



*F is for Future, a world without fossil fuels,  
 new solar symphony changing the gyre,  
 clean up our garbage, restore Nature's harmony,  
 offer our children the hopes they desire.*

## So how do we do it?<sup>1</sup>

How do we tackle the climate crisis with the speed and resolution that the climate scientists say is so urgently needed?

How do we make a rapid transition to a 100% renewable energy economy in a positive, nation-building manner, without causing economic mayhem, unemployment and chaos?

It's complicated. There's no doubt about it. Our economy is completely enmeshed in fossil fuels. We use fossil fuels to travel, to heat our homes and buildings, to generate electricity, to power our industry, to make plastics and to pave the roads. If fossil fuels were to magically stop working due to a zombie-ray from outer space or an unexpected change in the laws of physics, our economy would grind to an immediate halt.

But if we *don't* make a global transition out of fossil fuels, protect Earth's forests and reduce our consumption of meat—if we fail to prevent the carbon from accumulating in the atmosphere and fail to reduce the 300 GT carbon overload that's already there—we face a far more devastating and permanent collapse.

An economy can recover, but Earth’s oceans, savannahs, farmlands, forests and tundra and all the species they support cannot so easily adapt to the multiple impacts of a steadily warming world.

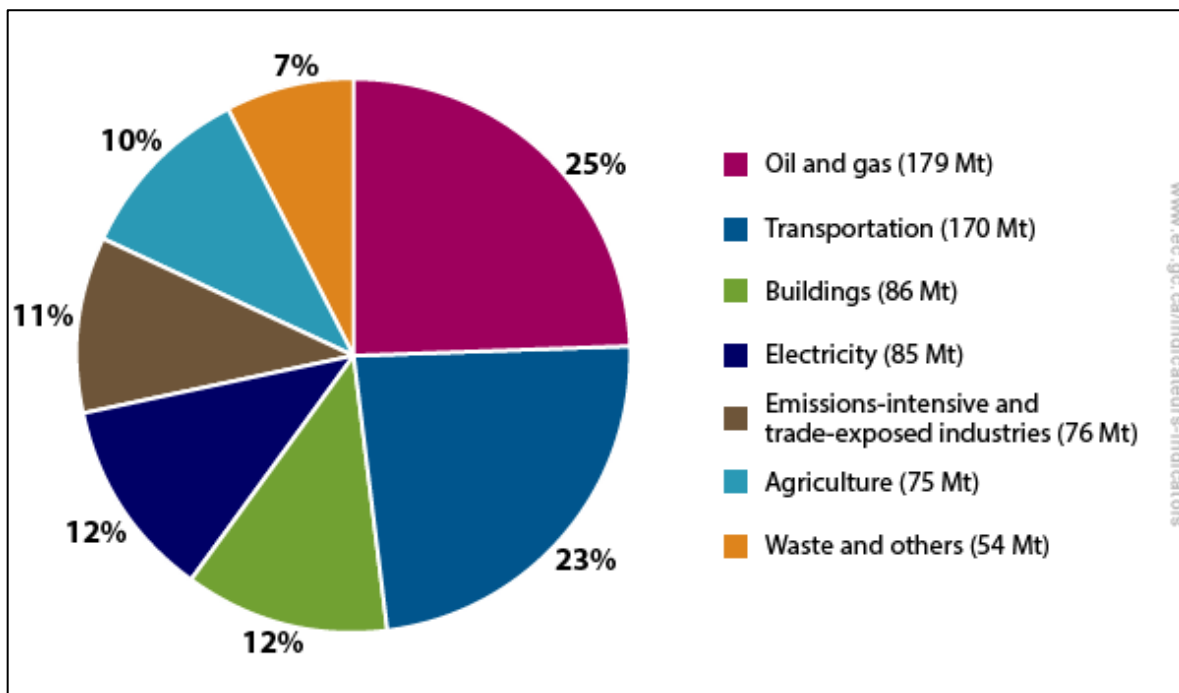
We *must* achieve this transition, pushing aside the denial of those who claim that climate change is a hoax we can safely ignore, or who insist that the needs of the economy must come first, as if an economy can exist independent of the environment that supports us all.

Yes, it’s complicated—but so was going to the Moon. So was establishing public healthcare, and defeating the Nazis. Endless tinkering to make the first airplane fly was complicated, too. Discovering how to bring electricity to a whole city was complicated. But since when did that stop us?

We owe it to ourselves to move beyond the single solutions that newcomers to the debate often promote, such as nuclear power, carbon capture, ending growth and consumerism, or somehow stopping population growth. We owe it to ourselves to grapple with the complexity of the crisis, and to emerge with a basket of solutions that address the actual emission of greenhouse gases, and the politics, policies and persuasions that drive them.

And we need to do it together. We cannot depend on policy wonks or governments to do it for us. We need all to be engaged, from students to full-time parents, from business-people and public servants to farmers and foresters. We need to do it together. So let’s get going.

Canada’s domestic greenhouse gas emissions have seven main sources, which are listed in the government’s inventory. These do not include our exported emissions, or emissions embodied in imported goods.



[Greenhouse Gas Emissions by Economic Sector](#). Environment and Climate Change Canada, April 2015.

Any strategy that does not address all seven of the major sources, and the dynamics that drive them, will be unable to achieve the transition that’s needed.

For ease of understanding, and hopefully without any sacrifice of complexity, I have sorted the initiatives that are needed into ten clusters, each of which has ten solutions, some of which are well acknowledged while others are less well understood.

## How rapidly must we do it?

There is a widely acknowledged risk that if the global temperature rise exceeds 2°C, it will be difficult and maybe impossible to prevent it from rising by 3° or more degrees, since negative feedback loops will kick in, and the last time the temperature was 3° warmer, the global sea level was 25 metres higher. Even a two or three meter sea-level rise will cause the permanent inundation of highly populated areas of the world, from Vancouver to New York, from Holland to Shanghai.<sup>2</sup>

The current increase of 1°C is already bringing a costly, painful and damaging increase in natural disasters.<sup>3</sup> This is why the world's nations collectively agreed at the COP-21 Paris climate conference to try to limit the warming to 1.5°C, and to 'well below' 2°C.

