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Volume 43 Number 1 2017

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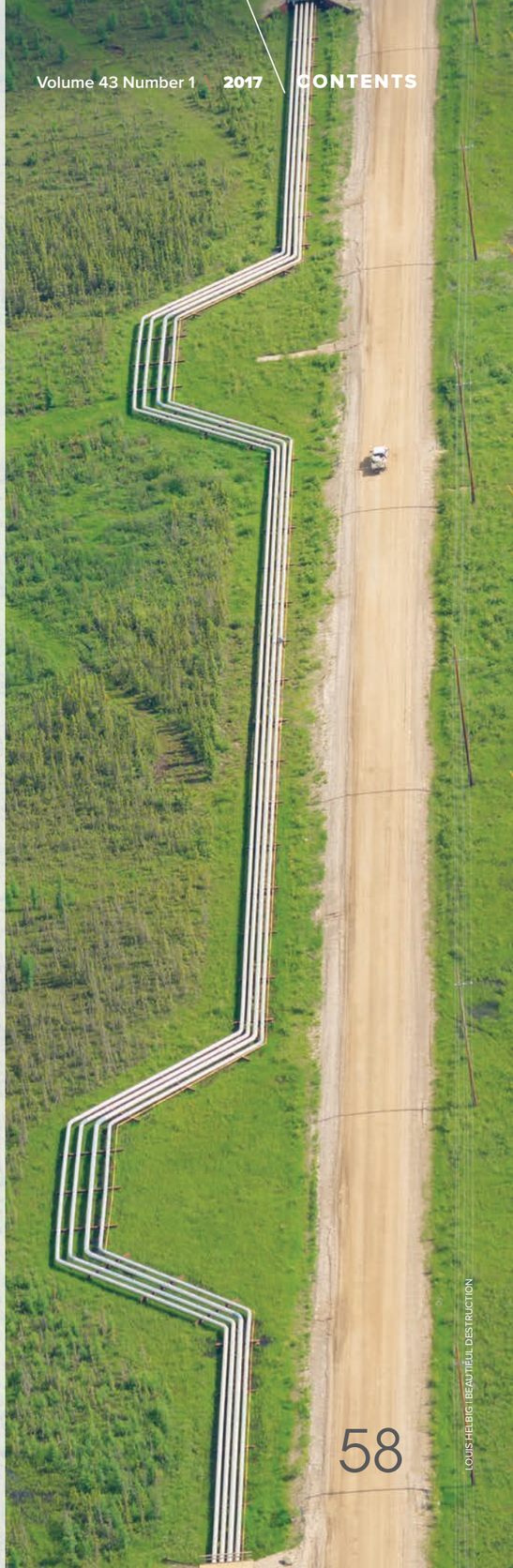
ECOLOGICAL ECONOMICS



LOUIS HELBIG | BEAUTIFUL DESTRUCTION

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COVER Transition Network promotes a reclaimation of local economy while connecting a network of transitioning communities worldwide. Engagement in your community can create solutions for global issues. Find information and resources at **transitionnetwork.org**.

+ **MORE AT** ajmag.ca/431

Turn the page for **A\J online** features.

ALSO FEATURED

AlternativesJournal.ca

Young Reporters

ENVIRONMENTAL DEFENCE

Thanks to Environmental Defence, youth from across the country investigated solutions to plastic pollution in their communities, and shared their findings through video, photography and writing. Featured above is Abhayjeet Sachal Singh & Faith Carswell's winning submission in the 15 to 18 age category, representing Seaquam Secondary School, Delta, BC.

ajmag.ca/youngreporters

NEW & NOTEWORTHY

FOTOLIA | FOTOFABRIKA

Evironmentalism in the Age of Trump

A\J's founder Robert Paehlke has an on-going series exploring how Canada's environmental policies will be impacted by the presidency of Donald Trump.

ajmag.ca/ecoTrump

COURTESY OF JULIA GALBENU

A Solution to Ecotourism

A\J alum, Julia Galbenu shares her epiphany that if we want to be an ecotourist, then we must be willing to sacrifice our luxuries.

ajmag.ca/wildecotourism

ALYSHABRILLA.COM

Sunny Records

A\J regular contributor Jessica Burman interviews musician Alysha Brilla to discuss her art, her passions and her commitment to making the world a better place.

ajmag.ca/AlyshaBrilla

FOTOLIA | OHENGINE

Eco Literacy

Eric Miller reminds us that environmentalism requires thinking big and communicating widely– and provides four compelling reasons for all of us to increase our economic literacy.

ajmag.ca/ecoliteracy

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THE VOICE OF CANADA'S ENVIRONMENTAL COMMUNITY

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A Great Unifier

KATIE

MY LIFE changed when I became a mother. As I read about soaring GDPs worldwide, I realized that the hardest work I have ever done (raising a human) wasn't included in my country's GDP, the main measurement of national success. This didn't seem right. As of now, our GDP increases when there is a natural disaster and decreases when women leave the workforce to become mothers.

Being an environmentalist who isn't good at math, economics has always seemed like the "enemy." Eventually, ecological economics became the disciplinary umbrella underneath which everything started to make sense, and gave me hope. But it was a journey getting here.

Within ecological economics, I discovered a plausible system that placed the economy inside the bounds of environmental limits, while at the same time ensuring the integrity of many shared values for Canada's diverse individuals. Practical applications of ecological economics often place community, diversity, family, justice, equity, and equality at the center of their approach. While I previously thought that economics could only pare Canada's wilderness down into a cost-benefit analysis, instead, ecological economics offers a holistic approach that puts values and nature back into economics.

I joined the Canadian Society for Ecological Economics (CANSEE) to begin channelling my activist energy into a project that seeks to influence the way society behaves. CANSEE and other ecological economists recognize that the economy is embedded in, and dependent upon, the environment. More than that, we recognize that economic activities, how people spend their money, are a pervasive aspect of that dependence, and want to influence the way people behave economically to limit environmental destruction.

In the last year, we have witnessed the political, social, and economic division plaguing our neighbours to the south. I am hopeful that as a country blooming with diversity we can overcome similar movements here at home. In this issue, CANSEE hopes to demonstrate that ecological economics can be part of a unifying political path. We want everyone to work less, spend more time with family, take a walk through the wilderness, and promote a healthier and better future for the children of the world.

In this issue, we hope to show you how we can come together within the movement of Ecological Economics. We offer new ways of measuring our well being in a world already seeing the impacts of climate change. We offer ways we can rethink some of the systems we as Canadians cherish like education and healthcare. We look at how the popular resurgence of DIY can not only tap into passionate creativity, but also provide a new framework for consumption and show how indigenous communities can be empowered to lead.

This issue demonstrates a theme – we can't keep doing things the way we used to, and we don't have to. We can be innovative, think differently, and tap into existing communities of change.

Ecological economics can function as a great unifier. The environmental and cultural values of the discipline depend upon community. Together we can redefine a successful Canada. AJ

Katie Kish is a mum, maker, and teacher who loves to explore how people find meaning and purpose through creativity and curiosity. She is a PhD candidate at the University of Waterloo and Vice President Communications with the Canadian Society for Ecological Economics.

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The mandate of this journal is:

- to provide critical and informed analysis of environmental issues;
- to promote an understanding of "environment" in the broadest sense of the word, including social and political dimensions of environments;
- to reflect a Canadian perspective informed by an understanding of global issues;
- to stimulate dialogue and exchange of information among environmental activists, academics and professionals; and
- to create a publishing opportunity for Canadian scholars and professionals.

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519-888-4442 (phone); ESAC@uwaterloo.ca; esac.ca

This journal has an inclusive language policy.
All manuscripts, with the exception of poetry, will be edited to eliminate sexist terminology. In quotes, sexist language is removed and replaced by alternative terms in square brackets.

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Katie Kish lives in a world where work is perpetually interrupted by sticky-fingered toddlers, trips to the dog trails, and a deep need to bake, make, and create. She believes that being with family, listening to and playing music, and gut-busting laughs are the best ways for a happy and fulfilling life.

Kish is a PhD candidate at the University of Waterloo's School for Environment, Resources, and Sustainability. In her research, she developed new ways to incorporate culture and society into ecological economic frameworks. She loves to help kids fall in love with being curious. By the end of this summer (knock on wood), she'll be moving on to help the littlest people of the world flourish and grow as an elementary school teacher.

What is your message to Trudeau and Trump?
Dear Trudeau: Big oil puts you in bed with Trump. Stop it. You're a married man.
Dear Trump: Peekaboo.

For fun ... An ecologist, an economist and a three-year-old walk in to a room with a cardboard box in the middle. The three-year-old takes them to the moon.

EAGLECLAW BUNNIE

Brett Dolter is an ecological economist. Much of his research focuses on climate change. He looks for cost-effective pathways and policies to lower greenhouse gas emissions. Sometimes the title makes him feel like he's fitting a square peg in a round hole. Some of his economics studies classmates thought he was a radical in his concern for sustainability. On the other hand, some of his environmental studies classmates thought he was cold-hearted to focus on trade-offs and economic constraints.

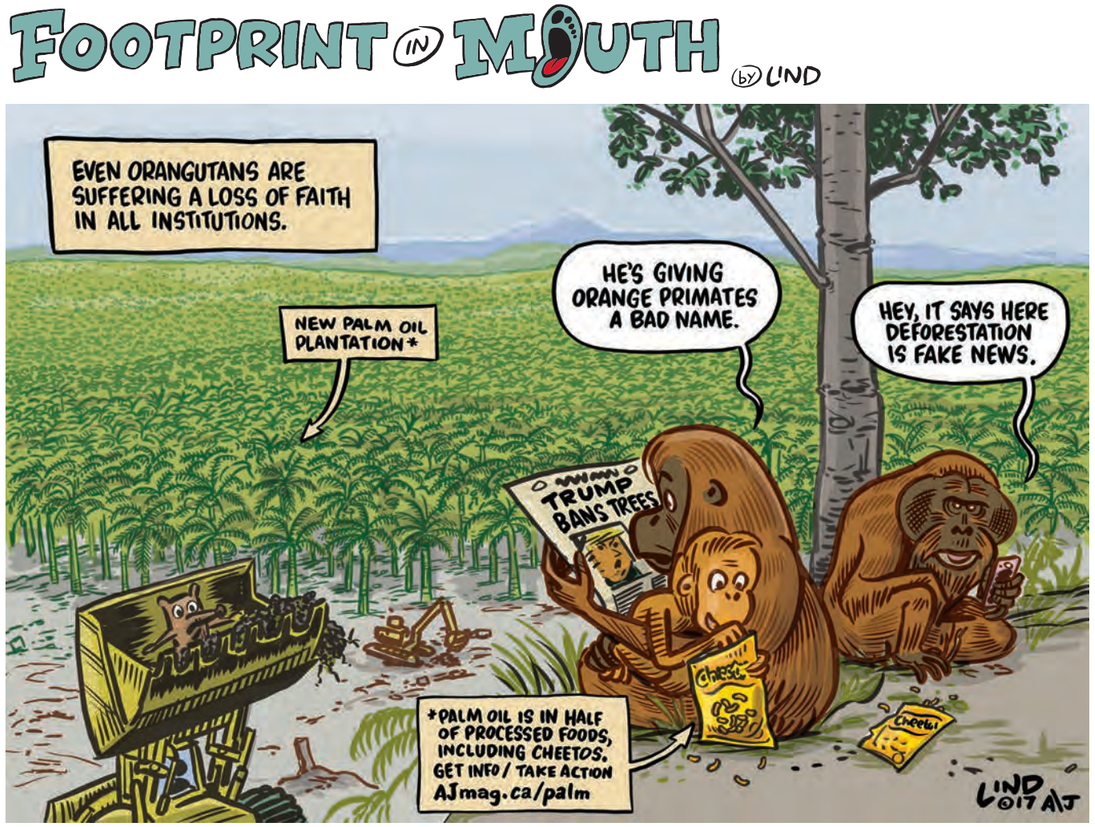
Dolter's Saskatchewan roots have likely shaped his research approach. The province has given birth to innovative ideas like universal healthcare, and is also a place where people put stock in practical, down-to-earth thinking.

What is your message to Trudeau and Trump?
Much of my research focuses on climate change. I'm trying to find cost-effective pathways and policies to lower greenhouse gas emissions. I would encourage our political leaders to move the debate from whether to act on climate change, to how to best reduce emissions. As citizens, each of us has a role to play to encourage our leaders to move beyond partisanship on this issue.

Katharine Zywert writes fiction, makes strange fabric art, and likes to knit without following a pattern. She is also a PhD Candidate at the School of Environment, Resources, and Sustainability at the University of Waterloo. Her research investigates novel approaches to the challenges facing human and ecological health in the Anthropocene. She is particularly interested in health system alternatives that hold potential for improving both human wellbeing and ecological integrity in a society with limited economic growth and declining material and energy resources.

What is your message to Trudeau and Trump?
The goal of perpetual economic growth is at odds with our long-term survival on this planet. The sooner governments accept this, the more likely we will be to achieve a humane transition to an equitable and ecologically viable modern society.

For fun ... An ecologist, an economist and an anthropologist walk into a forest. The ecologist says, "Wow, what an incredible, interconnected ecosystem." The economist says, "What? This is a lucrative natural resource, it'll really boost our GDP." The anthropologist looks up from her notebook and says, "Can you two talk a little slower? My hand's getting tired."



Research Digest

Moose in Decline

NORTH AMERICA The Ontario government initiated the Moose Project in 2015 to restore the declining moose populations over the last decade – a concern in both the USA and Canada. The Department of Natural Resources in Minnesota reported a 58 percent decline in the last decade. In Northern Ontario, within the Thunder Bay and Cochrane regions, moose populations are estimated to be 50 to 60 percent lower than a decade ago. Once numbered at approximately 700, Thunder Bay's moose population is now below 400.

While no single cause has been identified, factors such as habitat degradation, disease, hunting, and climate all contribute to lower populations. To manage these impacts, the Ontario government shortened the hunting season and delayed the start of the moose seasons in the last two years.
ajlinks.ca/MooseDecline

The River Runs Away

YUKON A new study released by the journal Nature Geoscience (April 2017) tells the story of "river piracy" – a term whereby the headwaters of one stream are diverted or "stolen" by another. Quaternary geologists have studied how melting glaciers from the last ice age (more than 11,000 years ago) rerouted water and sediment, with a profound effect on landscape evolution. The first modern river piracy episode, known at this time, happened last May in Yukon's Kluane Lake area. The most obvious and disconcerting change has been the disappearance of Slims River, with its waters being diverted to a different river system.

The 2016 spring melt from the Kaskawulsh Glacier – one of Canada's largest glaciers – radically changed the regional drainage pattern. Researchers, led by Canadian geomorphologist Daniel Shugar, used a combination of hydrological measurements and elevation models, to determine that in late May 2016, the Slims

#BANKEXIT SCREEN CAPTURE

Better Banking

PERHAPS YOU'VE WATCHED the recent video by comedian Sarah Silverman, discussing the reasons why she moved her money from a traditional bank to a community-focused credit union. In her case, upon learning that her traditional bank was invested in the Dakota Access Pipeline (a highly-controversial project that built an oil pipeline near protected and sacred lands belonging to the Standing Rock Indian Reservation), Silverman was incensed, and wanted to do something about it.

"I realized that as long as my money is in a big bank, I'm a part of the problem," states Silverman in the video.

"We can vote, we can protest, and another active thing that we can do is watch where we spend our money. We have a ton of power in places we never even realized. And one of those places is where we do our banking," comments Silverman.

While the video was specific to the US market, the issues are similar north of the border. Canada's "Big Five" banks – Royal Bank of Canada, Toronto-Dominion Bank, Bank of Nova Scotia, Bank of Montreal, and the Canadian Imperial Bank of Commerce – have all made *significant* investments in the oil and gas industry in this country and around the globe. Collectively, the Big Five have outstanding loans to the energy sector of almost $100 billion, representing almost five percent of their cumulative total of outstanding loans.

Plus, oil and gas stocks are commonly held in most Canadians' mutual funds and remain a key investment for our governmental pension plans (see "Canada's Dirty Pension," page 68). But what if you don't believe that your money should be perpetuating and enabling, as Silverman says, this "addiction to a product that's killing our planet?"

Consider a credit union.

"A credit union is like a bank, but it is a non-profit. And once you put your money into a credit union, you become a part-owner," states Silverman, continuing, "it's a cooperative … keeping your money safely invested in a place that won't invest in things you don't believe in."

Today, more than five million Canadians trust credit unions as their go-to providers of day-to-day banking services. While credit unions share the banking mantra of "empowering Canada's economy," their community-first focus and member/owner structures are dedicated (as non-profits) to putting people before profits.

And there are credits unions that will appeal to just about everyone, differentiated by geography, history and social responsibility focus – but all share the DNA (and a legacy) of doing business that does good, for their shareholders and for all Canadians. ***ajlinks.ca/sarahsilverman***

River, which flowed northward into Kluane Lake (and then to the Yukon River, ultimately discharging into the Bering Sea), reversed its flow. The Slims then became part of another watershed. Both the Slims River and Lake ultimately emptied into the Kaskawulsh River, a tributary of the Alsek River, which discharges into the Pacific Ocean.

Shugar and colleagues provide a detailed analysis of how an atmosphere warmed by fossil-fuel emissions led to the river's dramatic disappearance.

"This is likely to be permanent," said Shugar, who believes the warming trend that caused the Kaskawulsh Glacier to thin so dramatically, is likely to continue for the foreseeable future.
ajlinks.ca/RiverRun

A New Crack in the Ice

GREENLAND Researchers working with NASA's Operation IceBridge have snapped a picture of a crack in the middle part of Petermann Glacier on Greenland's northern coast. Operation IceBridge consists of flying airplanes over parts of Antarctica and Greenland and taking pictures to monitor changes in ice coverage and formations.

The crack is clearly identifiable in the image supplied by NASA, and is particularly concerning because of its location. Typically, cracks in glaciers occur relatively close to the sea "as the warmer temperatures and angle of descent cause ice to break off and float away." But in the case of this new crack, it has appeared very close to the centre of the glacier. In the opinion of project leader, Stef Lhermitte, an associate professor at Delft University of Technology in the Netherlands, the crack in all likelihood formed due to warmer water underneath the glacier.

If Petermann Glacier does split, the resulting ice island would be approximately 150 to 180 square kilometres in size. It would not necessarily change the level of the ocean but it would make room for new ice to begin flowing into the sea.
ajlinks.ca/CrackedIce

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Send your novel planet-protecting research/discoveries to
editorial@alternativesjournal.ca

COURTESY OF HIGHWAY OF HEROES LIVING TRIBUTE

Highway of Heroes

SINCE OUR INCEPTION as a country in 1867, Canada has suffered at least 117,000 fatal casualties in wars and in peacekeeping duties. Most recently, Canada has lost 158 military personnel in our efforts to fight Al Qaeda and the Taliban in Afghanistan, a conflict that started soon after 9/11 and continues to this day. The "highway of heroes," is the route taken by funeral corteges along Canada's busiest highway, Highway 401, during repatriation ceremonies for those killed. In a lovely touch, the overpasses and bridges along Highway 401 are usually packed with citizens saluting the heroes and their families as they make that final journey.

Now, a group of visionaries, including Canada's gardening guru, Mark Cullen, have proposed the creation of a Highway of Heroes Tribute, a living and growing monument to all those Canadian service members who have been killed in the line of duty since 1867. This group, which also includes support from Landscape Ontario, aims to plant 117,000 native trees along the Highway of Heroes route (from the Canadian Forces Base in Trenton), to create a rich green canopy of remembrance. They've been doing this work for just over a year and have held successful planning events that have attracted thousands of interested citizens.

While steel and concrete are the typical materials used to build memorial monuments, we here at A\J can't help but think that this project will be more impactful and beneficial than a traditional statue. Trees stand on duty for us each and every day, converting carbon gases into oxygen through photosynthesis, capturing and storing harmful greenhouse gases before they can escape into our atmosphere (and from there, warm our planet out of our comfort zone). And as much as Canada's history has been defined by human-made achievements, our country is still instantly recognizable to the rest of the world via the maple leaf on our flag and the taiga forests of our north.

It seems fitting that as Canada prepares to celebrate our next 150 years of country-hood, we're looking for new and more appropriate ways to honour the past while empowering the future. And trees, like soldiers, do stand on guard for us.

Very soon, we'll be able to see a living legacy of trees that reminds each of us the small but necessary sacrifices that we collectively need to make today (like driving an electric vehicle versus a gas-guzzler) to successfully transition to a low-carbon future tomorrow. ***hohtribute.ca***

New Thinking for Old Problems

Ecological economics, like the new generation of adults, is socially conscious, engaged and open to new ideas.

WESTERN millennials are technologically savvy, environmentally and socially conscious, entrepreneurial, global citizens. We want a future that is just, progressive, innovative, and meaningful. Ecological economics can help the next generation of adults build this future. Ecological economics provides a sustainable framework that supports entrepreneurship, more free time, equality, and improved well-being.

Ecological economics serves humanity, not economic and monetary growth. We are helping to design a new future – one where we measure our success based on happiness and well-being, rather than economic growth. Ecological economics cannot support unequal distribution of wealth (say goodbye to million dollar incomes), international travel will be more special than it is now; there won't be a new cell phone every year; and there likely isn't room for multinational-monopolistic corporations.

But, here's the 1, 2, 3 of it. While there are a variety of approaches and projects under the ecological economic umbrella, there are three integrated and agreed upon goals.

1. **Scale.** We live on a finite planet and the economy is a subsystem that must fit within that limit.

2. **Fair Distribution.** We will maintain social capital and quality of life through even distribution of wealth.

3. **Efficient Allocation.** We don't believe the market can regulate itself – it needs help.

In traditional economics, the environment is an "externality" (seen as not really costing anything to use, so it is external to the equation), but in ecological economics it is a greater part of the equation. *– Katie Kish*

ISABELLA VESELY

***AV** wood nymph Selina Vesely tells us about aspects of ecological economics, according to Katie Kish.*

New Economists on the Block

These emerging ecological economists are changing mainstream economics by introducing radical and critical changemaking, voicing alternative perspectives, and finding real world solutions that tackle the underlying issues, instead of applying band-aid solutions. You are going to read about all of these aspects of ecological economy when you delve into this issue.

Jennifer Gobby | *PhD Candidate | McGill University, Economics for the Anthropocene partnership*

Gobby is a climate justice activist who recognizes that the people most impacted by the current economic system are those who benefit the least. Their perspectives in the economic conversation are crucial. Yet these people tend to be systematically excluded from decision making in this country, even around resource development on their own lands and waters. Gobby is spending her years of PhD research working closely with Indigenous communities and activist organizations to collaboratively envision a more inclusive future, and move strategically towards a more just and ecologically viable Canada.

EAGLECLAW BUNNIE

Brett Dolter | *Postdoctoral Research Fellow | University of Ottawa, Institute of the Environment Education*

Tackling climate change requires a massive transformation of our energy system, which in turn requires changes to our paradigms, institutions, and decision-making processes. Dolter's research brings diverse stakeholders together to deliberate Canada's energy future. Through this process he hopes to generate a shared understanding of the challenges that lie ahead and a shared commitment to action.

Dorothy Larkman-Flood | *PhD Candidate | University of Waterloo, School of Environment, Resources and Sustainability, member of the Matachewan First Nation*

Larkman-Flood's work focuses on maintaining a positive corporate-Indigenous relationship. She is continuing research on the ethics of non-interference and how it gets applied. As this will influence flow of resources, it is an exemplar of ecological economics.

Patricia Huynh | *PhD Candidate | University of Waterloo, School of Environment Resources and Sustainability*

Huynh is saving the world, one soap bar at a time. Her studies in socio-ecological sustainability have helped bring her passion for science and making together. She leads workshops on soap making. She also participates in regional craft sale events and sells her product in independently owned and operated shops – a significant contribution to building the local economy.

SELINA VESELY

This is ecological economics

We respect limits by finding new solutions.

We value ecosystem services – things that benefit humanity, obtained through ecosystems.

We disrupt mainstream production and capitalism by making, repairing, and recycling goods.

We measure Canada's success based on well-being rather than monetary growth.

We support local living such as local businesses, famer's markets, and walkable communities.

We respect all voices (i.e., Indigenomics and ecofeminism).

Turn the page and dig into Ecological Economics!

PETER A. VICTOR

We've Outgrown Growth

We *can* have it all – full employment, no poverty, lower greenhouse gas emissions *and* fiscal balance without relying on growth.

"It turns out that money really does grow on trees, as well as in the soil, the water, and the inspiration and perseverance of the thousands of people who've worked to make the Greenbelt a major – and sustainable – economic force while keeping its core mandate intact."

– Burkhard Mausberg,
The Greenbelt: Protecting and Cultivating a Great Ontario Treasure

VARTKES PELTEKOGLU

If economic growth is an unmixed blessing, why would there be a need to talk about inclusive, green, clean, smart, responsible, or sustainable growth?

IN MY RESEARCH, I've asked the question: can we in Canada have full employment, no poverty, greatly reduced greenhouse gas emissions, and fiscal balance without relying on economic growth? Sounds nice, doesn't it?

I first addressed the implications of managing without growth 10 years ago in a book called *Managing Without Growth: Slower by Design, not Disaster.* I deliberately focused on rich countries where it has been shown in many studies that further increases in average GDP (gross domestic product) per person contribute less and less to people's sense of well-being.

