

NACo Series on County Considerations for Siting Energy Projects:

Nuclear Energy

Introduction

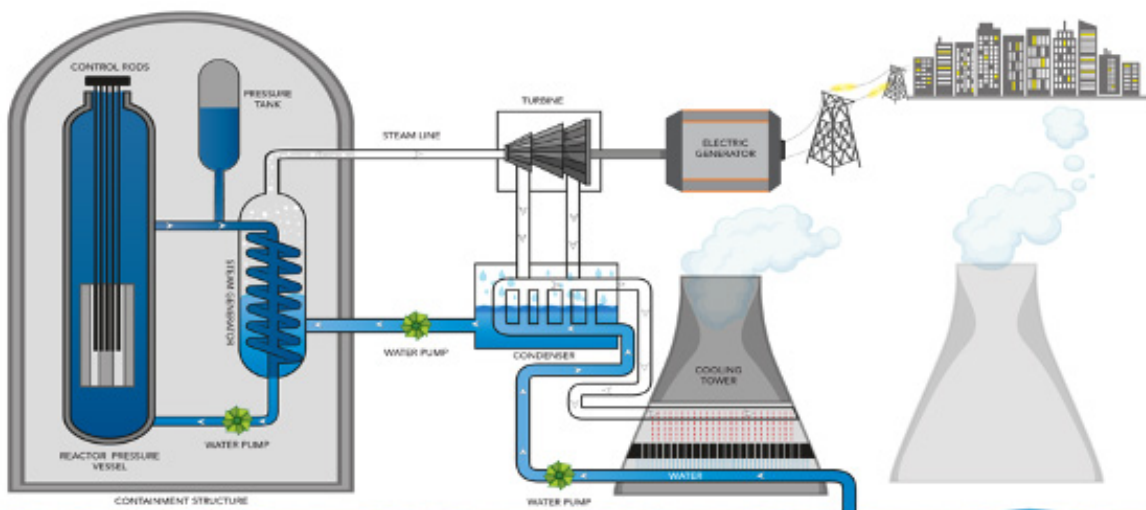
Nuclear energy is a zero-emissions electricity source generated through the controlled splitting of atomic nuclei. Long valued for its reliability and high energy density, nuclear power is gaining renewed attention as advanced reactor technologies promise enhanced safety, flexibility and reduced land use. In 2026, the United States operates just over 50 nuclear power plant sites that generate about 20 percent of the country’s total electricity and just less than half the country’s emissions-free electricity.¹ In recent years, rising energy demand, a new generation of nuclear reactor designs and the desire for carbon-free electricity have generated discussion of a “renaissance” in the American nuclear industry. For more county insights on energy topics, visit NACo’s Energizing Counties Resource Hub.

Nuclear Technology

A **nuclear reactor** is the heart of a nuclear power plant. Inside a reactor, the atomic nuclei of rare, refined elements (usually uranium) produce heat when they split into two smaller atomic nuclei in a process called **nuclear fission**. Extra particles released during fission collide with other nearby uranium nuclei and propagate a fission **chain reaction**. Nuclear reactors are specifically designed to slow and moderate chain reactions to extract their energy. Nuclear power plants, which can be comprised of one or more reactors, create energy the same way coal and natural gas power plants do. Heat from the nuclear fission boils water, creates steam and drives a turbine generator.

Engineers are currently creating “**advanced nuclear reactor**” designs that improve safety, performance, reliability and versatility compared to contemporary designs – while these present exciting opportunities, they are not yet commercially viable. Most of these designs add modern, digital control systems to existing plant models. As of April 2026, only one advanced nuclear reactor design has been built for commercial use (the Westinghouse AP1000 in Burke County, Ga.). Other designs that push current technical boundaries or scale down nuclear generator size for possible mass production are in the design and early prototype phase.

