

PROSPECTS OF NEW NPPs CONSTRUCTION IN THE U.S.

William E. Burchill, Ph.D.
President

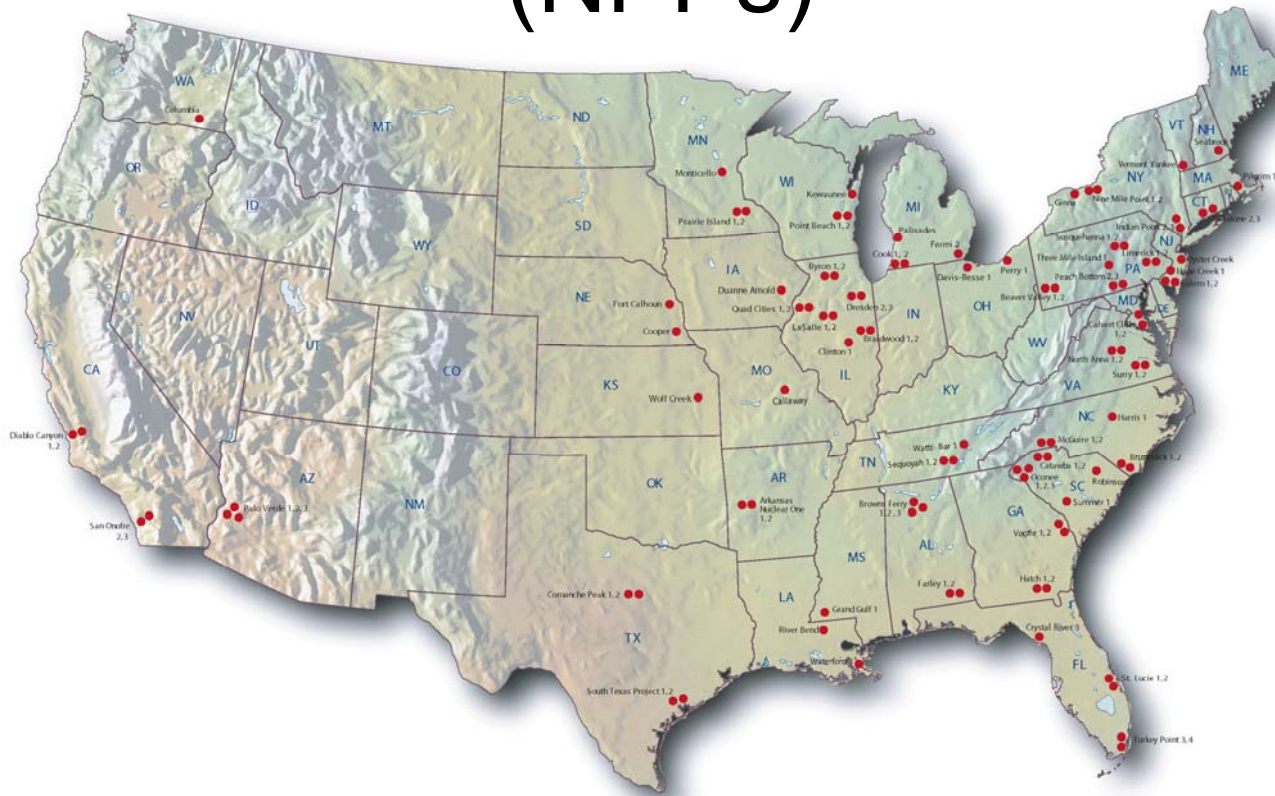
American Nuclear Society
Retired Department Head
Nuclear Engineering
Texas A&M University



LAS/ANS Symposium
Rio de Janeiro, Brazil
June 16, 2008



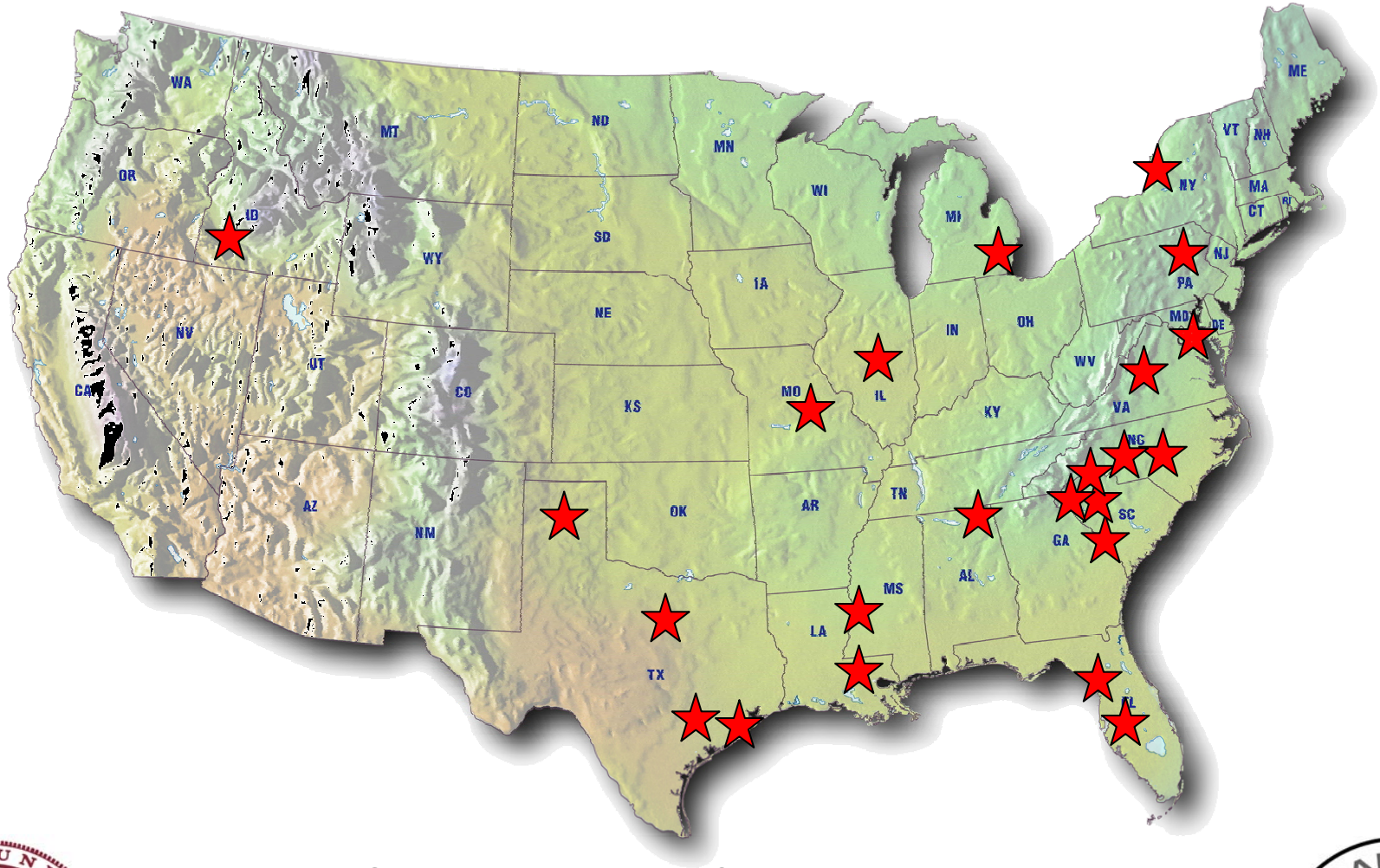
U.S. Operating Nuclear Power Plants (NPPs)



