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# Introduction to New Nuclear:

## Overview of Advanced Nuclear Technologies, Market, Policies and Local Impacts

**Becca Gillespie**

*2/23/2026*

# Level Setting: Intro to New Nuclear

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- Intro to Nuclear Technology and Nuclear Taxonomy
- Nuclear Power: Pros and Cons
- Nuclear Operations: Supply Chain, Fuel, and Waste
- Nuclear Safety
- **History of Nuclear in Iowa**
- **State of the Market**
  - **Market Indicators**
  - **Federal Policy Indicators**
  - **Key Players, Key Projects**
- **Nuclear Power Economics and Risks**
- **Economic Impact**
- **Public Opinion, State Policy**

# History of Nuclear in Iowa

- Ames Laboratory at Iowa State developed high-purity Uranium for the Manhattan project, and the process and fuel for WWII
- Duane Arnold Power Plant, Linn County, IA
  - NextEra Energy Duane Arnold, LLC, a subsidiary of NextEra
  - 615 MW GE  BWR, type 4
  - Provided 1,500 Jobs during refueling and operations
  - Idled/Decommissioning in 2020, Slated to be reopened in 2028.
- Iowa State Nuclear Engineering Program Closed in 1996
- Other, Nearby Nuclear Power Plants
  - Quad Cities Power Plant, Cordova, IL
    - 1,870 MW BWR, 2-units, 742 Employees
    - Owned by Constellation and MidAmerican
  - Cooper Power Plant, Brownville, NE
    - 835 MW BWR, 27 Miles from Iowa border
  - Fort Calhoun, 500 MW PWR in Fort Calhoun, NE: began decommissioning in 2016
  - LaCrosse 50 BWR in Genoa, WI: decommissioned (closed in 1987)


*Source: Presentation. Mack, Ken, NextEra Energy. Duane Arnold Regulatory Path to Potential Restart (EPID L2025-LRM-0021). March 19, 2025.*

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# State of the Market

## Commercial and Policy Market Indicators

# Signals that the Nuclear Renaissance Underway

## Market Indicators

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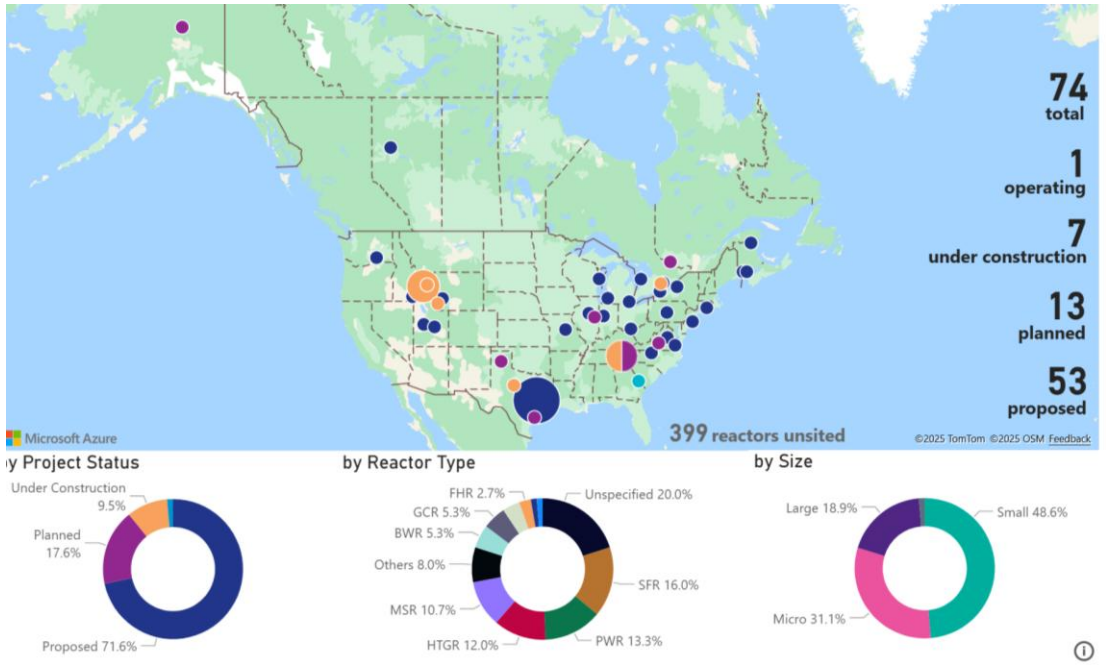
- Multiple projects underway with various technologies Notably: Kairos, X-Energy, GE Hitachi, Terra Power
- New nuclear reactor builds for early-of-a-kind or best-practices first-of-a-kind are projected to be cost-competitive at $73-148/MWh, including subsidies.
- One restart project nearly-completed and two underway: Palisades 800 MW plant in Michigan, Crane Energy Center (f.k.a. Three Mile Island Unit 1) 835 MW plant in Pennsylvania, Duane Arnold 600 MW plant in Iowa.
- Nuclear PPA's have been negotiated with data center off-takers at ~$77-110/MWh today.
- North American nuclear deal flow up to $25 Billion in 2024 compared to $1B in 2022.
- Increased interest from utilities; increased acceptance from the public

