

# **NRC Nuclear Education Grant Programs**

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# What I'll Cover

- **The NRC**
- **Some Energy Statistics**
- **Short History of University Nuclear Education**
- **University Program Timeline**
- **Enrollment Statistics**
- **NRC Program Mandate and Grants**
- **Omnibus Language**
- **Outlook for NRC Grants**
- **Other Education Areas Requiring Support**
- **Summary**
- **NRC Grant Contacts**

# About the NRC

- **Established by the Energy Reorganization Act of 1974**
- **The Act separated the regulatory activities of the former Atomic Energy Commission from promotional activities now conducted by DOE**
- **NRC is headed by five Commissioners appointed by the President to five-year terms, with one designated as Chairman**
- **NRC has its Headquarters in Rockville (MD) with regional offices in King of Prussia (PA), Atlanta, Lisle (IL), and Arlington (TX)**

# NRC Mission

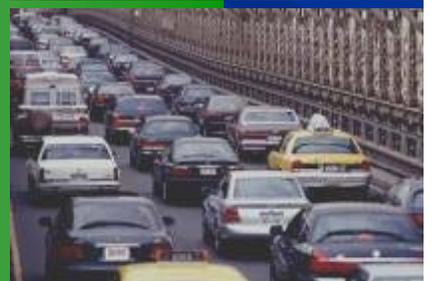
**“To regulate the nation’s civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment”**

# Some Energy Statistics

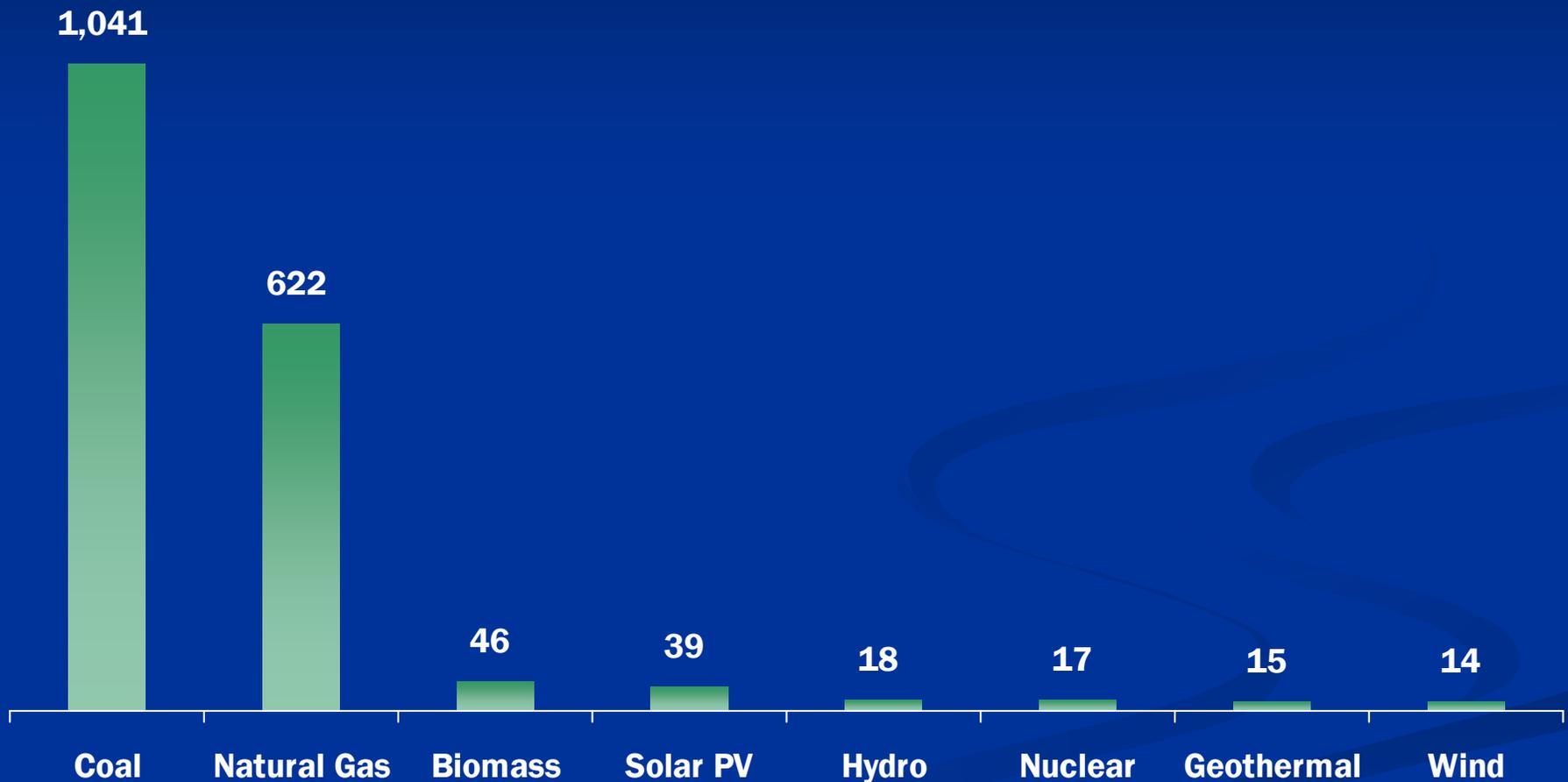
# U.S. View of Nuclear Energy

## ■ Quick facts

- 104 nuclear plants
- 20% of the nation's electricity
- Displaces 680 million metric tons of CO<sub>2</sub>/year
- Equivalent to 131 million passenger cars/year



