



# Pennsylvania Nuclear Energy Roadmap

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## Executive Summary:

# Pennsylvania's Opportunity to Lead in Nuclear Energy and the Next Era of Industrial Growth

**Pennsylvania is at a defining moment.** Electricity demand is rising after decades of stability. Artificial intelligence and advanced manufacturing are reshaping the economy. At the same time, nuclear energy is returning as a central solution for reliable and carbon-free power. Together, these forces create a narrow window for states that are ready to act.

Pennsylvania enters this moment with one of the most complete nuclear ecosystems in the United States. The commonwealth does not need to build an industry from scratch. It already operates one of the largest nuclear fleets in the country. It already supports a mature supply chain that serves projects across the nation. It already anchors research and talent through world-class universities and federal infrastructure. Pennsylvania's advantage is not any single asset. It is the ability to integrate generation, manufacturing, research, and demand within one coordinated system.

**The opportunity now is to convert that foundation into sustained leadership.**

This roadmap outlines a strategic path forward. It is not a siting guide. It does not prescribe specific technologies. It establishes a framework for coordination that reduces uncertainty and enables investment. Progress will depend on aligning institutions that influence energy systems, industrial development, and talent preparation.

## Vision for Pennsylvania

Pennsylvania leads as a national and global force in nuclear innovation, translating industrial strength and deep expertise into prosperity and energy security statewide.

## Vision for the Nuclear Energy Roadmap

The roadmap will guide and accelerate coordinated action to modernize and grow Pennsylvania's nuclear capacity across legacy and advanced technologies, align with federal and regional expansion goals, support reliable energy for diverse industries, promote the state's nuclear supply chain, and broaden opportunity and sustainability for communities statewide.

**This document presents a bold, yet practical, framework organized around five strategic goals to be achieved by 2050:**

## STRATEGIC GOALS



**#1 STRENGTHEN STATE LEADERSHIP AND REGIONAL COLLABORATION**



**#2 SUSTAIN, MODERNIZE, AND ENABLE THE EXISTING NUCLEAR FLEET**



**#3 ENABLE DEPLOYMENT OF NEW AND READY-TO-DEPLOY NUCLEAR TECHNOLOGIES**



**#4 GROW PENNSYLVANIA'S NUCLEAR SUPPLY CHAIN AND INDUSTRIAL LEADERSHIP**



**#5 BUILD AN INCLUSIVE AND FUTURE-READY TALENT PIPELINE**

### Why This Moment Matters

Electricity demand is growing at a pace not seen in decades. Large energy users are seeking power that is reliable at all hours. Nuclear energy is one of the few technologies that can meet that requirement at scale. Federal policy and private capital are aligning around that reality. At the same time, other states are moving quickly to capture investment. Pennsylvania's position is strong but not guaranteed. The central question is not only where reactors will be built, but where the long-term economic value will be captured. States that align infrastructure, industry, and talent will define the next phase of nuclear development.

## A Coordinated Path Forward

Nuclear development requires time. It requires capital. It requires coordination across many actors. No single organization can deliver that outcome alone. Pennsylvania's strength is its ecosystem. Plant operators sustain the existing fleet. Manufacturers produce critical components. Universities advance research and train talent. Policymakers shape the environment for investment. Labor organizations provide the skilled talent required to build and operate facilities. Team Pennsylvania serves as a neutral convener within that system. The role is to connect these capabilities and align them around shared priorities. The roadmap reflects that approach and focuses on coordination rather than prescription.

## A Whole-of-Commonwealth Opportunity

Nuclear energy supports more than electricity generation. It anchors long-term employment. It provides stability for local tax bases. It creates pathways for workers to enter high-quality careers. These benefits extend across regions from major metropolitan areas to rural communities with deep energy and manufacturing roots.

## Looking Ahead

Pennsylvania helped build the nuclear industry. The next phase will be defined by how effectively the commonwealth builds on that legacy. With clear direction and coordinated action, Pennsylvania can move from readiness to execution. The commonwealth can position itself not only as a host of nuclear generation, but as the place where the nation's nuclear future is designed, built, and sustained.

# Vision and Strategic Goals (by 2050)

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## Vision for **Pennsylvania**

Pennsylvania leads as a national and global force in nuclear innovation, translating industrial strength and deep expertise into prosperity and energy security statewide.

## Vision for the **Nuclear Energy Roadmap**

The roadmap will guide and accelerate coordinated action to modernize and grow Pennsylvania's nuclear capacity across legacy and advanced technologies, align with federal and regional expansion goals, support reliable energy for diverse industries, promote the state's nuclear supply chain, and broaden opportunity and sustainability for communities statewide.





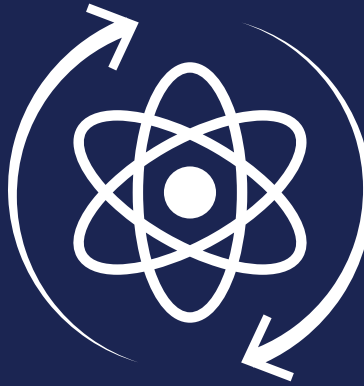
## #1 STRENGTHEN STATE LEADERSHIP AND REGIONAL COLLABORATION

*Advance coordinated action across state agencies, policymakers, industry, communities, and neighboring states to position Pennsylvania as a leading hub and accelerate nuclear project deployment and investment, and support financial approaches that help de-risk first-of-a-kind projects*

**Current Context:** Pennsylvania already plays a central role in the national nuclear energy landscape, supported by one of the largest operating fleets in the country and decades of institutional experience. As nuclear project deployment increasingly occurs through regional grids and multi-state supply chains, leadership is shifting from individual projects to coordination across jurisdictions. Without deliberate action, Pennsylvania risks underusing its existing influence at a moment when regional alignment is becoming more important.

**Potential Game Changer:** Pennsylvania can position itself as a regional convener for nuclear project deployment by aligning state agencies, neighboring states, and federal partners around shared priorities. Acting as a coordinator rather than a sole project sponsor would allow the commonwealth to shape outcomes that extend beyond its borders while reinforcing in-state economic benefits.

**Key Metric:** The number of regional or multi-state nuclear initiatives in which Pennsylvania plays a leadership role, paired with the level of nuclear-related investment enabled through those efforts.



## #2 SUSTAIN, MODERNIZE, AND ENABLE THE EXISTING NUCLEAR FLEET

*Extend operation of current reactors, improve performance, and ensure continued reliability for the electricity grid, industrial heat, and emerging applications, while anchoring new momentum in a fully supported existing fleet and capitalizing on momentum from reactor restarts*

**Current Context:** The existing nuclear fleet supplies a significant share of Pennsylvania’s electricity and provides the backbone of the state’s carbon-free power. These plants also anchor grid reliability across PJM and support long-term employment in host communities. Decisions around life extensions, major capital upgrades, and potential restarts represent some of the most immediate opportunities to preserve value, yet those decisions depend on sustained clarity and support. This goal focuses on ensuring the existing fleet remains fully supported as the foundation of Pennsylvania’s nuclear strategy, rather than serving as a source of resources for future projects.

**Potential Game Changer:** Making fleet modernization the foundation of the nuclear energy strategy ensures that new technologies new capacity development is additive to, not substitutive of, the existing fleet. Clear alignment around life-extension pathways and restart opportunities would preserve reliability while creating momentum for future deployment. This approach ensures that investments in new nuclear capacity do not come at the expense of operating plants that already deliver reliability and economic value.

**Key Metric:** The amount of existing nuclear capacity operating under extended licenses or returned to service, along with documented capital investment in plant modernization.



### #3 ENABLE DEPLOYMENT OF NEW AND READY-TO-DEPLOY NUCLEAR TECHNOLOGIES

*Prepare priority sites, including brownfield candidates, match technology options to industrial and community needs, and align with federal programs accelerating commercial deployment*

**Current Context:** Nuclear project deployment opportunities in Pennsylvania span both proven reactor technologies and newer designs approaching commercialization. While Goal 2 addresses the sustainment of operating plants, this goal focuses on opportunities to add new nuclear capacity at legacy energy and industrial sites. Readiness for deployment depends less on technology novelty and more on site preparation, grid integration, permitting clarity, and community alignment.

**Potential Game Changer:** By focusing on preparing places rather than prioritizing specific technologies, Pennsylvania can support deployment of both established reactor designs and emerging options as market needs evolve. This approach allows new nuclear projects to complement the existing fleet by adding capacity, flexibility, or new use cases without drawing resources away from operating plants. Advancing siting readiness, grid coordination, and permitting pathways at priority locations would allow Pennsylvania to attract a range of nuclear projects while sharing replicable lessons with other states.

**Key Metric:** The number of priority nuclear sites in Pennsylvania that are prepared to support new nuclear capacity, measured through completed siting, permitting, and grid-readiness assessments aligned with federal deployment programs.



## #4 GROW PENNSYLVANIA'S NUCLEAR SUPPLY CHAIN AND INDUSTRIAL LEADERSHIP

*Mobilize manufacturers, materials producers, technology firms, and service providers to meet rising national and global demand for SMRs, microreactors, and large-reactor components, building on existing corporate strengths*

**Current Context:** Pennsylvania's manufacturing base already supports nuclear operations through specialized fabrication and engineering services. National demand for nuclear components is expected to increase as deployment expands across the country. Without clear visibility into future demand, suppliers may delay investment or pursue opportunities elsewhere.

**Potential Game Changer:** Pennsylvania can strengthen its industrial leadership by helping manufacturers connect to credible project pipelines beyond the state. Supporting qualification pathways and participation in multi-state order books would allow in-state firms to scale alongside national deployment, even when reactors are built elsewhere.

**Key Metric:** The value of nuclear-related manufacturing and services contracts awarded to Pennsylvania-based firms, including participation in national or regional deployment efforts.



## #5 BUILD AN INCLUSIVE AND FUTURE-READY TALENT PIPELINE

*Expand pathways in trades, technical fields, and engineering to support both existing and new facilities, address cross-sector competition, and create long-term talent opportunity across communities*

**Current Context:** Pennsylvania's nuclear workforce is highly experienced, but many workers are approaching retirement as demand for new skills continues to grow. Modernization and deployment will increase the need for trained talent well before construction activity becomes visible. Without early alignment, talent shortages could slow progress and raise costs.

**Potential Game Changer:** Treating talent readiness as enabling infrastructure allows training capacity to expand in advance of need. Using Jobs, Growth, and Clean Energy: Pennsylvania's Nuclear Workforce Roadmap for the Next Century as a shared reference can help align education systems with projected demand and support transitions from legacy industries.

**Key Metric:** The number of Pennsylvanians trained for nuclear-related roles each year, paired with the share of nuclear positions filled by in-state workers.

# Drivers of the Roadmap

**Several structural factors shape Pennsylvania's approach to nuclear energy development.** Nuclear systems require long planning horizons and coordination across many actors. Progress depends on aligning expertise from industry, labor, universities, government, and nonprofit organizations. This roadmap organizes stakeholders around shared priorities rather than prescribing specific projects or technologies.



Align Pennsylvania stakeholders around the nuclear energy opportunity



Expand Pennsylvania's national and global leadership in nuclear supply chain and technical expertise



Underscore prominence of existing operating fleet and research reactors



Support informed policy and investment discussions



Position Pennsylvania as a regional nuclear hub

**This moment creates a need for alignment.** Interest in nuclear energy is expanding as electricity demand grows and reliable power becomes more valuable to the economy. Nuclear generation provides firm electricity that can support grid reliability as demand increases. States with established capabilities have an opportunity to participate in this expansion. Realizing that opportunity requires coordination across organizations that influence energy infrastructure, industrial development, and talent preparation.

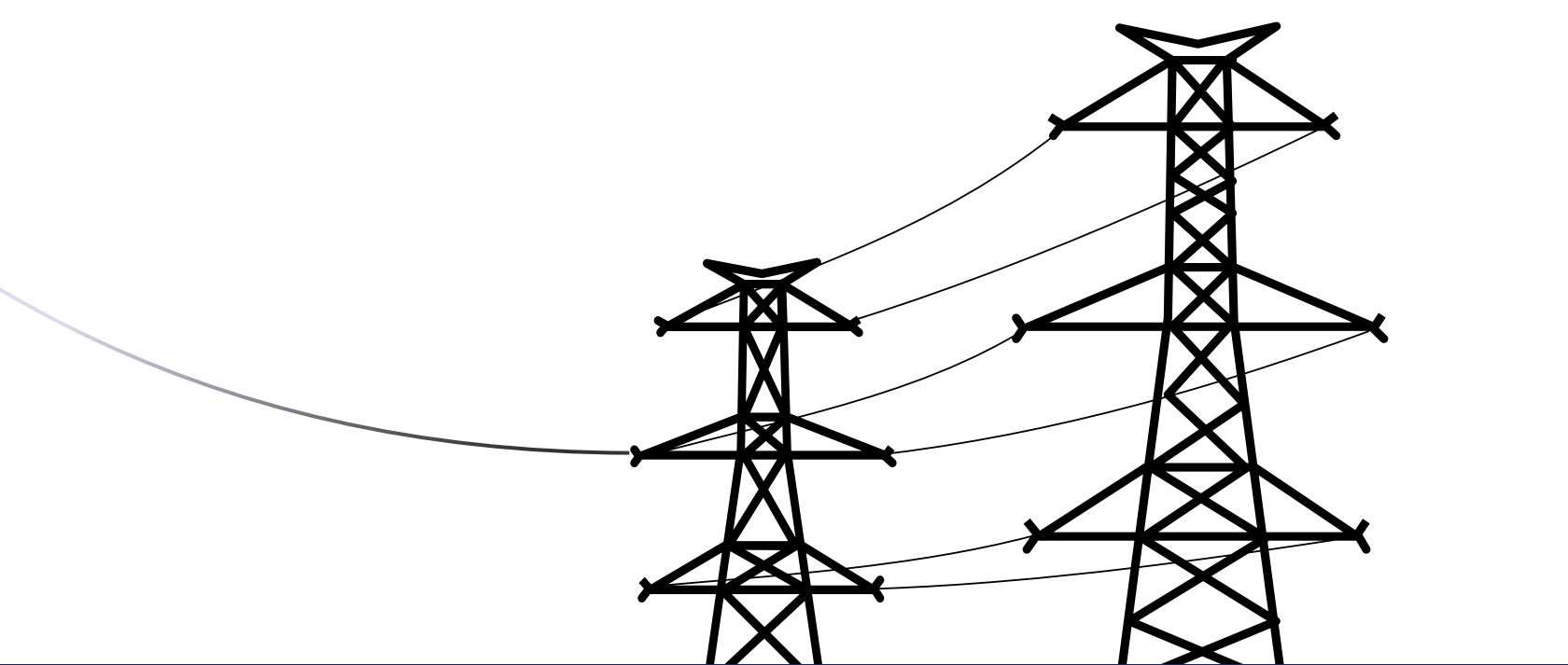
**Team Pennsylvania serves as a neutral convener.** The commonwealth's nuclear ecosystem includes plant operators that sustain the existing fleet and manufacturers that produce specialized components. Universities advance research and educate engineers and technicians who support the industry. Policymakers shape the regulatory and economic environment while labor organizations represent the skilled talent required for construction and operations. By connecting these communities, Team Pennsylvania helps align efforts around shared opportunities.



