

# Nuclear Power Plants Emission-Free Stability in a Volatile Market

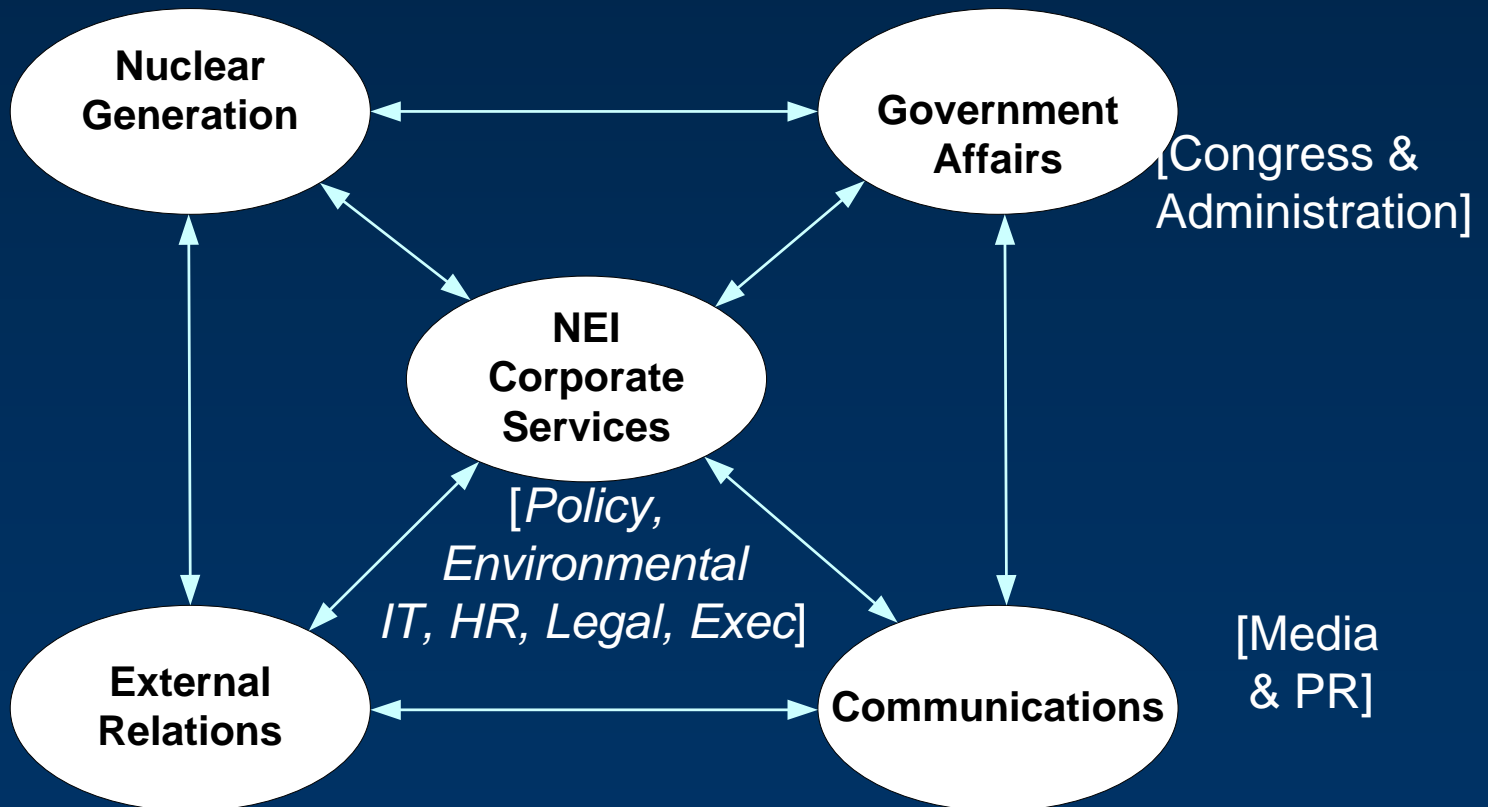
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# NEI

[Regulatory  
Yucca Mtn  
Fuel  
ROP, ...]



