

The *Fast* Lane



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The Fast Lane Tracking the Energy Revolution 2019

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A new energy era has already begun

When you think of a Canadian energy sector worker, what comes to mind? It might not be someone like Diane Praught, who uses recycled CO₂ to make stronger, cleaner concrete for new homes at Halifax-based CarbonCure. Or Kate Parnala, who helps build electric buses for Winnipeg's New Flyer. Or Charles Bureau, who creates clean fuels out of waste at Enkema's Edmonton facility. Yet they are three of the 298,000 people already employed in Canada's clean energy sector.

Now picture Canada in 10 years. Imagine more than half a million jobs like those of Diane, Kate, and Charles. **Canada's clean energy sector is on track to employ 559,400 Canadians by 2030** in jobs like these, according to new research from Clean Energy Canada and Navis Research. This future-looking model (which follows our historical analysis from May, [Missing the Bigger Picture](#)) provides a clear roadmap for Canada's future.

When it comes to energy, **there's a fast lane, and there's a slow lane**. The fast lane is our clean energy sector; the slow lane, our fossil fuel energy sector.

While jobs in the fossil fuel energy sector are set to shrink by 0.5% every year out to 2030, jobs in the clean energy sector are set to grow 3.4% annually over the next decade—nearly four times faster than the Canadian average. Coincidentally, this also represents 3.4% GDP growth in the sector every year for the next decade. That's more than twice as fast as Canada's economy, and nine times quicker than the fossil fuel sector is projected to grow over that period. Investment, meanwhile, is set to increase by 30% to \$38 billion between now and 2030.

In short, it's the Canadian energy success story that no one is talking about, often drowned out amid the headline-dominating buzz of gas prices, pipelines, and electricity costs. Put simply, when we talk about energy in Canada, we're missing the bigger picture.

And therein lies a problem: when governments miss this bigger picture, many of the jobs that come with it are at risk.

We can welcome this success only if we are committed to climate leadership. The sector's projected growth is modelled on policy measures either in place or announced in early 2019 at both federal and provincial levels. If climate measures are eliminated—as we've recently

seen in Alberta and Ontario—our emissions will go up and Canadians working in clean energy could lose jobs.

That would not be a very appealing future for most Canadians, who we know care deeply about our climate, and who no doubt want stable careers in a changing world.

The clean energy sector is made up of companies and jobs that help reduce carbon pollution—whether by creating clean energy, helping move it, reducing energy consumption, or making low-carbon technologies. It's diverse and spread across the country with opportunities in all provinces and in many industries.

Our previous report on the current size of Canada's clean energy sector found it already employs roughly the same number of people as real estate: 298,000 as of 2017. But as our model shows, there are hundreds of thousands of clean energy careers still to come. Indeed, **while 50,000 jobs may be lost in fossil fuels, just over 160,000 will be created in clean energy—a net increase of 110,000 new jobs.**

The world is transitioning to a low-carbon future. From our electric bus manufacturers supplying buses across North America to the Canadian technology that turns trash into fuel now found across Europe, Canada's clean energy industries and technologies will keep us internationally competitive.

And the policies that support them will keep us on track to fight climate change. There is more to do, not less. The clean energy sector is ready to get a lot bigger. Now we need to support its growth. **For our economy, our livelihoods, and our environment, let's choose the fast lane.**



A stylized, handwritten signature in black ink, consisting of a large, flowing 'M' and a smaller 'S'.

