



U.S. DEPARTMENT OF  
**ENERGY**

**Nuclear Energy**

---

## **U.S. Nuclear Power Policy and R&D Programs**

**Deborah Swichkow  
Outreach Program Manager  
Office of Nuclear Energy  
U.S. Department of Energy**

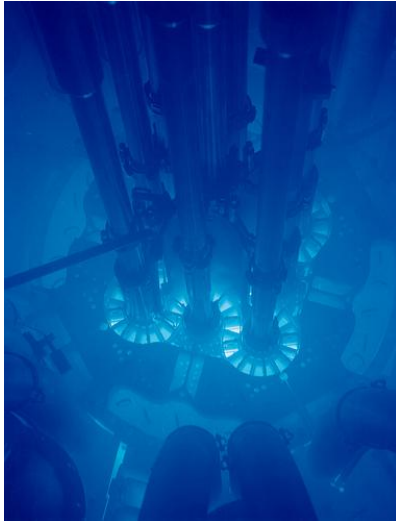
**NCSL Nuclear Legislative Workgroup Meeting  
December 14, 2011**



- **Nuclear power is clean, reliable base load energy source**
  - Provides 19% of U.S. electricity generation mix
  - Provides over 70% of U.S. emission-free electricity
  - Avoids about 700 MMTCO<sub>2</sub> each year
  - Helps reduce overall NOx and SOx levels
- **U.S. electricity demand projected to increase ~24% by 2030**
- **100 GWe nuclear capacity - 104 operating plants**
  - Fleet maintaining approximate 90% average capacity factors
  - Most expected to apply for license renewal for 60 years of operation.



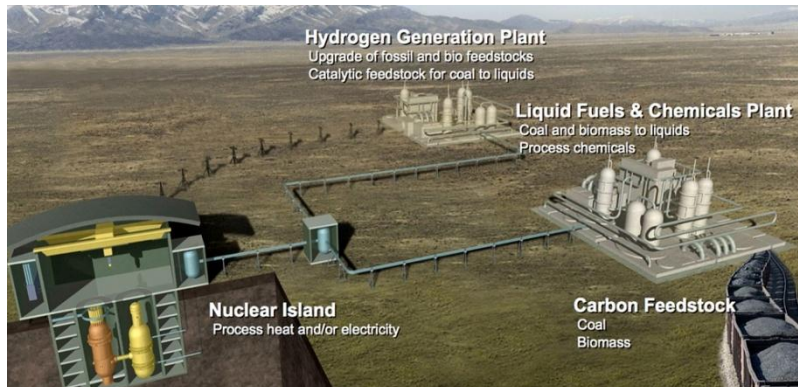
# Office of Nuclear Energy Mission



- The primary mission of NE is to advance nuclear power as a resource capable of making major contributions in meeting the nation's energy supply, environmental, and energy security needs by resolving technical, cost, safety, security and regulatory issues, through research, development, and demonstration (RD&D).

- Objective is to enable the development and deployment of fission power systems for

- Production of electricity (MWh)
- Process heat (BTUs)



# Nuclear Energy Objectives

## Nuclear Energy

---

- **Develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors**
- **Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals**
- **Develop sustainable nuclear fuel cycles**
- **Understand and minimize the risks of nuclear proliferation and terrorism**



# Fukushima Dai-ichi – U.S. Response

- President Obama asked the Nuclear Regulatory Commission *“to do a comprehensive review of the safety of our domestic nuclear plants in light of the natural disaster that unfolded in Japan”*
- Secretary Chu stated that *“the Administration is committed to learning from Japan’s experience as we work to continue to strengthen America’s nuclear industry”*
- Marvin S. Fertel, President & CEO Nuclear Energy Institute *“ The industry’s highest priority is the safe operation of the 104 reactors in 31 states and we will incorporate lessons learned from this accident at American nuclear energy facilities”*
- DOE’s Office of Nuclear Energy is reviewing its research portfolio



