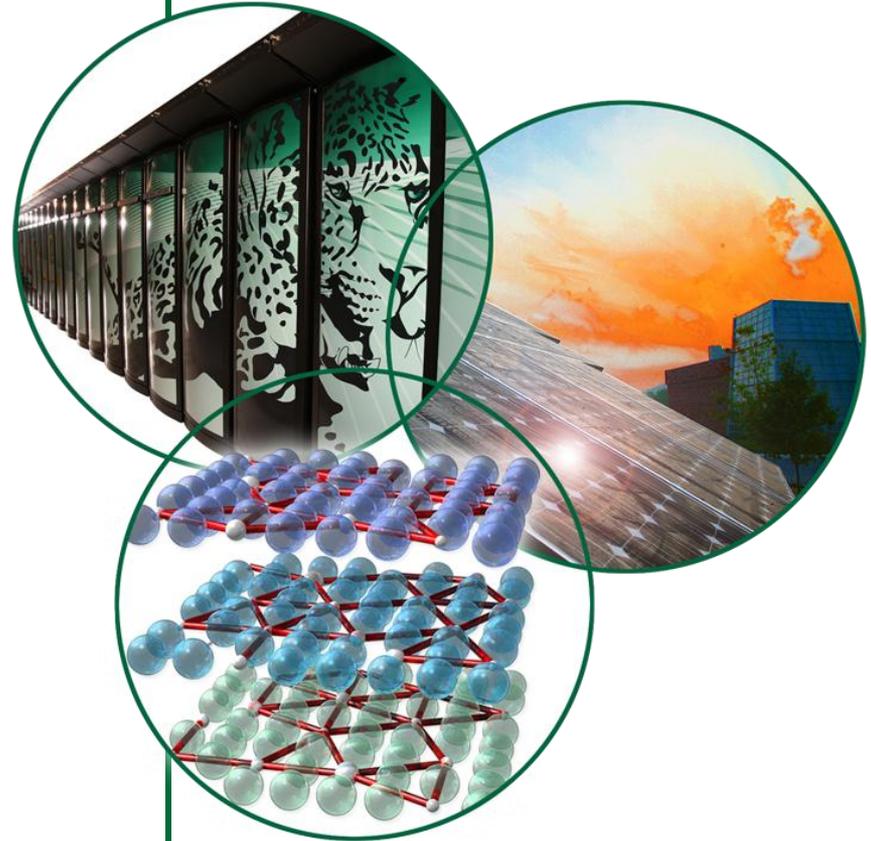


# Nuclear Energy Policy Issues

Presented to  
**Women in Nuclear  
Region II Conference**

**Timothy E. Valentine**

February 7, 2011

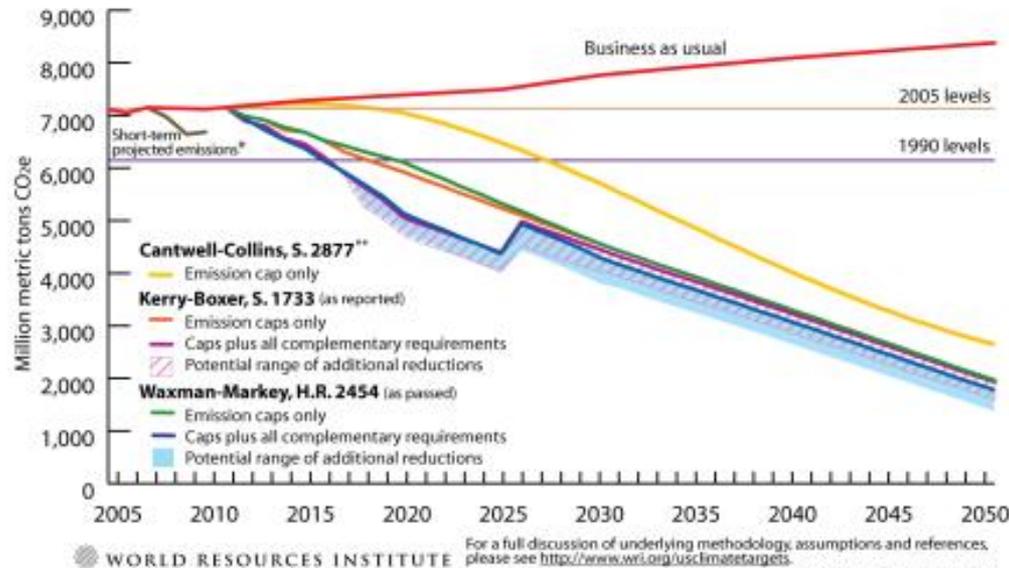


# What are the opportunities and challenges for nuclear power?

- Climate change policy continues to be one of the drivers for nuclear power yet its future is uncertain
- EPACT 2005 incentives for nuclear power and their implementation
- The nuclear waste conundrum
- Nuclear loan guarantees
- Small modular reactor activities
- Outlook for the future

# The Great Climate Debate: The many and moving targets of Congress

Net Emission Reductions Under Cap-and-Trade Proposals in the 111th Congress, 2005-2050  
December 17, 2009



For a full discussion of underlying methodology, assumptions and references, please see <http://www.wri.org/usclimatetargets>.

\* "Business as usual" emission projections are from EPA's reference case for its analysis of the Waxman-Markey bill. "Short-term projected emissions" represent EPA's most recent estimates of emissions for 2006-2010.

\*\* Cantwell-Collins sets economy-wide reduction targets beginning with a 20 percent reduction from 2005 levels by 2020. However, additional action by Congress would be required before these targets could be met. Reduction estimates do not include emissions above the cap that could occur due to the safety-valve.

**With the change in the control of the House and a stronger Republican minority in the Senate, the climate debate is likely to shift to a focus on a piecemeal energy technology approach instead of a cap-and-trade policy**

# Energy Policy Act of 2005: Incentives for new nuclear power

Issues	Congressional Action
