Industry estimates predict that production from the oil sands will more than double from the current volume of 1.6 million barrels per day to nearly 3.5 million barrels per day by 2020.<sup>6</sup>

The recent growth in oil sands production, coupled with higher oil prices, has dramatically increased the importance of oil to the Canadian economy. However, given the price volatility of oil, the effect is that Canada has now boarded the oil rollercoaster; a risky endeavour associated with unpredictable highs, lows, twists and turns.

## The Ups and Downs of an Oil Economy


Commodity prices, especially oil, are inherently volatile.<sup>7</sup> For example, the price for a barrel of oil ranged from \$60 to over \$140 in 2008. And in Canada, this volatility is compounded by the economics of the oil sands, which are more expensive to produce than other oil sources and require a high market price in order to break even.

The break-even point has been getting higher, with operating costs in the oil sands increasing by 250 per cent since 2000.<sup>8</sup> Estimates vary, but by one count, the price of oil must be above \$80 per barrel to make some new oil sands mine projects economical.<sup>9</sup> A recent report from Bank of America Merrill Lynch found Canadian oil sands need an average per barrel price of \$113 to break even.<sup>10</sup>

All of this explains why, according to the International Energy Agency (IEA), oil sands projects were among the hardest hit by the global recession and the resulting crash in oil prices.<sup>11</sup> It also explains why some oil sands projects, which seemed like a sure thing a couple of years ago, are now being delayed by oil sands giants like Suncor and Syncrude.<sup>12</sup>

The impacts of this volatility are most noticeable in Alberta, a province that collects more in oil royalties than it does in personal income taxes. Alberta's labour market is prone to more unpredictable and dramatic ups and downs in comparison to other regions in Canada.<sup>13</sup> Analysis by the C.D. Howe Institute demonstrates that Alberta has double the government revenue volatility of British Columbia and Ontario.<sup>14</sup> As oil sands production grows, so too will the amount of oil revenue to the federal government, making it also increasingly vulnerable to similar commodity-related price swings.<sup>15</sup> The federal government proudly trumpets that oil revenues pay for social programs,<sup>16</sup> which begs the question: what would happen to these programs should oil revenues dry up or vastly diminish?

While global commodity prices are currently doing well, there's no guarantee that the good times will last. For example, a recent report out of Harvard University predicts that, thanks to new technologies like horizontal drilling and hydraulic fracturing, oil prices will be highly volatile to 2015, after which time prices could suffer a dramatic fall, or even collapse.<sup>17</sup>



“We’re not questioning the wisdom of developing the oil sands. What we’re questioning is the current wild-west model for development — the pace of development. Surely we all benefit when we can have a thoughtful discussion about pace.”

- Gill McGowan, Alberta Federation of Labour<sup>119</sup>

Photo: David Dodge, The Pembina Institute

Then there are those who argue that the world simply cannot afford oil at \$100 per barrel and until alternatives are developed, we will be caught in a perpetual cycle of boom and bust. When oil prices rise too high, the economy crashes, sending oil prices through the floor; lower oil prices then make possible an economic recovery, which in turn leads to higher prices, and the whole cycle repeats. In the words of economist Jeff Rubin, the cure for high oil prices is high oil prices.<sup>18</sup> And there is the fact that high oil prices also encourage a transition away from oil as alternative energy sources start to look more appealing, which also has implications on prices.

## Digging in Deeper

It's worth noting that if we are experiencing a period of sustained high oil prices, we have an opportunity to use our new-found wealth strategically in order to provide for the future. Yet Canada is heading in the opposite direction of other advanced economies, such as Australia and Norway, which also rely on exporting commodities. These countries are taking advantage of the boom by increasing royalties, implementing strict climate policies, improving environmental standards and saving a portion of the wealth for the future.<sup>19</sup>

And what is Canada doing? Just the opposite. Canada has made it easier for new mining and energy projects to get regulatory approval, weakened environmental protection laws, and reduced the public financial take from this boom. This leaves us in a more vulnerable position to deal with a bust.

The federal government's 2012 budget systematically changed or repealed nearly every major environmental law.<sup>20</sup> The changes will have enormous impacts on our climate, as well as our air, land and water.

