# Advanced Nuclear Energy

North Dakota House Energy & Natural Resources Committees

Chairman Todd Porter & Members of the Committee

March 2, 2023

NUCLEAR ENERGY INSTITUTE

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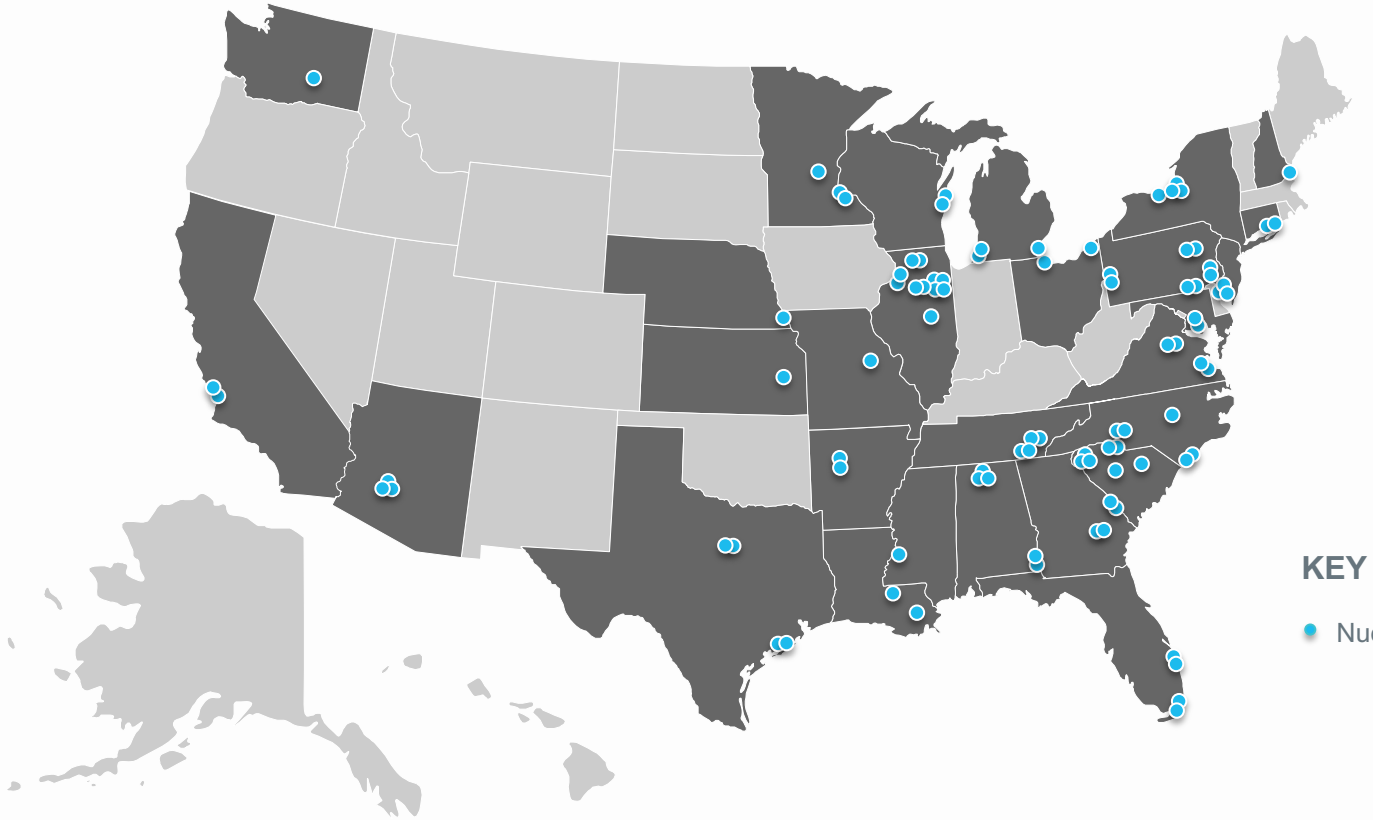
# Nuclear Provided Over 50% of Emissions-Free Electricity



Nuclear generated 19% of electricity in the U.S.

