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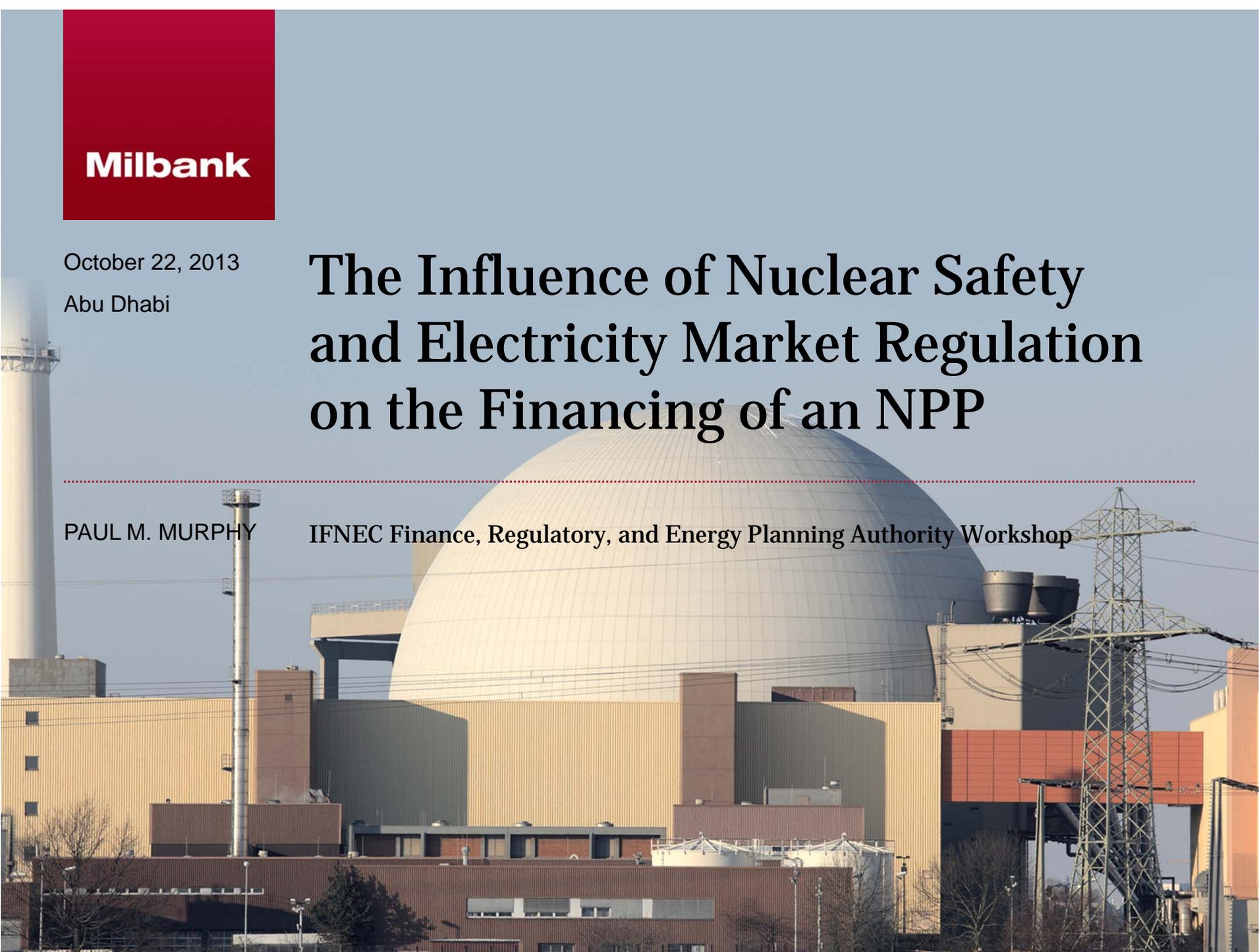
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Abu Dhabi

The Influence of Nuclear Safety and Electricity Market Regulation on the Financing of an NPP

