

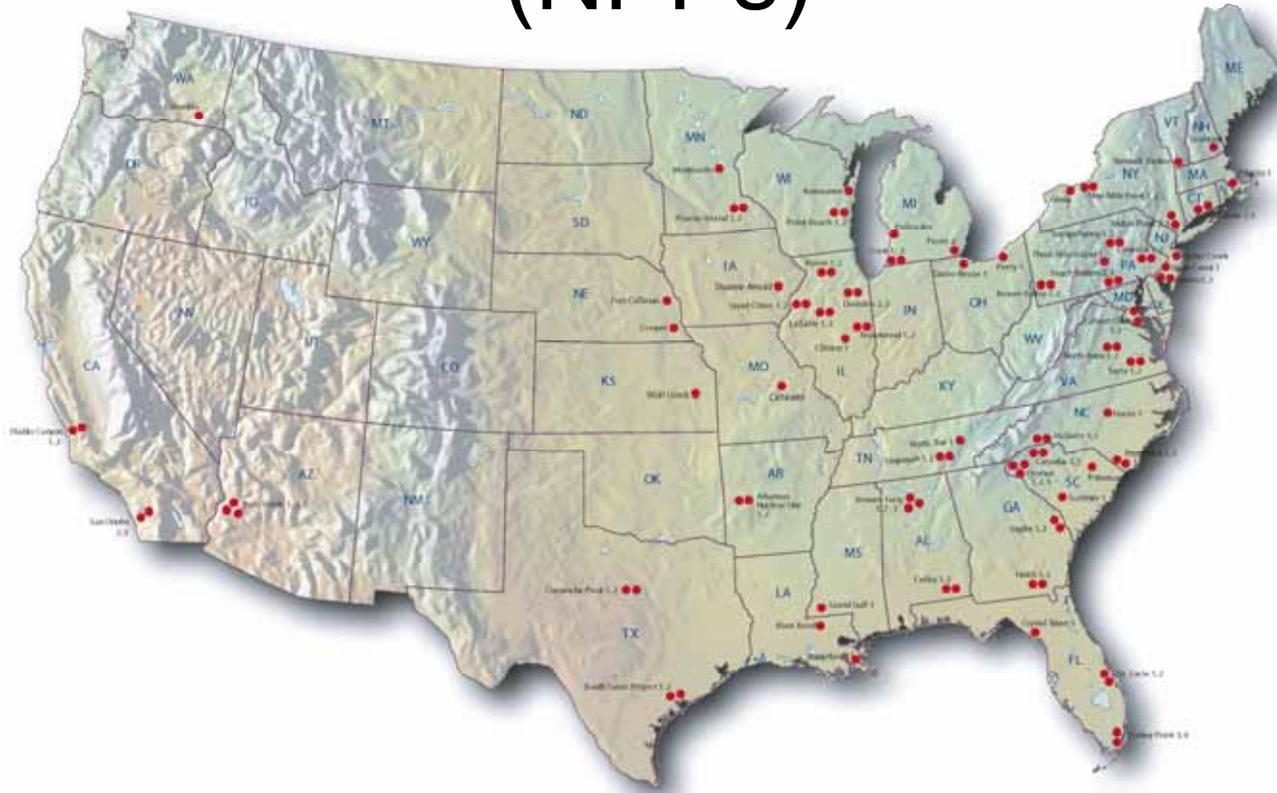
# STATE AND ACTIVITIES OF NUCLEAR ENERGY IN THE UNITED STATES

William E. Burchill, Ph.D.  
President  
American Nuclear Society  
Retired Department Head  
Nuclear Engineering  
Texas A&M University

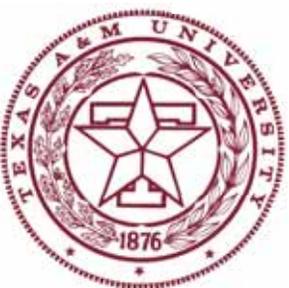
Korean Nuclear Society 40<sup>th</sup> Anniversary  
Jeju, South Korea  
May 21, 2009



