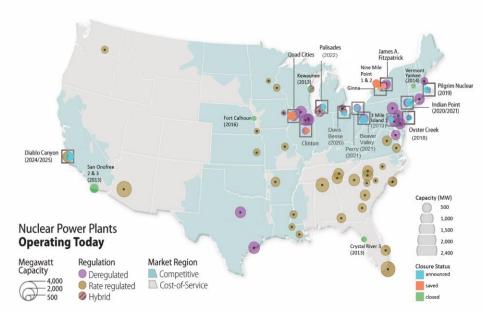


March 4, 2019

Senior Advisor to the Assistant Secretary for Nuclear Energy
Office of Nuclear Energy
U.S. Department of Energy

Nuclear Energy: A National Strategic Asset

- Recognition of the importance of nuclear today and in the future
 - Energy Security
 - National Security
 - Economic Prosperity
 - Environmental Sustainability
- Concern about the financial viability of some currently operating plants, yet benefits from keeping them running
- Increased interest in nuclear in domestic and international markets to address climate change and ensure reliable, resilient power
- Innovators and utilities looking at advanced nuclear as a way to move beyond electricity
- Secretary Perry: Make Nuclear Energy Cool Again!
- President Trump: Revive, Revitalize and Expand



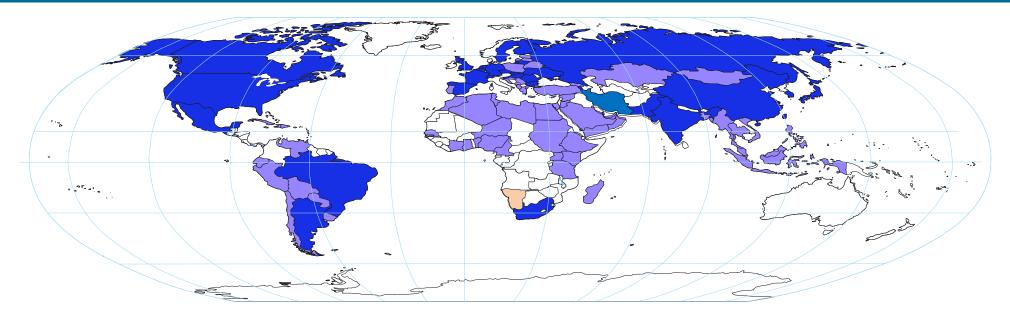
- 20% of electricity (56% of non-emitting)
- 92% capacity factor
- Supports 475,000 jobs
- \$10B in federal & \$2.2B in state taxes annually

"If you really care about this environment that we live in... then you need to be a supporter of this [nuclear energy] amazingly clean, resilient, safe, reliable source of energy."

Secretary Rick Perry at Press conference, May 10th

nuclear.energy.gov

Global Growth and Market Opportunity



Potential Nuclear Power Expansion

- 35 countries taking steps to develop nuclear power
- 30 countries with operating reactors developing expansion plans

~450 reactors operating 11% of electricity / 40% of clean electricity

- ~60 reactors under construction in 15 countries (20 in China)
- ~170 reactors planned in over 25 countries, worth as much as \$700 billion over the next 5-10 years
- ~370 reactors proposed in 36 countries, worth as much as \$1.6 trillion over the next 10-25 years

Source: IAEA/PRIS & WNA

Nuclear Power Plants Shutting Down Prematurely

Year	Retirements	MW	Operator	State	License Expiration	
2013	Crystal River 3	890	Duke	FL	2016 (40)	
	San Onofre 2 & 3	2,254	SoCal Edison	CA	2023 / 2024 (40)	
	Kewaunee	560	Dominion	WI	2033 (60)	
2014	Vermont Yankee	563	Entergy	VT	2032 (60)	
2016	Fort Calhoun	502	Omaha Power	NE 2033 (60)		
2018	Oyster Creek	610	Exelon	NJ	2029 (60)	
	Total Closed since 2013	5,276				
2010	Pilgrim	678	Entergy	MA	2032 (60)	
2019	Three Mile Island 1	803	Exelon	PA	2034 (60)	
2020	Davis-Besse*	908	FirstEnergy	ОН	2037 (60)	
	Duane Arnold	601				
	Perry*	1,268	FirstEnergy	ОН	2026 (40)	
2021	Indian Point 2 & 3**	2,061	Entergy	NY	2013 / 2015 (40)	
	Beaver Valley 1 & 2*	1,872	FirstEnergy	PA	2036 / 2047 (60)	
2022	Palisades	789	Entergy	MI	2031 (60)	
2024-25	Diablo Canyon 1 & 2	2,240	PG&E	CA	2024 / 2025 (40)	
	Total Pending Closures	11,220				
2017	FitzPatrick***	852	Entergy	NY	2034 (60)	
	Ginna***	582	Exelon	NY	2029 (60)	
	Clinton***	1,065	Exelon	IL	2026 (40)	
2017-18	Nine Mile Point 1 & 2***	1,937	Exelon	NY	2029 / 2046 (60)	
2018	Quad Cities 1 & 2***	1,819	Exelon	IL	2032 (60)	
	Total Saved	6,255				

