

Decarbonizing Nova Scotia's energy system: The nuclear option

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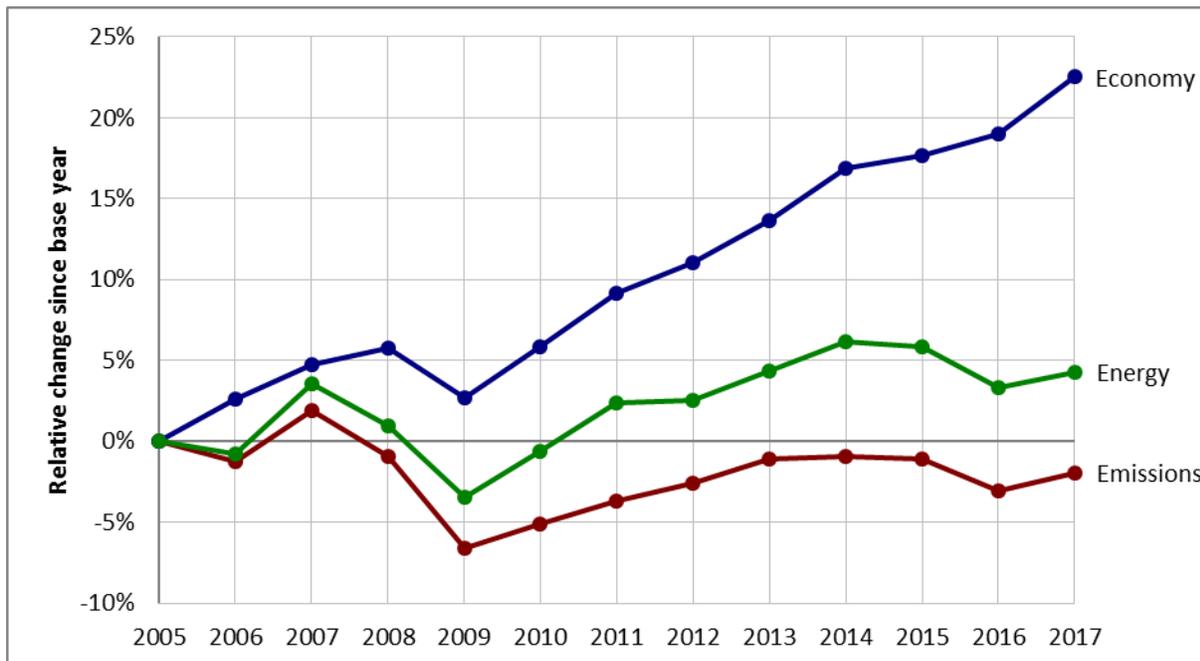
On Friday, high-school students will engage in climate-protests across the province, Canada, and around the world. They are demanding action on the part of their elders to reduce the emissions of greenhouse gases, notably carbon dioxide, so they will inherit a habitable planet.

Those questioning the need to protest in Nova Scotia can point to the 2019 National Inventory Report from Environment and Climate Change Canada, which shows that in 2017, Canada's emissions had declined 1.9% since 2005, whereas Nova Scotia's emissions were almost 33% below 2005 levels, the only province to exceed Canada's Nationally Intended Contribution target of a 30% reduction in emissions below 2005 levels by 2030.

However, the single number does not indicate how the jurisdiction achieving its reduction in emissions. Is it decoupling its economy from its energy system (that is, the degree to which its economy is becoming more energy-efficient), or decarbonizing its energy system (reducing its reliance on emissions-intensive energy sources), or both?

The following chart shows that between 2005 and 2017, Canada's economy (GDP) grew by 22.5% (solid blue line), while its demand for energy increased by 4.3% (solid green line). Since the demand for energy increased more slowly than the economy grew, the economy and its demand for energy is said to be weakly coupled.

