Nova Scotia's 2030 Clean Power Plan

Nova Scotia Department of Natural Resources and Renewables

2030 Clean Power Plan

- **Flexible.** Implementation of this Plan ensures that NS avoids decades of financial and technological lock-in. This creates flexibility for NS both on the path to coal closure by 2030; while also opening room for future investments in growth sectors like Offshore Wind, Hydrogen, Batteries etc.

- **Doable. On Time.** All the major electricity legislation or investments required to trigger the core actions of the Plan, and to close coal on time, have already been made by the NS Government, or will be set in motion in the coming months. And all can be delivered in time for 2030.

- **Affordable.** This Plan centres around Affordability – and ensures that the path to 2030 protects NS ratepayers (who already face high power bills) from being burdened with additional excessive risks or uncontrolled costs.

Nova Scotia's Electricity Context

Nova Scotia has commitments to:

- Phase out coal & reach 80% renewables by 2030.
- Reduce GHGs from electricity by more than 90% (from 10.7 MT in 2005).

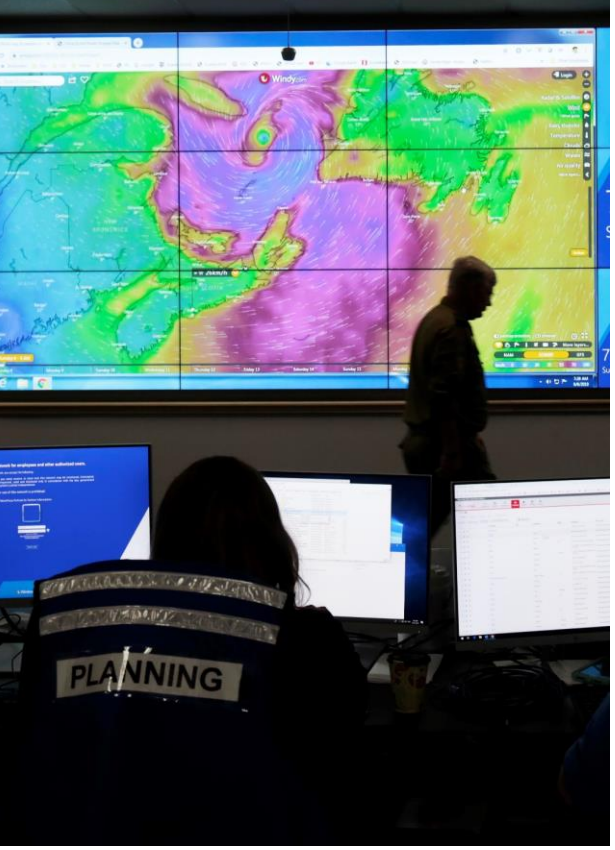
These commitments:

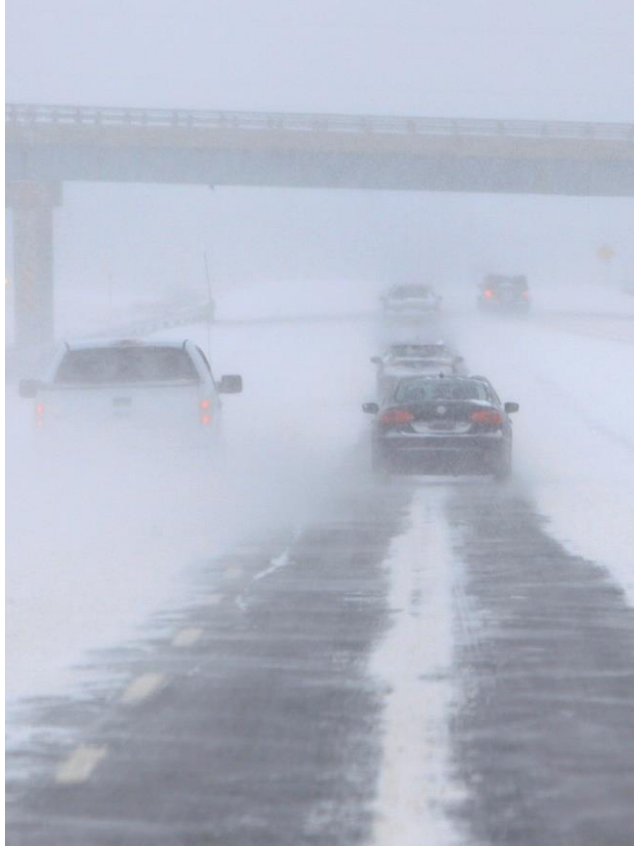
- Are driven by the Federal requirements for coal closure and new Clean Electricity Regulations.
- These create significant costs for NS ratepayers.

