Image: AVAAZ

A 26-Week Transition Program for Canada

By Guy Dauncey, FRSA, PIBC (Hon)

This is a work of imagination.
But the urgency of the crisis is real,
the need for the suggested programs is real,
and the data included in these proposals is real.

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About the Author

Guy Dauncey is an anthropological economist who works to develop a positive vision of a sustainable future, and to translate that vision into action. He is the author or co-author of ten books, including:

- *Stormy Weather: 101 Solutions to Global Climate Change* (2000). Winner of a Nautilus Gold Award. "A fabulous book. Everybody talks about the climate, but nobody does anything about it. Now they can. Stormy Weather provides a sweeping vision of the issues, and comprehensive practical solutions. A must read for anyone who wants a cleaner, healthier planet." - James Hansen, past-Director, NASA Goddard Institute.
- *The Climate Challenge: 101 Solutions to Global Warming* (2009). Winner of a Silver Nautilus Award. "Guy Dauncey has created something unique in the current literature by blending a highly readable narrative on global warming, a rich picture book on climate solutions, and an up-to-date digest of the relevant heaps of climate change information that have steadily grown into electronic Himalayas. If you wish to grasp the mind-boggling complexity of the climate challenge, read his book". - John Shellnhuber, Director Emeritus of the Potsdam Institute for Climate Impact Research, Senior Research Fellow at the Stockholm Resilience Centre.
- *Journey to the Future: A Better World Is Possible*. "Guy Dauncey has written an imaginative tour de force, blending science, philosophy, and fiction into a delightful story about how we can and must change the world, resulting in a bright green future." - David R. Boyd, author of *The Optimistic Environmentalist.*

He is founder and past-President of the BC Sustainable Energy Association, co-founder of the Victoria Car Share Cooperative, an Honorary Member of the Planning Institute of BC, a Fellow of the Royal Society for the Arts, a Fellow of the Findhorn Foundation, producer and host of Change the World on Spotlight (Shaw TV), and President of the Yellow Point Ecological Society. His website is www.thepracticalutopian.ca.

The author thanks Mitchell Beer, editor of *The Energy Mix*, Scott Sinclair, CEO of SES Consulting, and Elizabeth Sheehan, President of Climate Smart Business Inc. for their advice and suggestions.

"This is a practical, down to earth concrete step by step transition strategy for the Canadian government to get real about the climate emergency. A must read for all Canadians to make a difference and communicate to their elected officials new policies and programs that will make a difference now."
- Professor Ann Dale, Trudeau Fellow Alumna, Canada Research Chair, Royal Roads University

This is vital reading. It maps out an evidence-based route ahead; to open real conversations around what we actually need to do in these testing times. It should be read by politicians and policymakers, local and regional councillors, business front-runners, university and health service delivery managers, indeed everyone who wants to explore how we can collectively build the new zero carbon world we so urgently need.
- Paul Allen, Project Coordinator, Zero Carbon Britain project at the Centre for Alternative Technology

"Visionary and thorough, Dauncey's 26 week Transition Program deserves close scrutiny in Canada and beyond. His passion for a clean economy shines."
- Raffi Cavoukian, C.M., O.B.C., singer, founder of Raffi Foundation For Child Honouring

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CLIMATE EMERGENCY

A 26-Week Transition Program for Canada

Summary

What could the government of Canada do if its Ministers, MPs and civil servants really understood the severity of the climate emergency, and the urgency of the need? This paper shows how we could target a 65% reduction in emissions by 2030 and 100% by 2040. It proposes 164 new policies and programs, financed by $63 billion a year in new investments, without raising taxes or increasing public sector borrowing. The new programs and policies are announced every Monday morning between January and the end of June. To learn what they are, read on.

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January 6th, 2020

This is a joint statement from the Prime Minister and all Ministers in the new Liberal Cabinet. The commitments made below represent additions to our December 2019 Ministerial Mandate letters.[1]

We face an existential climate emergency, as 1,248 governments have declared, representing 800 million people.[2] As a world, we are not on track: we have yet to bend the curve of our ever-increasing carbon emissions. The goal of limiting warming to 1.5°C is rapidly slipping out of reach.[3] The consequences are already proving catastrophic, as we see from the wildfire inferno that is currently destroying a huge area of Australia, including much of the wildlife in the affected regions.

As your government, we will treat the emergency with the utmost urgency. We will work with the provinces, First Nations, businesses, labour unions, local governments, universities and anyone who will help us to achieve a transformational ramping up of efforts on every front.

The last time there was the current level of 410 ppm[4] of carbon dioxide in Earth's atmosphere, three million years ago during the Pliocene, modern humans didn't exist. The global average surface temperature was 2°C warmer than it has been during the last 10,000 years of our ancestors' life on Earth, and the ocean sea-levels were up to 23 metres higher.[5] 23 metres– not centimetres.

NASA has reported that 2019 was the second warmest year on record, and in April 2019, a scientific report from Environment and Climate Change Canada found that our country is warming at twice the rate of the rest of the world, that Northern Canada has warmed and will continue to warm at more than double the global rate, and that Canadians will end up with 10 times as many deadly heat waves and twice as many extreme rainstorms if nothing is done to reduce our climate pollution.[6] The steady increase in global emissions is pushing the climate towards dangerous and unpredictable tipping points, nine of which have already become active, including changes in the Arctic sea ice, the Greenland ice sheet, the Boreal forests, the northern permafrost, the North Atlantic circulation, the Amazon rainforest and the West Antarctic Ice Sheet.[7]

Next year (2020) is the year of truth. The year when we must move decisively to an economy that really starts to reduce investments in fossil fuels.
- Johan Rockström, Potsdam Institute for Climate Impact Research

In December 2019 Mark Jacobson and his team of researchers at Stanford University released a report showing how a transition to a world powered by 80% wind, water and solar energy by 2030 and 100% by 2050 is possible for 143 countries, including Canada.[8] Their analysis shows that globally, the use of renewables combined with the electrification of transportation and heat:

- Reduces global energy demand by 57% due to the efficiencies of electric vehicles and heat pumps.
- Reduces energy costs by 61%.
- Reduces private costs from $17.7 trillion a year to $6.8 trillion a year.
- Reduces the full social cost (private costs + healthcare costs and mortality + climate costs) by 91%, from $76 trillion a year to $6.8 trillion a year.
- Creates 28.6 million more long-term full-time new jobs than are lost in the transition.
- Uses just 0.65% of the available land area in the 143 countries (0.17% for the footprint of solar and wind equipment and 0.48% for the spacing between wind turbines).

The private financial saving of $10.9 trillion a year is equivalent to 12% of global GDP.[9] The Business As Usual future, by contrast, will cost $76 trillion a year in combined private, social and climate costs, representing 87% of global GDP, imposing a massive drain on the global economy. Canada faces the additional risk of multi-billion dollars of stranded financial assets, a risk that Mark Carney recently put as up to 80% of all coal assets and up to half of all developed oil reserves.[10]

The message is clear: the transition to 100% renewable energy is the most effective solution to the climate crisis, and will bring enormous financial and healthcare benefits to Canada and the world, while generating more new jobs that it destroys.

In the Cree language, *Tansi Neestow* means 'Hello brother'. It reminds us that we have a responsibility to each other. Our responsibility today is both to each other, as fellow Canadians, and to our Earth, that gives us everything. To all fossil-fuel workers workers and your families, we make this pledge: that we will care for you and protect you as we make this transition, enabling the changes to bring security and new opportunities for all.

In October 2019, a clear majority of Canadians voted for parties that support ambitious climate action, and this we will deliver. To this end, every Monday morning from now until the end of June we will announce new policies and initiatives to address the climate emergency.

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JANUARY: CLIMATE FOUNDATIONS

We can't save the world by playing by the rules, because the rules have to be changed.
Everything needs to change - and it has to start today.
Greta Thunberg

Week 1, January 6th Climate Governance

We have formed a **Climate Emergency Advisory Committee** that will meet monthly, chaired by the Prime Minister. We invite participation from all MPs who agree that we are facing a climate emergency and who are willing to work together on a comprehensive set of integrated climate solutions. The Committee's mandate is to upgrade the Pan-Canadian Framework on Clean Growth and Climate Change[11] targeting a 65% reduction in Canada's 716 megatonnes (Mt) of greenhouse gas emissions[12] by 2030 and 100% by 2040.[13] This is our new Nationally Determined Contribution to the Paris climate accord. Some will argue that this is not fast enough, and we welcome suggestions that could speed the pace of transition.

We need to work together to manage a just and equitable phase-out of Canada's fossil fuel supply. This broad objective will mean leaving most of the country's remaining coal, oil, and gas resources in the ground, and accordingly, we will not approve the Teck Resources Frontier expansion in Alberta's oil sands, which would add 6 Mt of GHG emissions every year.

We will introduce a **Climate Accountability Act**, establishing legally binding five-year emissions-reduction targets for every sector of Canada's economy. At the beginning of each year, an independent **Climate Commission** will produce a professional assessment of progress and make recommendations for further action. Each year in September, the Minister for Climate and Environment will present a climate action program with short-term and long-term initiatives showing how the government will achieve its goals. At the end of each year the Minister will face an examination in Parliament, when Members of Parliament will decide whether the government is complying with the Act or whether it should be required to act further. Models: British Columbia.[14] Denmark.[15]

We will introduce a **Wellbeing of Future Generations Act**, making it a legal requirement for all public bodies to consider the long-term impact of their decisions, and how they will affect future generations with regard to their positive or negative impact on climate, ecology, inequality, housing affordability and private household debt. Model: The Welsh Assembly, Wales.[16]

We will advance legislation on the **UN Declaration on the Rights of Indigenous Peoples** (UNDRIP), with the goal of passing it by the end of 2020.

We will **measure Canada's Wellbeing** annually, including regional and local differences, and prioritize actions that increase the wellbeing of Canadians and nature. Models: New Zealand, Iceland, Scotland, Bhutan.[17]

We will apply a **-3.5 Climate Discount Rate** to all economic modeling done by or for the federal government, and expect to see the same in third party economic modeling. The traditional accountancy practice of applying a discount rate to future costs is based on the assumption that such costs will be easier to bear due to productivity increases and economic growth. When the climate and ecological risk lens is applied, combined with an inequality, debt and housing affordability risk lens, it becomes clear that this assumption is no longer valid. Future costs will be harder to bear, not easier.

We will require **Climate Impacts Scorecards** for all proposed federal legislation, including our 2021 federal budget. We will apply a climate lens to all applications for federal money, including procurements, loans, grants, export supports and infrastructure project investments.[18] Model: New Zealand's announcement, December 2019.[19]

We will advance legislation to establish a **Sustainable Procurement Duty** for the $20 billion of goods and services that the government purchases each year. The Act will require that before a contracting business or agency supplies anything to the government it must demonstrate how it can improve the social, environmental and economic wellbeing of the area in which it operates, with a particular focus on reduced climate pollution, the involvement of small and medium enterprises and social enterprises, the promotion of innovation, reduced inequality, and hiring people who experience barriers to employment. These types of condition are also described as Community Benefit Clauses.[20] Model: Scotland.[21]

To ensure fairness in lobbying, and to keep the transition to 100% renewable energy on track, we will tighten the **Federal Lobbying Act** to increase transparency, and take steps to ensure that civil society groups have as many opportunities to lobby MPs and senior government bureaucrats as industry lobbyists.

Week 2, January 13th A Green New Deal

- We will develop a Green New Deal in partnership with business, labour unions, First Nations and non-profit societies to manage Canada's 20-year transition off fossil fuels in a planned, coordinated manner.
- Through programs to be announced over the next six months we will assist in the development of **a million new green jobs** over the next 20 years.[22] Our challenge will not be finding sufficient training and jobs for the displaced fossil fuel workers, but finding and training sufficient workers to take all the new jobs that will be created by the transition.
- We will extend the work of the Task Force on Just Transition for Coal Workers and Communities[23] to include all fossil fuel, forestry and agro-industrial workers whose jobs will disappear because of the transition, and we will enact a **Just Transition Act** to protect them financially with a two-year **Transition Income Guarantee** averaging $50,000 a year, and with job placement assistance, free college education and business or cooperative start-up support. Canada has 250,000 direct jobs in fossil fuels, so the 20-year transition will affect an average of 12,500 jobs a year. At $50,000 per affected worker per year, plus relocation costs, the cost is estimated at $1.5 billion a year.
  Cost: $1.5 billion per year (#1 – See Appendix: Climate Funding)
- To operate and administer the Transition Wages Guarantee and other initiatives to be announced in the coming months, federal and related organizations will hire up to 1,000 additional staff.
  Cost: 1,000 new staff @ $50,000 = $50 million per year. (#2)

Week 3, January 20th Canada's Carbon Tax

Carbon taxation is a net benefit to all Canadians and an essential tool as we navigate a rapid transition to renewable energy. The current tax is $30 per tonne in 2020, rising by $10 a year to $50 by 2022, the revenue from which is being returned to Canadians as tax rebates. In Ontario, the average family paying $357 in carbon tax costs per household is receiving $439 in rebates. 90% of the revenue is going to consumers as rebates, and 10% is going small and medium-sized businesses, schools, hospitals and other organizations.[24]

- The purpose of the tax is to incentivize citizens, businesses, organizations and utilities to switch to low or zero carbon energy. Thus a family whose members travel by bicycle, bus or electric vehicle and who have retrofitted their home to use a heat-pump will pay much less carbon tax, but they will receive the same tax rebate as other households. Later announcements will offer subsidies, grants and tax incentives to reduce emissions.
- The tax will remain revenue neutral, but instead of being returned as a tax rebate, the revenue will be distributed in the mail to all Canadians each January as an annual dividend.
- We will increase the tax and matching rebates by $25 a year, reaching $155 by 2025 and $280 per tonne by 2030, in keeping with scientific estimates of the price needed to reduce carbon emissions sufficiently to meet the Paris climate goals. In 2025, a household that pays $1,855 in carbon taxes will receive $2,268 in tax

rebates. As the decade proceeds and the transition to renewable energy accelerates, the taxes paid and rebates received will decline:

2121: $55	2022: $80	2023: $105	2024: $130	2025: $155
2026: $180	2027: $205	2028: $230	2029: $255	2030: $280

- Non-fossil-fuel export-sensitive industries will be able to apply for partial or total exemptions, so that Canadian business is not lost to countries which do not have a carbon tax or which charge a lower rate. In a future announcement we will discuss the possible use of border carbon adjustment tariffs.

