

Reducing Pollution, Creating Jobs

The employment effects of climate change and
environmental policies

Clare Demerse

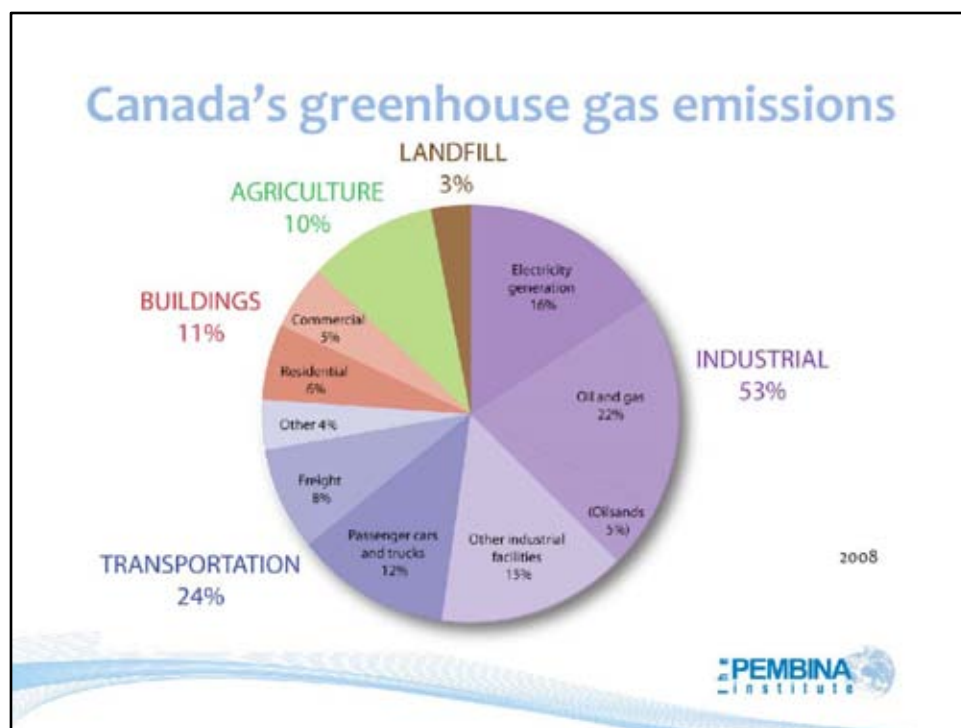
Acting Director, Climate Change

Preliminary results. Full report to be released in mid-March 2011.

The Pembina Institute

The Pembina Institute is an environmental nonprofit think tank with ~55 staff in eight offices. We work to advance sustainable energy solutions through innovative research, education, consulting and advocacy.

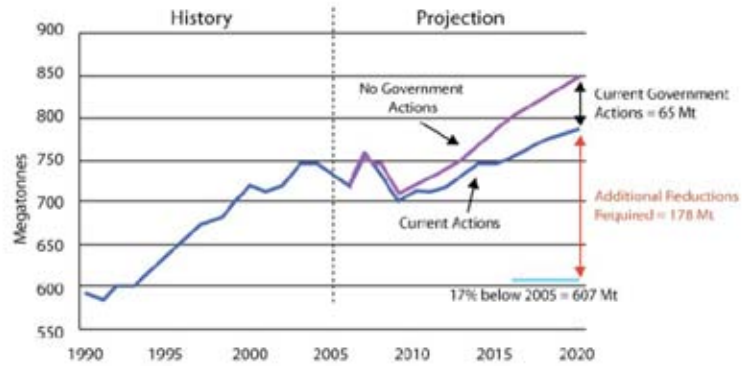




For more details, see <http://www.pembina.org/pub/1966>
Based on Canada's 2008 National Inventory Report

A long way to go

Scenarios of Canadian emissions to 2020



Adapted from: "Canada's Greenhouse Gas Target and Emissions Projections," Environment Canada, 2011.



