

Financing Nuclear Power Projects: Challenges and IAEA Assistance in Capacity Building

International Framework for Nuclear Energy Cooperation
Finance Workshop
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Nadira Barkatullah

International Atomic Energy Agency/Department of Nuclear Energy



IAEA


International Atomic Energy Agency

Initiative

Member States request for assistance:

- Understand financing of nuclear power projects
- Recognise potential financing structures and packages for nuclear investment
- Understand the challenges and risks associated with financing of a nuclear power project
- Develop the approaches for managing and mitigating these challenges and risks

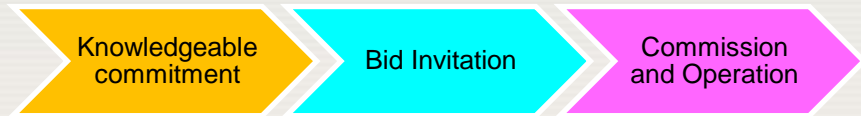
Milestones in Development of National Infrastructure of Nuclear Power

ISSUES	MILESTONE 1	MILESTONE 2	MILESTONE 3
National position			
Nuclear safety			
Management			
Funding and financing			
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			

CONDITIONS

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Nuclear and the cost of financing

- Why is the cost of finance for nuclear higher?
- Why is there a risk premium of $x\%$ above other power generation assets leading to a higher interest rate?



The Economics of Nuclear

Key Advantages of the Nuclear Power

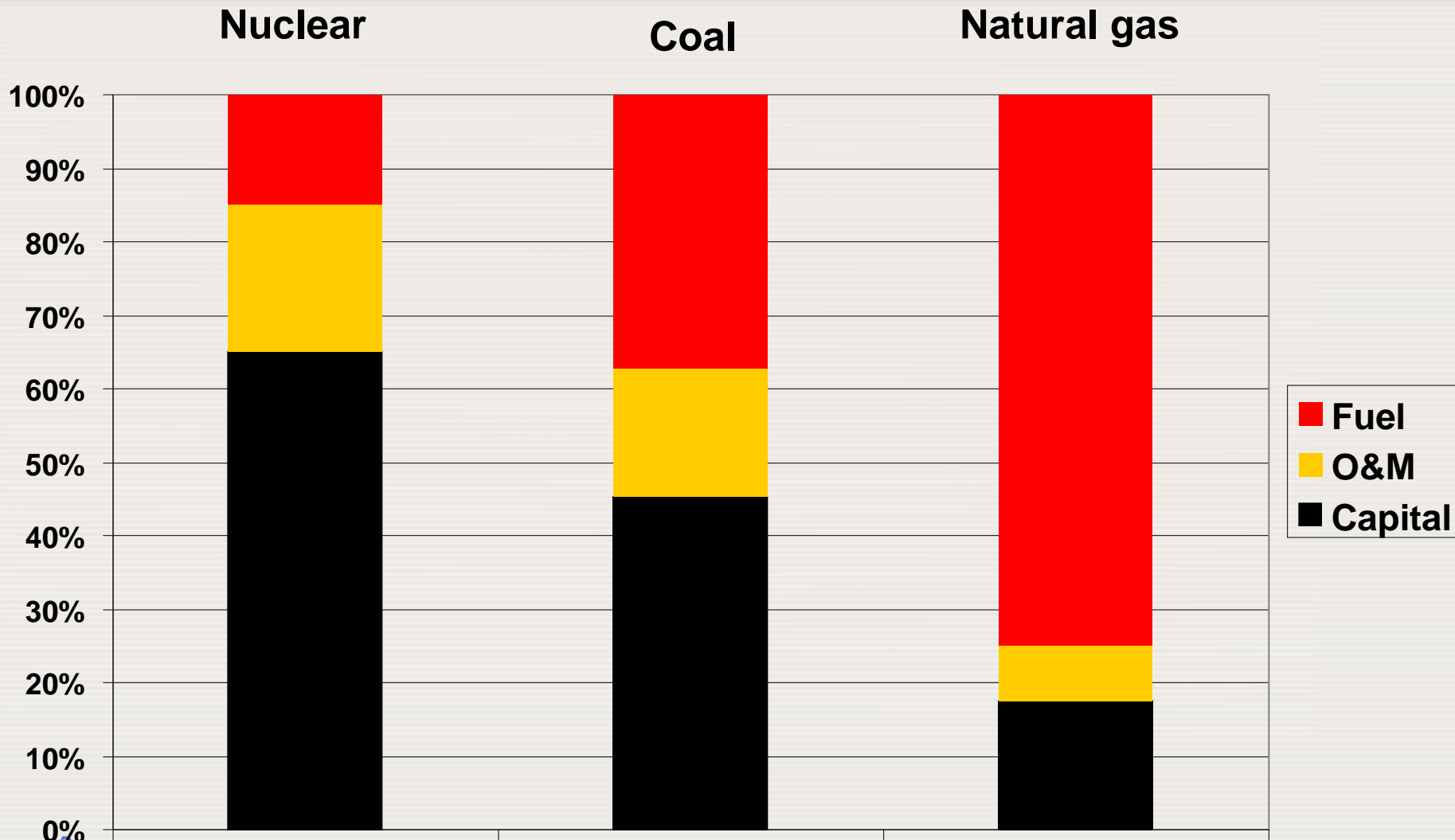
- Relatively low fuel cost: economic competitiveness
- Suitable for baseload capacity
- Long life time
- Low external costs
- Guarantee for energy supply
- Capacity development: contribution to national high technologies sector

