A Just Transition to a Life-Sustaining Economy

A KAIROS Research Paper by John Dillon, Ecological Economy Coordinator, May 2016

In Memory of Berta Cáceres

As I began to write this paper, I learned of the assassination of yet another brave defender of life. Berta Cáceres, a member of the Lenca Indigenous people and founder of the Civic Council of Popular and Indigenous Organizations of Honduras was a leader in a global movement to defend natural ecosystems from destructive resource extraction projects.

Berta was killed for standing up against the construction of the Agua Zarca dam on her sacred Gualcarque river, without the consent of the Lenca people. The proposed dam would cut them off from their traditional sources of water, food and medicines. At the same time, it would provide electricity for some of the mineral extraction projects that have been awarded concessions that cover 30% of Honduras.

In 2015, upon receiving the Goldman environmental prize, Berta issued a stirring call for humanity: ***"Wake up! Our Mother Earth – militarized, fenced in, poisoned, a place where basic rights are systematically violated – demands that we take action. Let us build societies that are able to co-exist in a dignified way, in a way that protects life."***[1] Within a year of that speech, in which she alluded to the threats on her life, Berta was murdered.

Bertha is just one of hundreds murdered for standing up against resource extraction projects. Over 116 human rights defenders were killed in 2014 alone and two-fifths of these were Indigenous people from the Americas and Southeast Asia.

Berta Cáceres Presente!

[1] Adapted from Berta Cáceres' acceptance speech, 2015 Goldman Environmental Prize Ceremony. See www.youtube.com/watch?v=AR1kwx8b0ms. See also www.youtube.com/watch?v=zh9Sn9oJR94 or https://vimeo.com/132559974 for a video on the struggle led by Berta that resulted in yet another assassination.

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The Ecological Imperative

Indigenous people have issued inspiring calls to defend Mother Earth from the threats posed by mining, forestry and energy projects. Identifying themselves as "the ancestral guardians of the Earth's lands, waters, oceans, ice, mountains and forests," Indigenous women from around the globe met in Lima in 2013 to warn about the dangers posed by the "compounded crises of climate change and impending irreversible loss of biological diversity."[1]

Scientists, too, have warned that human exploitation of natural wealth is endangering the planetary ecosystem's ability to support life as we now experience it. A group of 18 researchers have been studying "planetary boundaries," marking off zones of safety from zones of increased risk to life. They have identified four areas where human activities have caused excessive disturbances to global equilibrium. Those activities involve climate change, loss of biodiversity, changes in land use (largely due to deforestation) and biochemical flows (chiefly excessive use of phosphorus and nitrogen fertilizers).[2]

These phenomena are all inter-related. Deforestation is both a cause and a consequence of climate change and both of them endanger biodiversity. Similarly, industrial agriculture, with its heavy dependence on chemical fertilizers, is a cause of deforestation as well as climate change. By the same token, many of the solutions to climate devastation such as forest preservation and agroecology will also contribute to preserving biodiversity.

Climatologist James Hansen and colleagues warn, "if humanity wishes to preserve a planet similar to that … to which life on Earth is adapted," atmospheric carbon dioxide must be reduced from the current 404 parts per million (ppm) to 350 ppm through a rapid phasing out of fossil fuels and widespread adoption of clean energy technologies.[3]

In 2008, Hansen and colleagues wrote: "Humanity today, collectively, must face the uncomfortable fact that industrial civilization itself has become the principal driver of global climate. … The eventual response to doubling pre-industrial atmospheric CO_2 likely would be a nearly ice-free planet, preceded by a period of chaotic change with continually changing shorelines…. [T]here is a danger that human-made forcings could drive the climate system beyond tipping points such that change proceeds out of our control."[4]

In March 2016, Hansen's team released an updated, peer-reviewed version of their paper, "Ice melt, sea level rise and superstorms," published in the journal *Atmospheric Chemistry and Physics*. They found that most of the Earth's ice sheets are melting at a faster rate than predicted. In a video summary of the paper, Hansen states that ice melt from Greenland "raises questions about how soon we'll pass the point of no return in which we lock in consequences that cannot be reversed on any time scale that people care about." Noting that sea levels could rise by several metres this century, Hansen warns that it "would mean the loss of all the world's coastal cities."[5]

Rising sea levels are just one of the major consequences of climate change. The one degree Celsius rise in global average temperatures above pre-industrial levels that we already experience has resulted in more intense heat waves and an increase in droughts, floods, ruinous storms and larger and more intense forest fires. Although no one fire, including the one that forced the evacuation of over 80,000 people from Fort McMurray in May, can be directly blamed on climate change, the pattern is clear. Dr. Michael Flannigan who teaches at the University of Alberta and directs the Western Partnership for Wildland Fire Science says: "The area burned in Canada has increased over the past 40 to 50 years … due to human-caused climate change."[6]

Flannigan notes that climate change has led to drier vegetation, more lightening strikes and a prolonged fire season. Since wildfires destroyed large parts of Slave Lake in 2011, the official fire season in Alberta begins on March 1 instead of April 1. This year, another natural phenomenon, a more intense El Niño current in the Pacific Ocean, resulted in a warmer and dryer winter and spring in western Canada.

Climate change is estimated to cause on average 400,000 deaths each year, including those caused by malnutrition and communicable diseases among children in the global South.[7] The death toll is predicted to rise to 700,000 annually by 2030 unless urgent measures are taken to contain climate change.

Outline

Part One of this paper begins with an overview of what has come to be known as "predatory extractivism" – the exploitation of natural wealth for short-term profit without regard for the consequences for humans and for ecosystems that support life. It describes movements for taming, and ultimately ending, that kind of extractivism. Next it focuses on the urgent need to curtail the extraction of fossil fuels. Part One ends with a call to go beyond small steps aimed at slowing climate change and instead to embrace the broader climate and social justice vision embodied in the Leap Manifesto which is reproduced here.

Part Two explores some of the challenges and opportunities for making a just transition to a new economy in keeping with the Earth's carrying capacity. This section begins with an assessment of the cautious and inadequate responses to date by Canadian political leaders, in stark contrast with the proposals made by KAIROS and other civil society organizations. It includes descriptions of viable actions that can be taken immediately to assure that the transition to a low-carbon economy achieves justice for workers, including those laid off from fossil fuel industries, as well as for marginalized social groups. The paper ends with a discussion of some of the more ambitious policy challenges yet to be faced.

Part One: Transitioning from 'Predatory Extractivism' to a Responsible Use of what is Indispensible for Quality of Life

Latin American scholars have coined the term "extactivism" to describe an economic model based on the exploitation and export of large quantities of natural resources. They insist that it is not a new phenomenon but one that has gone on for centuries through "colonial and neo-colonial plunder and appropriation."[8] Uruguayan writer Eduardo Gudynas distinguishes between three types of extractivism: predatory, sensible and indispensable.[9] Gudynas calls for replacing the first kind with sensible extractivism as a step towards transitioning to a model that uses only what is necessary for humans to live well while avoiding excessive consumption.

Predatory Extractivism

Predatory extractivism can take many forms including large-scale mining, petroleum, hydroelectricity, forestry, fishing or industrial agricultural projects, all of which impose huge social and ecological costs on communities and ecosystems. These export-oriented projects are typically owned by transnational corporations or state enterprises, which is the case for most of the world's oil companies. Typically, they invest outside of their home countries and operate in enclaves with few benefits for the host nation whether in terms of employment, tax revenues or local procurement. Extractive industries, especially in mining, often make extensive use of toxic chemicals. Their work sites are seldom cleaned up, leaving local communities with poisoned waters or deforested lands devoid of traditional plants, animals or fertile soil.

Predatory extractivism treats the Earth as an infinite store of natural resources that can be exploited endlessly. It can even exhaust apparently renewable resources such as fish stocks or old growth forests so that they effectively are rendered non-renewable. Already, humanity's ecological footprint exceeds the Earth's carrying capacity by 50%. It now takes the Earth one and a half years to regenerate what humans extract each year.[10]

Unfortunately, predatory extractivism in the mining, forestry, agribusiness and energy sectors is all too familiar to KAIROS and our southern partners. Some three-fifths of the world's mining companies are registered in Canada, taking advantage of Canadian government loans, insurance and diplomatic support. Between 50% and 70% of all mining in Latin America is conducted by Canadian companies.

