facing the CLIMATE CHALLENGE

TRANSFORMING CANADA'S ENERGY ECONOMY

FACT SHEET

The Solutions We Need

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Technologies that can cut Canada's emissions — and the policies we need to deploy them

Spend a few minutes talking to business leaders, scientists, or policy experts about global warming, and the odds are good that you'll hear someone say that "technology is the solution."

And they're right. Canada needs a massive investment in clean energy technology to cut our greenhouse gas (GHG) pollution. The solutions are at hand: more efficient vehicles and buildings, wind and solar power, and even carbon capture and storage have already been demonstrated on an industrial scale. But Canada has not yet succeeded in dramatically accelerating investment in technologies like these so we can move them out of the fringes and into the mainstream.

According to the International Energy Agency, the world will need to invest more than US$10 trillion in clean energy technology over the next 20 years to have a chance of avoiding dangerous climate change.

Most of this investment will need to come from the private sector. But companies will need some strong motivation to spend an extra $10 trillion on cleaner alternatives to business as usual.

That's where governments come in. Strong policies to cut emissions are needed to drive the deployment of cutting-edge technologies.

Economic analysis shows that Canada's economy would create as many new jobs while meeting an ambitious GHG target as under business as usual.

Right now in Canada, clean technologies typically cost more than dirty ones. If we want to ramp up the deployment of clean technologies, we need to change that equation. That's the appeal of "carbon pricing," which means putting a price tag on GHG pollution. When polluters are forced to factor in the cost of addressing the environmental damage they are doing, clean options become competitive with older and dirtier technologies.

Over the coming decades, countries around the world will make massive new investments in clean technologies. That creates significant opportunities for the countries with clean technology to sell, both in company profits and in new jobs. Recent analysis by M.K. Jaccard and Associates, a leading economic modelling firm, found that with the right policies, meeting an ambitious emission reduction target in Canada could lead to the creation of 1.9 million net new jobs between 2010 and 2020 — essentially the same number we would create under business as usual.

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Solutions Q & A

Answers to some of the key questions about policies and technologies to cut our emissions

What are the top policies Canada needs?

Economists and policy experts agree that the central element of any credible climate policy for Canada is a strong price on GHG emissions. This can be achieved through either a cap-and-trade system or a carbon tax. In either case, the most effective carbon price will be one that covers at least 80% of Canada's emissions and minimizes loopholes, giveaways, and special treatment.

A strong climate policy package for Canada would also include: tough vehicle efficiency regulations; stronger building codes; regulations to cut emissions from landfills and fossil fuel production (venting and flaring); and new public investments in low-emissions infrastructure, agriculture and forestry.

If we implemented those policies, what technology solutions would be deployed?

A carbon price would create an incentive to lower emissions for Canada's heavy industry sectors: oil and gas, electricity, mining and manufacturing. If the carbon price is high enough, companies' lowest-cost option will be to make major investments in carbon capture and storage, renewable power, and energy efficiency. An economy-wide carbon price would also cover emissions from transportation, which would stimulate investments in cleaner fuels and new vehicle technologies such as plug-in hybrids and electric vehicles.

Do we need new technology breakthroughs to reduce emissions, or can we do it with today's technologies?

Economic analysis has shown again and again that we already have the technologies we need to make deep cuts to our GHG pollution. Of course, we should continue to innovate, and R&D should be part of Canada's climate strategy. But the best way to spur technology breakthroughs is to create demand for them with tough climate policies.

If we had a strong carbon price, why would we need any other policies?

Some emissions respond less well to a carbon price than others, especially in the short term. For example, a suburban family with two kids in soccer will keep driving to the games, even if a carbon price increases the cost of filling up the tank. A stringent vehicle fuel efficiency regulation would make sure that the family car doesn't guzzle gasoline.

Some emissions are also very difficult to include in a carbon pricing system for administrative reasons. For example, it wouldn't be possible for a farm to install the same kind of emission monitoring technology that a large coal plant can use.

In cases like these, regulations or public investments are needed in addition to the carbon price.

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A Role for Carbon Capture and Storage

Carbon capture and storage (CCS) is a technological process for trapping carbon dioxide emissions from large industrial facilities, compressing the gas, and then transporting it in a pipeline to a location where it can be stored underground. In theory, the storage is permanent: the goal of deploying this technology is making sure that the carbon dioxide (a greenhouse gas) never escapes into the atmosphere, where it would contribute to climate change.

CCS technology gets a lot of attention in Canada, mainly because of its potential role in reducing emissions from Alberta's oil sands and from coal-fired electricity. Although it has not been deployed on a large scale, CCS demonstration projects are already in operation in Canada and elsewhere.

There are a lot of questions about CCS, including how to ensure that the storage is safe and permanent, and how to handle long-term liability. CCS is an expensive technology, and the question of "Who pays?" to deploy it is a crucial one.

The Pembina Institute's perspective is that the urgent need to deal with rising emissions compels consideration of CCS in Canada. Pembina views CCS as one of a number of technologies that can contribute to reducing GHG emissions on the scale required to combat dangerous climate change. However, it is critical that CCS be considered as part of a portfolio of solutions, and adequate resources be directed to more sustainable options, especially renewable energy and energy efficiency.