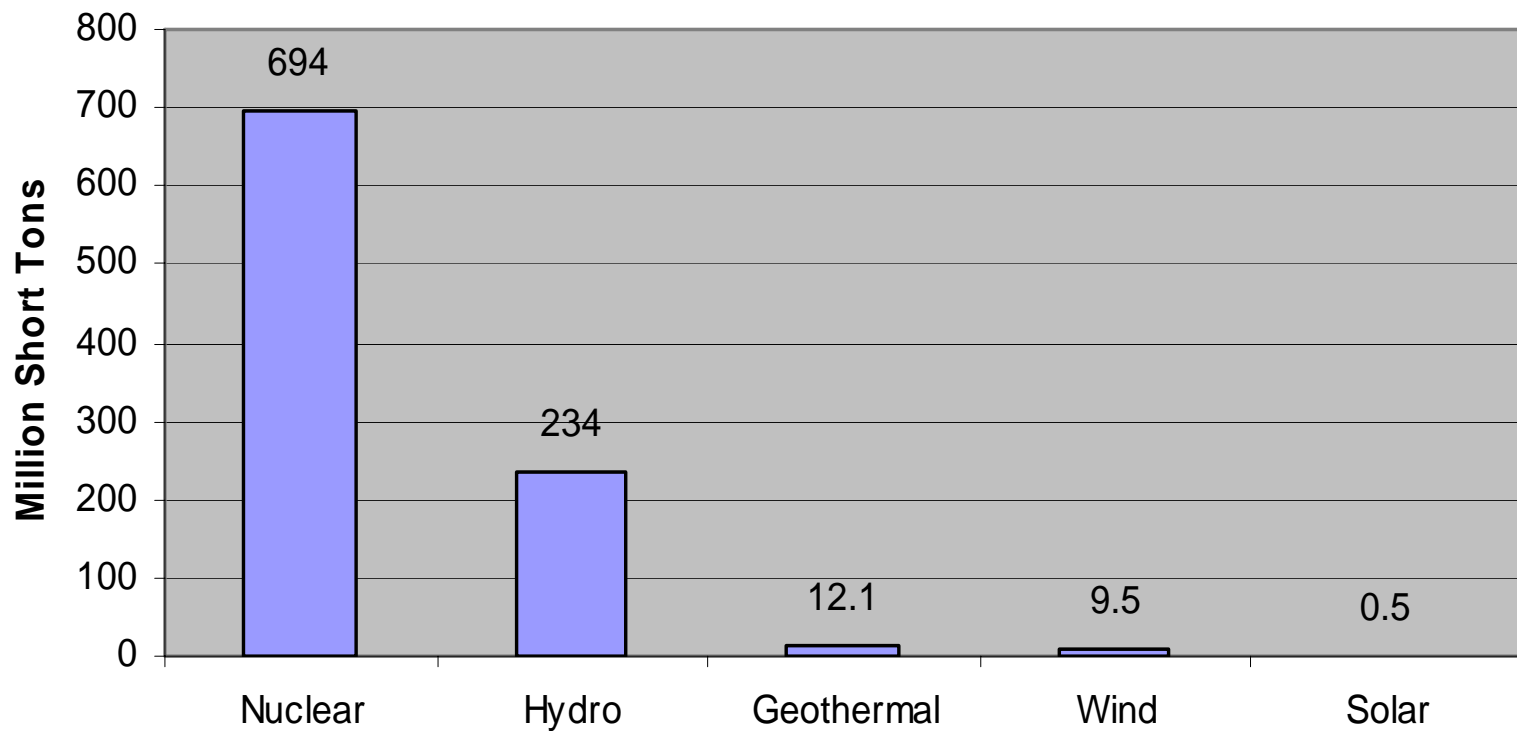
# Nuclear Generation

- Status of industry
  - Historical operating performance
- Benefits
- New plants

# Nuclear Power Plants Current Status

- 103 Operating Units
  - One under major refurbishment
  - Average capacity factor ~ 90% over last 4 years
- 20% of US electricity generation
- 70% of US emission-free generation
  - Wind 1%; Solar 0.1%
- Eliminates ~700 million tons/year of Greenhouse gases