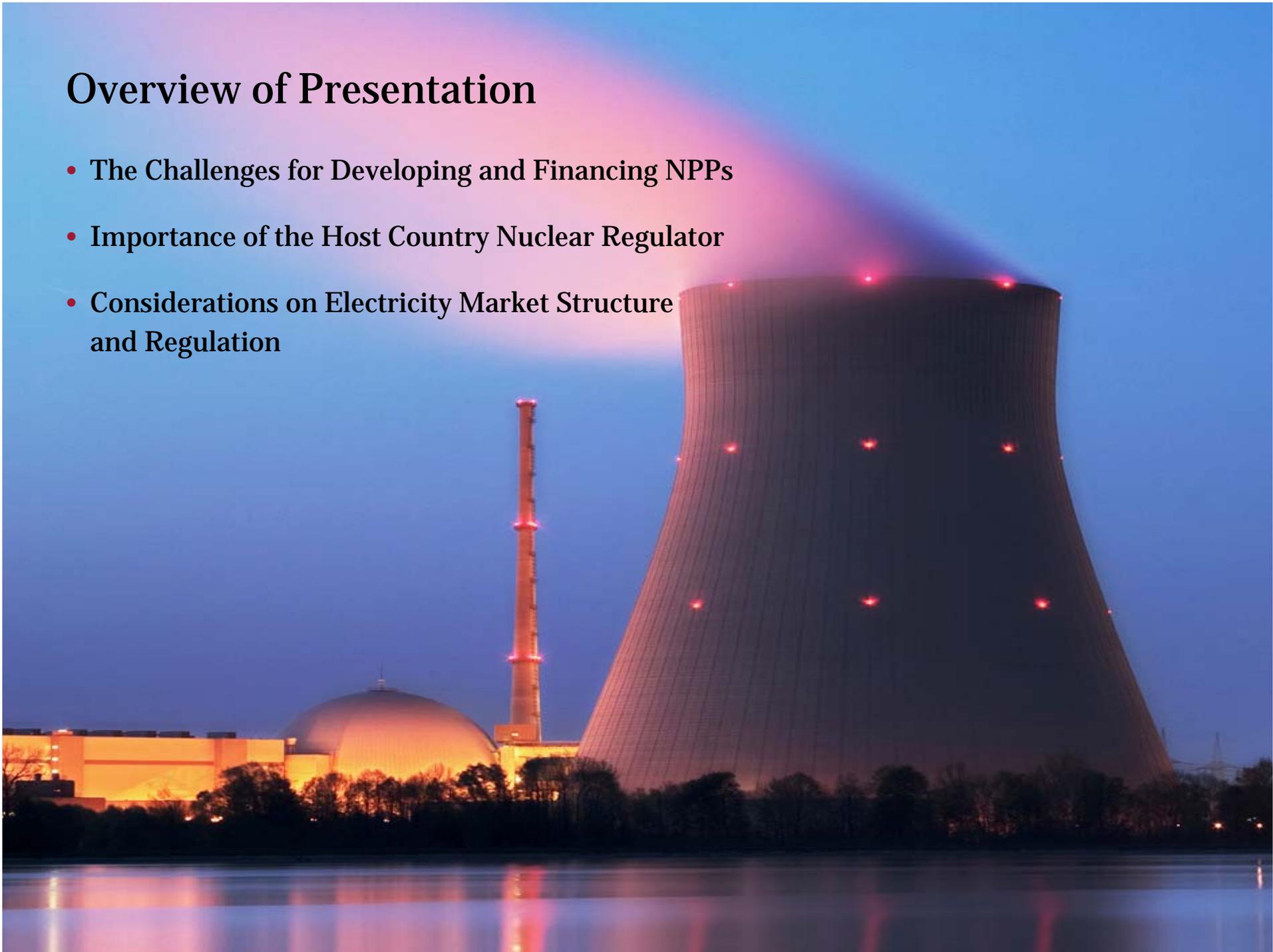
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IFNEC Finance, Regulatory, and Energy Planning Authority Workshop

The background of the slide is a photograph of a nuclear power plant. The central feature is a large, white, dome-shaped containment structure. To the left, there is a tall, thin cooling tower. In the foreground, there are various industrial buildings with corrugated metal siding and a large electrical transmission tower with power lines extending across the scene. The sky is clear and blue.