I used a simulation model of the Canadian economy to generate scenarios indicating that it is possible to move the economy towards prosperity and well-being without increasing GDP. I also considered some of the changes that would be necessary to make it so. These included a modest reduction in average annual working hours to reduce unemployment, an escalating carbon tax to discourage greenhouse gas emissions, and a number of anti-poverty measures to reduce poverty. Ultimately, I found that it would be possible for Canada to manage just fine without growth.

That was 10 years ago. Back then, it looked possible to make a reasonably smooth transition to an economy that would provide high and improving levels of well-being to all Canadians. Now it's not so clear.

In the decade since I began my investigations into alternative economic futures, Canada's GDP has grown 19.7 percent, GHG emissions have declined a measly 0.8 percent excluding LULUCF (land use, land-use change and forestry) but increased 6.0 percent including LULUCF. Although the inequality of income distribution declined slightly as measured by the Gini coefficient, the number of Canadians living below the Low Income Measure (LIM), used by the Organisation for Economic Co-operation and Development (OECD) to compare poverty among member countries, increased 8.0 percent. This was a smaller percentage increase than the total Canadian population, but nevertheless it meant that from 2004 to 2014 the number of Canadians with low incomes grew by 335,000 to 4.5 million.

It's widely believed that economic growth – the continual expansion of production and consumption of finished goods and services – is absolutely essential for improving the well-being of Canadians. But GDP is a seriously inadequate measure of well-being. It says nothing about distribution, excludes many factors that influence well-being such as environmental damage and other social costs, gives no value to unpaid work, and includes some expenditures on items such as increased commuting and home alarms whose contribution to well-being is questionable.

While GDP has been growing, other measures designed to evaluate how Canadians are really doing tell a very different story about our well-being. For example, between 1994 and 2014 the Canadian Index of Well-being, which is based on changes in education, health, community vitality, democratic engagement, living standards, time use, environment, and leisure and culture, increased just 9.9 percent. Meanwhile GDP increased 38 percent.

The Slowdown of growth

Since the 1950s, the promotion of economic growth, measured as an increase in inflation-adjusted GDP, has been the overarching policy objective of virtually all governments and political parties. Now economic growth is proving increasingly elusive as growth rates continue to slow. The average annual growth rate of OECD economies combined fluctuated between four to six percent per year in the 1960s. Since 2001, it's been in the 2 to 2.5 percent range with negative growth in 2009 during the financial crisis. The Canadian record is much the same. This decline in the rate of economic growth has revived concern about "secular stagnation," a condition of ongoing low or no economic growth due to insufficient spending or slow increases in productivity or both.

Slowing growth is a matter of grave concern to those who regard economic growth as vital. But something else is wrong with economic growth. We can see this from the proliferation of adjectives that are now frequently placed in front of economic growth. If economic growth is an unmixed blessing, why would there be a need to talk about "inclusive" growth, "green" growth, "clean" growth, "smart" growth, "responsible" growth, "sustainable" growth, all terms easily found in the literature and on the Internet? It implies that, economic growth is exclusive, brown, dirty, stupid, irresponsible and unsustainable, and if it is slowing down anyway, we really ought to think about managing without growth altogether, at least in a rich country like Canada.

Whether for reasons of the decline in the growth rate or because of its increasingly obvious inadequacies as an indicator of improving well-being, it is becoming clear to ecological economists that increasing GDP should be seen for what it is: a measure of means, not ends. These ends include the promotion of well-being, employment, social justice, environmental quality, and biodiversity – themes you see throughout ecological economic discussions. If the pursuit of economic growth becomes an obstacle to the achievement of these ends, then it is growth that should be questioned, not the ends that it is intended to serve.

This is not to say that our new policy objective should be to replace positive growth in GDP with a rate of zero. Rather, it means that we should enhance what really matters as we thoughtfully and deliberately reduce the requirements for materials and energy in our economy and also reverse the destruction of habitat that is stressing so many species with which we share the planet.

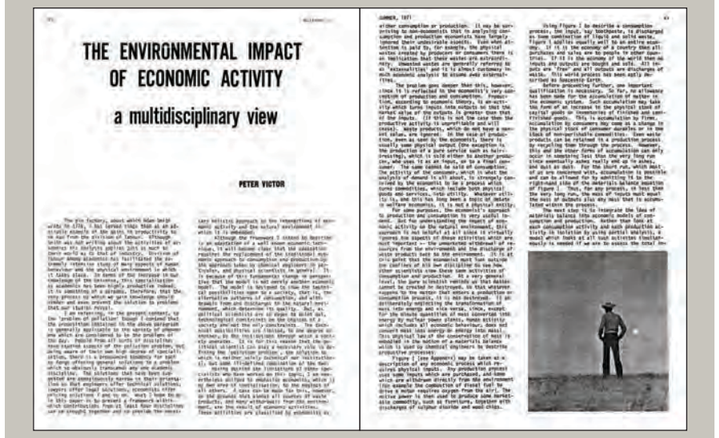
In this context the question of whether we can manage without economic growth in Canada becomes important, because it is folly to celebrate small reductions in material and energy use per unit of GDP, if overall the economy continues to unsustainably strip the planet of resources. But, if GDP is not growing, then a reduction of materials and energy per dollar guarantees an overall reduction in resource use.

What happens if GDP doesn't grow?

Suggestions to wean ourselves off dependence on economic growth are met with questions like "how can high levels of employment be maintained?" or "will it exacerbate inequality?" or "how will interest on loans be paid if

Back To The Future

LIKE A LONE COWBOY, Peter Victor was one of the first voices to speak up and lead the way for ecological economics. He wrote for **AJ** in our very first issue, way back in 1971. Even then he was writing about the "pollution problem" and calling for people in all academic disciplines to work together to overcome it. Take a look at his introduction below.



THE ENVIRONMENTAL IMPACT OF ECONOMIC ACTIVITY

a multidisciplinary view

PETER VICTOR

A page of Peter Victor's article in our first issue. Yes, that is a metaphorical economics cowboy looking off into the distance.

The pin factory, about which Adam Smith wrote in 1776, has served since then as an admirable example of the gains in productivity to be had from the division of labour. Although Smith was not writing about the activities of academics his analysis applies just as much to their world as to that of industry. Division of labour among academics has facilitated the extremely intensive study of many aspects of human behaviour and the physical environment in which it takes place. In terms of the increase in our knowledge of the Universe, this specialization by academics has been highly productive indeed. It is something of a paradox, therefore, that the very process by which we gain knowledge should hinder and even prevent the solution to problems that our studies reveal.

I am referring in the present context, to the 'problem of pollution' though I contend that the proposition contained in the above paragraph is generally applicable to the variety of phenomena which are considered to be the problems of the day. People from all sorts of disciplines have studied aspects of the pollution problem, but being aware of their own high degree of specialization, there is a pronounced tendency for each to forgo offering general solutions to a problem which so obviously transcends any one academic discipline. The solutions that have been suggested are conspicuously narrow in their orientation so that engineers offer technical solutions, lawyers offer legal solutions, economists offer pricing solutions and so on. What I hope to do in this paper is to present a framework within which contributions from at least four disciplines can be brought together and so provide the necessary holistic approach to the interactions of economic activity and the natural environment in which it is embedded. ...

Excerpt from "The Environmental Impact of Economic Activity: A Multidisciplinary Approach" from *Alternatives Journal*, Volume 1. Issue 1. 7: You can read the whole essay on our website at ajmag.ca/PeterVictor.

While GDP has been growing, other measures designed to evaluate how Canadians are really doing tell a very different story about our well-being.

GDP is not growing?" My colleagues and I have conducted in-depth research to answer these questions.

For example, my fellow economist Tim Jackson and I found that a two-fold strategy of work-time reduction and a shift to services with a low carbon footprint could maintain full employment in the UK with zero or even negative economic growth. We also found that inequality in a no-growth economy can be reduced with the increased prominence of sectors like health care, as well as stronger unions and labour protections. As well, through a relatively new type of macro-economic modelling we showed that a constant amount of money created through loans is perfectly consistent with a non-growing economy as long as bank profits obtained from extending the loans are distributed as dividends.

Is growth our best future?

Steps are being taken in the public and private sectors to address some of the failures of economic growth but with limited results. The call for faster economic growth remains as loud as ever and as long as we allow economic growth to trump other more meaningful objectives, our future prospects will be bleak. Many groups and individuals are exploring possible alternatives that offer solutions to the multiple challenges of climate change, biodiversity loss, resource scarcity, social justice and financial instability.

Tim Jackson and I offered our own views of such a future in a report for the Next System Project, a multidisciplinary initiative with the aim of offering a new way forward for economic organization in the United States.

We focused our attention on five interrelated dimensions of an economy that would deliver shared prosperity within the ecological conditions of the Earth. We looked at the types of enterprises that could thrive independently of the need to grow, the kinds of employment they could offer, the level and mix of investment required to transform the economy over time, the financial systems required to support the transformation, and the governance structures to establish, maintain, and strengthen real democracy.

What has emerged is something we call "ecological macroeconomics." This new approach to the macro-economy has three main components:

1. the "real economy" where goods and services are produced, distributed, and used,
2. a financial system that supports the real economy rather than dominates it, and
3. recognition that the materials and energy used to produce products (called "throughput") link economies to the biosphere on which they are wholly dependent.

Such a conception of what economies are and how they function is essential for identifying opportunities for changing the direction in which the world's economies, including Canada's, are headed.

Mainstream macroeconomics is blind to many of the problems of our era. It does not account for any loss of capacity of the environment to provide resources, the implications of climate change, or the need to obtain resources from increasingly remote areas. It pays insufficient attention to the financial sector, and focuses heavily on growing GDP. If we continue to rely on traditional macroeconomics, we are doomed to repeat our mistakes. A new *ecological* macroeconomics can help us escape the limitations and failures of the current economic system.

Economists and those concerned with the environment must demonstrate that by pursuing growth when it has become uneconomic – when its benefits outweigh its costs – we will fail to achieve our real objectives. The way to do this is to show as best we can that Canada, like any advanced economy, can manage without economic growth. Then we can hope that growth as an overarching objective of economic policy will fade into the past where it belongs. AJ

Ecological economist Peter A. Victor is a professor in Environmental Studies at York University. He has worked for nearly 50 years in Canada and abroad on economy and environment as an academic, consultant and public servant.

Check out the Next System Project, where leading minds are designing a new economic system for America: **thenextsystem.org**.

A Word from CANSEE

The group that brings you this issue ...

ECOLOGY, SOCIETY AND ECONOMY are all related. Each one affects the other. The Canadian Society for Ecological Economics (CANSEE) is a non-profit organization dedicated to understanding these relationships, and helping other Canadians understand them too.

We'd like to thank all the authors, reviewers and *Alternatives Journal* staff for their work. We're confident you'll see the fruits of this effort in the many engaging, challenging and hopeful results presented in the ensuing pages.

Every two years CANSEE holds a conference in a different Canadian city. In fact, this issue of *Alternatives Journal* you are now reading features adaptations of some papers presented at our last conference in Vancouver.

We hope you'll join us for our next one in October 2017, in Montreal at Concordia University. We're partnering with the Economics for the Anthropocene program to identify current ecological and social challenges, share our stories and visions for the future, as well as explore pathways for transformation and economic (r)evolution. Discover more at **montreal2017.cansee.ca**.

The fields of environment, economy and social justice all face increasing pressures today. Solving these problems requires cross-disciplinary research and policy making. CANSEE is committed to building bridges between these fields and developing new solutions. We envision a better Canada. So do you. Let's do it together. Join CANSEE.

Michelle Molnar is president of CANSEE, and she works at the David Suzuki Foundation as an Environmental Economist and Policy Analyst.

Glossary of Ecological Economics Terms

***HERE ARE** some words to look for as you work your way through our ecological economics issue.*

Agrowth The practice of being agnostic or indifferent as to whether the economy, as measured by GDP, grows. Increased emphasis is put on measuring well-being or social welfare with a holistic suite of indicators such as infant mortality, literacy rates, unemployment, and happiness.

Anthropocene A suggested title for the current geologic era. The name reflects humanity's large and growing impact on the ecosphere. The human species has now begun to affect the planet on a scale that justifies labelling this era as a new geological epoch. The term was brought to prominence by Paul J. Crutzen.

Business as usual (BAU) Continuing to live by current economic and social policies, which means continuing to act as though there are no biophysical thresholds or limits to the economy.

Decarbonization Eliminating greenhouse gas emissions from the energy system.

Decoupling Generally refers to the potential for economic activity, as measured by GDP, to grow, while environmental impacts remain constant or decline.

Degrowth A social and environmental justice movement that aims to achieve sustainability by restructuring society to focus on simpler living, local economic activity, and a reduced impact on the environment. The degrowth movement is known as the "decroissance" movement in France.

Ecological economics A multidisciplinary approach to economics grounded in the recognition that the economy is dependent on the ecosphere/planet. Key figures include Herman Daly, Peter Victor, William E. Rees.

Ecosystem services Within ecological economics, there is a strain of research that works to identify and place economic value on the services provided by ecosystems. These services could include climatic stability, water purification, the provision of oxygen, and the provision of food. The act of placing a monetary value on ecosystem services is often meant to draw attention to ecosystems and encourage policymakers to preserve and maintain these services.

Formal vs. informal economy A distinction is made between the formal economy, where money is used in exchange, and the informal economy, where work is carried out without monetary recognition. Any money exchanged in the informal economy is not tracked or taxed by the government. For example, childcare at a daycare is part of the formal economy, whereas childcare provided by parents can be considered part of the informal economy.

Gross domestic product (GDP) A measure of economic activity, calculated in three ways:

- by summing the incomes of a specific group of citizens or residents of an area,
- by summing the final expenditures of consumers, government, and businesses in a given area plus net exports (exports minus imports)
- summing the value added to goods and services as they move from basic inputs to final goods.

Green growth Economic growth wherein economic activity, as measured by GDP, increases, while negative environmental impacts decline.

Localism An approach to economic development that focuses on local economic activity to reduce environmental impact.

Macroeconomics The study of economic activity on a large scale, including the study of unemployment, monetary policy such as setting interest rates, and economic growth.

Throughputs The energy and materials that feed the metabolism of the economy, and are used as inputs when creating goods and services.

*Earth Economics has another glossary that you can explore at **ajlinks.ca/EEglossary**.*

JEROEN VAN DEN BERGH

Don't Worry, Be Happy

When we focus on employment, equity and environment, quality of life improves – and the people thrive.

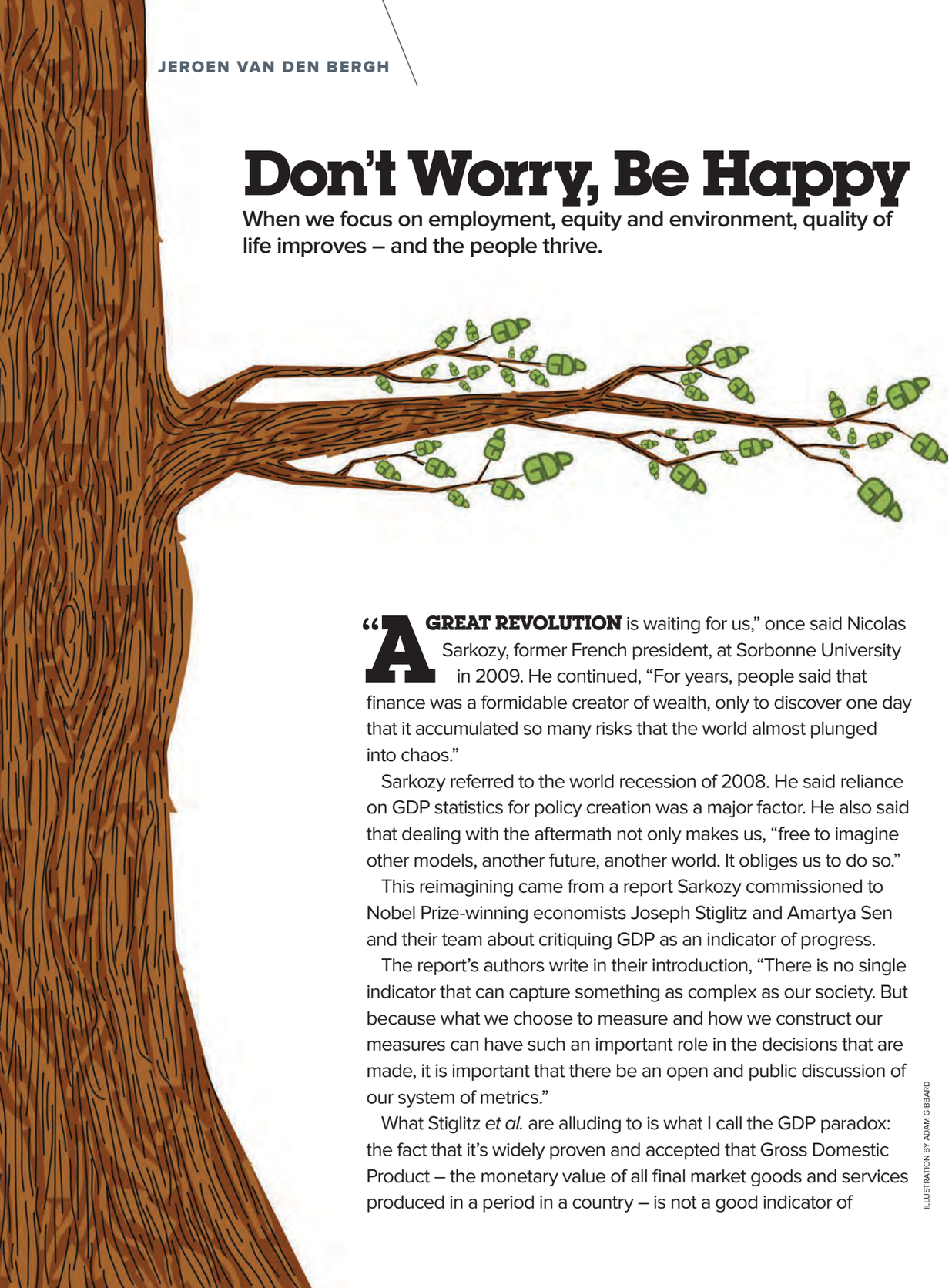


ILLUSTRATION BY ADAM GIBBARD

"A **GREAT REVOLUTION** is waiting for us," once said Nicolas Sarkozy, former French president, at Sorbonne University in 2009. He continued, "For years, people said that finance was a formidable creator of wealth, only to discover one day that it accumulated so many risks that the world almost plunged into chaos."

Sarkozy referred to the world recession of 2008. He said reliance on GDP statistics for policy creation was a major factor. He also said that dealing with the aftermath not only makes us, "free to imagine other models, another future, another world. It obliges us to do so."

This reimagining came from a report Sarkozy commissioned to Nobel Prize-winning economists Joseph Stiglitz and Amartya Sen and their team about critiquing GDP as an indicator of progress.

The report's authors write in their introduction, "There is no single indicator that can capture something as complex as our society. But because what we choose to measure and how we construct our measures can have such an important role in the decisions that are made, it is important that there be an open and public discussion of our system of metrics."

What Stiglitz *et al.* are alluding to is what I call the GDP paradox: the fact that it's widely proven and accepted that Gross Domestic Product – the monetary value of all final market goods and services produced in a period in a country – is not a good indicator of progress, and yet society is unable to let it go.

Many could argue Sarkozy was only open to thinking beyond GDP because the predictions of economic growth under his government at the time were unfavourable. His "beyond GDP" message could be viewed as a political cover-up. Whatever the reason, Sarkozy's actions finally put serious critique of GDP into the global spotlight.

The enduring growth debate

More generally in academic circles, "beyond GDP" has never meant letting go of GDP, but adding alternative indicators to it. The search for alternative progress indicators has been going on for decades without success. While I don't think we should give up on this search, it has been impossible to convince national account statisticians and politicians to replace the GDP with a better indicator.

One reason is that all reasonable alternatives need considerable data that are not consistently available over time and for all countries. An imperfect alternative would be the Human Development Index, but even though it is well known and widely used in the context of debate about developing countries, it has not received serious attention in policy discussions within rich countries. Incidentally, the Human Development Index shows that rich countries have reached a plateau of welfare, despite continual growth in GDP. This confirms the belief that growth does not contribute much to progress in rich countries.

A critique of GDP as an indicator of social wellbeing

There are many well-documented shortcomings of GDP as a measurement of welfare. I've listed the most important in "Shortcomings to GDP" on page 24. These imply that the GDP indicator cannot be relied upon to capture social welfare in general, i.e. under all circumstances, in all countries, and in all periods of time. The use of GDP as a progress indicator therefore represents a serious form of "information failure," which is likely to steer the economy in the wrong direction from a social-welfare angle.

Unfortunately, many people with political influence unconsciously still see the GDP as a good welfare measure. Politicians, journalists and economists get nervous when the GDP grows less than last month or last year. Information about GDP growth still has a large influence on the economy as choices made by consumers, companies and financial institutions are affected by expectations about, and forecasts of, the GDP. This can be regarded as paradoxical in view of the widely accepted critique of GDP as a welfare or progress indicator.

The various shortcomings of GDP as a welfare or progress indicator suggest that we should ignore the GDP (per capita) indicators in public debates and policy making, and focus instead on more direct indicators of employment, equity and the environment. In this scenario, we would be indifferent about the desirability or undesirability of GDP growth. This is expressed by the term "agrowth."

The aim of agrowth is to let go of economic growth as a sufficient and even necessary condition for realizing welfare, and instead take a rational approach to public decision-making. It is not against growth or in favour of zero growth. It just eliminates the unnecessary constraint of unconditional GDP growth. As a society, we need to realize that unconditional GDP growth (growth fetishism) is a constraint on our search for human progress, and without it we will arrive at better welfare outcomes.

For example, if economic growth tends to result from higher incomes rising faster than lower incomes, then striving for a more fair income distribution will be frustrated by a constraint that growth rate of average income (GDP per capita) should exceed a minimum threshold.

Or, if youth unemployment is high, then using public funding to create work experience may reduce long-term unemployment rates, but will likely reduce short-term GDP growth as the government has to raise more taxes. So, requiring high growth will hamper this type of work-experience policy.

While these examples show how prioritizing economic growth hampers social development, you might be wondering what exactly an agrowth strategy implies for economic growth? It would mean that we would at some points be willing – without even realizing, as we would ignore GDP information – to give up some (potential) GDP growth for a better environment, less unemployment, more income equality, more leisure, better health care, and more public services. Policy would prioritize net individual well-being and social welfare rather than average income. Economic growth would no longer be assumed as necessary or sufficient for progress. In other periods, desirable economic change might well be consistent with growth, but nobody should really care or know, as GDP would be disregarded. As a result, one could have periods of high growth followed by periods with low growth, or even a decline, in GDP terms, while maintaining progress in welfare terms.

An agrowth view will enhance the social-political acceptability of key public policies focusing on solving urgent and socially important problems.

Clear examples of welfare policy priorities are avoiding dangerous climate change, minimizing structurally high unemployment, and reducing extreme inequality and poverty. Associated policies would be judged on concrete indicator targets for each of these problems. Whether they would work out well in terms of growth would no longer matter. By not observing GDP movements, one would become truly indifferent about the GDP performance, as a good social welfare analyst should be. As a consequence, society can focus on important problems and replace GDP-growth-enhancing policy with welfare-enhancing policy.

Unlike the unconditional positive, zero, or negative growth required under growth and anti-growth strategies, agrowth allows for selective decline and selective GDP growth of different sectors over time. This is needed to enhance welfare, regardless of whether the sum of their changes amounts to growth or not.

Shortcomings of GDP

The main shortcomings of GDP when used as a proxy for social welfare are:

- GDP use does not satisfy basic principles of good bookkeeping
- Using GDP growth as a proxy for progress is inconsistent with the welfare focus in economics
- GDP does not capture insights of empirical research on happiness in psychology
- GDP does not capture income inequality, relative income, or status-seeking behaviour by consumers
- GDP neglects the informal economy
- GDP does not capture economic costs of environmental problems and depletion of natural resources

Political feasibility

Beliefs in GDP and growth are dogmatic in nature, fuelled by the persistent repetition of (mis)information through economics education and the public media. Many economists agree that GDP per capita is not a good measure of social welfare, but are then still unwilling to set it aside. An agrowth strategy is likely to be judged as odd in the current political setting where growth is the predominant goal.

Nevertheless, agrowth has a chance to become a serious line of thought, as there is a slowly but steadily increasing recognition among politicians and economists of the shortcomings of the GDP indicator, and increasing support for a more critical treatment of GDP information by international organizations like the OECD and the World Bank. Influential economists have stated in public that the times of high growth are over for several reasons, and that future growth may not be as high as it was in the past. They publish papers with titles like Robert Gordon's "Is U.S. Economic Growth over?"

Some view Sarkozy's stance on "Beyond GDP" as a failure, and some as leadership. Perhaps Sarkozy's presentation of Stiglitz and Sen's critical report was just a ruse to avoid disappointment about not reaching economic goals. Nevertheless, it could be the beginning of an international tipping point in favour of national policy that finally prioritizes welfare of the people over GDP.

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Measuring What Really Matters

The Index of Wellbeing is a more holistic reflection of Canadians' lives.