Risk Insurance	<ul style="list-style-type: none"><li>• 100% coverage of cost delays for first 2 new plants up to \$500M each</li><li>• 50% coverage of cost delays for plants 3 to 6 up to \$250M each</li></ul>
Loan Guarantees	<ul style="list-style-type: none"><li>• Guarantee for up to 80% of projects total debt</li><li>• Covers more than just nuclear</li></ul>
Production Tax Credits (more than just nuclear)	<ul style="list-style-type: none"><li>• 1.8 cents per kWh for plants with construction starting before 2014 and entering operation by 2021</li><li>• Limited to \$125 per kW</li><li>• Limited to a total of 6 GWe of new nuclear capacity</li></ul>
Price Anderson Act	<ul style="list-style-type: none"><li>• Extends Price Anderson Act indemnification for 20 years</li><li>• Requires each nuclear plant to contribute \$95.8M to secondary insurance fund</li></ul>
R&D	<ul style="list-style-type: none"><li>• \$2.95B authorized for nuclear R&amp;D</li><li>• Nuclear Power 2010 program authorized for government-industry cost share for testing COL process</li></ul>

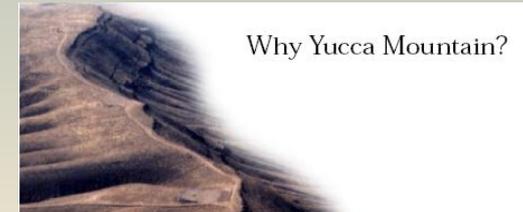
# Nuclear Waste Storage: the challenge beyond a 1,000 millenniums

## Yucca Mountain Licensing Activities:

- June 3, 2008, license Submittal to NRC
- Sept. 8, 2008, license accepted from docketing
- March 1, 2010, Blue Ribbon Commission established
- March 3, 2010, Secretary Chu submitted a motion to withdraw the Yucca Mountain application to NRC
- April 6, 2010, ASLB delays DOE motion
- April 23, 2010, NRC Commission vacated ASLB suspension order and required ASLB to review withdrawal motion
- June 29, 2010, ASLB rejects DOE motion
- Oct. 7, 2010, NRC staff suspend review of application
- Dec. 10, 2010, U.S. District Court of Appeals lifts stay on lawsuits related to withdrawal with final briefs due by Feb.
- Still no action by the NRC

