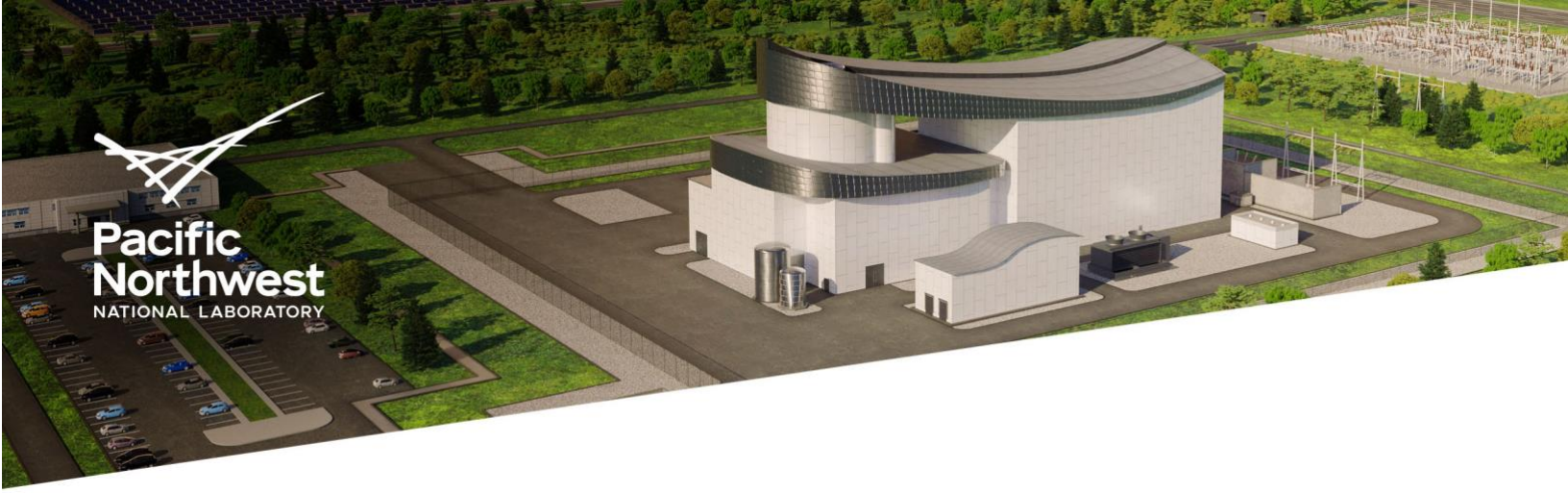


Redeveloping Coal Power Plants: Nuclear Power

Retired and retiring coal power plants provide a ready opportunity for redevelopment into clean energy infrastructure, including new nuclear energy generation projects. Existing land and facilities at the power plant site can be repurposed, including disturbed lands, for nuclear power and electricity infrastructure for connections to the grid. Combining site features with financial incentives from federal or state and local authorities can make projects at these locations more competitive compared to greenfield clean energy projects.

