THE U.S. NUCLEAR RENAISSANCE AND THE CHALLENGES IT PRESENTS

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NRG 0.1 Seminar
California Institute of Technology
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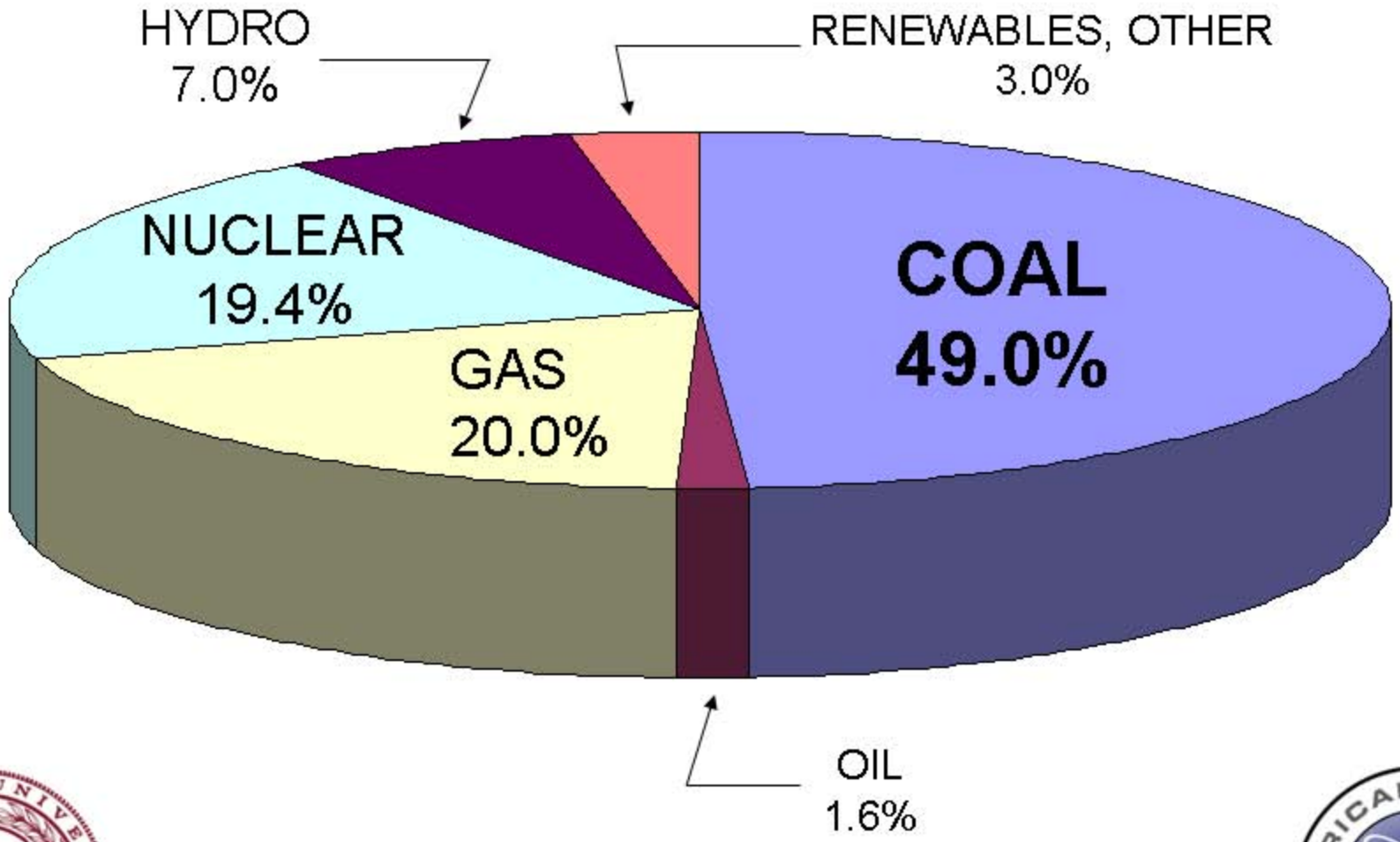
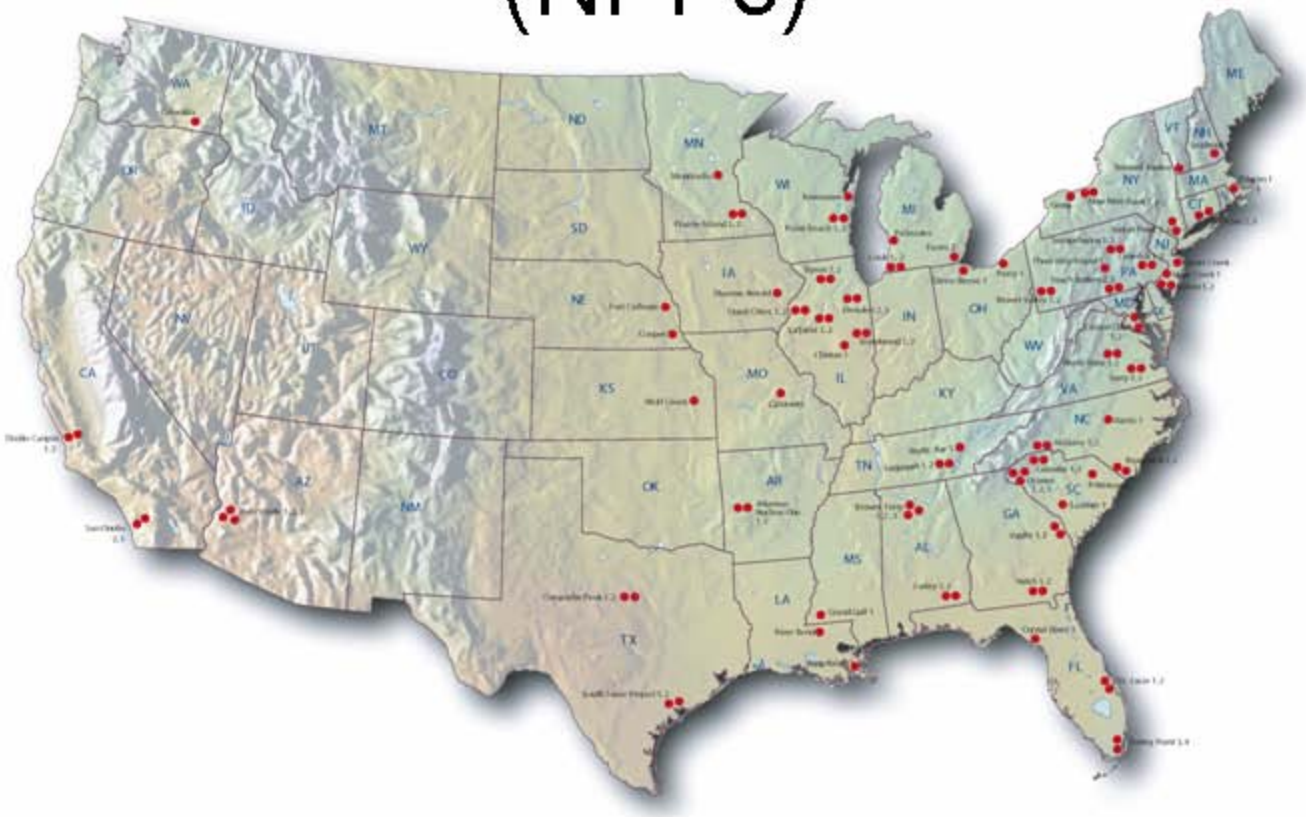
U. S. Electricity Generation by Fuel (2006)