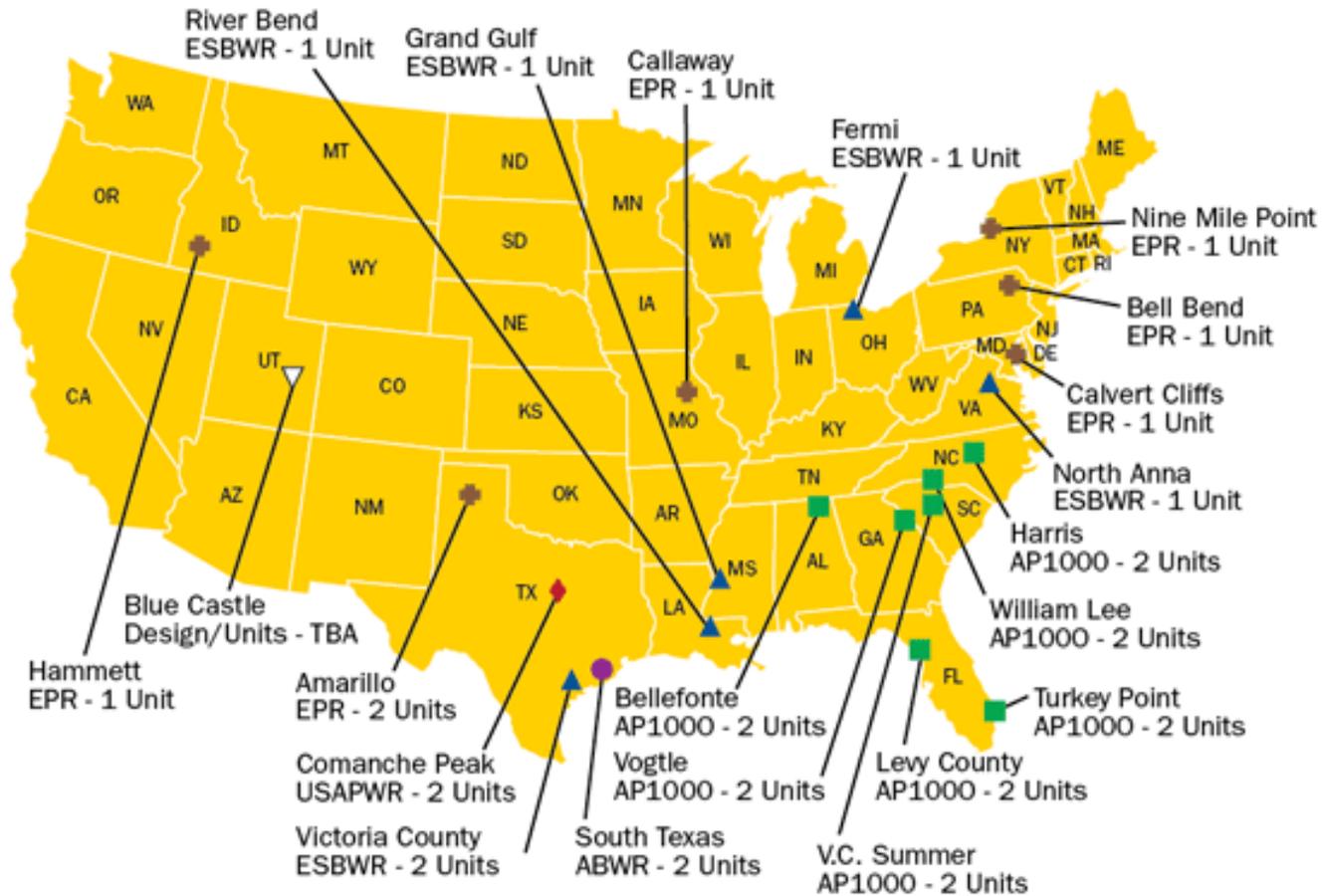
# U.S. Operating Nuclear Power Plants (NPPs)