Key Challenges to the Nuclear Power

- Highly capital intensive: high upfront capital costs, which are difficult to finance
- Sensitive to interest rates
- Long lead times (planning, construction, etc)
- Long payback periods
- Regulatory/policy risks
- New financing structures required to attract private investors

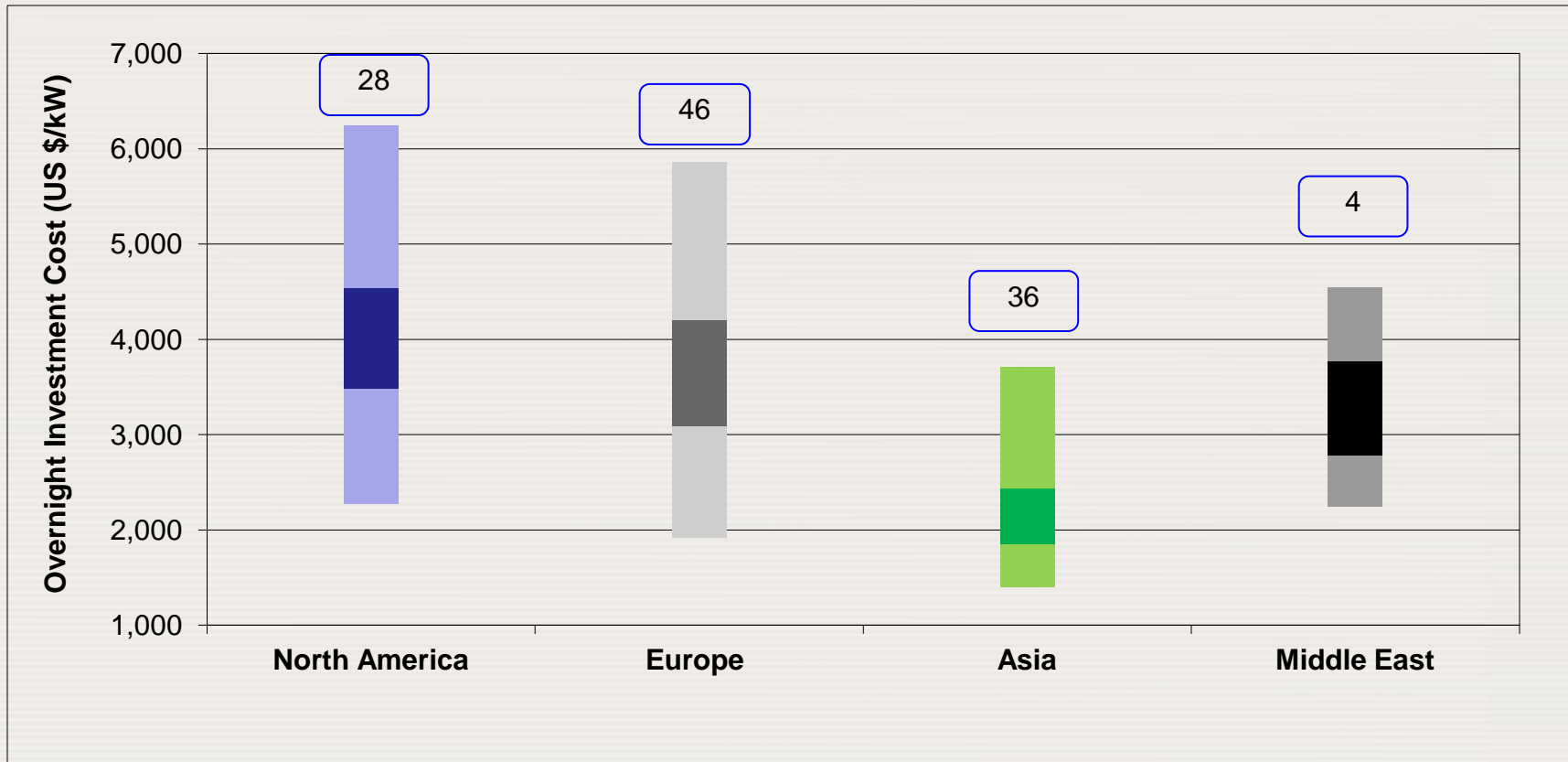
Challenge: Highly capital intensive

Cost structures of different generating options



IAEA

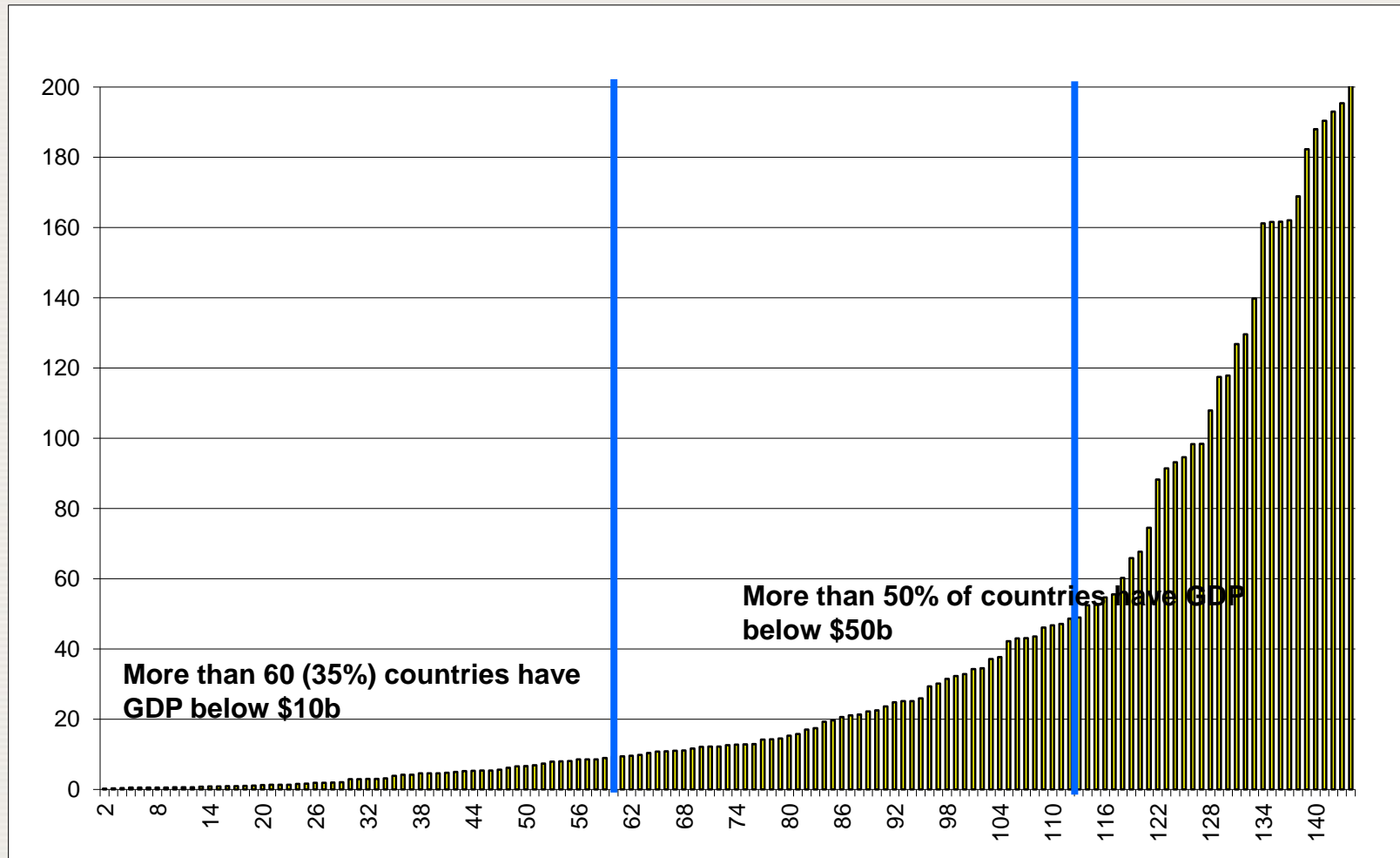
Challenge: NPPs overnight capital cost uncertainty - Overnight capital cost range by region