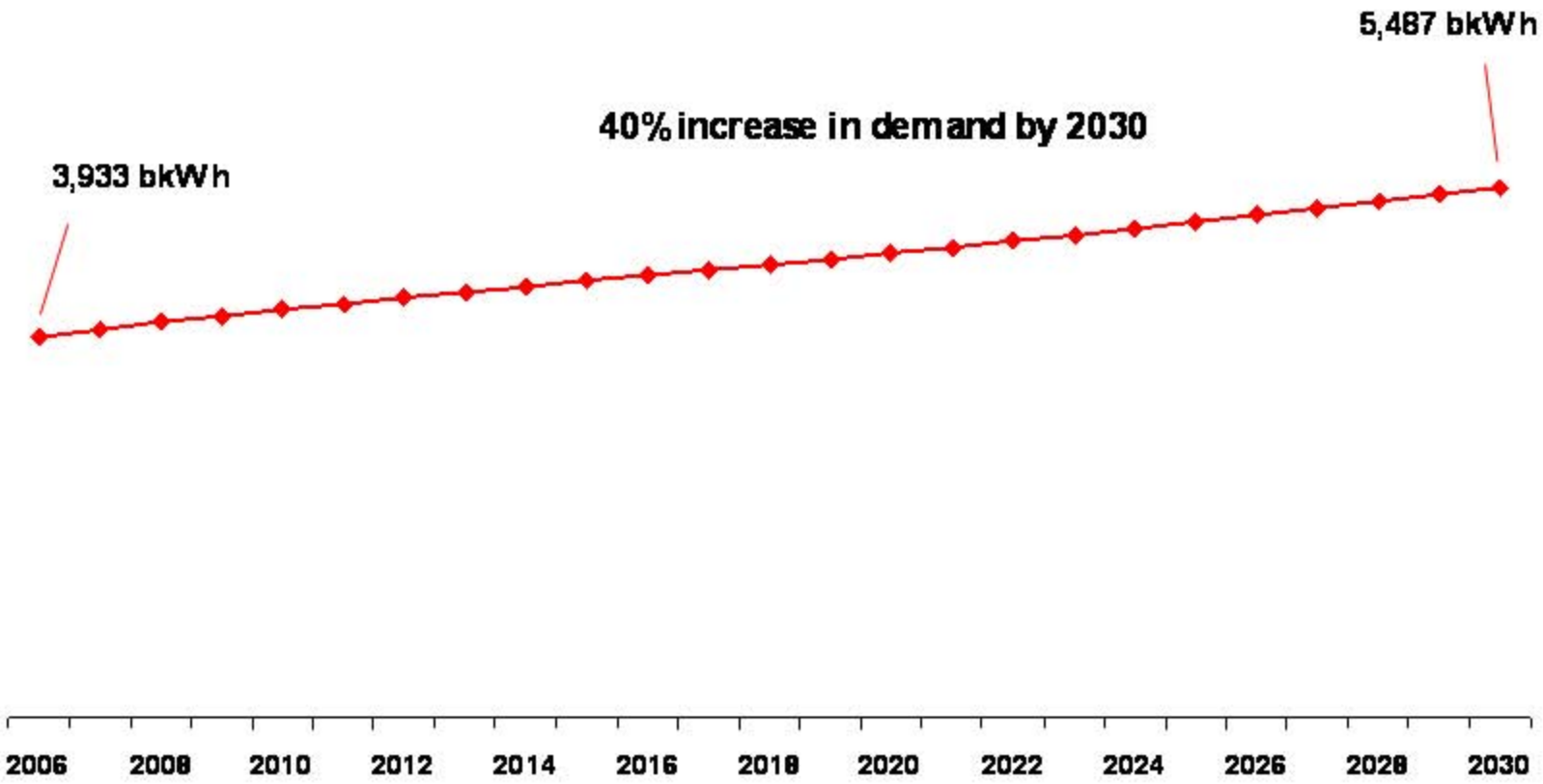
Source: DOE EIA
Updated 10/07

U.S. Operating Nuclear Power Plants (NPPs)