Canadian mining companies are frequently criticized for actions that forcibly displace peoples from their lands without their free, prior and informed consent, and cause serious environmental damage – including destroying glaciers, contaminating water supplies and cutting down forests.

In many cases, people who have resisted the loss of their lands and livelihoods have been criminalized and even killed. A study by Mining Watch and the International Civil Liberties Monitoring Group states: "For their efforts to protect water sources, livelihoods, sacred places

and ways of life from harm, Indigenous peoples, farmers, environmentalists, journalists, and other concerned citizens speaking out against resource extraction projects and their impacts are paying a steep price. They are frequently the targets of threats, accusations, and smears as well as attempts to label them as enemies of the state, opponents of development, delinquents, criminals, and terrorists. In the worst cases, they are targets of direct violence and assassination."[11]

Sensible Extractivism

Many social and ecological justice movements work hard to contain the worst aspects of predatory extractivism by demanding that corporations respect national and international laws and be held to high standards of social responsibility. They advocate for such measures as the right of communities to protect their ecosystems and local livelihoods; health and safety protection for workers; recognition of trade union rights; using the best available technologies to minimize damage to ecosystems; and payment of appropriate taxes and royalties to local and national governments. In some cases, proponents of sensible extractivism may advocate the upgrading of mineral or forestry products into intermediate products, such as producing lumber instead of exporting raw timber.

A comprehensive set of such policies was incorporated into the African Mining Vision adopted by African Union Heads of State in 2009.[12] According to this vision, mining in Africa should contribute to diversified economic development through such measures as local purchasing of goods and services, conversion of minerals into manufactured goods and benefits for communities such as electricity, clean water and skills training. Corporations are encouraged to establish partnerships with local businesses and civil society groups.

One obstacle to the full implementation of the African Mining Vision has been Foreign Investment Promotion and Protection Agreements (FIPAs). Canada has signed FIPAs with a number of African countries. They give foreign investors certain rights, including the right to sue governments using investor-state dispute resolution mechanisms whenever the corporations deem that laws or regulations unduly interfere with their operations or profits.

The transition from predatory to sensible extractivism involves the recognition of basic human rights, including the rights of Indigenous peoples to free, prior and informed consent (FPIC) in regard to extractive activities on their territories. The difficulty of halting predatory extractivism is illustrated by KAIROS' study on the experience of Indigenous peoples' resistance to mining projects in Guatemala.[13] Despite 78 extensive community consultations where 99% of participants voted against allowing mining on their lands, Canadian-owned gold mines were allowed to proceed. Tragically, community protests aimed at persuading Vancouver-based Goldcorp to comply with an order from the Inter-American Commission on Human Rights to suspend operations at its Marlin mine due to contamination of water supplies and damage to houses were met by violent repression.[14]

Where Indigenous peoples' rights to FPIC have been acknowledged, governments and corporations have, for the most part, interpreted it as involving some level of consultation leading to the signing of impact benefit agreements and offering some jobs or social services in return for allowing extraction projects to proceed.

However the right to FPIC as defined by the *UN Declaration on the Rights of Indigenous Peoples* involves more than consultation and the provision of benefits.[15] It necessitates recognizing that Indigenous peoples have the right to withhold their consent to projects on their lands. This recognition is key for moving beyond sensible extractivism to acknowledging that many extractive projects should not be allowed to proceed, or at least not in the way they are originally planned.

Indispensable Extraction

A shift to limiting the extraction of Earth's resources to that which is indispensible to support quality of life would require choosing to vastly reduce the scale of extractive operations. It would shift the focus from exports to giving priority to local or national needs. It would mean diminished global commerce and fewer resources devoted to producing luxury consumer goods. It would concentrate on meeting the basic needs of all, including those of impoverished and marginalized populations.

The debate on limiting the extraction of natural resources has played out most dramatically in Ecuador where Indigenous and civil society groups first championed a proposal to keep 850 million barrels of oil underground in the Yasuní National Park, one of the most biodiverse areas in the world. After his election in 2006, President Rafael Correa initially supported the idea but only on the condition that the international community provide Ecuador with US$3.6 billion in compensation, equivalent to half the commercial value of the oil.

In 2013, however, President Correa, disappointed that only tens of millions of dollars had been raised, with another US$300 million pledged, reversed himself and announced that oil exploration in the park would be allowed to proceed. Correa argued that revenue from oil exports was needed to fight poverty: "We cannot be beggars sitting on a sack of gold."[16]

Alberto Acosta as Minister of Energy and Mines under Correa, had championed the Yasuní initiative. He now broke ranks with the president and continued to oppose petroleum extraction from the Yasuní Park. Acosta challenged the notion that increasing revenue from petroleum extraction was essential for financing social programs, pointing to other options such as taxing the wealthy or the telecommunications monopolies, and eliminating subsidies for fossil fuel consumption.

Acosta has been careful to distinguish between halting existing production and new exploration: "It is difficult to imagine … a sudden shut-down of oil fields or mines. … But this transition will

never be a reality if extractivist activities continue to expand."[17] Rather they must gradually be cut back through a planned process of change.

Acosta adds that in choosing which projects to continue, "it is obligatory to maintain those areas that have … the highest levels of biodiversity" such as the Amazon rainforest.[18] In an open letter to President Correa, a broad coalition of Ecuadorean Indigenous and civil groups emphasize the danger that petroleum extraction activities pose to the survival of the Tagaeri, Taromenani and other Indigenous peoples living in voluntary isolation in the Yasuní national park.[19]

Similar struggles against projects that endanger fragile ecosystems and Indigenous rights are being waged around the world. In Canada, the hereditary chief of the Gitwilgyoots people, members of the Tsimshian Nation, and a broad coalition of Canadian civil society groups oppose the construction of the Pacific Northwest Liquefied Natural gas project on Lelu Island in British Columbia. The project threatens critical habitat for juvenile salmon, shellfish and other marine life.[20] In the United States, the Indigenous Environmental Network is opposing a plan by the Obama administration to allow offshore drilling in sensitive Arctic waters off Alaska and in the Gulf of Mexico.[21]

Indispensable extraction does not mean that all resource development would cease. In fact, some beneficial kinds would grow. For example, Bolivia plans to increase the use and industrialization of its lithium deposits, a critical component in batteries installed in electric vehicles.

Where indispensable extraction does occur, rigorous social and environmental conditions must apply, including plans for the reclamation of lands or waters disturbed by these activities. Gudynas notes that the cost of products would have to rise as environmental costs borne by communities under predatory extractivism would be incorporated into the price charged. These costs would include those linked to water use, lost agricultural production and land reclamation.

The movement towards accepting only indispensible extraction presents greater challenges and a more substantial break with the past than the transition from predatory to sensible extraction. This movement raises fundamental questions about, for example, the future of gold mining and fossil fuel extraction.

Stop the Gold Rush

Richard Swift, in a challenging essay titled "Stop the gold rush!," describes several examples of predatory gold mining projects and recalls the long history of humanity's quest for gold. He cites an estimate that 171,300 tonnes of gold have been mined throughout history. While some of that gold has been turned into jewelry, much of it is simply stored in the basements of central banks.