Pressurized Water Reactor (PWR)



Over 65 percent of commercial reactors in the U.S. are pressurized water reactors while the rest are boiling water reactors.²

Nuclear Project Types

Since the 1940s, nuclear power systems have been designed and built in many sizes, from battery-like systems with outputs comparable to a backyard generator to plants that power entire regions of industrial countries full of millions of people.

	RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG)	MICRO	SMALL	LARGE/UTILITY SCALE
ELECTRIC GRID CONNECTION	N/A (Space/Defense applications)	Customer side of meter	Transmission level; Customer side of meter	Transmission level
CAPACITY RANGE	100 W – 1 MW	1 MW – 50 MW	50 MW- 300 MW	300 MW – 1000 MW
TYPICAL SIZE	From pint glass to pickup truck bed	Semi-truck trailer	50 acres	600+ acres
MARKET VALUE	Continuous energy in remote or special applications	Uninterrupted power; offset grid power purchases; disaster relief	Multi-county baseload energy; Industrial site power	Regional baseload energy
OWNERSHIP	U.S. government	Large business or industrial facility	Utility or independent power producing company; Large business or industrial facility	Utility
EXAMPLE	Mars Rover thermoelectric generator	Westinghouse eVinci	GE BWRX 300; numerous naval vessels	54 sites in U.S.
COMMERCIAL READINESS TIMELINE	Not available; no timeline	Not available; design phase	Not available; U.S. prototype ~2035	Available; new reactors ~2035

RTGs do not use nuclear fission. Instead, they rely on the heat from natural radioactive decay to make heat and power for long-duration, remote applications.

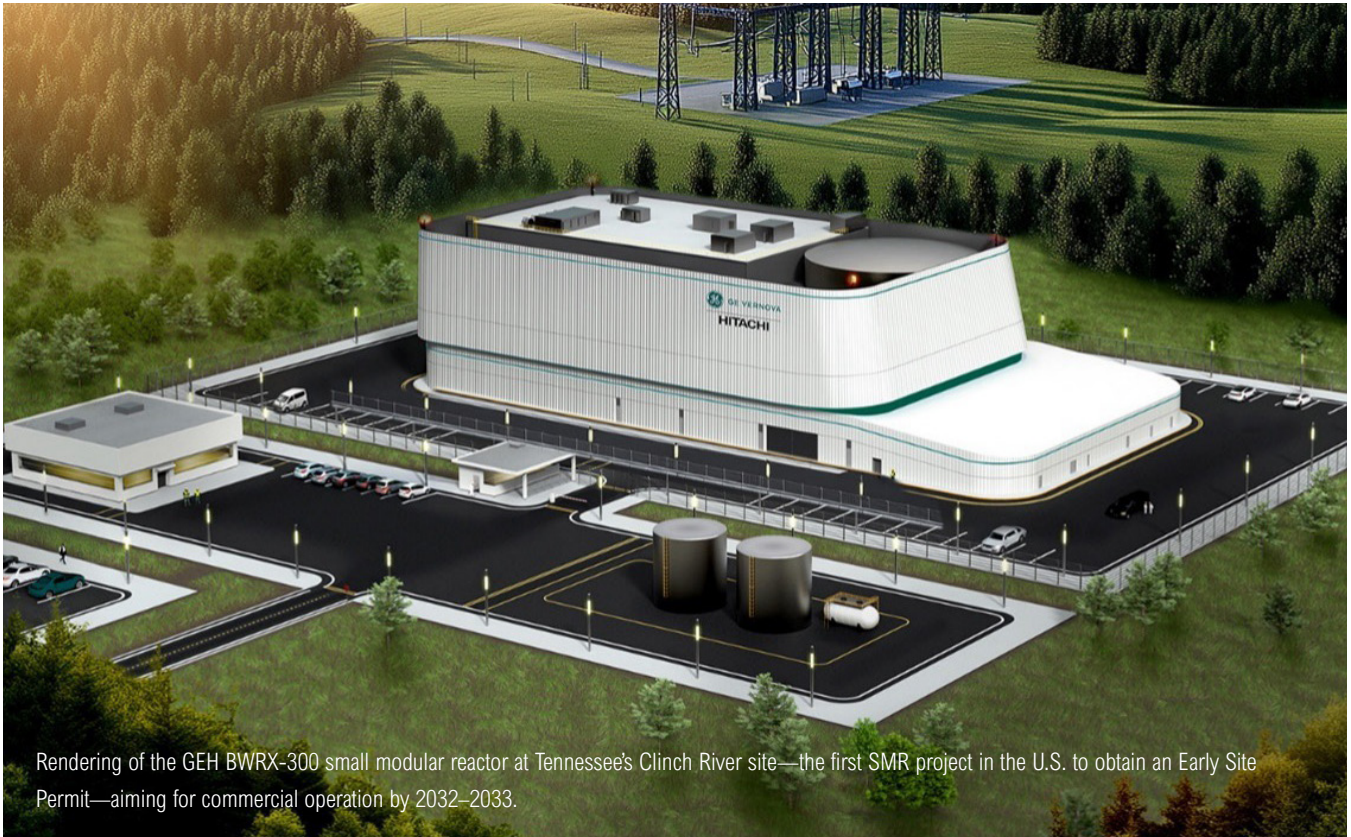
Micro and **small** reactors are in design phase or early deployment stages, with broader commercial availability expected in the early to mid – 2030s.

