U.S. New Build Construction: Challenges and Solutions

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Keys to Success in Nuclear New Build

» Developing experience and expertise

» Establishing key partnerships

» Developing appropriate supply chain and manufacturing capabilities

» Understanding customer key concerns

» Differentiating the model and tailoring the commercial approach
First Things First

- **U.S. Energy Policy**
  - Climate change legislation
  - National clean energy portfolio standard

- **Federal Loan Guarantee Program**
  - Affordable credit subsidy fee
  - Increased loan guarantee authority

- **Deregulated Markets Most Challenged**
  - Economic recession = low load growth = low power prices
  - CWIP not available
  - No incentives for new baseload as price is set on the margin

The fundamentals must be in place to enable new nuclear
An Introduction to AREVA

- AREVA is a global leader in solutions for CO₂-free power generation.
- AREVA’s has two major carbon-free offerings:
  - Nuclear Energy which covers every stage of the nuclear fuel cycle.
  - Renewable Energies for wind, solar, hydrogen and storage

- 48,000 employees
- Annual sales € 8.5 billion
- Order backlog € 43.3 billion

An Energy Mix that meets our customers’ requirements
AREVA is Gaining Advanced Reactor Construction Experience in Europe & China

Taishan 1&2, China

Flamanville 3, France

Olkiluoto 3, Finland
EPR™ Reactors: Average Series Construction Times In-Line with Other Series

Construction duration: 1st concrete to first criticality

(# months)

<table>
<thead>
<tr>
<th>Reactor Type</th>
<th>Duration (months)</th>
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</thead>
<tbody>
<tr>
<td>GEN 2 900 MWe</td>
<td>66, 64, 65, 59</td>
</tr>
<tr>
<td>GEN 2 1300 MWe</td>
<td>81, 79, 78, 79</td>
</tr>
<tr>
<td>GEN 2 - N4 1500 MWe</td>
<td>150, 135, 109, 103</td>
</tr>
<tr>
<td>GEN 2 1400 MWe²</td>
<td>129, 99, 89, 69</td>
</tr>
<tr>
<td>GEN 2 - export 1000 MWe</td>
<td>71, 69, 57, 57</td>
</tr>
<tr>
<td>GEN 3+ - EPR 1650 MWe</td>
<td>86, 71, 46, 46</td>
</tr>
</tbody>
</table>

Average (# months)

- GEN 2 900 MWe: 64
- GEN 2 1300 MWe: 79
- GEN 2 - N4 1500 MWe: 124
- GEN 2 1400 MWe²: 87
- GEN 2 - export 1000 MWe: 64
- GEN 3+ - EPR 1650 MWe: 62

1. First four units per technological steps
2. First 3 plants are pre-KONVOI designs (Brokdorf, Grohnde, Philippsburg 2) and fourth plant refer to the average of the 3 KONVOI units started simultaneously

Source: IAEA; AREVA; EDF; CGNPC
Nuclear Grade Manufacturing Must be Expanded To Enable Nuclear Renaissance

source: IAEA 2008

U.S. new plant manufacturing base has disappeared
Certainty of EPR™ Supply Chain

AREVA is the supplier for:
- NSSS Components
  - Reactor Vessel
  - Steam Generators
  - Pressurizer
  - CRDM
  - Reactor Coolant Pumps and Motors
- Digital I&C
- SR electrical components
- Uranium Supply, Conversion, Enrichment, and Fuel Fabrication

AREVA agreements:
- Bechtel A/E-C
- Siemens T/G, I&C
- Alstom T/G
- JSW Forgings
- MHI Manufacturing
- Northrop Grumman Mfg.
- Other global EPR plant components
  - ~ 20 suppliers

Key elements of the supply chain are under AREVA control
Continuous deliveries of quality products and process improvements for existing plants and new build projects

- **Chalon Saint Marcel**
  - 30 years of operations
  - Workshop: 39,000 m²
  - Reactor Pressure Vessels, Steam Generators, Pressurizers, Safety Injection Accumulators
  - ANS Nuclear Historical Landmark Award 2009

- **Sfarsteel (Creusot Forge)**
  - Heavy forging and machining
  - Workshops: 85,000 m² (4 sites)

- **JSPM (Jeumont)**
  - Reactor coolant pumps and motors, control rod drive mechanisms
Eagle Rock Enrichment Facility

» Project on track to produce SWU in 2014
  › Conditional Loan Guarantee secured - $2 billion to finance Eagle Rock
  › PCM contractor search in progress
  › NRC expected to issue license mid-2011
  › Site Prep to begin 2011 under an NRC approved Limited Work Authorization
  › Plant to start commercial production in 2014
  › Production capacity to power 25 reactors for one year

» Creates 1,000 jobs during construction and 300 during operation

» Fuel to power current U.S. fleet and propel nuclear revival
AREVA & Partners Join Forces to Build Major U.S. EPR™ Components in U.S.

AREVA Newport News Facility

Joint venture with Northrop Grumman and AREVA
- A new U.S.-based manufacturing facility for heavy components for AREVA’s EPR™ reactor customers
- Leverages Northrop Grumman Ship Building skilled resources for engineering and field support
- Option to expand to meet global demand for heavy components
- $363 million project cost/540 permanent jobs
- Groundbreaking July 22, 2009/COD delayed to match market demand

Alstom Chattanooga Manufacturing Facility

- Facility to manufacture EPR™ turbine/generator
- $280 million project/350 permanent jobs
- Inauguration June 24, 2010
Key Concerns Today from Financial and Industrial Investors

Costs concerns
- Overall profitability of investment
- Predictability of construction costs
- Recovery of costs in rates

Strategic concerns
- Uncertain competitiveness to other fuels depending on fossil fuel and CO₂ prices in the future
- Security of uranium supply
- Waste management
- Speed-to-market (matching power needs and lead time to build power plants)

Financing concerns
- Balance sheet strength vs size of nuclear investment
- Project completion
- Risk of company downgrading

Operational concerns
- Safety of nuclear operations
- Ease of operations
- Integration to the grid
- Continuity of service

Delivery models concerns
- Risk sharing and contracting mode
- Project management
- Resources constraints
Each Project is Unique

» Every project contains elements of these commercial and risk attributes and must be tailored to meet the prior cost, financing, delivery, strategic and operational concerns:

- Liquidated Damages
- Parent Guarantee
- Division of Responsibilities
- Limits of Liability
- Performance
- Schedule
- FOAK Carve outs
- Substantial Completion
- Joint & Several
- Warranty

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- Developing Supply Chain & Manufacturing Capabilities
- Understanding the Customer & Tailoring the Commercial Approach