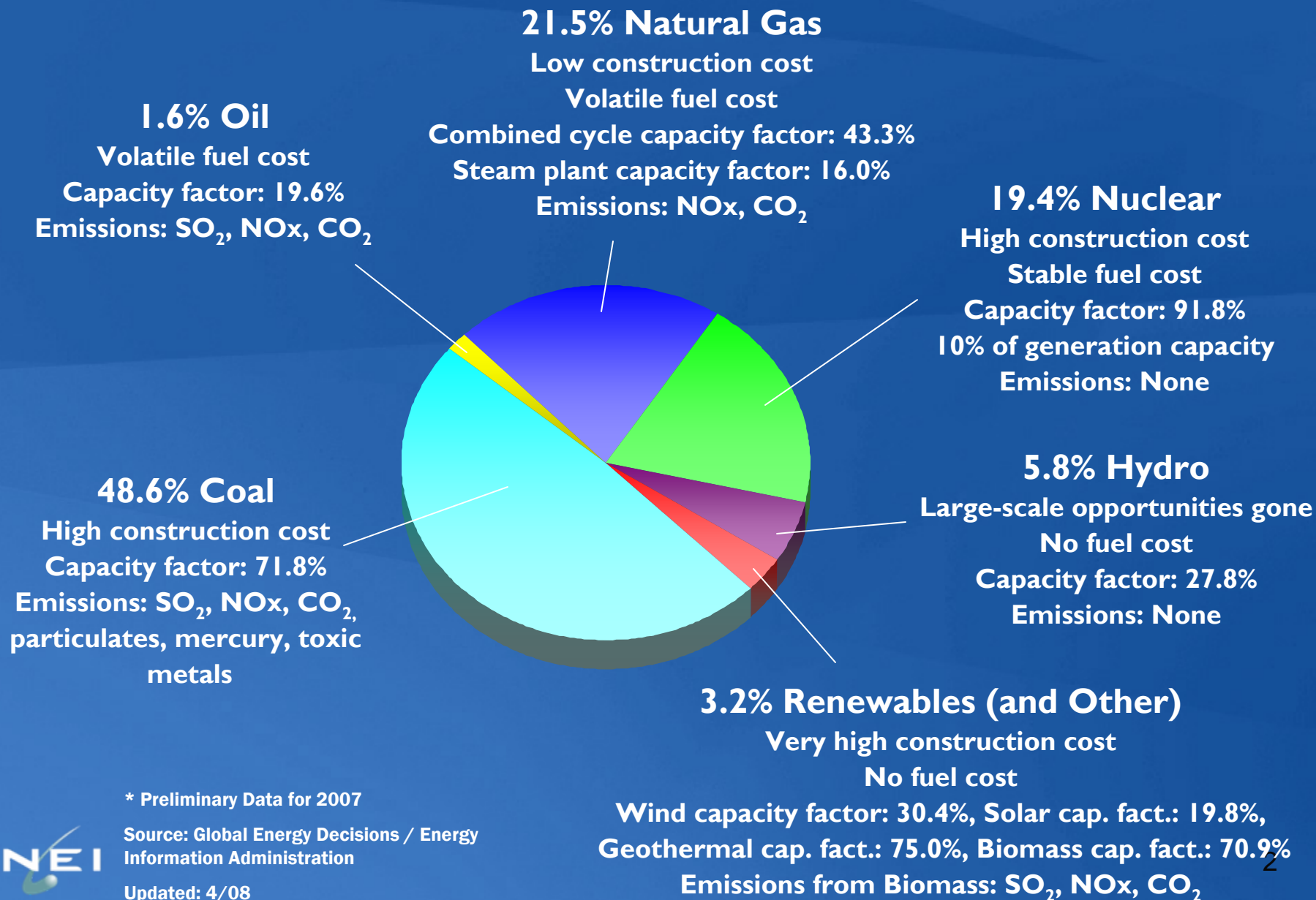


Nuclear Energy Institute and Prospects for New Nuclear

**Tom Houghton
Director, Strategic Regulatory Programs
Nuclear Energy Institute
August 26, 2008**

Sources of U.S. Electricity 2007*



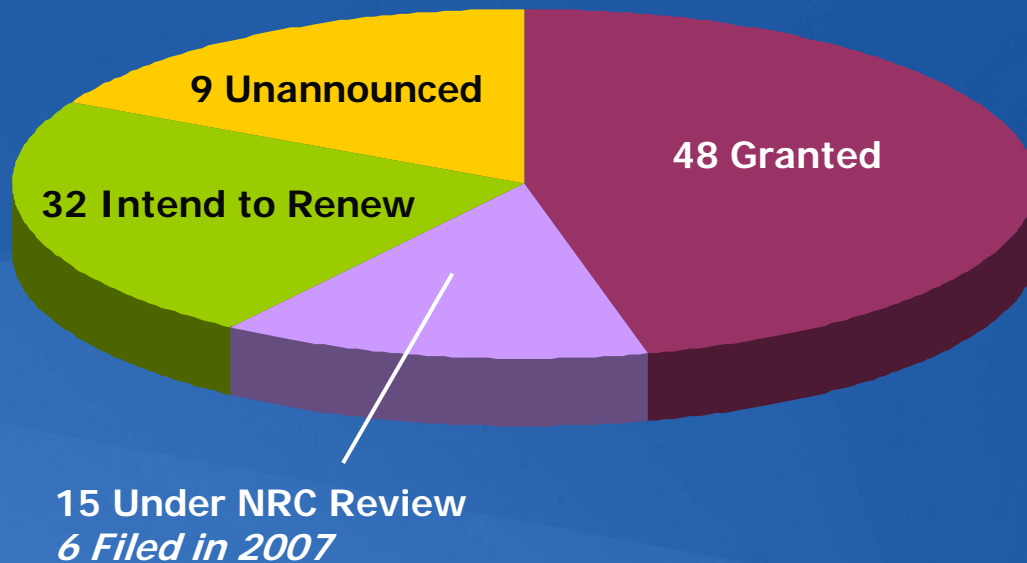
* Preliminary Data for 2007

Source: Global Energy Decisions / Energy
Information Administration

Updated: 4/08



License Renewals Continue ...



... And Plant Restarts

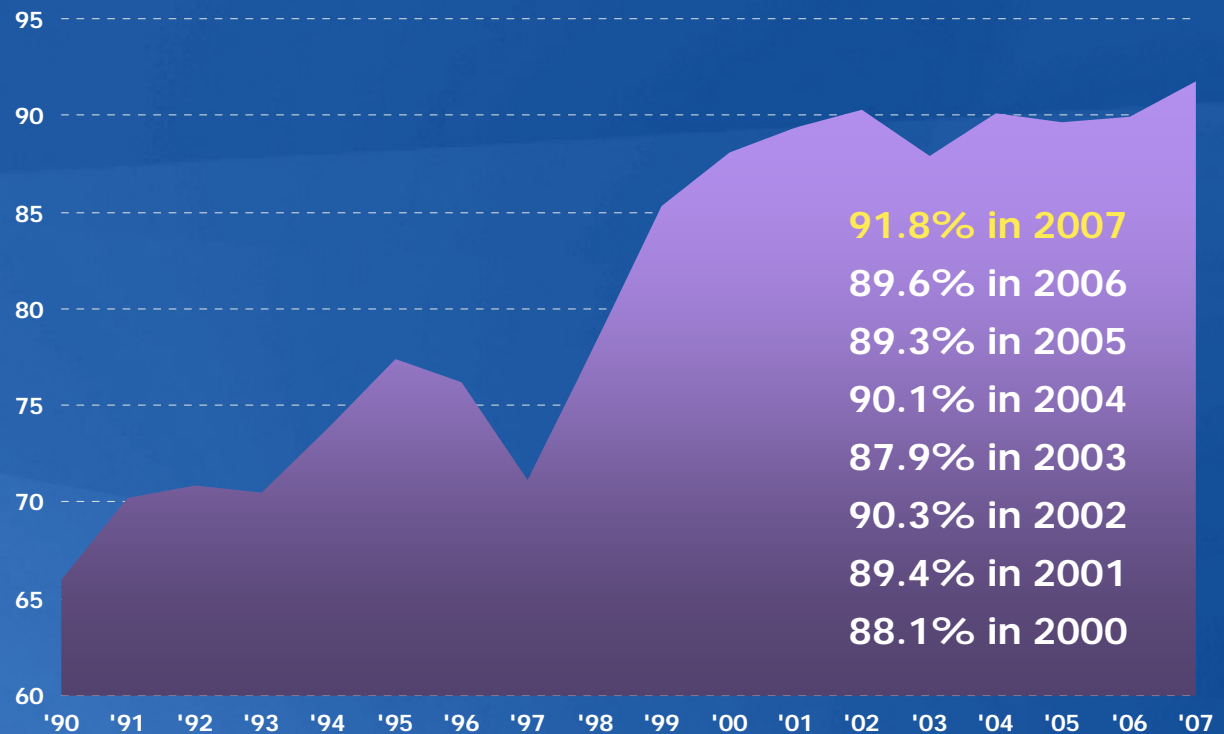
- TVA's Browns Ferry 1 back in service May 2007 (5-year, \$1.8 billion project)
- TVA approved Watts Bar 2 completion August 2007 (5-year, \$2.5 billion project)

