



Nuclear Powered Electricity

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Tuesday November 27, 2007
Gainesville, Florida**

Topics

- | **Why new nuclear plants are needed?**
- | **Regulatory & licensing issues**
- | **New nuclear plant economy**
- | **Deployment of new nuclear plant in north-central Florida**
- | **Public opinion**

Why new nuclear plants are needed?

Growing Need for More Electricity

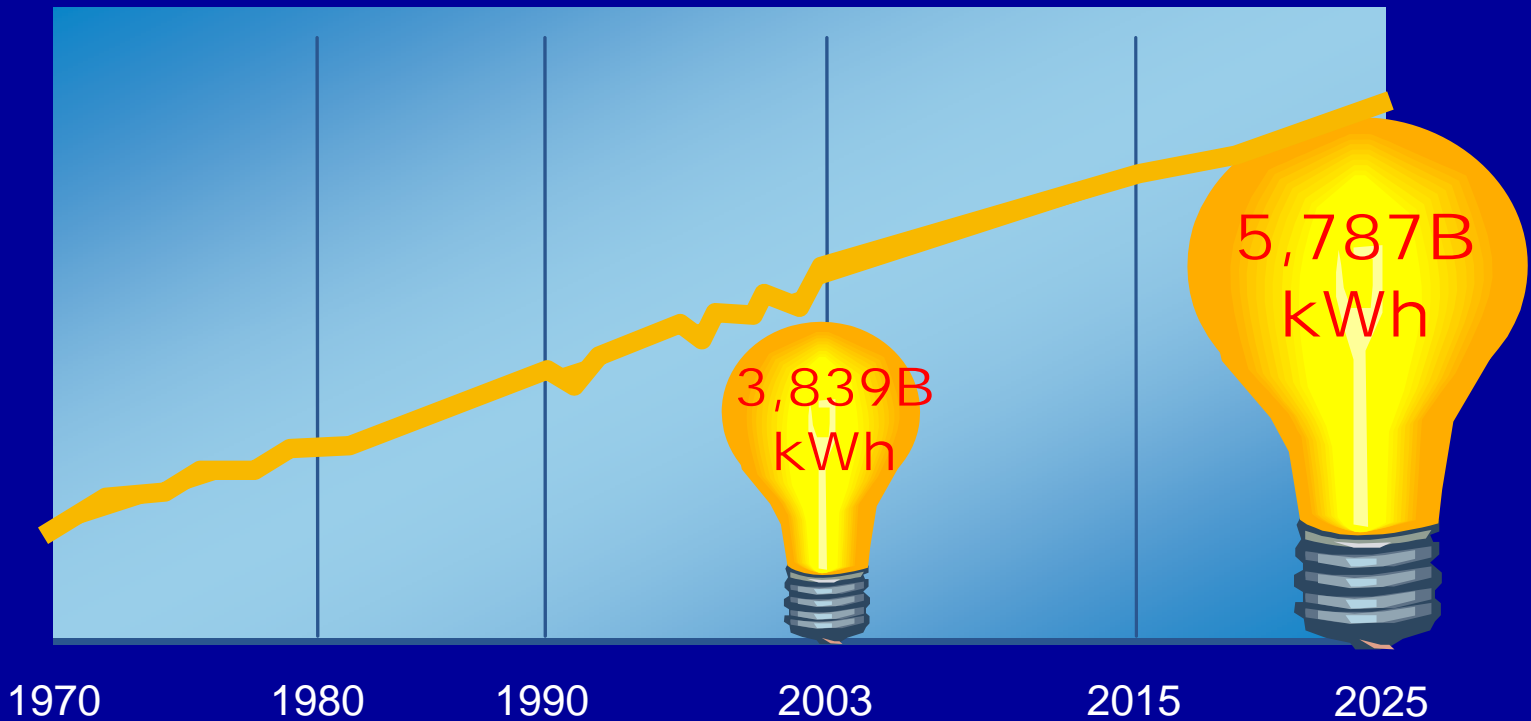
- | Rapidly increasing population
- | Larger homes
- | Greater reliance on technology



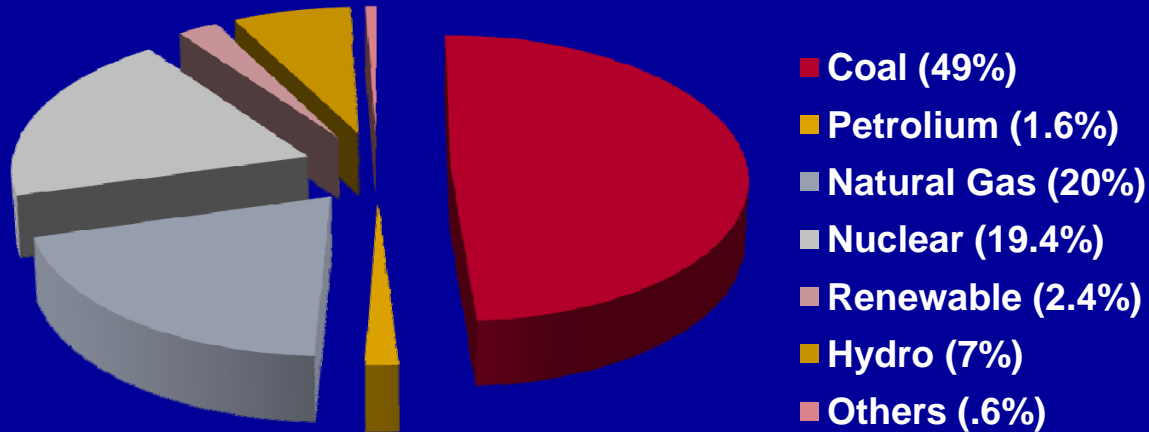
Average American Home
Sizes from 1974 – 2004

U.S. Energy Demand

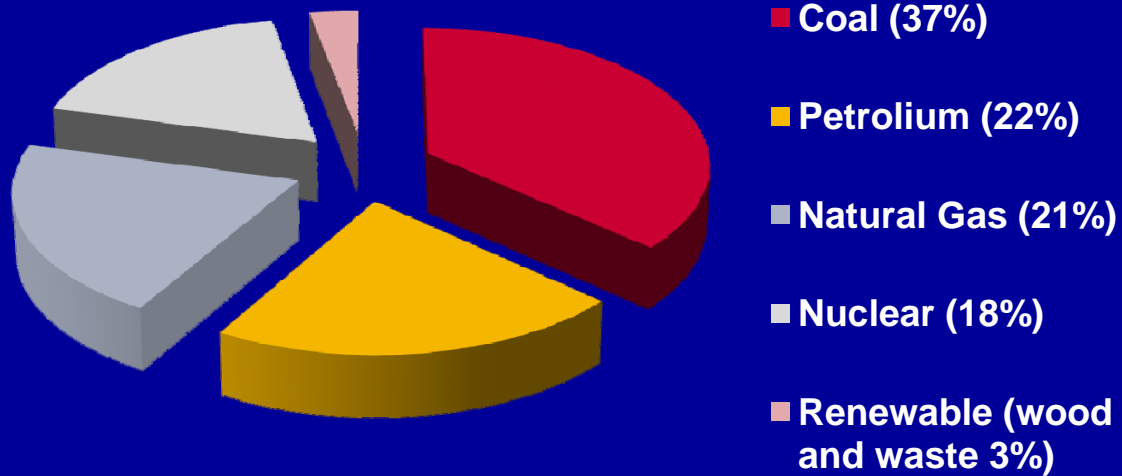
America Is Projected to Need 50% More Electricity by 2025



Source: U.S. Department of Energy

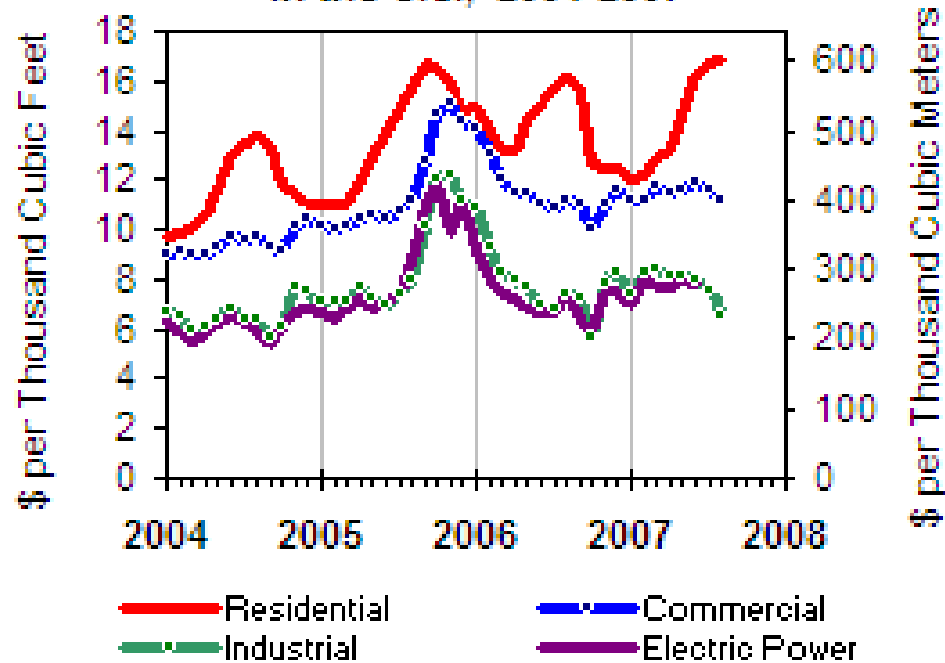


Electric Power Generation by Fuel Type in USA – 2006
(DOE Energy Information Agency)



