

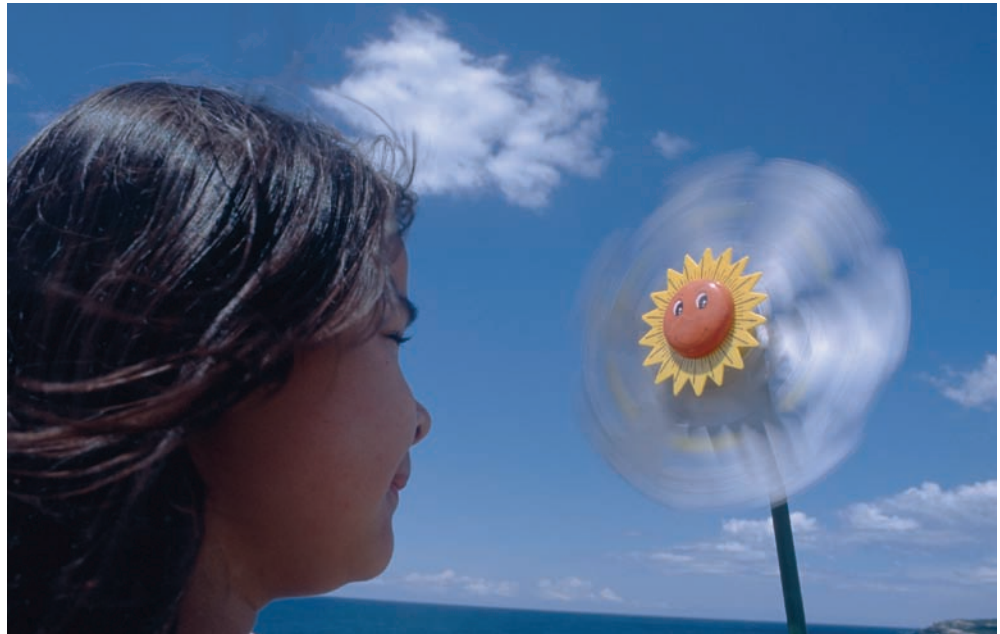


WWF® *for a living planet*®



renewable is doable

A Smarter Energy Plan for Ontario.



Keeping the Lights On in Ontario While Meeting Our Climate Change Commitments.

WWF-Canada and the Pembina Institute have commissioned a landmark study to forecast three options for Ontario's energy future.

Renewable is Doable confirms that smart, targeted investments in a diverse array of energy efficiency and renewable energy solutions over the next twenty years will achieve major cuts in greenhouse gas emissions, accelerate the closure of our highly-polluting coal plants, and avoid the need for new nuclear investments.

A greener and more affordable energy future is available.

Here's how we get it.

Renewable is Doable: A Smarter Energy Plan for Ontario

FUTURE-FRIENDLY: Efficiency and conservation are ways of meeting our energy needs with no environmental impacts, while well-designed wind, solar, bio-fuels and micro-hydro have much lower environmental impacts than fossil- or nuclear-based energy. So we won't leave a legacy of global warming or nuclear waste for our kids, and we'll be ahead of the pack as the world moves from the energy equivalent of typewriters and mainframe computers into the information age of laptop power plants and smart grids that use internet-age information management to reduce energy use.

PROTECTION AGAINST RISING FUEL COSTS: Conventional fuel costs - for oil, gas, coal and uranium - are rising. By contrast, energy efficiency, waste energy recycling, and renewable technologies have virtually zero fuel costs or exposure to future supply shortages. Capital costs for wind and solar technologies have decreased in the past decade, and still lower costs are predicted in the decade ahead.

FLEXIBILITY: Unlike large nuclear reactors or fossil fuel-fired stations, efficiency and renewable energy solutions are geographically dispersed around the province, use diverse, low- or no-cost fuels like the wind, water and wood or agricultural waste, and can be added quickly in modular increments to match future demand. Energy produced close to where it is used also reduces the stress on the transmission system and reduces energy losses in sending power over long distances.

RESILIENCE: Diversity and dispersal also add system security. If one wind turbine fails, the lights won't flicker. If an entire windfarm gets knocked out by a storm, only 40,000 people will lose power. If a single Darlington reactor goes down, 400,000 homes, or key industries, could face instant blackouts. To hedge this extra risk, high premiums have to be paid for decades to ensure large blocks of standby generation.