Sustained Reliability and Productivity

U.S. Nuclear Plant Average Capacity Factor

Highlights

- Fewer outages in 2007 (55 in 2007, 65 in 2006)
- Average outage duration in 2007 = 40.5 days

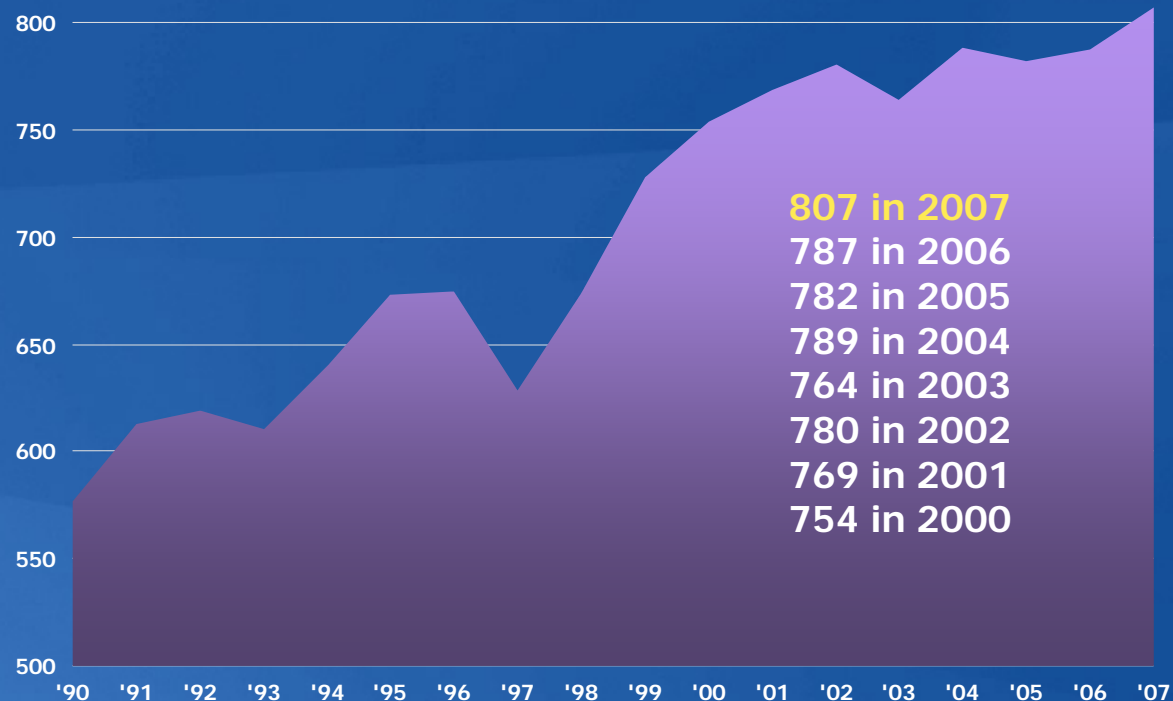


Output at Record Levels

U.S. Nuclear Generation (billion kilowatt-hours)

Highlights

- **5,222 MW of power uprates approved**
- **912 MW of uprates pending**
- **1,751 MW of uprates expected**

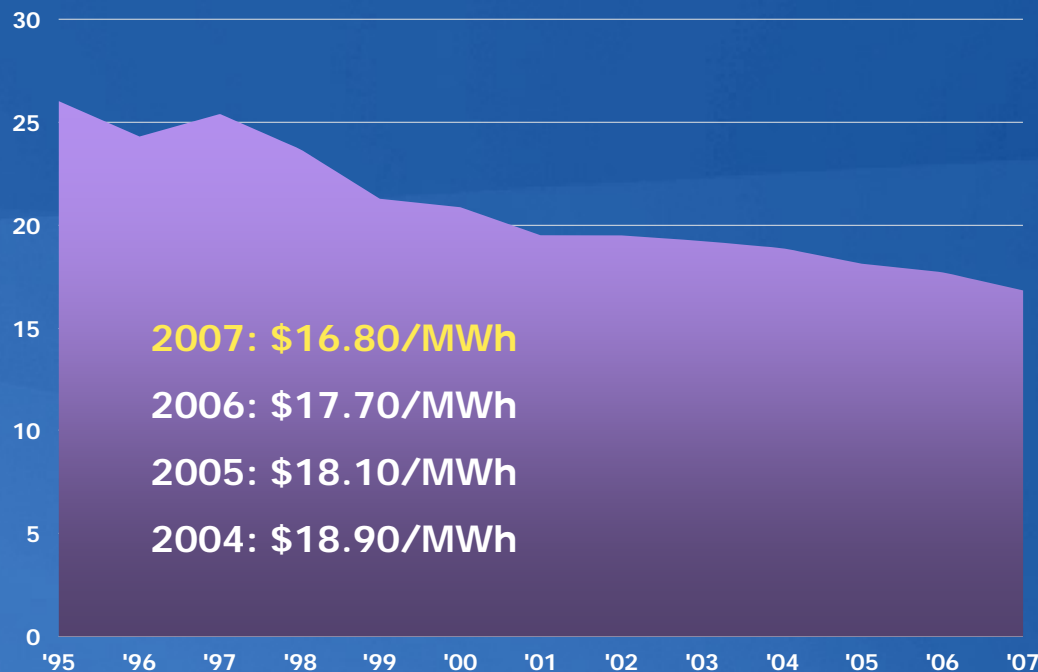


Sources: Global Energy Decisions, Energy Information Administration, U.S.

Nuclear Regulatory Commission, NEI estimate for 2007

Solid Economic Performance Continues

U.S. Nuclear Production Cost (2007 \$ per MWh)