Week 4, January 27th Our Climate Investments

To address the climate and ecological emergencies and to support Canada's transition to renewable energy and ecologically-managed forestry, farming and fisheries, in addition to large private sector investments, the Bank of Canada, new public banks, utilities, municipalities and citizens will collectively invest $62.7 billion a year, representing 3.6% of Canada's estimated $1,735 billion GDP in 2020.

Canada's money supply is created by its private banks whenever someone takes out a loan. The money does not pre-exist in a bank's accounts: the bank creates the money out of thin air, limited only by banking regulations which determine how much it must keep in reserves, and by trust in the lender, backed by collateral. The determining purpose of a private bank is to make profits for its owners and shareholders, which it does by charging interest on its loans and charging fees. A public bank can support its operations on fees alone, and it may but does not need to charge interest on its loans. It is managed by professional bankers for the public benefit.

Public banks all over the world are creating money for social purpose, guided by their city, regional or national governments. In Germany, Sweden, Denmark, Italy, Spain and France community and state-owned banks serve as much as 64% of the banking market. Germany's public Sparkassen banks, with 15,600 branches and offices, have a return on capital that is several times greater than Germany's private bank sector. As well as providing for the financial needs of Germany's small and medium-sized businesses, they have provided 72% of the financing for Germany's solar and wind installations. In Bangladesh, the publicly-owned Infrastructure Development Company provided the capital needed to install more than three million solar panels in rural areas between 2003 and 2014.

In Germany, the publicly-owned Kreditanstalt fur Wiederaufbau (KfW) has been the main source of financing for building retrofits to tackle the climate crisis. Between 2006 and 2009 it issued 27 billion Euros in loans and grants, triggered 54 billion Euros in further investment and rehabilitated 9 million housing units to a high energy standards, saving a billion Euros a year in heating costs and generating 894,000 jobs that lasted for at least a year.[25] In 2016 KfW also provided €3.5 billion in below market rate loans for energy efficiency in small and medium-sized manufacturers.[26]

Public banks can also serve their governments by storing government revenues, instead of these being held in a private bank, and they can issue loans for farmers, small businesses, students, and other chosen objectives. They can either issue these loans directly, or channel their lending through existing credit unions and community banks.

- To enable Canadians to benefit from the money-creating powers inherent to banking we will work with the provinces and professional bankers to establish **a Network of Public Banks** across Canada, one for each province and one for Yukon, Nunavut and the Northwest Territories. To enable this work to proceed immediately, we will provide $1 million for development costs, funded directly by the Treasury Board.

Central banks also have the power to create money, which they can use directly, as they did after the 2008 financial crisis, or indirectly, by underwriting other loans. In a July 2019 article in *Foreign Policy* titled *Why Central Banks Need to Step Up on Global Warming*, the economic historian Adam Tooze, Director of the European Institute at Columbia University and the author of *Crashed: How a Decade of Financial Crises Change the World*, argued that accomplishing the transformation needed to tackle the climate emergency will require a

huge redirection and increase in public spending, and that given the long-term nature of these investments, there is a strong case for funding a large part of the decarbonization drive through the issuance of long-term debt by public investment banks or directly by national governments, and that it should be the job of the central banks to support this push by acting as buyer of last resort for these long-term debts. This may raise raise fears of inflation, he wrote, but as advanced economies age, central bankers are struggling not to tame inflation but to ensure that it remains at 2% per year.[27]

The Bank of Canada is wholly owned by the people of Canada, enabling the government to work with the Bank to maximize its potential to assist with the investments needed to tackle the climate crisis and achieve the transition to 100% renewable energy.

The expenditures and investments needed to tackle the climate crisis through initiatives to be announced between now and the end of June come from five sources, none of which will increase taxation or public sector borrowing:

- **Climate Action Bonds** issued by the Government of Canada and bought by the Bank of Canada using **Green Quantitative Easing** until inflation passes 3% (currently 1.9%).[28] The Bank of Canada and private banks are the creators of Canada's money. Following the 2008 financial crisis, the Bank of England injected $375 billion into Britain's economy, the European Central Bank injected $1.34 trillion into Europe's economy and the US Federal Reserve injected $4.3 trillion into the US economy, using quantitative easing (QE). None of these actions caused inflation to increase. In 2013, Bank of Canada's governor Stephen Poloz said that America's QE program of $85 billion in monthly bond purchases had helped their economy, and suggested that the Bank of Canada would have done the same had conditions worsened.[29]
  Investment: $8.3 billion per year

- **5% Green Bonds**, equivalent to War Bonds, issued by the government, offering a 5% return, guaranteed by the Bank of Canada as buyer of last resort.
  Investment: $13.8 billion per year

- **Interest-Free Public Bank Loans** issued by a network of new public banks, guaranteed by the Bank of Canada as buyer of last resort.
  Investment: $11 billion per year

- **Pay-As-You-Save** (PAYS) Utility Loans and **Property-Assessed Clean Energy** (PACE) Municipal Loans, guaranteed by the Bank of Canada as buyer of last resort.
  Investment: $19.5 billion per year

- **Fossil Fuel Subsidy Transfers**.[30] Reviews suggest that Canada offers $3 billion to companies to explore and produce oil and gas within Canada, and that Export Development Canada spent almost $12 billion in 2016 and $10 billion in 2017 on foreign oil production.[31] The transfer of the subsidies to assist Canada's 20-Year Energy Transition means that the funds will continue to come from existing taxation.
  Investment: $10 billion per year

Almost all of these investments will generate income from income tax and GST, adding to government revenues. With KfW's home retrofit investments, for instance, for each €1 spent promoting retrofits and energy-efficient new builds the German government received €3 in tax income and savings. For a full table of our climate expenditures and investments, see Appendix 1.

FEBRUARY: ENGAGING CANADIANS

There is no task more urgent, more compelling or more sacred
than that of protecting the climate of our planet for our children and grandchildren.
Christiana Figueres

Week 5, February 3rd Climate Engagement

Without widespread citizen engagement it will not be possible to achieve our climate goals. The new initiatives announced today will build on Canada's Climate Action Fund, which funds initiatives that raise awareness of climate change and build capacity to increase climate action. [32]

- In 2021 we will form a **Climate Solutions Citizens' Assembly** of 50 people selected at random from across the country who will spend six residential or teleconference weekends learning about the climate and ecological emergencies and proposing solutions additional to those announced this year. Citizens' Assemblies have operated successfully in British Columbia, Ontario, Netherlands, Ireland, Poland and Belgium.[33] Cost: 6 x 50 x $500 + costs = $200,000, one-off. (#3)
- We will offer **500 Community Engagement Grants** of $10,000 each to communities across Canada that submit winning proposals to engage residents and neighbours in a six-months effort to reduce their household emissions. Lessons will be learned and reported back to Canadians, and a Canada-wide program will be rolled out in 2021. Cost*:* $5 million, one-off. (#4)
- In 2021, based on insights from the Community Engagement Grants, non-profit societies will be invited to organize teams of **Climate Action Coordinators**, each of whom will help 1,000 people make the transition to 100% renewable energy and climate and ecologically friendly lifestyles over ten years. To cover Canada's entire population, funding will be provided for 40,000 Coordinators. The scale of the effort is appropriate to the urgency of the climate and ecological emergencies, and similar to the scale of organizing that occurred during the Second World War.
  Cost: 40,000 @ 40,000 a year = $1.6 billion + 500 coordinators (each responsible for 80 coordinators) @ $60,000 = $30 million + costs and offices. Total = $1.7 billion per year (#5)
- We will invite bids for the creation, launch and operation of **Climate Solutions Roadshows** to be produced in partnership with the Climate Action Coordinators, to show in multiple simultaneous venues across Canada starting in 2021. 50 simultaneous week-long roadshows, 2 organizers each.
  Cost: 100 people x $50,000 = $5 million. Material costs for 2,500 roadshows a year @ $1,000 = $2 million. Total = $7.5 million per year (#6)

Week 6, February 10th Prairie Solutions

To the frontline workers in the coal, oil and gas industries: we understand your concerns. We need to bring the age of fossil fuels to a smooth but rapid ending, while protecting you and your families and communities.

- We will provide financial and other forms of support to affected workers through the Just Transition Act and the Transition Wages Guarantee, as announced in Week 2.
- To engage the citizens of north-eastern British Columbia, Alberta and Saskatchewan in the development of a prosperous post-carbon future, in partnership with their provincial governments we will fund 9 regional **Prairie Solutions Citizens Assemblies**, each consisting of 20 people selected at random who will spend six residential or teleconference weekends learning about and considering new economic opportunities. Members of the Assemblies will be offered insights into successful regional and local community economic development strategies around the world, and be encouraged to propose solutions for the next 100 years of life on the Prairies, when the age of oil has ended. We will fund a 10th Citizen's Assembly in Newfoundland to explore a similar future beyond oil. Cost*:* $1 million (#7)

- We will create a $5 billion **Green Prairies Futures Fund** to assist with the transition to a successful post-carbon economy. Cost: $500 million per year for ten years. (#8)

Week 7, February 17th Climate Education and Research

A proper scientific understanding of the climate emergency and its solutions is essential for all Canadians as we tackle this massive challenge. To this end:

- We will ensure that Canadian scientists continue to receive the research funding needed to understand the climate and ecological emergencies.
- We will work with the provinces to ensure that starting in September 2020, all school students will study solutions to the climate and ecological emergencies for one hour a week. Model: Italy has made sustainability and climate crisis compulsory subjects. Italian state schools will incorporate the UN's 2030 agenda for sustainable development into as many subjects as possible from September 2020, with one hour a week being dedicated to themes including the climate emergency and humans' influence on the planet. Other subjects will also be taught from the perspective of sustainability. Italy's Ministry of Education is being changed to make sustainability and climate the centre of its educational model.[34]
- Starting in Fall 2021, a **Certificate in Ecology and Climate Solutions** will be required for university entrance. Institutions that do not comply will not receive federal research grants or other funding.
- We will provide $50 million in **Climate 101 Curriculum Development Grants**, including teacher training and rollout. Cost: $50 million one-off (#9)
- School buses: Ontario (with 40% of Canada's population) has 18,000 diesel school buses, so Canada may have 45,000. Electric school buses cost $120,000 more than diesel buses, but the California Energy Commission has estimated that schools will save nearly $120,000 in fuel and maintenance per bus over 20 years, with added health benefits.[35] To enable every school board to switch to 100% electric school buses by 2030 we will create an **Electric School Bus Purchasing Pool**, providing $540 million a year in interest-free loans. This expands on our current commitment to help school boards and municipalities purchase 5,000 zero-emission school and transit buses by 2025.
  Cost: $540 million per year (#10), less the cost of the existing commitment.
- We will convert the Canada Youth Service Corps to the **Canada Youth Green Team** and expand it to offer 5,000 jobs paying $30,000 a year by 2022, with a focus on climate, environment, and ecological restoration. Cost: $160 million per year (#11)
- We will expand our **Learn-to-Camp Program** to reach 400,000 kids each year, adding climate and ecological learning to basic camping skills. Already budgeted under existing plans.
- To ensure that Canada's future politicians, economists, civil servants, lawyers, engineers, architects, business leaders, journalists and others have sufficient understanding of the economics of the climate emergency, we will encourage all **Economics and MBA courses** taught in Canada to include a module on climate science and solutions. Starting in September 2021, institutions that do not comply will not receive federal research grants or other funding. By January 2022, every economist hired by the federal government will be required to have completed such a module.

Week 8, February 25th Cohesive Communities

Every community in Canada needs the capacity and skills to embrace the transition, becoming strong and resourceful. In Britain, the Lambeth Study on participatory culture found that success in building a cohesive community requires regular engagement by 10-15% of the residents, and an investment of $140 per resident.[36] In the London east-end borough of Dagenham and Barking members of Participatory City are working to engage 25,000 residents in networks of friendship, and to grow 250 new projects and 100 new businesses with the goal of creating connectedness sufficient to make life better for everyone.[37]

We plan a future in which one of the central roles of government is to support non-governmental problem solvers, reducing the huge annual cost of putting dressings on our many problems, rather than solving them. In *The Beautiful Bailout: How a Social Innovation Scale-up Will Solve Government's Priciest Problems*, Shaun Loney explains how government partnerships with social enterprises can save money by reducing several of Canada's most costly problems, including off-grid diesel, and First Nations diabetes, poverty, incarceration and children in care.[38] To this end:

- We will continue our commitment to contribute $755 million over 10 years to the **Social Finance Fund**.[39]
- We will establish a **Cohesive Communities Fund** for social enterprise capacity building, comprehensive transition planning, urban greening, and ecologically sustainable community economic development in qualifying communities. Criteria for qualification include First Nations, low incomes, poor health indicators, and low participation rates in civic activities. $50,000 grants will be offered to 5,000 communities for five years to lay the foundations for a strong, participatory, cohesive community. This builds on our commitment to invest $50 million over two years in Investment and Readiness for social purpose organizations to improve their ability to participate in the social finance market.
  Cost: $250 million per year (#12)
- We will provide **Renewable Energy Capacity Building Grants** at $50,000 each to 500 communities, to ensure that Canada's First Nations and all neighbourhoods and communities across Canada are able to form cooperatives and social enterprises to engage in cooperative residential home energy retrofits, the development of renewable energy systems to end the use of diesel and natural gas for electricity, heat and transportation, and similar projects.[40] Cost: $25 million per year (#13)
- To encourage government staff and civil servants to support the transition, we will establish a partnership with the **League of Intrapreneurs**[41] and the **School for Social Entrepreneurs**[42] to offer trainings and on-line courses in social innovation and intrapreneurialism, emphasizing the successes that can be achieved by working in positive, problem-solving partnerships with social enterprises and non-profits, both among First Nations and elsewhere.
- We will require all federal agencies and public bodies to seek and measure a **Social Return on Investment**.[43] The scale of work needed to engage in nation-wide building retrofits, for instance, is a huge opportunity for social enterprises such as as Building UP, which operates in Winnipeg, Brandon and Toronto, to train and hire ex-prisoners and others with minimal or no work experience, reducing recidivism and saving the $80,000 annual cost of keeping a person in prison.[44]

MARCH: BUILDINGS and TRANSPORTATION

Many individuals are doing what they can. But real success can only come if there is a change in our societies, in our economics and in our politics.
David Attenborough

Week 9, March 2nd Green Buildings

Buildings produce 12% of Canada's GHGs.[45] The challenge is two-fold: new builds, and retrofitting Canada's 15 million homes and 480,000 industrial, institutional and commercial buildings.