Overview of Presentation

- The Challenges for Developing and Financing NPPs
- Importance of the Host Country Nuclear Regulator
- Considerations on Electricity Market Structure and Regulation



Challenges for Developing and Financing NPPs

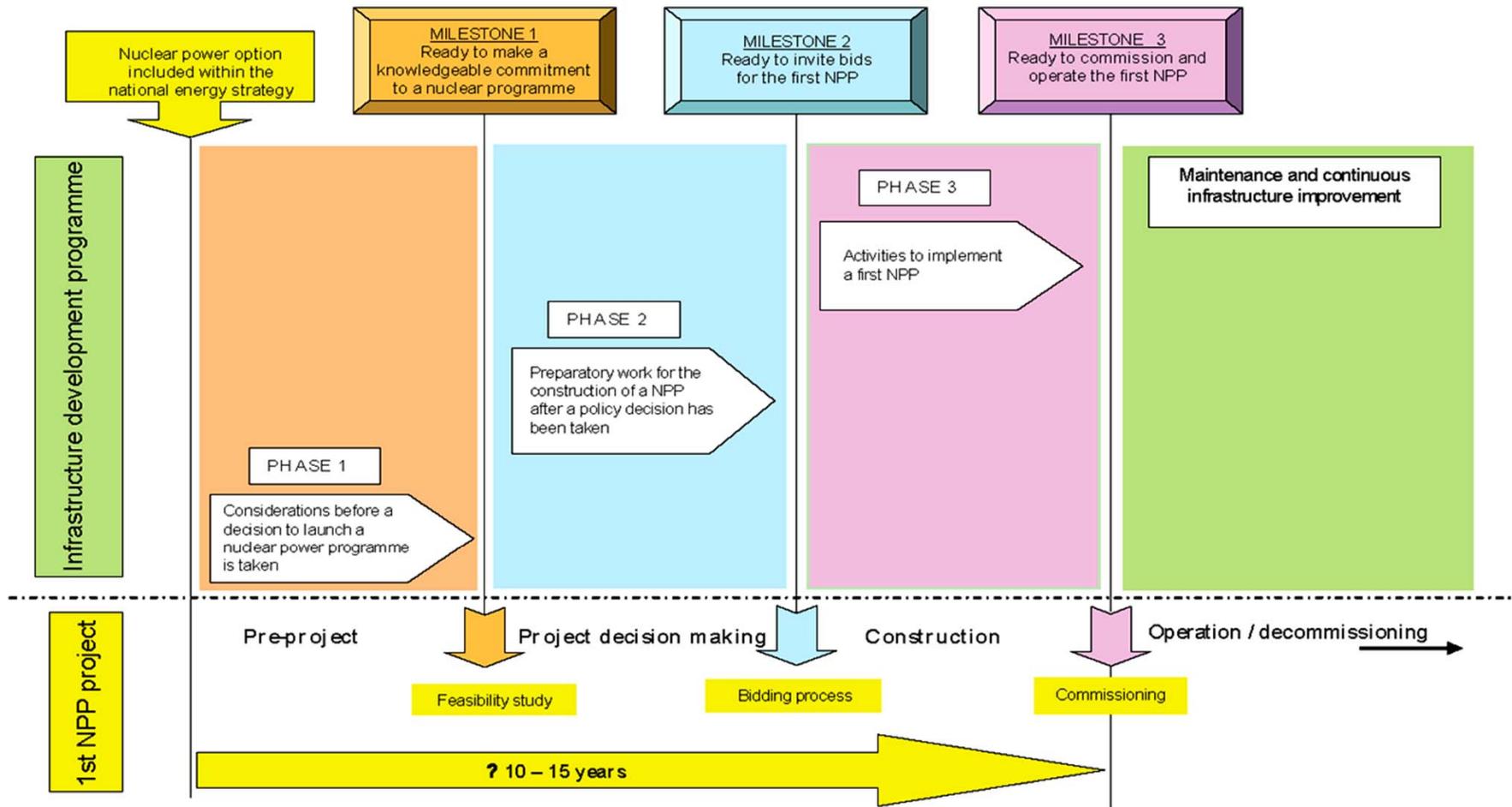


The Journey: 19 Issues / 3 Phases

Issues	Milestone 1	Milestone 2	Milestone 3
National position			
➔ Nuclear safety			
Management			
➔ Funding and financing	Conditions	Conditions	Conditions
➔ Legislative framework			
Safeguards			
➔ Regulatory framework			
Radiation protection			
➔ Electrical grid			
Human resources development			
Stakeholder involvement			
Site and supporting facilities			
Environmental protection			
Emergency planning			
Security and physical protection			
Nuclear fuel cycle			
Radioactive waste			
Industrial involvement			
Procurement			