From 92 reactors at 53 plant sites across the country

**KEY**

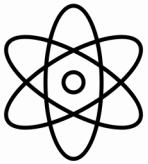
- Nuclear power reactor

Updated: May 2022 for the Year 2021

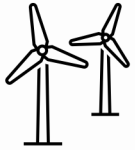
 

# Lowest System Cost Achieved by Enabling Large Scale New Nuclear Deployment

## Lowest Cost System

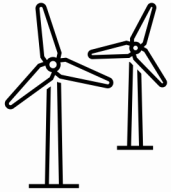


Nuclear is 43% of generation (>300 GW of new nuclear)

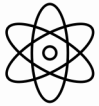


Wind and solar are 50%

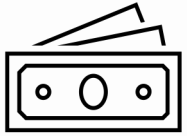
## Energy System with Nuclear Constrained



Wind and Solar are 77% of generation



Nuclear is 13% (>60 GW of new nuclear)



Increased cost to customers of $449 Billion

Both scenarios are successful in reducing electricity grid GHG emissions by over 95% by 2050 and reducing the economy-wide GHG emissions by over 60%

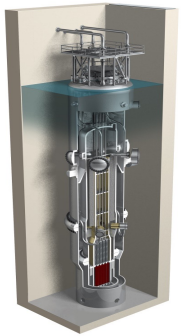
Source: Vibrant Clean Energy: https://www.vibrantcleanenergy.com/media/reports/

# Expanding Versatility through Advanced Technology

## Micro Reactors (< 20MW)

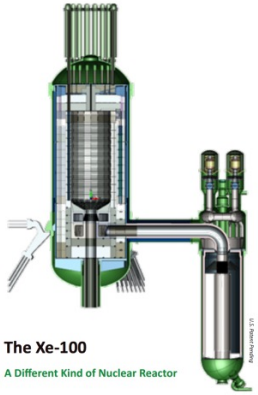
Oklo (shown)
Approximately a dozen in development

## LWR SMRs <300MW



NuScale (shown)
GEH X-300
Holtec SMR-160

## High Temp Gas Reactors

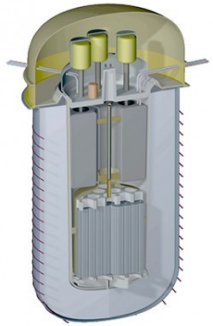



X-energy (shown)
Several in development

## Liquid Metal Reactors

TerraPower Natrium (shown)
Several in development

## Molten Salt Reactors



Terrestrial (shown)
Several in development

**Non-Water Cooled**
**Most <300MW, some as large as 1,000 MW**

NIA Technology Primer: https://nuclearinnovationalliance.org/sites/default/files/2022-07/ANRT-APrimer-July2022.pdf