Electric Power Generation by Fuel Type in Florida – 2006
(DOE Energy Information Agency)

Average Consumer Price of Natural Gas in the U.S., 2004-2007

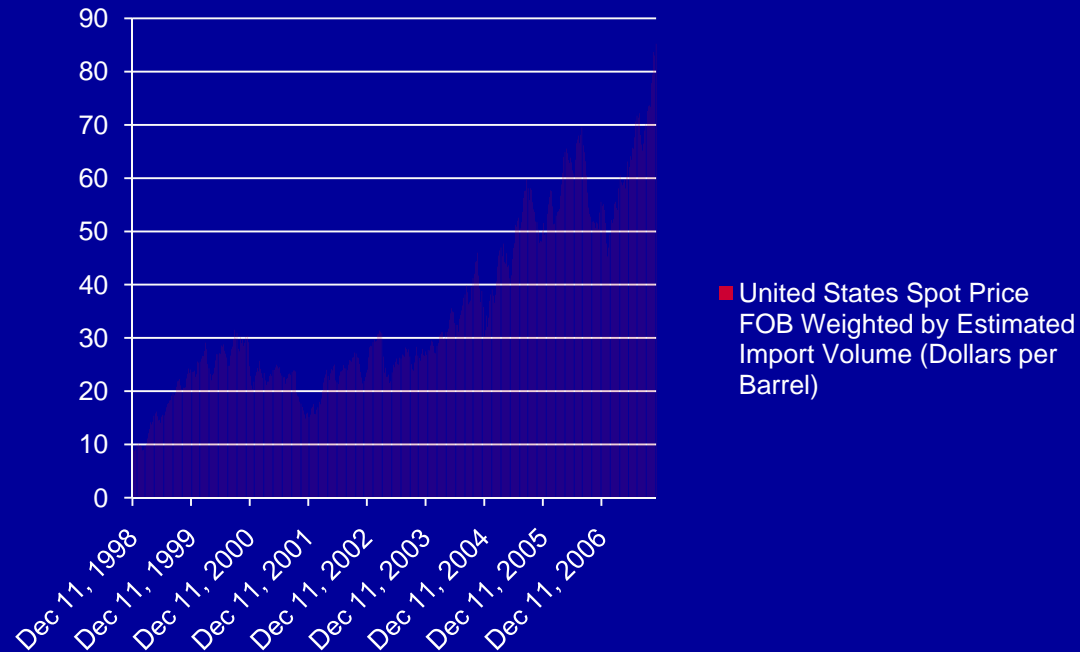


Average Price of Natural Gas in USA 2004-07
(DOE Energy Information Agency)

US Price of Crude Oil

\$8.51 Week of December 11, 1998

\$92 Week of December 10, 2007



New Nuclear Plant Interest

Rising fuel costs

- Gas
- Oil
- Coal

Environmental concerns

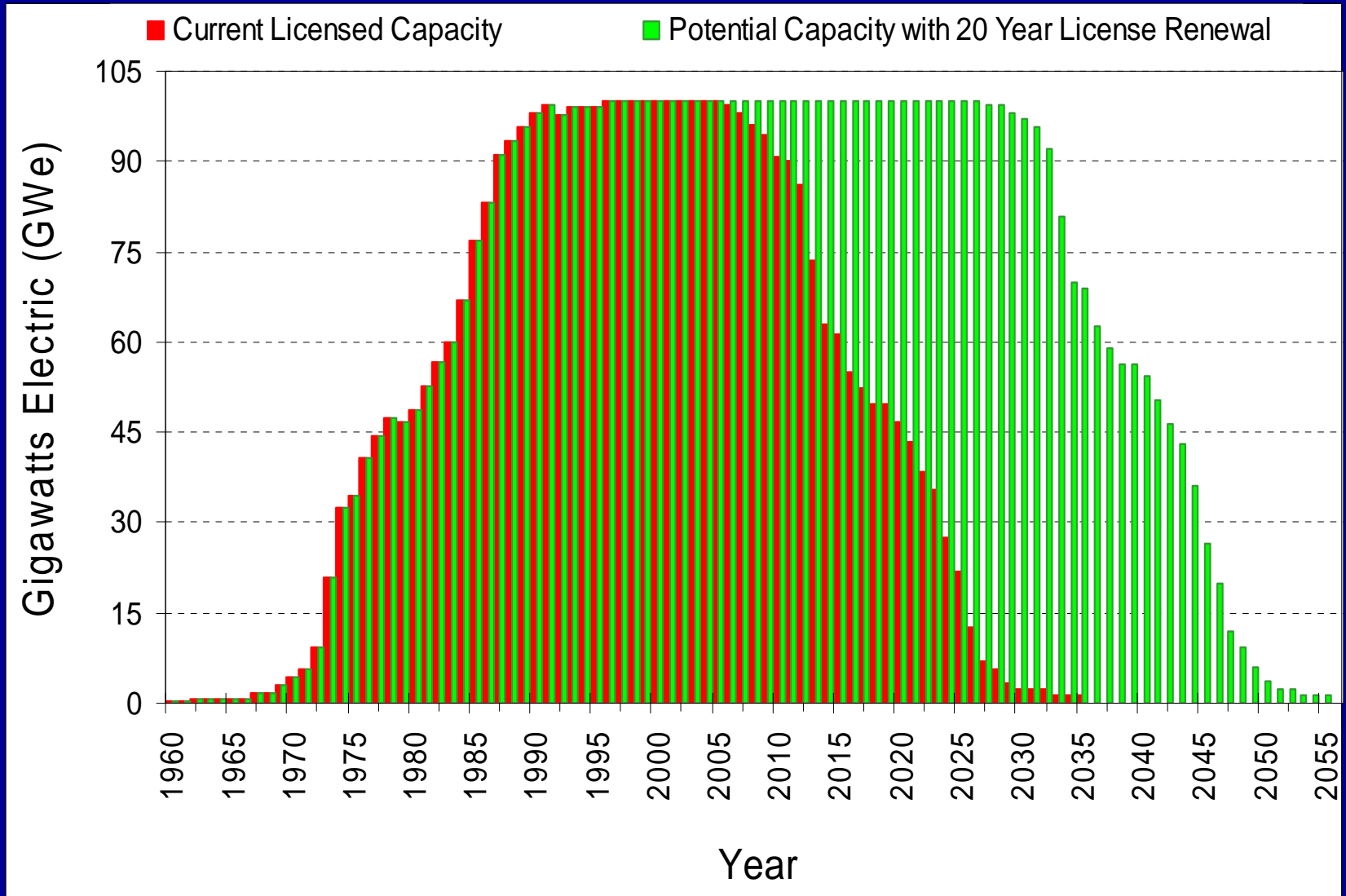
- CAIR rules
- Global warming
- Carbon tax (?)
- CO2



