



Supplementary Information

Renseignements supplémentaires

Presentation from Kenneth C Johnson

Présentation de Kenneth C Johnson

In the Matter of the

À l'égard d'

Ontario Power Generation Inc.

Ontario Power Generation Inc.

Application for a licence to construct one BWRX-300 reactor at the Darlington New Nuclear Project Site (DNNP)

Demande visant à construire 1 réacteur BWRX-300 sur le site du projet de nouvelle centrale nucléaire de Darlington (PNCND)

**Commission Public Hearing
Part-2**

**Audience publique de la Commission
Partie-2**

January 8-10 and 13-14, 2025

8-10 et 13-14 janvier 2025

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The Cleantech Revolution:

**Its Exponential Growth Has Rendered Ontario's
Nuclear Vision Outdated**


Submission to the CNSC January 2025 Hearings

Overview:

1. Nuclear is not a climate solution: too slow and too expensive with unique risks
2. The exponential growth of renewables has rendered Ontario's nuclear vision outdated
3. Nuclear/Gas Peaker has substantial opportunity costs and negative climate impacts
4. Ontario has multiple lower-cost solutions to decarbonize and expand the grid
5. If Ontario chooses nuclear there will be a long-term loss of cost competitiveness

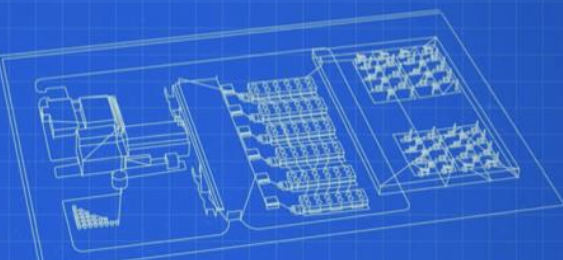
SMRs still are too expensive, too slow to build, and too risky to play a significant role in transitioning from fossil fuels in the coming 10 to 15 years.”

May 2024

 Institute for Energy Economics and Financial Analysis

Small Modular Reactors
Still Too Expensive,
Too Slow and Too Risky

David Schlissel, Director of Resource Planning Analysis
Dennis Wamsted, Energy Analyst

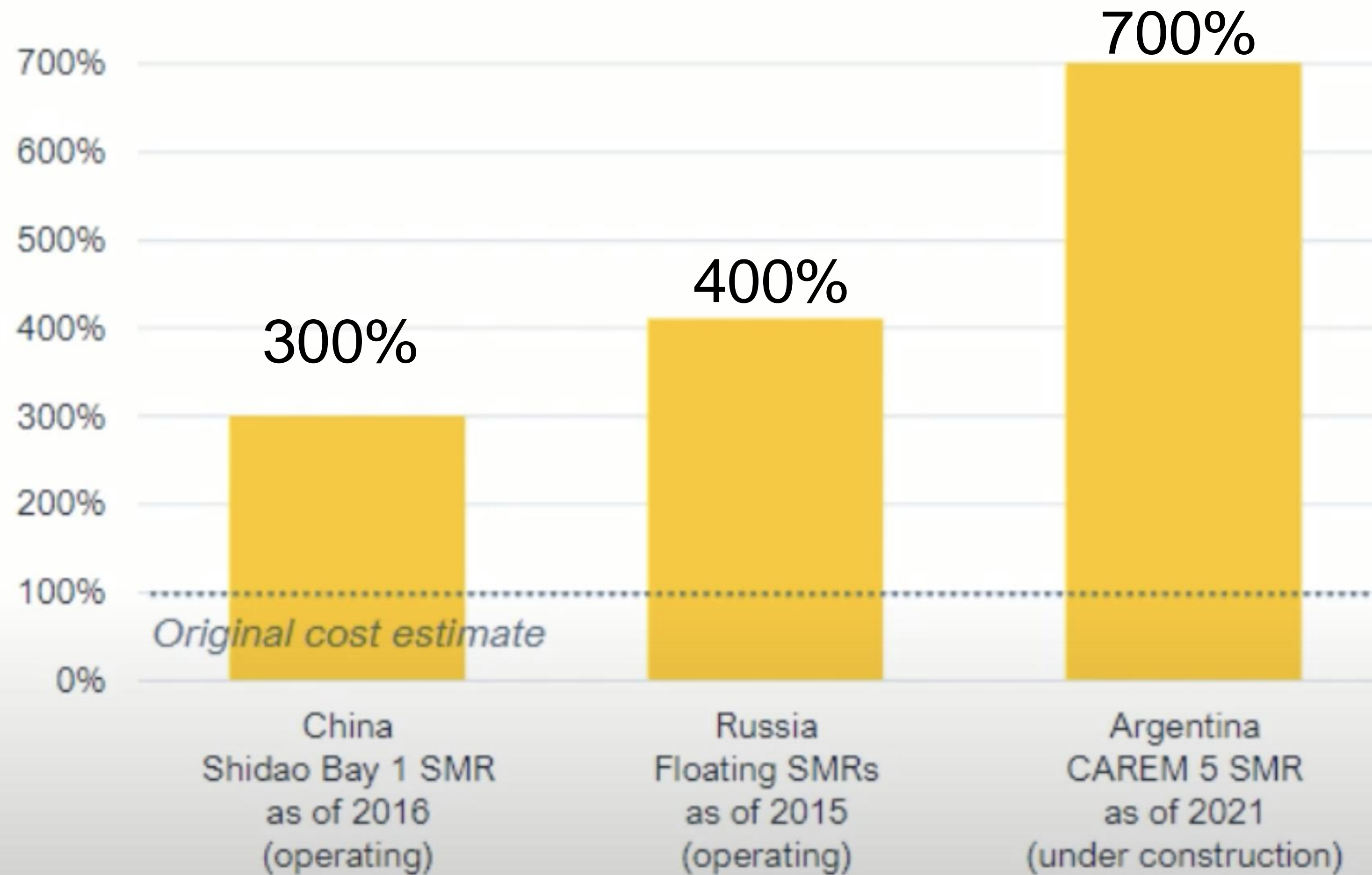


Expensive to build
Delays in construction
Financially risky
Not a good fit

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June 2024

Cost escalation in the only 3 SMRs built or under construction in the world - 300-700%

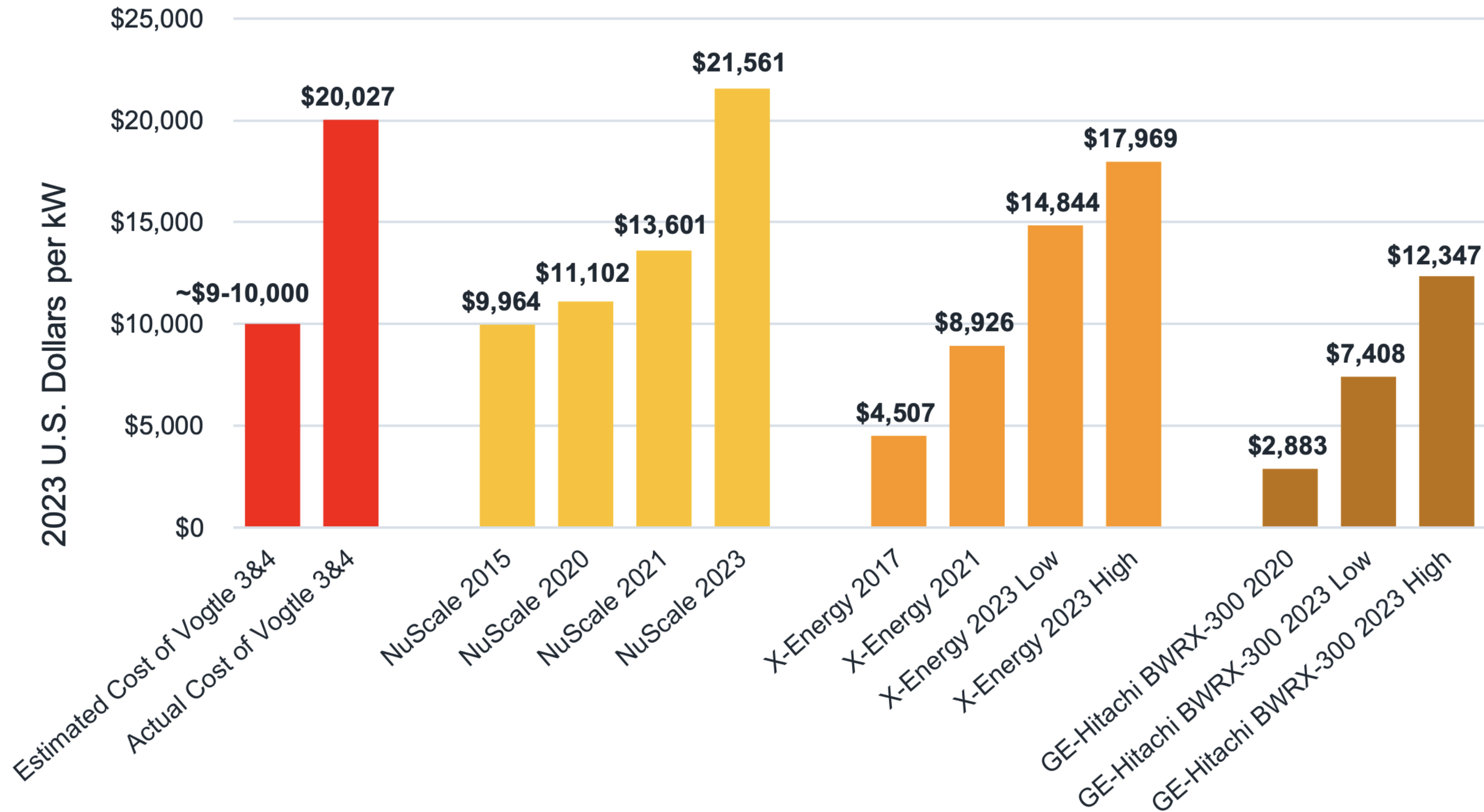
Figure 1: Cost Escalation Experienced by SMRs in Operation or Under Construction



Source: IEEFA calculations from data in the 2023 World Nuclear Industry Status Report and Bellona Environmental Foundation.