Over the last century, some of those banks, including the Bank of Canada, have abandoned basing currencies on gold, delinking them from what famous British economist John Maynard Keynes called "that barbarous relic." This has happened without undermining confidence in

paper money or its digital equivalent. Yet some 2,500 tonnes are still extracted at great expense every year from shafts bored into the ground or open pits and then stored in other underground vaults. After surveying numerous examples of human rights violations and ecological disasters, Swift concludes:

> "We need to stop this silly gold rush. Our species footprint needs to be reduced so that we can live within our ecological means. We can simply no longer afford to 'rush' about the globe digging up a shiny metal that is of marginal use and damn the consequences. We can't afford the energy it takes to do it. We can't afford the water it requires or is polluted in the process. We can't afford to keep dumping the poisonous chemicals involved. We can't afford the cowboy capitalism of mining companies that so easily degenerates into crime and thuggery. We need a different standard of value than gold – one that measures in clean air and water and sustainable incomes rather than some mystical pot at the end of an increasingly bedraggled rainbow."[22]

While Swift's essay provides much food for thought, there are other considerations that must be taken into account in the debate on gold mining. For instance, it is estimated that some 100 million people worldwide work as artisanal and small-scale miners. While these make up 90% of the workforce in gold mining, they extract only about 10% of the gold. Some non-governmental organizations such as Fairtrade International and the Alliance for Responsible Mining are working to improve their lot. However, an investigation by *The New Internationalist* found that not all the gold certified by these two NGOs is free from mercury and cyanide whose use continues to poison these miners and their communities.[23]

Keeping Fossil Fuels Underground

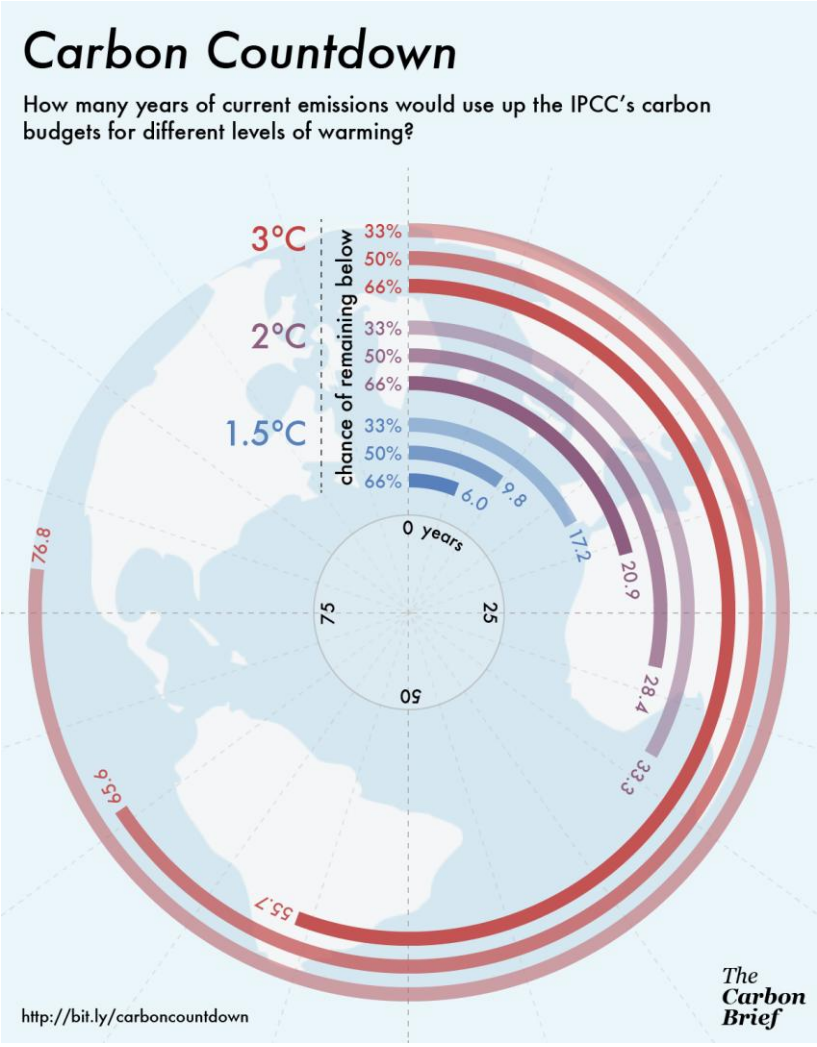
Given the threat that climate change poses to life on Earth, keeping most known reserves of oil, natural gas and coal underground is more urgent than ever. In recent years, studies by the Carbon Tracker Initiative, the International Energy Agency and the Intergovernmental Panel on Climate Change (IPCC) have made various calculations concerning how much of the world's known reserves of fossil fuels can be safely consumed without causing temperature increases above two degrees Celsius.[24]

One of the most significant outcomes of the 2015 Paris climate conference was a new commitment to keep the increase in global temperatures "well below 2 ^{0}C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 ^{0}C."[25] Scientists have begun to publish updated estimates of how much oil, gas and coal could be safely burned and how much must be left underground to meet the 1.5 degree target. A new study by scientists at the University of Queensland and Griffith University in Australia shows that under a business-as-usual scenario the global carbon budget for keeping temperature rises below 2 ^{0}C could be exhausted around 2029. The study warns: "To stay within a 1.5 ^{0}C global warming limit safely extractable reserves are forecast to be consumed by 2020."[26]

Similar calculations by *The Carbon Brief* based on the 2014 Synthesis Report from the IPCC reach the same conclusion: "It will take just six years of current emissions to exhaust a carbon budget that would give a good chance of keeping global warming below 1.5 degrees Celsius."[27] The Carbon Brief study comes up with different probabilities when it calculates how much of the world's remaining fossil fuels could be burned before causing temperatures to rise by 1.5, two or three degrees.

The six-year limit on business-as-usual consumption of fossil fuels corresponds to having a 66% chance of holding temperature rises to less than 1.5^0C. Using 2014 rates of fossil fuel consumption for 9.8 years would provide only a 50% chance of containing global warming under 1.5^0C.

To have a 66% chance of staying under 2^0C, the horizon for using fossil fuels at the 2014 rate would be 20.9 years. For a 50% chance, the world could go on burning fossil fuels at the same rate as in 2014 for another 28.4 years. The following chart summarizes *The Carbon Brief's* findings for carbon budgets under nine scenarios for 1.5, two or three degree increases in temperatures at different probabilities.[28]



Small steps are insufficient; we need to Leap

The ambitious goal set by the Paris conference and the realization that as few as six years remain in the world's carbon budget have opened up a new and qualitatively different stage in the debate on what policies are needed to address climate change.

In Canada, this new urgency for more dramatic action is best illustrated by the timely release of **The Leap Manifesto**[29] reproduced on the following pages.

KAIROS has joined with many Indigenous, social, environmental and labour organizations in endorsing this call for an accelerated transformation of Canada's economy and society.

The Leap Manifesto: A Call for Canada Based on Caring for the Earth and One Another

We start from the premise that Canada is facing the deepest crisis in recent memory.
The Truth and Reconciliation Commission has acknowledged shocking details about the violence of Canada's near past. Deepening poverty and inequality are a scar on the country's present. And Canada's record on climate change is a crime against humanity's future. These facts are all the more jarring because they depart so dramatically from our stated values: respect for Indigenous rights, internationalism, human rights, diversity, and environmental stewardship.

Canada is not this place today— but it could be.
We could live in a country powered entirely by renewable energy, woven together by accessible public transit, in which the jobs and opportunities of this transition are designed to systematically eliminate racial and gender inequality. Caring for one another and caring for the planet could be the economy's fastest growing sectors. Many more people could have higher wage jobs with fewer work hours, leaving us ample time to enjoy our loved ones and flourish in our communities. We know that the time for this great transition is short. Climate scientists have told us that this is the decade to take decisive action to prevent catastrophic global warming. That means small steps will no longer get us where we need to go.

So we need to leap.
This leap **must begin by respecting the inherent rights and title of the original caretakers of this land.** Indigenous communities have been at the forefront of protecting rivers, coasts, forests and lands from out-of-control industrial activity. We can bolster this role, and reset our relationship, by **fully implementing the United Nations Declaration on the Rights of Indigenous Peoples.** Moved by the treaties that form the legal basis of this country and bind us to share the land "for as long as the sun shines, the grass grows and the rivers flow," we want energy sources that will last for time immemorial and never run out or poison the land. Technological breakthroughs have brought this dream within reach. The latest research shows it is feasible for Canada to get 100% of its electricity from renewable resources within two decades[30] by 2050 we could have a 100% clean economy.[31]

We demand that this shift begin now.
There is no longer an excuse for building new infrastructure projects that lock us into increased extraction decades into the future. The new iron law of energy development must be: if you wouldn't want it in your backyard, then it doesn't belong in anyone's backyard. That applies equally to oil and gas pipelines; fracking in New Brunswick, Quebec and British Columbia; increased tanker traffic off our coasts; and to Canadian-owned mining projects the world over. The time for **energy democracy** has come: we believe not just in changes to our energy sources, but that wherever possible **communities should collectively control these new energy systems**.