# System Benefits of Advanced Reactors

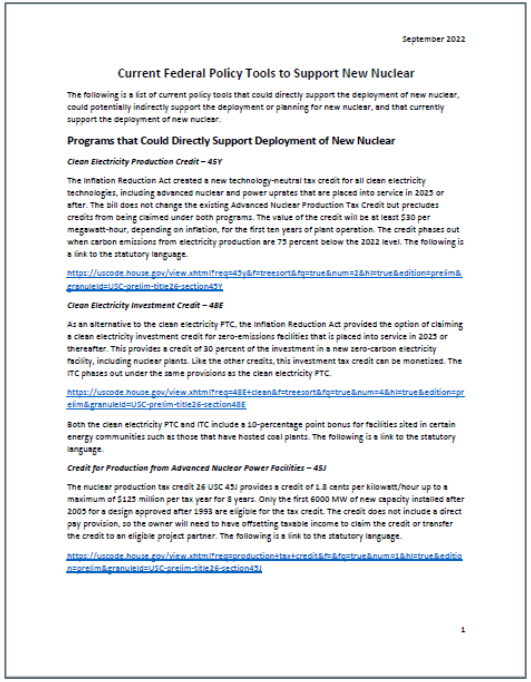
| | |
|---|---|
| Long term price stability | • Low fuel and operating costs |
| Reliable dispatchable generation | • 24/7, 365 days per year, years between refueling (Capacity factors >92%) |
| Integration with renewables and storage | • Paired with heat storage and able to quickly change power |
| Efficient use of transmission | • Land utilization <0.1 acre/TWh (Wind =1,125 acre/TWh; Solar 144 acre/TWh) |
| Environmentally friendly | • Zero-carbon emissions, one of lowest total carbon footprints<br>• Many SMRs are being designed with ability for dry air cooling |
| Black-start and operate independent from the grid | • Resilience for mission critical activities<br>• Protect against natural phenomena, cyber threats and EMP |

Source: SMR Start, *SMRs in Integrated Resource Planning*

# Strong Federal Support for Advanced Reactors

- DOE funding 12 different designs, >$5B over 7 years
- Infrastructure Bill
  - $2.5B funding for two demonstration projects
- Inflation Reduction Act
  - PTC: At least $30/MWh for 10 years
  - ITC: 30% of investment
  - Both can be monetized, include 10% bonus for siting in certain energy communities
  - Loan Guarantees – up to $40B in expanded authority
  - HALEU Fuel - $700M
- CHIPS Act
  - Financial assistance to States, Tribes, local governments and Universities



September 2022

**Current Federal Policy Tools to Support New Nuclear**

The following is a list of current policy tools that could directly support the deployment of new nuclear, could potentially indirectly support the deployment or planning for new nuclear, and that currently support the deployment of new nuclear.

**Programs that Could Directly Support Deployment of New Nuclear**

***Clean Electricity Production Credit – 45Y***

The Inflation Reduction Act created a new technology-neutral tax credit for all clean electricity technologies, including advanced nuclear and power uprates that are placed into service in 2025 or after. The bill does not change the existing Advanced Nuclear Production Tax Credit but precludes credits from being claimed under both programs. The value of the credit will be at least $30 per megawatt-hour, depending on inflation, for the first ten years of plant operation. The credit phases out when carbon emissions from electricity production are 75 percent below the 2022 level. The following is a link to the statutory language.

https://uscode.house.gov/view.xhtml?req=45y&f=treesort&fq=true&num=2&hl=true&edition=prelim&granuleId=USC-prelim-title26-section45Y

***Clean Electricity Investment Credit – 48E***

As an alternative to the clean electricity PTC, the Inflation Reduction Act provided the option of claiming a clean electricity investment credit for zero-emissions facilities that is placed into service in 2025 or thereafter. This provides a credit of 30 percent of the investment in a new zero-carbon electricity facility, including nuclear plants. Like the other credits, this investment tax credit can be monetized. The ITC phases out under the same provisions as the clean electricity PTC.

https://uscode.house.gov/view.xhtml?req=48E+clean&f=treesort&fq=true&num=4&hl=true&edition=prelim&granuleId=USC-prelim-title26-section48E

Both the clean electricity PTC and ITC include a 10-percentage point bonus for facilities sited in certain energy communities such as those that have hosted coal plants. The following is a link to the statutory language.