Proposed US SMRs also have escalating cost estimates - 2x-3x

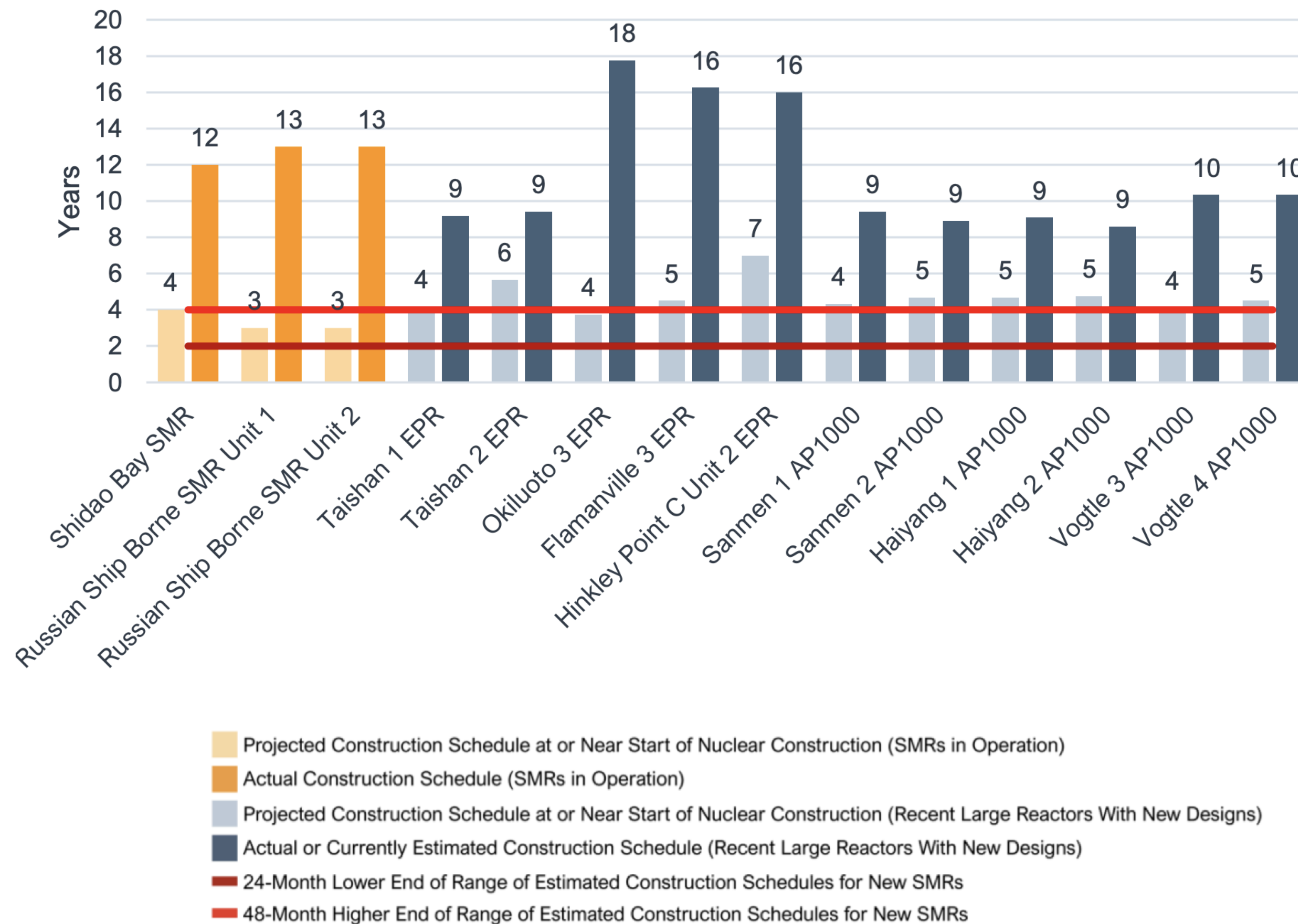
Figure 2: Projected Cost Increases for Proposed U.S. SMRs



Source: IEEFA calculations based on public data for each of the projects converted to 2023-year U.S. dollars. For example, see the [GE Hitachi website](#), [Four reactors could cost Saskatchewan \\$12 to \\$20 billion](#), [X-Energy and ARES Acquisition Corporation Announce Strategic Update](#), [Georgia Power Company's monthly and Quarterly Reports to the Georgia Public Service Commission](#)

Nuclear construction times - 9 to 18 years

Figure 4: Nuclear Construction Reality vs. Rhetoric



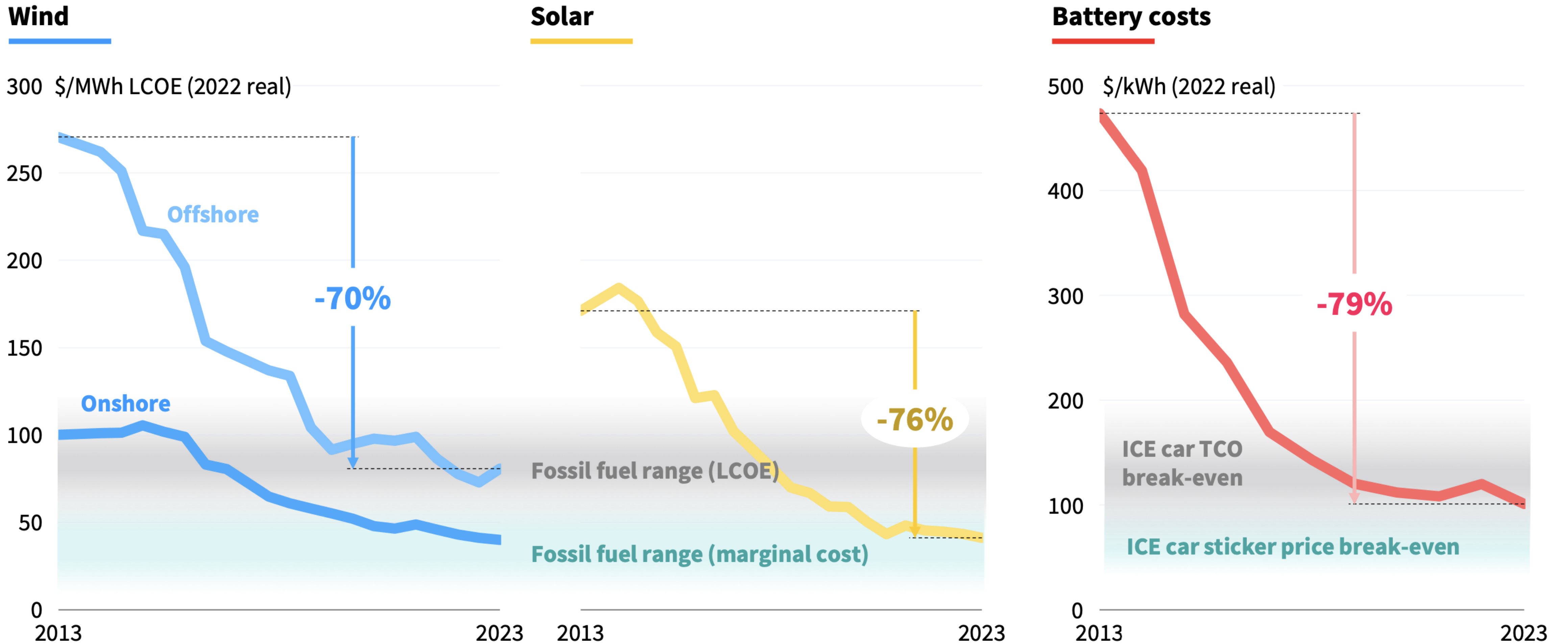
Source: IAEA Power Reactor Information System, EDF, 2023 World Nuclear Industry Status Report.

