Prospects of Advanced Nuclear Technology Deployment

in the United States

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C3 SOLUTIONS

Bipartisan & Public Support for Nuclear Energy

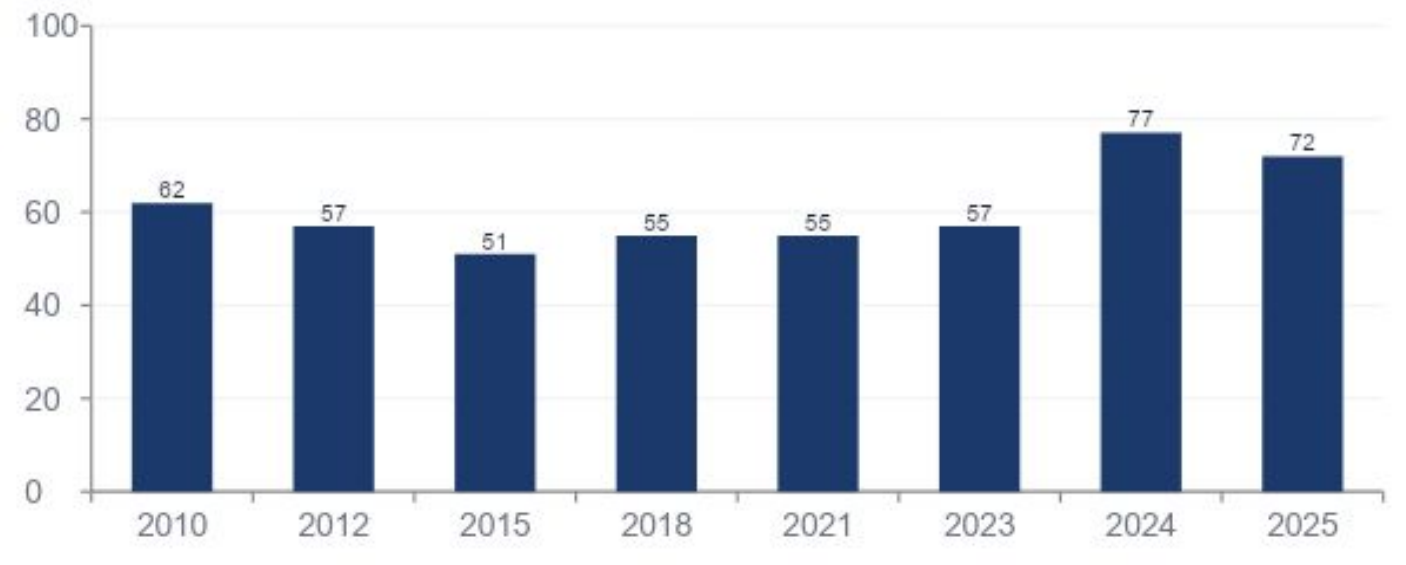
Nuclear Energy Innovation & Modernization Act (NEIMA)

- Signed into law by President Trump January 2019
- Directed NRC to develop new licensing framework for advanced reactors
- Required NRC to reduce licensing fees and application review times
- Set stage for Part 53 rulemaking finalized in 2026

ADVANCE Act (2024)

- Signed into law by President Biden July 2024
- Senate passed 88–2; House passed 393–14
- Reduces licensing fees & accelerates NRC reviews for advanced reactors
- Supports HALEU supply chain & international cooperation

