



The Darlington nuclear power station on Lake Ontario east of Toronto, generates more than 3,500 megawatts of clean electricity for Ontario, enough to supply a city of 2 million people.

Canada Can be Cleaner, and Stronger, with Nuclear

John Barrett

In the global conversation about climate change and clean energy, nuclear energy often gets sidelined. Canadian Nuclear Association President John Barrett argues that the accelerating push toward a low-carbon economy needs to include what was once a crucial component of both Canada's energy and foreign policy; nuclear power.

The Liberal federal government's March 22 budget proposes substantial spending under the heading of "strategic investments in clean technology to address climate change." The policy aim is clear: move Canada definitively and irreversibly towards a low-carbon economy.

But what is meant by "clean"? Are all clean energy technologies and sources included? Nuclear power, too?

A key initiative of last December's COP21 meeting in Paris was "Mission Innovation". Created by technology leaders like Bill Gates, it has also been embraced by a number of countries such as Canada, the United States, Japan and others. Mission Innovation contains a pledge to double in five years the funding of innovative technologies that foster low-carbon energy.

Mission Innovation cropped up at the recent North American Energy Ministerial meeting in Winnipeg in February. It was uncertain again whether nuclear power was considered part of the shift to a low-carbon energy future. The most one can find is a reference to “clean technologies—including renewable energy”. This would suggest that nuclear power is included.

On the margins of the Ministerial, I asked U.S. Secretary of Energy Ernest Moniz whether the United States included nuclear energy in its approach to Mission Innovation. His answer was an unequivocal “yes”.

The climate challenge we are facing is big and complex enough to warrant using the full range of low-carbon energy options available today—whether renewables, nuclear, or carbon-capture and sequestration. According to the Intergovernmental Panel in Climate Change (IPCC), low-carbon sources by 2050 must provide 80 per cent of global electricity, up from 30 per cent today, in order to hold back climate change. During the same period, global demands for electricity will double if the basic needs of humanity are to be met.

Does the contribution of nuclear to mitigating climate change really matter? Enormously. The International

Energy Agency has calculated that, since 1971, nuclear energy has avoided 56 Gigatonnes (Gt) of GHG emissions—equal to nearly two years of global emissions. Many climate scientists now agree that the greatest instrument for successfully and quickly decarbonizing energy systems is nuclear energy.

Can one be an environmental activist and support nuclear? There is a movement afoot among senior environmental leaders—like James Hansen, Mark Lynas, Michael Schellenberger and many others—that rejects the knee-jerk opposition between green and nuclear, especially if the overarching goal is to save the planet from climate change catastrophe.

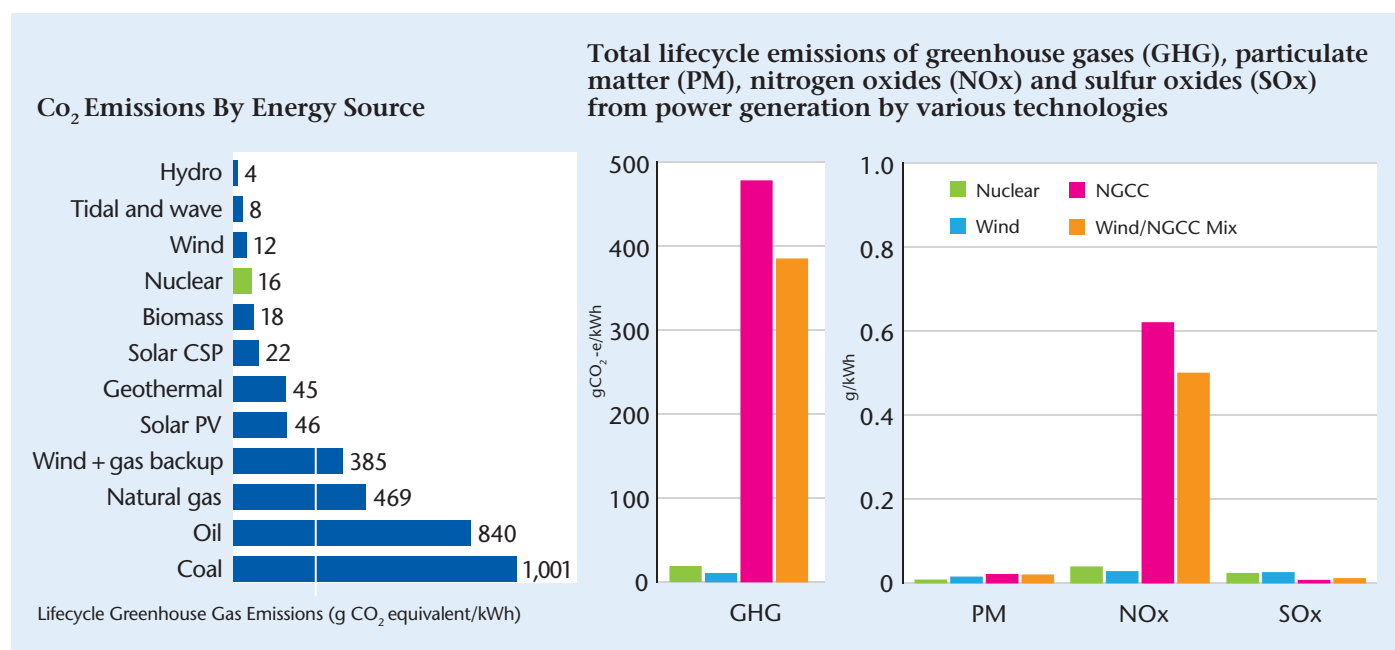
Committing huge expenditures of tax dollars needs sound policy as its foundation. Sound, effective energy policy requires an open mind; it starts with an unprejudiced, “technology neutral” analysis of the relative benefits and impacts of each clean energy source, in order to identify the real, practical solutions they offer for today’s policy needs.