104 Operating Reactors  
~20% of U.S. Electricity



# Announced Potential New NPPs



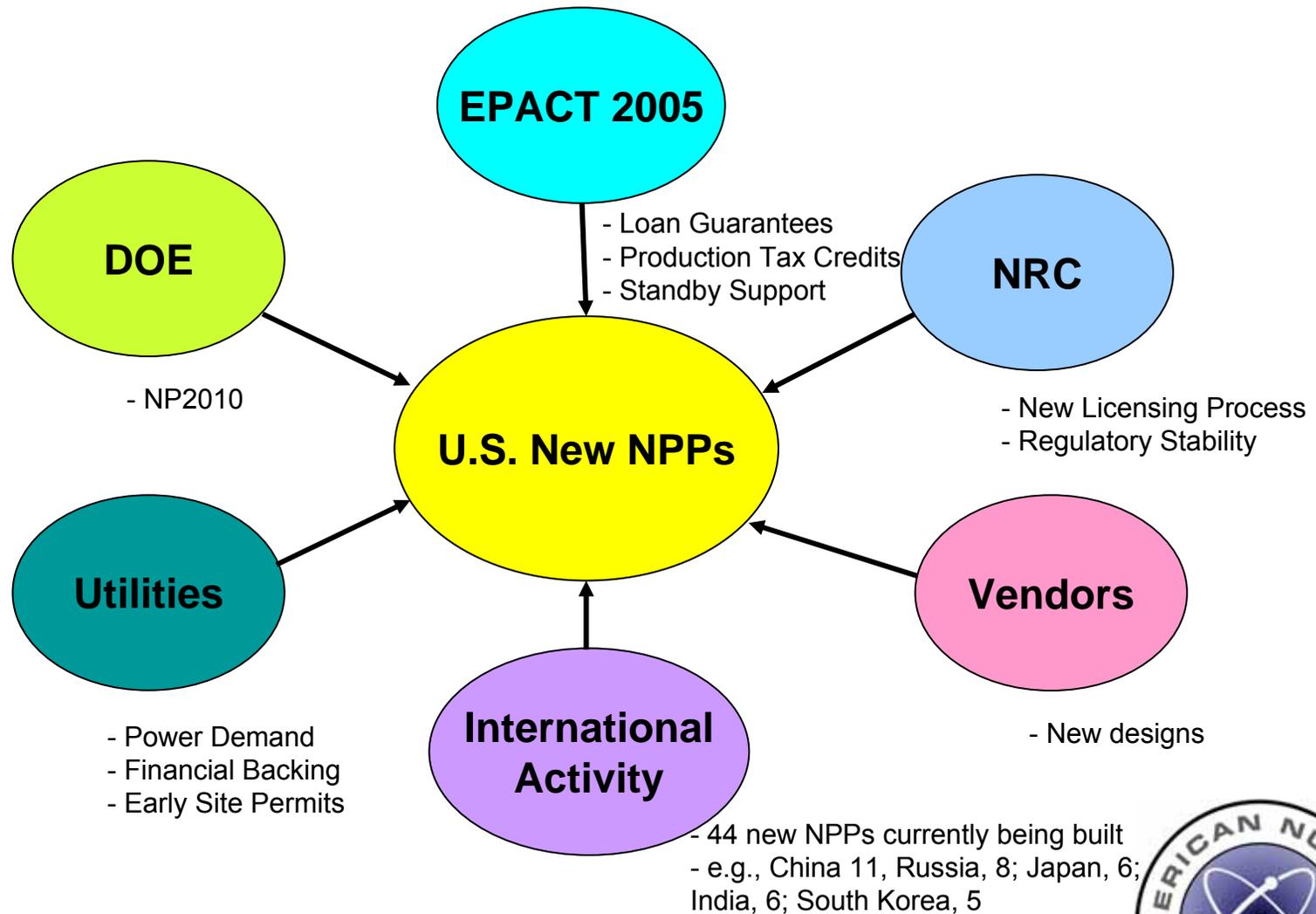
You may click on a design name to view the NRC's Web site for the specific design.

● ABWR   
 ■ AP1000   
 + EPR   
 ▲ ESBWR   
 ◆ USAPWR   
 ▽ Design/Units - TBA

Source: Nuclear Regulatory Commission website, 3/09



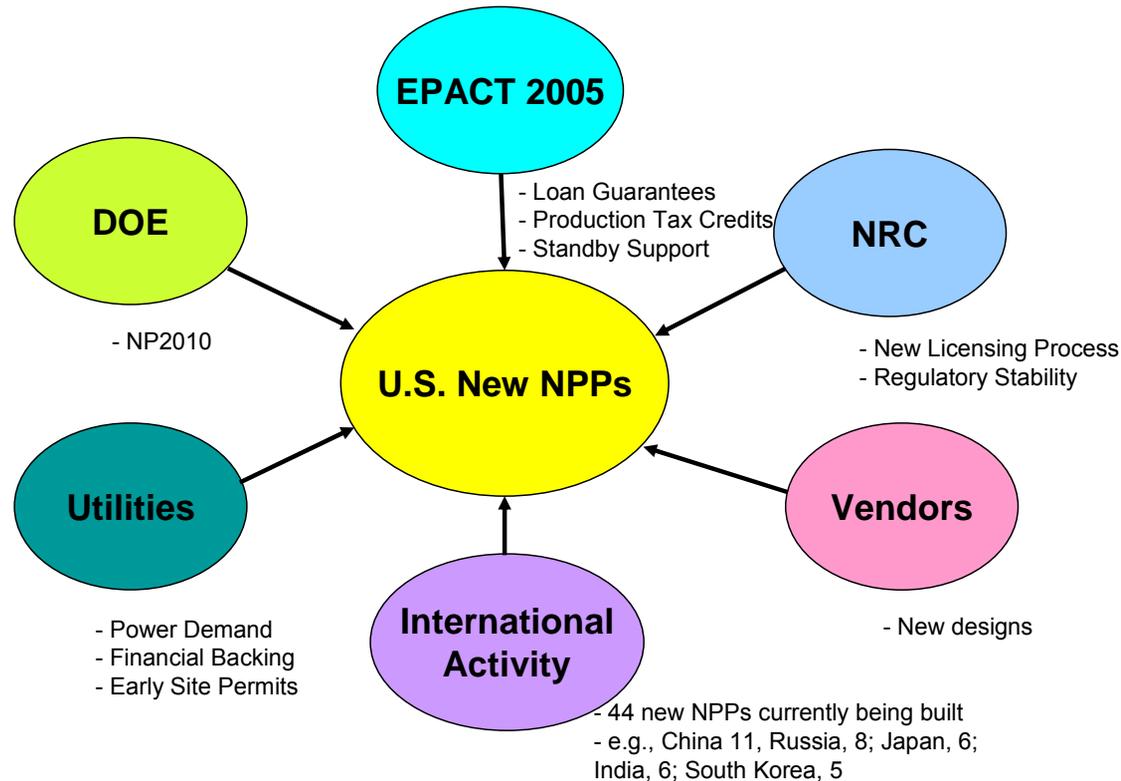
# Factors Which Influence Consideration of New U.S. NPPs