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

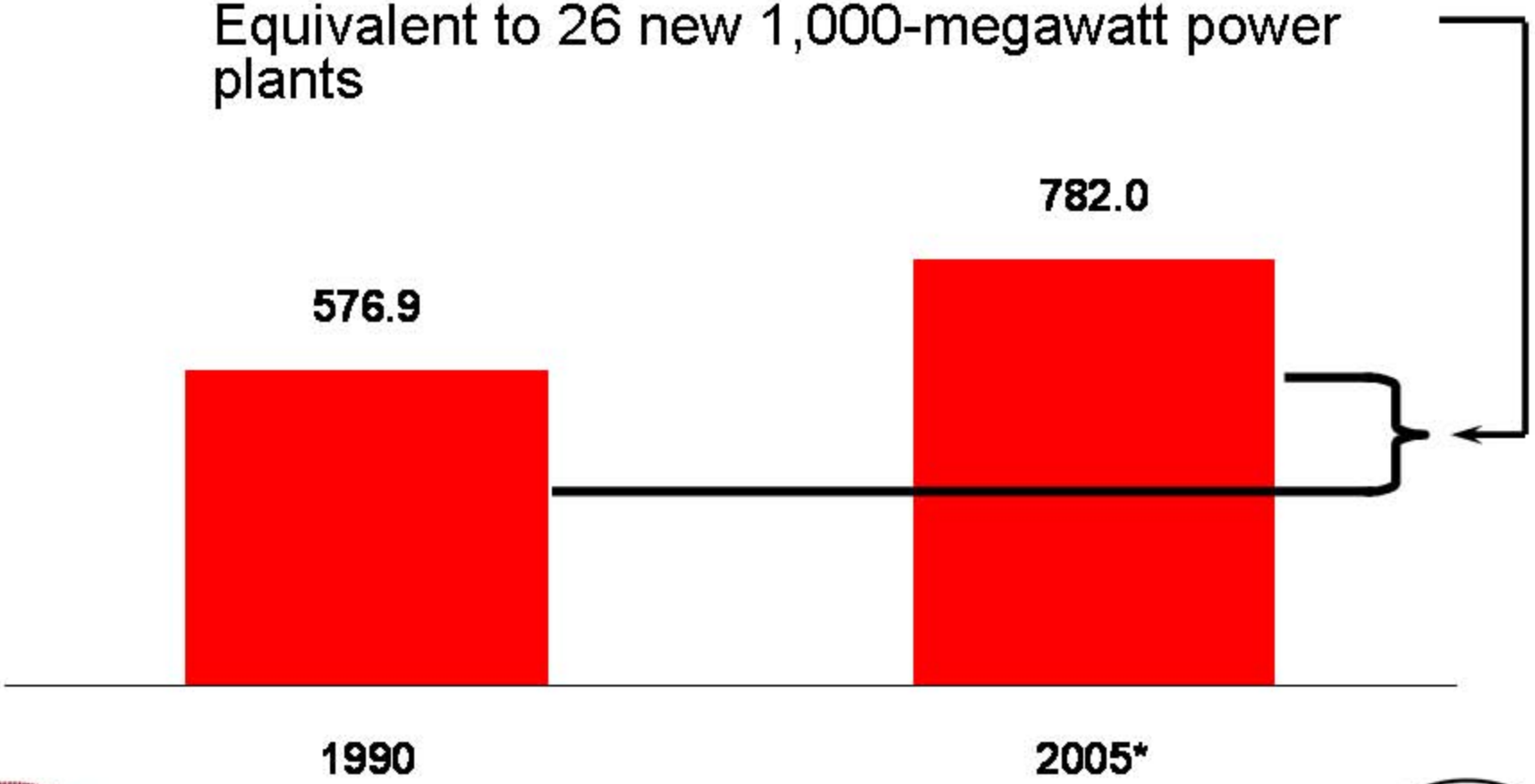
U.S. Electricity Demand Growth



Source: DOE EIA's 2007 Annual Energy Outlook
Updated: 1/07

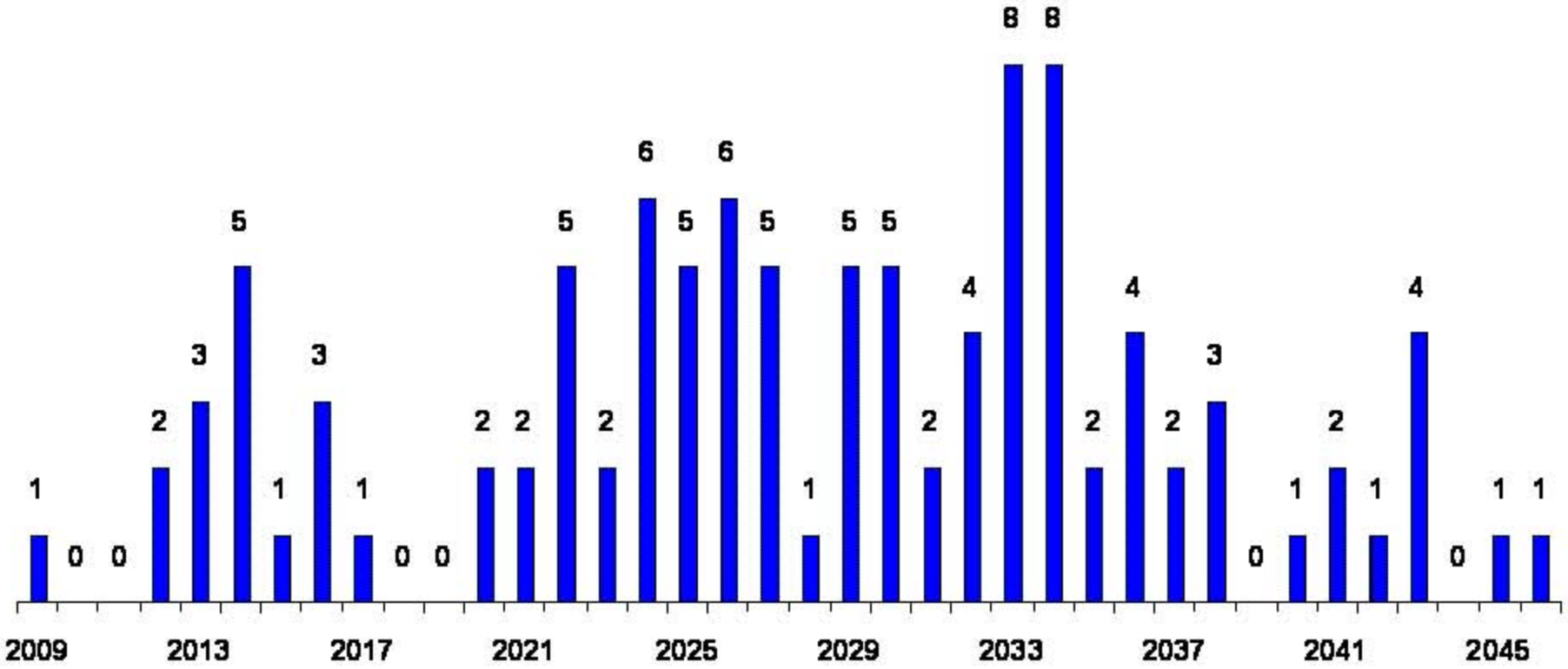
Growth of U.S. NPP Production During Recent 15 Years (billion kWh)

Equivalent to 26 new 1,000-megawatt power plants



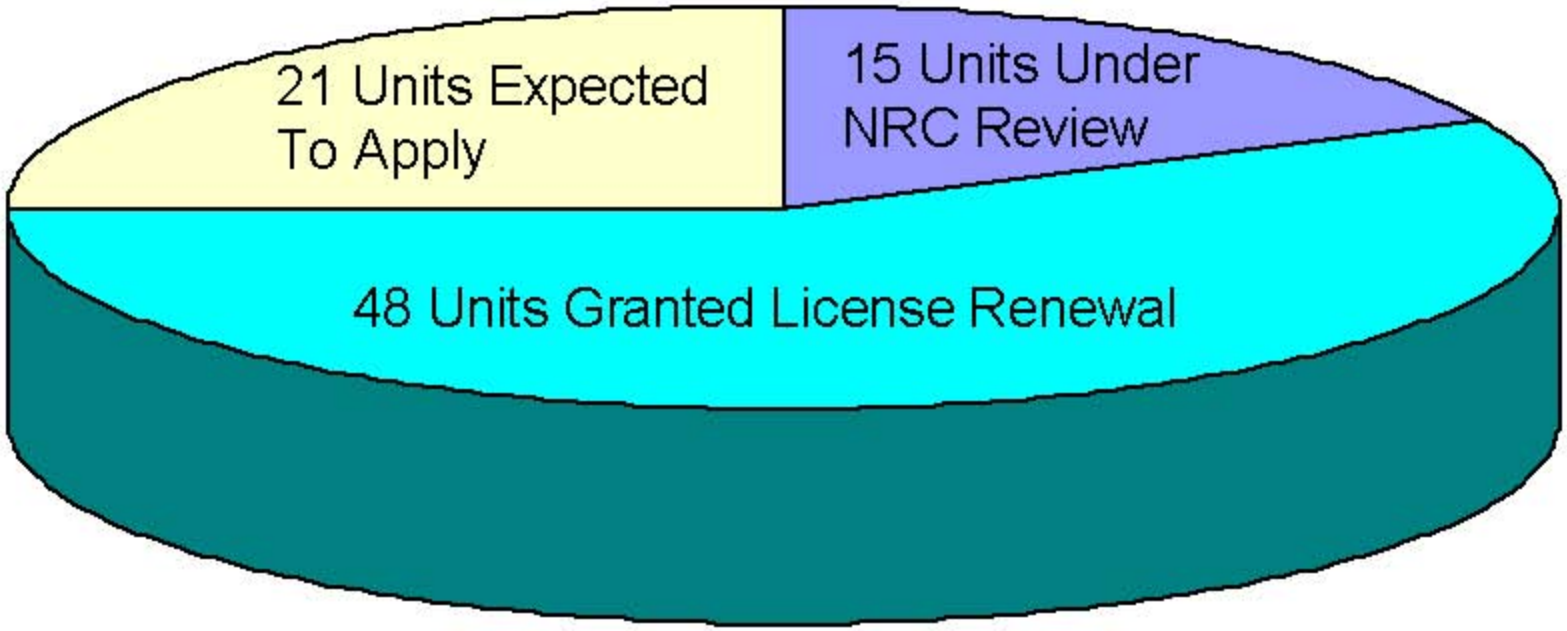
*Source: Global Energy Decisions / DOE Energy Information Administration
Updated: 4/06