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



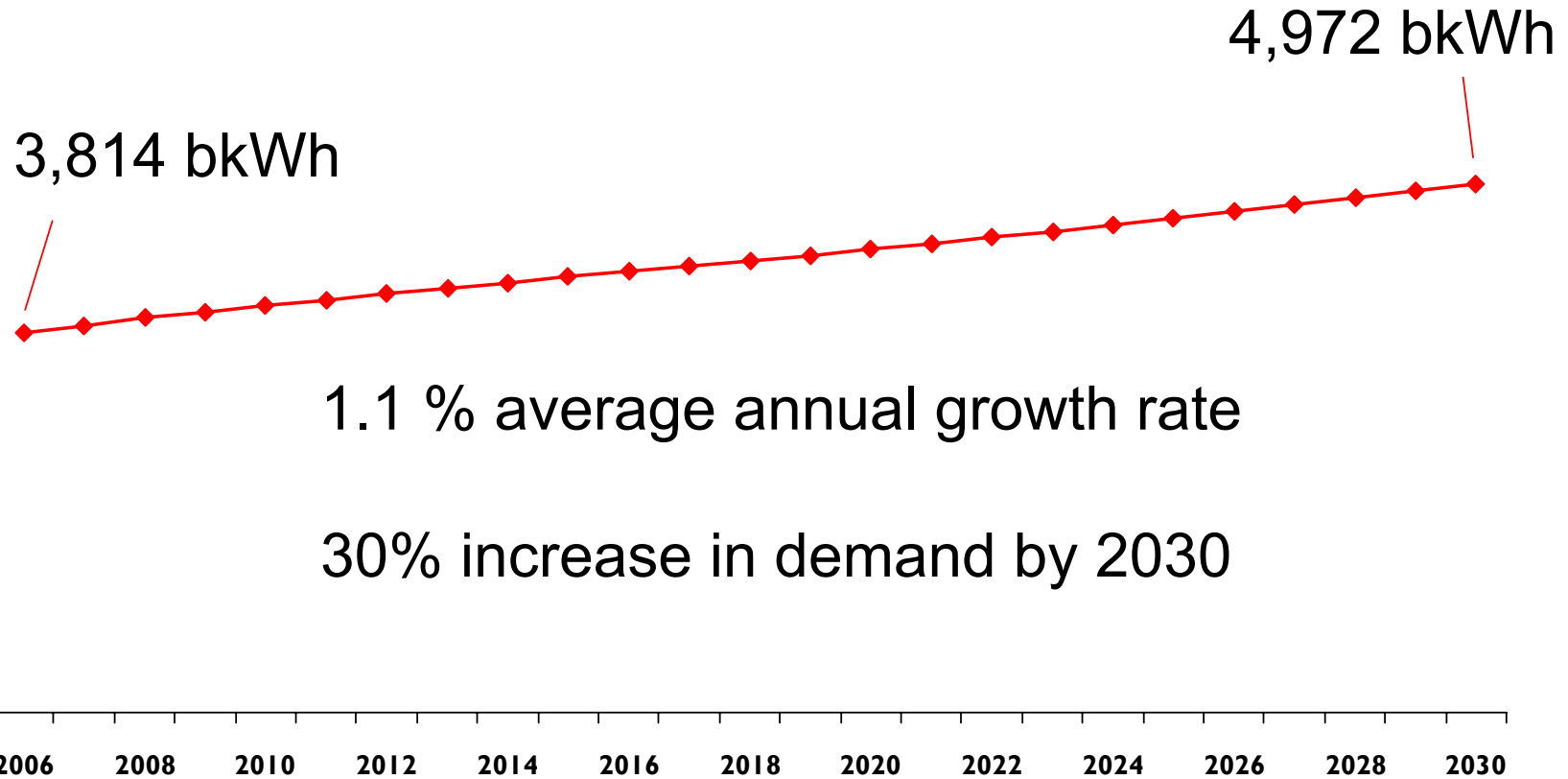
Announced Potential New NPPs



Source: NEI Manufacturing Workshops
Columbia, SC 3/08
Cleveland, OH 4/08
San Antonio, TX 5/08