Public Support at Historic Highs



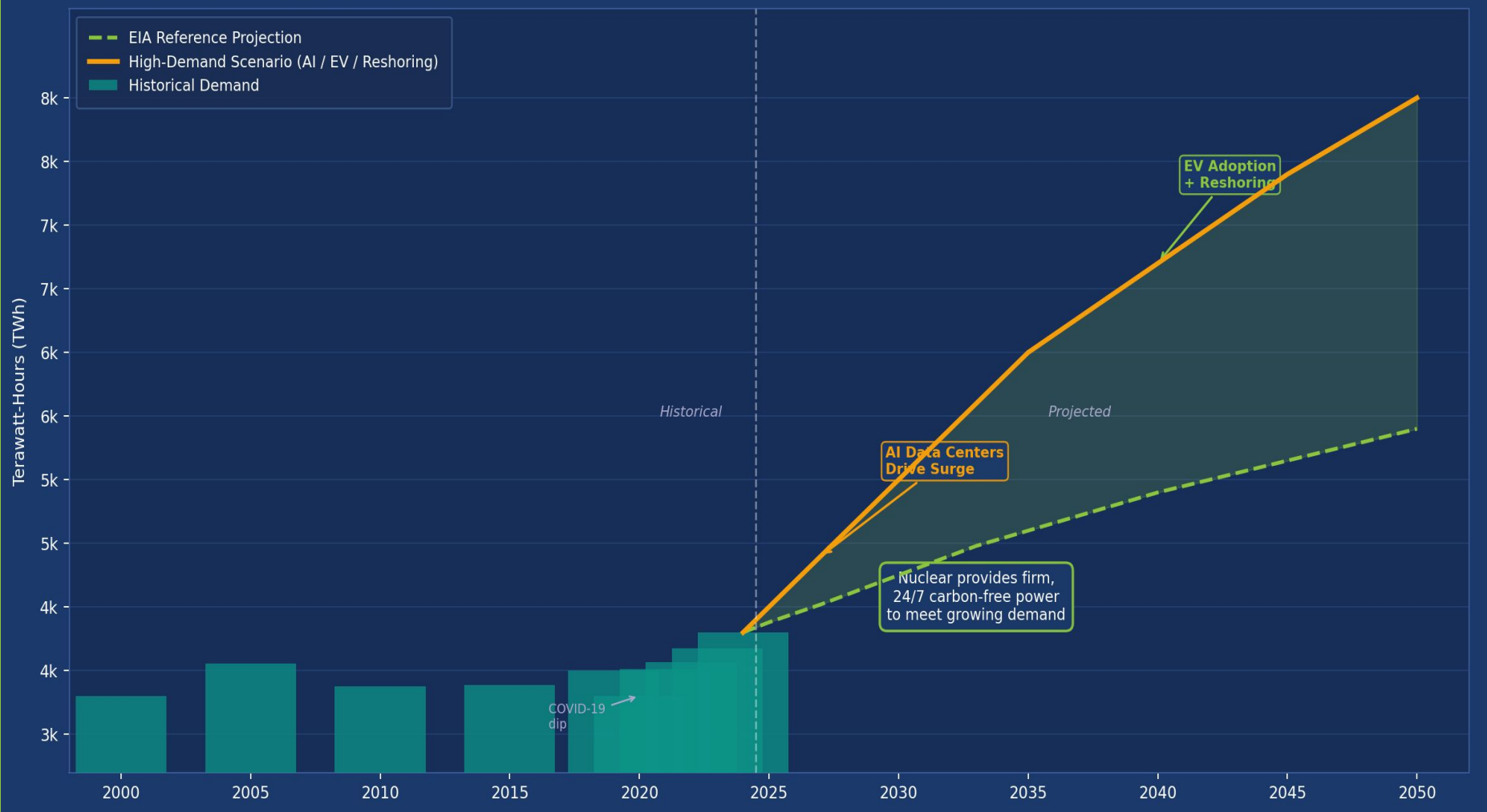
77%
Bisconti 2024
(All-Time High)

61%
Gallup 2025
(Near Record High)

87%
Support License
Renewals (2025)

Sources: Bisconti Research 2024; Gallup 2025; Nuclear Energy Innovation & Modernization Act (2019); ADVANCE Act (P.L. 118-67, 2024)

Rising U.S. Electricity Demand: The Nuclear Opportunity



500 GW+

Additional US power demand by 2040 (est.)