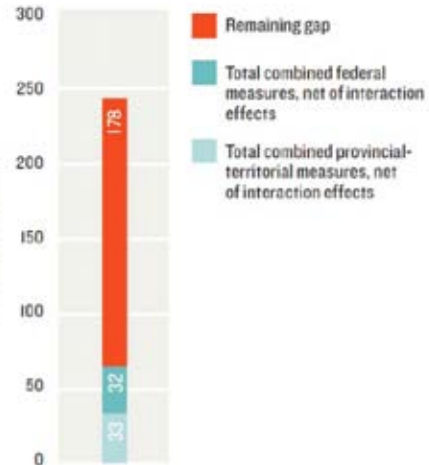
From <http://www.climatechange.gc.ca/default.asp?lang=En&n=DC025A76-1>


A long way to go

Contributions to emission reductions in 2020 from government measures

Adapted from: *Parallel Paths: Canada-U.S. Climate Policy Choices* (NRTEE)

ESTIMATED CONTRIBUTIONS IN 2020 TO EMISSIONS GAP FOR CANADA
BETWEEN 2020 TARGET AND FORECAST EMISSIONS IN THE ABSENCE OF
NEW POLICIES (Mt CO₂e)





Canada will need stronger policies to
meet the 2020 target

Tackling climate change

Pembina reviewed “green jobs” and the employment effects of climate policies.

What would happen to employment in Canada if the government adopted stronger climate change and clean energy policies?



Pembina did a review of the literature on “green jobs” and the employment effects of climate policies. One of the questions our report examines is:

What would happen to employment in Canada if the government adopted stronger climate change and clean energy policies?



Understanding the local employment effects of policies

Job creation estimates typically track three kinds of labour effects

Direct employment (e.g. an electrician wiring new solar panels)

Indirect employment (e.g. a glass manufacturer producing glass for the solar company)

Induced employment: jobs created when employees (direct and indirect) spend their paycheques (e.g. a local restaurant near the solar manufacturing plant hires new servers)

Economists can calculate the total employment effect of a given investment in a sector using *input-output tables* and associated *job multipliers*.



Two U.S. analysts (Pollin and Garrett-Peltier) estimated in 2009 that Ontario's additional annual spending on renewable energy under the province's Green Energy Act would yield 55,000 more total jobs (direct, indirect and induced) in a given year than business as usual.

The Government of Ontario estimates that its Green Energy Act will create 50,000 direct and indirect jobs by 2012.

Clean energy job creation: U.S.

US \$90 billion in support for clean energy:

- 83,000 jobs (direct and indirect by Q1 2010)
- 21,000 induced jobs (by Q1 2010)



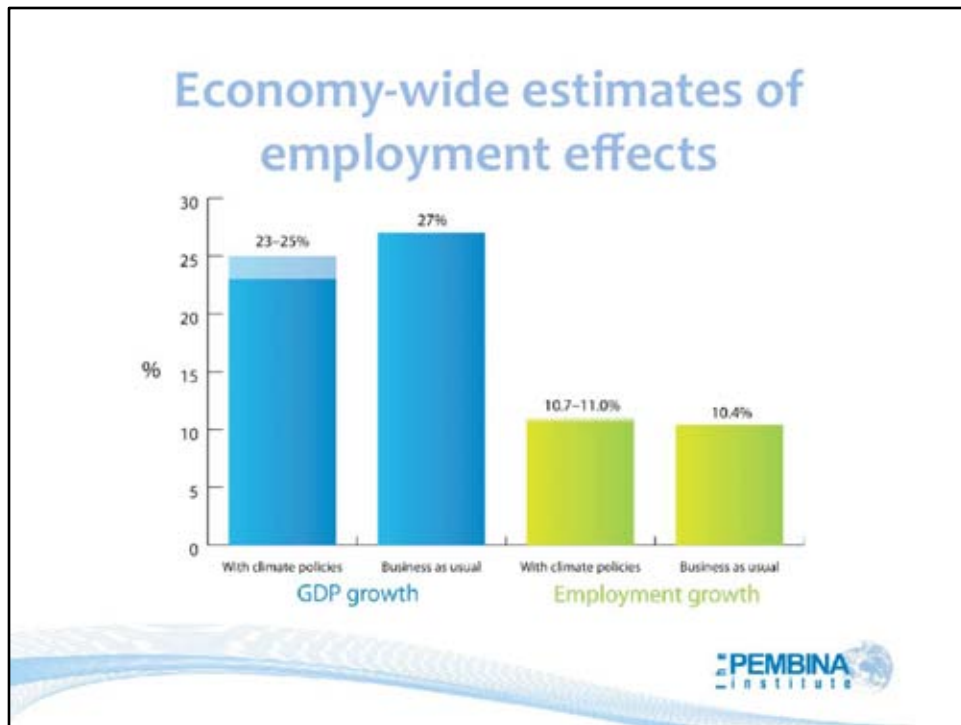
The Council of Economic Advisers to President Obama estimated the employment effect of the over US \$90 billion spent on clean energy under the 2009 American Recovery and Reinvestment Act. In April 2010, the President's economic advisory council estimated that this funding saved or created 83,000 jobs by 2010 Q1, spurring an additional 21,000 induced jobs.