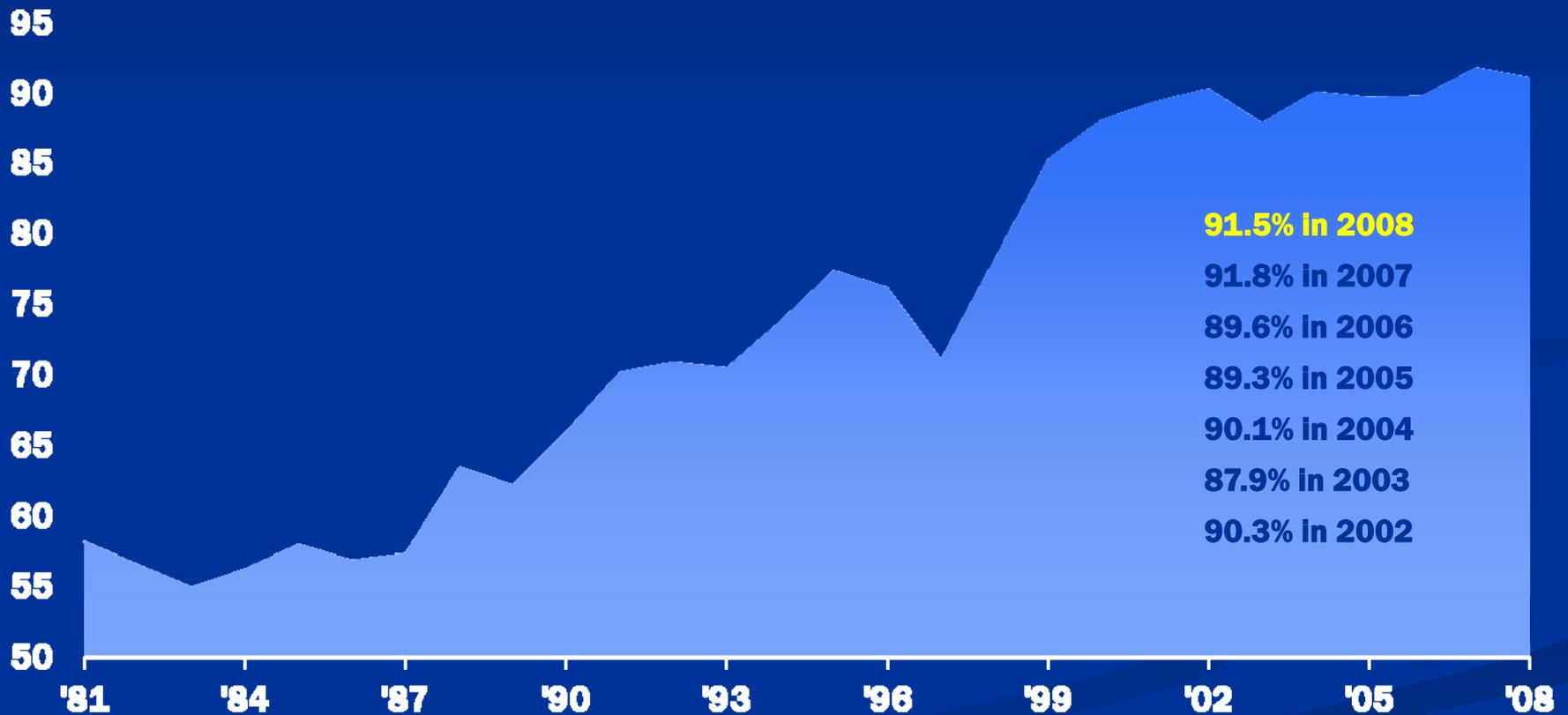
# Comparison of Life-Cycle Emissions Tons of Carbon Dioxide Equivalent per Gigawatt-Hour



Source: "Life-Cycle Assessment of Electricity Generation Systems and Applications for Climate Change Policy Analysis," Paul J. Meier, University of Wisconsin-Madison, August 2002.

