# What to Expect in Nuclear Energy - 2020

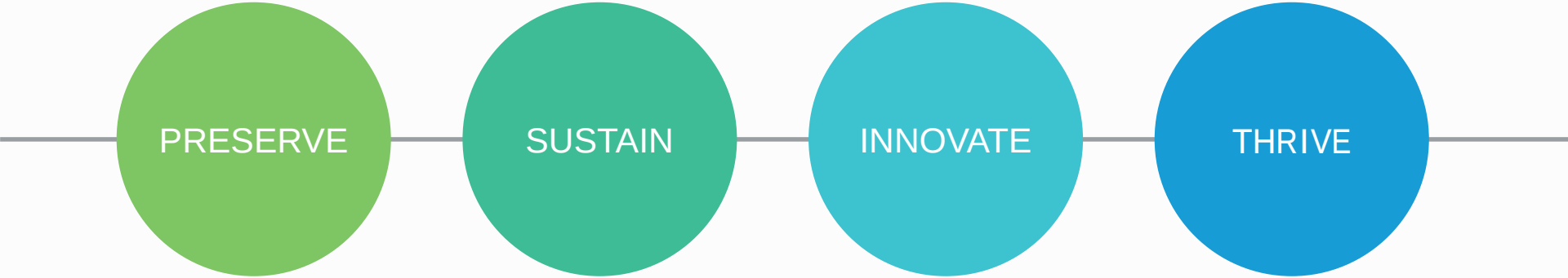
Presentation to the Energy Communities Alliance

John Kotek, Vice President, Policy & Public Affairs

January 30, 2019

NUCLEAR ENERGY INSTITUTE

# National Nuclear Energy Strategy




**Appropriately value nuclear generation**

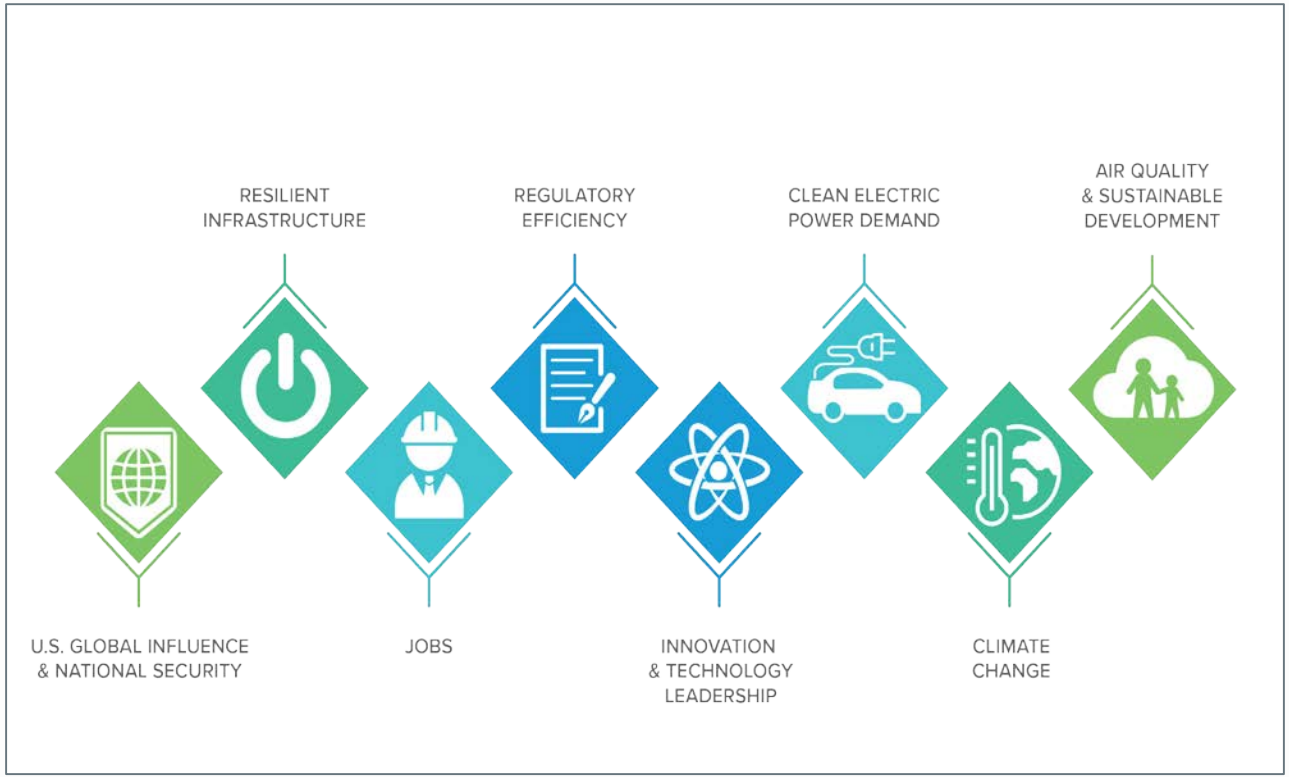
**Create sustainability via improved regulatory framework and reduced burden**