Economy-wide estimates of employment effects from climate policies

Some analysts think it is more accurate to model the economy-wide effects of clean energy policies, not just the short-term impact of a single investment.

In 2009, Pembina worked with the David Suzuki Foundation to publish an assessment of meeting the government's (then) 2020 target and a more ambitious target. The modelling was done by MK Jaccard and Associates at Simon Fraser University.



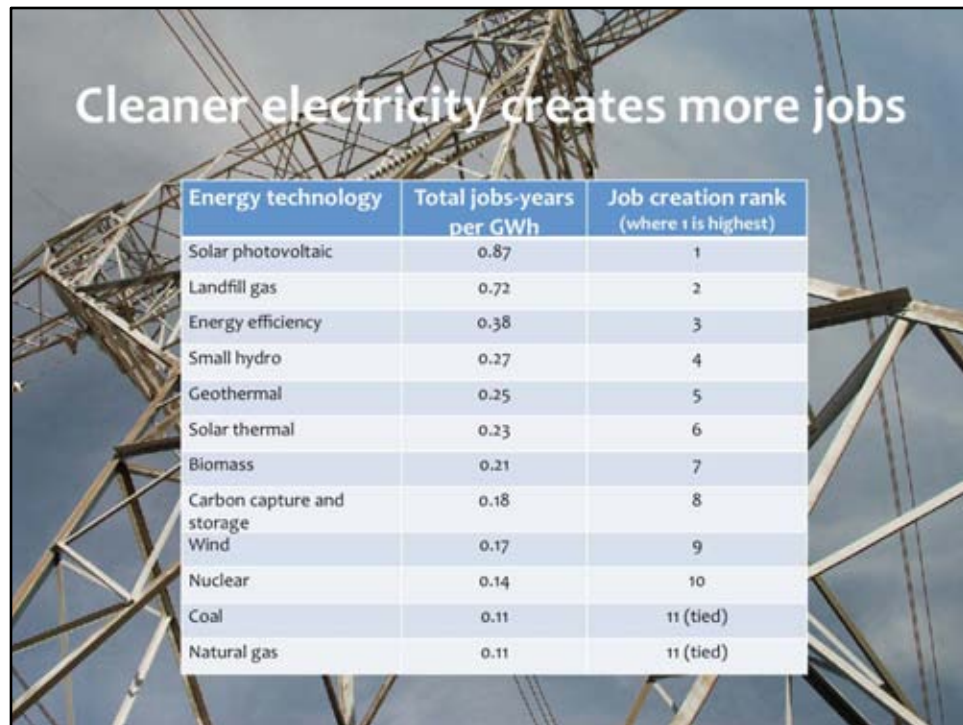
The results showed:

GDP growth of 2.1% or 2.2% per year vs. 2.4% under business as usual (cumulative GDP growth of 27% 2010-2020 under BAU vs. 23-25% under climate policies)
Employment growth of 10.7% to 11.0% from 2010 to 2020 while cutting emissions vs. 10.4% under business as usual.



One reason for this result is a “significant shift away from capital-intensive (e.g. fossil fuel) to labour-intensive (manufacturing and services) industries in all regions.”

Why? There are several reasons for this somewhat surprising result. One is a “significant shift away from capital-intensive (e.g. fossil fuel) to labour-intensive (manufacturing and services) industries in all regions.”



From Daniel Kammen, Kamal Kapadia, Matthias Fripp, *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?* (Berkeley: Renewable and Appropriate Energy Laboratory, University of California, 2004), 2, 3. Available online at <http://rael.berkeley.edu/sites/default/files/very-old-site/renewables.jobs.2006.pdf>

The full table factors in capacity factors and equipment lifetimes, and includes jobs in construction, installation and manufacturing; operations and maintenance (O&M); and fuel extraction and processing in order to allow for full comparability between energy choices.