To achieve this, the quantity of additional carbon that can be added to the atmosphere is very small, and the global transition to 100% renewable energy is needed as rapidly as possible. It is chiefly the difficult psychology and challenging politics of rapid change, influenced by stubborn resistance from fossil fuel interests, and climate denial propaganda financed by them, that make people believe it is not possible.<sup>4</sup>

The climate science is unequivocal, based on the physics of the accumulating carbon. For a 75% chance that the warming will not exceed 2°C, the total global carbon budget (starting in 2016), i.e. the total additional carbon dioxide that can be released, is 460 Gt of CO<sub>2</sub>.<sup>5</sup> A recent February 2016 analysis published in *Nature Climate Change* sets the budget at 590 to 1240 GtCO<sub>2</sub> for a 66% chance that the warming will not exceed 2°C.<sup>6</sup>

Based on the global budget of 460 Gt of CO<sub>2</sub>, Canada's total carbon budget starting in 2016 as a percentage of global emissions comes to 5,275 Mt of CO<sub>2</sub>, and it will be exhausted by 2028 at the current slow decline of just 7 Mt a year. For an orderly transition, Canada's emissions need to fall by 5-10% (25-50 Mt) a year, reaching zero between 2030 and 2040. The only way to justify a later date is to increase the chance of failure.

If the goal is to try to limit the warming to 1.5°C, as the world's nations agreed to in Paris, the decline must be a more rapid 10% a year, or 50 Mt a year.<sup>7</sup>

Key technological breakthroughs are still needed to make the goal achievable, but when President Kennedy declared in May 1961 that America would put a man on the Moon before the end of the decade, no-one at NASA knew how they were going to do it: they simply had the faith, skill and determination to make it happen, matched by a ten-year investment of \$25 billion, equivalent to \$500 billion in 2016 prices. What would climate action look like if our business, cultural and political leaders *really* intended to adopt a level of urgency similar to that with which we fought to defeat Hitler in World War II? This is what this paper addresses.

## Are these the best policies?

No. If we call the policies and initiatives enacted in Canada between 1990 and 2015 Plan A, then this is Plan B.

**Climate Plan A** was a mish-mash of weak approaches, a bit here, a bit there, without any long-term commitment, consistency, or correlation to the actual emissions that needed reducing. The only effective policies were those that are also in Plan B: the hard timetable for the closure of Ontario's coal-fired power; BC's carbon tax, until it stalled; and the Canada-US vehicle fuel emissions standards.

**Climate Plan B**, laid out here, is targeted and determined. Its important take-aways can be summarized as three major commitments:

- a) Inspire and educate Canadians to participate in a transition to 100% renewable energy and a new green economy;
- b) Put an effective price on carbon, and use most of the income to invest in the new green economy;

- c) Introduce comprehensive, targeted regulations that are effective enough to get us there.<sup>8</sup>

**Climate Plan C** will be needed if Plan B fails, and will become politically more acceptable as the urgency of the climate crisis sinks in. In Plan C, the world's nations, instead of offering voluntary Intended National Determined Contributions (INDCs), would agree to a global carbon cap, leaving most of the carbon reserves in the ground, imposing a *hard global cap* on the total carbon that can be released, leading to hard national caps for each nation, falling by 5% to 10% a year to stay within the cap. This will bring the need for carbon rationing as the fairest way to distribute the available carbon rights among people, businesses and governments, with rations falling by 5% to 10% a year as the transition to 100% renewable energy proceeds.

In reality, Plan C is needed *now*, but since most of Canada's pundits, public and politicians have yet to grasp the true urgency of the crisis, the debate about what's really needed has not even begun, not even on tiptoe. There is not yet the political will to embrace a hard, legislated "leave it in the ground" cap, accompanied by rationing. In Britain, rationing was not introduced until *after* World War II broke out, when everyone knew they were in an emergency, starting with gasoline and then including bacon, butter, sugar, and other essential food items.<sup>9</sup> Once the challenge had been taken on, both in Britain and in Canada, rationing was accompanied by an exceptional spirit of single-mindedness, determination and shared commitment.<sup>10</sup>

Plan B is based on the stated desire of Canadians to embark on the transition to 100% renewable energy, knowing that doing so in a planned and orderly manner will give us the best chance to safeguard our economy and the jobs we depend on for our incomes as the transition proceeds. According to a November 2015 Oraclepoll, 84% of Canadians want the federal government to direct new investment toward a plan to create jobs in the renewable energy sector, and 70% percent want a commitment to legally enforce limits on carbon pollution.<sup>11</sup>

So without more ado, let's dig into Plan B. Each cluster is accompanied by a scorecard, creating a maximum score of 100, enabling our policy progress to be tracked, published and rewarded.

## **Summary: The Ten Most Important Climate Action Clusters**

1. Promote climate leadership, engagement, education and adaptation.
2. Create targets, policies and regulations to achieve 100% renewable energy for electricity by 2030.
3. Create targets, policies and regulations to achieve a transition to sustainable transportation.
4. Create targets, policies and regulations to achieve a transition to sustainable buildings.
5. Put an annually increasing effective price on carbon.
6. Build a green cooperative entrepreneurial economy for the 21st century.
7. Create targets, policies and regulations to reduce fossil fuel industry emissions and leave most fossil fuels in the ground.
8. Create targets, policies and regulations to help Canada's emissions-intensive industries to reduce their emissions and shift to 100% renewable energy.
9. Create targets, policies and regulations to help Canada's farmers, ranchers and foresters to reduce their emissions and sequester carbon.
10. Work with other nations to accelerate global progress.