**Innovate, commercialize, and deploy new nuclear**

**Compete globally**

# Nuclear Energy Imperatives



# The Emissions Reduction Imperative

REUTERS

ENVIRONMENT MARCH 20, 2018 / 10:29 AM / A YEAR AGO

## McDonald's sets greenhouse gas reduction targets

Lisa Baertlein 3 MIN READ

(Reuters) - McDonald's Corp on Tuesday announced an approved, science based target to cut greenhouse gas emissions and battle climate change, saying it is the first restaurant company to do so.

Supply chains + Add to myFT

## Blue chips act to cut supply chain greenhouse gas emissions

Rolls-Royce, Nestlé and Panasonic among larger companies taking action

Michael Pooler JANUARY 29, 2018 2

The number of large companies taking serious action to tackle greenhouse gas emissions in their supply chains has doubled, according to research by an

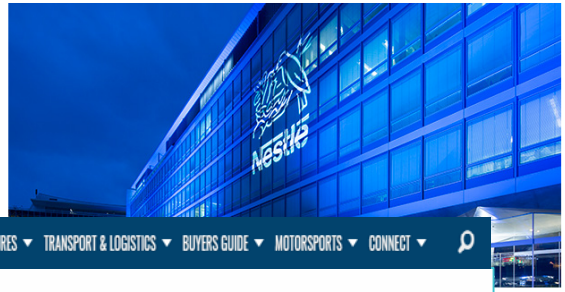
CLIMATE

## Nestlé commits to net-zero target by 2050

E&E NEWS PM

Haley Weiss, E&E News reporter

*Published: Monday, September 16, 2019*

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## Levi's Plans to Slash Emissions in Global Supply Chain by 2025

The apparel giant aims to reduce greenhouse gas emissions at a sprawling set of factories and mills in 39 countries, sta... suppliers

Levi's will start its effort to cut greenhouse gas emissions through energy-efficiency programs at factories run by vendors in the first tier of its supply chain, such as this supplier facility in Mexico. PHOTO: PHOTO COURTESY OF LEVI STRAUSS & CO.

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## Toyota wants zero carbon emissions in all factories by 2050

Marcus De Guzman

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*Clean, zero emission Toyota factories may soon be a reality*