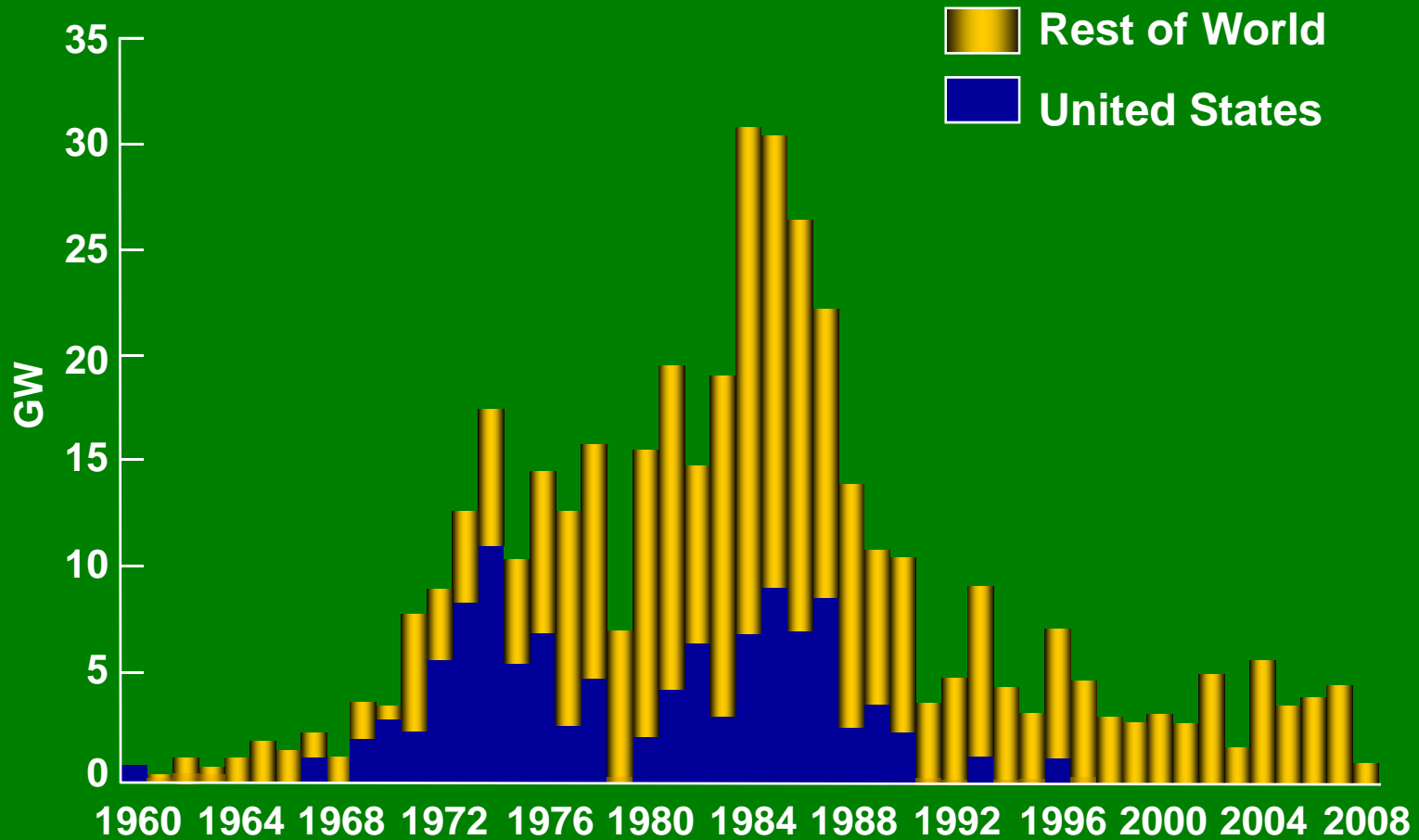
Need for baseload plants

- No baseload built since mid-80s
- New baseload cost delta
- Energy bill (EPAAct-2005) incentives

Nuclear Electric Power Capacity in USA



Global Nuclear Plant Deployment



Nuclear Power 2010 Program Scope and Goal

- | Exploring sites for new nuclear plants
- | Demonstrating key regulatory processes
 - w Early Site Permit (ESP)
 - w Combined Construction and Operating License (COL)
- | Developing new light water reactor designs
 - w Design Certification for new reactors
 - w First-of-a-kind engineering for new standardized nuclear plant designs
- | Developing concepts to mitigate financial risks

Program Goal: *Pave the way for industry decisions to build new advanced light water reactor nuclear plants in the United States that will begin operation early in the next decade.*

Energy Bill (EPAct 2005) Provisions

- | Price-Anderson coverage extended to new nuclear plants
- | Delay insurance (“Standby Support”)
 - w **Risk Insurance to cover delays for first six reactors:**
 - u Failure of NRC to complete review and approvals on schedule
 - u Litigation that delays start of full-power operation
 - u Up to 3 different advanced reactors (certified after 12/31/1993)
 - u First two units 100% up to \$500M (after initial 180 day delay)
 - u Next four units 50% up to \$250M (after initial 180 day delay)
- | Loan guarantees
 - w DOE to back up to 80% of cost of plant
- | Production tax incentives
 - w 1.8 cents per kWh/1000MW up to an annual cap of \$125M for 8 years (max 6000MWe)

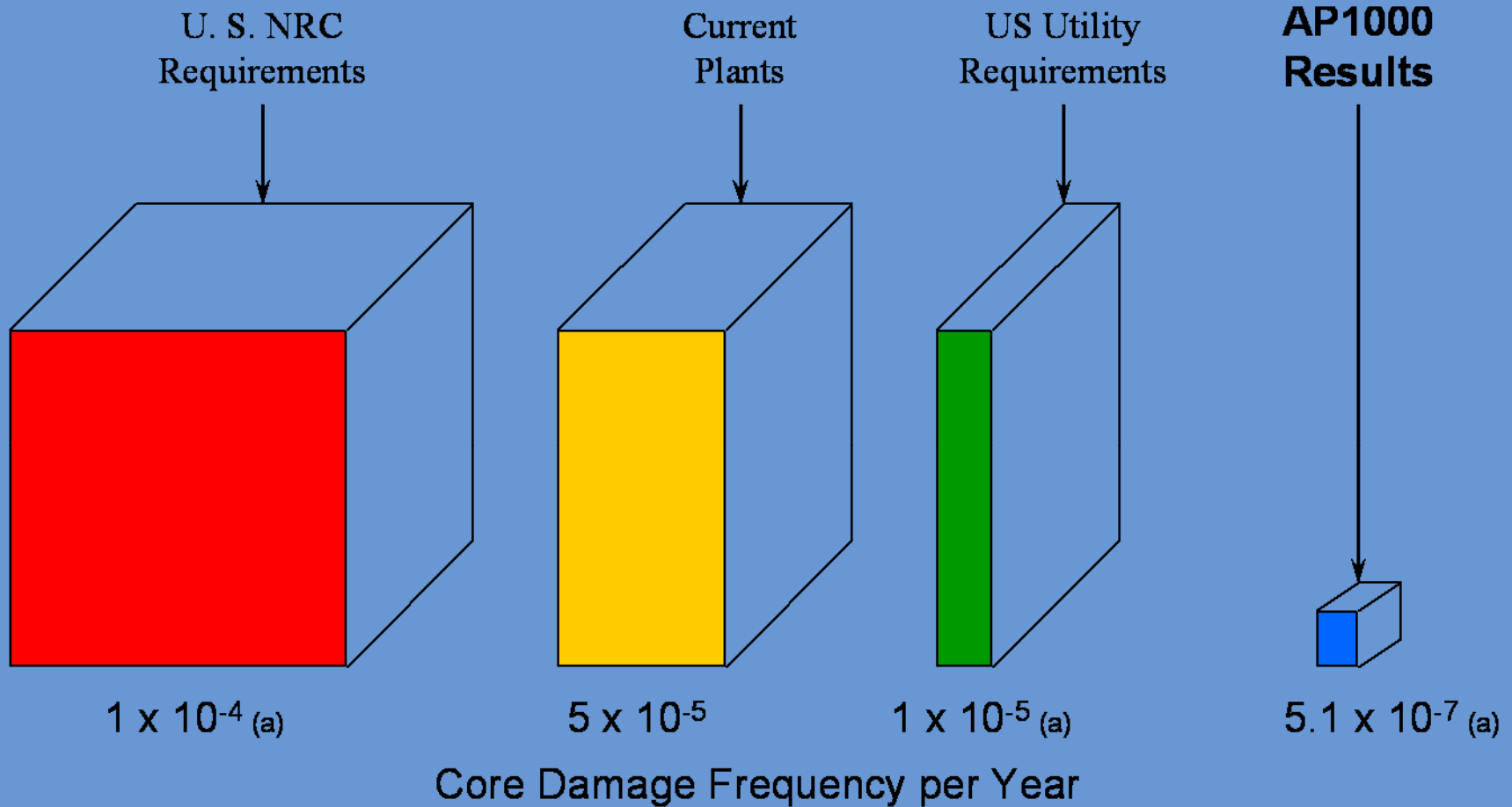
Industry teams pursuing new nuclear plant deployment

- | **NRG – STP site two ABWR plant, COL application to NRC
October 23, 2007**

- | **NuStart – TVA-Bellefonte (AP1000) and Entergy-Grand Gulf
(ESBWR)**
 - w **COL application to NRC: 30 October 2007 (AP1000) and February
2008 (ESBWR)**

