



# Enabling the Nuclear Renaissance – Codes and Standards

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# U.S. Nuclear Energy

- There are currently 104 commercial nuclear power reactors operating in the U.S.
- Nuclear power provides almost 20% of the U.S. electricity.
- One new reactor is under construction.



# Conditions of the mid-1980s did not favor nuclear construction

- Energy efficiency improvements
- Economic restructuring
- Significant drop in electricity demand
- Excess generating capacity
- Oil (traded fossil energy) price collapse
- Electricity market liberalization & privatization
- Regulatory interventions after TMI
- High interest rates
- Chernobyl



## Conditions of today are distinctly different from the mid-1980s

- Energy demand growth
- Fossil fuels no longer cheap
- Energy supply security concerns
- Attractive life cycle costs of nuclear power
- Pollution control and climate change
- Excellent operating experience
- Renewables and efficiency improvements



# Energy Policy Act of 2005

- Authorizes federal risk insurance for the next 6 nuclear plants for delays associated with NRC reviews (\$500 M for first 2 plants, \$250 M for next 4 plants)
- Nuclear energy production tax credits for the first 6,000 megawatts of electricity from new advanced reactors
- Authorizes \$3 billion in nuclear research and development



# Resurgence of Nuclear Power

- 26 new plants at 17 sites proposed by the industry
- Five different plant designs proposed
  - AP1000
  - Economic Simplified Boiling Water Reactor
  - Evolutionary Power Reactor
  - Advanced Boiling Water Reactor
  - Advanced Pressurized Water Reactor
- Advanced Reactors



# Codes and Standards Participation

- NRC commits significant resources to consensus standard improvements
  - 145 staff actively participate on various codes and standards developing committees (ASME, ANS, IEEE, etc.)
  - Extensive internal and external coordination activities
- Consensus standards facilitate globalization of the supply chain



# Codes and Standards – Now & Beyond

- **Quality Assurance**

Current framework of codes, conformity assessment, quality program implementation, and third party inspections complements our regulatory activities.

- Consensus standards endorsed by NRC
  - NQA-1, 1983, 1994, 2008, Design & Construction QA
  - N18.7/ANSI 3.2, Operations Administrative Controls





# Codes and Standards – Now & Beyond (Cont'd)

- **Global Harmonization of C&S**

MDEP C&S working group is identifying beneficial areas for code convergence and exploring options for reconciling differences

- Comparison of international Code requirements with those of ASME
- Harmonization may be possible through uniform high-level requirements for design and construction.



# Codes and Standards – Now & Beyond (Cont'd)

- **C&S Needs for Light Water Reactors**

The NRC and ASME work cooperatively to ensure that significant technical issues emerging from operating experience are effectively addressed in regulations and ASME Code requirements.

- ASME Code Cases
- New piping materials



# Codes and Standards – Now & Beyond (Cont'd)

## ■ **Future Trends for C&S**

Since 1995, the U.S. has issued a number of risk-informed requirements and guidance by the NRC and standards development organizations.

- Risk-informed design methodologies are under development
- Probabilistic methodologies covering a facility's life-cycle are considered.



# Codes and Standards – Now & Beyond (Cont'd)

- **High Temperature Codes for Advanced Reactors**

HTGR vendors and U.S. and other international laboratories are collaborating in Code developments.

- Codes and Code Cases for new materials
- Effect of HTGR operational environments

- **Other Advanced Designs**



# Summary

- A global nuclear renaissance is taking hold worldwide.
- A strong shared interest in assuring nuclear safety around the world
- Codes and standards can support the safe use of nuclear power.