# Sustained Reliability and Productivity

U.S. Nuclear Capacity Factor, Percent

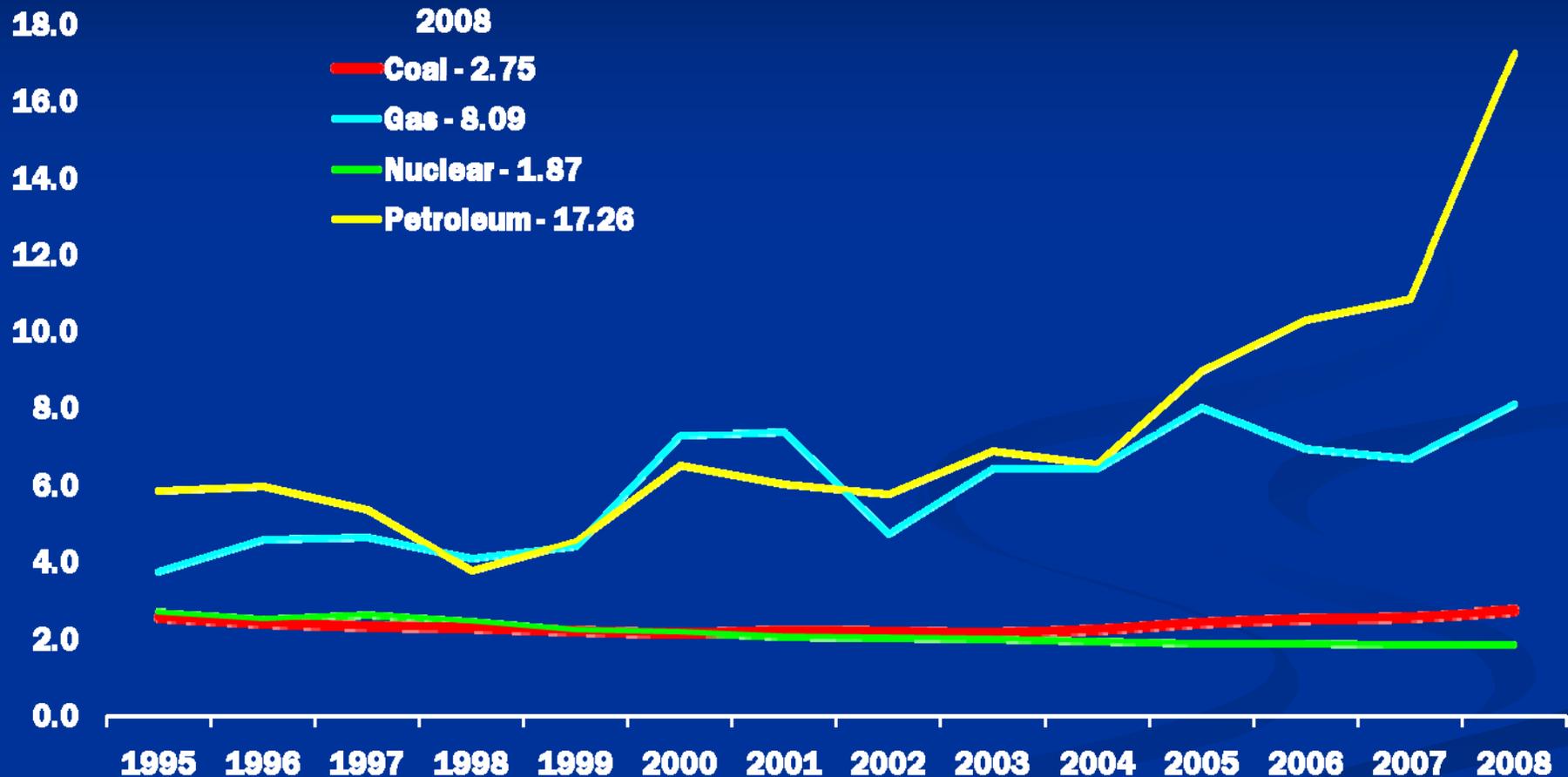


Source: Energy Information Administration

Updated: 4/09

# U.S. Electricity Production Costs

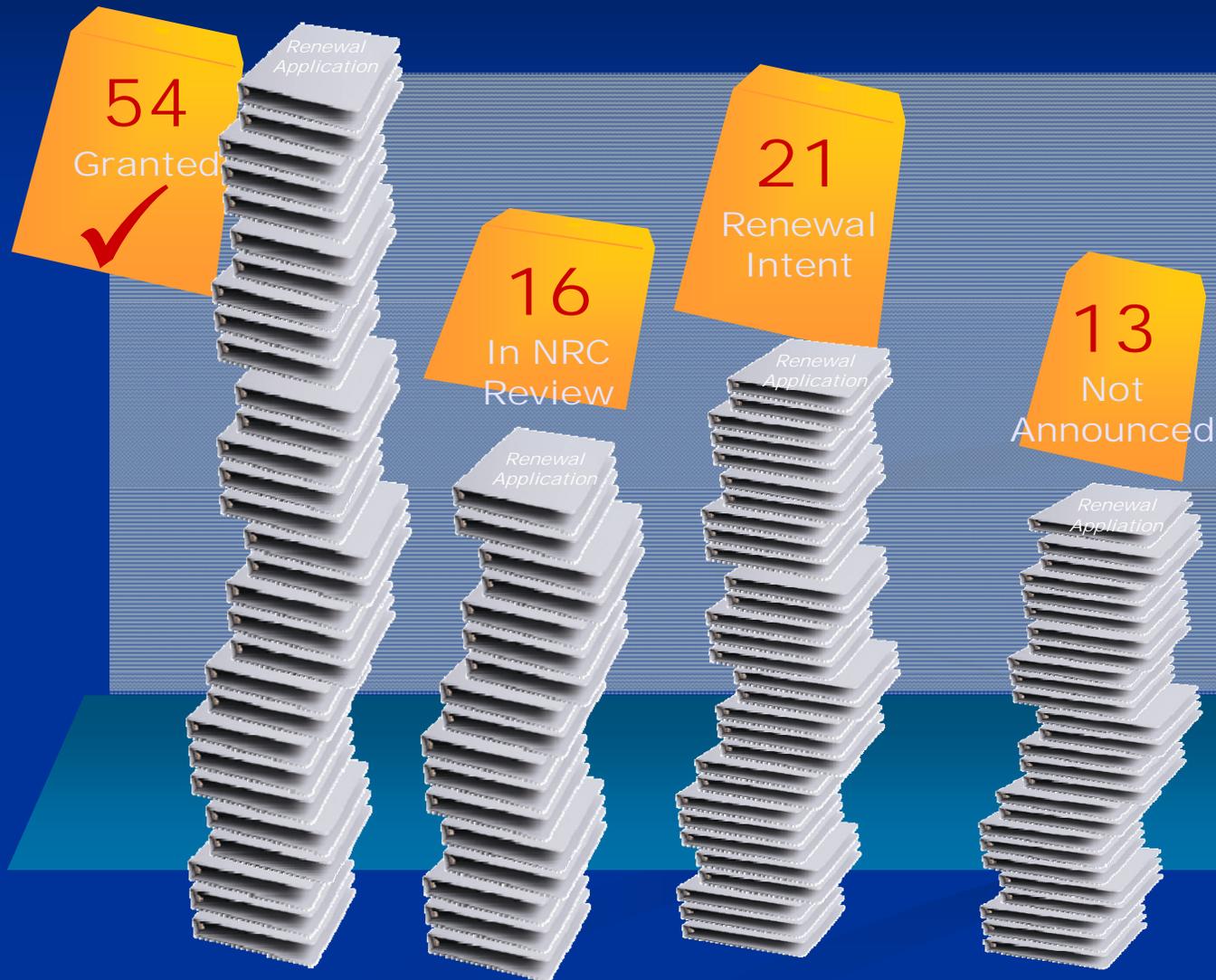
1995-2008, *In 2008 cents per kilowatt-hour*