The Pembina Institute does not support the construction of new nuclear reactors or the refurbishment of existing reactors in light of unresolved issues including lifecycle environmental impacts, nuclear waste management and long-term liability, and economic competitiveness.

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What role do the provinces and territories play in implementing climate policy solutions?

In Canada, environmental protection is a shared jurisdiction. Provinces control some very important levers of climate and energy policy, including building codes, land-use policies, and decisions about electricity supply. The federal government can implement carbon pricing policies, regulate energy efficiency and emissions, and use its spending power to reduce GHG pollution.

Two Ways to Add it Up

The tables below shows the results of economic modelling analysis by M.K. Jaccard and Associates of one scenario that meets the federal government's target to cut Canada's emissions to 20% below the 2006 level by 2020.

The first table shows the effect of each of 10 domestic policies needed to meet the target. The second shows the contribution of the six key technologies that are deployed as a result of the policies.

Policies	Reductions [a] in annual emissions in 2020 (millions of tonnes of CO_2 equivalent)
Carbon price ($100/tonne CO_2 equivalent by 2020)	87
Upstream oil and gas regulations (venting/flaring)	39
Landfill gas capture regulation	23
Public investment in electricity transmission	14
Commercial building efficiency standards	9
Electric heating requirement for new buildings in hydro provinces (BC, Manitoba, Québec)	8
Vehicle emissions regulations	6
Residential building efficiency standards	6
Government purchase of agricultural offsets	4
Public investment in transit (urban and inter-city)	3
Total	**223** [b]

a The incremental effect of a policy is measured by calculating the difference between the effect of all policies and all policies except the one in question. Because the policies overlap somewhat, their total effect is greater than the sum of the individual effects.

b These policies would reduce Canada's emissions from the business as usual level of 848 million tonnes to 626 million tonnes. In this scenario, the government would additionally need to purchase 56 million tonnes of international emission reductions (see "Taking it Global" above) to meet its target of 570 million tonnes, 20% below the 2006 level.

Photo: David Dodge, the Pembina Institute

Taking it Global

Once they are emitted, carbon dioxide and other GHGs remain in the atmosphere for hundreds of years. Over time, they spread evenly throughout the atmosphere. So from the environment's point of view, reducing emissions in Mumbai is just as effective as cutting them in Montréal. And we can find more low-cost opportunities to reduce emissions if we look worldwide than in Canada alone.

As a result, investments by the federal government in emission reduction projects in less wealthy countries can help lower the cost of meeting Canada's national GHG targets, while simultaneously helping those countries address climate change. The UN's Clean Development Mechanism certifies these kinds of emission reductions for purchase by countries or companies that have emission targets to meet.

Technologies	Reductions in annual emissions in 2020 (millions of tonnes of CO_2 equivalent)
Energy efficiency	54
Other GHG control, including reductions in emissions from venting, flaring and landfill gas	43
Carbon capture and storage	30
Fuel switching to electricity	30
Fuel switching in electricity generation to mainly wind and hydro	22
Fuel switching to other fuels	10
Total	**223** [c]

c These technologies would reduce Canada's emissions from the business as usual level of 848 million tonnes to 626 million tonnes, once 36 million tonnes of additional reductions resulting from lower output are taken into account. In this scenario, the government would additionally need to purchase 56 million tonnes of international emission reductions (see "Taking it Global" above) to meet its target of 570 million tonnes, 20% below the 2006 level.

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The U.S. is currently contemplating large-scale use of international emission reductions to meet its GHG targets: the "Waxman-Markey" bill passed by the House of Representatives in June 2009 would require the U.S. government to invest in forest conservation projects in developing countries.

Pembina's Perspective

Facing the climate challenge presents tough decisions, but there are solutions and opportunities.

We have all the ingenuity and talent we need to scale up clean technologies right here in Canada. But without policy leadership, Canada will lose out in the race for clean energy jobs.

Transforming our economy to run on clean energy — and doing our fair share to tackle global warming — starts with an effective price on Canada's GHG pollution. Economic modelling analysis commissioned by the Pembina Institute and the David Suzuki Foundation from M.K. Jaccard and Associates shows that making a science-based reduction to Canada's emissions will mean immediately implementing a carbon price and increasing it to $200/tonne (carbon dioxide equivalent) by 2020. If Canada opts for a lower carbon price, companies will invest less in clean technology deployment, and more public dollars will be required to make up the difference.

Canada has lagged behind its peers in facing the climate challenge. (In 2008, Canada finished second-last of 57 countries in the annual Climate Change Performance Index survey, placing ahead only of Saudi Arabia.) We have the technology solutions we need, and we know the policies capable of deploying them. There is absolutely no time to lose in getting started.

Renewable is Doable

Renewable energy investment outpaced investments in coal, natural gas and nuclear power combined in 2008, according to the UN. Technologies such as wind, solar and biomass have made major advances recent years, and grid engineers are becoming increasingly capable of incorporating large amounts of renewables into their systems. For example, on windy days, Spain can already generate over 40% of its national electricity from the wind. Pembina's analysis shows that, within 10 years, Canada could obtain over 20 per cent of its electricity from renewable sources like wind, solar, biomass and small hydro. This is more power than either nuclear or coal currently supply in Canada.

More Information

For in-depth reports, backgrounders and updates on the latest climate news and negotiations, go to climate.pembina.org.

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Sustainable Energy Solutions