New Builds. The Passive House standard is so efficient that the only heat source needed is a small heat recovery ventilator. It costs 4-5% more to build, but with no heating bills, the additional cost zeroes out within a number of years. The city of Brussels has shown that the Passive House standard can work for an entire city. They made the decision in 2011, giving carpenters four years to learn the new skills, and since 2015 every building, large or small, has been built to this standard.

- To give builders and carpenters time to prepare, we will upgrade Canada's building code to require every new building in Canada to be built to the **Passive House Standard** or an equivalent net-zero energy ready design by 2025, advancing the compliance date from the current 2030. We will continue our Net Zero Homes Grants that offer up to $5,000 for newly built homes that are certified net zero-emissions.
- To develop the necessary building skills, we will offer a $250,000 **Sustainable Buildings Course Development Grant** to each of Canada's 150 technical and vocational colleges and 12 schools of architecture, enabling tradespeople, architects, engineers, project managers and software developers to embrace the scale of work needed. Cost: $40 million one-off (#14)
- To enable architects, engineers, project managers, builders and trades workers to acquire Passive House and building retrofit skills, we will fund 50,000 **Sustainable Buildings Skills Training Placements** a year. Cost: 50,000 x 25k = $1,250 million per year (#15)
- To enable building inspectors and managers to acquire the skills needed to assess Passive Houses and building retrofits, we will establish a $5 million **Sustainable Building Inspectors Training Fund**. Cost: $5 million one-off (#16)
- The new standard will also apply to the 20,000 new homes that need to be build each year for low-income families, to address the affordable homes crisis.

Building Retrofits. Canada has 15 million homes, most of which will need an energy retrofit to make them more energy efficient and to replace the use of oil or gas with heat pumps or biofuel.

- To encourage greater building efficiency, starting in 2021 we will require every building that is listed for sale to carry an **Energy Benchmarking Label** to indicate its level of efficiency.[46]
- We will offer every homeowner and landlord a free **Energy Audit** plus follow-up visit, averaging 1.6 million homes a year over 10 years. Cost: 1.5 million @ $600 = $900 million per year (#17)
- To incentivize owners to retrofit their buildings by 2030 we will apply an annually increasing **Climate Danger Levy** to the use of oil and natural gas heaters and furnaces after 2030.
- To assist homeowners and landlords, in addition to the personal support offered by the 40,000 local Climate Action Coordinators (Week 5), we will offer interest-free **Home Energy Retrofit Loans** averaging $10,000 per unit for an average 1.5 million homes a year. This is a fourfold increase compared to the current target of 1.5 million homes over four years, but the interest-free loans are reduced from $40,000 to $10,000 to retain the same ballpark cost. The rising carbon tax on oil and gas will create an increasing incentive to undertake a retrofit, with added insulation, vapour barriers, efficient windows, etc. A ductless air-source heat pump costs around $5,000 before local utility rebates. On the Fisher River First Nations reserve in Manitoba, ground-source or water-source heat pumps cost around $18,000 per home,

permitting heating when the outside temperature is -20°C and reducing energy costs by 40%.[47] In Halifax, they cost $15,500 in 2015.[48] In Ontario, they cost between $22,500 and $29,000.[49]
Cost: $15 billion per year (#18)

To generate simple zero-downpayment financing:

- We will work with the provinces to require every utility to offer **100% Pay-As-You-Save (PAYS)** financing, as Manitoba Hydro does, financing loan repayments by the savings on the household energy bill. We will require Indigenous Services Canada to allow PAYS financing for First Nations social enterprises.[50]
- We will work with the provinces, Canada's largest cities and the Federation of Canadian Municipalities to establish a firm legal framework for **100% Property-Assessed Clean Energy (PACE)** financing, enabling long-term building retrofit loans that are repaid by a charge on the property tax that runs with the property, not the owner. PACE originated in the US in 2008 and has been used to finance 237,000 home and commercial retrofits worth $6.7 billion, creating 63,000 jobs, all without taxpayer support. [51]
- We will empower utilities and landlords to contract with **Energy Service Companies (ESCOs)** and social enterprises to undertake building retrofits, financed through the energy savings, with the estimated energy savings being protected by insurance.
- We will advance **Tenants Renovation Security** legislation to ensure that if tenants need to live elsewhere during a retrofit their landlords will work with their local municipalities to ensure that alternative rental arrangements are available, and to honour their post-retrofit tenancy at the same rent. Model: Vermont.[52]
- We will establish CMHC interest-free **Zero-Energy Modular Homes Loans** to encourage Canada's one million mobile home owners to replace their homes. A zero-energy solar modular home costs more than a regular mobile home, but without any heating bills, it costs less per month in combined mortgage and energy costs. Model: Vermont.[53] Cost: 100,000 homes a year @ $350,000 = $3.5 billion per year (#19)
- We will offer $1 million per year in **District Heat Development Grants** and $50 million per year in interest-free **District Heat Implementation Loans** to encourage Canada's municipalities to develop renewable energy district heat systems for 50 communities a year.
  Cost: $50 million per year grants (#20) and $2.5 billion per year loans (#21)
- We will offer **Industrial, Commercial and Institution Building Retrofit Loans** averaging $100,000 at 5% to assist owners of industrial, commercial and institutional buildings to undertake energy retrofits. With an estimated 480,000 ICI buildings, the rising carbon tax, and natural gas and heating oil being phased out by 2033, we will need to achieve an average of 48,000 ICI retrofits per year, or 1,000 per week. Cost: $4.8 billion per year (#22)

The challenge of this pace and scale of work is enormous. A consulting engineering company in Vancouver, with 20 licensed engineers or EITs (Engineer in Training) and nine support staff, does 20 to 50 commercial retrofits a year, suggesting 0.5 to 1 engineer job-years per retrofit. On this basis, 48,000 retrofits a year would require between 24,000 and 48,000 new engineers. Engineering Canada has 300,000 members, only 13.5% of whom are women. Of the 13,808 people who graduated from accredited post-secondary engineering programs in 2014, only 40% (7,825) became licensed engineers, suggesting a serious need for on-line courses, faster and easier licensing for immigrant engineers, and specialized building retrofit training certification.[54]

- We will establish a **Deep Retrofits Training Consortium**, including representatives from Colleges and Institutes Canada (CICan), Engineers Canada, engineering, architecture and design faculties, and high school co-op programs, and charge it to bring STEM education and deep retrofit skills to a wider demographic that includes women, indigenous and new Canadians.
- We will provide a $250,000 **Deep Retrofits Course Development Grant** to the new Consortium, seeking a rapid response. Cost: $250,000 one-off (#23)

Week 10, March 9th Walking, Cycling and Transit

Transportation produces 174 Mt of CO_2e emissions a year, accounting for 24% of Canada's emissions. We need to reduce this to zero by 2040.

- We will invite input to develop a **National Strategy on Walking and Cycling**, targeting the development of walkable cities and a walking and cycling modal share of 25% of all fair-weather trips in urban areas by 2030, 50% by 2040.
- We will offer $1 billion to municipalities in 50:50 funding for **Bikeway Infrastructure Grants**. The average cost to build a kilometre of protected bikeway is $375,000, so the grants will enable the construction of 5,000 kilometres of bikeways a year, at a cost 100 times lower than an equivalent new roadway.[55] Cost: $1 billion per year (#24)
- We will make the purchase of bicycles, cycling accessories and bus passes GST-free and tax deductible.
- Where vehicle travel allowances are provided, we will work with the provinces to require employers to pay cyclists and transit-riders the same allowance.[56] Model: Holland, and other countries.[57]
- We will invite input to develop a **National Transit Strategy**, targeting transit-oriented development and a transit modal share of 15% of all urban trips by 2030, 30% by 2040.
- We will allocate $2 billion a year to provide 50:50 funding for **Transit Infrastructure Investments,** on condition that all new buses are electric and local plans are in place for 100% electric buses by 2030. Cost: $2 billion per year (#25)
- We will allocate $1.6 billion a year to pay for **Free Bus Passes** for people under 25.[58] Cost: $1.6 billion per year (#26)

Week 11, March 16th Electric Vehicles

Our current target is that 10% of total light-duty vehicle sales should be zero-emissions vehicles (ZEV) by 2025, 30% by 2030 and 100% by 2040.

- With this announcement, we are changing our target such that all light-duty vehicle sales bought in Canada should be **zero emissions by 2030**. In 2020, many new electric vehicles have a range of 400 kilometres, and it is rare to find an EV driver who is not happy with their purchase. A Bank of America Merrill Lynch study found that over three years the cost of ownership of an EV (Tesla Model 3, Volkswagen ID.3, Audi e-tron, Nissan Leaf, MG ZS) is considerably lower than that of a conventional car.[59] In 2020, driving an electric vehicle 20,000 kilometres a year saves $2000 a year in reduced fuel and maintenance costs at 2019 gas prices,[60] providing $2,675 a year in savings to an average EV owner, or $50 a week. By 2030, when the carbon tax is $280 per tonne, the savings for an EV owner will be $3,695 a year, or $71 a week.[61]
- Starting in 2030 we will impose an annually increasing **Climate Danger Levy** on the price of every new gasoline or diesel vehicle, in addition to the carbon tax. We will continue to allow businesses to fully deduct the capital cost of zero-emission vehicles.
- We intend that all medium-duty trucks should be electric by 2035.
- We intend that all land vehicles and industrial equipment of every kind should be zero carbon (electric, hydrogen or synthetic fuel) by 2040.
- We will develop future iZEV incentives for these types of vehicle accordingly, adjusting the target forward or backward according to the market availability of ZEVs.
- We will continue our government's **iZEV Incentive**, which offers Canadians $5,000 off the price of a new ZEV costing less than $45,000, and $2,500 to lease a ZEV for a minimum 48 months.[62]
- We will continue our commitment to provide a 10% rebate on used ZEVs up to a maximum of $2,000. There are 2 million new vehicle registrations a year in Canada, and the average vehicle has a life of ten years.[63] The average EV may have a life of 25 to 30 years, with battery replacement after 10 to 15 years.

Year	iZEV Purchase Volume	% of new sales	Incentive	iZEV Program Cost
2019	60,000	3	$5,000	$300 million
2020	100,000	5	$5,000	$500 million
2021	400,000	20	$5,000	$2 billion
2022	600,000	30	$4,000	$2.4 billion
2023	800,000	40	$3,000	$2.4 billion
2024	1,000,000	50	$2,000	$2 billion
2025	1,200,000	60	$1,000	$1.2 billion
2026	1,400,000	70	0	0
2027	1,600,000	80	0	0
2028	1,800,000	90	0	0
2029	2,000,000	100	0	0

Cost: $1 billion a year averaged over ten years. (#27)

- We will phase out these incentives when the average price of a new ZEV equals the average price of a new mid-sized conventional vehicle, which we expect to happen by 2026 or earlier.
- We will continue to work with California on the stringency of our Low Carbon Fuel Standards in the years leading up to full zero emissions vehicles.[64]
- We will work with Canada's EV charging infrastructure providers and power utilities to ensure that EV charging capacity is in place along all major road networks, and in Canada's urban and rural areas. Models: Norway, Los Angeles.[65]
- We will work with Canadian auto manufacturers to maximize the manufacturing of EVs in Canada, using Canadian steel and aluminum.
- We will eliminate all federal taxes on the operation of carshare groups, and make carshare membership fees a tax-deductible expense.

Week 12, March 23rd Zero Emissions Railways, Freight and Heavy Equipment

Canada has 46,000 kilometres of railways,[66] almost all of which operate on diesel. In 2017, greenhouse gas emissions from the rail sector were 6.6 Mt CO_2e,[67] representing 0.9% of Canada's 716 Mt. Only 129 kilometres are electrified. Studies indicate that electrification costs around $5 million per kilometre.[68] This suggests that spread over 20 years, complete electrification would cost $230 billion, $11.5 billion a year, or $32,400 per tonne of avoided $CO2_e$.

- We will commission a **Railways Zero Emissions Study** of Canada's most-used stretches of railway to consider and cost electrification and the possible use of hydrogen, zero lifecycle emissions biofuel or synthetic diesel as cost-effective alternatives. Cost: $1 million one-off. (#28)
- We will commission a **Passenger Rail Study** to recommend changes to management practices to make passenger rail use faster and to eliminate delays due to commercial traffic. Cost: $200,000 one-off. (#29)

High-speed rail would cost a lot more. *High Speed Railways in China: A Look at Construction Costs* indicates that China may have reduced costs to US$17-$21 million per kilometre for a 350 kilometres/hour line, compared to $25-$39 million in the Eurozone.[69] In 2014, a 300-kilometres route from Calgary to Edmonton was costed at $6-$10 billion, or $20-$33 million per kilometre.[70] We will postpone any decision about investing in high-speed rail until we properly understand the cost of operating a zero carbon railway network across Canada.

Heavy-duty trucks produce 60 Mt of CO_2e a year, representing 37% of Canada's transportation GHG emissions and 8.4% of total emissions.[71] Industrial projects depend on diesel-burning equipment.