Production Costs = Operations and Maintenance Costs + Fuel Costs. Production costs do not include indirect costs and are based on FERC Form 1 filings submitted by regulated utilities. Production costs are modeled for utilities that are not regulated.

Source: Ventyx Velocity Suite  
Updated: 5/09

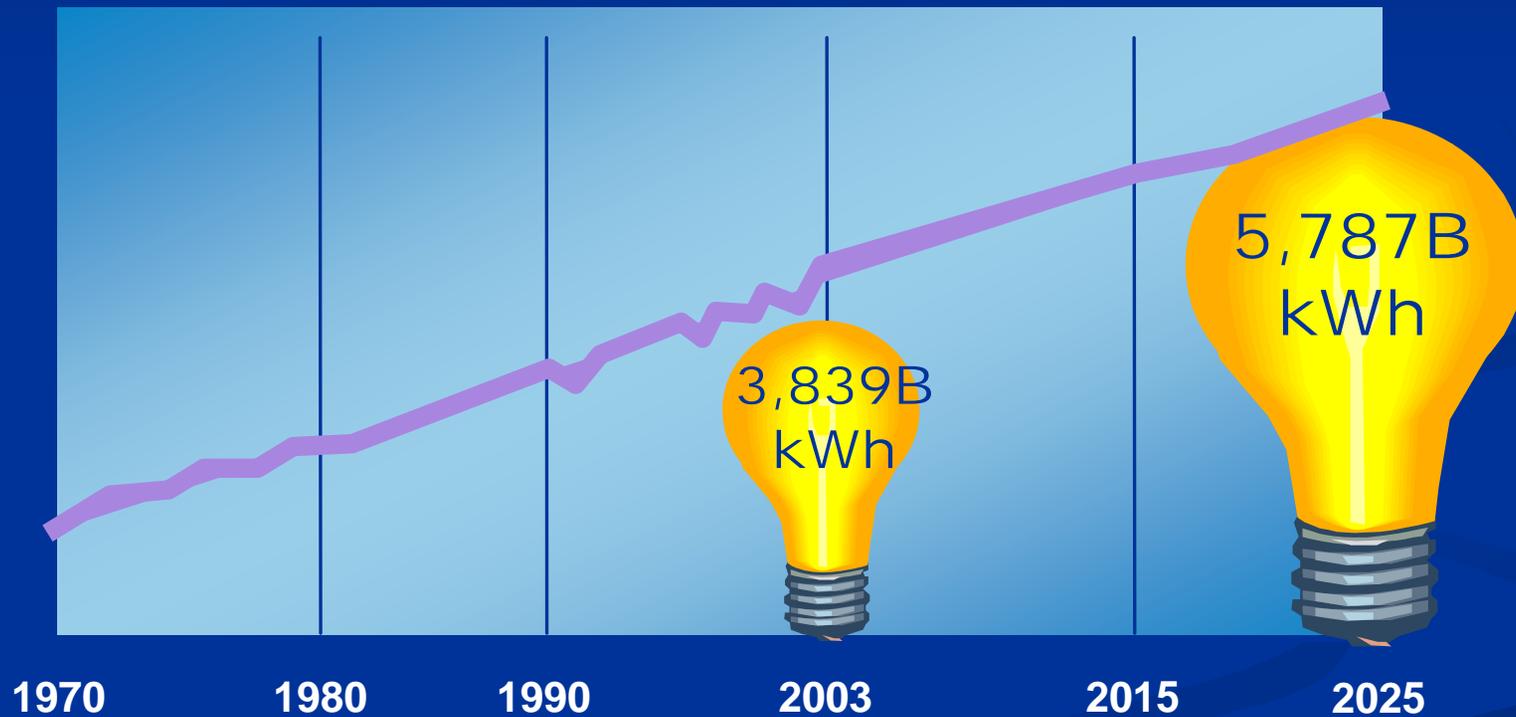
# Evidence of U.S. Nuclear Revival— *License Renewals*