Merran Smith
Executive Director
Clean Energy Canada

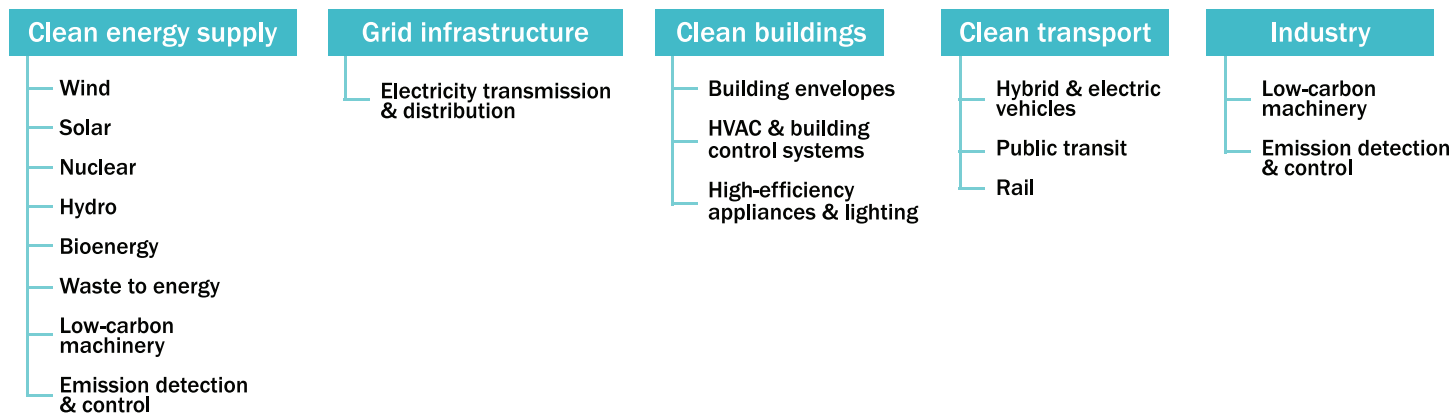


Clean energy sector: bigger than you think

THE CLEAN ENERGY SECTOR already employs 298,000 Canadians across all provinces and, since 2010, has been growing a third faster than the Canadian economy as a whole. The number of jobs grew well above the national average, and investment has been flooding in, growing from \$21 billion in 2010 to \$35.3 billion in 2017.

But, while the clean energy sector is already significant, it has the potential to get a lot bigger, meaning even more careers and opportunities for Canadians. All while creating an increasingly safe, clean, and more sustainable economy for all of us today and in the future. For more information on the size of Canada's clean energy sector at present, see our May 2019 report, *Missing the Bigger Picture*.¹

The sector breakdown





Electric vehicles will make up nearly half of new car sales in 2030

Help wanted

IN 2030, THERE ARE PROJECTED TO BE 559,400 jobs in Canada's clean energy sector. These are careers for Canadians in every province, from the Albertan insulator to the lineworker in Nova Scotia. They also represent a huge range of businesses, from manufacturing energy-efficient appliances to developing smart home systems that reduce household energy waste.

The majority of the jobs are in clean transport. That's jobs like manufacturing electric cars, buses, and trucks that are forecast to hit our roads in record numbers. In fact, several transit authorities have committed to buying only electric buses over the next decade,² while provinces like B.C. have legislated targets

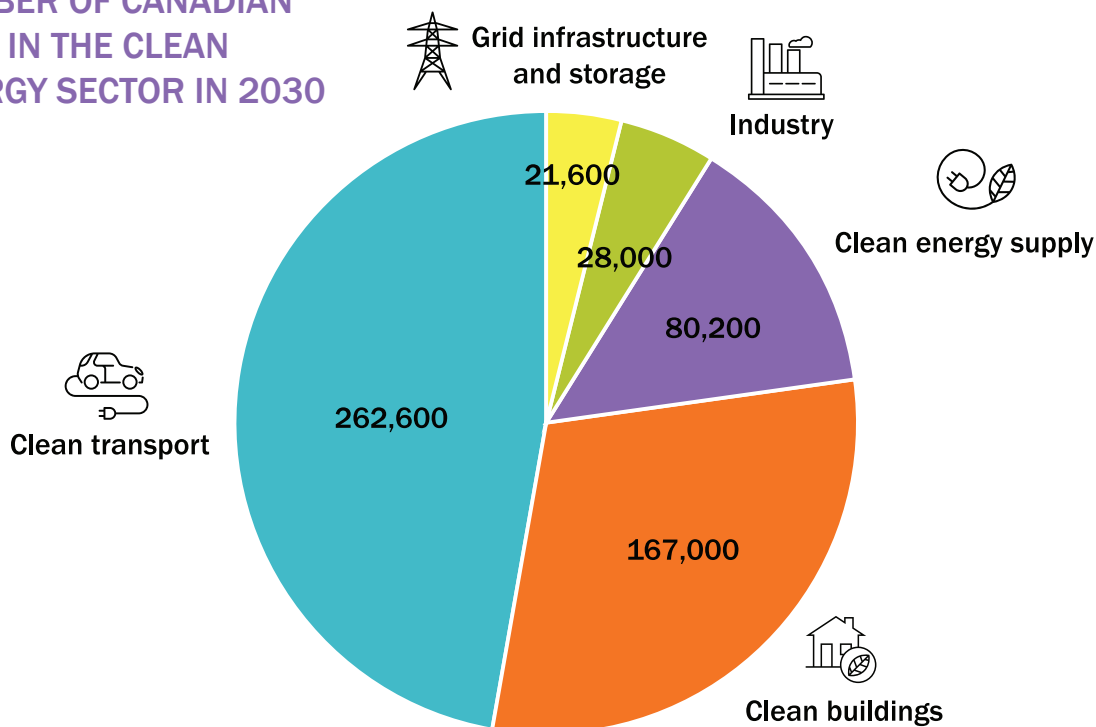
to only sell zero-emission passenger cars by 2040 (the federal government has the same target, albeit as an aspiration and not law).³