Source: Milestones in the Development of a National Infrastructure for Nuclear Power, IAEA Nuclear Energy Series No. NG-G-3.1, IAEA, Vienna (2007)

The Journey: 19 Issues / 3 Phases



Source: Milestones in the Development of a National Infrastructure for Nuclear Power, IAEA Nuclear Energy Series No. NG-G-3.1, IAEA, Vienna (2007)

Nuclear Financing Concerns

- Primary Concerns for Financiers
 - Long development / construction periods
 - High capital costs
 - Regulatory uncertainty
 - Reputational Risk
 - Safety culture
 - Environmental responsibility
 - Commitment to International Regimes and Standards
 - First-of-a-kind risk
 - Operational Success
 - Human Resources and Supply Chain
 - Sustainability of government commitment
 - Fuel cycle concerns

Key Principles for International Deployment

- Safety
 - Safe operation of civilian nuclear power facilities
- Security
 - Physical protection
- Safeguards
 - Non-proliferation
- Note that the nuclear industry is unique in its cooperation and regulation
 - But, remember, too, that the IAEA provides guidance on technology; the IAEA does not make law regarding civilian nuclear power, leaving such certifications to national regulatory authorities ...
 - ... Which means that the **host country regulator** is very important and must be capable !

Current Trends

- “Newcomer” Countries
- Export Credit Agency Financing / External Financing
- Vendor Equity and/or Foreign Investment / Ownership
- Government - to - Government Model
- Localization
- Technology Transfer

Core Competences for the Host Country

- Nuclear Regulatory Framework
- Electricity Market Rules / Regulation
- Legal regime
- Site Selection
- International Treaty Commitments
- Security
- Safeguards
- Spent Fuel and Nuclear Waste
- Decommissioning

Financing a Nuclear Power Project

- Financing an NPP has historically been one of the biggest challenges for NPP development
 - NPP financing involves unique risks, large sums, and limited sources of funds
- *Note that both Export Credit Agencies and Commercial Banks have internal lending policies that specifically address Reputational Risk considerations*
- Even though it might not be a “project financed” transaction, reputational concerns will necessitate a robust reporting and covenant package, applying project finance discipline to the project review process
 - Environmental & Social Considerations
 - ❖ Equator Principles
 - ❖ IFC & OECD Environmental Guidelines
 - International Nuclear Obligations
 - ❖ Nuclear Liability (both International Treaties and Domestic Law)
 - ❖ The 3Ss of Safety / Security / Safeguards
 - ❖ Bilateral agreements
 - **Confidence in the Host Country Regulator**
 - Importance of technical due diligence on the project

Lending Decisions:

What do financial institutions really care about?

- Conclusion: **REPUTATIONAL RISK** analysis is as important to financial institutions as the commercial analysis.

1. *Will I get paid back? How will I get paid back?*

2. *Is this a “good project”?*

Both are equally important!

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The Importance of the Nuclear Regulator

Capability of the Nuclear Regulator

- Key Questions:
 - Does the host country have a competent regulator in terms of both experience and technology-specific knowledge?
 - Is the regulator independent?
 - Does it have the requisite authority to act?
 - Will it take action when appropriate?
 - Will limitations be imposed as to technology type (e.g., PWR, BWR, HWR) and generation level (e.g., only Gen III and Gen III+)?
- The regulatory body must:
 - Have adequate legal authority, technical & managerial competence, and human & financial resources to fulfill its responsibilities
 - Be able to demonstrate *nuclear regulatory experience*
- Note that regulatory capability is a key consideration for financing entities
 - The regulator needs to be the “adult in the room” that watches over the project during both construction and operation
 - Challenge for financing entities: assessing regulatory competence

Additional Nuclear Regulatory Considerations

- Recognition of country-of-origin licensing
- Cooperation with country-of-origin regulator (e.g., training)
 - Note the difference between education / training and **practical regulatory experience**
- What is the licensing approach of the host country regulator?
 - Is the regulatory regime modeled after a recognized foreign regime?
- What will the licensing process be for:
 - Design certification
 - Site permit
 - Construction license
 - Operating license
 - Environmental permits
- Is a “reference plant” approach going to be used?
 - Note that site specific considerations will still need to be assessed
 - Will the reference plant have to be in operation by the bid submission deadline?
 - Can a reference plant approach be a tool to reduce regulatory uncertainty?