**The roadmap prioritizes Pennsylvania's core nuclear capabilities.** The most durable opportunity for the commonwealth lies in reinforcing the assets that already support nuclear energy. These assets include the existing fleet that anchors technical expertise, the industrial supply chain that produces nuclear components, and the talent base that supports operations and construction. Strengthening these foundations allows Pennsylvania to participate in nuclear development across the region while sustaining economic value within the state.

**Nuclear development operates within a broader national and regional system.** Federal institutions govern reactor licensing and safety oversight. Regional electricity markets influence investment decisions and grid planning. Global supply chains affect the availability of specialized materials and components. Pennsylvania cannot control these systems, but it can position itself effectively within them by strengthening industrial capacity and improving coordination across institutions.

**This roadmap will evolve through continued collaboration.** The framework reflects current knowledge and stakeholder input. As technologies advance and market conditions change, continued engagement across Pennsylvania's nuclear ecosystem will allow the roadmap to adapt and remain useful over time.



## National, Regional, and Pennsylvania Context

### National Context: Rising Electricity Demand and the Return of Nuclear Energy

The national energy system is entering a period of sustained electricity demand growth. New digital infrastructure is expanding rapidly. Advanced manufacturing is returning to domestic markets. Electrified technologies are increasing power consumption across the United States. Many of these facilities depend on electricity that is reliable and available at all hours. Nuclear energy is re-emerging in this environment as a source of dependable zero-emission power. Today, 94 nuclear reactors at 54 plant sites generate about one-fifth of the country's electricity, and roughly 45% of the country's carbon-free power.

Analysis from Grid Strategies found that electricity demand will grow by 166 GW as data centers expand and industrial activity grows.[1] Utilities and policymakers are responding to this shift. Across the country, utilities are planning significant additions of nuclear capacity over the coming decades. Industry projections suggest that as much as 100 GW of additional nuclear generation could be deployed in the United States by the 2050s.[2] Several projects are already advancing. Two commercial reactors are currently under construction, with an additional 30 planned and nearly 500 proposed.[3] Notably, three reactors that previously closed for economic reasons are preparing to restart operations, including Pennsylvania's Crane Clean Energy Center.

# Momentum for Nuclear Energy Around the Nation

*State interest in nuclear energy has accelerated rapidly across the United States. In 2025, 45 states examined nuclear energy policies through legislation, task forces, or strategic studies. Early in 2026, 13 governors referenced nuclear energy in State of the State addresses, signaling growing political attention.*

## Several states are now pursuing specific deployment targets



New York announced a goal of adding 5 GW of nuclear capacity



Illinois issued an executive order to pursue 2 GW of new nuclear generation by 2033



**These signals indicate that nuclear energy is becoming a central element of state energy strategies as electricity demand increases and grid reliability becomes a priority**

Progress for nuclear energy has been consistent across Federal Administrations. Federal policy is increasingly aligned with this renewed interest in nuclear energy. Congress preserved tax incentives that support both existing nuclear generation and new clean electricity investment. The ADVANCE Act directs the Nuclear Regulatory Commission to modernize licensing processes and improve regulatory efficiency. Federal agencies are also investing in domestic nuclear fuel supply and supporting demonstration projects for advanced reactor technologies. Taken together, rising electricity demand and renewed federal support are creating a new phase of nuclear development in the United States. States that already possess industrial supply chains and nuclear operating experience with trained workforces are positioned to play a central role in that expansion.

# Federal Momentum Supporting Nuclear Energy

Federal policy is increasingly aligned with expanded nuclear energy deployment. Policymakers view nuclear energy as an important pathway to strengthen U.S. energy security, maintain global technology leadership, support industrial competitiveness, and provide reliable zero-emission electricity.

Several federal incentives and initiatives now support both the existing nuclear fleet and new nuclear investment.

## Demonstration and early deployment

The federal government has selected 11 pilot projects intended to accelerate new nuclear technologies, to bring several projects to operation later this decade.

**The Advanced Reactor Demonstration Program (ARDP)** is a federal program that will demonstrate advanced nuclear reactor technology through a cost-sharing partnership with advanced nuclear reactor developers. Over \$2.5 billion has been allocated to fund the two flagship projects, X-energy and TerraPower.

Focusing on Gen III+ reactor technologies, the **Gen III+ program** funds projects that will build and deploy new nuclear reactors and address the gaps in the U.S. nuclear industry. The DOE reissued a \$900 million Gen III+ SMR solicitation, \$800 million of which will fund two tier-1 projects: Holtec's efforts to deploy an SMR at Palisades, and TVA's plans to deploy a GE-BWRX300 at its Clinch River site. \$100 million will go to a fast follower.

## Federal financing and investment

Federal financing programs are supporting nuclear deployment and plant restarts, including a \$1 billion loan to support the restart of Pennsylvania's Crane Clean Energy Center.

Congress has appropriated more than \$3 billion to expand domestic nuclear fuel supply and strengthen the nuclear industrial base.

## Potential future federal policy

Additional proposals under discussion, such as the **Advancing Reliable Capacity (ARC) Act**, aim to reduce financial risk for early mover nuclear projects.

Together, these policies reflect growing federal recognition that nuclear energy will play a significant role in meeting rising electricity demand while supporting U.S. energy security and industrial competitiveness.

**45U Zero-Emission Nuclear Production Credit** Provides up to \$15 per MWh for existing nuclear generation through 2032.

## Federal tax incentives

**45Y Clean Electricity Production Credit** Provides up to \$30 per MWh for new clean electricity generation, including nuclear, for projects that begin construction before 2034.

**45E Clean Electricity Investment Credit** Provides a 30% investment tax credit for qualifying clean energy projects. Additional incentives may be available for projects located in energy communities or using domestic components.

## Private sector and strategic partnerships

Major private-sector partnerships are forming to support advanced reactor deployment in the United States and abroad, including strategic investments tied to Westinghouse reactor technology.

## Regulatory modernization

The **ADVANCE Act** directs the Nuclear Regulatory Commission to modernize licensing processes and improve regulatory efficiency for new nuclear technologies.

Federal agencies are advancing reforms related to nuclear energy, national security applications, and supply chain resilience.

# How States Are Advancing Nuclear Development

States are pursuing nuclear energy through several policy approaches that support deployment and supply chain growth

### Supporting nuclear technology and supply chains

- **Indiana** authorized utilities to seek approval for early project development costs tied to small modular reactors
- **Texas** committed \$350 million to support advanced nuclear projects and established the Texas Advanced Nuclear Energy Office

### Launching studies and state task forces

- More than a dozen states have initiated formal studies or commissions to evaluate nuclear opportunities. Participants include **Arizona, Idaho, Louisiana, Maryland, New York, Oklahoma, Pennsylvania, Utah, and Wisconsin**

### Recognizing nuclear as a clean energy resource

- States like **Colorado, Indiana, Kentucky, and New Hampshire** have updated policy frameworks to recognize nuclear generation as a clean energy resource

### Removing regulatory barriers

- **Louisiana** authorized development of a federal permitting parity program designed to accelerate licensing for nuclear projects with federal agency collaboration

## Regional Context: A Mid-Atlantic Nuclear Corridor and Pennsylvania's Leadership

Nuclear energy development is accelerating across the Mid-Atlantic and Midwest. States surrounding Pennsylvania are advancing policies to sustain existing reactors and attract investment in new or additional nuclear capacity tied to rising electricity demand.

### Nuclear Activity in States Surrounding Pennsylvania

Several states near Pennsylvania are actively exploring nuclear deployment as electricity demand rises and federal incentives expand



#### OHIO

Focused on stabilizing its existing nuclear fleet while exploring future nuclear investment tied to grid reliability and industrial demand



#### KENTUCKY

Established a Nuclear Energy Development Authority to develop projects, support site readiness, and foster economic growth



#### NEW YORK

Announced a goal to add 5 GW of new nuclear capacity and is evaluating state-led development models



#### MARYLAND & VIRGINIA

Evaluating nuclear technologies to support data center growth and long-term grid reliability



#### WEST VIRGINIA


Repealed long-standing ban on nuclear construction and focused on legislative steps to oversee future nuclear development

Ohio has taken steps to stabilize its nuclear fleet while examining future reactor development. Kentucky recently removed restrictions on nuclear construction and is exploring advanced reactor projects linked to industrial growth. New York has announced plans to pursue new nuclear capacity through state-led initiatives. Maryland and Virginia are evaluating nuclear technologies to support data centers, federal facilities, and long-term grid reliability. These efforts reflect a broader regional shift.


Electricity demand from artificial intelligence infrastructure, advanced manufacturing, and electrification is rising quickly. Nuclear energy is increasingly viewed as one of the few technologies capable of delivering continuous, large-scale power to support that growth. Within this emerging landscape, Pennsylvania occupies a distinctive position. Many states exploring nuclear energy projects depend on specialized manufacturing and skilled labor that operate across state lines.

## Why Nuclear Order Books Matter

Nuclear supply chains expand only when manufacturers see a **predictable pipeline of projects**. **A single reactor rarely justifies new production lines or new talent training programs**



**Multiple projects over time create the confidence suppliers need to invest in nuclear certification and specialized equipment while building skilled labor capacity.**



### For Pennsylvania the implication is clear

Regional deployment matters even when reactors are built in other states: a steady flow of projects across surrounding states can sustain manufacturing demand while strengthening engineering expertise and skilled labor based in the commonwealth

Pennsylvania sits near the center of this regional nuclear ecosystem. Companies and workers in the commonwealth already support nuclear facilities throughout the United States. As new projects move forward across the region, those same capabilities will remain essential. The strategic question for Pennsylvania is therefore not only where reactors will be built, but where the long-term economic value of nuclear development will be captured. Reactor projects create decades of demand for specialized manufacturing and maintenance services.

Pennsylvania's location within the PJM regional grid places it within one of the largest electricity markets in the world. The state combines nuclear generation with abundant natural gas resources and extensive transmission infrastructure. These assets position the commonwealth to support rising electricity demand while sustaining a strong industrial base.

## Pennsylvania Context: An Established Nuclear Leader

Pennsylvania has the opportunity to lead the region by strengthening the industrial supply chain and technical expertise that enable nuclear project deployment, especially in areas like forging. Reactor projects may emerge in several states. The state that anchors the manufacturing base and talent pipeline will shape the regional nuclear economy. Leveraging Pennsylvania's existing industrial capacity and nuclear expertise positions the commonwealth to lead that ecosystem while supporting nuclear development across the broader region.

Pennsylvania has played a central role in the development of nuclear energy in the United States. The nation's first full-scale commercial nuclear power plant operated in Shippingport, Pennsylvania. Today, the commonwealth hosts eight operating reactors. Another unit is preparing to return to service as the Crane Clean Energy Center. Additionally, nuclear energy supplies roughly one-third of Pennsylvania's electricity and more than 90% of the state's carbon-free generation, enough to power 7.3 million homes.[4] Nuclear energy also contributes \$2 billion to Pennsylvania's GDP,[5] and has created at least 3,300 direct family-sustaining jobs and nearly 13,000 indirect jobs.[4] Pennsylvania also has the ability to host on the job training or apprenticeships at existing facilities to train new talent.

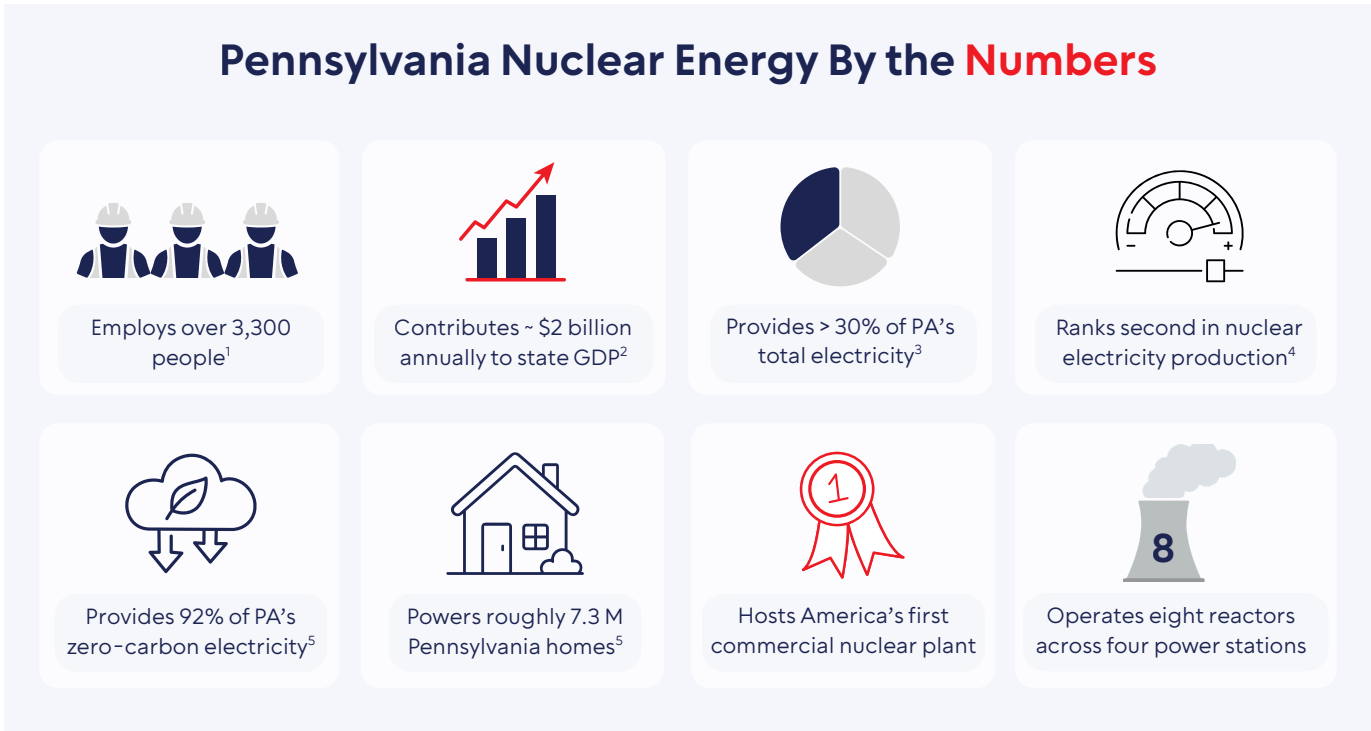
Pennsylvania's leadership extends beyond plant operations. The state maintains one of the most comprehensive nuclear industrial ecosystems in the country. Manufacturers across Pennsylvania produce components,

materials, and specialized equipment that support nuclear facilities nationwide. This manufacturing base ranges from large companies that design reactor systems to smaller firms that fabricate valves, forgings, electrical equipment, and other precision components used in nuclear plants. These companies operate alongside plant operators such as Constellation, Talen, and Vistra, forming an integrated nuclear economy that spans generation, manufacturing, engineering, and technical services.