New oil sands projects have already been approved that would ramp up production to a whopping 5.1 million barrels per day, yet the federal government is creating regulatory conditions that will further accelerate oil development in Canada while decreasing the royalties available to fund other services Canadians value.<sup>21</sup> And the weakening of environmental protection laws comes at a time when the investment community is calling for stronger rules to reduce the environmental impacts of oil sands production.<sup>22</sup>



“Over the last four decades, each time oil prices have spiked, the global economy has entered a recession.”

- Jeff Rubin<sup>120</sup>

## The Petrodollar's Impact

Recent history suggests this increased production will increase emissions and pollution. The recent commodities boom, led by oil, has also helped push the Canadian dollar higher. While there are other factors that contribute to its appreciation — reduced demand from the United States, and a global shift in manufacturing to Asia — rapid oil sands development is also playing a role.

The higher dollar makes it very difficult for Canada's large manufacturing industry (three times the size of the oil and gas industry in 2010) to sell their higher-priced goods abroad.<sup>23</sup> It also makes these goods less competitive with imported goods at home.<sup>24</sup> Indeed, the Organization for Economic Co-operation and Development's (OECD) 2012 Economic Survey of Canada concluded that the size and competitiveness of manufacturing in the Canadian economy is heavily influenced by the exchange rate.<sup>25</sup>

Booming commodity exports and an ailing manufacturing sector, combined with a currency that is strongly correlated to the price of oil, has led a number of economists and think-tanks, including the respected OECD, to conclude that Canada has anywhere from a mild to severe case of Dutch disease.<sup>26,27,28,29,30,31</sup>

Dutch disease is an economic malady that occurs when a country's exchange rate appreciates to the point where its manufactured goods are priced too high to export, resulting in the decline or collapse of the manufacturing sector.<sup>32</sup> Over the past decade, Canada has lost 500,000 manufacturing jobs.<sup>33</sup> According to an Industry Canada commissioned study, 33 to 35 per cent of the decline in manufacturing employment is due to a higher Canadian dollar.<sup>34</sup> One study found more than 200,000 jobs in the manufacturing sector were lost as a result of increased oil exports.<sup>35</sup>

Furthermore, while proponents of oil sands expansion tout the jobs created by building more mines and pipelines to export oil, those jobs are often temporary, involve long hours and displace workers from their families. Alberta is already experiencing a labour shortage.<sup>36</sup> The rapid pace of oil sands development is creating jobs in a part of the country that doesn't need them, and hurting jobs in other regions that desperately need them.

In addition to finding that Canada is showing signs of Dutch disease, the OECD also warned in 2008 about oil sands development creating regional disparities.<sup>37</sup> The oil sands resource is based in one part of the country, which receives the vast majority of the benefits from its production, but other parts feel the negative impacts. Findings like this — or any talk about economic downsides to oil sands expansion — are often used by the oil industry to create a regional narrative: east versus west.

It is notable, then, that the most public dispute among governments about the wisdom of oil sands expansion featured two Western provinces. At the Council of the Federation in July 2012, and in media commentary throughout the fall, tensions were not between east and west, but between Alberta and British Columbia.

“The export-oriented manufacturing sector had by 2011 shrunk sharply to only 12.6 per cent of total value added, down from a peak of 18.6 per cent in 2000. Its share of employment has also fallen substantially over the past decade... Both outcomes have been clearly correlated with exchange-rate developments.”

# THE BENEFITS OF CLEAN ENERGY: MORE JOBS, LESS POLLUTION

While increasing our dependence on the oil sands has risks, a shift towards renewable energy would bring benefits that are often overlooked. Across the globe over the last decade, renewable energy has experienced rapid growth in both investment and jobs as well as improved technology. Investments in renewable energy have grown steadily over the past eight years, even as governments have struggled to balance budgets in the wake of the global financial crisis.<sup>38</sup>

Last year, the trend continued in a big way. In 2011, \$280 billion was invested in renewable energy globally, which is a 13 per cent increase over 2010 and over five times the amount spent in 2004.<sup>39</sup> 2011 also marked a milestone when analysts recorded the trillionth dollar invested in renewable energy, energy efficiency and smart energy technologies since they began tracking the sector in 2004.<sup>40</sup> Furthermore, 2011 marked the first time investments in electricity from wind, sun, waves and biomass topped comparable investments in natural gas, oil and coal.<sup>41</sup>

According to the International Energy Agency, renewable energy is now the fastest growing energy sector.<sup>42</sup> This growth is expected to continue, with analysts predicting that \$7 trillion will be invested in additional renewable energy capacity over the next 20 years.<sup>43</sup>



## The Need for a Just Transition

It's clear that we need to transition from fossil fuels to low-carbon clean energy to make the emissions reductions needed to tackle climate change. And, it's clear that good jobs can be created in these emerging industries.