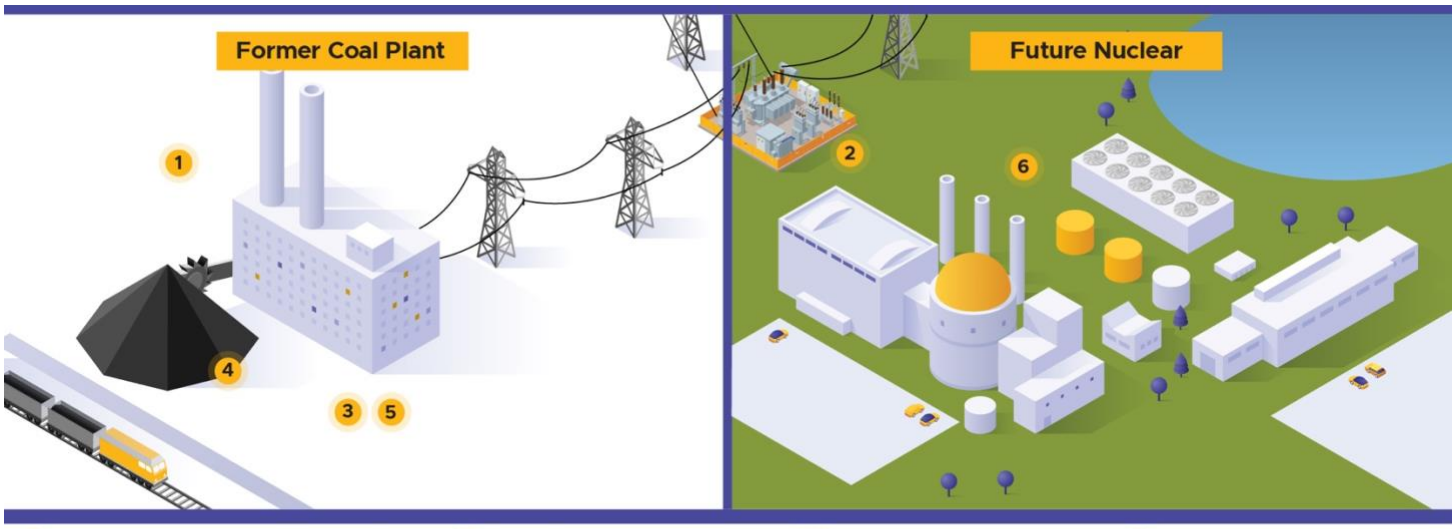
Repurposing former coal plants can bring economic revitalization to hard-hit energy communities. To be successful, it requires the input of developers, communities, local governments, nonprofits, and utilities. These groups can work together to preserve the workforce and economic benefits to communities, as well as maximize utilization of existing equipment, infrastructure, and permits to create new uses and value streams. This fact sheet summarizes key considerations and approaches to support communities and developers in repurposing coal power plants to nuclear power facilities.

What are key considerations for coal-to-nuclear redevelopment?

Every coal power plant redevelopment project has its own characteristics. A site assessment will determine what can be done in terms of environmental and siting regulations and onsite infrastructure. When considering redevelopment, it is good practice to consider multiple potential uses, such as combining energy-related redevelopment with habitat restoration or recreation.

Considerations for nuclear power include:

- **Financial support:** Nuclear deployments are expected to benefit from a technology-neutral federal investment tax credit (ITC) or production tax credit (PTC) through the Inflation Reduction Act (IRA). Coal-generating units that have retired since 2010 likely qualify as energy communities, which opens up an additional federal tax-credit bonus for local clean energy development. Department of Energy (DOE) Energy Infrastructure Reinvestment (EIR) financing can further support energy-related redevelopment and associated remediation. Electric cooperatives and certain other tax-exempt organizations such as local governments, Tribes, and U.S. territories can now access certain IRA tax incentives through elective pay. There may also be federal and state government incentives for brownfield redevelopment. Incentive timing will be an important consideration for new nuclear development. The IRA tax credits are expected to phase down in 2032 or the year when power sector greenhouse gas emissions are 25% of 2022 levels.
- **Point of interconnection:** A coal power plant's point of interconnection with the bulk electric system might be repurposed for interconnection of new nuclear generation, providing significant time and cost savings, as long interconnection queues are a significant hurdle to clean energy projects elsewhere. Nucelar power plants can also provide firm power that can maximize the use of the point of interconnection.
- **Siting:** For a given amount of energy generation, a nuclear reactor requires significantly less land than variable renewable resources such as solar and wind. For nuclear siting requirements, areas containing coal ash may need remediation before redevelopment. Water availability is also a consideration, as it will affect what cooling option (e.g., wet, dry, hybrid) will be needed.



1 **Energy Infrastructure Reinvestment (EIR)** loan guarantees from Department of Energy:
- To "retool, repower, repurpose, or replace energy infrastructure" to clean uses.
- Remediation and redevelopment can be covered in a single transaction.
- Commitment deadlines: September 2026.