- To assist the transition to hydrogen, electric drive or synthetic fuels, we will expand Canada's Green Freight Assessment Program[72] to include a **Green Freight and Equipment Investment Program**, supported by $500 million a year in interest-free loans,. Cost: $500 million pa. (#30)
- We will become active partners in the North American Council for Freight Efficiency (NACFE), and support its work for greater fleet efficiency.[73] NACFE recently reported that commercial battery-electric vehicles and fuel cell trucks will reach a lower total cost of ownership than conventional fleet vehicles by 2030.[74]

Global shipping runs on dirty heavy fuel oil, which is exempt from all energy taxes under the European Union's Energy Tax Directive, and benefits from a fossil fuel subsidy of €24 billion a year.[75] GHG emissions from shipping and aviation were omitted from the 1997 Kyoto protocol and have been excluded from carbon regulations ever since. Shipping companies have agreed to halve their greenhouse gas emissions by 2050 under a 2018 plan brokered by the International Maritime Organization,[76] but this is insufficient to enable a phase-out of Canada's emissions by 2040. The Danish shipping company Maersk has pledged to operate carbon-neutral vessels by 2030, targeting net zero emissions by 2050, and it is investing US $1 billion a year to achieve its goals.[77]

- We will seek to form a partnership with Maersk.
- We will invest $500 million a year in **Zero Emissions Ship Design** Research and Development for application in Canada's shipyards. This will expand on Natural Resources Canada's existing Hull Design Efficiency Challenge.[78] Cost: $500 million a year (#31)
- We will work with other nations to levy a global carbon tax on all shipping.

Week 13, March 30th Sustainable Aviation

Domestic and international aviation produced 21 Mt of CO_2e in 2017 (14.34 Mt international, 6.67 Mt domestic), representing 3% of Canada's emissions. Emissions are rising by 1 Mt a year. Fuel consumption and GHG emissions rose by 65.5% between 2005 and 2017, averaging 4.3% per year, in spite of a 17.6% increase in aircraft fuel efficiency. Progress towards the targets in *Canada's Action Plan to Reduce Greenhouse Gas Emissions from Aviation* is insufficient to keep up with the increased number of passengers and flights.[79]

- To discourage non-essential flights, starting in 2022 we will **ban the use of air miles and frequent flyer reward schemes**. There are 220 frequent flyer clubs with an estimated membership of 200 million across the world, many of whom take additional flights to maintain their privileged traveller status.
- We will introduce a **Frequent Flyer Levy**, with the first 5,000 km (Vancouver to St John's Newfoundland) for each Canadian being free, and a levy of $7 per 1,000 km being charged for each subsequent flight, increasing by $2 per flight for each subsequent flight within the year, with no upper limit. Thus after an initial levy-free flight, a 7,000 km trip from Vancouver to Heathrow would cost an additional $49; a second such flight would cost $63, and so on.
- The fees will not apply to airlines which use electric airplanes, such as Harbour Air, based in Victoria.[80] Flights for emergency reasons will be exempt. Northern and remote communities will be exempt. The fees will not be a deductible expense. The use of private jets will no longer qualify as a tax-deductible business expense.[81]
- Proceeds from the levy will contribute to a $100 million a year **Zero Emissions Aviation Fund**, offering $50 million in grants and prizes and $50 million in interest-free loans to help airline companies research electric, hydrogen, synthetic fuels, zero-emissions-lifecycle biofuels or other solutions. This will amplify the work being done in Natural Resources Canada's The Sky's the Limit Challenge.[82]
  Cost: $100 million a year. (#32)
- We will work with other nations and sharpen our advocacy at the International Civil Aviation Organization to levy a global carbon tax on all aviation.

APRIL: CANADA'S ENERGY

We simply have to stop digging and drilling, and take advantage of the vast possibilities offered by renewable energy and nature-based solutions.
United Nations Secretary General António Guterres, COP-25, Madrid, 2019 [83]

Week 14, April 6th Renewable Electricity

In 2017, the generation of electricity from fossil fuels produced 74 Mt (10.3%) of Canada's emissions. Renewable energy has become the cheapest option for new power generation. Onshore wind and solar PV power are now less expensive than any fossil-fuel option, without financial assistance. In 2018, the IRENA Report on Renewable Energy Generation Costs concluded that during 2018 commercially available renewable power generation technologies became even more affordable:[84]

- Bioenergy costs declined by 14%
- Solar PV costs declined by 13%
- Onshore wind costs declined by 13%
- Hydropower costs declined by 12%
- Geothermal costs declined by 1%
- Offshore wind costs declined by 1%

The levelized cost of land-based wind power has fallen to 1.5-3 cents/kWh in the US,[85] 3.7 cents in Alberta.[86] The levelized cost of offshore wind has fallen to US 4.7 cents/kWh, 6.23 cents Canadian.[87]

Priced over 30 years, utility-scale solar now costs 3-5 cents/kWh in America, 4-6 cents in Canada, which is much cheaper than new gas-fired or nuclear power.[88] The yield of a solar panel falls by 0.5% a year,[89] while the efficiency of new solar panels is rising by 0.5% a year. New residential solar PV priced over 30 years costs 7 cents/kWh, compared to current Business as Usual (BAU) utility prices of 10-15 cents/kWh, 13-20 cents/kWh by 2030. The Stanford report referenced in the introduction finds that Canada has 92 GW of residential solar capacity, of which 19% (17.5 GW) will be needed, and 176 GW of commercial and governmental potential, of which 60% will be needed.

In 2018 Canada consumed 640 terawatt hours (TWh) of electricity.[90] The Stanford report estimated that by 2050 Canada will need 1,327 TWh of electricity, including planned storage by various means, for grid stability. Compared to BAU, the needed end-load capacity falls from 404.5 GW to 152 GW. 33.3% of the reduction is due to the greater efficiency of electric vehicles and heat pumps, 23% to the elimination of upstream fossil fuel demand, and 6% to policy-driven increases in end-use efficiency beyond BAU. Canada's future energy demand will be produced by:

- Onshore wind: 33% (49% capacity factor)
- Offshore wind: 9% (56% capacity factor)
- Geothermal: 2.63% (86% CF)
- Hydro: 23.6% (51% CF)
- Residential solar: 7.6% (19% CF)
- Commercial and government solar: 14.6% (19% CF)
- Utility solar: 8.9% (19% CF)

The total land area needed is 425 square kilometres for the footprint of wind and solar devices (0.005% of Canada's land) and 8,700 square kilometres for spacing between the turbines (0.096% of Canada's land, which

can also be used for farming and utility solar PV). The average cost of new renewables between 2020 and 2050 is 7 cents/kWh. The total investment needed is $914 billion ($700 US dollars), most of which will come from private investors and be repaid by Canadians' monthly utility payments.[91] To speed the transition to 100% renewable energy:

- We will **phase out coal-fired electrical utilities in Canada by 2027**, three years earlier than our current target, though units may be kept on standby or in reduced operation until 2030 for transition flexibility.[92]
- We will work with the provinces to **phase out gas-fired electrical utilities by 2030**, though units may be kept on standby or in reduced operation until 2033 for transition flexibility.
- We will require **dependency on diesel as the primary source of heat and power in off-grid situations to end by 2030**, though generators may remain available for back-up grid stability and for use in emergencies.
- To encourage investments in renewable energy, we will **cut tax rates by 50%** for companies and social enterprises that develop, manufacture and install zero-emissions technology.
- We will advance legislation enabling the **community and cooperative ownership** of renewable energy projects, guaranteeing their right to participate in Canada's energy transition, and making it illegal for a power utility to discriminate against local power producers and social enterprises, or to levy solar fees to discourage uptake.
- To encourage local investment, we will expand the Clean Power Fund into a 5% interest $5 billion per year **Community Renewable Energy Development Fund** to ensure that smaller entities including First Nations, farmers, cooperatives and social enterprises are able to compete with private corporations and keep locally generated income within local communities. Cost: $5 billion per year (#34)
- We will work with such entities to establish a **Canadian Community Energy Collaborative**, using their share purchasing power to increase financial resilience and protection against risk.
- 17.5 GW of residential installations is approximately 4.5 million solar rooftops, or 450,000 a year over ten years. Each installation costs on average $10,000, and generates solar earnings of $1,000 a year. To accelerate uptake, the Bank of Canada will act as buyer of last resort for $4.5 billion in **PAYS and PACE Solar Loans** in provinces and territories that are working to close down coal and gas-fired power generating facilities, or which need to generate more power to meet demand. Cost: $4.5 billion (#33)
- We will rewrite **Canada's Building Code** to require every new building with clear southern exposure in similar provinces and territories as above to have the optimum number of solar panels, starting in 2021. Model: France.[93]

Nuclear power: Nuclear power in Ontario produces 15% of Canada's power. We do not support the construction of new nuclear plants because of the heavy opportunity cost resulting from the long period of time needed to plan, win approval and build a nuclear plant, when the same investment could generate much more wind and solar power without undue delays. Nor do we support extending the life of existing, obsolete facilities. We are also concerned about the non-sustainability of uranium mining, the health hazards at every stage of the nuclear fuel cycle, and the global security risk of nuclear weapons proliferation.[94]

Week 15, April 13th First Nations and Rural Opportunities

In the Yukon, $200 million is spent each year to import diesel to provide power and heat for the community's 40,000 people, averaging $5,000 per person, $25,000 for a family of five. There are many renewable alternatives, including geothermal and biomass-based district heat, and wind and solar energy for power. In Finland, a country with a similar northern climate, 25% of total energy comes from biomass.

- To end the use of diesel for power and heat and to speed the transition to renewable energy in off-grid northern, remote and Indigenous communities, we will remove all barriers to the approval of community-based and social enterprise contracts and investments. This will strengthen the work being done in Natural Resources Canada's Indigenous Off-Diesel Initiative.[95]

- We will use our **Sustainable Procurement Duty** (Week 1) to ensure that contracts for home retrofits and other renewable energy projects can be given to social enterprises, and that contractors are able to hire ex-inmates, people who experience mental health and substance abuse challenges, and people who have no high school diplomas, poor literacy skills, no drivers license, no work experience and no hope.

Model: Build Inc, Winnipeg. A social enterprise insulation and home retrofit contractor and training program for people who face barriers to employment, whose work lowers utility bills, employs neighbourhood people, cuts crime and decreases GHGs.[96]

Model: Aki Energy, Winnipeg. A First Nations social enterprise whose members have installed 350 geothermal heating systems in four Manitoba First Nations, laying 213 kilometres of pipe that will cut utility bills by $15 million over 20 years.[97] Geothermal installations in 100,000 First Nations homes will generate $1.5 billion in investment, $750 million in paid jobs, 15,000 person-years of employment, and $5 billion in reduced energy bills over 20 years.[98]

Week 16, April 20th A Renewable Energy Grid

- To ensure that Canada's power utilities continue to produce reliable dispatchable power through the transition to 100% renewable energy, we will provide $100 million in **Renewable Grid Research Grants** over 10 years to develop improved systems of utility power storage and grid reliability. This will continue and expand the work being done in the joint Canada-UK Power Forward Challenge.[99]
  Cost: $10 million per year (#35)
- To encourage grid stability, we will work with the provinces to enable utilities that adopt **time-of-use pricing** as practiced by Hydro One and other utilities to receive a one-time 10% corporate tax reduction.[100]
- To reduce Canada's energy demand from lighting, appliances and equipment, we will make **Energy Star certification** mandatory for all new home appliances starting in 2022.
- We will introduce an annual **Efficient Appliances Award** to find the most efficient ('Top Runner') product for each type of appliance, from light bulbs to computer servers and vehicles, as in Japan.[101] The company producing the winning appliance in each category will be granted the cash equivalent of a one-year GST waiver on the winning appliance, which can be repeated for as many years as that appliance wins its category award. Every two years, we will upgrade the regulated standard for appliances in that category to emulate the most efficient design.
- To discourage the rebound effect that causes people to use more energy as the efficiency of appliances increases, we will work with the provinces to offer power utilities that adopt tiered pricing, as practiced by BC Hydro and other utilities, a one-time 10% corporate tax reduction.

Week 17, April 27th Fossil-Fuel Wind-Down

In 2017, Canada's oil and gas sector produced 195 Mt of CO_2e, accounting for 27% of the country's emissions.[102] Between 2020 and 2024, oil and gas corporations are planning to invest US$1.4 trillion in new extraction projects, 85% of which are in the US or Canada, and 50% of which Mark Carney tells us will result in stranded financial assets. These future investments would release 148 gigatonnes of carbon CO_2 by 2050, the equivalent of 1,200 new coal-fired power plants. If we allowed this, all our other efforts to get Canada's climate pollution under control would be wasted.[103]

Following Earth Day on April 22nd we confront the single biggest challenge to climate action in Canada, while sustaining the unity of our country and supporting the frontline fossil fuel workers whose jobs will be displaced as a result of the transition off carbon. To succeed in our goal of reducing GHG emissions by 65% by 2030 and 100% by 2040 we must extract only those fossil fuels that are needed to see us through the transition. To this end:

- We will work with the provinces and use our regulatory powers to **phase-out the use of coal** by 2027, three years ahead of our current schedule.
- We will work similarly to **phase-out the use of natural gas by 2035**, except for emergency purposes. We accept the science which shows that natural gas produced by fracking is as bad as coal because of its **fugitive methane emissions**,[104] and that liquefied natural gas (LNG) consequently produces no climate benefit compared to coal or other fossil fuels.[105] We will cease our mistaken efforts to win carbon offset credits for the export of LNG.
- We will work similarly to **phase-out the use of oil by 2040**, except for emergency purposes.
- We will write off our investment in the **Trans Mountain Pipeline**.
- We will **not approve any new or expansion fossil fuel projects**, including the proposed $20 billion Teck Resources Frontier project, which would add 6 Mt of greenhouse gas emissions emissions every year.[106]
- We will **not approve any more licences** for exploratory drilling for oil or gas.
- As announced in January (Week 2), we will **financially protect all front-line fossil fuel workers** whose jobs disappear with a two-year Transition Wages Guarantee averaging $50,000 a year, job placement assistance, free college education, and business or cooperative start-up support.
- As announced in February (Week 6), we will engage the citizens of north-eastern BC, Alberta and Saskatchewan in the development of a prosperous post-carbon future. We will form nine regional **Prairie Solutions Citizens Assemblies,** and support emerging projects through our Green Prairies Fund.
- We will **end all fossil fuel subsidies** by 2021. Reviews suggest that Canada offers $3 billion to companies to explore and produce oil and gas within Canada, and that Export Development Canada spent almost $12 billion in 2016 and $10 billion in 2017 on foreign oil production.[107]
- Starting in 2021, we will require that all conventional and social media **advertising for fossil fuels** and for fossil-fueled electricity, vehicles and heat carry a climate danger warning, including adverts for conventional cars. [108] Starting in 2025 we will ban all such advertising.
- To ensure that the closure of fossil-fuel facilities or the bankruptcy of companies does not leave abandoned toxic sites, we will require every facility to **post a bond sufficient for clean-up**, as estimated by a professional third-party cost estimator.
- In 2017, methane produced 93 Mt of CO_2e, accounting for 13% of Canada's GHGs, of which fossil fuels were responsible for 40%.[109] Over 20 years, which is the timeframe of climate urgency that matters, methane traps 84 times more heat in the atmosphere than CO_2. To maximize the reduction in fugitive methane emissions in the years leading up to total phase-out we will tighten the existing methane regulations for the upstream oil and gas sector and add a **Fugitive Methane Emissions Tax**, at a price to be determined.[110] The methane tax will also apply to landfills, and potentially in future to other biogenic sources such as cattle and sheep.