However, that doesn't mean governments can sit back and hope for the best when it comes to jobs and workers during the transition. A just transition strategy is needed to provide a deliberate and coherent plan for workers.<sup>67</sup> This needs to include a full assessment of the current jobs in the fossil fuel industry, and how these highly skilled workers could be used in the new low-carbon economy. The type of job opportunities is just as important as the actual number of jobs: a part-time job in the services industry is not equivalent to a full-time manufacturing job. The shift to a sustainable economy needs to include sustainable jobs across the country.



## Putting People to Work

Employment in the clean energy field is growing at a rapid pace. In 2011, approximately 5 million people were employed in the renewable energy sector globally, more than double the number employed in 2006.<sup>44</sup> Some 670,000 workers are employed in wind power and 820,000 in solar photovoltaics (PV). More than 900,000 people are employed in the solar thermal sector. It's estimated that almost 2.25 million people work in the biomass energy sector in Brazil, the United States, Germany, and China alone.<sup>45</sup>

These job numbers are significant, and they're expected to grow in the years ahead in step with investment. For example, assuming current targets are met, global employment in wind energy will more than double from 670,000 workers this year to over 1.4 million by 2030.<sup>46</sup>

As the global shift towards clean energy continues, business leaders and policy makers who act quickly and effectively could make major gains for their businesses and constituents, while others may lose opportunities for new jobs, businesses and investments.<sup>47</sup> These trends have prompted a number of prominent international bodies, such as the OECD, to advise that governments take steps to bolster renewable energy and the green economy as a new source of jobs and growth.<sup>48</sup>

In Denmark, wind power supplies 25 per cent of electricity and employs 25,000 people.<sup>49</sup> Germany had 372,000 workers in renewable energy in 2011, a 34 per cent increase from 2008.<sup>50</sup> Germany's renewable energy sector is expected to grow by 400,000-500,000 by 2020.<sup>51</sup> Both Germany and Denmark have lower overall unemployment rates than the rest of Europe.

China has 1.6 million renewable energy jobs<sup>52</sup>, and the nation plans to spend \$27 billion this year to promote energy conservation, emissions reductions and renewable energy.<sup>53</sup> China is adding 100,000 new clean energy jobs each year, and will create 2.9 million new jobs just to meet its domestic demand for clean energy.<sup>54</sup>

## Making Clean Energy a Priority

As the global renewable sector has matured, it has become clear that countries with strong policy frameworks have the strongest clean energy sectors relative to the size of their economies.<sup>55</sup> This positions them to experience more economic benefits from renewable energy.

In this context, Canada is not a strong player in the clean energy field and risks being left behind. Canada's 2009 stimulus spending in clean energy was less than Saudi Arabia, China, Australia, France or the United States.<sup>56</sup> By the end of 2011, G20 governments had spent \$142 billion on clean energy through their stimulus spending, yet Canada had only contributed \$600 million to this.<sup>57</sup> That's equivalent to 0.035 per cent of Canada's GDP.<sup>58</sup> This amount is dwarfed by the clean energy stimulus funds allocated by the U.S. and China. The U.S. has allocated \$65.6 billion<sup>59</sup> or 0.435 per cent of GDP and China's clean energy stimulus funds amounted to \$46.2 billion or 0.633 per cent of GDP.

In September 2012, Japan announced that it will invest \$470 billion USD in renewable energy and more than double that amount in energy efficiency.<sup>60</sup>

Despite recent action from some provinces, Canada has been falling behind other countries in investment in renewable energy. The chart below shows that Canada ranked 11th among G20 countries in clean energy investment, below the U.S., China, Brazil and Spain.<sup>61</sup>

**Table 2. Top 10 in Clean Energy Investment in 2011<sup>62</sup>**

2011 Rank	Country	2011 Investment (billions of \$)
1	United States	48
2	China	45.5
3	Germany	30.6
4	Italy	28.0
5	Rest of EU-27	11.1
6	India	10.2
7	United Kingdom	9.4
8	Japan	8.6
9	Spain	8.6
10	Brazil	8.0
11	Canada	5.5

Recently, the National Roundtable on the Environment and the Economy found that without new policies, Canada is missing out on a \$60 billion domestic market in low-carbon goods and services, which could yield over 400,000 jobs.<sup>63</sup>

It's not all negative news out of Canada. Some provinces are taking the lead on renewable energy — even though the country as a whole lags behind other nations on the global stage.