2 Potential IRA clean energy tax credits: Technology-neutral ITC (§48E) or PTC (§45Y)

3 **Energy community bonus** for certain IRA tax credits for siting clean energy in qualifying areas where a coal-powered generating unit has retired since 2010.

4 **Brownfields grants** from the Environmental Protection Agency to assess or clean up sites with real or potential contamination. Grants also available for related job development. DOE EIR can help finance environmental remediation as part of a redevelopment project.

5 **Cooperative and certain other non-profits:** IRA tax credits now available through elective pay mechanism.

6 **Potential local incentives** for clean energy, remediation, or brownfield redevelopment.

- **Workforce:** Projects that pay prevailing wages and employ apprentices from registered apprenticeship programs can increase the base amount of their IRA tax credit. Projects should also engage workers and unions to evaluate opportunities for incumbent workers to contribute to remediation and new energy infrastructure construction and operation (e.g., through Community Benefits Agreements). Further, nuclear is uniquely positioned as an energy source to preserve an existing coal power plant's regional economic impact and jobs. Based on a study performed for a coal plant in the Four Corners region of the Southwestern U.S., a coal-to-nuclear transition would have a net positive effect on employment in the coal plant's community; the existing workforce is largely transferable with workers being aligned in skillsets.
- **Industrial Applications:** Much of the industrial sector's carbon dioxide emissions are due to fossil fuel combustion used for process heating. Some industries may also have decarbonization objectives that may drive their pursuit of clean energy generation solutions. Nuclear energy can assist in decarbonizing industry, and many advanced reactor developers are considering cogeneration (i.e., the generation and use of both electricity and heat) applications in their designs.
- **Design Selection:** Nuclear reactor design selection is arguably the most important decision made in the process of deploying a nuclear reactor, as the decision results in a multi-decade relationship between the nuclear reactor owner and the design vendor. Designs may differ in power output, footprint, water usage, fuel selection, and waste handling. A prospective owner needs to determine their business needs and constraints upfront and follow a methodology, such as the Electric Power Research Institute's Technology Assessment Guide, in selecting designs.

Getting started on redevelopment

All stakeholders can:

- ✓ Engage with the local utility to understand the timing of coal retirements and consideration of replacement resources (e.g., through the utility integrated resource planning (IRP) or related processes).
- ✓ Raise awareness of key federal incentives, including:
  - The federal clean energy investment tax credit IRA ITC (§48E) and PTC (§45Y).
  - The energy community bonus for tax credits for certain developments in qualifying coal closure communities.
  - The domestic content bonus for using certain domestically sourced components and materials in clean energy projects.

- Energy Infrastructure Reinvestment (EIR) loan financing through the U.S. Department of Energy for supporting clean redevelopments; project development should start now to allow loan commitments by September 2026.

There may also be specific roles for certain stakeholders. Considerations may include:

- **Owner of retiring coal power plant:** Develop a request for information or request for proposals for redevelopment in anticipation of a closure. For a nuclear-specific redevelopment, owners can seek Department of Energy support for nuclear feasibility studies through the Gateway for Accelerated Innovation in Nuclear (GAIN) Nuclear Energy Voucher program. The vouchers provide funding to DOE national laboratories to help businesses overcome critical technological and commercialization challenges. All awardees are responsible for a minimum 20% cost share, which could be an in-kind contribution.
- **Energy regulator:** Ensure that federal and state financial support are included in the assessment of redevelopment options.
- **Local authority (e.g., state, municipal, and county governments):** Engage with the plant owner to understand the effects of redevelopment options on local tax revenues and employment.
- **Community organizations:** Promote and facilitate participation in public engagement processes.
- **Educators (e.g., community colleges and apprenticeship programs):** Identify future workforce needs and tailor curricula accordingly.