Pennsylvania is also a center of nuclear research and education. Universities across the state support research in nuclear science, materials, and energy systems while training the next generation of engineers and technical specialists. Penn State operates the Breazeale Reactor, the longest continuously operating licensed research reactor in the United States. The reactor serves as a platform for research and collaboration with federal agencies and industry partners. This academic infrastructure reinforces the state's broader nuclear workforce. Nuclear facilities employ thousands of Pennsylvanians in engineering, operations, and technical roles. Many more workers are employed through supply chains that support plant maintenance, equipment manufacturing, and refueling outages. The concentration of expertise across universities, operating plants, and manufacturers is a defining feature of Pennsylvania's nuclear leadership.

Pennsylvania’s nuclear history includes the 1979 accident at Three Mile Island Unit 2. The accident produced no detectable health effects among plant workers or the public and led to major improvements in safety culture across the industry.[6] Even so, it remains an important part of the state’s energy history and continues to shape public discussion.

For these reasons, Pennsylvania’s nuclear opportunity extends beyond reactor construction alone. The commonwealth’s operating fleet, supply chain capacity, and skilled workforce provide a foundation for long-term participation in the next phase of nuclear energy development.



### Why This Moment Matters: A Strategic Window for Nuclear Energy

Electricity demand is rising for the first time in decades while federal policy, private investment, and state strategies are increasingly aligned around nuclear energy. At the same time, several states are moving quickly to position themselves for new projects and supply chain investment. These conditions create a narrow window in which states with existing nuclear industries can translate that foundation into long-term economic leadership.



### Important Dynamics and Considerations

Please scan the QR code to read the full list.

## GRAPHIC SOURCES

1. [Pennsylvania Department of Environmental Protection. Pennsylvania Annual Energy Report, 2022.](#)(link opens in a new tab)
2. [Pennsylvania General Assembly. Testimony before the Pennsylvania House of Representatives, Commonwealth of Pennsylvania, 2019.](#)(link opens in a new tab)
3. [U.S. Energy Information Administration. Pennsylvania State Energy Profile and Analysis. Last modified February 19, 2026.](#)
4. [Caitlin Ritchie. "Nuclear Generation by State." Choose Energy. Edited by Jamie Cesanek. Last modified April 2, 2026.](#)
5. [Nuclear Energy Institute. "Pennsylvania State Fact Sheet," 2024.](#)

## FOOTNOTES

- [1] [Nuclear Energy Institute. "Pennsylvania State Fact Sheet," 2024.](#)
- [2] [U.S. Energy Information Administration, "Pennsylvania State Overview," Last modified February 19, 2026.](#)
- [3] [State of Louisiana, "2026 Nuclear Strategic Framework," Governor Jeff Landry \(2026\).](#)(link opens in a new tab)
- [4] [U.S. Department of Energy, "Demonstration of Microreactors for Remote, Industrial, and Security Applications" \(2023\).](#)
- [5] [Idaho National Laboratory, "Microreactors".](#)
- [6] [International Energy Agency, "Nuclear Power in a Clean Energy System" \(2022\).](#)



## Near-Term Actions (2025–2030)

Pennsylvania’s near-term actions focus on building readiness through disciplined coordination, shared learning, and clear sequencing. The goal is to reduce uncertainty, align public and private actors, and generate early proof points that inform longer-term decisions. These actions emphasize methods and processes rather than predetermined outcomes, positioning the commonwealth to move decisively as opportunities emerge.



### **Conduct a Statewide Nuclear Opportunity and Siting Assessment**

Pennsylvania should develop a shared, data-informed understanding of where nuclear development is most feasible in the near- and medium-term (e.g., existing nuclear facilities, retired or retiring fossil-fuel plant sites, where grid access, talent, and public acceptance already exist).

- Define Pennsylvania’s nuclear energy ecosystem (generation, fuel, enrichment, reactor design, component manufacturing, supply chain, etc.)
- Define Pennsylvania’s nuclear energy ecosystem (generation, fuel, enrichment, reactor design, component manufacturing, supply chain, etc.)
- Apply a common analytical framework to evaluate potential sites based on grid access, existing infrastructure, talent availability, and community context building on Oak Ridge – Siting Analysis for power Generation Expansion (OR-SAGE)

- Prioritize initial screening of existing nuclear facilities and retired or retiring fossil-fuel plant sites, where grid interconnection, skilled labor, and public familiarity may reduce barriers to development or deployment
- Examine coal-to-nuclear or other brownfield site conversion opportunities as a distinct pathway, recognizing the value of site reuse, repurposing infrastructure, and talent transition
- Distinguish between near-term viable sites and longer-term opportunities as conditions evolve
- Translate assessment findings into practical implications for communities, utilities, manufacturers, and policymakers to support shared prioritization



### **Establish an Interagency Nuclear Coordination Group**

Coordinated state action is essential to avoid duplication, reduce friction, and align with federal processes.

- Formalize a cross-agency coordination mechanism to align timelines, share information, and resolve interdependencies early
- Reduce barriers to deployment (siting, financing, and talent)
- Harmonize Pennsylvania’s state engagement with federal agencies to align permitting, funding, and technical assistance timelines
- Ensure representation across public sector, energy policy, regulation, utilities, labor, academia, and industry, without prescribing a fixed governance model
- Provide a consistent interface for industry, communities, and regional partners to reduce fragmentation and mixed signals



### **Advance Targeted Permitting and Regulatory Readiness**

Regulatory certainty supports confidence even when it is not the primary barrier to deployment.

- Map state and local permitting processes alongside federal licensing pathways to identify alignment opportunities and sequencing gaps
- Focus near-term actions on clarity and predictability rather than wholesale regulatory reform
- Engage early with the Public Utility Commission to clarify how existing regulatory tools apply to life-extension investments, restarts, and future projects
- Evaluate the Alternative Energy Portfolio Standards to assess how nuclear energy is recognized and valued, and identify options to better align AEPS with long-term reliability and investment objectives without disrupting existing market signal
- Translate regulatory considerations into practical implications for developers, manufacturers, and communities



## Launch Early Pilot and Partnership Efforts

Early pilots can translate planning into action while limiting risk.

- Focus early pilot efforts on coordination, siting, and process learning rather than new reactor technology development
- Leverage Pennsylvania's universities and existing manufacturing base to support pilot activities related to permitting, supply chain readiness, and talent transition
- Explore public-private partnership models used in other states to align utilities, manufacturers, and public agencies around shared deployment goals
- Capture and share lessons from pilot efforts to inform future projects in Pennsylvania and other states



## Develop a Nuclear Communication, Community, and Talent Readiness Framework

Public understanding and community readiness are critical to durable progress.

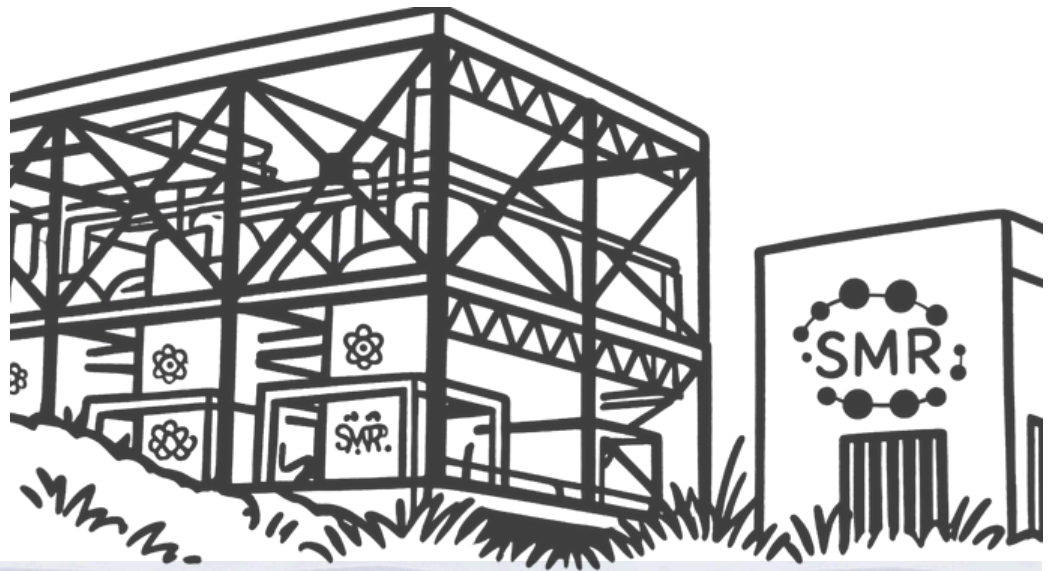
- Sequence engagement to align with concrete decision points (e.g, viable site locations), avoiding premature outreach before timing and potential benefits are clear
- Recognize that existing nuclear host communities, transitioning energy communities, and new potential hosts may require different engagement approaches
- Frame nuclear opportunities beyond emerging digital or AI narratives, emphasizing reliability, economic stability, and local benefit
- Align community readiness with talent preparation so residents can see pathways to participate as projects advance



## Align Capital and Financial Structures for Nuclear Project Deployment

Nuclear energy projects require a combination of financial and policy mechanisms to reduce risk and ensure they are delivered on time and on budget.

- Convene developers, utilities, investors, and public partners to clarify capital timing, risk considerations, and coordination needs
- Examine how peer states have used grants, credit support, or cost-sharing mechanisms to inform Pennsylvania's long-term options
- Explore opportunities to reduce early-stage costs associated with siting and permitting preparation
- Treat talent readiness as a signal of project viability, recognizing that a strong talent pipeline can reduce financing risk and improve project economics



## Long-Term Strategies (2025–2050)

The long-term strategies build from the nuclear visions and define how Pennsylvania will translate ambition into coordinated action through 2050. Together, these strategies focus on sustaining and integrating the existing nuclear fleet, enabling deployment and national leadership, preparing communities and talent, and aligning capital to support long-term investment. This approach reflects a unique moment of alignment between federal ambition, industrial demand, and Pennsylvania’s strengths in energy leadership, manufacturing, research, and talent. By leading across these dimensions, Pennsylvania can scale nuclear energy to support economic growth, energy security, and resilience over the coming decades.



### **Bolster Nuclear Ecosystem**

Nuclear energy is a cornerstone of Pennsylvania’s reliability and competitiveness, supporting the vision of a state that leads in energy security and long-term economic growth. Modernizing and sustaining the existing fleet is central to this strategy. Targeted upgrades can extend reactor life and performance well into 2050, while evaluations of potential repowering or restart opportunities can add capacity without the long lead time associated with new construction.

## Coordinated Fleet Modernization in Other States



States like Illinois and New York have used coordinated planning to extend existing reactor life through performance upgrades, cost-sharing arrangements, and policy frameworks that value reliability

These approaches offer models for sustaining fleet operations that Pennsylvania can adapt as it evaluates modernization and repowering options

As Pennsylvania modernizes its energy systems, industrial suppliers will play a critical role in supporting safe, reliable operations. This opportunity includes both established nuclear vendors and manufacturers with relevant industrial capabilities that can support maintenance, component replacement, and system upgrades. Helping these firms understand qualification requirements and pursue nuclear-grade certification pathways can broaden supply chain participation while reinforcing longevity of the existing fleet. Coordinating these efforts with fleet modernization planning strengthens reliability and creates durable economic benefits for manufacturing communities across the commonwealth.

Grid readiness is essential to sustaining and expanding nuclear's role in Pennsylvania's energy system.

Transmission capacity, interconnection, and system operations must support both extended operation of the existing fleet and the integration of new nuclear power generation as it comes online. Siting decisions should align with available grid capacity, while statewide planning should reflect projected growth in energy demand. Aligning grid planning with federal deployment ambitions will help Pennsylvania participate in demonstration cycles and regulatory coordination efforts. As new nuclear capacity is added, complementary technologies such as storage, industrial electrification, or thermal integration can improve system efficiencies and strengthen reliability. Continued investment in transmission and related infrastructure will support reliable power delivery, enable future deployment, and reinforce broader economic growth.



### **Advance** Deployment and Technology Leadership

Pennsylvania can play a leading national role in advancing next-generation nuclear technologies from early projects to scalable deployment. That role is not limited to where facilities are ultimately built. It rests on Pennsylvania's ability to support deployment nationally by providing the industrial capacity, technical expertise, and problem-solving capability required to move projects from concept to operation.