Toyota

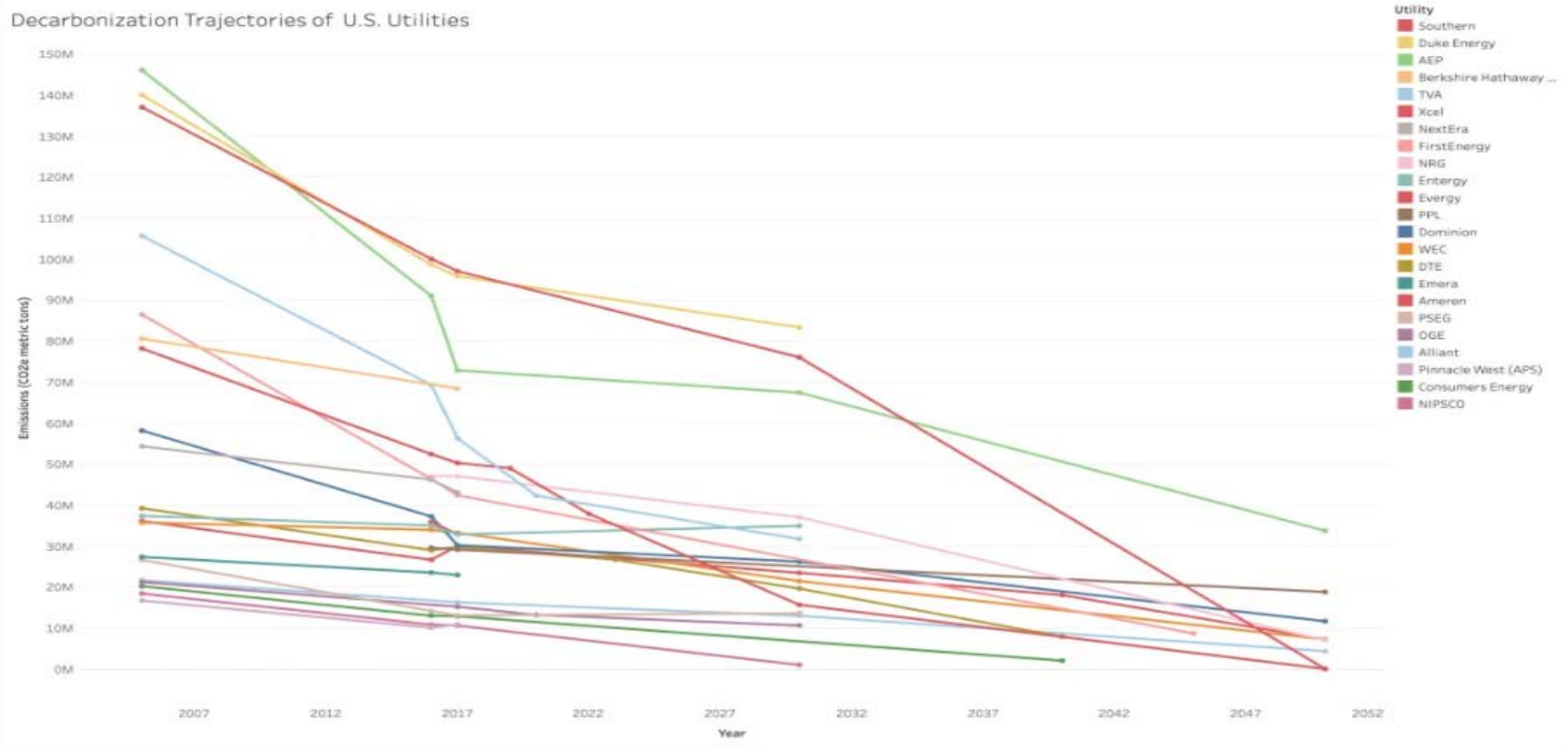
May 31, 2019 09:41

Let's face it, manufacturing cars is no easy feat. Aside from the fact that you have to build a whole fleet of them, you'll also need plenty of resources and energy to manufacture batches of them. But using energy means you're also producing $CO_2$ emissions, which is never good.

That's right, aside from automobiles, car factories also use plenty of energy that result in more $CO_2$ emissions that harm the environment and add more greenhouse gases that pollute the air. So how does Toyota plan to combat that? By setting a goal of achieving 35% reduced $CO_2$ emissions in global plants worldwide by 2030, and having zero $CO_2$ emissions in all manufacturing plants by 2050.

Part of the "Toyota Environmental Challenge 2050", the automaker is looking at not just reducing their carbon footprint from their cars, but also from their manufacturing facilities. To do this, Toyota has been finding ways of recycling and using alternative means of generating energy.