IAEA: Data collected from various publications and studies to keep track of nuclear power plants investment costs, since 2008 (updated Feb 2011), [all data in 2008 USD](#)

Challenge: GDP varies across the countries

Gross Domestic Product (GDP) in \$2010 billions



Challenge: Market capitalisation and NPP highly capital intensive

➤ Approximate market capitalisation of the leading EU, US and Asian utility companies

Country	Utility	Market capitalisation (USD billions)
EU	GDF SUEZ	54
EU	EDF	40
EU	Enel	31
EU	RWE	27
US	Southern Company	39
US	Exelon Corporation	25
US	Dominion Resources	29
US	Duke Energy	27
Asia	Korea Electric Power Corporation	12
Asia	Saudi Electricity Company	16
LA	Centrais Eletricas Brasileiras	9

Note: Updated April 2012

Challenge: Credit rating pressure

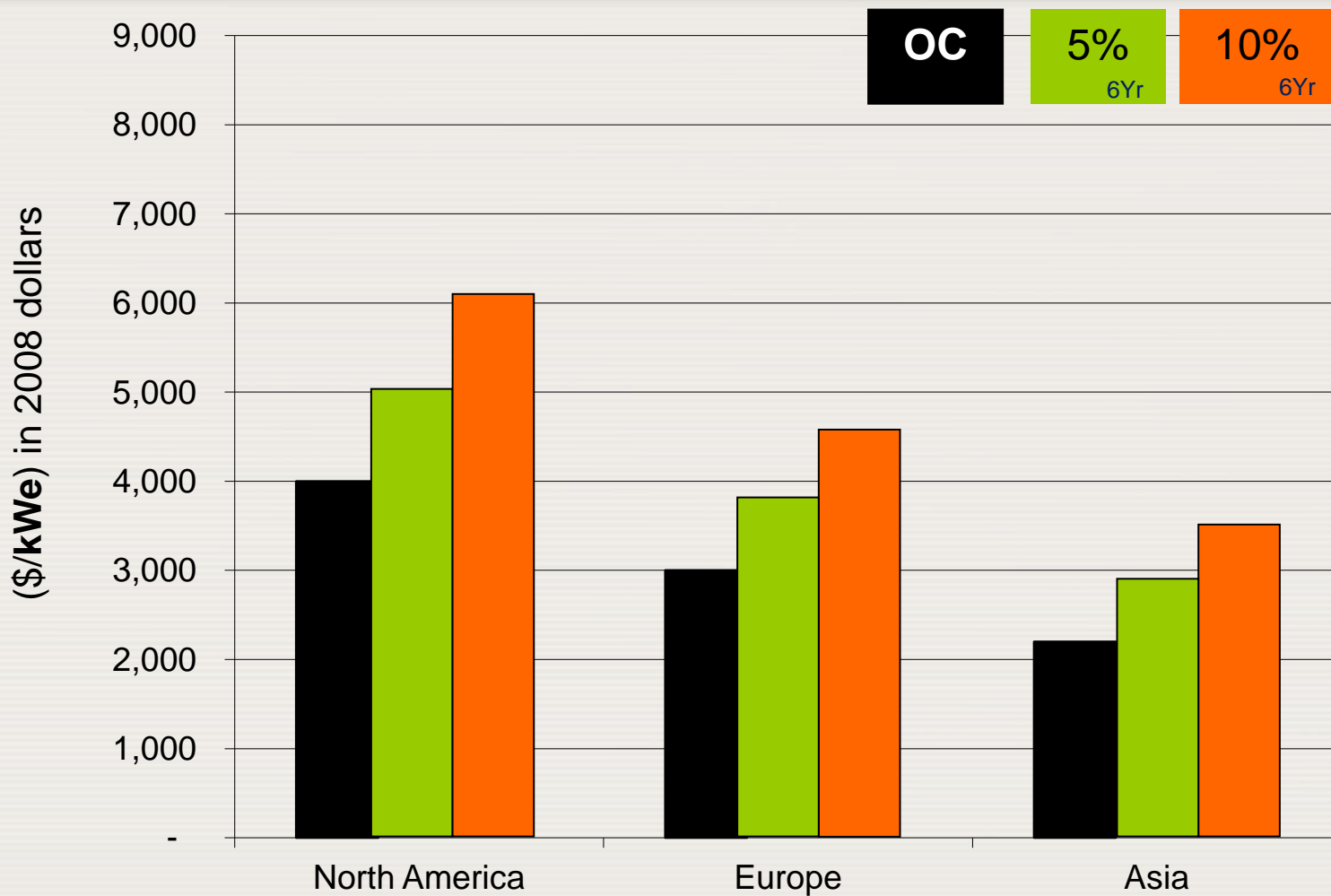


➤ “Moody's Says Substantial Nuclear Plant Cost Overruns Increase TVA's Rate Pressure and Debt Ceiling Risks...” *(9 April 2012, Moody's Investors Service)*