Expiration Of U.S. NPP Licenses 2009-2046



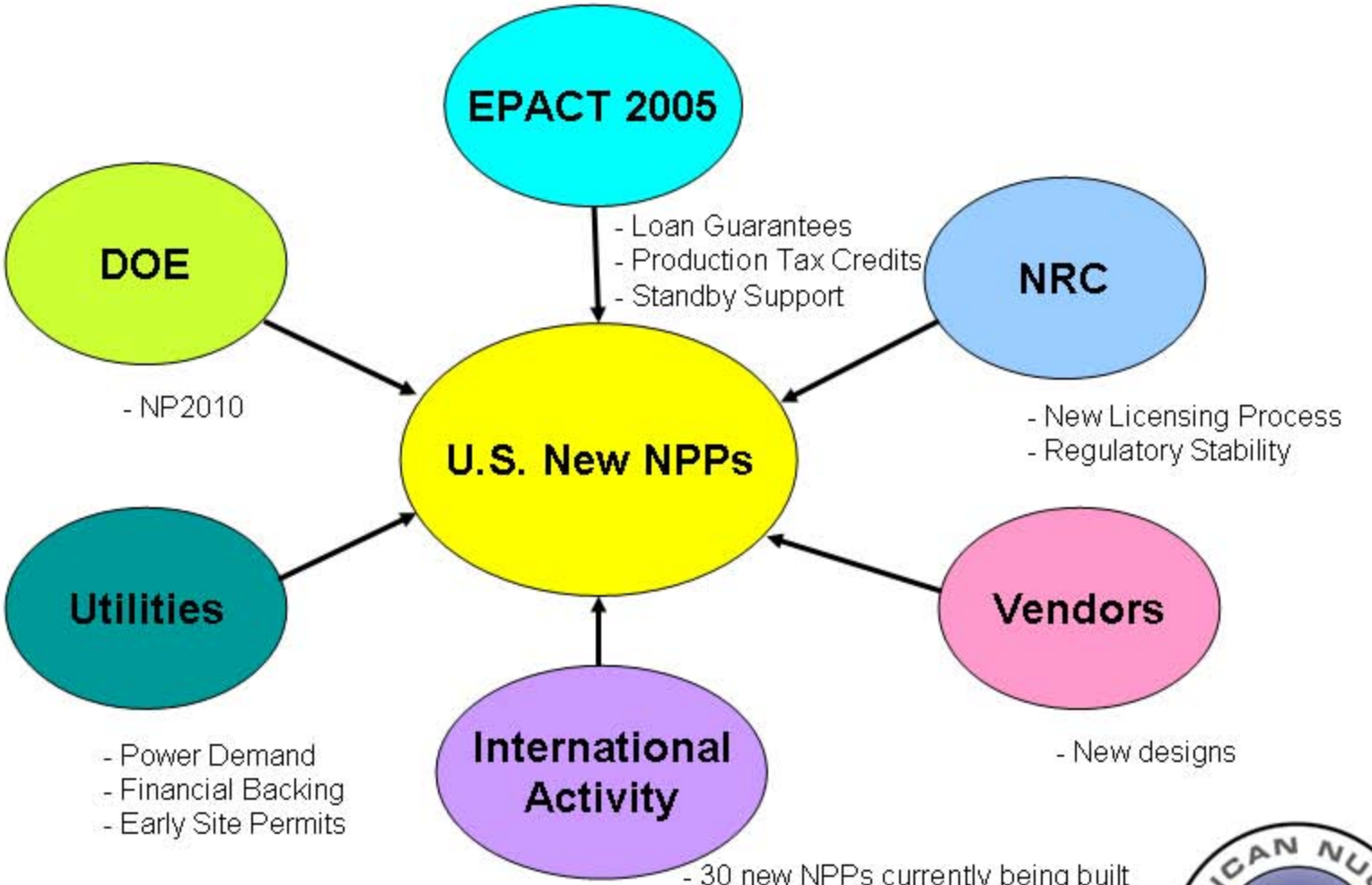
Source: U.S. Nuclear Regulatory Commission
Updated: 1/07

U.S. Applications For License Renewal



Source: U.S. Nuclear Regulatory Commission
Updated: 1/08

Factors Which Influence Consideration of New U.S. NPPs



Many factors are converging NOW!

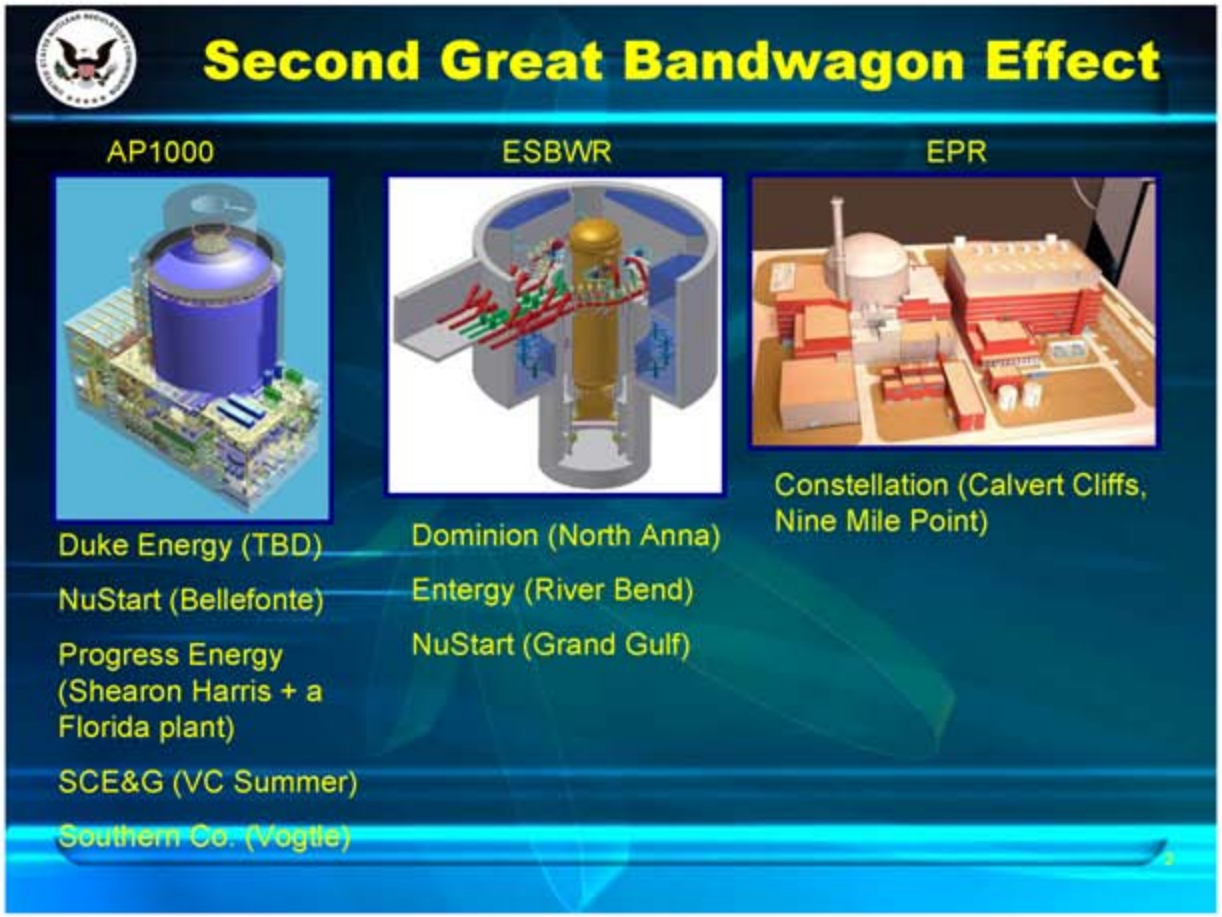
New NRC NPP Licensing Process

Early Site Permit (ESP)

Design Certification (DC)

Combined Construction and Operation License (COL)

> 30 COL Applications Announced Since January, 2006



Source: U.S. Nuclear Regulatory Commission
2006 Regulatory Information Conference

Announced COL Applications

Company	NPP Design	Number of Units	COL Submittal Date
Alternate Energy Holdings	EPR	TBD	FY 2009
Amarillo Power	EPR	TBD	FY 2009
AmerenUE	EPR	TBD	FY 2008
Constellation (UniStar)	EPR (3)	3	FY 2008
Detroit Edison	TBD	TBD	FY 2008
Dominion	ESBWR	1	November 2007
Duke	AP1000	2	December 2007
Duke	TBD	TBD	TBD
Entergy	ESBWR	1	FY 2008
Entergy (NuStart)	ESBWR	1	FY 2008
Exelon	TBD	TBD	TBD
Exelon	ESBWR	2	FY 2008
Florida Power & Light	TBD	2	FY 2009
Luminant	APWR	2	FY 2008
NRG Energy / STPNOC	ABWR	2	September 2007
PPL Corp.	EPR	1	FY 2009
Progress Energy	AP1000	4	FY 2008
South Carolina Electric & Gas	AP1000	2	TBD
Southern Company	AP1000	2	FY 2008
TVA (NuStart)	AP1000	2	October 2007