Large/Utility scale projects are mature, reliable and well understood. However, new deployments typically require long lead times (10–15 years), making them best suited for long-term energy planning rather than rapid capacity expansion.

“Nuclear power is a major driver of Oswego County’s economy and one of our largest employers. For over 50 years, it has provided clean, safe, and reliable energy to both the county and New York State, making it a smart choice for the nation’s energy future.”

**County Clerk Terry M. Wilbur,
Oswego County, N.Y.**

Small Modular Reactors



Small modular reactors (SMRs) are essentially any advanced nuclear reactor with a design output less than 300 MW. Some SMRs are scaled-down versions of existing designs with modern electrical control systems while others are based on revitalizing older technologies. SMR designers hope to produce safe, cheap power plants by manufacturing reactor components at scale in factory-like settings. Early prototypes are currently being designed, and most designs will require component and system testing before building the first prototype unit.

Authority

Utility scale projects that interconnect at transmission voltages fall under the purview of the Federal Energy Regulatory Commission (FERC) and independent system operators (ISOs). Interconnections to the distribution system are handled by the electric services provider and regulated by the state and/or Public Utilities Commission (PUC). Interconnection queues maintained by these agencies can provide insights into the potential of nuclear projects in a region. Nuclear projects also have state and federal environmental requirements, Nuclear Regulatory Commission (NRC) requirements, Occupational Safety and Health Administration (OSHA) design and construction requirements, as well as state/county/township zoning requirements.

Siting Nuclear Projects

Nuclear power developers prospect for project locations across the country and select sites to minimize cost and regulations while maximizing project returns. These developers consider factors that include:

Land – Utility scale nuclear plants typically take up hundreds of acres, but as regulations change and reactor sizes potentially shrink, the amount of land needed for nuclear facilities may decrease. Depending on regulations, power plants may be located on brownfield sites or in urban environments.

Local Infrastructure – Nuclear power plants do not require fuel pipelines or freight-rail transportation access like comparable coal and gas power plants, but they can benefit from rail/barge access. As they use water for cooling, a reliable nearby water source is usually crucial to plant operations.

Interconnection – Siting with access to existing transmission lines is preferred for front-of-meter projects. Developers are showing interest in behind-the-meter projects that directly power on-site loads without exporting energy to the grid.