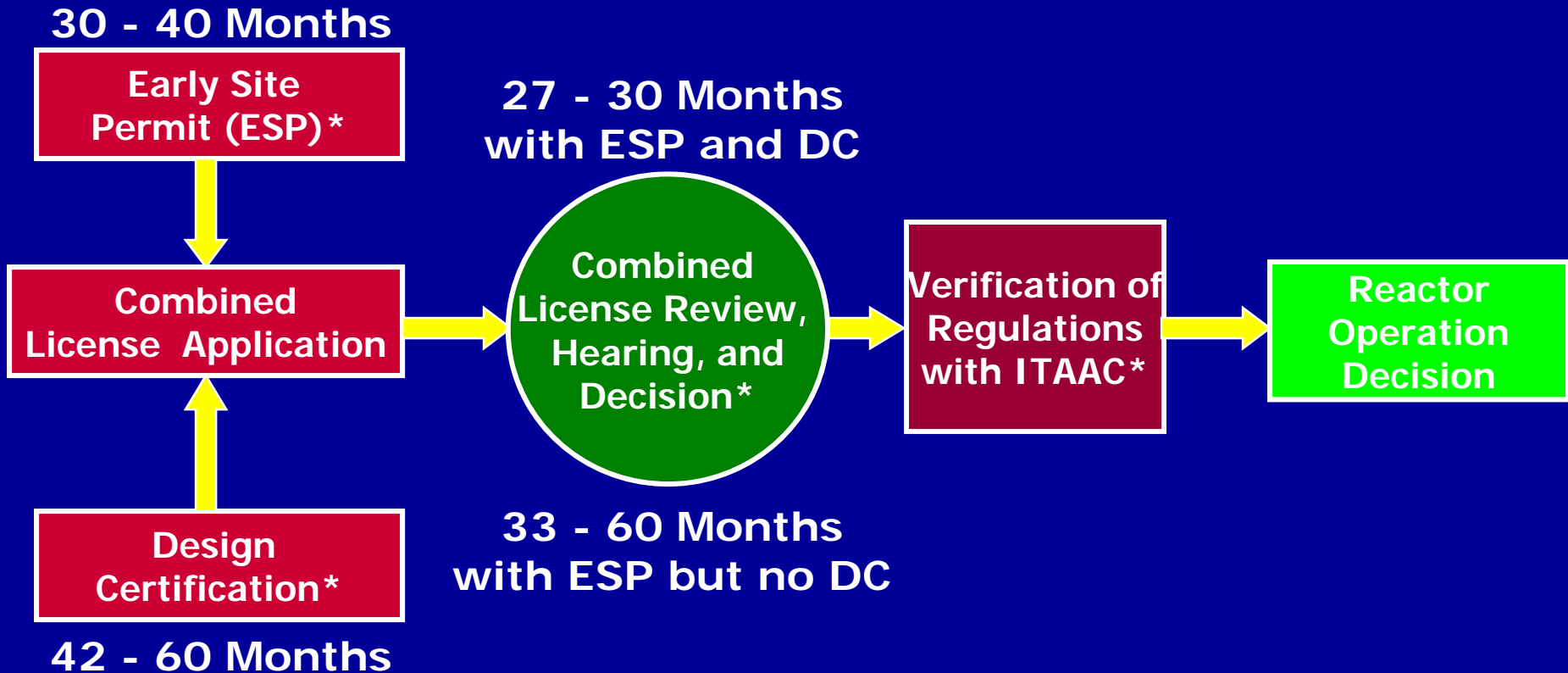
- | **UniStar (Constellation and AREVA with Bechtel Power as
subcontractor A/E) – Calvert Cliffs or Nine Mile Point (EPR)**
 - w **ESP in 2007 for the Calvert Cliffs or Nine Mile Point sites and a COL
application for the EPR reactor in 2008, with design certification for
the EPR proceeding at the same time and to be submitted in Sep
14, 2007**

Evolutionary and Passive Plants Provide In-depth Safety and Investment Protection



Note (a) CDF includes random and internal hazard events from at-power and shutdown conditions.

The new NRC licensing process



* Hearing – Public Comment Opportunity

Design Certifications

- | **NRC review and approval of a standardized design by rulemaking**
- | **Already certified:**
 - w C-E (W-Toshiba) System 80+
 - w GE/Hitachi/Toshiba Advanced Boiling Water Reactor (ABWR)
 - w Westinghouse AP600
 - w Westinghouse AP1000
- | **Design Certification review- In progress (and expected):**
 - w GE ESBWR
 - w AREVA US-EPR (expected late 2007)
 - w MHI US-APWR (expected 2008)

Combined Operating License

- | COL is the fundamental licensing process in Part 52 for reducing regulatory risk for companies building nuclear power plants
- | May reference an ESP, a standard design certification, both, or neither
- | Objective is to resolve all safety & environmental issues before authorizing construction
- | Prior to fuel load, must verify the facility has been constructed in accordance with COL (CIP-ITAAC)

ITAAC Review and Approval

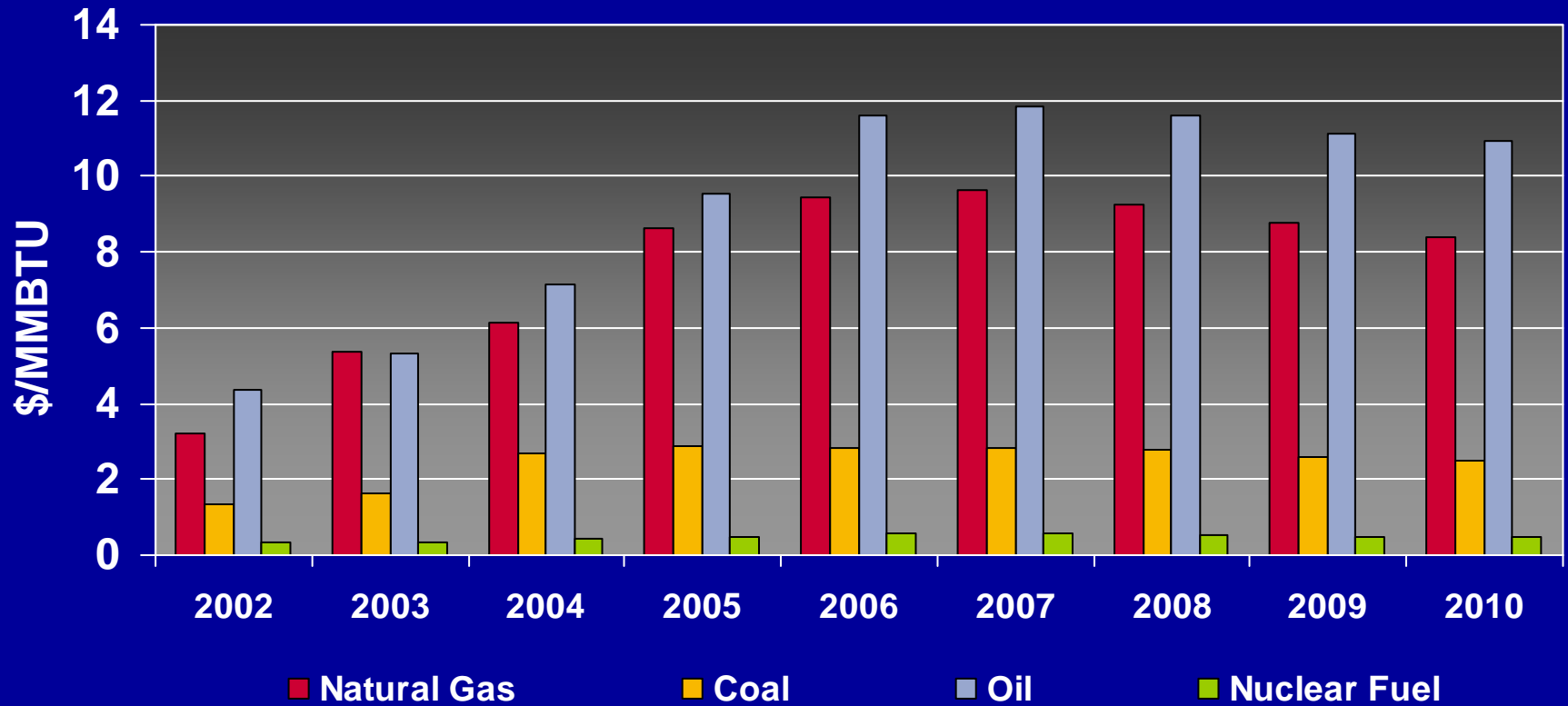
- | Provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations (10 CFR 52.97(b)(1))
- | Required to be submitted as part of the design certification and combined license applications
- | Reviewed by NRC staff in conjunction with application
- | Conditions placed on the Combined License

ITAAC Format

- | Design commitment
 - w Key features from design basis
- | Inspections, tests and analyses
 - w What observations, tests or examinations will be done to determine if the commitment was met?
- | Acceptance Criteria
 - w Taken from assumptions in Safety Analysis