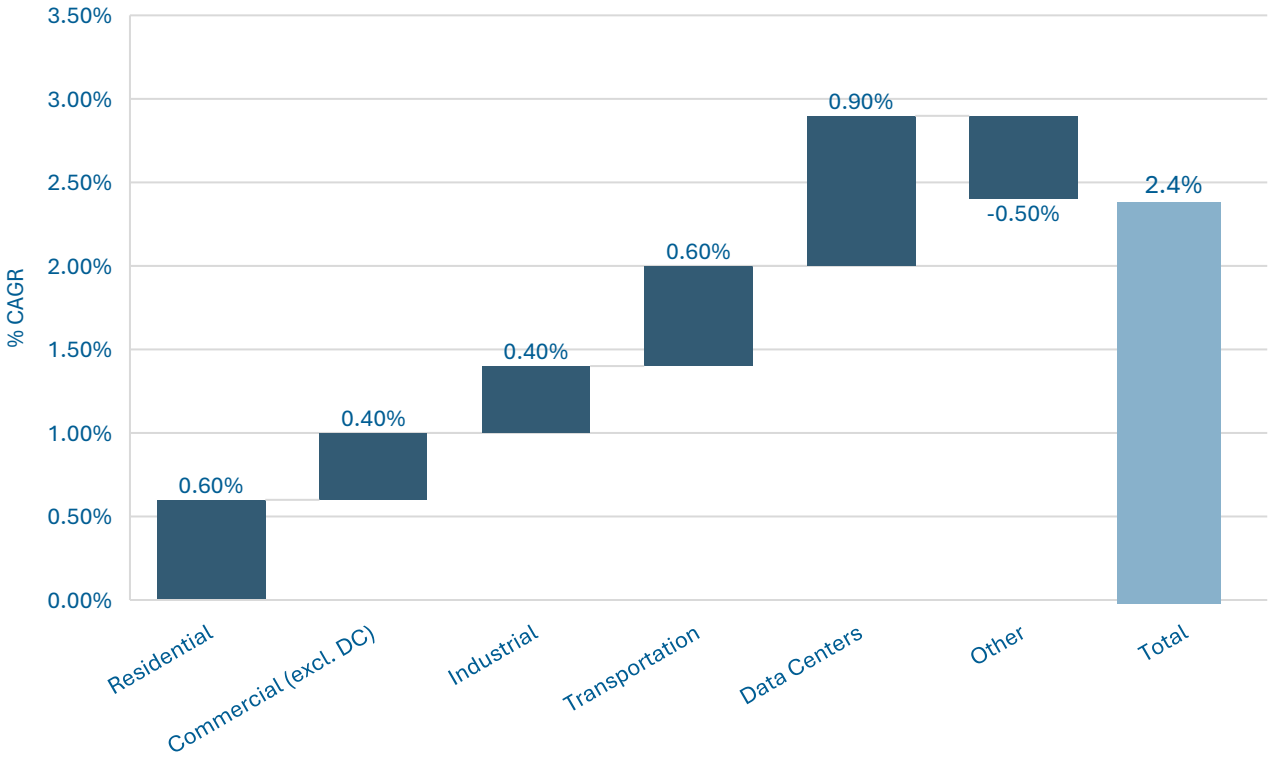
Market Indicator: 74 Projects Tracked by NEI




*Source: Nuclear Energy Institute. Project Dashboard. Accessed 17 Sept 2025*

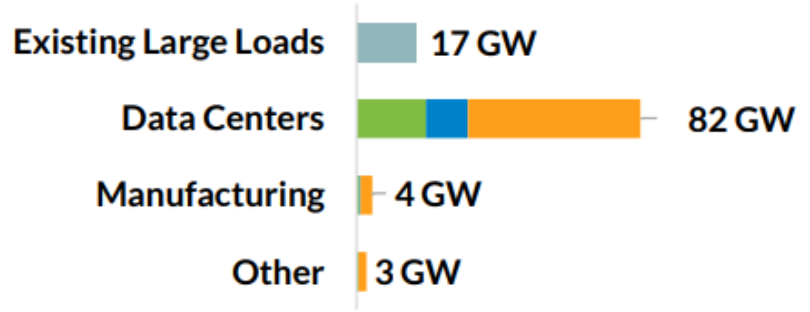
# Demand for Electricity is Rising Nationwide, Driving Prices Up

## Contributors to Load Growth




*Goldman Sachs Load Growth Report, 2024*

## 2044 System Large Load Composition by Confidence Level




- **Low Confidence:** Project has not been submitted through a MISO planning process; it may be reflected IRPs or remain at a conceptual stage
- **Medium Confidence:** Project has been submitted through a MISO planning process, or has been publicly announced, but construction has not yet begun
- **High Confidence:** Interconnection agreements are in place, regulators are aware, and project construction is underway.

*MISO. 2025 LTLF Pilot Survey Results Summary, 2025. Feb 12,2026*

# Increasing Market Penetration of Intermittent Renewables & Increasing Demand for Reliable Energy*

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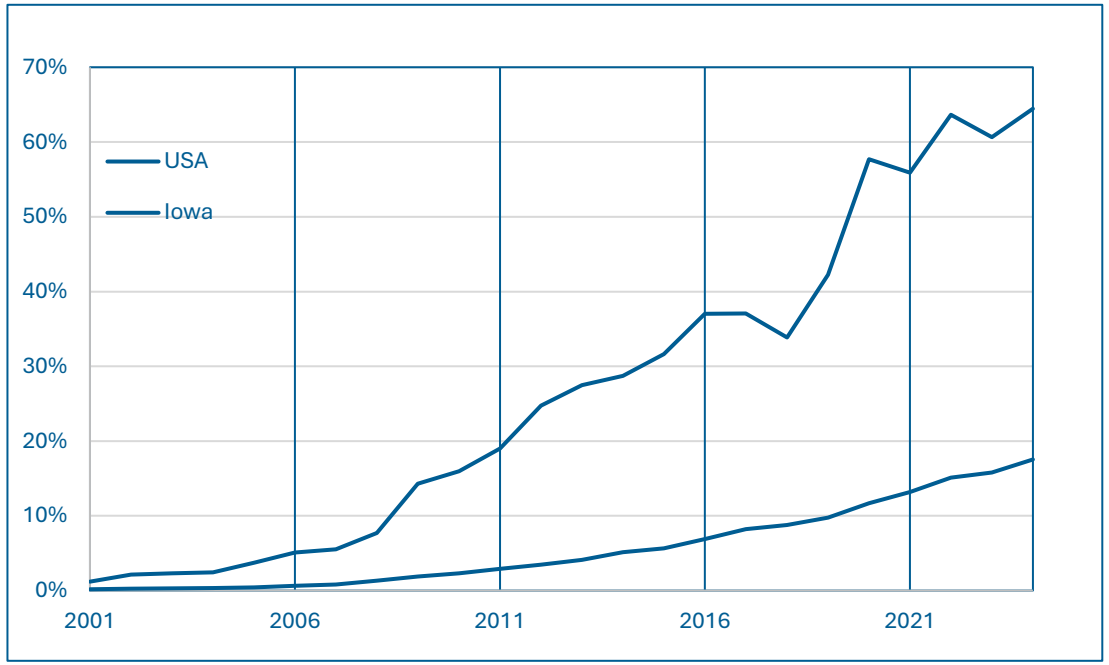
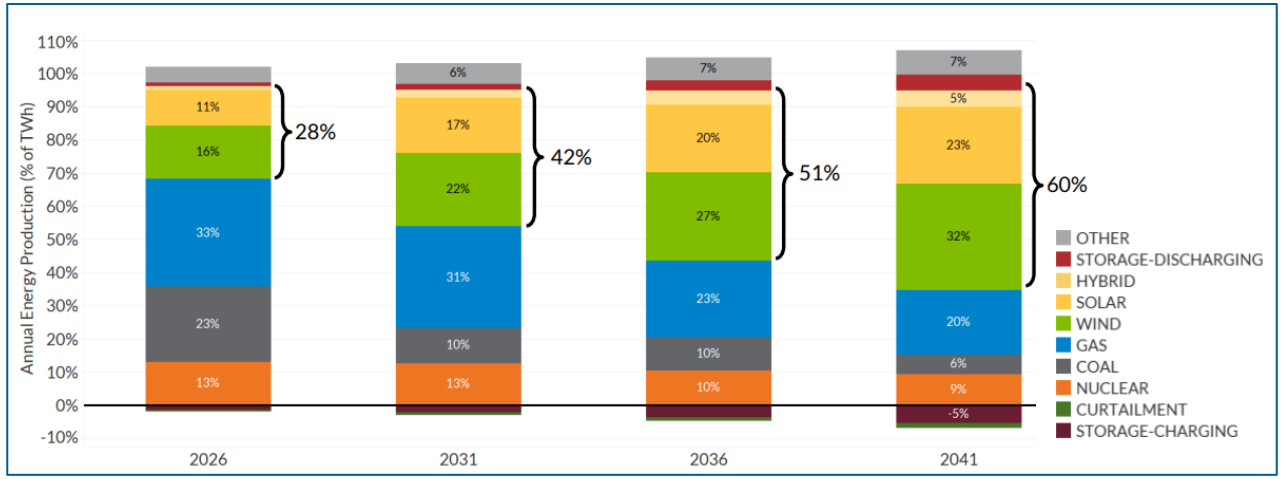
## Percentage of Generation from Wind and Solar