There are also 167,000 jobs in clean buildings, making it the second-largest employer in the sector. Most of these workers will be making buildings energy-efficient, helping our homes and businesses waste less energy and save money.

And there are 80,000 Canadians employed in clean energy supply, working to bring clean power across the country, whether by maintaining wind farms, repairing power lines, or designing microgrids.

Employment breakdown

NUMBER OF CANADIAN JOBS IN THE CLEAN ENERGY SECTOR IN 2030



4x

Job growth in Canada's clean energy sector will be **nearly four times faster** than job growth in other sectors

A picture of prosperity

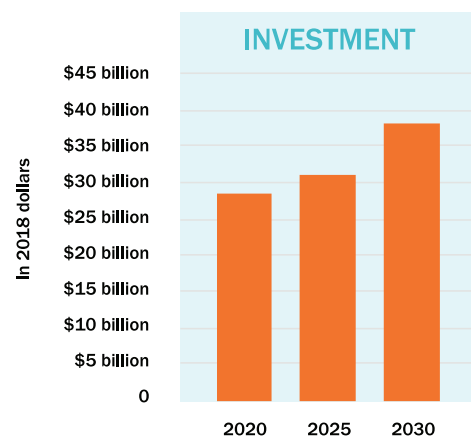
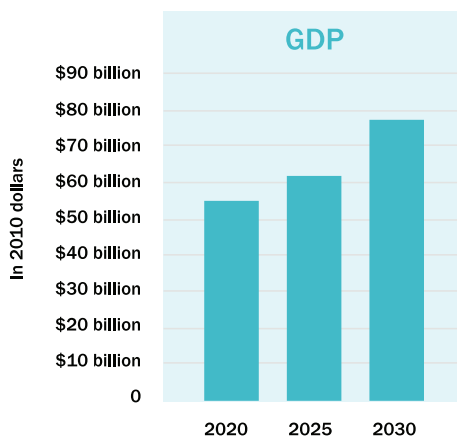
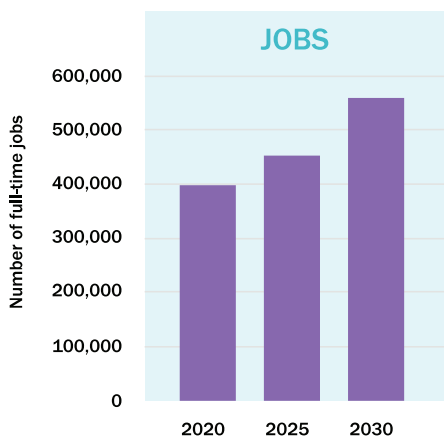
CANADA'S CLEAN ENERGY SECTOR IN 2030 is a picture of prosperity. But how will we get there? Our modelling shows that the clean energy sector will grow rapidly in every province, generating tens of thousands of new jobs while drawing in billions in investment. Clean transport is by far the fastest growing industry in the sector, with its GDP and investment increasing at least 5% every year and the number of jobs increasing 3.6%—several times the national average.

As a whole, **the clean energy sector's GDP is set to grow by 3.4% every year**, increasing from \$54.9 billion in 2020 to \$77.4 billion in 2030. **Compare that to the Canadian economy, which is currently growing at 1.5% per year.** In fact every part of the sector is expected to grow, with the exception of nuclear (largely because of planned refurbishments). **The number of jobs in the sector is also set to grow by 3.4% a year as well, from**

398,000 in 2020 to 559,400 in 2030. The job growth rate across Canada, for comparison, is forecast to be 0.9% a year. Investment is set to arrive by the billions, rising from \$28.6 billion in 2020 and \$38.2 billion in 2030.