***Many factors are converging NOW!***



# Factors Which Influence Consideration of New U.S. NPPs

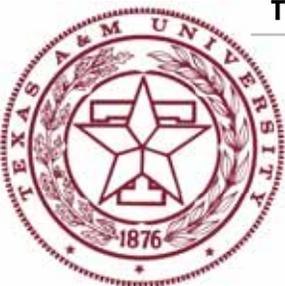


***Many factors are converging NOW!***  
***THE BIGGEST MAY BE***  
***PUBLIC CONCERN OVER***  
***POTENTIAL CLIMATE CHANGE***

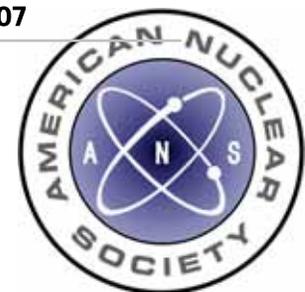


# Status of COL Applications

Company	NPP Design	Number of Units	COL Submittal Date
Alternate Energy Holdings	EPR	TBD	FY 2009
Amarillo Power	EPR	TBD	FY 2009
Constellation (UniStar)	EPR	2	March 2008/September 2008
Detroit Edison	ESBWR	1	September 2008
Dominion	TBD	1	November 2007
Duke	AP1000	2	December 2007
Entergy	TBD	1	September 2008
Entergy (NuStart )	ESBWR	1	February 2008
Exelon	TBD	TBD	TBD
Exelon	ABWR	2	September 2008
Florida Power & Light	TBD	2	FY 2009
Luminant	APWR	2	September 2008
NRG Energy / STPNOC	ABWR	2	September 2007
PPL Corp.	EPR	1	October 2008
Progress Energy	AP1000	4	February 2008/July 2008
South Carolina Electric & Gas	AP1000	2	March 2008
Southern Company	AP1000	2	March 2008
TVA (NuStart )	AP1000	2	October 2007



Source: Nuclear Energy Institute  
 Updated: 5/09  
 See also NRC website



# New NPP Orders

4/8/08



5/27/08



1/5/09



Each contract is for two 1,000 MWe AP1000s and related facilities.

2/25/09



Contract is for two 1,400 MWe ABWRs and related facilities.

Sources: Georgia Power, SCANA, Progress Energy, STPNOC, Shaw, Westinghouse, Toshiba Press Releases



# Other Major New U.S. Nuclear Facilities

- 1 Heavy Components Fabrication Facility
  - Areva Newport News (JV with Northrup-Gruman) in Virginia
- 1 MOX Fabrication Facility
  - Areva at Savannah River Site in North Carolina
- 4 New Enrichment Facilities
  - Areva in Idaho
  - General Electric in North Carolina
  - Louisiana Energy Services in New Mexico (COLA approved by NRC July 06)
  - US Enrichment Corp in Ohio
- 3 Reprocessing Facilities (letters of intent to NRC)
  - Areva
  - Louisiana Energy Services
  - Proprietary submittal
- 1 Waste Vitrification Demo Facility
  - DOE Hanford in State of Washington



# The Challenges

- Re-establish the nuclear infrastructure

Utilities  
Vendors  
Labor

Universities  
Government  
Investors

- Determine fabrication sources
- Maintain high performance standards
- Address proliferation concerns
- Continue to build public confidence
- Gain political support
- Long-term nuclear waste disposal
  - License Yucca Mtn.
- Close the nuclear fuel cycle