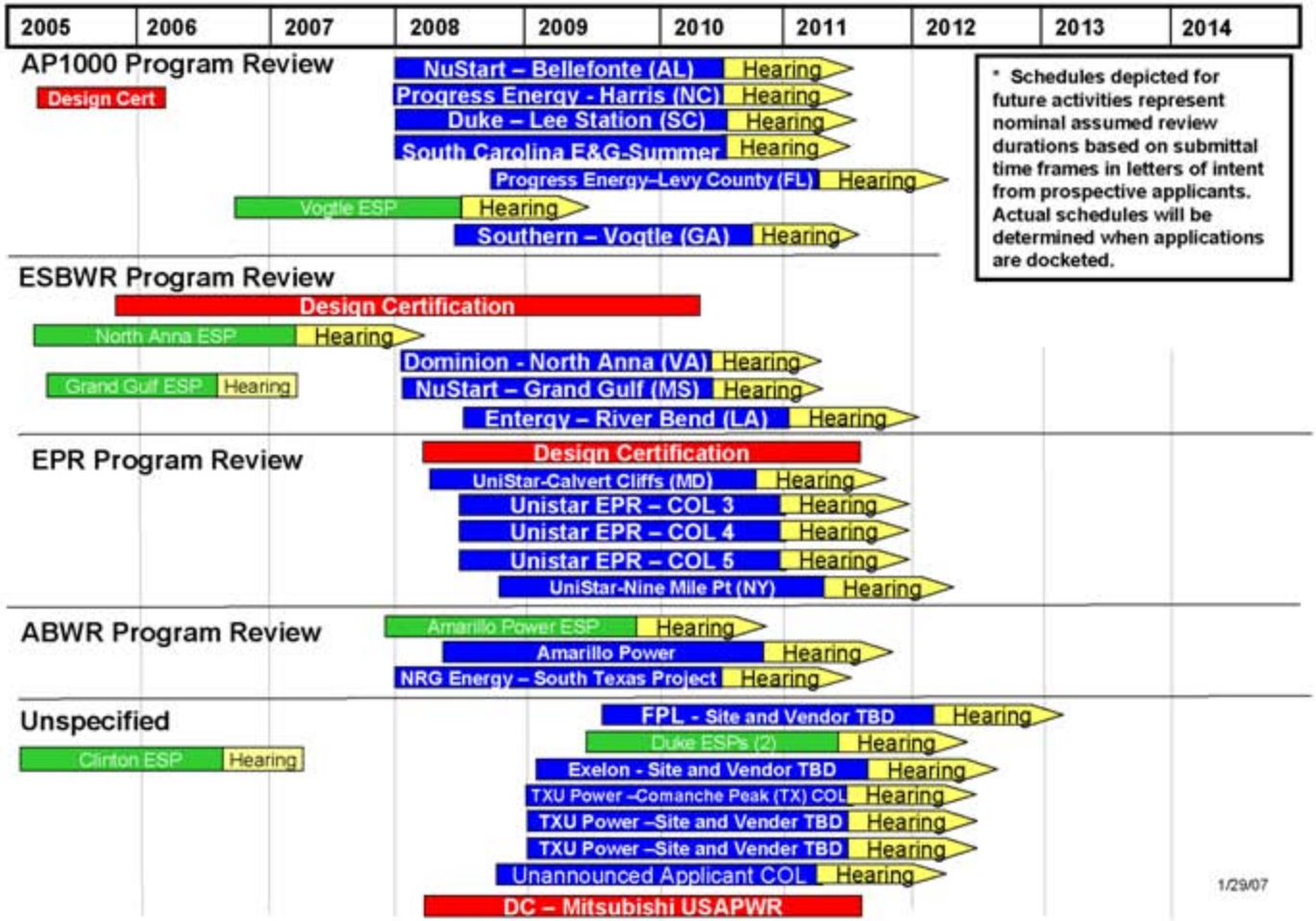
Source: Nuclear Energy Institute
Updated: 1/08

Summary of COL Applications

- 17 companies preparing COL applications for at least 33 reactors
- 4 designs certified, 1 under review, 2 being prepared for review
- 3 early site permits issued, 1 under review, 6 companies considering applications
- Industry expenditure to date on new NPPs – $2+ billion
- 4 COL applications submitted in 2007

Source: Nuclear Energy Institute
Updated: 1/08

New NPP Licensing Applications



Source: U.S. Nuclear Regulatory Commission
2007 Regulatory Information Conference

The Challenges

Infrastructure

- Re-establish the nuclear infrastructure

Utilities	Universities
Vendors	Government
Labor	Investors

- Determine fabrication sources

Public and Political Support

- Maintain high performance standards
- Address proliferation concerns
- Continue to build public confidence

Nuclear Waste Management

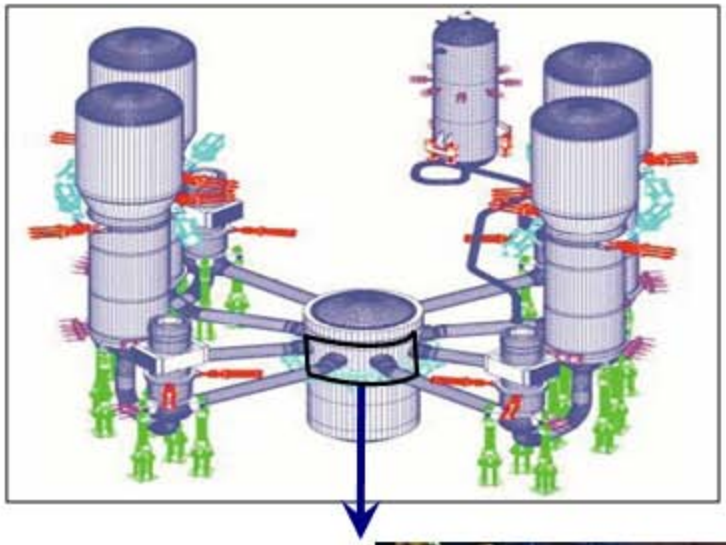
- Long-term nuclear waste disposal
  - License Yucca Mtn.
- Close the nuclear fuel cycle

Examples of Infrastructure Issues

- DOE funding for university Nuclear Education Programs
- Knowledge, experience, & labor shortages
- DOE failure to implement 1982 Nuclear Waste Policy Act
  - DOE Standard Contract with utilities
  - Accept SNF by January 31, 1998
- Delays in applying for Yucca Mountain repository license following 2002 approvals by Congress and President
- Slow implementation of 2005 Energy Policy Act
  - 4/24/06, Production tax credit
  - 8/4/06, Standby support coverage
  - 10/4/07, Clean-energy loan guarantee program

Fabrication Sources

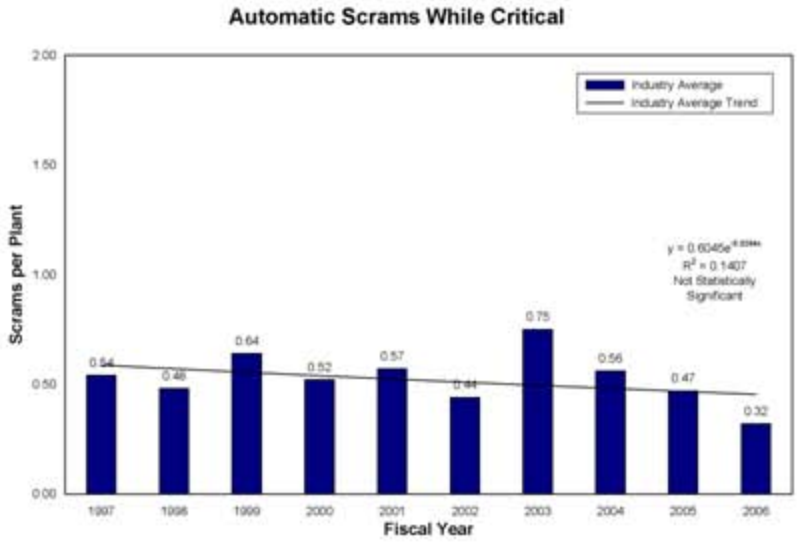
U.S. EPR #1 forgings are currently in production at Japan Steel Works (JSW)