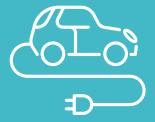
Several industries are expected to see particularly rapid expansions. **The hybrid and electric vehicle industry, predicted to grow 28% annually, will create 14 times more jobs in 2030 than in 2020**, while annual investment will grow from \$1.7 billion to \$7 billion (perhaps not surprising as electric vehicles are expected to make up 48% of new car sales in 2030). Waste-to-fuel processing is also set to increase a massive 10% in GDP every single year—7 times faster than the rate of growth elsewhere in the Canadian economy. Bioenergy and emissions detection and control are also set to attract significant investor attention.

The clean energy sector: accelerating fast



FACES OF CLEAN ENERGY

Kate works in:



Clean transport

If you rode a bus to work today, there's a good chance it was made by Winnipeg-based New Flyer. It's also possible that part of the bus completion was assisted by Kate Parnala.

Kate is a manufacturing engineering technologist with New Flyer working on the production of electrical components that control the operation of some of New Flyer's buses.

New Flyer, a subsidiary of NFI Group, is the largest bus manufacturer in North America, employing 1,300 people in Canada who manufacture transit buses, including zero-emission battery-electric buses. And because buses—especially electric ones—cut Canada's carbon pollution by getting people out of their cars, **New Flyer is one of the biggest employers in Canada's clean energy sector.**

And while increasing transit use, particularly electric transit, cuts pollution, it also creates more Canadian jobs—like Kate's. Her working day starts with meetings to ensure operational metrics are achieved daily, and her job involves a lot of problem-solving and continuous improvement.

"Throughout the day, I try to find new ways to solve challenges and develop solutions related to electrical component development," she says.

When not helping build increasingly clean buses for North American roads, Kate does her best to live a sustainable, zero-waste lifestyle and enjoys charity runs.

Other examples of clean transport jobs include: an electric bus driver or a mechanical engineer designing parts for electric cars

PHOTO: NEW FLYER

Name: Kate Parnala

Career: Manufacturing Engineering Technologist

Company: New Flyer

“Throughout the day, I try to find new ways to solve challenges and develop solutions related to electrical component development.”



Faster than fossil fuels

THE CLEAN ENERGY SECTOR IS SET to grow far more quickly than fossil fuel energy. **The Canadian fossil fuel energy sector's GDP is forecast to grow 0.4% a year—almost nine times slower than the clean energy sector, which is on track to grow 3.4%.**

Between now and 2030, annual investment in the clean energy sector is expected to grow 2.9% a year, while investment in the fossil fuel energy sector is on track to shrink 1.2% annually.

Jobs in the clean energy sector are also going to be more readily available over the next decade as they

increase by 3.4% a year from 398,000 in 2020 to 559,400 in 2030. Jobs in the fossil fuel energy sector, meanwhile, will decline 0.5% a year, from 1 million in 2020 to 989,700 in 2030. To put that into perspective, by 2030, Canada's clean energy sector will employ 57% as many Canadians as the fossil fuel energy sector—a significant increase that we can expect to continue. **Indeed, while 50,000 jobs may be lost in fossil fuels, just over 160,000 will be created in clean energy—a net increase of 110,000 new jobs.**

CASE STUDY

ONE POLICY THAT CREATES 31,000 JOBS

The Clean Fuel Standard might not have an exciting name, but it represents a lot of jobs and pollution saved. According to another study we conducted with Navius in 2017,⁴ the clean fuel standard is on track to create up to 31,000 jobs in clean fuels by 2030 and eliminate 30 megatons of pollution (equal to taking seven million cars off the road). Scrapping it—and policies like it—would have a high cost on both clean jobs and pollution.