***Credit for Production from Advanced Nuclear Power Facilities – 45J***

The nuclear production tax credit 26 USC 45J provides a credit of 1.8 cents per kilowatt/hour up to a maximum of $125 million per tax year for 8 years. Only the first 6000 MW of new capacity installed after 2005 for a design approved after 1993 are eligible for the tax credit. The credit does not include a direct pay provision, so the owner will need to have offsetting taxable income to claim the credit or transfer the credit to an eligible project partner. The following is a link to the statutory language.

https://uscode.house.gov/view.xhtml?req=production+tax+credit&f=treesort&fq=true&num=1&hl=true&edition=prelim&granuleId=USC-prelim-title26-section45J

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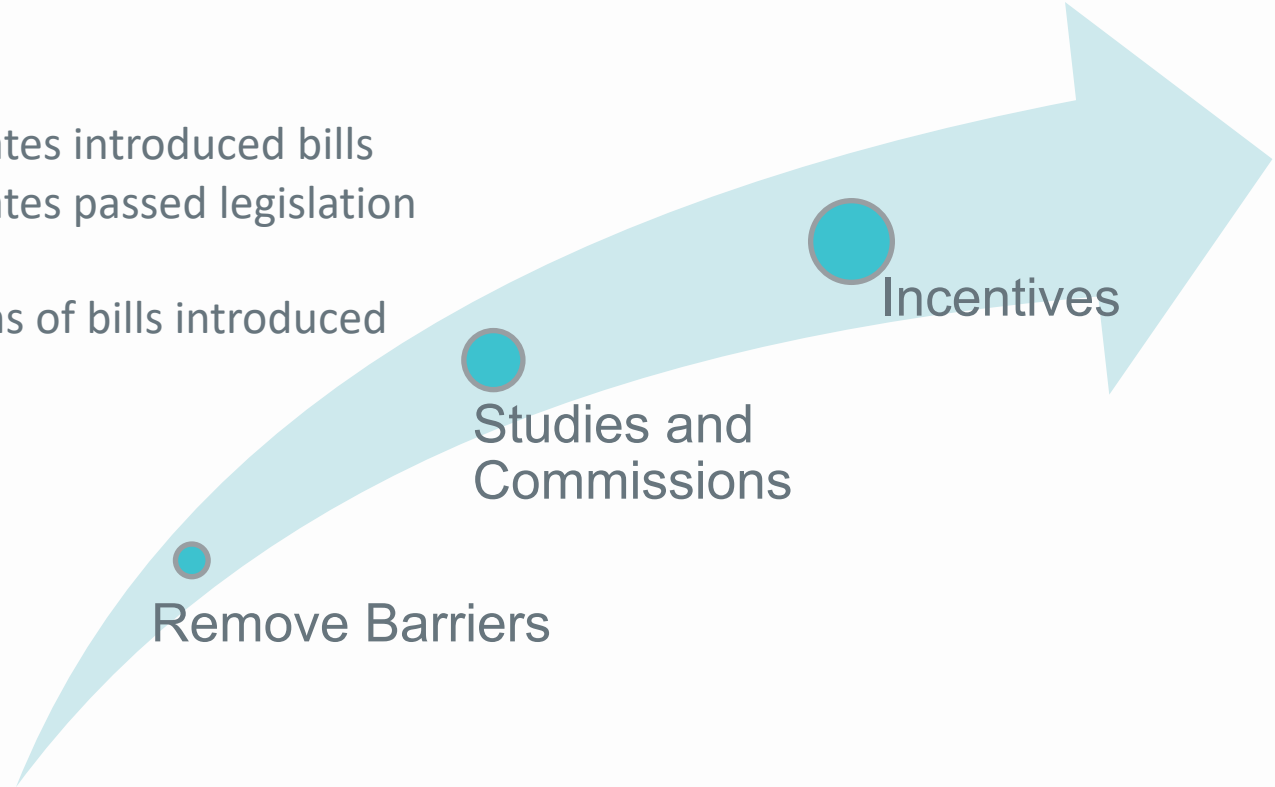
Current Federal Policies: https://www.nei.org/CorporateSite/media/filefolder/advantages/Current-Policy-Tools-to-Support-New-Nuclear.pdf