MAY: A GREEN ECONOMY

Imagine there is a fire in your house. What do you do? Your senses are heightened, you are focused like a laser, and you put your entire self into your actions. You enter emergency mode.
Margaret Klein Salamon, Founding Director of The Climate Mobilization

Week 18, May 4th Green Business

- To encourage businesses to engage with the transition we will advance a **Carbon Accountability Act** (Week 1) which starting in January 2021 will require businesses with more than $25 million in annual sales to publish their annual carbon emissions, describe efforts to reduce their emissions, and disclose their climate risk, both physically and financially.
- We will require companies listed on the Montreal, Toronto and Vancouver Stock Exchanges to show evidence of action to tackle the climate emergency. Companies that fail to do so by January 2022 will risk being de-listed.
- We will offer **Climate Smart Business Grants** of between $500 and $2,500 (average $1,500) to Canada's 1.18 million small and medium enterprises (SMEs) to assist them to reduce their emissions to zero. 55% of such businesses have fewer than four employees, and only 1.6% are medium-sized businesses. Since 2007, Climate Smart, based in Vancouver, has been providing training and software that enables businesses to measure their carbon emissions and achieve reductions.[111] On average, businesses achieve an 11% reduction in emissions within two years; top-performers achieve a 30% reduction. Case studies from a sample of 70+ Climate Smart businesses show a total annual cost savings to the companies of $4.5 million, averaging $64,000 per business. Deeper investments will be needed to achieve 100% reduction in emissions. Cost: 118,000 x $1,500 = $177 million per year (#36)
- To assist businesses with the investments and equipment upgrades necessary to eliminate their emissions, we will establish a $4 billion per year **Climate Smart Investment Fund**, offering long-term 5% interest loans to SMEs, averaging $30,000. The Government of Canada will guarantee these loans in case of failure. This initiative will build on and extend the existing $500-million Low Carbon Economy Challenge[112] and the Climate Action Incentive Fund for SMEs, which is offering $107 million for 2019/2020 in Saskatchewan, Manitoba, Ontario and New Brunswick.[113] Cost: $4 billion per year (#37)
- To train Climate Smart Business Advisors, we will fund 20 **Climate Smart Training Workshops** a year at a cost of $10,000 each. Assisting 1.18 million SMEs over 10 years averages 118,000 a year. One Climate Smart Business Advisor assists 75-100 SMEs a year, so 1,200 Advisors will be needed to assist 118,000 SMEs a year, with a surge in demand expected in the mid-2020s as the carbon tax increases. Cost: $200,000 a year (#38)
- To level the playing field on imports, we will work with our trade partners to adjust each of Canada's 99 existing or planned trade and investment agreements[114] and to impose **Border Carbon Tax Adjustment Tariffs** on imports from countries that pay no or low carbon taxes.[115] We will join other nations in seeking ways to impose **Climate Tariffs** on countries that are not doing their part to reduce their emissions.[116]

Week 19, May 11th A Circular Economy

As part of Canada's commitment to become a climate and ecologically-friendly country, we need to change the way we treat the materials we use to make the things we need and enjoy. Since the 1970s, global resource use has tripled, reaching 100 billion tonnes in 2017, with resource extraction and processing (including fossil fuels) accounting for 90% of biodiversity loss and water stress, and 50% of climate impacts:[117]

- Our global extraction of biomass has increased from 9.0 to 25 billion tonnes per year.
- Our global extraction of metals has increased from 2.6 to 10 billion tonnes per year.
- Our global annual use of fossil fuels has increased from 6 to 15 billion tonnes per year.

- Our global extraction of sand, gravel and clay has increased from 9 to 51 billion tonnes per year.

These numbers underscore the urgent need to shift to a fully circular economy where there is no such thing as waste. At the end of its useful life, everything must either be repairable, or be recycled for the re-use of its mineral and organic components. To this end:

- We will build on the European Union's circular materials re-use work to develop a **Circular Economy Scorecard** to be applied to every product, starting voluntarily and being required by law by 2025.[118]
- We will invite public input to develop a **Circular Economy Accountability Act** that will require all businesses with more than $25 million in annual sales to (a) measure their wastes and unwanted surpluses and to report plans for re-use or recycling, and (b) analyze their supply chains and report on measures being taken by domestic supply chain contributors to increase the Circular Economy Score for each product.[119]
- To facilitate this, we will develop a set of streamlined **Circular Economy Reporting Tools** to keep the process simple for small businesses and standardized for the government.
- To accelerate the transition to a circular economy, we will offer Canadian manufacturers $1 billion over 10 years in interest-free **Circular Economy Loans** to increase their products' circularity.
  Cost: $100 million per year over ten years. (#39)
- We will press ahead with the planned **Ban on Harmful Single-Use Plastics** by 2021.[120]
- We will advance a **Right to Repair Act** that requires products to be designed in ways that enable users and repair specialists to make easy repairs that keep items in use and out of landfills, while giving household budgets a break. The legislation, first advanced by Ontario MPP Michael Coteau, will require brands to provide consumers and electronics repair shops with replacement parts, software and tools for diagnosing, maintaining or repairing their products for a fair price; to provide electronic documents such as repair manuals for free; and to reset any electronic security that may disable a device during diagnosis, maintenance or repair.[121] Such legislation has been enacted in France, and proposed in Ontario and 18 US states.[122]
- We will invite public input into a proposed **Recycling Sales Tax** on every product, graded according to its **Circular Economy Score**. Products that are easy to repair, re-use and recycle would pay a lower tax than those that are harder or impossible, applying the principle of Extended Producer Responsibility across the economy. Revenues would be used to pay for product recycling and composting. Delays in implementation would be allowed in northern and remote communities to allow time to put repair and recycling facilities in place.
- We will offer $10,000 grants to enable 50 organizations and libraries to pioneer the best ways to establish **Repair Cafés** and **Libraries of Things**, enabling people to share and repair basic domestic items instead of purchasing and owning them.[123] Cost: 50 x $10,000 = $500,000 one-off (#40)

Week 20, May 18th Green Industry

In 2017 heavy industry produced 73 Mt of CO_2e, accounting for 10% of Canada's emissions, including non-fossil-fuel mining, smelting and refining, and the production and processing of industrial goods such as fertilizer, paper and cement.[124]

- We will reduce the allowed emissions-intensity for heavy industrial polluters annually. Working with the provinces, we will introduce our government's planned domestic **carbon-trading system** for industrial operations that emit more than 50,000 tonnes of CO_2e a year, enabling them to purchase credits for emissions above the regulated level from another heavy emitter, or to pay the carbon tax on their excess emissions.[125]
- To accelerate solutions, we will expand Canada's **Strategic Innovation Fund** by investing an additional $200 million a year in GHG-reducing solutions such as bio-hydrogen, green electro-hydrogen, electric arc furnaces, cement and concrete alternatives, hydrogen blast furnaces, halocarbon alternatives, electric

battery development, direct air CO_2 capture, and other climate critical technologies. The German company Thyssenkrupp Steel has succeeded in powering a blast furnace using hydrogen instead of coal, producing only water vapour.[126] Climeworks, based in Zurich, is capturing carbon from the air, mixing it with wastewater and storing it deep underground in balsatic rock.[127] Carbon Engineering, based in Squamish BC, is doing similar work.[128] The Fund will no longer support any fossil fuel related projects, such as LNG Canada, which received $220 million from the Fund in 2019.[129]
Cost: $200 million per year (#41)

- We will update Canada's halocarbon regulations and phase in a **Halocarbon Tax**, targeting zero emissions by 2040, using the revenue to assist companies to develop alternatives. Refrigerants, fire retardants, halocarbon products and synthetic gases (HFCs, PFCs, SF6 and NF3) generate just under 2% of Canada's GHG emissions. HFCs' Global Warming Potential is 1,000 to 9,000 times larger than CO_2. Project Drawdown identifies refrigerant management as its top option for reducing GHGs, with the global potential to eliminate the equivalent of 90 billion tonnes of CO_2 by 2050.[130]

Week 21, May 25th Green Finance

The climate emergency poses four risks to the stability of Canada's financial system:

- Losses to the insurance system caused by the increase in climate-related disasters, with the impacts spilling over into the financial system as a whole. In 2018, insured losses from severe weather events across Canada totalled $1.9 billion, compared to $400 million a year in previous decades.[131] A 2019 industry survey found that professional insurance actuaries ranked climate change as the greatest risk, ahead of cyber damages, financial instability and terrorism.[132]
- Climate liability costs stemming from successful lawsuits.
- Fossil fuel industry stranded assets of up to $2 trillion globally.[133]
- Losses to Canada's GDP resulting in a climate-caused collapse of financial confidence.

The Bank of Canada has expressed its concern about the dangers of a climate-driven 'Minsky Moment' when bull market optimism collapses into bear market pessimism.[134] To reduce this risk:

- As announced earlier (Week 18), we will require all larger companies including banks, pension funds and insurance companies to apply **climate stress tests** to their assets and portfolios, and to disclose their physical and financial climate and ecological risks in their annual reports.
- We will require all insurance companies to apply a climate stress test to every type of policy, adjust policies and increase premiums accordingly, and provide their customers and clients with three years notice of climate-vulnerable coverages which may be withdrawn or increased by more than 10% a year, such as coverage against predictable floods and forest fires, and flooding caused by foreseeable sea-level rise.
- We will **phase out the tax-free status of charitable foundation investments in fossil fuels** by 2022. 11,000 Canadian foundations have assets totalling $84.4 billion, the fossil fuel portions of which could be reinvested in Green Bonds.[135]
- We will develop a **taxonomy to define green investments** and ecologically sustainable economic activity, building on work in the European Union.[136]
- We will give **pension funds tax incentives** for a minimum level of green investment.
- We will **widen the mandate of the Bank of Canada**, placing protection of the environment at the core of its mission, enabling it to use all the tools at its disposal to address the climate and ecological emergencies, including using Green Quantitative Easing and other refinancing operations to support and underwrite investments that contribute to Canada's green transition.[137]
- We will ask the Bank of Canada to act as **buyer of last resort** for the issuance of 5% Green Bonds, interest-free loans issued by Canada's new network of regional public banks, PAYS loans issued by utilities, and PACE loans issued by municipalities.

- We will ask the Bank of Canada to use **Green Quantitative Easing** to purchase Climate Action Bonds from the government until inflation passes 3%.
- We will ask the Bank of Canada, the Canada Pension Plan and all other federal funds to **cease buying assets from companies involved in carbon-intensive and fossil fuel-related industries**, and to eliminate all carbon-intensive assets from their portfolios by 2022.
- We will ask the Bank of Canada to **issue credit guidance** to all banks, credit unions and shadow banks in Canada's banking system, barring them from extending credit for the expansion of carbon-intensive and fossil fuel-related ventures. Financial institutions which do not comply will risk losing their access to the Bank of Canada's overnight lending facilities and their $100,000 customer deposit insurance from the Canada Deposit Insurance Corporation.

JUNE: PROTECTING NATURE

21st century regenerative farming is the brightest hope for our planet to reverse the effects of global warming, and to protect and improve the health of farmers, global citizens and future generations.
Timothy LaSalle, CEO, Rodale Institute

Week 22, June 1st Regenerative Forestry

It is not our emissions as such that are causing the climate emergency: it is our *accumulated* emissions. Our world therefore faces not one but two climate challenges:

- **Challenge #1**: to reduce our human-caused atmospheric pollution to zero.
- **Challenge #2**: to reduce the atmospheric burden of carbon to its pre-industrial level, from 900 to 600 Gigatonnes (Gt), where 300 Gt. of carbon equate to 1.1 trillion tonnes of CO_2. Such a reduction can be achieved by increased carbon sequestration in forests, farms, ranch lands, wetlands, peatlands and marine ecosystems, by the use of timber, hempcrete and other carbon-storing building products, and by technological means such as Climeworks (see above) with secure geological storage.

When a country announces that it will plant trees or protect forests to absorb its emissions it muddles the two challenges. Each country needs to reduce its emissions to zero AND contribute to sequestrating the excess carbon already in the atmosphere, based on its available land area. Terms such as 'carbon neutral' and 'net zero carbon' mix those messages by wrongly implying that planting trees to capture carbon offsets the need to reduce emissions.

The global land area is 150 million square kilometres. 20% is covered with snow and ice and 33% is desert, leaving 45% (67.5 million square kilometres) to sequestrate the surplus carbon. Canada has 10 million square kilometres of land, of which 50% is permafrost, so in an ecologically rational world we would be working to re-absorb 7.5% of the 300 gigatonnes of surplus atmospheric carbon over the next 100 years, or 225 million tonnes a year, which illustrates the size of the challenge. If we default on our role, other countries will have to capture more than their land-share.