Clean energy sector jobs will grow

3.4%
a year

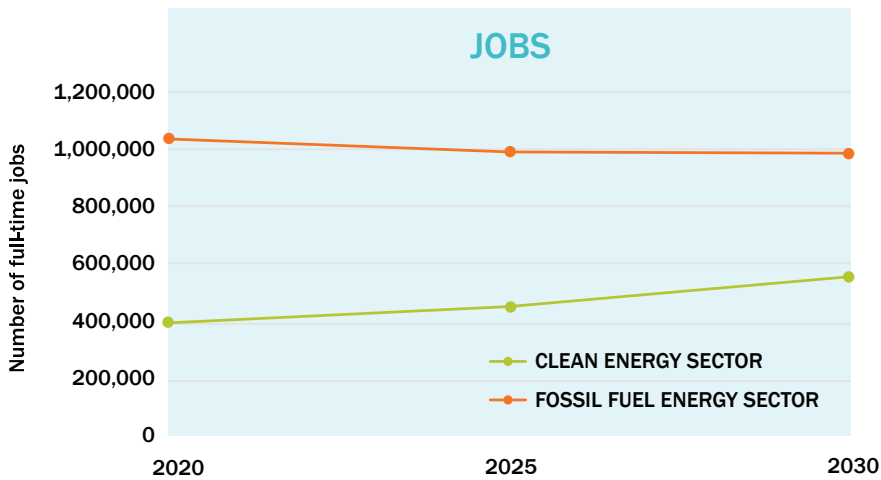
While fossil fuel energy sector jobs will decline

0.5%
a year

DEFINING THE FOSSIL FUEL ENERGY SECTOR

The values for both the size and number of people employed in the fossil fuel energy sector is greater than the numbers reported by Statistics Canada and our previous report, *Missing the Bigger Picture*. This is because the definition of the sector is a lot broader. It includes fossil fuel production, electricity generation using fossil fuels, and value added (e.g. trucking companies that rely on fossil fuels) in line with the clean energy sector definition.

Growth vs. decline

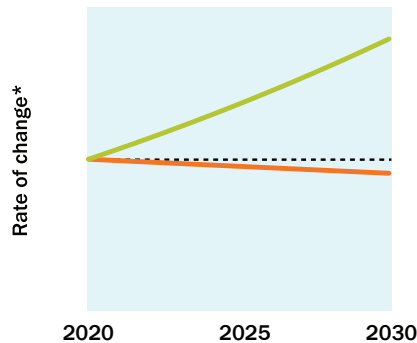


160,000
clean energy jobs gained

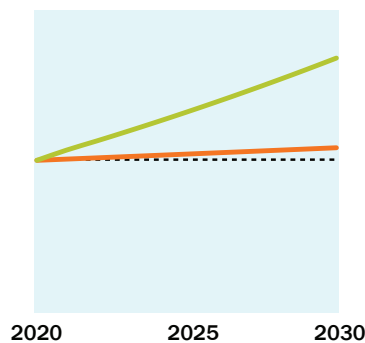
50,000
fossil fuel jobs gone

a net increase of
110,000
new energy jobs

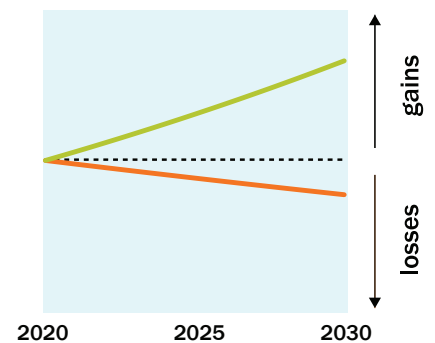
JOB GROWTH



GDP GROWTH



INVESTMENT GROWTH



— CLEAN ENERGY SECTOR — FOSSIL FUEL ENERGY SECTOR ----- ZERO GROWTH

*normalized to the same 2020 level

JOB NUMBERS

	2020	2030
CLEAN ENERGY SECTOR	398,000	559,400
FOSSIL FUEL ENERGY SECTOR	1,039,000	989,700

GDP DOLLARS

	2020	2030
CLEAN ENERGY SECTOR	\$54.9 billion	\$77.4 billion
FOSSIL FUEL ENERGY SECTOR	\$238.0 billion	\$248.3 billion

INVESTMENT DOLLARS

	2020	2030
CLEAN ENERGY SECTOR	\$28.6 billion	\$38.2 billion
FOSSIL FUEL ENERGY SECTOR	\$116.8 billion	\$103.6 billion



➡ **CLICK HERE** to watch our video on the future of clean energy jobs in Canada and share the good news

Obi works in:



Clean buildings

"I've had people come out of their house to shake my hand and say we've helped them bring up the equity of their house," says Obi Sadden, who runs the company Energy Plus Insulation in Medicine Hat, Alberta.

