Mitigation of Project risk in Nuclear New Build

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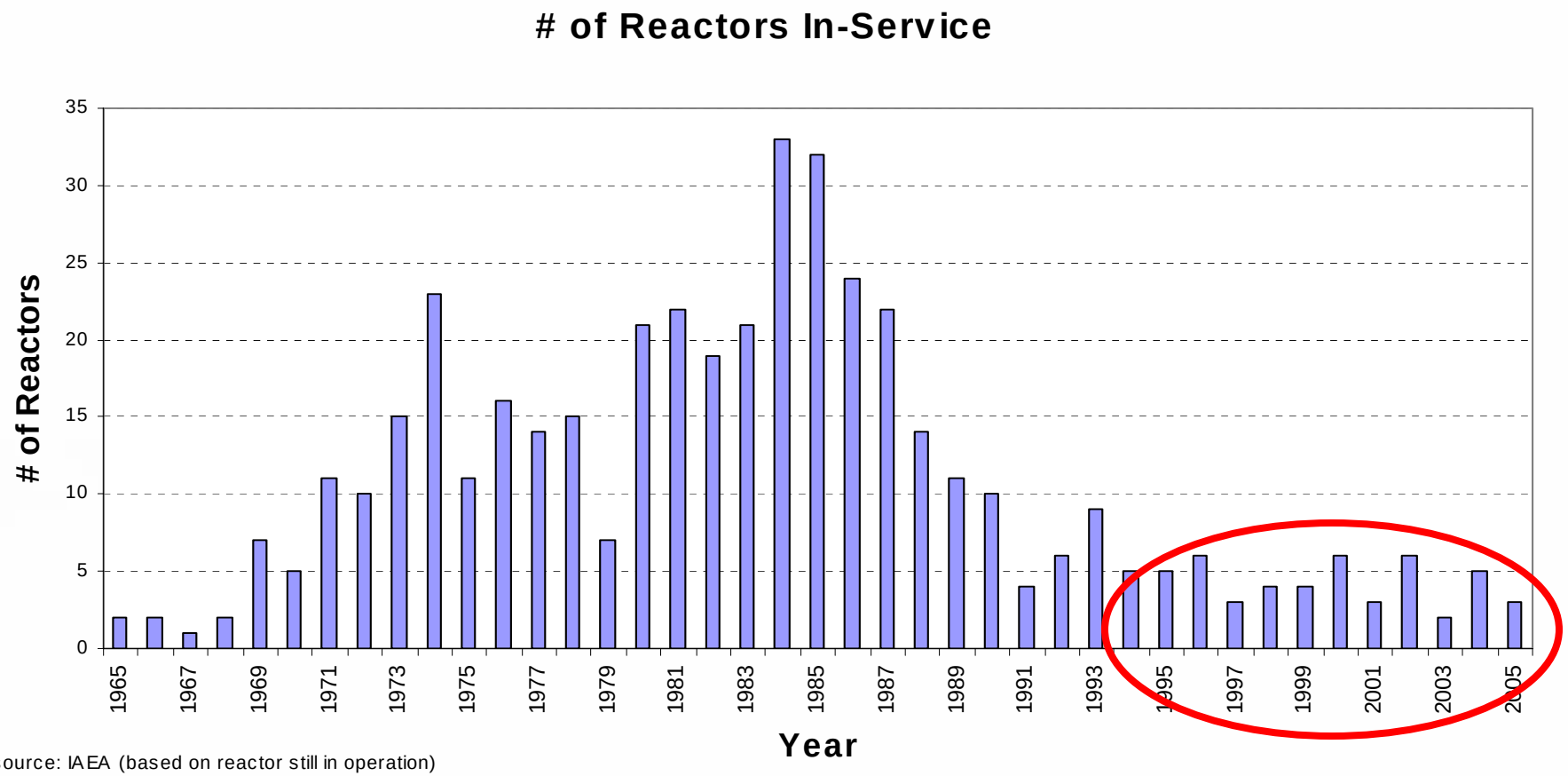
AECL

Overview

1) NPP projects in the past decade
2) New Build issues
3) Addressing the Risks
4) Experience in risk minimization
5) Application in UK

Few Projects in the Last Decade



source: IAEA (based on reactor still in operation)

New Nuclear Projects

Vendor	Number of Plants Since 1996	
	Completed	Under Construction
AECL	**6**	**1**
AREVA	**6**	**1**
General Electric	**2**	**2**
Westinghouse (ABB/CE series in Korea)	**4**	**0**