U.S. Electricity Demand Growth

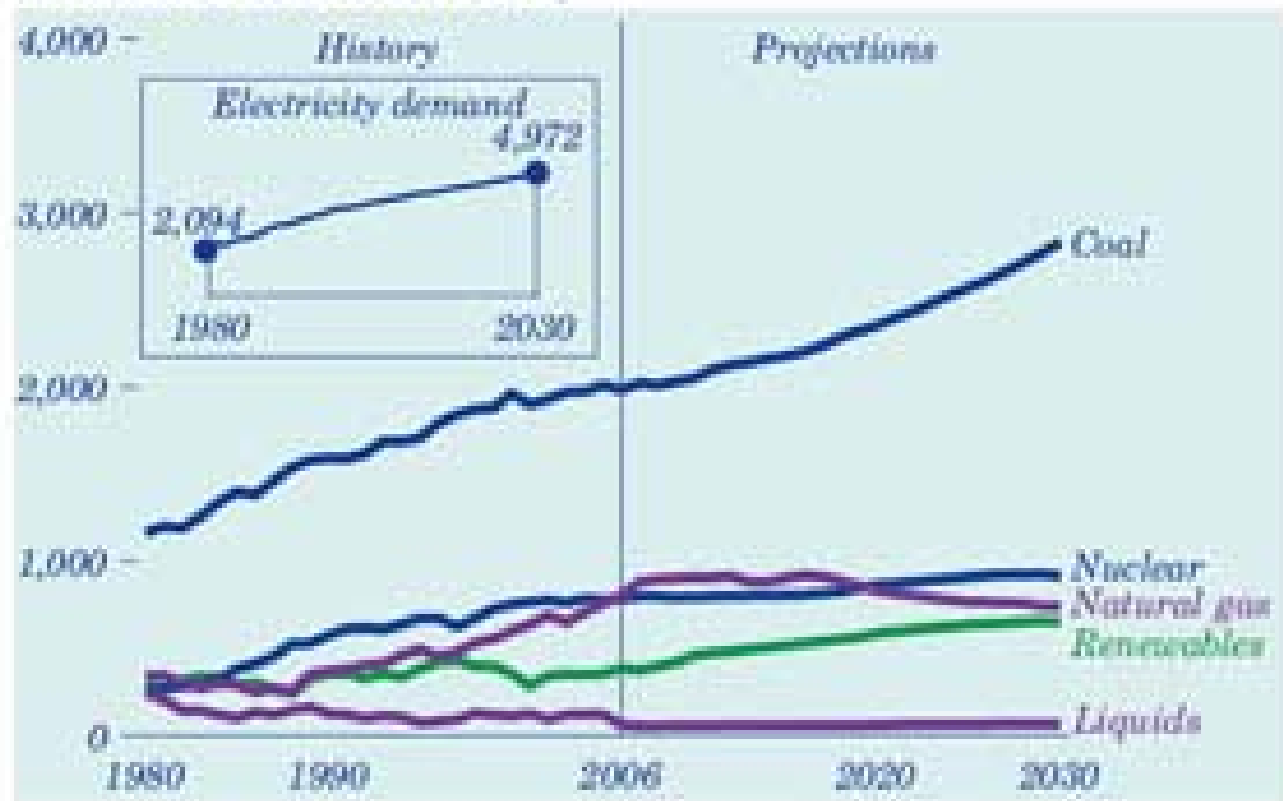


Source: DOE EIA's 2008 Annual Energy Outlook
Updated: 3/08



Projection of Electricity Generation by Fuel

*Figure 7. Electricity generation by fuel, 1980-2030
(billion kilowatthours)*

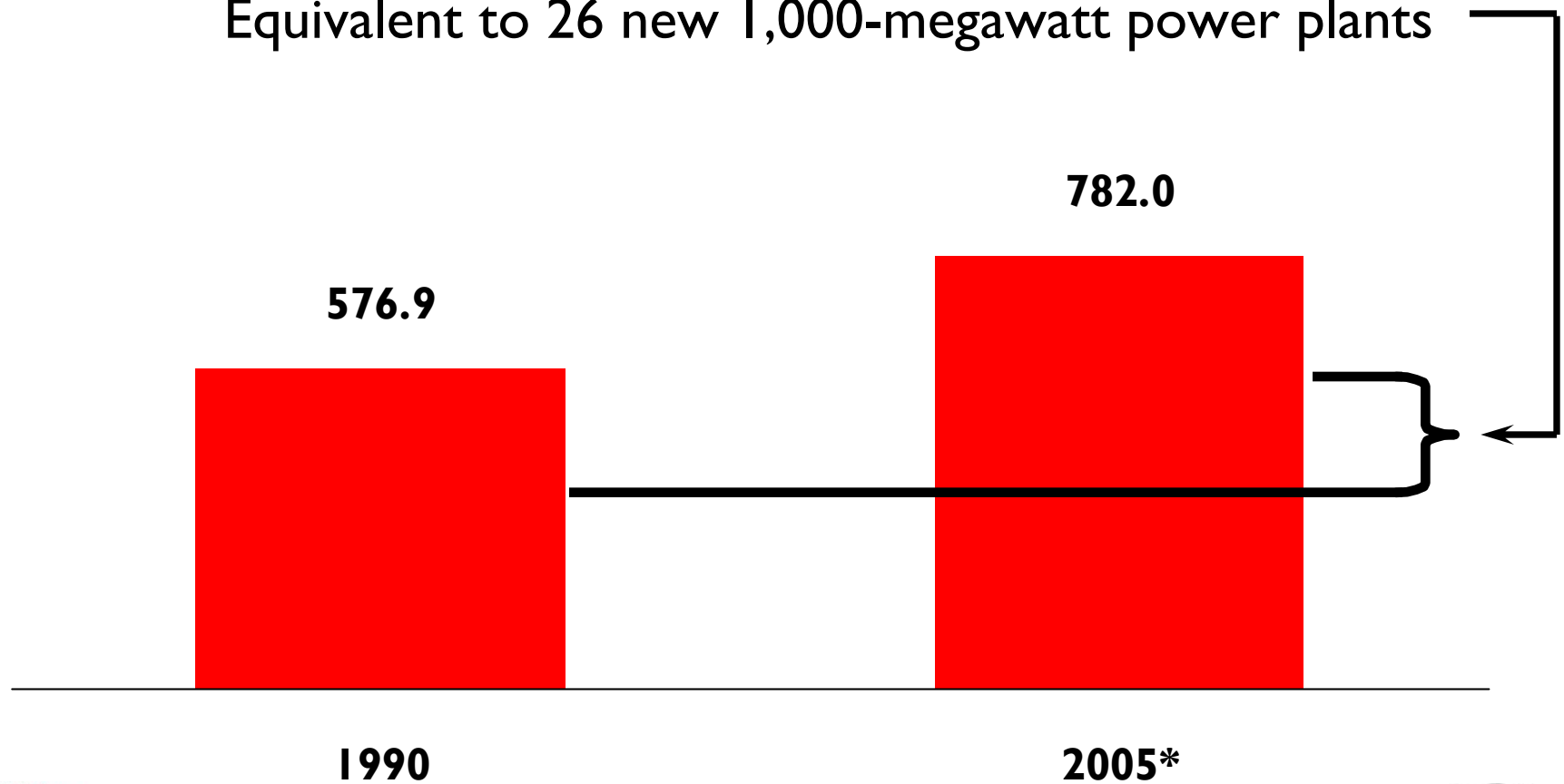


Source: DOE EIA's 2008 Annual Energy Outlook
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Growth of U.S. NPP Production During Recent 15 Years (billion kWh)

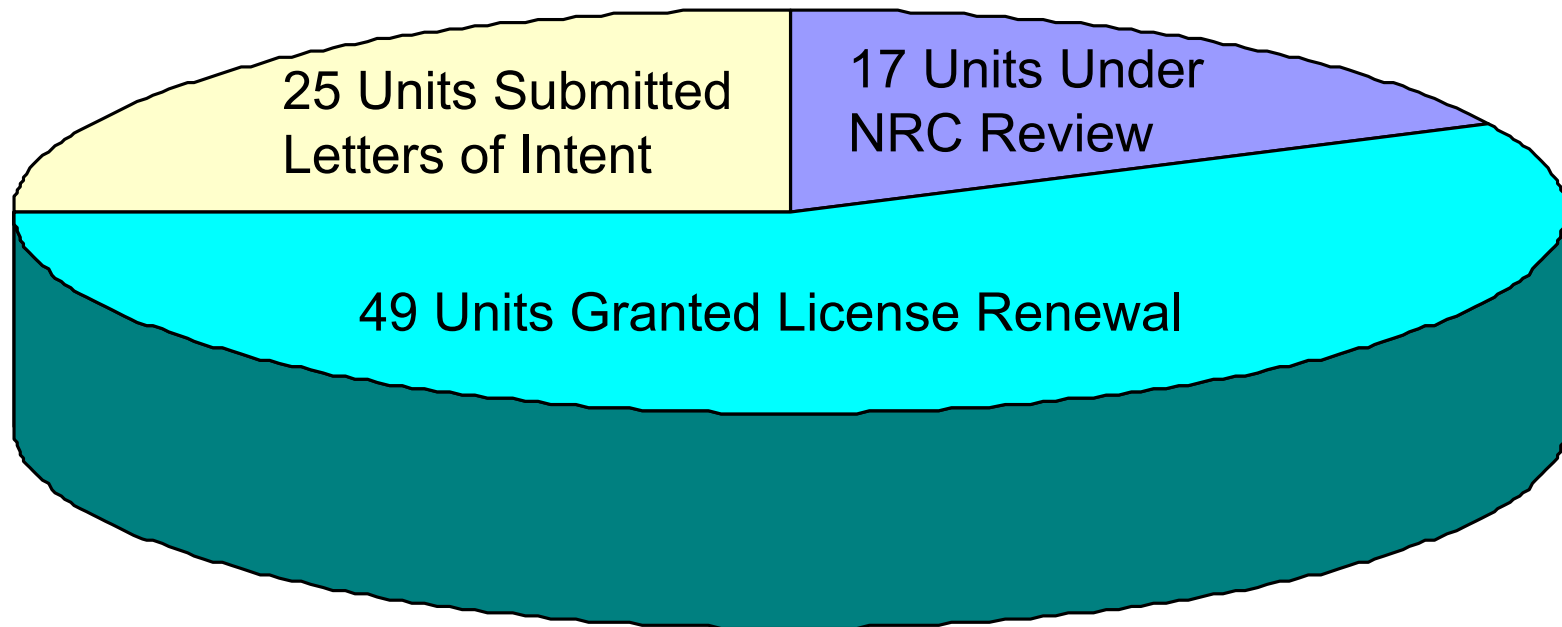
Equivalent to 26 new 1,000-megawatt power plants