Canada has 8.75% of the world's forested area (3.47 million square kilometres), all of which stores carbon:[138]

- BC's coastal old-growth forests store 1,000 tonnes of carbon per hectare in above-ground and below-ground biomass.
- Cool temperate west coast forests store 625 tonnes of carbon per hectare.
- The boreal forest stores 100 tonnes per hectare.
- The older a forest, the more carbon it captures and stores. Temperate forests add two tonnes of carbon per hectare per year.

When a forest is clearcut in the Pacific Northwest it takes 13 years before the newly growing forest absorbs more emissions than are released from the cut area. In BC, sequestration dead zones that follow clearcutting occupy 3.6 million hectares.[139] On Vancouver Island, the old-growth forest is being logged at a rate of 9,000 hectares a year (25 hectares a day), causing a loss of nine million tonnes of carbon a year, less the carbon stored in long-lasting timber products.[140] Wildfires and pest outbreaks, amplified by the climate emergency, are causing further losses. Between 1993 and 2002 BC's forests stored an additional 120 million tonnes of carbon, but between 2003 and 2012 they released 70 million tonnes.[141]

In Ontario, 10% to 23% of reforested areas are not growing new trees due to road-building and full-tree harvesting, the debris from which inhibits forest renewal. Over 30 years, 650,000 hectares of forest have been lost, representing 16.5 Mt of lost opportunity for carbon sequestration; deforestation rates are 50 times greater than official federal reports.[142] In 2017, the National Resources Defense Council reported that clearcutting in

Canada's boreal forest was releasing 26 Mt of CO_2 emissions a year. These forest-related emissions and removals are not currently included in our federal and provincial GHG accounting. [143]

In 2017, the forestry sector contributed $24.6 billion to Canada's economy (1.4% of GDP) and employed 210,000 people, mostly in Quebec, British Columbia and Ontario (1.1% of total employment).[144] Changing the way the forest industry works so that our forests store carbon instead of losing it, becoming a solution to the climate emergency rather than a contributing cause, is a challenge we must urgently embrace.

Evidence indicates that clearcutting destroys carbon in the soil and trees, causes erosion and dramatic flooding, and destroys wildlife habitat. Ecological forest management methods that use small canopy openings protect the soil, watersheds and habitats and increase forest carbon, while still supporting a forest industry. Evidence for this approach can be found in the Harrop-Proctor community forest in BC, the Lubeck community forest in Germany, and elsewhere.[145] Forest Europe has developed six criteria for sustainable forest management, including the maintenance and enhancement (a) of the forests' contribution to global carbon cycles, (b) of forest ecosystem health and vitality, and (c) of their productive functions (wood and non-wood), (d) their biological diversity, (e) their protective functions, and (f) other socio-economic and cultural functions. [146]

To reduce Canada's forest carbon emissions:

- Starting in 2022, we will commence **annual accounting of carbon emissions and storage** in Canada's forests, reporting these annually alongside our other reported emissions.
- We will work with Canada's provincial governments, forest companies and non-profits to make a transition to **Ecological Forest Management Methods**, maximizing the forests' ability to sequestrate atmospheric carbon while also fulfilling other critical functions.
- We will establish a **Forest Carbon Commission**, with a mandate to establish a methodology for measuring forest carbon, study different forest management methods including in countries such as Finland,[147] and recommend ways for forest companies to make the transition to ecological methods of management.
- To assist with the change, we will offer $500 million in **Ecological Forestry Training and Transition Grants**. Cost: $500 million one-off (#42)
- In keeping with our Just Transition Act (Week 2), skilled and professional forest workers will receive **free training in ecological forest management**.
- When the forest carbon measurement tool is ready we will require forest managers with more than 1,000 hectares of forested land to **submit a forest carbon report** every five years.
- We will apply a **$25 per tonne forest carbon tax on lost carbon**, rising each year, using the income to support the transition.
- We will offer $100 million in **Bioeconomy Development Grants** to increase the number of jobs generated per 1,000 cubic metres of timber harvested, both in value-added products and in the production of ecologically sustainable forest bioproducts.
  Cost: $100 million one-off (#43)

Tree Planting. Researchers at ECH University in Zurich have calculated that Earth could support 4.4 billion hectares of continuous tree cover, 1.6 billion more than the current 2.8 billion hectares. Once mature, the new forests could absorb and store 205 billion tonnes of carbon (128 tonnes per hectare), or two-thirds of the 300 billion tonnes humans have released into the atmosphere since the Industrial Revolution.[148]

We will participate in the global drive to plant a trillion trees by 2030. In 2019, Ethiopians planted 350 million trees in a day.[149] Australia has pledged to plant a billion trees by 2050; Ireland to plant 440 million trees by 2040. We have pledged to plant two billion trees by 2030. The ECH study determined that Canada has the third-greatest potential to plant trees in the world – 117 billion trees over 78 million hectares, at a rate of 1,500 trees per hectare,

representing 11.7% of the global target. In areas where deer are not major browsers, one way to achieve such a huge number might be by airplane or drone-delivered seed bombs.[150]

- We will provide $1 million in **Tree-Planting Research Grants** to establish, plan and cost the best ways to plant this many trees in Canada. Cost: $1 million one-off (#44)

Week 23, June 8th Regenerative Farming

Agriculture in Canada produces 64 Mt of $CO2_e$ a year, accounting for 8.4% of emissions. The CO_2 and methane emissions result from animal production, manure, and the loss of carbon from agricultural soils. Nitrogen oxide emissions result from manure and the use of chemical fertilizers.[151] When fertilizer production is added, the proportion grows. Globally, agriculture produces 25% of all GHG emissions, and the livestock industry (meat and dairy) produces 15%, more than all the world's transportation.

The health, viability, and productivity of our farms and ranch lands is critically important for Canadians, and yet the way we practice agriculture and ranching is a major cause not only of the climate emergency but also of the global ecological emergency. Deeply unsustainable farm practices are contributing to dramatic declines in bird and insect populations, including bees and other critically important pollinators, the loss of topsoil fertility, and the loss of soil carbon. They are also creating dead zones and toxic algal blooms in lakes, rivers and seas, caused by nitrogen and phosphorus run-off from sewage, fertilizers and pesticides.[152] The use of chemical pesticides has also been linked to a number of diseases, including Parkinson's,[153] and the lack of nutritional quality in the food that many Canadians eat contributes to the growing incidence of diabetes (a 37.3% increase between 2004 and 2014)[154] – and obesity (one in three Canadians, representing $5-7 billion a year in healthcare costs).[155]

A transition to sustainable, climate-friendly farming practices is essential, yet it presents a huge challenge to Canadian farmers and agribusiness companies that have evolved their highly productive practices and technologies over many decades, while steadily eroding the capacity of the soil to grow food.

Studies show that regenerative organic methods of farming and ranching can produce similar yields while storing carbon in the soil, producing no GHG emissions, and allowing nature to regenerate.[156] Forty years of side-by-side trials by the Rodale Institute in Pennsylvania have found that after a five-year transition, the yields from organic farming are competitive with conventional farming, and that in drought years, yields can be up to five times greater. Sustainable farm operations in the U.S. Midwest recovered faster than conventional farms after the crippling floods in 2019.[157]

The Rodale Institute has shown that organic farmers earn three to six times greater profits, use 45% less energy, and reduce their carbon emissions by 40%. In 2016, the Institute's no-till organic manure systems produced 200 bushels of corn per acre, almost twice the yield of a conventional no-till system.[158] In the Indian state of Sikkim (population 620,000), which has been 100% organic since 2016, a few crop yields fell, but most increased. Bee populations are said to be rebounding, with plants dependent on bee pollination like cardamom providing much higher yields.[159]

Studies show that small-scale agro-ecological farming methods are profitable and productive, while storing carbon in healthy soil, conserving water, protecting bees and other pollinators and eliminating the use of chemical pesticides.[160] One soil health specialist has suggested that over time, globally restored farm soils could recapture as much as 65 ppm of atmospheric CO_2, reducing the future level from 420 to 355 ppm.[161]

Research also shows that regenerative, holistic methods of ranch land management build soil-health, store more carbon, restore ecological functions and increase biodiversity.[162] A 2013 study found that compared to conventionally managed farms, regenerative farms in Mexico could accommodate more cattle per acre, had lower cow and calf mortality, purchased less feed, used fewer herbicides, and the topsoil was deeper, more aerated, and densely covered with plants.[163]

Methane production from cows, pigs and sheep presents a further problem, since over 20 years, methane traps 84 times more heat in the atmosphere than CO_2. In New Zealand, research is being conducted into new breeds of cows and sheep, and the ability of seaweed-enhanced diets to reduce methane emissions by as much as 80%.[164]

In consequence of the urgent need to eliminate Canada's carbon emissions, and the many positive impacts of regenerative organic farming:

- We will establish a multi-stakeholder **Canadian Farmland Transition Council**, and mandate it to research, cost, plan and implement a full transition to organic regenerative methods of farming and holistic methods of ranch land management by 2040. Cost: $2 million per year (#45)
- We will introduce a steadily increasing **Tax on Chemical Pesticides and Fertilizers** and use the revenue to provide a **Regenerative Farming Transition Subsidy** to farmers and ranchers who make the change for a maximum of five years, based on yields.
- We will work with farmers to rapidly phase out **harmful chemical pesticides** that have been shown to damage humans, wildlife or pollinators.
- We will establish a $5 million per year **Regenerative Farming Research Fund**, to develop solutions to farmland transition problems as they arise. Cost: $5 million per year (#46)
- We will establish a $100 million per year **Regenerative Farming Transition Fund** to top up the income from the new taxes when it is insufficient to support farmers and ranchers during the transition. Cost: $100 million per year (#47)
- As part of our Green New Deal, we will ensure that **agro-industrial workers** whose jobs disappear as a result of the transition receive the same support as fossil fuel workers. The cost is included in our Week 2 announcement.

The production of meat and dairy generates a heavy load of GHG emissions. Scientists are warning that livestock production needs to reach its peak within this decade, since meat production is 10 to 100 times more damaging to the climate than plant-based food, while the 80% of the world's farmland that is used for livestock produces only 18% of the food calories humans consume.[165] The release of land used for livestock could also contribute to the important work of reforestation. Many health benefits result from reduced consumption of meat and dairy, but most people's eating habits are well-established and culturally-rooted. To address this complex problem:

- We will establish a multi-stakeholder **Climate Friendly Food Council** to recommend strategies and measures for consumers, retailers, farmers and governments to reduce emissions from meat and dairy production and consumption. The Imperial College of London/WWF paper on *Strategies for Reducing the Climate Impacts of Red Meat/Dairy Consumption in the UK* provides a good beginning.[166] Cost: $2 million per year (#48)
- Starting in January 2021 we will require all food delivery agents serving federal institutions to offer **vegetarian and vegan options** at every event and begin a new **Meatless Monday** tradition, and we will encourage provincial and municipal governments and school districts to do the same.

Week 24, June 15th Ecological Restoration

We face an ecological as well as a climate emergency. Because of our human influence, Earth is in the midst a mass extinction crisis: up to a million species are threatened with extinction, many within decades.[167]

As part of this emergency, our oceans are in crisis. The ocean has absorbed 90% of the heat from our carbon emissions, and 20% to 30% of our human-caused carbon dioxide, making the water more acidic and more hostile to shellfish, corals and many other marine species. One in four species of sharks, rays and skates are threatened with extinction, due primarily to overfishing. On Canada's coasts, populations of marine fish, birds, mammals and reptiles fell by 9% between 1970 and 2014. In Atlantic Canada, cod, mackerel and tuna declined by 38%. Our already announced measures will contribute to the protection and restoration of nature, but much more is needed

to restore the previous richness of Canada's ocean wildlife and biodiversity. To this end, working with the provinces, First Nations and others:

- At the UN Biodiversity Conference in October 2020 we will re-affirm our goal **to protect and restore 30% of Canada's land ecosystems by 2030, 50% by 2050**. 11.8% is currently protected. Target 1 in Canada's 2020 Biodiversity Goals and Targets is that by 2020, at least 17% of terrestrial areas and inland waters and 10% of coastal and marine areas are conserved through networks of protected areas and other effective area-based conservation measures.[168] We will continue to support the Pathway Team pursuing Target 1: the Indigenous Circle of Experts, the National Advisory Panel and the National Steering Committee.
- We will re-affirm our goal to establish **Marine Protected Areas** (MPAs) to protect and restore 30% of Canada's marine waters by 2030, 50% by 2050. Only 14% of our waters have some degree of protection, and in 2018 we erred in allowing the Northeast Newfoundland Slope marine refuge to be opened for oil and gas exploration.[169] In light of the climate crisis and the urgency to protect Canada's marine waters, this decision will be reversed. MPAs protect species, habitats and ecosystems, sheltering ocean life and habitats so that they can recover from pollution or overfishing. They are off-limits to industrial uses, including oil and gas extraction, commercial fishing and seabed mining.[170]
- We will take these commitments to the World Ocean Summit in March 2020 and the UN Ocean Conference in June 2020, and we will continue our work with our fellow members of the High Level Panel for a Sustainable Ocean Economy.[171]
- We will develop **Science-Based Protection Targets** for each of Canada's ecosystem types, from deciduous to coniferous forests, prairie grasslands to Arctic tundra, freshwater to marine ecosystems.
- We will work with the provinces, territories, Indigenous communities, scientists, industry and other stakeholders to expand the Species at Risk Act into a **Species and Ecosystems at Risk Act** to protect all endangered ecosystems across the country, based on the principles of conservation biology and traditional ecological knowledge.
- We will support **Indigenous Protected and Conserved Areas** such as Tribal Parks with appropriate legislation, policies, and funding for land use planning, management and stewardship and sustainable economic development in First Nations communities.
- We will establish a $5 billion **Endangered Habitat Acquisition Fund** over 10 years to purchase and protect endangered ecosystems on private lands, and to offer conservation financing for First Nations sustainable economic development linked to the implementation of Indigenous Protected Areas and old-growth forest protection. This financing is additional to existing programs under the Habitat Stewardship Fund, the EcoAction Community Funding Program and the Canada Nature Fund.[172]
  Cost: $500 million a year. (#49)
- We will seek ways to expand the **Ecological Gifts Program**, which enables Canadians who own ecologically sensitive land to leave a legacy for future generations protected by a conservation covenant, offering significant tax benefits. [173] We will seek ways to make it cheaper and easier for **Community Land Trusts** to issue and monitor conservation covenants.
- We will establish a $10 million per year **Ecological Democracy Fund** to enable local organizations to engage more volunteers to protect and restore local ecosystems. Cost: $10 million per year (#50)
- As announced earlier (Week 7), the **Canada Youth Green Team** will offer 5,000 jobs paying $30,000 a year by 2022, with a focus on climate, environment, and ecological restoration.