Examples of Coal-to-Nuclear Redevelopments

Wyoming	TerraPower plans to build its Natrium reactor near a coal plant in Kemmerer, WY. The coal plant currently produces ~800 MWe. The replacement power is 345 MWe with the potential to use the Natrium design's thermal storage to boost system output to 500 MWe for more than five and a half hours. The expected land area for the Natrium plant is 44 acres with plans to employ 250 workers. TerraPower's Natrium technology was selected as an awardee of the DOE's Advanced Reactor Demonstration Program (ARDP); the DOE authorizes up to $2 billion for the Natrium project.
North Carolina	A December 2022 Order from the North Carolina Utility Commission enabled Duke Energy to spend up to $75 million for project development costs for advanced nuclear. Duke recently announced plans to repurpose the Belews Creek Steam Station (2220 MWe capacity) in Stokes County, North Carolina with advanced nuclear power. Duke plans to submit an early site permit to the United States Nuclear Regulatory Commission as a first step in redeveloping the site for nuclear power generation.
Kentucky	In 2022, coal-fired power plants supplied 68% of Kentucky's electricity generation; Kentucky is also the fifth-largest coal-producing state in the United States. Up until 2017, Kentucky had a moratorium on nuclear energy. In March 2023, the Kentucky nuclear energy development working group was established to identify any barriers to the deployment of nuclear power in Kentucky. The working group concluded that there are no insurmountable barriers to nuclear energy development in Kentucky and identified several challenges that require attention for nuclear development in the state.
Colorado	Colorado introduced a bill requiring studies of electric transmission and advanced energy solutions technologies in rural Colorado, which includes the study of advanced nuclear. Studies are focused on energy transitions related to retiring coal plants and the need for firm energy generation; one such study recommends advanced nuclear as a potential option for replacing a retiring coal plant. Results and recommendations from the studies are to be submitted to the appropriate Colorado legislative committees on or before July 1, 2025.
West Virginia	West Virginia is the second largest producer of coal; the state's electricity is also predominantly supplied by coal-fired power plants. In 2021, coal-fired power plants produced 91% of West Virginia's total electricity generation. In 2022, West Virginia repealed its ban on nuclear power that has been in place since 1997. The repeal is the first step in enabling nuclear deployment in the state.

Relevant data and information for coal power plant redevelopment

Redevelopment options can be informed by national and local datasets (visit the Coal Power Plant Redevelopment Visualization Tool for publicly accessible database and map). Site-specific assessments can help further refine options.

Coal-to-nuclear relevant resources include:

Siting Tool for Advanced Nuclear Development (STAND): Identifies and examines potentially feasible sites for advanced nuclear facilities. The tool is not limited to coal plant repowering analyses and can include greenfield sites as well.

Oak Ridge Siting Analysis for power Generation Expansion (OR-SAGE): Employs a wide array of geographical information system data sources to characterize sites against the requirements for nuclear technology (e.g., population density, water consumption and proximity, land use, seismic activity, etc.). Used to identify candidate areas for nuclear development.

TerraPraxis EVALUATE tool: Quickly assesses the business case for repowering a coal station, including cost and schedule. Can be used to evaluate different repowering scenarios for specific coal power plants.