# Air Quality CO<sub>2</sub> Emissions Eliminated



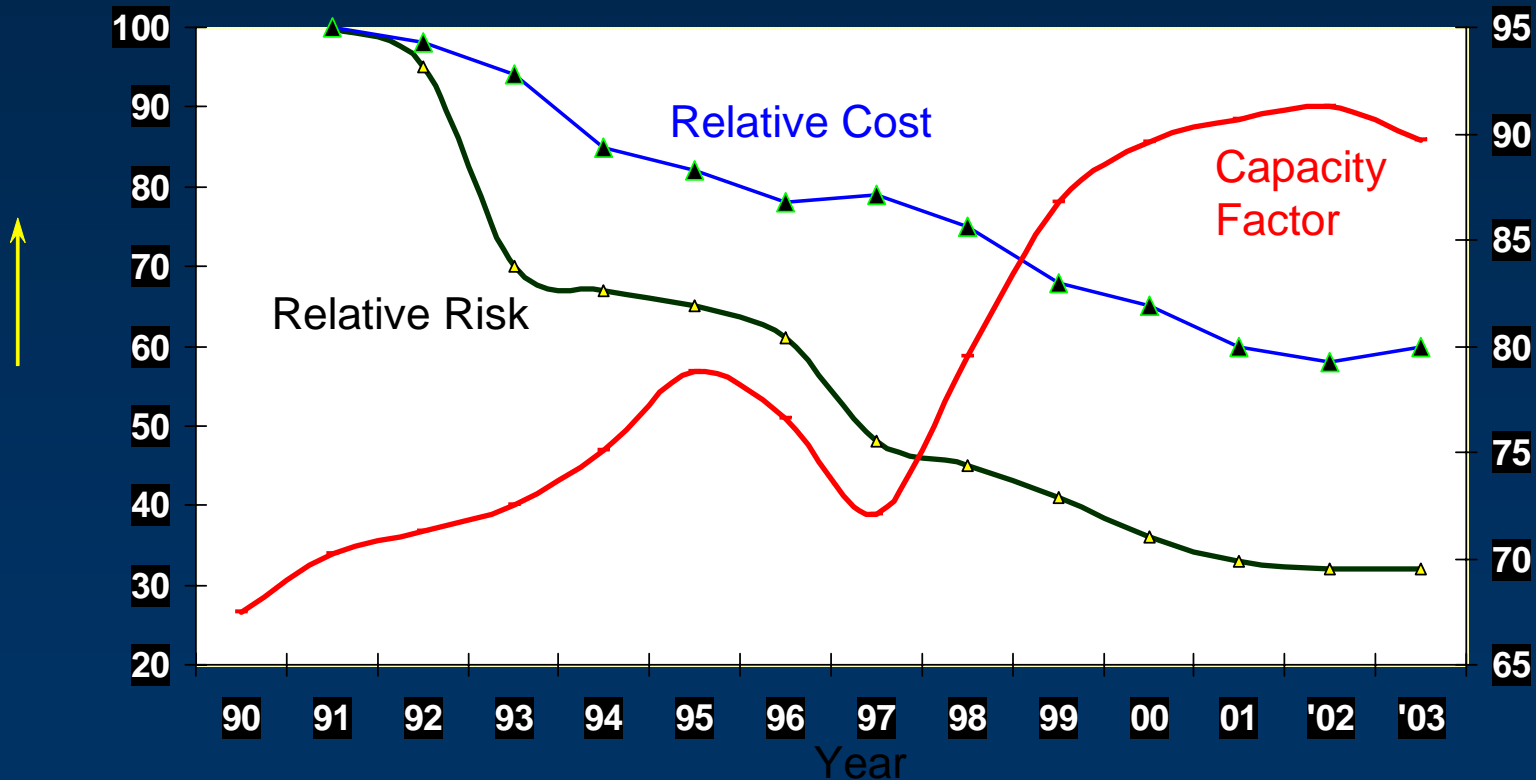
Source EIA



# Decade of Safety & Economic Improvement

Relative Cost  
Risk (CDF)

