



Developing Nuclear New-Build Power Projects

Fundamental Requirements and Factors
Influencing Successful Project Execution

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Theme 1– Challenges and Opportunities for U.S. Nuclear Energy

Global Deployment Of The Advanced Boiling Water Reactor (ABWR)



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Four operational ABWRs in Japan

ABWRs under construction/planned in Japan and UK

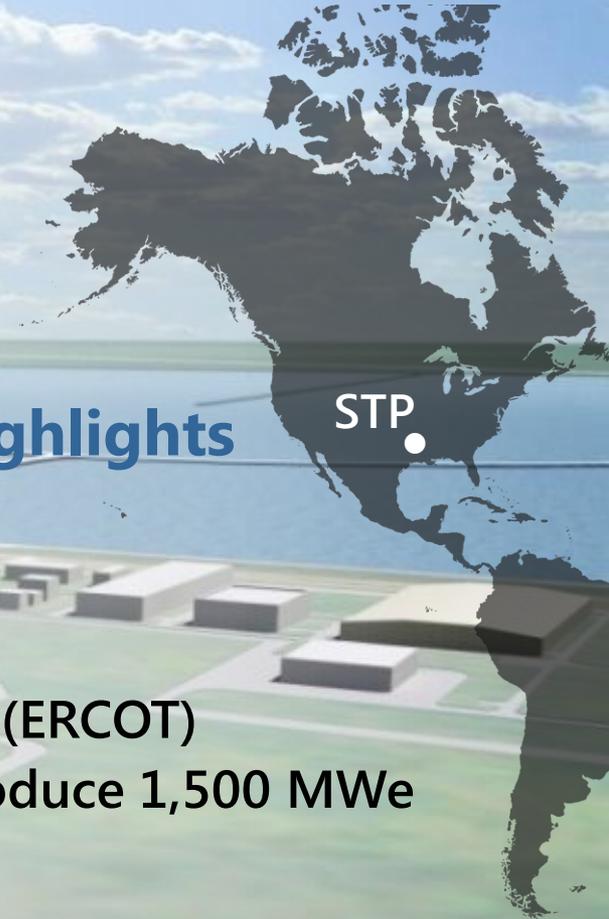
South Texas Project Units 3&4 Project Highlights

Developer: Nuclear Innovation North America

Location: South Texas Project site near Bay City, Texas

Electric Grid: Electric Reliability Council of Texas (ERCOT)

Plant: 2 Toshiba US-ABWR units, each unit to produce 1,500 MWe (gross output after uprate)



STP Units 3&4 Status



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- NRC Safety and Environmental reviews completed
- Mandatory Hearing before NRC Commissioners
 - Uncontested and completed – November 19, 2015
 - Commissioner deliberation in progress
- Combined License – estimated January 2016
- Engineering, Procurement, and Construction currently on hold
 - Engineering ~40% complete
 - Restart dependent on market

STP 3&4 will be “shovel ready” after receipt of the COL

Economic Development Benefits



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- New nuclear power generation at STP will create high-quality, “send your kids to college” jobs
- Construction and operation of STP Units 3 and 4 will create approximately 5,000 jobs at peak construction and add 800 permanent jobs to the 1,300 existing jobs at the facility
- STP jobs will support the creation of an additional 1,500 jobs in the local community
- Total direct and indirect jobs will create more than 90,000 man-years of work in Texas during construction

New nuclear power generation will put Texans to work

Clean Power Plan and Avoided CO₂ Emissions



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- The Clean Power Plan requires Texas to achieve 1,042 lbs. CO₂ per MWh by 2030
- New nuclear generation is the single most effective means to reduce CO₂ emissions in the power industry

Approximate Annual Emissions from Coal Generation <u>Avoided</u> with 1 MW of New Capacity	
Nuclear	9,300 tons
Wind	3,900 tons
Solar	2,900 tons
Nat. Gas CC	4,500 tons



Approximate Incremental MW Needed to Meet EPA's Clean Power Plan Emission Rate by Technology Choice	
Nuclear	9,500 MW
Wind	22,500 MW
Solar	30,500 MW
Nat. Gas CC	19,500 MW

- Different emissions avoided reflect different capacity factors and reduced emissions associated with gas