Unplanned, additional burdens must be managed:

- Significant fuel cost pressures have arisen from the delayed and under-delivering Maritime Link, which forces increased purchases of expensive coal.
- More and stronger storms are impacting reliability.

Historic Coal Prices (USD)





- Nova Scotia's electricity system is highly vulnerable to climate change linked events.
- The past 12 months alone have seen:
  - Historic Hurricane Fiona, September 2022
  - Historic Polar Vortex, February 2023
  - Historic Forest Fires, May 2023
  - Historic Rain & Flooding, July 2023
- These types of events will continue to increase in frequency and intensity.

NOVA SCOTIA

Maritime Link Update

- The Maritime Link, Labrador Island Link, and Muskrat Falls facilities have been commissioned, but there remain significant ongoing challenges in receiving the full value of Nova Scotians' investments.

- Nova Scotian ratepayers have been carrying the double cost burden of not only paying the annual costs of the Link itself, but then also being required to pay – and at soaring global prices – for replacement coal and gas. This fuel was required for some years because of delays in commissioning, now compounded by ongoing under-delivery issues.

- The future is more promising, but in the meantime, this has created severe fuel cost pressures on NS ratepayers, and an ongoing bill.

Atlantic Loop: Update

1. Capital costs have increased by 300%, from $2.95 Billion in 2020 to more than $9 Billion today. Burdening everyday Nova Scotian ratepayers with this level of new cost, plus the risk of even more cost escalation, is unacceptable.

2. Quebec has confirmed it does not have the product Nova Scotia required to close coal – firm energy available for sale to meet our winter peak needs.

3. Global supply chain challenges (HVDC equipment, cables); plus the need for all three provinces to complete approvals and negotiations; plus a tight construction industry mean the Atlantic Loop cannot be ready for 2030.

4. Investing in our own energy resources avoids Nova Scotian's having to spend billions on infrastructure in Quebec and New Brunswick.

- Hydro Quebec Strategic Plan 2022-26

This option is no longer viable for 2030.

Comparative Energy Sources: Costs ($/MWh)

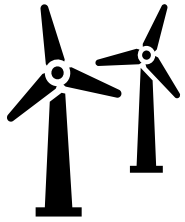
Atlantic Loop Energy	**$200-$250**	
NS Wind		$45-$65
Battery + NS Wind		$70-$100
Offshore NS Wind		$70-$140
Solar		$80-$130
Natural Gas*		$100-$170
Imports (from NL, NB, NE)		$150-$200
Smart Grid/Efficiency		$0-$50

*Natural Gas may incur carbon costs. However, revenues would be in recycled back to mitigate ratepayer impacts through investments in further GHG investments.

Nova Scotia's Historic Opportunity

- NS has some of the most exceptional winds in the world, with capacity factors that can exceed 50% in the onshore.
- Our offshore has even more wind potential, providing Nova Scotia a significant advantage in offshore wind and hydrogen.
- Nova Scotia is also home to world-class expertise in batteries, and rapidly growing new firms.
- Harnessing these local resources reduces Nova Scotia's dependency on imported coal or natural gas, and enormously strengthens our energy security.
- Wider electrification will enable NS to replace $5 Billion spent on bills for imported fuel, by tapping into much cheaper local, renewable power.