Fossil fuels are capital-intensive, not labour-intensive

A 2010 ranking found that oil and gas extraction is the most capital intensive industry in Canada.

Capital intensity and labour intensity are inversely related: higher capital intensity means lower labour intensity in a given sector.

By that measure, investing public dollars in virtually any other sector of Canada's economy would yield more jobs per dollar than oil and gas extraction.

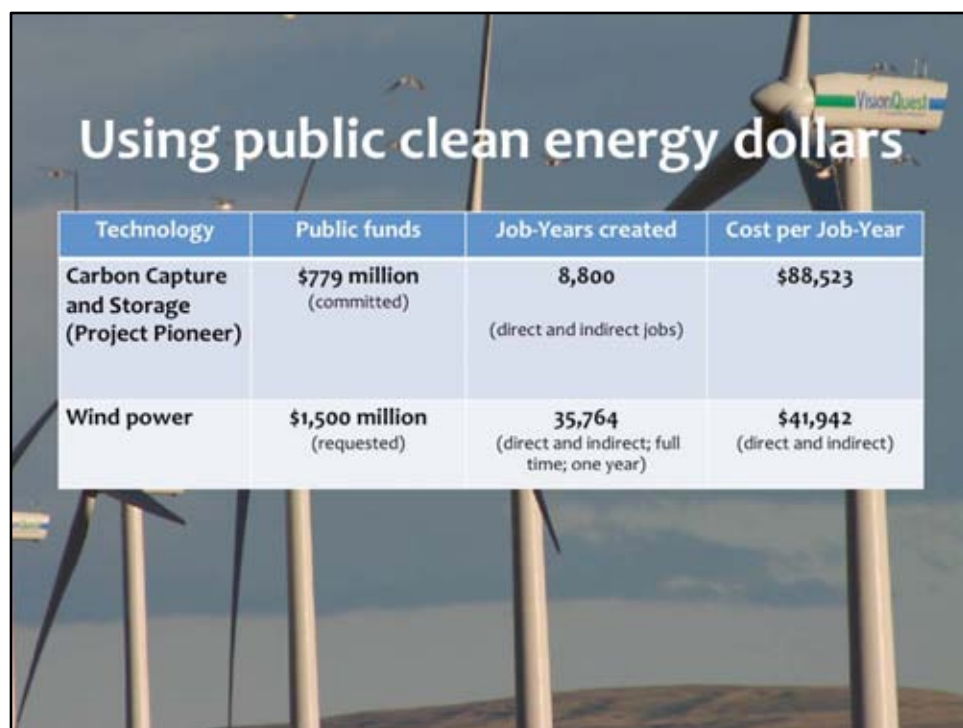
Fossil fuels are capital-intensive, not labour-intensive

- Investing public dollars in other sectors would yield more jobs per dollar
- Reducing fossil fuel subsidies would increase employment in Alberta and Saskatchewan slightly.



A 2010 assessment of the effect of phasing out fossil fuel subsidies found that reducing subsidies would increase employment slightly in both Alberta and Saskatchewan. (Sawyer et al, Fossil Fuels: At What Cost?)

http://www.globalsubsidies.org/files/assets/ffs_awc_3canprovinces.pdf



Pembina Institute calculations

Project Pioneer information is from <http://projectpioneer.ca/economic-opportunity/employment-supplier-opportunities> and personal communications, TransAlta.

Wind data is from Steve Taub, *Canada's ecoENERGY Investment in Renewables Pays Off for Taxpayers* (Stamford: GE Financial Services, 2010), 3, 7. Available online from http://www.canwea.ca/news/release/release_e.php?newsId=73.



Countries that can position themselves as leaders in low-carbon technology may boost their export potential.

Germany

- generous support for renewable energy
- 2 out of every 3 jobs in the renewable energy industry are estimated to be export-related



“This appears to be the case for Germany, where generous support for renewable energy has created a competitive export industry. Over the next decade or so, the share of exports in total sales for renewable energy has been estimated at 69%. That is, two out of three jobs in the industry could be export-related.”