“The rhetoric from small modular reactor (SMR) advocates is loud and persistent: This time will be different because the cost overruns and schedule delays that have plagued large reactor construction projects will not be repeated with the new designs. But the few SMRs that have been built (or have been started) paint a different picture—one that looks startingly similar to the past. **Significant construction delays are still the norm and costs have continued to climb.”**

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June 2024

Cleantech costs have fallen rapidly

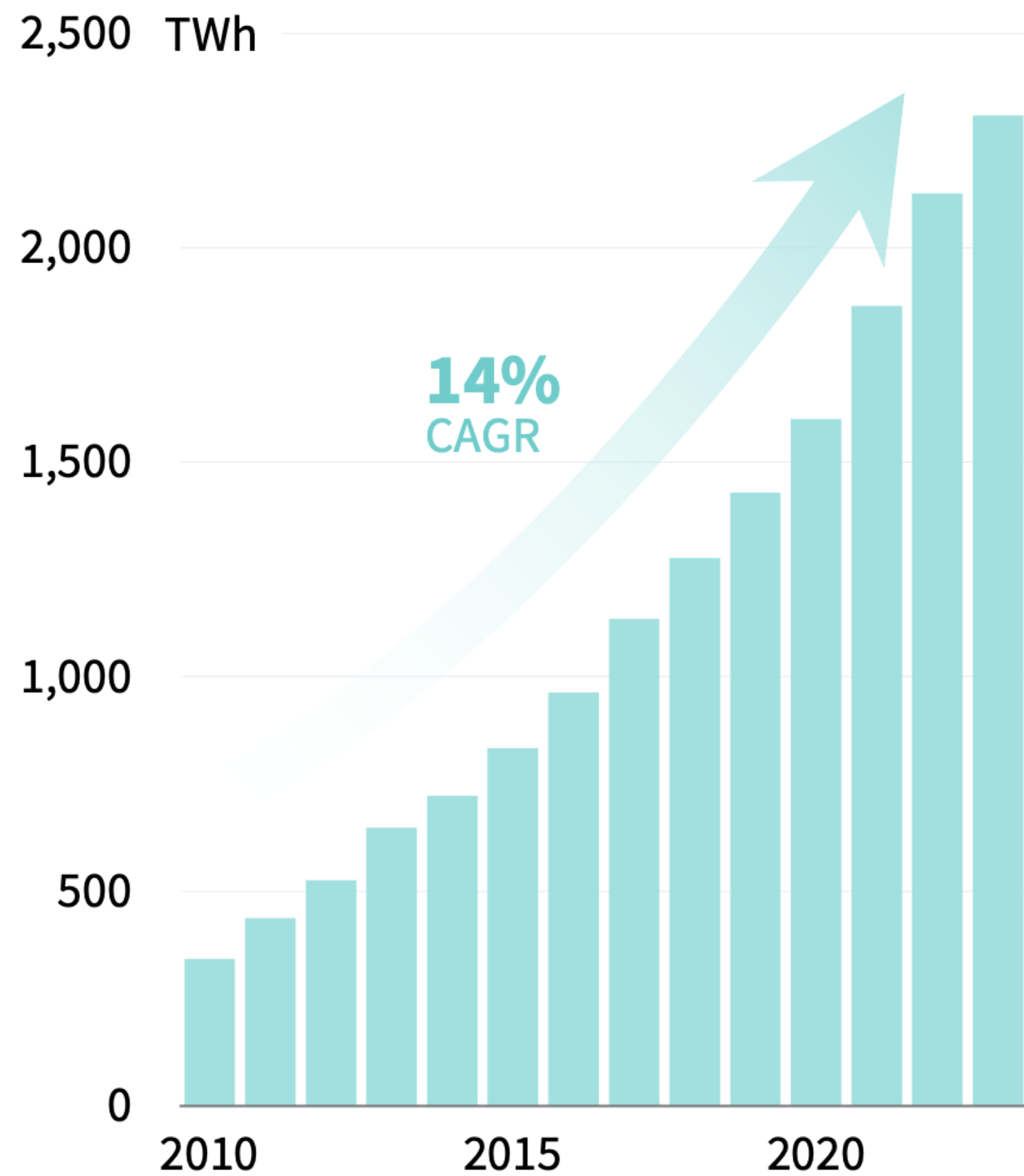
Clean technology costs fall by around 20% for every doubling of deployment — Wright's Law



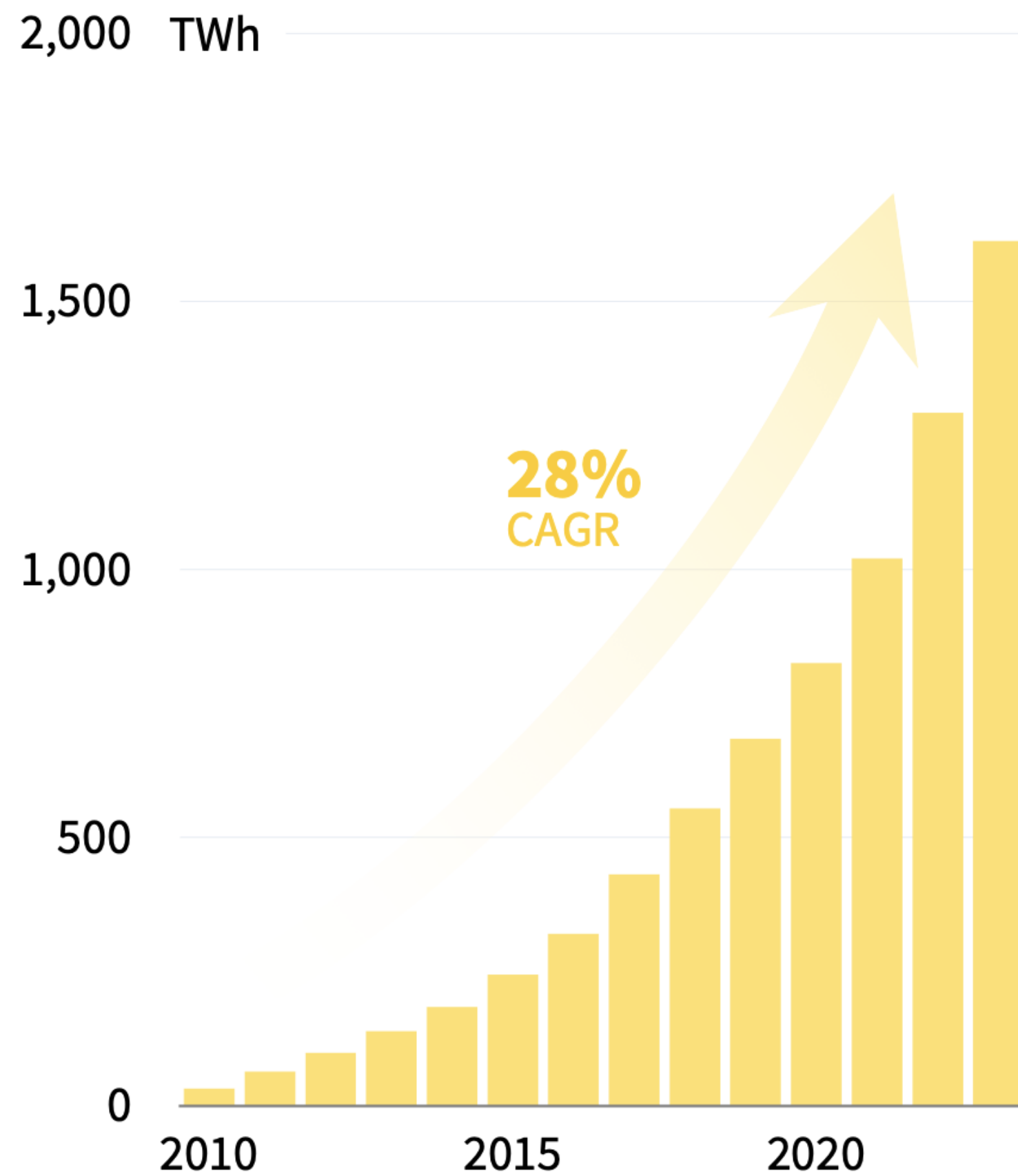
Leading to exponential growth in renewables

Global solar generation has been doubling every 2–3 years, and battery storage capacity every year

