The Path to Decarbonization:

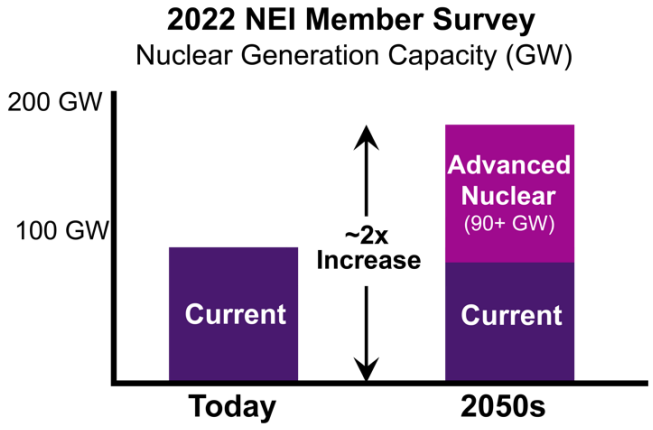
Overview of the Demand for New Nuclear

Nuclear Energy: The Key to Net-Zero

Nations around the world have made aggressive commitments to decarbonize to mitigate the worst effects of a changing climate. Nuclear carbon-free energy is at the core of all viable plans to decarbonize not only the electric sector but entire economies. Our current fleet of nuclear reactors is the backbone of our current clean-energy generation and new reactor designs are the foundation of the net zero-carbon future. Modeling by climate experts consistently demonstrates that the most reliable, affordable low-carbon energy system requires an increase in nuclear generation globally alongside increases in wind, solar and battery storage.

Innovative designs for new reactor technology are advancing to deployment by the end of the decade. There is a growing body of knowledge that provides greater understanding of the need for and interest in new nuclear to achieve decarbonization goals set by governments and the private sector. Summarized below are recent studies and modeling that present the opportunity and demand for advanced nuclear technologies.

U.S. Utilities Outlook



An NEI survey of its 19 utility members[1] found a significant role for new nuclear generation to reach decarbonization commitments, based on a representative small nuclear reactor (SMR) cost profile[2]:

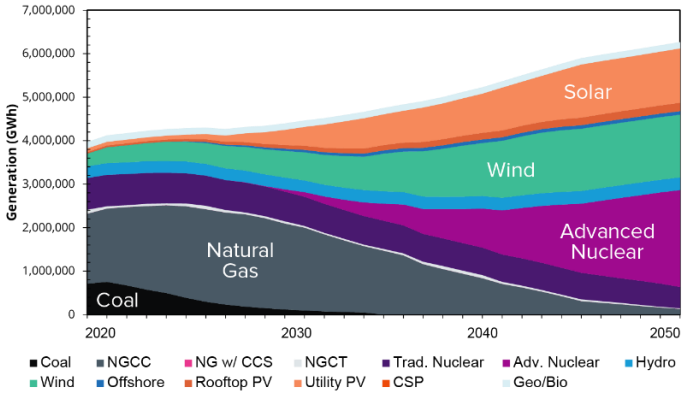
- More than 90 GW of new nuclear generation by the 2050s
- More than 300 new SMRs deployed in the U.S. over the next 25 years
- 90% of current fleet expected to extend operating life to 80 years
- Many utilities evaluating sites that currently host operating or retired coal plants.

[1] The NEI member utilities represent less than half of the total electricity generation in the U.S. Nationally these numbers are anticipated to be much greater.

[2] The cost effectiveness of SMRs is a key factor in utility consideration, with more costly SMRs reducing the projection by nearly half. Even at a higher price, utilities could add hundreds of new reactors by 2050.

U.S. Grid Modeling

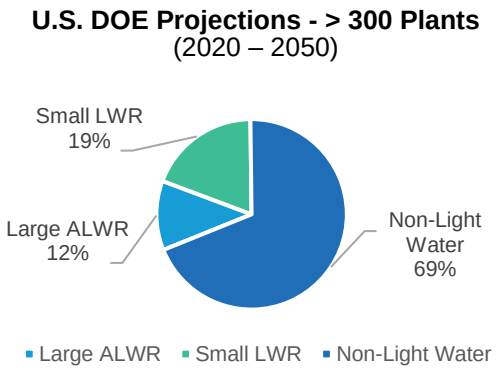
Vibrant Clean Energy Projection [2] (2020 – 2050)



Numerous experts have employed a variety of models to assess pathways to decarbonization of the electric sector. Vibrant Clean Energy (VCE) utilizes one of the most detailed models available to assure that low-carbon solutions align with the reliability that the electricity grid of the future will demand.