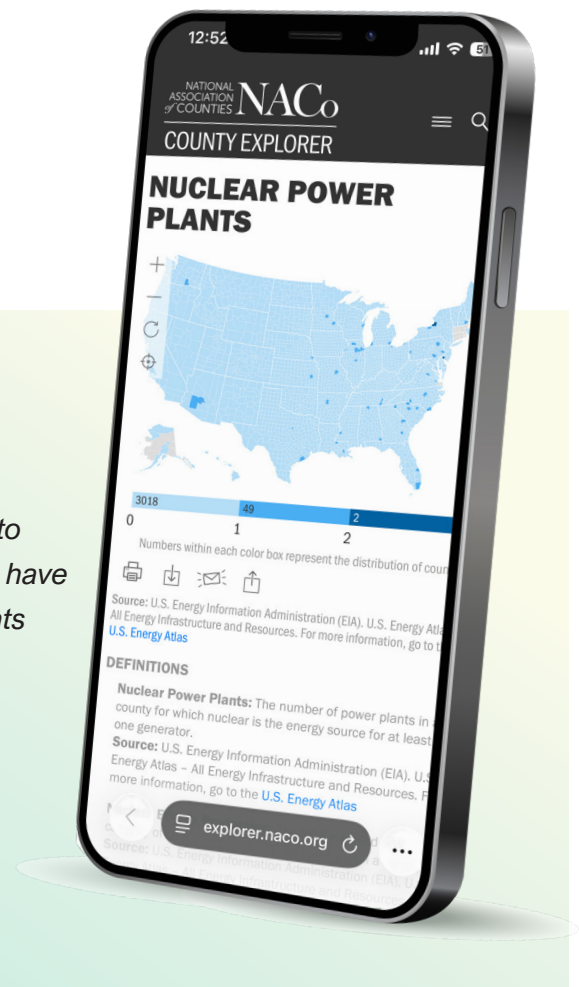
Community Acceptance – Nuclear power plants are very large installations designed to operate for 60 years or more. After a nearly decade-long development and construction period, a new plant will become a substantial part of the community for at least two generations. Plant owners and operators must have a collaborative relationship with the community and its leaders to sustain a productive facility.

Incentives – Developers target local, state or federal incentives and tax credits to meet investment hurdles. Counties may be asked to offer incentives to early project funders in exchange for the selection of their site versus another comparable site.

Developers may also seek labor and regulatory easements/agreements to incentivize siting in a community.

As these factors can influence developers' desire to site in one location over another, counties may wish to assess each of them independently. However, the current nationwide surge in energy demand may make even non-ideal land, interconnection and incentive structures economically viable to developers, opening up more opportunities for counties that may have discounted their resources.

Scan the QR code to see which counties have Nuclear power plants



County Considerations for Siting Nuclear Projects

Nuclear power plants are complicated projects requiring in-depth coordination for years amongst many parties. Staying informed on commercial viability timelines for new reactors can prepare county leaders to critically assess statements from developers and questions from constituents on the topic. Key issues for county officials in collaborating with developers and drafting nuclear development ordinances include:

Project Lifecycle – All told, the beginning of a nuclear power project until final decommissioning will likely span 80 to over 100 years. The full lifecycle for SMRs and other advanced nuclear reactor designs is undetermined, but their operational lifespan is expected to match or exceed existing systems. Historically, projects begin with multiple years of site characterization work to fulfill NRC requirements and lengthy design and approval phases. The most recent U.S. nuclear project's construction phase lasted 15 years instead of its seven-year forecast. Counties can anticipate project timelines of seven years or longer and plan accordingly for potential schedule extensions.

Decommissioning – Although regulations may change in the future, today a nuclear power plant's end-of-life is complicated by on-site spent fuel storage and by radioactive equipment within the power plant that must be treated carefully during decommissioning. Decommissioning can take a decade or more; some counties have legacy remediation and sociopolitical issues stemming from nuclear projects that "ended" more than 50 years ago.

