A Strategic Analysis of the Investment Opportunity for Advanced Nuclear Generation

Dr. Joe Turnage
MIT

March 12, 2007
Description of a Path to Successful Deployment of New Nuclear Using a Risk-Managed Approach
Price Paradox

Current low prices do not support cost recovery for new baseload generation,

*but*

Scarcity of supply looms.

85% of electric industry executives surveyed by CERA this year felt that there would not be adequate generation within the next 5 years.
Market Drivers

Regional Reserve Margins

- Bar graphs depict both current year, and either the year reserve margins are expected to drop below 18% (red bar), or last year in forecast period.
- Development of new capacity is expected to occur whenever reserve margins drop between 15% - 18%.
- California Hydro capacity has been de-rated by 25% for calculation of reserve margin.

Reserve margins have been forecast based on existing capacity plus capacity currently in construction. Peak demand is taken from available NERC/region data.

SERC excludes uncontracted capacity in its supply. If included reserve margins are significantly higher.

Source: NERC 2005 Long-Term Assessment
The Talk and Hype

Power Plants Announced & Under Construction: 181,791 MWe

Map contains all planned categories: proposed, feasibility studies in-progress, applications pending, permits approved, site preparation in-progress, under construction, and testing

Source: Energy Velocity
The Walk

Market Drivers

Areas of Greatest Opportunity

Power Plants Under Construction: 20,177 MWe

Map contains categories: under construction, and testing
Source: Energy Velocity
Planned Generation - PJM Classic

If significant new build effort does not occur there could be a sizeable reserve margin deficit in PJM Classic after 2010.
Market Drivers

Dispatch Curve - PJM Classic

**Estimated Fuel Costs**
- Gas: $6.50 /mmbtu
- Oil: $50 /Barrel

Calvert Cliff Unit 3
- 1,600 MW

Calvert Cliff Units 1 & 2
- 1,735 MW

Nuclear is Lowest Marginal Cost,
100% Dispatched 365 Days/Year
Environmental Paradox

Public wants energy security and abundant supply, but
Won’t accept emissions.

Emissions from Nuclear Power Plants:
$CO_2 = 0$, $SO_2 = 0$, $NO_x = 0$, $Mercury = 0$, $Particulates = 0$
Market Drivers

Energy Policy Direction

Energy Policy

**Economic**
- Meet needs of growing economy
- Limit consumer costs
- Promote investment
- Limit vulnerability from imported oil

**National Security**
- Non-proliferation
- Reduce vulnerability of energy fuel supply and infrastructure

**Environmental**
- Improve air quality
- Limit greenhouse-gas contributions

Energy Policy facilitates efficient resolution of the Paradoxes - It has Multiple Aims
The Role of Technology

- Only with improved technologies can we
  - Limit oil imports without incurring excessive economic or environmental costs
  - Improve urban air quality while meeting growing demand for automobiles
  - Use abundant U.S. and world coal resources without intolerable impacts on regional air quality, acid rain, and global climate
  - Expand the use of nuclear energy while reducing accident and proliferation risks
What are the Options?

- Given the Paradoxes and Energy Policy direction, there are limited available technologies for new development that take advantage of market drivers:
  - Integrated Gasification Combined Cycle (IGCC)
  - Super Critical Pulverized Coal (SCPC)
  - Gas
  - Renewable
  - Nuclear
Option #1: Integrated Gasification Combined Cycle

- Technology
  - Coal and other hydrocarbons are gasified
  - Resulting synthesis gas is cleaned then fired in a gas turbine
  - Gas turbine exhaust produces steam that drives a steam turbine

- Upsides
  - Fuel optionality, especially low sulfur coal and pet coke
  - Poly generation optionality: transportation fuels, fertilizer (ammonia), chemicals
  - Superior environmentally especially in a CO₂ constrained environment

- Downsides
  - Capital cost higher than Pulverized Coal (offset by lower fuel cost and higher efficiency)
  - Limited commercial experience with IGCC configuration
  - Requires chemical process expertise and coal management skills
  - Sequestration technology not defined
Option #2: Super Critical Pulverized Coal