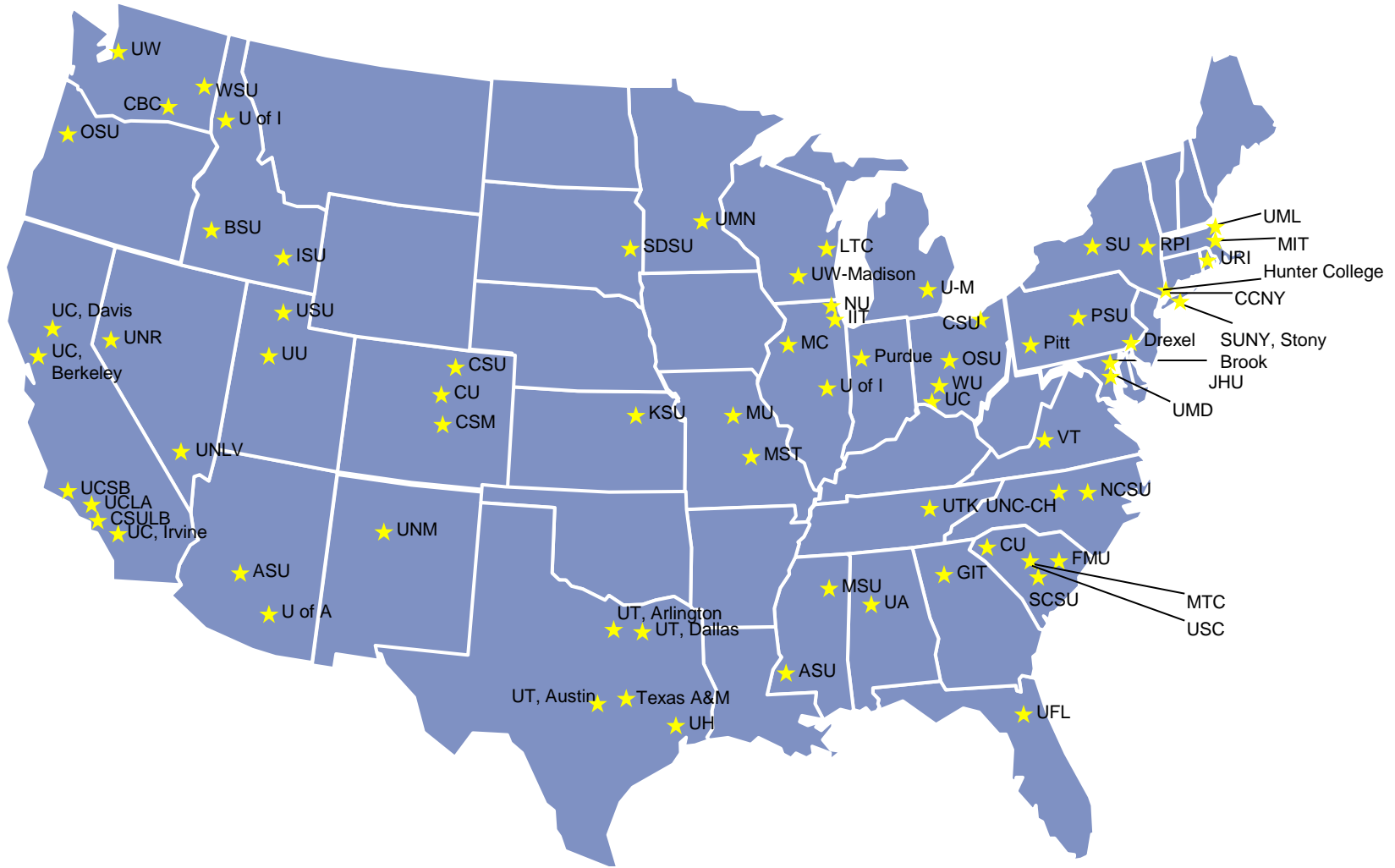


- 
- **Reducing the need for Operator Actions in Accident Response enhances overall safety.**
    - Passive Systems enhance safety
      - AP1000, ESBWR, SMRs, HTGRs
    - Better understanding of dry cask storage systems.
  - **Re-engineering barriers can reduce complications.**
    - SiC cladding
    - Enhanced fuel properties
  - **Re-evaluation of potential natural phenomena.**
    - Re-evaluation of U.S. seismic criteria
  - **Targeted use of Modeling and Simulation.**
    - Improved modeling of operating reactors
  - **Enlistment of the University Community.**