Since its introduction in 2009, Ontario's Green Energy and Green Economy Act has expanded the province's renewable energy industry, while helping to close polluting coal power plants. North America's first comprehensive guaranteed pricing structure for renewable electricity production — called a FIT, or feed-in tariff — has helped Ontario attract more than \$27 billion in private sector investment and 30 clean energy companies. Thanks to the Act, Ontario has created more than 20,000 jobs and is on track to create 50,000 jobs.<sup>64</sup> And the closure of Ontario's coal plants will reduce carbon pollution by an amount equivalent to taking approximately 500,000 cars off Ontario roads.<sup>65</sup>

In 2010, Nova Scotia passed regulations mandating utilities to supply 25 per cent of their electricity from renewable, low-impact sources by 2015. The province has committed to increase the target to 40 per cent by 2020. The plan is expected to generate roughly \$1.5 billion in investment and 5,000 to 7,500 person-years of employment. Many of these new jobs have already been created.<sup>66</sup>

Whether looking at these provinces or neighbours to the south, Canada doesn't have to look far to see how harnessing renewable energy can help the economy and labour market.

## MAKING THE SHIFT: CLEAN ENERGY INVESTMENT IN CANADA

As the renewable energy sector has grown across the globe, costs have come down dramatically.<sup>68</sup> In many jurisdictions, they're already on par with fossil fuel energy.<sup>69</sup> In time, the same will happen in Canada, especially when prices reflect the costs of carbon emissions. For now, tipping the balance in favour of renewable energy over fossil fuels requires government support.<sup>70</sup>

To be sure, there are those who oppose such government support and would prefer to let markets determine how our demand for energy is met. But every new form of power generation has been made viable due to government support, including Alberta's oil sands. In fact, the oil sands have been the beneficiaries of decades of support, and they are still subsidized today. It is estimated that Canadian federal subsidies to the oil and gas sector are worth more than \$1.3 billion a year, even now.<sup>71</sup>

If we wish to confront climate change, governments need to intervene. In 2009, Canada, as part of the G20, committed to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption."<sup>72</sup> This commitment was reaffirmed in Toronto in 2010, when G20 countries asked the International Energy Agency, OPEC, OECD and World Bank to provide an analysis of the scope of energy subsidies, and again later that year at a G20 Summit in Seoul.<sup>73</sup> Yet the Canadian government has made little progress to date on this commitment.<sup>74</sup>

This section of the report outlines three scenarios to show the job potential of investing \$1.3 billion — the amount of federal taxpayer subsidies to oil and gas companies — in clean energy options (see Appendix for methodology details).

### Scenario 1 – Industry Targets

Renewable energy industry associations have developed targets to integrate low-impact renewable energy into the electricity grid. This scenario looked at what could happen if the \$1.3 billion currently handed over to oil and gas companies was instead used to help meet renewable energy industry targets.

The Canadian Wind Energy Association has set a target of 55,000 megawatts (MW) of wind to be installed in Canada by 2025; 5,500 of which have



"In 2011, investments in electricity from the wind, sun, waves and biomass topped comparable investments in natural gas, oil and coal for the first time."

– Alex Morales, "Renewable Power Trumps Fossils for First Time as UN Talks Stall"<sup>122</sup>

already been built.<sup>75</sup> The Canadian Solar Energy Industry Association has set a target of between 9,000 MW (peak) and 15,000 MW (peak) of solar energy capacity to be installed by 2025.<sup>76</sup> The Clean Air Renewable Energy Coalition (CARE) set a goal of meeting 15 per cent of Canada's electricity needs with low impact renewable energy by 2020.<sup>77</sup>

To achieve these targets, 3,807 MW of wind and 692 MW of solar would need to be installed each year. At this rate of development, CARE's goal would be met by 2020. Installing 1,612 MW of biomass and 260 MW of hydroelectricity annually, on top of the industry targets for wind and solar, would achieve CARE's goal in six years. The investment required to achieve these targets is \$13 billion (see Appendix for methodology).