"There is a feeling that all is not well in Canada. But it's more than a feeling; it's a fact. When we compare trends in the wellbeing of Canadians to economic growth in the period from 1994 to 2014, the gap between GDP and our wellbeing is massive and it's growing. When Canadians go to bed at night, they are not worried about GDP. They are worried about stringing together enough hours of part-time jobs, rising tuition fees, and affordable housing. They are thinking about the last time they got together with friends or the next time they can take a vacation. Maybe that's why we are getting less sleep than 21 years ago."

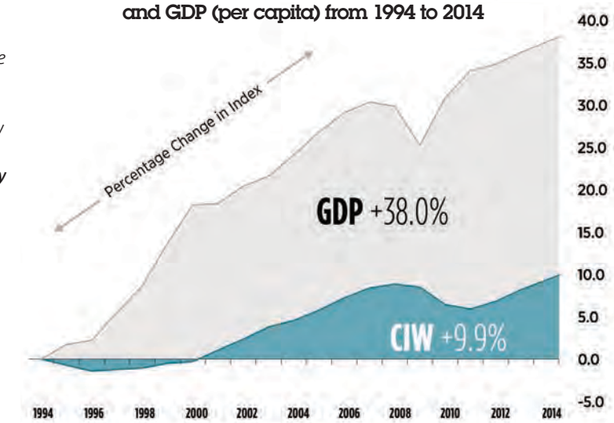
*–from the **Canadian Index of Wellbeing Executive Summary***

WHILE CANADA'S Gross Domestic Product (GDP) may be steadily increasing by around 0.5 to 0.7 percent per year, can we say that the lives of Canadians are improving at the same rate, or at all? GDP provides us with a simplistic number that only demonstrates the improvement of our economy.

The Canadian Index of Wellbeing (CIW), developed at the University of Waterloo, provides a fuller picture. By looking at eight domains of life, it measures indicators relevant to livelihood and wellbeing. The resulting number helps to promote evidence-based community decision making.

While the CIW has improved by 9.9 percent since 1994, the gap between the CIW and GDP is increasingly growing. This indicates that Canada's current economic activity does not prioritize the wellbeing of citizens. //

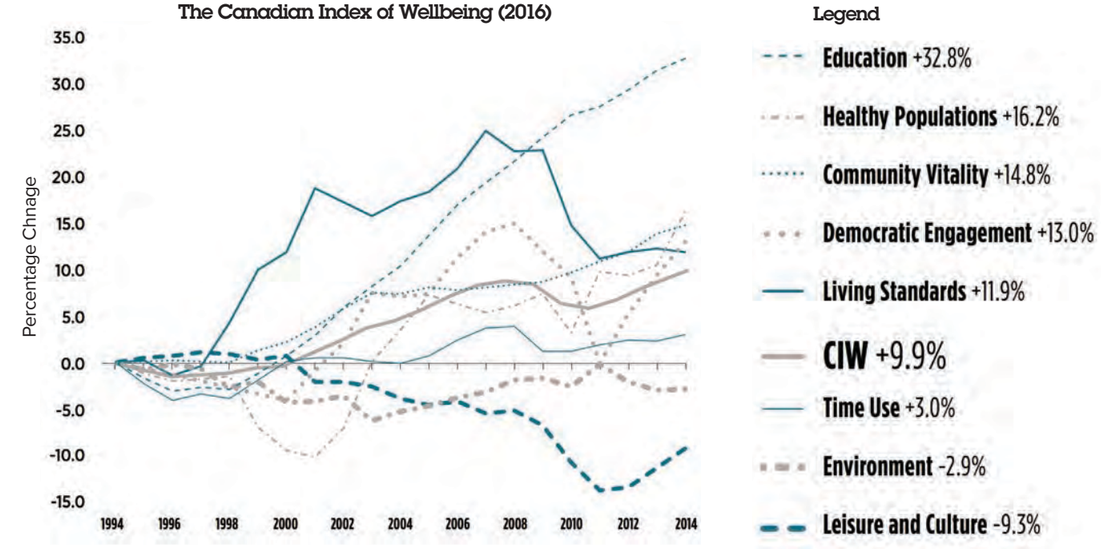
Trends in the Canadian Index of Wellbeing and GDP (per capita) from 1994 to 2014



When Canada's GDP and the CIW are compared, the two indicators do not grow in tandem. The 2008 recession shows up as a dip in GDP, while the CIW shows that quality of life took longer to recover.

Explore the Canadian Index of Wellbeing further: **ajlinks.ca/CIWellbeing**.

The Canadian Index of Wellbeing (2016)



The Canadian Index of Well being is calculated from eight different social indicators. The CIW researchers have kept track of how Canadians are doing in these areas, comparing today with 20 years ago.

FOTOLIA | PATPITCHAYA

Evolution of a Theory

How a "textbook of record" is a classic example of the need to connect ecology and economy on campuses.

WHEN THE Second World War ended, big business in America was faced with a dilemma. Workers had become accustomed to high wages, but with no war to fuel production, and an influx of returning workers, business owners needed to find a way to keep workers happy without cutting into their profits. What they did to address this problem has set the discipline of economics on a trajectory not grounded in reality. This continues to affect every person in Western society today and explains long-lasting conflict over ideas within academia.

At a university near you …

An undergraduate student who takes environmental studies courses learns material that can undermine her optimism for the future. She will encounter environmental indicator data that suggest our planet's health is declining precipitously: CO_2 levels unseen by any of our ancestors, a rate of biodiversity loss paralleling past major extinction events, or air quality data that indicate a tragic loss in life expectancy for many urban residents. Invariably, economic growth and rising standards of living will be linked to such trends.

Meanwhile, a student taking lectures in the economics department will learn material that might make him envious of the opportunities that will be available to the grandchildren of his generation. He will learn of the remarkable growth in living standards over the past two centuries. He will learn measures governments can take to foster future economic growth and to temper recessions. However, the relationship between economic activity and the environment is unlikely to merit much attention. As one student described his economics lecturer's response to questions on such topics, "They say alright, yeah, the environment is important but we're not going to think about it right now [laughs]. A lot of 'we'll get to that later.'"

I've long been interested in how the teaching of economics at the undergraduate level addresses questions of sustainability. I've interviewed economics students and lecturers for both economics and environmental studies courses. Through this research, I've observed this dysfunctional phenomenon that has persisted for too many years on Canadian university campuses.

Students aren't the only people who get frustrated by these two solitudes. Environmental scientists recognize that economics drive public policy and that economic theory can offer highly useful tools to improve prospects for sustainability. Thus, many environmental studies and resource management programs require that students earn credits in a principles of economics course offered by the economics department. But environmental students noted to their faculty how economics lecturers failed to address how economic policies might impinge on sustainability.

The discrepancy between undergraduate economics programs and sustainability programs does a disservice to today's students. In my study of students at the University of British Columbia, Simon Fraser University and the University of Victoria, I found that taking a course on the principles of economics didn't help the students reason through how a carbon tax would affect a company that installed wind turbines to generate electricity.

Yet, a principles course ought to prepare a student to solve a basic question regarding the impact on business and consumer decisions of putting a price on carbon. Economist Arthur Pigou first spelled out the underlying logic of taxing pollution in his book *The Economics of Welfare* in 1912. The idea that inefficiency results when firms that pollute do not pay for the full social costs of production has long been considered one of the core principles of economics. There is something very wrong with a course on principles of economics that students can pass without understanding how a price on pollution gives firms and consumers the incentive to make greener choices.

Lessons from history

Such disappointing student outcomes are hardly surprising, given how principles courses tend to be taught. In most cases, the logic behind taxing carbon emissions and other pollutants to protect the environment and human health is relegated to one chapter on externalities. And some textbook authors, aware that economics lecturers are pressed for time, invite lecturers to skip over this chapter. One of the lecturers I interviewed at the University of Victoria strongly critiqued his colleagues for not teaching sections on environmental externalities. He explained that this omission meant that far too many students completed their principles of economics course with the erroneous belief that markets always deliver socially optimal outcomes and that government regulation is unnecessary.

The content of most principle-level courses is largely determined by the course textbook the students have been assigned. Furthermore, the five bestselling textbooks at any point in time take up most of the market share and there is remarkable homogeneity amongst them, so topics covered in principles courses have come to be quite standardized across North America. Let's explore how typical textbooks have been revised to cover themes of economic growth and its environmental implications.

Samuelson's *Economics*, first published in 1948, is widely acknowledged as having shaped most of the principles textbooks that are still used in today's lecture halls. This text was published in 19 editions and thus it gives us a unique window into how the presentation of economic theory evolved over 60 years. No other economics textbook has had the same longevity. Other economists have referred to it as the profession's "textbook of record," and academic articles have been published about its remarkable influence on the discipline. While we will focus on Samuelson's textbook, my examination of different editions of other leading textbooks during this time frame shows a similar pattern (though Samuelson tends to be more progressive and more willing to acknowledge the downsides of market economies than many of his contemporaries).

Given the contemporary obsession with economic growth, it is surprising to find that in Samuelson's first edition of *Economics*, there are few passages on economic growth— the topic does not even merit an index entry (the closest we come is GNP; eight pages explain how the national income is measured). However, by the sixth edition in 1964 we see a remarkable shift: growth is characterized as a "cheerful subject." Samuelson elaborates: "The key word in most economic discussions these days is growth." The index has 24 entries for growth, and the term "growthmanship" merits its own index entry.

We'll continue looking at how the presentation of growth evolved in Samuelson's text below, but first, how can the fact that growth was given so little attention in 1948, but by the 1960s had taken on such importance in economics teaching be explained? Robert Collins' book, *More: The Politics of Economic Growth in Postwar America* offers a carefully footnoted analysis of the key developments in this process.

Collins documents that when the US government wound down its military spending at the end of the Second World War, the country's business elites had a number of worries. They worried that with government spending shrinking, the country might slip into depression again. Furthermore, as factories churned out munitions for the war effort, workers had grown accustomed to rising wages and they now expected a greater share of total output, but improving worker's pay and enhancing benefits risked undercutting business profitability. Finally, ongoing improvements in productivity also drove the country's factories to find new markets. Otherwise, an accumulating inventory of unsold goods would cause prices and profits to collapse.

The Committee for Economic Development (CED) sought to influence the US government by offering policy solutions that would overcome these challenges to profits, while still being palatable for the working class. The CED, founded in 1942, was made up of 150 business leaders and professors from business schools. They came together around the belief that the private sector should collaborate with government in seeking economic stability. They were pragmatic and recognized that their pro-business agenda would stand a better chance of being adopted by government if it also promised some gains for workers.

There is something very wrong with a course on principles of economics that students can pass without understanding how a price on pollution gives firms and consumers the incentive to make greener choices.

The CED spelled out the linchpin arguments in favour of growth in its widely circulated 1947 report, *Taxes and the Budget: Program for Prosperity in a Free Economy.* The authors recommended that government's overarching mission should be to foster "a steadily rising level of demand as our productive capacity grows." Growth would enable businesses to be profitable even though they would be paying their workers gradually rising wages and benefits; workers meanwhile would be able to find good jobs and to afford consumer goods. As its part of the bargain, the business sector was to accept that the state has a responsibility to manage the economy for growth.

The CED's report profoundly influenced the President's Council of Economic Advisors; its 1949 report to the US President was singularly focused on how growth should be the overarching public policy imperative. The economic advisors wrote of their "firm conviction that our business system and with it our whole economy can and should continue to grow." The advisors claimed that an endlessly growing economy would reduce "to manageable proportions the ancient conflict between social equity and economic incentives. ..."

In other words, according to the CED's reasoning, if the economy keeps growing and workers' job prospects keep improving, the lower class will put less pressure on politicians to create generous government programs to assist the needy. If expenditures on social programs were thereby kept in check, there would be less pressure to increase the rate at which the upper class was taxed.

Even without an increase in the tax rate applicable to the rich, as the economy expands and as more workers get good jobs thanks to growth, government revenues keep rising. These funds can then be spent on defence, education and other social programs. Meanwhile, since the well-off keep much of their income, they can invest in new business ventures. Such investments and increased government spending stoke further growth in a virtuous cycle. Furthermore, the upper class can position its interests as being allied with those of the poor by pointing to the jobs their investments create. This line of thinking still persists today.

The growth agenda quickly propagated through western economies (in part via principles courses and textbooks like Samuelson's) because it offered economic benefits to business, labour and government. It promised an economic environment where private enterprises could be profitable and living standards could keep rising for workers, all the while generating government revenues that were sufficient to fund the social programs dear to progressives. Thus parties on the left of the political spectrum have tended to promote economic growth with similar enthusiasm to those on the right.

When the CED put forth its pro-growth agenda in 1948, the biophysical and environmental implications of economic activity were not issues that generated much public or even scientific interest. So it is not surprising that the CED, the President's Council of Economic Advisors or the politicians who took up cause of ensuring governments promoted growth failed to consider how ever rising levels of economic output would impact the environment.

The timeline documented by Collins for the spread of pro-growth thinking fits with the changes in Samuelson's textbook. The first edition of *Economics* was written before the CED wrote the report that sold growth to big business and government. Samuelson and the economics profession had had plenty of time to buy into the growth agenda and incorporate it into principles courses by the time the sixth edition of *Economics* was published in 1964. And for a while, economic growth seemed to be delivering on its promises and delivering unprecedented prosperity while reducing tensions between social classes.

Just as American society largely neglected the environment at that time, so too did the first seven editions of Samuelson's textbook. However, as the years passed, the signs that pollution problems were worsening became harder to ignore. Rachel Carson's 1962 classic *Silent Spring* introduced the American public to the threat pesticides had on ecosystems. This marked the early beginnings of the modern

environmental movement. In the eighth edition of 1970, Samuelson finally included a section that addressed a section of examples on how economic activity was polluting the environment.

In 1972, the Massachusetts Institute of Technology study on *Limits to Growth* shook global confidence that growth could be sustained without undermining the biosphere. Drawing on historical data on resources, population, industrial output, agricultural output and pollution, the team lead by Dennis and Donnella Meadows used a computer to simulate a dozen different scenarios for humanity out to the year 2100.

The study's stark conclusion reads, "If the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."

Limits to Growth thus presented a frontal attack on the economics profession's unqualified endorsement of growth. In 1973, using the ninth edition of *Economics*, Samuelson mounted a counterattack.

While Samuelson acknowledged the general public had given *Limits* a favourable reception, he noted that the economics profession viewed the report critically. He included in his textbook a graph from *Limits* that portended collapse before 2100 with the dismissive annotation, "What mixture of pseudoscience and common sense do studies like this one by the Club of Rome [the MIT team that wrote the report] represent?"

Within a few years, using critiques that too often misrepresented the original study, economists and business leaders managed to undermine public perceptions of *Limits*' scientific merit. It was the era of Reagan, the height of growth optimism.

With the 12th edition in 1985, William Nordhaus joined Samuelson as co-author and took over the task of revising the textbook. Nordhaus had earlier published a testy but flawed critique of *Limits* that had influenced Samuelson's response to the MIT study. Furthermore, in 1992 he produced an influential economic model that suggested a go-slow approach towards reducing greenhouse gas emissions. So he had shown no sign of sympathy to the idea that there might be limits. Republican President Ronald Reagan (1981-1989) strenuously rejected the notion of limits. So it is not surprising that the 12th edition devoted little space to tackling the idea.

By the 18th edition in 2005, the scientific consensus regarding human impacts on the climate system had solidified. Though little space in *Economics* is devoted to tackling the limits to growth argument, the authors acknowledge a "second wave of growth pessimism" less concerned with the implications of depleting non-renewable resources, but focused instead on "mounting scientific evidence that industrial activity is significantly changing the Earth's climate and ecosystems." Nevertheless, the rest of the textbook cheerfully advances the benefits of pursuing further growth.

We can now come back to our overarching question: how is it that within institutions of higher learning – many of them having made public commitments to advancing sustainability – the two worlds of economics and the environmental sciences continue to co-exist and offer students such incompatible perspectives? Why is there not a sustained effort to share knowledge, to evaluate each other's underlying assumptions, to wrestle with how the environment and the economy interact? Should universities not be teaching students skills and knowledge relevant to understanding and managing the economy for the Anthropocene – the current geological epoch when changes in Earth systems are dominated by human activity? Can universities not do better at preparing students to engage in important policy discussions, such as whether and how society can shift away from being dependent on growing GDP?

The above review suggests the following diagnosis of our dilemma. Textbook authors and principles lecturers have – perhaps unwittingly – endorsed an agenda hatched more than a half century ago on behalf of business interests. The decision to put forth growth as the cornerstone of economic policy reflects both the business community's economic challenges of the postwar period and the limited ecological knowledge of the time.

Growthmanship thinking was intended to ensure that government policy favoured big business, all the while ensuring that labour interests and pressures for a more equitable distribution of wealth would be placated by steady improvement in the worker's position and the benefits of living in a consumer society. With this compact, any remaining public pressure for the less well off in society to get a fairer share of total economic output could be easily managed by government and business.

Growth is now deeply embedded in institutions, in political thinking and in our culture. We are now so dependent on it to deliver economic stability, that even the prospect of accelerating ecological collapse is unable to shake growth from its pedestal. In failing to scrutinize the biophysical viability of growth or to consider alternatives, universities have failed to serve the public interest.

Growth is no longer delivering the goods. The time is ripe for calling into question society's commitment to growth. Thanks to neoliberal reforms such as tax cuts for those with higher incomes, the benefits of growth increasingly accrue to the richest one percent, while accelerating automation means fewer workers have dependable jobs. Growth is no longer benefitting the working class, and prospects for the middle class have stalled – realities that Trump harnessed to take the presidency.

A new history

There are signs, however, that the body of economic theory that remains unscientifically wedded to growth may be losing legitimacy on university campuses. The Faculty of Environmental Studies at Simon Fraser University finally addressed the issue a few years ago when they stopped requiring their students to take the principles course from the economics department. Instead, the faculty now offers its own course in ecological economics that scrutinizes the viability of growth, and is more relevant to the sustainability issues the students will be grappling with once they graduate. Another hopeful sign: some students from the economics department take this course to get a critical perspective on their discipline.

Other programs with an environmental focus may follow SFU's lead and develop in-house courses in ecological economics or sustainability economics, rather than requiring their students to take a principles of economics course that ignores humanity's ecological predicament. Though they may have to stray beyond the Economics Department, graduate students can find professors who do transdisciplinary research on the economics of sustainability. In Canada, York University and the University of McGill, working in collaboration with the University of Vermont, recently set up a new graduate program in "Economics for the Anthropocene." With the growth and expansion of initiatives like these, together we can overcome our addiction to growth and shift to new ways of thinking. AJ

Tom Green is an ecological economist and associate professor at the Universidad del Rosario in Bogotá, Colombia. He has a longstanding interest in reforming economics education to make it more relevant to the Anthropocene and to reflect how human wellbeing is dependent on the Earth's life systems.

You can read MIT's original *Limits to Growth* report/prediction in full here: **ajlinks.ca/MITreport** or why not peruse some current reflections: **ajlinks.ca/economycollapse2030** and **ajlinks.ca/limitsofgrowth**.

What's the Difference?

Traditional economy (i.e. some existing Indigenous communities and pre-industrial Western society)	Market economy (i.e. Postindustrial revolution to today)
Primary relationships People knew who they traded with, made their products, and often found them through family and friend recommendations.	**Secondary relationships** People buy and sell products without knowing each other. Trade is usually faceless. Generally, people are unaware of who make their products or who is benefiting from the transaction.
Small communities People organized in smaller communities, reducing the need for fiscal transfers and large tax margins to cover social services. Many services were provided by locals as part of the economy, rather than something outside of it, such as getting wool from local farmers for clothing.	**Urbanization** Much government taxation is needed in order to afford infrastructure and social services (the library, education, etc.). Thus the economy becomes vital for the wellbeing of these services.
Religious (states) In some traditional communities, the local religious or spiritual traditions played a significant role in the community and in economic activities.	**Secular (states)** Modern economies are not affiliated with religious or spiritual meaning. Efficiency replaced meaning in production leading to "alienation" resulting in a lack of identity with production and associated with exploitation.
Obligation Members of a family or a community were often obliged to participate in specific sectors and had little opportunity to leave their geographical area.	**Freedom** People are highly mobile and free to work in the sector of their choosing. As a downside, this freedom includes freedom to starve, if a worker cannot find work.
Homogenous Traditional economies would focus more specifically on what could be produced locally and by the regional culture. Trade with other cultures and societies took place much later and was quite special.	**Multicultural** A variety of cultures influences any given product. Consumers can purchase nearly anything they desire from another culture both online and in urban shopping centers. In some ways, this has led to rampant cultural appropriation.
Reciprocal Premodern economies were less focused on efficiency and variety of choice, and more focused on neighbourly trade. Economic relationships were built over long periods of time and strengthened through personal bonds.	**Exchange** Economic relationships both begin and end quickly. After trading or buying from someone there is no feeling of obligation or tie to that person for future exchange. Brands attempt to create "brand loyalty" to combat this.
Pre-Industrial Economic goods and services took longer to produce, and were not created on a massive scale. Products were highly energy and worker intensive. People rarely amassed a vast collection of "stuff."	**Industrial** Most consumer goods are mass-produced in factories. People have unfettered access to goods and services.

TABLE BY KATIE KISH

This table compares societies operating with pre-modern and modern-style economies. Modern economies are built around the concept of the individual – policy, identity, market and state are all separate, and people operate largely independently from each other. Meanwhile, pre-modern economies are built upon relationships between these spheres of society, as well as between people. For example, buyers know the person who made their products and often decide where to spend their money based on relationships.

BRETT DOLTER

Electrify Everything

Shifting to low-carbon energy requires an economic and social transition.

SINCE James Watt invented the steam engine in 1781, we have understood the power of fossil fuels. The industrial revolution was powered by coal. In the 20th century we tapped into the power of oil to revolutionize transportation and agriculture. Today coal, oil and natural gas supply 81 percent of the world's energy needs. If we are to address the growing threat of climate change, we need to transition away from these fossil fuels. One pathway to making this transition is summarized by *Vox* writer David Roberts: "1. Clean up electricity, 2. Electricity everything."

Electricity can be used to power everything from transportation to steelmaking. If we can clean up electricity, then we can work to electrify everything and eliminate greenhouse gas emissions from our energy system. In a recent research paper (see link at end) Nicholas Rivers and I identified how Canada can reduce greenhouse gas emissions in the electricity sector at the lowest cost. To motivate emissions reductions, we include carbon pricing in our economic model. Cost matters and if we make pollution more expensive, electricity system planners will find ways to reduce pollution.

As we increase the price of carbon in our model, we find that the optimal electricity mix changes. With a carbon price of $80/tonne, most of Canada's coal plants would no longer be economical. The model suggests they should be retired and replaced by natural gas power plants and wind turbines.

At higher carbon prices, our model recommends replacing natural gas generation with more wind power. For example, at a carbon price of $200/tonne, the model recommends that wind power provide 30 percent of Canada's electricity supply. This is a significant scaling up from the current two percent of supply, but recent research by the Canadian Wind Energy Association (CANWEA) and General Electric has shown that wind can provide 35 percent of electricity demand in Canada without encountering technical barriers.

The exact mix of power sources that can clean up Canada's electricity sector may change over time as the cost of technologies change. For example, if solar continues to fall in price, it may become more cost-competitive than wind. Carbon pricing can continue to drive electricity planning decisions towards the options that give us emissions-free electricity at the lowest price.

If we then move to electrify everything we can reduce our country's appetite for energy. Mark Jacobson and his team have argued that we can meet all of our energy needs, for all purposes, using wind, water and solar power by 2050. In his scenarios, renewable energy would increase from 1.4 percent of the world's energy supply to 100 percent in 33 years. As Jacobson said at the beginning of the article, electrification can reduce energy demand by 40 percent because "electricity is more efficient than combustion."

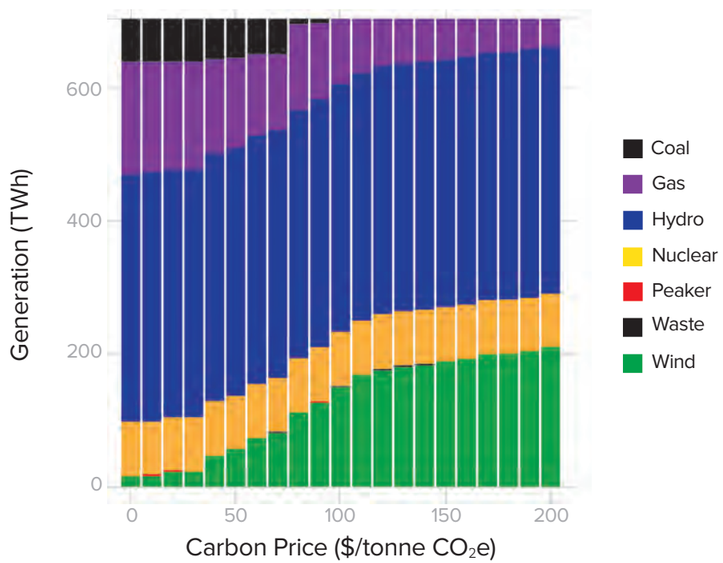
Technologies exist today to allow for the complete electrification of personal transportation. Auto manufacturers like Tesla specialize in battery-electric vehicles, while others like Nissan, Ford, Chevrolet and Volkswagen are moving to introduce fully electric models. Consumer uptake of these vehicles can be encouraged by well-structured climate policy, such as Quebec's zero-emissions vehicle regulations.

Freight transportation is a more difficult sector to electrify, but technologies such as hydrogen fuel cells with hydrogen produced by zero-emissions electricity or biofuels could play a role.

