



# NRG and Toshiba: EmPowering Nuclear Development in US

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March 26, 2008



CLEAR **DIRECTION**

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# NRG and Toshiba: A Powerful Partnership



## TOSHIBA

### Development Capability

- ✓ Licensing Expertise
- ✓ Financing Expertise
- ✓ Partnering and Offtake Relationships
- ✓ Continued Funding of Development Efforts
- ✓ Additional Opportunities
- ✓ Existing Development Program

## NUCLEAR INNOVATION NORTH AMERICA



### EPC Capability

- ✓ 40 Years of BWR Construction Experience
- ✓ Committed Capital
- ✓ Existing Manufacturing Supply Chain
- ✓ Modularized Design Engineering and Construction
- ✓ Positive Subcontractor Relationships



A focused, disciplined, conservative  
well-capitalized nuclear development company



# Nuclear Innovation North America LLC: A Nuclear Focused Project Development Company



## NRG Contribution

- 50% share of STP 3&4 (1,350 MW net) and development rights including filed COLA
- Management and support services (IT, accounting, benefits)
- Identified future development opportunities
- Licensing expertise
- Optimized nuclear financing plan
- Releasing purchase order securing Reactor Pressure Vessel (including heavy forgings) for STP 3

## Toshiba Contribution

- \$300 million contributed in 6 annual installments of \$50 million for 12% interest in Nuclear Innovation North America
- Pre-negotiated EPC terms for two additional, two unit EPC agreements (up to six units)
- Using proven Advanced Boiling Water Reactor (ABWR) design
- Support for licensing modifications
- Support in securing long lead time materials for Nuclear Innovation North America projects (secured slots for ultra heavy forgings)

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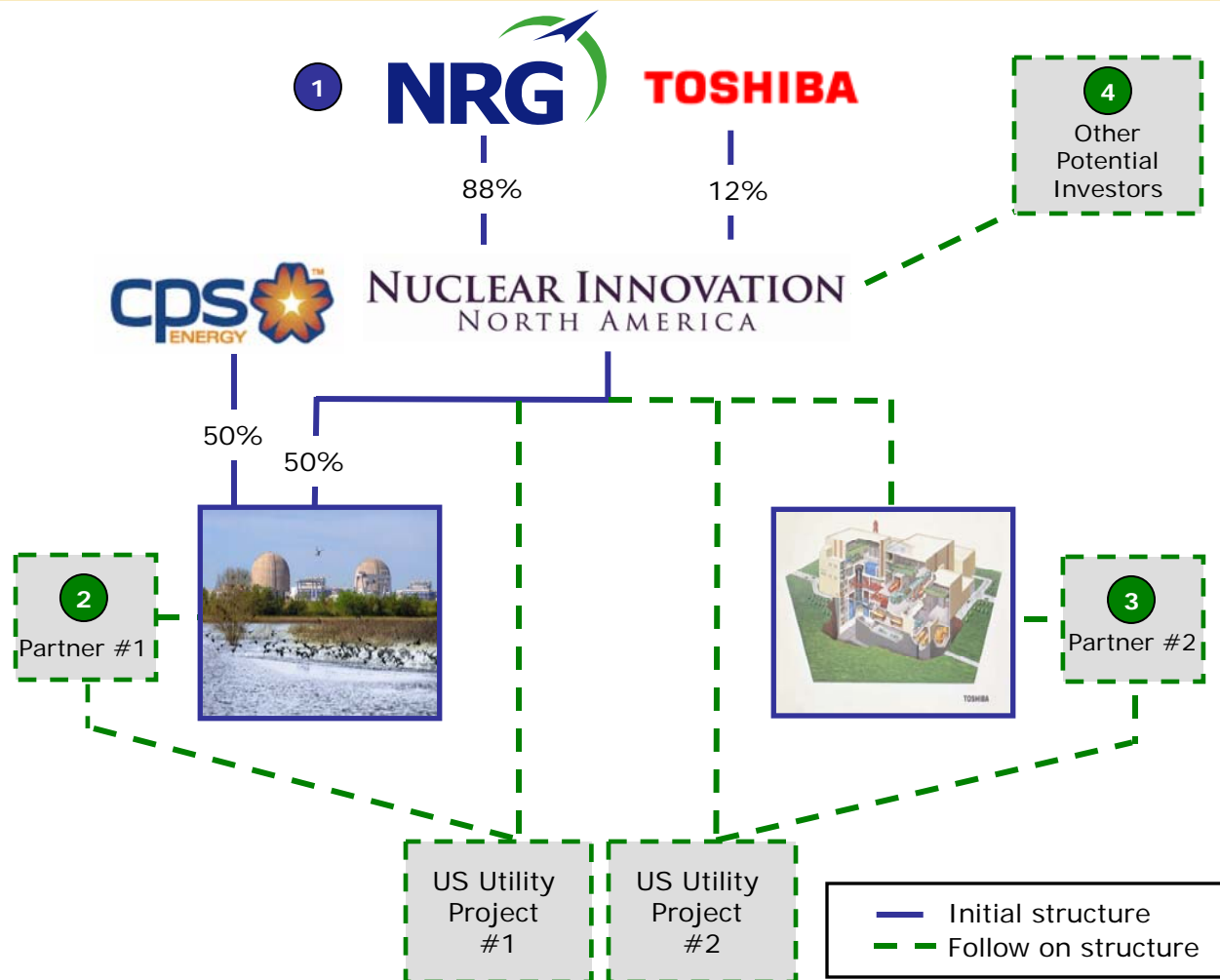
Capitalize on combined established expertise in nuclear licensing, development, engineering and construction

# Nuclear Innovation North America's Multi-Unit ABWR Strategic Step Structure



## Long Term Strategy

- 1 NRG contributes its STP 3&4 interest and development rights and Toshiba contributes \$50 million cash upon Nuclear Innovation North America closing with an additional 5 annual installments, totaling \$300 million
- 2 Leverage assets and expertise of Nuclear Innovation North America into a participation interest in another ABWR project
- 3 Nuclear Innovation North America and a partner begin additional 2 unit nuclear site development
- 4 Additional third party investors can be added to fund cash requirements



Note: the current ownership of STP 1&2 (44% NRG, 40% San Antonio and 16% Austin) remains unaffected by the development of STP 3&4 and the creation of Nuclear Innovation North America.

Focus on advancing and leveraging the ABWR design

# Nuclear Innovation North America

## Multi-Step Strategic Benefits



- Maintain momentum for the development of an ABWR fleet in the United States
  - Most certain design from cost and licensing perspective
- Provide incremental nuclear investment opportunities for NRG
  - Multi-unit agreement includes pre-negotiated EPC terms for additional projects
  - Supports NRG's approach to "averaging down" its carbon exposure
- Fund additional capital for the STP expansion (STP 3&4)
  - \$150 million of \$300 million Toshiba investment specifically dedicated to STP 3&4
  - Optionality for additional strategic partners
- Aligns with NRG's balanced capital allocation strategy

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Leverages NRG's strategic initiatives and competitive advantages on multiple fronts

# Nuclear Innovation North America Strategy: Mitigating New Nuclear Development Risks



Risk...	...Mitigation
1. Cost	<ul style="list-style-type: none"><li>➤ Pre-negotiated EPC terms (including fixed margin and risk premium)</li><li>➤ Clear, open-book bidding process for major equipment</li></ul>
2. Design	<ul style="list-style-type: none"><li>➤ Built four times, twice by Toshiba</li><li>➤ Built on budget and in 39 months or less each time</li><li>➤ Twelve year operating history</li></ul>
3. Licensing	<ul style="list-style-type: none"><li>➤ Previously certified design</li><li>➤ Some modifications to improve operation</li></ul>
4. Manufacture	<ul style="list-style-type: none"><li>➤ Existing pipeline for components, with capacity to handle our units</li><li>➤ Ability to secure long lead materials due to its vertical integration</li></ul>
5. Construction	<ul style="list-style-type: none"><li>➤ Committed vendor with financial investment in project success</li></ul>
6. Operation	<ul style="list-style-type: none"><li>➤ Technical sharing arrangement with Tokyo Electric Power, developer of the first two ABWRs, with successful operating history</li><li>➤ Partnering strategy for new unit operations</li></ul>

Nuclear Innovation North America  
business model provides enhanced certainty

# Proven Technology: Advanced Boiling Water Reactor (ABWR)



**ABWR is the most viable approach to new nuclear**

	<i>Our Choice</i>			
	ABWR	ESBWR	AP1000	EPR
Manufacturers	GE, Hitachi, Toshiba	GE	Westinghouse	AREVA
Unit Size	1,350	1,600	1,000	1,600
Reactor Design	Boiling Water Reactor	Boiling Water Reactor	Pressurized Water Reactor	Pressurized Water Reactor
NRC Certified Design	Yes	No	Yes	No
Status of Design Engineering	Completed except for site specific changes	In Progress	In Progress	In Progress
Units Commissioned / In Operation	4	0	0	0

- ✓ Already certified by NRC
- ✓ Four units successfully commissioned
- ✓ Design is complete
- ✓ Dependable construction schedule & supply chain

ABWR technology has been commercially deployed for 10 years in Japan with plants built "on time and on budget."

★ Proven Design: Timely Construction, Flawless Operation ★

# Proven EPC Partner: Toshiba



## BWR/ABWR Experience

- Entered business in 1966
- Constructed 22 plants
  - 17 as prime contractor
- Constructed<sup>1</sup> ABWR nuclear units Kashiwazaki Kariwa 6 & 7 in 37 (Jan-96) and 40 months (Dec-96), respectively

## United States Experience

- Owns Westinghouse Nuclear
- Largest US manufacturer and service provider of Pressurized Water Reactor (PWR)
- Led 2004 TVA/DOE Bellefonte Study of ABWR construction in US
- Formed Toshiba American Nuclear Energy (TANE) to focus on ABWR licensing and engineering in the US
- Migrating Japanese successful construction (open top construction and modularization<sup>2</sup>) methods to US constructor

<sup>1</sup> Construction months begin with first safety concrete to complete first fuel load

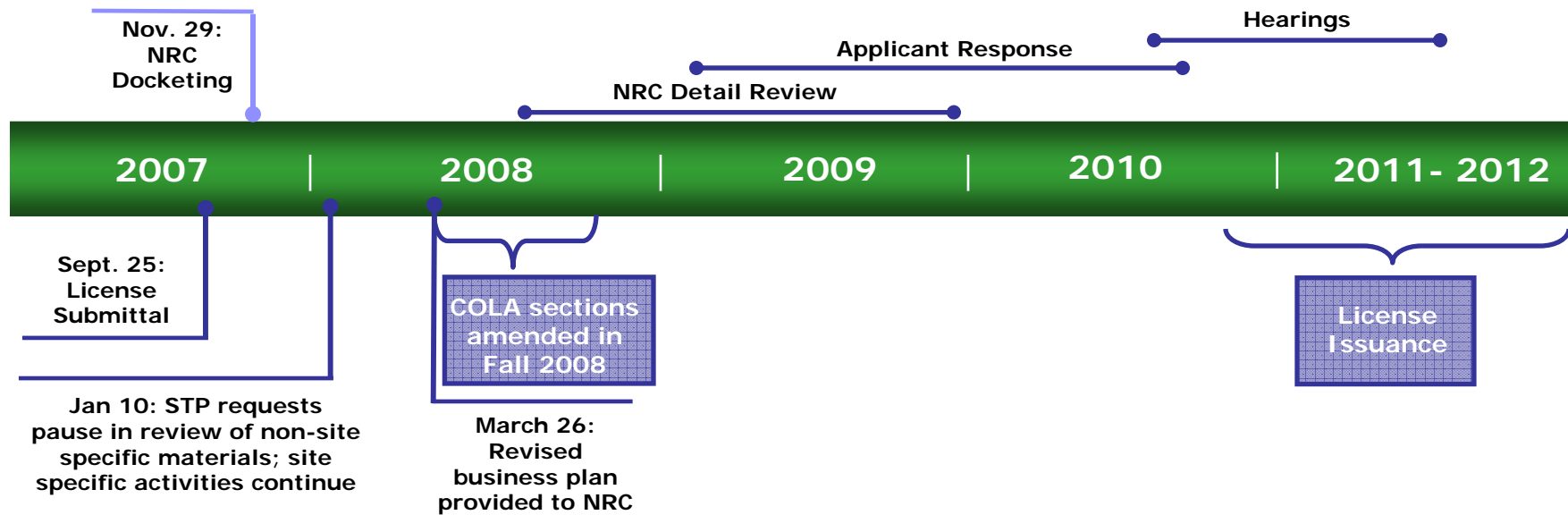
<sup>2</sup> Implies keeping open building rooftop to allow for large modules to be placed into the building and avoid manufacturing on site in restricted spaces.

Toshiba is well positioned to export its successful ABWR track record from Japan to the U.S.

# Updated STP 3&4 Licensing Path



## Anticipated Timeline and Process for COLA Filing



- Pause in review allows time to prepare a revision to shift to Toshiba
- Application remains based on the certified design with minimal changes
- NRC rules allow for qualified vendors to use a certified design
- Delay expected to have a modest impact to our overall schedule

Schedule impact is a fair trade-off for EPC certainty

# Creating Cost Certainty - Overnight



- Significant risk mitigation by selecting ABWR technology which has been built four times
  - ✓ Provides history of full engineering and nearly all quantities required for construction are known
- Primary open risk for our activities is the difference between U.S and Japanese labor productivity
- NRG will have a closed book, fixed price contract at financial closing, at which point escalation risk will cease
- Similarly, NRG intends to hedge its foreign exchange exposure as it makes its financial commitments

Relative Cost Comparison	ABWR Cost (\$/kw)		FPL Midpoint (\$/kw)
<b>Base Cost (including G&amp;A, Fee and Contingency)</b>			
U.S. Sourced Quantities	\$470		
Foreign Sourced Quantities	\$770		
Site and Structural Improvements	\$340		
Labor	\$1,320		
<b>Total EPC Cost</b>	<b>\$2,900</b>		<b>\$3,013</b>
Owner's Cost (Excluding IDC)	\$300		\$592
<b>Total Cost Excluding IDC</b>	<b>\$3,200</b>		<b>\$3,605</b>
Transmission Cost	\$0		\$220
<b>Total Cost Including Transmission</b>	<b>\$3,200</b>		<b>\$3,825</b>
<b>Risks</b>	<b>Low</b>	<b>High</b>	
Cost Escalation Provided by FPL (through 2020)			\$2,680
Potential Cost Variance for NRG <sup>1</sup>	(\$335)	\$470	
<b>Price Range (before IDC)</b>	<b>\$2,865</b>	<b>\$3,670</b>	<b>\$6,505</b>

Source: NRG estimates and Nucleonics Week dated 2/21/08

<sup>1</sup> Variance includes labor productivity, material price escalation until finance close and foreign exchange currency risk until hedged

NRG's choice of ABWR, with a fixed price contract, creates significantly more price certainty than other developers

# STP Development: Solid Start to Realizing Value



## 2007 Accomplishments

- ✓ Completed first application for a new operating nuclear unit to be received by the NRC in over 29 years
- ✓ Offtake MOUs for 80% of net Nuclear Innovation North America 40% ownership in STP 3&4
- ✓ Negotiated EPC terms that are consistent with project finance market requirements
- ✓ Developed a valuable supplement to the U.S. loan guarantee program
- ✓ Negotiated 50% agreement with CPS Energy
- ✓ Executed Participation Agreement with STP 1&2 owners which permits use of Common Station Facilities for additional units on site
- ✓ Texas legislature acts to support nuclear development

## 2008 – 2009 Goals

- ❑ Build out Nuclear Innovation North America infrastructure (location, staffing plan)
- ❑ Advance STP 3&4
  - Revised licensing plan
  - Finalize Master EPC agreement
  - Turn PPA MOUs into binding agreements
  - Participate in DOE loan solicitation
- ❑ Move forward ABWR fleet development
  - Finalize site selection for next two projects
  - Submit letter of intent to the NRC in 2008 for at least one project
- ❑ Develop additional partnering opportunities
  - Swap STP 3&4 (~20%) interest for investment in another development unit
  - Additional investors in Nuclear Innovation North America to provide growth capital

★ Emergence of Nuclear Renaissance has begun ★

# Questions and Answers



Appendix:



# Nuclear at STP



## Why Nuclear Power?

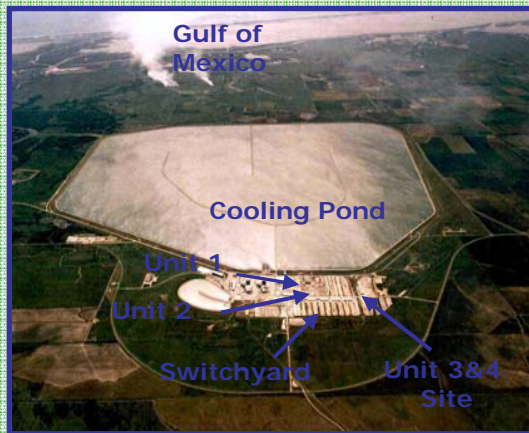
### Energy Independence<sup>1</sup>

- Avoids 37.6 million barrels of oil/p.a.
- Avoids 177 bcf of gas/p.a.
- Avoids 13.1 million tons of coal/p.a.
- Avoids 8,100 MW or 202,500 acres of land for wind

### Environmental Air Emission Displaced<sup>1</sup>

- Avoids SO<sub>2</sub> emissions of 40,918 tons/p.a. (3.46 lb/MWh)
- Avoids NO<sub>x</sub> emissions of 11,353 tons/p.a. (0.96 lb/MWh)
- Avoids mercury emissions of 828 lbs (0.56 oz/GWh)
- Avoids CO<sub>2</sub> emissions of 18.4 million tons (1,560 lb/MWh)

## South Texas Project



## Why STP?

- One of only two existing nuclear facilities in state
- Enormous footprint
- Common station facilities<sup>1</sup> (particularly reservoir) already designed for four units
- Ready access by barge and rail
- Widespread public support
- Open space and access to local Houston load center
- Top quality operator (STPNOC)

<sup>1</sup> Assumes 100% capacity factor for nuclear, ERCOT average (2005) and assumes representative technology by fuel type

★ Nuclear power is the most efficient "zero carbon" power generation available ★

# South Texas Project (STP) - "Today"



## Key Operating Data for Current Units

Unit	1	2
Commenced Operations	8/1988	6/1989
License Expiration	2027	2028
Net Capacity <sup>1</sup> (MW)	1,342	1,331
Technology	Westinghouse PWR	
Last Outage Cycle	10/2006	4/2007
Net Capacity Factor (3 year rolling avg.)	96.1%	94.7%

<sup>1</sup> Total MW capacity includes recently completed uprates

## Key Site Characteristics

- ✓ 4 unit site (2 currently operating)
- ✓ 7,000 acre reservoir
- ✓ 12,200 acre site
- ✓ Low population
- ✓ Minimal site preparation required
- ✓ Barge & rail access
- ✓ Robust transmission system

## Other STP Facts

- ✓ **Owners** include NRG (44%), City of San Antonio (40%) and City of Austin (16%)
- ✓ **Operator and Fuel Manager** is South Texas Project Nuclear Operating Company or STPNOC
- ✓ **Fuel Storage** is adequate for current life of the units
- ✓ **Fuel Contract Coverage** is 100% through 2011 and 25% through 2021 for uranium, 100% through license life for enrichment, and 100% through license life for fabrication

★ Existing STP Facility is Young and Robust ★

# South Texas Project Nuclear Operating Company or STPNOC: Industry Leading



- **Productivity**
  - Low fuel cost
  - One of the lowest reported production cost (1.35¢/kwh)
  - Highest producing two-unit nuclear plant (out of 33) three years in a row
  - Highest producing single unit in 2006 (unit 2)
- **Safety**
  - The only U.S. plant with three safety trains per unit
  - Strenuous and continuous training program
  - Exposure limits twice as strict as required
- **Security**
  - Design, strength of structures
  - Multiple layers, types of defenses
  - Upgrades since 9/11
- **Innovation**
  - In cooperation with NRC, piloted risk analysis of plant components
  - Piloted post-9/11 security requirements
  - Two “Best of The Best” awards—Only repeat-winner plant
  - Six “Top Industry Practice” awards—Most for any plant



STPNOC is a top nuclear power operator with a performance record equal to top fleet operators



# General STP Development Timeline



- Support NRC Review
- Engineering and Modularization
- EPC Open Book Process Executed

Order Long Lead Components



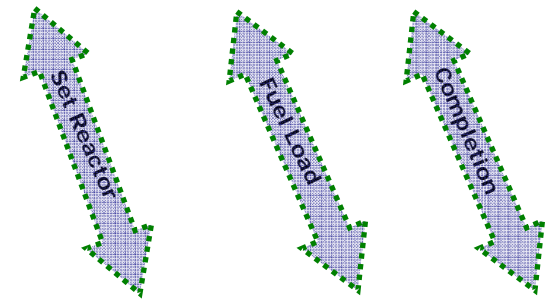
- Complete**
- Mobilize Licensing Contractors
  - Execute Interim Contracts
  - Develop Conceptual Plan
  - Independent Evaluation/Feasibility
  - Develop and Submit COLA
  - State Environmental Approvals
  - Secure Forging Slots for Project
  - Owner Approvals
- In Progress**
- Execute Vendor/Contractor Agreements
  - Develop project financing plan
  - Complete power marketing plan

Begin Non-Safety Related Construction

Two units developed and permitted together...



- COL Final Approval
- Execute PPAs
- EPC Contract Finalized
- Project Financing
- Begin Simulator Training (commences 2007)
- Start Safety Related Construction



...to be constructed with an optimal 12 month stagger



★ Key for timeline is securing long lead items, some in excess of 60 months to fabricate (e.g., forgings) ★

# Energy Policy Act of 2005



## Highlights

- **Loan Guarantee Program**
  - ❑ Loan guarantee for 80% of project cost
  - ❑ 30 years term
  - ❑ Enables financing and lowers cost of funds
  - ❑ Specific implementation rules being drafted by DOE now
  
- **Production Tax Credits (PTCs)**
  - ❑ \$18/MWhr or \$125mm per year per 1000 MW maximum
  - ❑ Declines pro-rata based on number of units in operation
  - ❑ STP 3&4 well positioned to receive the maximum PTCs permitted by the Energy Policy Act

## Loan Guarantee Program Timeline

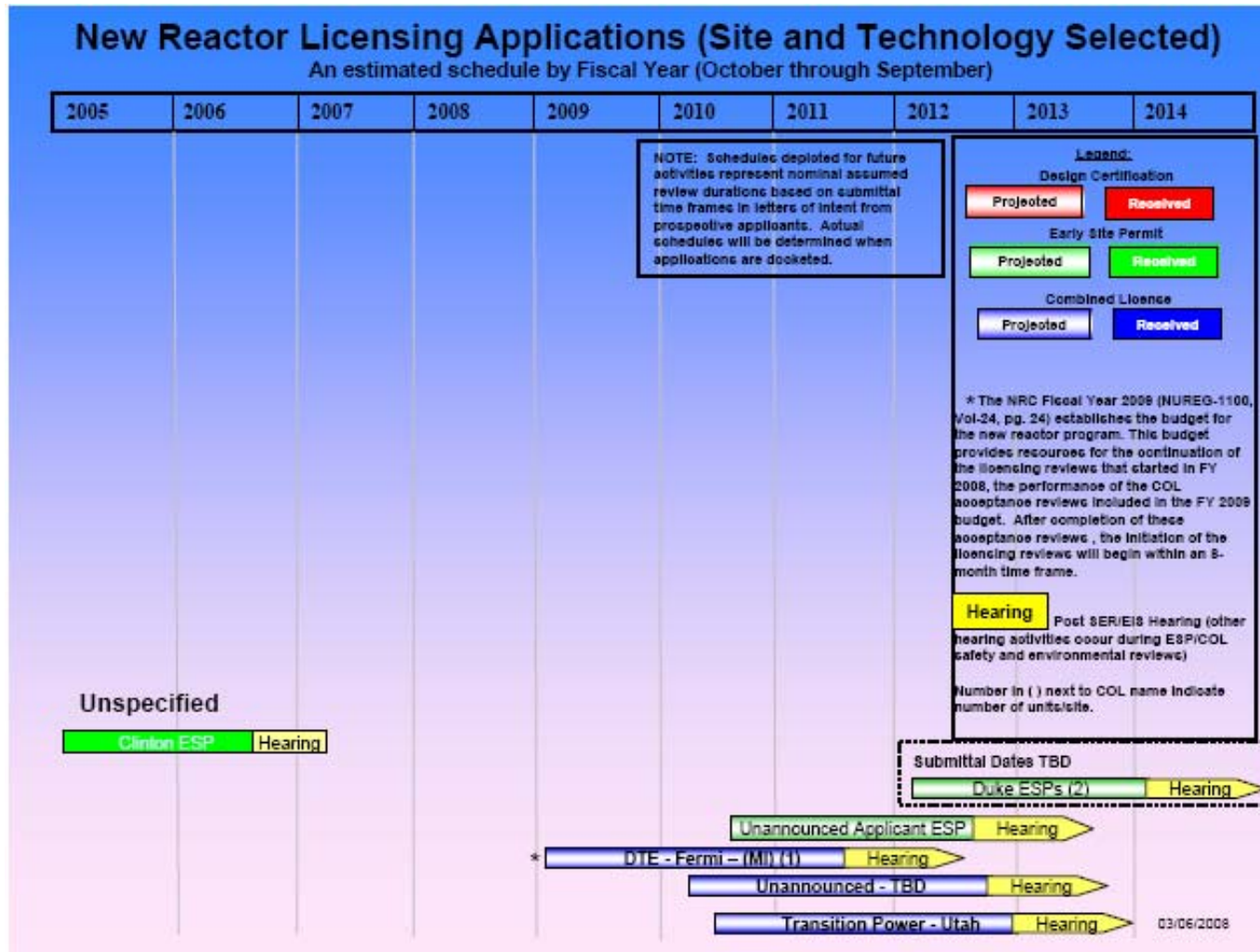
- ☑ Final guidelines have been issued
- ☑ Loan Guarantee office well staffed
- ❑ There are still issues that create uncertainty for potential borrowers
  - Initial appropriation of \$18.0 billion may not be adequate for the first wave of nuclear development
  - Issuer pays government "subsidy" cost which is a number that is not yet defined

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Being a first mover has significant financial benefits for NRG



# New Reactor Licensing Applications (Site and Technology Selected)



Source: NRC

ABWR - certified by the NRC in 1997

# Nuclear Innovation North America: Financial Impacts



## Transaction Impacts

- No gain/(loss) on Toshiba contribution
- No cash tax leakage
- No impact on restricted payments capacity
- Nuclear Innovation North America consolidated with NRG; Toshiba interest reflected as minority interest
- Toshiba contributions reflected on NRG balance sheet (cash, minority interest, additional paid-in capital)

## Future Impacts

- Under current accounting approach, 88% of cost of new COLA is expensed at NRG
- Estimated at \$40-50 million per two unit site<sup>1</sup>

<sup>1</sup> STP 3&4 COLA development costs were higher than follow on future COLA development filings largely driven by one-time non-recurring set up costs including infrastructure build-out and completion of aspects of ABWR certified design

## Cash Cost Sharing Mechanism

STP 3&4 development capital cost

**Less:** Toshiba annual installment applied first to offset STP 3&4 cost

**Plus:** Additional costs for future development projects

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Net development cash costs

**NRG share of net development costs**                      **88%**

**Toshiba share of net development costs**                      **12%**

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Establishing a development platform in a financially responsible and tax efficient manner