Source: NRC, July 2009

# U.S. Energy Demand

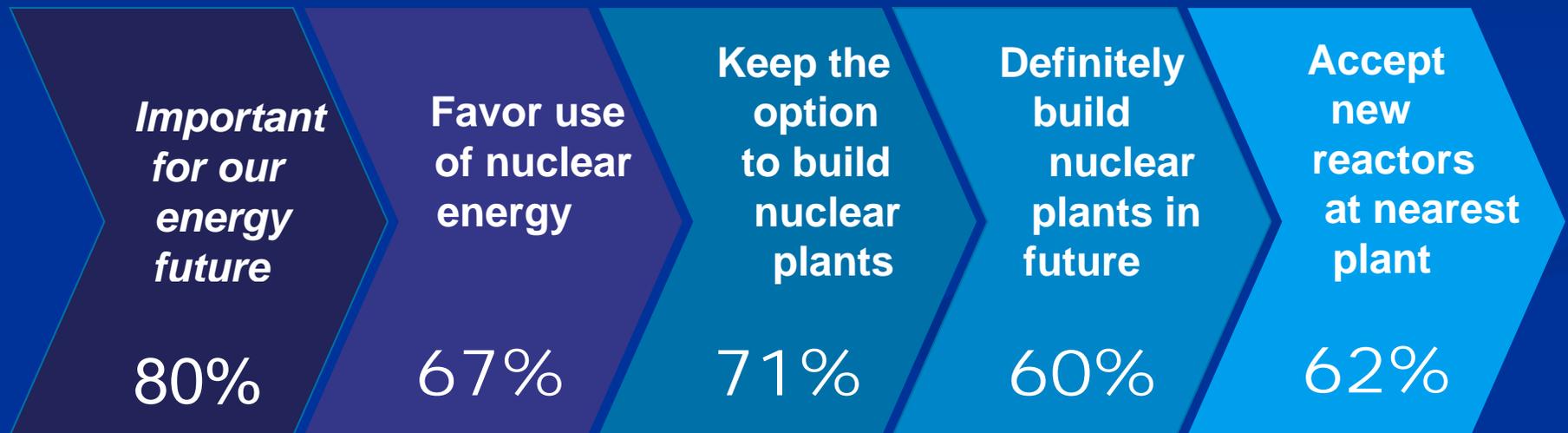
America Is Projected to Need 50% More Electricity by 2025