New Nuclear Plant Economy

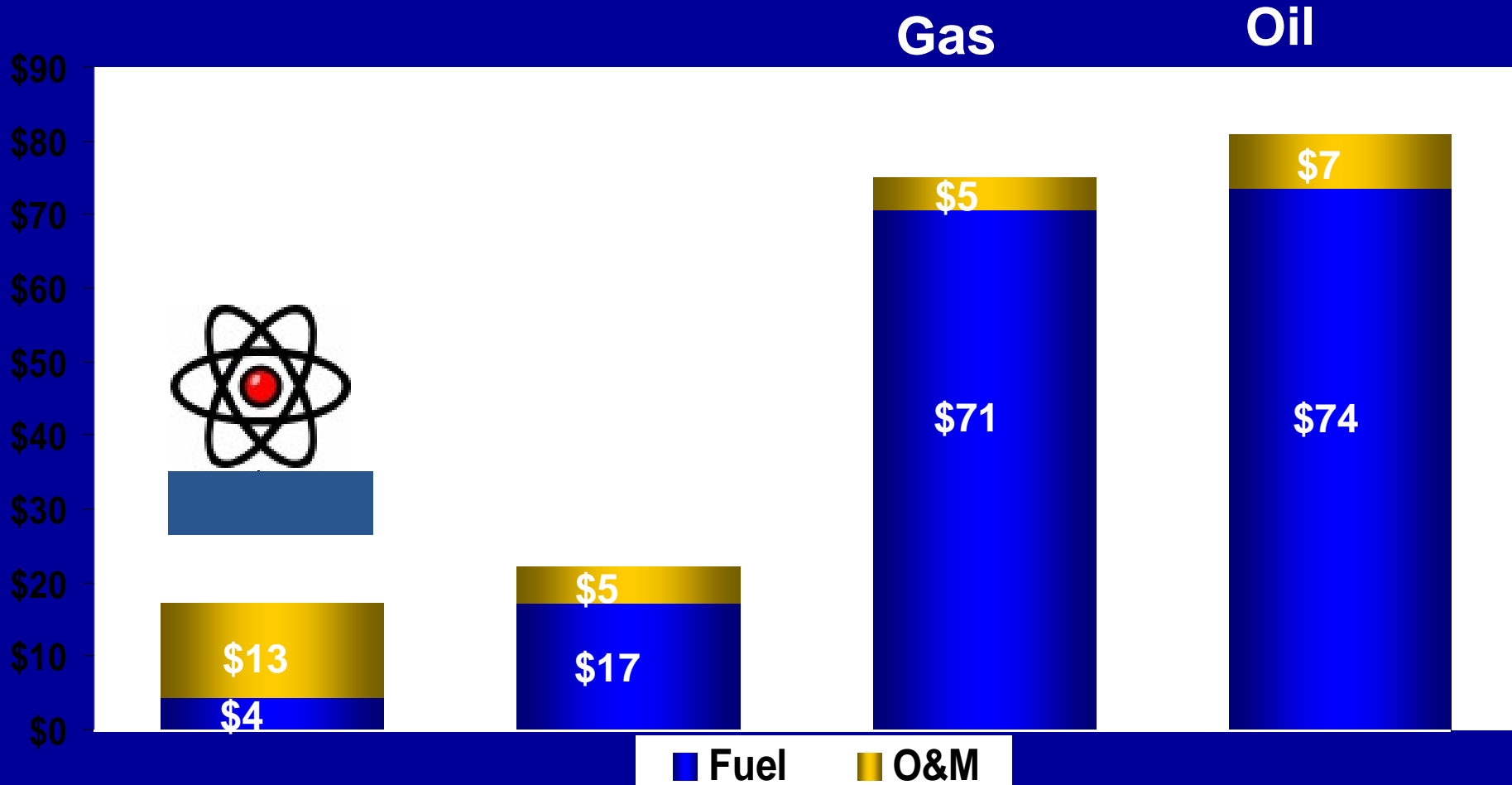
Fuel Costs



Nuclear Economics Today

Most Competitive Production Costs

2005 \$/MWh for Fuel and O&M



Nuclear New Build Economics

The Cost of the First New Unit (\$/KW)

	Industry Quotes, All-in \$2006/KW	\$1,800 - \$2,000
Overnight Costs	Plant Structures & Equipment	\$1,500 - \$2,000
	+	
	NRC Filing Fees	\$30 - \$50
	+	
	Permitting & Development	\$100 - \$150
	+	
	Owners Cost	\$100 - \$150
	+	
	Contingency	\$100 - \$200
	=	
	Total, All-in \$2006/KW	\$1,850 - \$2,550
	+	
	Escalation	\$200 - \$300
	+	
	Interest During Construction	\$400 - \$600
	=	
	Total, All-in \$2020/KW	\$2,450 - \$3,450

New Baseload Economics

Nuclear vs. Coal/Gas New Build Timeline

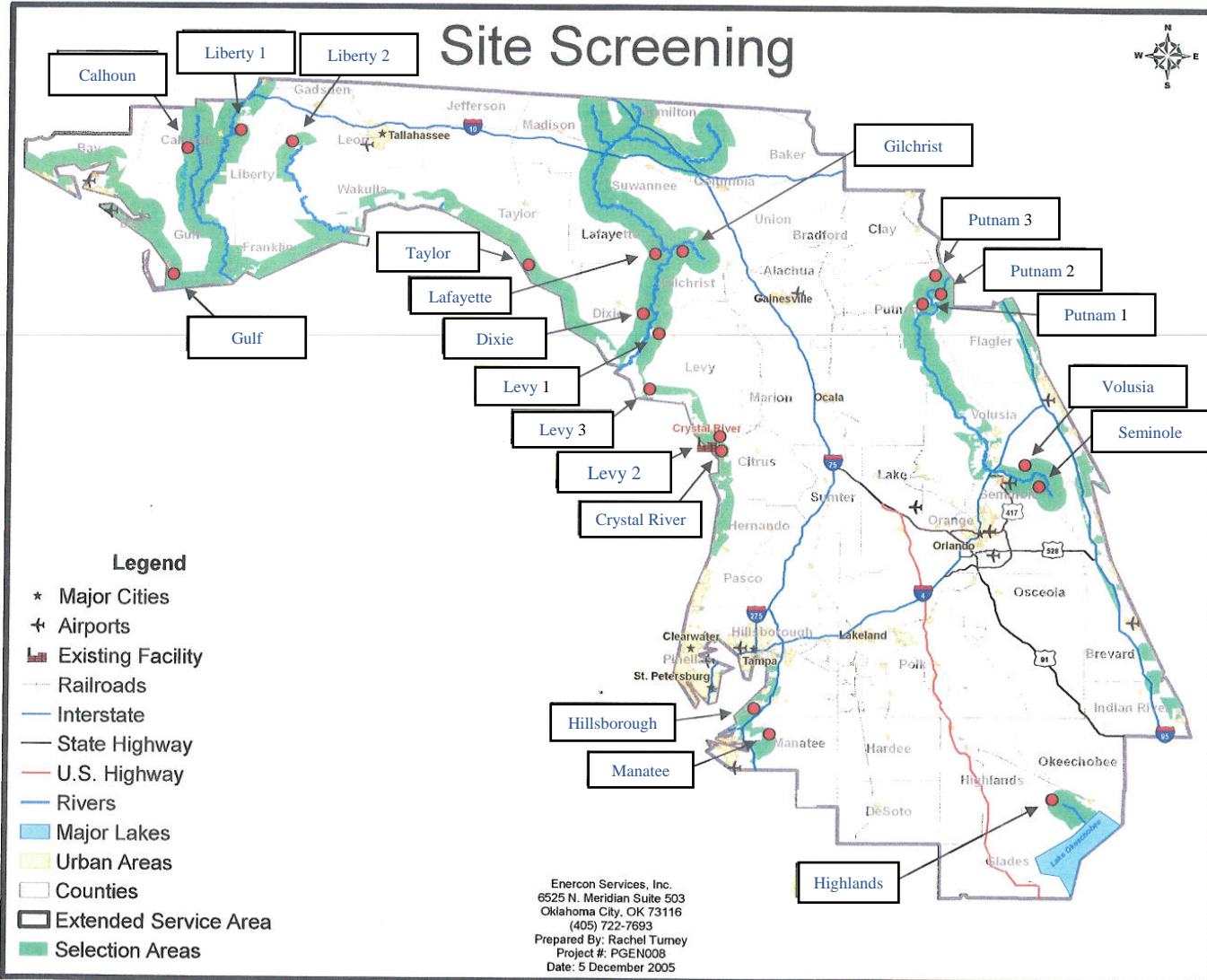
		<u>Filing</u>	<u>Permitting</u>	<u>Construction</u>	<u>Total</u>	
Nuclear		2 - 3 yrs	3 yrs	4 - 5 yrs	9 - 11 yrs	
Coal	Ultra Super Critical	————	3 yrs	————	4 yrs	7 yrs
	IGCC	————	3 yrs	————	4 yrs	7 yrs
Gas Combined Cycle		————	1 yr	————	2 yrs	3 yrs

New Nuclear Plant Deployment in North Florida

New Nuclear Plant Site Selection Process Considerations

- | Health and Safety Criteria
 - w Example - geology and seismology, cooling system requirements, nearby hazardous land uses
- | Environmental Criteria
 - w Example - disruption of important species/habitants and wetlands
- | Socioeconomic Criteria
 - w Example - construction related effects
- | Engineering and cost-related criteria
 - w Example - water supply and rail/barge access
- | Transmission Criteria
 - w Example - direct connection and system upgrade costs
- | Incentives & Public Support
 - w Example Incentives – deferred property taxes, investment tax credits, job creation tax credits, infrastructure improvements