Additional Nuclear Regulatory Considerations

- **Who will take regulatory risk?**
 - Particularly important if the regulatory regime is ***untested***
 - Can baseline assumptions be established so that the developer takes some (reasonable) regulatory risk?
 - The nuclear regulatory process can be a source of delays (historically) and, thus, a key concern for the financing of a potential project
- **Timing is critical**
 - Timing of key legislation to establish regulatory framework and approach
 - Timing of regulations to support NPP development, construction, operation, and decommissioning
 - Timing of human resources development to support regulatory needs
 - ❖ Program development must consider regulatory development vis-à-vis the overall project schedule
 - ❖ The more that is done simultaneously with engineering, procurement, construction, and operation, the greater the need for risk transfer away from the developer
 - ***Both developers and financing entities struggle with unknowns***

Final Thoughts on Nuclear Regulatory Considerations

- A capable regulator is a “confidence building measure” for the project
 - Independent, Experienced, and Adequately Resourced (re. both personnel and funding)
 - Primacy of Safety
 - Nexus with financing entities’ REPUTATIONAL RISK analysis
 - ❖ *Query: Is external financing obtainable if a sound nuclear regulatory regime is not in place and functioning effectively?*
- But the regulator can be a source of uncertainty as well
 - Historically, a potential source of delays (and increased costs)
 - [Need for / lack of] a proven track record
 - How can “predictability” be established for a “newcomer” country?
 - ❖ Possible need for risk sharing (without compromising independence and safety analysis) as a means of dealing with “unknowns”
 - ❖ Following recognized international best practices



Considerations on Electricity Market Structure and Regulation

Electricity Market Considerations and Financing

- 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.

Creating Market “Certainty” for Developers

- 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*

* Note the Workshop Scenario envisions a liberalized market.

Creating Market “Certainty” for Developers

- 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***

What is the role for the Electricity Regulator Body?

- The ERB controls how the generator interacts with the grid and with the market
 - ... as opposed to the nuclear regulatory authority, which has a nuclear safety mission with a focus on the right to construct and to operate
 - While the ERB might not determine the ultimate outcome (i.e., actual project revenue), its behavior (fairness, predictability, etc.) will have an impact on a financing entity's assessment of commercial / regulatory / legal risk for the project
- ERB needs to establish clear rules
 - Regardless of the choices that are made, if the rules are established in a clear and transparent fashion – ***and done so within a schedule that supports project development*** – then the “market” (both technical and financial) can react to the structure
 - The rules are ultimately a reflection of government policy vis-à-vis nuclear power

What is the role for the Electricity Regulator Body?

- Does the ERB need to be “independent” or “consistent”?
 - While the nuclear regulatory authority has a safety mission that supersedes all other considerations, the ERB can function with greater alignment with the governing authority to reflect national goals
 - Thus, from a financing perspective, the key issues for the ERB are:
 1. Clarity
 2. Transparency
 3. Consistency / Fairness
 4. Durability (over time)
 5. Alignment of regulatory processes (nuclear and electricity market)
 - Moreover, financing entities will want to see that protections exist, within the proposed structure, if a fundamental change to the structure (i.e., deregulation) occurs

Putting it all together ...



Concluding Thoughts

- Ultimately, it has to be a viable project ... it must be a “good project”
 - Nuclear projects are unique
 - High visibility program of geopolitical significance
 - Sustained government support is critical
 - Classic nuclear challenges must be addressed
 - Participants need to be dependable
 - Reputational Risk factors must be considered
 - Regulatory structures need to support nuclear power generation
 - Early-stage program decisions must consider financing issues
 - Economics must work
 - If you don't have a viable structure that can be financed, you don't have a project

Thank you for your time and attention

Contact Information:

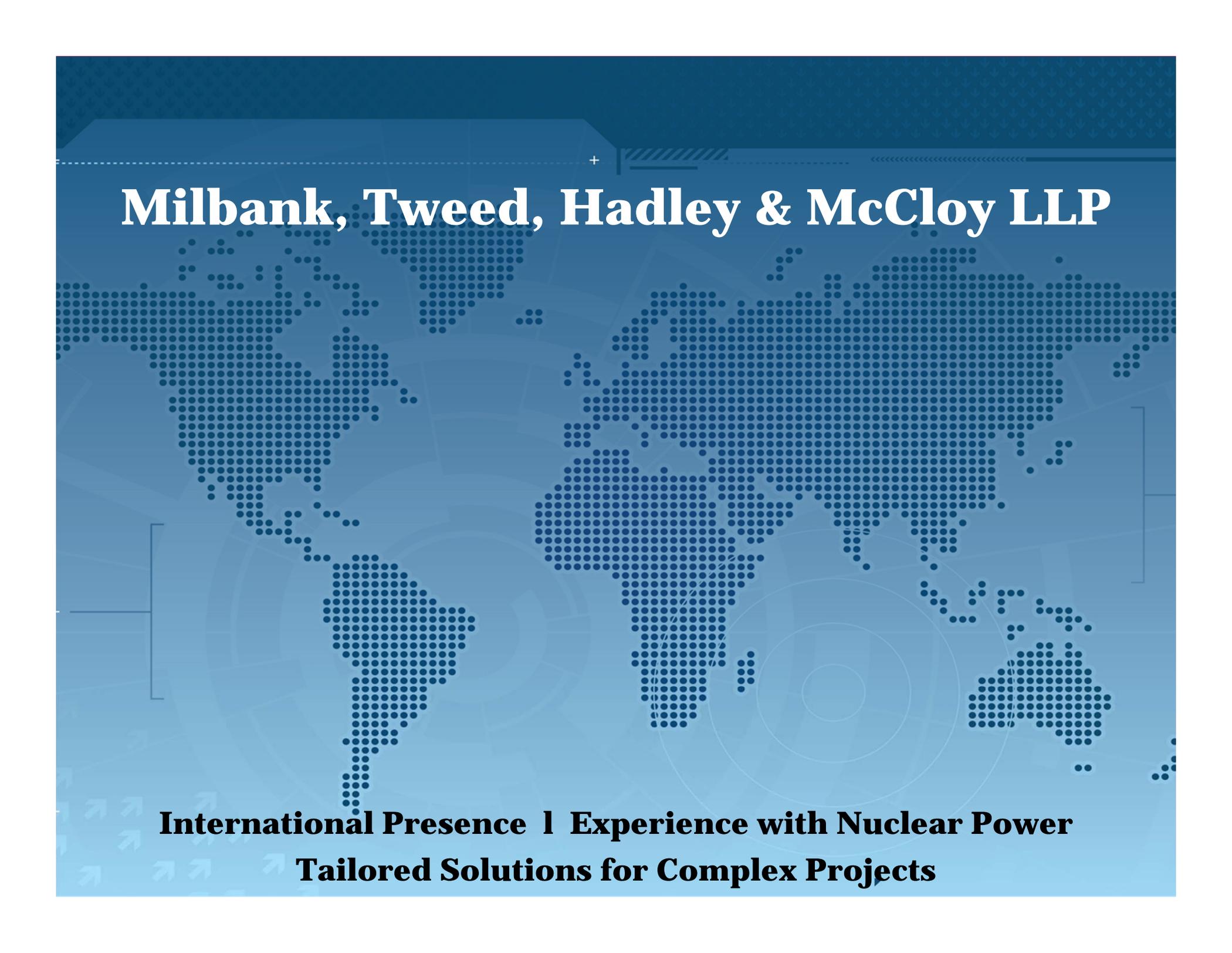
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Paul Murphy's practice focuses on multiple aspects of the nuclear industry – from legal and policy matters, including international regulatory and treaty frameworks and issues regarding nuclear liability, to strategies for creating viable nuclear power programs and the identification and mitigation of associated risks – representing developers/owners, 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 a new report to be released in the next few months, entitled, *"Alternative Contracting and Ownership Practices for Nuclear Power Plants"*.

Mr. Murphy currently serves as a two-time appointee to the US Secretary of Commerce's Civilian Nuclear Trade Advisory Committee, and he serves as chair of its Finance subcommittee. In addition, Mr. Murphy recently 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 five 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), 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.

Prior to joining Milbank, he served as Senior Counsel for Bechtel Power Corporation, supporting both the Nuclear and Fossil business lines as a transactional attorney involved in bid evaluations, business development, proposal submittals, contract negotiations, procurement, and project execution.

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.

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