Nova Scotia's 2030 Clean Power Plan

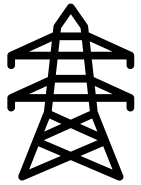


New Energy Resources

1. Wind
2. Solar

Smart Grid Management Tools

3. Batteries and Renewables Integration
4. Electrification and Load Management

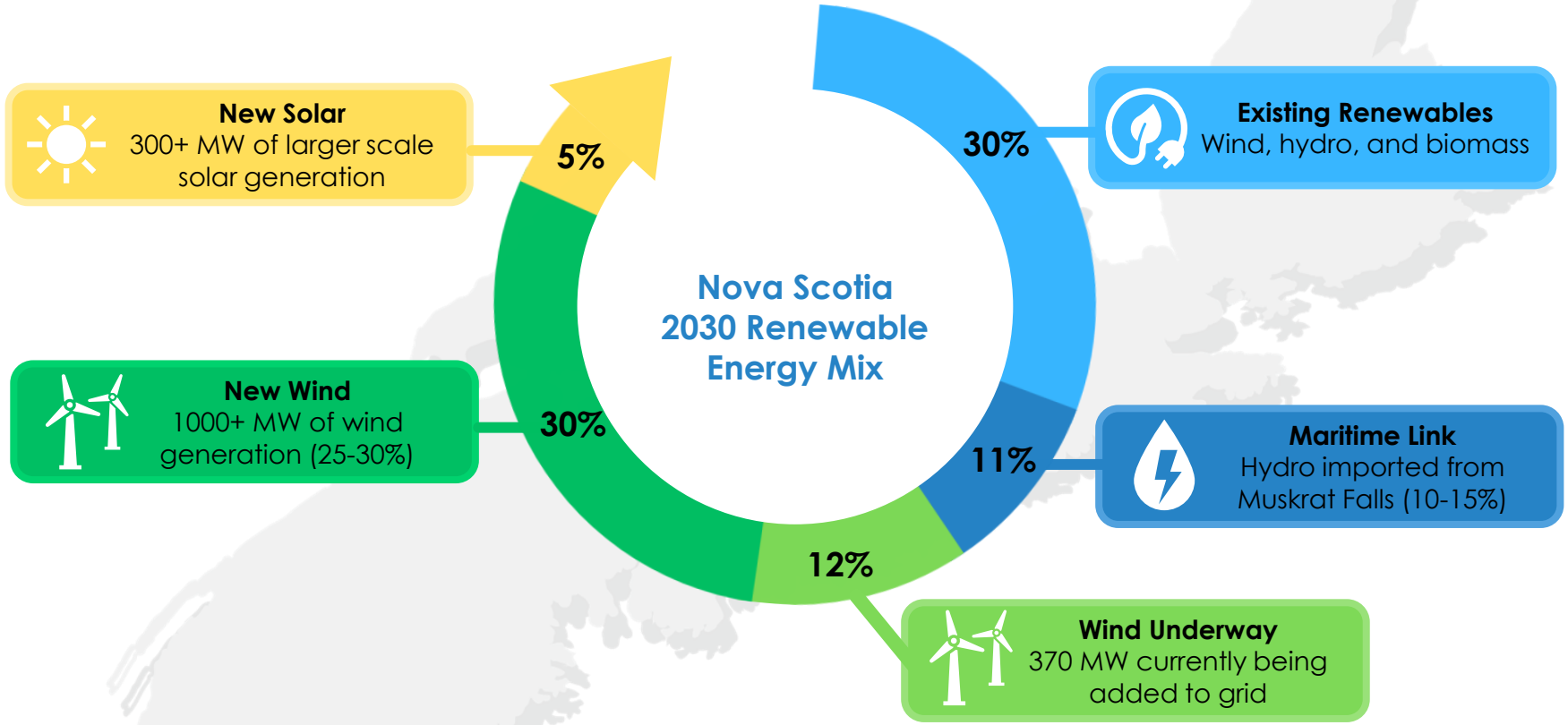


Resilience and Reliability

5. Transmission
6. Fast-Acting Generation
7. Emergency and Reliability

Nova Scotia's 2030 Clean Power Plan

Achieve 80% renewables • Close coal • Cut electricity GHGs by 90% • Improve grid resiliency



