



Washington Group International

Integrated Engineering, Construction, and Management Solutions



The Nuclear Power Renaissance: A Life Cycle Perspective

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Critical Time for Nuclear Power Dialog



- ◆ Great timing for this conference
- ◆ Appropriate location, too
- ◆ All sectors must play a role
 - Government, Industry and academe
 - Even some “strange bedfellows”

Who Said This?



Quote #1 ...*“Nuclear energy is the only large-scale, cost-effective energy source that can reduce (greenhouse) emissions while satisfying a growing demand for power. And these days it can do so safely.”*

Quote #2 ...*“I think the future holds great opportunities for nuclear power ... because safety has improved and environmental quality has improved.”*

Political & Regulatory Climate Change



Dr. Patrick Moore



Jimmy Carter

- ◆ No greenhouse gas emissions
- ◆ Rising fuel prices
- ◆ Growing dependency on Middle Eastern and Latin American states
- ◆ Technology improvements
- ◆ 70% public support nationwide
- ◆ Nuclear Energy Policy Act
 - Energy production tax credit (8 years)
 - 80% loan guarantees
 - “One-step” licensing (construction and operations)
 - Price Anderson Act renewal for plants online before 2025
- ◆ Global nuclear plants planned (124 proposed reactors)
- ◆ Utilities & manufacturers gearing up
- ◆ \$100B to 200B global market next 10 years

First ... A Little History ... The 1970s



- ◆ 300+ nuclear plants in various stages of planning, licensing, engineering, and construction
- ◆ Big “events”
 - Three Mile Island
 - Carter policy on recycling
- ◆ A flawed long-term business model
 - Cost/schedule overruns
 - Unpredictable regulatory process
 - Poorly organized and incentivized client-supplier relationships

The Result ... The 1980s and 1990s

- ◆ Decline in new nuclear plant investment
 - 200 new plants discontinued by early 1980s
- ◆ Expertise migrated to government sector
 - Most moved to Savannah River Site
- ◆ But ...ultimately a strong, safe, efficient, consolidated nuclear industry emerged
 - More disciplined operating standards
 - Plant efficiencies rose from ~65% to 90+%
 - Life extension of existing plants
 - Improved analysis
 - Heavy component change-out (steam generators, pressurizers, etc.)
 - New standardized reactor designs with passive safety systems

Today's View

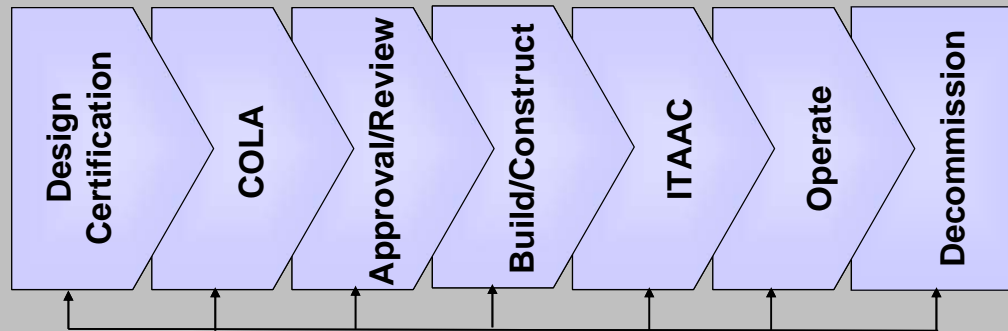
- ◆ Growing nuclear / environmental consensus
- ◆ 2005 Energy Policy Act offers important incentives
- ◆ Economic drivers increasing
 - Rising comparative fuel costs
 - Energy demand worldwide
 - ~50 new plants over next 25 years to maintain current nuclear share in USA
 - Spent fuel and waste issues discounted by banks
 - One-step licensing process reduces financial risk
- ◆ New entrants to the US market
 - Toshiba acquisition of Westinghouse
 - UniStar alliance based on Areva technology
 - Hitachi/GE joint venture
 - Mitsubishi US Advanced Pressurized Water Reactor
 - Mitsubishi/Areva Alliance
- ◆ Early licensing process already underway in USA