Capacity Factor

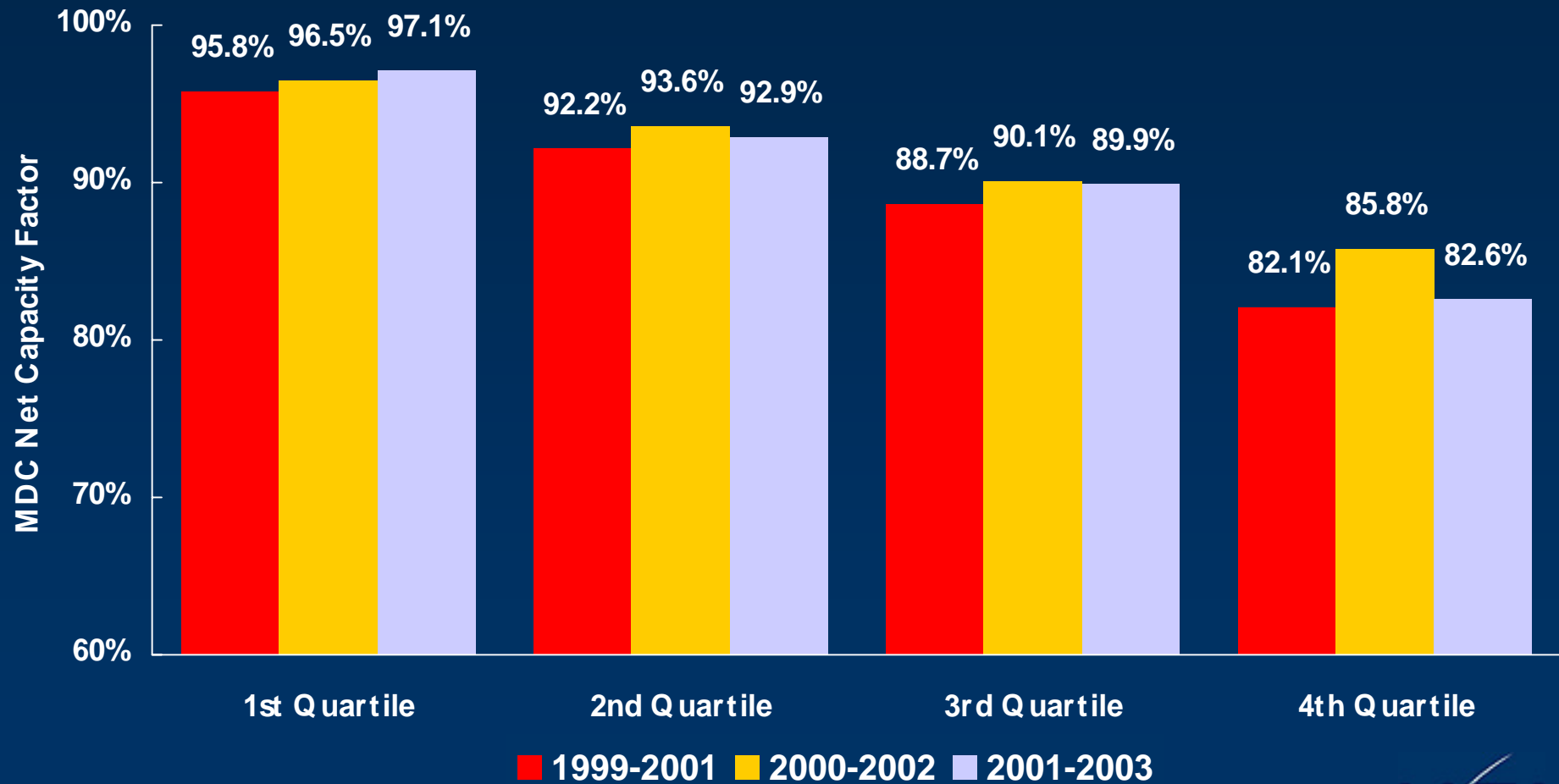


Based on UDI, DOE & NUS Data plus info. from ERIN Eng & EPRI