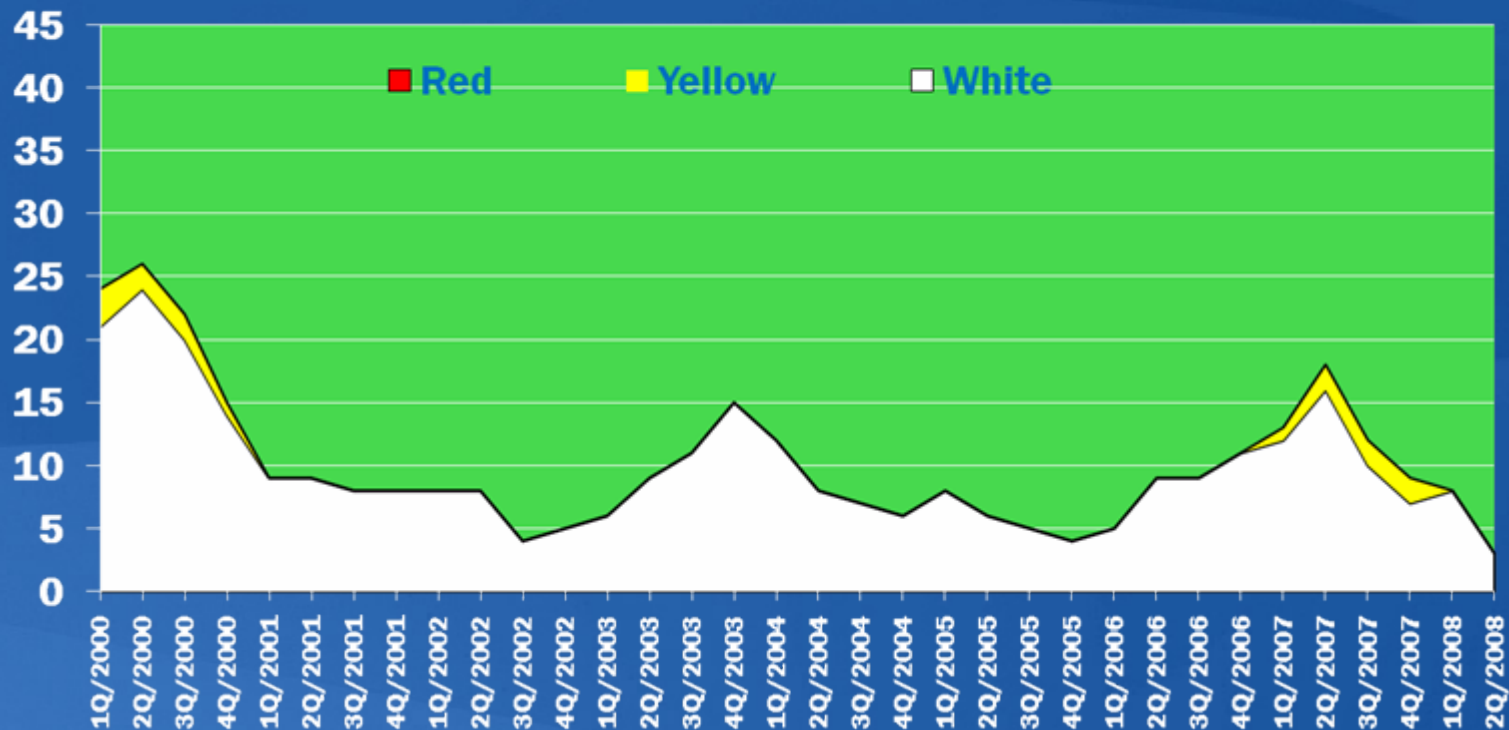
Sources: Global Energy Decisions, NEI estimate for 2007

Solid Margins

- **\$16.80/MWh** production cost implies busbar cost of \$22-23/MWh
- Average prices in selected power markets in 2007:

Entergy	\$46.71/MWh
ERCOT	\$49.71/MWh
NEPOOL	\$69.12/MWh
NYISO	\$68.62/MWh
PJM West	\$59.84/MWh

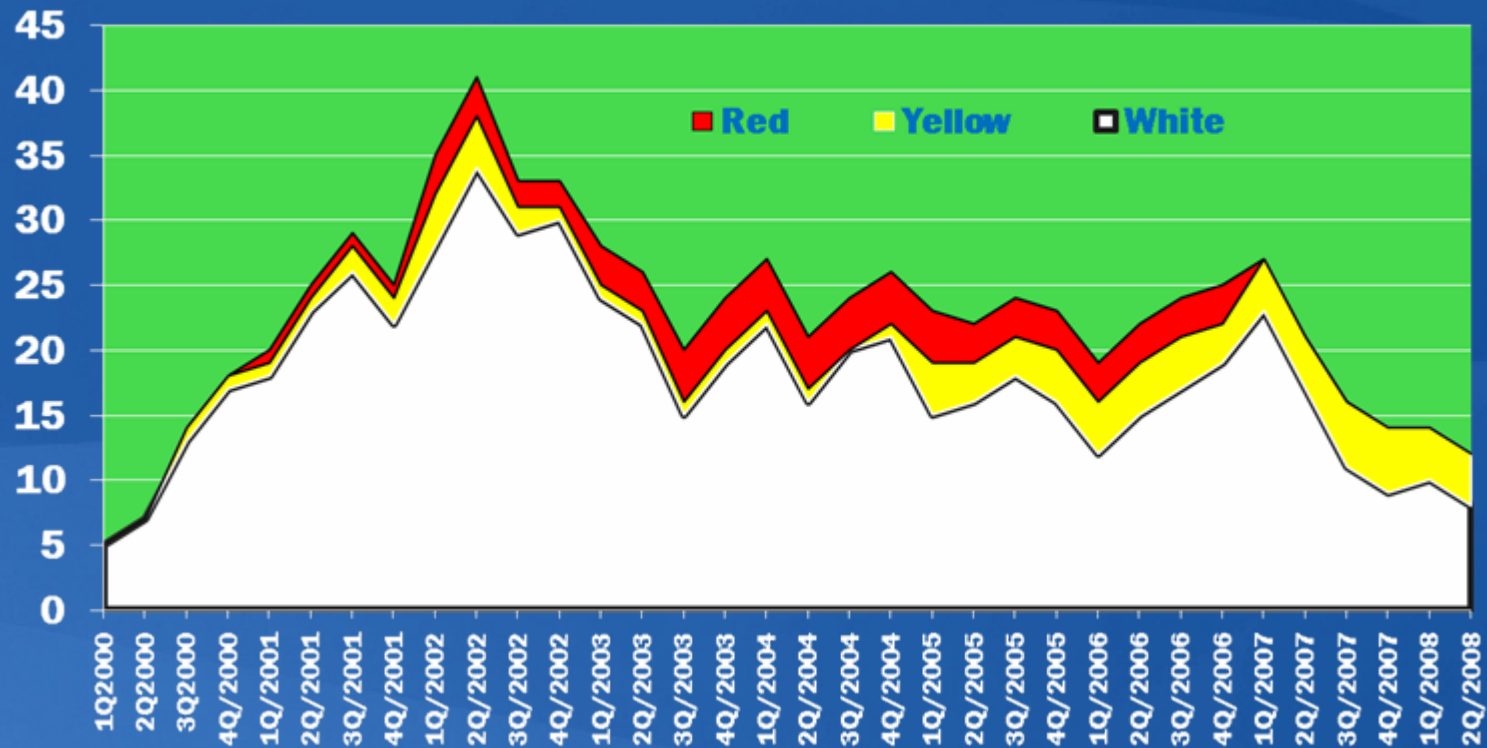
Greater-Than-Green Performance Indicators