— Samuel Fankhauser, Friedel Sehleier, and Nicholas Stern, “Climate Change, Innovation and Jobs” in *Climate Policy* No. 8 (London: Earthscan, 2008), 425, <http://www.cccep.ac.uk/Publications/research-articles/Docs/climate-change-innovation-jobs.pdf>

Missing out on export opportunities

Wind turbine manufacturers			Solar cell manufacturers		
Manufacturer	Country	Market share	Manufacturer	Country	Market share
Vestas	Denmark	12.5%	First Solar	United States	8.9%
GE Energy	United States	12.4%	Suntech Power	China	5.7%
Sinovel	China	9.2%	Sharp	Japan	4.8%
Enercon	Germany	8.5%	Q-Cells	Germany	4.8%
Goldwind	China	7.2%	Yingli	China	4.3%
Gamesa	Spain	6.7%	JA Solar	China	4.2%
Dongfang	China	6.5%	Kyocera	Japan	3.2%
Suzlon	India	6.4%	Trina Solar	China	3.2%
Siemens	Germany	5.9%	SunPower	United States	3.2%
Repower	Germany	3.4%	Gintech Chinese	Taipei	3.0%

Source: International Energy Agency, World Energy Outlook 2010



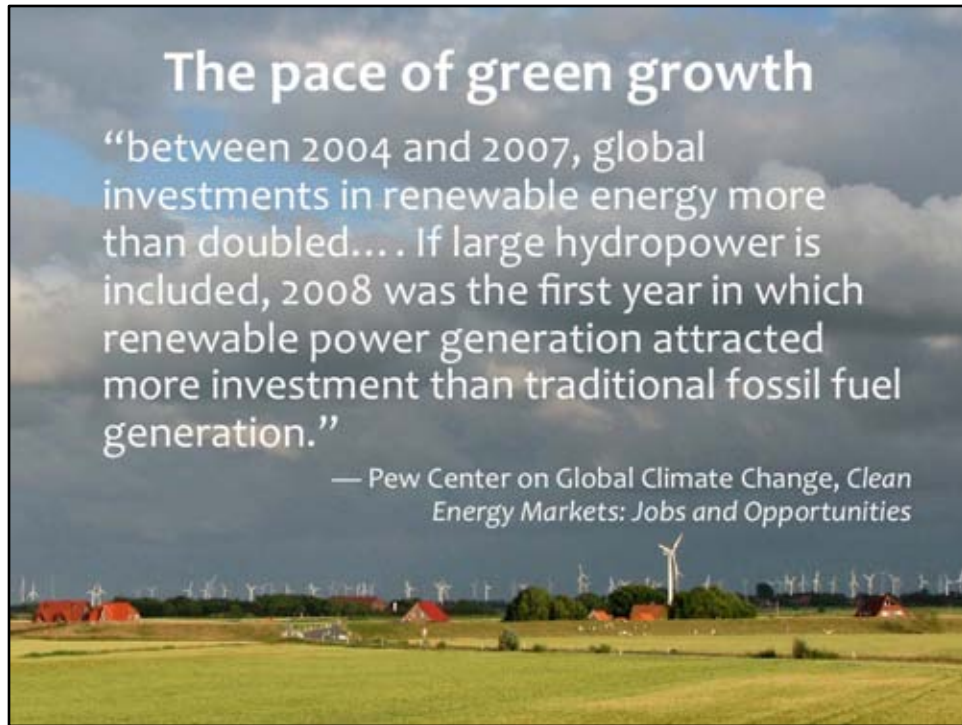
International Energy Agency, World Energy Outlook 2010 (Part 2, p. 291-292.)



According to the Pew Charitable Trusts, clean energy “has experienced investment growth of 230 per cent since 2005.... In 2009, US \$162 billion was invested in clean energy around the world.”

The Pew Charitable Trusts, *Who’s Winning the Clean Energy Race? Growth, Competition and Opportunity in the World’s Largest Economies* (Washington: The Pew Charitable Trusts, 2010), 4. Available online at

http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Global_warming/G-20%20Report.pdf (accessed February 9, 2011).



The pace of green growth

According to the Pew Centre on Global Climate Change, “between 2004 and 2007, global investments in renewable energy more than doubled.... If large hydropower is included, 2008 was the first year in which renewable power generation attracted more investment than traditional fossil fuel generation.”