Economic Impact – The power plant's operations can provide counties with local revenue via negotiated tax agreements and/or labor agreements. Traditional nuclear power plants provide hundreds of high-paying jobs and ample taxes to counties for 60 years or more. Towns and counties hosting nuclear power plants often have well-funded schools and services, and the plant workers live locally and support local businesses. County leadership can support residents by ensuring the appropriate benefit-sharing mechanisms are chosen early in the project lifecycle.

Land Use – Advanced reactors can potentially be built on plots less than 50 acres whereas traditional reactors were built on plots of 600 acres or more. Current regulations require sites to be security-controlled for the life of the plant. Based on regulatory reform, new reactors could be built in urban environments, so it is useful for counties to stay informed of shifting federal policies.

Workforce Development – In the short term, a nuclear facility can generate 100-8,000+ on-site construction jobs depending on project size and design complexity. Long term job numbers, like those for operations and maintenance, range from 20-600+ per plant depending on project size. Advanced nuclear power plants will require less staffing than traditional plants. County leaders, local trade schools and community colleges can work together to develop energy-based curricula to meet demand for longer-term employment.

Visual Impact – Advanced nuclear power plant designs are marketed to look sleek, but financial constraints may result in a more typical industrial design. Tall cooling towers may or may not be necessary depending on the plant's location and design. County leaders can address community concerns by promoting public input early in the site selection phase and by requiring visual barriers to minimize the impact.

Public Perspective – Active, early community engagement with accurate information can help address misinformation and ensure equitable community benefits. Counties are encouraged to approach early project proposals with caution and independently validate developer claims as preliminary estimates of timelines, costs and benefits may not reflect actual project feasibility.

Frequently Asked Questions about Nuclear Energy

Is nuclear energy safe?

Nuclear power plants are designed using rigorous safety standards developed by the Nuclear Regulatory Commission. A well-built and well-run nuclear power plant has minimal routine emissions – mainly heat and steam – and uses low enriched fuel that cannot cause a nuclear explosion. Worldwide, three major accidents have occurred in about 70 years of operation. As an example of safe operations, the U.S. Navy operates dozens of small nuclear reactors to power ships and submarines with service members living and working near onboard reactors. For more detailed information on nuclear energy regulations and safety, visit the Nuclear Regulatory Commission’s fact sheet webpage.³

What happens to nuclear waste?

Other than cleaned cooling water, nuclear power plants capture every bit of material they use and store it. Used fuel, often mistakenly called “waste,” is currently stored on-site in robust steel and concrete containers. Used fuel retains about 95 percent of the energy capacity it had before being used, and it can be recycled almost infinitely, though the U.S. does not currently recycle commercial fuel.

What do nuclear power plants cost?

Material costs alone for new large power plants are estimated to be upwards of \$2 billion. Nuclear plants also include additional safety systems to eliminate single points of failure and meet regulatory standards which contributes to additional costs compared to other thermal power plants. Until nuclear plant construction becomes more commonplace, cost and schedule estimates presented to county leaders may be much less than what is required to complete the project.

What is nuclear fusion?

Fusion takes place when small atomic nuclei combine into larger nuclei. This process releases vast amounts of energy, and it produces the heat and light emanating from stars like our sun. Starting and containing a fusion reaction requires an enormous amount of energy input. While many research facilities have maintained small fusion reactions for short amounts of time and investment into fusion research has grown, commercial fusion-produced electricity is a far-off goal that may never compete economically with current generation technologies.

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For official NACo positions, please refer to the American County Platform



¹ U.S. Energy Information Administration. Total Energy Table 7.2b “Electricity Net Generation: Electric Power Sector”. <https://www.eia.gov/totalenergy/data/browser/?tbl=T07.02B#/?f=A&start=1949&end=2025&charted=1-2-3-5-8-14>

² NUCLEAR 101: How Does a Nuclear Reactor Work? | U.S. Department of Energy

³ Nuclear Regulatory Commission. “Fact Sheets & Brochures.” <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/index#gab>



660 North Capitol Street NW
Suite 400 | Washington, D.C. 20001
202-393-6226 | www.NACo.org

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