➤ “.....ratings agencies could downgrade French energy giant EDF and British Gas owner Centrica if they decide to build four reactors..” *(7 April 2012 This is Money)*

➤ “S&P set to downgrade Italy's Enel rating” *(Reuters 12 March 2012)*

Challenge: Investment cost and Interest During Construction (IDC)



Major Challenges to Financing NPP

➤ Other Challenges

- Long pay back period
- Foreign exchange rate risk
- Commodity price risk
- Multinational Institutions policy on credit availability
- Uncertainty in the Regulatory process
- Construction Supply Chain risks
- Deregulated electricity market rules and regulation
- Operational performance risk
- Negative Public Perception of nuclear
- Nuclear liability and insurance on how to cap and allocate the “extraordinary nuclear occurrences”
- Management of spent fuel and waste, and decommissioning



Agency Assistance in Capacity Building

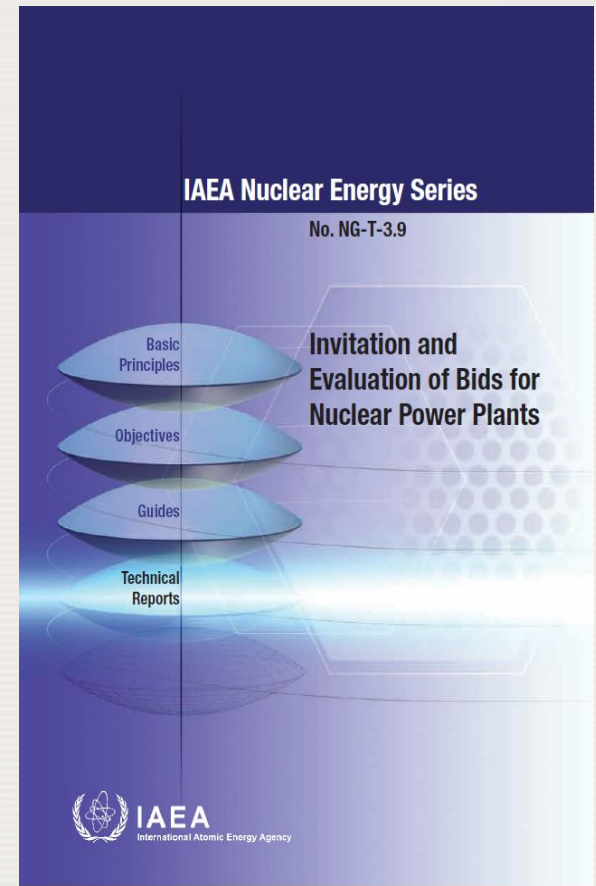
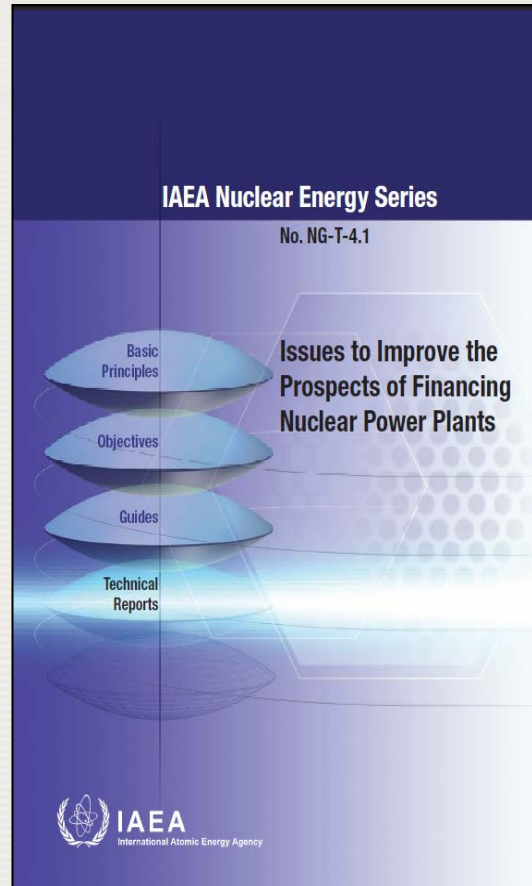
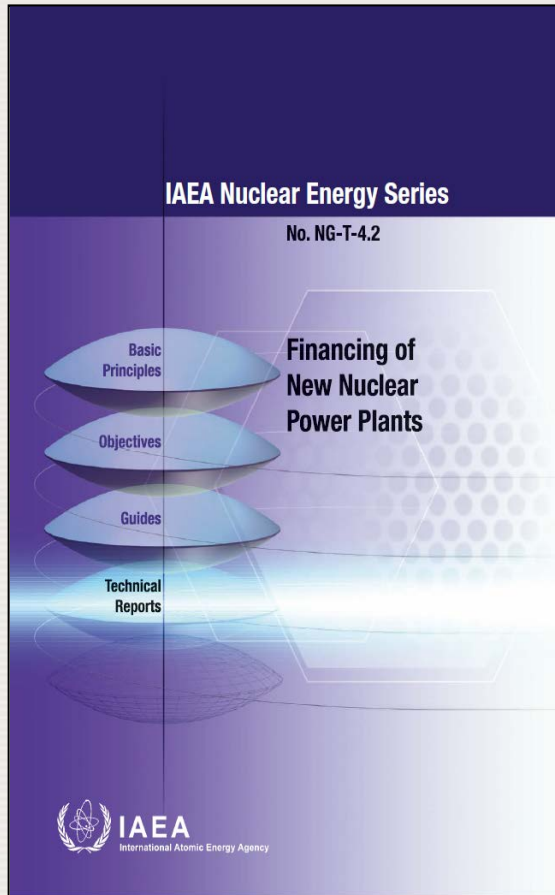
How is the Agency assisting the newcomers regarding financing of NPPs?