- **Technology**
  - Coal boiler operates at higher temperature (1000 degrees F) and higher pressure (3500 pounds per square inch) than subcritical boiler, resulting in increased efficiency

- **Upsides**
  - Well understood mature technology
  - Large existing fleet
  - Super Critical and Advanced Super Critical has improved efficiencies over Pulverized Coal

- **Downsides**
  - Limited technology/cost improvement potential
  - Strong public/enviro opposition
  - Scrubber requirements increasing and expensive
  - Penalized under any carbon emission scenario
Option #3: Gas

- Technology
  - Gas turbines

- Upsides
  - Lower capital cost
  - Speed to market
  - High efficiency, high reliability, clean emissions

- Downsides
  - Volatile fuel cost
  - Abundant, relatively new existing capacity competing for razor thin margins
  - Infrastructure bottlenecks for gas delivery
Option #4: Renewable

- **Technology**
  - Wind
  - Solar

- **Upsides**
  - Growing public interest
  - RPS driving increasing demand
  - Speed to market

- **Downsides**
  - Intermittent generation (Not necessarily On-peak)
  - Limited geographically
  - Dependent on substantial government support
  - Transmission Issues (Available Transmission Capacity for intermittent generator)
Option #5: Nuclear

- Technology (Several viable technologies)
  - U.S. EPR (AREVA)
  - AP1000 (Westinghouse)
  - ESBWR, ABWR (GE)
  - APWR (Mitsubishi)

- Upsides
  - Large base-load generation
  - Low operating costs with stable margins
  - Emission-free
  - Support from Administration & Public

- Downsides
  - Used nuclear fuel
  - Capital cost
  - Long time to market
  - Requires sophisticated operating capabilities

"Advanced nuclear power is an “eloquent solution” with careful risk management"
New Nuclear Risks

- Current risks that are effectively managed or mitigated
- Risks with emergent issues requiring elevated attention
- Risks that require the highest level of vigilance
Creating options through UniStar Business Model
- Securing Partners
- Identification and characterization of sites
- Utilization of U.S. EPR design detail
- Preparing COL’s for 4 units
- “Locking up” Long Lead Materials
- Obtaining conditional loan guarantees
- Securing Conditional Financing
- Perfecting the UniStar Business Model

The UniStar business model mitigates risk and capitalizes on market opportunity
UniStar Business Model

- Business Model achieves economic success
  - through *competitive advantage*
  - driven by *standardization* and *scale*
  - implemented in a *risk-managed approach*

*It takes both standardization and scale to achieve economic success*
Elements of *Competitive Advantage*

- Significantly different business model from that used by others
- Barriers to entry
  - Exclusivity agreement with AREVA
  - Intellectual property
- Early mover advantages
  - EPAct incentives
  - Procurement of long lead materials
  - NRC resources for COL
- Reduced First-Of-A-Kind risks
  - Construction in Finland and France
UniStar Business Model: Standardization

- Standardization
  - AREVA is Prime Contractor for Project Companies
  - Bechtel is Constructor
  - UniStar Nuclear Operations will be licensee and operator
  - Standardization of fleet yields efficiencies in project cost, licensing, and operations
  - Reference Plant: CCNPP
Dimensions of Standardization

- Engineering (initial and operating)
- Licensing (COL and operating)
- Construction productivity
- Operator training & Maintenance task training (specialized crews)
- Shared resources during Refueling Outages
- Work practices & procedures
- Reduced/common spare parts
- Information systems

Preliminary analyses show one-time savings of over $850M per plant and on-going savings of over $20M annually per plant based on 4 plant fleet
UniStar Business Model: Scale

- Four units required to achieve analyzed savings and scale
  - Deployment of a fleet of four identical U.S. EPR’s
  - Currently CE retains option for 100% ownership of Calvert Cliffs Unit #3
  - No ownership required in EPR’s 2 through 4

- Could market some ownership of Calvert Cliffs Unit #3 to achieve business goals

