NUCLEAR INNOVATION ALLIANCE

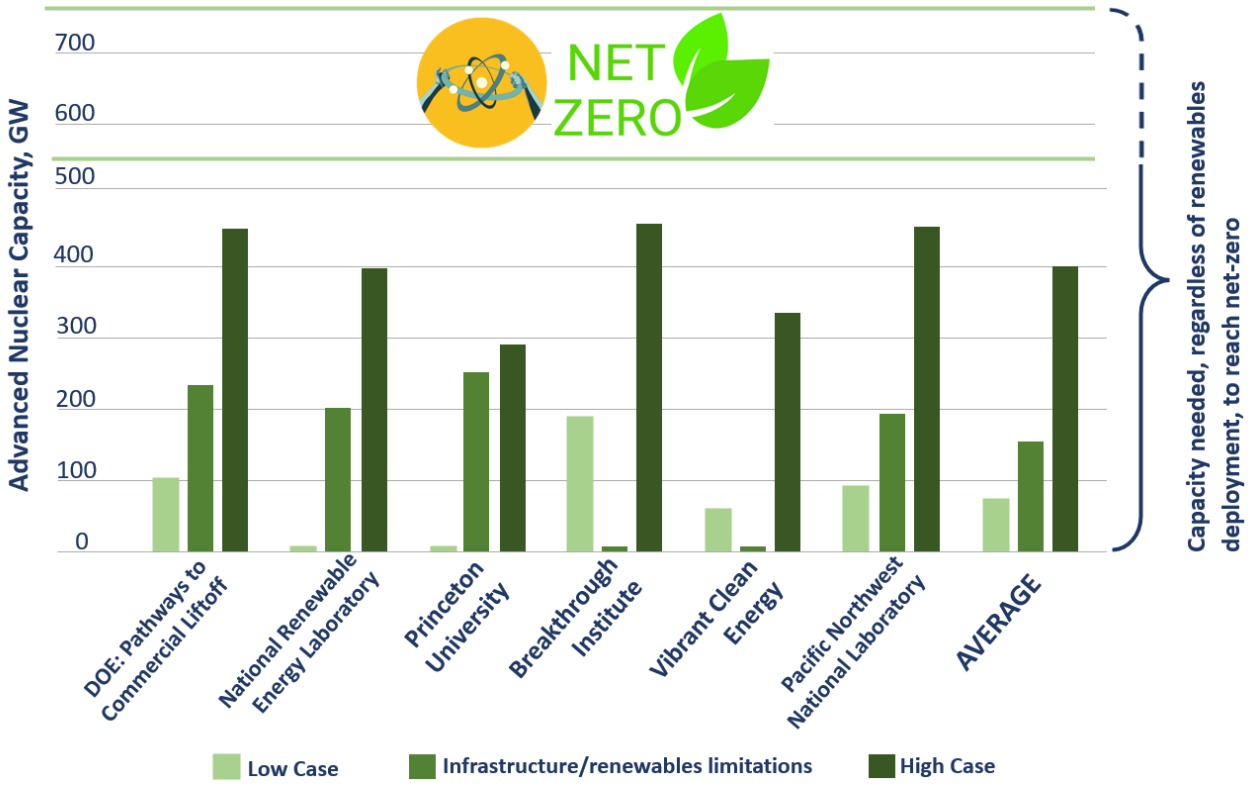
Advanced Nuclear Energy is a Key Climate Solution

The Intergovernmental Panel on Climate Change (IPCC) continues to show that human activities, primarily through greenhouse gas emissions (GHGs), are raising global temperatures and causing widespread, rapid changes in the earth's climate. IPCC has found that the deployment of more clean energy technologies, including advanced nuclear energy, is needed to fight climate change. Next generation nuclear energy, together with other clean energy sources, can meet these needs.

In the power sector, numerous energy models and analyses show that nuclear and renewable energy are complementary in achieving deep decarbonization goals. However, modeling shows that the United States needs ~550 to ~770 GW of additional clean firm power, regardless of renewables deployment, to reach net-zero GHG emissions (see figure 1). This is in part because full decarbonization will require: (1) firm zero-carbon electricity generation that meets demand during all seasons and over long durations; (2) flexible clean energy sources that can quickly ramp their energy output to complement intermittent renewables; and (3) decarbonizing non-electric energy sectors. Advanced nuclear energy can do all three. For example, high-temperature and excess heat generated from advanced nuclear reactors have the potential to decarbonize industrial processes, provide district heating to residential and commercial buildings, generate clean hydrogen, and even provide the energy for desalinization plants.