# U.S. Nuclear Industry Capacity Factors by Quartile

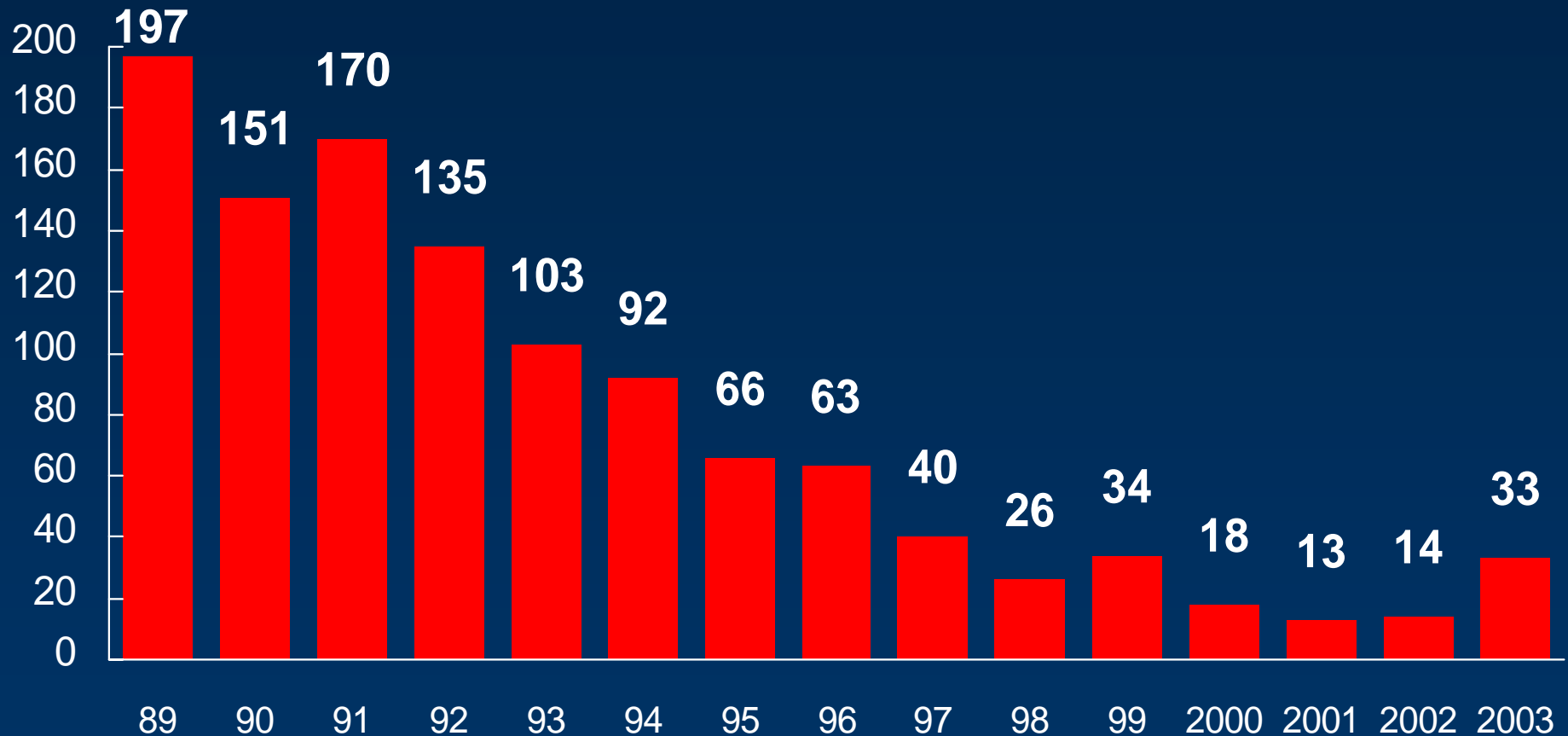
(3-year rolling average for 103 units)



