



DOE nuclear power plant loan guarantees - Evaluating regulatory & market risk

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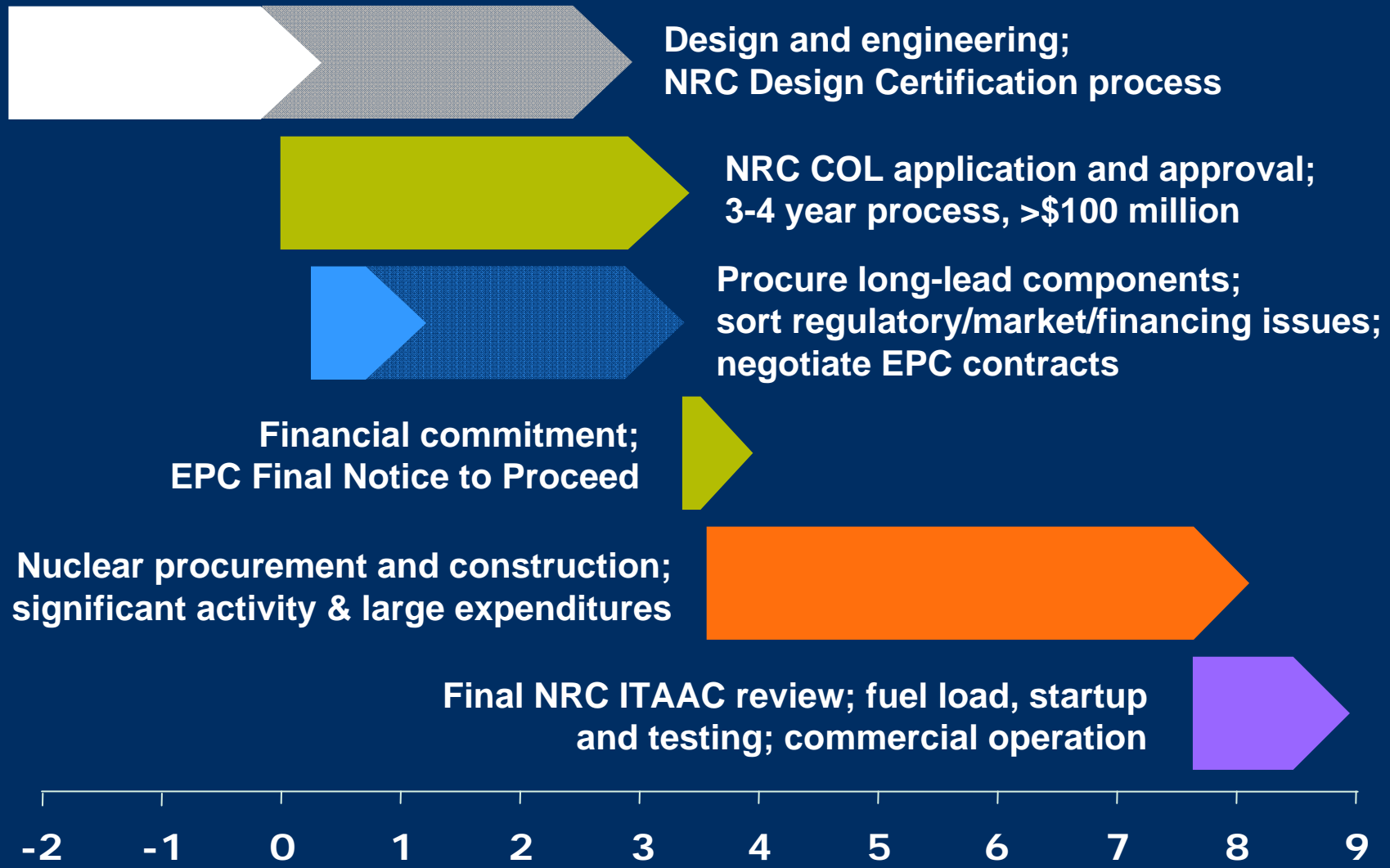
The slides that follow do not provide a complete record of this presentation and discussion.

The views expressed in this presentation and discussion are mine and may not be the same as those held by NERA's clients or my colleagues.

- USA
 - NRC COL applications starting in Sep 2007; first COL approvals due late 2011 or early 2012
 - First Wave and Second Wave nuclear projects; DOE Loan guarantees are key factor

- International
 - Large new nuclear build in China
 - Key lessons for US nuclear projects
 - Global battle for reactor vendor/design dominance

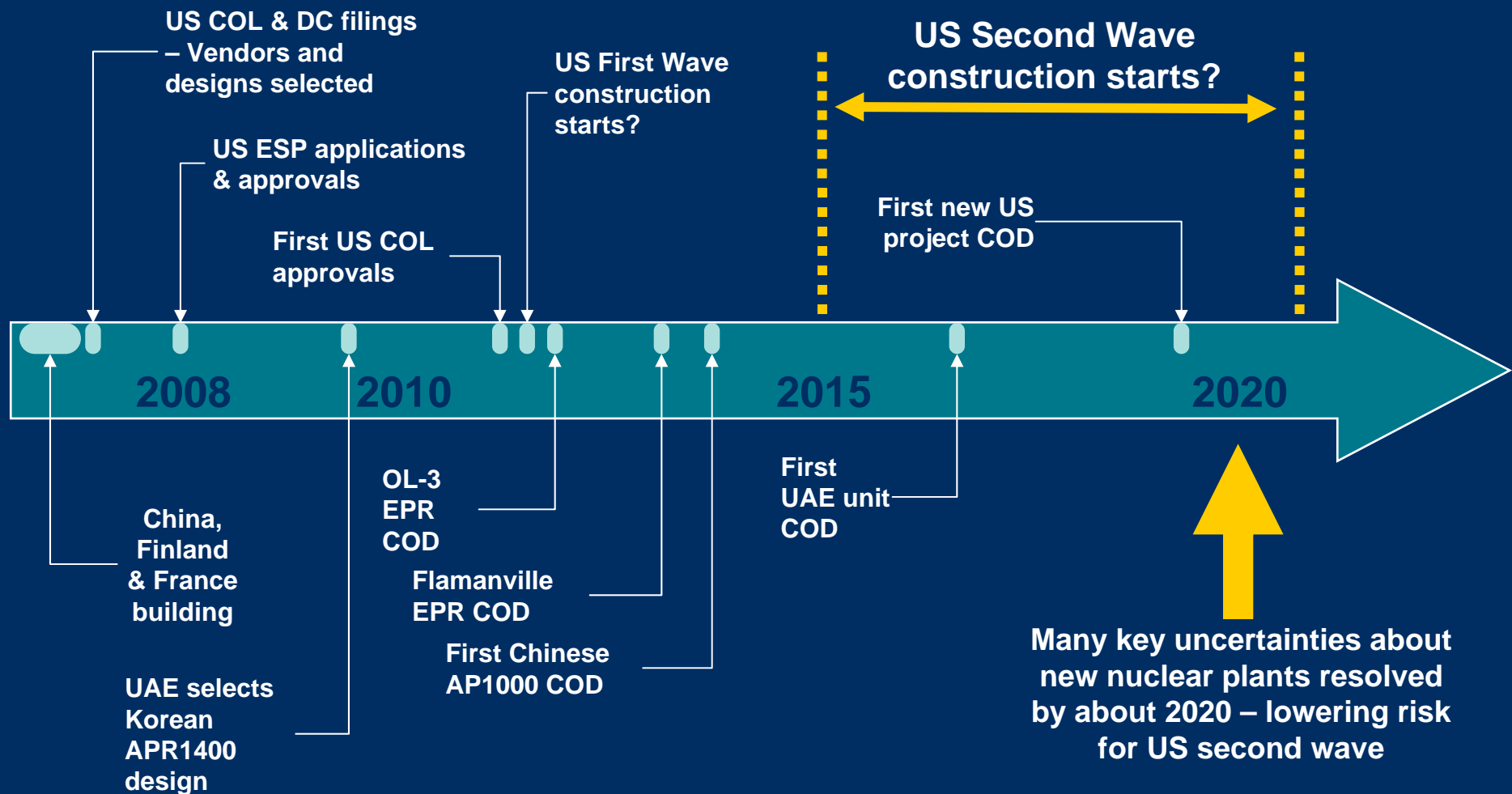
US new nuclear timeline



US First and Second Wave



NERA
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New Nuclear Build



- Very large capital investment; long development period
- Asset with operating life of 60 years or longer
- Bet-the-company commitment for most US utilities
- Industry history suggests concerns:
 - Contentious rate cases and disallowances in 1980s
 - Electricity industry more complicated now
 - Large stakes and complex issues
 - Likely resurgence of legal and regulatory disputes

History of nuclear cost overruns



Reactor construction starts (units)	Projected overnight cost (\$/kW)	Actual overnight cost (\$/kW)	% Overrun
1966-67 (11)	\$612	\$1,279	109%
1968-69 (26)	\$741	\$2,180	194%
1970-71 (12)	\$829	\$2,889	248%
1972-73 (7)	\$1,220	\$3,882	218%
1974-75 (14)	\$1,263	\$4,817	281%
1976-77 (5)	\$1,630	\$4,377	169%

U.S. Congressional Budget Office, *Nuclear Power's Role in Electricity Generation*, Pub. No. 2986, May 2008, p. 17.

New US nuclear – two tracks



- Regulated

- Owner is a regulated electric utility; nuclear plant will be in regulated rate base
- Regions and states which did not restructure the electricity industry (e.g., the Southeast)

- Merchant

- Owner is a merchant power plant developer; returns from market revenue
- Regions with formal electricity markets (e.g., Texas, Mid-Atlantic, New York)

A. Regulated nuclear plants



- Experience in 1980s (still relevant!)
 - State regulators faced unprecedented rate increases
 - Prudence reviews and disallowances
 - Large negative impact on utilities and the industry
- Significant financial impact
 - 1984 to 1993 - more than \$17 billion written off
 - In 1980s alone, more than \$7 billion deemed imprudent
 - Another \$2 billion deemed not “used and useful”

Disallowances



- Disallowances for multiple reasons
 - Imprudence
 - Excess Capacity
 - Cost Caps
 - Economic Value
 - Canceled or abandoned nuclear plants

Large impact of disallowances



- Bankruptcies and financial distress
- Utilities wary of large capital projects
- Regulatory & industry reform
 - Better rules for large baseload investments
 - Integrated Resource Planning (IRP)
 - Electricity industry restructuring & markets

Utility financial crises



- Cost overruns, plant cancellations, and disallowances led to financial distress
 - Public Service Co of New Hampshire - Seabrook
 - Long Island Lighting Company - Shoreham
 - Consumers Power - Midland
 - Washington Public Power (Energy NW)

Regulatory reforms



- Reform of regulated utility expansion planning process
- Integrated Resource Planning (IRP)
 - Evaluate all options, from both the supply and demand sides
 - Minimize costs to all stakeholders (and not just costs to the utility)
 - Flexible plan that reflects uncertainty and potential for changed circumstances
- Regulated utility “own-build” options included in IRP process
 - Implicit or explicit cap on the cost recovery for utility self-build options
 - Higher assurance of regulatory certainty & cost recovery
- Explicit up-front prudence review
- Early recovery of costs (i.e., return on CWIP)

Industry reforms



- Response to perceived breakdown of regulation
- Early experience in UK and Australia and NZ
- US is mix of regulation and markets
 - Some regions restructured (e.g., NY, NE, PJM, Texas, CA)
 - Other regions resisted (e.g., Southeast, West)
 - Public Power mostly opted out

B. Merchant nuclear plants



- In regions with electricity markets
 - Unregulated generation industry
 - Power plant investments based on market return
 - Existing nuclear units profitable
 - No experience with new merchant nuclear
- Two potential first wave projects are merchants
 - Calvert Cliffs (Maryland/PJM market)
 - South Texas Project (Texas/ERCOT market)

- Risks based on market outcomes . . .
 - Demand – future electricity and capacity use
 - Supply - new entry, including renewables
 - Fuel costs - natural gas, often marginal, is important
- . . . and nuclear project outcomes
 - Cost overruns and delays before operational
 - Project interruptions / prolonged outages

C. US Nuclear Risk Issues



- A series of checklists related to risks for nuclear projects
 - Regulated projects
 - Merchant projects

Regulated project risk – Imprudence



- Prudence cases from 1980s asked:
 - Were decisions made at appropriate level in utility?
 - Was procurement based on competitive bids?
 - Did contracts have incentive/penalty mechanisms?
 - Were schedules and reporting systems in place?
 - Was construction effectively monitored?
 - Was project budget monitored?
 - Did managers respond to project changes?

Regulated project risk – Excess Capacity



- Excess capacity disallowance lessons for today
 - Excess capacity at commercial operation date is key
 - 10 years or more from start to commercial operation
 - Electricity demand 10 years from now is uncertain
 - Regulator approval of capacity planning approach
 - Off-ramps (i.e., cancel or delay) if conditions change
- Certificate of convenience and necessity
 - Lowers risk of excess capacity disallowance
 - Regulator approval of capacity planning process

Regulated project risk – Cost Caps



- Cost cap disallowances more common today
 - State IRP process allow utility self-build option
 - Utility self-build cost estimate \equiv cost cap
 - Low risk of prudence reviews if cost $<$ cap
 - Higher risk of disallowances if cost $>$ cap - utility must prove that costs $>$ cap are prudent
 - Lower risk by frequent regulator updates – potentially including changes to cost cap

Regulated project risk – Canceled Plants



- Some canceled plants totally disallowed
- Some allowed prudent costs to be recovered:
 - Was a certificate of public convenience and necessity in place?
 - Was decision to begin construction reasonable at the time?
 - Were costs incurred prior to cancellation prudently incurred?
 - Was decision to cancel the project timely and reasonable?
 - Was utility prudent in not cancelling the project earlier?
- Key lesson - prudence of all actions taken (or not taken) over project life will be examined

Merchant risk – market risk *AND* project risk



- Very long time frame
 - 10 years of development
 - 60-year asset life
 - Decommissioning & used nuclear fuel
- Market risk
 - Demand for power
 - New entry, including renewable mandates
 - Fuel prices and carbon regimes
 - Technology shifts (i.e., new generation technology)
- Project risk may be significant, especially in FOAK projects

NERA's nuclear practice



- NERA nuclear industry experts
- Well-earned reputation for convincing, reliable, and objective advice and testimony
- Rigorous economics and sound analytical techniques – often in the context of high-stakes litigation or arbitration

NERA's nuclear expertise



- ***Strategic Advice*** – Due diligence for owners, investors, and others
- ***Regulatory Approval and Rate Cases*** - Expert testimony on prudence, economics of nuclear investments, and related topics
- ***Design and Vendor Evaluation*** - Assisting clients select nuclear plant designs / vendors; assess bids and contract terms
- ***Market Analysis*** - Assessment of power markets; analysis and testimony on market power and competition issues
- ***Litigation*** - Testifying in nuclear industry regulatory disputes, international arbitrations and litigation cases
- ***Risk Assessment*** - Assessment of project risks and development of risk management strategies



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