Air travel remains the one transportation sector where commercially available alternatives to fossil fuels are currently lacking.

> **If you electrify everything** and produce electricity from wind, water, and solar, your power demand goes down 42.5 percent. Most of that is due to the fact that **electricity is more efficient than combustion**. If I drive a car, the plug-to-wheel efficiency of an electric car is about 80 to 86 percent. In other words, 80 to 86 percent of the electricity going into the car goes to move the car and the rest is waste heat. In a gasoline car, only 17 to 20 percent of the energy in the gasoline goes to move the car, the rest is waste heat. So, by going to an electric car, you reduce power demand for cars by a factor of four to five. But if you average over all sectors there's a 23 percent reduction of power demand due to electrification. Then you save around 13 percent of all energy due to the fact that 13 percent of all energy worldwide is used to mine, transport, and refine fossil fuels and uranium, and you eliminate all that energy requirement. So that's 13 more percent. And then we think we can squeeze another seven percent out from end-use energy efficiency improvements beyond business as usual. **So we can reduce power demand 42.5 percent by electrifying**."
>
> *– Mark Jacobson in a recent lecture at the University of British Columbia*

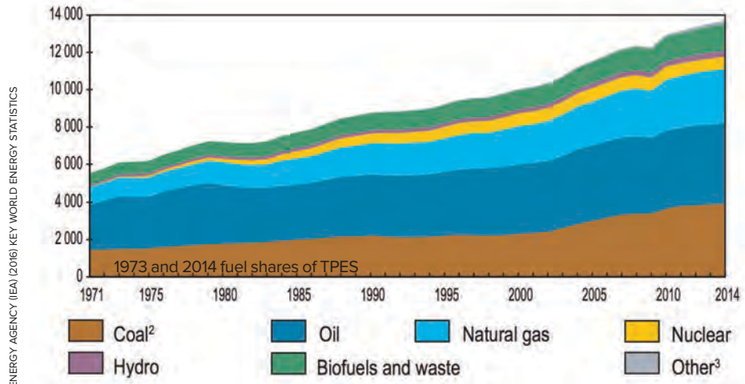
Carbon Pricing Scenarios



When carbon is realistically priced, the most cost effective mix of energy sources changes. At $80/tonne, coal is replaced by wind and natural gas. At $200/tonne, wind and hydro take over as the most cost effective sources of energy. Solar is missing from the chart, but as technology improves and prices fall, solar could become more cost competitive than wind.

The World's Energy Supply

World[1] total primary energy supply (TPES) from 1971 to 2014 by fuel (Mtoe)

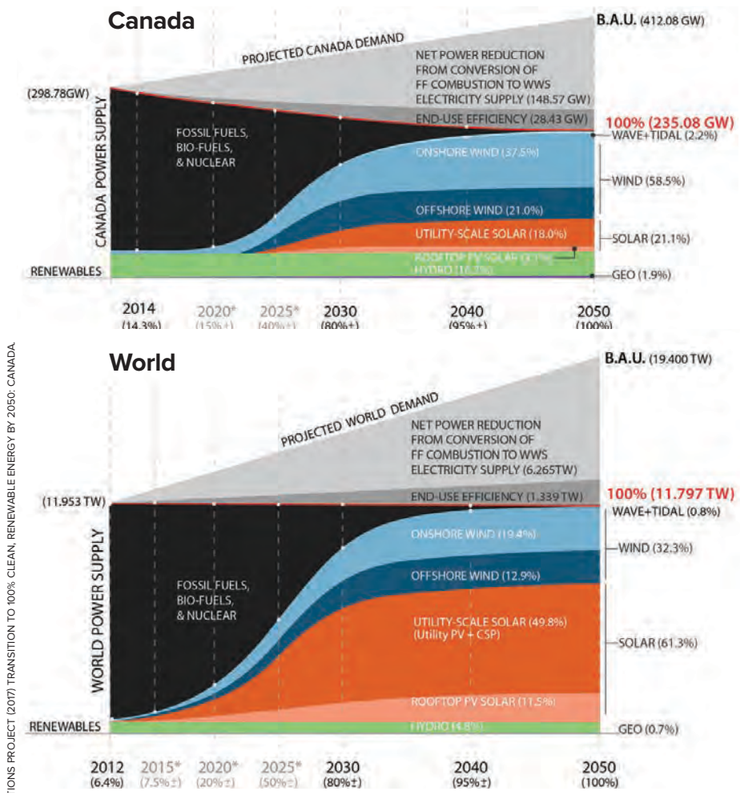


INTERNATIONAL ENERGY AGENCY (IEA) (2016) KEY WORLD ENERGY STATISTICS

1. World includes aviation and international marine bunkers
2. In these graphs, peat and oil shale are aggreated with coal
3. Includes geothermal, solar, wind, heat, etc.

The breakdown of the world's energy sources from 1973 to 2014

Projected Energy Supply and Demand



THE SOLUTIONS PROJECT (2017) TRANSITION TO 100% CLEAN, RENEWABLE ENERGY BY 2050: CANADA

The people at SolutionsProject.org have used Marc Jacobson's research to create these graphs showing the predicted energy demand and energy supply until 2050.

That sector alone is responsible for about nine percent of global emissions and so innovation is needed to find alternatives.

Electricity can also be used for many heating and industrial processes. Natural gas furnaces can be replaced with solar thermal heat and ground-source heat pumps. Coal-fired furnaces for making steel can be replaced with electric arc furnaces.

Globally, Jacobson's models predict that electrifying everything could keep total energy demand roughly constant until 2050. In Canada, his team finds that energy demand would actually decline from current levels as global demand for fossil fuels dries up and Canada's oil, gas and coal sectors are phased out.

There is a cost to be paid to make this transition. Rivers and I find that decarbonizing the Canadian electricity sector completely by 2025 would cost an additional $12 billion per year.

But, the benefits would be substantial. Electricity sector greenhouse gas emissions would be reduced to zero. Pollutants such as mercury, sulphur dioxide and particulate matter would be eliminated, improving air quality and human health. Water would no longer be used in the boilers of coal and natural gas plants. And the stage would be set to electrify everything and reduce emissions in other sectors.

The transition will create hardship for some Canadians. Fossil fuel extraction is a big part of the Canadian economy, comprising between 11 to 16 percent of exports in recent years. As Bank of Canada Deputy Governor Timothy Lane recently noted, the shift to a low-carbon economy will be a structural shift for Canada. Canada's challenge will be to advance the low-carbon energy transition while ensuring that Canadian workers and companies affected by a fossil fuel phaseout play a role in cleaning up electricity while electrifying everything. This means the coming transition will be not only an energy transition, but an economic and social transition for Canadians. It's time for a national conversation on how best to achieve this transition. AV

Brett Dolter is an ecological economist specializing in climate and energy policy research. He is the vice president of Research and Education for the Canadian Society for Ecological Economics and is a postdoctoral research fellow at the University of Ottawa's Institute of Environment.

The Solutions Project.org has made a do-able plan to completely convert the world's energy supply to renewables. Find out more at **thesolutionsproject.org**.

Read Nicholas Rivers' and Brett Dolter's research article: **ajlinks.ca/costofelectrifying**.

Check out David Roberts' *Vox* article: **ajlinks.ca/voxelectrifyeverything**.

KATIE KISH

Growing Pains

How systems might change as we return our footprint to a reasonable size.

FOTOLIA | ATELIER AVANT-GARDE

WITH ALL THIS TALK of low/de/no-growth, we have to stop to ask ourselves, what is the smallest ecological footprint possible to support a liberal and technologically progressive society?

The progressive politics and social norms that we cherish today, such as gender equality, race and ethnic multiculturalism, disability rights, and sexual freedom have all been fuelled by mass consumption and cheap energy. Our social services, which help protect these politics, norms and rights – like hospitals, libraries, welfare and infrastructure stability – depend on tax transfers generated by consumption. Therefore, success in the politics of environmentalism could mean undermining this base and cutting (potentially quite deeply) into the government tax pocket for social services.

Therefore, changing our society to a no/low/de-growth economy could, for example, potentially decrease access to needs like childcare or birth control. If this were to happen, gender equality would be undermined. We would need to band together to find new and innovative solutions.

In Canada, each province and territory provides varying levels of child care subsidies or monthly child benefits. The budget for this comes from tax revenues provided by citizens and consumers. If we limit the amount of consumption and scale back the economy, we can expect to see a reduction in tax revenues. Thus, the government may no longer be able to provide subsidies for childcare and/or child rearing. Childcare has given women a great deal of freedom for returning to work and pursuing their careers. If, in a low growth society, the government can no longer provide these subsidies, we may see more women staying home (of course, men could easily take this role as well) or a greater role of extended family in child rearing.

As author Katharine Zywert points out in "New Prescription" on page 52, the modern healthcare system is highly energy intensive. Without planning ahead and preparation, a localized economy may see the loss of sophisticated (read "high energy") medications and health services such as chemotherapy or birth control. Birth control has given women enormous freedom over their bodies and lives. However, an IUD requires the creation of plastic, and mining of copper and pills require exact measurements of hormones in a laboratory. The lowest energy contraception is abstinence (however, abstinence-only sex education has been proven ineffective at preventing unwanted pregnancy) or cycle tracking.

The actual consequences of a low growth economy are undeterminable, and without a massive social experiment we may never know. However, although we may see the loss of some socially cherished institutions and technologies, we can look forward to a new kind of progress. In social resilience theory, the stage following a 'collapse' is characterized by ingenuity, innovation, and creativity. Now is the time for us to begin exploring new and exciting ways of approaching the future. For example, instead of having high energy medical institutions to deal with depression and anxiety, we can look at the causes of this. Perhaps, citizens need more time with people they love, less time working, and more time spent outside. Or, perhaps, mothers need a re-emergence of a "village" in parenting to cope. Certainly, this won't cure all instances of depression, but it might reduce its prevalence.

We may find that in the future we're not "giving up" on access to tax- or energy-dependent goods and services Instead, we'll be challanged to find the right solutions for a happy planet and happy lives. What that happier life looks like, is up to the emerging generation of policy makers and citizens. Now is the time for exploring new approaches to life. Now is the time to decide what is really important to us. AV

Katie Kish is a mum, maker, and teacher who loves to explore how people find meaning and purpose through creativity and curiosity.

Scientific American has put together an interactive map to demonstrate where in the world fruits and vegetables come from: **ajlinks.ca/fruitvegorigins**.

JEROME DUPRAS

Cost of Living

With ecology-focused planning tools, communities will reap the benefits.

COURTESY OF ALUS.

IN THE MID 20TH CENTURY, a continuous ring of forests, wetlands and farmlands surrounded the city of Montreal. The south side of the St. Lawrence River was mainly dedicated to farms of hay, oats and grazing cows, while plenty of forests were left to grow in the north.

Today, the landscape has changed considerably. Practically the only land use in Montreal and Laval is urban development, and the protective ring of natural space that once surrounded the island has been largely interrupted and paved over.

I was born and raised in the Montreal region. I worked in agriculture when I was a kid, and used to play in the forests near my home. As I grew up, I saw these natural and agricultural ecosystems disappear and be replaced by monster houses and shopping centers. In 20 years, my village, only 10 km outside the island of Montreal, changed from an agricultural area to a commuter town. I decided to study that phenomenon in my graduate studies, and preserve the urban biodiversity in my activism. Now, all my work and social engagement is motivated by my one and three-year-old children. What kind of Montreal will exist for them, and for their children?

My research has led me to the concept of ecosystem services, a new frontier in environmental research. The concept refers to the tangible and intangible benefits that nature provides to people at different scales. Forested areas within urban centres, for example, improve air quality by sequestering pollutants, wetlands mitigate flooding damage, and forest canopy cover reduces urban heat island effects.

The importance of ecosystem services produced by urban ecosystems have been integrated into transnational initiatives, such as the *Millennium Ecosystem Assessment* and *The Economics of Ecosystems and Biodiversity* since the early 2000s, with the concept also being applied through local initiatives. These include initiatives emerging out of New York, Berlin, Cape Town, Quito, Seattle, London or Canberra that explicitly recognize ecosystem services in their development plans.

In Canada, seven out of 10 people live in metropolitan areas, and one in three Canadians live in either Toronto, Montreal or Vancouver. These urban centres have the fastest growing populations, suggesting the proportion of Canadians living in cities will increase in the coming decades. This creates challenges for the management of natural environments within cities and on their outskirts.

Since the 1950s, growth of the urban population in Canada has been based on the urban sprawl model, characteristic of the post-war years in North America. This carving out of land for human use impacts ecological connectivity. Ecological connectivity includes the ability of living species and matter to move freely across the landscape, and is critical to ensure the survival of species and important ecosystems.

For example, urban sprawl since the 1960s in the Greater Montreal area has resulted in the loss of over 25 percent of woodlands and wetlands and has thus reduced ecological connectivity by 80 percent. This qualitative and quantitative decrease in the environment has significant public health impacts and generates significant economic costs, resulting in $235 million in ecosystem losses each year in Montreal (in terms or recreational value, pollination, and waste treatment for example).

Justification for the environment

Unfortunately, the main problem encountered in the consideration of environmental objectives in urban areas is that the protection of natural environments is still often perceived as an economic constraint. The general lack of planning tools available to land managers, in terms of laws, rules, policies and programs, do not accommodate conservation, restoration and enhancement of the natural heritage as objectives that can also be viewed as economically viable.

Previous page: Saskatchewan ALUS staff and assistants demonstrate the installation of a waterfowl "henhouse" in a large wetland that has been beautifully restored and enhanced through ALUS.

Consequently, with the combination of the high property values of available urban space where natural ecosystems may exist combined with the municipal tax structure of urban areas, it becomes increasingly challenging to justify the implementation of environmental initiatives.

The typical urban sprawl model of the later 20th century remains a dominant urban development model in Canada because services provided by nature are not traditionally quantified in economic terms. Natural processes are not translated into economic terms for use in decision-making. At the same time, the conservation of natural environments is generally perceived as an economic cost, and a barrier to economically competitive urban development. This leaves the environment out of economic decisions, resulting in distorted land-use and urban planning.

In order to limit the erosion of natural areas in cities and suburbs, it is increasingly common, in the language of public authorities and environmental NGOs, to talk about natural environments in terms of infrastructure. This is called the Green Infrastructure Approach. This approach argues biodiversity and ecosystems produce, like human-built infrastructure, a number of "ecosystem services" that guarantee quality of life and security for communities.

It is vital to attribute economic values to the real contribution of nature in terms of public services. Doing so can have two effects. First, the economic consideration of natural capital can not only assure that quality of life of urban residents is prioritized, but also that it can be economically viable with other competing land-uses and hence the production of public services. Second, the conceptual attractiveness of this perspective offers a language that resonates with the demands placed on decision-makers, practitioners and other land-use planning stakeholders. This can also help ensure that urban planning tools better incorporate the values of biodiversity and ecosystem services that land-users and managers hold dearly.

In Canada, many studies have been carried out to determine different ways to place value on biodiversity and ecosystems. Environmental features, or "natural infrastructure" can be evaluated differently depending on the scale at which they are considered. For example the monetized benefits of a single tree will be different than when it is grouped into a larger forest. This is why looking at valuing the environment through the lens of many scales in urban areas is critical.

On a micro scale, an urban green infrastructure can simply take the form of a tree. In 2014, the TD bank issued two reports on the value of trees in large Canadian cities. By assessing the effect of trees on water runoff control, air quality, carbon sequestration and energy savings, these studies have indicated a value of approximately $330 million per year for the urban forests of Montreal, Halifax, Vancouver and Toronto, with an average of about $700 per tree. The return on investment is very advantageous since for every dollar invested in tree maintenance, a return of $2 to $13, depending on the city, is expected to be recovered in avoided costs for households and utilities.

At a medium-scale, a green infrastructure approach might include a wetland, a creek or a woodlot. In Quebec, researchers measured that households would be prepared to disburse an average of approximately $500 per year through their municipal tax bill to ensure that wetlands are protected and restored. This would effectively double the area of wetlands protection in southern Quebec. Water filtration, flood protection, habitat for biodiversity and carbon sequestration services have motivated this significant willingness to pay of more than 2,000 respondents, which would result in the economic valuation of approximately $4,000 per hectare of wetland.

Finally, on a regional scale, a green infrastructure approach represents a green network or green belt, which enables the interconnection of natural environments for improved ecological connectivity across the landscape. This principle of ecological connectivity is increasingly present in land use planning and urban planning.

Numerous studies have examined the economic value of ecological corridors in many of Canada's major cities. For instance, the aquatic and terrestrial ecosystems of the Montreal Greenbelt produce many non-market ecosystem services that represent a shadow market contribution valued at almost $3 billion per year. Similarly, significant values have been measured for the Ottawa Greenbelt ($5 billion) and Toronto ($2.6 billion annually).

Ways to measure value

However, we run into two problems: complexity of measuring services and ethics.

Converting ecosystem processes into measurable services with economic value is complex. An estimate of the value of certain services or natural environments can be made through the use of various instruments.

For example, techniques based upon how existing markets function, such as the replacement costs of substituting natural capital for built alternatives can provide an indication of the value of losing natural environments. For instance, it may be possible to examine the cost of built infrastructure that could replace a natural wetland, which filters thousands of cubic meters of water and protects surrounding areas against flooding while also harbouring rare and endemic species.

Other techniques refer to secondary markets that indirectly convey the value of elements of natural capital. As such, it is possible to evaluate the aesthetic and recreational value of a lake through its effects on the real estate market.

Finally, other approaches exist which simulate markets for certain goods and services that do not have a market of reference. One can thus estimate the "willingness to pay" of residents to increase the area of green space in their neighborhood. On the other hand, it may be recognized that values for natural ecosystems may be incompatible with market mechanisms or economic means of valuation and therefore possess a value that can't be measured with any built or substitutable alternative (e.g., the customary values local communities might hold to natural environments may not be replaceable by built environment alternatives).

While these studies reveal important economic values, the monetization of ecosystem services is not in itself a goal. The objective of a green infrastructure approach aims to provide new indicators that can highlight the real contribution of natural ecosystems to the health and well-being of communities; values that the traditional municipal tax and planning tools are unable to recognize. Indeed, the existing model of municipal taxation largely explains the historical and continued threat to natural and agricultural environments in urban and peri-urban areas. The high dependence of municipalities on property taxes serves to fuel a model of urban sprawl that proves to be economically inefficient, socially unfair and destructive to the environment.

Going forward

Several ecological economists emphasize the importance of setting up new programs and policies that internalize the economic and non-economic values of ecosystem services. Such tools can take various forms, like land tax credits for the protection of private natural environments, royalties related to soil regeneration, and compensation for the restoration of green areas.

Even if Canadian cities are not generally prepared to promote and use such tools, a major contemporary challenge in land-use planning is to transition to a model that recognizes the real value of ecological heritage and that is able to internalize the full social, environmental, and economic costs of unsustainable urban sprawl. In this regard, the concepts of ecosystem services and green infrastructure offer promising avenues for improving the development model of our cities.

One possibility for change is "payments for ecosystem services" initiative, in which monetary incentives are offered to landowners in exchange for land management that can increase the production of one or more ecosystem services, including the conservation of natural draining basins to allay runoff during storm events.

The great news is that some Canadian cities have begun to recognize and internalize the negative economic externalities of urban sprawl.

Since 2015, for instance, the city of Mississauga, Ontario, charges home owners and businesses alike for storm water costs based on the size of their property. The revenue obtained from storm water management provides an interesting potential to explore alternative green infrastructural approaches to absorb storm water while maintaining and enhancing natural environments.

In 2016, the city of Trois-Rivières in Quebec offered real estate tax reductions of up to 50 percent to urban woodlot owners of five hectares and over who are committed to preserving them. In the same way, the town of Gibson in British Columbia is managing and financing urban natural ecosystems as part of its infrastructure development planning.

It's time for other Canadian cities to follow suit – to recognize the public services provided by ecosystem services, from farmers, to bees, to trees and waterways. Enhancing the resiliency of a city means searching out elegant solutions to problems, and there is nothing more elegant than using nature to provide solutions for complex social problems. Nature should no longer be viewed as a constraint, but instead a part of each of us individually, and a part of our communities. AJ

Jérôme Dupras is a professor at the Department of Natural Sciences of the Université du Québec en Outaouais. His research focuses on ecosystem services and land use planning and management.

There's lot's on the go about sustainable development in Montreal. Find out more at Maison de Développement Durable/The Centre for Sustainable Development: **lamdd.org**.

ALUS is a leading organization dedicated to helping Canadian farmers and land owners take care of their land to share the ecosystem benefits with all Canadians. Find out more at **alus.ca**.

Economics Evolution

From the 1900s to Nature's return.

humans arrive — 250,000-years ago

collective learning: sharing information and passing it on to the next generation — 50,000 years ago

agriculture — 10,000 years ago

Global connection and Anthropocene: humans start dominating the environment — 1800 C.E.

1900 — 1910 — 1920 — 1930 — 1940 — 1950 — 1960 — 1970 — 1980 — 1990 — 2000 — 2010

1900: Women at work
Women begin entering the workforce in more significant numbers, which increases further during World War I.

1888: Southall Pads
The first commercial sanitary napkins become available. These will become essential during the war period (no pun intended).

1914 to 1918: The mother of invention?
Wartime competition to dominate drives a massive push in technological development and innovation (e.g., tanks, fighter planes, poison gas, etc ...).

1923: Economics starts to heat up
John Maynard Keynes (definer of modern economics as we know it) publishes *A Tract on Monetary Reform*, gaining the interest of economists.

1929 to 1939: Keynesianism by default
During the Great Depression, demand is unstable and creates an inefficient market. Keynes recommends eonomy-stimulating tactics to attempt to control the supply of money through policies relating to inflation, taxation, and interest rates. This style of economics is known as Keynesianism.

1926: Ecological economics' first appearance
Frederick Soddy publishes *Wealth, Virtual Wealth and Debt*. Soddy criticizes the idea of the economy's ability to create infinite wealth, but is overshadowed by Keynesian economics.

1936: Keynes' masterpiece
Keynes publishes the *General Theory of Employment, Interest, & Money* (commonly known as *The General Theory*): a magnum opus that defines macroeconomic theory.

1939 to 1945: World War II
Rearmament and an increase in government intervention in economic systems helps lift countries out of economic depression.

October 19, 1929: Black Tuesday
Economic production continues at post war levels, but citizens do not have the means to consume. This coupled with drought leads to the Great Depression, which begins with a stock market crash on Black Tuesday, and lasts until the end of the 1930s in many countries.

1987: "Sustainable development" coined
The United Nations assigns The Brundtland Commission the mission of rallying all countries to work together to combat environmental degradation. In their report, the term "sustainable development" is coined. This offers hope as a response to environmental limits without having to compromise social well-being and the wealth associated with growth. It functions as the primary approach to environmental economics for the next 30 years.

1968: Earthrise photo
Astronaut William Anders takes a photo of the Earth rising from the perspective of the moon during the Apollo 8 mission. It illustrates the finite limits of our planet, revitalizes the romantic image of Earth, and has since been called the photo that ignited the environmental movement.

1971: Our first issue!
Alternatives Journal is first published.

1962: *Silent Spring* published
Environmental pioneers give early warnings about the economy's harmful effects on the environment. Rachel Carson publishes her trailblazing book *Silent Spring* about biochemical use.

1940s to 1960s: The golden age of capitalism
World War II is over, and governments need to solve the problem of high production and low consumption because they don't want a repeat of the Great Depression. So, they turn to Fordism. In 1914, Henry Ford of the Ford Motor Company famously doubled his workers' wages to five dollars a day so they could afford to buy the cars they were producing. Fordism has three key principles:

1. Standardized products made by machines
2. Assembly lines
3. Higher wages for workers

This, alongside great advances in efficiency, creates a perfect storm for capitalism. Industries create large quantities of items with efficient methods to keep prices low, and pay their workers enough to buy the products. This leads to the "Golden Age of Capitalism" when owning a car and moving to the suburbs is a popular idea of freedom.

1990s: Radical environmentalism
Environmentalism becomes radical with the rise of movements like Earth First. Environmental politics are taken more seriously by society. The United Nations' Rio de Janeiro Earth Summit and Kyoto Protocol suggest that government regulations and global governance can help resolve environmental peril.

1970: Threats to capitalism
Threats to capitalism begin to emerge. The Bretton Woods System (the global organization of economic relations among Allied countries) collapses, there is an oil crisis (1973), and a stock market crash (1973-74) leading to another recession. In response to this, environmental warning literatures grow in popularity (*Limits to Growth* by Donella Meadows, *et al.* in 1972, *Small is Beautiful* by Ernst Friedrich Schumacher in 1973, and *Steady State Economics* by Herman Daly in 1977). The ecological cost of booming capitalism becomes obvious. This is largely ignored throughout the 1970s and well into the 1980s.

2008 to 2015: "Degrowth" grows in activist circles
There is a convergence of environmentalism, steady state economics and anti-capitalist activism as seen by the momentum gained by the Degrowth movement (actively reducing economic growth) and the Occupy or 99% movement.

Nature returns! It's up to us to set things on the right path.

2000s: Counterculture grows
Growing dissatisfaction with the lack of environmental progress, combined with ideas like Peak Oil and Climate Change as existential threats, nurtures countercultural ideas like bioregionalism and relocalization, which focus on community resiliency and localism. The Transition Network, also founded on these principles, is launched.