Source: UDI/NRC - Updated 05/04



# Number of Unusual Events Reported to NRC (1989-2003)



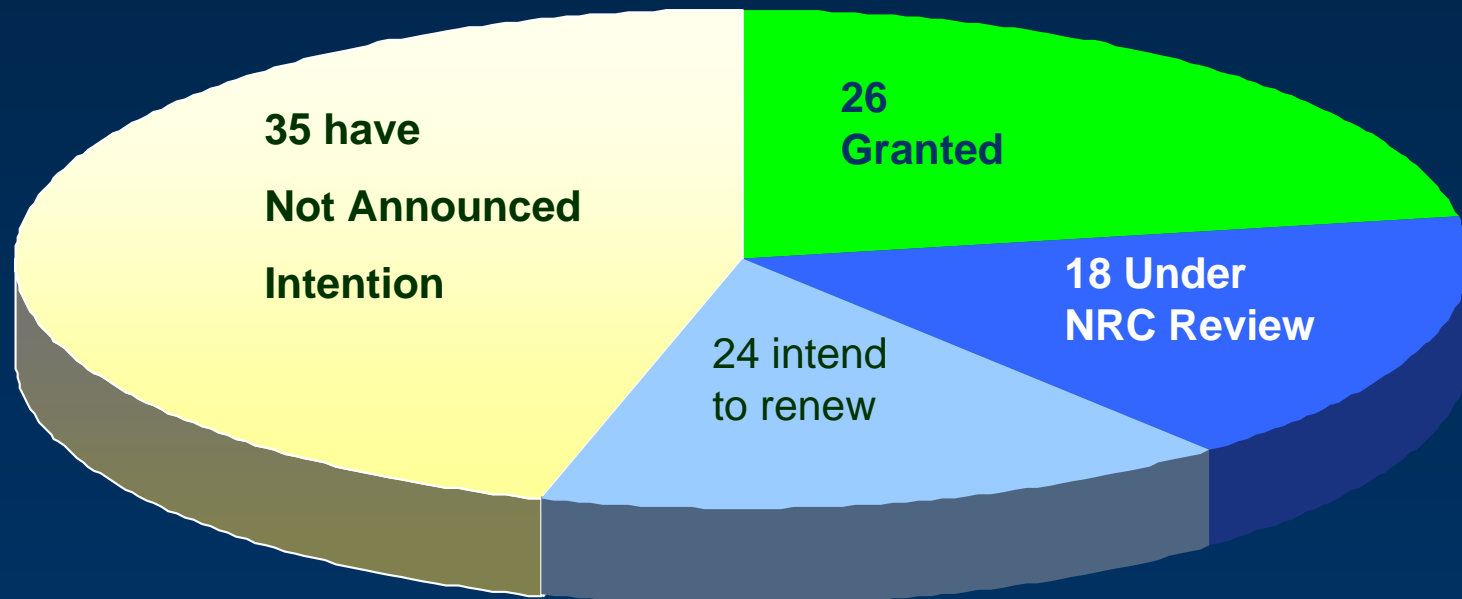
Source: SCIENTECH - Updated 06/04

Note: A Notification of Unusual Event for power and non-power reactor licensees is a condition involving potential degradation of the level of plant safety that does not represent an immediate threat to public health and safety.





# Nearly All Nuclear Plants Will Renew Their Licenses



License Renewal Status Mar 2004

# Workforce Issues

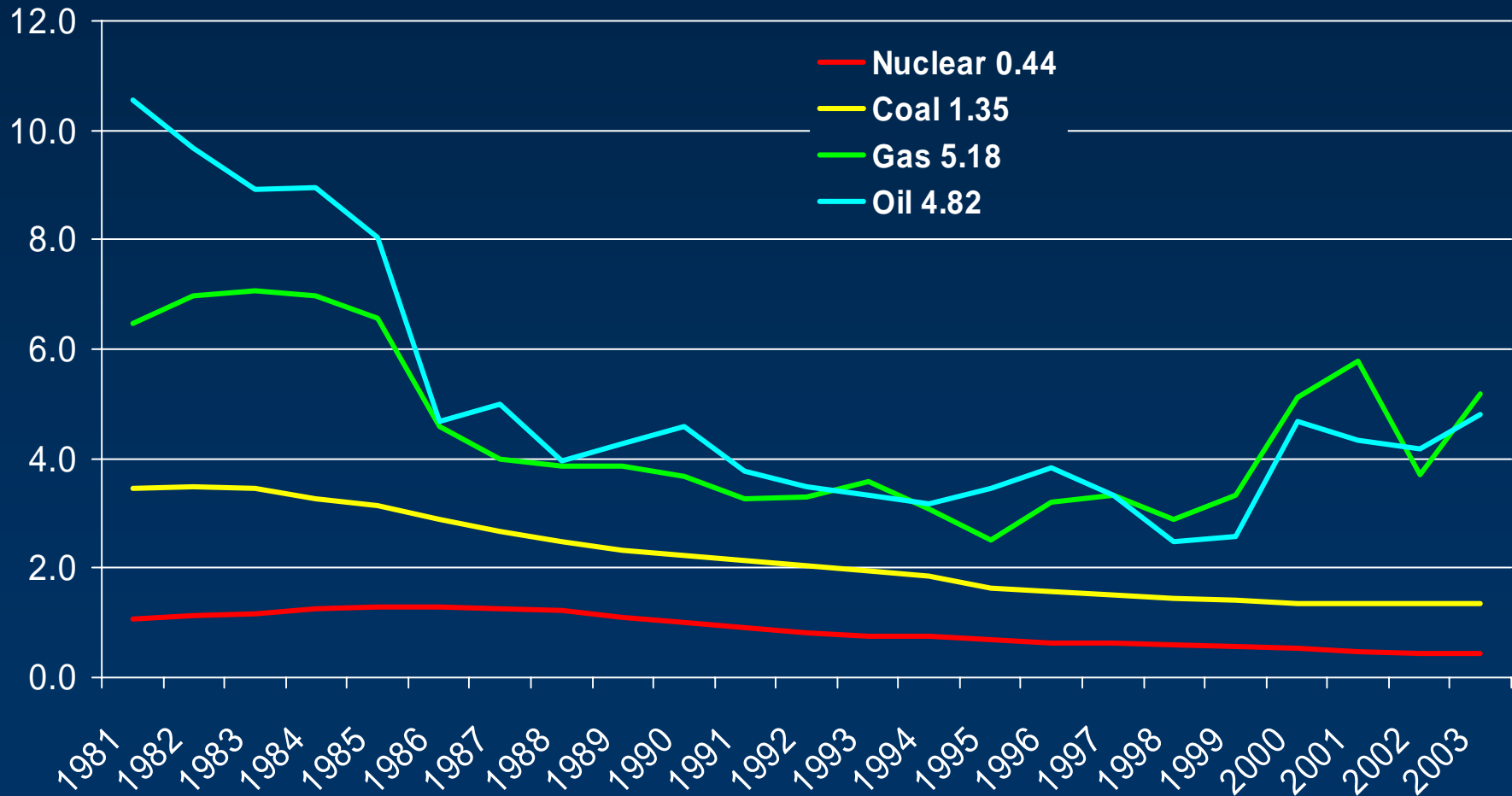
- 50% of workforce will retire in the next decade
  - Knowledge retention a major issue
- Shortages in engineers & health physics
  - Hiring now to ensure knowledge and experience is transferred before 2015
- Major concern in shortages of skilled trades
  - Health physics technicians, I&C, welders
- National program with Dept. of Labor, unions, schools, universities & community colleges to ensure sufficient skilled workers are available