Supporting Resiliency and Reliability of the Grid

Batteries: 300 MW
Innovative battery deployment underway

Fast Acting Generators: 300 MW
New, dispatchable generators

NS-NB Tie: 500+ MW
New 345kV reliability line to NB to help manage renewables

Reliability/Emergency Plants: 450 MW
Retain 4 oil/gas units for emergency use

Load Management: 150 MW
Peak management, demand response, and efficiency

NOVA SCOTIA

1. Wind

- Increase onshore wind generation from 20% to 50%+ of electricity.
  - Add ~1,000 MW of new wind by 2030 to reduce GHGs and stabilize costs through fixed price contracts.
  - Plus 370 MW is already underway from the recent RFP.
  - Confirmed in all scenarios from NSP's Integrated Resource Plan.
- Wind is widely-agreed to be the lowest cost electricity resource available to Nova Scotia, with the latest RFP costing just 5.3 cents/kwh for 370 MW.
- **Fall 2023:** Nova Scotia launches the Green Choice Program procurement for the next 350 MW of wind.
- Additional procurements will follow (est. 2025 and 2027) alongside work to encourage responsible development and mitigate supply chain issues.

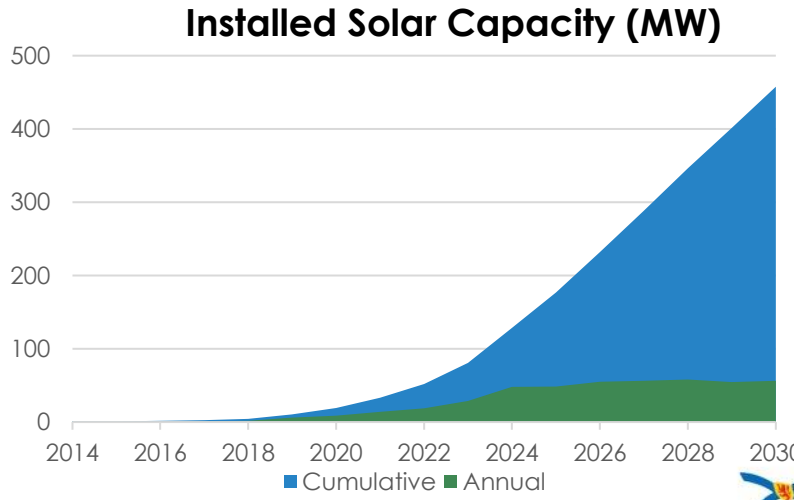
2. Solar

- Significantly expand the use of solar across NS.
  - Net metering was strengthened in legislation, and 7,000 Nova Scotians have now installed solar.
  - Demand is growing on farms, businesses, municipalities and First Nations – driven by economics, and a desire for more control over their energy.
  - The solar industry now employs 500 people today in NS and is on trend to hit 1,000 next year.

- **Fall 2023:** NS's Community Solar Program and Commercial Net Metering launch this Fall- with more than $150M in solar investments expected across Nova Scotia's communities in 2024.

- By 2030, the Nova Scotia Plan expects at least 300MW+ of larger scale solar installed through existing programs.