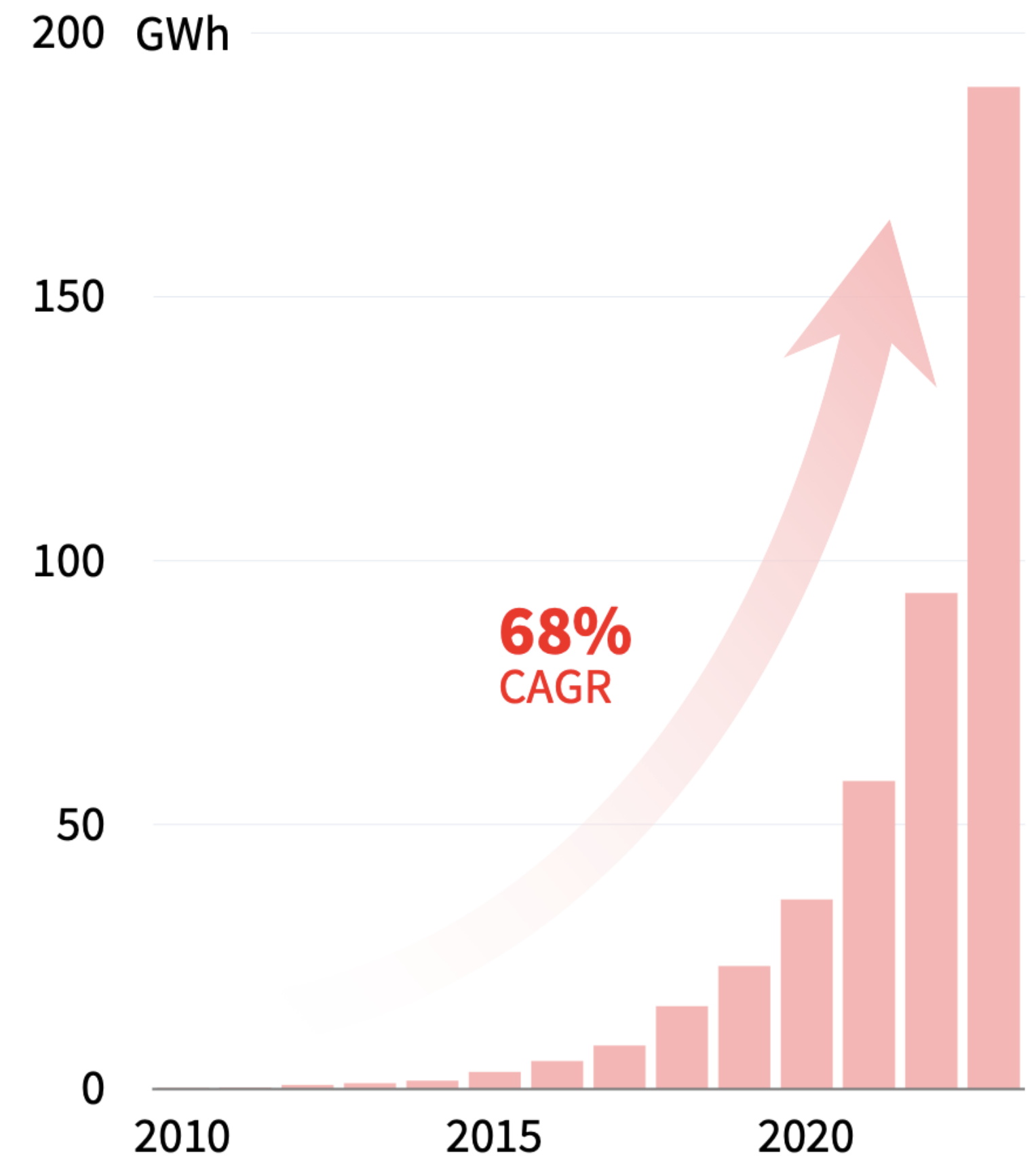
Wind generation



Solar generation



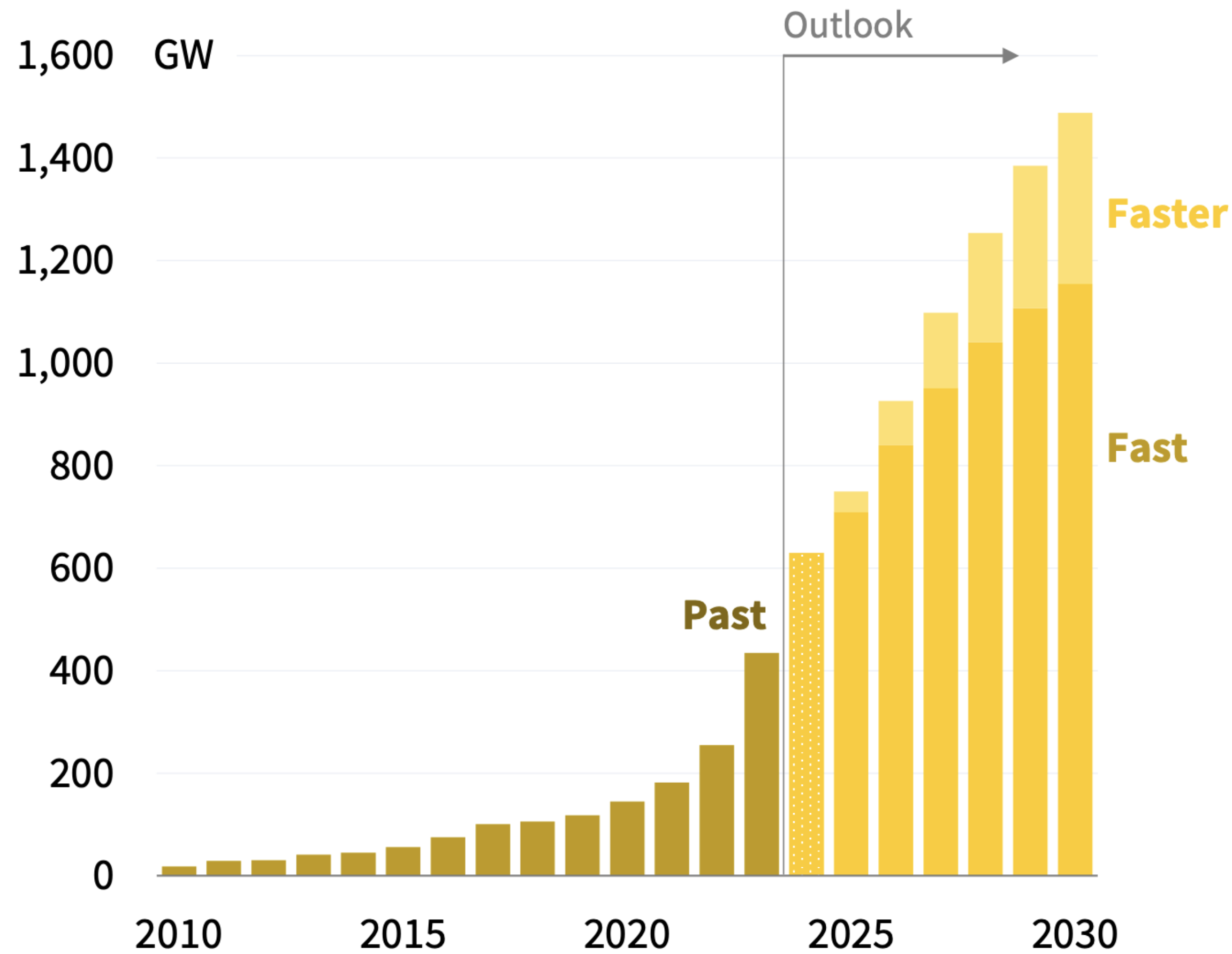
Battery storage



Super-fast growth in solar and battery sales

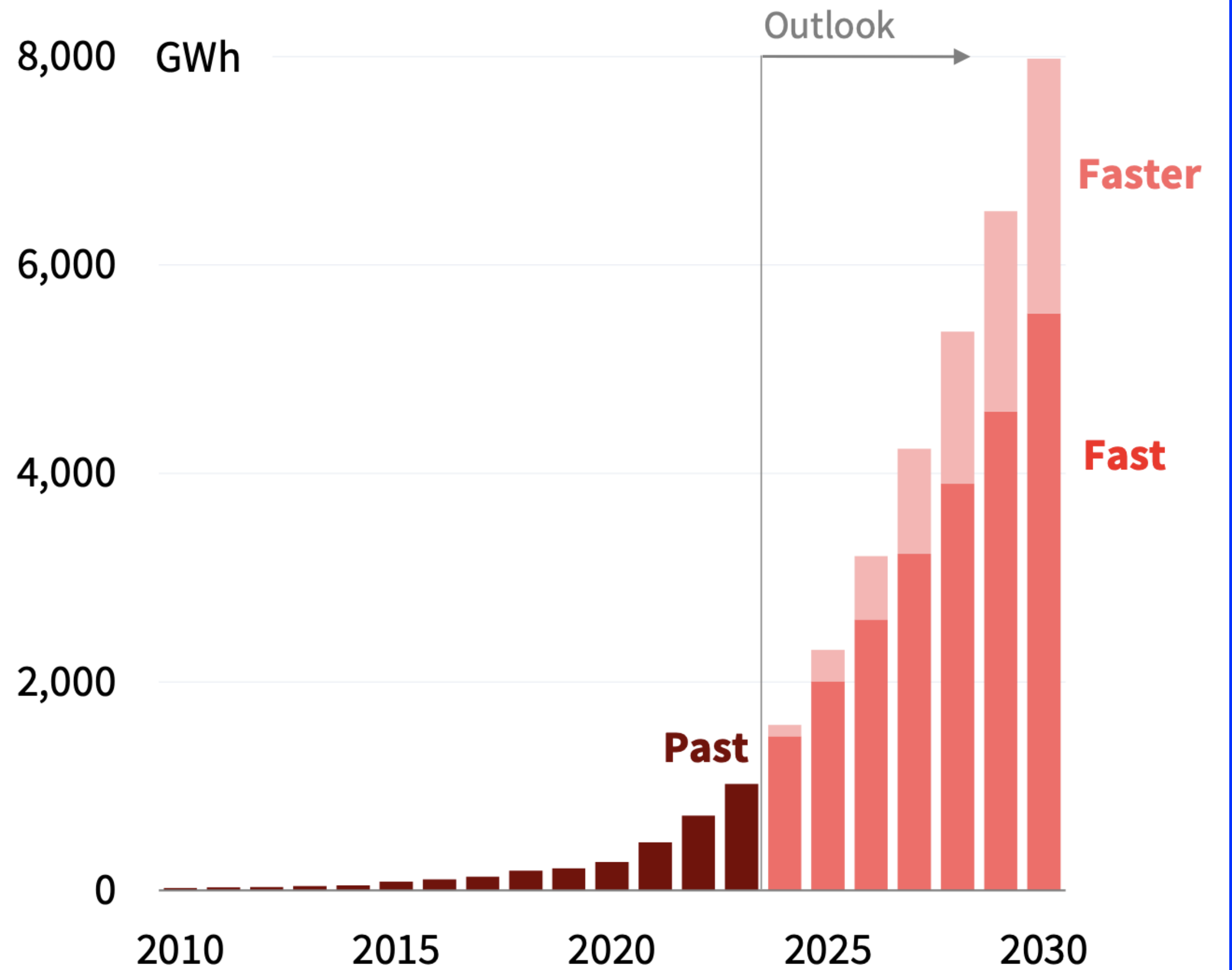
Solar sales are on track for over 1,000 GW per year by 2030

Global solar sales



Battery sales are likely to be over 6,000 GWh a year by 2030

Global battery sales



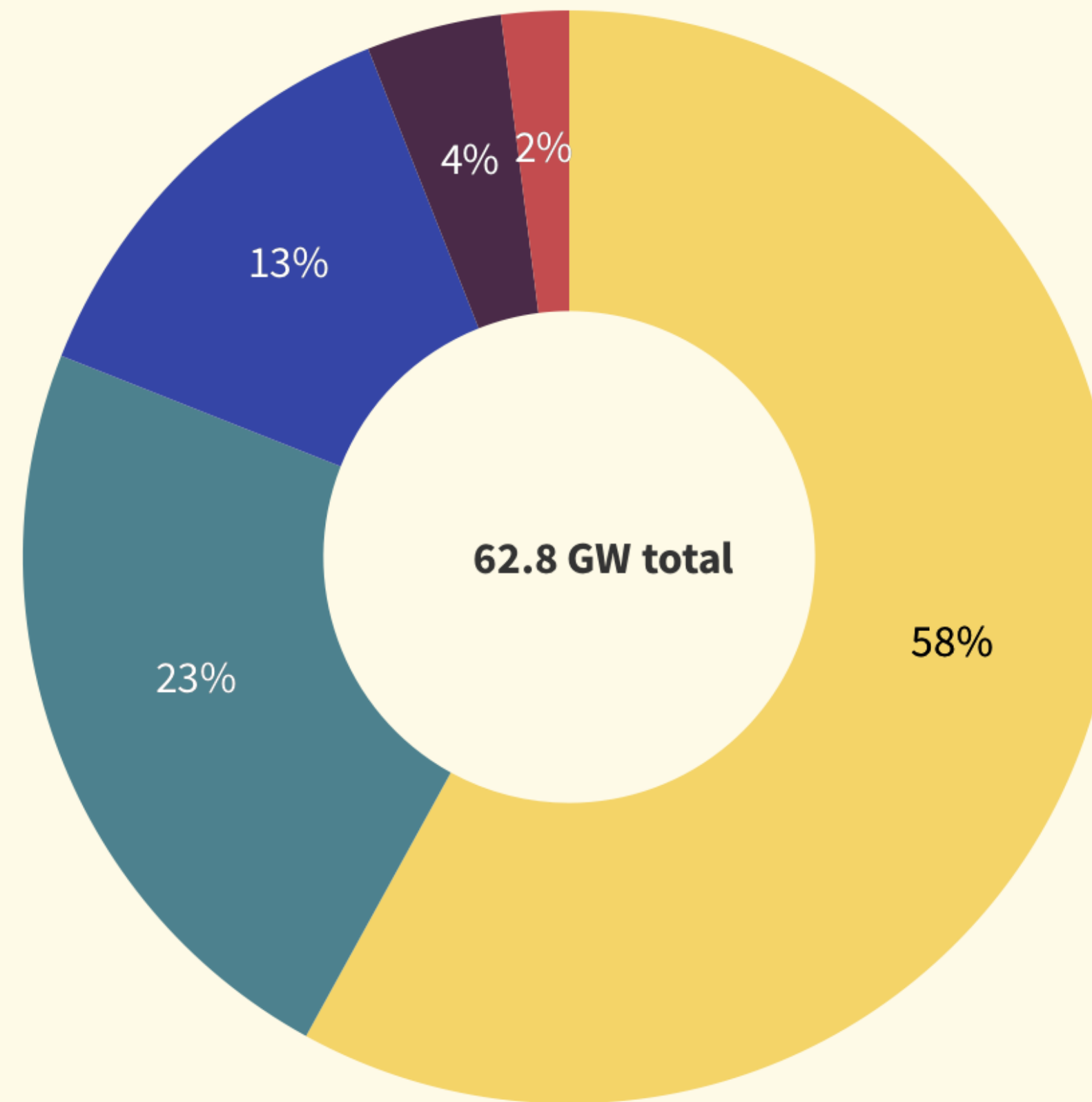