Performance Indicators

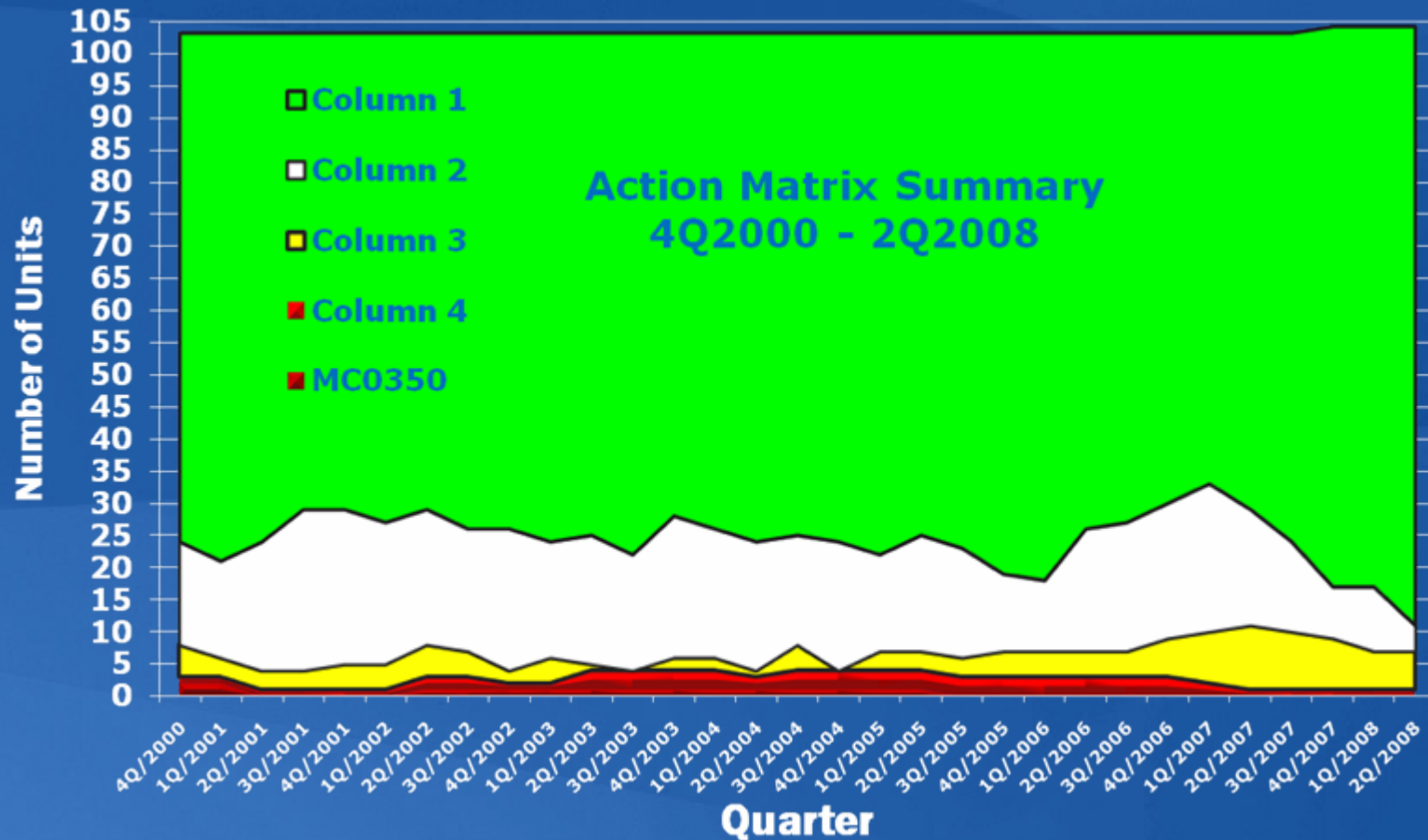
Industry performance for latest quarter (2Q2008) is at highest level since ROP began

Active Greater-Than-Green Findings



Greater-than-Green Findings

Fewest number of active >Green findings since first year of ROP



Action Matrix

Current quarter (2Q2008) shows the greatest number of Column 1 plants since the inception of the ROP

What is the Nuclear Energy Institute?

- **NEI: The industry policy organization since 1953 (Atomic Industrial Forum)**
- **NEI formed in 1994 by merger of**
 - **American Nuclear Energy Council (Legislative)**
 - **Committee on Energy Awareness (Communications)**
 - **Nuclear Utility Management and Resources Council (Regulatory)**

319 Member Companies in 17 Countries

- All U.S. nuclear utilities
- International nuclear utilities
- NSSS and major component vendors
- Architect/engineering firms
- Radiopharmaceutical manufacturers
- Fuel suppliers
- Universities
- Labor unions
- Law firms

Leveraging the Expertise of the Industry

Advisory Committees

- ❖ Nuclear Strategic Issues Advisory Committee (NSIAC)
- ❖ Governmental Affairs Advisory Committee (GAAC)
- ❖ Communications Advisory Committee (CAC)
- Working Groups
- Task Forces
- 1,800 member representatives serving on 140 committees, working groups and task forces

NEI Mission

- **Ensure the formation of policies that promote beneficial uses of nuclear energy and technologies**
- **Provide a forum to resolve technical, regulatory and business issues for the nuclear business**

Accomplishing the Mission

- **Policy direction on critical issues**
- **A unified industry approach to address and resolve nuclear regulatory and related technical matters**
- **Advocacy and representation before the Congress, Executive Branch agencies, regulatory bodies, media and state policy agencies**
- **Accurate and timely information to policy makers, the public and other constituencies**
- **Assistance to the nuclear energy industry with regard to state issues such as environmental considerations**
- **Encouragement to educational institutions to promote education in nuclear energy disciplines**

2008 Business Plan

CORE ACTIVITY 1

Enhancing the Business Environment for the Safe and Reliable Operation of Existing Plants

CORE ACTIVITY 2

Creating the Business Environment for New-Plant Deployment

ESSENTIAL ACTIVITIES

Enhancing the Regulatory Environment

Managing Used Nuclear Fuel

Advancing a National Energy Policy

Sustaining the Nuclear Infrastructure

Branding & Building Public Support

Enhancing Community Relations & Incident Response

Regulatory Oversight
Safety-Focused, Risk-Informed Regulation
Security & EP
New-Plant Deployment
Fuel Cycle
Radiation Protection

Fuel Acceptance
Waste Confidence
Funding
Licensing
EPA Standard
Nevada
Standard Canister
Advanced Technologies

Implementation of EPACT 2005
Funding For DOE Nuclear Activities
Recognition Of Environmental Benefits
Long-range Policies

Work Force
Fuel Supply
Physical Infrastructure
Financial
Community Outreach

Coordination With Member Efforts
Targeted Advertising
Outreach to Media, Policy Makers
Outreach to State, Labor

Industry Community Relations Programs
Benchmarking Against Other Industries
Community Relations "Tools"
NEI Emergency Plan / Improved Coordination

MISSION-CRITICAL FUNCTIONS

Influencing Public Policy & Policymakers

Influencing the Political Process

Relationship Development

Member Support: Policy Coordination

Member Support: Information & Technology

Internal Operations

Nuclear Strategic Issues Advisory Committee (NSIAC)

- **Advises NEI on Strategic Direction**
- **Full Committee**
 - CNOs of each operating utility and similar executive-level individuals of INPO, major vendors and architect engineers
- **Steering Committee**
 - Operating utility CNOs
- **Formal Initiatives**
 - 80% vote of utility CNOs on an issue commits the industry