2008: Global financial crisis
What began as a collapse in the American mortgage market in 2007 spreads to become a worldwide financial crisis in 2008. Millions of people across the world lose their jobs, createong political and economic turmoil across the globe, as well as widespread anxiety linked to geo-political, ecological and economic crises.

2016 to present: Global economic disorder
Large changes and crises due to economic flux can be found all around the world, including the ongoing European migration crisis of hundreds of thousands of refugees seeking asylum in the European Union, or dying in the attempt. Other examples include the UK's Brexit decision to leave the EU and America's election of Donald Trump who won on a platform of "America first" foreign and economic policy.

The first part of our timline was inspired by the Big History Project which chronicles history from the big bang until now. Take a look: **school.bighistoryproject.com.**

DAN O'NEILL & ANDREW FANNING

New Beans to Count

Researchers apply an innovative set of biophysical and social indicators to rank 180 countries.

BEFORE HE BECAME prime minister, Justin Trudeau remarked in an interview with Maclean's magazine, "There are a lot of people out there, environmental thinkers like Herman Daly and others, who talk about the fact that maybe economic growth within a finite system is not either possible or even desirable." Trudeau is referring to our society's obsession with measuring how well we're doing based on economic growth, and how this doesn't really do our country justice.

For example, the work of a stay-at-home-parent is tough, and often thankless. And, using the lens of gross domestic product to measure the progress of a country, this work is also invisible. To show up in the national tally of useful activity, parents need to find jobs and send their children to daycare.

Gross domestic product (GDP) is an indicator of economic activity – of money changing hands. If you buy a beer or a new bicycle, this adds to GDP. If the provincial government invests in education, this also adds to GDP. Most people would argue these are good things. However, if there is an oil spill from a Kinder Morgan pipeline, any government clean-up cost also adds to GDP. If more couples get divorced and incur costly legal fees, then this adds to GDP. Even the $5.3 billion that will be spent rebuilding Fort McMurray will boost Canada's GDP, according to the Conference Board of Canada, although few would call this economic progress. The problem is that GDP does not distinguish between "good" and "bad" economic activities. It treats both the same.

And yet at the same time, many forms of socially beneficial activity, like household and volunteer work (including child-rearing), are not counted towards GDP because no money changes hands.

Many economists and other social scientists are critical of using GDP as a measure of national progress. Even Simon Kuznets, the creator of the national tallying system that led to GDP famously warned: "the welfare of a nation can scarcely be inferred from a measurement of national income." More recently, a commission chaired by Nobel Prize-winning economist Joseph Stiglitz concluded that the system of national accounts should shift its emphasis from measuring economic production to measuring people's well-being in the context of sustainability.

Why is this change important? Pursuing GDP growth as a national policy goal has two main problems. The first is environmental. As the economy grows, we use more resources and produce more wastes. Up to a point this is not a problem, but we're now living in a world where the scale of economic activity is interfering with critical earth-system processes. A major study published in the journal *Science* attempted to define the "safe operating space" for humanity on this planet. The authors identified nine planetary boundaries related to key earth-system processes. They concluded that humanity is currently surpassing at least four of these critical boundaries – those related to climate change, biodiversity loss, land use change, and biogeochemical flows (nitrogen and phosphorous). The authors warned that transgressing one or more of the boundaries could lead to catastrophic changes at the continental to planetary scale.

The second reason to question growth is social. Data on happiness and life satisfaction are now widely available from surveys such as the Gallup World Poll and World Values Survey. In these surveys, people are asked to rate their level of life satisfaction on a numerical scale (from 0 to 10 for example). If we look at these data over time in wealthy countries like Canada, we find that although GDP per capita has more than tripled since 1950, people have not become any happier. If we compare data across countries, the picture is a bit more complex. Happiness and life satisfaction do tend to increase with income, but only up to a point. Richard Layard shows in his book *Happiness: Lessons from a New Science*, first published in 2005, that beyond an average income of about $20,000 (US) a year, additional money does not buy additional happiness. A 2010 study from Princeton University estimated that number to be closer to $75,000. Regardless of the amount, there is a cap on the happiness money can buy.

In short, the pursuit of GDP growth does not seem to be improving people's lives in wealthy nations, but does seem to be leading us towards environmental catastrophe. These findings have led ecological economists to argue that we should be pursuing a different economic goal in countries like Canada – one based on improving quality of life, rather than increasing consumption.

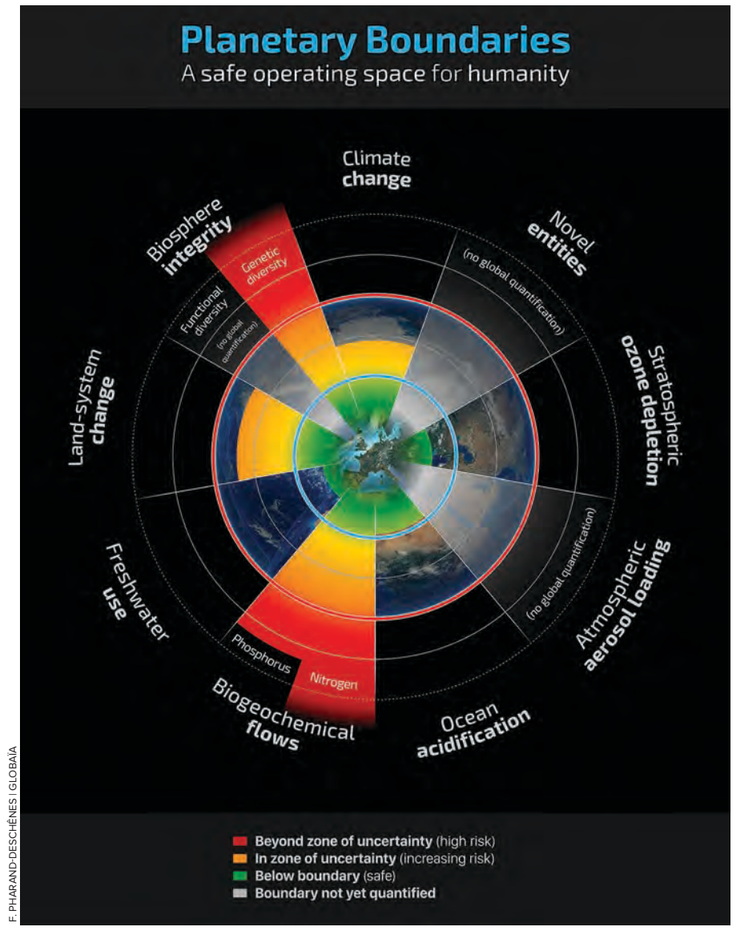
So what to do?

Two important ideas have emerged as alternatives to growth. The first is the concept of a "steady-state economy," an idea that was developed by former World Bank economist Herman Daly in the 1970s. At its simplest, this is an economy where population, resource use, and waste emissions are stabilized, and kept within planetary boundaries. The second idea is the concept of "degrowth" (or *décroissance*). Given that humanity is already exceeding four planetary boundaries, advocates of degrowth argue that resource use must first be reduced before a steady-state economy can be established. The idea of degrowth is to downscale production and consumption in wealthy nations, with the goal of both improving quality of life and reducing environmental impact.

Drawing on these ideas, we developed the Degrowth Accounts—a set of biophysical and social indicators designed to determine how close (or far away) modern-day economies are to the idea of a steady-state economy, and to explore whether it's possible to improve quality of life while reducing resource use. The biophysical indicators are based on Herman Daly's definition of a steady-state economy, and include measures such as material use, energy use and CO_2 emissions. The social indicators are based on the goals of the degrowth movement, as described in the declaration from the first conference on degrowth, held in Paris in 2008. They include measures such as health, happiness, and equality.

We applied these indicators to 180 countries over a 10-year period. We found that over 80 percent of people in the world live in biophysical growth economies – countries where resource use is increasing from year to year. Canada falls into this category, with increasing values in five of the seven biophysical indicators that we measured. It does particularly badly on CO_2 emissions, which are increasing at 1.5 percent per year. At this rate, Canada's emissions will double in less than 50 years.

There are, however, some grounds for optimism. A small number of countries in the world have largely stabilized resource use. Japan is perhaps the best example of these, reporting stability in all seven of the biophysical indicators that we tested. Moreover, countries with stable resource use tend to perform better on many social indicators than countries where resource use is growing. Countries with stable resource use are



F. PHARAND-DESCHÊNES | GLOBAIA

Planetary Boundaries is a concept developed by Johan Rockström, Will Steffen and a team of 26 leading environmental scientists. These boundaries define a "safe operating space for humanity" as a reference point for sustainable development. The scientists warn that once any of the nine boundaries has passed its tipping point, there is risk of "abrupt or irreversible environmental change." Respecting the boundaries reduces risks to human society. Source: Stolkholm Resilience Centre, 2015.

more democratic and more equal, and their citizens are happier and healthier than those in growing economies.

This finding runs contrary to economic thought going as far back as Adam Smith, one of the most influential thinkers in economics. In *The Wealth of Nations*, Smith famously expounded:

> It deserves to be remarked, perhaps, that it is in the progressive state, while the society is advancing to the further acquisition, rather than when it has acquired its full complement of riches, that the condition of the labouring poor, of the great body of the people, seems to be the happiest and the most comfortable. It is hard in the stationary, and miserable in the declining state.

In contrast to Smith's view, however, our findings suggest that it is much better to live in a society that has acquired "the full complement of riches," and has stopped increasing these riches, than to live in a society that is still "advancing to further acquisition."

The problem is that countries that have stabilized their resource use, such as Japan, have generally done so at a level that is far too high to be extended to all people on the planet. Japan's ecological footprint is close to three times the globally sustainable size, while Canada's is almost four times the sustainable value. If all people were to live like Canadians, we would need three additional planets to sustain us! Meanwhile, countries that are using resources at anything like the sustainable level generally perform poorly on social indicators.

Life satisfaction in countries with a sustainable ecological footprint is, on average, a full point lower (on a 0 to 10 scale) than in countries like Canada, while life expectancy is roughly 12 years lower. For example, although Ecuador's ecological footprint is very close to what is globally sustainable, life satisfaction is only 6.4 (compared to 7.6 in Canada), while healthy life expectancy is just 64 years (versus 73 in Canada).

The implications of these results are profound. On the one hand they provide evidence that wealthy countries like Canada need to substantially reduce their resource use if poorer countries are to grow theirs. Degrowth is required. On the other hand, they suggest that if resource use were reduced to a sustainable and globally equitable level, the resulting quality of life would likely be inadequate by today's standards. In short, if all people on planet Earth are to lead a good life within planetary boundaries, then we need to become much better at transforming natural resources into human well-being. There are plenty of resources outlining the next best steps, and some are explored right here in this issue of *Alternatives Journal*.

Dan O'Neill is a lecturer in ecological economics at the University of Leeds, but currently on sabbatical at the University of Victoria. He is co-author (with Rob Dietz) of *Enough Is Enough: Building a Sustainable Economy in a World of Finite Resources*, a best-selling book, which has been made into a short film (by the same name and it is available on YouTube).

Andrew Fanning is a postdoctoral researcher in ecological economics. His work investigates sustainable and desirable alternatives to the current growth-based economic system.

Want to learn more about the degrowth accounts and the set of indicators used? Find out more here: **ajlinks.ca/degrowthaccounts**.

Read the rest of PM Trudeau's 2012 interview here: **ajlinks.ca/trudeauinterview**.

Measuring People, the Planet and the Economy

FOR A COUNTRY to achieve a sustainable economy, it must stabilize its resource use at an ecologically sustainable level (a "steady-state economy"), while maintaining the social well-being of its citizens. Even though no countries have managed to achieve all three of these requirements, some do well in one or two areas. Let's take a look at the countries that come closest. Maybe we can learn how to take the best from each.

Consider the following five countries, ranked according to how stable their resource use is over a 10-year period.

Top Five Countries ranked by Biophysical Stability
(out of 99 countries)

Country	*Biophysical Stability*	*Social Performance*	*Ecological Footprint*
Japan	1st	9th	70th
Switzerland	2nd	1st	77th
France	3rd	18th	76th
Poland	4th	31st	66th
Denmark	5th	2nd	98th

This list includes countries with some of the highest social outcomes in the world. If everyone on Earth consumed resources and emitted wastes like the residents of these countries, we would need around three Earths to sustain us! That said, Japan, Switzerland and Denmark are all ranked within the top 10 countries for social performance. The good news is, now that their economies are relatively stable and their people are cared for, they can focus on reducing their footprint. The Philippines, United Arab Emirates, Ecuador, Japan and Switzerland are all working with the Global Footprint Network to keep track of their resource use and create effective policy to reduce their national footprints. These initiatives include the Philippines finalizing its first *National Land-Use Act*, the UEA conducting in-depth research for tangible footprint reduction, and Switzerland being the first country to vote on whether or not to include a green economy in their constitution. *—D.O. & A.F.*

For more information on the Global Footprint Network's work towards nation-wide footprint reduction visit **footprintnetwork.org**.

KATIE KISH & STEPHEN QUILLEY

DIY

How to put meaning back in your work.

WHAT HAPPENS when you give a third grader a power drill? With some wood and a little supervision, she'll make her own keepsake box. Or, put her in that same space with a soldering iron, copper tape, LEDs and a circuit board, and she'll learn first-hand how to direct the power of electricity. The Underground Studio at THEMUSEUM in Kitchener brings kids, parents and teachers together regularly to tinker, build, design and create. We visited them on a day they were making gumball machines. All around us we saw kids of varying ages comfortably using all kinds of items from power tools to markers. And the best part? They were participating in the maker revolution.

All over the world, a new maker culture is reinventing what older readers may have experienced as Do It Yourself. It's a burgeoning network of "makerspaces" – physical spaces operated by community members where tool libraries, training and collaboration combine to bring the process of production back to local hands. This year, Hackerspaces.org reported 1336 of these makerspaces active worldwide, with 355 opening soon. It's a growing movement, and it's only getting bigger.

This resurgence of making comes at the same time as the increasing popularity of online marketplaces, the online sharing economy, innovations in creation like 3D printers and a mass movement towards knowledge freedom and sharing with projects like Wikipedia, open source and Massive Open Online Courses. In 2015, members of Etsy, the online marketplace for handmade products, sold $3.21 billion in merchandise, while sharing services such as Uber (car sharing) and Airbnb (home sharing) are worth over $66 billion and $30 billion (both $US) respectively.

With over 135 million adult makers in the US alone, and over 2000 planned or active makerspaces worldwide, maker communities show a thriving new future of production. Makers are finding ways to bring local production together with new technology, a task that many in the past thought impossible.

Why make?

Every society that has experienced a capitalistic reorganization of labour has experienced positive and negative outcomes. In the West and in places like China and India, capitalism has brought about unprecedented material affluence and rising standards of living.

Charlie Chaplin in his 1936 film ***Modern Times****, a comedy about a factory worker who keeps getting into to trouble because he can't assimilate into an industrial production line. His character searches for meaning in his work – a struggle everyone can relate to.*

This organization of society has also provided the framework for rationalized legal systems, more liberal social mores, greater democracy, and the consolidation of universally recognized human rights. But, modernization and capitalism have also involved recurring trade-offs, most evidently in relation to the global ecological crisis but also, a pervasive "crisis of meaning."

Since the 18th century and the Industrial Revolution, capitalist modernization has transformed the entire world. Karl Marx famously wrote about one main negative aspect of this modernity, that is, alienation from work. Where once individuals produced an entire chair to be proud of, they now work on an assembly line contributing just one screw. He believed this alienation from work leaves individuals feeling empty.

Perhaps the darkest and most extreme symptom of this crisis can be found in the prevalent Chinese industrial suicide issue, exemplified in the 2012 suicide protests at the Foxconn factory in Wuhan, China. Experts like Pun Ngai of Hong Kong's Polytechnic University assert that China's worker suicides reflect a deeper problem about the declining emotional health of China's migrant workers. These workers are isolated from their families and face a bleak, low-paid existence on production lines.

Scholars and romantics have persistently railed against the loss of meaning that accompanies the systematic adaptation of the industrial worldview. Over the last two centuries, they have often envisioned alternative approaches to the modern world. But their ideas were invariably rebuffed because their vision of a small and beautiful society of artisans seemed to require would-be revolutionaries to embrace a life of simplicity or, from the perspective of the average shopping mall citizen, gross poverty. Their utopia, it seemed, was incompatible with modern amenities like dentistry, antibiotics and new iPhones.

No one has been able to demonstrate a feasible alternative modernity that reconciles modern science and technology with artisanal craft production or the efficiency of the modern market with locally sourced manufacture. Sustainable development specialists working for decades have not found a way to slow down economic growth through small-scale lifestyle innovations.

However, more than ever before it is clear the planet cannot accommodate current levels of consumption, and change must happen. The most recent release of the *Planetary Boundaries* report (see page 43) argues that we have crossed four of Earth's nine key boundaries, and are quickly encroaching on at least two more.

New technologies in small-scale fabrication (such as 3D printing) and communication have made it possible for us to dream once again of a small scale, locally oriented, low-impact form of society. Today's dream of localism is scientific, innovative, technically progressive and able to sustain relatively high technology. It goes way further than gumball machines.

Exploring the solution

Maker culture provides a niche for ecological economists to explore the ways in which re-emerging social connectivity, new technologies and radical redefinitions of our economy come together. Here we offer five ideas to drive home the significance of maker culture as a model for the kind adaptations that are necessary in the face of coming global ecological and economic challenges:

Generate community-owned resources and production. Makers and maker communities typically prefer to use materials that are locally sourced or traded with other makers in the area. This strips away the complexity of the global supply chain, eliminating overhead costs such as transportation, packaging, mass advertising and storage. Diana Ivanova and colleagues, in their *Journal of Industrial Ecology* article (2015), argue that household consumption contributes up to 60 percent of global greenhouse gas emissions, mostly from environmentally costly production.

“Creating is not just a ‘nice’ activity; it transforms, connects and empowers.” It leads to increased feelings of satisfaction, self-esteem, creativity and joy.

Create ultra-affordable, recyclable, and replicable housing and goods. People will potentially be able to make or 3D-print pieces of any product using design ideas and templates on the Internet. While some jobs may suffer, new ones will open up to create and release the designs of these products.

The very idea of repairable home goods is revolutionary enough on its own, but an inexpensive, reusable and replicable house could change the face of poverty forever. Such ideas introduce an entirely new kind of economy. Rather than a growth economy, the (re)Maker economy would help reorient individuals away from a culture of work and production, and instead focus on what they need to psychologically thrive.

Return to the local landscape and ignite new ways of learning. A local (re)Maker economy would rely on locally available materials and would start from the assumption that people would be more satisfied even with reduced income and consumption of goods. Urban salvaging and reusing of existing materials would be necessary for success, and when these run out, locally sourced materials would be used. Future makers would see a marked reduction in the accessibility of global materials, which might help to reflect the actual cost of our goods. Instead of paying five dollars for many cotton T-shirts, we may begin paying $40 for one that we take really good care of. Makers tend to be creative in their problem solving, using one material for many non-traditional purposes. With this, makers also experience a whole new way of learning that engages hand to brain learning processes. Thus, fewer goods will go a longer way.

An economy that contributes to personal mental health. A recent article in The Guardian entitled “Creating is not just a ‘nice’ activity; it transforms, connects and empowers,” argued that making leads to increased feelings of satisfaction, self-esteem, creativity and joy in those that participate in it. Our research echoes this argument. Thus, not only does the act of making challenge the dominant capitalist way of thinking, but it also inserts meaning into the process of consumption and production.

An economy that contributes to a community. Makers rely on the network of other makers, in their community and online, to learn to perfect their skills and to share resources. There is also a thriving gift and barter economy between makers. While conducting our research in Prince Edward Island, we found that almost every maker was willing and interested in bartering with other makers. During our interviews with Etsy shop owners across Canada, we found they were similarly open to trades and bartering. Some makers trade for the materials necessary to make their products while others trade their finished products (for example, beer and bread for pottery). Both kinds of trade were common.

A caveat

Making lowers the ecological cost of any material or consumer goods by stripping away wider distribution chains, packaging, etc. It could also provide a new framework for individuals to find meaning in work and production, displacing conspicuous consumption and alienated work as a means for happiness and fulfillment. What is changing is that the Internet-facilitated collaboration combined with small-scale production technologies is creating the possibility for a different kind of solution to local and global problems. The (re)Maker vision of networked, local production emphasizes the importance of living within local ecological means, and of local community and interdependence. However, there is a caveat. Any seismic shift towards a local, bioregional, DIY, maker economy would have serious unintended consequences.

Making is typically domestic and informal – and, as such, invisible to the fiscal system. Any significant decrease in the formal economy in this way could, potentially, divert revenue from the state, and undermine cherished features of modern societies that have so far been expanded because of capitalistic economic growth. This includes anything from health systems and investment in infrastructure, to childcare, schools and the military.

The eventual success of a maker economy would depend upon the extent to which such systems could be redesigned to benefit everyone. New possibilities create a basis for a new world, but they present even more significant challenges to the existing welfare and infrastructure commitments. Wicked dilemmas of low-growth economics is further explored in “Growing Pains” on page 35.

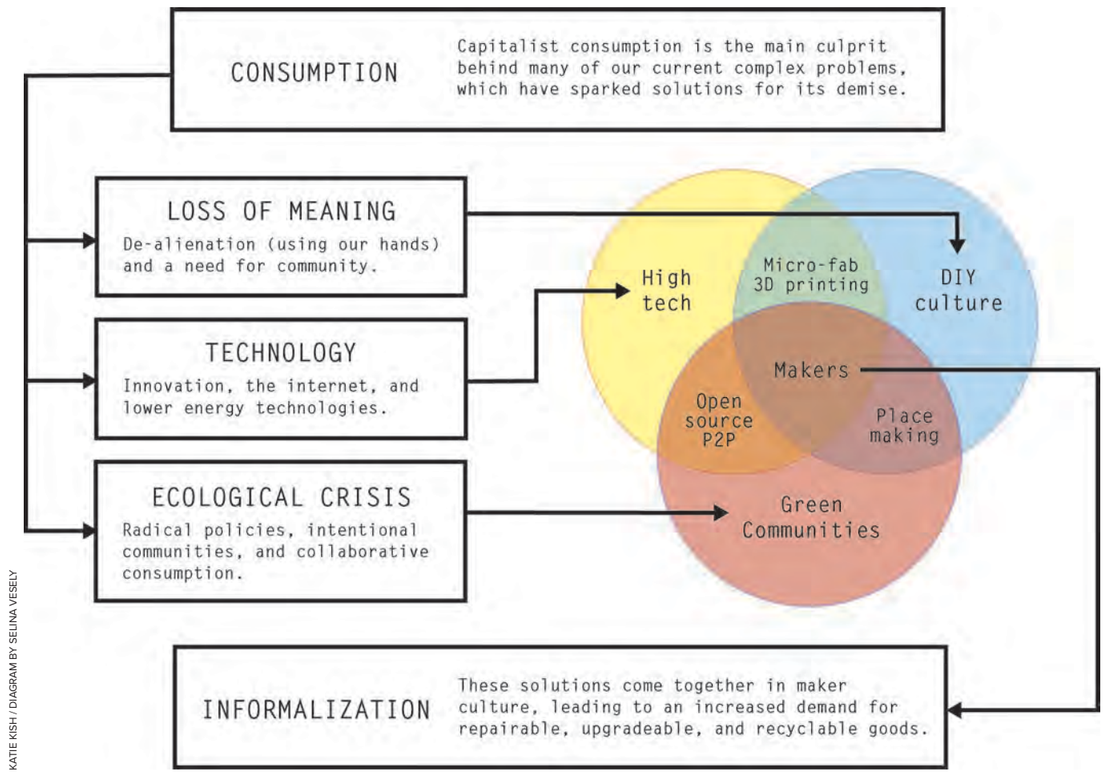
A society we can be proud of

After talking with nearly a hundred makers across Canada, we have found that maker culture has many parallels with the social commitments of the Guilds and Friendly Societies present in Early Modern European societies before capitalism. The main similarities are a commitment to community and local self-reliance, an emphasis on mutualism rather than reliance on the state, hostility towards corporate capitalism and large corporations, and local production as a backbone for a new economy of trade, sharing and longer lasting goods.

Modern makers also see their work as an implicit protest against rising inequality and environmental degradation. By teaching people how to repair and build they are helping those who are unable to afford to buy new products. By producing quality goods they are protesting against “throw-away” society.

Not only is this a strong anti-capitalist

(re)Making Consumption



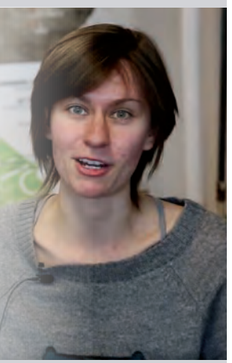
KATIE KISH / DIAGRAM BY SELINA VESELY

Capitalist consumption has set up a unique situation for the resurgence of DIY While earlier DIY movements were seen as anti-progress, the new maker movement incorporates technology as a response to ecological crises. Makers thrive in the current social, ecological, and economic sphere by combining the values of environmentalism and opportunities of technology to remake the world.

What Would A\J Do with more resources?

"I would love to see A\J create a lot more digital, online content."

– Selina Vesely, Graphic Designer



"What I would love to see is more stories on student innovations with the environment or technology."

– Veronika Szostak, Editorial Intern

"We are Canada's leading environmental media organization and I think that we need to show it."