Source: BNEF historical and 2024E for solar (high), RMI S-curves. For more see X-Change: Batteries.

96% of New U.S. Grid Capacity in 2024 will be carbon-free

Almost all new U.S. grid capacity in 2024 will be carbon-free

Planned power plant capacity additions in 2024, by source

Solar Battery storage Wind Gas Nuclear

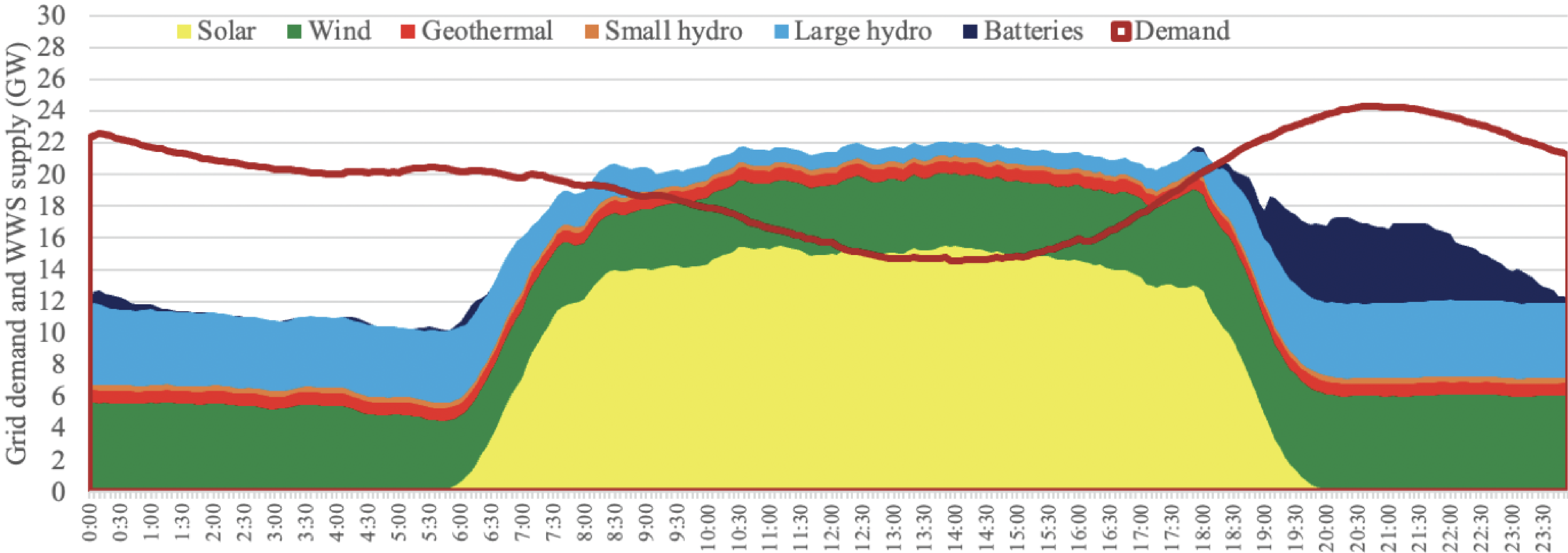


Source: [U.S. Energy Information Administration, Preliminary Monthly Electric Generator Inventory, December 2023](#)

