THE ART OF THE GLOBAL DEAL

Nuclear Infrastructure Council: Special Summit III on Global Nuclear Energy Markets

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# OVERVIEW OF PRESENTATION

- Trends & Key Messages
- Government-to-Government Deals
- Other Possibilities
- Country Examples
- Market Risk
- SMRs & ARs: Is “Next” the Answer?
- Concluding Thoughts
Trends & Key Messages
TRENDS IN THE NUCLEAR SECTOR

- **“Newcomer” countries**
  - Lack of a track record
  - Human resource challenges
  - Will but not Means ($)
  - Interest in SMRs and Advanced Reactors

- **Importance of Financing**
  - Biggest challenge for NPP development
  - ECA financing as an option
  - Ultimate test of NPP viability
  - Massive capital need and major development period exposure

- **Government - to - Government Model**
  - The nuclear procurement is done at a government-to-government level
  - Financing can be through an intergovernmental loan
  - Currently being used by Russia in a number of locations (Egypt, India, Bangladesh, Belarus, Hungary, etc.)
  - Pros: Makes financing easier
  - Cons: Limits technology choice
  - Key Consideration: Strength of bilateral relationship
  - Realization: Government is a key factor in a nuclear development program
  - This is tied aid
New nuclear projects are not being competitively bid under classic government procurement models

Deals are being done at a Government – to – Government level, usually under the umbrella of an Intergovernmental Agreement, most often involving:
  - State Owned Entities on the exporting side
  - Loans outside of the OECD’s Sector Understanding on Export Credits for Nuclear Power Plants
  - A package of deals across multiple sectors

THEREFORE, these deals are more about bilateral / geopolitical relationships and less so about “the market”
  - For both exporter and importer, nuclear is viewed as a strategic asset / critical infrastructure
Government – to – Government Deals
GOVERNMENT-TO-GOVERNMENT FINANCING

### Features

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<th>Features</th>
<th>Rationale</th>
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<td>Procured at government-to-government level</td>
<td>Based on relationships between countries</td>
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<td>Availability of financing is specific to certain countries</td>
<td>Exporting country also benefits from the transaction</td>
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<td>Technology choice limited and based on bilateral relationship</td>
<td>Facilitates exporting country’s technology by linking financing to technology selection</td>
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### Examples of Government-to-Government Financing

- Implemented by Russia in a number of countries, including: India, Egypt, Bangladesh, Belarus, Hungary, etc.
- Implemented by China in Pakistan and Argentina
- Key Consideration: Strength of bilateral relationship
- Realization: Government is a key factor in a nuclear development program

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MOTIVATIONS

For the Host Country:
- Foreign experience … a partnership of sorts
- Foreign source of funding
- Deals in other sectors

For the Exporting Country
- A market for its nuclear power plant
- Bilateral relationships
- Long term linkages
- Deals in other sectors
- More focused aid with tangible results
- A round-tripping of the money
RUSSIAN & CHINESE DEAL-MAKING

Russian Approach
1. Do everything
2. Organic technology
3. Bring the money
4. Lock up the market at an early stage
5. Go where others won’t go (Iran)
6. Strategic relationship building
7. Look to the future with innovative technologies

Chinese Approach
1. Go it alone or team up where it makes sense
2. Imported and then retooled technology
3. Bring the money
4. Leverage participation in one nuclear project for another (UK; Argentina; possibly Brazil)
5. Go where others won’t go (Pakistan)
6. Commercial relationship building
7. Look to the future with innovative technologies
Other Possibilities
Overview of Export Credit Agencies ("ECAs")

- Sovereign entities
- Designed to promote exports of a country
- ECA financing is tied to amount of national content
- Depending on the ECA, ECAs can provide:
  - Actual loans
  - Guarantees for lenders
  - Insurance for lenders
  - Equity loans
- ECA financing is viewed as cheaper than pure commercial debt
- ECA financing is governed by OECD lending guidelines (for most ECAs)
- ECA financing is viewed as a “good thing” for a project
- ECA financing is political (both positive and negative)
- 18 year repayment period following commercial operation
EXPORT CREDIT AGENCIES – THE OECD RULES