Ownership in each of the first 4 units not required to achieve scale
Fleet Benefits Realized by Constellation Energy

- Capacity Factor increased 10% since 2002
- Productivity contribution to corporation $118M from 2004 through 2006*
- Safety performance at all-time high

The business value of a nuclear power fleet is proven by experience

*Based on 2004 & 2005 actuals, 2006 forecast
UniStar Business Model: *Risk-Managed Approach*

- Risk-managed approach
  - Global market
  - COL → Construction → Operation
  - Minimize exposure to large cash outlays via financing options
    - Strategic partners and/or equity investors
  - Availability of EPAct incentives
  - Pre-defined exit ramps
Driving Down the Level of Uncertainty

- Technology Certainty
- Standby Default Coverage
- Production Tax Credit
- Loan Guarantees
- Regulatory Certainty
- Credit Rating Agencies Impact
- Project Financeable

Energy Policy Act 2005
Finance

Risk Today → Risk 2009

Make a Go or No Go Decision

Time
Implementation of Business Model through Phased Approach to Risk Management

**Design Certification for U.S. EPR**
- **DC:** AREVA
- **T=0:** 2005

**Combined Construction and Operating License**
- **COL:** UniStar
- **T=6:** 2011

**Long-lead Materials**
- **LLM:** UniStar
- **T=1:** 2006

**Early site activities:** UniStar
- **T=1:** 2006

**Options Creation**
- **T=0:** 2005

**Exercising Options**
- **T=5:** 2010

**Commit to Construct**
- **Construction:** UniStar
- **T=5:** 2010

**Owner’s Project Management**
- **T=10:** 2015

**Product is certified design for all U.S. EPR’s in fleet**

**Product is asset - License to build a U.S. EPR at a specific site (good for 40 years)**

**Product is a steel forging - Secondary market exists for resale (ASME/RCCM conversion)**

**Optimizes construction schedule and allows for acceleration if market conditions change**

**Early decisions build “options” for future - Options have significant value**
Design Certification (AREVA Scope)

**Design Certification for U.S. EPR**

- **DC: AREVA**
- **COL: UniStar**
- **LLM: UniStar**
- **Early site activities: UniStar**
- **Commit to Construct: UniStar**
- **Construction: UniStar**
- **Owner’s Project Management**

**Product is certified design for all U.S. EPR’s in fleet**

- **Construction: UniStar**
  - T=5: 2010
  - T=10: 2015

**Product is asset - License to build a U.S. EPR at a specific site (good for 40 years)**

- **Long-lead Materials**
  - T=1: 2006
  - T=6: 2011

**Product is a steel forging - Secondary market exists for resale (ASME/RCCM conversion)**

- **Options Creation**
  - T=0: 2005
  - T=5: 2010

**Optimizes construction schedule and allows for acceleration if market conditions change**

- **Early site activities: UniStar**
  - T=1: 2006

- **Commit to Construct**
  - T=5: 2010

Owner’s Project Management
Design Certification

- AREVA is pursuing U.S. EPR Design Certification (DC) application and approval with NRC
- DC application submission is critical to the UniStar Construction and Operating License (COL)
  - DC application must be submitted prior to COL submission
  - DC application currently planned for December 2007
- AREVA bears cost & risk

Significant UniStar management oversight and involvement in DC schedule and progress due to critical nature of DC application
Design Certification

Status Highlights

- DC workload is approaching peak staffing
  - August staff: 281 FTE AREVA and 22 FTE Bechtel
- EPR DC Project is 42% complete as of the end of August
- 2006 Milestones: completed 51 of 52 scheduled through August
- EPR DC Project on track to meet December 2007 submittal to the NRC

AREVA is meeting schedule with NRC and relations are very positive
Combined Construction and Operating License (COL)