Site Screening



Legend

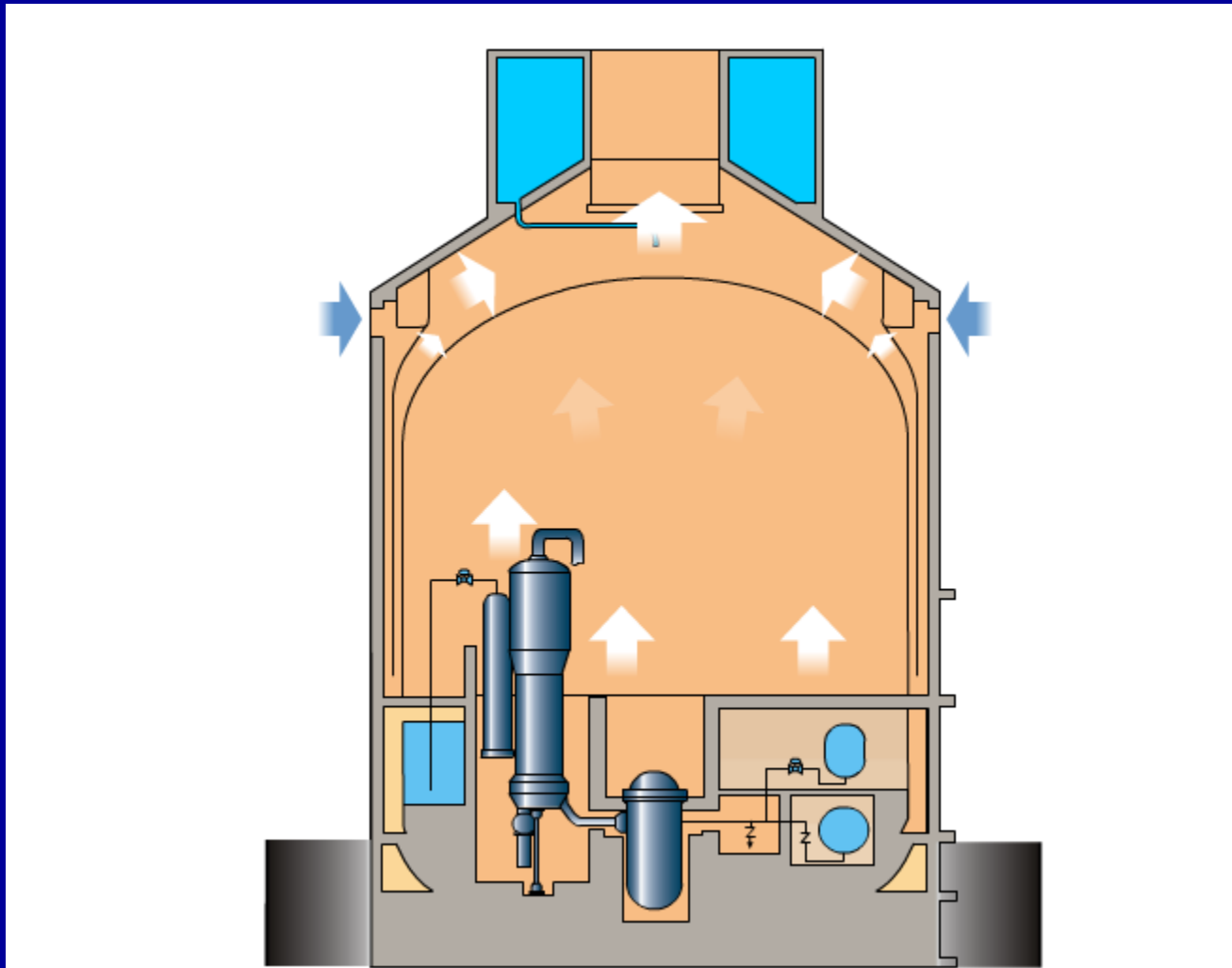
- * Major Cities
- ✈ Airports
- 🏠 Existing Facility
- Railroads
- Interstate
- State Highway
- U.S. Highway
- Rivers
- 🌊 Major Lakes
- 🏘 Urban Areas
- Counties
- ▭ Extended Service Area
- 🟢 Selection Areas

Enercon Services, Inc.
 6525 N. Meridian Suite 503
 Oklahoma City, OK 73116
 (405) 722-7693
 Prepared By: Rachel Turney
 Project #: PGEN008
 Date: 5 December 2005

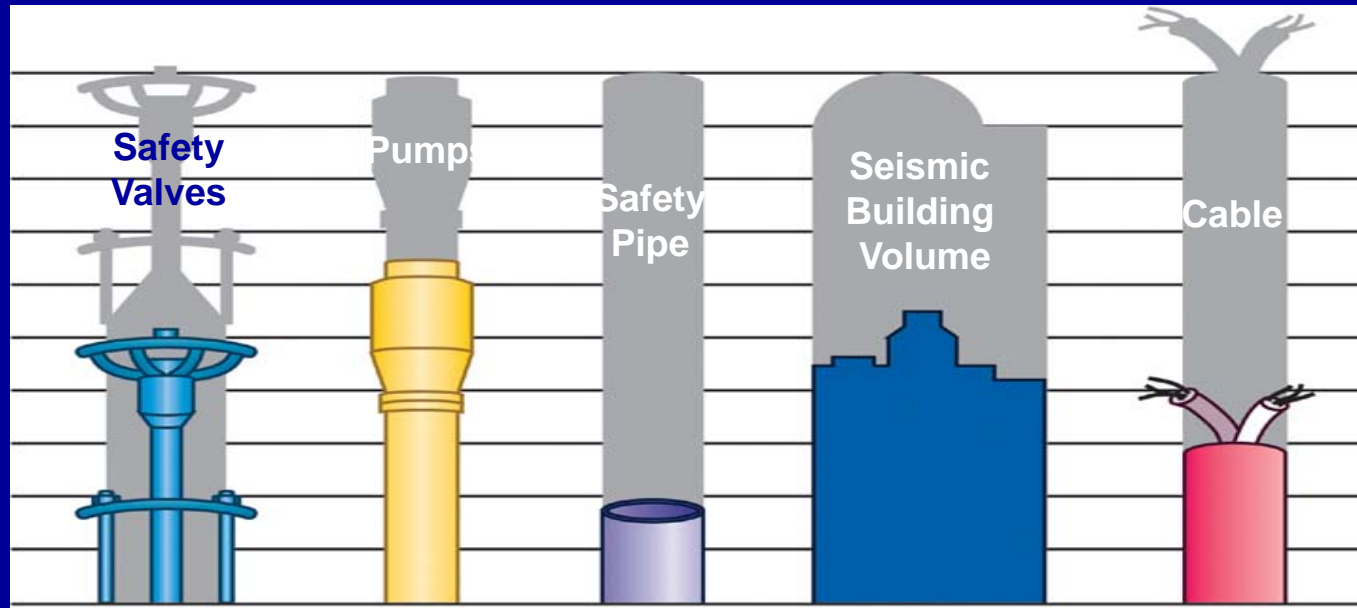




Passive Containment Cooling Operation During Normal and Abnormal (Accident) Operational Transients