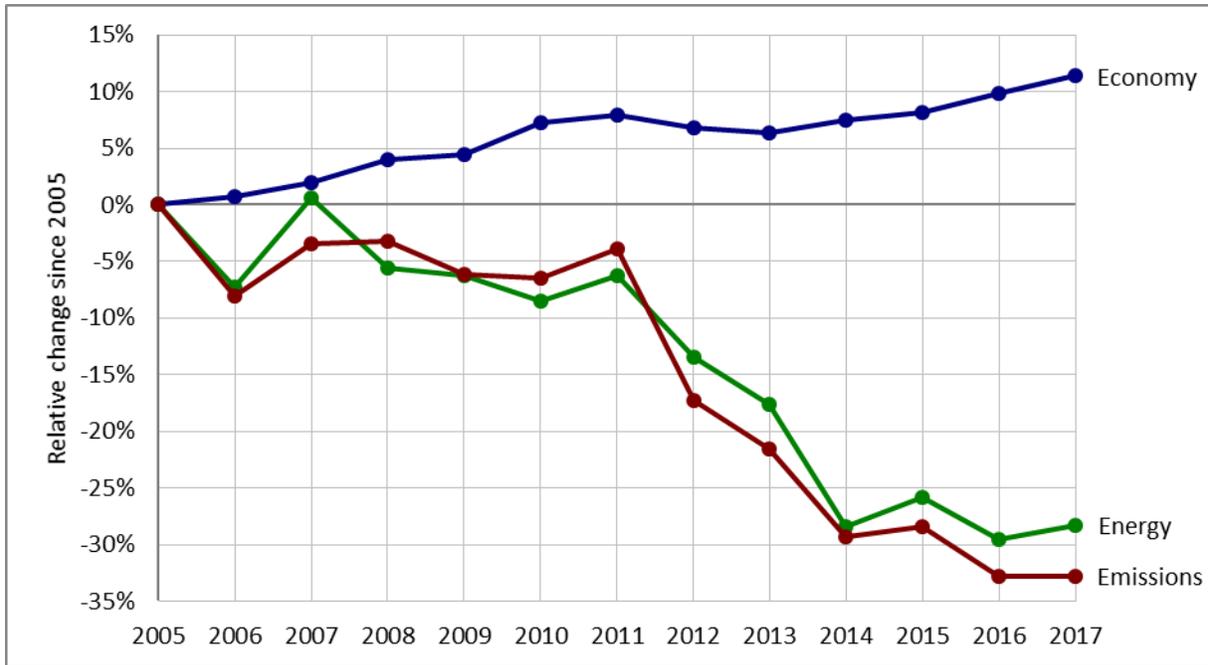
The chart also shows that Canada's emissions declined by 1.9% (red line), albeit slightly, over this period, indicating very-weak decarbonization of the energy system.



Nova Scotia, like the other Maritime Provinces, Ontario, and Quebec, all decoupled (their economies grew and energy demand decreased) and decarbonized (emissions declined more than their demand for energy changed).

In Nova Scotia's case (see chart below), the economy grew by 11.4% between 2005 and 2017 and demand for energy dropped by 28.3%, indicating a strong decoupling.

Surprisingly perhaps, Nova Scotia had very-weak decarbonizing. This is the result of the change in emissions closely tracking the decline in energy demand.



The following two pie-charts of Nova Scotia's emissions in 2005 (left) and 2017 (right) show why the province had very-weak decoupling.

Energy-related emissions declined about 42% in three areas:

