EDF EPR CONSTRUCTION EXPERIENCE
Fabrice TEMPIER – Nuclear Power Business Unit Director– EDF China
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FRENCH NUCLEAR INDUSTRY: JOINT FORCES FOR NEW BUILD & OPERATION

- GIFEN, Industry Group of the French Nuclear Energy

- Strategic Contract for the French Nuclear Industry signed on January 28th, 2019

EDF, LEADER OF THE WORLD CLASS FRENCH NUCLEAR INDUSTRY

- Third Industrial Sector
- 220,000 People Working in Nuclear
- 2,500 SME's Involved
KEY ASSETS OF INTEGRATING THE FRENCH NUCLEAR INDUSTRY FEEDBACK EXPERIENCE

**D&D**
Solid experience in decommissioning
9 units taken from operation to decommissioning

**Unique experience across the entire fuel life cycle**
with French industry

**A unique experience of nuclear services**
provided to more than 360 reactors all over the world (80% of capacity installed)

**European and world scale feedback in operation**
Around 1,700 PWR reactor-year of operation feedback
More than 70 reactors operated by the Group

**A strong and qualified nuclear workforce**
more than 75,000 employees capable to manage all the steps of NPP construction

**Recent experience of construction**
1 EPR in operation
3 EPR to be in operation in the coming months
2 EPR under construction
EPR GENIII+ DESIGN

Complementarity
(between active and passive systems)

Diversity
(Against Common Cause Failures)

Redundancy
(against single failure)

Diversified Emergency Diesel Generators

Core Catcher & Containment Spray

A COMBINATION OF DETERMINISTIC AND PROBABILISTIC SAFETY APPROACHES

4 train systems in 4 Safeguard Buildings

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EPR LICENSING EXPERIENCE

A ROBUST DESIGN ALREADY LICENSED IN 4 DIFFERENT COUNTRIES
EDF EPR under operation, commissioning or construction

- **EPR FLAMANVILLE 3**
  - The Reference Plant

- **EPR TAISHAN**
  - Unit #1: The First EPR in operation
  - Unit #2: preparation for COD

- **EPR HINKLEY POINT C**
  - First nuclear construction project in the UK in 30 years

Main EPR projects under development

- **EPR JAITAPUR**
  - The world largest nuclear power plant: 9.9 GWe

- **EPR SIZEWELL C**
  - A replication of EPR Hinkley Point C

- **EPR KSA PROJECT**
  - 2 EPR Units
EPR FLAMANVILLE 3 REFERENCE PLANT

GENERAL INFORMATION

- First EPR reactor in France
- Power output: 1,650 MW
- EDF combining its skills and responsibilities of Owner & Operator and Architect Engineer – 100% EDF ownership

CURRENT STATUS

August 2017
Nuclear circuit cleaning

August 2018
Functional tests vessel open successfully completed

February 2019
Start of hot functional tests

January 2018
Cold tests carried out

NEXT

4th Quarter 2019
fuel loading and start-up operation
**GENERAL INFORMATION**

- The first two EPR reactors in China
- Power Output: 1,750 MW each
- EDF as co-owner and co-operator – 30% EDF ownership
- Design adaptation to country’s tropical climate

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**CURRENT STATUS**

29 June 2018
Unit #1: grid connection

6 June 2018
Unit #1: 1st criticality

**NEXT**

13 December 2018
Unit #1 in Commercial Operation

10 December 2018
Unit #2: Start of hot functional tests

Second half of 2019
COD Unit #2
EPR HINKLEY POINT C: A NEW BUSINESS MODEL FOR NEW NUCLEAR THAT INSPIRES OTHER COUNTRIES

GENERAL INFORMATION
- First nuclear construction project in the UK in 30 years
- Power output: 1,638 MW each
- A certification process: Generic Design Assessment (GDA) requirements for reference plant EPR Flamanville 3 adaptations (used for HPC and SZC)
- Contract For Difference (CFD) guarantying a fixed price of electricity for 35 years
- 66.5% EDF ownership

CURRENT STATUS
- September 2016: Final contracts signed
- October 2013: UK Governments agrees Contract For Difference for HPC
- Mid-2019: 1st nuclear concrete
- March 2017: Reactor common raft first concrete successfully poured for power station galleries

NEXT
- 2025: COD Unit #1
- 2026: COD Unit #2
EPR SIZEWELL C: THE NEXT NEW BUILD IN THE UK

GENERAL INFORMATION

- 2 EPRs on the site of Sizewell totalizing 3,200 MW of capacity installed
- Project developed by EDF Energy together with CGN
- Replication of Hinkley Point C design

CURRENT STATUS

- Generic Design Assessment

SCHEDULE

- