



**CONCENTRIC**  
ENERGY ADVISORS

# **CAN NUCLEAR ENERGY COMPETE?**

**Presented by:  
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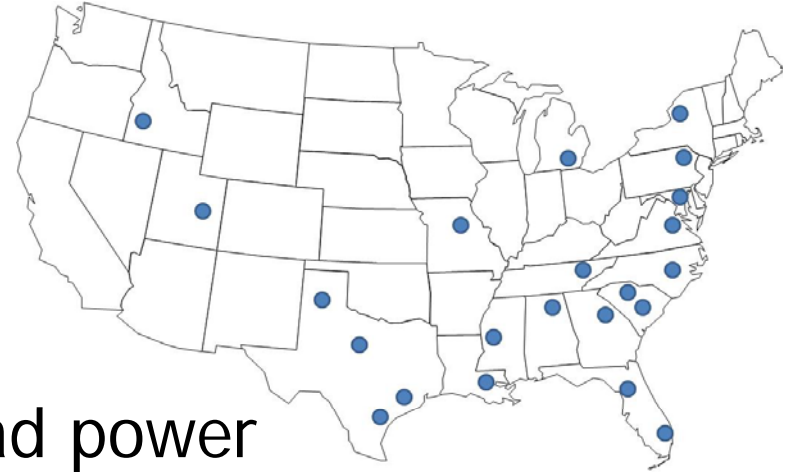
**7<sup>th</sup> Annual Platts Nuclear Energy Conference**

**February 17, 2011**

# What's At Stake

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- Reduced carbon emissions
- Fuel diversification
- Long-term price stability
- Reliable & abundant baseload power
- Potentially reduced reliance on imported fossil fuels (indirect benefit)



**By June 2009, 22\* projects announced, today only 2-3 projects are actively moving toward construction in the near term.**

\* Includes Watts Bar 2



## U.S. New Nuclear – A Bump In The Road

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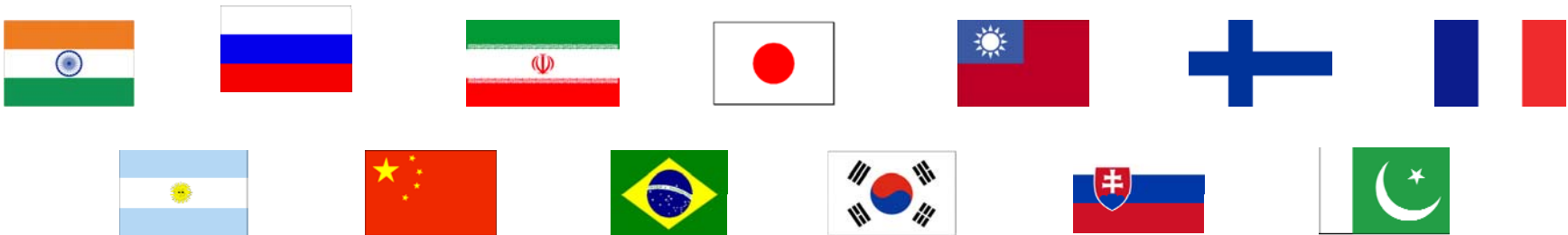
- Loan guarantee program continues to languish, but recent announcement indicate a possible increase in funding
- Costs generally trending upward
- Low natural gas prices and resulting low power prices have influenced long-term economics
- Licensing process is being demonstrated, but challenges remain
- Carbon regulation delayed



## Rest Of The World Moves Forward

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- Since 2004, 22 new reactors have come on-line in seven countries
- 65 reactors totaling nearly 63 GWe are under construction in 14 countries
  - 1 reactor under construction in the US
- Construction costs and schedules are improving in certain countries while other countries are challenged to develop a robust supply chain and workforce



# Why?

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## Worldwide

- National energy plans which embrace nuclear power
- Government support through ownership and supportive policies
- Developed/Developing supply chain and workforce
- Plans for addressing spent nuclear fuel disposal

## U.S.

- Lack of national commitment and divided regulatory responsibilities
- Difficulty obtaining loan guarantees and lack of federal government incentives
- Aging workforce/diminished supply chain
- No resolution for SNF



# Cost of New Nuclear

- Cost of new reactors is dependent upon:
  - Online date
  - Technology
  - Cost of debt & equity
  - Regulatory or market structure

Project	Technology	# of Units	Total Capacity	Estimate Type	\$ Year	Project Cost		COD Assumed In Estimate
						(billions)	\$/kW	
Unistar	US EPR	1	1600 MW	Overnight Costs	2008	\$10.00	\$6,250	2016
Duke Energy	AP1000	2	2234 MW	Overnight Costs	2007	\$11.00	\$4,924	2021, 2023
Florida Power & Light	AP1000	2	2234 MW	All-in Costs	Year	\$18.70	\$8,371	2022, 2023
Florida Power & Light	ESBWR	2	3040 MW	All-in Costs	2018	\$24.30	\$8,005	2018, 2020
NRG Energy	ABWR	2	2700 MW	Overnight Costs	2010	\$12.10	\$4,481	2015, 2016
PPL	EPR	1	1600 MW	All-in Costs	2010	\$14.00	\$8,750	2018-2020
Progress Energy - Levy	AP1000	2	2234 MW	Overnight Costs	2007	\$9.30	\$4,206	2021, 2022
Progress Energy - Levy	AP1000	2	2234 MW	All-in Costs	Year	\$19.85	\$8,885	2021, 2022
SCE&G	AP1000	2	2234 MW	Overnight Costs	2007	\$7.18	\$3,214	2016, 2019
Southern Company	AP1000	2	2234 MW	All-in Costs	Year spent	\$13.33	\$5,967	2016, 2017
Tennessee Valley Authority	AP1000	2	2234 MW	All-in Costs	Year	\$8.00	\$3,636	2014, 2015 †

**New nuclear is a \$7-9 billion per reactor, “bet the company” proposition for US power companies**



# U.S. Nuclear Development – Financing Matters

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## Impact of Assumptions on Merchant Plant

<u>Assumption</u>	<u>Construction Costs</u>	<u>Value of Plant</u>
Federal Loan Guarantee	(~3.5%)	~75%
Power Prices ↑10%	NA	~8.75%
1 Yr Schedule Reduction	(~5.5%)	~5.25%*

\*Assumes overnight costs remain constant.



# Can New Nuclear Compete In The U.S.?

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## **Yes, but the private sector cannot do it alone**

- Only the largest power companies can even consider tackling these investments individually
- Loan guarantees are a must for merchant projects
- Consortium approach is critical to managing risk and scale for merchant projects
- In the short-run, “option” value of a COL supports continued investment in licensing process

**Strong energy policy and effective government support are critical**

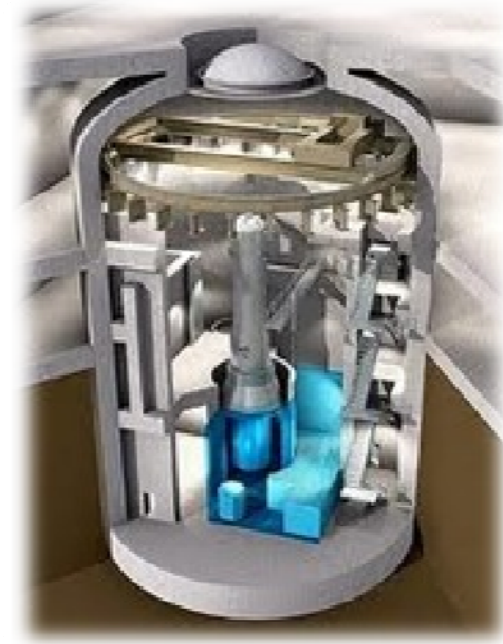




# What About Small Modular Reactors (“SMRs”)?

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- “Bite sized” units and investments
  - Size
  - Cost
- May be a way to broaden the number of companies involved
- SMRs seem to be key to a significant enlarging of the U.S. nuclear program.



Babcock & Wilcox



## To Be Successful - Build Upon The Positive

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- State of the Union & 2011 Budget Proposal
  - Administration is committing to a clean energy strategy, including nuclear
- State level initiatives
  - CWIP in rate base is critical for rate regulated projects
  - PILOT agreements and other state support necessary for merchant projects
- Federal licensing process is being demonstrated



## And Take On The Hard Issues Once And For All

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- Get serious about pricing externalities, particularly carbon, and recognize the benefits of nuclear power
- Commit to effective and consistent government support which lowers the cost of financing nuclear development
- International lessons learned
- Advance modular development
- Address spent fuel disposal

**Consistency and certainty are critical**



# Potential Government Support

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- Loan guarantees
- Streamline nuclear construction oversight and regulation
- Incentives and tax credits, possibly minimum price guarantees
- Potential direct federal involvement
  - TVA or other publicly owned companies



# **New Nuclear Can Compete In The U.S.**

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## **But we must:**

- Develop a national imperative
- Fix the loan guarantee program
- Provide other government support
- Establish supportive and consistent regulatory policies
- Solve the spent fuel disposal issue

**Will these investments cost something? Yes.**

**Will it cost more if we do nothing? Likely.**



# Questions and Follow Up

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