This wind farm near Sault Ste. Marie was built on-time and on-budget, and now provides enough power for 40,000 homes.



This micro-hydro project operated by the Serpent River First Nation in northern Ontario provides reliable power without interfering with the ecology of the river.



This cogeneration plant near Kingston uses a waste energy recycling process to produce both electricity and industrial steam for adjacent industries.

Managing Risk

Even setting aside the unsolved problems of safety, radioactive waste, and weapons proliferation highlighted by the Intergovernmental Panel on Climate Change in their report on solutions to global warming, nuclear reactors have intrinsic features which magnify investment risk.

The most serious is that they require large amounts of construction capital and a decade to build. This amounts to an 'all or nothing' gamble that the reactors will perform as predicted for four decades.

Three decades ago, Ontario made exactly the same gamble with its first fleet of reactors. Billions were borrowed and sunk into 20 reactors at Pickering, Bruce, and Darlington. The bets never paid off, leaving a legacy of debt.

The OPA plan assumes none of this will happen again. History indicates it will. No prudent planner or politician can deny this major risk exists. It must be a key factor in the planning and approvals process. At the very least, it should be assumed that the reactors will operate at the performance levels they have in the past.

If the proposed reactors match past poor performance, Ontario's dirty coal plants, or future gas plants, will have to run longer and harder to provide replacement power. In this case, the reactors will extend greenhouse gas and smog emissions, not end them.

There is now solid evidence that a less risky, rigid and costly power system 'package' can be built as future Ontario demand requires. This makes the nuclear option one of last resort - not a first and inescapable choice.

Greener Options for Ontario's Electricity Future

Ontario plans to spend over \$100 billion to replace much of Ontario's dirty, aging power plant and transmission system during the next two decades, including building new nuclear reactors and rebuilding old ones. This will be the biggest capital investment in provincial history and risks repeating the mistakes of the past.

The good news is that a better electricity future is possible, where we keep the lights on without coal or nuclear power. The three pillars of the **Renewable is Doable** future are:

1. *Stop energy waste by Ontario households and businesses. Improving energy efficiency means getting the same energy service with less energy use by, for example, legally requiring new fridges and air conditioners to be much more efficient than the older equipment they replace.*
2. *Tap Ontario's abundant sources of renewable energy. Wind, low-impact hydro, bio-fuels, methane capture at landfill sites, and solar power can meet most of our electricity needs once we are efficient.*
3. *Capture and recycle waste heat and pressure from industrial and commercial operations into electricity (also called cogeneration).*

Together, these can deliver a clean, affordable, reliable power system by 2027. Major progress is possible in five years. Existing coal and nuclear plants can be phased out and no new reactors need to be built. Consumers will save money and greenhouse gas emissions from the power sector over the next 20 years will be half of those from the OPA plan.

Packaging a Robust Solution

The key to planning for the long-term is not simply matching future supply and demand by 2027. It is building an optimum 'package' which features faster construction times, flexible production, the lowest risk, the highest reliability, realistic costs, and minimal pollution.

Achieving this requires rigorous advance homework, and sober assessments based on actual performance and conservative forecasts of power output and costs. This is precisely what our study does.

It concludes that a cleaner, greener power system comprised of dozens of diverse 'laptop' power plants across Ontario will work far better, at far less risk and cost, than a dozen monolithic nuclear 'mainframes'.



Solar panels provide maximum power on hot, sunny days when we are using the maximum amount of electricity. Their cost is declining rapidly as the technology improves.

Efficiency and Conservation

The first step in greening Ontario's grid is to eliminate wasted power. We use 60 per cent more electricity per capita than people living in New York State. This waste represents a gold mine. As California has found, it is far cheaper to pay to find this hidden waste, and extract it with smart energy-saving technologies, than to pay for new power plants. The Soft Green package pursues all of the conservation and efficiency resources identified by the OPA as cost effective and achievable. The Deep Green package would match the efficiency levels being achieved in leading jurisdictions in Europe and the U.S.