Pew Center on Global Climate Change, *Clean Energy Markets: Jobs and Opportunities* (Washington: Pew Centre on Global Climate Change, 2010), 4. Available online at http://www.pewclimate.org/docUploads/Clean_Energy_Update_Final.pdf (accessed February 9, 2011).

Defining green jobs

- Instead of job creation, some researchers count number of workers who fit a definition of “green” jobs.
- However, no common definition of green jobs currently exists.



Defining and describing green jobs

Instead of estimating the job creation potential of green policies, some analysts create a definition of green jobs and tally up the number of workers who fit the definition.

At this time, there is no common definition of green jobs, since researchers have different thresholds of which work is “green” enough to be counted.



Some characteristics of green jobs:

- Familiar work in a more sustainable setting
- Geographically dispersed

Defining and describing green jobs

However, studies show that green jobs are

Familiar work in a more sustainable setting

Geographically dispersed (i.e. green jobs opportunities are available in communities across Canada).

Environmental employment in Canada

- ECO Canada defines environmental employment as “employed individuals who spend 50% or more of their work time on activities associated with environmental protection, resource management, or environmental sustainability.”



Environmental employment in Canada

The Environmental Careers Organization of Canada (ECO Canada), the sector council responsible for Canada's environment sector, defines “environmental employment” as “employed individuals who spend 50% or more of their work time on activities associated with environmental protection, resource management, or environmental sustainability.”

Environmental employment in Canada

- More than 682,000 environmental employees (2010)
- 4% of Canada's total employed labour force
 - 5 times larger than total direct employment in auto manufacturing in 2008
- In comparison, 300,000 workers in energy production — 1.8% of total workforce



Based on ECO Canada's definition, there were over 682,000 environmental employees in Canada in 2010.

This is equivalent to 4% of Canada's total employed labour force

It is five times larger than total direct employment in auto manufacturing in 2008

In 2010, energy production as a whole (oil, gas, and electricity generation) accounted for about 300,000 Canadian workers, or 1.8% of the total workforce. (ECO Canada counts 4.5% of the workers in mining, quarrying and oil and gas extraction, and 2.0% of the workers in utilities, transportation and warehousing, as environmental employees.)

Support for clean energy investing

June 2010 survey by  the gandalf group
The Gandalf Group

- for Climate Action Network–Réseau action climat Canada
- *Climate Change and the Environment*



Copy available upon request to the author



91% of Canadians agreed with the statement that "it will benefit the economy to invest in renewable energy technology now"
72% "strongly agree," 16% "somewhat agree"

The Gandalf Group, June 2010 survey for Climate Action Network–
Réseau action climat Canada on "Climate Change and the Environment",
Powerpoint presentation of results to slide 36.



90% of Canadians supported the statement that “investments in green technologies can create new good jobs now”

74% “strongly agree,” 16% “somewhat agree”

The Gandalf Group, June 2010 survey for Climate Action Network–Réseau action climat Canada on “Climate Change and the Environment”, Powerpoint presentation of results to slide 36.

Maximizing Canada's clean energy job potential

Federal government should

- Direct public dollars away from fossil fuel subsidies and towards core climate change solutions (energy efficiency, clean energy).
- Publish and implement a credible plan to meet its 2020 target, with a price on GHG emissions as the centrepiece of that plan.
- Develop a clean energy employment transition strategy for Canada.



To improve Canada's chances of creating clean energy jobs, the federal government should

Direct public dollars to core climate change solutions, such as energy conservation, energy efficiency and renewable energy, which have superior job creation performance to spending on fossil fuels.

Publish and implement a credible plan to meet its 2020 target. Current government policies (federal and provincial) don't get us there. A price on greenhouse gas emissions would be the centrepiece of any effective plan to reach Canada's target.

Develop a clean energy employment transition strategy for Canada, including skills development, training, certification, and transition policies for workers or communities whose jobs are lost or changed by the transition to cleaner energy.

Areas for further research

- Assess Canada's clean energy "comparative advantage"
- Develop regionally-specific clean energy statistics
- Estimate the job creation potential of clean energy policies
- Estimate economic and employment costs of climate change



Potential areas for further Canada-specific research include:

Assessments of Canada's clean energy "comparative advantage"

The development of regionally-specific clean energy statistics

Detailed, regional estimates of the job creation potential of clean energy policies

Canada-specific estimates of the economic, and employment, costs of climate change itself.

Thank you

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