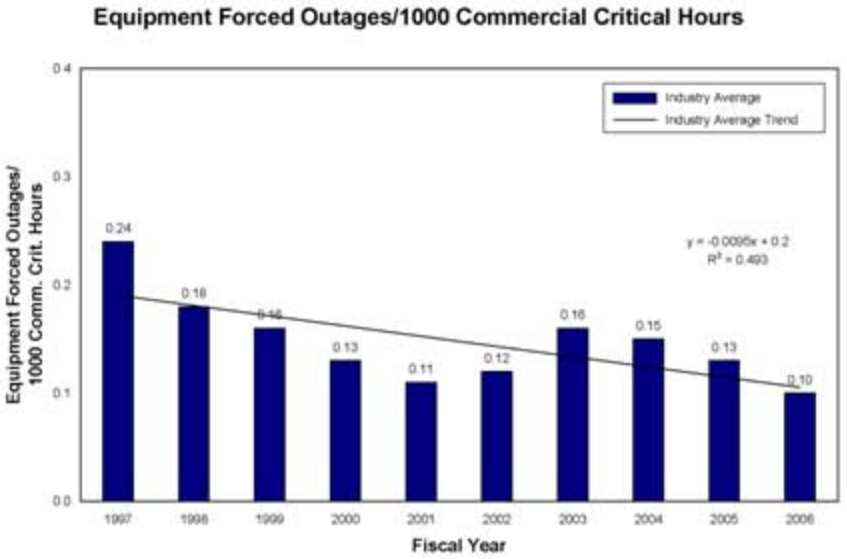


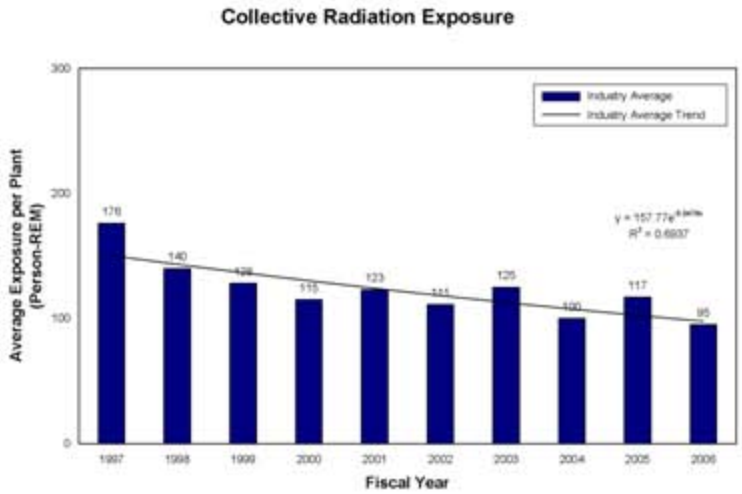
Nozzle shell forging for U.S. EPR #1

Source: Unistar

High Performance Standards







Source: Nuclear Regulatory Commission Office for Analysis and Evaluation of Operational Data, 11/07

Addressing Proliferation Concerns

- Physical solutions
  - Continue current barriers (guns, gates, & guards)
  - Reduce inventory of weapons-grade material by fission in power reactors
  - Implement advanced fuel cycles
  - Remove inventory of weapons-grade material from the biosphere
- Political solutions
  - Prohibit reprocessing facilities in additional countries (GNEP)
  - Prohibit enrichment facilities in additional countries (GNEP)
  - Establish centralized world-oversight of all weapons-grade material (GNEP)

