

# **Nuclear Generation: Challenges for a New Building Cycle**

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# Some Background

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- **Advantages of nuclear generation:**

- No emissions
- Stable fuel and electricity prices compared to other fuels
- Efficient generation with high capacity utilization and availability
- Significant base load capability can address increasing demand
- Resource diversity away from natural gas → Less dependence on imports

- **Disadvantages of nuclear generation:**

- Nuclear waste storage and disposal needs to be addressed / Reprocessing of fuel?
- Very high operating risk
- Consequences of accidents can be severe
- Very high construction/fixed costs → pressure on operators to maintain impeccable operating and maintenance records so that plants run all the time

# **Why Is New Nuclear Generation Capacity Appealing?**

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- **Demand for electricity increases every year**
- **EPA requires reductions in SO<sub>2</sub>, NOx and Hg emissions**
- **Suitable sources of energy for the future include:**
  - Hydro-electric generation
  - Gas-fired generation
  - Integrated Gasification Combined Cycle (IGCC) generation
  - Nuclear generation
  - Other – Solar, wind, biomass
- **When factoring potential impact of carbon limitations, only hydro-generation and nuclear generation comply while providing high availability and capacity utilization**

# Challenges for the Nuclear Industry

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- **Combined Construction and Operating License (COL)**
  - NRC is encouraging design standardization → Quicker approval
  - Design approved *before* construction begins → Mitigates undue delays and spiraling costs
- **Cost of Construction**
  - Reactor designers are still determining costs
  - Construction costs will rise due to global demand for raw materials
  - Industry “out of practice” for many years and insufficient experienced labor available
  - Over-night construction costs could be \$2,500/KW to \$4,000/KW
    - A 1,000MW unit can cost **\$2.5 billion to \$4 billion**

# Challenges for the Nuclear Industry

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- **Cost Recovery and Financing**
  - Regulated Companies –
    - Clear and transparent regulatory framework to recover costs
    - Framework must withstand changing political and regulatory environment
  - Merchant Companies –
    - Long-term commitment from off-taker to allow for recovery of investment
- **How to build – *EPC Contract or Cost + margin?***
  - Contract must limit cost over-runs or at least make them very explicit and identifiable
- **Absent certainty of cost recovery, financing will be very challenging and no utility will under-take a project of this size or complexity**

# Challenges for the Nuclear Industry

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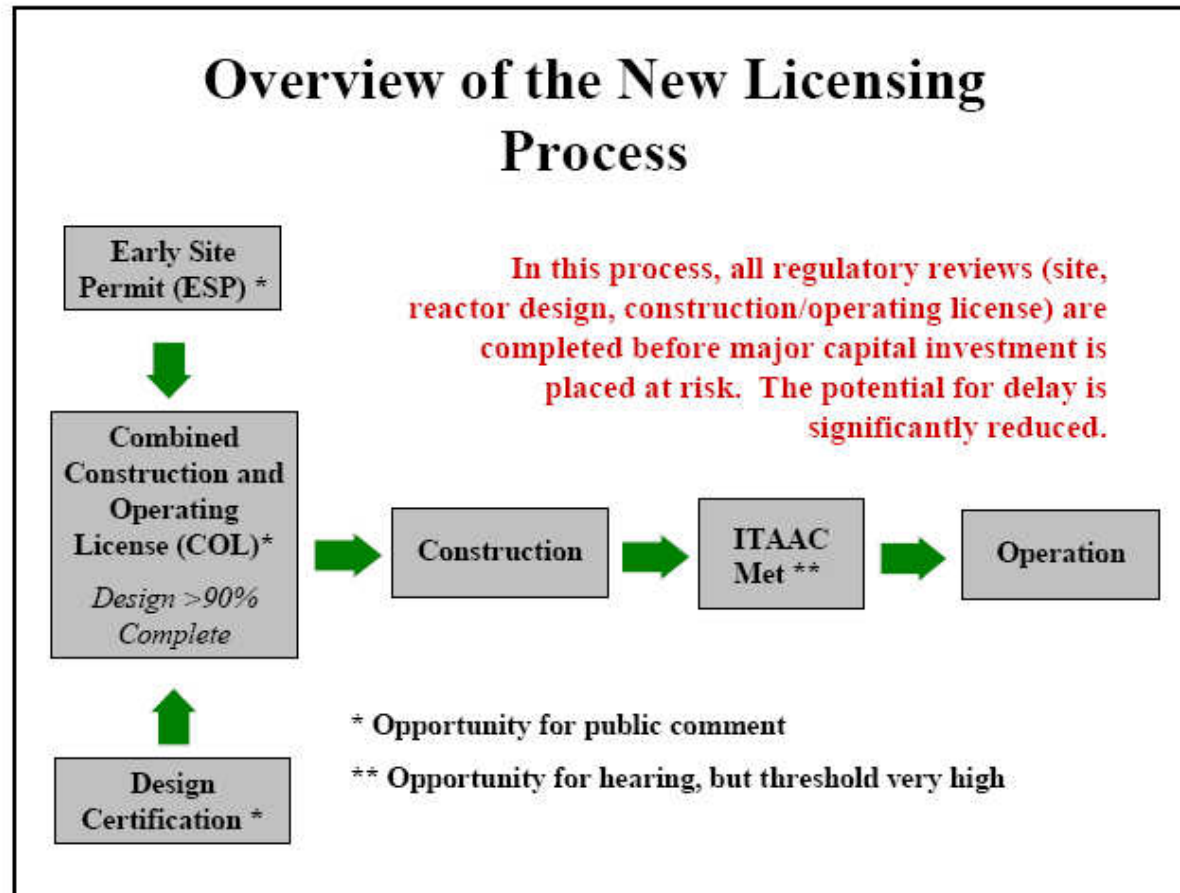
- **Spent Fuel and Decommissioning**
  - Incentives for new generation but Yucca Mountain still not accepting spent fuel → Not the right message to industry participants
  - Why not pursue re-processing? It works in France
- **Energy Policy Act of 2005 provides incentives**
  - Production Tax Credits - 1.8 cents/KWh for first 6,000MW up to \$125mm annually
  - Federal risk insurance to offset delays during construction due to regulatory or legal obstacles
  - Federal loan guarantees for up to 80% of a project's debt financing or total cost? No clear guidelines on how it will work.
- **Societal Acceptance and Public Reception**
  - Educate public and constituents
  - Why does it work in France, Finland, China and Japan?
  - Is conservation the right alternative? Is it an alternative?

# Opportunities for the Nuclear Industry

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- **Nuclear generators can make a lot of money**
  - Natural gas sets the marginal cost of generation in most markets in the US
  - Nuclear plants are price-takers with variable costs significantly lower than those of coal and especially gas fired plants
- **Provide resource diversity and may even contribute to resource independence**
  - No need to rely on natural gas or import sources of fuel
- **Good for the environment**
  - As long as waste disposal is addressed

# New Licensing Framework



Source: Status and Outlook for Nuclear Energy in the United States, August 2006, Nuclear Energy Institute

# STANDARD & POOR'S

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