## Sustainable nuclear fuel cycle options under consideration:

- Interim storage of spent nuclear fuel at one or more sites
- Phased licensing of a repository for defense material
- Advanced proliferation resistant used fuel reprocessing and recycling
- Recycling of mixed oxide fuel and reprocessed uranium in existing and advanced reactors



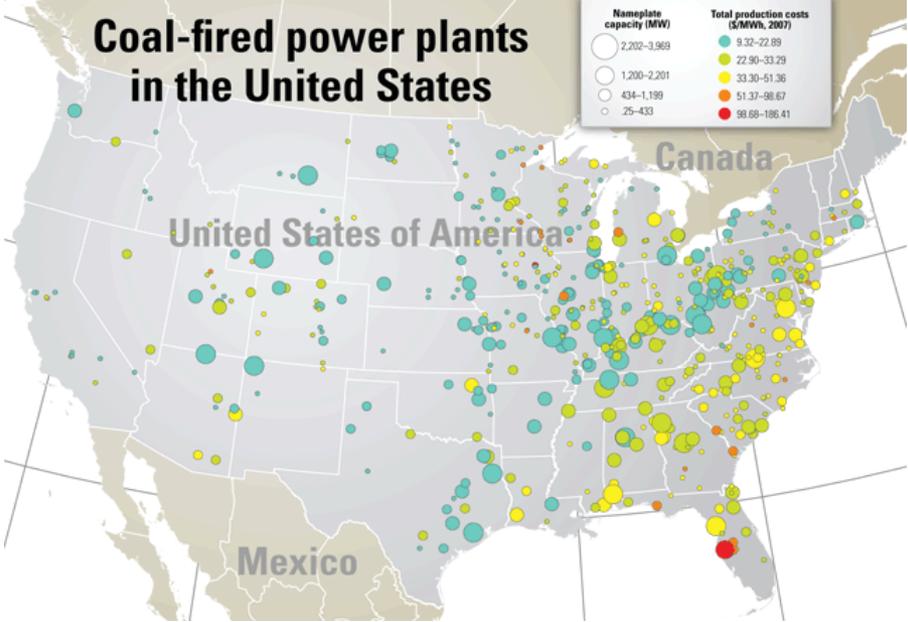
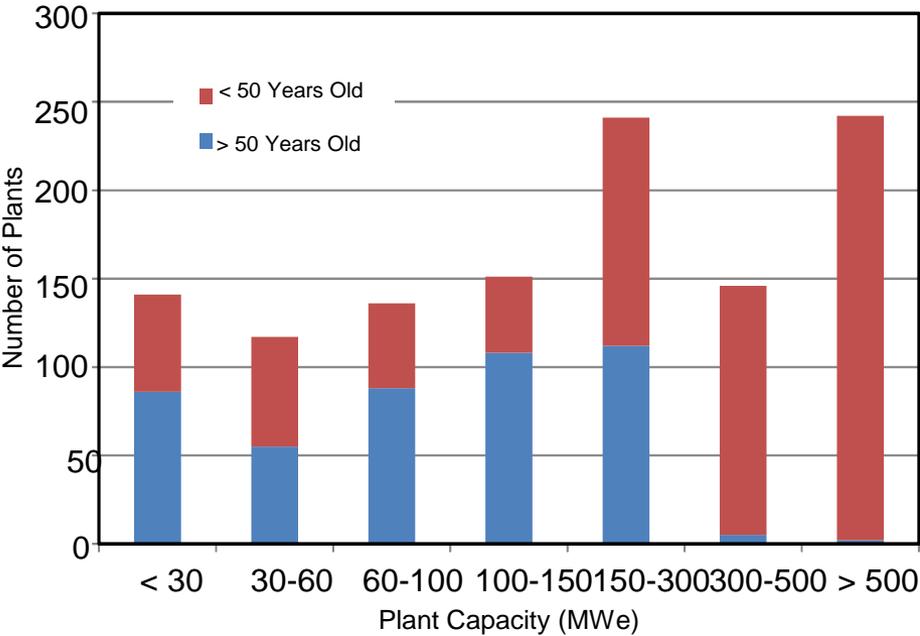
# Nuclear loan guarantees: an unrealized option for broader nuclear deployment