- Useful information (e.g. documents)
- Workshops, training and analytical tools
- Cooperation with international organizations and others (like, OECD/NEA, OECD/IEA, Global Nuclear Energy Partnerships, Generation IV International Forum)



Agency Assistance in Capacity Building

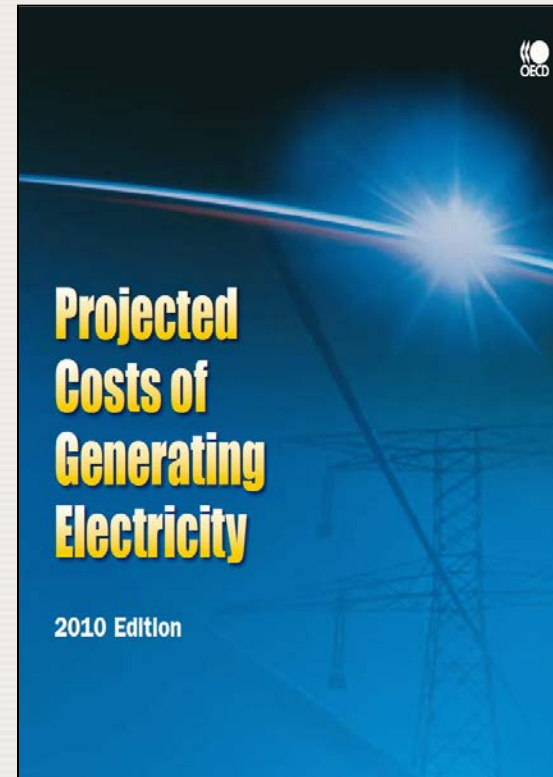
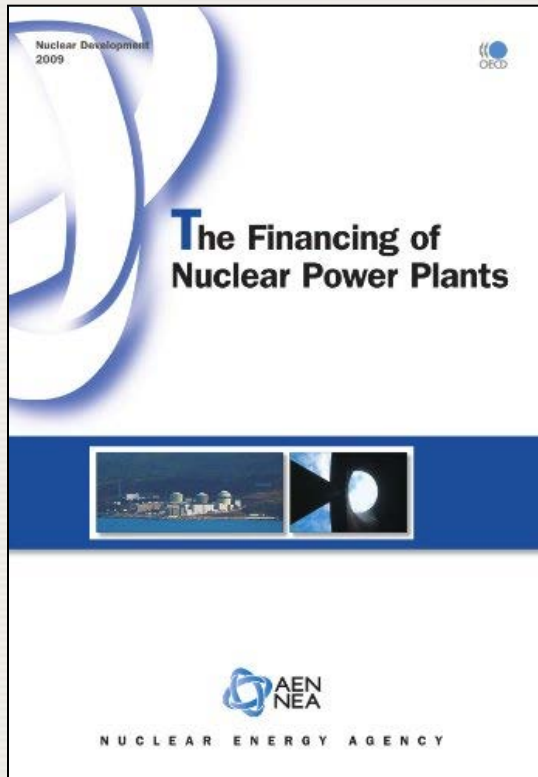
IAEA publications



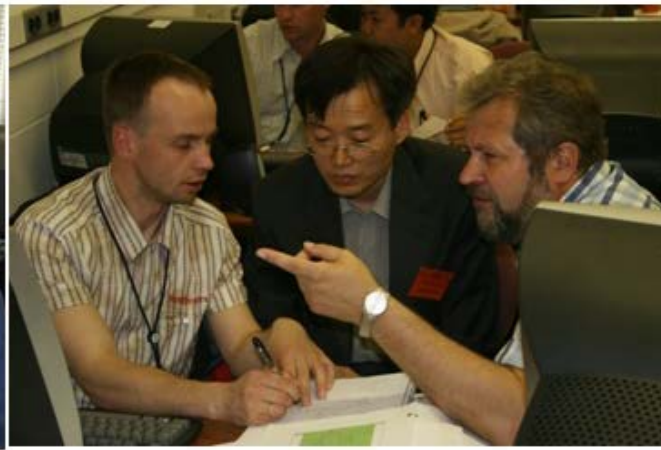
- Alternative Contracting and Ownership Policy, Under Preparation

Agency Assistance in Capacity Building Collaboration with OECD

➤ OECD Publications



IAEA's Support for Capacity Building Training and Workshops



Agency Assistance in Capacity Building

Training sessions

Organise training sessions to employ the use of IAEA tools like FINPLAN

FINPLAN - Financial Analysis of Electric Sector Expansion

Plans

INPUT

- | Investment programme (= capacity additions) & operating expenses
- | Economic and fiscal parameters (inflation, escalation, exchange rates, taxes)
- | Financial parameters (credits, bonds...)



FINPLAN



➤ to help assess the financial viability of plans and projects and to analyze alternative expansion plans by evaluating their financial consequences

OUTPUT

For each year:

- | Cash flows
- | Balance Sheet, Statement of Sources, Applications of Funds
- | Financial Ratios:
 - Working Capital Ratio
 - Leverage ratio
 - Debt Repayment Ratio
 - ...
 - Global Ratio

Agency Assistance in Capacity Building Workshops on Financing

- Financing workshop to meet the requirements of the MSs to support and enhance their understanding of Financing and Financial Risk Management concepts