Early preparation enables disciplined progress. When sites are evaluated in advance and communities understand potential development pathways, technology decisions can be aligned more closely with system needs and long-term objectives. As advanced reactors mature, this alignment helps reduce uncertainty and ensures lessons from early projects translate into smoother execution over time.

Pennsylvania can play a significant role in accelerating reference plants across the country by supporting deployment efforts in other states through its supply chain strengths, research capabilities, and talent. As developers advance first-of-a-kind and early commercial units, Pennsylvania's competitive advantages in metals, machining, fabrication, engineered systems, and industrial equipment manufacturing position the commonwealth as a reliable contributor to reactor component production. The state's depth in advanced manufacturing enables firms to adapt existing capabilities to nuclear requirements and scale production as demand grows. By helping suppliers pursue nuclear-grade qualification and participate in multi-state procurement efforts, Pennsylvania can reduce risk for utilities and developers leading early deployments while reinforcing its role as a trusted contributor to the national and global nuclear ecosystem.

### Ontario's Darlington SMR as a Scalable Deployment Model



Ontario Power Generation is building a GE Hitachi BWRX-300 small modular reactor at the Darlington site, with plans for three additional units. The province has committed at least 1 billion dollars in early funding, and the project now serves as a model for fleet-based deployment where multiple identical units reduce cost and accelerate construction.

***Darlington demonstrates how a single site can anchor replicable development and create an effective "order book" for a reactor design***

### TerraPower's Sodium Demonstration and Federal Cost-Share



Through the Advanced Reactor Demonstration Program, the Department of Energy is partnering with TerraPower to advance the Sodium reactor in Kemmerer, Wyoming. The federal government is providing up to 2 billion dollars in a 50-50 cost-share structure that reduces early-stage financial risk. Co-location at a retiring coal plant shows how nuclear can support economic transition while creating a replicable model for future deployments.

Federal alignment shapes the pace and sequence of deployment. Licensing pathways, demonstration programs, and financing windows establish how projects advance nationally. When state actions are coordinated with these timelines, Pennsylvania is better positioned to contribute meaningfully through supplier readiness, applied research, and development activity that aligns with federal priorities. Regional coordination further strengthens this approach by enabling shared learning and reinforcing momentum across state lines.

## TVA's Integrated Project Team at Clinch River



The Tennessee Valley Authority has created an integrated project team with GE Hitachi, Bechtel, and Sargent & Lundy to plan the first BWRX-300 at the Clinch River site. The team structure aligns utility, vendor, and engineering partners from early design through commissioning, providing a model for reducing project delivery risk and strengthening early deployment readiness.

Research and validation anchor credibility as deployment accelerates. Universities, EPRI, national laboratories, and industry partners provide applied insight that helps resolve technical challenges and validate performance. When research remains closely connected to deployment experience, innovation moves more quickly from promise to practice. Through this strategy, Pennsylvania can help advanced nuclear technologies transition from early demonstrations into scalable solutions.



### **Strengthen Community Capacity and Talent Pipeline**

For nuclear energy to deliver lasting value in Pennsylvania, communities and talent systems must be ready to grow alongside investment. Community readiness shapes how projects move from concept to reality and influences both timing and public confidence. Talent readiness determines whether those projects can be delivered and sustained over time. Addressing community capacity and talent pipelines deliberately better positions Pennsylvania to turn long-term strategy into durable results.

Communities play an active role in shaping how nuclear development unfolds. Local leaders must be able to evaluate opportunities, understand long-term implications, and participate meaningfully in early planning. When communities have access to practical guidance and trusted information, they are better equipped to navigate infrastructure needs and regulatory processes. That preparation leads to clearer expectations, more predictable siting decisions, and stronger confidence among residents and project partners alike.

## Community Engagement at the Darlington SMR Site



Ontario's Darlington SMR project includes extensive community engagement, municipal readiness activities, and regional workforce planning. The project highlights how early and transparent engagement can build confidence, strengthen public understanding, and prepare communities for long-term investment.

## Kemmerer's Coal-to-Nuclear Transition Model



Kemmerer, Wyoming, a former coal community, is preparing to host the TerraPower Sodium reactor. The community has played an active role in planning for workforce transition, economic diversification, and local engagement. This case provides a real-world example of how nuclear projects can support long-term economic renewal when community capacity and planning are in place.

Talent readiness presents a parallel challenge that unfolds over decades rather than project cycles. Nuclear energy depends on continuity over time, with skills developed, retained, and renewed as systems operate and change. When talent preparation does not keep pace, pressure builds across schedules and costs, weakening confidence in delivery. Approaching talent development as a sustained investment allows Pennsylvania to support reliable operations and maintain momentum as nuclear activity grows. *Jobs, Growth, and Clean Energy: Pennsylvania's Nuclear Workforce for the Next Century*, expected for release in Fall 2026 by Penn State, provides a strong basis for aligning future needs with training capacity. Its value lies in connecting projected demand to education and training systems in a way that supports long-term planning rather than short-term responses. When pathways are clearly linked to anticipated project timelines, institutions can scale with confidence and individuals can pursue stable, high-quality careers.

This strategy also supports economic transition across Pennsylvania. Many workers in energy, manufacturing, and industrial sectors already possess skills that translate well to nuclear-related roles. Creating visible pathways for advancement supports long-term opportunity by building on strengths communities and its residents already possess. By investing in community capacity and a future-ready talent pipeline, Pennsylvania can ensure that nuclear development is not only technically achievable but socially durable. This approach reinforces the success of fleet modernization, deployment leadership, and capital alignment by ensuring that people and places are prepared to participate and benefit over the long term.



## Mobilize Capital for Long-Term Nuclear Investment

Pennsylvania’s nuclear ambitions through 2050 depend on how effectively capital is aligned with long-term objectives. Nuclear energy requires sustained investment over long time horizons, and success depends on financial structures that manage risk and provide clarity early in the development process. The purpose of this strategy is to create financial conditions that attract private investment while protecting ratepayers and reinforcing the strength of the existing fleet.

### Federal Loan Guarantees for New Builds and Restarts



Federal financing tools have played a key role in modern nuclear projects. The Department of Energy’s loan guarantee program supported completion of the Vogtle units in Georgia and is now backing the restart of the Palisades plant in Michigan with 1.52 billion dollars. A one billion dollar loan is also supporting the restart of the Three Mile Island unit in Pennsylvania, now renamed the Crane Clean Energy Center. These cases show how federal financing can support both new construction and the revitalization of existing assets.

Federal funding opportunities are an essential part of this equation. Programs administered through the Office of Energy Dominance Financing and the Department of Energy are designed to reduce early financial risk and improve the ability of projects to secure private financing on reasonable terms. Pennsylvania’s advantage lies not only in accessing these programs, but in being ready when they open. Projects that are well-sited and permitted, and supported by consistent policy signals are far more likely to compete successfully for federal support. Aligning state actions with federal funding timelines increases the likelihood that Pennsylvania-based projects, suppliers, and talent programs are positioned to benefit.

In Pennsylvania, regulatory clarity plays an outsized role in creating that predictability. Engagement with the Public Utility Commission and other oversight bodies shapes how risk is allocated and how costs are recovered. While construction work in progress recovery is limited in a competitive market, clear guidance around modernization investments, restarts, and long-term power contracts can still reduce uncertainty. When expectations are transparent, financing costs decline and investment decisions become more disciplined.

**Nuclear investment performs best when supported by predictable, long-term capital commitments.**



**The Tennessee Valley Authority's vertically integrated model** allows it to plan generation alongside transmission needs and customer demand, while committing a defined portion of its capital program to nuclear energy. That structure lowers financing costs and supports steady investment over decades rather than episodic, project-by-project decisions.

**PJM's competitive wholesale electricity market** separates generation from transmission and distribution and relies on private investment rather than traditional cost recovery through regulated utility rates, which limits direct replication of this model.

It is also critical that financial alignment extend beyond reactor construction. Manufacturing expansion, talent development, and site preparation often require capital well before a reactor project reaches a final investment decision. When these investments are coordinated rather than pursued in isolation, they reinforce one another and strengthen the overall business case. Pennsylvania's role is to ensure that public tools complement private capital in a way that supports sequencing and scale.

By treating finance as a deliberate enabling strategy, Pennsylvania can attract long-term investment, safeguard its existing nuclear assets, and position itself as a credible partner in national nuclear project deployment. Predictability, discipline, and coordination will be central to achieving that outcome.

## **Positioning Pennsylvania for 2050**

Together, these strategies chart a long-term course for Pennsylvania to lead the nation in nuclear energy through 2050 and beyond. By sustaining and modernizing the existing nuclear fleet as a cornerstone of grid reliability, the commonwealth anchors reliability today while creating the conditions for continued innovation over time.

This roadmap also looks beyond infrastructure to people and places. It aligns growth with local capacity so communities are prepared to participate and benefit as nuclear development advances. By connecting talent readiness and economic opportunity for long-term nuclear planning, Pennsylvania can ensure progress is shared and durable across regions with deep energy and industrial roots.

With clear direction and sustained coordination, Pennsylvania can reduce risk, attract long-term investment, and strengthen its role in the national nuclear landscape. This approach positions the commonwealth not only to meet future energy needs, but to define what responsible, community-centered nuclear leadership looks like in the decades ahead.

# Roles and Enablers

The Nuclear Energy Roadmap depends on aligning the capabilities that define Pennsylvania’s nuclear ecosystem. Beyond individual projects, the commonwealth’s strength lies in its industrial capacity, technical expertise, and experience built over decades. Coordinated action across these foundations will position Pennsylvania to lead in nuclear energy through sustained reliability and economic value. The categories below describe the core enablers of progress, each focused on an area where alignment and follow-through are required over time. Responsibilities are shared across institutions and progress depends on consistent coordination rather than isolated action.



## Policy, Governance, and Regulatory Alignment

Policy and regulatory clarity are essential to sustaining Pennsylvania’s existing nuclear fleet and supporting long-term investment. State and local actions have the greatest impact when they reinforce federal oversight and provide a consistent framework for decisions such as life-extension investments at operating plants. When state processes align with federal timelines, uncertainty declines for projects that involve reactor restarts or major capital upgrades. Over time, regular coordination across agencies helps ensure that decisions affecting nuclear facilities remain anchored in long-term system needs rather than driven by near-term pressures.

### Who

Federal agencies with nuclear and energy oversight responsibilities, state agencies with energy, environmental, and economic development roles, the Public Utility Commission, local governments, and nonprofit policy organizations.

### Role

- Align state and local processes with federal nuclear oversight to support life-extension investments and potential restarts at operating plants
- Provide policy and regulatory certainty for major capital investments such as life extensions, uprates, and long-term maintenance of the existing nuclear fleet
- Coordinate siting, permitting, and energy policy decisions to enable nuclear development while pursuing broader energy system reforms that reduce uncertainty for long-lead infrastructure projects
- Maintain consistent interagency engagement so nuclear decisions reflect long-term reliability and industrial priorities



## Grid, Infrastructure, and Siting Readiness

Nuclear energy delivers its full value only when generation planning is aligned with the grid systems that support it. For the existing fleet, that alignment requires confidence in transmission availability and interconnection performance as plants operate well into mid-century. Similar planning considerations apply when evaluating sites for new nuclear technologies, particularly at legacy energy locations where grid access already exists. When data are shared early and planning efforts are coordinated, siting decisions can reflect both technical realities and long-term reliability goals.

### Who

Electric utilities, transmission owners, PJM Interconnection, state agencies, and local planning entities

### Role

- Ensure transmission planning supports extended operation of Pennsylvania's nuclear fleet and accommodates future nuclear technologies
- Integrate nuclear considerations into long-term PJM planning for load growth driven by data centers, electrification, and industry
- Prioritize reuse of existing power plant sites and industrial locations with established grid access
- Improve transparency around interconnection, transmission availability, and infrastructure constraints



## Supply Chain and Industrial Capacity

A resilient supply chain is critical to sustaining nuclear operations and enabling future deployment. Pennsylvania's industrial base already supports component fabrication and specialized services for operating plants, providing a strong foundation for future growth. Expanding participation requires helping manufacturers that are new to nuclear understand qualification pathways and long-term market expectations. When developers, utilities, and public institutions align around credible project pipelines, manufacturers are more likely to invest in equipment, training, and quality systems that support participation at scale.

### Who

Manufacturers, technology vendors, engineering and construction firms, utilities, developers, and industry associations

### Role

- Sustain and expand engagement of firms that currently support nuclear operations in Pennsylvania
- Enable manufacturers from adjacent sectors to pursue nuclear-grade qualification using Pennsylvania's industrial base as a starting point
- Connect suppliers to credible project pipelines tied to life-extension, modernization, and national deployment efforts
- Position Pennsylvania firms to participate in multi-state and national order books rather than isolated projects



## Capital Alignment and Financial Readiness

Nuclear investment depends on capital structures that match long asset lifetimes and extended development horizons. Financing decisions for plant modernization follow a different path than financing decisions for new construction, yet both approaches benefit from early clarity around regulatory treatment and project sequencing. Federal financing programs can play an important role in lowering risk, particularly when projects are well prepared and aligned with program timelines. State-level coordination helps ensure that investments in manufacturing and talent occur alongside project development rather than trailing behind deployment decisions.

### Who

Developers, utilities, large energy users and offtakers, financial institutions, federal financing programs, and state economic development organizations

### Role

- Improve project bankability for nuclear modernization and deployment by aligning capital with long asset lifetimes
- Position Pennsylvania projects, suppliers, and talent initiatives to compete effectively for federal financing and risk-reduction programs
- Clarify regulatory treatment of long-term investments to reduce financing costs in a competitive generation market
- Sequence investment in manufacturing capacity and talent development alongside project timelines



## Talent Development and Education

Sustaining the existing nuclear fleet requires a workforce prepared to support operations over multiple decades. Life-extension investments create demand for skilled technicians and engineers well before construction activity becomes visible. Training capacity therefore needs to expand in anticipation of future needs rather than in response to shortages. *Jobs, Growth, and Clean Energy: Pennsylvania's Nuclear Workforce Roadmap for the Next Century*, expected for release by Fall 2026, offers a shared reference point for aligning education and training efforts with projected demand.