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



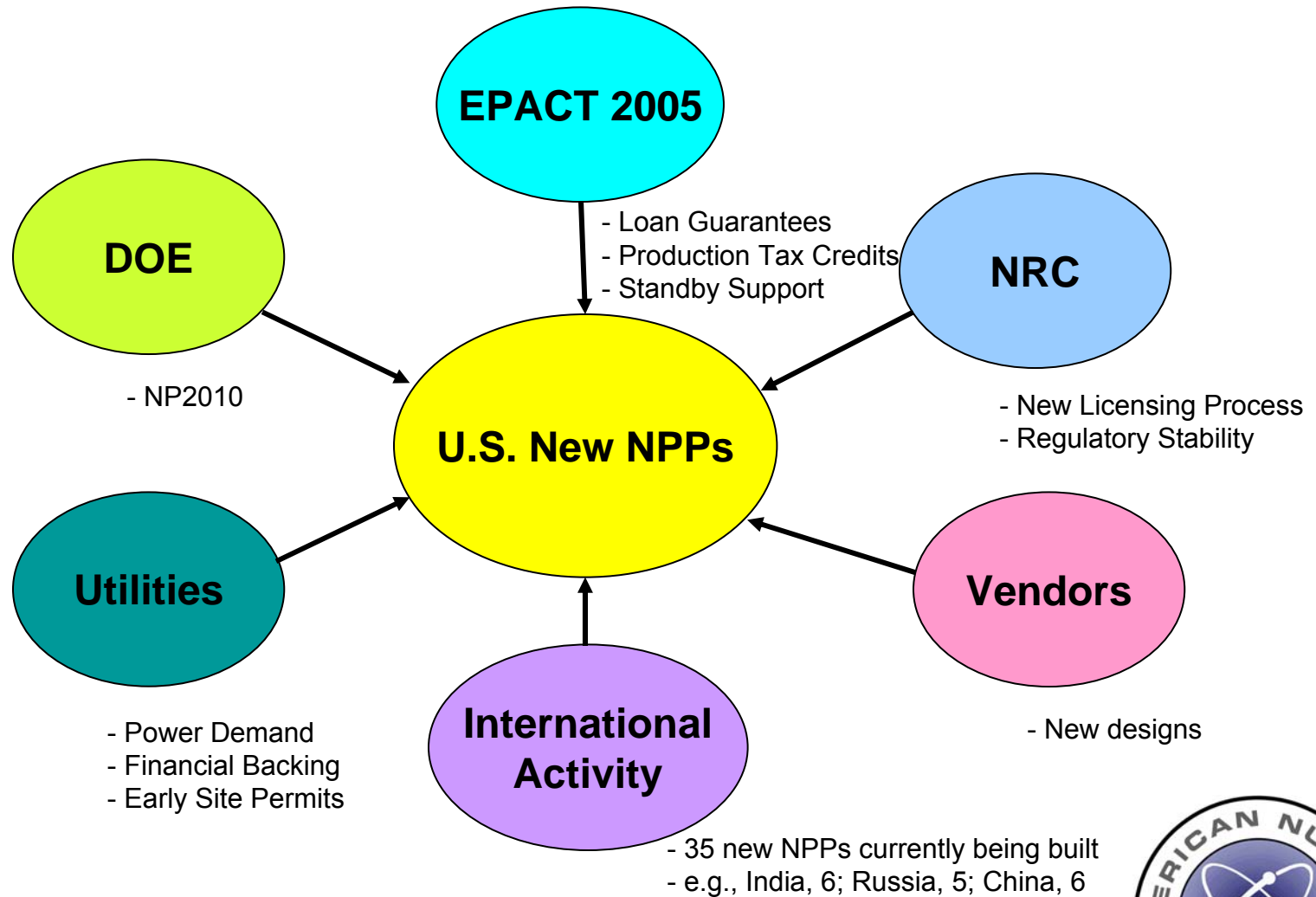
U.S. Applications For License Renewal



Source: U.S. Nuclear Regulatory Commission
Updated: 6/08




Factors Which Influence Consideration of New U.S. NPPs

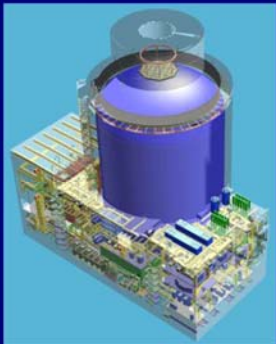
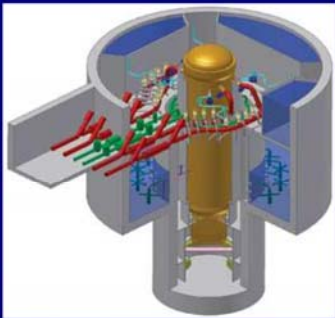



Many factors are converging NOW!



> 30 COL Applications Announced Since January, 2006

 **Second Great Bandwagon Effect**

AP1000	ESBWR	EPR
		
Duke Energy (TBD) NuStart (Bellefonte) Progress Energy (Shearon Harris + a Florida plant) SCE&G (VC Summer) Southern Co. (Vogtle)	Dominion (North Anna) Entergy (River Bend) NuStart (Grand Gulf)	Constellation (Calvert Cliffs, Nine Mile Point)



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	March 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	February 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	March 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: 5/08



Summary of COL Applications

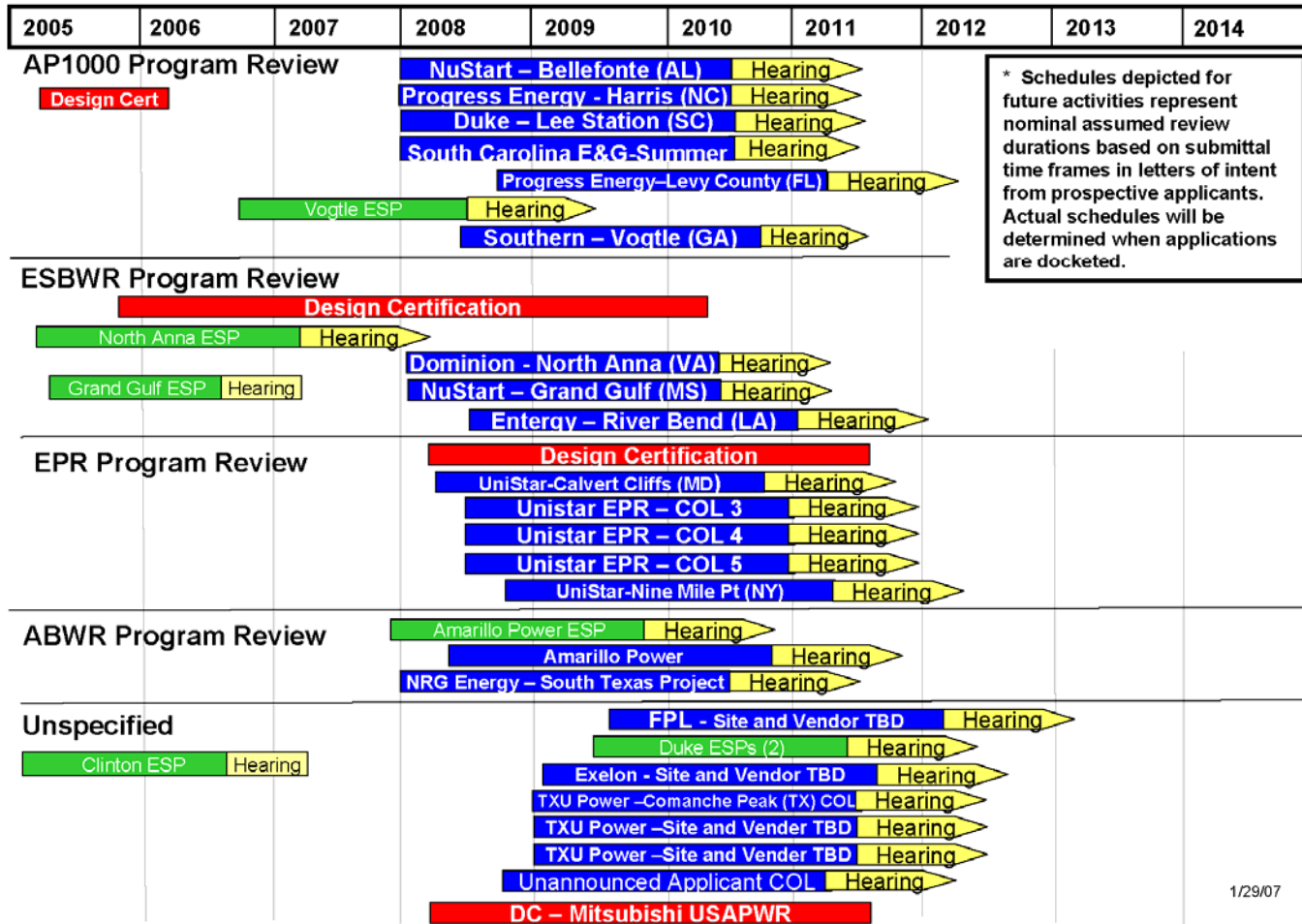
- 17 companies preparing COL applications for at least 33 reactors
- 4 NPP designs certified, 4 under review
- 3 early site permits issued, 6 companies considering applications
- Industry expenditure to date on new NPPs – \$3+ billion
- 4 COL applications submitted in 2007
- 5 COL application submitted YTD in 2008