3×

Data center electricity growth by 2030

35%+

Share requiring firm, 24/7 baseload power

🤖 AI Data Centers | ⚡ Electrification | 🏭 Re-shoring | 🌡️ Robust Economic Growth

Sources: EPRI (2023); Goldman Sachs Global Investment Research (2024); Lawrence Berkeley National Lab (2024); McKinsey & Company (2024)

Private Sector Demand: Big Tech Bets on Nuclear

Microsoft

Three Mile Island Restart (Crane Clean Energy Center)

20-yr PPA with Constellation Energy. TMI Unit 1 restarted Sept 2024 — first U.S. nuclear restart. ~835 MW carbon-free power to Microsoft data centers.

Additional Nuclear Sourcing

Carbon-negative by 2030 commitment. Nuclear central to clean energy strategy, plus PPA with fusion startup Helion Energy.

Google

Kairos Power PPA — up to 500 MW

Oct 2023: First-ever corporate advanced nuclear PPA. Kairos fluoride salt reactor fleet scaling to 500 MW by 2035.

Nuclear as Grid Anchor

24/7 carbon-free power required for AI compute. 25-yr Duane Arnold PPA (600 MW) + 200 MW fusion deal with Commonwealth Fusion.

amazon

$500M Investment in X-energy + Energy Northwest Deal

Oct 2024: $500M into X-energy + Energy Northwest Xe-100 SMR deal — targeting 5 GW of advanced nuclear by 2039.

Talen Energy — Data Center Nuclear PPA

Direct nuclear co-location at Talen Energy's Susquehanna plant, PA — first data campus co-located with an operating nuclear plant.

Meta

6.6 GW in Nuclear Deals — Jan. 9, 2026

Vistra (2,609 MW, existing plants) + TerraPower Natrium (2.79 GW, 2032–35) + Oklo Aurora (1.2 GW, Pike County OH, ~2030).

Largest Corporate Nuclear Procurement in U.S. History

Largest corporate nuclear procurement in U.S. history — spanning existing plants and next-gen advanced reactors.

Sources: Constellation Energy press release (Sept. 2024); Google blog (Oct. 2023); Amazon press release (Oct. 2024); Meta announcement (Jan. 9, 2026); Commonwealth Fusion Systems

Advanced Nuclear: A Growing U.S. Industry Landscape

Sources: NRC Reactor Status Reports; DOE Office of Nuclear Energy; company press releases; Breakthrough Institute NRC Rulemaking Tracker

DOE: Programs, Investments & Partnerships

💰 Energy Dominance Financing Program (formerly LPO)

$26.5B to Southern Company (GA Power + AL Power) — DOE's largest-ever loan. Covers 6 GW in nuclear uprates/renewals, new gas & grid. Palisades: $1.52B; Susquehanna: $1B.

⚗️ HALEU Availability & Fuel Line Pilot Program

$700M HALEU supply chain. Fuel Line Pilot (EO 14299): Oklo, Terrestrial Energy, TRISO-X & Valar Atomics selected. Goal: 21 MT by June 2026 — ending foreign fuel dependence.

🔬 Gen III+ SMR Program

March 2025: $900M solicitation for Gen III+ SMRs. Targets first U.S. SMRs by early 2030s. Supports NuScale, GE Hitachi, Holtec & others.

⚛️ DOE Reactor Pilot Program

EO 14301: 11 companies aiming for 3 reactor criticalities by July 4, 2026. Industry-funded; DOE provides authorization pathway outside national labs.

🌍 Westinghouse-Cameco-Brookfield Deal

Oct. 2025: U.S.-brokered deal with Cameco & Brookfield to accelerate Westinghouse reactor deployment at home and abroad.

⚡ Executive Orders (May 2025)

May 23, 2025: 4 EOs — 400 GW nuclear by 2050, reactors on federal lands, streamlined NEPA reviews, NRC overhaul (EO 14300).