## Cluster 1. Promote climate leadership, engagement, education and adaptation

The transition needs the support, involvement and engagement of millions of climate-literate Canadians. We need to do this together. Therefore:

1. Work with Canada's provinces, mayors and other partners to organize cross-country inspirational celebrations of Canada's new vision, and our determination to be a world leader in our embrace of a sustainable green future.
2. Work with the provinces to establish a long-term funding program for community climate initiatives, and by 2018 to train 5,000 Canadians to become Climate Solutions Leaders in their communities, and in the businesses and institutions where they work.
3. Work with the provinces and educational leaders to ensure that climate educators in Canada's schools and colleges teach accurate climate science, and place most of their emphasis on solutions to the crisis, not just the problems. Our kids already have deep worries about the future, and it is highly irresponsible to give them more reason for despair without also showing how we are tackling the crisis.
4. Work with the provinces and college leaders to ensure that Canada's colleges offer the training programs needed for the transition to 100% renewable energy, and to Canada's new green entrepreneurial economy.
5. Work with the provinces and college and university leaders to assist every school, college and university in Canada to convert to 100% renewable energy by 2025.
6. Work with Canada's school and university leaders to create a requirement that starting in 2020, every student applying for college or university must have passed a high school course in Environment 101, including coverage of 100% renewable energy and other climate solutions.
7. Work with Canada's provinces, mayors and councils to assist every community in Canada to develop plans to become a 100% renewable energy community.
8. Work with Canada's First Nations to encourage the shift to 100% renewable energy for all purposes on First Nations land.
9. Work with Canada's business leaders to move each sector of the economy towards a green, 100% renewable energy future.
10. Work with Canada's provinces, mayors and councils and First Nations leaders to ensure that local and regional climate adaptation and resilience plans are properly developed and funded. The Parliamentary Budget Officer has estimated the cost of climate-related weather disasters to the federal disaster fund at \$900 million a year from 2016-2012, and at \$4.2 billion a year for all Canadians.<sup>12</sup>

Score	Action
1	1 of the ten initiatives
2	2 of the ten initiatives
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10	All ten initiatives

## Cluster 2. Create targets, policies and regulations to achieve 100% renewable energy for electricity by 2030.

This goes to the core of the problem, which is the planned replacement of fossil fuel energy with 100% renewable energy. The solutions in this cluster address the use of electricity, which produces 12% of Canada’s GHG emissions. Heat is covered below under buildings and industry, fuel under transportation.

As recently as five years ago it was rare to hear people call for the transition to 100% renewables. Today, the call is being made by climate leaders worldwide, including leaders of the G-7. Even those who seek the expansion of fossil fuels acknowledge that in the long-term the transition is inevitable, changing the debate from “if” to “when.”<sup>13</sup> Research based on getting to 100% by 2040 shows that 420 TWh of new renewable electricity will be needed each year. To get there by 2030, much more will be needed each year.<sup>14</sup>

For Canada’s supply of electricity to come from 100% renewable sources, ten solutions are needed:

1. Work with the provinces to develop a legislated plan to phase out all coal and diesel-fired power plants by 2025, replacing them with renewable energy to generate electricity.
2. Work with the provinces to develop a legislated plan to phase out all gas-fired power plants by 2030.
3. Launch an initiative to lift the required efficiency of all lighting, appliances, fans and other equipment to a world-best standard, similar to Japan’s Top-Runner program.<sup>15</sup>
4. Launch an initiative to provide appropriate incentives and tax-breaks and to encourage energy-saving behaviour and technologies in our homes, businesses, factories, farms and public institutions.
5. Work with the provinces to develop policies, incentives and regulations to support the rapid development of solar energy, to eliminate unnecessary barriers and costs, and to ensure that Canada’s utilities continue to prosper while supporting the solar revolution.
6. Work with the provinces to develop policies, incentives and regulations to support the rapid development of Canada’s wind and other renewable energy resources, and the grid development needed for east-west transmission.<sup>16</sup>
7. Do the same for geothermal power, which faces unique challenges due to its high initial set-up cost.
8. Work with Canada’s First Nations to assist all remote communities to move to 100% renewable energy.
9. Invest in R & D for power storage and demand-side management technologies, to balance the intermittency of wind, solar and other renewables.
10. Work with Canada’s colleges and universities to ensure that electricians, plumbers, builders, architects and engineers receive the training needed for a 100% renewable energy future.

If successful, these policies will generate 127,000 direct and indirect jobs and 90,000 induced jobs. If the transition is successful, it will generate over a million new jobs during a planned 25-year transition (2015-2040), and 876,000 new permanent green jobs, compared to the 800,000 jobs in fossil fuels that will be lost. All jobs numbers come from the research paper *Almost Twice As Many: Green Jobs in Canada in the Transition to 100% Renewable Energy*, by Guy Dauncey (2015), assuming a goal of 100% by 2040.

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### **Cluster 3. Create targets, policies and regulations to achieve a transition to sustainable transportation.**

Moving on. 23% of Canada’s emissions come from transportation, which depends on diesel, gasoline, kerosene and bunker fuel. For long-distance trucking, shipping, aviation and industrial-scale transport devices the solutions have yet to be developed, but for the rest, an electric future is within sight. Therefore:

1. Adopt a legislated goal of achieving 100% renewable energy for most transportation purposes by 2040.
2. Work with the provinces and city mayors to invest in a greatly expanded cycling infrastructure, and to dramatically increase the share of cycling for urban trips, as towns and cities in Holland, Denmark and Sweden have already achieved, bringing many benefits to personal happiness and the quality of urban life.
3. Work with the provinces and rural communities and regional districts to build a world-class long-distance cycling network, similar to Quebec’s 5,300 km Route Verte.
4. Work with the provinces and city mayors to invest in expanded electric transit and light-rail transit, and to substantially increase the share of transit for urban trips. An investment in electric buses is self-financing, since it pays for itself within the 12-years life of a transit bus.
5. Work with the provinces and Canada’s railway companies to invest in the solar-electrification and dual-tracking of all of Canada’s major railways by 2040.
6. Work with the provinces to integrate electric vehicle financial incentives into a pan-Canadian program, and to build a nationwide EV charging network including incentives such as free use of HOV lanes.
7. Work with the US, the province of Ontario and Canada’s auto-industry to enact new vehicle emissions standards that would require all new cars and light trucks manufactured in or imported into Canada to have a fleet average of 0 gm CO<sub>2</sub>/km by 2030, resulting in a fleet that operates predominantly on 100% renewable energy by 2040. The current US/Canada standard calls for 101gm CO<sub>2</sub>/km by 2025.<sup>17</sup>
8. Work with Ontario, Quebec and the auto-industry to ensure Canadian manufacturing success in the rapidly growing market for electric vehicles, trucks, bikes and buses.
9. Form a partnership with other nations, industry experts and partners such as the Carbon War Room and invest in R & D to support progress and deployment toward 100% renewable energy for long-distance trucking, using electricity, sustainably harvested bioenergy, green hydrogen, green methanol, electric hyperloops or other means.
10. Do the same to support similar progress toward 100% renewable energy for long-distance shipping and flying.

If successful, these policies will protect Canada’s auto-industry, and generate hundreds of thousands of jobs in transit, 14,000 jobs electrifying the railways, and 75,000 new jobs in cycle tourism as Canada’s network of cross-country bike-routes grows.

<b>Score</b>	<b>Action</b>
1	1 of the ten initiatives
2	2 of the ten initiatives
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10	All ten initiatives

## Cluster 4. Create targets, policies and regulations to achieve a transition to sustainable buildings.

Buildings produce 12% of Canada’s GHG emissions. The challenge is both to ensure that everyone *has* a home, and to heat all of Canada’s buildings using renewable energy, even in the north. We don’t have all the technical solutions yet for complex renewable energy retrofits, but there’s a huge amount we can be getting on with:

1. Work with Canada’s building professionals to produce an upgraded National Building Code requiring all new buildings to be nearly zero energy starting in 2021, similar to the European Energy Performance of Buildings Directive. In Brussels, Belgium, every new building is now being built to the Passive House standard, requiring 90% less heat energy, the 10% being supplied by heat recovery ventilators.<sup>18</sup>
2. Require all new federal buildings to meet the Passive House standard, starting immediately, and work with the provinces to require the same for all new provincial buildings.
3. Require all federal buildings to be retrofitted to meet the Passive House retrofit standard by 2030, starting with the PM’s residence at 24 Sussex Drive, and work with the provinces to require the same for all provincially managed buildings.<sup>19</sup>
4. Work with the provinces and city mayors to establish a lasting national affordable housing strategy, and to provide the investment needed to eliminate homelessness and meet the right of all Canadians to secure, adequate, accessible, affordable, sustainable, zero-carbon housing.
5. Work with the provinces to require energy labeling and benchmarking for all buildings. An initiative to improve the efficiency of lighting and appliances is listed at #2.3 (electricity) above.
6. Establish incentives, tax credits and new financial tools and work with the provinces, city mayors and industry organizations such as the Toronto Atmosphere Fund to assist, accelerate and require (a) residential building energy retrofits, and (b) multi-unit residential building energy retrofits for apartments and condos.
7. Do the same for commercial building energy retrofits, using 100% renewable energy district heat where appropriate.<sup>20</sup>
8. Work with Canada’s First Nations to retrofit all homes and buildings on reserves, and to train First Nations people to develop businesses and cooperatives providing renewable energy, and passive house building and retrofitting.
9. Work with the provinces and with Canada’s colleges to ensure that people attending architectural, engineering, planning, building, electrical and plumbing courses acquire the skills needed to build and retrofit 100% renewable energy buildings.
10. Invest in R & D to support Canada’s business, engineering and architecture leaders to develop technical and design solutions for the task of retrofitting high-rise and other buildings for 100% renewable energy, using district heat, bioenergy, biogas, ground-source heat, air-source heat, stored solar thermal energy, waste heat and other means, and to deploy the solutions.

If successful, these policies will generate 90,000 new direct and indirect permanent jobs.

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2	2 of the ten initiatives
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## Cluster 5. Put an annually increasing effective price on carbon

There is a growing consensus that it is essential to put a price on carbon, since carbon pollution imposes severe costs on our societies and our planet's ecosystems, the same way that smoking imposes costs to people's health and public healthcare and is taxed accordingly.

There is debate about the merits of different systems of carbon pricing, including (a) whether it should be done by means of a tax or fee, or by means a cap, with the auctioning of credits; (b) whether the resulting income should be redistributed to taxpayers as a tax-reduction or an annual dividend, or be re-invested in the transition;<sup>21</sup> and (c) about the price that's needed to be effective.<sup>22</sup>

Assuming agreement that a price on carbon *is* needed, the ability to make it effective is only limited by public and political acceptability, the negative aspect of which is linked to a perceived negative economic impact on Canada's economy. This, in turn, is linked to the absence of a clear and compelling vision and analysis of a future Canada that operates on 100% renewable energy, with the multiple benefits this will bring, and the absence of an informed understanding of the damage that Canada and the world will face if we fail to make the transition.

To tackle the true urgency of the crisis, a final price of north of \$150 a tonne is needed, and it is this author's belief that as much of the revenue should be re-invested in the transition as is politically possible.