– Leah Gerber, Associate Editor

Watch our video on YouTube!
ajlinks.ca/ResourcesVideo

alternativesjournal.ca | info@alternativesjournal.com

stance, but as Tim Ingold argues, the process of making is a mindful activity. Our research indicates that this mindful process enhances the self-esteem of kids and adults by producing a product that they are proud of.

Thus, an old vision of embedded production and community is re-emerging with new technology. Embedded production means that the production of goods is tied with the needs of a society.

At least potentially, open-source, microproduction and Internet communications could allow small-scale artisan production for local needs and consumption. In the future, people may not have to give up comfort to lower their impact. People may be able to work with local makers to repair a broken toaster instead of buying a new one. When they do buy new goods, they can buy them from local makers. In time, such an economy can stop consuming for consumption's sake, and couple notions of a meaningful, good life with collaborative creativity. A\J

Katie Kish is a mum, maker and teacher who loves to explore how people find meaning and purpose through creativity and curiosity. She is a PhD candidate at the University of Waterloo and Vice President Communications with the Canadian Society for Ecological Economics.

Stephen Quilley is an associate professor at the University of Waterloo's School of Environment, Resources, and Sustainability, where he researches topics ranging from the long-term dynamics of human ecology and local economic development to neo-Pagan environmentalism and the role of traditional music in community resilience. You can read about his research interests and find calls for graduate students on his blog: navigatorsoftheanthropocene.com.

Did you know the White House hosted its first Maker Faire in 2014, and that former president Barack Obama declared June 12 through June 18, 2015, as the National Week of Making? It's true! Check out the notices here: ajlinks.ca/ObamaMakingWeek.

An Interview with Tomorrow's Makers

JEM AND ARLO QUILLEY are brothers, ages 11 and 13 respectively, who made gumball machines at THEMUSEUM in Kitchener in 2015. Their dad co-wrote, "DIY" with Katie Kish, and Kish decided to ask these British kids what they think about the maker movement.

A\J: *What did you like the most about making at THEMUSEUM?*

Arlo: Working with everyone else and seeing everyone else's models come to life. And the wood work. I love wood.

Jem: Same thing; love woodwork so much.

What didn't you like?

Arlo: Not so keen on gumballs.

Jem: Accidentally swallowing the gumballs.

What is your next project?

Arlo: Last week I was using Nerf guns, and modifying them to shoot faster, and then steam-punking them by adding pipes and bits and bobs.

Jem: I took a piece of wood, a long piece of wood, and used a glue gun to make designs and then spray painted it brown to make it into a sceptre with magical properties.

What advice would you give to people who want to be makers?

Jem: Be careful around the tools, and let your inspiration flow – don't hold back.

Arlo: Get off your butts and video games and start doing woodwork. It's a more active thing to do, it opens up your mind and allows you to focus on things in the long term that are better than looking at a screen and you have a skill for woodwork for when the world collapses.

Jem: When you carve a piece of wood or make something, it gives you a much better feeling than when you're in a video game. It's ethereal to know you have completed something like that. You feel a sense of pride in what you've made – not that some factory has mass-produced a phone, or a company that has made something. If you make something, then you have done something.

Arlo: My dad has bought me a set of uilleann pipes* – it's more than just an instrument. It's a whole beast with a personality. When you break a reed, it is like fly-fishing: when you fly fish you're not just going to go to the store and buy all your equipment and go fishing. You're going to learn fly tying, which fish come out in which season, and probably how to make more effective fly hooks than any mass-produced plastic thing.

With the pipes, you make your own reed. It involves time and effort. Reeds are what make the pipe sound. It's like a voice box made out of cane, willow, or spruce. And you put them in the chanter and that gives the sound. It is the most important sound. They need constant tinkering and repair, because they're very contrary. If you have been playing your pipes in Ireland and the weather is normal, and then come to Canada, your pipes will sound completely different and maybe even break. You have to do all the craft to keep them sounding good. The music involves the wood working skills.

JASON HAVRELIAK

Jem and Arlo at THE MUSEUM.

Katie Kish interviewed the Quilley brothers in March 2017.

*Uilleann pipes are traditional Irish bagpipes. Also known as union pipes and elbow pipes, they are played by pumping your right elbow on a set of bellows. Pipe Major Stewart will tell you more at **ajlinks.ca/uilleannpipes**.

Check out **themuseum.ca** for exhibits and events galore.

KATHARINE ZYWERT

New Prescription

Designing a sustainable community care system in a world without growth.

FEWER THAN two hours' drive northeast of Brussels, nestled among gentle green fields, lies the town of Geel. Here, the model for mental healthcare in a future without economic growth has quietly persisted for 700 years.

In Geel, families take in people with mental health issues as boarders, welcoming them as new family members and supporting their full participation in community life. Boarders are treated as guests, not as patients, the mentally ill, or people in need of psychiatric help. Hospital-based medical care is available in town to prescribe and manage pharmaceutical regimens and to deal with crises, but Geel's family care system is overwhelmingly non-medical. The families that make lifelong commitments to care for a stranger who has difficulty living independently are frequently unaware of, or uninterested in, their boarders' official medical diagnoses.

This centuries-old practice stands against the current one, which increasingly medicalizes mental health and social issues. Instead, it offers a community-based alternative that operates with minimal state involvement and limited formal intervention.

What's wrong with healthcare?

Even in countries with universal healthcare, the chance to make a profit continues to determine medical research priorities, trends in professional specialization, and choice of treatment options. According to the Global Forum for Health Research's report, only 10 percent of medical research funding is directed toward improving treatment for 90 percent of the world's disease burden. From 2000 to 2011, Pedrique and colleagues found that only one percent of new pharmaceuticals and vaccines were developed to address diseases of poverty including malaria and tuberculosis, with the rest concentrated on cancers, neuropsychiatric disorders, and cardiovascular conditions that disproportionately affect wealthy populations.

Along the same lines, social psychologist Jean Twenge describes how high salaries and better working conditions are attracting medical students away from general practice toward specializations like dermatology that deliver minimal health benefits.

So long as growth is the underlying purpose of the economy, market forces will continue to shape health systems. However, as economic growth slows, the logic of choosing high-emission surgical alternatives or concentrating research funding on illnesses that only affect small segments of the population starts to break down.

It becomes particularly counterintuitive if we consider the long-term negative health effects of rising emissions and subsequent climate change.

Direct effects of increased levels of greenhouse gases and hydrocarbons in the atmosphere include more respiratory health problems, suppressed immune function, and higher rates of allergies because warmer climates favour the growth of allergenic plants like ragweed.

Medical anthropologist Merrill Singer also describes how climate change is responsible for the global resurgence of infectious disease as the earth warms and disease vectors such as mosquitos and ticks migrate further north and into higher altitudes, extending their reach. At the same time, higher temperatures increase the metabolic rates of mosquitos, further speeding up disease transmission. In a world where economic growth remains coupled to rising consumption, escalating greenhouse gas emissions, and accelerating climate change, economic growth ultimately jeopardizes human health.

In this time of increasing environmental degradation and decreasing economic growth, achieving dramatic improvements in population-level health outcomes is more about directing money to the right places than it is about spending more.

In an article about developing health policies for contexts of slowed economic growth, medical doctor and global health researcher Eduardo Missoni argues that beyond a certain level of spending (around $75 US per person), higher healthcare budgets no longer correlate with increased life expectancy. Instead, people-driven innovations should be the focus. For instance, cohousing and intergenerational care programs that allow seniors living with degenerative diseases to maintain some degree of autonomy could be a better solution to the needs of aging populations than buying more hospital beds.

For many of us, the end of economic growth could inspire new social practices and approaches to health that increase our quality of life. The trouble lies in getting there, from here.

So how do we get there?

A former sheep market at the edge of Totnes, an old town by the River Dart in southern England, now functions as a center for community health and wellbeing. The once empty space for

VICTORYIMAGES

The Lamb Garden is the site of the Gardening for Health initiative in Totnes, UK. Once a site for sheep auctions, the land has been converted into a garden where local physicians and health centres refer patients for much needed "green therapy." Here, people learn about and practice the therapeutic benefits of gardening.

showing sheep now contains herb and vegetable gardens, a pergola, a fruit garden and benches for leisure, while the auctioneer's office houses gardening tools.

Local doctors refer their patients to "The Lamb Garden" as it's now called, to participate in a "Gardening for Health" program to treat vascular diseases and mental health issues such as depression and dementia. Local school children attend classes at the garden where they grow vegetables and learn the basics of healthy nutrition. Open workshops teach community members skills in gardening, healthy eating and environmental stewardship.

The Gardening for Health program is a partnership between the local doctor's office Leatside Surgery, the University of Plymouth, and a local Community Shared Agriculture teaching program. It fits into the larger goal to increase resilience of local communities.

Totnes is also the town that began Transition Initiatives, a community-led social movement to increase resilience by combating climate change and reducing reliance on fossil fuels. The Transition Town network now includes thousands of initiatives in over 50 countries. It aims to relocalize economies by developing decentralized, renewable energy infrastructure and retraining community members to provide for basic needs, while invigorating local food production, currencies and medicinal capacities.

Counter to the conventional association of wellbeing with ever-increasing material standards of living, programs like Gardening for Health and Transition Towns illustrate how consuming less is not only good for the environment, but can enhance our own health and happiness.

It's not going to be easy

But let's not kid ourselves. A community model of healthcare asks a lot from families – much more than the in-patient and supported housing programs that are staffed by professional healthcare providers and are typical in modern health systems.

One National Public Radio article describes the difficult behaviours that Geelians Toni Smit and her husband Arthur Shouten have learned to navigate as they provided family care to boarders. For one man they had to repeatedly chase away the lions he saw coming out of his bedroom wall at night. For another, they had to deflect his overpowering physical attachment and affection for Smit, which had begun to put a strain on her marriage.

In Geel, these behaviours are accepted and managed at the level of social relationships rather than being seen as a justification for removing people from community life. But, while Geel's family care system draws lightly on state resources, it demands a heavy commitment of time and responsibility from ordinary people.

The tension between the financial and ecological costs of modern healthcare and the expenditures of time and energy at the community level that would be required to support a health system with a smaller environmental footprint is a trade-off we inevitably face in designing sustainable health systems.

In a context of economic contraction, the economic sphere shrinks and the sphere of social reciprocity expands. For health, this means that mutually beneficial exchanges of time, resources and care will need to compensate for a smaller, professionalized healthcare sector. As families and community members, we will have to do more to maintain our own and each other's health. We will have to depend less on the formal interventions we have come to rely on for everything from childcare to long-term care for the elderly; treatments for depression and anxiety; and medications for an expanding array of conditions rooted in poor diets, sedentary lifestyles and toxic environments.

Fortunately, according to ecological economists Kallis, Demario and D'Alisa in their introduction to *Degrowth: A Vocabulary for a New Era*, a shrinking economy may free up our time to do just that. Managed effectively by implementing policies like a universal basic income and work-sharing, the end of economic growth could reorient the purpose of economic activity away from consumption and financial profit toward an "economy of care" supported by ordinary people able to spend their time and resources caring for others without being paid, and without compromising their own wellbeing.

With communities looking after more of their own health needs in a Geel-like approach to reciprocal care, formal health systems could focus their resources on population-level health interventions and other activities requiring coordination at a higher scale. These include public health measures such as sanitation and immunization, advanced surgeries, and research to support ongoing innovation in pharmaceuticals and medical technology.

In *The Transition Handbook*, Rob Hopkins, founder of Transition Town Totnes, envisions a model for health systems in a post-carbon economy. Structured as a diverse network of local health centres, medical care would emphasize preventative health programs, integrate biomedical and complementary treatments, cultivate medicinal plants locally, and produce a limited range of pharmaceuticals in small batches. Partnerships like the Gardening for Health program would strengthen ecological, social and individual health in tandem. In Transition health systems, healthy diets and more active lifestyles contribute to physical health while access to meaningful work and more satisfying social relationships reduce the prevalence of stress and anxiety disorders. Totnes' *Energy Descent Action Plan* includes indicators for tracking progress toward improved health and wellbeing, including lower rates of depression and obesity, more time spent walking, more land dedicated to growing medicinal plants, and decreased social isolation among seniors.

Nevertheless, designing a sustainable health system for a future without economic growth requires significant reorientation of health and care activities. The good news is that the most promising alternatives, like the initiatives in Geel and Totnes, are increasingly found at the boundaries of formal health systems.

Alternatives are emerging in social movements that reinvigorate networks of community reciprocity, in policies that emphasize population health over incremental benefits to individuals, and in preventative practices that recognize the interdependence of human health, community wellbeing and environmental stewardship. These alternatives are accessible, participatory, and are fundamentally dependent on the energy and commitment of ordinary people. Grounded in the principles of ecological economics, including economic relocalization and labour-intensive economies of care, they offer multiple pathways for improving ecological integrity and human health in a future without growth.

In the most fundamental way, it is impossible to separate human health from the health of the environment. When the ecological foundations of breathable air, clean water, and nutritious food are threatened, the prospects for long-term human survival on this planet become increasingly uncertain. But, if we're willing to contemplate profound redesign of health systems and expand on successful innovations that blur the boundaries of individual, community and ecosystem health, humans won't simply survive, we'll flourish.

Katharine Zywert's doctoral research focuses on health in the Anthropocene, with fieldwork investigating social innovations that have the potential to build resilient health systems for an era of constrained economic growth and social-ecological instability. Katharine holds a Master's in Medical Anthropology from the University of Oxford and a Graduate Diploma in Social Innovation from the University of Waterloo.

St. Dymphna is the patron saint of mental illness and her feast day is on May 15. According to local lore, she is buried in Geel and the town continues her mission to care for the mentally ill to this day.

Further interest: Geel is also home to the largest reggae festival in Europe. Check it out at **reggaegeel.com**.

Now rivers have the same legal status as people, we must uphold their rights #indigenomics
CA Hilton, MBA @Hesquiaht

Economic development is so much more than just money and jobs!!! Relationships, culture, sustainability ... These have value! #indigenomics
Rhiannon Vining @RhiannonVining

How can we properly engage an indigenous worldview that assesses wealth differently? #indigenomics @SFUCED
Melissa S Hillier @MelissaSHillier

Great start at #indigenomics to remember to invest locally and be inclusive
Gordon Campbell @GordCampbell13

#indigenomics: the dominant worldview is neither the only one, nor the best one for moving our economy forward. #neweconomy #CED
Johanna Henderson @johannapz

Time for #indigenomics - working from the strength of our cultures and land toward true self-determination. 7 generation thinking.
Sarah Pash @sarah_pash

#indigenomics = Redistribution of wealth through assertion and exercise of Indigenous sovereignty #Decolonization
Stephen John Ford @1mohawklawyer

TWEETS COLLECTED ON MAY 16, 2017

Sustainable Inclusive Development

Carol Anne Hilton's concept of Indigenomics is the next transformative step in economics.

WHAT WOULD economic and social development look like if designed from an indigenous worldview? That is the question Carol Anne Hilton asked when she developed the concept of Indigenomics. Hilton is a member of the Nuu chah nulth Nation, whose traditional territory is on the west coast of Vancouver Island, British Columbia. She says, "At the heart of Indigenous worldviews, from one end of the earth to the other, is a concept, which expresses itself as Hish uk Ish tsa walk, which in my own Nuu chah nulth language translates into 'Everything is one and interconnected.'" As CEO of Transformation, Carol Anne helps to translate the indigenous worldviews of First Nations communities into economic and social development plans.

Hilton launched the idea of Indigenomics as a twitter hashtag. The concept is now taking hold in a much bigger way. Carol Anne is recognized as forward-thinking in her field and has been appointed to the federal finance minister's Advisory Council on Economic Growth. She is also writing a book called *Indigenomics: A Global Powershift* and she teaches in the Community Economic Development Program at Simon Fraser University.

Hilton defines Indigenomics as:

> [T]he conscious claim to, and creation of space for the emerging knowledge, activity and promotion of all things related to indigenous economy. That worldview is really what allows us to be able to express: What is most important to us? What have we been taught? How do we see the world in such a way that we can not only ensure the continuance of who we are as people, but that we can also look at what new thinking is required today?

Hilton's parents and grandparents attended residential schools, which are widely viewed as instruments of cultural genocide, an attempt to erase indigenous culture. She sees Indigenomics as part of the "new language" that is required to pursue reconciliation: "Canada is built on old thinking. That old thinking isn't what's going to emerge into our future. The new thinking that is required requires new language. If you look at the establishment of new language over 150 plus years, it's only on this side of the spectrum of time that we see words such as consultation, referrals, free prior informed consent, reconciliation. Those were not the founding words of our language of this country."

Hilton now challenges Canadians to think, "What if economic development was an act of reconciliation?" "What is the kind of thinking that First Nations are approaching the topic [of economic development] from?" Her work is helping to show another, more sustainable and inclusive pathway to our shared future. AJ

Brett Dolter is a Canadian climate and energy policy researcher, and VP for the Canadian Society for Ecological Economics (CANSEE).

Get started – engage in the Indigenomics discussion online using #indigenomics.

Familiarize yourself with the recommendations of the Truth and Reconciliation Commission of Canada: Calls to Action: **ajlinks.ca/TRCcallstoaction**

Watch Carol Anne Hilton in action when she addressed a sold out event in Vancouver last year. **ajlinks.ca/IndigenomicsandReconciliation**

Enoughness

THE FOLLOWING screen captures are from the video *Enoughness: Restoring balance to the economy.* It was produced by First Peoples Worldwide, an organization founded by Indigenous economist Rebecca Adamson. This video takes you to a greater understanding of the core values of Indigenous economics.

The Indigenous economy, like its worldview, which includes interdependent, decentralized production and extensive use of resources (i.e. not wasteful), promotes responsible resource management, abundance, kinship, a belief in enoughness, [and] encourages sharing and cooperation. In the Arctic after a successful whale hunt, Inuit kinship and reciprocal obligations ensure everyone's needs are met fairly and equitably. The prerequisites for sustainability are the health of the economy measured by the health of whole.

Indigenous people's territory spans 24 percent of the Earth's land surface, but is home to 80 percent of its total biodiversity. This is not a coincidence.

In Indigenous cultures, balance and harmony aren't romantic notions but millenia-old design fundamentals.

Words adapted from First Peoples Worldwide video. Watch Rebecca Adamson's entire video at ajlinks.ca/enoughness.

TROY VETTESE

Black Snake in the Grass

The business case for new pipelines is terrible.

LOUIS HELBIG | BEAUTIFUL DESTRUCTION

"Conduit & Trucks." A web of above ground thermal conduit piping typical of the SAGD operations throughout the oil/tar sands. This network is part of Suncor's Firebag facility in Alberta.

THERE HAS RARELY been a worse time to build pipelines in Canada than now. One wouldn't surmise this from listening to the business elites of Toronto and Calgary, gung-ho for the newly approved Trans Mountain expansion, Line 3 replacement, and Keystone XL. Yet, economic conditions have changed greatly since the Keystone XL was first proposed nine years ago. The heated arguments surrounding the pipeline then cannot simply be warmed up again because the business arithmetic undergirding new export-pipelines no longer adds up like it once did. For all of the much-ballyhooed "public interest" that these projects supposedly represent, only a small segment of Canadian business will benefit and many pipelines will ship nothing but air.

Like the current Keystone pipeline, the proposed Keystone XL connects Hardistry, Alberta to Steele City, Nebraska, except by a more direct route. From there, the

LOUIS HELBIG | BEAUTIFUL DESTRUCTION

"McKay River & Mine Expansion." Forest-clearing, as part of a process known as overburden removal, in preparation for the expansion of the Syncrude's open pit North Mine in Alberta. This clearing is immediately adjacent to the McKay River which flows into the Athabasca River at Fort McKay a settlement surrounded by industry on almost all sides. A further expansion known as the Mildred Lake Extension (MLX) is planned for 2018 and will include mining west of the Fort McKay River.

hydrocarbons would go to Cushing, Oklahoma, and from there, further pipeline additions already in place connect to port cities and refineries on the Gulf of Mexico.

The original purpose of the Keystone XL was to capture the highest possible price for tar sands crude. The US price benchmark, named the West Texas Intermediate (WTI), and the benchmark price of crude from the Brent North Sea field (a representation of international prices) have floated in tandem for decades, so in the past, it didn't matter that landlocked Albertan hydrocarbons were sold at WTI prices. In the 2000s however, WTI and Brent began to diverge as production of Albertan bitumen and fracked petroleum from North Dakota and Montana increased faster than nearby refining and shipping infrastructure could accommodate. Greater demand than supply for pipelines and refineries in the middle of the North American continent gave pipeline owners leverage over tar sands producers, allowing them to dictate prices. As a result, WTI prices for hydrocarbons dropped, and the gap between WTI and Brent peaked in September 2011 at nearly $30, more than a quarter of a barrel's price. Suddenly, there were two separate markets for petroleum.

Many pipelines from Alberta terminated in the small town of Cushing, Oklahoma. There, crude oil pooled in vast vats, sitting in queue until it could be shipped to the heavy-oil refineries ringing the Gulf of Mexico. Those with well-placed pipeline capacity could buy crude cheaply from the continent's interior and ship it from the Gulf of Mexico to regions that paid international prices, like the US North-East because it was not connected by pipeline to Albertan and North Dakotan producers.

The Albertan commercial class and their allies within the provincial government fumed at subsidising US pipeline firms, refiners, and drivers in the Rocky Mountains states. The crash of petroleum prices in 2014 relieved some pressure on the WTI-Brent gap.

Barack Obama's rejection of TransCanada's application for the Keystone XL in 2015 led to a lull in the debate. Pipeline firms looked to slightly less contentious projects to ship product, such as reversing Line 9 even though it passes through major Canadian cities including Toronto.

Although the election of Donald Trump has breathed new life into the Keystone XL, the economic context that animated it in the first place no longer exists: the price gap between WTI and Brent has evaporated.

This is due to two reasons. First, new pipelines connecting the US Gulf Coast to its fossil-fuel-saturated heartland have been built over the past five years, such as the Seaway and Keystone XL South. Secondly, the US government ended its four-decade ban on petroleum exports in 2015 (originally, the US put the ban in place as a measure against oil scarcity, but that condition no longer applies). These two measures mean that it is physically possible to bring more petroleum to the Gulf of Mexico (instead of keeping it pent up in Cushing) and international markets could soak up this extra supply, equalizing the WTI and Brent indices. It now matters little if the tar sands product gets to the coast or not, since it will garner more or less the same price anywhere. Indeed, there is no point seeking the much-vaunted Chinese market, despite Albertans' obsession with it, because the US hosts most of the world's heavy-oil refiners (Canada's oil is classified as a heavy oil). Mexican heavy oil gets eights dollars less per barrel in China than it does in the US because China has fewer facilities that can process it.

Without the need for new coast-bound pipelines, the existing Canadian infrastructure suffices to export all the bitumen that Alberta is likely to produce. There is no need to build any new pipelines at all. Even if tar sands production increases by another million (m) barrels per day (bpd), then Canada will still have a 16 percent buffer of excess capacity. In 2015, Canada exported 3m bpd, almost all to the US. The existing network can handle 4.1m to 4.5m bpd (estimates vary), and rail could carry another 0.8m bpd. Indeed, according to a report by the Natural Resources Defense Council, as recently at 2012, only half of Canada's export-pipeline capacity was being used. Currently, tar sands operators can produce about 2.5m bpd and conventional petroleum output is 1.3m bpd. In a decade, however, I estimate conventional production will decline to less than a million bpd (since Canada is running out of conventional petroleum). CAPP predicts it will drop to 1.1 million by 2025. This drop in conventional production will free up space on the pipeline network, and domestic consumption will likely stay the same as now – to use roughly 1.2 m bpd of Canadian production. (Canada also imports about .7m bpd.) If one does the sums, it's clear that current export capacity suffices.

It's quite possible for tar sands production to be fixed at this maximum, some 3.5m bpd, for a while. It is the limit at which the provincial carbon pollution cap of 100m tonnes will take effect. This was imposed by Edmonton in 2015 after negotiations with tar sand producers and the coalition of environmental NGOs who led the anti-Keystone XL campaign. Even if this promise was made insincerely, it is hard to imagine production increasing drastically anytime this decade. Tar sands projects are capital-intensive and take years to come online, so unlike the nimble fracking industry, it is easy enough to predict future production. There are few large projects proposed beyond the ones already underway due to depressed prices – indeed, some Big Oil firms have pulled out of Alberta including Statoil and Shell. As Rystad Energy, an independent oil and gas consultancy firm notes, "The contribution from unsanctioned [unapproved] projects is not likely to be visible before 2020, as operators postpone their final investment decisions." Even the Canadian Association of Petroleum Producers (CAPP), the fraternity of tar sands bosses, has tempered its expectations of the rate for production in 2030 production from 5m bpd to 3.67m bpd – and CAPP tends to overestimate.

Why then is there such enthusiasm to build new pipelines at all? To answer this, one has to understand the role of pipeline firms within the broader fossil fuels market, and how their position shapes that market. Pipeline companies like Enbridge, Kinder Morgan, and TransCanada, want to go ahead and build infrastructure whether it's needed or not because they signed long-term contracts with tar sands oil producers before the fall in prices in 2014. These contracts are very lucrative because they locked-in prices twice as high as today's prices for sometimes as long as 25 years. If contracts were negotiated now, they would likely be worth only half as much. All of these firms would get paid by shippers, whether or not the shippers have fuel to ship or if it became cheaper to ship by another route. The share price of pipeline firms depend on these projects being realized.