### Who

Universities, community colleges, career and technical education providers, workforce development boards, labor organizations, utilities, and employers

### Role

- Align education and training capacity with Pennsylvania's projected nuclear talent needs
- Support life-extension, operations, manufacturing, and future deployment roles across the nuclear value chain
- Retain and transition workers from legacy energy and industrial sectors into nuclear careers
- Leverage *Jobs, Growth, and Clean Energy: Pennsylvania's Nuclear Workforce Roadmap for the Next Century* as a shared planning reference



## Community Capacity and Public Engagement

Community engagement is most effective when engagement efforts are grounded in real decisions and clear choices. Host communities benefit from timely access to information about activities such as plant life-extension or site evaluations, especially when information reflects local conditions. Labor organizations and workers themselves also play an important role in building public understanding and confidence around projects. Messages delivered by workers who live in and are a part of the community can carry significant credibility and trust. Planning support enables local leaders to assess opportunities with confidence and to weigh long-term implications. Over time, trust is built through sustained engagement that connects clearly to outcomes communities can see and measure.

### Who

Local governments, regional and local economic development organizations, community stakeholders, nonprofits, utilities, developers, labor organizations, and workforce representatives

### Role

- Support informed decision-making in communities hosting nuclear facilities or potential sites
- Provide planning tools that help local leaders assess long-term economic and infrastructure implications
- Ground engagement in real project timelines and tangible outcomes rather than abstract concepts
- Build durable public confidence through consistent communication and follow-through



## Research, Innovation, and Collaboration

Applied research plays a practical role in improving performance and reducing risk across the nuclear ecosystem. Collaboration between universities and plant operators allows new methods to be tested in operating environments, strengthening confidence in those methods. Similar partnerships support manufacturers as component qualification progresses for nuclear service. Together, these efforts reinforce Pennsylvania's role as a source of expertise and applied knowledge rather than simply a location for projects.

### Who

Universities, national laboratories, research institutions, industry partners, and nonprofit research organizations

### Role

- Advance applied research that improves performance, safety, and cost across the nuclear ecosystem
- Support validation and testing in operating environments and industrial settings
- Strengthen collaboration between research institutions and Pennsylvania-based suppliers
- Reinforce Pennsylvania's reputation as a source of nuclear expertise and practical know-how

# Nuclear Power for a Resilient Grid and Economy

Pennsylvania's power system is entering a period of rapid change, with rising electricity demand and increasing system complexity. Maintaining reliability under these conditions requires resources that can perform consistently at scale. Nuclear energy fulfills this role by anchoring the grid with firm, carbon-free power that supports long-term system stability and economic growth.

## 1. Grid Reliability and Carbon-Free, Firm Power

Nuclear energy provides carbon-free, firm power that operates continuously, independent of weather conditions. Nuclear plants generate electricity without producing carbon emissions during operation, making them one of the largest sources of carbon-free power on the grid. Unlike variable resources such as wind and solar, nuclear facilities deliver consistent output over long periods, giving grid operators a dependable foundation for balancing supply and demand. With a capacity factor of approximately 92 percent in 2024,<sup>[1]</sup> nuclear energy produces more electricity from its installed capacity than any other commercial energy source, reinforcing its role as a cornerstone of grid reliability. Nuclear energy is most effective when integrated alongside renewable resources, offsetting their variability and helping create a diverse, balanced, and carbon-free energy mix.

As power systems incorporate growing levels of inverter-based resources, including renewables and battery storage, nuclear energy plays an increasingly important stabilizing role. Inverter-based technologies do not inherently provide the same system strength, inertia, and voltage support as traditional generation. Nuclear plants help maintain frequency stability and operational resilience, reducing the risk of disruptions during periods of high demand or variable renewable output. When paired with renewables and storage, nuclear energy complements variable resources by providing consistent output that enables a balanced system combining flexibility with reliability.

## 2. Applications Beyond Electricity Generation

The reliability and carbon-free nature of nuclear power support critical sectors that cannot tolerate interruptions. Advanced manufacturing depends on continuous electricity and, in some cases, high-temperature heat for industrial processes. Healthcare systems rely on uninterrupted power for hospitals, data systems, and life-saving equipment, as well as on radioisotopes produced by nuclear facilities for diagnostics and cancer treatment. National security and defense-related operations require resilient energy supplies that remain available during extreme events or grid stress.

### Operational Flexibility Beyond Electricity

Nuclear facilities can provide value beyond electricity generation. In some regions, plants support medical isotope production for diagnostics and cancer treatment, industrial heat for manufacturing processes, and other non-electric services that require continuous, high-quality energy.

Outside Pennsylvania, examples such as the **Palo Verde Generating Station** in Arizona demonstrate how nuclear plants can integrate with local resource constraints by reclaiming wastewater for cooling, reducing competition with municipal and agricultural water needs. These examples illustrate the operational flexibility of nuclear energy when integrated thoughtfully into regional infrastructure systems.

Nuclear facilities can also support industrial applications directly. Projects such as X-energy's partnership with Dow in Texas demonstrate how advanced reactors can provide high-temperature steam to fully decarbonize industrial processes while maintaining reliability. These use cases highlight nuclear energy's versatility as both an electricity source and an enabler of industrial competitiveness.

### 3. Regional Transmission, Backup, and Export Value

Pennsylvania's nuclear plants are integrated into the PJM Interconnection, the nation's largest regional transmission organization, where they function as dependable anchors for system reliability. Because nuclear units deliver steady output across all seasons and operating conditions, they play an important role in maintaining reserve margins, supporting frequency stability, and reducing reliance on short-notice resources during periods of system stress.

Participation in PJM's regional markets allows Pennsylvania's nuclear fleet to provide reliability value beyond state borders. When generation within the commonwealth exceeds local demand, nuclear facilities can export power to neighboring states, supporting regional balance and reducing the risk of shortages elsewhere in the system. During extreme weather events or unexpected outages, this ability to move firm power across the PJM footprint can help limit the severity and duration of disruptions affecting customers and critical infrastructure.

The long operating life of nuclear facilities strengthens this regional role. With licenses extending up to 80 years, nuclear plants provide durable generation assets around which transmission planning, interconnection upgrades, and grid investments can be made with confidence. This stability supports long-term coordination between generation, transmission, and load growth, particularly as PJM manages increasing demand from data centers, electrification, and industrial expansion.

Taken together, nuclear energy's firm output, integration into PJM's regional transmission system, and long asset life position Pennsylvania as a consistent contributor to regional reliability and energy security. This role reinforces the commonwealth's standing as a net exporter of dependable, carbon-free power while supporting system resilience and economic confidence across the PJM region.

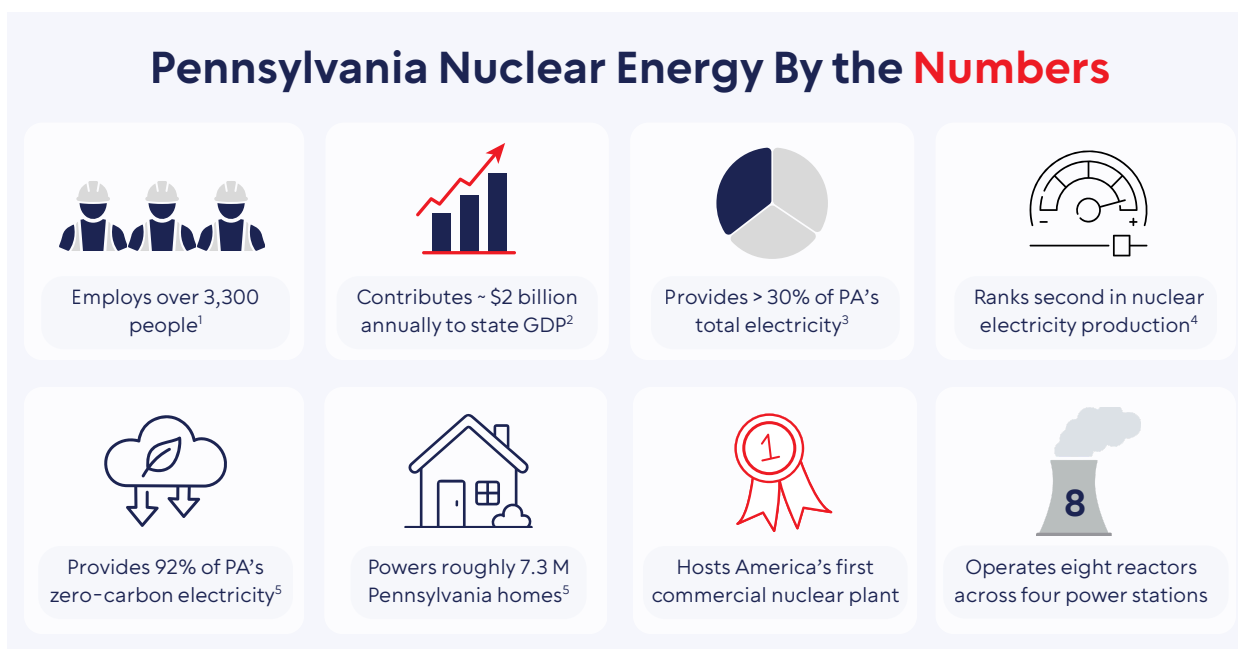
# Nuclear Energy in Action – Real Benefits for Pennsylvanians

Pennsylvania is uniquely positioned to meet the rapidly growing electricity demand driven by artificial intelligence, cloud computing, advanced manufacturing, and defense-related technologies. Nuclear energy already anchors the commonwealth’s power system, supplying roughly one-third of all electricity generated statewide and more than 90 percent of Pennsylvania’s carbon-free power.[1] As the nation’s second-largest nuclear-producing state, Pennsylvania plays a critical role in maintaining U.S. energy reliability at a time of accelerating growth.[2]

## Reliable Power for a Changing Economy

Dependable electricity has become foundational to modern economic activity. Digital infrastructure, advanced manufacturing, and national security applications require continuous, uninterrupted power that cannot tolerate outages or volatility. Nuclear energy provides firm, around-the-clock electricity at scale, ensuring stability as demand rises and power systems grow more complex.

Pennsylvania’s existing nuclear fleet is already deeply integrated into the state’s economy and energy mix. Beyond electricity generation, these facilities support engineering expertise, operational know-how, and long-term system reliability. Together, these assets form a platform that allows Pennsylvania to support new industrial growth without sacrificing grid performance or affordability.



## Integrating Nuclear Power with Digital Infrastructure

A growing number of technology companies are seeking long-term, carbon-free power arrangements to ensure reliable operations and meet sustainability goals. Pennsylvania’s nuclear infrastructure offers an established foundation for meeting this demand.

One approach involves locating major data centers near existing nuclear facilities, allowing them to draw directly from a constant energy source. This model reduces pressure on the broader grid, shortens development timelines, and signals to investors and regulators that Pennsylvania is prepared to accommodate advanced industries responsibly.

Another emerging application lies in nuclear-powered microgrids to support essential digital services, including hospitals, emergency operations centers, and research institutions. By pairing nuclear power with advanced digital management systems, Pennsylvania can enhance resilience during outages and cyber disruptions.

## Economic and Talent Benefits Rooted in Communities

Nuclear energy delivers durable economic value to the communities that host it. Facilities operate on multi-decade timelines, supporting stable employment, predictable tax revenues, and long-term planning certainty for local governments. These attributes are especially important in rural and post-industrial regions where sustained economic anchors are limited.

Just as important, nuclear facilities support highly skilled talent and a broad supplier ecosystem. Operators, engineers, technicians, manufacturers, and service providers all benefit from long-term demand tied to plant operations and modernization. When paired with local education and training institutions, nuclear assets create clear pathways into family-sustaining careers that remain rooted in place rather than shifting with short-term market cycles.

## Economic Impact Across Pennsylvania

Nuclear energy provides a stable economic foundation with benefits that extend well beyond plant sites. Across Pennsylvania, **nuclear facilities generate hundreds of millions of dollars annually in state and local tax revenues** helping to fund schools, infrastructure, and essential public services in the communities where they operate.

BEAVER COUNTY	LUZERNE COUNTY	MONTGOMERY COUNTY	YORK COUNTY
Beaver Valley Power Station	Susquehanna Steam Electric Station	Limerick Generating Station	Peach Bottom Atomic Power Station
1,760 workers	2,186 workers	1,996 workers	1,932 workers
\$776M in GDP	\$872M in GDP	\$867M in GDP	\$849M in GDP
\$136M in State & Local Tax Revenue	\$156M in State & Local Tax Revenue	\$145M in State & Local Tax Revenue	\$157M in State & Local Tax Revenue

## Case Study: Lessons Learned from Other States

Other States are already demonstrating how nuclear energy can support digital growth and industrial modernization when firm power is aligned with emerging demand. In Louisiana, state agencies, utilities, and technology firms have coordinated the siting of large-scale data centers alongside dispatchable generation, integrating power planning into early permitting and community engagement. This approach has reduced delays while securing local benefits, talent commitments, and long-term tax investment.[3]

In Idaho, a different but complementary model has emerged. At the Idaho National Laboratory, microreactor technologies are being developed and demonstrated through DOE-supported programs, universities, and private industry to address industrial and security applications.[4] INL also serves as a national hub for supplier engagement, component testing, and early manufacturing validation, allowing firms across the country to participate in nuclear project deployment without hosting reactors themselves. These efforts show how smaller, flexible nuclear systems can deliver reliable power for next-generation digital and industrial uses.[5]

Pennsylvania is well-positioned to adapt and extend these lessons. With one of the nation's largest operating nuclear fleets, a deeply experienced workforce, and long-standing regulatory expertise, the commonwealth can align energy policy and economic development to reduce uncertainty and attract investment without compromising safety or oversight. By engaging national institutions such as INL as partners in supplier qualification, testing, and talent development, Pennsylvania can connect its industrial base directly to national nuclear project deployment efforts. By pairing coordinated planning, applied partnerships, and deliberate community engagement, Pennsylvania can position its nuclear assets as platforms for innovation, economic resilience, and long-term competitiveness.[6]