The \$1.3 billion would get us 10 per cent of the way to those three targets, creating significant new renewable energy generation capacity. It would go a long way in creating jobs as well — an estimated 20,000 jobs — if oil and gas subsidies were invested in clean energy (see table 3). Further investment would be needed to fully reach the industry targets, either from other government sources or private funds. With the additional investment to reach the industry's targets, an estimated 200,000 jobs would be created.

**Table 3. Industry Standards Job Creation Potential**

	<b>GWh Generated</b>	<b>MW Installed</b>	<b>2010 Cost Per kW Installed<sup>78</sup></b>	<b>Investment Needed (Millions)</b>	<b>1/10 Cost Covered (Millions)</b>	<b>Job Creation (Per \$1 Million Investment)</b>	<b>Jobs Created</b>
Wind	11,672	3,807	\$1,370	\$5,216	\$522	14.7	7,667
Biomass	11,299	1,612	\$2,750	\$4,434	\$443	16.4	7,272
Hydro	569	260	\$2,880	\$749	\$75	14.2	1,063
Solar PV	1,212	692	\$3,760	\$2,602	\$260	15.8	4,111
<b>TOTAL</b>	<b>24,753</b>			<b>\$13,000</b>	<b>\$1,300</b>		<b>20,113</b>


“The clean economy is in fact delivering on hopes that it would generate a diverse array of quality positions that are at once more export- and more production-oriented than is the rest of the economy. Clean economy jobs tilt toward manufacturing and exporting and provide more opportunities with better pay for lower-skilled workers.”

## Scenario 2 – Energy Efficiency

Energy efficiency is the most cost effective way to meet growing energy demands. At a cost of \$27/MWh, efficiency is approximately one-third of the cost of wind energy or natural gas cogeneration.<sup>79</sup> Additionally, energy efficiency projects save homeowners and businesses money. This has an intrinsic benefit to the economy, as more money is available for other goods and services, creating more jobs in the process. We used estimates of how many jobs are created per unit of energy saved through energy efficiency measures to determine that 14 jobs can be created for every \$1 million invested in energy efficiency.<sup>80</sup> Thus, if the \$1.3 billion of oil and gas subsidies were instead invested in energy efficiency, it could create an estimated 18,296 jobs (see table 4).

**Table 4. Energy Efficiency Job Creation Potential**

	Jobs/GWh	Cost (\$/MWh)	Jobs/ \$1 million	Jobs/ \$1.3 billion
Energy Efficiency	0.38	27	14	18,296



“Energy efficiency is widely recognized as a key option in the hands of policy makers but current efforts fall well short of tapping its full economic potential...tackling the barriers to energy efficiency investment can unleash this potential and realize huge gains for energy security, economy growth and the environment”

- International Energy Agency, World Energy Outlook 2012<sup>124</sup>

## Scenario 3 – Meeting a 2°C Target

Renewable energy and energy efficiency are key tools for lowering greenhouse gas emissions. The scientific community believes we need to prevent warming of more than two degrees Celsius to avoid dangerous climate change, a goal which Canada supported at the 2008 UN climate summit in Bali.

The Pembina Institute engaged modelers to determine the economic impact to Canada of meeting this two degree target based on putting a price on carbon pollution as a tool to get there.<sup>81</sup> The model looked at what types of shifts in our economy would take place if Canada were on track to do its share to keep global warming below two degrees. While Canada does not currently have the policies in place to do this and is set to have emissions far higher than what's required of Canada, it's an important exercise to consider what would happen if the country acted responsibly to help keep global warming below two degrees.

The modeling found that significant shifts in the electricity industry would help Canada do its share to keep global warming below two degrees, in addition to other changes in the economy. It showed that one way to work toward meeting the two degree target is to increase hydroelectricity by 8-13 Terawatt-hours (TWh) and wind by 70-88 TWh by 2020.

Achieving the low end of these estimates (8 TWh of hydroelectricity and 70 TWh of wind produced annually by the year 2020) requires an annual investment over eight years of \$5.2 billion to add the new wind and hydro production needed. The capacity needed to be installed annually to generate this amount of electricity is 457 MW of hydroelectricity and 2,854 MW of wind. If the \$1.3 billion of oil and gas subsidies were used instead to reach these renewable energy targets, it would cover nearly one quarter of the cost and would result in the creation of an estimated 18,947 jobs (see table 5). More investment would be needed — from government or the private sector — to reach targets.