The tar sands industry either remains silent or demonstrates its support of the pipeline industry when it proposes new projects because of their adversarial relationship. Even though there may be enough pipe to ship all of Canada's hydrocarbon production, pipeline firms often have the upper hand in negotiations. Jennifer Hocking, an Albertan energy lawyer, interviewed several representatives from tar sands firms and found that in their opinions, "pipelines still hold a natural monopoly, and therefore the general absence of objections from shippers in tolling applications [the process of setting rates to use the pipeline] by pipeline companies to the National Energy

Board (NEB) ought not to be taken as active support from the shippers for the tolls proposed by the pipeline company." In other words, hydrocarbon shippers admit to feeling like they can't oppose pipeline companies because they have a monopoly on the market.

Before 1997, pipelines were regulated like railroads used to be or the Internet today – as a "common-carrier." This means that the owners of infrastructure could not discriminate between its users, but left capacity open to short-term contracts so firms shipped their goods when necessary. The slow shift since pipeline regulations were changed in 1997 has meant that more and more pipeline capacity is tied in long-term contracts, forcing firms to compete for space.

Today, of the four pipelines that bring petroleum out from western Canada, only one, the Enbridge Mainline, remains a common-carrier. Large producers buy up space on pipelines to ensure that they have space when they need it, something that seemed pressing during the bitumen bubble before 2014. The need to secure space on a pipeline was driven by the decreasing share of capacity set aside for short-term contracts, between a fifth and a twentieth. This shortage of common-carrier capacity is the true problem, rather than a shortage of space overall. Imperial Oil argued that "converting existing common carriage capacity to contract was inappropriate given the shortage in capacity," Hocking reports that during the Trans Mountain expansion application to the NEB, Chevron, a multi-national oil corporation, argued that Trans Mountain was a monopoly. Despite these objections, the NEB approved Trans Mountain's application.

Securing reliable space on a pipeline is especially important if hydrocarbon producers have to fulfill orders at specific times and places. For example, firms that hope to ship bitumen to East Asia co-ordinate the delivery of fuel through the Trans Mountain pipeline to arrive at Burnaby's tanker terminal at the right time and in sufficient quantity when their ship arrives, otherwise the whole operation is moot. This need for certainty allowed Trans Mountain's owner, Kinder Morgan, to extract higher prices for longer contracts. Kinder Morgan even tried to stop bidders from communicating with one another by including controversial confidentiality clauses in its contracts, hoping to extract a better deal by muddying the market. Although the National Energy Board (NEB) eventually responded to the tar sands producers' howls of protests and forced Kinder Morgan to remove the clauses, it rarely pushes pipeline firms very far. When Total and Suncor complained that Kinder Morgan was using its monopoly power to gouge shippers because there was no fair way to determine prices, the NEB applied little more than a slap on Kinder Morgan's wrist. The Canadian government seems unwilling to support its supposed favoured child, the tar sands industry, and instead aids the dominance of pipeline firms.

This favouritism stems from Ottawa's dependence on pipeline firms. Only these firms have the expertise to build and operate such infrastructure, because Canada is one of the only countries that does not have a state-corporation-run pipeline network. In Canada, only private firms can get bitumen to markets, making the state and tar sands firms dependent on them. Transportation, after all, rather than production, is more susceptible to monopoly power. In another example of this, Standard Oil colluded with railways to dominate the petroleum industry; it actually owned relatively few wells. "Given the importance of the expansion to the Canadian economy," Hocking ventures, "the NEB appears to have decided that it was appropriate to interfere as little as possible."

Furthermore, it is doubtful if either Calgary or Ottawa take their climate change initiatives very seriously. Both would likely welcome higher petroleum prices and renewed investment in Northeastern Alberta. If that were to happen, new pipelines might be necessary, even if that might not happen for another decade or two.

Both the federal and provincial governments seem to be indulging in wishful thinking if they believe it was a shortage of pipeline capacity rather than petroleum's price that has dampened investment in the tar sands. This line of thought is laid out by Jackie Forrest, a director at the ARC Energy Research Institute, "If we were in a scenario where we had excess capacity, you could make the argument that, all things being equal, you would see more capital invested here than what otherwise would have been the case."

If all three recently approved Canadian pipeline proposals are built (Line 3, Trans Mountain expansion, and Keystone XL) export-pipeline capacity in Canada would increase by three-quarters. Even if the tar sands were ripping out 3.5m barrels per day (bpd) of fuel and there was another million bpd in conventional production, that still leaves a surplus of 2.7 million bpd in excess pipeline capacity. These underused new pipelines would remain a monument to carelessness; a frittering of twenty-five billion dollars of capital due to the NEB's ineptly regulated faux market. Yet, the pipeline owners would be happy, for regardless whether their infrastructure is used or not, they will become fat from the terms of their pre-2014 contracts. Tar sands operators and the Canadian government would remain in a bind, but both would see the excess capacity as useful if the boom returns. If it does not, then eventually these expensive, underused projects might undermine the pipeline industry, weakening its grip over tar sands producers and the Canadian state. At that point though, all of these pipelines will have ripped up thousands of square kilometres of forest and poisoned too many streams, rivers, aquifers, and coastlines in a much hotter world.

Troy Vettese is a doctoral student at New York University, where he is writing a dissertation on the history of the tar sands industry.

The National Observer has put together a good overview of the major pipelines the oil and gas industry hopes will be built. Although put together in 2016, it's still a useful resource: **ajlinks.ca/CApipelines**.

RYAN KATZ-ROSENE

The Great Contradiction

An illustrated guide to the growth-environment paradox.

The growth-environment paradox

Illustrations by Adam Gibbard

People need economic growth to prosper, and yet economic growth harms the environment. This is the growth-environment paradox: attempting to improve our quality of life today, while pursuing economic growth erodes the foundations for future life. This short guide sketches out the five main responses to the paradox.

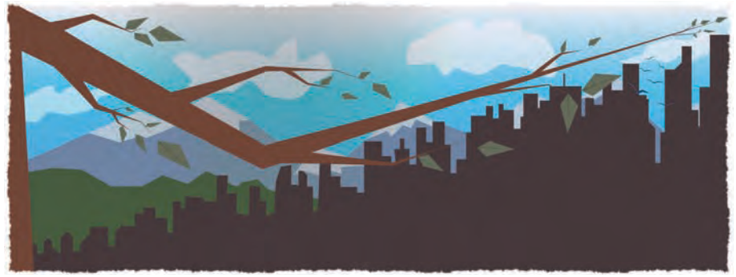
Growth is green

Some economists refute the existence of a problem in the first place. Free market advocates such as those at the Adam Smith Institute in Great Britain, the Heritage Foundation in the US, or the Fraser Institute in Canada, exemplify this position. In this view, economic growth comes with more efficient use of resources, and therefore a decreased ecological footprint. This can be seen in the graph as both economic growth and environmental health move upwards together in harmony.

The "growth is green" perspective is often asserted about pollution. As societies become wealthier (on a per capita basis), they appear to have a higher capacity to clean up rivers and landscapes, and to keep them clean. So, people who think growth is green usually advocate for free markets as a way to reduce the exploitation of non-renewable resources, while also promoting wealth accumulation.

> "Canada's challenge will be to advance the low-carbon energy transition while ensuring that Canadian workers and companies affected by a fossil fuel phaseout play a role in cleaning up electricity while electrifying everything."
>
> *– Brett Dolter, "Electrify Everything," page 32*

Growth could be made green



Brett Dolter argues for this in "Electrify Everything," page 32. Jerome Dupras' arguments fall here as well in "Cost of Living," page 36, about finding better ways to value nature.

A second common response to the paradox suggests reforming our economy to make economic growth green. People who think growth can become green suggest that through major state reforms and new ways of governing, nations can develop solutions that separate economic growth from material consumption. Some supporters of this view say that achieving the appropriate balance of market and laws, fostering investment in technological innovation, and using resources more efficiently will result in sustainable capitalism. In the graph above, you can see where economic growth and environmental health at first were opposed, and then through this theoretical transformation of the economy, moved upwards together.

Managing without growth

"We've Outgrown Growth" on page 16, "Don't Worry, Be Happy" on page 22, and "New Beans to Count" on page 42 all fall among this spectrum of thought.

The third potential response is that growth should be abandoned as a policy objective altogether, and instead, the economy should prioritize people's basic material needs. Those in this camp range widely from reformers of policy priorities to more radical writers calling for the overhaul of capitalism. Generally, they advocate for a society that functions within the capacity of the available ecosystem; a condition of ecological and economic stability. The idea is to abandon economic growth as a policy priority because after a certain point (reached long ago in industrialized societies), growth no longer improves people's overall quality of life. The graph shows that as environmental health improves, economic growth is diminished.

Overthrowing growth

In this issue, Carol Anne Hilton's viewpoint, page 56, about incorporating First Nations' economics represents this line of thought.

In turn, the more radical group suggests capitalism itself is the problem because it is founded upon economic growth. These thinkers call for an overhaul of society so that social prosperity is completely removed from the accumulation of wealth. Bellamy Foster (2009), for instance, calls for an ecological revolution to make peace with the planet and establish a new eco-socialist way of life where the principles of communitarianism replace profit motive. The graph here shows when economic growth stops completely, environmental health continues to grow.

The damage of growth is done

Katie Kish & Stephen Quilley's piece "DIY," page 46, and Katharine Zywert's article "New Prescription"on page 52 align with this theory.

The fourth main response is to accept that there may be no solution to this paradox, and anticipate inevitable, large declines in quality of life and the state of the environment. This can be seen in the graph below as both environmental health and economic growth drop off. Some in this camp are alarmists; others are simply pessimistic about the ability of people to live sustainably.

The 1972 MIT report *Limits to Growth* states: "If the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."

This is the view held by alarmists and pessimists. Their prescriptions are wide-ranging: while some resort to nihilism, others like our authors Kish and Quilley or Zywert, find hope in building adaptive capacity in local communities in order to deal with impending declines in the environment and the economy.

Humans are but a blip in geologic time. We have come and we will inevitably go, just like many past species. Today's economic policies and decisions will determine how long humans and other species will survive on Earth. The balance governments choose between global economic growth and environmental health today will inevitably shape our ability to prosper in the near future. AJ

Ryan Katz-Rosene is assistant professor at the University of Ottawa's School of Political Studies. He and his family live on an organic farm in Cantley, Quebec.

Adam Ashby Gibbard is the publications and communications officer at the International School of Phnom Penh, Cambodia. He has lived there for the past two years with his family.

Get Into It

How to dive into the ecological economy.

*Here's a great list of ways to get involved in the ecological economy, with organizations and people who are already doing it! Have fun exploring the ideas for an alternative economy below. We'd love to see your photos and videos – give us a shout on Facebook, Twitter (both **@alternativesj**), or Instagram (**@alternativesjournal**), and use the hashtag **#EcoEcon**.*

Tap into the sharing community. You can find sharing programs for almost anything you need without having to buy it. From kitchen gadgets, to cars, tools, housing, musical instruments even lawn mowers… Your local library is a great place to start, but Google will also help out. And if you can't find that Uilleann-pipes-sharing program you're looking for, why not start one? Here are some links to get you thinking:

- Car sharing: ***zipcar.ca***
- Stuff sharing: ***sharingdepot.ca***
- Tool Sharing: ***vancouvertoollibrary.com***
- Heavy equipment sharing: ***dozr.com***
- Musical Instrument sharing: ***ajlinks.ca/mtlinstruments***

Attend a local Maker Space, find one nearest you: ***ajlinks.ca/findmakerspace***.

Think about doing a "staycation" this year or travelling to a Canadian destination that you've never been to. We have a lot of pretty nooks and crannies here. Buzzfeed has a great list of Canadian staycation destinations across the country: ***ajlinks.ca/staycation***.

Study ecological economics at a local university to explore any of the questions or ideas explored in this issue. Search for online accredited courses on the Canadian Virtual University here: ***cvu-uvc.ca***, or try searching out a free online MOOC (massive open online course) at sites like ***mooc-list.com*** or ***coursera.org***.

Shop at thrift stores and craft fairs. Etsy.com is a network connecting makers to consumers around the world. In 2016, Etsy hosted a Canada-wide live craft show event with dozens of craft shows set up across the country: ***ajlinks.ca/etsycanada***. You can explore Canadian Etsy makers online here: ***ajlinks.ca/canadacrafts***.

Shop local at farmers' markets near you or anywhere you might visit. Farmers' markets are the heartbeat of the community. Check out this directory of Canadian farmers' markets: ***ajlinks.ca/marketscanada***.

SELINA VESELY

Ali Engering, a uWaterloo geography graduate student, checks out the wares at the 2017 ENVigorate festival's Swap Shop in Waterloo, Ontario.

Organize or participate in a community stuff swap at your local community centre or university. Or try out a swap site like this one: ***swapsity.ca***.

Plant a tree (and other plants – bonus if they're edible!) in your back or front yard. Include your children or a neighbour who might like to join in! Check out ***treecanada.ca*** for resources.

Pick berries or fruits at your local U-Pick-It farm, and hold a canning and jamming session with your friends. Here's a handy guide to safe canning: ***ajlinks.ca/canning***. If you don't know what to do with your fruit tree, look for a local fruitshare organization.

Join the discussion about a Universal Basic Income in Canada: ***basicincomecanada.org***.

Join a 100 Mile Food Challenge for one week. Here are some resources to get you started:

- ***ajlinks.ca/wintermenu***
- ***ajlinks.ca/gardenplan***
- ***ajlinks.ca/suzukitips***

And then tell us about it: **letters@alternativesjournal.ca**.

Check out the Transition Town Movement in Canada. Transition Towns is a network of communities across the world that have committed to transforming their town into a place capable of meeting its own needs: to become a place of resiliency. In Canada, you can find Transition Towns from British Columbia all the way to New Brunswick. Find the Transition Town nearest you at ***ajlinks.ca/findTT***, or if they're too far, look here for transition town training to bring the idea home with you: ***ajlinks.ca/makeTT***.

Join the Canadian Society for **Ecological Economics** at ***cansee.ca***!

Most importantly: work less, play music, spend more time outside, use your hands, treasure your family and be satisfied. AJ

JOHN BENNETT

"Rainbow Lava" from Louis Helbig's photo book Beautiful Destruction. Fractal pattern of residual bitumen and sunlight broken into a rainbow spectrum by the oily film on a tailings pond in Alberta. Tailings contain a host of toxins including bitumen, naphthenic acids, cyanide, phenols and metals such as arsenic, cadmium, chromium, copper, lead and zinc.

Canada's Dirty Pension

Did you know you own 95% of a Colorado fracking company? You do.

THE 19 MILLION Canadians who pay Canada Pension Plan deductions think they are putting money aside for retirement, but will it be there when they need it? Are the billions collected being invested wisely?

Friends of the Earth Canada is concerned that fund managers aren't taking climate risk into account and, instead, are putting this pension money into the old dirty economy's fossil fuels. Will sufficient funds be available when needed for beneficiaries?

Prime Minister Justin Trudeau's government came to office promising urgent action on climate change. Its first related action was to sign the Paris Agreement committing Canada to work with other countries to holding global warming to below 2°C up above preindustrial levels. Since then the PM has negotiated the Pan-Canadian Framework on Clean Growth and Climate Change with the provinces, giving Canadians the impression that progress is being made to transition to a green economy. But is it?

The federal government collects billions of CPP contributions every year – more than is needed to pay current Canadian pensioners. The excess, some five billion dollars annually, is invested by the Canada Pension Plan Investment Board (CPPIB). The portfolio has grown to almost $300 billion, making it by far the largest Canadian pension fund. The eight largest Canadian public pension funds control more than one trillion dollars.

There's no signal that CPPIB has or will address climate risk in its investments. In the last year alone the CPPIB has invested at least five billion dollars in the fossil fuel industry. In 2015, CPPIB former CEO, Mark Wiseman said: "I don't think we'd go buy Exxon, but we might buy a piece of Exxon if it were for sale." Exxon is a company that not only contributes to climate change directly but has also been accused of funding climate change deniers.

Mr. Wiseman is now tasked by the federal government to set up the new Canadian Infrastructure Bank.

CPPIB bailed out Encana to the tune of $900 million by buying its fracking interests in Colorado. Then it purchased additional drilling rights from another company and created a new company "Crestone Peak Resources" in July 2016, retaining 95 percent ownership. Fracking in Colorado is highly contentious as communities across the state demand more control of drilling. The CPPIB followed up with the purchase of a pipeline owned by Devon Energy in Northern Alberta and Penn West's assets in Saskatchewan. It has since invested heavily in a Texas drilling company, a North Sea offshore drilling company and made a major investment in Kinder Morgan two weeks before the federal government approved the pipeline.

Many financial institutions like the Norwegian Government Pension Fund Global, the Dutch healthcare pension fund and the French insurer AXA have begun to include "Climate Risk" in their decision making process. The CPPIB does not. For example, it recently purchased part of the ailing insurance giant AIG Canada, investing $1.1 billion (US). Clearly insurance companies suffer significant losses as a result of climatic events like the 2016 Fort McMurray wild fire. The CPPIB did consider the real possibility that investing in AIG will lose money as the result of fires, floods and storms.

In 2015, Friends of the Earth Canada asked Corporate Knights to look into the investments of the five biggest public sector pension funds. It turns out they were forgoing on average $20 billion profit each and every year by not fully incorporating climate risks into investment decisions. It is estimated that the Canada Pension Plan likely missed out on $6.5 billion to over seven billion in profits by sticking with climate polluting industries.

The Canadian Centre for Policy Alternatives investigated the top 20 Canadian public pension funds and found the CPPIB is more heavily invested in fossil fuels than other funds. About 22 percent of the CPPIB's Canadian and six percent of its foreign investments are in fossil fuel producers or pipeline companies. CPPIB owns stock in more than 30 companies involved in the worst climate polluting industries – coal mining and coal burning utilities.

Beatrice Olivastri, Friends of the Earth's CEO says, "This is not just a question of morality. It is about the 'fiduciary responsibility' [meaning duty of care] of pension funds to safely invest contributions to ensure money will be there to pay pension benefits." Olivastri has written to Canada's Chief Actuary asking him to investigate CPPIB's climate liability.

The Paris Agreement is leading to new regulations and carbon taxes. These constitute risks to investors in fossil fuels. On the other hand, adapting to climate change with dykes and other infrastructure or providing alternative fuels etc. create new opportunities for investors.

Many pension funds like Quebec's Caisse des Dépôts have signed the "The Montreal Carbon Pledge" agreeing to measure and disclose the carbon footprint of their investments. They have also joined the Portfolio Decarbonization Coalition, a group of global investors working with the United Nations Environment Programme. The Canada Pension Plan has not!

Former Bank of Canada President Mark Carney, who now heads the Bank of England, was asked by the G20 to study how financial institutions should react to climate change. His committee's first recommendation called upon them to disclose their risk to climate change. The CPPIB has taken no action.

The CPPIB says it conducts Environmental, Social and Governance studies or ESGs on its investments. However, it refuses to release the ESG report on buying Encana's assets (a natural gas company) or any other investment, and Canada's Access to Information Act does not apply to the CPPIB.

"We hoped the government or the CPPIB would respond to climate risk and take it seriously, but it is clear now that we have to mobilize the public if we are going to protect future pensions," said Ms. Olivastri. AJ

John Bennett is now a Senior Policy Adviser with Friends of the Earth Canada. He has worked on climate and energy issues for decades. He is best know for his work as Executive Director of the Sierra Club Canada and previously with Greenpeace.

Friends of the Earth Canada has setup a petition campaign at **pensionsforgreenfuture.ca**. For those who contribute to other pensions, check out **pensionpower.net**. Learn about Friends of the Earth Canada's climate risk pension campaign at **foecanada.org**.

Examining Ontario's Ecoplan

Ontario's environmental commissioner speaks up about cap and trade – and the plan for the future.

Dianne Saxe
Environmental Commissioner of Ontario

Some might call me Ontario's environmental watchdog, but officially, I am the Environmental Commissioner of Ontario – the ECO. No other Canadian jurisdiction has an ECO equivalent, although the auditors-general of Canada and Québec have Commissioners of Sustainable Development. Ontario is the only province with an Environmental Bill of Rights, although some environmental rights are recognized in the laws of Quebec, Yukon, Northwest Territories, and Nunavut.

The ECO is not part of any government, but an independent, non-partisan officer of the Ontario Legislature appointed unanimously by all political parties for a five-year term. In this position I have two key roles:

1. Guard and promote the Ontario Environmental Bill of Rights, which was adopted in 1993
2. Report to the Ontario Legislature and the public at least annually on energy use and conservation, climate change, and environmental rights and environmental protection.

Last November I delivered my first report on greenhouse gas emissions, called *Facing Climate Change*. Find the link to it at the end of this article. Here are the basics of what you need to know from this report.

CLIMATE CHANGE is the greatest challenge of our generation. Per capita, Canadians are among the world's worst greenhouse gas polluters.

As a rich country whose economy is heavily dependent on fossil fuels, how can we in Canada do our fair share to reduce pollution? The federal government, with the agreement of most provinces and territories, has proposed a Pan-Canadian Framework on Clean Growth and Climate Change. This framework sets a target of a 30 percent reduction below Canada's peak greenhouse gas (GHG) emissions by 2030. There were 747 megatonnes (Mt) of GHGs emitted in 2005.

There is a long way to go, but Ontario has made an excellent start.

In 1990, Ontario created almost 30 percent of Canada's GHGs. By 2014, Ontario's GHG emissions were six percent below its 1990 levels, 19 percent below its 2005 peak and only 23 percent of Canada's total emissions. The largest single reason for this progress was that Ontario closed its coal-fired electricity generating stations, helping to clean up its air at the same time. Coal is a potent source of GHGs, as well as mercury, other air pollutants and smog. In 2005, Ontario had 53 smog days; in 2015 (the first full year after the last coal plant closed) there were none, and only one in 2016. (This wasn't entirely due to Ontario; the US also closed many coal plants during that same decade. A lot of Ontario air pollution blows in from the US.)

Ontario remains ambitious. The federal framework could allow Ontario to emit 148 Mt of GHGs in 2030. Instead, Ontario has committed to:

- 15 percent below 1990 levels by 2020 (27 Mt reduction to ~ 155 Mt)
- 37 percent below 1990 levels by 2030 (67 Mt reduction to ~ 115 Mt)
- 80 percent below 1990 levels by 2050 (146 Mt reduction to ~ 36 Mt)

These targets are amply justified by climate science, as summarized in chapter one of our climate change report.

Climate action will be expensive and, in some cases disruptive, but climate inaction will cost far more.

But these further reductions will be difficult. Ontario still depends on fossil fuels for 80 percent of its energy. Transportation is our biggest challenge: Ontario's largest and fastest growing share of GHG emissions is from petroleum products used in transportation. Natural gas used in industry, homes and commercial buildings is our second largest source of GHGs. Methane from agriculture and waste management, and black carbon from diesel engines and inefficient wood stoves, are also serious pollutants.

Climate action will be expensive and, in some cases disruptive, but climate inaction will cost far more. While not all impacts are harmful, on balance, climate change will bring more extreme weather, ecological damage, financial loss and human misery.

Climate change does not mean that everywhere will be warmer all the time. Natural cycles, and disruption of those cycles, will sometimes make some places colder. But what used to be "normal" weather is gone, and not likely to return.

Ontario is already warming faster than the world average and the visible impacts are growing. Coldwater fish are losing habitat. Moose populations are declining. Invasive species are flourishing. Wildfire risk is increasing. Disease-carrying pests are spreading. Northern communities' essential ice roads are becoming unreliable. The season for ice fishing and snow sports is shrinking. Cities like Toronto, Windsor, Burlington, Thunder Bay and Sault Ste. Marie have suffered heat stress, extreme storms and devastating floods. Severe heat and drought have crimped water supplies and damaged crops. Meanwhile, people in other countries are being driven from their homes.

It is too late to avoid some disruptive and expensive changes to our environment and economy. But we still can influence how destructive those changes will be. By working together, we can still protect much of what we love, by reducing the GHGs that we emit, and by preparing for the changes ahead.

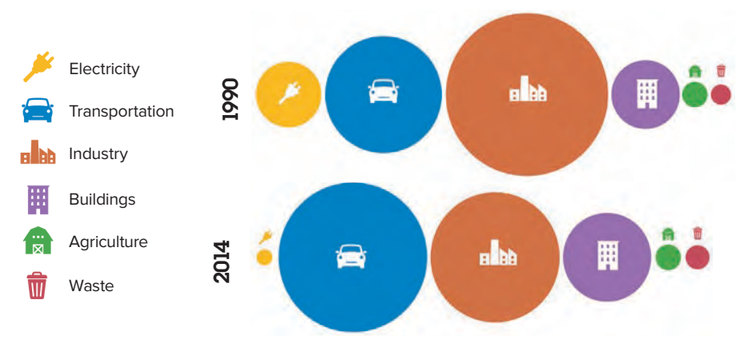
Cap and trade

Under the Pan-Canadian Framework, Canada is joining a worldwide movement to put a price on GHG emissions, starting in 2018. Putting a price on carbon pollution gives businesses and citizens an economic incentive to reduce their GHG emissions. Until now, there has been no price on GHG emissions. Pollution has been freely thickening a carbon blanket in the Earth's atmosphere, which has had dire consequences to global climate patterns and destructive secondary reactions (such as rising sea levels, drought, flood, famine ...).