Week 25, June 22nd Climate Adaptation and Preparedness

Because of humanity's failure so far to reduce and re-absorb our carbon pollution, and the continuing accumulation of heat-trapping gases in the atmosphere, the climate crisis will continue to worsen and become costlier every year. In consequence, as well as doing everything we can to reduce and recapture our emissions, we must prepare for rising air, water and ocean temperatures, more extreme storms, floods, forest fires, droughts,

heat-waves, crop failures and diseases, melting glaciers and permafrost, biodiversity losses, invasive species and ocean acidification, continuing sea level rise, and for disaster-affected communities, appalling distress and loss.

- We will continue to support our **Federal Adaptation Policy Framework, our Disaster Mitigation and Adaptation Fund** and our current programs on climate adaptation, to reduce vulnerability and strengthen resilience.[174] Natural infrastructure practices have a critical role to play in making communities more resilient, including bioretention ponds, bioswales, urban trees, in-stream structures, green roofs, rainwater harvesting, rain gardens, flood setbacks, floodplain preservation, restoration of inland wetlands, living shorelines, reefs, dunes, maritime coastal forests of trees and shrubs, and saltwater marshes.[175]
- We will work with the provinces, territories and Indigenous Peoples to **complete all flood maps**, including forecasts for sea level rise at the top end of the modeled ranges, since observation reveals those to be the expected outcomes.
- Starting in 2022, as announced earlier (Week 21), we will require insurance companies to apply a climate risks lens to all their policies, looking 100 years out, and to attach climate risk and resilience clauses, resulting in higher rates where no action is taken by a policy-holder and reduced rates where preventive action is taken.

Week 26, June 29th Global Engagement

Unless every nation pulls its weight, global emissions will continue to rise and the climate emergency will bring an ever more disastrous future. To this end:

- We will apply a climate and ecological emergency lens to all **Canadian diplomacy** with other countries.
- We will work with other nations to establish a **Fossil Fuel Non-Proliferation Treaty**.
- We will pursue our commitment to the **United Nations Sustainable Development Goals**.
- We will continue to increase Canada's international development assistance every year to 2030.
- We will join the **High Ambition Group of Nations** committed to urgent action to tackle the climate and ecological emergencies. We will convene a meeting in Montreal in September 2020, inviting leaders of Bhutan, Costa Rica, Denmark, Finland, France, Iceland, New Zealand, Norway, Portugal, Spain, Suriname, Sweden, Switzerland, the UK and other countries that have made legally binding pledges to achieve net zero emissions by 2050 or earlier.[176]
- At COP-26 in Glasgow in December 2020 we will bring our **Nationally Determined Contribution** of a 65% reduction in climate pollution by 2030 and 100% by 2040.
- We will increase our contribution to the **UN Green Climate Fund** to $4 billion a year.[177] In 2010, the world's wealthiest nations agreed to mobilize US $100 billion per year by 2020 from a variety of sources to address the pressing mitigation and adaptation needs of developing countries, and that a share of the funding should be channeled through the Green Climate Fund. By 2019 only US $9.78 billion had been pledged, with the UK, France, Germany, Japan and Sweden showing up as the top contributors.[178] Canada contributed $300 million to the Green Climate Fund's initial period (2015-2018), and has given $288 million in other commitments.[179] Cost: $4 billion a year (#51)
- We will work with other nations to protect **global whale populations**. Each whale absorbs an average 33 tonnes of CO_2 before it dies, when it sinks to the bottom of the ocean and its carcass remains there for centuries, storing its carbon. Whales also support the production of phytoplankton, which capture as much CO_2 as 1.7 trillion trees, or four Amazon forests. A 1% increased phytoplankton productivity would capture and store the same amount of CO_2 as two billion mature trees. If the world's whales could rebuild their population from the current estimate of 1.7 million to 4 or 5 million, as it was before the advent of industrial whaling, they would capture 1.7 billion tonnes of CO_2 annually.[180]

Week 27: July 6th The Climate Solutions Dividend

The 26 weeks are over, and this is not a new announcement, but rather an economic and financial impact analysis of the 164 policies that have been announced over the past six months. An analysis of the investments and expenditures proposed in this paper needs to consider the following risks:

1. The risks inherent in following a Business-As-Usual policy playbook, and not embracing the rapid transition to 100% renewable energy and zero GHG emissions.
2. The risks of a dangerous increase in Canada's Private Debt to GDP Ratio, which the history of financial crises shows to be the prime historical cause of financial crisis.
3. The number of jobs generated, and the ability of Canada's workforce to absorb them.
4. Changes to government revenues.
5. The risk of inflationary pressure due to expansive monetary policy.
6. The risk that the new investments will crowd out other investments.
7. The increase to the annual deficit.
8. The risk that the Bank of Canada acting as buyer of last resort will create moral hazard.
9. The costs and benefits of transferring energy expenditures to renewables.
10. The overall economic impact in an era of secular stagnation with low growth and ultra-low interest rates.

Summary of Investments and Expenditures	Annual Investment ($ bn)	Jobs generated	New government revenues ($ bn)	% of Canada's GDP $1,735 billion
Climate Action Bonds	8.313	136,000	1.224	0.48
5% Green Bonds	13.8	138,000	1.242	0.79
Interest-Free Public Bank Loans	11	110,000	0.99	0.63
PAYS and PACE Loans	19.5	195,000	1.75	1.12
Fossil Fuel Subsidy transfers	10	60,000	0.54	0.58
Total	62.7	639,000	5.746	3.6

Climate Action Bonds

Investment: $8.3 billion per year. Approximately $6.8 billion in wages, $1 billion in iZEV grants and $500 million in Habitat Acquisition grants.

- Positive Financial Impacts: If the new jobs pay $50k a year, the expenditures summarized in Appendix 1 will create 136,000 jobs. If each new earner pays $6,000 in taxes,[181] they will provide $816 million in new government revenues. With a 1.5% multiplier effect as the new money ripples through the economy, the new revenues total $1.224 billion a year.
- Negative Financial Impacts: Central Bank money-creation can be inflationary if the economy cannot absorb it, either because there is full employment or because all needs are being met.

5% Green Bonds

Investment: $13.8 billion per year. The bonds are used to finance ICI building retrofits, renewable energy projects and SME green business investments.

- Positive Financial Impacts: If 50% of the investment pays for labour and 50% for materials, that's $6.9 billion in wages. Using the same assumptions, it will create 138,000 jobs and generate new government revenues of $1.242 billion a year.
- Negative Financial Impacts: Can Canada's economy absorb this much private investment, or will the Green Bonds crowd out other important investments?

Interest-Free Public Bank Loans

Investment: $11 billion per year. The loans are used to invest in green technology, including electric school buses, new zero-energy modular homes, district heat systems, green freight, zero emissions aviation, and circular economy loans.

- Positive Financial Impacts: If 50% of the money pays for labour and 50% for materials, that's $5.5 billion in wages. Using the same assumptions, it will create 110,000 jobs and generate new government revenues of $990 million a year.
- Negative Financial Impacts: Will the loans stretch private and corporate debt to a worrying level? Electric buses and zero-energy modular homes will pay for themselves through energy savings, so are very low risk. District heat systems will be repaid through utility bill payments, generating equally low risk. Investments in green freight and aviation will enable Canadian companies to build market advantage and be repaid through sales. Circular economy loans will enable Canadian businesses to reduce their costs on the proposed Recycling Sales Tax. The loans are guaranteed by the Bank of Canada, eliminating risk of loan default.

PAYS Utility Loans and PACE Municipal Loans
Investment: $19.5 billion per year. The loans are used for home energy retrofits and solar loans.

- Positive Financial Impacts: If 50% of the money pays for labour and 50% for materials, that's $9.75 billion in wages. Using the same assumptions, it will create 195,000 jobs and generate new government revenues of $1.75 billion a year. The home energy retrofit loans will pay for themselves over 20 years and the solar loans over 10 years, with repayments being secured by utility payments (PAYS) and municipal taxes (PACE).
- Negative Financial Impacts: I have not suggested an interest rate for the PAYS and PACE loans, but if it is 5% there should be no shortage of investors.

Fossil Fuel Subsidy Transfers
Investment: $10 billion per year. In 2017, Export Development Canada spent $10 billion on foreign oil production. $4 billion is allocated to the Green Climate Fund, reducing domestic investment to $6 billion, which is invested in 40,000 Climate Action Coordinators, the Prairie Solutions Futures Fund, Transit Infrastructure grants, free bus passes, and green R&D.

- Positive Financial Impacts: If 50% pays for labour and 50% for materials, that's $3 billion in wages. Using the same assumptions, it will create 60,000 jobs and generate new government revenues of $540 million a year.
- Negative Financial Impacts: None

Discussion

Risk 1: Business-As-Usual. The risks inherent in following a Business-As-Usual policy playbook and not embracing the rapid transition to 100% renewable energy and zero GHG emissions.

> **Analysis**: Business-As-Usual, pursued globally, would result in an aggregate annual cost of $76 trillion a year in combined private, climate impact and healthcare costs, representing 87% of global GDP. Canada faces the additional risk that 80% of its coal assets and 50% of its oil assets would be stranded, causing large investor losses. The transition to 100% renewable energy, embraced globally, reduces the combined private, social and healthcare costs by 91%. If Canada acts alone, the private costs and healthcare costs would fall, but the climate costs would not change, which is why cooperative global action is so essential.

Risk 2: Private Debt to GDP. A high Private Debt to GDP Ratio is the prime warning sign of a potential financial crisis. In December 2018 Canada's ratio was at an all-time high at 266.5% of GDP, the 7th highest in the world. The US deleveraged some of its debt to 197% of GDP after the 2008 financial crisis when average net wealth households lost 36% of their wealth[182] and seven million people lost their homes.[183]

> **Analysis:** There is risky debt, and safe self-financing debt. Of the $44.3 billion a year of new debt:
> - $11 billion carries no interest, making the loans inherently safer.
> - For the $19.5 billion in PAYS and PACE loans the repayments are wired into a household's utility bills (PAYS) or municipal taxes (PACE), premised on the energy saving investments paying for themselves in

reduced utility bills, so there is no aggregate loss of household income. The debts need to be categorized as self-financing in federal economic tracking so that they are not added to Canada's Private Debt to GDP Ratio, inviting a negative reaction from the ratings agencies.

- The $13.8 billion a year in Green Bonds is used to finance ICI building retrofits, which self-finance the repayments through utility bills, renewable energy projects, which are repaid by future secure utility contracts, and SME green business investments, which reduce costs accruing through the rising carbon tax.

Risk 3: Jobs. In November 2019 Canada had 1.2 million unemployed workers, 450,000 vacancies, and a 5.6% unemployment rate. Stats Canada underestimates the true level of unemployment by aggregating part-time workers into full-time equivalents, hiding 430,000 people who need work. It also doesn't count those who want to work but are not actively seeking work, perhaps because they have given up, hiding a further 420,000 workers, suggesting an actual total of two million unemployed workers.[184] Canadians work in some 19 million jobs.[185] In 2018 the energy sector generated 269,019 direct and 550,588 indirect jobs. 96% of the workforce does not work in jobs related to fossil fuel industries.[186]

Analysis: The proposed investments will generate 639,000 direct jobs, plus the associated indirect and induced jobs. This is a surplus of 370,000 direct jobs after the replacement of the fossil fuel jobs, representing 31% of Stats Canada's unemployed workers, and 18.5% of the actual unemployed. Using the 1.5 multiplier to include indirect and induced jobs, the numbers rise to 46.5% and 28%, reducing Canada's official unemployment rate from 5.6% to 2.7%, and absorbing almost all of the employment slack in the economy.

Risk 4: Government Revenue. Government revenues from the energy sector between 2013-2017 averaged $16.8 billion dollars a year. The oil and gas industries generated $14.8 billion, including $11.8 billion from upstream extraction. The energy sector's share of taxes generated $7 billion in 2018, representing 11% of provincial and federal operating revenues, approximately $4.9 billion of which came from fossil fuel industries, $2.1 billion from electrical utilities.[187]

Analysis: $5.74 billion per year of new revenues from the transition will offset the loss of $4.9 billion revenues from fossil fuels.

Risk 5: Inflation. Standard economics warns that in a full economy with no slack an expansive monetary policy will cause inflation.

Analysis: The proposed programs do appear to eliminate most or all of the slack in Canada's economy, risking inflation as the investments become full-blown. Canada's core inflation rate has been inching up to 2% since 2017, and is currently not a concern, except in the housing market, which is exclude from the Consumer Price Index.[188] Steady monitoring will be needed.

Risk 6: Crowding out. The risk that the new investments will crowd out other investments, endangering economic stability.