🤖 Genesis Mission & DOE National Labs

Genesis Mission uses AI to double U.S. scientific productivity within a decade — nuclear is a core focus. INL leads RD&D and hosts NRIC.

Sources: DOE LPO announcement (2025); DOE HALEU solicitation; EO 14299 (Fuel Line Pilot); DOE press releases; DOE Genesis Mission announcement

Opportunities for General Permitting Reform

1

NEPA Streamlining

Reform NEPA regs by June 2025. Expand categorical exclusions for nuclear permits on federal lands. Eliminate duplicative reviews.

2

Nuclear Reactors on Federal Lands

Reactors authorized on DoD bases, national labs & federal properties — bypasses state zoning. Army targeting microreactors at U.S. bases by 2028.

3

NRC Licensing Timeframes

Part 53 (eff. Apr 29, 2026) fast-tracks advanced reactor licensing. ADVANCE Act cuts fees. Target: 18–24 month reviews (down from 42 months).

4

Siting & Interconnection Reform

Grid interconnection queues stretch 4+ years. Priority opportunity: co-locate nuclear at retiring fossil fuel sites with existing grid connections.

Key Permitting Reform Opportunities

Brownfield Siting Priority

Reactors replacing retired coal/gas plants — existing grid, water, and workforce already in place.

State-Federal Permitting Compacts

States opt into expedited federal review in exchange for streamlined state-level approvals.

Design Certification Pre-Approval

Pre-certified SMR designs eliminate site-by-site NRC reviews — modeled after AP1000 precedent.

One-Stop Shop Agency

Single federal coordinator across NRC, DOE, EPA & Army Corps to prevent inter-agency delays.

Digital I&C Fast Track

Update outdated analog I&C standards — a major bottleneck for modern reactor designs.

Sources: ADVANCE Act (2024); EO on federal lands (2025); NRC Part 53 final rule (2026); NEPA regulations; FERC interconnection queue data

NRC Regulatory Reform: Unlocking the Next Generation of Reactors

EO 14300 (May 2025): NRC's framework was built for 1950s-70s light-water reactors — 25 rulemakings now modernize it for advanced & micro reactors.

Proposed rules: Mar–Jul 2026 | Final rules: Jul–Nov 2026

FINAL

Streamlining Contested Adjudications in Licensing

Proposed 3/3/26; Final 7/10/26 — Strict 18-mo/25-mo licensing deadlines; narrows frivolous contentions; blocks pro se delay.

PROPOSED

NEPA Implementation Reform

Proposed 4/9/26; Final 11/23/26 — Categorical exclusions for repeat designs; 3–5 yr EIS shrinks to 12–24 months.

PROPOSED

Foreign Ownership (FOCD) Exceptions for Allied Nations

Proposed 4/10/26 — Safe harbors for allied-nation capital (Japan, France, S. Korea); threshold exemptions for minority ownership.

PROPOSED

NRC Recognition of DOE/DoD Legacy Reactor Designs

Proposed 4/9/26; Final 10/30/26 — Leverages DOE reviews for TerraPower, X-energy, Kairos; cuts months from licensing.

UPCOMING

Rescission of Duplicative ACRS Review Requirements

Direct Final 7/24/26 — Eliminates 6–12 months of duplicative ACRS review for repeat certified designs.

FINAL

Sunset Rule

Jan 2026 — Obsolete NRC rules automatically expire; ends accumulation of cost-adding regulations.

PROPOSED

Requirements for Microreactors (≤50 MWe)

Proposed 4/17/26 — Right-sized licensing for ≤50 MWe: smaller EPZs, factory pathways, risk-calibrated burden.

PROPOSED

Regulatory Enhancements: Licensing, Decommissioning & Oversight

Proposed 6/9/26 — Risk-informed approaches, streamlined decommissioning timelines, safety-focused inspection regime.

PROPOSED

Modernizing Physical Security Requirements

Proposed 5/18/26; Final 11/23/26 — Graded Part 73 security: armed response and cybersecurity scaled to actual reactor risk.