Therefore:

1. Work with the provinces to determine whether to adopt a cap, a fee, or a combination of both, and to establish a unified pan-Canadian price on carbon. To be effective, it needs to start at \$50 a tonne in 2018 and increase by \$10 a year, reaching \$170 a tonne by 2030, generating \$20 billion to \$30 billion a year. For the purposes of this paper, we assume that a fee will be applied, while not precluding the use of a cap. If there is a lower starting price, the annual increase needs to be more rapid.
2. As far as measurability will allow, include methane and the other greenhouse gases, with appropriate prices.
3. Put most of the income in Canada's Low-Carbon Economy Trust to finance the transition to 100% renewable energy, the rest being returned to people on lower incomes. Create an arms-length management structure to operate the Trust to free it from political footbaling and other sensitivities.
4. Allow temporary tightly defined case-by-case exemptions for businesses that are vulnerable to imports from countries that have not imposed carbon pricing, or required the equivalent level of greenhouse gas reductions. If the price on carbon threatens the existence of a Canadian company due to expanded business by its non-carbon-priced competitor, no emissions reductions will be achieved, so bi-lateral GHG reduction agreements will need to be pursued.

Score	Action
1	\$10/tonne, 100% R-N (revenue neutral), rising by \$5 a year
2	\$30/tonne, 100% R-N, rising by \$5 a year
3	\$50/tonne, 100% R-N, rising by \$10 a year
4	\$50/tonne, 50% R-N, 50% Solutions Fund, rising by \$10 a year
5	\$50/tonne, 40% R-N, 60% Solutions Fund, rising by \$10 a year
6	\$50/tonne, 30% R-N, 70% Solutions Fund, rising by \$10 a year
7	\$50/tonne, 20% R-N, 80% Solutions Fund, rising by \$10 a year
8	\$50/tonne, 10% R-N, 90% Solutions Fund, rising by \$10 a year
9	\$50/tonne, 100% Solutions Fund, rising by \$10 a year
10	\$50/tonne, 100% Solutions Fund, rising by \$15 a year

## Cluster 6. Build a green cooperative entrepreneurial economy for the 21<sup>st</sup> century

In addition to the transition to 100% renewable energy, we need to build a Canadian economy that does not depend on the financial stimulus from producing and selling fossil fuels. This cluster of policies combines a number of solutions relating to the development of a new green economy:

1. Issue additional Ministerial mandate letters anchoring climate protection into all government decisions to ensure that trade, export, infrastructure or land-use policies do not trump climate policies, and requiring ministers to apply a climate test to all energy-related decisions. See [www.climateest.org](http://www.climateest.org)
2. Invest in targeted research and development in areas where the private sector is unwilling to take the risks. In her book *The Entrepreneurial State: Debunking Public vs. Private Sector Myths* the economist Mariana Mazzucato shows the importance of government involvement and investment to build a green, entrepreneurial economy.<sup>23</sup>
3. Develop an initiative to support innovation, entrepreneurship and cooperatives in all communities, including schools, colleges, universities, First Nations and minorities.
4. Develop an initiative to encourage community-based economic development and the formation of local cooperative business networks, learning from the successful post-war experience of business development in the Emilia-Romagna region of Italy.<sup>24</sup>
5. Develop an initiative to encourage banks and businesses to become Benefit Corporations, embracing a legal change to their governing principles that commits their owners and directors to produce a social or environmental benefit as well as a financial benefit.<sup>25</sup>
6. Develop a Canada-wide initiative first to encourage and later to require green business certification, building on the model developed on Vancouver Island.<sup>26</sup>
7. Require annual carbon emissions reporting by every company above a certain size, and require every business seeking a grant, loan or export assistance from the federal government to show how it plans to reduce its emissions by 5% a year or more.
8. Enact legislation re-affirming the right of the Bank of Canada to create and lend interest-free and low-interest credit to federal and provincial governments for the purpose of investing in infrastructure developments for a 21<sup>st</sup> century green economy, as it did prior to 1974 to finance the construction of the Trans-Canada Highway, the St. Lawrence Seaway, and Canada's universities and hospitals.<sup>27</sup>
9. Work with the provinces to encourage the development of Provincial Banks, similar to the Bank of North Dakota, enabling them to invest in economic development using locally created credit.<sup>28</sup>
10. Use this new public lending ability to finance key components of the transition to 100% renewable energy, including R&D, building retrofits, railway solar-electrification, and cycling and transit investments.

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## Cluster 7. Create targets, policies and regulations to reduce fossil fuel industry emissions and leave most fossil fuels in the ground

The oil and gas sector produces 25% of Canada’s GHG emissions, more than any other sector. The transition to a 100% renewable energy economy will reduce them to zero, but untangling Canada’s economy from its historical engagement with fossil fuels, leaving most of the fossil fuel reserves in the ground, will be a huge undertaking. Therefore:

1. Work with Canada’s banks and investors and with Canada’s pension and similar funds to integrate climate risk and stress tests into all investments, and to support an orderly divestment from fossil fuels by 2030.<sup>29</sup>
2. Phase out all remaining fossil fuel incentives and subsidies by 2020. In 2014, the Pembina Institute estimated that subsidies and other direct federal supports in 2012 came to \$1.3 billion.<sup>30</sup>
3. To balance the loss by 2040 of 550,000 direct and indirect jobs in the fossil fuel industry, work with the provinces to develop programs to help people retrain for new jobs, and to help affected communities such as Tumbler Ridge and Fort McMurray to envision, plan and build a new future.
4. Issue no new federal permits or approvals for pipelines or other facilities intended to facilitate the export of Canada’s coal, oil and gas resources, and work with the provinces to issue no new permits for oil exploration, as France has done.<sup>31</sup>
5. Work with the provinces and Canada’s coal industry to prepare for the phase-out of coal from Canada’s economy by 2025, and to ensure the successful bioremediation of lands disturbed by coal-mining activities.
6. Work with the provinces and Canada’s oil industry to prepare for the phase-out of oil from Canada’s economy by 2030, and by 2040 at the latest, and to ensure the successful bioremediation of lands disturbed by oil sands and other operations.
7. Work with the provinces and Canada’s natural gas industry to prepare for the phase-out of gas from Canada’s economy by 2030, and by 2040 at the latest, and to ensure the successful bioremediation of lands disturbed by fracking and other activities.
8. Establish a preparatory legal framework to enable the possible federal purchase of bankrupt coal, oil and gas companies, with a view to an orderly wind-down.
9. Work with the foreign owners of coal, oil and gas companies to negotiate an orderly wind-down of their activities, and to minimize the risk of legal action under free trade treaties.
10. Work with the provinces and with Canada’s coal, oil and gas industries to assist, accelerate and require the reduction of fugitive methane and nitrous oxide emissions.