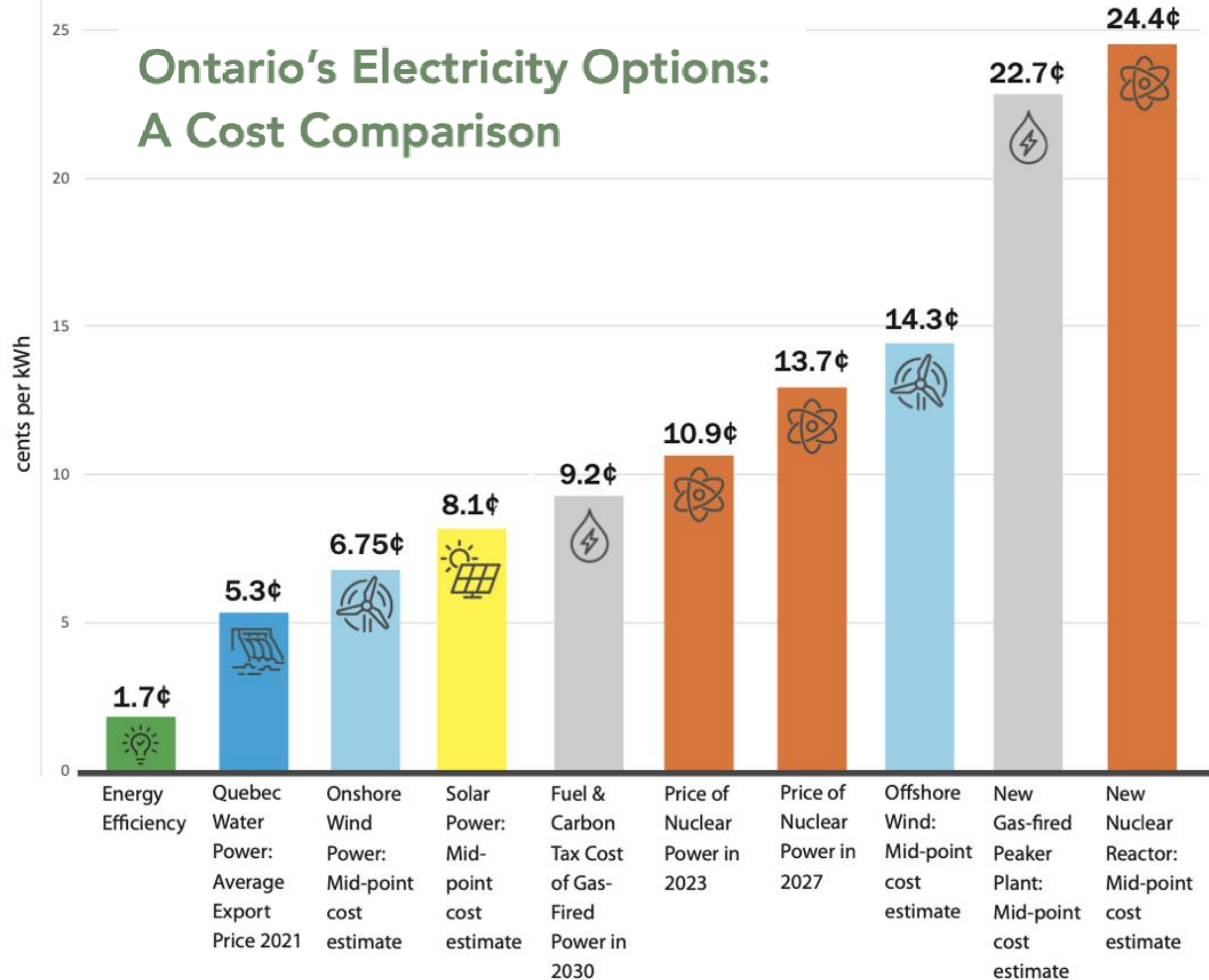
 CANARY MEDIA

California May 25th 2024: Cleantech meets all Electrical Grid Demand all Day

California Main Grid Electricity Demand and Wind-Water-Solar (WWS) Supply (GW)
Sat. May 25, 2024