*Source: EIA Generation Data*

## MISO Historical and Projected Energy Production by Type

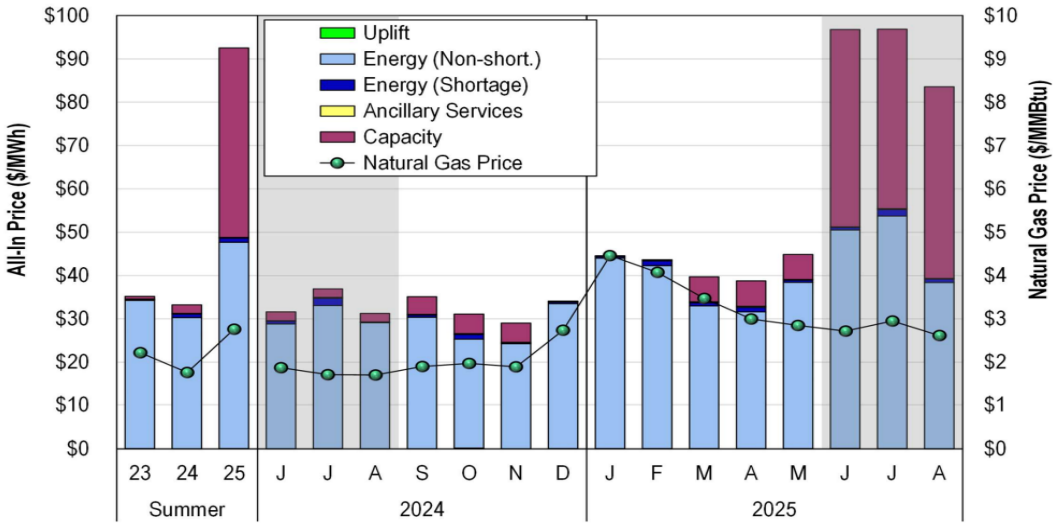



*Source: MISO 2025 Regional Resource Assessment*

# Effect of increased demand for reliable energy resources is an increase in capacity prices.

- Increased demand and resource retirements, along with recent changes to the prices setting process in MISO (reliability-based demand curve) are already tightening the market and raising prices, particularly capacity prices
- In coming years, new capacity accreditation methodology along with continued increases demand and resource retirements will continue to tighten the capacity market, keeping capacity prices high.
- High capacity prices contribute to high electricity prices but also to high valuation of resources with high capacity value, such as nuclear energy.

MISO all-in-price Summer 2023-2025




*MISO IMM Quarterly Report Summer 2025, Sept 16 2025, Potomac Economics*

# Signals that the Nuclear Renaissance is Underway:
## Government Indicators

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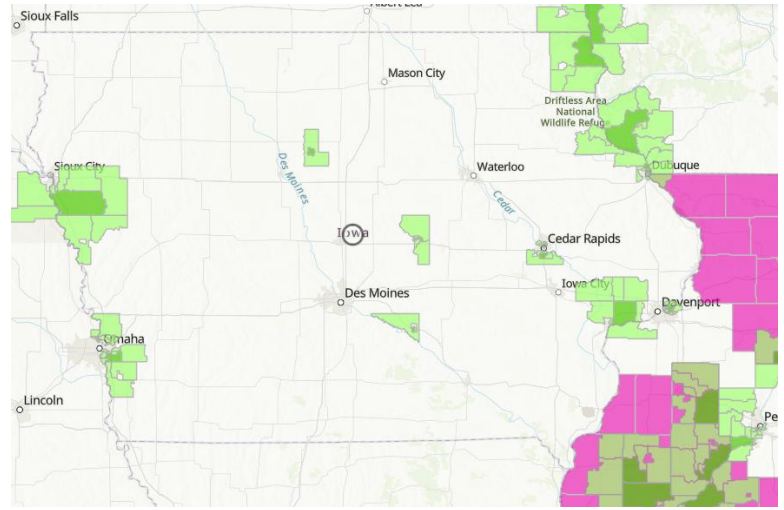
- Investment tax credits of 30-50% for construction started by 2033 persisted through OBBBA
  - 30% for following the basic rules of the program, now including FEOC limits
  - 10% adder for being in an energy community, see map
  - 10% adder for using > 55% domestic content
- Energy Dominance Fund (f.k.a. LPO) continues to issue loans (or loan guarantees) for nuclear projects and restarts.
  - Loan up to 80% of all project costs at the 10-year treasury bill rate, about 4.3% average in 2025.
- Four nuclear-friendly Executive Orders issued by Trump administration in May 2025. Three other Executive orders generally supporting nuclear energy Jan-Feb '25. Notably:
  - Target set: 400 GW of Nuclear Power Plants online by 2050
  - NRC regulation efficiency improvements and license timeline caps
- Various government programs to stimulate the industry
  - DOE is funding two Advanced Reactor Demo Projects (TerraPower, X-Energy) in since 2020
  - DOE established reactor pilot program and fuel line pilot program in 2025
  - DOE awarded $400 M each to TVA and Holtec for Gen III+ reactors in 2025
  - $80 Billion in funding announced for new AP-1000 projects in 2025
  - DOE announces $2.7 Billion toward Uranium Enrichment in 2026