A Challenge for Government

- ◆ Maintain stable and predictable regulatory process
- ◆ Energy Act incentives – only as a kick-start
- ◆ Encourage practical solutions addressing the entire nuclear life cycle
 - Yucca Mountain
 - Monitored retrievable storage
 - Advanced Fuel Cycle – GNEP and MOX
 - Waste reduction
 - Sustains USA relevancy in global nonproliferation
 - Next Generation Nuclear Plant (NGNP)

A Challenge for Industry

- ◆ Establish a global supply chain
- ◆ Stay hungry – maintain safety and efficiency focus of the past 30 years
- ◆ Maintain integrated understanding of the nuclear life cycle
 - Provides continuity, efficiencies, and a fundamental understanding of plant's technology basis
 - Project reliability
 - i.e. Sarbanes-Oxley



- ◆ A track record of successful projects will help sustain governmental / financial support and credibility

A Challenge for Industry (cont'd)

- ◆ Attract and develop human resources
- ◆ Good news / bad news situation
 - Current workforce aging ... but has life-cycle perspective
 - Government sector migration enriched prior nuclear experience
 - Comprehensive nuclear life cycle scope and responsibility
 - K-Reactor restart
 - Innovative reprocessing
 - Nuclear facility D&D
 - High-level waste management
- ◆ Washington Group has 7,500 nuclear-experienced professionals
 - But must augment with new talent development
 - Revitalize innovative university programs and recruitment
 - Establish internal training in nuclear critical disciplines
 - Life-cycle mentoring
 - Retiree utilization / limited work week
 - Planned job rotation

A Challenge for Academe

- ◆ Talent replenishment – the 1960s revisited

- Rahe’s axiom

“The beginnings of any technology-rich business are all characterized by a shortage of large numbers of technically trained people needed to support ultimate growth”

	<u>1980</u>	<u>2000</u>
Nuclear engineering programs	41	24
BS degrees	1,700	550
MS degrees	850	450
PhDs	600	400
University research reactors	65	30

- Rahe’s corollary

“The resources will come when the business becomes attractive to the best-and-brightest who adapt skills to become part of an exciting opportunity ... but our universities need to help”

A Challenge for Academe (cont'd)