Physical Solutions - Barriers

Barriers

No-Man Zones

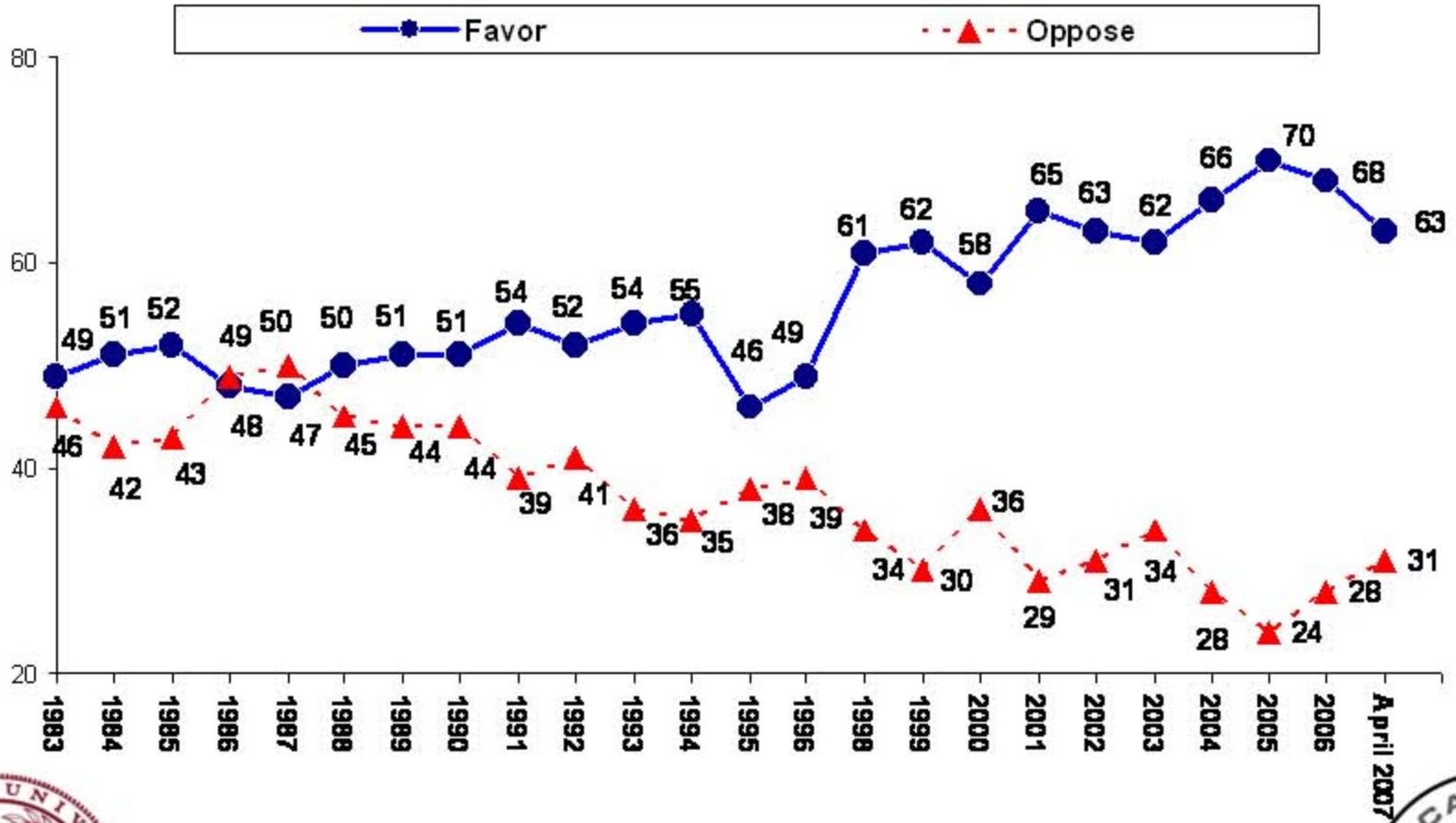
Surveillance

Guards

Gates

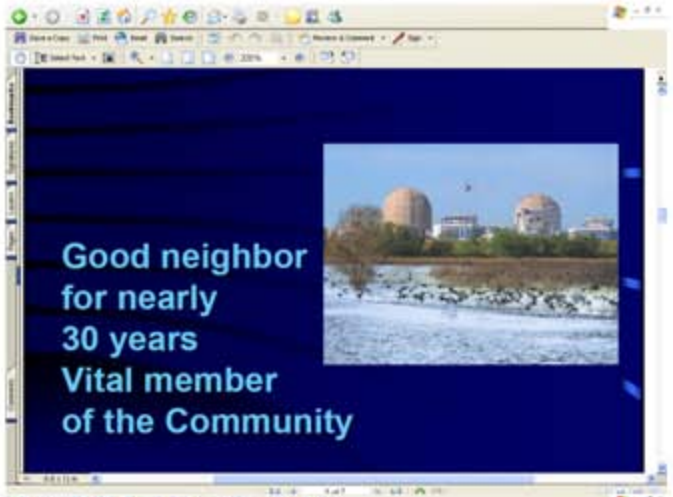
Guns

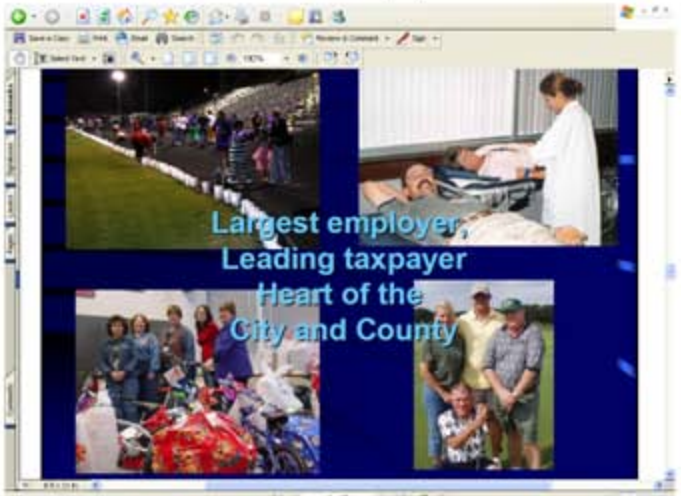
U.S. Public Opinion Of Nuclear Power

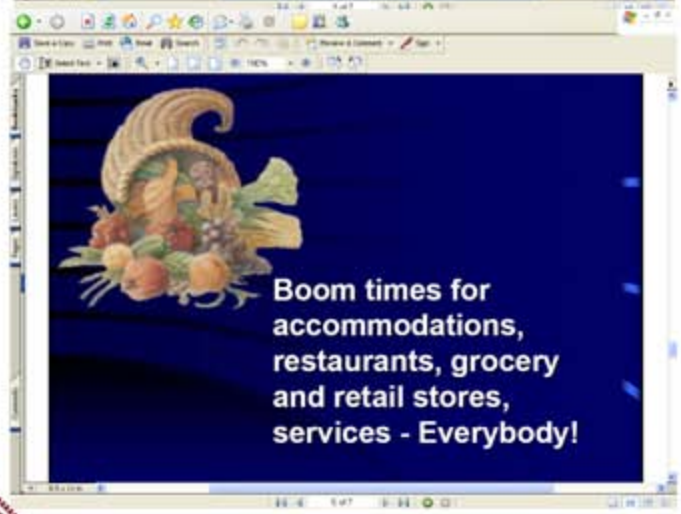


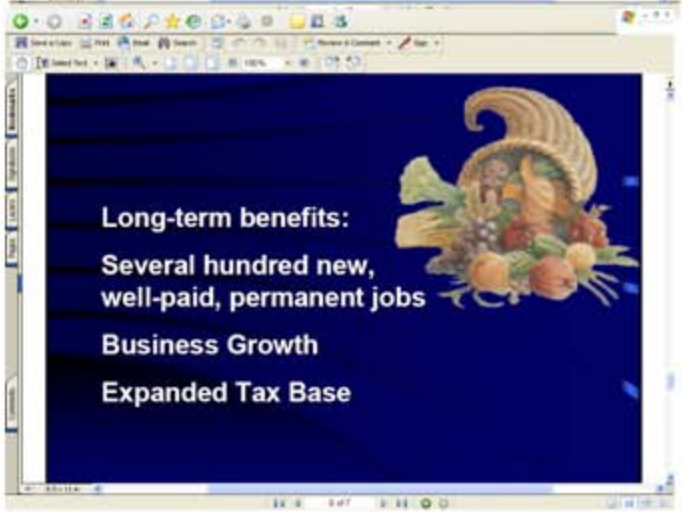
Source: Bisconti Research

Public Opinion – NPP Neighbors







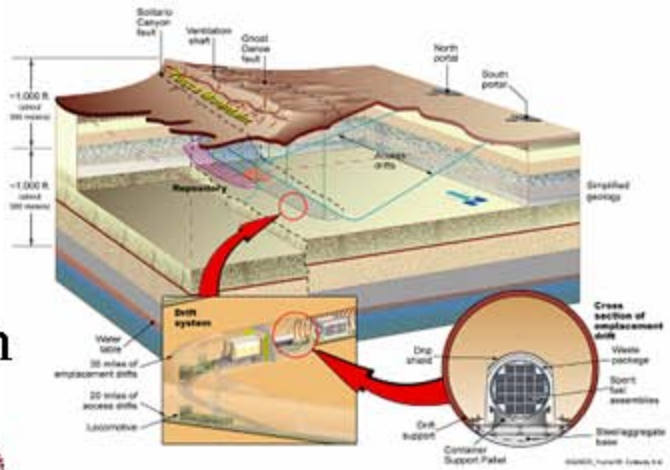


Source: Presentation by Mayor of Bay City Texas, Location of South Texas Project NPP