Souce – NEI 2005 World Nuclear Industry Handbook/
IAEA PRIS Database

Nuclear Renaissance

- **Demand for increased generation across the world – China, India, US, UK, Canada and elsewhere**
- **Supply is limited – Nuclear is being considered seriously by all nations**
- **Expect to construct up to 157 GW of New NPP in the next few decades (to 2030)***
- **Nuclear industry needs to address its issues**

***source The New Economics of Nuclear Power WNA 2005**

Nuclear New Build Issues

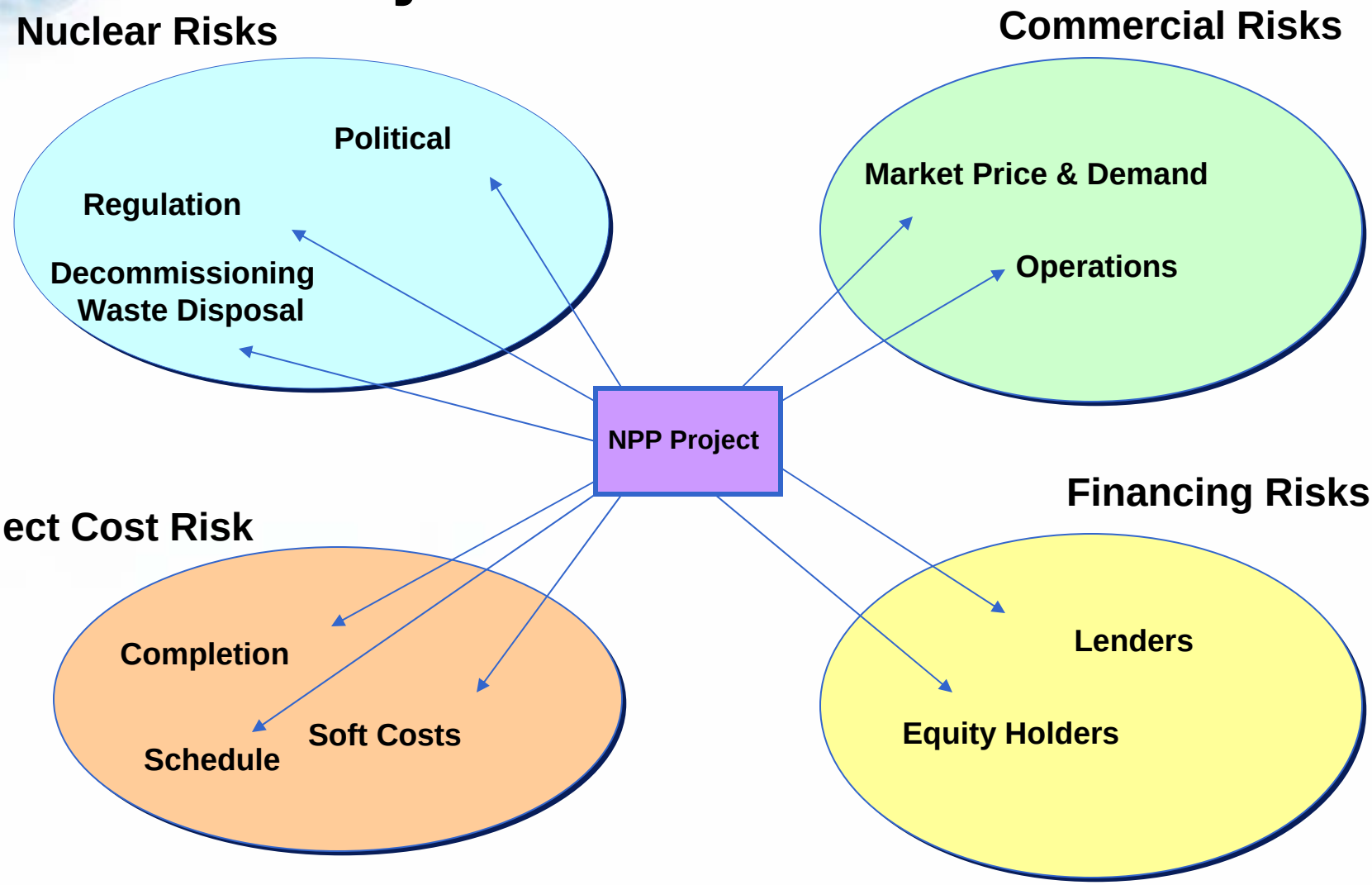
- **Nuclear industry's public image is tarnished – accused of "heavily-subsidized" and uneconomic**
- **Industry linked to Government – due to "nuclear special features"**
- **BUT industry is seeking new orders on a commercial basis with minimal Government support**

Nuclear New Build Issues

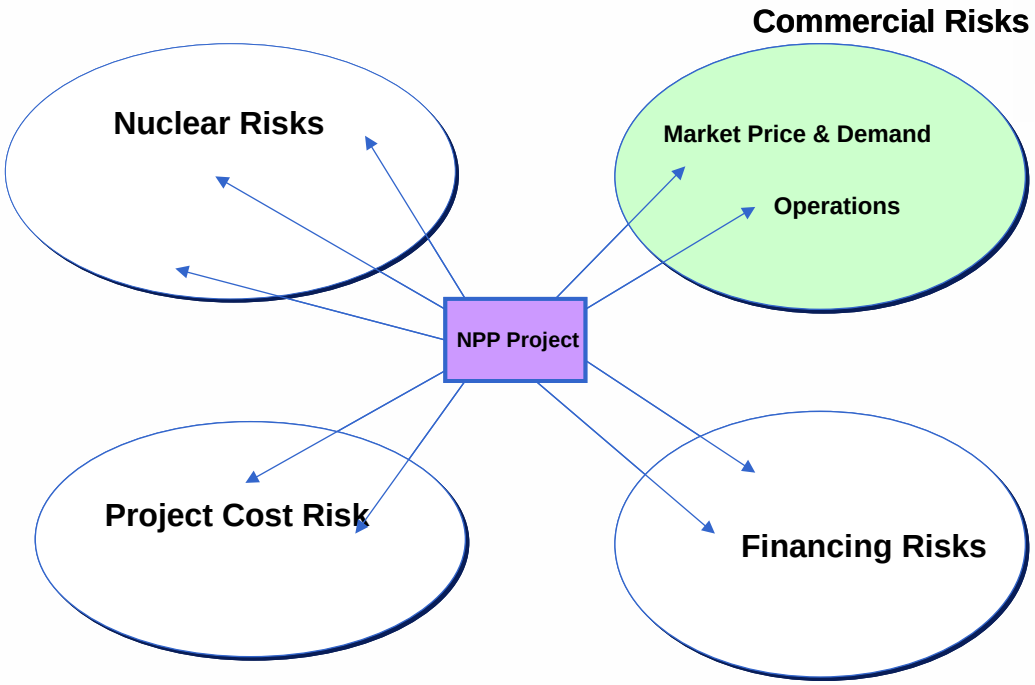
- **Financing Issue for new build - identification & management of risks**
- **Proponent, together with Vendor, must not look at history as a model**
- **Vendor and proponent must take an innovative approach to risks**