- Governed by the “OECD Arrangement on Officially Supported Export Credits”
  - Designed to create a level playing field, so that competition is based on the underlying goods and services, not the terms and conditions of the financing
  - For financing nuclear power plants, the key tools for project-level financing include:
    - Direct Loans
    - Guarantees of Commercial Bank Loans
    - Investment Insurance
- But note, too, that all ECAs are not subject to the OECD rules
  - Russian and Chinese ECAs have more flexibility
While Export Credit Agencies do provide guarantees …

- They charge a fee for taking on the Borrower’s risk of default
- The fees are based on the risk of the Borrower
- ECAs will diligence the project for technical and reputational considerations
- They will not cover the full cost of the Project; therefore, other debt and/or equity will need to be sourced
EXPORT CREDIT AGENCIES AS THE KEY SOURCE FOR FINANCING INTERNATIONAL NUCLEAR POWER PLANT DEVELOPMENT

- **Leadership role**
  - Financial conservatism of commercial banks vis-à-vis nuclear power
    - But, commercial banks will follow ECAs
  - Export promotion mission
  - Perhaps, the “only game in town” for NPPs, but for straight government-to-government loans

- **“Halo Effect”**
  - Creates a sovereign, bilateral quality to the deal
  - Rigor of project diligence is a confidence-building measure for the project and the marketplace
    - Addresses “Reputational Risk” considerations
  - Note the “third country” function of a multiple ECAs in the deal
VENDOR FINANCING

Vendor finance can refer to a variety of financing options:

- **Vendor arranged credit** -- vendor facilitates financing from sources such as relationship banks and export credit agencies.
- **Vendor provided credit** -- often short-term, such as construction loans.
- **Vendor equity** -- gives vendors, e.g. nuclear reactor/NSSS suppliers, a share in future net income generated by the nuclear power project. From a risk perspective, vendor equity is a riskier proposition than lending or selling.

### Increasing Level of Risk and Commitment

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<td>Relatively small part of overall financing</td>
<td>Limited vendor balance sheet capacity</td>
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<td>Not cheap</td>
<td>Vendor weighted average cost of capital typically exceeds that of the export credit agency</td>
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<td>Limited recourse to vendor balance sheet</td>
<td>Vendors unwilling to “bet the farm”</td>
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<td>Credit enhancement by host government</td>
<td>Vendor risk aversion</td>
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<td>Exit strategy</td>
<td>Vendor unwilling to tie up capital long-term</td>
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VENDOR FINANCING: VENDOR EQUITY

• **Vendor Equity**
  • Trend over the last 6-8 years
  • Source of equity (along with ECA-provided debt)
  • An opportunity to move profitability from EPC Contract to equity return on investment
  • Integrate foreign knowledge (and personnel) into long-term project operating plan and operating organization
  • **Rationale:**
    • Provides foreign source of equity
    • Reduces burden on host owner
    • Facilitates export of technology; it is often not a traditional “equity play”
    • Provides further human resources development of “country of origin” utilities (as well as source of expertise in cases like the UAE and Turkey)
    • Creates alignment of interests
    • Possibly, a long term commitment
VENDOR FINANCING: VENDOR EQUITY

- Examples of Vendor Equity Financing
  - Lithuania: Hitachi (stalled for foreseeable future)
  - UAE: KEPCO
  - Turkey (Akkuyu): Rosatom / BOO structure
  - Turkey (Sinop): MHI
  - UK (Hinkley Point C): Chinese investment
  - UK (Horizon): Hitachi
  - UK (NuGen): Toshiba/Westinghouse (and now what?)
Country Examples
• **Vogtle**
  - Georgia
  - Regulated market
  - US loan guarantee of $8.3 billion
  - Interest rate of 3.283%
  - Tenor: 20 years