# Utility Decarbonization Commitments

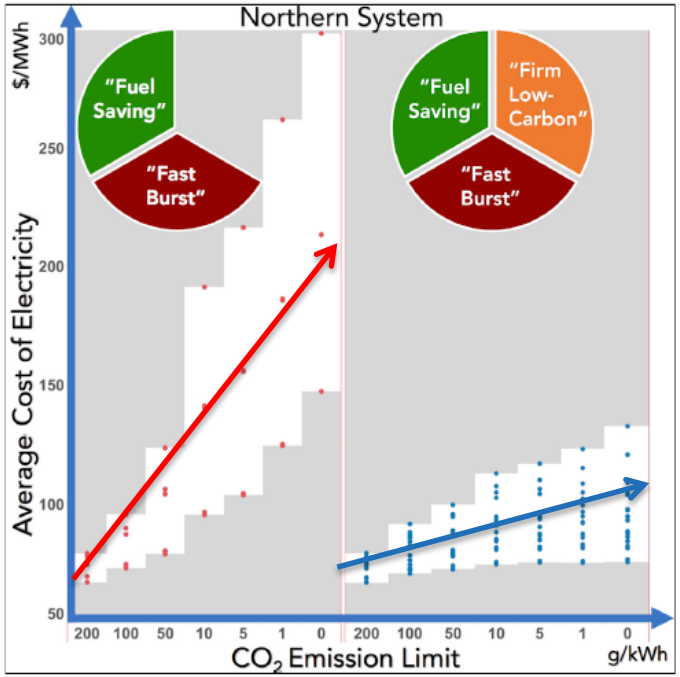



Decarbonization pathways of the nation's largest investor-owned utilities, according to their carbon targets

Source: https://www.energyandpolicy.org/utility-carbon-targets/

# Firm, Low-carbon Generation Enables Affordable Decarbonization





Nestor A. Sepulveda, Jesse D. Jenkins, Fernando J. de Sisternes, Richard K. Lester

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HIGHLIGHTS

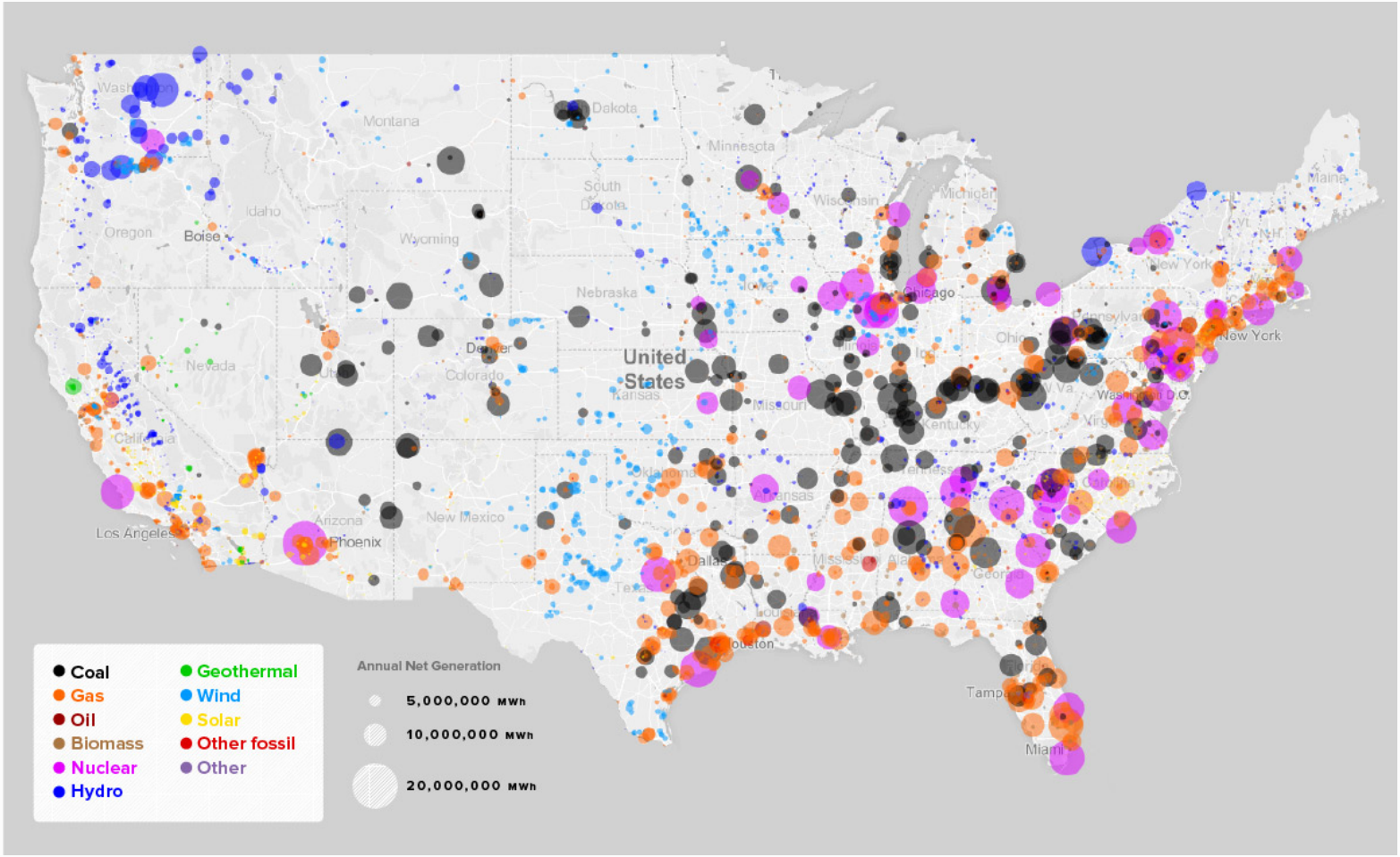
Firm low-carbon resources consistently lower decarbonized electricity system costs