# State Action for Advance Reactors

2022
- 19 States introduced bills
- 11 States passed legislation

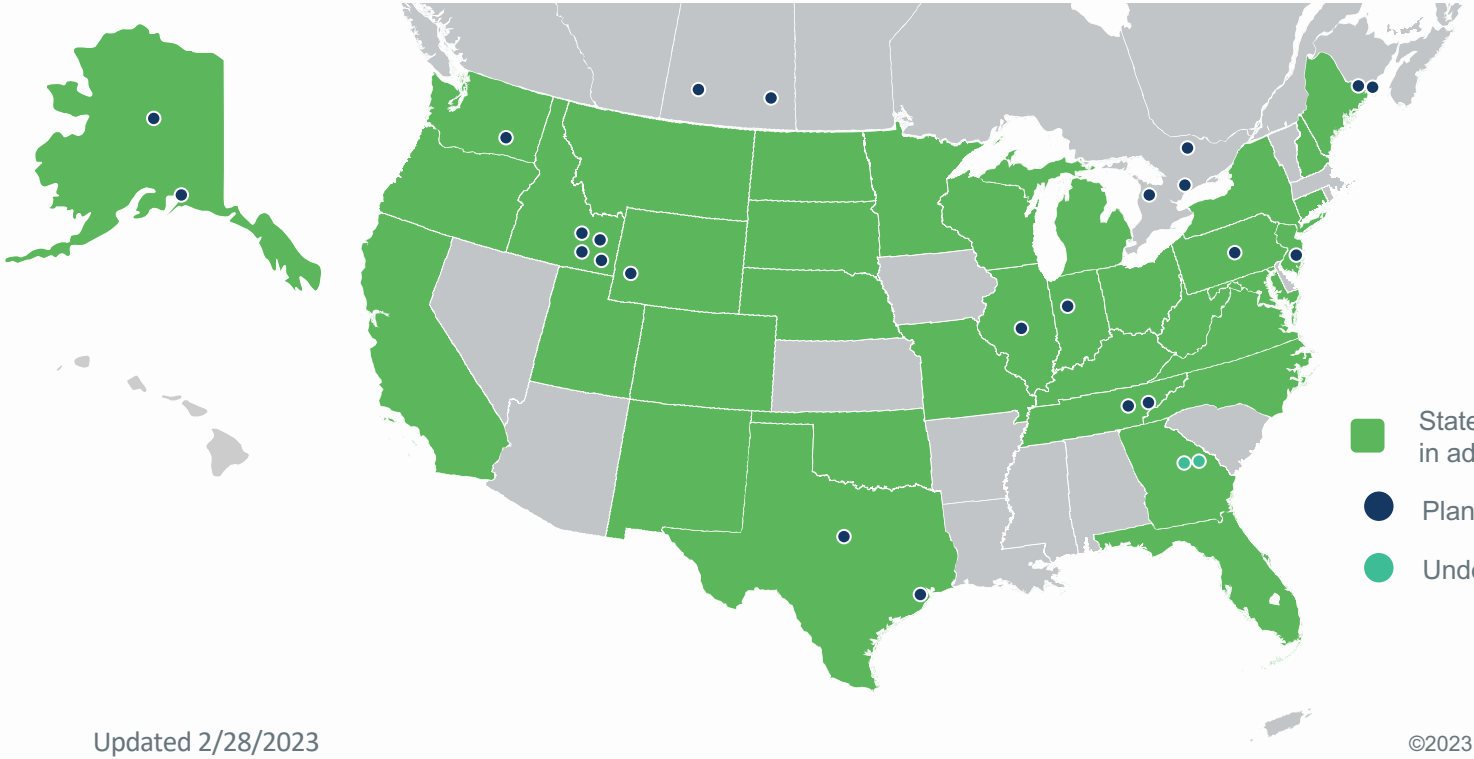
2023
- Dozens of bills introduced




State Policy Options: https://www.nei.org/resources/reports-briefs/policy-options-for-states-to-support-new-nuclear

# Advanced Nuclear Deployment Plans

## Projects in planning or under consideration in U.S. and Canada >20; Globally >30




Updated 2/28/2023

# QUESTIONS?

By Third Way, GENSLER