As an alternative to the profit-gouging of private companies and the remote bureaucracy of some centralized state ones, we can create innovative ownership structures: democratically run, paying living wages and keeping much-needed revenue in communities. And **Indigenous Peoples should be first to receive public support for their own clean energy projects.** Power generated this way will not merely light our homes but redistribute wealth, deepen our democracy, strengthen our economy and start to heal the wounds that date back to this country's founding.

A leap to a non-polluting economy creates countless openings for similar multiple "wins." We want **a universal program to build energy efficient homes, and retrofit existing housing,** ensuring that the lowest income communities **and neighbourhoods will benefit first** and receive job training and

opportunities that reduce poverty over the long term. **We want training and other resources for workers in carbon-intensive jobs, ensuring they are fully able to take part in the clean energy economy**. This transition should involve the democratic participation of workers themselves.

High-speed rail powered by just renewables and affordable public transit can unite every community in this country – in place of more cars, pipelines and exploding trains that endanger and divide us. And since we know this leap is beginning late, we need to invest in our decaying public infrastructure so that it can withstand increasingly frequent extreme weather events. Moving to a far more localized and ecologically-based agricultural system would reduce reliance on fossil fuels, capture carbon in the soil, and absorb sudden shocks in the global supply – as well as produce healthier and more affordable food for everyone.

We call for **an end to all trade deals** that interfere with our attempts to rebuild local economies, regulate corporations and stop damaging extractive projects. Rebalancing the scales of justice, we should ensure **immigration status and full protection for all workers.** Recognizing Canada's contributions to military conflicts and climate change — primary drivers of the global refugee crisis — we must welcome refugees and migrants seeking safety and a better life.

Shifting to an economy in balance with the earth's limits also means **expanding the sectors of our economy that are already low carbon: caregiving, teaching, social work, the arts and public-interest media.** Following on Quebec's lead, a national childcare program is long past due. All this work, much of it performed by women, is the glue that builds humane, resilient communities – and we will need our com-munities to be as strong as possible in the face of the rocky future we have already locked in.

Since so much of the labour of caretaking – whether of people or the planet – is currently unpaid, we call for a vigorous debate about the introduction of a universal basic annual income. Pioneered in Manitoba in the 1970's, this sturdy safety net could help ensure that no one is forced to take work that threatens their children's tomorrow, just to feed children today.

We declare that "austerity" – which has systematically attacked low-carbon sectors like education and healthcare, while starving public transit and forcing reckless energy privatizations – is a fossilized form of thinking that has become a threat to life on earth. The money we need to pay for this great transformation is available — we just need the right policies to release it. Like **an end to fossil fuel subsidies. Financial transaction taxes. Increased resource royalties. Higher income taxes on corporations and wealthy people. A progressive carbon tax.** Cuts to military spending. All of these are based on a simple "polluter pays" principle and hold enormous promise.

One thing is clear: public scarcity in times of unprecedented private wealth is a manufactured crisis, designed to extinguish our dreams before they have a chance to be born. Those dreams go well beyond this document. "We call on all those seeking political office to seize this opportunity and embrace the urgent need for transformation". We call for town hall meetings across the country where residents can gather to democratically define what a genuine leap to the next economy means in their communities. Inevitably, this bottom-up revival will lead to a renewal of democracy at every level of government, working swiftly towards a system in which every vote counts and corporate money is removed from political campaigns.

This is a great deal to take on all at once, but such are the times in which we live. The drop in oil prices has temporarily relieved the pressure to dig up fossil fuels as rapidly as high-risk technologies will allow. This pause in frenetic expansion should not be viewed as a crisis, but as a gift. It has given us a rare moment to look at what we have become – and decide to change.

Now is the time for boldness. Now is the time to leap.

Part Two: Challenges and Opportunities for a Just Transition

When federal, provincial and territorial leaders met in Vancouver in early March to discuss actions on climate change and the environment, they delivered very little by way of new initiatives. The *Vancouver Declaration on clean growth and climate change* struck a tone of urgency noting how "the cost of inaction is greater than the cost of action" but, in the end, crucial decisions were postponed for a year.[32] Instead of moving forward on critical issues, the First Ministers created four working groups to identify options for (a) clean technology, innovation and jobs; (b) carbon pricing mechanisms; (c) specific mitigation opportunities; and (d) adaptation and climate resilience.

Conspicuously absent from the Declaration is a commitment to submit a new greenhouse gas reduction pledge to the United Nations climate secretariat. Yet, prior to the Paris conference federal Minister of Environment and Climate Change Catherine McKenna had declared the former government's inadequate pledge a "floor" on which Canada would build a new commitment.

KAIROS joined with colleagues in Climate Fast in drafting an Open Letter to the First Ministers prior to the Vancouver meeting. The letter called for immediate actions to avoid catastrophic climate change and ensure a just transition away from fossil fuels. Endorsed by 74 environmental and social justice organizations, it detailed six initiatives that Canadian governments must take to fulfill the promises made at the Paris conference:

1) **A new science-based emission reduction target consistent with a 1.5 degree temperature rise.** Cutting our emissions as much as possible as soon as possible will set us on a path to achieving this goal, whereas delaying action may preclude any possibility of staying under a 1.5 degree rise.
2) **A clear and measurable plan for a just transition to 100% renewable energy by 2050.** Canada needs to transition to 100% low-carbon electricity by 2035 and strive for 100% reliance on renewable sources for all forms of energy by 2050. Investing in renewable energy creates up to eight times as many jobs as investing in oil and gas extraction.
3) **Investments in a green economy and an end to subsidies for fossil fuel industries.** In 2009, at the G20 summit in Pittsburgh, Canada promised to eliminate subsidies to fossil fuel industries. The subsidies averaged $2.9 billion over 2013 and 2014, of which $1.7 billion came from the federal government. Savings from cutting subsidies should be redirected to support for public transit, green infrastructure and clean technologies.
4) **A carbon fee set at $30 per tonne with a commitment to increase it over time**. The government must establish, in consultation with the provinces and territories, a national standard for pricing carbon emissions through a carbon fee set initially at $30 per tonne of greenhouse gases and increasing steadily to a level consistent with limiting temperature increases to 1.5 degrees Celsius.
5) **A far-reaching, permanent regulatory approval process for assessing energy projects**. A new, permanent regulatory approval process must replace the flawed National Energy Board process. It must respect Indigenous peoples' rights to free, prior and informed consent as required by *the UN Declaration on the Rights of Indigenous Peoples*, which the government

of Canada has promised to uphold. An approval process must take into account both emissions and the downstream carbon footprint caused by most resource extraction.[33]

6) **A $4 billion annual contribution to climate adaptation and mitigation measures in the Global South.** Based on precedents where Canada has contributed 3% to 4% of multilateral funds, Canada's fair share of the US$100 billion promised in the Paris decision document would be $4 billion a year by 2020.[34]

The Vancouver conference failed to take concrete action on any of these demands. Disagreements on whether and how to put a price on carbon, as voiced in particular by Saskatchewan Premier Brad Wall, were a major stumbling block. Despite media reports that Ottawa is considering imposing a minimum carbon price on the provinces, no federal official has been willing to say so on the record.[35] Instead, the four working groups are to report in September 2016 before the First Ministers reconvene in October.

2016 Federal Budget: "Many small steps but no large leap"[36]

While major initiatives will have to wait until after next fall's federal/provincial/territorial meeting, the 2016 federal budget released on March 22 does contain some positive measures that break with the previous government's lack of action on climate change. These measures include $518 million over five years for municipalities to spend on climate mitigation and adaptation projects and $250 million over five years to build capacity for renewable energy. There is also money set aside to build infrastructure for charging electric vehicles and tax breaks for investments in electrical vehicle charging stations and electrical energy storage facilities.