### GRAPHIC SOURCES

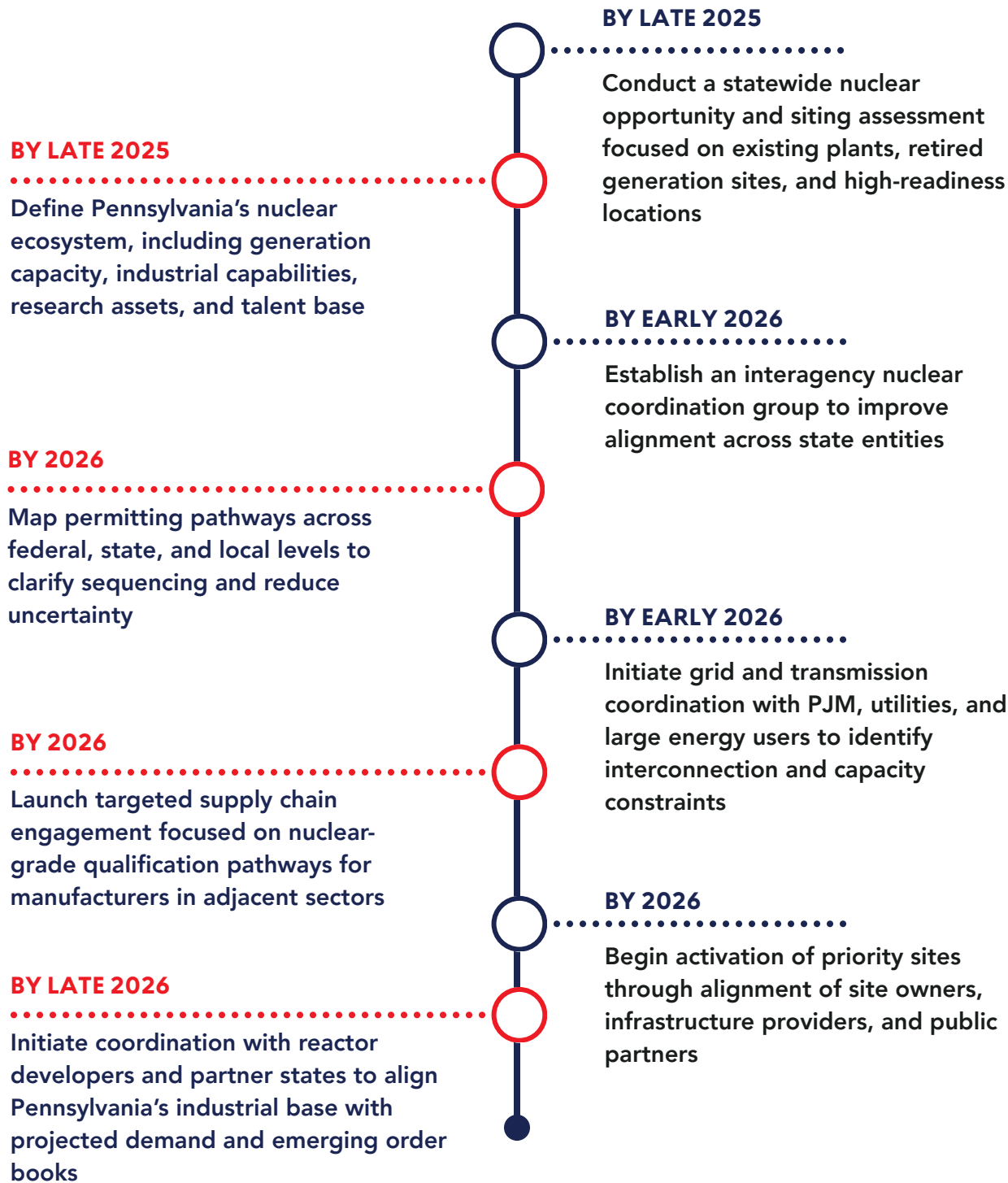
1. [Pennsylvania Department of Environmental Protection. Pennsylvania Annual Energy Report, 2022.](#) (link opens in a new tab)
2. [Pennsylvania General Assembly. Testimony before the Pennsylvania House of Representatives, Commonwealth of Pennsylvania, 2019.](#) (link opens in a new tab)
3. [U.S. Energy Information Administration. Pennsylvania State Energy Profile and Analysis. Last modified February 19, 2026.](#)
4. [Caitlin Ritchie. "Nuclear Generation by State." Choose Energy. Edited by Jamie Cesanek. Last modified April 2, 2026.](#)
5. [Nuclear Energy Institute. "Pennsylvania State Fact Sheet," 2024.](#)

### FOOTNOTES

- [1] [Nuclear Energy Institute. "Pennsylvania State Fact Sheet," 2024.](#)
- [2] [U.S. Energy Information Administration, "Pennsylvania State Overview," Last modified February 19, 2026.](#)
- [3] [State of Louisiana, "2026 Nuclear Strategic Framework," Governor Jeff Landry \(2026\).](#) (link opens in a new tab)
- [4] [U.S. Department of Energy, "Demonstration of Microreactors for Remote, Industrial, and Security Applications" \(2023\).](#)
- [5] [Idaho National Laboratory, "Microreactors".](#)
- [6] [International Energy Agency, "Nuclear Power in a Clean Energy System" \(2022\).](#)

# Phased Roadmap Timeline with Milestones

## Immediate Actions



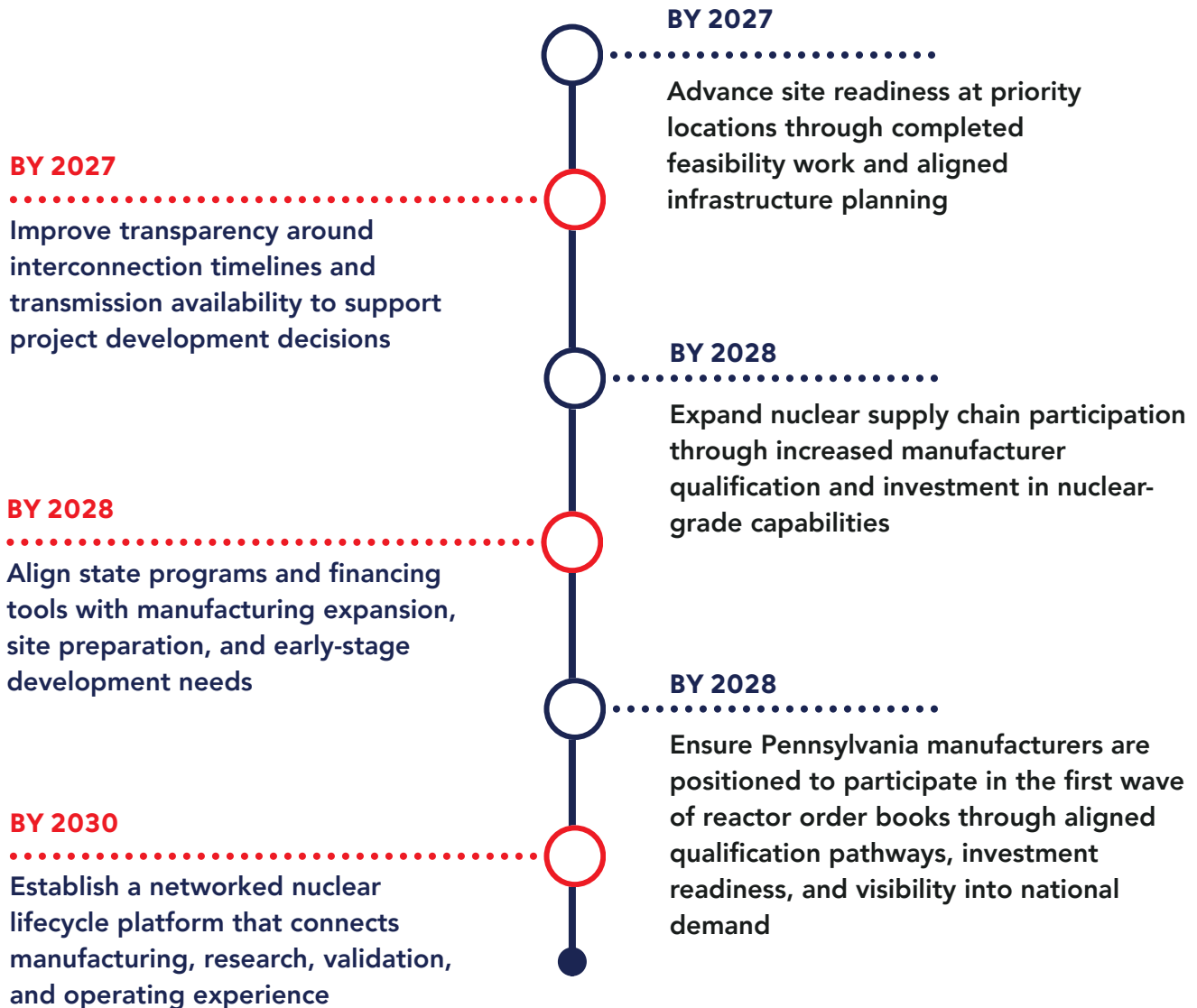
### Team Pennsylvania Role:

Convene stakeholders across government, industry, and utilities to align siting, infrastructure, and supply chain readiness while positioning Pennsylvania's industrial base to support both in-state and multi-state nuclear project deployment

# Phased Roadmap Timeline with Milestones

## Short-Term Actions

Move from planning to execution by preparing sites and strengthening manufacturing capacity while aligning infrastructure with project demand.



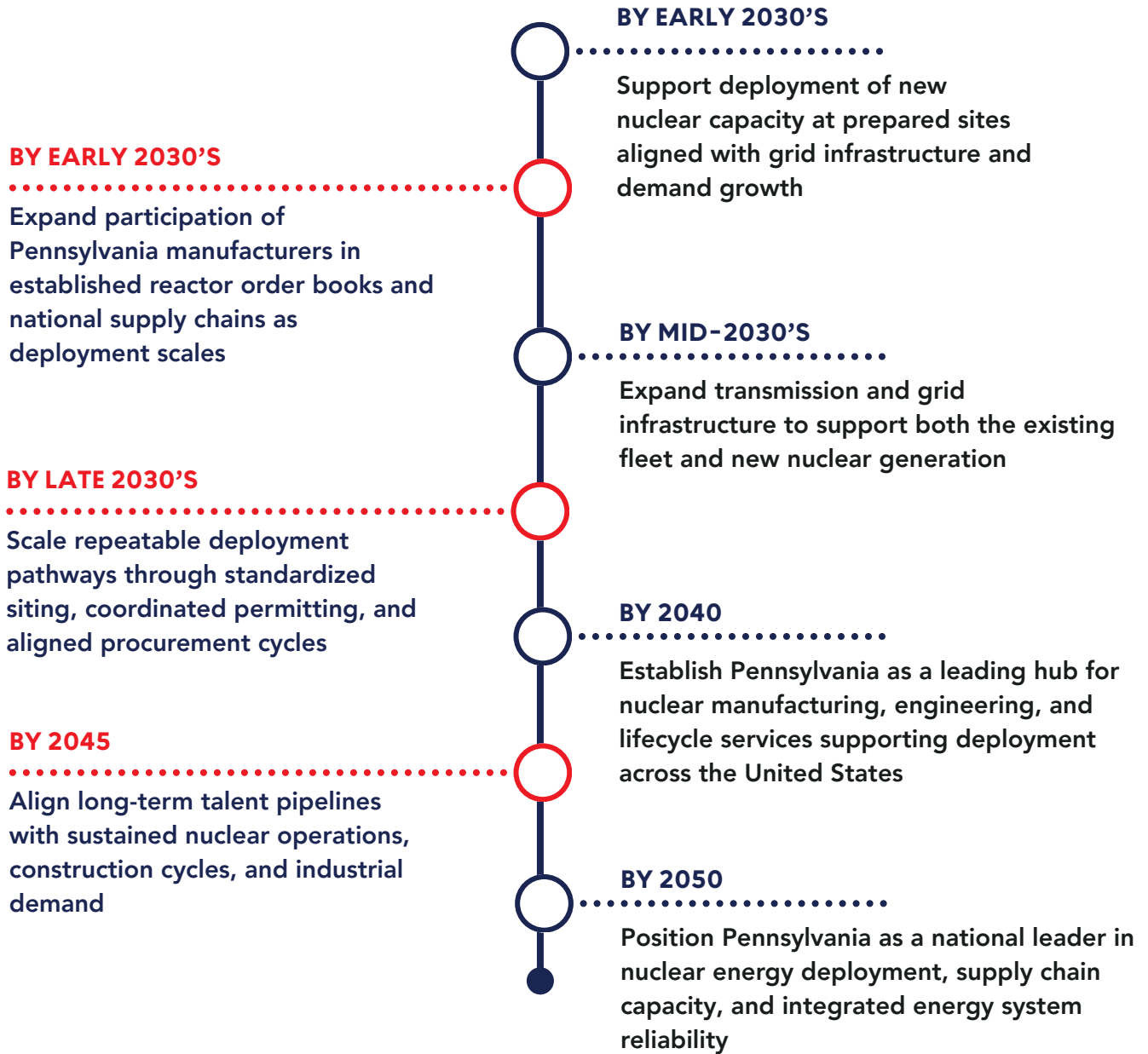
### Team Pennsylvania Role:

Coordinate across partners to scale supply chain participation, align infrastructure and capital with project timelines, and connect Pennsylvania’s capabilities to national demand and emerging reactor order books

# Phased Roadmap Timeline with Milestones

## Long-Term Actions

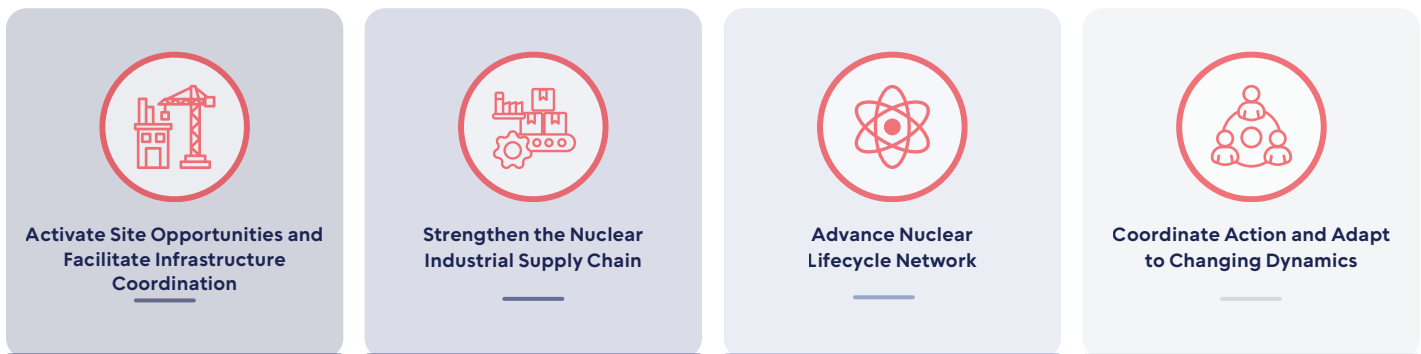
Enable sustained nuclear project deployment at scale while positioning Pennsylvania as a national center for manufacturing, engineering, and lifecycle support.