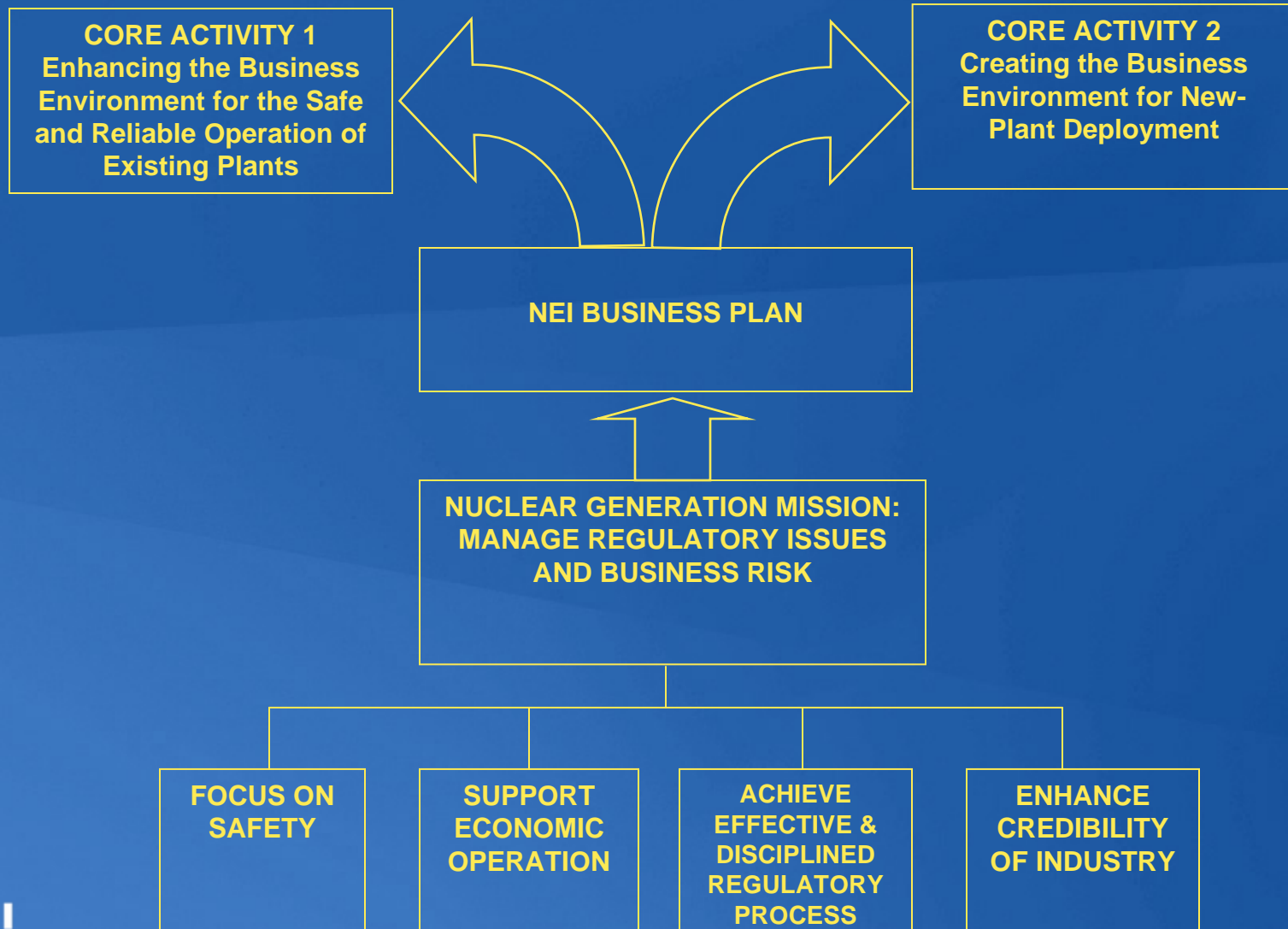
Most Recent Formal Initiatives

- **Management of Materials Issues**
- **Standardized Security Plans**
- **Industry Composite Adversary Force To Support NRC Force-on-force Exercises**
- **Portable Qualifications**
- **Cyber Security**
- **Groundwater Protection**
- **Control of Heavy Loads**

2008 – 2010 Strategic Imperatives

- **Maintaining the highest level of safe and reliable plant operations**
- **Systematically managing change in the industry**
- **Significantly increasing outreach to federal, state and local policymakers**
- **Proactively/preemptively addressing issues that challenge public confidence and credibility**

Nuclear Generation



Success achieved by leveraging industry resources:

Working Groups

- Security
- New Plant
- Digital I&C
- Emergency Prep
- Materials Executive Oversight Group
- Radiation Protection
- Risk-Informed Reg.
- Used Nuclear Fuel
- Fire Protection

Task Forces

- Licensing Action
- Control Heavy Loads
- Work Hours
- Sump Performance
- NFPA 805
- Dry Cask Storage
- License Renewal
- ROP
- Construction Inspection
- ... and 32 others

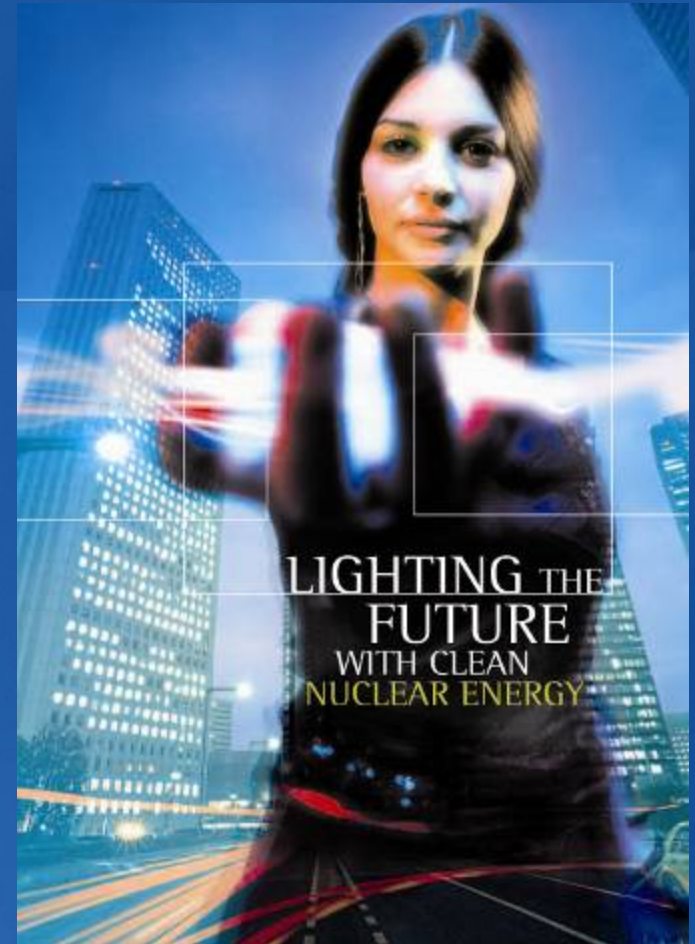
Governmental Affairs

- **Climate Change: The dominant energy issue in coming years**
- **Loan Guarantees and other incentives in the Energy Policy Act of 2005**
- **Waste Confidence/Standard Contracts**
- **Nominations to the NRC, DOE, and other agencies**
- **Product v. Services - Now pending at the Supreme Court**
- **Building Alliances**
 - **Labor/ Building Trades**
 - **Grassroots – Nuclear Advocacy Network**
- **Political Action Committee: \$450,000 per 2-year election cycle, equally divided among the two parties**

NEI Communications: This Is Our Brand

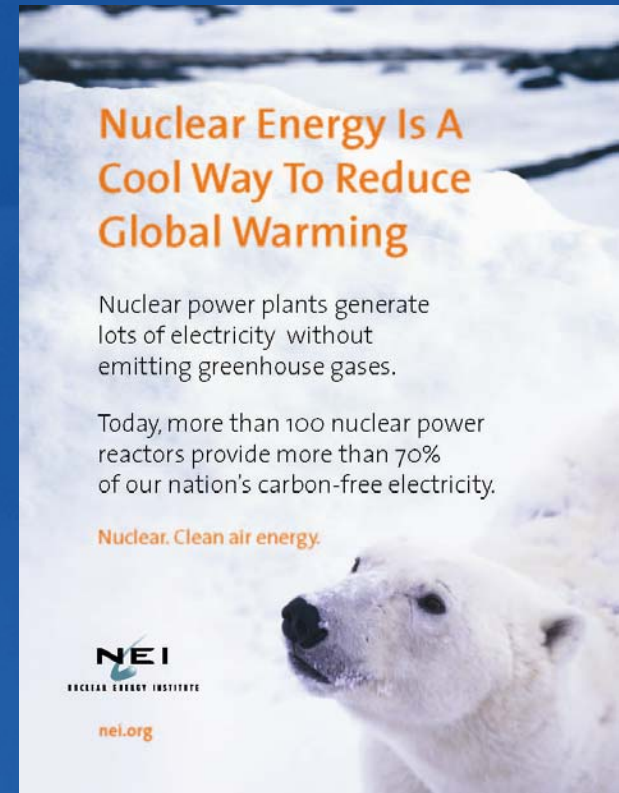
Nuclear is ...