The budget includes $128.8 million over five years to help deliver energy efficiency programs. An overdue promise is "to provide $10.7 million over two years, starting in 2016-17, to Indigenous and Northern Affairs Canada to implement renewable energy projects in off-grid Indigenous and northern communities that reply on diesel and other fossil fuels to generate heat and power."[37] Other promised spending for infrastructure in Indigenous communities could also involve new energy systems.

A major disappointment is the budget's failure to eliminate all remaining subsidies for fossil fuels. In fact it explicitly preserves a special tax allowance favouring liquefied natural gas (LNG) facilities and extends for 12 months the Mineral Exploration Tax Credit, applicable for some kinds of fossil fuel exploration, that was due to expire this year. In 2014, tax subsidies to tar sands extraction are estimated to have been as large or even greater than all the revenues the federal government received from the same source.[38]

On balance, the budget falls far short of what is needed. One infrastructure spending promise is for a $3.4 billion public transit fund to cover up to 50% of eligible costs for urban transit projects over five years. However, this money will only be spent if the other half of the cost is covered from municipal and provincial coffers. Assuming that matching funds are available, the resulting $6.8 billion falls far short of the $17.6 billion suggested by the Green Economy Network (GEN) for improving and expanding public transit. Were the latter target met, 223,000 jobs could be created over the five years.

The table below reproduces the Green Economy Network's proposal for investing 5% of the annual federal budget in renewable energy, energy efficiency and public transportation over five years to create one million new jobs and reduce annual GHG emissions by 20% to 35%.[39] As with its public transit promise, the federal budget also falls short of GEN's goals for spending on renewable energy, energy efficiency and higher speed rail services. Annual federal spending on energy efficiency and renewable energy, dispersed over several programs, is only about one-fifth of the amount suggested by GEN. Federal spending on building retrofits, also dispersed over a number of programs, amounts to just under half of the GEN proposal.[40]

	$Billions Invested Over 5-Year Period	Total Person Job Years Created	GHG Emission Reductions (Mt CO2eq)
Renewable Energy (solar, wind, geothermal power)	$23.3	290,000	44 - 110
Energy Efficiency (i.e. building retrofits)	$30.0	438,000	32 - 126
Public Transit (i.e. improvements and expansion)	$17.6	223,000	11 - 20
Higher Speed Rail (between cities in urban corridors)	$10.0	101,600	1 - 5
5-Year TOTALS	**$80.9 billion**	**1,052,600 Jobs**	**88 - 261 Mt annually**

The 2016 federal budget does promise new spending on climate initiatives if negotiations with the provinces and territories achieve a comprehensive national plan for addressing climate change. Anticipating a positive outcome for those negotiations, the federal budget sets aside $2 billion over two years, starting in 2017, for a Low Carbon Economy Fund. The "Fund will support provincial and territorial actions that materially reduce greenhouse gas emissions … [allocating resources] towards those projects that yield the greatest absolute greenhouse gas reductions for the lowest cost per tonne."[41]

While the budget does not directly promise to collect new revenues from putting a price on carbon, it is widely assumed that a carbon pricing regime would fund more federal and provincial investments into climate change mitigation measures. Media reports circulating prior to the Vancouver meeting cited a price of $15 per tonne of CO_2 as the likely initial level for a national minimal price on carbon emissions payable to either the federal, provincial or territorial treasuries. However, unnamed federal officials declined to say that any specific price was actually under consideration.[42]

The Alternative Federal Budget prepared by the Canadian Centre for Policy Alternatives proposes a harmonized nation-wide carbon tax of $30 per tonne of CO_2 emissions to be implemented as of January 1, 2017. The price would rise by $5 per tonne in each subsequent year, reaching $50 per tonne by 2021. Such a tax would raise $17.8 billion in its first year. In the second and third years revenues would fall to $17 billion and $16.5 billion respectively, despite higher rates, as the price on carbon has its intended effect of discouraging the use of fossil fuels. Revenues would be available for transfers to low-income families to compensate for added costs and for spending on other mitigation and adaptation measures.[43]

In addition the Alternative Federal Budget contains several other proposals for ways to raise revenue to pay for the transition to a low-carbon economy. These include:

- $5 billion a year from a national financial transaction tax;
- $8 billion a year from ending special tax treatment for capital gains income;
- $6 billion a year from returning the corporate tax rate to its 2006 level;
- $2 billion a year by tackling tax havens;
- $3.5 billion a year by creating a new federal tax bracket on incomes over $250,000;
- $1-$1.5 billion a year by scaling military spending back to pre-9/11 levels;
- $3 billion a year by eliminating income splitting.[44]

The availability of all these revenue options contradicts the argument made by Prime Minister Trudeau that "we must … continue to generate wealth from our abundant natural resources to fund this transition to a low-carbon economy."[45]

A Just Transition

A central element of the Leap Manifesto is the call for a just transition for workers whose jobs may be lost in the transition to a low-carbon economy. Mark Rowlinson and Tim Gray, on behalf of Blue Green Canada, an alliance of labour unions and environmental groups, describe elements of a just transition strategy. It entails starting now "to work with communities, workers, their unions, and industries to identify vulnerable jobs and plan for the changes ahead" rather than risk having to play catch up when a crisis occurs. Just transition programs include changes to Employment Insurance rules, creation of retraining programs, support for workers who must relocate, and "the creation of industry-supported transition funds." They stress: "Activities need to be tailored to the circumstances of workers and their communities rather than a one-size-fits-all approach."[46]

The 2016 federal budget takes some steps towards assisting workers laid off from fossil fuel industries and unemployed youth. For example there is more access to Employment Insurance through reduced waiting periods and more access to EI Call Centres. There is $85.4 million over five years for union apprenticeship training and $175 million for training unemployed and underemployed workers. The budget also pledges $15 million over two years for the Aboriginal Skills and Employment Training Strategy to support jobs in areas such as housing renovation and construction.

A just transition must be inclusive of marginalized groups. Dr. Cheryl Teelucksingh, a sociologist at Ryerson University and Laura Zeglen, coordinator for the Green Gap Project, point out: "It would be naïve to assume that [equitable opportunities for decent work] will naturally result from the transition to a green economy."[47] Social inclusion requires innovative programs and collaboration among governments, private businesses and non-governmental organizations. They propose three tools for inclusion of visible minorities, who are often stigmatized by racial stereotypes, in a green economy:

1) Employment equity measures aim to rectify systemic labour market inequalities that discriminate against historically disadvantaged groups. They involve both employment and training opportunities as well as ensuring that racialized groups are not concentrated in jobs

with poor pay and few opportunities for promotion. To date, formal employment equity policies usually apply only in the public sector or in government-regulated businesses. Since many of the jobs in building a green economy, such as those in installing renewable energy technology or building retrofits, will be in the private sector, employment equity practices need also be applied to private contractors through extending coverage of equity programs and teaching employers how to implement equity policies that extend beyond hiring quotas.

It is also important to reach out to racialized and marginalized communities with information about opportunities for employment in the green economy. Private employers need to be made aware of the advantages of hiring from minority and immigrant groups which could lead to new business opportunities. Trade unions have a role in advocating for equity measures as part of the collective bargaining process.

2) Community Benefits Agreements (CBAs) are legally-enforceable contracts communities sign with developers to ensure that projects benefit local residents. In the context of green economy initiatives, they can help to achieve equitable hiring practices, training opportunities, and support for social enterprises. CBAs can bring specific benefits for marginalized groups who are too often not only bypassed by development but even the victims of environmental racism when, for example, toxic wastes are dumped on their lands. An example of an effective CBA is the deal negotiated with the Toronto Community Benefits Network with respect to Eglinton Crosstown Light Rail Transit System. While not legally binding, this agreement aims at enhancing job placement and job training opportunities for community members affected by the construction project as well as procurement of goods and services from local businesses and local social enterprises.