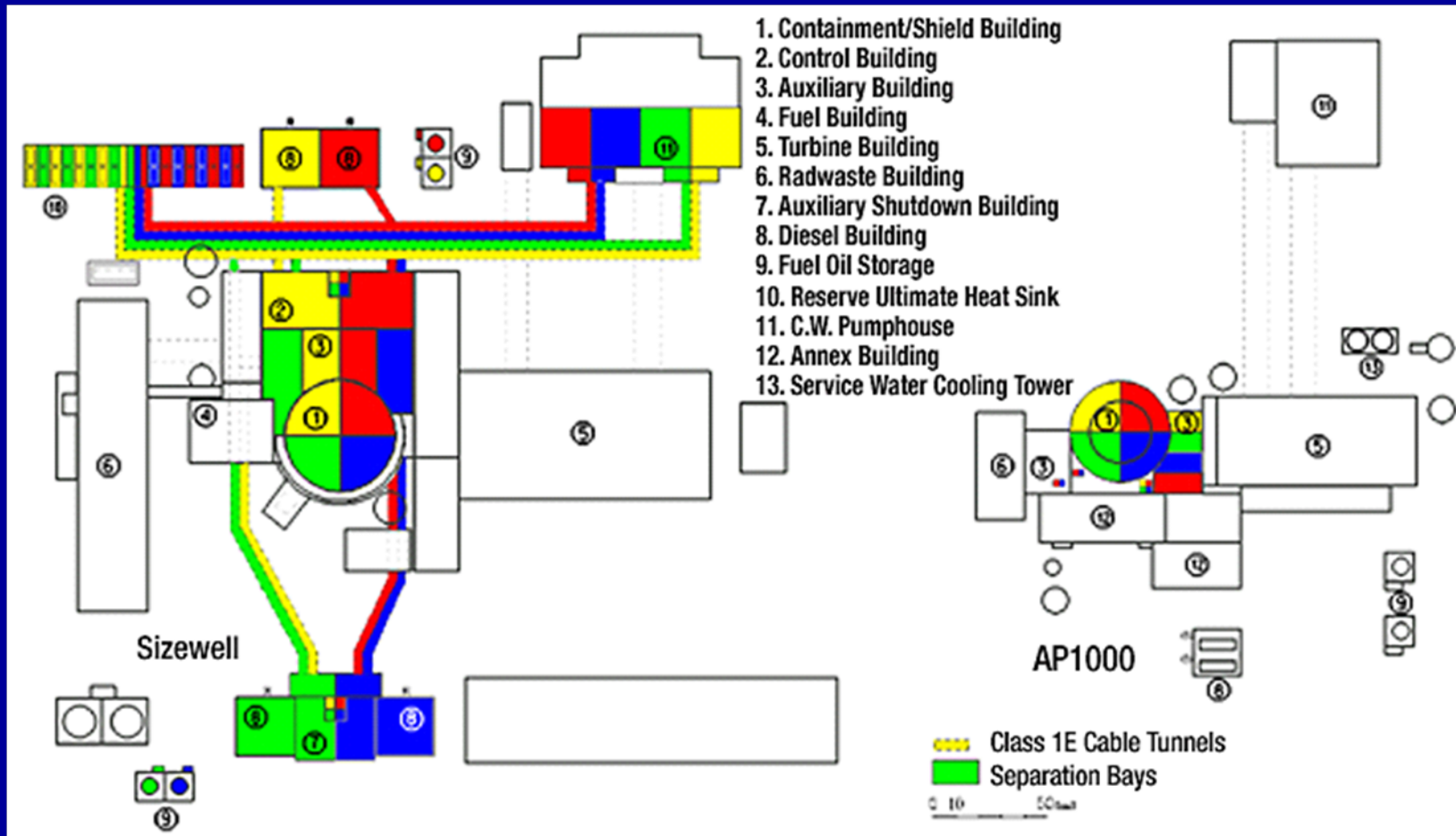
AP1000 Simplifications Drive Economics and Construction Schedule



Reduced Number of Components:

	1000 MW Reference	AP1000	Reduction
- Safety Valves	2844	1400	51%
- Pumps	280	184	34%
- Safety Piping	11.0 x 10 ⁴ feet	1.9 x 10 ⁴ feet	83%
- Cable	9.1 mil. feet	1.2 mil. feet	87%
- Seismic Building Volume	12.7 mil. ft ³	5.6 mil. ft ³	56%

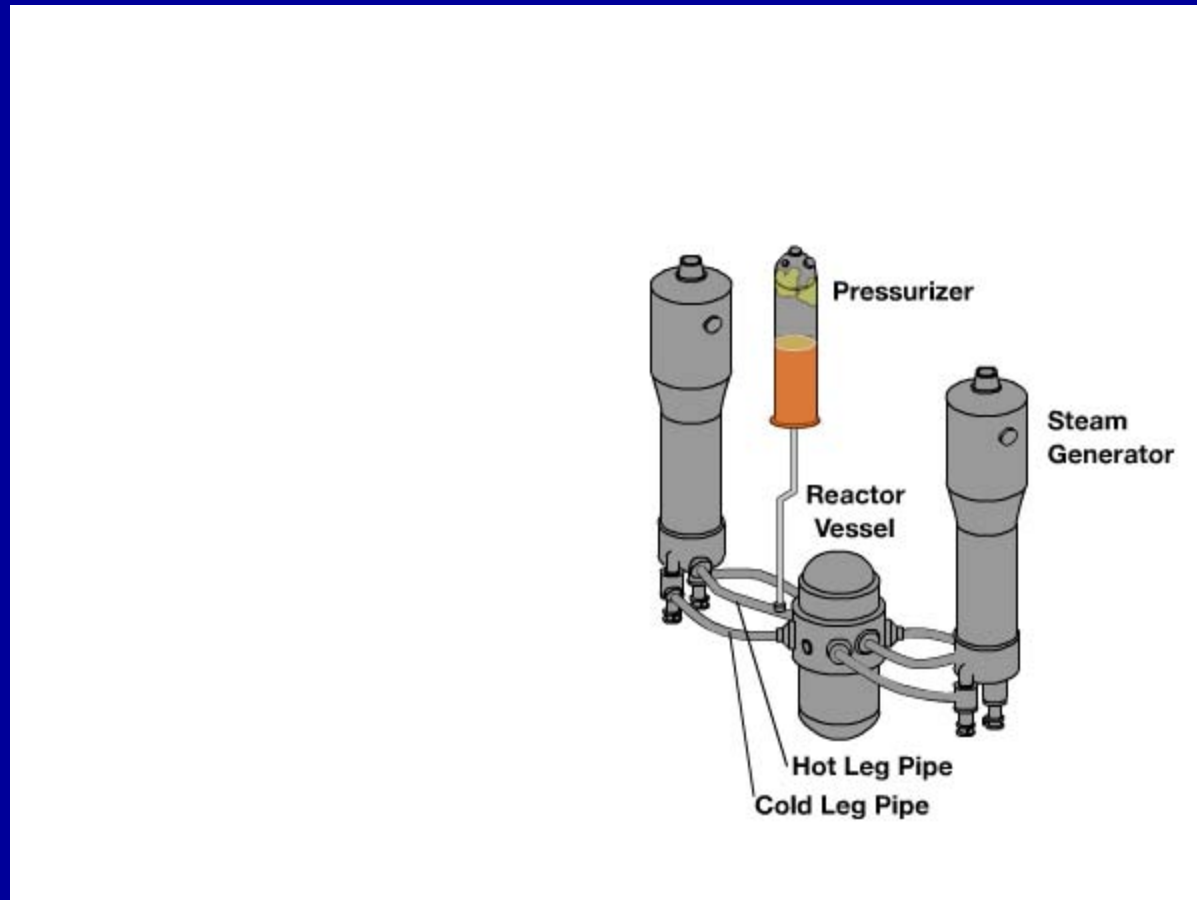
AP1000 Smaller and Dramatically Simpler than Evolutionary Plants