Source: U.S. Department of Energy

# Evidence of U.S. Nuclear Revival

## Increasing Public Support



Source: *Bisconti Research Inc.*

# Existing or Expected ESP / COL Applications in the U.S.

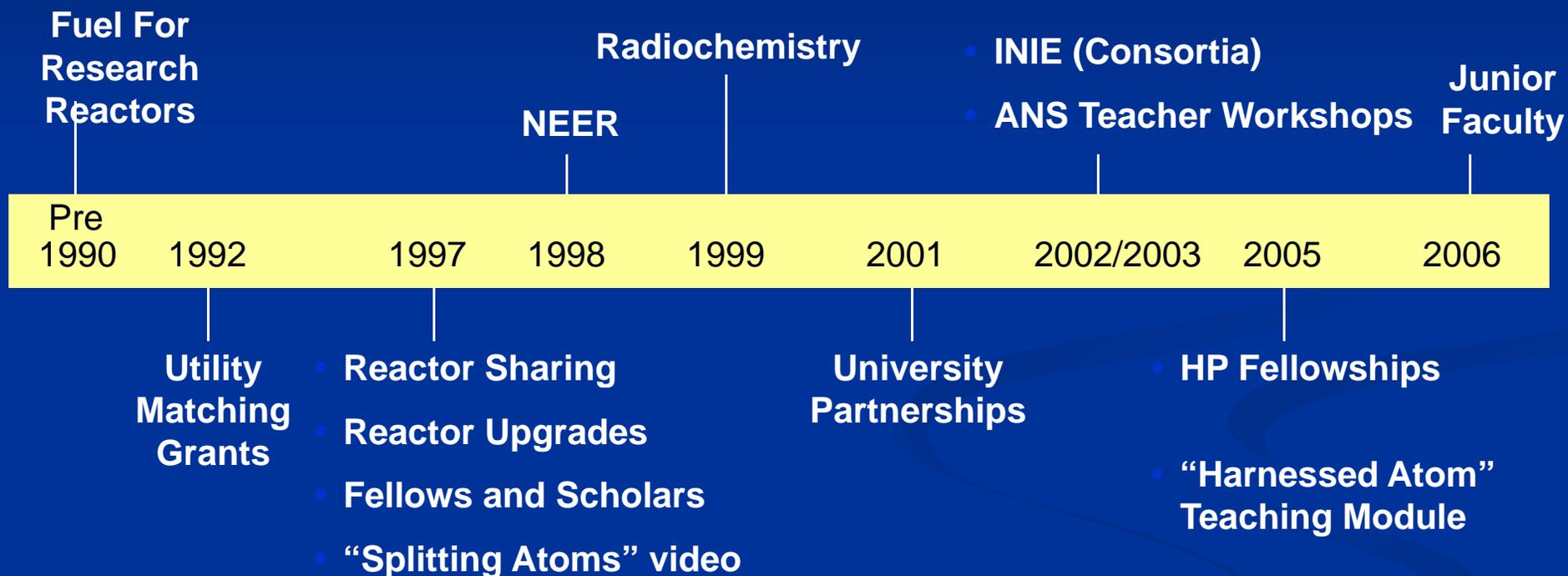
<b>Reactor Type</b>	<b>Number</b>
<b>AP1000 (Westinghouse)</b>	<b>14</b>
<b>EPR (AREVA)</b>	<b>7</b>
<b>ABWR &amp; ESBWR (GE)</b>	<b>8</b>
<b>USAPWR + TBA</b>	<b>2 + 2</b>
<b>Total</b>	<b>33 (22 applications)</b>

Source: NRC's Office of New Reactors, July 2009

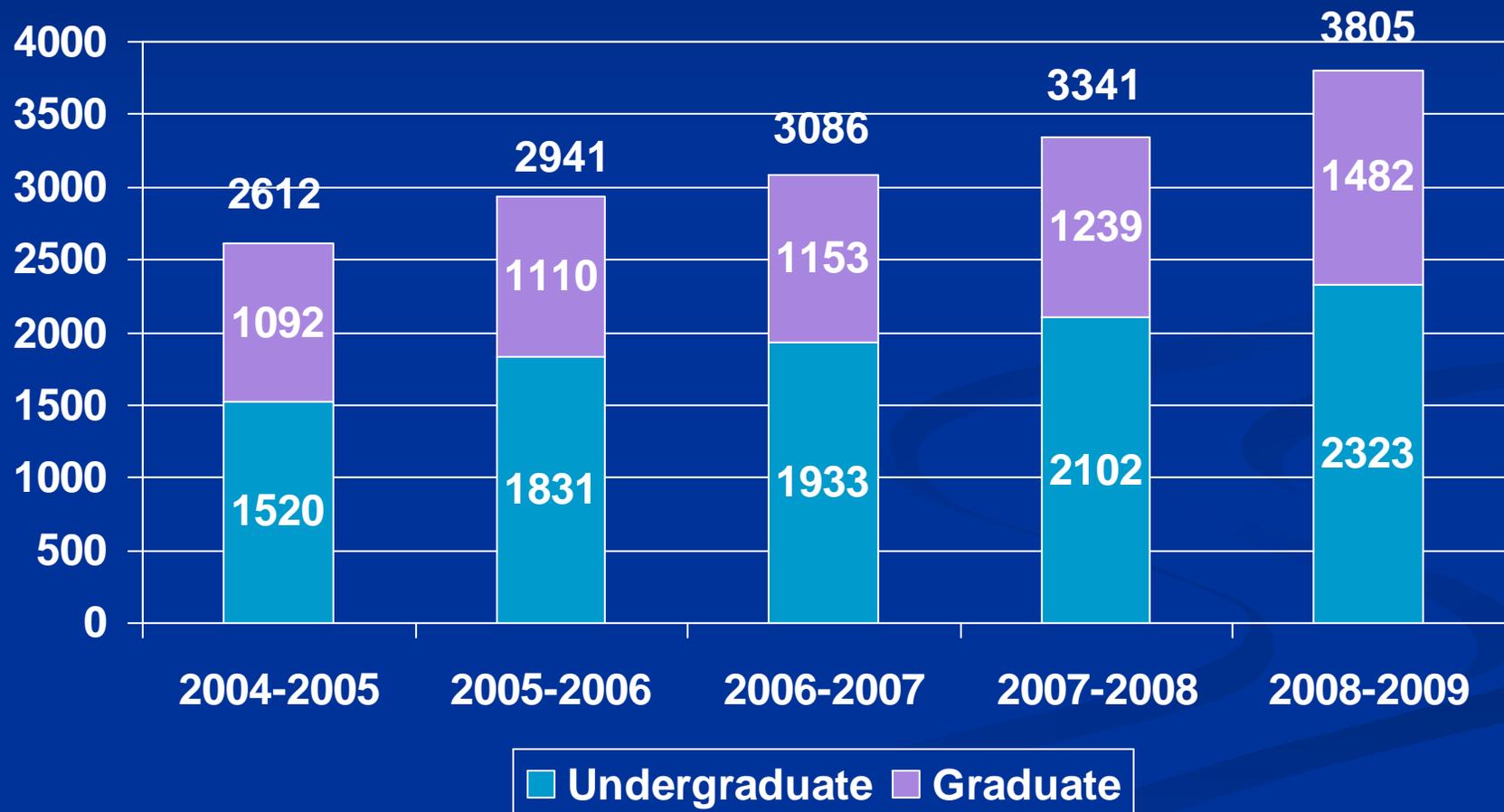
# **A Little History on University Nuclear Education**