ITC Energy Communities in Iowa




*Department of Energy. Energy Community Tax Credit Bonus Portal. Accessed 2/17/2026*

# New Nuclear, Key Technology Players and Projects

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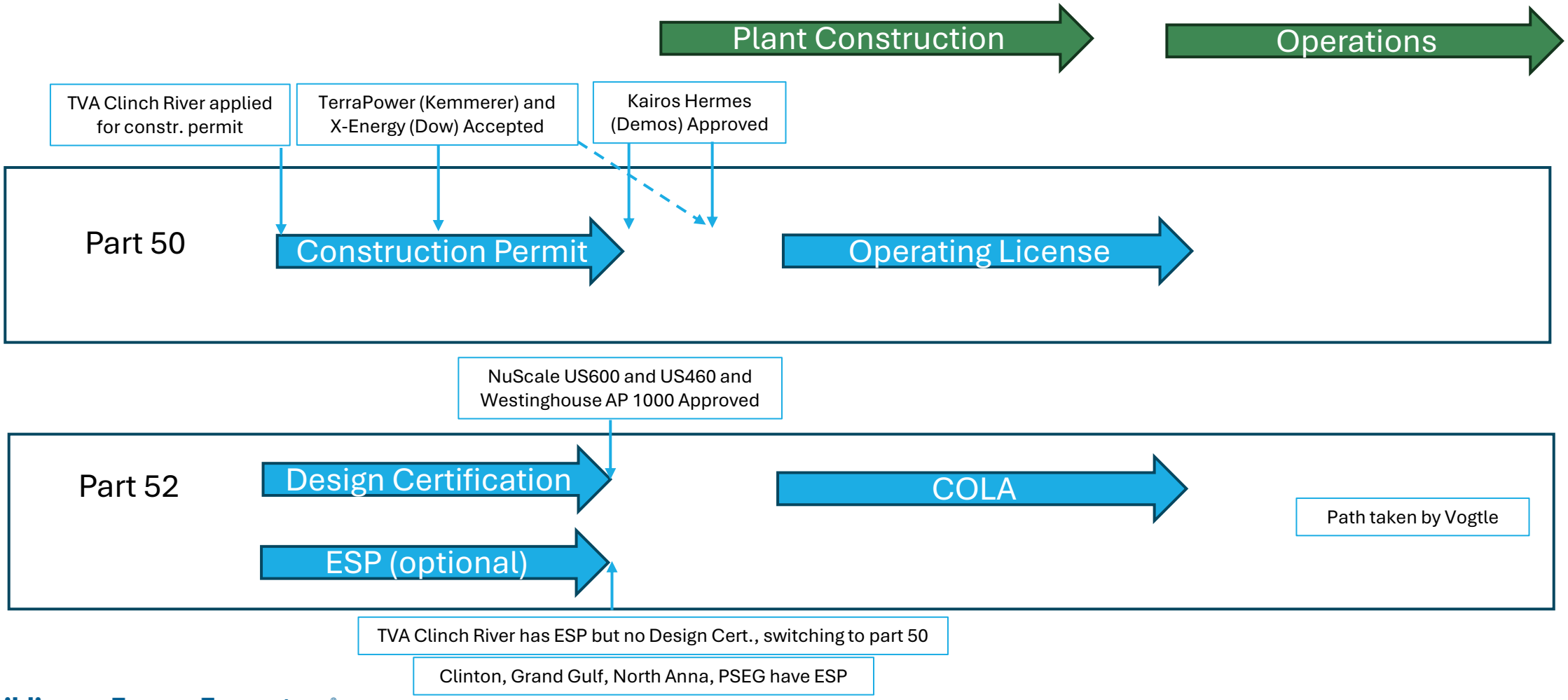
**Leading Gen III+ and Gen IV Technologies in USA & Canada**

| Generation & Type | Name | Power | Projects | Mod. | Cool. | Status |
|---|---|---|---|---|---|---|
| III+ PWR | Westinghouse AP 1000 | 1 GW | GA, SC | Light Water | | 2 MW In Operation |
| III+ PWR | Westinghouse AP 300 | 1 GW | TBD | Light Water | | Pre App for DL underway |
| III+ PWR | Holtec SMR 300 | 300 MW | MI | Light Water | | Planned for MI, DOE award |
| III+ BWR | GE Hitachi BWRX-300 | 300 MW | TN, NC, ON | Light Water | | ESP complete, DOE award |
| III+ PWR | Rolls Royce SMR | 470 MW | TBD (UK) | Light Water | | Pre App beginning soon |
| III+ PWR | NuScale Voygr | 77 MW+ | TVA | Light Water | | Design License issued |
| IV HTGR | X Energy XE-100 | 100 MW | TX | Graphite | Helium | DOE Demo Proj. (plan) |
| IV FHR | Kairos KP-FHR | 75 MW+ | TN, PNW | Graphite | Flouride | 2 Demos have CP |
| IV SFR | Terra Power Natrium | 345 MW | WY | Fast | Sodium | DOE Demo Proj. (plan) |