In a recent study VCE found that pairing nuclear with wind and solar is the most cost-effective means to decarbonize electricity generation. This lowest-cost scenario projects nuclear energy could provide nearly 43% of all generation in 2050. Among the key findings:

- More than 300 GW of advanced nuclear generation capacity is needed
- Significant opportunities identified for repurposing hundreds of fossil-generation sites



In a recent study performed for the U.S. Department of Energy, Idaho National Laboratory (INL) investigated the role of advanced nuclear in supporting a net-zero economy. The INL analysis utilized a Global Change Analysis Model to assess the U.S. electricity generation capacity consistent with achieving economy-wide net-zero emissions by 2050 utilizing wind, solar, hydro, nuclear, and fossil with carbon capture and sequestration. In the analysis, the **total electricity demand nearly doubled and nuclear generating capacity was shown to increase by more than 150%**.

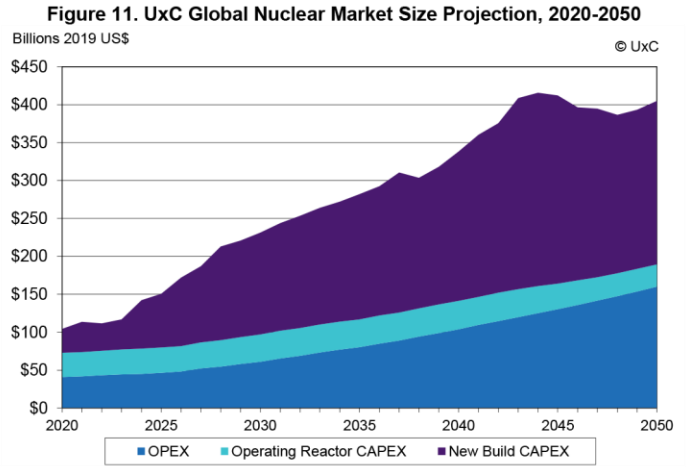
INL then converted the needed generation capacity into the number of plants of different types, including large light water reactors, small light water reactors and non-light water reactors with a total of **more than 300 plants** being added to the system.

Demand for Non-Grid Applications

Decarbonization of the U.S. grid may be the most straightforward aspect of meeting our decarbonization goals. Addressing the entire U.S. economy will require numerous other applications of zero-carbon energy, particularly in some of the hard-to-decarbonize sectors. Nuclear is uniquely suited for many of these applications due to the versatility and scalability of nuclear options that can provide everything from high-temperature process heat, to hydrogen, to off-grid or micro-grid electricity.

A recent study performed by engineering firm Sargent & Lundy found that **opportunities for nuclear beyond the grid could dwarf the demand for grid generation** with literally thousands of potential applications.

Export Market Opportunities



Opportunities for nuclear energy in a decarbonized **energy system extend far beyond the U.S. Recent IPCC reports project that global nuclear energy capacity will need to double by 2050** to keep temperature rise to 1.5 C. A 2020 report by the consultancy UxC found that a doubling of global nuclear energy generation would create a **market opportunity in excess of $8 trillion** in the continued operation of existing reactors and the construction and operation of new nuclear reactors. The report projected that U.S. vendors could capture a cumulative $1.3 to $1.9 trillion of this market.

Conclusion

Carbon-free nuclear energy is critical to achieving decarbonization of the U.S. and global economies. Advanced nuclear energy provides an invaluable tool that is flexible, scalable, reliable and safe. In combination with wind, solar, hydro and energy storage, nuclear energy is the enabler of a reliable, sustainable and cost-effective decarbonization pathway for global energy systems. The variety of methods, stakeholders, and analyses described above show that the impending demand for nuclear energy is tremendous. Meeting the moment requires all stakeholders – policymakers, industries, regulators and the public – to move at a pace that has not been seen before. Capitalizing on this opportunity requires action on multiple fronts:

- The industry must invest in next-generation workforce, development of reliable supply chains and improved project delivery.
- The U.S. government must enact technology-inclusive incentives that spur demand for new nuclear energy, sustain support for advanced nuclear demonstrations, incentivize supply chain development, and expand support for nuclear exports.
- The U.S. Nuclear Regulatory Commission must undergo fundamental change by modernizing its processes to enable the efficient siting and licensing of safe nuclear energy facilities at scale.
- State policymakers must transition from technology-specific mandates to technology-inclusive policies that value existing and new nuclear energy systems.