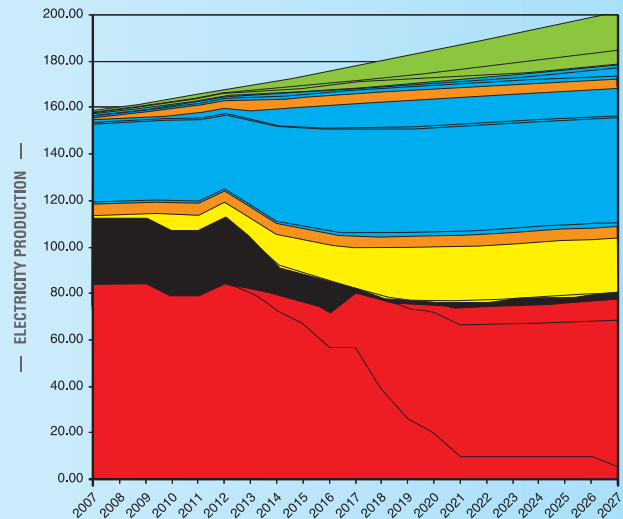
Renewable Energy

The Soft Green package maintains existing hydro plants such as Niagara and those in northern Ontario, but supplements these with additional hydro imports from Manitoba and Quebec and a diverse slate of new renewable wind farms (the largest new source of power), low-impact hydro plants, bio-fuel generators, and solar panels. The Deep Green package adds even more wind power, coupled with storage capacity to better meet peak demands, and more solar power.

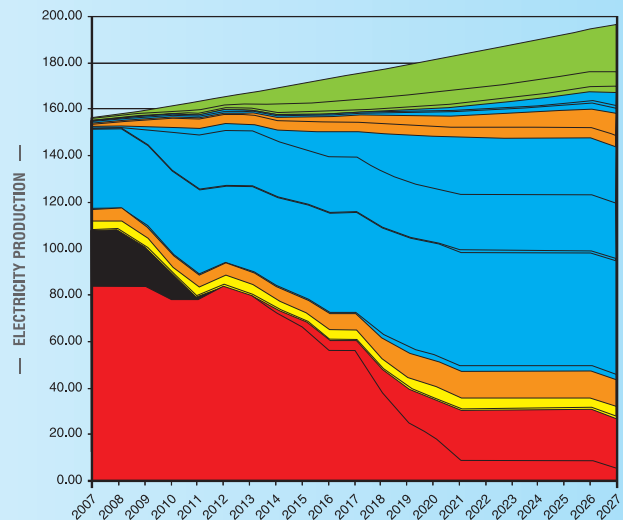
Cogeneration

The Green scenarios include aggressive measures to recycle or convert the large amounts of wasted heat energy at Ontario industrial and commercial sites into power with little or no incremental environmental impact, through a proven technology called cogeneration. Ontario ranks far behind many parts of Europe and the U.S. in tapping this potential. Converting this waste heat into power is cheaper, cleaner, and less risky than building new nuclear capacity, and has the added benefit of reducing stress on the electricity grid because power is produced close to where it is used.

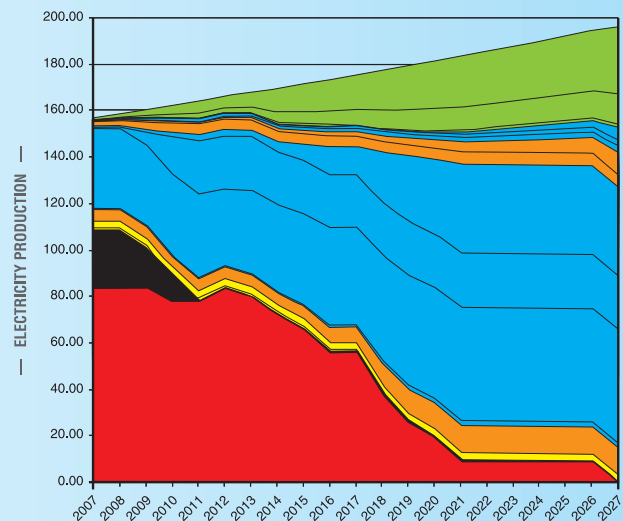
OPA Plan



Soft Green Scenario



Deep Green Scenario



Natural Gas

Natural gas is far cleaner than coal, but still emits greenhouse gases and smog-causing pollutants. Both Green packages use fewer gas plants than what the OPA Plan requires, and the Deep Green package would avoid the need for some plants already planned.