# Nuclear Energy University Programs FY 09- FY 11

■ Over \$170 Million in Competitive Awards to U.S. Universities (total: 72) and Students





# U.S. Interests in Nuclear Energy

## Nuclear Energy

---

- **Early Site Permits:** 4 early site permits approved for Clinton, Grand Gulf, North Anna sites, and Vogtle; additional permit applications filed.
- **License Applications:** 18 Construction and Operating License applications for 28 new reactors have been submitted for NRC review; Areva and USEC enrichment licenses filed; 71 reactor license renewals approved.
- **Reactor Design Certifications:** Four designs have been certified; three new designs (APWR, EPR, and ESBWR) and one amendment (AP 1000) are under review; ESBWR and AP1000 through ACRS
- **New Plant Orders:** 4 plant construction contracts initiated; 9 power companies have placed large component forging orders.
- **Plant Construction:** TVA construction activities at Watts Bar 2, and reinstated construction permits for Bellefonte 1 and 2. LES enrichment plant operating.
- **Financial Incentives:** First DOE conditional loan guarantees approved for Vogtle. Loan guarantee ceiling proposed to increase to \$54 billion in FY11. Conditional loan guarantee approved for Eagle Rock enrichment plant.
- **Small Modular Reactor Program:** Administration support for multiyear LWR SMR Licensing and Deployment Program. \$67M requested in FY12.





# Growing Interest in Small Modular Reactors (SMRs)

- **Growing global interest is motivated by economic, environmental and energy security concerns**
  
- **Potential benefits include**
  - Enhanced safety and robustness from simplified designs
  - Reduced capital cost
  - Enhanced security from below-grade siting
  - More flexible siting and deployment options
  
- **Commercial deployment of U.S. SMR technology can help position America to lead the global clean energy economy**
  - Reestablish U.S. technical leadership and innovation
  - Create high quality jobs
  - Improve U.S. global competitiveness

# Draft Blue Ribbon Commission Report: Key Recommendations (July 29, 2011)

---

- A New Consent- Based Approach to Siting
- A New Organization to Implement the Waste Management Program
- Access to Utility Waste Disposal Fees for their Intended Purpose
- Prompt Efforts to Develop One or More Permanent Geologic Disposal Facilities
- Prompt Efforts to Develop One or More Consolidated Interim Storage Facilities
- Support for Advances in Nuclear Energy Technology and for Workforce Development
- Active U.S. Leadership in International Efforts to Address Safety, Non-Proliferation and Security Concerns

# FY 2011-12 Budget Summary

## Nuclear Energy

Program	FY 2011 Adjusted	FY 2012 Request	FY 2012 House	FY 2012 Senate
<b>Research, Development, &amp; Demonstration</b>				
Integrated University Program	-	-	5,000	-
LWR SMR Licensing Technical Support	-	67,000	67,000	-
Reactor Concepts RD&D	164,706	125,000	136,986	31,870
Fuel Cycle Research and Development	182,428	155,010	132,000	187,917
Nuclear Energy Enabling Technologies	50,891	97,364	95,014	68,880
International Nuclear Energy Coop.	2,994	3,000	3,000	3,000
<b>Infrastructure</b>				
Radiological Facilities Management	51,715	64,888	49,000	69,888
Idaho Facilities Management	183,604	150,000	155,000	136,000
Idaho Sitewide S&S	88,200 <sup>a</sup>	98,500	93,350	93,350
Program Direction	86,279	93,133	92,000	86,279
Use of Prior Year Balances	-	-1,367	-1,367	-
Rescission of Prior Year Balance	-6,300	-	-	-
<b>Total NE:</b>	<b>804,571</b>	<b>852,528</b>	<b>826,983</b>	<b>677,184</b>