Availability of firm low-carbon resources reduces costs 10%–62% in zero-$CO_2$ cases

Without these resources, electricity costs rise rapidly as $CO_2$ limits near zero

Batteries and demand flexibility do not substitute for firm low-carbon resources




Source: https://www.visualcapitalist.com/mapped-every-power-plant-in-the-united-states/

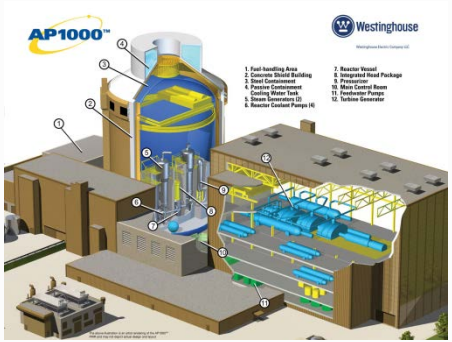
 

# Federal Support for Nuclear Energy RDD&D

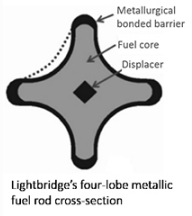
- NEIMA, NEICA passed and signed
- NELA, NERA, IESA, other bills introduced
- CLEAN Act, other bills value nuclear's zero-carbon generation
- Appropriations consistently increased; demo project $

| | DOE-NE Request | Congressional Appropriation |
|---|---|---|
| FY 2017 | 994 M | 1,016 M |
| FY 2018 | 823 M | 1,205 M |
| FY 2019 | 877 M | 1,326 M |
| FY 2020 | 940 M | 1,493 M |

# Continuum of Innovation



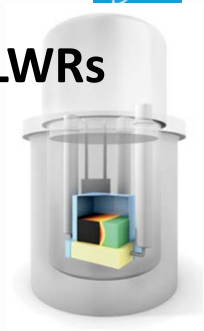

## Evolutionary LWR Fuels



Lightbridge's four-lobe metallic fuel rod cross-section

## Advanced Non-LWRs

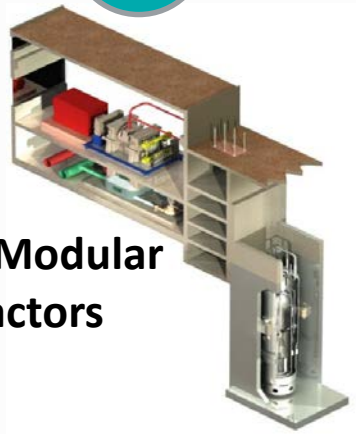
- Hi-temp gas
- Liquid metal
- Molten salt
- Micro-reactors