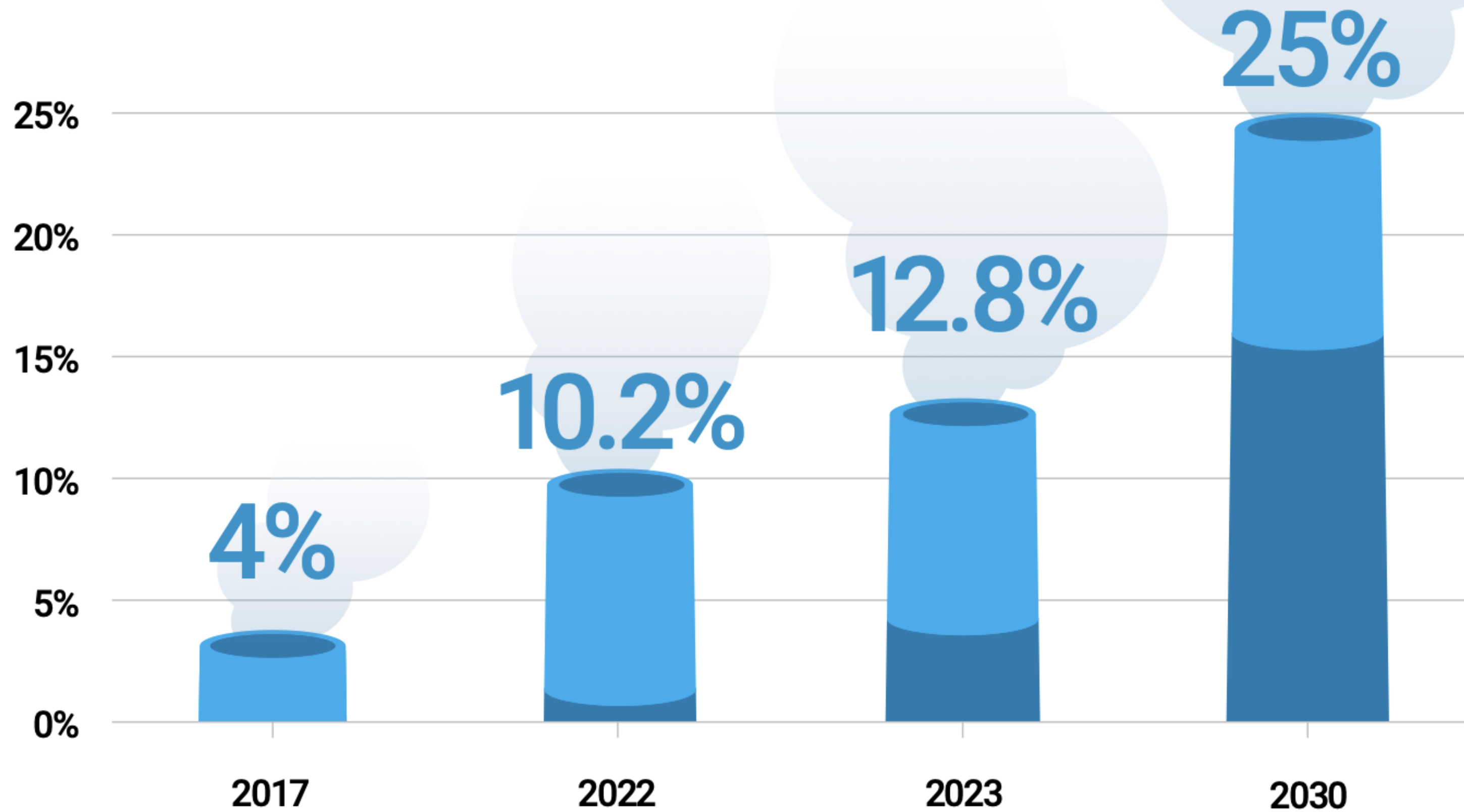


Ontario's Electricity Options: A Cost Comparison



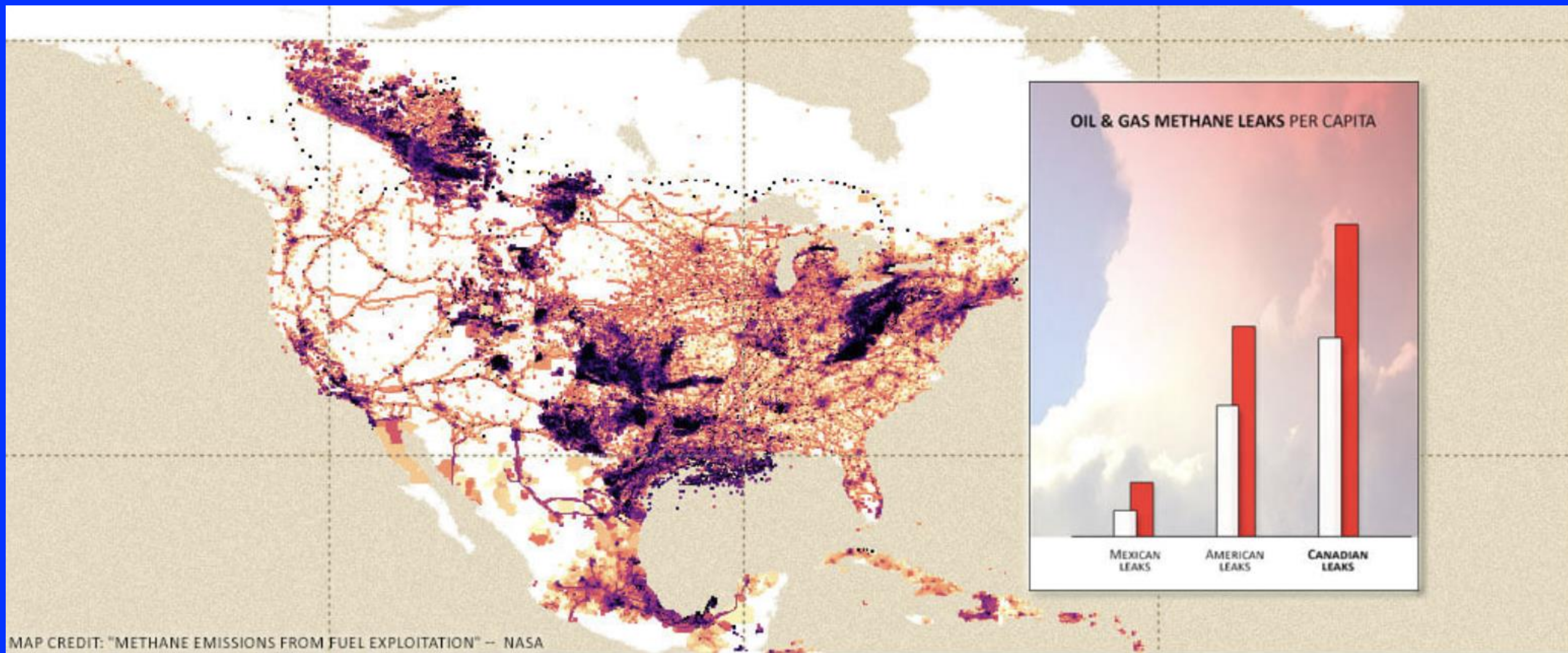
25% of Ontario electricity generation will be from natural gas in 2030!

Figure 2 | Percentage of Ontario's Electricity Provided by Polluting Gas*



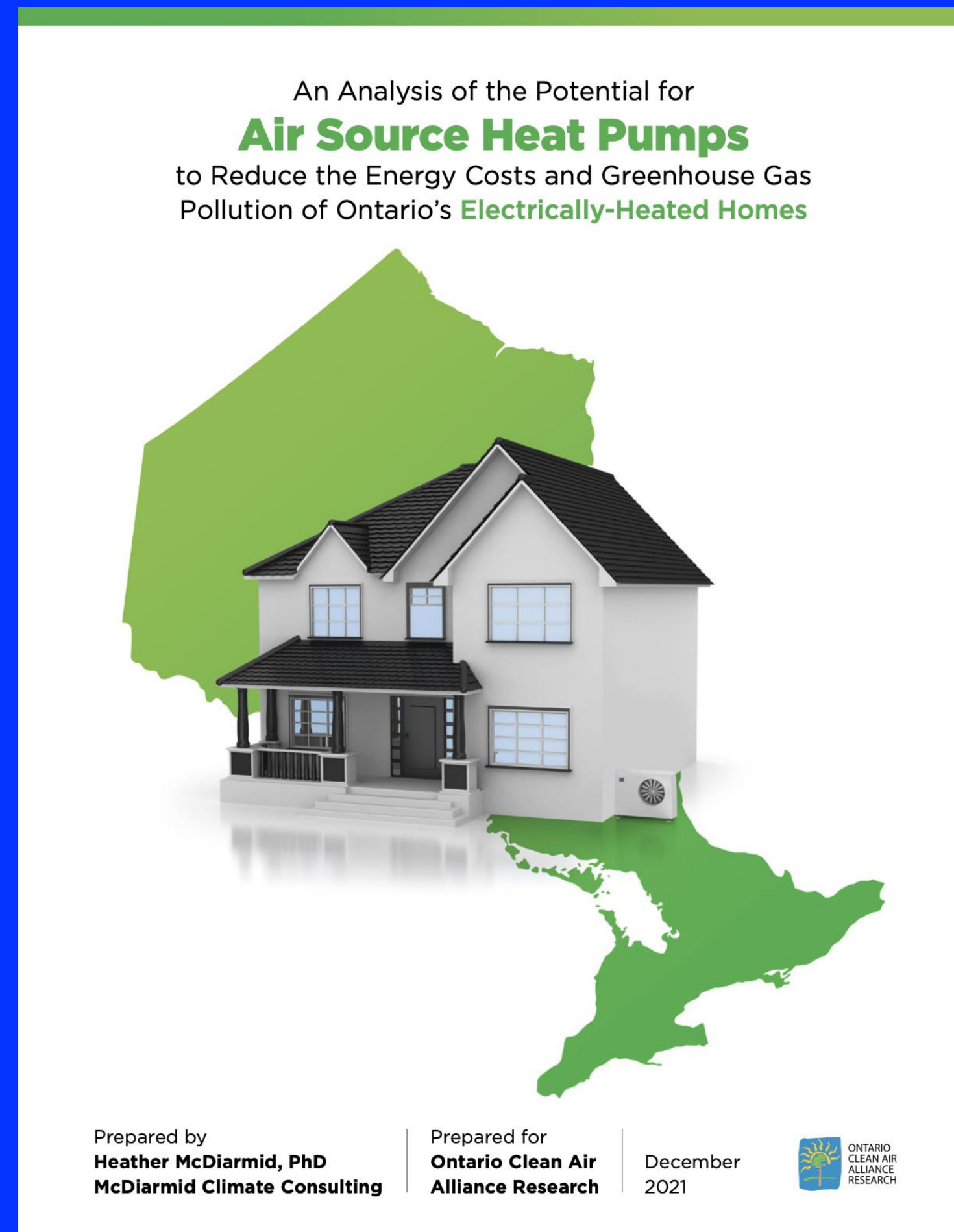
* Ontario Energy Board, *Ontario's System-Wide Electricity Supply Mix: 2017 Data*; Ontario Energy Board, *Ontario's System-Wide Electricity Supply Mix: 2022 Data*; IESO, "2023 Year in Review"; and IESO, *2024 Annual Planning Outlook*, Data Tables, Figures 26 & 27.

Results of recent satellite monitoring of methane release in the production of natural gas demonstrate that Gas Peaker Plants are often worse for the climate than coal



1. Efficiency First - the best bang for the buck

An Example: Air Source Heat Pumps for Ontario's 450,000 Electrically-heated Homes



A Switch to Heat Pumps in 450,000 electric-baseboard-heated Ontario homes: reduce electricity costs on average by \$2,144 per year

\$

Installing heat pumps in all electrically heated homes could:



Reduce homeowners' electricity costs by almost **one billion dollars** per year (\$960 million)



Reduce the electricity generation and GHG pollution of **Ontario's gas-fired power plants by 18%** by 2030



Increase GDP by **16-18 billion dollars**



Create **99 to 112 thousand** person-years of employment

2. Buying Power from Quebec at 5.3 Cents/KWh: Clean cheap plentiful hydro power when we need it

- Quebec has offered long-term contracts for electricity to Ontario at 5.3 cents/kilowatt-hour
- Quebec's Northern Hydro Dam system - perhaps largest, cheapest hydro storage source in the world?
- Ontario has 5 existing transmission interconnection corridors to Quebec

3. Utilizing Quebec Northern Hydro Dam System as cheap storage for Ontario renewable production

Why cheap wind power is making Quebec's big, old dams more valuable as a 'battery,' say experts

\$600 million Innu wind project will use province's hydro dams as backup power for when wind doesn't blow



[Don Pittis](#) · CBC News · Posted: Feb 08, 2021 4:00 AM EST | Last Updated: February 8, 2021



4. Re-Contracting Expiring Ontario Wind and Solar Contracts

Re-Contracting Expiring Renewable Contracts

In 2022, Ontario's non-hydro renewables (wind, solar, bioenergy) produced 21.25 TWh.⁶ According to the *2024 Annual Planning Outlook*, as a result of expiring contracts this supply could fall to 6.20 TWh by 2035.⁷ Therefore, by re-contracting with Ontario's non-hydro renewable power producers, the IESO could reduce our potential electricity supply shortfall in 2035 by 15.05 TWh (21.25 – 6.20).