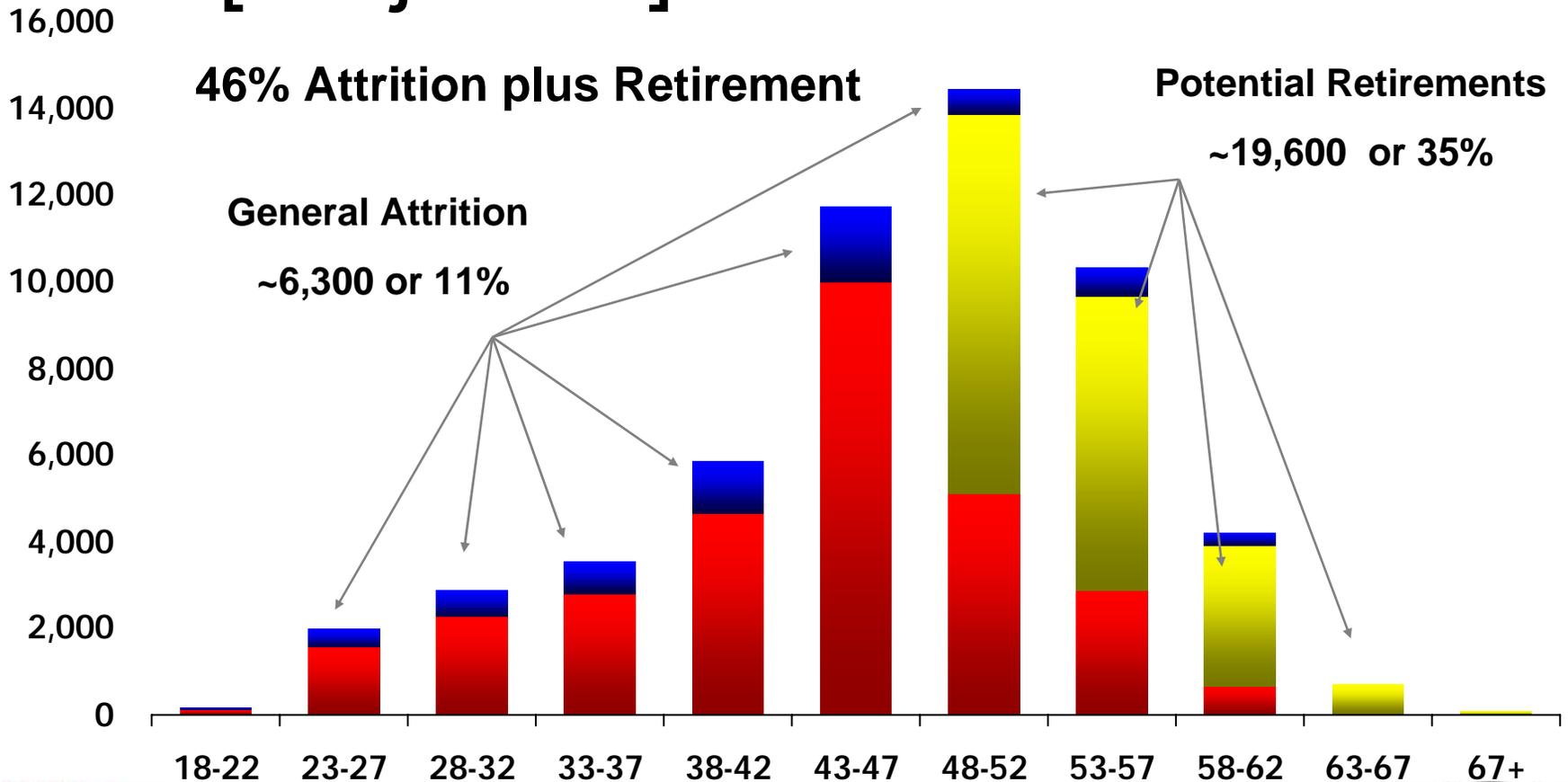
Infrastructure

Public and  
Political  
Support

Nuclear Waste  
Management



# Nuclear Generation Worker [Projected] 5-Year Attrition

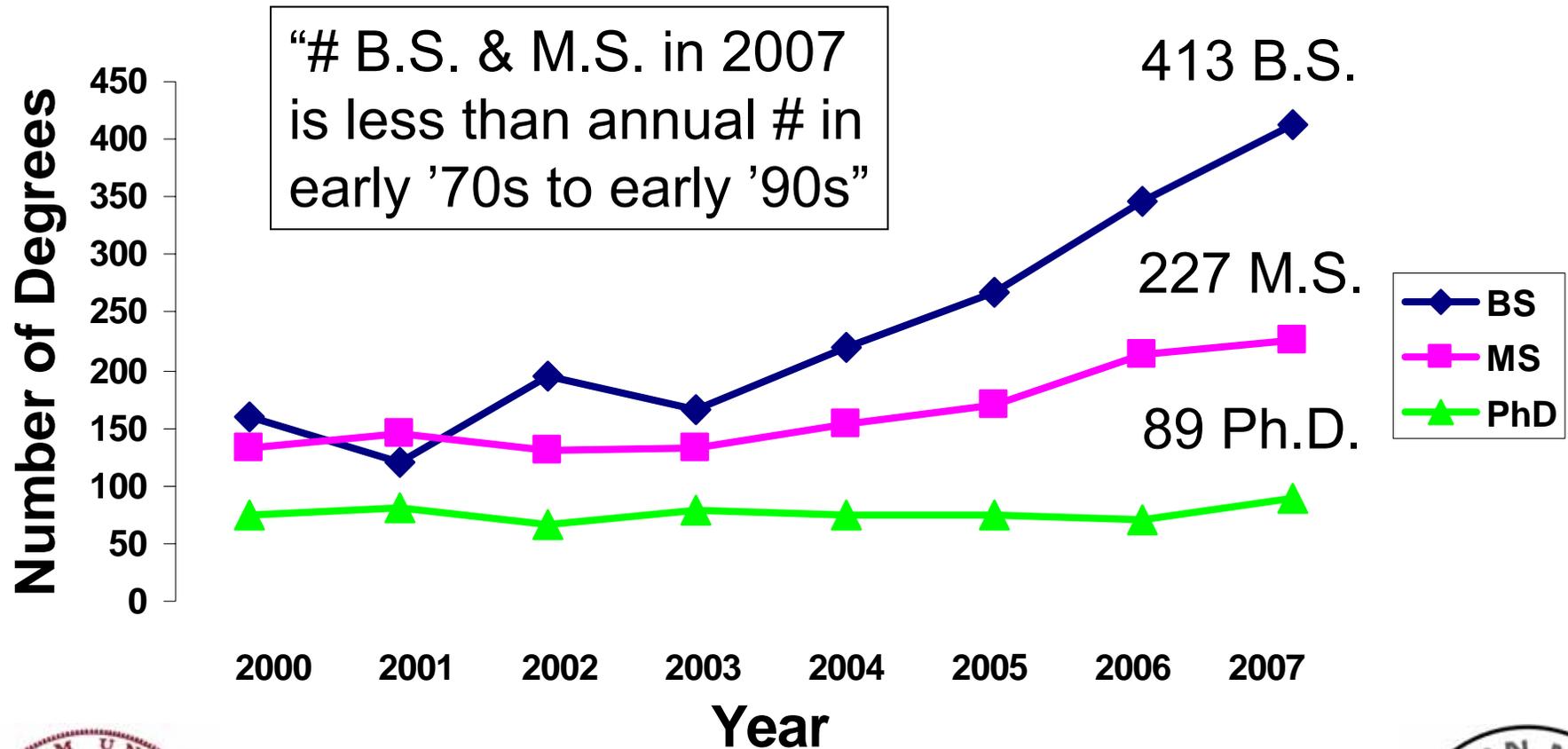


Potential Retirees are defined as employees that will be older than 53 with 25+ years of service, or older than 63 with 20 years of service, or older than 67 within the next five years.