- **clean-air** energy
- **reliable** and plays a vital role in diverse energy portfolio
- **affordable**

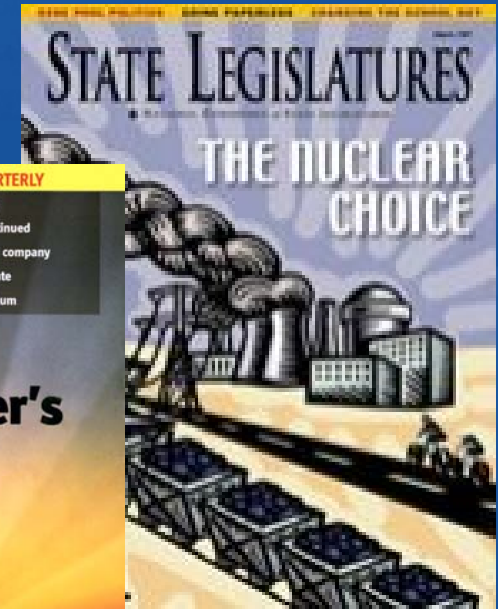
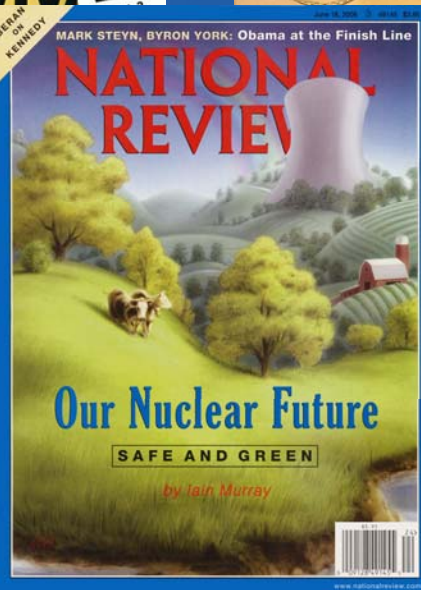


Climate Change Drives New Support

- NEI supports federal action among all sectors, but no specific mechanism
- IPCC, National Academy of Sciences, Earth Institute, World Economic Forum support nuclear's role to reduce GHGs
- Bush plan; legislation unlikely until 2009-10
- Gore advisor on CNN: "Even good old liberals are supporting nuclear energy. So do I."



Proactive Media Outreach



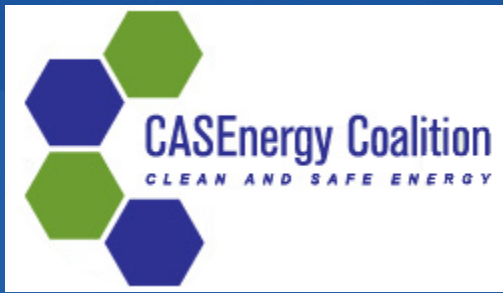
Broadening Industry Advocates

- **Clean and Safe Energy Coalition: 1,600 members**
- **Nuclear Advocacy Network: 2,411 members**
- **Newman-Wachs Racing sponsorship**
- **Think tanks/policy groups**
- **Bloggers/independent journalists**



NWR Nuclear. Clean Air Energy
Car and driver Simona de
Silvestra





Energizing 1,700 organizations and decision-makers

- Focus on key states
- Membership expansion, diversity
- Media recognition
- Policymaker outreach



<http://www.cleansafeenergy.org>

Public Opinion: Attitudes are more favorable

- **63% favor the use of nuclear energy**
 - “strongly favor” increased, “strongly oppose” decreased
- **59% agree with “definitely” building new plants**
 - 29% strongly agree
- **67% agree that nuclear is clean air energy—up from 62% in Oct. 2007**
- **67% associate nuclear energy “a lot” or “a little” with climate change solutions**
- **7 out of 10 people agree that today’s nuclear power plants are safe and secure**



Key Issues:

[Protecting the Environment](#) ▶

[Reliable and Affordable Energy](#) ▶

[New Plants](#) ▶

[Safety and Security](#) ▶

[Nuclear Waste Disposal](#) ▶

Breaking News

- [Congress' FY08 Appropriations Bill Paves Way For Continued Advancement of Nuclear Power](#)
- [Industry Welcomes Approval of International Liability Framework as Part of New Energy Law](#)
- [Congressional Budget Agreement Will Help Encourage Construction of New Nuclear Plants](#)

Policy Updates

- [Advanced Fuel-Cycle Technologies Hold Promise for Used Fuel Management Program](#)
- [Integrated Used Fuel Management](#)
- [Nuclear Energy: A Key Tool in Reducing Greenhouse Gas Emissions](#)

Resources and Stats

- [Conferences and Meetings](#)
- [Industry Data](#)
- [Document Library](#)
- [Emissions Avoided by the U.S. Nuclear Industry \(1995-2006\)](#)
- [Economic Benefits Studies](#)



The Science Club

Resources for students and teachers, including animations that explain the fundamental principles of nuclear energy.

[+MORE](#)

New Plant Deployment

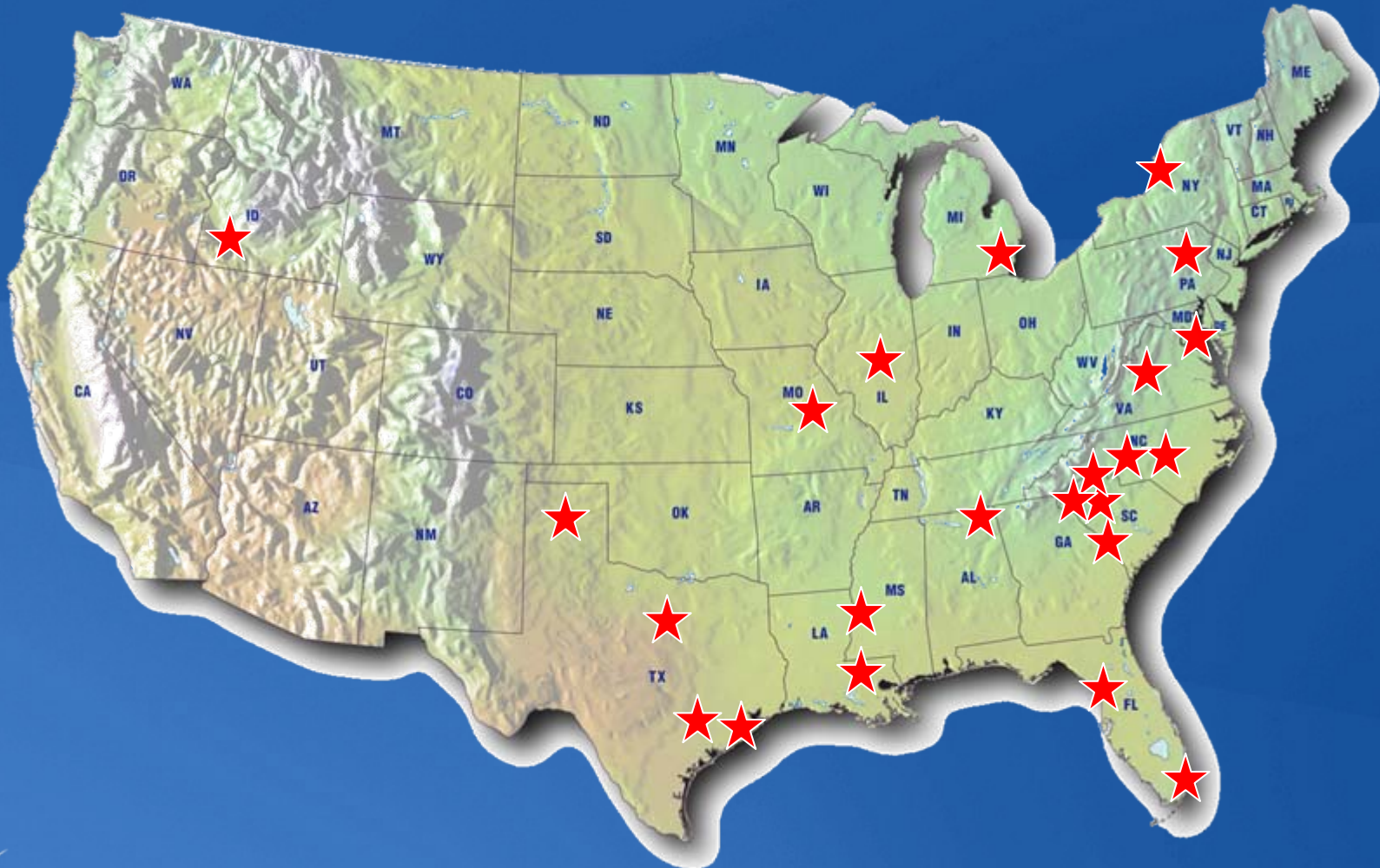
Global New Nuclear Activity

- **35 plants under construction ~ 30 GW**
- **91 plants on order or planned in 18 countries**
 - **Expected to be in operation ~- 2017**
- **200 projects under consideration in 27 countries**
 - **Statement of intent/proposal**