Sizewell B

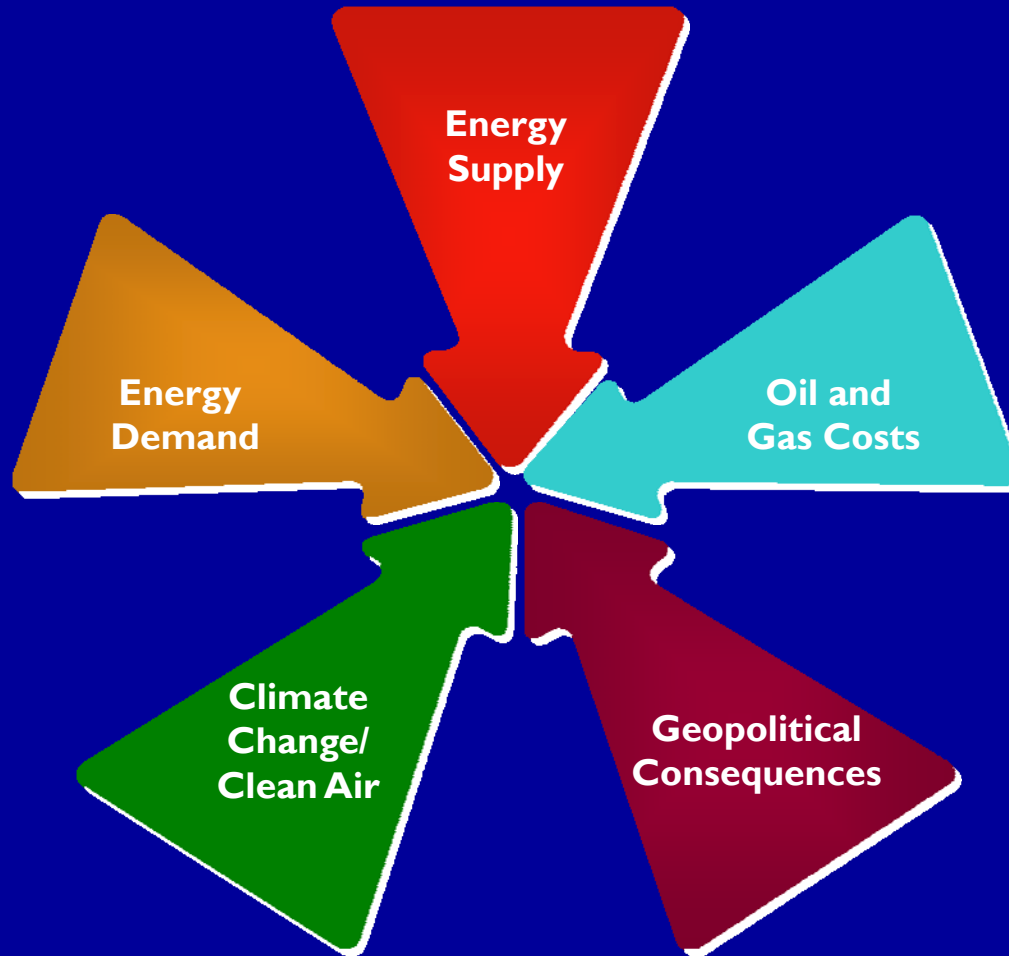
AP1000

Passive Core Cooling System Operation During a Small-Break LOCA



Public Opinion on New Nuclear Power Plant Deployment

Converging Factors



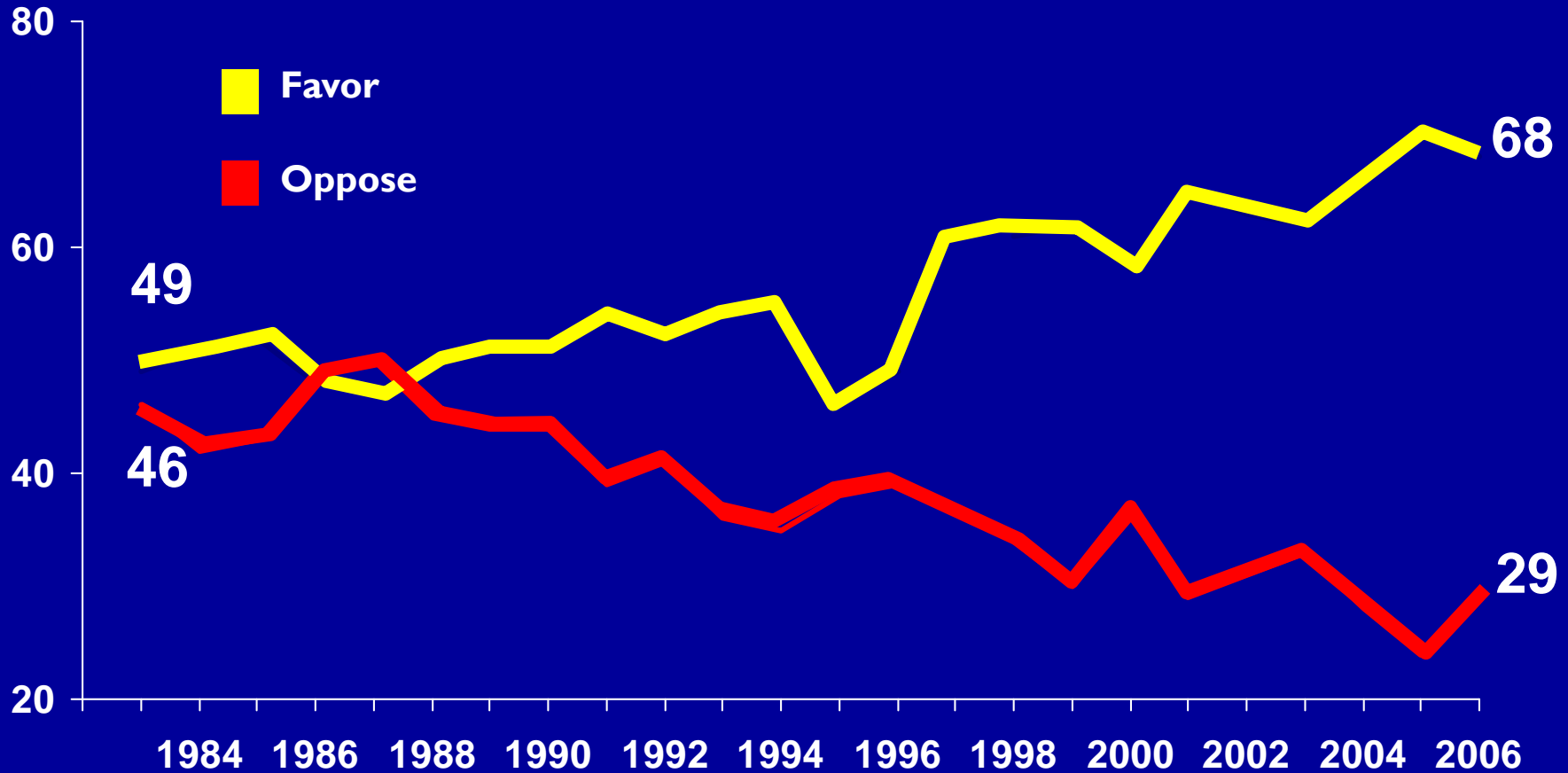
23-Year Trends Show Big Change



- Bisconti Research national public opinion surveys:
 - 1,000 U.S. adults age 18+
 - Margin of error plus or minus 3 percentage points

68% Favor Use of Nuclear Energy

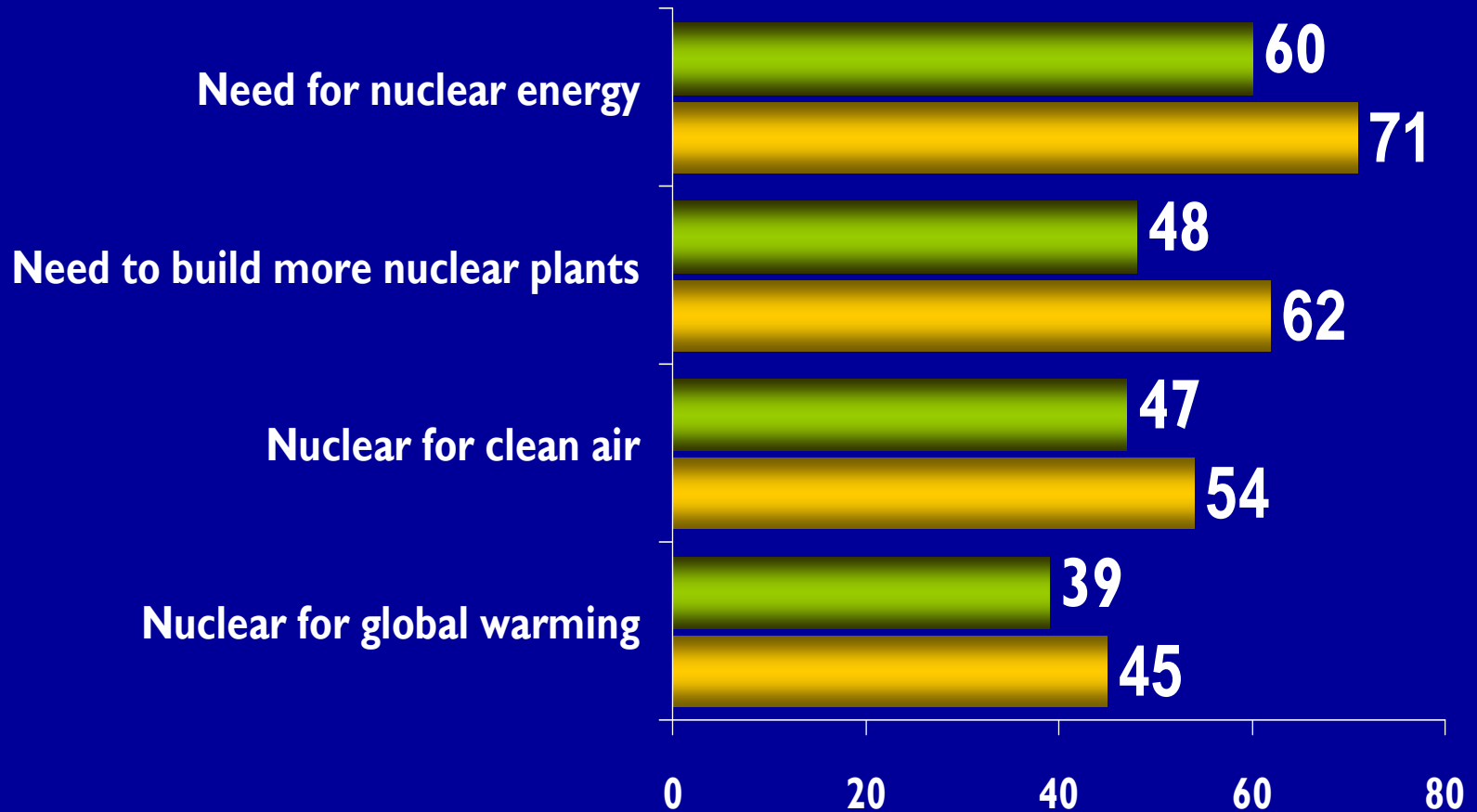
(Trend 1983-2006, Annual Averages)



The Buzz: Heard About in Past Year

■ All U.S. Public

■ College Graduate Voters



Nuclear Power in the News

The New York Times

Nuclear Power's Second Act

USA
TODAY

Time for Nuclear Power

REUTERS

Record Gas Prices Breathe Life Into Nuclear Power

The Boston Globe

Hot Properties: Nuclear Power Plants

Five Steps of Support for New Plants