Score	Action
1	1 of the ten initiatives
2	2 of the ten initiatives
3	3 of the ten initiatives
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## **Cluster 8. Create targets, policies and regulations to help Canada’s emissions-intensive industries to reduce their emissions and shift to 100% renewable energy**

Canada’s emissions-intensive industries produce 11% of Canada’s emissions, so a targeted regulatory environment needs to be created that will assist, accelerate and require their reduction, including nitrous oxide and fluorinated F gases, and their full participation in the transition to 100% renewable energy. Therefore:

1. Work with the provinces and with Canada’s mining industry to assist, accelerate and require the reduction of GHG emissions.
2. Do the same for Canada’s smelting and refining industry.
3. Do the same for Canada’s pulp and paper industry.
4. Do the same for Canada’s iron and steel industry.
5. Do the same for Canada’s cement industry.
6. Do the same for Canada’s lime and gypsum industry.
7. Do the same for Canada’s chemicals industry.
8. Do the same for Canada’s fertilizer industry.
9. Do the same for Canada’s refrigeration, air conditioning, foam and aerosol industry.
10. Do the same for Canada’s municipal, industrial and other landfills, and work with Canada’s municipalities to accelerate progress towards achieving a zero-waste, circular economy by 2050.<sup>32</sup>

<b>Score</b>	<b>Action</b>
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10	All ten initiatives

## **Cluster 9. Create targets, policies and regulations to help Canada’s farmers, ranchers and foresters to reduce their emissions and sequester carbon**

Agriculture produces 10% of Canada’s GHG emissions, including CO<sub>2</sub> from farm operations and soil depletion, methane from livestock and liquid manure, and nitrogen oxide emissions from the use of fertilizers. Canada’s farms and ranches can also play a crucial role in absorbing surplus carbon from the atmosphere by the use of organic farming practices and management-intensive livestock practices, both of which build soil carbon.

The carbon emissions from Canada’s forests and peat-lands are another important consideration. In 15 of the 24 years from 1990 to 2013 Canada’s managed forests and forest products sector removed more carbon from the atmosphere than they emitted, for a total net sink of 3,600 Mt CO<sub>2</sub>e. During the same period, the carbon stored in harvested wood products sequestered a net total of 938 Mt CO<sub>2</sub>e.<sup>33</sup> Therefore:

1. Commission a report into the ability of Canada’s farms, forests, ranchlands, peat-lands and ocean sea-grass beds to sequester excess carbon from the atmosphere, with recommended policies and incentives to reward increased carbon sequestration.
2. Commission a report into the full external cost of conventional farming, and then introduce a tax on pesticides and fertilizers, with most of the revenue being used to eliminate those costs by supporting farmers as they make the transition to certified organic status.<sup>34</sup>
3. Work with the provinces and with Canada’s greenhouse industry to assist, accelerate and require the reduction of its GHG emissions, and to accelerate its transition to the use of 100% renewable energy.
4. Work with Canada’s agricultural colleges and beef, pork and dairy farmers to accelerate programs to measure and reduce methane emissions from cattle, and to reward reductions.
5. Work with the provinces and Canada’s farmers to do the same to reduce nitrous oxide emissions from the application of fertilizers, and to reward reductions.
6. Work with farmers and ranchers to educate them about the way different soil management methods and managed intensive rotational grazing practices sequester carbon from the atmosphere.<sup>35</sup>
7. Work with various partners to educate Canadians about the climate impact of a meat-based diet; work with Canada’s restaurants and retail food industry to offer more low-meat options; and invite people to join the federal cabinet in making one day a week meat-free, as the City of Oslo is doing.<sup>36</sup>
8. Work with the provinces, forest professionals and forest companies to develop and require new standards, regulations and educational tools to protect the remaining old growth forests, to increase forest carbon sequestration, and to protect Canada’s forests against increasing climate-induced wildfires and insect attack and help them adapt.
9. Work with Canada’s provinces, developers, architects and building industry to encourage and require more use of carbon sequestering timber in buildings, in place of GHG-producing cement and steel.
10. Work with Canada’s agricultural and forestry colleges and training programs to develop programs to ensure that students understand the impacts of climate change, the means of adaptation, and the methods that can reduce emissions and store more carbon in Canada’s soils and forests.

<b>Score</b>	<b>Action</b>
1	1 of the ten initiatives
2	2 of the ten initiatives
3	3 of the ten initiatives
4	4 of the ten initiatives
5	5 of the ten initiatives
6	6 of the ten initiatives
7	7 of the ten initiatives
8	8 of the ten initiatives
9	9 of the ten initiatives
10	All ten initiatives

## Cluster 10. Work with other nations to accelerate global progress.

Canada’s efforts to tackle the climate crisis contribute to the larger global effort—and there are several ways in which Canada can show leadership globally. Therefore:

1. Plan Canada’s future Intended National Determined Contributions, as per Paris, so that they ramp up every five years to reflect Canada’s progress toward 100% renewable energy and zero GHG emissions.
2. Join and play an active role in the International Renewable Energy Agency (IRENA). [www.irena.org](http://www.irena.org)
3. Work in the High Ambition Coalition, which includes Canada, the United States, the European Union, and 79 African, Pacific and Caribbean countries, to push for stronger climate action targets and implementation.<sup>37 38</sup>
4. Work with the High Ambition Coalition to ensure that emissions from international aviation and shipping are included in the next round of UN climate talks, and not left to the discretion of the International Civil Aviation Organization (ICAO) and the International Maritime Organization, which have been unable to reach agreement on how to deal with their emissions. Pressure the ICAO to accelerate the adoption of a CO<sub>2</sub> standard for new aircraft, a CO<sub>2</sub> standard for all operating aircraft, and the adoption of a market based mechanism.<sup>39</sup>
5. Deforestation and forest degradation are responsible for more than 10% of global emissions. Work with the High Ambition Coalition to strengthen the REDD mechanisms (Reducing Emissions from Deforestation and Forest Degradation), to ensure that the critically important store of carbon in the world’s forests is protected.
6. Work with the High Ambition Coalition and other supportive nations to negotiate a series of Climate Solutions Treaties, independent of the Paris Climate Agreement, to accelerate the spread of tangible climate solutions such as geothermal energy, carbon pricing, Passive House design, electric vehicles and farmland carbon sequestration.
7. Work with the USA and Mexico to strengthen the 2016 North American clean energy and climate accord, to press for greater cooperation and ambition, and to end public financing by Export Development Canada and similar bodies for coal, oil and gas developments overseas.
8. Work with nations that are party to Canada’s existing and future Free Trade Agreements to renegotiate any clauses that state or imply that free trade has priority over climate action, and to include language that guarantees climate action measures protection against legal challenge from companies seeking damages for losses.
9. Work with supportive nations to develop the foundations for similar Fair Trade Agreements, with a view to replacing all Free Trade Agreements.<sup>40</sup>
10. Increase Canada’s November 2015 commitment to the \$100 billion Green Climate Fund from \$2.65 billion to \$4 billion to help developing nations with the cost of coping with the climate crisis and to support the renewable energy transition.<sup>41</sup> Canada produces 1.25% of global GHG emissions and 2.25% of the global GDP, but we are a prosperous nation, and we need to pull our weight.

Score	Action
1	1 of the ten initiatives
2	2 of the ten initiatives
3	3 of the ten initiatives
4	4 of the ten initiatives
5	5 of the ten initiatives
6	6 of the ten initiatives
7	7 of the ten initiatives
8	8 of the ten initiatives
9	9 of the ten initiatives
10	All ten initiatives

## What will it cost?

A Climate Solutions Budget to achieve these goals is suggested in Appendix 1, showing an annual expenditure of \$22.5 billion, set against carbon tax income averaging \$22.6 billion a year.

By retaining 80% of the income from the carbon tax for use in the Low Carbon Economy Trust, the \$22.6 billion withdrawn from consumer spending would be put straight put back into the economy, generating jobs and maintaining consumer spending.

Over the period of the transition to renewable energy, the plan would generate almost twice as many jobs as would be lost, enabling Canada's economy to come through the transition in good shape. Every major transition has its challenges, just as the transition from horses to automobiles did in the period 1890 to 1920. The end-point of the transition, however, will be a far more ecologically and financially stable and resilient economy. Failure to make the transition, on the other hand, will bring ecological and financial devastation.

Further finance for the transition can be created by using interest-free and low-interest loans created by the Bank of Canada and Public Banks in each province, as described above.

## In Conclusion

*T is for Truth, is it easy to tell it  
when comfort and lies intervene?  
When solid reality speaks of a tragedy  
waiting its millions to claim?*

*The truth is we're cooking the planet in carbon,  
we're loading the oceans with grief,  
we're melting the icecaps and burning the forests,  
burdening Earth past belief, but...*

*The truth it is also that visions impossible  
now stand ready to chime,  
that people are ready and change is inevitable.  
Everything changes in time.*

From *A Modern Alphabet*, by Guy Dauncey (2015)<sup>42</sup>

## About the Author

Guy Dauncey is a futurist who works to develop a positive vision of a sustainable future, and to translate the vision into action. He is founder and past-President of the [BC Sustainable Energy Association](#), and the author or co-author of ten books, including the award-winning *Stormy Weather: 101 Solutions to Global Climate Change* (2000), *The Climate Challenge: 101 Solutions to Global Warming* (2009) and the recently published *Journey to the Future: A Better World Is Possible*, an ecotopian novel set in the year 2032, which describes Climate Plan C in action.

He is the author of these recent research papers:

- *The 2040 Climate Imperative: Zero Emissions by 2040*. BCSEA, 2015. [www.bcsea.org/2040-imperative](http://www.bcsea.org/2040-imperative)
- *Could BC Become a 100% Renewable Energy Region? A Four-Part Series*. BCSEA, 2015. [www.bcsea.org/news/could-bc-become-100-renewable-energy-region-part-1-of-4-part-series](http://www.bcsea.org/news/could-bc-become-100-renewable-energy-region-part-1-of-4-part-series)
- *Almost Twice As Many: Green Jobs in Canada in the Transition to 100% Renewable Energy*, by Guy Dauncey. The Practical Utopian, September 2015. <https://guydauncey.files.wordpress.com/2015/09/almost-twice-as-many.pdf>

He is an Honorary Member of the Planning Institute of BC, a Fellow of the Royal Society for the Arts, and a Fellow of the Findhorn Foundation in Scotland. His websites are [www.earthfuture.com](http://www.earthfuture.com) and [www.journeytothefuture.ca](http://www.journeytothefuture.ca) and [www.thepracticalutopian.ca](http://www.thepracticalutopian.ca)

