

Successful Nuclear Energy Project Development:

Planning, Financing and Building Nuclear Power Plants

**JACKSON
ASSOCIATES**
INTERNATIONAL NUCLEAR CONSULTANTS

3 Day Intensive Training Course

Nuclear energy projects must navigate a range of complex industrial, technological, regulatory, financial, economic and planning issues. Using a mixture of presentations and real-world practical case studies this *Successful Nuclear Energy Project Development* course will familiarise participants with each step of the lifecycle of a nuclear power station build and its supporting nuclear infrastructure requirements.

Focussing on real-world planning, financing, business and economic issues, the course will examine how reactor procurements are actually undertaken and discuss the industry terminology used, key business issues, business models and global reactor vendor

offers, as well as the major consulting, equipment supply, equipment qualification and service groupings that a developer might purchase during a typical nuclear power plant construction project. The course will explain different options for how spent fuel and radioactive waste can be successfully managed and commercial pricing and disposal strategies. The course will draw upon a wide range of international case study examples from Britain, China, Japan, Europe, the Middle East and the United States including the new Contracts for Difference (CfD) and Strike Price electricity market mechanisms that have been successfully applied in the UK to fund commercial nuclear build projects for the first time in liberalised private sector energy markets.

Who Should Attend?

This three day intensive training course is intended for early-career to mid-career professionals and executives in energy industries, potential nuclear industry suppliers, the professional services sector and government officials who will be involved in nuclear power development projects.

No prior knowledge of the nuclear industry is assumed as full training will be provided by the course lecturer. Case study sessions and simulation exercises will be highly interactive with extensive discussion with course delegates. Emphasis will be placed on the business aspects of nuclear power.

This *Successful Nuclear Energy Project Development* course is recommended for electricity utility company staff, government officials, Embassy and Foreign Trade officials, legal professionals, nuclear supply chain companies, energy market regulators, nuclear safety and environmental regulators, market analysts, and anybody wishing to broaden their knowledge and career prospects within the growing nuclear energy sector.

The course may be particularly suitable as familiarisation training for international staff intending to work on planned new nuclear power plant development projects in the UK.

Course Aims and Objectives

The aim of this course is to equip participants with a sound understanding of the nuclear industry, its value chain and potential trade opportunities arising from commercial nuclear energy development by utility companies. The course will focus on business aspects of modern civil nuclear energy technology for electricity generation projects undertaken by public and private sector utilities.

Participants will:

Understand the major kinds of civil nuclear power technology today, their suitability for different national power grids, reactor siting requirements and nuclear safety licensing arrangements.

Understand how nuclear power plants are procured and financed, how electricity markets are being reshaped, and how Contract for Difference (CfD) and Strike Price mechanisms function.

Understand the lifecycle of a nuclear development project, reactor procurement timelines, project stages, business models, supply chain arrangements, service groupings and equipment supply.

Understand nuclear fuel supply, the nuclear fuel cycle, nuclear non-proliferation and different options for spent fuel management such as spent fuel storage, reprocessing and MOX production.

Understand the economic planning and provisioning needed for nuclear decommissioning and long-term radioactive waste management and the support services required to enable this.

Course Modules

This *Successful Nuclear Energy Project Development* course is intended for a maximum of 30 participants and will consist of 7 learning modules plus real-world practical case studies and simulation exercises. Case study sessions and simulation exercises will be highly interactive with extensive discussion with course delegates. Emphasis will be placed on the business and commercial aspects of nuclear power.

Benefits from Attending

BOOST your knowledge and career prospects in the fast-growing nuclear energy sector

LEARN how to successfully manage nuclear power programmes effectively

UNDERSTAND key nuclear programme drivers and how to overcome technical, commercial and financial barriers

MANAGE RISK more effectively through early understanding of likely problem areas

APPLY best practices from the most successful international nuclear build programmes



About Your Training Leader

Ian Jackson is a nuclear consultant and author with 30 years' experience working internationally in both the public and private nuclear sectors. Ian successfully negotiated and secured funding for the £50 million UK-China nuclear Joint Research and Innovation Centre (JRIC) announced by British Chancellor George Osborne in 2015. Ian is a Fellow of the UK Society for Radiological Protection (FSRP) and a Chartered Radiation Protection Professional (CRadP). Ian's business books and technical publications include "Nukenomics: The Commercialisation of Britain's Nuclear Industry" (Nuclear Engineering International Books), "Nuclear Energy and Proliferation Risks: Myths and Realities in the Persian Gulf" (Chatham House), "Siting New Nuclear Power Stations: Availability and Options for Government" (UK Department of Trade and Industry) and "Effluent Release Options from Nuclear Installations: Technical Background and Regulatory Aspects" (Organisation for Economic Cooperation and Development).