There are two main ways to put a price on carbon pollution: a carbon tax, and/or a cap-and-trade program. Each can work well, or badly, depending on design and implementation. British Columbia chose a carbon tax. Ontario and Quebec chose cap and trade. A carbon tax is simpler to understand and cheaper to administer, but may not produce the expected reductions in GHGs. Cap and trade is more complicated, and may not produce the expected revenue, but can produce more reliable GHG reductions at a lower economic cost. The money raised can be returned to citizens, as BC does, or used to help transition to a lower-carbon economy, as Ontario plans to do.

Ontario's *Climate Change Mitigation and Low-carbon Economy Act*, 2016 (the "*Climate Act*"), creates a cap-and-trade system that covers 82 percent of Ontario's direct emissions. This system covers all fossil fuels (e.g., gasoline, diesel and natural gas) used in Ontario by individuals, governments and

Ontario's GHG Emissions by Sector



In the last 24 years, transportation became Ontario's largest and fastest growing source of GHGs. It consumes fossil fuels, so it's also Ontario's biggest challenge in GHG reduction.

*Source: **National Inventory Report 1990-2014: GHG Sources and Sinks in Canada, Part 3**, Environment and Climate Change Canada, Table A11-12, (2016) p.55.*

But there remains a chasm between the facts and what the public understands, and between government rhetoric and action.
If the government doesn't treat climate change as an emergency, then many people feel that they don't need to either.

businesses, and some other important GHGs like refrigerants. The first four-year compliance period began on January 1, 2017, and runs until 2020. To keep costs down for Ontario residents and businesses, Ontario plans to link its system with California and Quebec in 2018. For a plain-language primer on cap and trade, see our climate report Appendix A. For an analysis of the key issues around Ontario's system design choices, see chapter four of *Facing Climate Change*. (Find links to both of these at the end of this article.)

In general, Ontario's cap-and-trade system is well designed; balancing the urgent need for GHG reductions with the cost to Ontario citizens and businesses and the need to build public and non-partisan support. The types of changes that will reduce GHG emissions can also have many benefits for Ontario's environment and economy.

In 2020, we expect those required to participate in Ontario's cap-and-trade system, known as capped emitters, to have, in total, a 24-Mt gap between their projected business as usual emissions and the allowances (i.e., permits to pollute) that the government will distribute (for free or by auction). Emitters have several options for filling that gap; one option is to buy allowances from California.

Linking Ontario's cap-and-trade system with California and Quebec will reduce costs for Ontario GHG emitters (including everyone who uses petroleum products or natural gas), because California allowances are currently plentiful and cheap. It also has other important benefits such as improving market liquidity. But if Ontario emitters buy too many allowances from outside the province, Ontario emissions may not go down much. Also, the California cap-and-trade system faces legal problems.

Buying California allowances could send some emitters' capital to California for several years. However, the cap-and-trade system plus the Climate Change Action Plan should also reduce Ontario's $11-billion-dollar/year imports of petroleum and natural gas. The balance could be in Ontario's favour.

For these calculations, and a detailed analysis of the Action Plan, see chapter six of *Facing Climate Change*.

A timely supply of voluntary GHG reductions outside the cap available for emitters to buy may help keep investment and GHG reductions in Ontario. Offset credits allow emitters to buy GHG reductions from sectors such as agriculture and waste that are not covered by the cap. Offset credits may be accepted as valid and high-quality if they create GHG reductions that are "real, permanent, irreversible, additional and verifiable and is carried out in accordance with prescribed protocols." Ontario is working with other provinces across Canada to develop protocols for recognizing valid offset credits.

Spending the money well

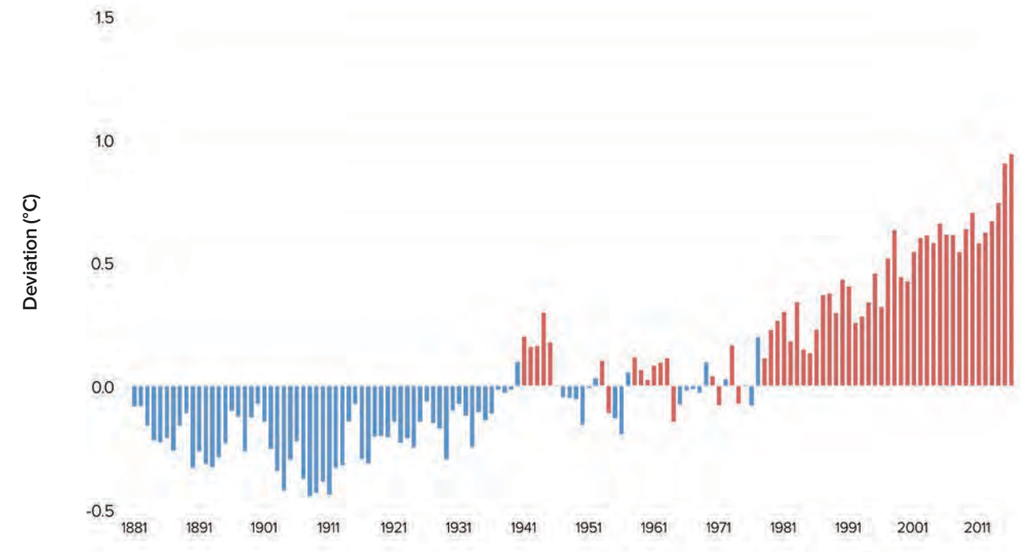
The Ontario government will put the proceeds from its quarterly cap-and-trade allowance auctions into a Greenhouse Gas Reduction Account (GGRA) that it controls. Its justification: it needs the money to pay for the Action Plan mentioned below, to drive emissions reductions that would not otherwise occur.

The ECO agrees with the government that putting a price on carbon, by itself, would not be enough to achieve Ontario's reduction targets, unless the price were very high. But will this large amount of new money (up to two billion dollars per year) be genuinely used to reduce Ontario's GHG emissions, or will it leak away into other government priorities? We are urging the government to build public confidence by ensuring that the money is being spent only on new GHG reductions, with clear spending rules and transparent, timely reporting.

Climate Change Action Plan

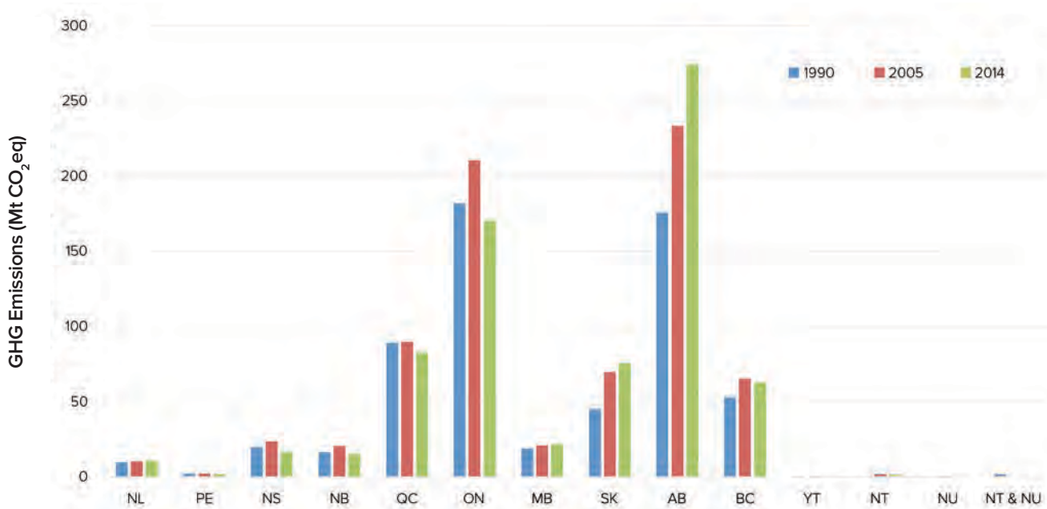
The cap-and-trade system alone is predicted to provide only 2.8 Mt of the 18.5 GHG reductions needed to meet Ontario's 2020 GHG target. The government claimed that the next 9.8 Mt of reductions will come from its Climate Change Action Plan, to

Annual Temperature Deviations



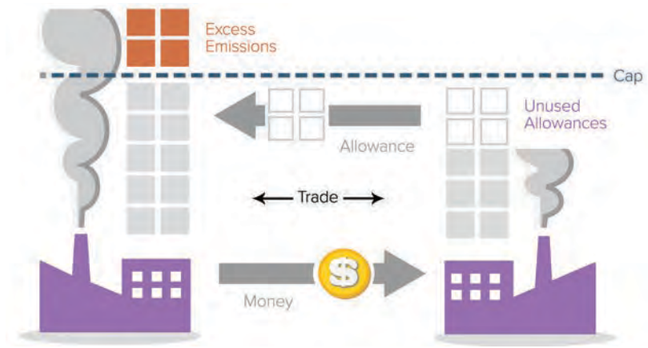
On a global scale, the average annual temperatures since 1880 have steadily increased by 1.5° Celsius compared to the average global temperature of the 20th century.
*Source: **Climate at a Glance: Global Time Series**, NOAA National Centers for Environmental Information (2017).*

Emissions by Province



While Alberta's GHG emissions have surpassed Ontario's since 2005, Ontario has had the largest decline in GHGs since that same time, mostly because it closed coal-fired electricity generating stations
*Source: **National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada, Part 3**, Environment and Climate Change Canada (2017).*

How Cap and Trade Works



The government sets an industry-wide limit to carbon production. Corporations who produce more than the set carbon limit are able to buy allowances from corporations who produce under the allowed amount. This creates a market for carbon so that companies can actually make money by cutting their carbon output. As time passes, the government will incrementally lower the cap, which in turn will cut the number of allowances issued, and drive up their price.

Diagram adapted from ***Ontario's Climate Change Strategy*** *(2015).*

be funded from the Greenhouse Gas Reduction Account, i.e., from selling cap-and-trade allowances to emit GHGs.

The Action Plan contains some excellent proposals, which should, over time, reduce Ontario's emissions. For example, the ECO supports the Action Plan's proposed investments in low-carbon transportation and in clean technology innovations. The proposed green bank (now called the Low Carbon Solutions Deployment Corporation) should help individuals and businesses to improve energy efficiency in buildings, and be a helpful intermediary between building owners/operators and energy efficiency service providers.

However, the Action Plan is not likely to produce 9.8 Mt in new reductions by 2020, as the government claimed. For example, the government claimed that using Greenhouse Gas Reduction Account funds to subsidize electricity prices would produce 3 Mt in emission reductions. We found no evidence to support this claim and concluded that subsidizing electricity rates is not an acceptable use of these funds. Fortunately, the government is no longer proposing to divert Greenhouse Gas Reduction Account funds in this way.

Altogether, cap and trade and the Action Plan are likely to produce only part of the reductions needed to meet Ontario's 2020 target. The rest will have to come from new reductions elsewhere in the economy, offset credits and/or California allowances.

Knowledge + action = hope

This has been an important year, with much progress on climate action in Ontario and around the world. Ontario has punched above its weight, and deserves kudos for its active role in national and international cooperation. Putting a price on GHG pollution was long overdue.

But there remains a chasm between the facts and what the public understands, and between government rhetoric and action. If the government doesn't treat climate change as an emergency, then many people feel that they don't need to either. To earn public support for serious climate action, the whole government must consistently show that it takes climate change seriously.

At the same time, climate change action cannot be left entirely to governments. As Canadians who care about each other and the beautiful country in which we live, there is much we can each do. Here are three simple but important things you can do now:

1. **Figure out your own GHG footprint, then reduce it.** (Online carbon calculators, such as project neutral can help.) For example, I found out that my biggest current impact was from heating my house with natural gas, so I switched to renewable natural gas (landfill methane) from Bullfrog.
2. **Speak up about climate change whenever you can.** Let your friends, neighbours, colleagues and (especially) elected representatives know that this is an issue about which you care deeply. Tell them what you are doing about it; ask them what they are doing, and why.
3. **To make it easier to speak up effectively, learn more about the current science.** It's worse than your friends and colleagues probably think. If it helps, use the facts and graphics in our report. We wrote it for you.

No one can do everything, but everyone can do something. It's not too late to make a difference.

As the Environmental Commissioner of Ontario, Dianne Saxe is the guardian of the Environmental Bill of Rights (1993). Saxe is also one of Canada's most respected environmental lawyers and the only practitioner with a PhD in environmental law. Awards have included Ontario Bar Association Distinguished Service Award, and the Osgoode Hall Lifetime Achievement Gold Key. At times, you might find Saxe somewhere in Canadian wilderness canoeing, kayaking or cross-country skiing.

Find Dianne Saxe's first report on greenhouse gas emissions, Facing Climate Change here: **ajlinks.ca/FCCreport**.

Find Appendix A to the ECO's Progress Report here: **ajlinks.ca/FCCappendix**.

Here are some fine online carbon calculators: **carbonfootprint.com**, **carbonzero.ca** and **projectneutral.org**.

Rhetoric and Refugees

Trump is what happens when we fail to understand our global problems in context.

ANDREW

IF YOU WANT to know why Donald Trump is a symptom and not a problem or why the world faces a crisis of civilization as opposed to a "clash of civilizations," it's best to spend some time with Nafeez Mosaddeq Ahmed.

Ahmed is a British investigative journalist who has been connecting the dots on energy, climate change and globalization for years. The title of his latest book sums up our predicament: *Failing States, Collapsing Systems*.

The new global drama of eroding democracies and failed states, he says, can best be explained by a dramatic energy story that the media doesn't want to report.

"Trump is what happens," writes Ahmed, "when you fail to understand our global problems in their interconnected, systemic context."

The whole mess begins with net energy declines, a subject this column has often explored. As the world runs out of cheap conventional fuels, industry has switched to shale gas, bitumen or offshore oil. But these extreme fuels make poor substitutes because they return less energy and cost more capital, water and energy to extract.

A global economy that has grown fat on cheap energy in the past 70 years is now having trouble digesting unconventional fuels funded by easy credit and wild debt.

As Ahmed notes, global oil and gas production once offered energy returns of 100:1 ($100 return on every dollar) – a veritable energy feast that fueled the growth of global capitalism for 100 years.

But those bountiful energy returns have ended. Today net energy returns average between 15:1 and 17:1. Once returns drop below 10, fossil fuels can't generate enough surpluses to pay for the arts, government and society as we know it, let alone a transition to renewable energy.

As the quality of fuels decline, the global economy (a highly engineered tree fertilized by cheap oil) registers the change as "economic stagnation." Around the world "the rate of GDP growth correlates directly with the steady decline" in energy returns, notes Ahmed. And GDP is dropping or slowing down from China to Europe.

This energy descent is taking place just as the globe's fossil fuel economy has transgressed several biophysical limits to growth including climate change, the decimation of wild creatures and the alteration of the world's nitrogen cycles from fertilizer abuse.

Climate change is now undoing economies and shifting populations. According to Mosaddeq Ahmed, heat waves and drought propelled by disruptive carbon emissions could put a third of the world's population at risk of starving by 2050. The more we disrupt earth systems, warns Ahmed, the more we destabilize human systems.

Take Syria for example. First its oil production, a key source of government revenue used to subsidize wheat prices, dropped by half over the last decade. Then climate change amplified drought cycles in Syria killing crops and depleting water resources.

Hundreds of thousands of climate refugees poured into the cities while food prices triggered protests. The nation's bloody civil war now threatens to destabilize Europe with millions of refugees. Complexity, built by fossil fuels, has made the world a fragile place.

Or consider the mayhem in Nigeria. Its population will rise from 160 million to 250 million by 2025 just as the nation's key revenue earner, oil, experiences a serious drop in production due to depleted reserves and rampant corruption. Meanwhile the terrorist group Boko Haram recruits from areas ravaged by drought and food shortages. The forecast: an escalation of political violence.

And what of the European Union? Oil production peaked in the region in 2002 and the Union's dependency on foreign oil imports hit 87 percent in 2014 – the highest level recorded in 25 years. Unrelenting economic stagnation coupled by high unemployment has revived nationalistic movements while climate change could overwhelm the continent with more refugees from North Africa and the Middle East by 2030.

So Trump, angry populism and anti-Muslim rhetoric are symptoms of what happens when you ignore a qualitative change in energy resources, and shift the focus to chaos and terrorism, which are also symptoms of the same problems.

"Human systems – social, political, geopolitical, cultural, and so on – are becoming destabilized in the context of escalating Earth System Disruption driven by dependence on fossil fuels," writes Ahmed.

"But the failure to understand this is driving increasingly reactionary approaches that address only symptoms of this destabilization."

This may be the globe's most pressing negative feedback loop. AJ

Andrew Nikiforuk is an award-winning journalist, who has covered issues in energy and economics for over 30 years. His latest book is *Slick Water: Fracking and One Insider's Stand Against the World's Most Powerful Industry* (Greystone Books Ltd.).

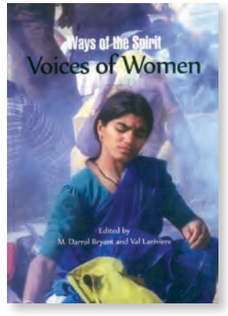
PHOTO BY DOREEN DOCHERTY

DIVINE CONNECTION

Ways of the Spirit: Voices of Women

Edited by M. Darrol Bryant and Val Lariviere, Kitchener: Pandora Press, 2014, 208 pages.

Reviewed by CAROLINA MIRANDA



Last year I went back to my parents' home in Brazil for Christmas and my mom gave me one of the most important gifts I've ever been given thus far: boxes and boxes of letters, cards, journals, and an overall infinite amount of childhood memories that she kept along the years without my knowledge. She also kept some of my school books – my favourite ones. And to my utter surprise, I realized that throughout my childhood, the subject I took most pride in was Religion. I had always thought language, reading and poetry were among my strongest suits, but my memory somehow had buried what became clear while staring at the evidence that was contained in these notebooks: Religion was most definitely my dearest subject in primary school.

I was raised loosely Catholic at home – I say this because my parents really didn't think it was that important to attend mass, and my dad certainly had much more secular views of life than my mom did. But I did attend very traditional and strict Catholic schools all the way to grade eight – my Portuguese grandmother, Rosa, made sure I did so. She has always been devoted to her parish, and for many years, it was her oven that baked all of the holy hosts for Sunday Communion. She'd cut each one of them by hand, with a little cup she had in her kitchen. While reading about Jesus' altruism and kindness seemed to have truly inspired me in my childhood years, there was another childhood memory of mine that never really left me, but which I kept a secret until very recently: I always talked to trees, and I could feel the elements of Nature in a different way. It was as if there was a mutual understanding between us.

I did not dare to bring this up for fear of being called crazy, but I knew that my connection to Nature was something profound and sacred. I was raised along the lush shores of Rio de Janeiro, and the trees, as well as the ocean had a way of reminding me that all was well, whenever my heart was tight. It was there that I found solace when my first puppy died. And I remember sobbing in my family car, staring at the coast we were leaving behind, when we took a long journey moving from one state to another, embarking on a life that was going to be a lot more suburban. What I also discovered last year, is that my grandfather Manuel, married to Rosa, was in fact an indigenous man, but who had his connection to the land and to his Indigenous origins severed. His seemingly Catholic name was in fact a product of colonization and catechization of Jesuit schools.

Reading the collection of essays found in *Ways of the Spirit, Voices of Women*, edited by M. Darrol Bryant and Val Lariviere, and written mostly by women from the Greater Toronto Area where I live, gave me a sense of place, and an understanding that the contradictions in my soul are actually not at all that uncommon. They are in fact what allows me to have a richer sense of empathy through a much more complex understanding of faith. Each writer shares the many ways in which they relate to their spirituality, not as a conflicted contradiction but as a beautiful tapestry of experiences that form in any fully grown adult who has lived, learned and loved in these highly complex times we currently find ourselves in. These reflective and intimate stories (and sometimes poems) hold profound wisdom and share teachings that are as intricate as the women themselves. Their accounts attempt to show the reader what is most authentic about their spirituality, and in doing so, they find ways of connecting to what is divine and meaningful around them, finding sacredness in some of their most real, human experiences. Be it through dance or yoga, through the connection with animals, or through the simple act of listening and speaking, each story allows us to understand the different ways in which these women live meaningfully, in the moment, while seeking harmony and inner peace.

Each story is incredibly honest and filled with the intricacies of what it means to be human: the legacy we are given by our ancestors, our own search for healing and the belief in a greater purpose, which sometimes leads the authors to completely unforeseen pathways. Casey Clifford Rock, for instance, a Catholic theologian, found her deepest expression of living faith through the practice of meditation and yoga. Sometimes the stories take us through a sensitive journey of awareness about what's constantly surrounding us, such as when contributor Judith Maclean Miller exposes the beauty in her exploration of dialogue, through the ways of speaking and listening. Within each story, however, we are left with a sense of relief, for these women speak their deepest truths authentically and gently, generously serving as a mirror in which we are able to see ourselves. They provide us with a reflection of our own intersectionalities and diversity, and with that comes a sense of safety in knowing that no one is alone in the need to belong and to connect to a higher power, however this connection may manifest itself.

In times when life seems to have lost so much of its value, where we are desensitized by headlines about more than 30 migrants being shot dead in a boat off the coast of Yemen or a puppy being shot dead for accidentally entering the runway and delaying flights at an airport in New Zealand, *Ways of the Spirit, Voices of Women* is a balm for the soul and a promise of hope for the future. It shows us in practical and non-dogmatic ways that it's up to each one of us to make a concerted effort to reconnect with ourselves, with the preciousness of life, and a profound sense of divinity. It reminds us that any attempt we make at elevating our characters and our spirits through an honest understanding of ourselves will lead to the understanding of one another. In this, we may just find a promise of a better, gentler and more gracious world – and that it may just be women who show us the way to awakening through authentic life experiences and an ethics of care. A\J

Carolina Miranda is an elementary school teacher in Ontario, and one of the co-founders of the social-profit organization Feminine Harbor. She is also a mother and a woman of much faith in the universe. You can contact Carolina at **info@femininehar bor.com**.

Next in A\J

Food & Food Resiliency

A\J explores the impacts of climate change on our food systems, with a particular eye on the innovations that will allow us to create a more resilient nutritional network.

Can't Buy Me Bugs
From his new tribute book to the beetles, *David Waltner Toews* tailors an exclusive article for A\J Readers in his in-depth look behind the insect-eating movement.

Run-off to Ruin
Andrew Reeves, A\J's water columnist, shares with us the tragic (and on-going) story of the Lake Erie algae bloom crisis, its roots in factory-farming and over-fertilization, and the steps that are being taken to try to keep 2017 from being the worst year ever for toxic algae blooms.

Urban Agriculture
Most Canadians live in cities. The food that most Canadians eat is grown outside cities, sometimes thousands of miles away. We'll explore how some forlks can hopscotch the 100-mile diet to the 100-steps diet.

+ *Lots more stories, recipes and ideas and inspiration.*
In the meantime, please enjoy more features at **alternativesjournal.ca**

Language Trigger

We were so set on winning the argument that we couldn't see how our words closed doors.

TZEPORAH

I WAS FIRST introduced to the concept of ecological economics 25 years ago in an undergraduate course that looked at the work of Herman Daly and the concept of "steady state economics." We also looked at Hazel Henderson and her ground-breaking work on valuing what is called "externalities" in our economic system – the very air we breathe and the water we drink – and of course the work of E.F. Schumacher who popularized the phrase "small is beautiful" and championed the idea that small, appropriate technologies and solutions that emphasize empowerment of communities are worth considering over the doctrine of "bigger is better."

As I look back on the last 25 years of environmental activism I am saddened by how little progress we have made in creating debate on these and other theories and how few gains we have made in ensuring that ecological health is prioritized in our economic systems. Why is that?

Upon reflection I think that it is in part because "progressives" have failed to recognize how the language we use triggers the opposite reaction that we hope for. We are so set on winning the argument, on being right, that we have been blind to how the language we use has closed doors and reinforced the idea that our demands are unrealistic, pie in the sky or simply require too much sacrifice.

When we call for reduced consumption or "living simply," most people hear that they will be constrained from getting what they want. They picture a time when societies did not have today's conveniences. I have heard more than once when I talk about conservation and climate change that, "you just want everyone to go back to shivering in the dark."

Yet, when I envision economy in a society that that values nature and is addressing the threat of climate change, I envision a high tech, clean tech society. I see Shanghai's magnetic levitation electric high speed rail trains, co-generation systems from sewage like in Vancouver's Olympic Village and community solar installations. I don't see caves and "hair shirts."

However, when we frame the ideal as less and argue against growth we immediately challenge the majority view of progress. To be clear, it is essential that we price carbon, water, and all ecosystem services if we are going to have true ecological economics, but is it essential that we slow growth? Do we need to consume less, or less bad stuff? I think we need more development of renewable energy not less. Yes, we need efficiency and conservation but arguing that that's all we need just doesn't ring true.

Creating environmental debates that actually lead to legislative or corporate changes requires building power – building large constituencies, convincing opinion leaders or amassing financial power. All of that requires creating narratives that open debates not close doors. Our arguments must ring true to people so we can have what is called in social movement theory a "resonant chord." If we truly want to ensure that our economic decisions respect nature, we should be arguing that not doing so has harmful personal and societal impacts. By doing the right thing we will have more – more opportunities, more new exciting technologies, more water, more clean air and not less. AJ

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Tzeporah Berman has been designing and running environmental campaigns in Canada and beyond for over 20 years.

The name Herman Daly keeps coming up. Why not find out more about his ideas of "steady state economics" at **ajlinks.ca/steadystate**.