The Need for New US Nuclear Plants

- **Need for power**
 - **Company customer growth rates increasing 20,000 to 30,000 per year**
 - **Population increasing**
- **High and volatile fossil fuel prices**
- **Climate change**
- **US nuclear generation lowest baseload cost – 1.68 cents/kWh**
- **High US nuclear plant capacity factors**

Potential New Nuclear Plants



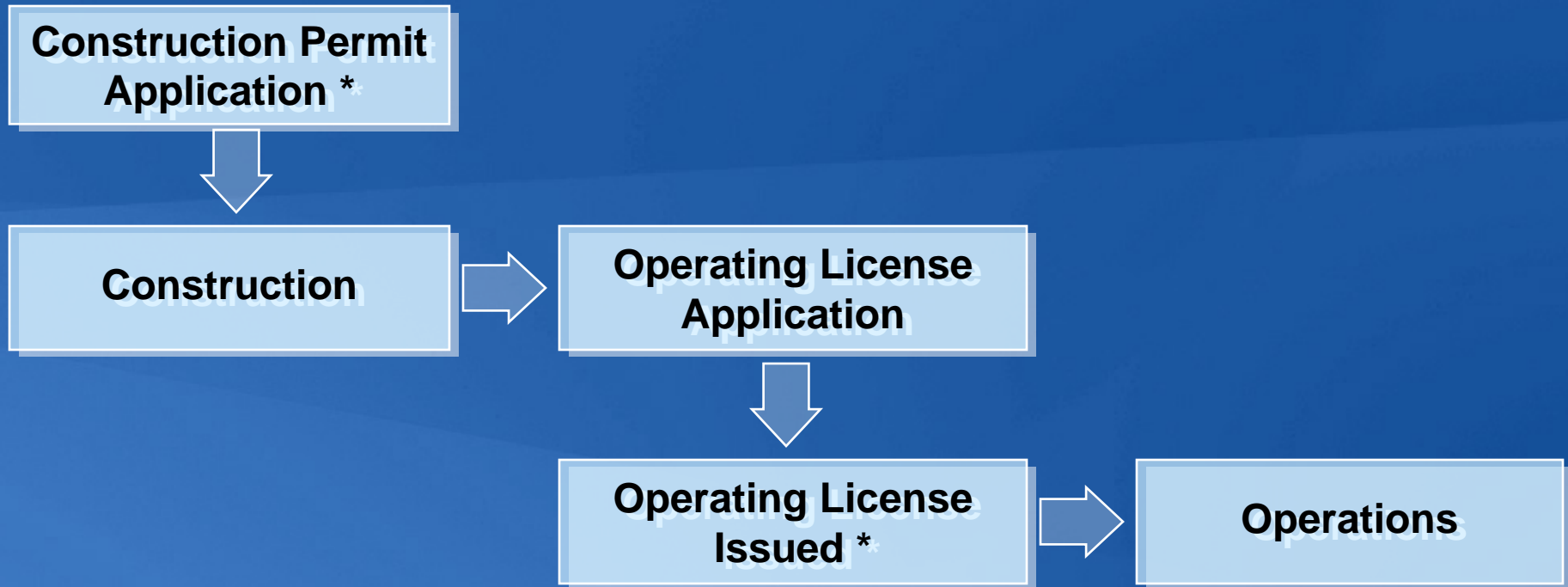
Five Designs Under Consideration

- **Areva EPR – 1600 MWe Four-Loop PWR**
 - Design certification submitted 12/07
- **Mitsubishi APWR – 1700 MWe Four-Loop PWR**
 - Design certification submitted 12/07
- **ABWR – 1350 MWe BWR -- GE design certified in 1997**
Operating in Japan & under construction in Taiwan
- **Westinghouse AP1000 – 1175 MWe Two-Loop PWR**
 - Certified 2006; amendment submitted 11/07
- **GE ESBWR – 1500 MWe BWR - Under NRC review**
 - Design certification expected 2011

Licensing & Construction Then and Now

THEN	NOW
Design as you build	Plant designed before construction begins
Changing regulatory standards and requirements	More stable process: NRC approves site, design, construction & operation before construction begins and significant capital is placed “at risk”
Main opportunity public intervention when plant is essentially complete	More opportunities to intervene at well-defined points in process. Intervention at the end of the process must be based on objective evidence that acceptance criteria, defined in the license, have not been, and will not be met
Minimal standardization	Standard NRC-certified designs – 70+% Standard
Inefficient construction management practices	Lessons learned from overseas projects Modular construction practices

10 CFR Part 50 -- Old Licensing Process

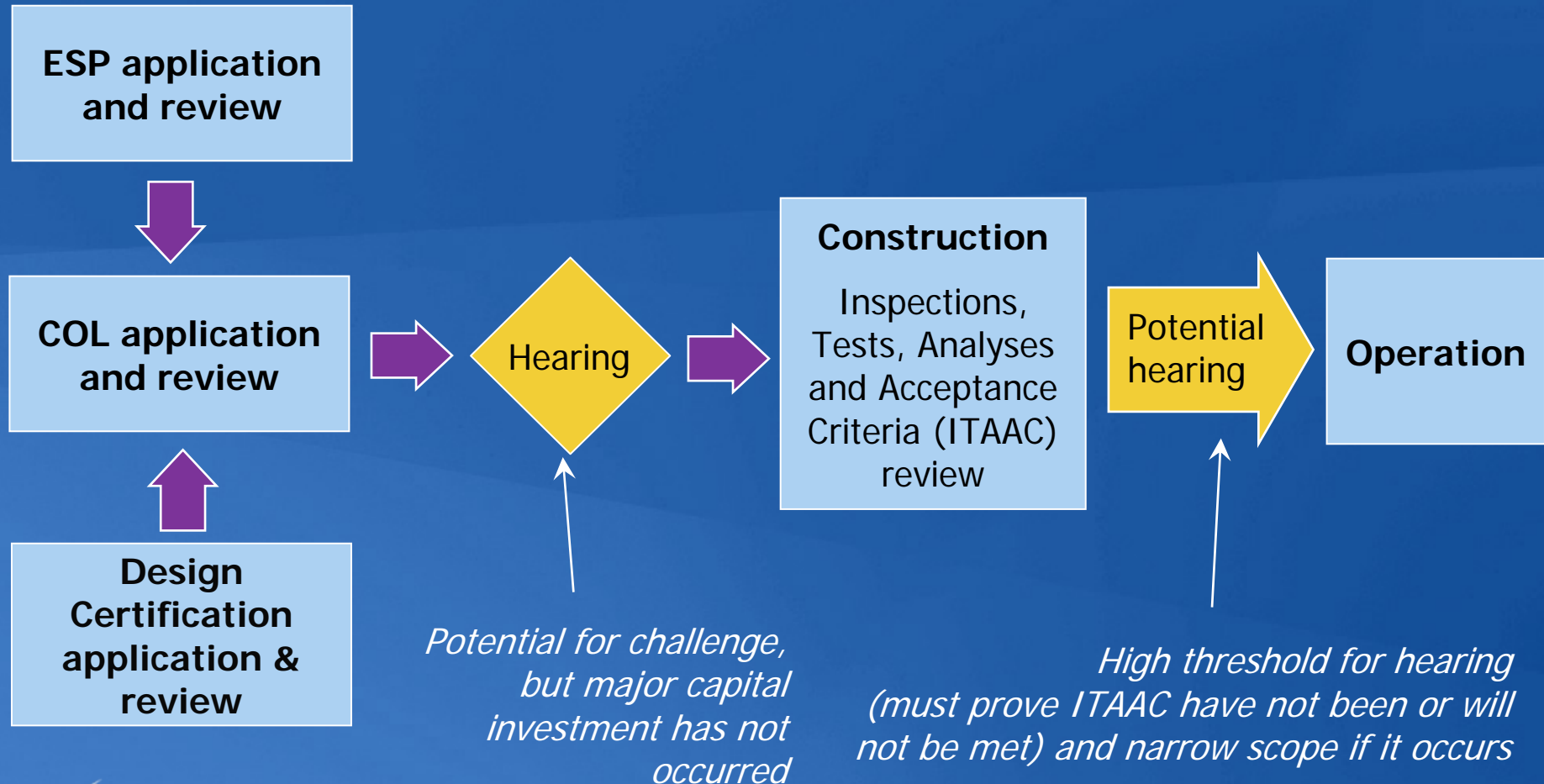


New Licensing Process Industry Objectives

- **Resolve safety issues before the start of construction**
- **Earlier & increased public involvement**
 - More information is made available at appropriate time
 - Increase communication & public confidence
- **Add certainty & predictability**
- **Increase investor confidence**
 - Reduce licensing risk
- **Reduce project time (licensing, construction and start-up) to ~ 84 months**
 - Assumes early site permit & certified design