Financial Experts

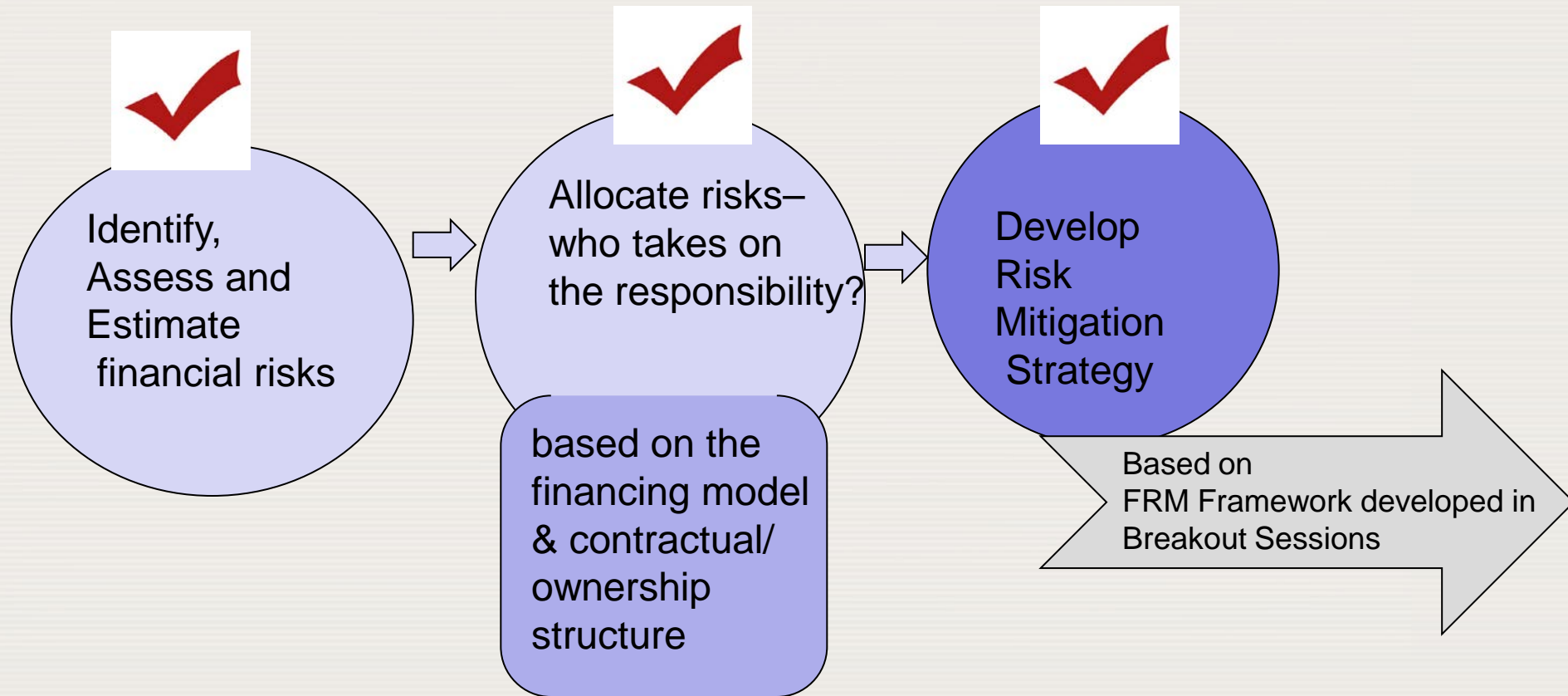


Member States



Agency Assistance in Capacity Building Workshops on Financing

➤ Introduced Financial Risk Management Framework



Agency Assistance in Capacity Building Workshops on Financing

Financial risk mitigation strategy - Example of a risk matrix

Name of risk	Risk assessment	Allocation	Mitigation
Construction delay	Medium	Owner/Contractor	Qualified third party contractors/PMC
Credit risk	High	Owner/Lender	Well defined loan agreement
Foreign Exchange/Currency	Medium	Owner/Lender	FX hedging strategy
Interest	Medium	Owner	Fixed rate/ECA

Agency Assistance in Capacity Building Workshops on Financing: Some Examples



➤ **Economics and Financing of Nuclear Power, EU Region, February 2009**

➤ **Introduction to Identification and Management of Financial Risks for Nuclear Power Plant Projects, EU Region July, 2010**

➤ **Financing Structures and Introduction to Management of Financial Risks for Nuclear Power Plants, Asia Region December, 2010**

Fukushima Impact

➤ Are Member States still interested ?

- Nuclear Costs to Rise Following Fukushima Disaster (*Energy Business Daily, April 25th, 2011*)
- “The economics of nuclear power may deteriorate..in the wake of the Fukushima accident (*OECD International Energy Agency, 2011 World Energy Outlook*)
- Eurozone: S&P downgrades Europe (Reuters, 14 January 2012)



- The interest still persists as “Countries tell UN their nuclear plants continue” (*Nucleonics Week, 29 September, 2011*)

Agency Assistance in Capacity Building

Recent Workshops on Financing

Evidence: Regional Training Workshop on Financing Structures and Introduction to Management of Financial Risks for Nuclear Power Plants, December, 2011

MS - Very enthusiastic to learn about financing structure and financial risk management issues, *“more needed than less...”*

“...valuable for my country...”

“Very essential to have follow up..”



Agency Assistance in Capacity Building Workshops on Financing

Key findings of the workshops:

- **Governments have a critical role with explicit long-term commitment**
- **Wide range of overnight capital cost challenging for newcomers**
- **Financing and construction duration key influencing factors to impact total investment cost**
- **Other main risks - foreign exchange rate risk, variation in interest rate and funds**
- **No one-size-fit-all solution, each project is unique**
- **The Fukushima accident foreseeable risk might lead to unnecessary safety measures, which might increase the cost of NPPs**



Agency Assistance in Capacity Building Workshops on Financing



Key findings of the workshops (cont'd):

- Risk sharing critical among key stakeholders
- Private financing - JV among utilities with robust balance sheets
- Meticulous Financial Risk Management Strategy imminent
- ECA support is vital and ensures bankability of the project
- Strict financial industry regulation, like Basel III to impact liquidity and more vigilance of large scale risky projects
- Governments need to urge multilateral financial institutions like World Bank, to assist with the financing of NPPs
- Construction risk is rated no 1 – so to gain confidence of investors...”more projects on Schedule and within Budget”



***Thank you very much for your
attention!***