- Key provisions of DOE loan guarantees
  - Major revisions to rule making in December 2009 greatly improved the process
  - \$18.5B currently authorized with an additional \$36B requested in FY11 budget
  - Sec. 1703 applicants pay the credit subsidy cost directly
  - Solicitation required for utilities to apply for a loan guarantee
  - Final terms of guarantee not negotiated until COL is issued by the NRC
- OMB rules require authorization for issuing loan guarantees in an appropriations bill
- Current Status
  - Feb. 2010, conditional loan guarantee issued to Georgia Power for \$8.33B
  - May 2010, conditional loan guarantee for AREVA enrichment facility for \$2B
  - Oct. 2010, Constellation rejects loan guarantee terms
  - Consolidation in nuclear industry could reduce credit subsidy costs for reactors in the future (Duke and Progress)

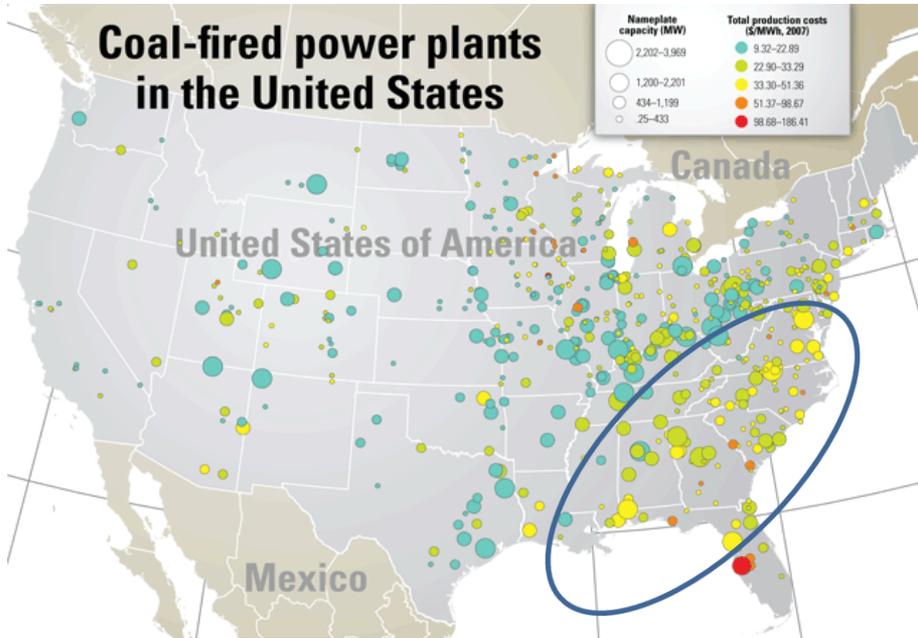
# Small Modular Reactors: an option for U.S. leadership

- Senate legislation in 111<sup>th</sup> Congress
  - S.2052 (Udall, Bingaman and Murkowski) supported R&D that included SMRs
  - S.2812 (Bingaman and Murkowski) supported licensing activities for SMRs
  - S.2052 and S.2812 passed out of committee July 21, 2010
  - Voinovich introduced a separate bill that included much of S.2052 and S.2812
- House legislation in 111<sup>th</sup> Congress
  - HR.5163 and HR.5164 introduced in House Energy and Commerce Committee to promote SMR development but no action taken
  - HR.5866 introduced in the House Science and Technology Committee to promote R&D including SMRs and passed out of the House on December 1, 2010
  - House bills were bipartisan bills
- Outlook
  - SMRs likely to get continued support in the Senate and the House
  - Major focus in the DOE programs although the budget is small
  - OMB not very supportive of SMRs
  - Not likely to get consideration for loan guarantees