Obi fell into the insulation industry by chance. He started as a firefighter in the oil and gas sector, but in 1980, policy changes caused Alberta's interest rates to sky-rocket, and Obi lost his job.

Pondering his next career move, he decided to join a friend's insulation firm, and eventually started his own company in 2004.

Obi says that most people do want to make their homes more energy efficient, but a difficult economy and lower rebates make it hard. "We have to push for greater awareness and education so people understand what's inside their homes," he says.

Knowing his company is helping lower emissions, energy consumption, and contributing to cleaner air is a source of pride. "I feel tremendous gratitude whenever people come up to me to thank us for our services and helping them save money—many tell us they wish they'd done it sooner."

Obi's story is part of Efficiency Canada's ["Our Human Energy" campaign](#).⁴

*Other examples of clean building jobs include:
an electrician installing smart home energy systems or
a plumber fitting ground-source heat pumps*

PHOTO: EFFICIENCY CANADA

FACES OF CLEAN ENERGY

Name: Obi Sadden

Career: Entrepreneur

Company: Energy Plus Insulation

“

*I feel tremendous gratitude
whenever people come up to me
to thank us for our services and
helping them save money—many tell
us they wish they'd done it sooner."*



Name: *Fahimeh Kazempour*

Career: *Technical Manager,
Grid Innovation*

Company: *Alectra Utilities*

Fahimeh works in:



Grid infrastructure
and storage

Fahimeh's love for all things electrical began at an early age, she says. "I took apart lots of my toys, including my grandma's old radio, to see what is inside and how they work. Of course, I failed to put them back together."

Fahimeh now works for Alectra Utilities, the second-largest municipality-owned utility in North America, providing clean power to millions of homes in the Golden Horseshoe area.

Fahimeh conducts research and analysis on emerging smart grid and clean energy technologies, developing microgrids, zero-emission homes, and vehicle charging infrastructure.

There are many things she enjoys about her job, particularly when she sees people's lives benefit: "I won't forget when a customer called to say how grateful he was that he could invite his neighbours round for a cold beer when the whole neighbourhood lost power but his house, which was equipped with solar and battery storage."

*Other examples of grid infrastructure and storage jobs include:
a lineworker maintaining power lines or an electrical engineer designing parts for smart grids*

PHOTO: ALECTRA UTILITIES



Name: *Diane Praught*

Career: *Director of Technical Services*

Company: *CarbonCure Technologies*

Diane works in:



Industry

When Diane was a child, she used to climb a tree in her back garden on Prince Edward Island and watch the construction of the Confederation Bridge. She reminisces that this was what first kindled her interest in concrete: "From the start, I had a curiosity about the built environment."

Diane's passion for the built environment has stuck. She works for CarbonCure, a Nova-Scotia-based company that aims to reduce the carbon footprint of construction by using recycled CO₂ to improve the manufacturing process of concrete.

No two days are the same in her role as head of the technical services and support department, she says. "My days range anywhere from creating departmental standard operating procedures and training our team, to getting up at 2 a.m. to spend 12 hours field-testing concrete with engineers and quality control personnel."

With a degree in environmental engineering technology, but a background in concrete quality control, for Diane, finding a career at CarbonCure was a match mixed in concrete heaven.

*Other examples of industry jobs include:
an engineer designing low-carbon equipment for the mining industry or a technician managing carbon capture and storage equipment*

PHOTO: CARBONCURE



Choosing the fast lane

OUR CLEAN ENERGY SECTOR'S SUCCESS DEPENDS, in part, on the decisions we make as a country. This vision of Canada's clean energy sector in a decade is viewed through a telescope of pre-existing policies. Remove these policies, and the picture worsens.

These are measures like pricing carbon pollution, the clean fuel standard, investments in energy efficiency, the phaseout of coal power, programs to promote clean power, funding for cleantech, and more. These efforts have been taken at federal and provincial levels—and they're vital for the sector to keep growing.

But some of these policies have already been axed at the provincial level, and good, clean jobs are being lost. **In Ontario, 6,000 jobs and half-a-billion dollars of investment⁶ are thought to have been lost after the provincial government cancelled renewable energy projects.** And without the federal government stepping in with a price on carbon pollution, as well as replacing the electric car and energy efficiency incentives⁷ scrapped by Premier Doug Ford, Canada's biggest province would have fallen even further behind in its climate efforts—not to mention job growth in its clean energy sector.