**Design Certification for U.S. EPR**

- **DC:** AREVA

**Combined Construction and Operating License**

- **COL:** UniStar
  - T=0: 2005
  - T=6: 2011

**Long-lead Materials**

- **LLM:** UniStar
  - T=1: 2006

**Early site activities: UniStar**

- T=1: 2006

**Options Creation**

- T=0: 2005

**Exercising Options**

- T=5: 2010

**Commit to Construct**

- **Construction:** UniStar
  - T=5: 2010
  - T=10: 2015

**Owner’s Project Management**

**Product is certified design for all U.S. EPR’s in fleet**

**Product is asset**

- License to build a U.S. EPR at a specific site (good for 40 years)

**Product is a steel forging**

- Secondary market exists for resale (ASME/RCCM conversion)

**Optimizes construction schedule and allows for acceleration if market conditions change**

**U.S. EPR Operational**
COL Properties

- Can stop development anywhere along way
- Completed COL has a 40-year life
- 75%-80% of reference plant COL is applicable to subsequent units
- Can use COL to build, sell, or bank for later use
- Early COL provides opportunity to earn PTCs for CCNPP “US EPR-1” - up to $200 million/year for 8 years

Continue to create options with embedded exit ramps
COL Properties (continued)

One could utilize the COL to build, sell, or bank it for later use.

Cost of Option

COL & Early Site Work

Support Creation of UniStar Marketplace

Long-lead Materials

Decision

Build 90%

Bank 5%

Sell 5%

EV of the Option is about $350 million
Long Lead Materials

Design Certification for U.S. EPR

DC: AREVA

Combined Construction and Operating License

COL: UniStar

T=0: 2005

Long-lead Materials

LLM: UniStar

T=1: 2006

Product is certified design for all U.S. EPR’s in fleet

Product is asset - License to build a U.S. EPR at a specific site (good for 40 years)

Product is a steel forging - Secondary market exists for resale (ASME/RCCM conversion)

Optimizes construction schedule and allows for acceleration if market conditions change

U.S. EPR Operational

Owner’s Project Management

T=5: 2010

Option Creation

T=10: 2015
Long Lead Material (LLM) Option Value & Exit Strategies

- UniStar Nuclear is pursuing maximum flexibility of LLM
- AREVA is designing forgings to enable worldwide use - increasing flexibility (ASME/RCCM conversion for Rx Vessel completed)
- Transfer of LLM should be possible after delivery to AREVA
  - Use equipment for different UniStar site
  - Sell to or swap with AREVA for use at international site
- UniStar Nuclear will work to
  - Maximize flexibility and optionality in forging PO
  - Mitigate cancellation fees
Early Site Activities

**Design Certification for U.S. EPR**
- DC: AREVA

**Combined Construction and Operating License**
- COL: UniStar
  - T=0: 2005
  - T=6: 2011

**Long-lead Materials**
- LLM: UniStar
  - T=1: 2006

**Early site activities: UniStar**
- T=1: 2006
- T=5: 2010

**Commit to Construct**
- Construction: UniStar
  - T=5: 2010
  - T=10: 2015

**Option Creation**

**Product is asset**
- License to build a U.S. EPR at a specific site (good for 40 years)

**Product is certified design for all U.S. EPR’s in fleet**

**Product is a steel forging**
- Secondary market exists for resale (ASME/RCCM conversion)

**Optimizes construction schedule and allows for acceleration if market conditions change**

**Owner’s Project Management**
Update Summary

- Goal is to obtain a license to construct a single U.S. EPR at CCNPP (CCNPP EPR-1) while developing at least 3 other U.S. EPR opportunities through UniStar

- UniStar has gained considerable credibility with NRC providing opportunity to influence NRC

- Submittal of QA plan to NRC was first COL-related submittal in the industry

- COL activities currently under budget and ahead of schedule

- CCNPP core boring activities complete

- Critical equipment supply tighter than originally contemplated; but long-lead materials for first U.S. EPR have been secured; exploring options for long-lead materials for second U.S. EPR

- UniStar marketing efforts continue to show promise, competitors starting to vigorously respond

- DOE loan guarantees evolving in sub-optimal manner
**From**

- **Option Creation**
- **Combined Construction and Operating License**
  - COL: UniStar
  - T=0: 2005
  - T=1: 2006
  - T=5: 2010
  - T=6: 2011