# Projects are Progressing, but most are still in Pre-Construction



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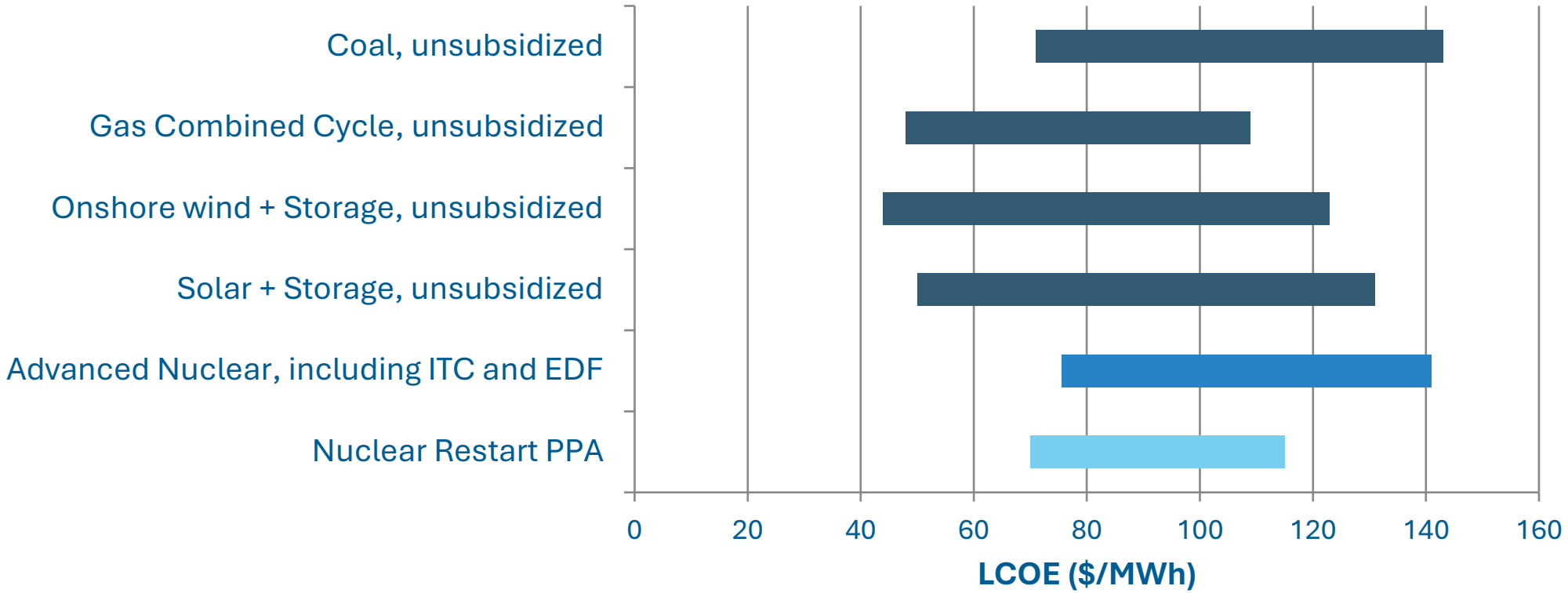
# Nuclear Power Economics and Risks

# Business Case appears compelling…

## LCOE of Nuclear and Other Reliable Generators




Source: ESN Analysis

# ...and yet, risk precludes commercial lending...

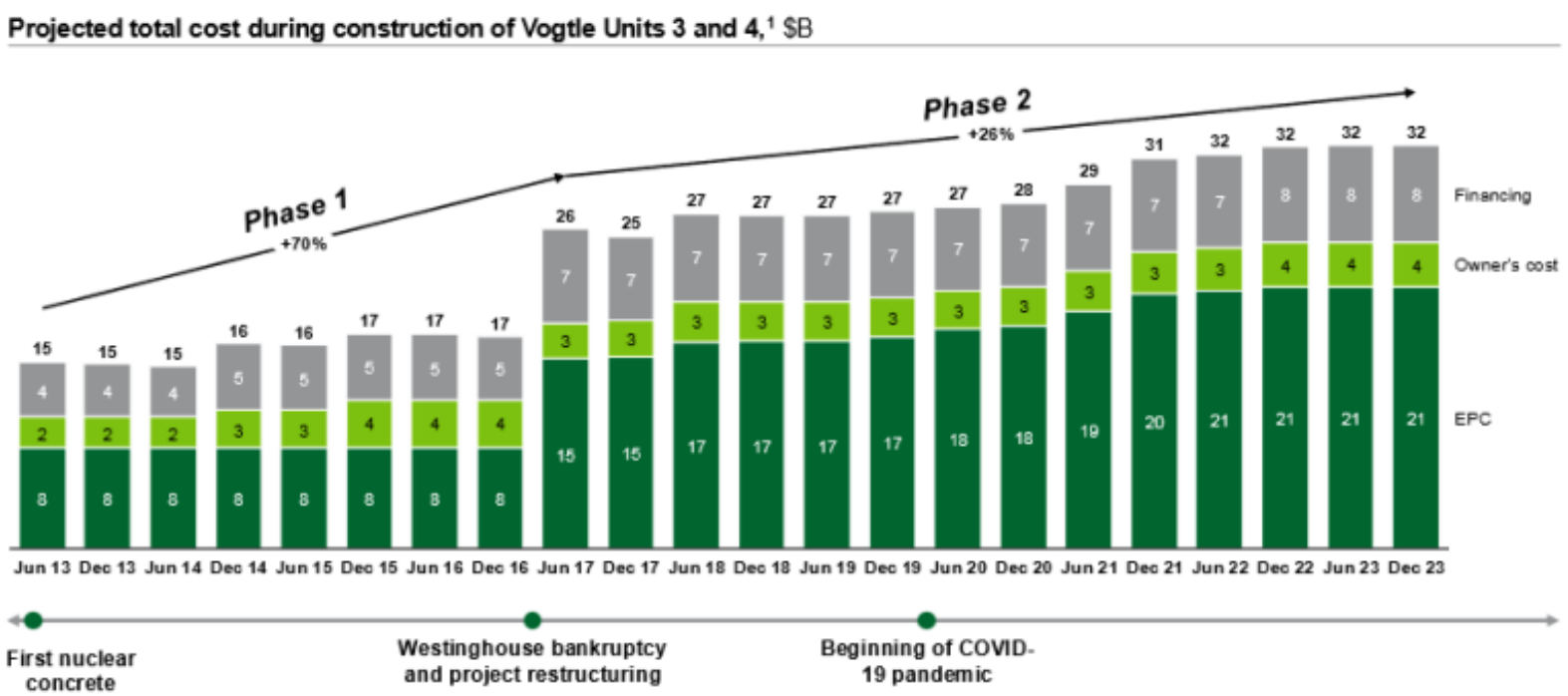
"...are there any nuclear projects that are investable for my mandate yet? And the answer was no, but hopefully soon....and that's kind of the key question."