- **Over the past 30 years the U.S. has:**
  - **Seen a decline from approximately 66 university research reactors to just 25**
  - **Watched a student population in nuclear engineering go from 1800 to 600 to 3800 and counting**
  - **Witnessed a decline in university nuclear engineering programs from about 50 to fewer than 30 to a recent resurgence to about 35**
  - **Recorded drastic shifts in public perception/acceptance of nuclear energy due to TMI, Chernobyl, greenhouse gas concerns and energy shortages and price escalations**

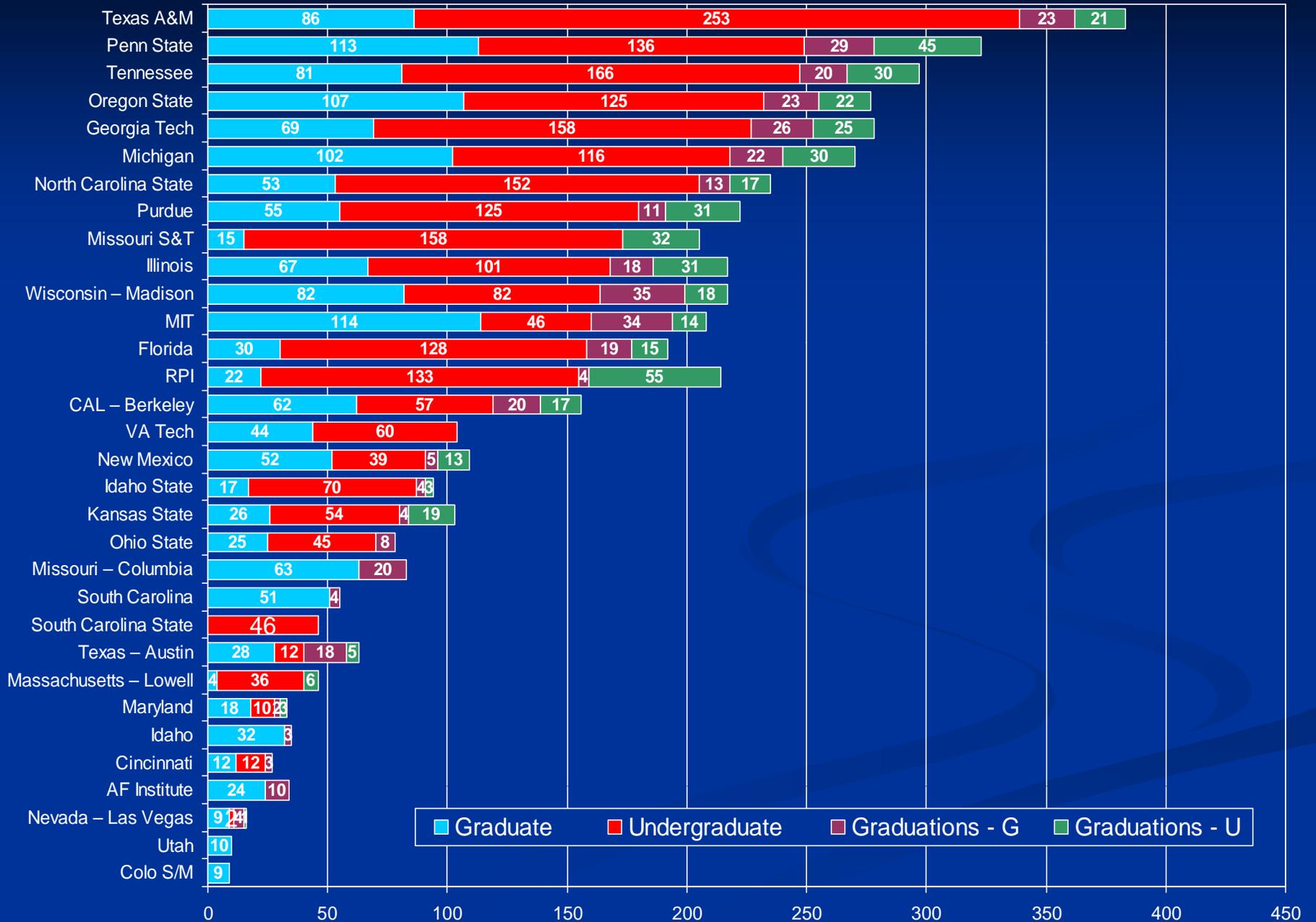
# University Program Timeline (Approximations)