Source: "NEI Work Force Report," Nuclear Energy Institute, December, 2007



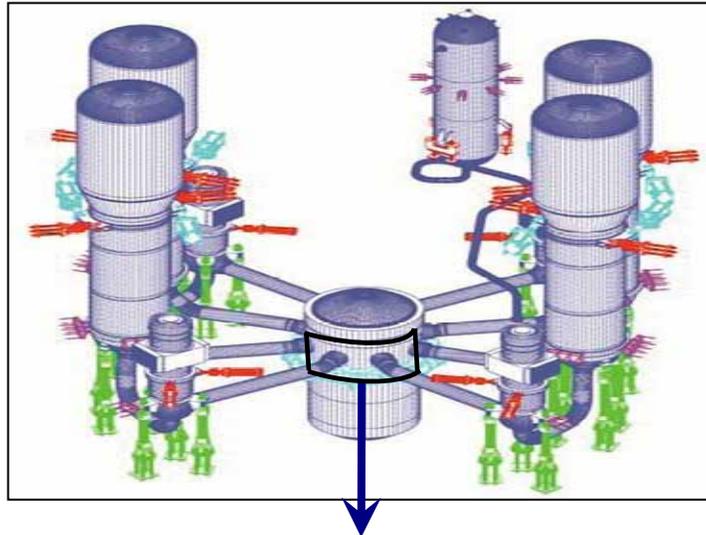
# Nuclear Engineering Graduates to Support the Nuclear Renaissance



Source: “Nuclear Engineering Enrollments and Degrees Survey,” 2007 Data, Oak Ridge Institute for Science and Education