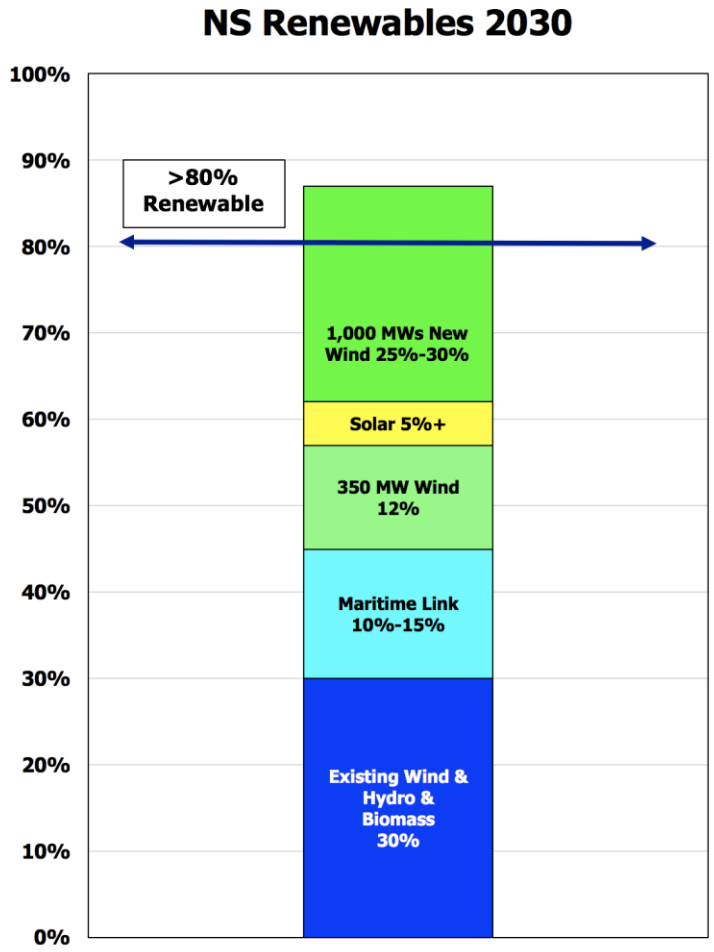
Berwick Community Solar Project



NOVA SCOTIA

Achieving 80% Target & #1 in GHG Reductions

- More than 80% renewable power can be achieved by building out Nova Scotia's own local renewables.
- The 2030 Clean Power Plan will also reduce electricity GHGs by more than 90% (from 10.7MT in 2005 to <1MT in 2030 to 0.5 MT by 2035).
- Nova Scotia is already leading Canada in GHG reductions and by 2030 will be #1 in all of North America.
- Planning for the future also requires a greener, more flexible, and more reliable grid.



3. Batteries and Renewables Integration

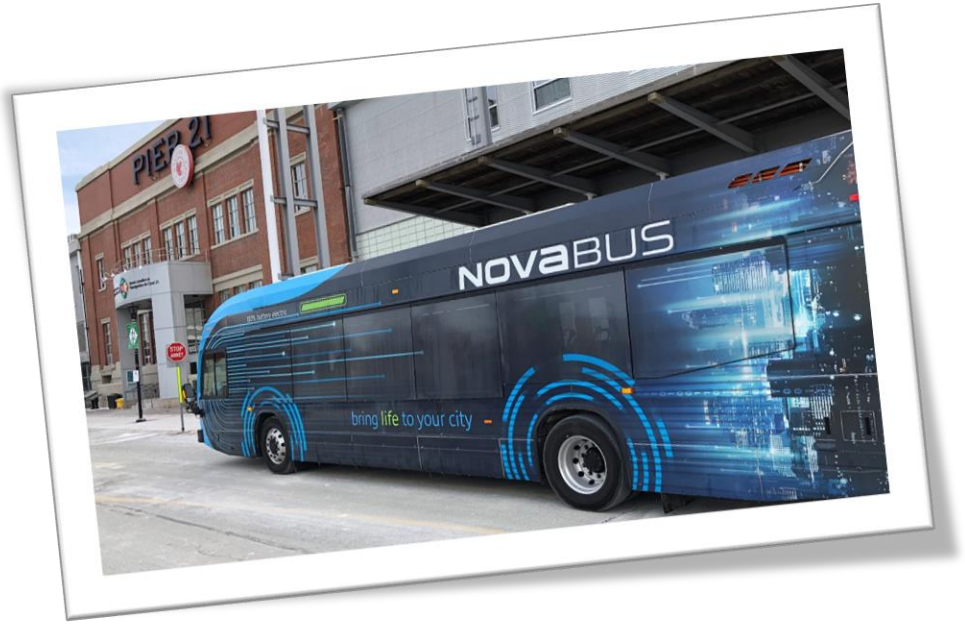
- Battery technology is improving at world-changing rate:
  - Researchers like Nova Scotian Jeff Dahn and his team (at Dalhousie and with Tesla) have developed batteries that will last 1,000,000 miles in an EV.
  - These kinds of batteries are now also helping electricity systems, both to manage renewables but also to provide important grid services.