Sources: Nuclear Energy Institute,
Nuclear Regulatory Commission
Updated: 5/08



New NPP Licensing Applications



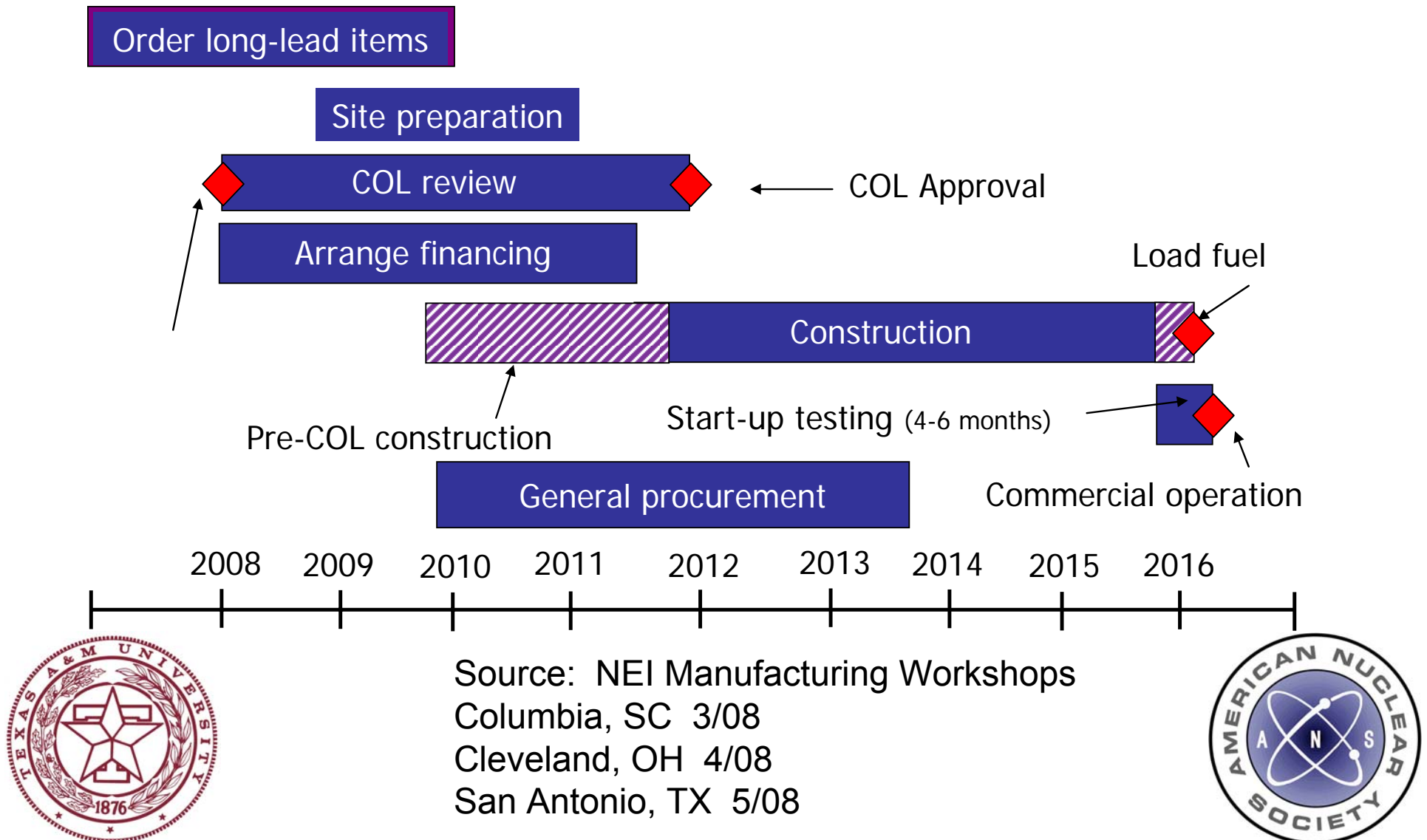
1/29/07



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



Schedule Leading to New NPP Operation



First 2 U.S. New NPPs Ordered April 8



Georgia Power, acting for itself and for **Plant Vogtle's** co-owners (Oglethorpe Power, Municipal Electric Authority of Georgia [MEAG Power], and Dalton Utilities), entered into an **Engineering, Procurement and Construction contract (EPC)** with a consortium consisting of **Westinghouse Electric Company LLC** and **The Shaw Group Inc.'s Power Group** for the engineering, procurement and construction of **two AP1000 nuclear units** with electric generating capacity of approximately **1,100 megawatts each** and related facilities.