Mark Sowinski, Morgan Stanley Sept 23, 2025

Big Banks are not relevant to this space at all from a lending point of view. The regulatory lending requirements do not allow for project lending especially in this country... So in the end it's the structured private debt markets that would step in above and beyond the LPO, or in place of.

James Shaefer, Gugenheim Securities Sept 24, 2025

# FOAK cost risks, as demonstrated by Vogtle




1. These figures are an estimate of total project cost based on a scaled-up view of Georgia Power's 45.7% share of the project, this means of estimation is inexact due to the differing Financing and Owner's costs between stakeholders. Project costs that are excluded from the VCM reports include: (i) budgeted cost contingency that has not been allocated; (ii) additional cost contingency budgeted by certain other owners (iii) nuclear fuel costs (and related financing costs); and (iv) certain monitoring costs, some of which are owner-specific. Source: Georgia Public Services Commission's Vogtle Construction Monitoring Reports (VCM)

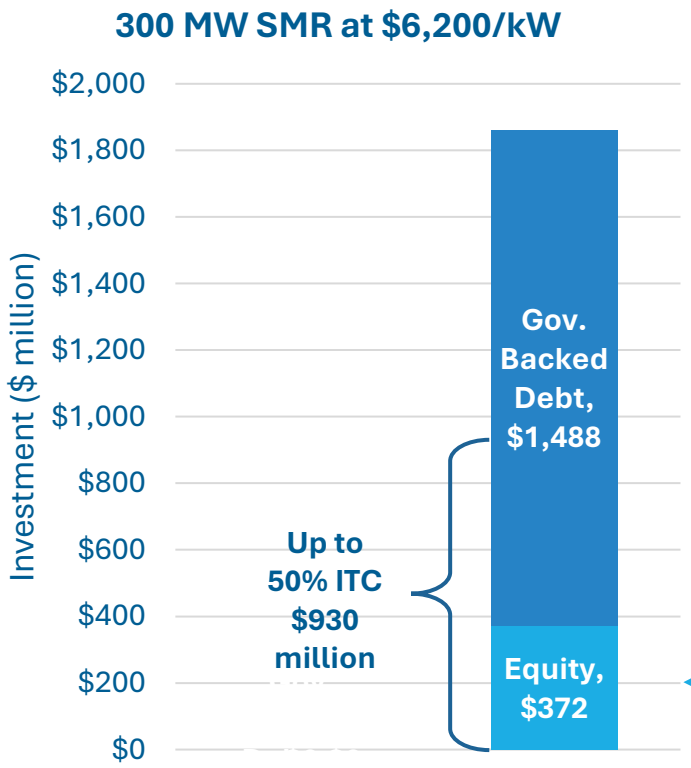
Figure 39. Vogtle Units 3&4 Cost Estimates in $billion throughout the Project Lifetime [176]



U.S.DOE.Sept. 2024. Pathways to Commercial Liftoff: Advanced Nuclear Accessed Feb. 20, 2026

# ...Therefore:

- Projects must leverage government support and partner creatively




**Owners may be led by:**

- Traditional Utility
- Large Publicly traded developer
- Start-up developer (PE or VC backed exist now)
- Consortium of multiple entities

**Minority shareholders may include:**

- Strategic Investors
- EPC partner
- Off-taker
- Technology Developer

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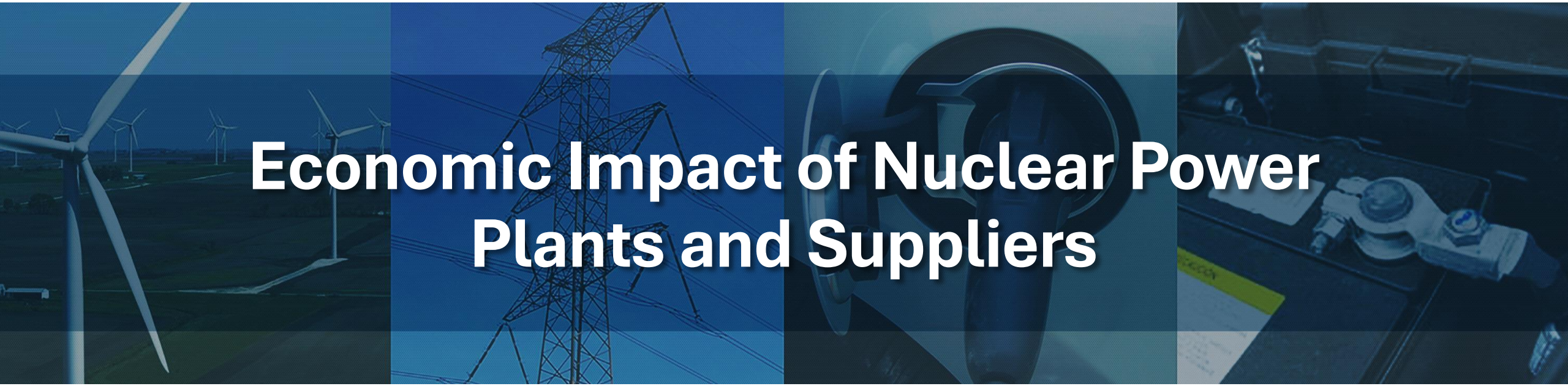