Given the huge decline in costs for solar and wind over the past decade and the near zero operating costs of existing projects, the IESO will be able to renew its existing contracts at low prices.

5. Developing Offshore Great Lakes Wind Power

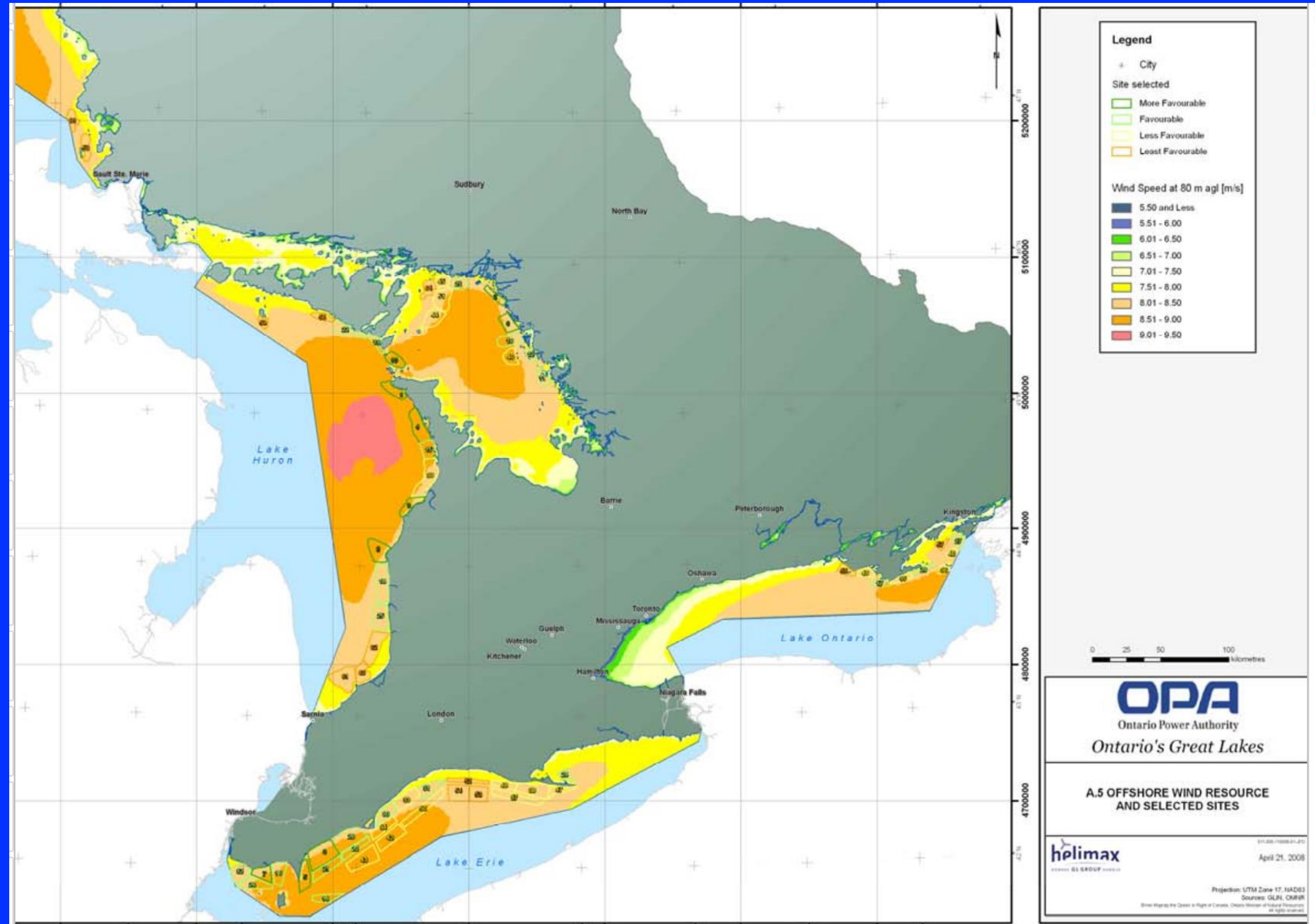
Could offshore wind in the Great Lakes provide the cheap, clean power Ontario needs?

Offshore wind farms in the Great Lakes could provide enough carbon-free energy to meet all of Ontario's growing demand at nearly half the cost of new nuclear reactors. There's just one problem: Ontario declared a moratorium on offshore wind projects in 2011.

Updated July 19, 2023 at 6:43 a.m. | [April 18, 2023](#) | 4 min read



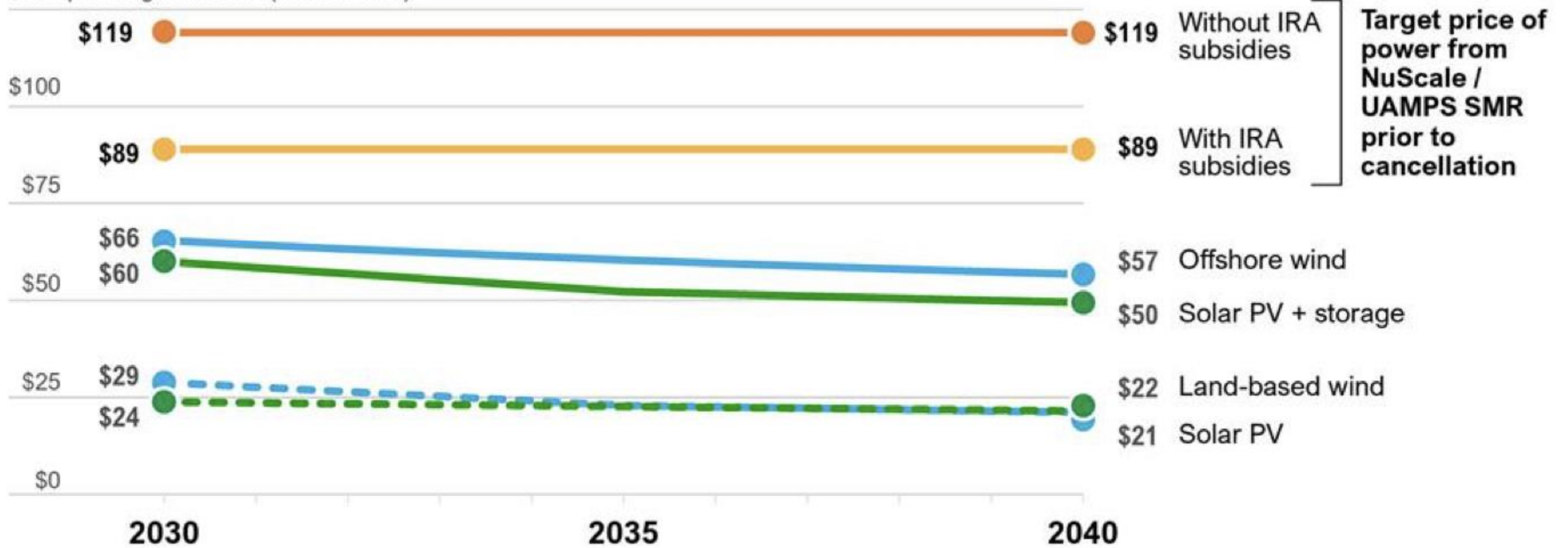
64 Proposed Sites for Ontario Great Lakes Offshore Wind Farms



Helix Report (2008)

Figure 5: SMR Power Costs Will Be Much Higher Than Renewables, Storage

\$125 per megawatt hour (2022 dollars)



Source: IEEFA analysis based on data from NuScale, UAMPS and NREL.

“It is vital that this debate consider the opportunity costs associated with the SMR push. **The dollars invested in SMRs will not be available for use in building out a wind, solar and battery storage resource base. These carbon-free and lower-cost technologies are available today and can push the transition from fossil fuels forward significantly in the coming 10 years—**years when SMRs will still be looking for licensing approval and construction funding.”

Institute for Energy Economics and Financial Analysis
June 2024

Conclusions:

Time for a Renewables Future in Ontario

- Nuclear is not a climate solution: too slow, too expensive with unique risks
- The exponential growth of renewables has rendered Ontario's nuclear vision outdated
- There are significant opportunity and climate costs to pursuing the nuclear vision
- There are a range of far more cost-effective renewable paths for decarbonizing and expanding the Ontario grid