# NE Enrollment Trends (2004-2009)



## Nuclear Engineering Enrollments and Graduations - 2008-2009



# Growth, Hiatus, Transfer, Resumption

- **Late 1990's – 2006: DOE “University Programs” grow from \$3M to \$30M/year**
- **2007: DOE ends most support to nuclear engineering schools; NRC Curricula Program (\$5M) begins**
- **2008: Congress transfers some of former DOE program to NRC (\$15M)**
- **2009: DOE restarts its program to support universities**

# Legislative Language For NRC (\$15M) University Education Grants

- **“Funding ....includes an additional \$15,000,000 to support education in nuclear science, engineering, and related trades to develop a workforce capable of the design, construction, operation, and regulation of nuclear facilities and the safe handling of nuclear materials.”**
  - **“...funds are to be used for ...scholarships, ...fellowships in nuclear science, engineering, and health physics and for faculty development grants...for the first six years of their (junior faculty) careers.”**
- **“Some of these funds are....for scholarships for trade schools in nuclear-related trades”**
- **“The Commission is directed to make generous use of the waiver or suspension provisions (concerning service commitments) ...”**
  - **“....this funding is intended to benefit the nuclear sector broadly rather than solely to benefit the NRC.”**

# Curriculum Development (\$5M) Program

- Support courses, studies, training, curricula, and disciplines pertaining to nuclear safety, nuclear security, nuclear environmental protection, etc. deemed critical to the NRC mission.
- Supports: NE, HP, EE, ME, materials, safeguards and security, human factors and human reliability

# Change in Direction - Enter NRC

- Therefore, for FY 2008 – Congress adds *some* university funding for NRC (\$15M) but not for DOE.
- This funding is in addition to the \$5M NRC receives for curriculum development grants
- Three new funding opportunity announcements are issued by NRC:
  - Fellowships and scholarships
  - Faculty development
  - Trade school/community college scholarships

# **\$15M – FY 2008 Results**

- **49 of 99 applications funded**
- **Approximately 175 students received a scholarship or fellowship**
- **2 (out of 4) to minority serving institutions**
- **Required service agreement**

# **\$5M – FY 2007/2008 Results**

- **2007:**
  - **26 curriculum awards**
  - **8 to minority serving institutions**
- **2008:**
  - **40 curriculum awards**
  - **11 to minority serving institutions**

# 2009 Awards

- **\$15M:**
  - 130 proposals; 59 awards (45%)
  - Over 300 students will receive a scholarship or fellowship
  - Expected award date: July 2009
  - Omnibus funding bill for '09 provided \$15M each for NRC, DOE, and NNSA
- **\$5M:**
  - 130 proposals; 43 awards (33%)
  - Awards announced in June 2009

# Omnibus Language and Changes

- The Omnibus legislation provides DOE, NRC and NNSA \$5M each (from the \$15M each) for an coordinated and jointly implemented “Integrated University Program”
- “Support multiyear research projects that do not align with programmatic missions but are critical to maintaining ....nuclear engineering and science”
- NRC grant program authorized for 10 years
- OMB has changed “nuclear education” to “nuclear research and development”

# Outlook – Can NRC Do It?

- **As a regulator, NRC's educational reach is more limited than other agencies, such as DOE**
- **Congress has provided NRC funding for workforce development but not physical infrastructure support – universities desire/need both**
- **NRC dilemma: Balance educational needs of the nuclear sector with regulatory mission**
- **At present, NRC alone cannot conduct an educational program that will satisfy all of the Nation's nuclear education infrastructure needs**

# Examples of Other Education Areas that Require Support

- **University research reactors**
- **Internships for students – government, national labs and industry**
- **Nuclear engineering/science research grants**
- **International component – i.e., student exchange**
- **Pre-college outreach programs – i.e., DOE's "Harnessed Atom"**
- **Cooperative programs among universities, Federal agencies and private sector**
- **A nationwide survey to gauge the expected demand for nuclear trained workers (engineers, health physicists, radio-chemists, the trades, etc.), and the demographics of the current workforce**

# What Can NRC Offer Students?

- “Best place to work” in the Federal Government
- Scholarships and fellowships
  - \$10,000 to \$50,000 per year for up to four years
- Summer internships offered to grant recipients
- Enhanced employment opportunities at NRC
- Repayment of student loans
- Nuclear Safety Professional Development Program

# Summary

- **NRC is a key player in nuclear workforce development and currently the sole player developing the vitally needed trades and crafts through two year institutions**
- **Structured outreach program is missing from NRC education program inhibited by the regulatory nature of the agency**
- **Within the funding made available, NRC and DOE are fulfilling the congressional mandate to build nuclear education infrastructure and train the future workforce**
- **Many other entities are making important contributions to workforce development**
- **Efforts to move nuclear education disciplines to other non-specialized federal agencies are counterproductive**

**“We cannot always build the future  
for our youth, but we can build our  
youth for the future.”**

**- Franklin D. Roosevelt**

# Grant Office Contacts

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