# Benefits of Nuclear Power

- Proven, reliable, low-cost supplier of electricity
- Stable fuel cost
- Improves the environment
- Economic benefits – jobs & economy
  - Each nuclear plant
    - Adds over \$500 million/year to the economy
    - Employs ~ 500 – 1500, with an equivalent number of indirect jobs
- Waste product is controlled, stored, monitored, protected and regulated

# US Electricity Fuel Costs (1981-2003)

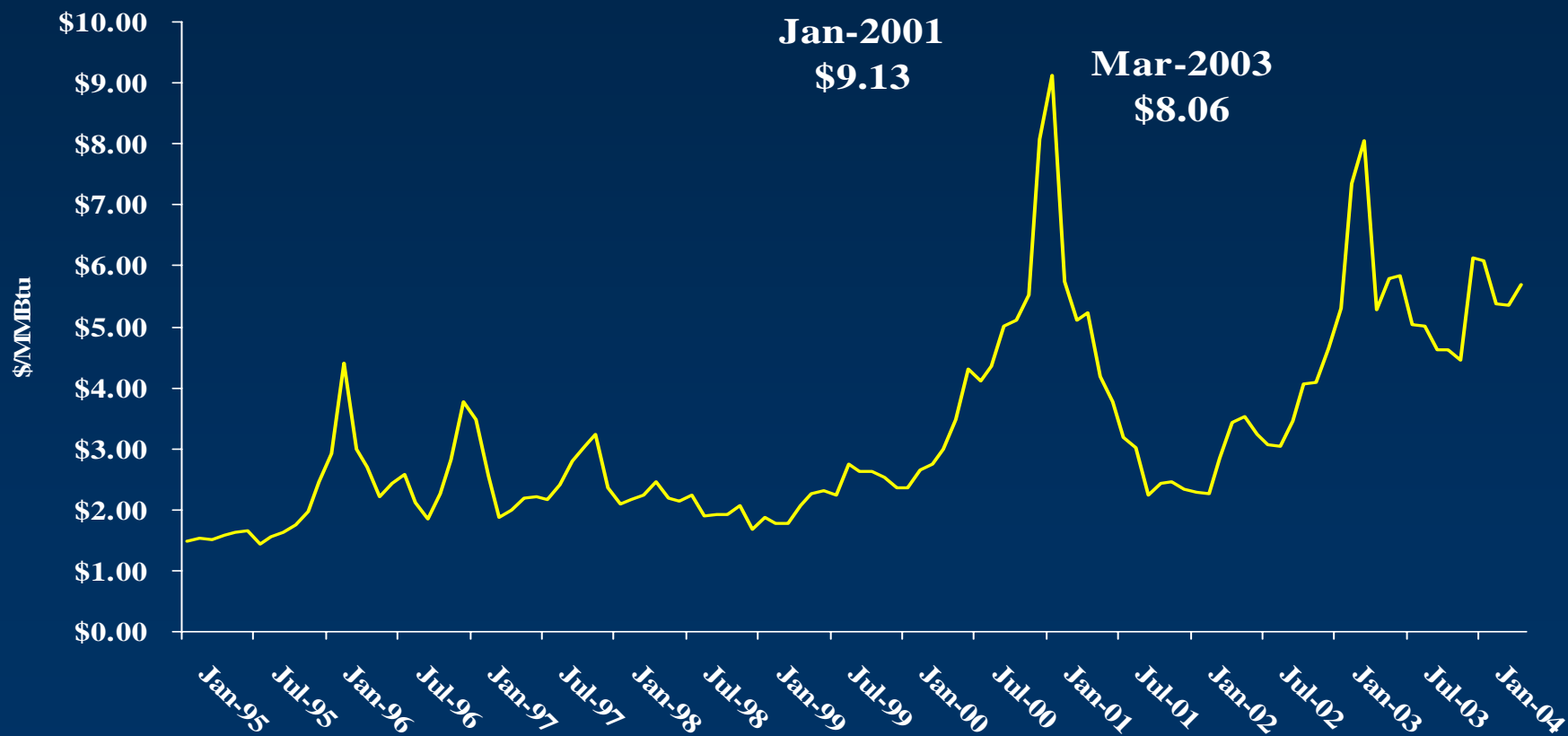
2003 cents per kilowatt-hour



Source: FERC/EUCG – Updated 9/04



# Price Stability Natural Gas Prices



# Reduce US Dependency on Foreign Suppliers

- 1,000MW capacity combined cycle plant operating at 90% capacity factor
  - Natural gas fired ~ 77 billion cu.ft/yr.
  - Oil fired ~ 12 million barrels/yr
- By 2015 10% - 15% of US natural gas supplies will be from non-North American sources
- Nuclear can help stabilize natural gas demand, lower costs, improve price predictability, and reduce dependency on foreign suppliers

# Environmental Benefits

- Nuclear generators eliminate Greenhouse gas generation
- Existence of a nuclear plant assists in siting industrial facilities (environmental cap & trade)
  - Eases burden of siting fossil fueled plants
    - Assists in maintaining a balanced & diversified generating portfolio

# The Hydrogen Economy & Nuclear

- Potential for new fuel system
  - Canadian & Japanese R&D using nuclear technology
  - Need for US pilot projects (using existing nuclear plants) to test, validate process & infrastructure
  - Build foundation for launching advanced reactor hydrogen production based on non-proliferation designs
- Cannot develop a hydrogen economy without nuclear and meet cost & environmental metrics using natural gas



# The Need for New Nuclear Generation

- US needs 300,000+MW of new generation by 2025
  - Baseload needed after 2010 – clean coal & nuclear
- Increased environmental controls raise siting and cost problems for fossil fuel plants
- US industry needs low cost energy to sustain global competitiveness
  - A diverse and balanced generating portfolio
  - Base-load generation -- Non/low-emission
  - Nuclear lowest cost base-load generating option