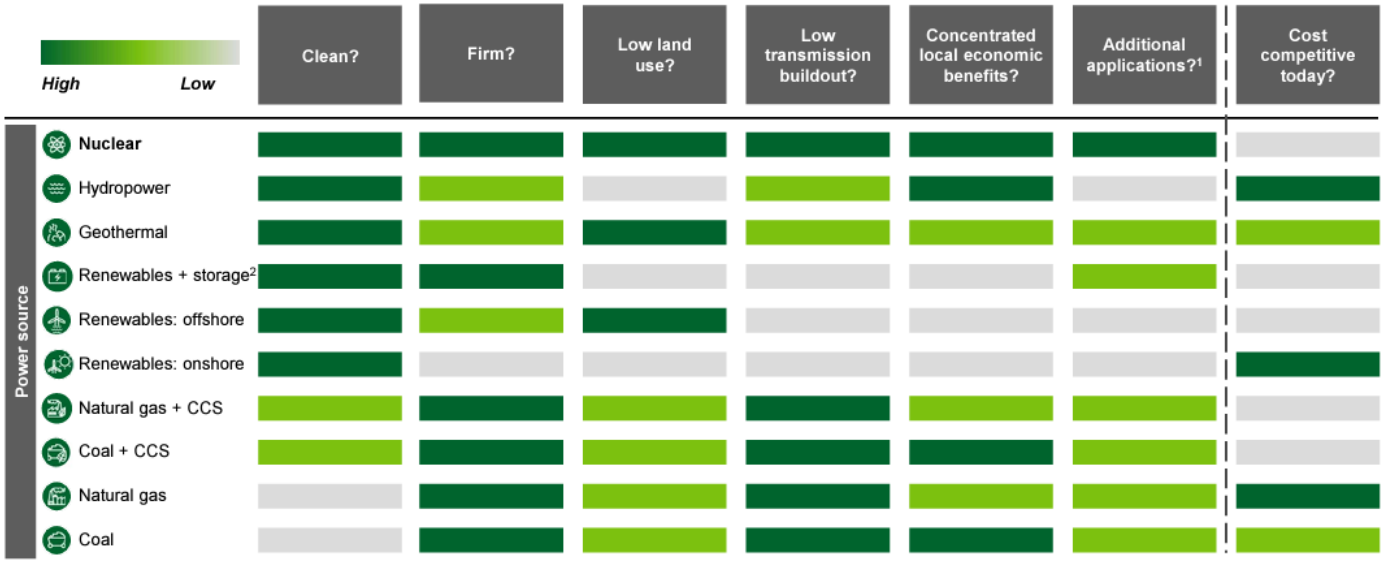
These models show that, on average, advanced nuclear energy could provide ~75 to ~425 GW of this needed clean firm capacity addition, and complement other clean firm options (e.g., variable renewables paired with long duration energy storage, fossil fuels with carbon capture, or geothermal energy) to make up the difference to get to net-zero.

Figure 1: Modeling the Role of Advanced Nuclear Energy in Reaching Net-Zero:



Advanced nuclear energy is uniquely poised to help with decarbonization because it is clean, firm, has low land use, requires low transmission build out, has concentrated local economic benefits, and can be used to decarbonize non-electric sector applications. Advanced nuclear energy ranks high in these six areas, compared to other energy sources. These benefits and features can be seen in the figure below.

Figure 2: Advanced Nuclear's Value Proposition Compared to Other Power Sources



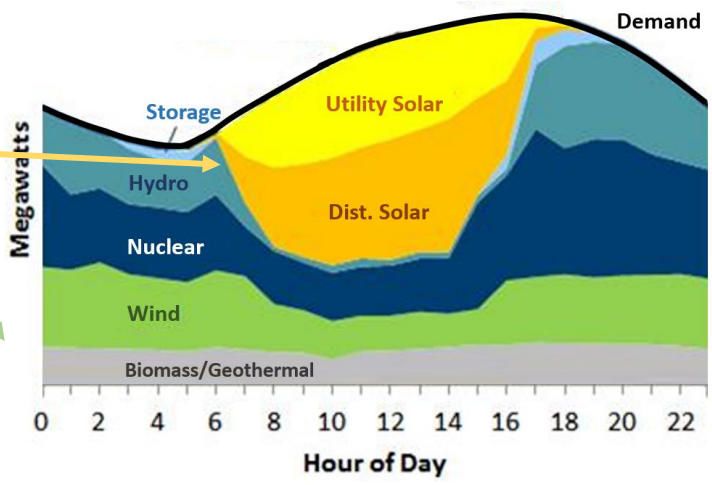
Source: DOE Pathways to Commercial Liftoff

While renewable energy can help satisfy large portions of our energy needs, eliminating carbon emissions from energy production without firm low-carbon energy sources like nuclear power will be extremely costly. Based on the best available facts and analysis, including those from MIT, Sepulveda et. al., and Vibrant Clean Energy, a broad technology portfolio that includes renewable energy and flexible energy sources as well as advanced nuclear energy can create the most cost-effective carbon-free energy systems.

Figure 3: The Role of Flexible Resources in a Clean Energy System

Systems with high penetration of **solar** and **wind** require firm and flexible resources to ensure reliable power supply and a cost-effective system.

Source: The Brattle Group



Flexible resources, like **advanced nuclear energy**, and **hydro** can provide high-quality ramping and load-following to match demand when the supply of low-cost renewables goes down.

Conclusion: Advanced nuclear energy is needed, alongside other clean energy technologies, to meet our net-zero climate goals. Energy systems modeling clearly shows that renewables are important, but aren't enough to reach net-zero. There is a gap. Advanced nuclear reactors can play a major role in filling this clean energy gap and can provide the firm energy needed to create a cost-effective carbon-free energy grid.