# Economic Impact of Nuclear Power Plants and Suppliers

# Economic Impact, Nuclear Power Plant: Operations

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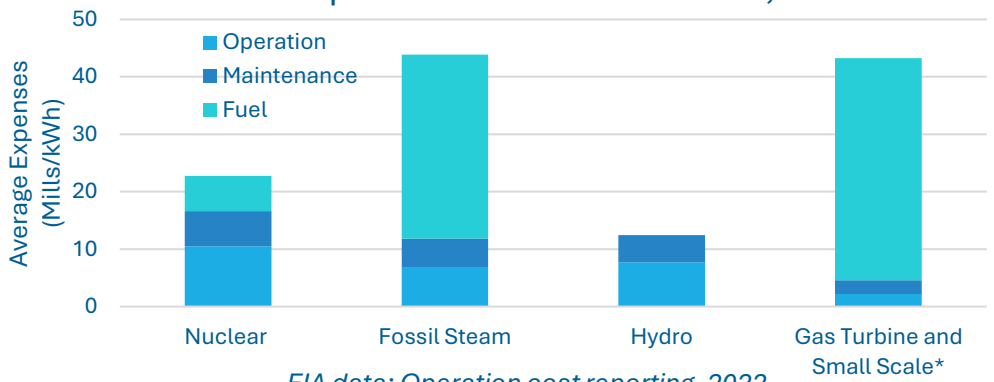
- Operations
  - Nuclear Power Plants typically have twice the jobs of a similarly sized coal plant
  - Existing plants have ~0.6 employees per MW
  - Idaho national labs published a guidebook sharing the direct, indirect and induced effects of various sized nuclear power plants
  - Relative to fossil plants, labor and parts are key inputs to nuclear whereas fuel is the key input to fossil plants
  - For Iowa, a non coal and non-gas producing state, that money is leaving the state economy.

NPP Annual Economic Impact for Communities of 200,000+

| | | Employment (jobs) | Labor Income ($ Millions) | Value Added ($ Millions) | Total Output ($ Millions) |
|---|---|---|---|---|---|
| 300 MWe plant | Direct Effect | 100 | $16.1 | $53.5 | $136.7 |
| | Indirect Effect | 161 | $15.3 | $30.9 | $60.0 |
| | Induced | 91 | $5.1 | $9.2 | $15.8 |
| | **Total** | **352** | **$36.5** | **$93.7** | **$212.5** |
| 500 MWe Plant | Direct Effect | 140 | $22.6 | $84.9 | $227.8 |
| | Indirect Effect | 269 | $25.5 | $51.6 | $100.0 |
| | Induced | 139 | $7.9 | $14.1 | $24.2 |
| | **Total** | **548** | **$55.9** | **$150.6** | **$352.0** |

*J. Hansen, W. Jenson, B. Dixon, L. Larsen, N. Gualta, N. Stauff, K. Bigel, F. Omitaomu, M. Allen-Dumas and R. Belles, "Stakeholder Guidebook for Coal-to-Nuclear Conversions," U.S. Department of Energy, 2024*

NPP Operational Cost Breakdown, 2022




*EIA data: Operation cost reporting, 2022*

# Economic Impact, Nuclear Power Plant: Construction

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- Construction
  - Construction typically estimated at 4 years for SMR's, and 6+ years for GW-scale reactors.
  - Estimates of 1600-2000 people on site during construction.
  - At least ~30% of construction is on-site; Idaho study estimated 57% of construction costs would be spent in Idaho.

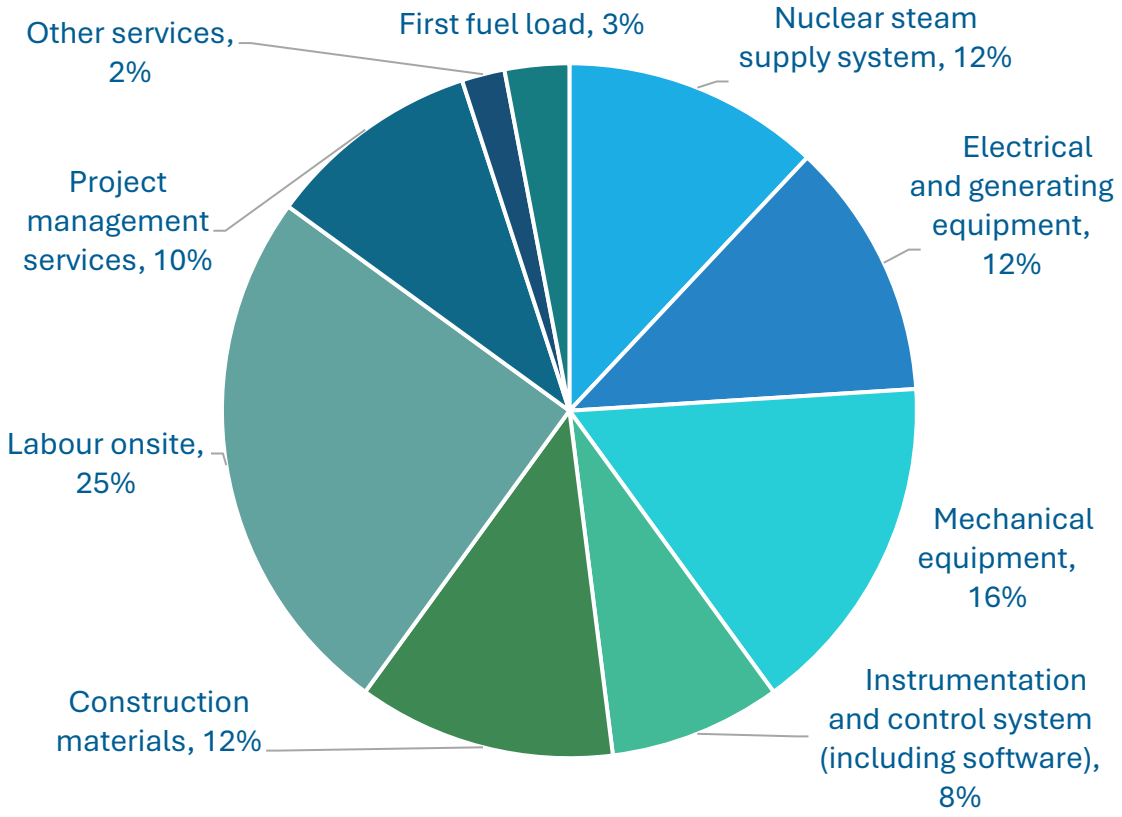
Cost of NuScale UAMPS, and amounts to be spent in Idaho