- Battery prices have fallen by 95% in recent decades. However, the speed of deployment in Nova Scotia will depend on significant Federal funding.
  - Other investments to strengthen the grid are also required to ensure safety and reliability.

- **Work underway:** NRR is presently reviewing applications for 300MW of innovative early battery deployment projects, across multiple Nova Scotian sites and communities.

4. Electrification and Load Management

- Nova Scotians spend $5 Billion every year for imported fossil fuels like coal, heating oil, gasoline and diesel.
- A key driver for building a clean electricity system in Nova Scotia is to produce energy savings by electrifying heating and transportation for households.
- Electrification will reduce energy bills and replace spending on imported fuels with clean local electricity.
- More Heat Pumps & EVs will also increase electricity needs and peak load on the Grid, especially after 2030.
- **Next Step**: Manage 150MW of load through Demand Response and low-cost actions like smart EV charging, building code updates, and standards on heat pumps.



Electrification

- The CAA estimates an average vehicle's gas bill is $2,000-$4,000. Instead, driving an EV saves you $1,500 to $3,000 in fuel costs each year.
- As the vehicle fleet converts over time, Nova Scotians will save $1.5 to $2 Billion/year on gasoline (>70% of which is the cost for the imported fuel).
- Using Made-in-NS electricity brings those dollars back home.
  - For instance, bringing that >70% (= $1.4 Billion) in fuel bills coming back home to NS will create thousands of new jobs.

Owners of EVs in Nova Scotia today, recharge at the equivalent of

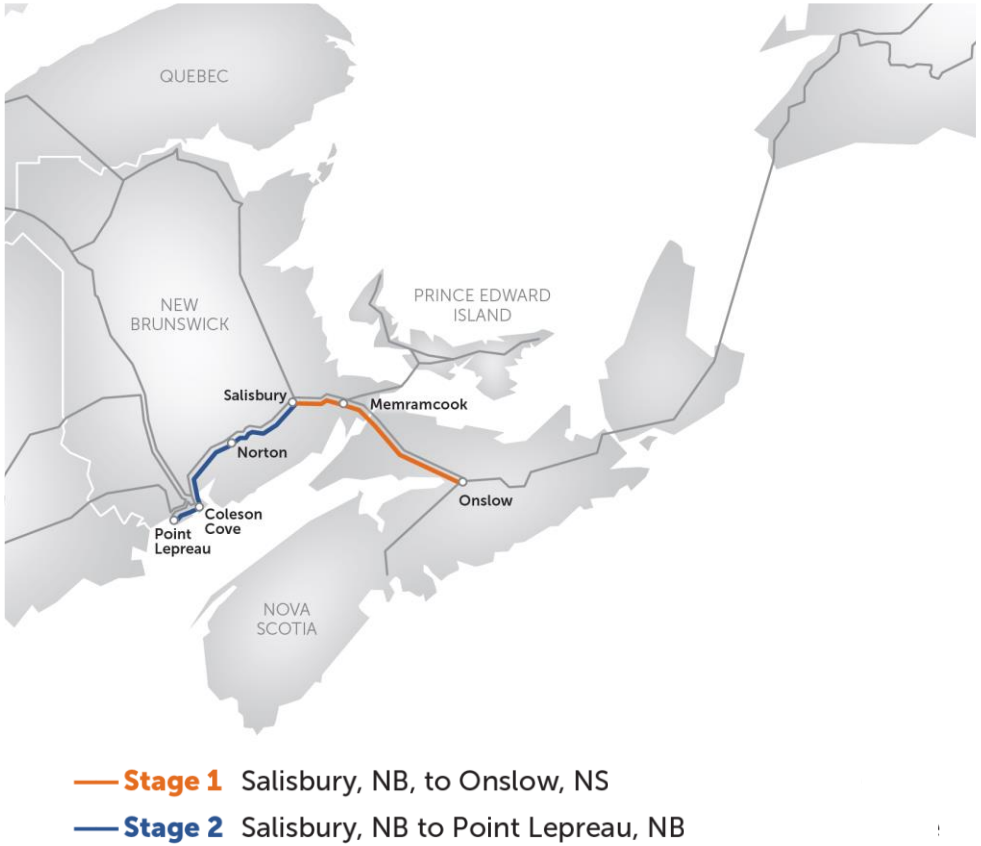
Pump Prices of 35 cents a liter

NOVA SCOTIA

Load Management and Vehicle-to-Grid (V2G)