• **Summer**
  - South Carolina
  - Regulated market
  - Loan guarantee available but not taken
• Jordan
  • Equity investment of 49.9%

• Finland
  • 34% equity
  • Debt financing of €2 billion

• Turkey
  • 100% equity (but goal is to sell down to 51% equity)

• Bangladesh
  • Debt financing of $12.65 billion
  • 28 year repayment with 10 year grace period
  • Rate: Libor plus 1.74% but capped at 4%

• Egypt
  • Debt financing of $25 billion
  • 22 year repayment starting in 2029
  • Rate: 3%

• Vietnam (cancelled)
  • Debt financing of $9 billion

• Hungary
  • Debt financing of €10 billion
  • 30 year tenor

• Belarus
  • $10 billion
  • 25 year tenor
• **Pakistan (K-2 & K-3)**
  - Debt financing of $6.5 billion from China Exim Bank
  - Tenor: 20 years
  - Rate: “to be repaid at concessional rate”

• **UK (Hinkley Point)**
  - 33% equity stake
  - Plus rights to Bradwell site
• **UAE**
  - Debt financing of $2.5 billion from K-Exim
  - Debt financing of $250 million from commercial banks
  - Debt financing of $16.32 billion from AD Dept of Finance
  - 82/18 ownership structure (ENEC / KEPCO)

• **Olkiluoto 3**
  - $716 million of debt financing

• **UK (Hinkley Point C)**
  - All equity financing (EDF plus CGN)
  - CfD structure
  - Loan guarantees not used
Market Risk
Query: “How will I get paid back?” / “Will I get paid back?”

- Ultimately, the Project must make commercial sense for both debt and equity
- Electricity Market Risk becomes a key consideration
  - the Electricity Regulatory Body* oversees the operation of the power market (rules, licenses, disputes, etc.) and controls the ability of an entity to generate (and sell) electricity within the national (or regional) structure
- Consider that Gen III / III+ designs will run for 60 years
  - Equity Investor needs to take a long view of the market
- Consider that, in a mature market like the United States, the only nuclear new build is occurring in regulated markets
- Remember that nuclear power plants are “price takers,” not “price setters”
  - Note the current situation in European power markets, where deregulated power markets have been distorted by renewables subsidies

* The generic reference to “Electricity Regulatory Body” (or “ERB”) is meant to capture the entity or multiple entities responsible for overseeing electricity market operations, including market rules, licenses, etc.
• What is the nature of the electricity market?
  • Is the electricity market regulated, deregulated, or mixed?
  • How do subsidies and mandatory preferences for certain types of generation influence market behavior?
  • What are the fuel options available to the country?
  • Is carbon priced?

➢ The structure of the electricity market – specifically, the market structure (and its stability) following commencement of commercial operation of the NPP – will have a direct impact on financing options
• **What types of assurances do developers need?**
  - Long term PPAs
    - as measured against the tenor of the debt (e.g., ECA debt has an 18 year repayment period from COD)
    - with a credit-worthy off-taker
  - Guaranteed market pricing
    - the UK’s “Contract for Difference” approach (and possibly going beyond the tenor of the debt to capture the long-term nature of the asset)
  - Carbon Treatment
    - carbon tax
    - carbon credit / emissions trading structures
  - Cost Recovery During Construction
    - utilized in certain regulated markets in the United States

• **But, should such assurances place some risk on the developers?**
  - Prudency reviews
  - When should the pricing be fixed?
  - Should nuclear power receive preferential dispatch as a clean form of baseload generation?
    - Query: Why would a country promote nuclear energy, undertaking expensive, extensive, and lengthy programmatic development, only then to let the market decide what the generation mix should be?
    - Query: If the reason for “going nuclear” relates to energy security, energy diversity, clean energy, and/or the need for baseload generation, then it would seem that rules and/or incentives need to be put in place to maximize the value of the nuclear generating asset
  - **In other words:** Should the market be left to determine dispatch and/or pricing?