3) Social enterprises are "non-profit organizations that employ business methods and practices to create training opportunities and employment for low-income and marginalized individuals."[48] While they face many challenges, not the least of which is obtaining financing, they can be a viable part of the transition to a green economy when supported by government programs. They can be designated within CBAs to provide goods or services to green projects. An example of a functioning job strategy for marginalized persons is Calgary's Green Collar Job: "A partnership between industry, training, municipal and non-profit sectors … designed to help lower income people in Calgary move into environmental jobs that offer opportunities for advancement and good wages in fields such as green construction, renewable energy, environmental remediation and recycling."[49]

Manitoba Social Enterprises Show the Way

Lynne Fernandez' informative study on government and local community support for social enterprises in Manitoba describes several successful programs for training unemployed workers from marginalized communities for green jobs.[50] Provincial programs in conjunction with Manitoba Hydro have helped train workers in building retrofits and renewable energy installations. As a Crown corporation, Manitoba Hydro has been able to finance projects that will save energy and reduce GHG emissions over the long term without having to worry about short-term profitability. Here are four examples of successful initiatives described in Fernandez' study:

Aki Energy, an Indigenous-owned enterprise, trains and employs Indigenous community members to install geothermal heating systems. *Aki* is the Oji-Cree word for Earth. In its first year, Aki trained 30 workers who installed 110 residential geothermal systems in two communities, the Peguis First Nation and the Fisher River Cree Nation. Aki works in collaboration with Manitoba Hydro "to access Pay As You Save (PAYS) Financing. This program finances the up-front cost of equipment and installation, recovering the cost through [utility bills] over 20 years."[51] Since the savings are larger than the financing charge, the participating households pay lower bills. Geothermal heating and cooling systems are not only more efficient than the electrical systems they replace, they also reduce demand for new thermal or hydro power installations. Aki Energy is expanding its program to serve other First Nations.

The Brandon Energy Efficiency Program (BEEP) is another example of a successful social enterprise. BEEP has trained 129 workers to install attic, basement and wall-cavity insulation among other retrofits on Manitoba Housing properties. The trainees are mostly Indigenous men who had been unemployed or collected Employment Insurance. The program is funded by Training and Employment Services, a provincial agency, and pays minimum or just above minimum wages. Successful trainees can advance to a second part of the program where they take on more responsibility and earn higher wages.

Another program is BUILD (Building Urban Initiatives and Local Development) that trains 50 workers each year who are mostly Indigenous men but also some recent immigrants and women who acquire skills in areas such as insulating building and installing doors and drywall. Some graduates of the BUILD program find jobs with another social enterprise, Manitoba Green Retrofit, which does energy retrofits for Manitoba Housing.

Lynne Fernandez concludes her survey of social enterprises in Manitoba with the observation that ongoing government support is crucial for such initiatives to succeed including more support for assisting works to transition into the regular workforce.

Delivering Community Power – Reinventing the Post Office

The Leap Manifesto team and the Canadian Union of Postal Workers have proposed a vision for transforming Canada Post's assets into hubs for building a vibrant green economy.[52] They have put forward several ideas for incorporating features and services that have already proven viable in other countries into Canada's 6,300 post offices. These include:

- pioneering use of vehicles that run on 100% renewable energy (Norway has replaced its diesel fleet with electric vehicles);
- installing charging stations for electric vehicles at post offices;
- delivering fresh food from local farms as well as mail (France and Australia have pioneered this service);
- door-to-door mail carriers checking in on seniors and people with mobility issues as is happening already in Japan;
- postal banking services providing financial services – making loans for investments in green energy such as home retrofits or installing solar panels for families underserved by commercial banks. The United Kingdom, France, New Zealand, Brazil and Italy all have postal banking services.

Zero-Waste Initiatives

The Toronto Environmental Alliance and a local of the Canadian Union of Public Employees representing civic employees have produced an informative resource for a zero waste future that contains many practical ideas on how to reduce waste and avoid unnecessary resource extraction:

"A zero waste future is one in which goods are shared, designed to last and be easily recycled and repurposed. Zero waste … focuses on the highest and best use of a resource [by implementing the call to] reduce, reuse and recycle (in that order). … Zero waste is about building a vibrant circular economy, where unwanted materials are not disposed in a landfill or incinerator, but become the raw materials for something new. A strong circular economy keeps valuable resources circulating in the local economy, supporting good green jobs."[53]

It is already possible to reduce, reuse, recycle or compost 85% of the waste coming out of a typical Toronto home and ways can be found to reduce the other 15%. At the heart of a zero waste future is an understanding that "waste management is not a disposal problem to be solved by machines rather, it is a resource recovery challenge to be solved by empowering people."[54] A prime example of the potential benefits of recycling is the fact that producing an aluminum can from recycled materials uses 20 times less energy than producing one from raw bauxite.

Reducing, reusing and recycling materials creates 10 times more jobs than does waste disposal in landfills. Composting organic waste reduces both dependence on chemical fertilizers and greenhouse gas emissions. Individual choices can make a difference as shoppers can choose to buy unwrapped produce, for example, instead of over-packaged goods. The average Canadian household spends $28 each week on food that never gets eaten.

Some examples of the already realizable benefits of a zero waste economy include projects that donate surplus food and clothing to shelters or furniture to refugees. At one condominium building in Scarborough, 1,000 residents participating in the *Mayfair on the Green* project have reduced the fees they pay for waste disposal from $20,000 to $5,000 per year by composting organic wastes, recycling paper, metal and plastic and making used household goods, books and clothes available to other residents or charities, among other initiatives.[55]

One way to reduce the demand for new goods is to repair and restore items in ways that foster a circular and sharing economy. Many communities are establishing tool sharing services that operate like public libraries. Public policies including rewards, fines and regulations are also needed to promote zero waste and reuse. For example, "construction, renovation and demolition waste such as wood, drywall, brick, and plastics are easy to recycle, but they often end up in landfill."[56] Supermarkets in France are now legally obliged not to throw away unsold food. To avoid large fines, they must donate it to food banks or other charities.

More Ambitious Policies Needed

Given the magnitude of the challenges we face for containing climate change and making the transition to relying on renewable energy for 100% of our needs by 2050, the immediate practical measures just discussed, while vitally important, are far from adequate. Were Canada to

continue emitting GHGs at the same rate as currently, its share of the global carbon budget consistent with having a 50% chance of keeping temperature increases below 1.5^{0} C would be exhausted in just six years.[57] Hence it is imperative that Canada find ways to quickly reduce its emissions by scaling back its most GHG intensive industries.

In *After the Sands*, political economist Gordon Laxer explains how Canada's remaining reserves of conventional oil and gas are sufficient to make the transition to a low-carbon economy without relying on either the tar sands or hydraulic fracturing (fracking) to extract oil or gas from shale formations.[58] Phasing out tar sands production is essential since extracting crude from bitumen emits three times as much carbon as conventional oil production. Similarly fracking operations to extract natural gas from shale formations release 50% more methane, a GHG that is 85 times more potent than CO_2 over a 20 year period, than conventional drilling.

The scenario described by Laxer is only possible if fossil fuel exports to the U.S. are phased out. This requires Canada to break free of the proportional sharing clause in the North American Free Trade Agreement. This provision would require Canada to go on exporting oil or gas to the U.S. in the same proportion as what was exported over the previous three years were Canada to adopt policies aimed at curtailing exports for conservation purposes.[59]

The NAFTA proportionality clause is but one way in which free trade agreements can interfere with making the transition. For example, the investor-state dispute settlement clauses in many agreements allow foreign corporations to sue governments that undertake actions deemed to interfere with investors' rights. A prime example is the pending suit by Lone Pine Resources, a U.S. firm, challenging Quebec's moratorium on hydraulic fracturing.

Another uniquely Canadian challenge for a just transition is the over-representation of resource extraction corporations on our stock exchanges. One-quarter of the market capitalization of Canada's publicly listed companies is made up of the oil and gas sector ($232 billion), the mining sector ($180 billion) and the pipelines and utilities sector ($164 billion). Thirty percent of the world's oil and gas companies are listed on the Toronto Stock Exchange (TSX).

The junior mining sector, focused on mineral exploration and more speculative activity, is a special niche of the Canadian capital markets. Over 1,300 mining and mineral exploration companies are listed on the TSX and the Toronto Venture Exchange (TSXV) – more than anywhere else in the world.[60] The shift towards sensible, and eventually indispensable, extraction will change the face of Canada's capital markets.