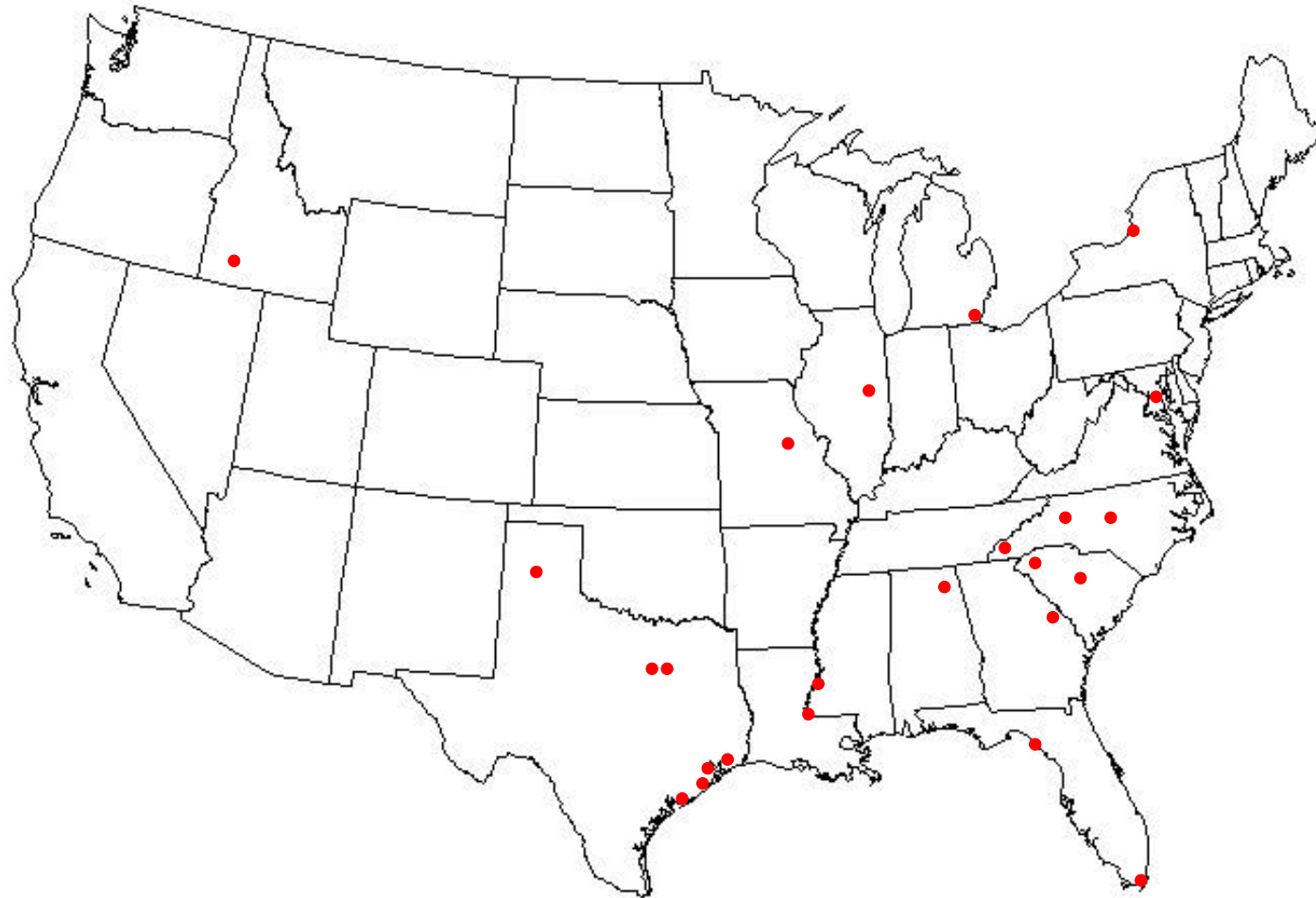
- ◆ University - government collaborations
 - Help recruit faculty – research grants
 - Nuclear life-cycle focus
 - Advanced fuel-cycle
 - Increase masters scholarships and PhD fellowships
 - Increase National Laboratory exchanges / collaborations
 - Support nuclear science outreach to secondary schools
- ◆ University - industry collaborations
 - Re-invigorate co-op programs in critical disciplines
 - Scholarships
 - Adjunct faculty (life-cycle perspective)
- ◆ University research-teaching reactor collaborations
 - Maintain current DOE / university base program
 - Sunrise Reactor
 - Peer reviewed reactor research proposals

Finally ... a challenge for the Southeast Preserving the Nation's Nuclear Core



- ◆ Location ... Location ... Location
 - 75% of new plants in USA – Southeast and Texas
 - 18 plants to serve ... \$90 billion investment
- ◆ The nation's nuclear talent "corps"
 - SRS site contractors
 - 8000 nuclear professionals
 - Washington Safety Management Solutions
 - World's largest nuclear safety-licensing consultancy
 - 500 analysts and support staff
 - Washington Energy Center
 - Certifying new advanced reactor designs
 - Savannah River National Lab
 - Savannah River Energy Park & Sunrise
 - Southeast hub for scarce nuclear services
 - Licensing
 - Engineering
 - Technical Analysis
 - Operations training and consulting

Location ... Location ... Location



Pending
New
Nuclear
Plant Sites

It's time ...
to respond
to the
opportunity