The Risks

Project Structure Risks

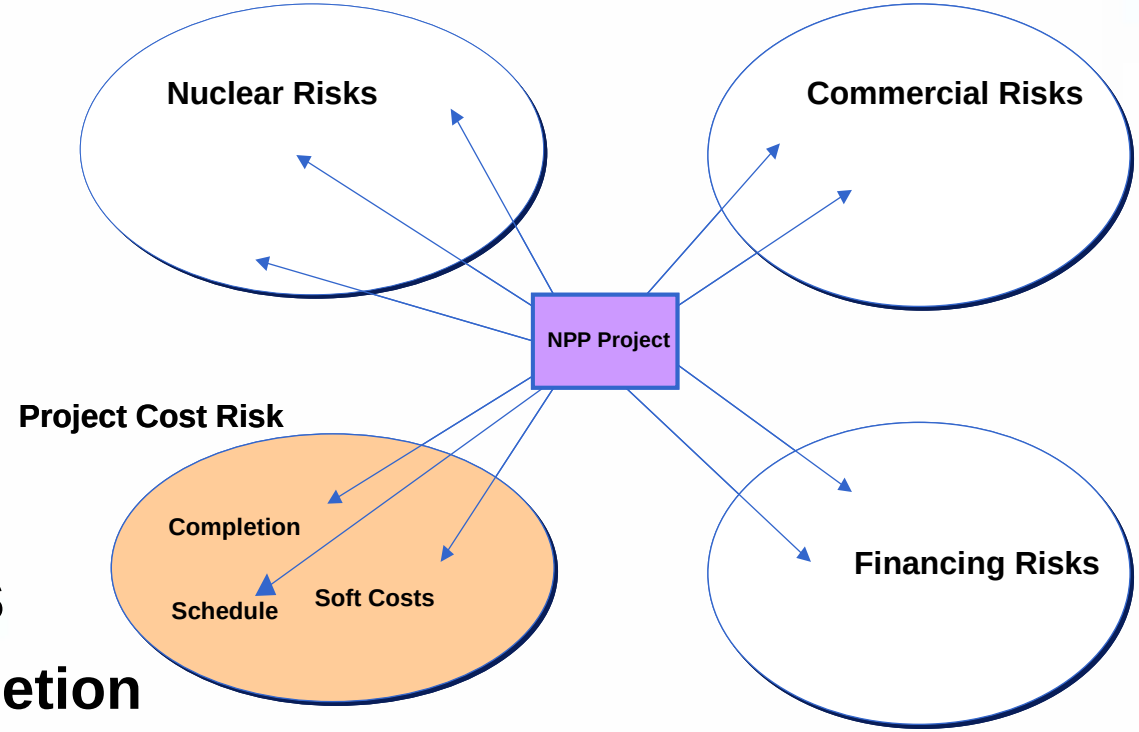


Commercial Risks



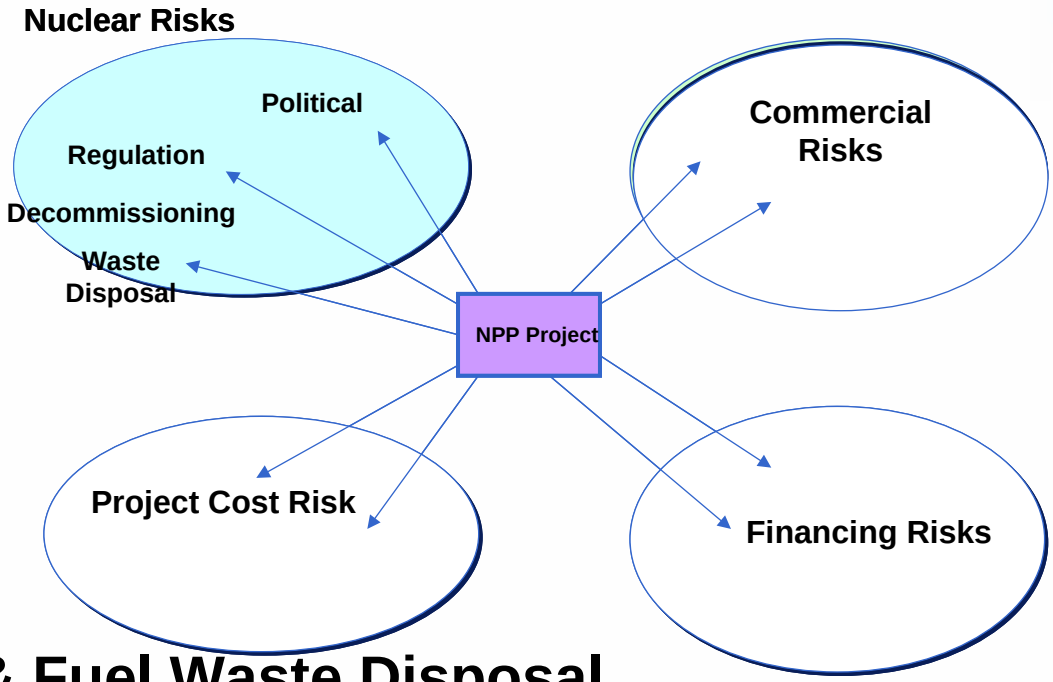
- **Commercial Risks**
  - **Operations**
    - **Fuel supply/ Operations and Maintenance / performance**
  - **Market Price & Demand**
    - **Utility/offtaker/PPA**