With the world shifting to clean energy, our fossil fuel energy sector faces significant challenges. We must now be energy leaders, not just fossil fuel energy leaders, or we will fall behind. The transition to clean energy is a job creator during a time when fossil fuel energy jobs will continue to decline.

This does, of course, need to be a fair transition for all. That means retraining programs and transition centres for fossil fuel energy workers, akin to what exists now for coal workers as Canada phases out coal power. Others could find work helping the oil and gas sector evolve its products⁸ from fuels we burn to other uses, like supplying carbon fibre⁹ or hydrogen,¹⁰ or extracting lithium¹¹ for electric car batteries from oilfield wastewater.

Market changes will occur regardless of government decisions, and Canada could fall behind if our policies don't allow our clean energy sector to excel at home and grow abroad. We need to build on our climate policies, not disassemble them.

In short, we need to choose the fast lane for our economy and our future.

“ I was drawn toward clean energy. You can't not like the idea of changing waste to fuel. It was an easy buy-in.”

FACES OF CLEAN ENERGY

Name: Charles Bureau

Career: Process Engineer

Company: Enerkem

Charles works in:



Clean energy
supply

PHOTO: ENERKEM®

Charles works for Quebec-based Enerkem, which builds waste-to-fuel facilities around the world. The refineries take non-recyclable trash from garbage cans and dumpsters and transforms it into a clean-burning, biodegradable fuel that can be used in cars, buses, and airplanes. Like the old saying goes, one person's trash is another person's treasure. Or in this case, ethanol.

Charles's job is to support the daily operation of the plant and provide day-to-day guidance to the plant's operators. His days vary, and he is often moving around the facility. "While I'm sometimes at my desk, I spend most of my time in the control room with the operators or in the field," he says.

Charles started working for Enerkem during an internship as part of his university degree after he visited the first pilot plant in the course of a class. As Charles puts it, "I was drawn toward clean energy. You can't not like the idea of changing waste to fuel. It was an easy buy-in."

Charles has now been at the company for almost a decade. When not transforming trash into biofuels, he enjoys hanging out with his two daughters and wife, exploring the Rockies with them, and occasionally manages to squeeze in a game of golf or hockey.

After all, in life as in sport, Charles knows where the puck is going.

*Other examples of clean energy supply jobs include:
a technician maintaining a wind farm or an engineer designing a hydroelectric dam*



METHODOLOGY

Modelling was undertaken using Navius's gTech model. The model is unique as it combines three different models into one system. It is able to simulate technological choice (how households and firms select their technologies), macroeconomics (accounting of the economy at large, including how provinces interact with each other and the rest of the world), and biofuels supply. For more information, see the corresponding [technical report](#) produced by Navius Research.¹² All

investment values are reported in 2018 dollars and all GDP is reported in 2010 dollars for ease of comparison with other datasets. The policy frameworks modelled are those that were either implemented or announced as of February 2019. A full list of policies included can be found in the corresponding technical report.² This methodology and scope applies to everything modelled, including fossil fuel energy.

DIFFERENCES FROM PREVIOUS REPORT

There are some differences in the way the sector is defined compared to the historical analysis presented in *Missing the Bigger Picture*. This is due to differences between historical data collection and forecasting methodologies.

- Construction built above existing building codes is considered green (because these codes are written to higher environmental standards than past codes), unlike the historical report, which considers only buildings certified to meet green building standards. As a result, the new report is a broader definition. The construction of building envelopes (or building shells) is included.
- This report considers the value added associated with the use of all clean energy technologies. For example, an electric vehicle may be used to provide courier services, adding value to that vehicle's impact.
- Results are reported in real rather than nominal dollars.
- Industry is included. Industry includes low-carbon machinery (e.g. the adoption of technologies such as electric motors and compressors, industrial heat pumps, and biomass and high-efficiency natural gas-fired boilers) as well as emission control (e.g. landfill gas flaring, inert anodes in aluminum production, and carbon capture unrelated to energy supply). Note that low-carbon machinery and emission control are also included in energy supply, but the technology is used for a different application (ie. the supply of clean energy).

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