**Table 5. Meeting a 2°C Target Job Creation Potential**

1/4 Costs Covered							
	Annual Increase in Generation (GWh)	Annual Increase in Installed Capacity (MW)	Cost Per kW <sup>82</sup>	Investment Needed by 2020 (in Millions)	One Quarter of Annual Cost (over 8 years) in Millions	Job Creation (Per \$1 Million Investment) <sup>83</sup>	Jobs Created
Hydro	1,000	457	\$2,880	\$ 2,608	\$ 326	14.2	4,629
Wind	8,750	2,854	\$1,370	\$ 7,792	\$ 924	14.7	14,318
<b>Total Investment</b>					<b>\$ 1,300</b>	<b>Total Jobs Created</b>	<b>18,947</b>

## Conventional Energy and Transit Scenarios

The above estimates are interesting but they are especially telling when compared with the job creation potential of the same \$1.3 billion invested in conventional energy sources, transit or construction.

The Alberta government produces a table of economic multipliers, intensity ratios and supply ratios for its economy. The most recent table available is based on the 2007 Alberta Finance and Enterprise Input-Output Model and includes values using 2007 and 2010 dollars.<sup>84</sup> These multipliers were used to generate job estimates to compare with the clean energy scenarios above. Far from the claims of the oil industry, spending \$1.3 billion on oil and gas extraction creates a fraction of the jobs that investing the same amount in clean energy does.

**Table 6. Conventional Energy and Transit Scenarios**

	<b>Jobs Created Per \$1 Million Invested<sup>85</sup></b>	<b>Jobs Created with \$1.3 Billion</b>
Oil & Gas Extraction <sup>86</sup>	1.80	2,340
Existing Electric Power Generation, Transmission & Distribution <sup>87</sup>	2.00	2,600
Petroleum & Coal Products Manufacturing <sup>88</sup>	2.00	2,600
Pipeline Transportation <sup>89</sup>	2.20	2,860
Transit & Ground Passenger Transportation <sup>90</sup>	13.20	17,160
Construction <sup>91</sup>	6.30	8,190
Renewable Energy Industry Targets Scenario (per table 3)	15.50	20,113
Energy Efficiency Scenario (per table 4)	14.10	18,296
Meeting a 2° C Target Scenario (per table 5)	14.60	18,947

These scenarios give a sense of the job potential of various options for spending \$1.3 billion of taxpayer's money. They don't, however, provide information at this stage about the type and location of the jobs. This type of analysis is important for governments to consider when developing plans to transition from fossil fuels to clean energy.

Recent job trends in the clean energy sector reflect the estimates above. About 5 million people worldwide have found new jobs in the renewable energy sector, despite it providing only 8 per cent of primary energy.<sup>92</sup>

Investments in renewable energy continued to climb year-over-year during the worst of the recession.<sup>93</sup> Investment in oil and gas, by comparison, fell by 19 per cent in 2009.<sup>94</sup> When it comes to job creation and economic stability, renewable energy is a far better option.

## CONCLUSION AND RECOMMENDATIONS

Canada can reduce pollution, fight climate change and create jobs by hastening, not resisting, the transformation away from polluting fuels. And as this report shows, relying so heavily on oil puts our economy on shaky ground and creates a fraction of the jobs that investments in renewable energy and other climate change mitigation measures would create.

We are not alone in reaching these conclusions. In fact, governments have repeatedly been warned about the perils of a myopic embrace of oil at the detriment of all else. Alberta's Finance Minister, for example, raised red flags about the volatility of oil and said relying on oil revenues is "not workable going into the future."<sup>95</sup> A report commissioned by former Alberta Premier, Ed Stelmach, said the province should prepare for a time when the demand for oil sands oil dries up. In their words, the province should be aware that in the future, "We may have heavy oil to sell, but few or no profitable markets wishing to buy."<sup>96</sup>

These statements come from the province that theoretically has the most to gain from oil sands development. But even Alberta recognizes the risk of a one-track mind when it comes to relying on oil. Most recently, the National Roundtable on the Environment and the Economy found that without new policies, Canada is missing out on a \$60 billion domestic market in low-carbon goods and services, which could yield over 400,000 jobs.<sup>97</sup>