New COL Process Reduces Uncertainty

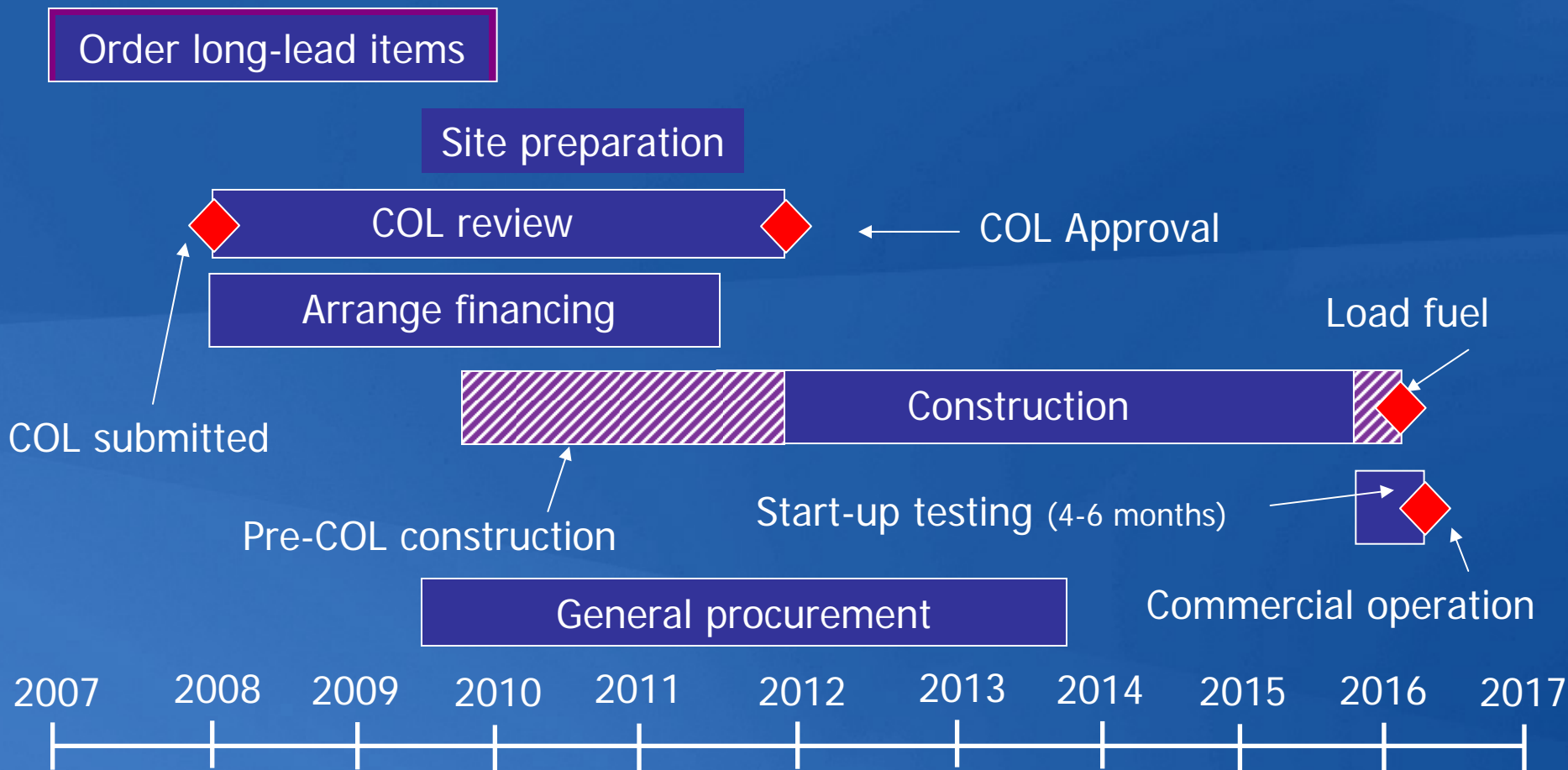
(10 CFR Part 52)



Standardization

- **Standard designs – power block**
- **Component standardization within the limit of supplier capacities**
- **Design centered working groups for each design**
 - **Current focus on licensing**
 - **Reference submittal; one review; one regulatory position**
 - **Subsequent applications replicate reference application**
- **Partnerships between designers and suppliers**
- **Operational standardization still an open issue**

Deployment Schedule



Issues Facing New Deployment

- **Financing \$8 billion projects**
- **Infrastructure – Skilled workforce & supply chain**
- **Safety and security**
 - **Effective & balanced regulation; experienced operators**
- **Waste management**
 - **Requires earlier planning and public involvement**
 - **Integrated spent fuel management program**

Financing

- **US utility companies small**
 - \$15 billion to \$40 billion market capitalization
 - Difficult to finance \$8 billion nuclear projects
- **Federal Government incentives (EPACT 2005)**
 - Loan Guarantees
 - Standby support
 - Production Tax Credits
- **Construction work-in-progress payments**
 - State & customer pre-payment
- **Need for innovative financing structures**
 - Partnerships & consortia
 - License, build, start-up, turnover

US Commercial Outlook to 2020

- **First 4 – 8 plants expected to start commercial operations in 2016**
 - Others under construction
 - Building rate and projects adjusted based on the success of the first few projects
- **Potential for new plants**
 - 15 - 20 in 2020; 45+ by 2030
 - ***If*** first projects are successful

Future Advanced Reactor Designs Post 2020 Deployment

- **10 MWe to 350 MWe**
 - **US designers considering mid-size reactors**
- **Liquid metal, High temperature gas cooled, light-water reactors**
- **Generation and industrial process heat applications**
- **Fast reactors – part of integrated spent fuel management program**

Small Reactors

- **Generation – remote areas N. America & countries with smaller electrical grids**
- **High temperature gas reactors**
 - **Process heat – high coolant temperatures – 700+C**
- **Industrial applications**
 - **Petro-chemical industry, Hydrogen manufacture**
 - **Coal/gas to liquid fuels – no carbon footprint**
 - **Water purification & desalination**

Uncertainties Remain ...

- **New licensing process untested**
- **New administration, Congress in 2009**
- **Will escalation of input costs continue?**
- **No firm capital costs for nuclear (or anything else)**
- **Commercial terms (e.g., EPC contracts) tough to negotiate**
- **Large financial commitment for relatively small companies**

... But the Uncertainties Are Hedged

- **More efficient, predictable licensing process**
- **Industry has clear understanding of what went wrong the last time**
- **Unmistakable need for new baseload capacity**
- **Bipartisan political support**
- **Strong public support**
- **Solid support from labor, growing support from environmental community**
- **Growing concern about carbon emissions**

Can We Maintain 20% Share of Generation in 2030?

- **Projected total net generation in 2030 is 4,968 bkWh**
- **20 percent of 4,968 bkWh is 994 bkWh**
- **Current fleet generates 800 bkWh per year; need to add 194 bkWh, or 25 GWs at 90% capacity factor**
- **Also need to add 4.5 GW due to retirements**
- **Total is about 30 GW or 20-25 new plants, depending on plant size, between 2016 and 2030**
- **That's a 14-year period. Can we do it?**
- **Absolutely: 58 OLs between 1970 and 1979; 47 OLs between 1980 and 1989.**
- **In fact, we should aim for more than 20% share in 2030!**