Pending review and approval by PJM

^{**} One reactor will shut down in 2020, and the other will shut down in 2021.

^{***} Closures averted by state policy actions.

Combined Construction and Operating Licenses (COLs)

SITE/LOCATION			REACTOR TECHNOLOGY/ NO. UNITS		COLA DATES			
		UTILITY			Submitted	Docketed	Issued	
Vogtle	GA	Southern Nuclear	AP1000	2	3/28/2008	5/30/2008	2/10/2012	
V.C. Summer	SC	SCE&G	AP1000	2	3/27/2008	7/31/2008	3/30/2012	
Fermi	MI	DTE Energy	ESBWR	1	9/18/2008	11/25/2008	5/1/2015	
South Texas Project	TX	STPNOC	ABWR	2	9/20/2007	11/29/2007	2/12/2016	
Levy	FL	Duke Energy	AP1000	2	7/30/2008	10/6/2008	10/26/2016	
William States Lee	SC	Duke Energy	AP1000	2	12/13/2007	2/25/2008	12/19/2016	
North Anna	VA	Dominion Energy	ESBWR	1	11/27/2007	1/28/2008	6/2/2017	
Turkey Point	FL	Florida Power and Light	AP1000	2	6/30/2009	9/4/2009	4/5/2018	

Construction Stop (7/31/17)

Terminated (7/12/18)

Terminated (4/26/18)

- 18 COLs have been docketed by the NRC since 2007
- 8 (totaling 14 reactors) have been approved
- 10 (totaling 14 reactors) were suspended and or withdrawn
- 6 Licensees currently hold COLs

American Innovation Can Capture the Global Market

Advanced Nuclear Industry: Next Generation



Congressional Support for Nuclear Energy – Strong and Bipartisan

Current Fleet

- Investment Tax Credit
- Support to local communities impacted by nuclear power plant closures

Advanced Reactor Concepts

- Production Tax Credit
- Micro-reactors for national security locations
- Versatile Fast Neutron Source
- Advanced Reactor Demo Projects
- High Assay-Low Enriched Uranium (HALEU) fuel

Streamline Innovation

- Regulatory reform
- Licensing cost-sharing for advanced reactor concepts
- Accessibility to DOE facilities
- Export control reform

- Since 2015, over 20 bills have been introduced, 4 reported out of committee, 5 passed the House or Senate, and 4 were signed into law. 6 of the bills are related to waste. (updated 1/22/19)
- Support also includes appropriating the largest funding ever for DOE-NE in FY 2019 (\$1.3B)

Office of Nuclear Energy Mission Pillars

Existing Fleet



Advanced Reactor Pipeline



Fuel Cycle Infrastructure





Sustaining the Existing Fleet

Improving Performance and Reducing Costs

- LWRS subsequent license renewal and technical improvements
- Accident Tolerant fuel enhanced performance and safety
- CASL Energy Innovation Hub for M&S
- Non-electric applications to improve flexibility and increase revenue generation

Policy and Market Reform Support

- Level the playing field with technology neutral policies
- Ensure critical attributes are properly valued
- Risk-informed, performance-based regulation
- State and Local Technical Assistance, **Education and Outreach**



