Canada has a choice. While the production capacity of the oil sands is substantial, the fact that it's there doesn't mean it all should be developed. Put another way, "The Stone Age did not end because we ran out of stones; we transitioned to better solutions. The same opportunity lies before us with energy efficiency and clean energy."<sup>98</sup>

Renewable energy and low carbon sources generate more jobs than the fossil fuel sector per dollar invested. In Canada, just by retrofitting municipal buildings nationwide 5,600 to 7,840 full-time jobs could be generated.<sup>99</sup> One study found that 22,000 jobs could be created in Canada's four eastern provinces through investments in energy efficiency.<sup>100</sup> Imagine the labour market benefits if the entire country invested in energy efficiency.

The transition to clean energy will need to be supported by policy and investment. We recommend that Canada:

1. **Eliminate fossil fuel subsidies:** Canada should stop handing taxpayer dollars to polluting fossil fuel industries. This creates a financial incentive to make the economic and environmental problems worse.
2. **Develop a Canadian energy strategy:** The strategy must prioritize the transition from fossil fuel to non-polluting, renewable energy. It also must identify strategies for industries — like renewable energy and energy efficiency — to make the transition happen.
3. **Create green jobs:** The Canadian energy strategy needs to include a robust strategy to harness jobs in renewable energy and low-carbon industries, and include a just transition plan for current energy workers and others affected by the transition.
4. **Set national targets:** The federal government should develop targets for renewable energy, energy efficiency and transit and work with provinces to reach them.
5. **Educate:** Build awareness among the Canadian workforce about the green economy and ensure Canadians are trained to take advantage of the jobs created in it.



“The Stone Age did not end because we ran out of stones; we transitioned to better solutions. The same opportunity lies before us with energy efficiency and clean energy.”

- Steven Chu and Arun Majumbar<sup>125</sup>



## Appendix: Methodology Details

This Appendix presents details on the methodology employed to estimate the job creation potential for the alternative clean energy scenarios. The analysis is based on the use of multipliers, the details for which are presented below. We also describe the details for each of the scenarios employed in this study.

### Multipliers

Economic multipliers are based on detailed economic models that predict what happens in an economy when certain factors change. The renewable energy and energy efficiency job multipliers used were the combined direct and indirect job multipliers reported by Pollin and Garrett-Peltier, in “Building the Green Economy.”<sup>101</sup> While there is a range of multipliers that have been estimated for renewable energy, we chose a set that are commonly used, represent most technologies, and are geographically relevant to the Canadian context.

The multipliers that Pollin and Garrett-Peltier report are as follows:

Energy Source	Job Creation (Jobs Per \$1 Million Spent)		
	Direct	Indirect	Direct and Indirect
Conservation and Demand Management	9.0	5.2	14.2
Hydroelectric	8.2	6.0	14.2
On-Shore Wind	7.6	7.1	14.7
Offshore Wind	7.6	8.2	15.8
Bioenergy	8.4	8.0	16.4
Waste Energy Recycling	8.2	7.9	16.1
Solar	8.2	7.6	15.8
Smart Grid	7.0	7.1	14.1
Average of All Technologies	8.0	7.1	15.2

Pollin and Garrett-Peltier write that three factors explain the slight differences in job multipliers between the technologies listed above. Those are:

- “Relative labour intensity: This measures how much of a given amount of money is spent on paying workers, as opposed to spending on supplies, rent, land, transportation and energy.
- “Local content: This includes the proportion of total spending for a given project that remains within the local economy as opposed to being spent on supplies of all sorts externally.
- “Pay levels: If a given amount of spending is used to pay people lower average wages, this means that this given spending level can create more jobs.”

Multipliers are determined both by the scope of the multipliers (do they reflect direct, indi-

rect and/or induced effects) and the type of model employed (a closed or open input-output model). Each of these factors are described briefly in the bullets below.