Analysis: $13.8 billion in Green Bonds represents 10 million Canadians buying $1,380 in Green Bonds a year ($115 a month) to contribute to their $2.5 trillion of total pension assets.[189] In 2019, Canada's personal savings rate was 3.2% of the total disposable personal income of $1.3 trillion, totaling $41.6 billion, so $13.8 billion would absorb 33% of Canadians' annual savings. Some would come from the sale of fossil fuel investments. A more complex issue is whether the suggested rate of 5% is too generous, and might induce Canadians to cut back on spending in order to save more. Allowing the Green Bonds rate to float for their initial months would allow a market price to emerge. In 2018, the investment giant Black Rock expressed a concern that Canada's excessive borrowing could crowd out private sector investments, leading to higher rates and greater economic stress.[190]

The Canada Pension Plan Investment Board has $4 billion invested in the top 20 traded fossil fuel companies. When they disinvest and reinvest in Green Bonds this would account for 29% of one year's issuance of Green Bonds.

Risk 7: Taxation and Public Borrowing.

Analysis: The increased carbon tax adds to taxation, but it is returned through an annual dividend check, creating no net increase in taxation. Of the five types of financing, only the Green Bonds add to public borrowing ($13.8 billion). The loans are for ICI Building Retrofits, Community Renewable Energy investments and Climate Smart Investments, the savings from which will repay the bonds, enabling the loans to be accounted for separately and not added to the public deficit.

Risk 8: Moral Hazard. The risk that the Bank of Canada's underwriting of the new debts as lender of last resort would create moral hazard, inviting bad behaviour by unscrupulous players.

Analysis: The answer is almost certainly yes it would, since no society can be free of unscrupulous players. Close monitoring of loans will therefore be required, with punitive actions announced in advance to deter fraud and opportunism.

Risk 9: Costs and Benefits. The financial, employment and healthcare costs benefits that would result from transferring household and corporate energy expenditures from coal, oil and gas to renewables.

Analysis: In 2018 Canada's energy sector accounted for 11% of GDP ($230 billion), $145 billion of which (63%) came from fossil fuels.[191] Oil and gas exports totalled $119 billion, while energy imports totalled $50.5 billion, $49 million of which from was fossil fuels, suggesting a positive balance of fossil fuel trade contributing $70 billion a year to Canada's economy. Foreign control of oil and gas extraction reached 43% in 2016, however, so an unknown share of the income may not remain in Canada. The financial benefit of fossil fuels from exports is therefore a $70 billion foreign exchange injection (less the foreign owners' share). This will become a loss of export earnings that will need to be made up in other ways, hopefully through the export of green technologies and services.

The employment increase of 370,000 jobs has already been covered. A second set of benefits results from the elimination of air pollution, and costs associated with pain and suffering, early death, and acute and chronic non-fatal illnesses. The 2015 IISD report *Costs of Pollution in Canada* pegged the cost of smog at $36 billion a year, representing 2% of Canada's GDP. The proposed policies would also reduce traffic noise (electric vehicles being much quieter); reduce ground-level ozone, which inhibits plant growth; eliminate pesticide-related diseases such as Parkinson's and some cancers; and eliminate freshwater algal blooms and ocean dead-zones from chemical fertilizer run-off.[192]

There may also be financial benefits, since each person who drives an EV saves $2,000 a year by not buying gasoline, thanks to the lower cost of electrical driving, money which becomes available for expenditure elsewhere. In 2018 Canadians consumed 110 billion litres of refined petroleum products,[193] spending $143 billion at an average $1.30 a litre, much which probably circulated back into the economy. By saving 66% of this expenditure, consumers have an additional $95 billion a year in their pockets, but analysis of how this money would circulate compared to the expenditure on fossil fuels is beyond the scope of this paper.

Risk 10: Overall economic impact in an era of secular stagnation with low growth and low interest rates.

Analysis: The $62.7 billion investment will increase Canada's GDP of $1,735 billion by 3.6% a year, or by 5.4% with a 1.5 multiplier effect. Combined with the healthcare savings (2% of GDP), it generates an economic stimulus equivalent to 7.4% of GDP. This is the **Climate Solutions Dividend**.

How the dividend will be spent will be a cultural decision: some will choose to buy more stuff, while others choose to buy more time, signaling a civilizational shift from economic growth to cultural progress.

Appendix1 : Climate Funding $ million pa	**Total**	**Climate Action Bonds**	**5% Green Bonds**	**Interest-Free Loans**	**PAYS and PACE**	**FF Subsidy Transfer**
1. Transition Wages Guarantee	1,500	1,500				
2. 1,000 additional staff	50	50				
3. Citizens Assembly	0.2	0.2				
4. Community Engagement Grants	5	5				
5. 40,000 Climate Action Coordinators	1,700	0				1,700
6. Climate Solutions Roadshows	7.5	7.5				
7. Prairie Solutions Citizens Assemblies	1	1				
8. Green Prairies Futures Fund	500	0				500
9. Climate 101 Curriculum Development grants	50	50				
10. Canada Electric School Bus Purchasing Pool	540	0		540		
11. Canada Youth Green Team	160	160				
12. Cohesive Communities	250	250				
13. Renewable Energy Capacity Building Grants	25	25				
14. Sustainable Buildings Course Dev't Grants	40	40				
15. Sustainable Buildings Skills Training	1,250	1,250				
16. Building Inspectors Training Fund	5	5				
17. Home Energy Audits	960	960				
18. Home Energy Retrofit Loans	15,000	0			15,000	
19. Zero-Energy Modular Homes Program	3,500	0		3,500		
20. District Heat Development Grants	50	50				
21. District Heat Implementation Loans	2,500	0		2,500		
22. ICI Building Retrofit Loans	4,800	0	4,800			
23. Deep Retrofits Course Dev't Grant	0.25	0.25				
24. Bikeway Infrastructure Grants	1,000	1,000				
25. Transit Infrastructure Grants	2,000	0				2,000
26. Free Bus Passes	1,600	0				1,600
27. iZEV Incentives	1,000	1,000				
28. Railways Zero Emissions Study	1	1				
29. Passenger Rail study	0.2	0.2				
30. Green Freight Investment Program	500	0		500		
31. Zero Emissions Ship Design	500	500				
32. Zero Emissions Aviation	100	50		50		
33. PAYS and PACE Residential Solar Loans	4,500	0			4,500	
34. Community Renewable Energy Dev't Fund	5,000	0	5,000			
35. Renewable Grid Research Grants	10	10				
36. Climate Smart Business Grants	177	177				
37. Climate Smart Investment Fund	4,000	0	4,000			
38. Climate Smart Training Workshops	0.2	0.2				
39. Circular Economy Loans	4,000	0		4,000		
40. Repair Cafés and Libraries of Things	0.5	0.5				
41. Strategic Investment Fund	200	0				200
42. Ecological Forestry Transition Grants	500	500				
43. Value-Added Wood Products Dev't Grants	100	100				
44. Tree-Planting Research Grants	1	1				
45. Canadian Farmland Transition Council	2	2				
46. Regenerative Farming Research Fund	5	5				
47. Regenerative Farming Transition Fund	100	100				
48. Climate Friendly Food Council	2	2				
49. Endangered Habitat Acquisition Fund	500	500				
50. Ecological Democracy Fund	10	10				
51. Green Climate Fund	4,000	0				4,000
Totals	62,703	8,313	13,800	11,000	19,500	10,000

Appendix 2: HIGHLIGHTS

- A planned 20 to 30-year transition off fossil fuels.
- A transition wages guarantee for displaced fossil fuel and related workers, averaging $50,000 a year for two years, with free college retraining and education.
- A network of new public banks.
- The carbon tax increases by $25 a year; Canadian households will receive annual carbon dividend cheques in the mail.
- 40,000 Climate Action Coordinators, each of whom will help 1,000 people make the transition to renewable energy and climate and ecologically friendly lifestyles.
- 9 Prairie Solutions Citizens Assemblies, consisting of people selected at random who will learn about and consider new economic opportunities for the post-carbon prairie economy.
- A $5 billion Green Prairies Futures Fund to assist with the transition to a successful post-carbon prairie economy over ten years.
- A Certificate in Ecology and Climate Solutions to be required for university entrance.
- An Electric School Bus Purchasing Pool, engaging every school board.
- The new Canada Youth Green Team will offer 5,000 jobs a year with a focus on climate, environment, and ecological restoration.
- A Cohesive Communities Fund for social enterprise capacity building, transition planning, urban greening and ecologically sustainable community economic development.
- Renewable energy capacity building grants to enable Canada's First Nations and other communities to form cooperatives and social enterprises.
- All new buildings to be built to the Passive House Standard or equivalent by 2025.
- Every homeowner and landlord to be offered a free Energy Audit and interest-free Home Energy Retrofit Loan averaging $10,000, reaching 1.5 million homes a year over 10 years.
- A Climate Danger Levy on the use of oil and natural gas heaters and furnaces after 2030.
- Interest-free loans to enable Canada's one million mobile home owners to replace them with zero-energy modular homes.
- Interest-free district heat loans to enable municipalities to develop district heat systems.
- 5% industrial, commercial and institution building retrofit loans, targeting 48,000 retrofits a year.
- A National Strategy on Walking and Cycling, targeting 25% of all fair-weather trips in urban areas by 2030, 50% by 2040. $1 billion a year in 50:50 funding for Bikeway Infrastructure Grants.
- A National Transit Strategy, targeting a transit modal share of 15% of all urban trips by 2030, 30% by 2040. $2 billion a year in 50:50 funding for Transit Infrastructure Investments.
- $1.6 billion a year for free bus passes for people under 25.
- All light-duty vehicle sales to be zero emissions by 2030. All medium-duty trucks by 2035, land vehicles and industrial equipment by 2040.
- A Climate Danger Levy on every new gasoline or diesel vehicle after 2030.
- Continued iZEV incentive, $5,000 off the price of new zero emissions vehicles under $45,000.
- $500 million a year for zero emissions ship design research and development.
- The end of air miles and frequent flyer reward schemes.
- A Frequent Flyer Levy. Proceeds to a $100 million per year Zero Emissions Aviation Fund.
- Coal-fired electrical power production to be phased out by 2027, gas-fired power by 2030.
- The use of diesel as the primary source of heat and power in off-grid situations to end by 2030.
- Tax rates reduced by 50% for companies that develop and install zero-emissions technology.
- All new buildings with clear southern exposure to have the optimum number of solar panels.
- $4.5 billion in zero-interest loans for residential solar installations in specific provinces.

- $10 billion per year Community Renewable Energy Development Fund for First Nations, farmers, cooperatives and social enterprises.
- The government will write off its investment in the TransCanada Pipeline.
- No approval for new fossil fuel projects or licences for exploratory drilling for oil or gas.
- A Carbon Accountability Act will require larger businesses to publish their annual carbon emissions, describe efforts to reduce their emissions and disclose their climate risk.
- Companies that fail to do so will risk being de-listed from Canada's stock exchanges.
- Climate Smart Business Grants for Canada's 1.18 million small and medium enterprises.
- A $4 billion per year Climate Smart Investment Fund for small and medium enterprises.
- Development of a Circular Economy Scorecard, to be applied to every product.
- A Circular Economy Accountability Act, requiring larger businesses to increase the Circular Economy Score for each product.
- $1 billion over ten years in interest-free Circular Economy Loans for manufacturers.
- A proposed Recycling Sales Tax on every product.
- An additional $200 million per year for Canada's Strategic Innovation Fund for climate solutions. The Fund will no longer support fossil-fuel related projects.
- All insurance companies will be required to apply a climate stress test to every type of policy, and to adjust policies and increase premiums accordingly.
- The tax-free status of charitable foundation investments in fossil fuels will be phased out by 2022.
- A widened mandate for the Bank of Canada that places protection of the environment at the core of its mission, enabling it to use all the tools at its disposal to address the climate emergency.
- Pension fund tax incentives for a minimum level of green investment prior to 2022.
- The Bank of Canada, Canada Pension Plan and other public funds must eliminate carbon-intensive assets from their portfolios by the end of 2022.
- The Bank of Canada to issue credit guidance, requiring banks not to extend credit for the expansion of carbon-intensive ventures.
- A transition to Ecological Forest Management Methods.
- $500 million in Ecological Forestry Transition Grants.
- $25 per tonne forest carbon tax on lost carbon, rising each year.
- $100 million per year in Value-Added Wood Products Development Grants.
- A Canadian Farmland Transition Council to plan and implement a full transition to organic regenerative methods of farming and holistic methods of ranch land management by 2040.
- A steadily increasing Chemical Pesticides and Fertilizers Tax to provide a Regenerative Farming Transition Subsidy to farmers and ranchers who make the change.
- A Climate Friendly Food Council, to recommend measures to reduce emissions from the production and consumption of meat and dairy.
- All food delivery agents serving federal institutions to offer vegetarian and vegan options.
- Continued goal to protect and restore 30% of Canada's land ecosystems by 2030, 50% by 2050.
- Continued goal to protect and restore 30% of Canada's marine waters by 2030, 50% by 2050.
- A $5 billion Endangered Habitat Acquisition Fund over ten years to purchase and protect endangered ecosystems on private lands.
- A $4 billion annual contribution to the UN Green Climate Fund.
- These programs, totaling $62.7 billion a year, will be financed by:
  (a) $8.3 billion per year in Climate Action Bonds issued by the Government of Canada, bought by the Bank of Canada.
  (b) $13.8 billion per year in 5% Green Bonds, equivalent to War Bonds.
  (c) $11 billion per year in interest-free loans issued by a new network of eight public banks.
  (d) $19.5 billion per year in PAYS utility loans and PACE municipal loans.
  (e) $10 billion per year in Fossil Fuel Subsidy Transfers.

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Inheritance

If we, the children of the meek,
should inherit an earth
whose rainforest lungs
breathe a tale of waste –
an earth where the ailing sea
shudders in its own slick

If we, the children of the meek,
should inherit an earth
where the grass goes nostalgic
at the mere mention of green
and the sky looks out of its depth
when reminded of blue

If we, the children of the meek,
should inherit such an earth,
then we ask of the future
one question: Should we dance
or break into gnashing of teeth
at the news of our inheritance?

- *John Agard*

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If everyone knew how serious the situation is, and how little is actually being done,
everyone would come and sit down beside us.
We are facing a disaster of unspoken sufferings
for enormous amounts of people.

So please, treat the climate crisis like the acute crisis it is, and give us a future.
Our lives are in your hands.

- Greta Thunberg