- Nuclear power emits virtually zero greenhouse gases and other pollutants
- New nuclear generation is the single most effective means to reduce greenhouse gas emissions and regional haze in Texas

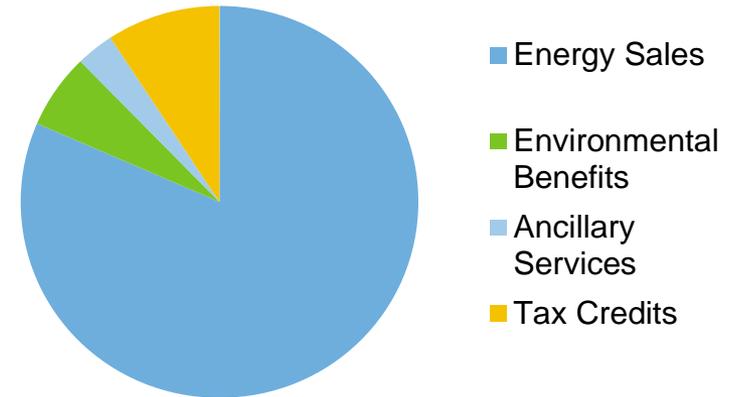
The Keys to Moving Forward at STP 3&4



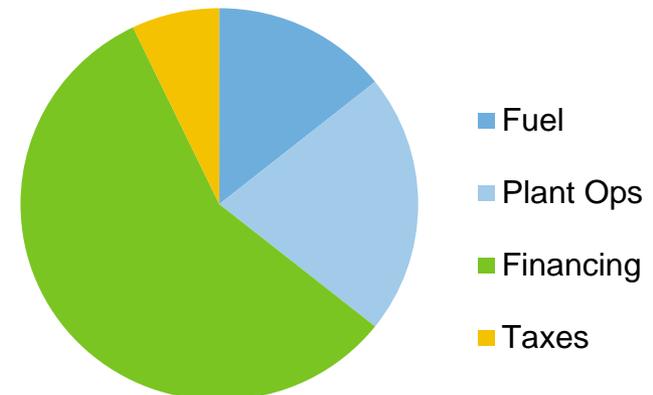
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- EPC execution
- Ensure revenues are available for full recovery of the cost of power
 - Participate in market policy development for energy and ancillary services
 - Maximize capacity factors
 - Secure environmental benefit recognition
 - Pursue existing, available tax credits
- Minimize fuel price volatility
 - Develop Uranium hedging plan
 - Secure conversion and fabrication
- Ensure top quartile operating cost
 - Utilize best practices from STPNOC
- Aggressively pursue lowest cost financing plan
- Minimize property tax expense through state incentive programs

**Revenue Sources
(illustrative)**



**Cost of Power
(illustrative)**





BACKGROUND SLIDES

Key Considerations For Plant Development



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Six Primary Considerations

- Power and energy demand fundamentals of the market
- Technology fit
- Sufficiency of revenue sources
- Construction risk: cost and schedule certainty
- Availability of, and access to capital funding
- Reasonability and timeliness of regulatory authorization

A successful development project must have line of sight on each of these important factors

Structural Factors Influencing Project Execution



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Project Economics

- Fundamental market prices
- Financial structuring
- EPC contracting strategy
- Foreign exchange rates
- Operating costs
- Income and ad valorem tax