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**ELECTRICITY MARKETS: CREATING MARKET “CERTAINTY” FOR DEVELOPERS**

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[Graphics and logos]
• **Sovereign-guaranteed Power Purchase Agreement (PPA):**
  • Host government assuming market risk
  • Host government supporting an above-market price to incentivize debt and equity financing
  • Host government creating a credit-worthy offtaker to facilitate financing
  • Host government ensuring that power is sold, as it is available (via capacity and utilization payments)

- Query: Is the PPA a complete pass-through of project costs?
- Query: Does the developer suffer for delays?
- Query: Does the tenor of the PPA go beyond the term of the initial debt?
Utilities in the US and Europe are having difficult times in deregulated markets
  • Gas prices in the US have made NPPs unprofitable in deregulated markets
  • Renewables subsidies and dispatch priorities have made baseload generation unprofitable in deregulated markets in the US and Europe (e.g., the phenomenon of negative pricing)
    • Gas plants in Europe
    • Nuclear plants in the US

Consequence
  • Grid reliability
  • Capacity issues

Query: Could we see a return to regulated markets? Or, at least, a UK-fashioned approach in other markets?
SMRs & ARs: IS “NEXT” THE ANSWER?
RELEVANCE OF THE IAEA

• Banks love to say, “Does the project comply with IAEA guidelines and standards?”

  • The challenge is that this condition, is nebulous, recognizing that IAEA pronouncements in the area of NPP development are not laws, they might not be applicable in all cases, they evolve over time, and the body of IAEA work is too extensive to assess against a particular project.

  • Project participants, lenders, and their technical and legal advisory teams will need to establish a meaningful set of evaluation criteria vis-à-vis the IAEA’s body of guidance and other applicable benchmarks in order to reach a concrete understanding on how such standards will be applied to the NPP and the consequences for non-compliance therewith.

• Importance of IAEA reviews of the program and the project:

  • INIR review (Integrated Nuclear Infrastructure Review)
  • IRRS review (Integrated Regulatory Review Service)
  • Pre-OSART and OSART reviews (Operational Safety Review Team)
### THE JOURNEY: 19 ISSUES / 3 PHASES

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THE JOURNEY: 19 ISSUES / 3 PHASES

CORE COMPETENCES FOR THE HOST COUNTRY

- Site Selection
- Licensing
- Legal and Regulatory Framework
- International Treaty Commitments
- Safety
- Security
- Safeguards
- Spent Fuel and Nuclear Waste
- Decommissioning
- Audit Regime
DO ARs/SMRs PROVIDE A QUICKER & CHEAPER WAY TO GET AN NPP?

- Consider Program vs. Project Costs

- Can a host country shorten the IAEA’s “Milestones” process?

- Are all the IAEA’s “Milestones” still relevant?
  - Note that the IAEA is updating its Milestones approach to adjust for ARs/SMRs
  - Can enough customer countries afford / achieve the Milestones?
  - Query: Can US industry and the USG help create and shape the market?
Concluding Thoughts
POINTS TO PONDER

• Four unique challenges of the asset class:
  • Presence of nuclear safety regulator
  • Overcoming development risk
  • Nuclear liability
  • Shortcomings of financial modeling

• What are the US Government’s ambitions?
• Are the ambitions of US industry realistic? Can US industry compete?
• Will SMRs/ARs be “game changers”? If so, when?
• How broad and deep is the SMR/AR market?
• Will climate change considerations carry the day internationally?
So what is to be done for US industry?
  - What is needed?
    - Absolute alignment between Government and Industry re. targeted countries
    - Fostering Bilateral Relationships
  - Financing
  - Playing to Strengths:
    - Strategic dialogue; value of US presence
      - Don’t forget the supply chain!
    - US Labs, Universities, and Regulatory Capability
    - Packaging a deal: What else does the host country want?
  - US industry needs to demonstrate that it can deliver projects on time and on budget
Remember re. the international competitive environment:

- This is not a fair fight
- It will never be a fair fight
- So stop asking for it to be a fair fight
- A sure way to lose is to show up with a knife to a gun fight

Strategic Endeavor:

- A nuclear power program is a strategic endeavor for the host country
- The relationship with the host country is a strategic endeavor for the competition
- Therefore, this must be a strategic endeavor for the USG
- These deals are about influence and long-term, bilateral relationships across multiple sectors
AND WHAT ABOUT “THE MARKET”?  