# Heavy Metal Fabrication Sources



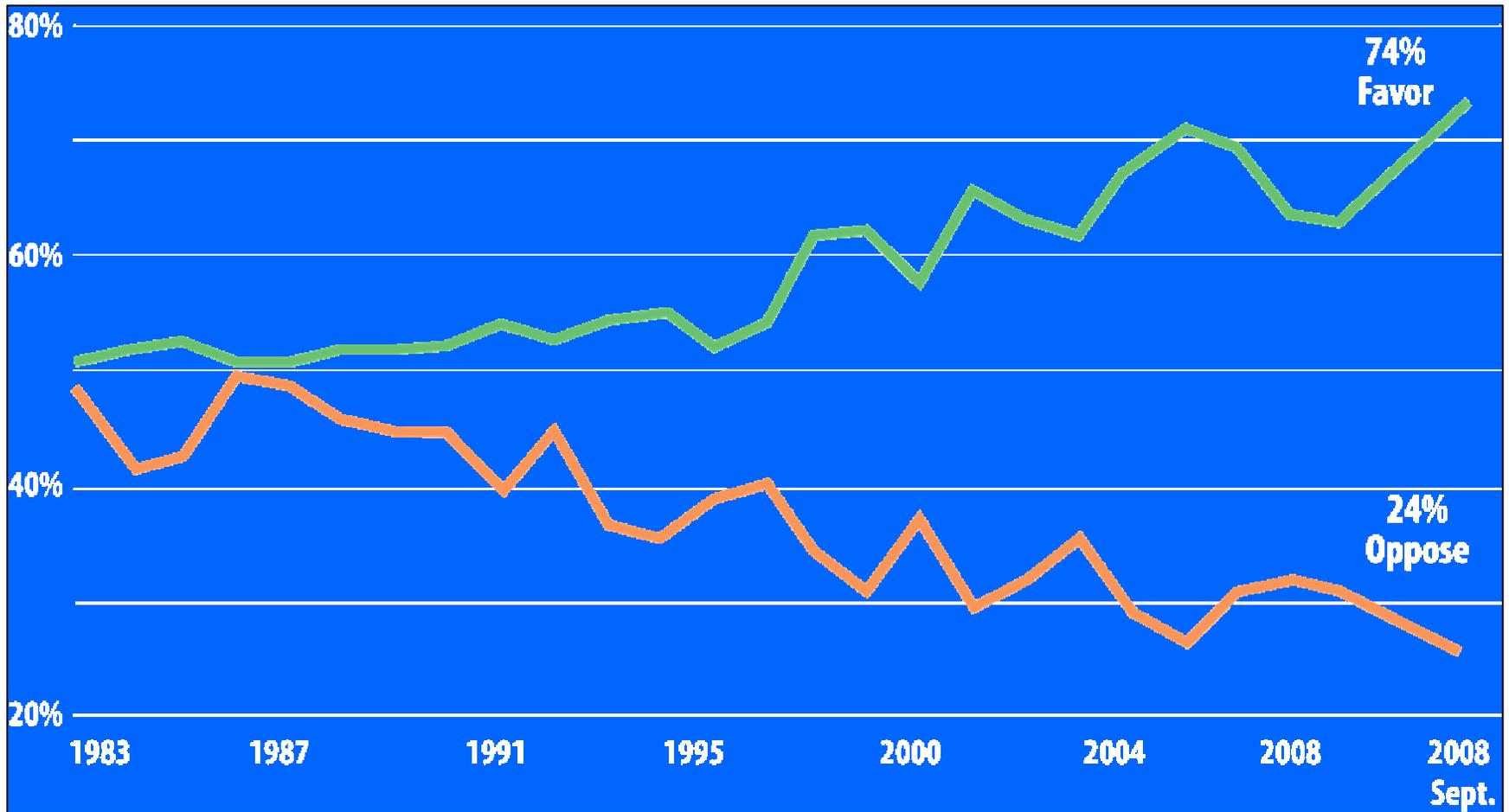
Nozzle shell  
forging for  
U.S. EPR #1  
at Japan  
Steel Works



Source: Unistar



# U.S. Public Opinion Of Nuclear Power



Source: Bisconti Research  
9/08



# Political Support



4/5 Prague: “We must harness the power of nuclear energy on behalf of our efforts to combat climate change...”

4/20 Beijing: “We believe that nuclear energy must remain a significant component of our own energy mix ...”



5/7 DOE announced FY 2010 Budget request of \$845M for nuclear programs

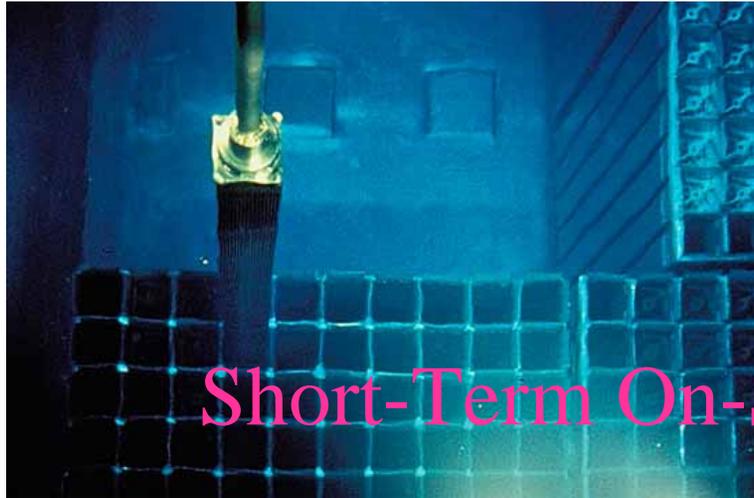
5/7 NRC announced FY 2010 Budget request of \$1.07B (\$248M for new reactors)