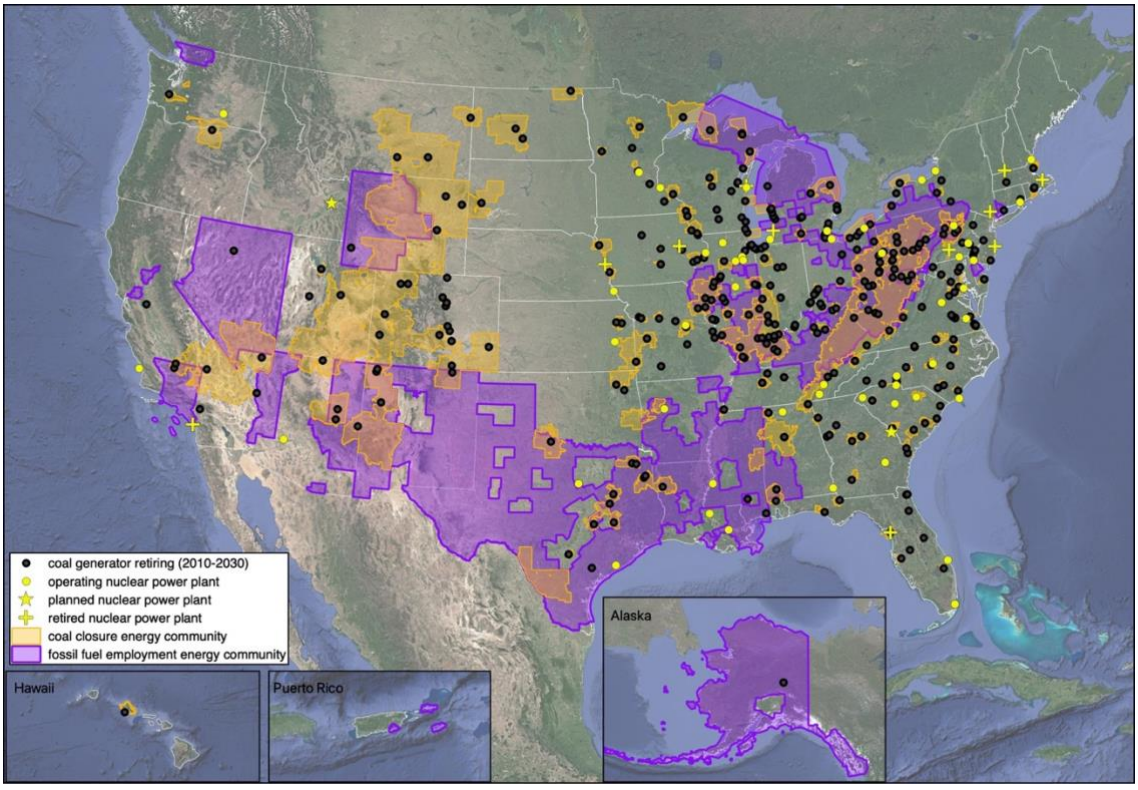
Advanced Nuclear Technology: Site Selection and Evaluation Criteria for New Nuclear Power Generation Facilities (i.e., EPRI Siting Guide): Provides siting guidance to prospective utilities throughout the lifecycle of the siting process. This guide combines regulatory guidance and business-related considerations for siting purposes. It is a good starting point and comprehensive reference for any siting activities.

Advanced Nuclear Technology: Owner-Operator Reactor Technology Assessment Guide (i.e., EPRI Technology Assessment Guide): Outlines the nuclear technology and design selection process for owner-operators, including prospective utilities. This guide provides a general selection process, as well as recommendations on how to compare technologies and designs against one another.

GAIN Studies: Economic impact assessment, siting evaluation, and technology assessment performed for a coal plant in the Four Corners region of the Southwestern U.S. Previous studies also include an investigation of benefits and challenges of coal-to-nuclear conversions. The investigation determined that hundreds of coal power plant sites across the United States could be converted.