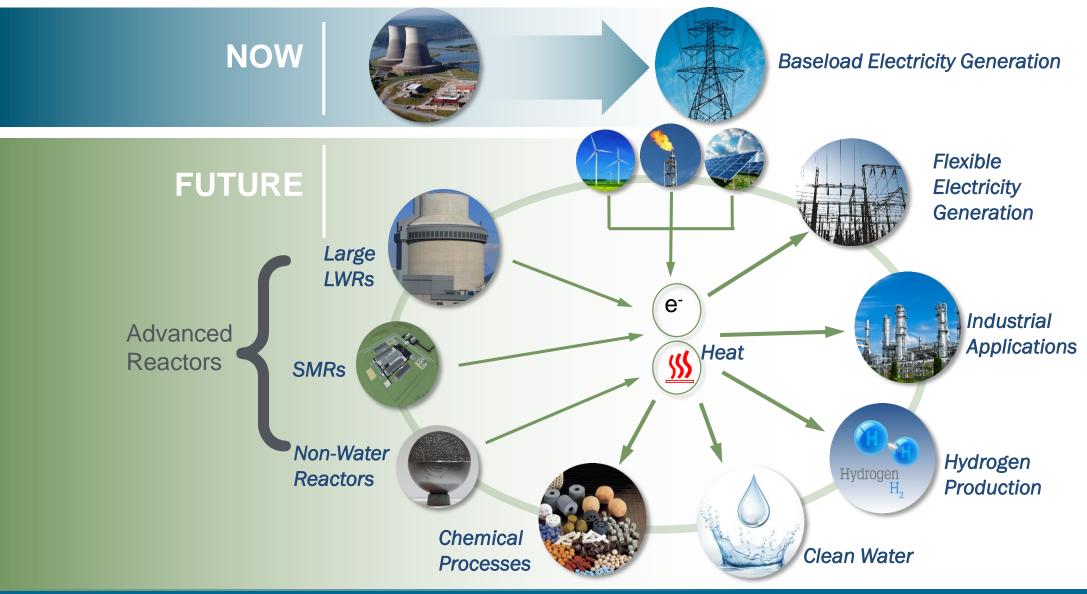








Nuclear Beyond Electricity – Advanced Reactors



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Small Modular Reactors

Greater affordability

- Easier financing for public power entities
- Lower capital investment
- Factory fabrication, shorter construction times

New standard of passive nuclear safety

Energy and environmental benefits

- Greenhouse gas and air pollution avoided
- Grid benefits: stability, security, quality, availability, reliability
- Siting flexibility
- Hybrid energy systems and flexible integration with renewables

Importance to National Security

Economic development and job growth

Manufacturing jobs and supply chain opportunities in the United States









Micro Reactors

Designed for Specialized Applications

- Siting flexibility including near population centers
- Micro-grids
- Remote Operating Bases
- Data Centers
- Disaster Relief (FEMA)
- Specialized Non-electric Applications





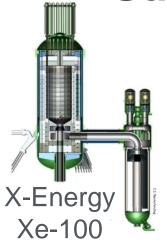






Non-Water Advanced Reactors

Gas Reactors





General Atomics
Energy Multiplier Module, EM2

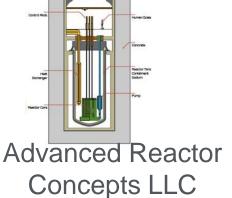
Fast Reactors



PRISM



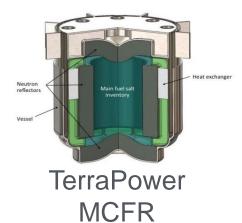
TerraPower TWR



ARC-100

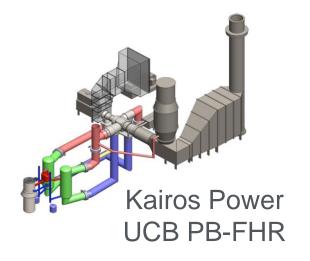
Molten Salt Reactors







Elysium USA MCSFR



Summary

- The demand for domestically-generated, reliable, resilient and clean sources of baseload electricity will continue to drive many countries toward nuclear energy as part of their energy security and national economic and environmental calculus.
- Profound opportunity for new nuclear growth exists:
 - Strong global market interest
 - Growing need for increased global access to electricity
 - Support energy security, economic and environmental goals
 - U.S. leadership to ensure safety & nonproliferation are as important as ever
- The Administration is committed to advancing nuclear energy in the U.S. and abroad.

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Questions?



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