<b>Appendix 1: A Climate Solutions Budget</b>	<b>Billion +</b>	<b>Billion -</b>
A <b>carbon tax</b> starting at \$50 a tonne on 500 million tonnes of CO <sub>2</sub> . 80% of the income to finance the transition to 100% renewable energy, 20% returned to low-income Canadians. Income averaged over three years. For income from future years, see below.	22.6	0
For <b>building retrofits</b> , tax credits and incentives pay for themselves through GST spent on building products. Low-interest loans self-financing through savings. The government could create the credit needed to advance low interest loans by forming a Canada Infrastructure Bank, or using the Bank of Canada for this purpose.		1.0
The shift to <b>renewable electricity</b> would be self-financed through tendering for wind, solar and geothermal power, supported by solar feed-in tariffs until the price of solar PV falls sufficiently that it no longer needs support.		1.0
Based on the Ontario Metrolinx Go Rail electrification numbers, <b>railway electrification</b> would cost \$7 billion a year, split between the railway companies and the government. Canada's railways hauled 289 million tonnes of freight in 2010. <sup>43</sup> Several studies have outlined the benefits of electrification: <ul style="list-style-type: none"> <li>• 50% reduction in rolling stock operating costs.</li> <li>• 15% reduction in infrastructure operating costs such as track maintenance due to lightweight trains.</li> <li>• 3% increase in rolling stock availability.</li> <li>• 22% reduction in vehicle leasing costs.<sup>44</sup></li> </ul>		3.5
The investment in <b>safe, separated bike lanes</b> would be shared with local communities, with a \$1 billion federal contribution. If the cycling rate in towns and cities reaches 25% there would be \$43 billion annual savings in healthcare costs due to increased fitness. This compares to BC's current BikeBC commitment of \$11 million a year and Ontario's \$8 million a year. Vélo Québec has estimated that cyclists on the Route Verte spend \$95.4 million annually, generating revenues of \$15.1 million for the government of Québec. <sup>45</sup>		1
The investment in <b>transit</b> , at 50% of the level proposed for the 2015 MetroVancouver Mayors' Plan, would cost \$12 billion a year.		12
The <b>electric vehicles incentives</b> program, targeting 100,000 vehicles a year with a \$5,000 incentive, would cost \$500 million a year.		0.5
The <b>transition to organic farming</b> would be self-financed through the new tax on chemical pesticides and fertilizers.		0
<b>First Nations funding for zero-carbon housing and training</b>		1
<b>Climate science, education and community engagement</b>		0.5
Canada's Contribution to the <b>Global Climate Fund</b>		1
Program administration (spread between initiatives)		1
	22.6	22.5

## Appendix 2: Carbon Tax Income, 2016-2026

Year	Carbon tax \$	Tonnes of CO <sub>2</sub> million	Revenue \$ billion	80% of revenue \$ billion
2016	50	500	25	20.0
2017	60	475	28	22.8
2018	70	450	31	25.2
2019	80	425	34	27.2
2020	90	400	36	28.8
2021	100	375	37.5	30.0
2122	110	350	38.5	30.8
2123	120	325	39	31.2
2024	130	300	39	31.2
2025	140	275	38.5	30.8
2026	150	250	37.5	30.0



## Appendix 3: Green Budget Coalition 2016 Budget Recommendations

- 1. Energy Efficiency:** Implement a series of initiatives to greatly improve energy efficiency in Canadian homes and businesses. For 2016-17: \$30 million.
- 2. Renewable Energy:** Accelerate the uptake of renewable energy technologies and diversify the energy economy by supporting solar, wind, tidal, biomass, micro-hydro, geothermal, clean technologies and electric cars. For 2016-17: \$10 million.
- 3. National Carbon Pricing:** Coordinate a national carbon-pricing standard to support the provinces and territories in reaching a harmonized carbon price across Canada of at least \$50 per tonne of CO<sub>2</sub> by 2020. For 2016-17: \$2 million.
- 4. Energy Subsidy Reform:** Begin the phase-out of subsidies to the fossil fuel industry. For 2016-17: \$1 million in administration. Estimated savings: \$4.694 billion per year in subsidies no longer paid.
- 5. Public Transit:** Implement new public transit spending. For 2016-17: \$2 billion.
- 6. Conserving Oceans:** Fulfill the government's commitments to reach Canada's international marine protection targets, and ensure ocean health by investing in ocean planning to manage development, restore ocean science and monitoring capacity, and transform fisheries management. For 2016-17: \$105.5 million.
- 7. Green Infrastructure For First Nations Communities:** Green infrastructure planning should be integrated into all investments in infrastructure on First Nations land. For 2016-17: \$514 million.

Green Budget Coalition: <http://greenbudget.ca/recommendations>

## Endnotes

<sup>1</sup> My thanks and appreciation to Patricia Warwick (co-founder of Zero-Carbon Ontario), Mitchell Beer (President of Smarter Shift, Climate Reality Project leader), Mark Jaccard (Professor of sustainable energy at Simon Fraser University), and Audrey Dépault (National Manager, The Climate Reality Project Canada) for their valuable feedback on this paper.

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- <sup>42</sup> From *A Modern Alphabet*, by Guy Dauncey. <http://thepracticalutopian.ca/2015/09/29/a-modern-alphabet/>
- <sup>43</sup> With CO<sub>2</sub> priced at an average \$100 over 10 years, the carbon tax would add \$268 to each 1,000 litres of fuel. In 2009, Canada's railways used 1.87 billion litres of diesel, costing \$500 million a year. With full electrification, fuel costs will fall from \$2.8 billion a year (diesel at \$1.25/litre + carbon tax at \$100 /tonne) to \$400 million for electricity, saving \$2.8 billion a year. See 2010 Rail Trends, page 22. [www.railcan.ca/assets/images/trends/2010\\_12\\_29\\_RAC\\_Trends\\_2010\\_en.pdf](http://www.railcan.ca/assets/images/trends/2010_12_29_RAC_Trends_2010_en.pdf)
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*Dad, I'm scared and angry. Your generation created  
this problem. What are you going to do to fix it?*

- Mary Doerr, 15-year old daughter of John Doerr, in 2007



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