# New Nuclear Plants?

- None ordered for 30 years
- Reasons
  - Until mid '90s an anemic operating record
  - Unpredictable licensing process
  - Design/Construct-As-You-Go approach
    - Unreliable and prolonged construction

# Licensing Problems Being Addressed

- 1989 – 10 CFR Part 52 introduced
- Introduced a combined construction permit & operating license (COL)
- Resolves issues and contentions earlier
- Provides more information earlier
- Provides for more opportunity for comment & requires a more disciplined process
- Introduced ITAAC (Inspections, Tests, Analyses and Acceptance Criteria)
- Need for increased planning and project discipline

# Financing New Nuclear Plants

- Significant changes in electricity industry since 1970s
  - Many companies not operating in cost-of-service
- Wall Street nervous over new, unproven licensing process
- Large capital projects diminish financial performance metrics – earnings per share, etc
- Innovative approaches to financing large capital projects
  - Consortium approach
  - Public-Private financial structure for large projects that support essential national infrastructure
  - Loan guarantees, accelerated depreciation, tax credits,...

# New Plant Status

- Four designs approved – Six in pipeline
- Three Early Site Permits under review -- 2006
- Three consortia ready to test new COL process, prior to formal application
  - 16 companies involved
  - Developing trial license applications
    - Work to complete ~ 2007-8
  - Decisions to order in 2007-8
  - Start construction 2009-2010

# New Nuclear Plants?

- Yes, if:
  - Prove new licensing process -- predictable & stable
  - Establish a financial structure for financing large capital projects that benefit national and State infrastructure
  - Nation gets serious about environment
  - Certainty on spent fuel disposal
- Energy costs, the economy & environmental issues will drive the need for new nuclear plants

# Going Forward from 2005

Nuclear power plants provide safe,  
reliable, low-cost electricity

Stable cash flow

Hedge against volatility

natural gas price and

Safeguard against energy

environmental requirements

**Safe and  
Reliable**