- Many EVs can power your home for days if the power goes out. And some Nova Scotians are already using their vehicles as generators during storms.
- This capability will also allow vehicle owners to support the grid with their cars.
- **Work underway:** NS is developing programs that will enable Nova Scotian drivers to unlock the full value of their vehicles and also reduce ratepayer costs by avoiding new investments.

5. NS-NB Regional Transmission

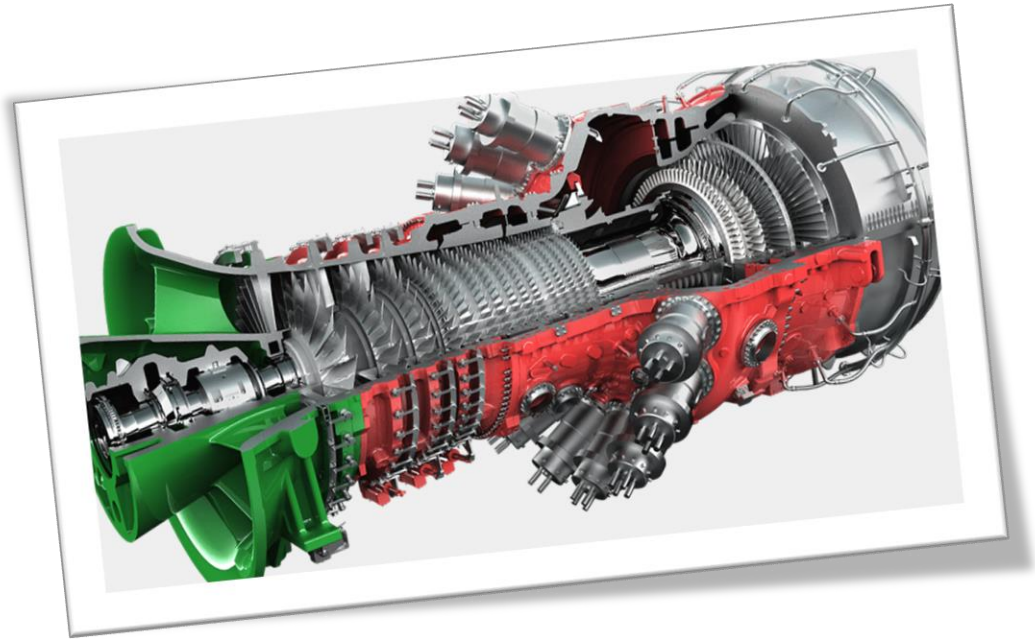


Nova Scotia's electricity system is only weakly connected to the North American grid, through New Brunswick.

- A new 345kV line to NB is needed to manage renewables, boost reliability and resiliency.
  - This NS-NB Reliability Tie will run from Onslow to Salisbury, enabling 500MW+ of imports/exports. This project is expected to be online in 2028.
  - Extending this line to Point Lepreau would enable greater access to NB, New England, and Quebec.
  - This new line and extension can be completed by 2029 at a total cost of ~$1.4B, far less than the Atlantic Loop.
  - This supports regional population growth; enhances reliability; and enables more energy trading.
- **Work underway:** Interprovincial & Federal talks are underway to support these transmission investments.

6. Hydrogen-Capable/Flex-Fuel Generators

- By 2030, and with coal closed, the NS system will still need options that can run for a few days if it is not windy, to ensure power during winter peaks, or should storms/events impact transmission lines.
- This will require a certain, limited amount of new, fast-acting, dispatchable generation by 2027.
- Manufacturers are designing new units capable of burning green hydrogen or bio-fuels to reduce GHGs.
  - Before investments are made, options that could use a domestic clean fuel will be considered.
- **Next step:** Finalize technology choice, location, and timing for 300MW of fast acting generation.