UPCOMING

Modernizing the Radiation Protection Framework (LNT/ALARA)

Proposed 6/3/26; Final 11/23/26 — Challenges LNT model; raises public dose limit 100→500 mrem/yr; restructures ALARA.

Sources: EO 14300 (May 2025); Breakthrough Institute NRC Rulemaking Tracker; Federal Register (2026); NRC proposed and final rules

Opportunities for Spent Nuclear Fuel Management

95,000

Metric Tons of Spent Nuclear Fuel in the U.S.

Stored safely across 79 sites in 33 states

No permanent repository since Yucca Mountain stalled

Growing ~2,000 metric tons/year

U.S. has world's largest spent fuel stockpile

Consolidated Interim Storage (CIS)

Two CIS facilities in TX and NM move fuel from at-risk sites to centralized dry-cask storage — the near-term solution while permanent disposal is resolved.

Permanent Repository Progress

Revive Yucca Mountain OR pursue consent-based siting. DOE's Nuclear Waste Fund holds $40B+ from industry fees. Congress must act to unlock a path forward.

Advanced Fuel Recycling

France-style closed cycles reuse 96% of spent fuel as new reactor fuel. DOE ARPA-E funds reprocessing R&D. Dramatically cuts waste volume and radiotoxicity.

Spent Fuel as Advanced Reactor Fuel

TerraPower Natrium and other Gen IV designs use spent fuel directly — converting the U.S.'s largest liability into an energy asset.

Market-Based Management: Transitioning to a Waste Producer Pays Model

Require waste producers to pay full lifecycle costs. Direct access to the $40B+ Nuclear Waste Fund aligns incentives without taxpayer exposure.

Sources: NRC (2025; DOE Nuclear Waste Fund Annual Report; Blue Ribbon Commission on America's Nuclear Future (2012); Congressional Budget Office

U.S. Nuclear Engagement: Global Opportunities

Russia dominates global reactor exports; China is building out rapidly at home and abroad. The U.S. must compete — or cede nuclear market share and geopolitical influence.

Export Tools and Cooperation

Building on Comparative Advantages

Innovation, capital, construction experience, uranium deposits, enrichment capacity, & heavy component construction.

123 Agreements

EO: State Dept. to pursue 20+ '123 Agreements' by 2029 — civil nuclear treaties unlocking U.S. reactor and fuel exports.

EXIM Bank & USTDA

Competitive financing to rival Russia's state-backed deals. $3B in Letters of Interest for Poland & Romania, and feasibility and project development in Ukraine & Indonesia.

Int'l Nuclear Energy Act (2025)

Nuclear Export Working Group with 10-year strategy for LWRs, advanced reactors, fuel, and materials.

Key Partner Countries, Opportunities & Leveraging Capabilities

🇵🇱 Poland

6 AP1000 reactors ($40B+). EXIM & USTDA financing. First unit target: 2033.

🇷🇴 Romania

Cernavodă expansion (2 units). US-backed NATO ally countering Rosatom.

🇺🇦 Ukraine

USTDA support for post-war reconstruction. Cutting Russian fuel dependency.

🇮🇩 Indonesia

USTDA feasibility underway. First nuclear in SE Asia — sets regional precedent.

🇬🇧 United Kingdom

Refreshed NRC-ONR MOU (2024). Joint streamlining of advanced reactor licensing.

🇯🇵 Japan

Restarting fleet post-Fukushima. Partner on SMR R&D and countering Russian/Chinese exports.

🇰🇷 South Korea

MOU on nuclear export cooperation (2024). Potential joint deployment in third countries.

🇨🇦 Canada

3rd-largest uranium producer. CANDU fleet + advanced SMR programs. Key partner on fuel supply security.

Sources: State Dept. 123 Agreements; EXIM Bank (2025); Int'l Nuclear Energy Act (2025); DOE Office of Nuclear Energy; company press releases

C3 SOLUTIONS

Thank You

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