| Cost Category Description | NuScale SMR Cost ($ Millions) | Expenditures Sourced or Originating within Idaho |
|---|---|---|
| **Capitalized Direct Costs** | $1,806 | $745 |
| Structures and Improvements | $612 | $422 |
| Reactor Plant Equipment | $869 | $235 |
| Turbine Plant equipment | $196 | $53 |
| Electric Plant equipment | $35 | $9 |
| Heat Rejection System | $63 | $17 |
| Misc Plant Equipment | $30 | $8 |
| **Capitalized Indirect Costs** | | |
| Design Services at Home office | $131 | $0 |
| Field Construction Management | $61 | $61 |
| Field Construction Supervision | $247 | $247 |
| Field Indirect Costs | $225 | $225 |
| Owners Costs | $0 | $131 |
| **Total** | **$2,469** | **$1,408** |

*G. Black and S. Peterson, "Economic Impact Report: Construction and Operation of a Small Modular Reactor Electric Power Generation Facility at Idaho National Laboratory Site, Butte County," Idaho Policy Institute, Boise State University, 2019.*

# Economic Impact, Nuclear Power Plant: Supply Chain

- World Nuclear Association estimates that the Nuclear steam supply system, including the reactor, is 12% of the total costs.
- EPRI: "…the direct cost of the nuclear island was found to be less than 20% of all direct costs (i.e., 80% of on-site labor, on-site materials, and offsite manufacturing are for components in the balance of plant). Therefore, the perception that only the NSSS reactor hardware cost that must come down to make nuclear competitive, is not correct; significant savings should also be pursued in the balance of plant."

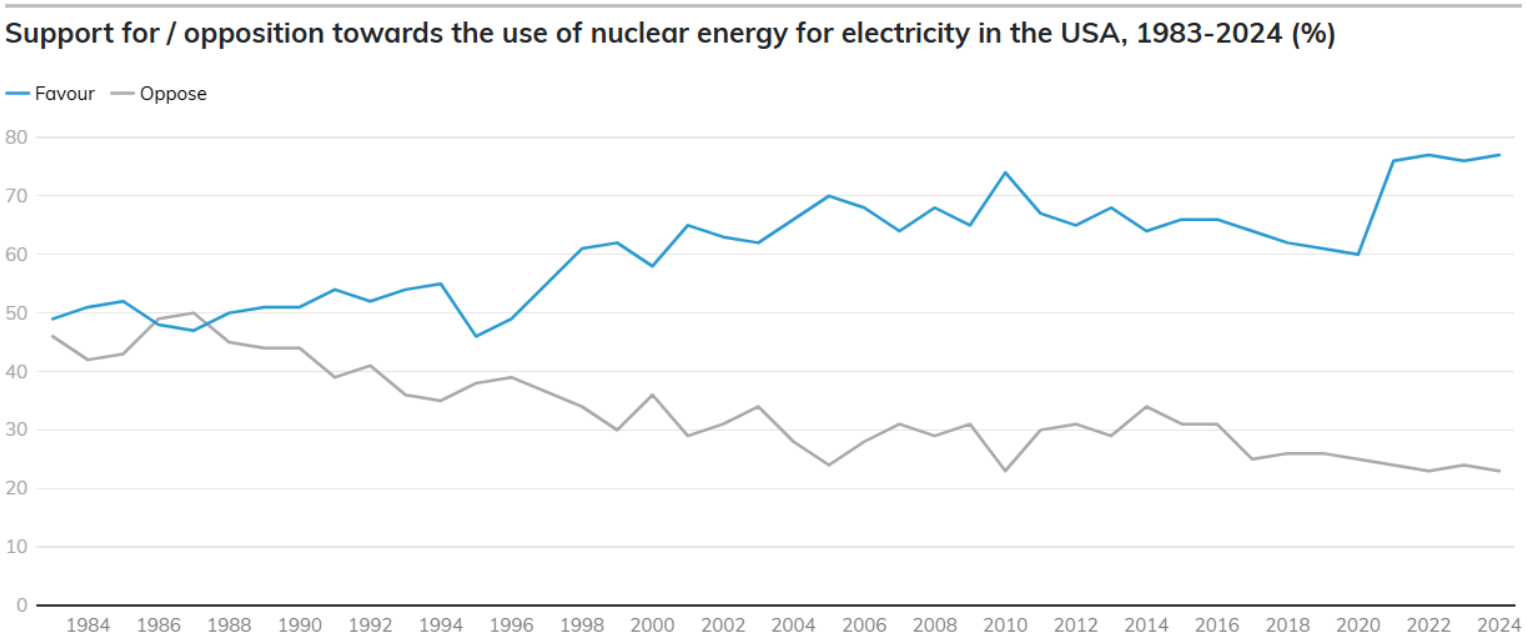



(1) https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power

(2) https://www.epri.com/research/products/000000003002015935 Advanced Nuclear Technology: Economic-Based Research and Development Roadmap for Nuclear Power Plant Construction. EPRI. June 2019

# Rising Public Opinion of Nuclear Energy

- Rising public sentiment towards nuclear energy across the USA
- 91% of nuclear power plant neighbors (residents within a 10 mile radius of nuclear power plant) have a favorable opinion of the plant nearest to them.
- 88% of neighbors support nuclear energy generally, compared with 77% of general public (2022).




Question asked: Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear energy as one of the ways to provide electricity in the United States?

*Source: Bisconti Research, Visualization: World Nuclear Association*

# State Policy Benchmarking
## High-Level Overview

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### Development Stimulus

- Kentucky: $30 M total
- Texas Nuclear Energy Program Fund: $350 M to plan, assess and launch projects
- Wyoming Energy Matching Fund: $155 M
- Tennessee: $136 M among various funds
- Nebraska: $1M

### Utility Justification

- Missouri, Virginia, and Indiana: Allows rate recovery for early development efforts
- Colorado and Utah: classify nuclear among clean energy resources, required by law.

### Permitting Certainty

- IL, WV, CT, MT, KY, WI lifted moratoria in 2020's.
- NYPA RFI solicits communities and counties to indicate interest in nuclear.
- Indiana Creates Energy Production Zones