- **Long-lead Materials**
  - LLM: UniStar
  - T=1: 2006

- **Early site activities: UniStar**
  - T=1: 2006

**To**

- **Project Development**
- **Design Certification for U.S. EPR**
  - DC: AREVA
- **Cofﬁned Construction and Operating License**
  - COL: UniStar
  - Product is asset - License to build a U.S. EPR at a specific site (good for 40 years)
  - T=6: 2011
- **Product is a steel forging - Secondary market exists for resale (ASME/RCCM conversion)**
- **Optimizes construction schedule and allows for acceleration if market conditions change**
  - T=5: 2010
- **Commit to Construct**
  - Construction: UniStar
  - T=5: 2010
- **U.S. EPR Operational**
  - T=10: 2015

**Owner’s Project Management**

- **T=0: 2005**
- **T=5: 2010**
- **T=10: 2015**
What Needs to be in Place to Build

- Financing arranged (2009)
- EPC contracts executable
- Construction optimized
  - EDF involvement
  - Olkiluoto and Flamanville lessons-learned
- Conditional Loan Guarantees granted
- Minimum level of PTC’s identified
- Definitive cost estimate developed

The level of uncertainty will be reduced to an acceptable level of risk prior to making a Go/No Go decision on committing to construction.
Behind the Decision to Build is an Investment Opportunity and a Public Policy Benefit that is Compelling
First: The Investment Opportunity

Base Case: Overnight Cost - $1,935/kW

Items Included in Base Case Overnight Cost:
- Design Certification
- Home Office Overhead
- Nuclear Island
- Turbine Island
- Balance of Plant
- Owner’s Costs

Items Not Included in Base Case Overnight Cost But Included in Base Case Proforma:
- Initial Nuclear Fuel Load
- COLA
- Transmission Upgrades
- Contingency
- Financing Costs
Base Case Proforma: Assumptions

- EPR - 1600 MWe (2015 COD)
- 2009 - 2015 Construction Financing - 80% Debt and 20% Equity
- 2015 Takeout Financing - 80% Debt over 30 years and 20% Equity over 40 years
- 18% Return on Equity at Risk
- 5.5% Interest on Debt
- 1.0% Risk Pool Fee (2009)
- 0.5% Loan Origination Fee (2009)
- 100% Receipt of PTCs
- 95.3% Average Capacity Factor
- 39.55% Effective Tax Rate
## Base Case Proforma: 2006 $/MWh Bus-Bar Cost

<table>
<thead>
<tr>
<th>Description</th>
<th>Base Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Costs</td>
<td>$9</td>
</tr>
<tr>
<td>(Including Decommissioning)</td>
<td></td>
</tr>
<tr>
<td>Variable Costs</td>
<td>5</td>
</tr>
<tr>
<td>Equity Return</td>
<td>19</td>
</tr>
<tr>
<td>Debt Service</td>
<td>15</td>
</tr>
<tr>
<td>Net Tax</td>
<td>-</td>
</tr>
<tr>
<td>PTCs</td>
<td>(11)</td>
</tr>
<tr>
<td><strong>Total Bus-Bar Cost</strong></td>
<td><strong>$37</strong></td>
</tr>
</tbody>
</table>
Bus-Bar Cost Sensitivity Assumptions

- **Base Case**
  - 80% Debt / 20% Equity
  - 5.5% Interest on Debt
  - 18% Return on Equity at Risk
  - 1.0% Risk Pool Fee
  - 100% Receipt of PTCs
  - 0.5% Loan Origination Fee

- **Scenario 1: Impact of Lower Federal Guarantee Percentage**
  - Assumes 64% Debt @ 5.5% and 36% Equity @ 18%

- **Scenario 2: No PTCs**
  - Same as Base Case assuming 0% PTCs

- **Scenario 3: Includes PTCs But No Federal Loan Guarantee**
  - Assumes Commercial Project Financing
  - 50% Debt @12% and 50% Equity @ 18%;
  - 1% Loan Origination Fee and No Risk Pool Fee

- **Scenario 4: No EPAct**
  - Same as Scenario 3 but No PTCs
## Bus-Bar Cost Sensitivities

<table>
<thead>
<tr>
<th>Description</th>
<th>Base Case</th>
<th>Scenario 1 (64% Debt &amp; 36% Equity)</th>
<th>Scenario 2 (No PTCs)</th>
<th>Scenario 3 (Includes PTCs But No Fed. Guarantee - 50% Debt &amp; 50% Equity)</th>
<th>Scenario 4 (No EPAct - 50% Debt &amp; 50% Equity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Costs (Including Decommissioning)</td>
<td>$9</td>
<td>$9</td>
<td>$9</td>
<td>$9</td>
<td>$9</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Equity Return</td>
<td>19</td>
<td>28</td>
<td>19</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Debt Service</td>
<td>15</td>
<td>12</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Net Tax</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>PTCs</td>
<td>- (11)</td>
<td>- (11)</td>
<td>-</td>
<td>- (11)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Bus-Bar Cost</strong></td>
<td><strong>$37</strong></td>
<td><strong>$51</strong></td>
<td><strong>$48</strong></td>
<td><strong>$69</strong></td>
<td><strong>$80</strong></td>
</tr>
<tr>
<td><strong>Difference from Base Case</strong></td>
<td><strong>$0</strong></td>
<td><strong>($14)</strong></td>
<td><strong>($11)</strong></td>
<td><strong>($32)</strong></td>
<td><strong>($43)</strong></td>
</tr>
</tbody>
</table>
Indicative Wholesale Power Prices 2005 ($/MWh)

1. Source: Platts
It’s straightforward: The difference between $80/MWh required to return 18% to an investor without the Energy Policy Act and the $37/MWh market clearing price needed with the Energy Policy Act represents potential rate payer value created by deploying nuclear power plants utilizing all the incentives inherent in the Act.

This value is $575 MM per USEPR per year

More fundamentally, at $80/MWh, these plants would not likely be built
III. Challenges

- Rulemaking (are we eroding rate payer value?)
- Financing (the need for leverage)
- Public perceptions (only 1 micron deep?)
- Infrastructure (components from a globally sourced supply chain)
- Qualified labor pool (must pay attention now)
- Issues with the back end of the fuel cycle (including implications for public perception)
Mischief with the Rules

- Currently, a number of considerations being contemplated by OMB and DOE will degrade the value created by the EPAct by increasing the cost and availability of debt.
  - Guaranteeing only 64% of the debt instead of 80%. The $37/mWh number would have to go to $51/mWh - and the rate payer value would be degraded by $187 million per USEPR per year. This is worth more to rate payers than all the PTCs.
  - Prohibition against “stripping” (pro-rata secondary sale requirement)
  - No “pari passu” treatment with lenders
These issues are indicative of an overall mindset that is out of balance in securing the benefits which Congress legislated in the EPAct. Consider:

- The statute makes it clear (Section 1702(g)(4)(B)) that, in the event of default, the loan guarantee is non-recourse beyond the project. The DOE Guidelines, however, require the Secretary of Energy to ensure that “the prospective borrower has pledged project assets and other collateral or surety, including non-project-related assets, as determined by the Secretary to be necessary as assurance for the repayment of the loan.”

- The statute promotes the President’s: Advanced Energy Initiative. It is a substantive initiative. In the initial solicitation, however, DOE states: “...multiple pre-applications can only be submitted for distinctly different projects that are unique from one another. Loan Guarantees most likely will be limited to one guarantee per applicant.”
Bottom Line
(Apparently Not Yet Understood by OMB and Some in DOE):

1. Federal Loan Guarantees are a more efficient investment incentive than production tax credits.

2. Although Loan Guarantees are helpful in dealing with new technology risk, their fundamental benefit is in creating access to capital at attractive rates and in creating opportunities to leverage equity. Absent this leverage, capital requirements for a program of substantial new nuclear builds will strain the balance sheets of the largest nuclear power generating companies (both regulated and merchant).