Limiting the expansion of the fossil fuel industry would reduce the value of many of these companies. Some service providers, such as drilling companies, could adapt to a low-carbon economy by refocusing their services on emerging opportunities such as geothermal energy projects. However, the largest corporations by market capitalization, like Suncor Energy ($51.6 billion), Canadian Natural Resources Ltd. ($33.1 billion) and Imperial Oil ($38.2 billion), would face serious devaluations if their vast petroleum reserves could not be developed. These three companies represented over 5% of the value of the TSX at the end of 2015.

Limits on large-scale industrial gold mining would also have a major impact on Canadian mining sector. Gold is the largest commodity group within that sector, accounting for 22% of all mining companies listed on the TSX and TSXV.

As regulations are introduced to rein in predatory extraction, many speculative projects will no longer be economically viable as the social and environmental costs are fully internalized and Indigenous peoples' sovereignty is respected. The elimination of "flow-through shares" and other preferential tax structures would require extractive projects to demonstrate their value without fiscal subsidies from the federal government.

Like a War-Time Economy

Many observers invoke a call for action equivalent to a war-time economy. Although we may be uncomfortable with the militaristic language, it is an appropriate metaphor. Consider, for example, how dramatically and rapidly the U.S. economy was converted to a war footing during the Second World War. President Franklin D. Roosevelt established the War Production Board in January 1942. By the end of 1943, two-thirds of the U.S. economy was integrated into the war effort.[61] Measures taken in the U.S. included a complete ban on the production of private automobiles, a halt to highway construction and rationing of strategic goods including tires, gasoline and fuel oil.

In August 1940 , the Canadian Parliament gave the Department of Munitions and Supply under C.D. Howe sweeping powers to "mobilize, control, restrict or regulate to such extent as the Minister may, in his absolute discretion, deem necessary, any branch or trade or industry in Canada" in favour of the war effort.[62] While some manufacturing facilities were redeployed, more than half of Canada's war production came from plants that had not existed in 1939.

While the analogy to war-time production is not intended to suggest that exactly the same kind of centralized control is appropriate for building a low-carbon economy, it does suggest that necessary leaps will require the active engagement by the state. In an important new study for the Broadbent Institute, Brendan Haley contrasts two examples of how Canadian governments did or did not support innovations in the energy sector.

On the one hand, the federal and Alberta governments made significant investments in research, development and demonstration projects without which the tar sands would not have reached commercial viability. In contrast, the National and Saskatchewan Research Councils funded the construction of the "Conservation House" in Regina in 1977. It achieved dramatic energy savings through the use of insulation and other features to the point where no conventional heating system was needed even during a prairie winter.

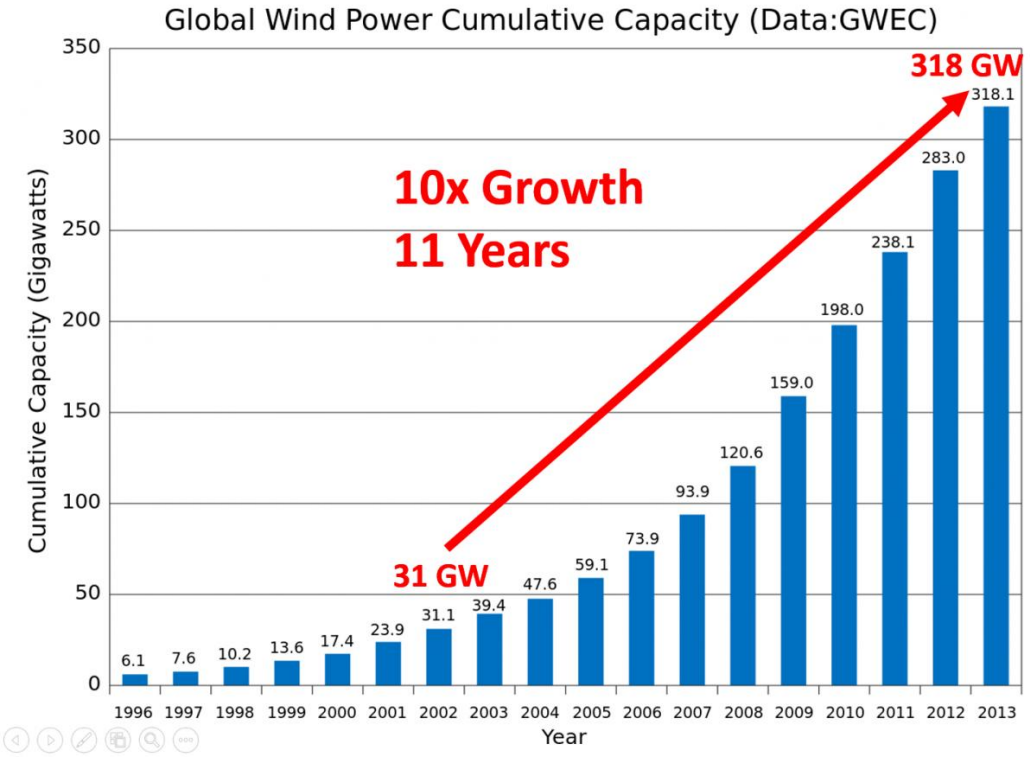
However, Haley points out: "The initial success of the Conservation House was not followed up with further demonstration, labour-market development, supply chain coordination, and changes in codes and standards that would have helped diffuse these building practices."[63] Instead Germany benefitted from these pioneering efforts, becoming the world leader in the design of passive solar housing.

Haley argues persuasively that market-based policies such as putting a price on carbon are by themselves inadequate, in part because they do "a poor job of promoting a diversity of technologies. The implicit model of a low-carbon transition driven by carbon pricing foresees technologies developing one after the other – the lowest cost first, followed by the next-lowest cost, and so on. This means the market model 'picks' a certain technology and neglects the other technologies until prices send the right signals."[64]

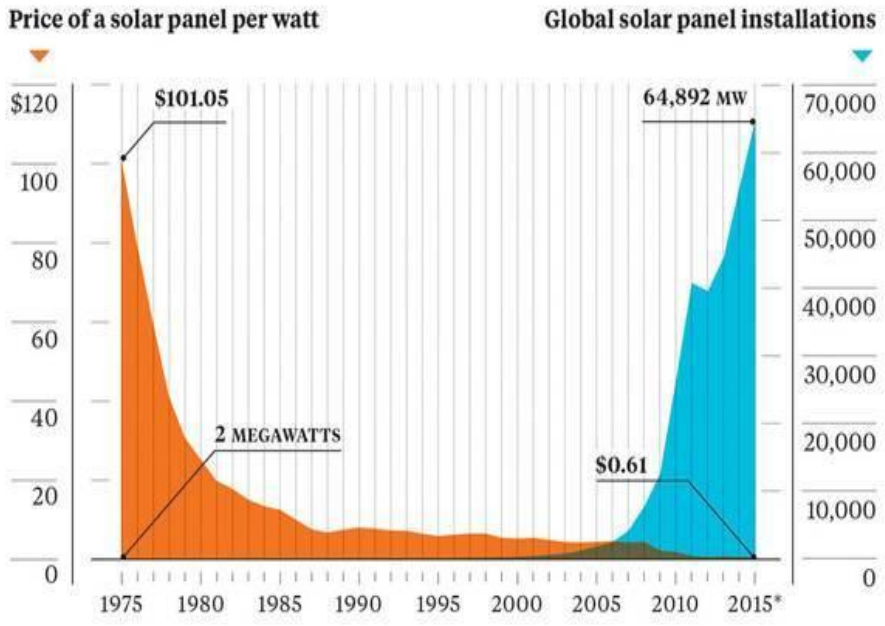
What is needed in addition to carbon pricing are other policy tools to encourage innovation. These would include new regulations, feed-in tariffs to encourage adopting solar or wind power, public procurement to develop markets for new technologies and public financing for development of green technologies over time horizons that are unattractive to private investors.