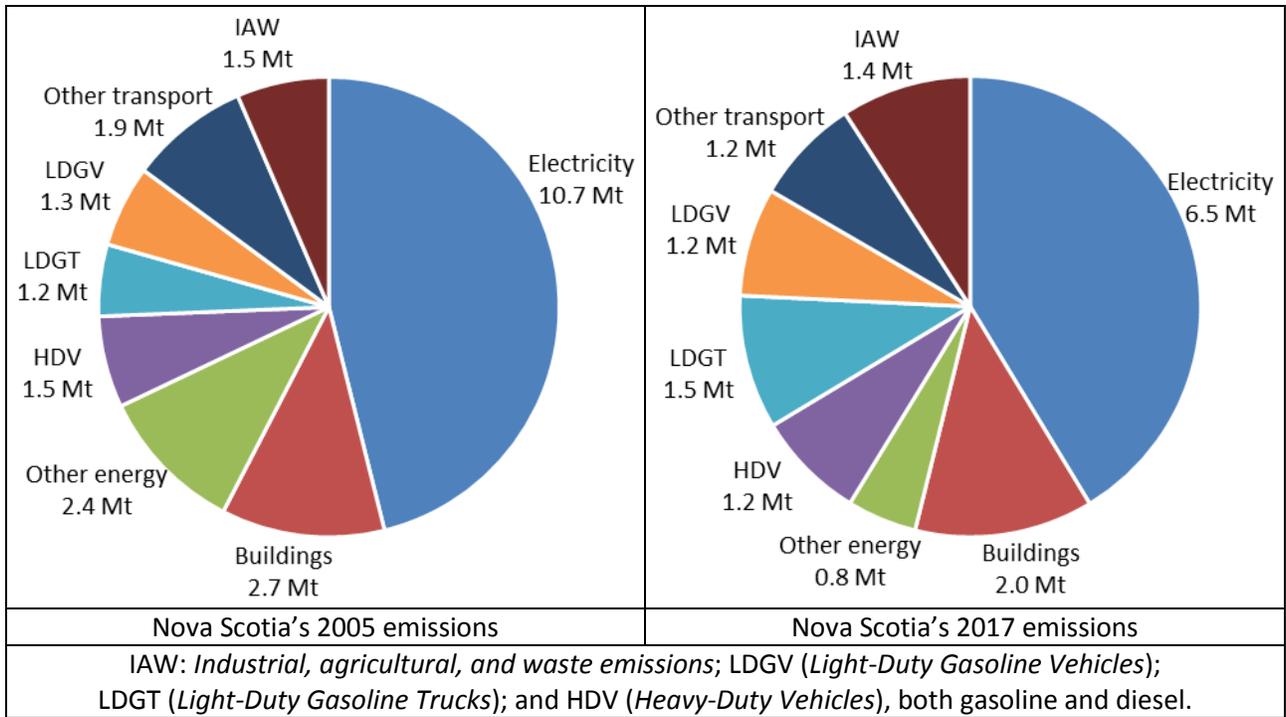
Electricity, the result of declining demand and Nova Scotia Power reducing its use of coal and increasing its use of natural gas and renewables;

Buildings, improvements in building-efficiency and reducing oil for space heating in favour of, for example, heat-pumps (thereby shifting emissions from the building to Nova Scotia Power); and

Other energy, the result of the closure of the Dartmouth refinery, the decline of the offshore, and a decline in industrial activities such as mining and pulp and paper production.

Emissions from transportation declined by 15%, primarily the result of declines in freight transport (*Heavy-Duty Vehicles* and *Other transportation*). Private transportation (*Light-Duty Gasoline Vehicles* and *Light-Duty Gasoline Trucks*) showed little change.

Non-energy emissions from industry, agriculture, and waste remained virtually unchanged between 2005 and 2017.



In other words, the decline in Nova Scotia's emissions is due primarily to decoupling (largely the result of the province's weak economy) as opposed to widespread decarbonizing. Moreover, the limited decarbonizing that has taken place is due in large part to changes in Nova Scotia Power's energy mix.

Clearly, if emissions are to decline significantly, a greater effort must be made to decarbonize Nova Scotia's energy system.

It is tempting to suggest that encouraging the uptake of electric vehicles will result in significant reductions in the province's emissions. While this will reduce transportation emissions, it will simply shift the emissions to Nova Scotia Power. Given the emissions-intensity of Nova Scotia Power's present energy mix, the overall improvements in the province's emissions by electrifying the transportation system would be limited.

Ultimately, if Nova Scotia's energy system is to decarbonize, significant changes to the energy mix of the province's electricity supply will be needed. While helpful, power from Muskrat Falls will not be enough.

To reduce Nova Scotia's emissions to the point where the students involved in the climate protest will have a habitable planet, Nova Scotians will need to consider other decarbonization options, such as nuclear.

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