

Legal Update

NARIS Report Shows Multiple Pathways to 80% Carbon Reduction by 2050

The North American Renewable Integration Study (NARIS) assesses opportunities to modernize and decarbonize the North American power system through the integrated planning and operation of generation and transmission infrastructures to meet end-use demand.

On June 24, 2021, the US Department of Energy (DOE) and Natural Resources Canada (NRCan) [announced](#) the release of the [US Perspective Report](#) and the [Canadian Perspective Report](#) as part of the latest NARIS study.

In the study's [summary](#), the DOE and NRCan state:

“The North American electric power system is undergoing significant change, with renewable resources now contributing more generation than ever before. This transformation is poised to continue given decreasing technology costs and ambitious decarbonization goals at the federal, state, local, corporate, and consumer levels. The North American Renewable Integration Study (NARIS) aims to inform grid planners, utilities, industry, policymakers, and other stakeholders about challenges and opportunities for continental system integration of large amounts of wind, solar, and hydropower to support a low-carbon future grid.”

Key highlights of the latest NARIS study include:

- There are multiple combinations of electricity generation, transmission and demand that can result in 80-percent carbon reduction by 2050.
- The future low-carbon system can balance supply and demand across a wide range of future conditions, with all generation and storage technologies contributing to resource adequacy.
- Operational flexibility comes from transmission, electricity storage and flexible operation of all generator types, including hydropower, wind, solar and thermal generation.
- While carbon targets can be achieved with conservative assumptions about the cost of wind and solar, steeper cost reduction of these technologies can lead to a faster and less costly transition to a low-carbon electricity grid.
- Regional and international cooperation on electricity transmission, as envisioned by the study, can provide significant net system economic benefits through 2050.

Launched in 2016, NARIS evaluates four scenarios for North American power systems through 2050, focusing on the effects of various renewable technology cost trajectories, emission constraints, demand growth and outcomes.

The four scenarios are shown in the table below from the summary:

Table 1. Description of the Core Scenarios

Scenario	Key Assumptions	Renewable Contribution ^a
Business as Usual (BAU)	The North American grid continues to evolve with expected trajectories for all technology costs, and there are no major changes to carbon legislation across the continent. The scenario includes only state-based requirements as of October 2018 in the United States.	50% (57% total carbon-free)
Low-Cost Variable Generation (Low-Cost VG)	VG, including wind and solar, follows a low-cost trajectory based on NREL's 2018 Annual Technology Baseline (ATB). Otherwise, the scenario is the same as the BAU scenario.	70% (78% total carbon-free)
Carbon Constrained (CO ₂ Constrained)	Carbon emissions from the electricity sector are reduced throughout North America, including an 80% reduction from 2005 levels in the United States and Mexico and a 92% reduction in Canada, also from 2005 levels. Otherwise, the scenario is the same as the BAU scenario.	71% (78% total carbon-free)
Electrification	New end-use energy demands, including heating and transportation are electrified. And 2050 loads are nearly double the 2020 loads. Otherwise, the scenario is the same as Carbon Constrained scenario.	79% (84% total carbon-free)

^a Renewable Contribution is the modeled share of annual generation in 2050 from all renewable technologies. Renewable contribution in the Electrification scenario is higher than the Carbon Constrained because it is subject to the same carbon constraint (80% reduction), but with much higher loads. This requires more zero-carbon generation, both in absolute terms and relative to total load.

The installed generation in each of the core scenarios is shown in the following table from the summary:

Table 2. Installed Capacity in the Core Scenarios (GW)

Type	Near-Term (2024)	BAU (2050)	Low-Cost VG (2050)	Carbon Constrained (2050)	Electrification (2050)
Coal	190	80	20	0	0
Gas	470	670	610	620	740
Hydro	90	90	90	90	90
Nuclear	50	50	50	50	50
Solar	140	510	700	710	1,230
Storage	20	30	30	60	130
Wind	140	280	490	480	840

For more information about the topics raised in this Legal Update, please contact the following lawyer.

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