While Renewable Energy Use is Growing, the Gap to be Filled is Huge

Can Canada make the transition to 100% renewable energy by 2050? The speed with which wind and solar power installations are growing across the globe is encouraging. In 2015, the majority of new investments in electricity generation globally involved renewable sources. That year, wind power capacity grew by 17% and solar capacity by 37%. The amount of energy generated from renewable sources, excluding large hydro, doubled between 2007 and 2015. The graph below illustrates how rapidly global wind power capacity grew between 2002 and 2013.[65]



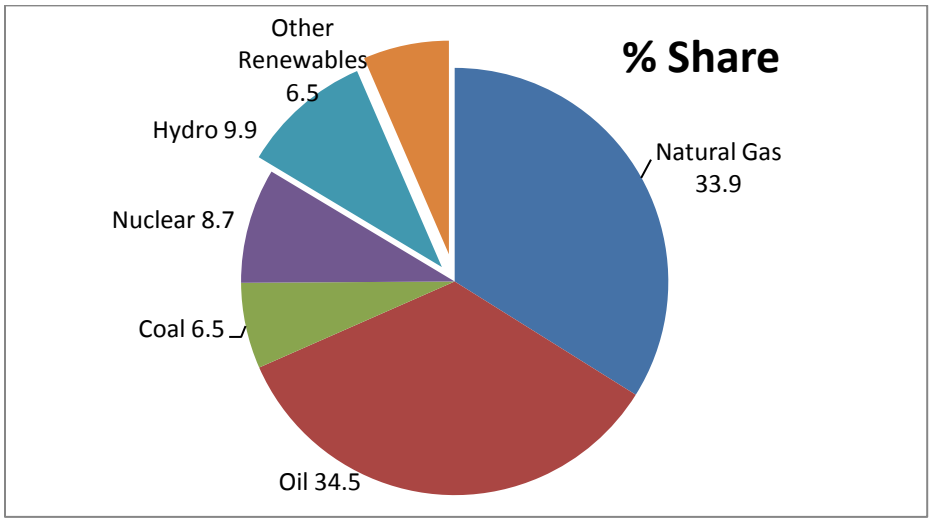
The next graph illustrates how the decline in price for solar panels has spurred a dramatic increase in installed solar voltaic capacity.[66]



While these trends are encouraging, the pace of growth in renewable energy may still not be fast enough to keep global temperature rise to 1.5^{0} C above pre-industrial.

The following graphs, drawn from data in the National Energy Board's most recent report on *Canada's Energy Future*, illustrate the immense challenges we face. The first graph shows the percentage shares of various sources for all kinds of energy used for heating, industry and transportation as well as electrical generation in 2014.

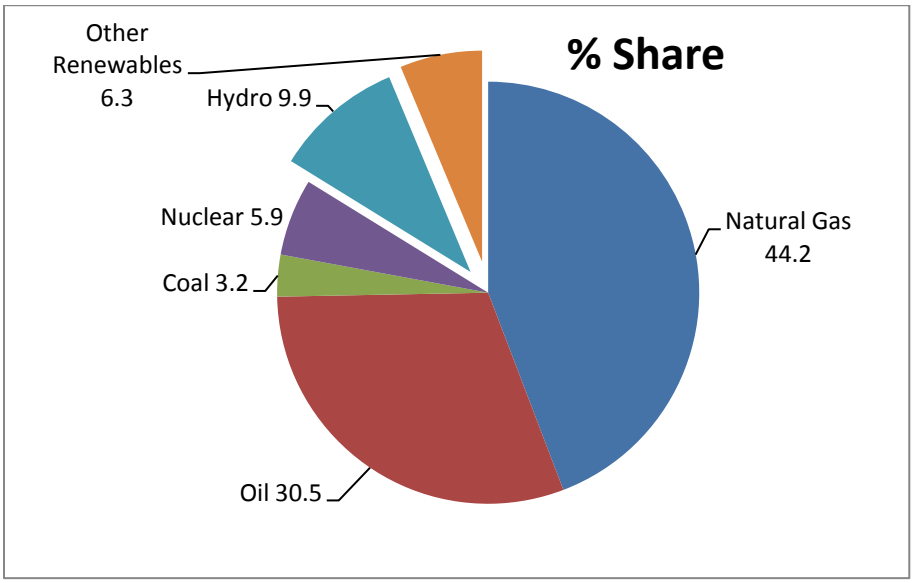
Share of Fuel in Primary Energy Demand 2014[67]



The next graph shows the National Energy Board's projections for 2040, only 10 years before 2050 when we would hope to be reliant on renewable sources for 100% of our energy needs. The striking thing about this graph is that the NEB actually projects the share of non-hydro renewable

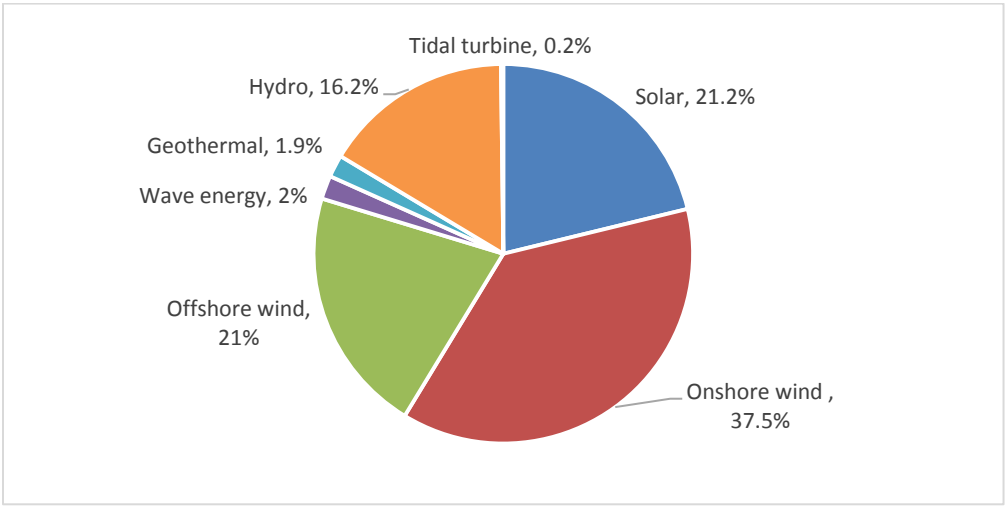
to decline from 6.5% in 2014 to 6.3% in 2040. While the shares of coal and oil are projected to decline, the big increase is for natural gas. Although gas combustion releases only half as much CO_2 as burning coal, an increased reliance on gas would be particularly dangerous for the climate given the large amounts of methane leaks that occur when gas is extracted from fracking operations.

Share of Fuel in Primary Energy Demand 2040[68]



While these graphs illustrate the huge challenge we face, there are other possibilities for Canada's energy future. Mark Jacobson and colleagues at Stanford University have investigated the potential for renewable energy across the globe. The next graph illustrates a possible scenario for energy production in Canada in 2050, based on using only known technologies without resorting to nuclear power, biomass or new large-scale hydro projects.

A Scenario for 100% Renewable Energy in Canada by 2050[69]



Jacobson's study estimates that implementing this plan would create 293,000 construction jobs and result in 463,000 full-time operating jobs. It also projects savings on health expenditures of $107.6 billion each year as well as and 9,598 fewer deaths annually from pollution.

Clearly we need to seize the opportunities created by declining costs for installing renewable energy. At the same time, the gap to be filled is huge. It will take concerted action by all levels of government and efforts by communities that strive for energy democracy by asserting local control over new energy systems to achieve a just transition.

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[57] This estimate is based on Canada's share of the carbon budget to have a 50% chance of staying under 1.5 degrees as calculated by the *Carbon Brief* discussed in Part One. Some argue that Canada's share should be calculated on our share of the world's population (0.5%); others maintain it should be calculated on Canada's present day emissions (1.7% of global carbon emissions). This calculation uses a mid-point weighting of 1.1% taking into account both population and current emissions as advocated by M.R. Raupach et al., "Sharing a quota on cumulative carbon emissions." *Nature Climate Change* 4, 873-879. 2014.

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