### Team Pennsylvania Role:

Sustain long-term coordination across the nuclear ecosystem while reinforcing Pennsylvania's role as a national industrial backbone supporting deployment, supply chains, and system reliability

# Team Pennsylvania Commitments



The image shows four commitment cards arranged horizontally. Each card has a red circular icon at the top, a title in bold text, and a short horizontal line below the title. The cards are: 1. 'Activate Site Opportunities and Facilitate Infrastructure Coordination' with an icon of a crane and building. 2. 'Strengthen the Nuclear Industrial Supply Chain' with an icon of a factory and gears. 3. 'Advance Nuclear Lifecycle Network' with an icon of an atom. 4. 'Coordinate Action and Adapt to Changing Dynamics' with an icon of a group of people.

Team Pennsylvania’s commitment to this roadmap reflects our role as a nonpartisan, neutral convener focused on turning strategy into coordinated action. Nuclear development in the commonwealth depends on alignment across industry, government, and communities. No single entity can organize that system alone. Our role is to bring the right partners together, connect existing efforts, and help translate opportunity into investable, actionable pathways.

We will focus where coordination challenges are greatest and where Pennsylvania’s strengths can be most effectively activated. That effort includes strengthening the industrial base, aligning infrastructure and planning systems, and ensuring that emerging opportunities create lasting economic value for the commonwealth. Rather than duplicating existing work or leading in areas owned by others, Team Pennsylvania will concentrate on advancing shared initiatives that benefit from cross-sector collaboration.



## Activate Site Opportunities and Facilitate Infrastructure Alignment

Building on site readiness work completed through GAIN’s efforts, Team Pennsylvania will focus on activation. This work centers on bringing together site owners with utilities, transmission planners, and state agencies to align infrastructure planning and development timelines. A key focus will be grid integration and transmission readiness. Interconnection constraints and transmission capacity often determine whether projects can move forward. Team Pennsylvania will help coordinate dialogue across relevant entities to improve visibility into grid conditions and support more predictable pathways to power.

A growing number of large energy users are exploring on-site or behind-the-meter generation to meet demand. These approaches can accelerate project timelines and enable faster deployment of energy-intensive facilities. In cases where new generation is sited fully behind the meter, and not delivering new power to the grid, there is a risk that new capacity may only support individual projects and not the overall strength of the system. For Pennsylvania, the opportunity is to ensure that new generation also contributes to grid reliability and enables broader economic activity. Coordinated planning across transmission, generation, and end users will be essential to achieving that outcome. The objective is to move beyond technical site readiness and establish coordinated pathways that reduce uncertainty and support future investment.



### **Strengthen the Nuclear Industrial Supply Chain**

Pennsylvania's industrial base remains a defining advantage. Many manufacturers across the commonwealth already produce components for highly regulated sectors such as defense and energy. These capabilities provide a strong foundation for participation in nuclear supply chains, but additional steps are often required to meet nuclear-specific standards. Team Pennsylvania will focus on reducing barriers to entry for qualified manufacturers. This effort includes convening industry, technical experts, and federal partners to clarify pathways for nuclear-grade qualification and to better understand the requirements associated with certifications such as ASME standards. By improving visibility into these processes and aligning available resources, this work can help manufacturers evaluate and pursue entry into the nuclear sector with greater confidence.

In parallel, Team Pennsylvania will work with partners to identify opportunities for targeted support that strengthens supplier readiness. This focus area may include coordination around technical assistance, facility upgrades, or process improvements that are necessary to meet nuclear requirements. The goal is to build on existing industrial strengths and expand the number of Pennsylvania-based firms capable of supporting nuclear project deployment over time. Models from other sectors, including supplier development programs used in naval shipbuilding, demonstrate that targeted support can accelerate manufacturing readiness and expand qualified supplier bases.



### **Advance Nuclear Lifecycle Network**

Pennsylvania already has the assets needed to support the nuclear lifecycle. Manufacturing capacity exists across the state. Research institutions provide technical expertise and testing environments. The operating fleet contributes real-world experience that connects design to deployment. The opportunity is to bring these elements into closer alignment and activate them as a coordinated system. Team Pennsylvania will focus on advancing near-term efforts that connect manufacturing to testing and then to deployment. This includes working with partners to improve access to validation infrastructure and to clarify pathways for nuclear-grade qualification. It also includes supporting efforts that help technologies move from development into real operating environments.

This approach does not depend on a single site. It builds on existing assets and links them into a network that functions as an integrated platform. Over time, this network can support a broader lifecycle model that strengthens both innovation and deployment. Some elements of the nuclear lifecycle extend beyond Pennsylvania. In those areas, Team Pennsylvania will work with neighboring states to explore shared approaches while maintaining a focus on capabilities that can be developed within the commonwealth.



### **Coordinate Action and Adapt to Changing Dynamics**

Team Pennsylvania will serve as a coordinating partner across the nuclear ecosystem, helping to align efforts that would otherwise move forward independently. These coordination efforts include maintaining active engagement with stakeholders across the industry to ensure that work within the commonwealth is connected and mutually reinforcing. As initiatives advance, Team Pennsylvania will continue to identify opportunities for collaboration, surface emerging challenges, and help partners navigate areas where coordination is required. This approach reflects the reality that nuclear development depends on sustained alignment across multiple institutions rather than isolated efforts.

The roadmap is intended to remain responsive to changing conditions. As technologies evolve and market dynamics shift, Team Pennsylvania will continue to refine priorities and support new areas of collaboration that strengthen Pennsylvania's position in the nuclear ecosystem. Without sustained coordination, nuclear development risks proceeding in fragmented ways that limit economic impact. Team Pennsylvania's role is to ensure that these efforts move forward as a connected system that benefits the commonwealth as a whole.

## Policy Considerations

Pennsylvania's nuclear opportunity extends beyond reactor construction. The commonwealth's strength lies in its established operating fleet, industrial supply chain, and experienced talent base. Together, these assets position Pennsylvania to support projects nationwide while anchoring long-term economic value at home. In a national expansion of nuclear project deployment, states that preserve industrial capacity and specialized talent are positioned to capture manufacturing, engineering, and service revenues even when projects are built elsewhere.

Policy considerations should be sequenced to reflect both urgency and structural constraints. Pennsylvania's existing nuclear fleet and industrial base are the foundation for any future expansion. Actions that stabilize and strengthen this foundation must occur first, as delays risk the erosion of capabilities that cannot be quickly rebuilt. Subsequent steps can then focus on enabling additional deployment pathways, particularly as neighboring states refine approaches to revenue stabilization and project development. The sequence begins with actions that preserve the existing fleet and the capabilities it supports.



### **Stabilizing and Modernizing the Existing Fleet**

Because nuclear facilities operate over multi-decade timelines, revenue clarity influences where capital investment, modernization activity, and talent retention occur. In a competitive wholesale market, preserving stable operating conditions for the existing fleet is the logical starting point. Ensuring predictable treatment of life-extension investments under state regulatory frameworks can reduce financing uncertainty. Clarifying how firm, zero-emission generation is recognized within the Alternative Energy Portfolio Standards may influence long-term revenue expectations and investor confidence. Even modest adjustments to how nuclear attributes are defined or credited may influence long-term modernization and capital investment decisions.

Stability at the fleet level protects more than generation output. It preserves the certification base, quality assurance systems, and supplier relationships that underpin Pennsylvania's broader nuclear ecosystem. Delayed or uncertain policy signals at this stage may shift capital investment and technical expertise to other states.



### **Strengthening Industrial Supply Chain and Talent**

Pennsylvania already maintains economic development tools that intersect directly with nuclear manufacturing and training capacity. The EDGE tax credit program, which supports large capital investment projects, could be evaluated for eligibility clarity around nuclear-grade manufacturing facilities or major plant modernization activity. Manufacturing PA programs that provide low-interest financing and technical assistance may help suppliers pursue ASME or N-stamp certification, upgrade quality control systems, or expand production lines tied to national nuclear demand.

WEDnetPA funding can offset training costs for companies expanding nuclear-related operations, while workforce development boards and apprenticeship tax credits can support scaling of skilled trades pipelines required for refueling outages, plant upgrades, or supply chain fabrication.

The Pennsylvania Energy Development Authority, through programs such as the Energy Accelerator, could support infrastructure tied to industrial expansion, including grid interconnection improvements, site preparation activities, or specialized training facilities. Although not nuclear-specific, these programs provide a foundation that could be aligned with nuclear-adjacent investments.

Coordinating these existing programs with Jobs, Growth, and Clean Energy: Pennsylvania's Nuclear Workforce Roadmap for the Next Century, expected for release by Fall 2026, can improve alignment between projected labor demand and training capacity. Aligning these tools strengthens Pennsylvania's position as a national supplier of nuclear components and expertise. Without timely alignment, suppliers may prioritize markets where demand signals and qualification pathways are clearer.



### **Advancing Site Readiness and Infrastructure Coordination**

Site preparation reduces development risk. Prepared sites reduce early-stage uncertainty and improve time-to-decision for private investment. Pennsylvania's PA Sites program already supports engineering, environmental studies, and due diligence to advance industrial properties. Expanding eligibility or prioritization criteria to include nuclear-ready characteristics could accelerate feasibility assessments at existing nuclear facilities, retired generation sites, or industrial brownfields with transmission access. Work can be done to build on the existing analysis by Oak Ridge National Laboratory on additional reactor siting locations in Pennsylvania.

The Office of Transformation & Opportunity's PA Permit Fast Track program provides an existing model for interagency coordination. Applying similar coordination to nuclear-related projects could improve sequencing across environmental review, infrastructure planning, and economic development approvals without altering federal licensing authority. Early coordination is particularly important, as infrastructure and interconnection constraints can become binding before policy or financing decisions are finalized.



### **Improving Financial Alignment and Revenue Visibility for Future Capacity**

If load growth or regional market dynamics warrant additional deployment, revenue stabilization tools may warrant further evaluation. In PJM's competitive wholesale market structure, revenue volatility can increase financing costs for capital-intensive assets and can delay investment decisions.

## Why Revenue Certainty Matters in Competitive Markets

**In vertically integrated states, utilities recover generation costs through regulated rates.** Pennsylvania operates within a competitive wholesale market. Generators rely on PJM energy and capacity revenues, which fluctuate with fuel prices and market conditions.

**For capital-intensive assets that operate for decades, lenders and investors require predictable long-term cash flow.** Revenue volatility increases financing costs, even for existing facilities.

**Improving revenue visibility does not require market restructuring.** It means clarifying how firm, carbon-free generation is valued so that industrial investment and talent development decisions remain economically viable.

## Regional Market Context and Competitive Positioning

**Neighboring states have adopted mechanisms affecting traditional nuclear assets**

➤ Ohio and Maryland have implemented stabilization measures for existing plants, while New York established zero-emission credits to preserve its fleet while advancing additional nuclear technologies

➤ Because PJM operates as an integrated regional system, infrastructure costs and capacity market outcomes affect participating states collectively; if large electricity users locate elsewhere within PJM, associated industrial benefits may accrue outside Pennsylvania even though system-wide costs remain shared

➤ Strengthening in-state revenue stability, supply chain participation, and talent retention allows Pennsylvania to maintain economic value within the commonwealth regardless of where additional generation is ultimately built

Pennsylvania's existing statutory frameworks could be evaluated to determine whether credit-based mechanisms or long-term contracting structures can be structured within restructuring constraints. For example, adaptations to existing credit systems or targeted procurement mechanisms could provide revenue visibility while maintaining wholesale market participation. PEDA financing programs may also support early-stage project costs such as interconnection studies, engineering design, or infrastructure upgrades that occur prior to a final investment decision. When paired with federal financing tools, state participation can leverage larger capital pools while limiting public exposure.

The objective of these approaches would be to reduce first-mover uncertainty and improve bankability, rather than to replace competitive markets. As other states move to provide revenue certainty, delayed consideration in Pennsylvania may place projects at a competitive disadvantage.



### Fostering Community Integration and Long-Term Public Value

Nuclear facilities provide predictable tax contributions and sustained employment over decades. Long operating lifetimes provide host communities with tax stability and planning certainty that few other infrastructure assets can match. Policy coherence across revenue stability, industrial development, and talent readiness supports durable community alignment. Pennsylvania already uses tools such as tax increment financing and local economic development incentives in other sectors. Applying similar structured frameworks to nuclear-adjacent projects may improve transparency and community benefit alignment while reinforcing long-term public value.

Sequencing these considerations is essential to maintaining competitiveness. Stabilizing the existing fleet preserves the foundation. Strengthening supply chains and talent ensures that capacity can scale. Preparing sites and aligning infrastructure reduces development risk. Only after these steps are in place can revenue tools for future capacity be evaluated with discipline. Acting on this sequence in a timely manner allows Pennsylvania to respond to growing demand while retaining the capabilities that differentiate its nuclear economy.

## Recent Nuclear-Related Legislative Activity in Pennsylvania

### House Bill 2017 (2025–2026 session)

Interest in nuclear energy has increased in the Pennsylvania General Assembly as policymakers examine how the commonwealth can sustain its existing fleet and prepare for future nuclear technologies. Several legislative initiatives have focused on enabling next-generation reactors. House Bill 2017 (2025–2026 session) adjusts state regulatory fee structures that were originally designed for large conventional reactors. The bill allows the Department of Environmental Protection to set appropriate oversight fees for small modular reactors and microreactors. This change is intended to remove a regulatory barrier that could affect deployment of smaller nuclear technologies.