Module Topics

Module 1

Introduction to commercial nuclear power technology

- How do nuclear power plants operate?
- What technology choices are available and what are the key differences?
- How does the nuclear energy market operate?
- What are the roles of the public and private sector in technology selection and procurement?
- What are the key global nuclear build trends today?
- How do different national energy policies affect reactor technology selection choices?

Module 2

Reactor safety, siting and electricity grid requirements

- What are the key stages of nuclear reactor build planning?
- What are the major requirements for nuclear reactor siting?
- How is reactor selection influenced by integration and expansion within national power grids?
- How does the nuclear safety and regulatory environment affect reactor technology?
- What are the key financial risks from nuclear accidents and how are these managed?
- What is Equipment Qualification and why is it important?

Module 3

Reactor construction value chain and supply chain opportunities

- Overview of nuclear reactor procurement programmes
- EPC, BOO and Turnkey contracting models
- Nuclear reactor build steps and construction value chain
- Supply chain demand modelling for different reactor designs
- Localisation of reactor construction supply chains

Module 4

Nuclear utility business models and market economics

- How are electricity markets being reshaped?
- What are contracts for difference and strike price mechanisms?
- How fast are nuclear costs rising and why?
- How could this impact funding arrangements?
- How are cost escalation risks perceived by private sector investors and the financial markets?
- How does this affect new nuclear project risk and WACC?
- What technical and management solutions are available?

Module 5

Commercial nuclear fuel supply and spent fuel reprocessing

- How does the nuclear fuel cycle operate?
- How is uranium fuel supplied?
- How do supply/demand/enrichment economics affect the uranium market?
- What is the value chain for fabrication of nuclear fuel and its pricing segments?
- What is the role of commercial spent fuel reprocessing?
- Under what conditions is reprocessing economic for utilities?

Module 6

Radioactive waste management infrastructure planning

- What are the technical options available for managing radioactive wastes?
- How can nuclear liabilities be managed successfully within a commercial energy market structure?
- What are the pricing mechanisms?
- What is Fixed Unit Price and Waste Transfer Price for disposal of Spent Nuclear Fuel?
- What commercial pricing strategies are available?
- How does the size of the nuclear power plant fleet change unit disposal pricing?
- What is the potential for disposal liability funding shortfalls?
- How can disposal costs be modelled and what are the key sensitivities to be considered?

Module 7

Nuclear decommissioning and deep geological disposal

- What are the key stages of nuclear decommissioning?
- How are nuclear reactors decommissioned in practice?
- Funding of nuclear decommissioning programmes
- Development of deep geological disposal facilities
- Capex and Opex cost structure of GDFs
- Impact of nuclear fleet size on repository scale and waste handling flexibility
- Radiological limits on repository size and its effect on pricing

All course modules will include extensive references to practical examples and case studies. The course is international in focus. The particular position of Asia and the UK will be highlighted including nuclear supply chain opportunities and service demand modelling. The course will draw extensively on lessons and recent experience from international nuclear build projects and their supply chains.

Course Agenda

TIME	DAY 1	DAY 2	DAY 3
8:30 - 9:00	REGISTRATION	MORNING COFFEE	MORNING COFFEE
9:00 – 10:15	MODULE 1 Introduction to commercial nuclear power technology	MODULE 4 – Part 1 Nuclear utility business models and market economics	MODULE 6 Radioactive waste management and infrastructure planning
10:15 – 10:30	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
10:30 – 12:00	MODULE 2 Reactor safety, siting and electricity grid requirements	MODULE 4 – Part 2 Nuclear utility business models and market economics	MODULE 7 Nuclear decommissioning and deep geological disposal
12:00 – 13:00	LUNCH	LUNCH	LUNCH
13:00 – 14:45	MODULE 3 Reactor construction value chain and supply chain opportunities	Nuclear reactor business case team exercise	Nuclear waste disposal financing team exercise
14:45 – 15:00	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
15:00 – 16:30	Nuclear reactor siting team exercise	MODULE 5 Commercial nuclear fuel supply and spent fuel reprocessing	Review of key nuclear lessons from the course and presentation of delegate certificates
16:30 – 17:00	CONCLUSION DAY 1	CONCLUSION DAY 2	COURSE COMPLETION



Please contact us at:

UK Telephone: 07809 485 337

International Tel: 0044 7809 485 337

Web: www.JacksonAssociatesInternational.com

Email us: www.JacksonAssociatesInternational.com/contact/