Project Risks



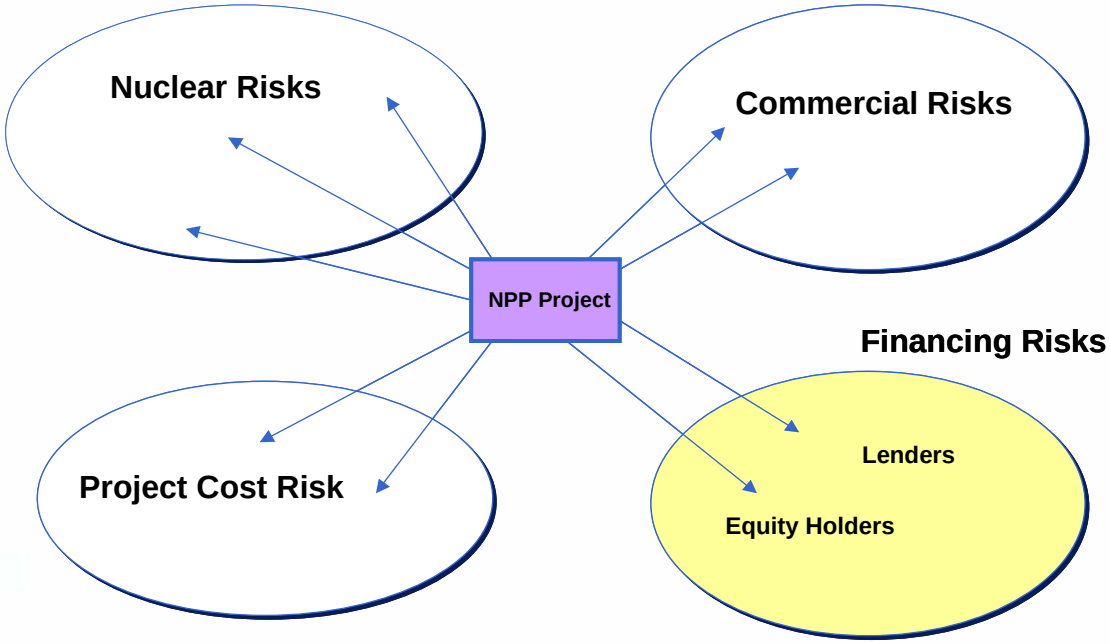
- **Project Risks**
  - **Project Completion**
  - **Local construction**
  - **Force Majure**
  - **Project Cost & Schedule**

Nuclear Risks



- **Nuclear Risks**
  - **Nuclear liability**
  - **Decommissioning & Fuel Waste Disposal**
  - **Regulation – changes beyond the definition of the project**
  - **Licensing**

Financing Risks



- **Financing**
  - **Lenders/Bankers**
  - **Equity Holders – impact of Nuclear investment on share value**

Addressing the Risks

- **Need appropriate blend of risks in the Project Model and the Financing Model**
- **AECL has extensive knowledge with risks in new builds**
  - **Nuclear, Commercial, Regulatory, Project risks addressed in all new build contracts**

Risk Allocation Model

Risk Element	Historic Models	Regulated (Qinshan)	New UK Model
Project Delivery: Contract Model	Owner as General Contractor	Turnkey	Project Consortium
Design – Cost & Schedule			
Equipment Supply – Cost & Schedule			
Project Management – Cost & Schedule			
Construction – Cost & Schedule		Shared Owner/AECL	
Commissioning – Cost & Schedule		Shared Owner/AECL	
Plant Performance (Power Output)			
Licensability			
Regulatory Delay not due to Contractor/Consortium			
Contractor's Liability		AECL cover to contract cap	AECL cover to contract cap
Technology Risk on Plant Design		AECL cover to contract cap	AECL cover to contract cap
Financing – Loan Repayment Risk	100%		100 % or less
Operation - Plant Operations Cost & Risk			
Market – Electricity Revenue Risk			
Decommissioning, Waste Storage Risk			

Legend:

- **AECL / Partners /Sub**
- **EDC**
- **Government of Canada**
- **Owner**
- **Government**
- **Project Consortium**

Vendor/Turnkey supplier Risks

- **Local expertise and resources**
- **Defined scope and division of responsibilities**
- **Effective turnovers from design to construction to commissioning**
- **Advanced project management tools**

Application in UK

- Fully liberalized market in UK
- Renewable obligations credits, climate change levy and EU carbon emission trading are incentive mechanism currently in place
- Carbon emission trading as an incentive mechanism for nuclear is needed
- Financing models – will reflect new financial and commercial risks – more proponent/vendor risk sharing
- Backstop on key nuclear issues
  - Decommissioning
  - Waste disposal
- Some support for market price stability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