Source: Georgia Power, Westinghouse, and Shaw Press Releases, 4/8/08



Second 2 U.S. New NPPs Ordered May 27



Again, 2 AP-1000 NPPs

At an existing NPP site

Contract price \$9.8B

Commercial operation target 1916 for 1st unit



Source: South Carolina Electric & Gas, Westinghouse,
and Shaw
Press Releases, 5/27/08



The Challenges

Infrastructure

- Re-establish the nuclear infrastructure

Utilities

Universities

Vendors

Government

Labor

Investors

Public and
Political
Support

- Determine fabrication sources

- 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

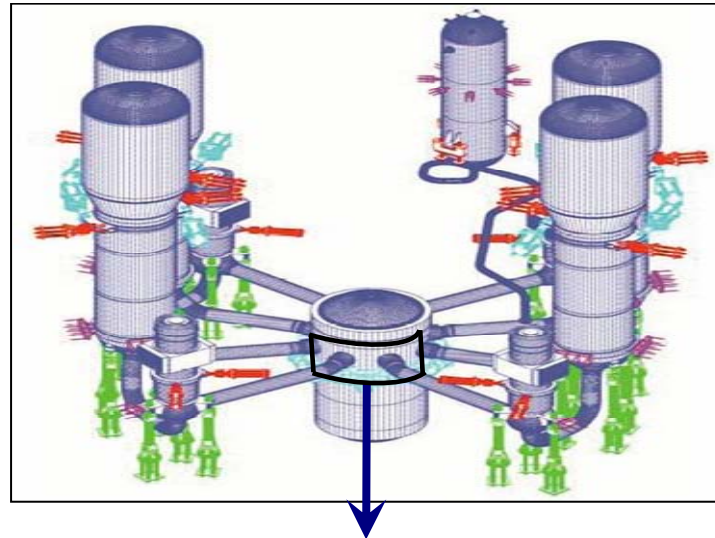


Examples of Infrastructure Issues

- Half of U.S. university NE programs have closed
- DOE funding for university NE Programs cut in FY07 & FY08
- Knowledge, experience, & labor shortages
 - degreed engineers
 - skilled labor
- Loss of manufacturing capability
 - heavy metal components
 - N-stamp shops
- DOE failure to implement 1982 Nuclear Waste Policy Act
- 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



Heavy Metal Component Fabrication



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

Source: Unistar



Equipment & Commodities for First Eight Commercial Plants

- Up to 20,000 high quality valves
- Up to 2,000 high quality pumps
- Over 200,000 ft quality pipe
- Over 1,800 miles of cable
- 4 million cubic yds of concrete
- 500,000 tons of steel
- 700,000 electrical components

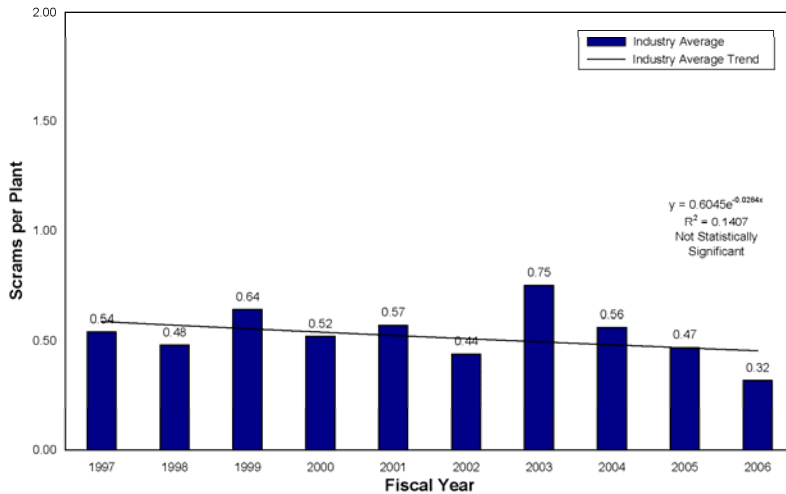


Source: NEI Manufacturing Workshops
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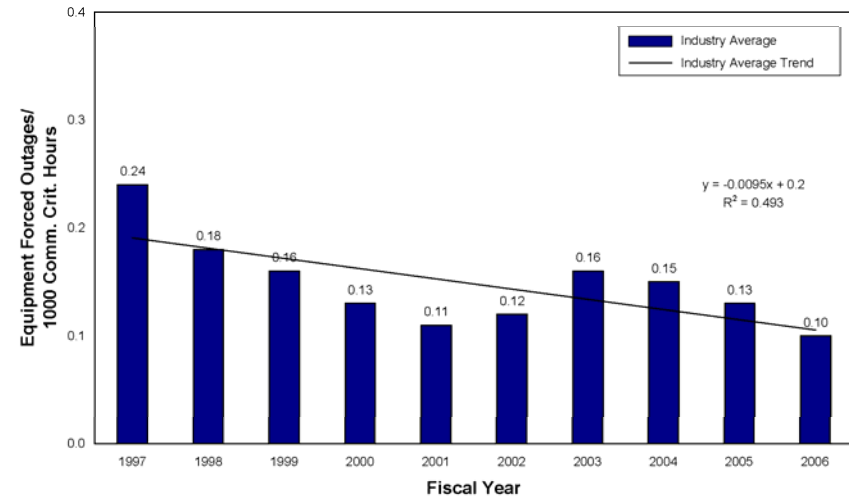


High Performance Standards

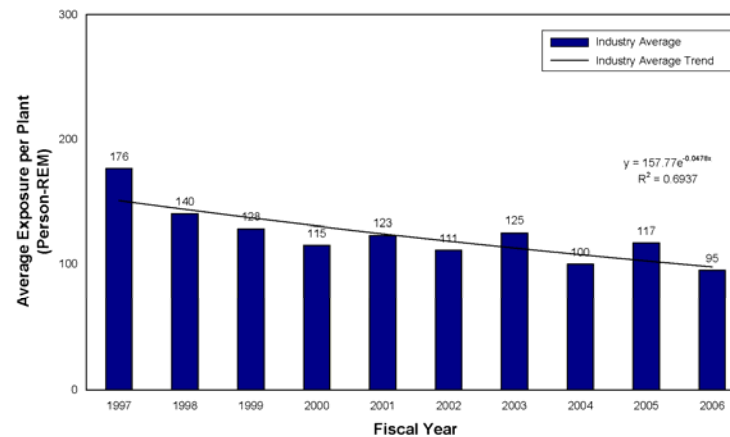
Automatic Scrams While Critical



Equipment Forced Outages/1000 Commercial Critical Hours



Collective Radiation Exposure



Source: Nuclear Regulatory Commission Office for Analysis and Evaluation of Operational Data, 4/08



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
- Political solutions (proposed by GNEP)
 - Prohibit reprocessing facilities in additional countries
 - Prohibit enrichment facilities in additional countries
 - Establish centralized world-oversight of all weapons-grade material