Here are some initial observations of the important contribution of nuclear energy and technology to getting the country to a low-carbon future.

Nuclear-generated electricity is clean energy, free from air pollutants and with extremely low GHG emissions. The real reason Ontario was able to close its coal-fired generating stations, which far outweighed the small and irregular output of its current wind and solar, was that over 3,000 megawatts of nuclear power came back on-line to fill the clean energy gap.

Renewable technologies are intermittent. For some time to come, they will be minor players in providing the required electricity to power homes and industry. However, this may change in the longer term. A strategic perspective sees nuclear energy as a critical bridge to that future development, while providing clean, needed electricity in the meantime.

Moreover, with the U.S. Clean Power Plan, there will be increased demand in northern states for clean electricity, which could be supplied by hydro power (from Manitoba and Quebec) and nuclear (from Ontario). As such markets grow and greater electricity integration is sought (witness the recent MOU by North American energy ministers on clean energy collaboration), Canadians will benefit from the capacity to substantially increase nuclear-generated clean electricity exports.



Source: Intergovernmental Panel on Climate Change. Renewable Energy Sources and Climate Change Mitigation. Geneva; 2011.

Nuclear remains one of the most affordable electricity sources worldwide. In Ontario, the cost per kilowatt-hour of electricity generated by nuclear power is in the realm of eight cents—substantially less than wind power (typically above ten cents) and far less than solar.

Technology neutral analysis would examine the waste products and GHG emissions of all energy sources, including renewables. There is growing recognition that the environmental impact of renewable waste products has not been accounted for—unlike nuclear energy, where every bit of waste is identified, managed and paid for. As other energy sources go through technological change, what happens to the discards? Have the toxic components of wind turbines and solar panels, often mined in foreign countries, been fully accounted?

Nuclear power generation, like other advanced technologies, can bring big leaps in Canadians' quality of life. For example, innovative Small Modular Reactors (SMRs) could assist remote northern communities in providing clean, low-emitting electricity for electricity, heating, water purification and other needs. This would take these communities off dangerous, polluting, expensive and unreliable diesel fuel and remove a key constraint on their economic growth—advancing both aboriginal health and northern development.

SMRs could also enable resource and human development in hard-to-access, off-grid mining sites such as Ontario's Ring of Fire. They could power cleanly the steam generation needed in Alberta's and Saskatchewan's oil sands industries—cutting their GHG emissions and conserving natural gas for higher value uses.

There is much talk of electric cars and the extensive development of clean transport infrastructure to get millions of drivers off fossil fuel. Nuclear can support this, thanks to its large-scale, baseload character, ensuring that the cars are charging with electricity from clean generating sources (not fossil fuel-fired). Only nuclear

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has both the capacity and the low-carbon footprint to decarbonize the economy on the tight time-scale required by the climate challenge.

It is well to recall the role of nuclear-generated electricity in Canada. In terms of energy supply, nuclear accounts for 15 per cent of the country's electricity. Most importantly, it produces 20 per cent of its clean, emissions-free electricity, a real contribution to reducing GHG emissions and building a carbon-free economy.

Nuclear technology is a key part of an advanced economy, supporting medicine, materials science, advanced manufacturing, food safety, and energy production. According to the Canadian Manufacturers and Exporters, nuclear power generation directly and indirectly supports 60,000 Canadian jobs.

In Ontario, the coming refurbishment of 10 Bruce Power and Ontario Power Generation units will activate approximately \$25 billion in investment and thousands of high quality jobs. This is the largest concentrated clean energy investment in North America, if not the world.

Canada's civil nuclear capabilities are a strategic asset for Canada's foreign policy. They give the Government of Canada additional means for developing and building long-term relationships in Asia, Eastern Europe, Latin America, the Mideast and Africa.

However, countries will not buy Canadian nuclear technology (such as CANDU power reactors) or uranium resources without assurances that the Canadian government and Canada's nuclear industry are committed over the long term.

Moreover, Canadian nuclear technology, research and regulatory regimes give Canada world standing in deal-

ing with non-trade issues such as global security, non-proliferation and forging geopolitical relationships to meet Canadian foreign policy goals.

In setting an evidence-based and duly diligent policy framework for reaching the government's climate change/low-carbon objectives, the following should therefore be incorporated:

- Recognize the important role of nuclear energy in meeting GHG emissions targets
- Include nuclear energy in the definition of clean energy technology and in energy dialogues with Canada's provinces
- Invest in innovative low-carbon nuclear energy sources
- Provide funding support to R&D and innovative technology projects
- Support a Nuclear Innovation Council to bring together government and industry in cost-sharing partnership on nuclear technology and research
- Support exports of Canada's advanced nuclear technologies and uranium resources globally, as low-carbon sources of energy
- Integrate into foreign policy the important role played by our nuclear technology and expertise in Canada's key bilateral and international security interests.

With a strategic approach that includes nuclear, the policy options expand. And the possibility increases of successfully developing a low-carbon economy, with benefits not just for the climate but for Canada's workers, economy, energy supply, international partnerships and our place at the international table. **P**

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