3. There are significant public policy benefits which drove the Energy Policy Act, including those associated with electricity generation at attractive prices. We should not forget, however, that the fundamental drivers of energy security and concerns over global warming require that this policy be applied effectively, in a sustained fashion, over a long period of time.
In Spite of the Challenges, the Opportunity is Real\textsuperscript{1}

\begin{itemize}
  \item Passion for the Work
  \item Being the Best
  \item Robust Economic Engine
\end{itemize}

\textit{It’s an exciting time to be in the nuclear industry – from any perspective!}

\textsuperscript{1} – Source: The Hedgehog Concept – Jim Collins in Good to Great
What We’re Showing Potential Partners

- U.S. EPR has the greatest regulatory certainty
  - Design margins
  - Security margins
  - Global standard
- The UniStar investment is a hedge on a carbon constrained future
- UniStar/Constellation has the capability to license & operate a national fleet
- A prudent “risk-managed approach” provides minimum financial exposure
- A UniStar portfolio further hedges risk and extracts fleet value
- Together, we have enough clout and scale to further reduce vendor “rents” and get the costs lower

The time is now to take the initial steps to create significant value
What We’re Seeing

- Response has been to engage through board level discussions - first decision to proceed with a COLA has been made by an entity other than Constellation
- Fundamental business case for US EPR-1 at Calvert Cliffs remains sound
- Uncertainties are being reduced and risks lowered
Creating value from intellectual property through the following entities:

- UniStar Nuclear Development Company
- UniStar Procurement Company
- UniStar Nuclear Operating Services
- UniStar Project Companies

*The UniStar Business Model becomes a company when a number of entities are in place, capitalizing on the intellectual property that has been established*
Nuclear Development Company

A mechanism to maximize the value of intellectual property and ensure learning curve opportunities are captured

- Designed to act as Project Company’s agent in securing the COLA (which is then transferred to UniStar Nuclear Operating Company)
- Acts to manage the EPC program
- Acts to provide services (e.g. project siting services) and holds supporting intellectual property (e.g. Information Management System)
Nuclear Project Ownership

Ownership: Project Companies

- Each nuclear plant owned by a separate Project Company
  - Flexibility in structure (partnership, LLC, etc.) based on legal and tax considerations
  - Owned by one entity, strategic players in nuclear or other interested investors
- Flexible staffing options (e.g. direct, secunded from another organization, or housed in the Operating Company).
- Alternative structures will be considered based on partners’ needs
UniStar Nuclear Operating Company Service (UNO)

A mechanism to assure standardization of the entire fleet throughout the life of the plants

- For profit Operator/Licensee for all UniStar plants
- Standardization services
  - Engineering
  - Licensing
  - Training
  - Shared outage services & centralized project management
  - Work practices and procedures
  - Support services across the fleet
  - Spare parts sharing/shared procurement
  - Information Management System
  - Fuel procurement
UNO Management and Ownership Structure

- Four most important features are:
  - UNO will be owned only by experienced nuclear owners/operators
  - UNO - operator/licensee
  - Provides quick decision-making
  - Ensures essential standardization of plants, practices and procedures

- Ownership structure is designed to:
  - Facilitate decision making during formative years
  - Incentivize and reward initial (“Early Mover”) strategic project owners

- Early Mover Strategic project owners:
  - Participate in molding UNO structure
  - Must have nuclear ownership and operating experience
  - Are recognized as nuclear operating leaders through active participation in INPO, WANO, and NEI as well as active engagement in nuclear policy development at NRC
  - Are limited to the first four or five strategic project owners who join the UniStar business model
Post 2035, UniStar can comprise the largest share of the U.S. market for new nuclear power plants
- At 1/3 of the market:
  17 plants by 2035 and 50 plants by 2050

Objective
- Self-finance with a market cap appropriate for large, capital intensive infrastructure projects
The UniStar Vision

- EPR’s 11-16
- EPR’s 1-10
- Existing Plants

UNO #1

UNO #2

UNO #3