Physical Solutions - Barriers



Barriers



No-Man Zones



Surveillance



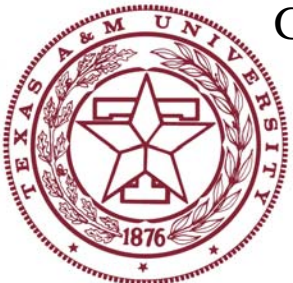
Guards



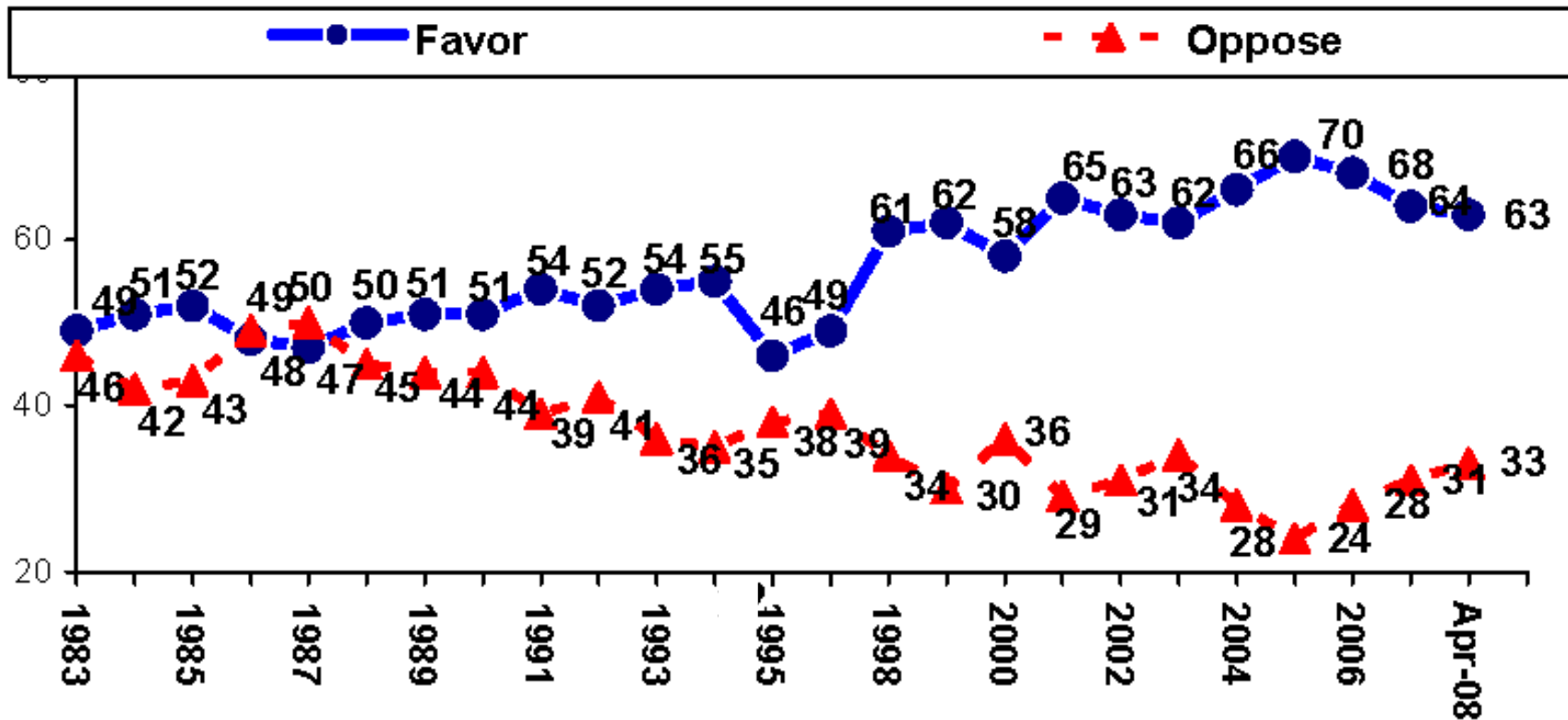
Gates



Guns



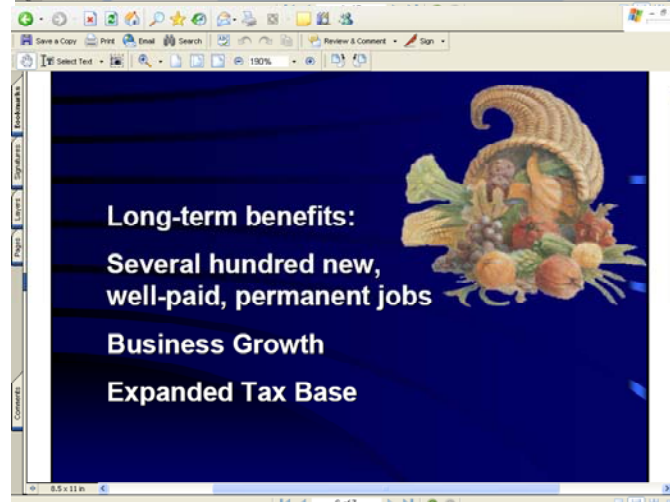
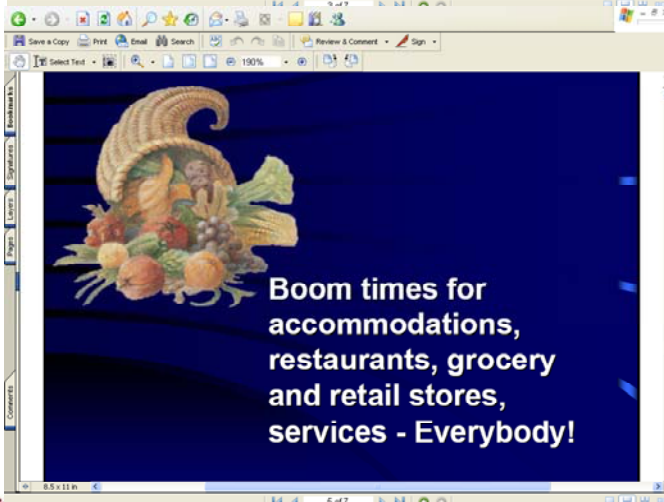
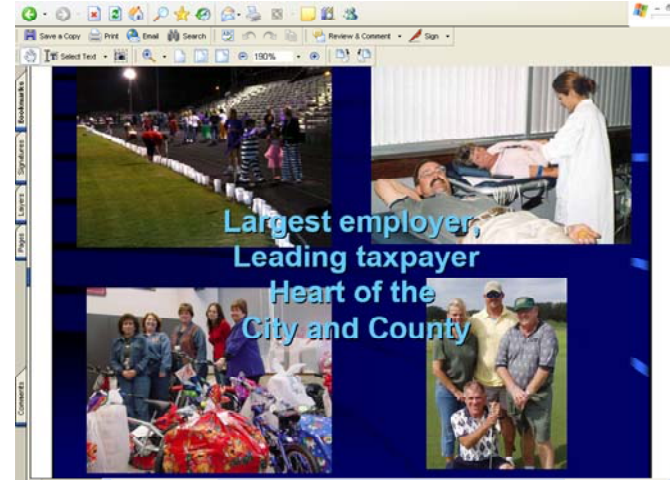
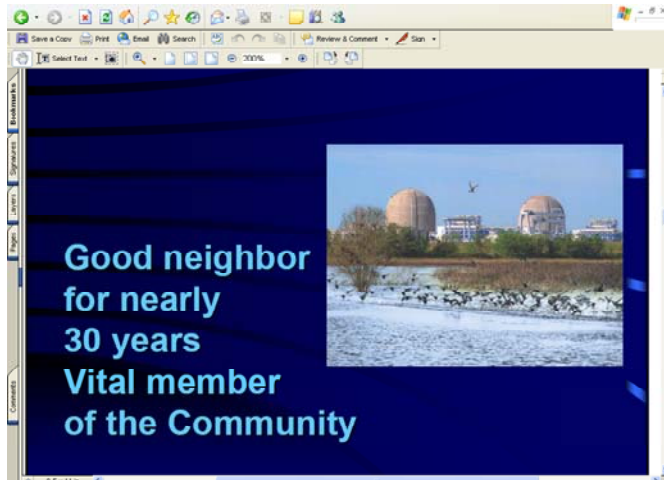
U.S. Public Opinion Of Nuclear Power