Nuclear Waste Disposition

Short-Term On-Site Storage at NPPs

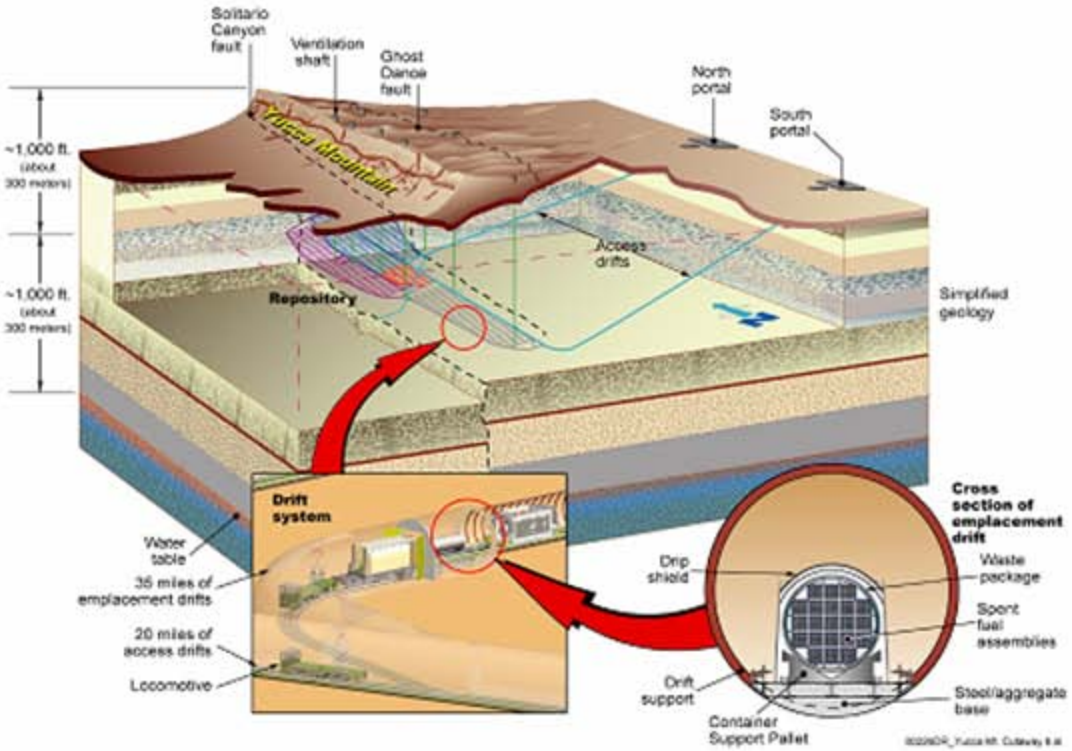
Long-Term Storage Yucca Mountain



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

License Yucca Mountain

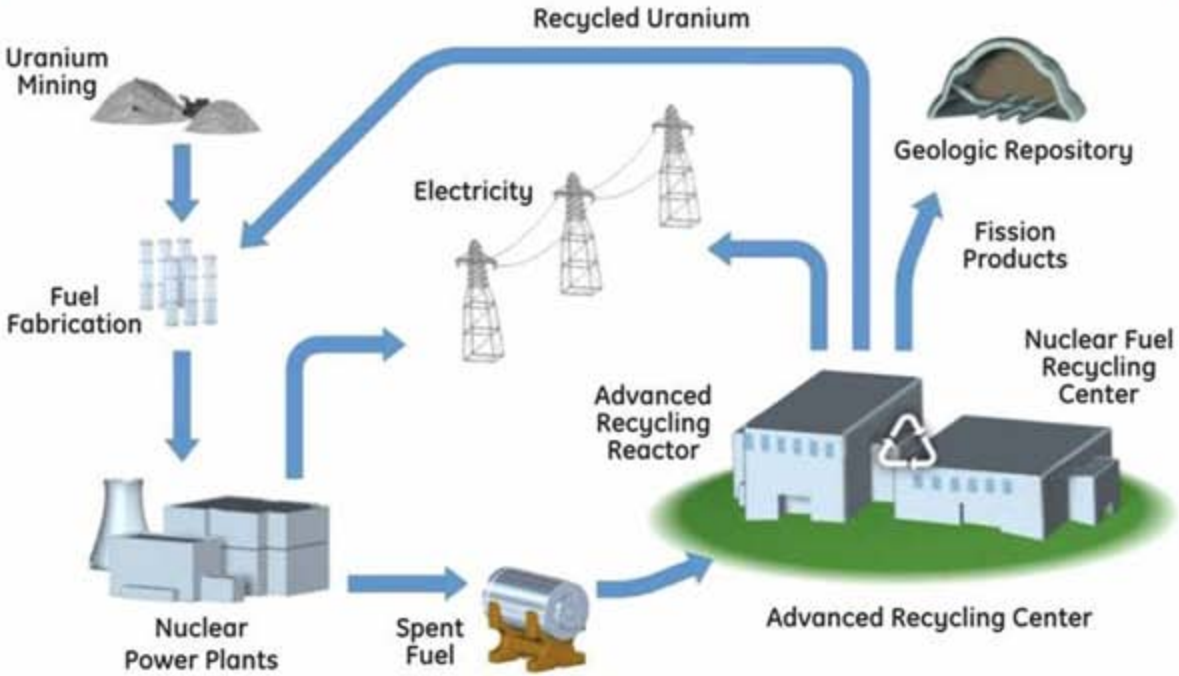


Current projection
for license application
Submit
Spring 2008
Open
2017 ?
2021 ?

Address Nevada political resistance to Yucca Mountain
by demonstrating support of Nevada state goals

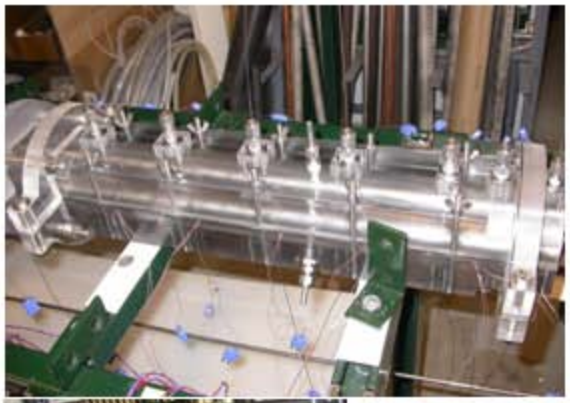
- Synergism with gaming tax income
- Boost of local employment
- National leadership position
- No negative impact on tourism

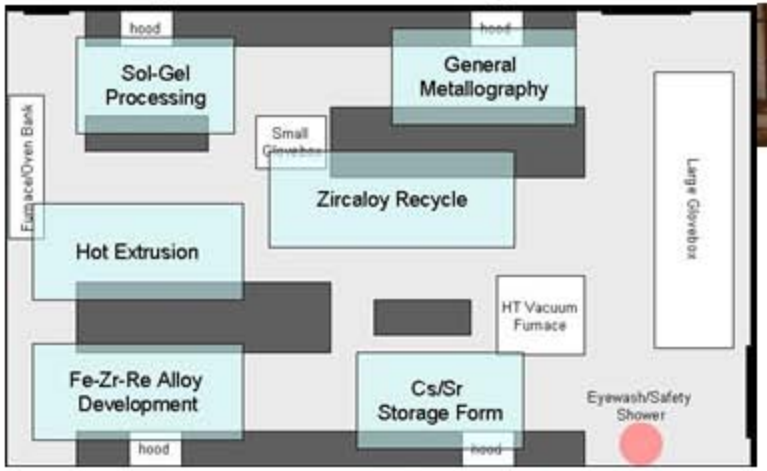
Close The Nuclear Fuel Cycle

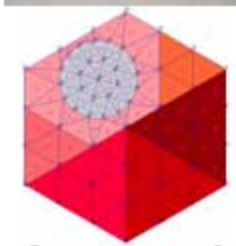


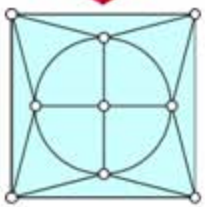
- Re-establish reprocessing
- Establish recycling (with or without MOX and advanced reactors)
- Define HLW forms
- Establish geologic repository

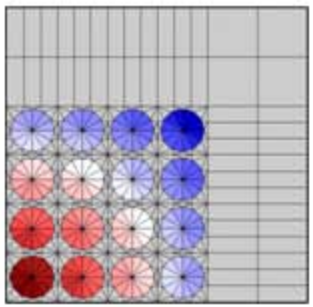
Texas A&M University
Nuclear Engineering Research





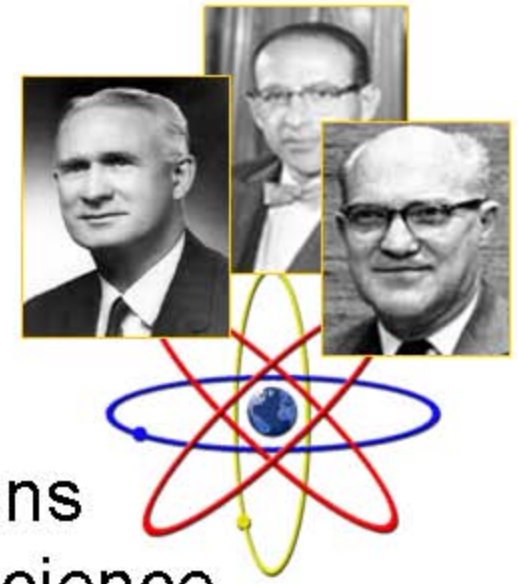






Role of the American Nuclear Society

- Provide a professional home for scientists and engineers in the nuclear profession



- Recognize members' contributions to the advancement of nuclear science, engineering, and technology (NSET)

Role of the American Nuclear Society

- Provide forums to exchange information needed to develop and to apply NSET

- Serve as a credible source of information about NSET

Role of the American Nuclear Society

- ANS professional divisions
  - provide peer review of new NSET developments
  - advance NSET at topical meetings and workshops

- ANS public policies and public information
  - inform the Public
  - assist Government in developing sound policies

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AMERICAN NUCLEAR SOCIETY A N S

QUESTIONS AND DISCUSSION

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