Coal

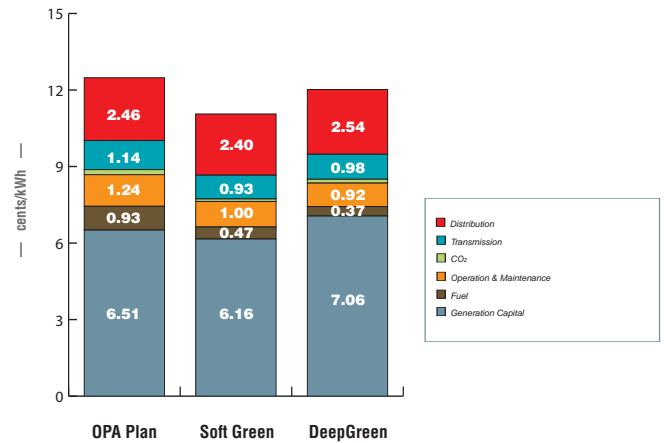
According to our modeling, the OPA's Preliminary Plan won't fully phase out coal until 2017 due to its reliance on nuclear power; the OPA predicts the performance of Ontario's nuclear plants will improve dramatically, but we have assumed that they perform no better or worse than they have over the last 30 years which means keeping coal longer. Both Green Scenarios eliminate coal by 2012.

Nuclear

The OPA Plan puts the greatest portion of its resources into nuclear power. The Soft Green package assumes that the rebuilding of the Bruce nuclear reactors that are already contracted for go ahead, but that there are no additional investments in new or rebuilt nuclear plants. The Deep Green package phases out all nuclear by 2027.

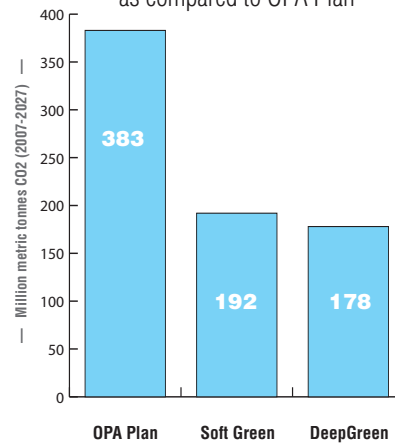
Results:

Total Delivered Costs of Electricity in 2027 are lower for Green Scenarios



Results:

Total greenhouse gas emissions over 2007-2027 period are 50% lower in Green Scenarios as compared to OPA Plan



Renewable is Doable uses a state-of-the art computer simulation model and data from the Ontario Power Authority (OPA), cross-referenced with comparable energy efficiency and renewable energy project performance in the U.S. and Europe, to compare the OPA's proposed plan with two greener options. To avoid overstating the benefits of the greener options, we have used a number of conservative assumptions. For example, we used the OPA's prediction that demand for electricity will grow at roughly twice the rate it has since 1990. And we assumed that there will be no cost over-runs on nuclear projects, although historically the best we have done is a 40% cost over-run building the Pickering A Plant, while the Darlington station came in almost \$11 billion over its original \$4 billion budget. The full technical reports are available at www.renewableisdoable.ca or the Pembina Institute (www.pembina.org) and WWF-Canada (www.wwf.ca) websites.



Making it happen

Ontario's power system is aging fast, while population and demand are climbing. Coal and nuclear plants - which are coming to the end of their operating lives - account for about two-thirds of energy produced, and are major sources of greenhouse gases, smog, airborne toxics, and long-lived nuclear wastes.

RENEWABLE IS DOABLE sets out achievable targets for energy efficiency, conservation and renewable energy so that we can build a greener energy system for the 21st century, rather than re-building a system from the 1950s.

We all have a role to play in making this happen - in making sure we 'do' the 'doable'. To find out how you can get involved, go to:

www.renewableisdoable.ca

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

Conserving the world's biological diversity; ensuring that the use of renewable natural resources is sustainable; and, promoting the reduction of pollution and wasteful consumption.

For more information visit www.wwf.ca



for a living planet®

DONORS

Many thanks to The Ontario Trillium Foundation, the McLean Foundation, and the EJLB Foundation for their support for the work of WWF-Canada and the Pembina Institute on climate change solutions.

About the Pembina Institute

The Pembina Institute creates sustainable energy solutions through innovative research, education, consulting and advocacy.

More information about the Pembina Institute is available at <http://www.pembina.org>.