For more data and information, visit: energycommunities.gov/

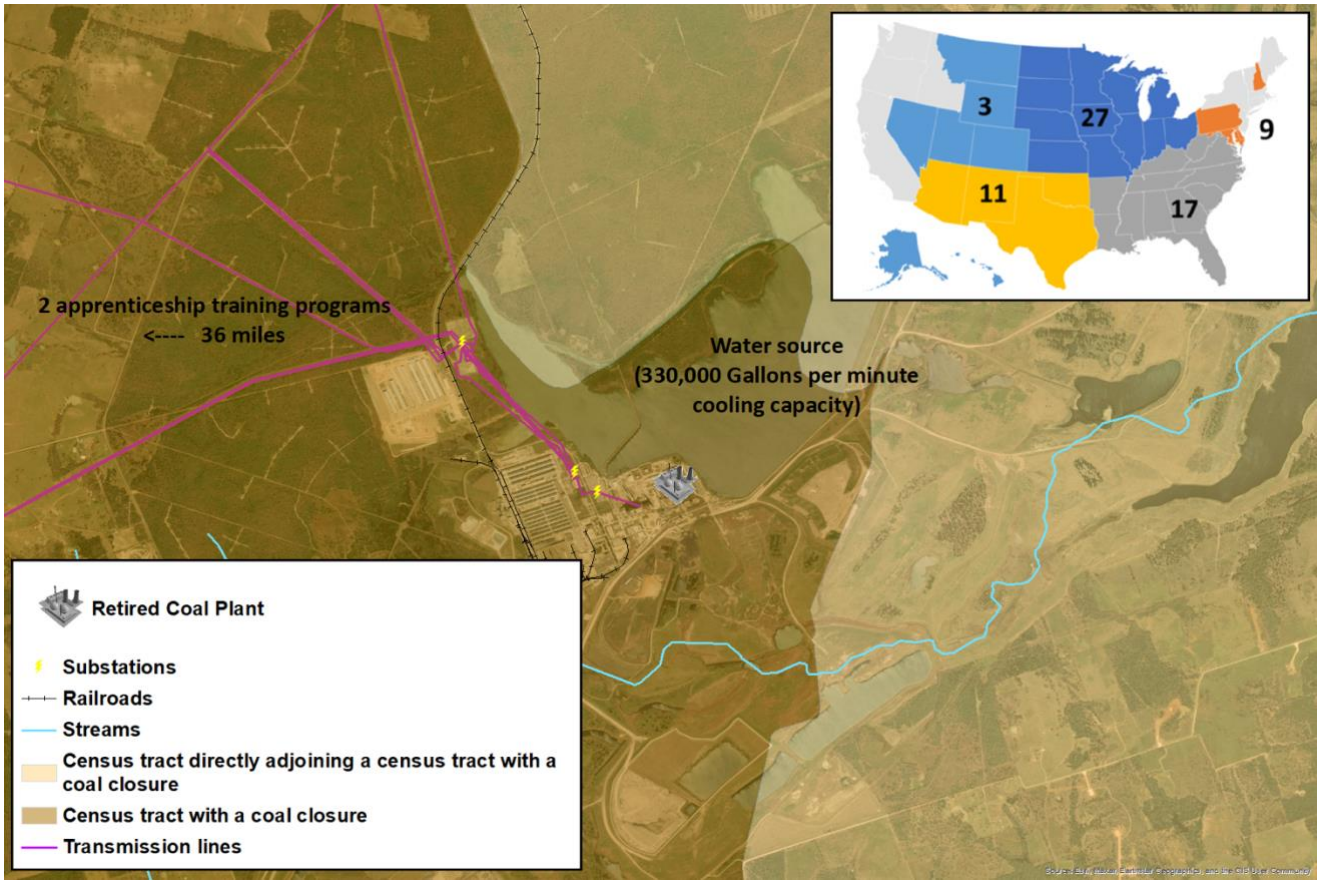
Retired and Retiring Coal Power Plants along with Operating, Planned, and Retired Nuclear Power Plants (Data as of August 2023)



Hypothetical example: Coal-to-nuclear site redevelopment

A 1024-megawatt coal-fired power plant was constructed in 1981 along a major rail line that supplied lignite coal, and generated electricity until its full retirement in 2018. Cleanup efforts at the retired plant are scheduled to be complete in April 2024. The 84-acre site has yet to get an official redevelopment plan. The site is within an energy community as defined by the IRA, and sits on the line of an adjacent qualifying community, meaning it can qualify for an additional tax credit bonus. The population within 20 miles of the facility is about 500 people. There are two trade apprenticeship programs, one in plumbing and the other in industrial mechanics, about 37 miles away across a primarily rural landscape. There is a 435-megawatt solar installation 20 miles away planned for January 2025 operation with electricity demand in the area expected to rise, especially in the summer months. The closest off-site substation allows for a stepdown to 138 volts and an adjacent water body allows up to 330,000 gallons-per-minute of water intake with the facility's current cooling technology, which is important to some redevelopment options. It is also adjacent to rail with a sizable railyard on the premises for transporting material useful to redevelopment or updated operations.

The map on top right shows the number of U.S. coal sites by region retired in last six years likely amenable to siting an advanced reactor. Read the full report *Investigating Benefits and Challenges of Converting Retiring Coal Plants into Nuclear Plants* for detailed information.



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Visit the Coal Redevelopment Project site for additional resources.