# SMRs are a possible alternative to small and aging coal-fired plants that will be costly to replace



# SMRs as a replacement of coal-fired plants could leverage off of success of new nuclear construction in the South



\*Review Suspended by Applicant

\*\* COL Application Amended by Applicant to ESP on 03/25/2010

# Some indicators for the future of nuclear are good

- Demand for clean energy will continue to rise albeit possibly at a slower rate due to economic conditions
- Even with lack of a global consensus on climate change deployment of nuclear plants worldwide is accelerating
  - 63 units are under construction throughout the World (01/11)
  - China with ~10 GWe nuclear capacity has 27 plants under construction (~29.8 GWe) and is targeting nuclear capacity at 80 GWe by 2020, 200 GWe by 2030 and 400 GWe by 2050
- Demonstrated timeliness for construction in Japan
  - 37 months from pouring of concrete to first fuel loading
- DOE loan guarantees process is established and conditional commitments have been made
- Consolidation of nuclear utilities in the U.S (Duke Energy and Progress Energy)
- Administration's willingness to include nuclear in Clean Energy Standard

# Congressional recognition of importance of nuclear energy

- Support for the development of new nuclear plants remains a priority of many in Congress
  - Nuclear support (tax credits, loan guarantees, manufacturing tax incentives, etc.) was seen as critical to the passage of any climate bill in the Senate
- Nuclear energy R&D budget within the Department of Energy remains somewhat steady and key programs are expected to maintain Congressional support (fuel cycle R&D, small reactors and University programs)
- Reluctant support for a national CES in the Senate while the House will want to ensure regional flexibility

“The vast majority of the members on my committee support nuclear power, and so do the majority in the Senate.... I don’t think there is any question that we are going to be seeing new plants.”

*Sen. Barbara Boxer (D-CA)  
Chair, Environment and Public Works Committee  
December 17, 2006*

# Support for nuclear power is broad

“Nuclear energy is the best option to curb carbon emissions.”

*Dr. R. K. Pachauri  
Chairman, Intergovernmental Panel on Climate Change  
The Times of India, August 26, 2008*



“I have been a long-time supporter of nuclear energy. I believe clean, safe energy is what this country needs and what nuclear power has to offer.”

*Senator Tom Carper (D-DE)  
Chairman, Clean Air and Nuclear Safety Subcommittee  
Senate Committee on Environment and Public Works  
[http://carper.senate.gov/issues/energy\\_env.cfm](http://carper.senate.gov/issues/energy_env.cfm)*

“Nuclear power is one of the most promising alternative technologies that can help reduce our dependence on foreign sources of energy.”

*Senator Mary Landrieu (D-LA)  
Committee on Energy and Natural Resources  
6/27/2008 Press Release supporting nuclear power*



“I am an ardent supporter of expanding our country's nuclear capacity.”

*Congressman James Clyburn (D-SC)  
Former House Majority Whip  
<http://clyburn.house.gov/pressroom-statements-detail.cfm>*

# Expanding U.S. nuclear energy:

Issues	5-year actions
Initial orders	<ul style="list-style-type: none"><li>● Implement risk insurance and execute loan guarantees</li><li>● Fully test the COL process</li><li>● Limit design revisions (AP1000, EPR, etc.)</li></ul>
U.S. industrialization	<ul style="list-style-type: none"><li>● Commitment leads to investment stability</li><li>● Complete projects on schedule and within budget</li><li>● Invest in designer and manufacturing capability</li><li>● Role of SMRs: possible U.S. leadership</li></ul>
Sustainable fuel cycle	<ul style="list-style-type: none"><li>● Spent fuel ownership</li><li>● NWPA modifications</li><li>● Long-term interim storage to lead to a closed fuel cycle?</li></ul>
R&D infrastructure	<ul style="list-style-type: none"><li>● Investments in new reactor and fuel cycle technology</li></ul>
Some Challenges	<ul style="list-style-type: none"><li>● Cheap natural gas</li><li>● Nuclear waste disposal</li><li>● No price on carbon</li><li>● Commodity prices, design changes and plant costs</li></ul>



# **Oak Ridge National Laboratory: Science and technology for the energy challenge**

**[www.ornl.gov](http://www.ornl.gov)**