- **Direct, Indirect and Induced Effects**

An increase in demand for a commodity will result in expansion of production to satisfy increased demand. This is a direct effect. An indirect effect is the ripple effects as these firms purchase additional required inputs from other firms. Induced effects are the result of employee wages spent on other commodities.<sup>102</sup>

- **Input-Output model**

Both Pollin and Garrett-Peltier and the Alberta Government use the input-output model to estimate the effects on employment resulting from an increase in final demand for the products of a given industry. The most common components of the input-output model are economic multipliers which include commodity and industry intensity ratios as well as industry multipliers. Because of limitations to input-output models, they are most effective when used to examine specific, short-term consequences of a given investment.<sup>103</sup> It is also preferable to use economic multipliers for relative rather than absolute comparisons. The limitations of input-output models and the multipliers derived from them are twofold. The static nature of the model is not subject to the limits of production capacity; and these models reflect industry averages for technology use and average input costs.<sup>104</sup>

- **Open and Closed Model**

Open multipliers reflect only direct and indirect effects and are derived from the open model. Closed multipliers include induced impacts as well as direct and indirect effects, and are derived from the closed model. In the closed model, the household sector is treated as a production sector, with income not allocated to savings and taxes spent on consumer goods and services.<sup>105</sup>

## Scenarios

Scenarios were developed based on real, achievable targets, affordable solutions, and steps Canada needs to take to make a meaningful contribution to reducing greenhouse gas emissions.

### Development Costs

The cost of installing capacity for each of the renewable energy technologies employed in this analysis is based on Working for the Climate - Renewable Energy and the Green Job Revolution (presented below).<sup>106</sup>

Technology	2010 Installed Cost Per kW
Wind	\$1,370
Biomass	\$2,750
Hydro	\$2,880
Solar Photovoltaic	\$3,760

### Industry Targets

The targets set by CanWEA for wind<sup>107</sup> and CanSIA for solar PV<sup>108</sup> for the year 2025 were used to base the level of industry growth that could be achieved. The base year for the calculation was 2012, so the total amount to yet to be developed was divided by 13 to obtain an annual amount of development.

The geothermal industry has a target of 5,000 MW of geothermal capacity to be installed by 2015<sup>109</sup> but this target was not used in the scenario due to lack of information about the job multipliers for geothermal energy.

The CARE estimate<sup>110</sup> was based on the reference case projected electricity demand in 2020 by the National Energy Board. The 2009 estimate for electricity demand in 2020 is 682,527 GWh.<sup>111</sup> The CARE goal is to meet 15 per cent of this demand with renewable energy, or 102,379 GWh annually.

Capacity factors were used to calculate the generation in GWh based on the megawatts of capacity installed as follow:

Wind	35%
Solar PV	20%
Biomass	80%
Hydroelectricity	25%

## Efficiency

The cost to install energy efficiency measures was based on an equivalent of \$27 per megawatt-hour (MWh).<sup>112</sup> The report, “Putting renewables & energy efficiency to work: How many jobs can the clean energy industry generate in the US?” uses a multiplier of 0.38 jobs created per GWh.<sup>113</sup> Combining this with the cost per MWh results in a job multiplier of 14 jobs per \$1 million invested. This is comparable to Pollin and Garrett-Peltier’s work, which uses a job multiplier of 14.2, which would result in 18,460 jobs for a \$1.3 billion investment.

## 2 Degree Target

The report, “Exploration of two greenhouse gas emissions targets: 25% below 1990 and 20% below 2006 levels by 2020”<sup>114</sup> reviews the feasibility and cost of policy to meet these two levels of greenhouse gas (GHG) emissions reduction in Canada. The report bases its results on a core policy package which is a carbon dioxide equivalent (CO2e) emissions price, implemented as a full auction upstream cap and trade system or a carbon tax covering all combustion and almost all fixed process emissions, as well as a full suite of complementary regulations. The implementation of these policies drives investment in renewable energy. The modeling that MK Jaccard and Associates Inc. performed showed the following shifts in the electricity industry. “Of the increase in 2020 production relative to business as usual, small and large hydro took 8-13 TWh, wind took 70-88 TWh, nuclear 5 TWh, and coal and natural gas with carbon capture and storage (CCS) 37-39 TWh. Coal and natural gas without CCS lost about 90 TWh of generation share”.

## Conventional Energy and Transit Scenarios

The economic multipliers used to estimate job growth are from Alberta Finance and Enterprise’s tables of Alberta Economic Multipliers 2007. The multipliers were calculated from Industry Intensity Ratios using the Open Model. The multipliers for the direct and indirect effects on the Alberta economy due to a change in output for 59 major industries in Alberta are presented as intensity ratios, expressed as number of jobs per \$10,000 of output. We used the intensity ratio based on 2010 dollars.<sup>115</sup>

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