Congress has authorized \$18.5B in loan guarantees for new reactors

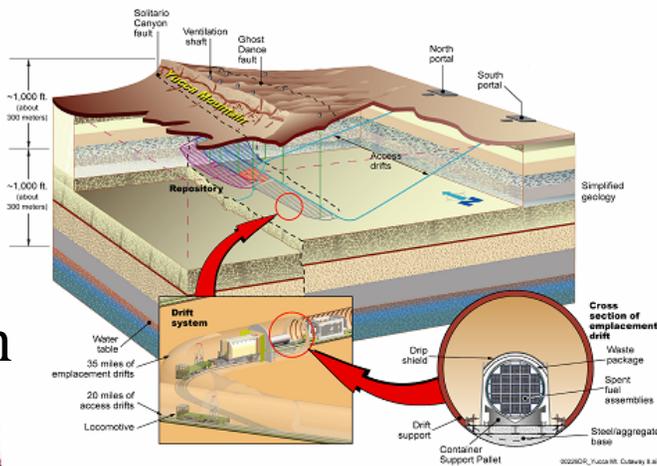


# Nuclear Waste Disposition



Short-Term On-Site Storage at NPPs

Long-Term Storage  
Yucca Mountain



Ultimate Options:

- Fuel Reprocessing
  - Recycle Fissile Material
  - Transmute High Level Waste
  - Vitrify Residual Waste
- As demonstrated currently in France, Russia, Japan and previously in USA



# WIPP Has Operated for 10 Years

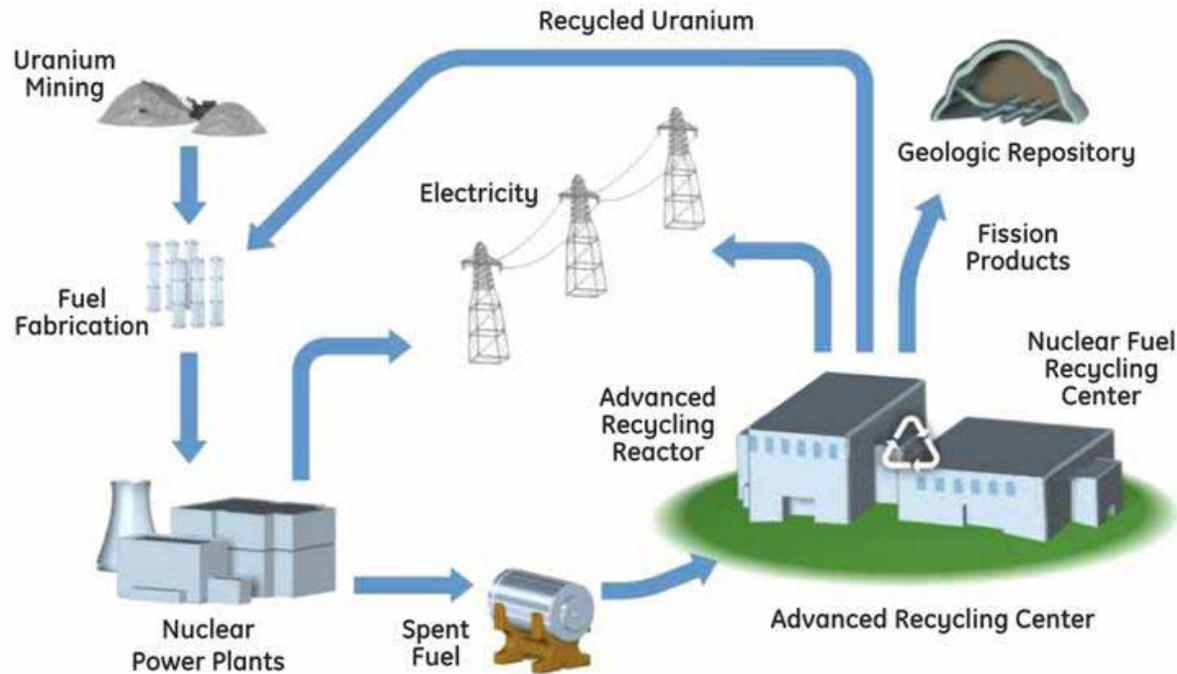


**“The Salado Salt Formation (WIPP) can take as much nuclear waste of any type from anywhere for the next ten thousand years.”**

**James Conca  
UNM**



# Close The Nuclear Fuel Cycle



- Re-establish reprocessing
- Establish recycling (MOX with or without advanced reactors)
- Define HLW forms
- Establish geologic repository



# QUESTIONS AND DISCUSSION

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