Source: Bisconti Research
4/08



Public Opinion – NPP Neighbors



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



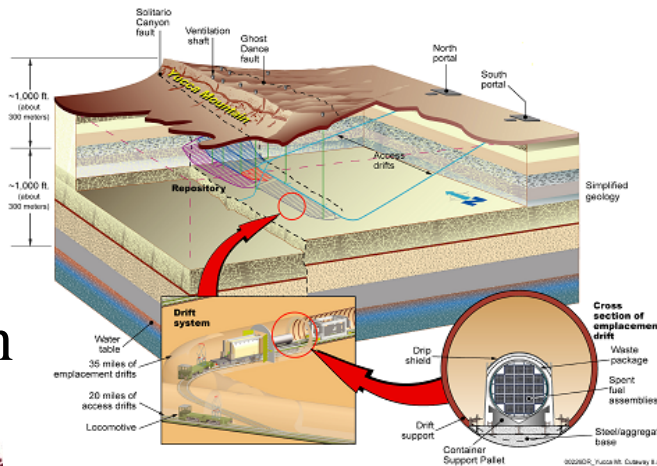
Nuclear Waste Disposition



Short-Term On-Site Storage at NPPs



Long-Term Storage
Yucca Mountain

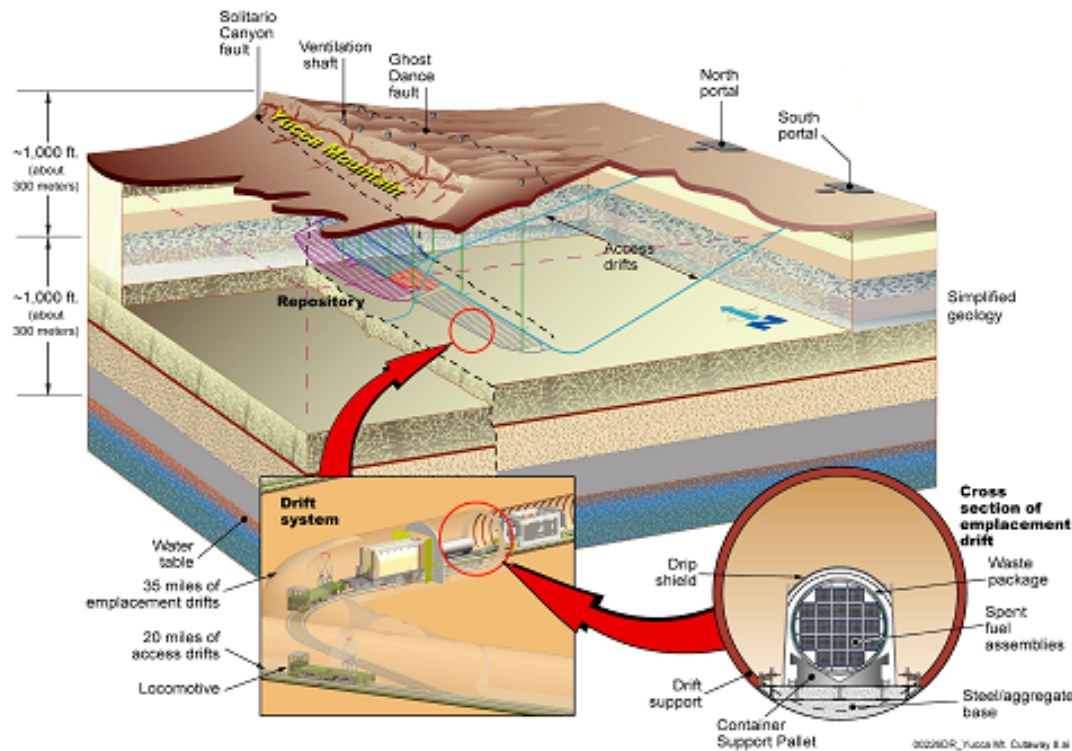


Ultimate Options:

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



License Yucca Mountain



DOE submitted a license application to NRC 6/3/08

Repository will 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



WIPP Has Operated for 8 Years

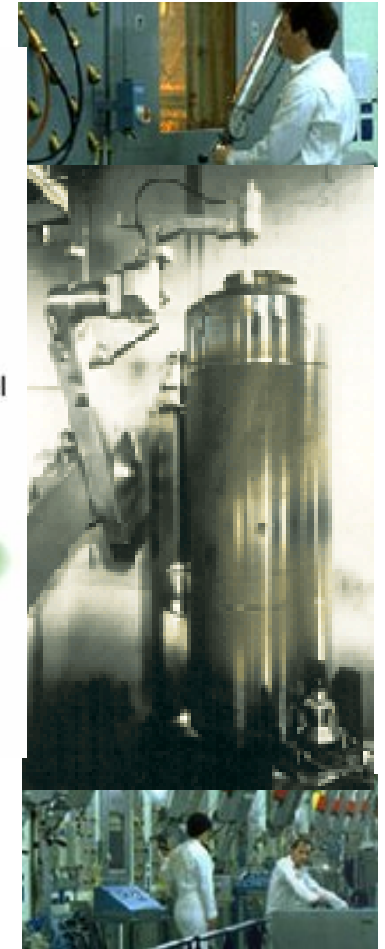
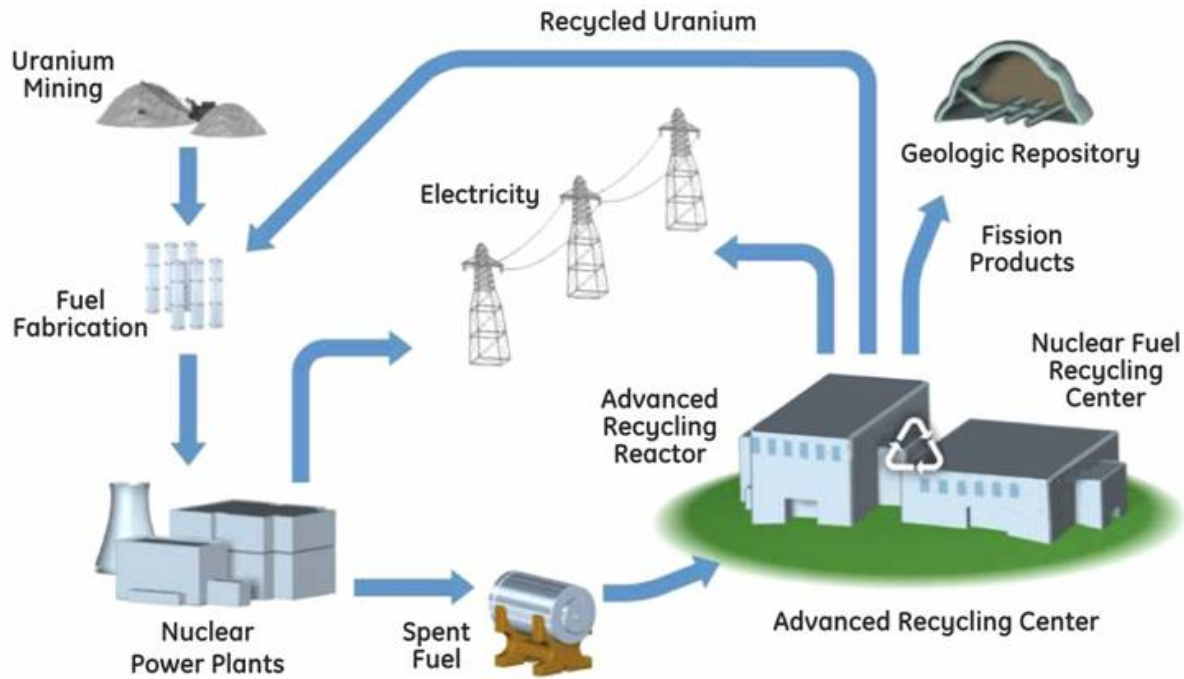


“The Salado Salt Formation (WIPP) can take as much nuclear waste of any type from anywhere for the next ten thousand years.”

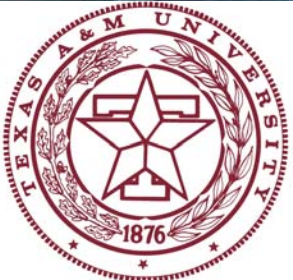
**James Conca
UNM**



Close The Nuclear Fuel Cycle



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



QUESTIONS AND DISCUSSION

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