- **NPPs are not sustainable under deregulated market conditions**  
  - For developed civilian nuclear power countries (e.g., US, UK)  
  - For emerging nuclear power countries

- **Markets must be created and shaped**  
  - For SMRs and Advanced Reactors

- **Potential Customers must be helped**  
  - Program development as a key area for USG assistance  
  - Program development and early stage advisory work as a key opportunity and influencing presence for US industry (i.e., “shaping the deal”)  
  - Key area for US (both industry and government) to be **relevant**
THANK YOU!

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PAUL MURPHY

Paul Murphy’s practice focuses on multiple aspects of the nuclear industry – from legal and policy matters, including international regulatory and treaty frameworks and issues regarding nuclear liability, to strategies for creating and financing viable nuclear power programs and the identification and mitigation of associated risks – representing developers/owners, technology providers, investors, and contractors on nuclear projects internationally. Mr. Murphy is recognized as an expert in the development and financing of nuclear power programs by the International Atomic Energy Agency (IAEA), the OECD’s Nuclear Energy Agency (NEA) and the US government. Mr. Murphy currently serves on the IAEA’s Technical Cooperation Program team, which assists member states in developing civilian nuclear power programs. Mr. Murphy has served as a designated expert, chairman, and author at several special meetings and for multiple working groups of the IAEA, primarily involving the development, financing, and structuring of nuclear power projects. He continues to work with the IAEA in a number of key areas, including a current revision of the IAEA’s Handbook on Nuclear Law and as lead author for the IAEA’s, “Alternative Contracting and Ownership Practices for Nuclear Power Plants”.

Mr. Murphy has served as a four-time appointee to the US Secretary of Commerce’s Civilian Nuclear Trade Advisory Committee, and he has served as chair of its Finance subcommittee. In addition, Mr. Murphy served as the US Government's sole representative on an NEA working group on “Financing of Nuclear Power Plants”, acting as chairman for the working group. Mr. Murphy also chaired the IAEA working group that issued, “Issues to improve the Prospects of Financing Nuclear Power Projects.” Mr. Murphy has also worked with the Nuclear Energy Institute, the US State Department, the US Mission to the OECD, and the Export-Import Bank of the United States on revisions to the OECD’s Guidelines for the financing of nuclear power projects by Export Credit Agencies.

For the last seven years, Mr. Murphy served as a faculty member for the “Training Course on Nuclear Power Infrastructure Programs and Related Projects in Emerging Nuclear States”, held on behalf of the US State Department and the IAEA at the Argonne National Laboratory and attended by representatives of over 20 foreign governments. Mr. Murphy was the lead instructor for the segments on financing and the bidding / evaluation process for nuclear power projects.

In addition to his work in the nuclear sector, Mr. Murphy’s representations have included extensive work in the engineering and construction industry, where he has been heavily involved in the nuclear and fossil power sectors, both domestically and internationally. His project experience, both domestic and international, includes nuclear (new build, steam generator replacement, nuclear operating plant services), coal (both new build and environmental retrofit), LNG and gas-fired power projects, ranging from EPC contracting structures to technical support agreements and including major equipment purchase agreements and subcontracting. Recent projects have included work in solar power projects (CSP), IGCC and coal liquefaction plants, and pipelines.

Mr. Murphy is a graduate of Princeton University’s Woodrow Wilson School for Public and International Affairs and a graduate of Harvard Law School. Mr. Murphy is also a member of the International Nuclear Law Association, and he has recently been appointed to ASME’s Clean Energy Technology Advisory Panel.
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