Execution Challenges

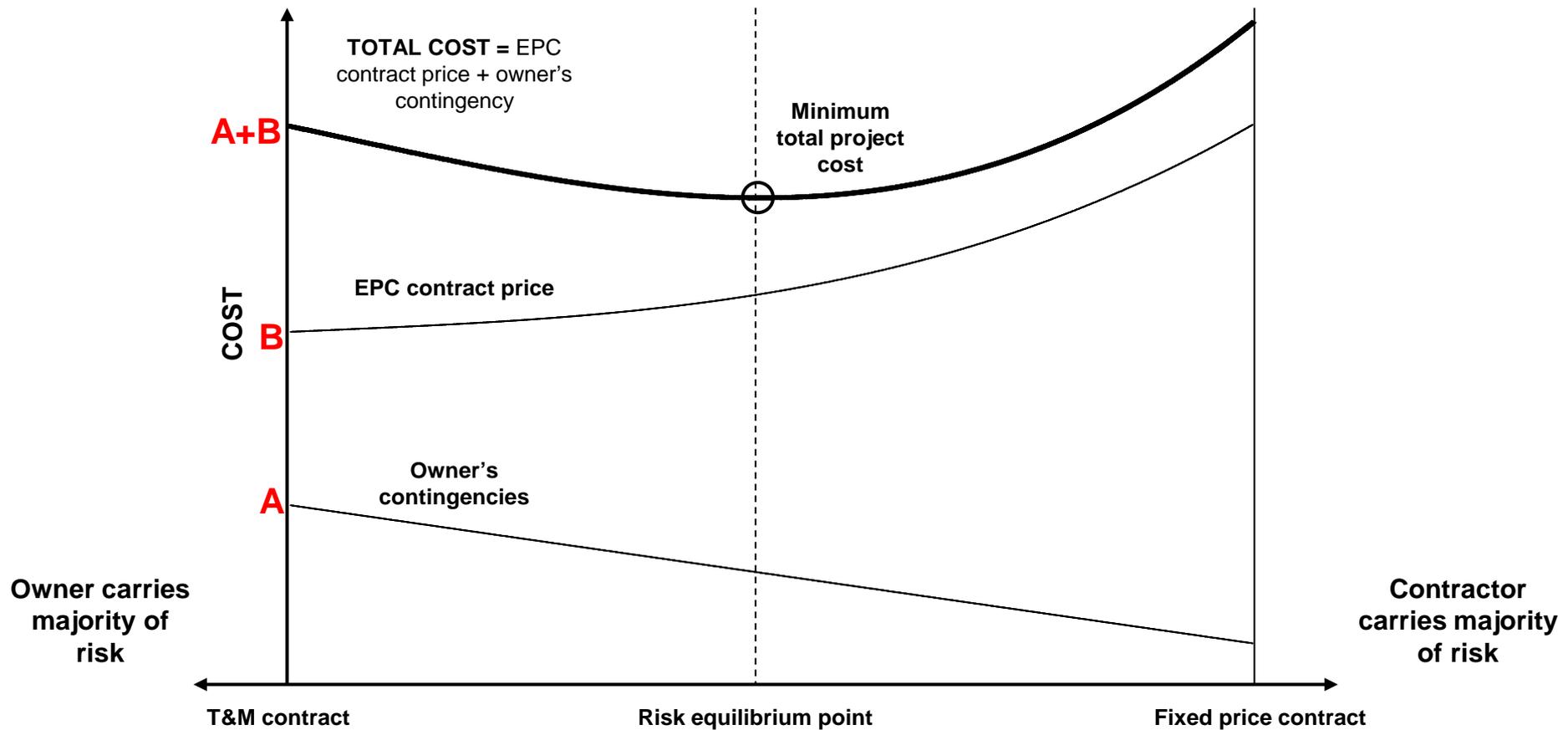
- Securing revenues or hedges
- Defining and managing risk
- Project scale
- Resource availability
- Regulatory affairs
- Public affairs

After meeting the threshold fundamental requirements, the developer must structure the project into an executable transaction

The Contract Price / Owner Contingency Dynamic



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The Industry And Government Are Supportive



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- ✓ The U.S. nuclear industry is the safest industrial sector in the world
- ✓ The NRC's Part 52 licensing process creates a platform for regulatory risk mitigation
- ✓ Increased employment and tax base value are recognized locally

These attributes create a solid foundation for new reactor deployment

Market Fundamentals Are Pointing To Nuclear



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- Carbon and regional haze regulation is coming...and legacy coal retirements likely
- Combined-cycle natural gas plants, wind and solar aren't the only answer
- Market regulators recognize reliability is a value driver

Indicators favor development of new nuclear plants

But Nuclear Power Is Still Disadvantaged



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- Financing is not available without federal, state and/or ECA support
- Line of sight on spent fuel disposal is needed to broaden the investor base
- Nuclear tax incentives (PTCs and/or ITCs) are needed to level the playing field and for parity to other technologies

Resolving these important factors will improve the likelihood of broad nuclear expansion in the United States



Questions?