7. Emergency and Reliability Back-Up

- Nova Scotia has relied for decades on coal-fired generators for storms or extended cold spells.
- Many of these units retained the dual-fuel ability to burn oil, to ensure greater reliability during emergencies and when back-up was needed.
- We will retain some of these units' capabilities to ensure sufficient emergency and back-up:
  - These will be used, as at present, very infrequently (<1% of the year), with similarly small GHGs of <0.05 MT (vs NS Electricity GHGs of 10.7 MT in 2005).
  - This saves ratepayer more than $500 Million.
  - Every IRP scenario includes retaining at least 3 oil plants (450MW capacity) at 10% of the cost of alternatives.

Nova Scotia's 2030 Clean Power Plan

Wind

Add 1,000+MW new onshore wind by 2030 (offshore potential post-2030)
Green Choice procurement has begun, more every 18 months

Solar

Net Metering now well-established and growing each year
300MW+ large Solar by 2030 - Commercial begun, Community in Fall

Batteries + Renewables Integration

300-400MW Batteries by 2030
Additional renewable integration investments for reliability underway

Electrification/Load Management

Peak Management, Demand Response and Efficiency investments to reduce 150 MWs of peak and peak growth

Transmission

A new NS-NB Reliability Tie transmission line in service pre-2030
Potential to extend new transmission to Point Lepreau, NB by 2030

Fast-Acting Generation

300MW Hydrogen Capable/Flex-Fuel generators by 2030
Potential for 300+ MWs additional in 2030 or later

Emergency & Reliability Back-Up

450+MW Emergency/Back-up oil generators (use of existing plants)
Potential 100+ MW Coal-to-Gas conversions 2030

Clean Electricity Solutions Task Force

- The Task Force will:
  - Examine electricity infrastructure needs for reliability, capacity and storage to meet climate change goals.
  - Examine connections to other essential services such as telecommunications.
  - Review the *Nova Scotia Utility and Review Board Act* in terms of electricity generation, transmission and rates.
  - Engage subject matter experts, the Mi'kmaq and other interested Nova Scotians.

- The report from the Task Force will be available early in 2024.

Flexibility – for 2030 and post-2030

- Nova Scotia must avoid taking on too-large new risks (especially post-Maritime Link) or long-term constraints that limit adoption of new, local renewable energy.
- Our decisions will always consider the current price, timing, volume, product, risk, and local content.
- The 2030 Plan retains flexibility to add new supply:
  - As population and load growth are expected.
  - By backing out even more fossil use (<1.0 MT in 2030), by limiting new fossil investments.
  - Procurement can then select the best technology available, whether on or offshore wind, solar, hydrogen, or something new, like geothermal.

Post-2030 Energy Options

- Global efforts to decarbonize electricity generation are accelerating, and new technologies are emerging one after the other into the mainstream.

- Given this, by 2030, Nova Scotia will possess far more options, and more knowledge, about workable, cost-effective solutions that fit our conditions.

  - There is enormous promise for the use of offshore wind in Nova Scotia after 2030, as well as hydrogen (potentially before 2030).
  - The rapid growth of EVs will bring new load but also bring entirely new grid management tools, with enormous potential to reduce system investments.
  - New long-duration batteries technology, geothermal energy, and bio-energy will also become increasingly cost-effective.
  - NB may have power available from its Small Modular Nuclear Reactors (SMRs).

Nova Scotia's 2030 Clean Power Plan

☑ The elements of Nova Scotia's 2030 Plan are clear, implementable, and limit ratepayer risk and investment. The Plan:

- Closes coal by 2030.
- Achieves and exceeds the 80% Renewable Energy Standard.
- Cuts Nova Scotia's total GHGs by >53%, the best in Canada.
- Moves NS electricity onto long-term, stably-priced renewables.
- Creates jobs in every community through solar, heat pumps, and wind.
- Ensures the Greener Grid is also a More Reliable Grid.
- Expands Atlantic regional ties.
- Limits ratepayer risk by avoiding billions in locked in new capital costs to 2075.
- Expands personal choice.
- Puts competition at the heart of energy generation and grid management in NS.
- Enables household and business bill savings – across all energy bills.