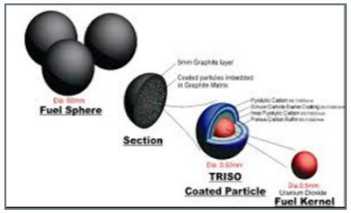
2016 2020 2025 2030


## Large LWRs

NuScale Power Module

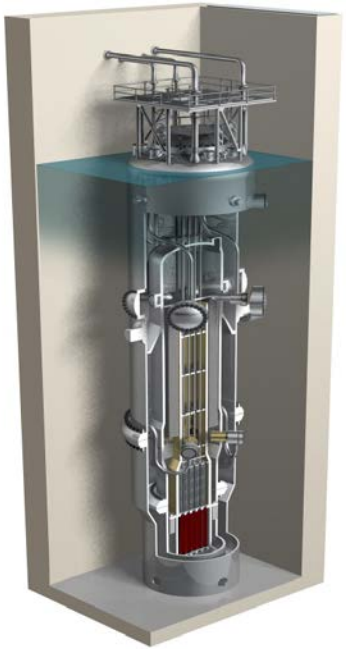


## Small Modular Reactors



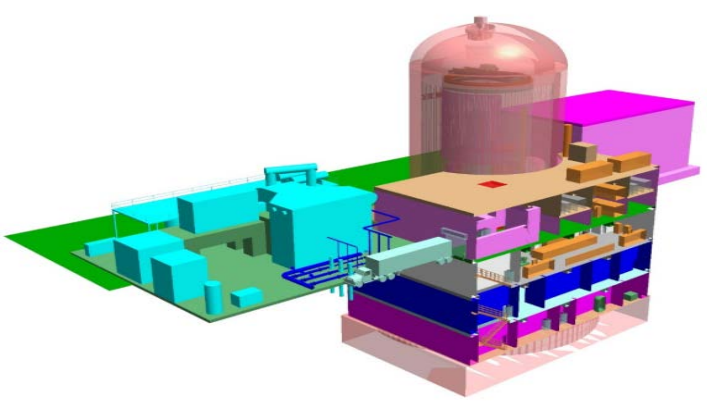

 

# Small Modular LWRs



NuScale Power Module

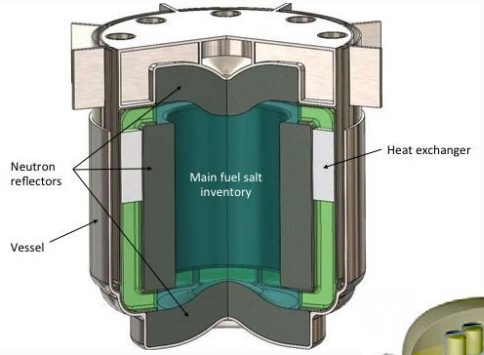
GEH BWRX-300



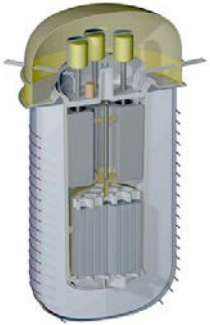
Holtec SMR-160

# Non-Water Cooled Reactors

## Molten Salt Reactors

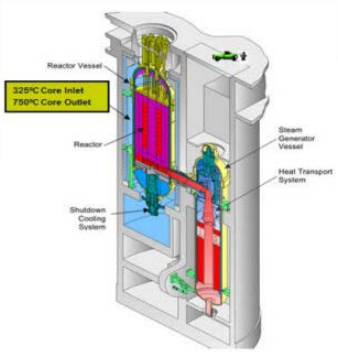



TerraPower



Terrestrial Energy

## High Temperature Gas Reactors



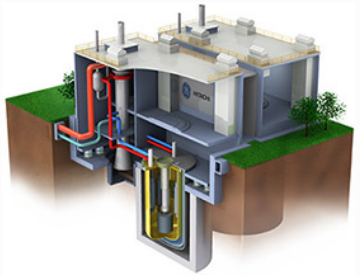

Framatome


X-energy

## Micro Reactors

Westinghouse eVinci

## Liquid Metal Reactors



GE PRISM

# Micro-Reactors

Features
- 1 MWe to 10 MWe (typical)
- 10 year fuel life (typical)
- Operates independent of grid


HolosGen


OKLO
2 MWe

Westinghouse eVinci
200 kWe to 25 MWe

Others (not all inclusive)
- Elysium
- General Atomics
- Hydromine
- NuGen
- NuScale
- X-Energy

# Creating A Brighter Nuclear Energy Future: The Essentials

- Markets and policies (e.g. CES) that fully value what nuclear delivers and stimulate new build
  - Current plants - ITC
  - New reactors – ITC or PTC
- Sustained successful operating of existing plants
  - Safe operations
  - Continually increasing operational efficiency
- Continued movement toward more risk-informed regulation

# Creating A Brighter Nuclear Energy Future: The Essentials

- Investment in RDD&D that preserves U.S. status as leading innovator
  - Cost-effective, flexible new designs
  - Advanced fuels, I&C, materials, construction/fab techniques, etc.
  - Preserve existing & add new R&D, production and manufacturing capabilities
- Success in export markets
  - Ex-Im Bank – reauthorized until 2026
  - Administration advocacy
- Increased public acceptance/social license
  - Resolve back-end of the fuel cycle
  - New approaches to siting, public engagement

# QUESTIONS?

By Third Way, GENSLER