### Pennsylvania Reliable Energy Sustainability Standard (PRESS)

Other proposals have examined how nuclear energy fits within Pennsylvania’s broader electricity policy framework. The Pennsylvania Reliable Energy Sustainability Standard (PRESS) was introduced as House Bill 2277 and Senate Bill 1190 (2023–2024 session). PRESS would update the state’s electricity portfolio structure and recognize nuclear generation within a reliability-focused energy standard. The proposal does not limit eligibility to advanced reactors and could apply to large light-water reactor technologies. The General Assembly has also directed formal study of nuclear development opportunities. House Resolution 238 (2021–2022 session) instructed the Joint State Government Commission to examine the potential role of small modular reactors in Pennsylvania’s energy system.

### Alternative Energy Portfolio Standards (AEPS)

The legislature has also discussed potential updates to the Alternative Energy Portfolio Standards (AEPS). AEPS is Pennsylvania’s primary framework for encouraging clean electricity generation. Current law does not include nuclear energy within the credit structure. Some policymakers have explored whether future reforms could recognize the role of reliable zero-emission generation within the state’s electricity mix. These discussions remain ongoing and reflect broader national debates about how energy policy frameworks account for reliability and emissions performance.

### Bipartisan Nuclear Energy Caucus

Lawmakers have also established a bipartisan Nuclear Energy Caucus in the General Assembly. The caucus provides a forum for legislators to examine nuclear technology and economic development opportunities connected to the industry. Together these legislative efforts show growing interest among Pennsylvania policymakers in the future role of nuclear energy in the state’s electricity system and economy.

# Organizations, References, and Appendices

- Organizations that lent time, insight, and expertise to develop the roadmap
- Glossary of acronyms and definitions used throughout roadmap

## Participating Task Force Organizations

The Pennsylvania Nuclear Energy Roadmap is the result of collaboration, and while the strategies and considerations reflect the broadest possible set of views, they do not imply a full endorsement by every participant of the Task Force.



Scan here to view the full list of Participating Organizations

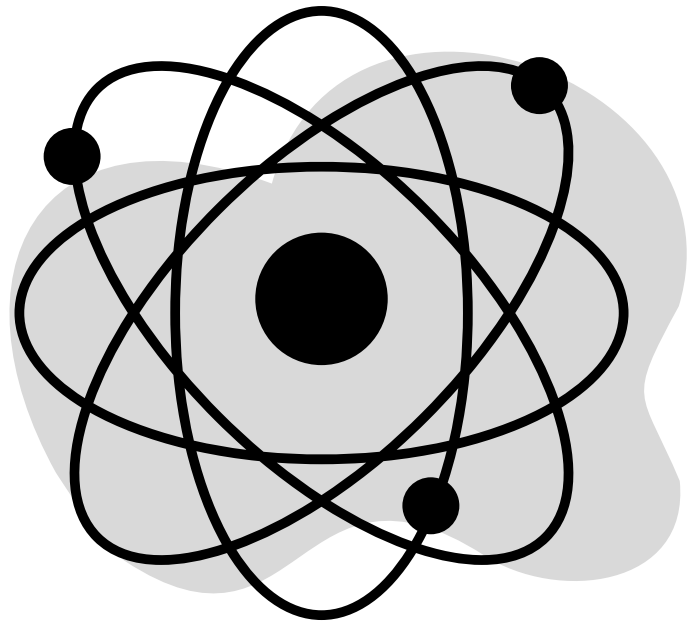
## Glossary of Acronymns

<b>ADVANCE Act</b>	Federal legislation designed to modernize nuclear licensing and accelerate deployment of advanced reactors.
<b>Alternative Energy Portfolio Standards (AEPS)</b>	Alternative Energy Portfolio Standards; State policy that requires a certain percentage of electricity sold by utilities or suppliers to come from designated alternative or clean energy sources.
<b>ARC Act (Advancing Reliable Capacity Act)</b>	Proposed federal legislation intended to reduce financial risk for early nuclear deployment projects and support first-mover commercial investment.
<b>ASME (American Society of Mechanical Engineers)</b>	Develops technical standards and certification programs used throughout the nuclear industry, including nuclear-grade manufacturing qualifications.
<b>Baseload Power</b>	Power plants that operate continuously to meet minimum electricity demand.
<b>Brownfield Site</b>	Previously developed industrial or energy sites that may be suitable for redevelopment or repowering, including retired fossil fuel facilities.

<b>Capacity Factor</b>	The percentage of time a power plant operates at full output relative to its maximum possible output. Nuclear plants typically have capacity factors above 90%.
<b>Capital Stack</b>	The combination of financing sources used to fund a project, including equity, loans, tax incentives, and grants.
<b>Carbon-Free Power</b>	Electricity generation that does not emit carbon dioxide during operation.
<b>Coal-to-Nuclear Transition</b>	The redevelopment of retired or retiring fossil fuel generation sites for nuclear energy deployment, often leveraging existing infrastructure, transmission access, and workforce assets.
<b>Contracts for Differences (CFDs)</b>	A financial mechanism that stabilizes project revenues by guaranteeing a fixed electricity price.
<b>Credit-Based Structures (CBSs)</b>	Market mechanisms that provide financial credits for electricity generation with certain attributes, such as zero emissions.
<b>Data Center</b>	A facility that houses computing infrastructure and requires large amounts of reliable electricity for continuous operation.
<b>Dispatchable Generation</b>	Power generation sources that can be turned on or adjusted to meet electricity demand.
<b>DOE</b>	U.S. Department of Energy
<b>Dry Cask Storage</b>	A method of storing spent nuclear fuel in sealed steel and concrete containers above ground.
<b>Enrichment</b>	The process of increasing the concentration of uranium-235 in nuclear fuel.
<b>Firm Power</b>	Electricity generation that is available on demand and can operate continuously regardless of weather conditions.
<b>Fission</b>	A nuclear reaction in which a heavy atomic nucleus splits into smaller nuclei, releasing energy that can be used to generate electricity.
<b>First-of-a-Kind (FOAK) Project</b>	The initial commercial deployment of a new reactor technology or design, often associated with higher development risk and cost.
<b>Fuel Cycle</b>	The full lifecycle of nuclear fuel, including mining, conversion, enrichment, fuel fabrication, reactor use, storage, and disposal.
<b>Fusion</b>	A nuclear reaction in which two light atomic nuclei combine to form a heavier nucleus, releasing large amounts of energy.
<b>Generation Upgrade</b>	An increase in the electricity output capability of an existing nuclear power plant through equipment upgrades or operational improvements.

<b>Grid Reliability</b>	The ability of the electricity system to consistently deliver power without interruption.
<b>Interconnection</b>	The process of connecting a new electricity generator to the power grid.
<b>Large Load Customers</b>	Large electricity consumers whose operations require substantial and continuous power demand, typically measured in tens or hundreds of megawatts.
<b>Life Extension</b>	The process of extending the licensed operating life of an existing nuclear reactor through regulatory approval and plant modernization investments.
<b>Load Growth</b>	Increasing electricity demand over time due to factors such as industrial expansion, electrification, and data centers.
<b>NEI (Nuclear Energy Institute)</b>	The Federal agency responsible for nuclear reactor licensing and safety oversight.
<b>Orderbook</b>	The pipeline of planned nuclear reactor deployments that provides demand visibility for manufacturers and suppliers. A clear orderbook allows suppliers to justify investments in nuclear-grade upgrades, certification, tooling, and workforce expansion.
<b>PEDA (Pennsylvania Energy Development Authority)</b>	Pennsylvania authority that supports energy-related financing and infrastructure initiatives.
<b>PJM (PJM Interconnection)</b>	Regional transmission organization that manages electricity markets and grid reliability across multiple states including Pennsylvania.
<b>Power Purchase Agreement (PPA)</b>	A long-term contract between a power producer and a buyer for the sale of electricity.
<b>PUC (Public Utility Commission)</b>	Independent state agency responsible for regulating public utilities and overseeing aspects of electricity distribution, natural gas service, and energy infrastructure within the commonwealth. Also plays a role in transmission planning, utility reliability, and consumer protection.
<b>Ratepayer</b>	A residential, commercial, or industrial electricity customer that pays utility or retail electricity charges.

<b>Spent Nuclear Fuel</b>	Used nuclear fuel removed from a reactor after it can no longer efficiently sustain the fission process.
<b>Supply Chain Qualification</b>	The process through which manufacturers meet nuclear industry standards for safety, quality assurance, and component production.
<b>Transmission System</b>	The process through which manufacturers meet nuclear industry standards for safety, quality assurance, and component production.
<b>Zero-Emission Generation</b>	The process through which manufacturers meet nuclear industry standards for safety, quality assurance, and component production.



## Nuclear Energy 101

### Foundational Information for Policymakers and the Public

With a baseline understanding of nuclear technologies, site needs, safety principles, and economic benefits, readers can more easily interpret the roadmap's strategic goals. This foundation supports strategies for strengthening existing nuclear assets, preparing priority sites, expanding the supply chain, and developing long-term talent pipelines.

Readers engaging with the roadmap benefit from understanding several practical considerations.

- States that prepare early for siting, permitting, and talent development are best positioned to attract investment
- Federal incentives are available and time-sensitive
- Nuclear supports more than electricity; it also powers advanced industries such as chemicals, data centers, hydrogen production, and materials manufacturing
- Regional collaboration improves cost-sharing opportunities and strengthens the supply chain
- States with strong manufacturing capabilities can serve national reactor orders, even if reactors are built elsewhere



#### Nuclear 101

Scan here to watch Nuclear 101: A shared Foundation for Pennsylvania's Energy Future Video



#### FAQs

Scan here to view our frequently asked questions and share your feedback

# Frequently Asked Questions

## ► **Why did Team Pennsylvania produce this roadmap, and why now?**

The roadmap responds to a clear shift in national energy demand and nuclear project deployment. Electricity demand is increasing, and nuclear energy is re-emerging as a primary source of reliable and carbon-free power. At the same time, federal programs and private investment are moving quickly to support new reactor deployment and strengthen domestic supply chains.

Pennsylvania enters this moment with a complete nuclear ecosystem. The commonwealth operates one of the largest nuclear fleets in the country. It supports a mature manufacturing base that already produces nuclear components. It anchors research and technical expertise through universities and federal infrastructure. The opportunity is to convert these assets into a coordinated system that can support deployment at scale. Timing is critical. Other states are advancing policies and projects that position them to capture manufacturing investment and future reactor development. This roadmap was developed to align stakeholders and support action before those opportunities are committed elsewhere.

## ► **Who is the audience for this roadmap?**

This roadmap is intended for participants across the nuclear ecosystem. It is designed for policymakers who shape the regulatory and economic environment. It is relevant to manufacturers that are evaluating entry into nuclear supply chains. It speaks to plant operators that sustain the existing fleet and may support future deployment. It applies to universities and research institutions that advance technology and train talent. It also provides context for communities that host nuclear facilities and will experience long-term economic impacts. Each of these groups plays a distinct role. Progress depends on how effectively those roles are aligned.

## ► **How should I read this roadmap?**

The roadmap is structured to reflect how nuclear development occurs in practice. It does not follow a single linear narrative because deployment depends on multiple systems moving together. Readers may begin with the Executive Summary([link opens in a new tab](#)) and Context([link opens in a new tab](#)) sections to understand Pennsylvania's position. The Important Dynamics and Considerations([link opens in a new tab](#)) section explain elements of how nuclear ecosystems function, including market structure, supply chain constraints, and financing considerations. The Policy Considerations([link opens in a new tab](#)) section considers tradeoffs and sequencing of policy mechanisms. The roadmap is intended to support decision-making rather than provide technical instruction.

## ► **What does Pennsylvania control given federal regulation and regional markets?**

Nuclear energy operates within a system shaped by federal regulation and regional electricity markets. Pennsylvania does not control reactor licensing or wholesale market pricing. Those responsibilities sit with federal agencies and regional grid operators.

Pennsylvania does have influence over key enabling conditions. State policy can support the continued operation of the existing fleet. It can improve coordination around siting and infrastructure. It can strengthen the industrial base and talent that support nuclear development. It can also help align stakeholders so that projects move more efficiently. The roadmap focuses on these areas of influence. Progress depends less on changing jurisdiction and more on improving coordination within the system that already exists.

## ► **How will progress be tracked?**

Progress will be evaluated based on observable movement across the system. This movement includes activity in supply chain readiness, progress in site activation, and alignment of infrastructure with development timelines. It also includes evidence of investment and expansion within Pennsylvania's industrial base. Team Pennsylvania will help maintain visibility into these areas by identifying where coordination is producing results and where additional alignment is needed. The goal is to track real progress in deployment conditions rather than rely only on static metrics.

## ► **Isn't nuclear too expensive and too slow to deploy?**

New nuclear projects require significant upfront capital and long development timelines. Those characteristics are real and must be managed. However, nuclear plants operate for decades and provide continuous power, which supports long-term economic stability and reduces exposure to fuel price volatility. Pennsylvania's position is different from states starting from scratch. The existing fleet, established supply chain, and available sites reduce some of the risks associated with early deployment. Over time, repeatable projects and stronger supply chains can improve cost and schedule performance.

## ► **What happens next?**

The next phase focuses on coordinated execution across several priorities. The starting point is the existing fleet. Sustaining and modernizing operating plants preserves technical expertise and maintains Pennsylvania's role in the national energy system. From there, attention shifts to strengthening the industrial base. Manufacturers that already serve defense and energy markets can expand into nuclear if qualification pathways are clear and demand signals are visible.

Site activation and infrastructure alignment follow. Development depends on interconnection capacity, transmission planning, and siting clarity. Without early coordination, these constraints can delay projects regardless of policy or financing. Over time, these steps support new deployment. As supply chains strengthen and infrastructure is prepared, Pennsylvania can position itself to support both reactor development and the broader nuclear lifecycle. Team Pennsylvania's role is to help align these efforts so that they move in sequence rather than in isolation.



**TEAMPA.COM**

**320 Market St. #600W Harrisburg Pennsylvania 17101**

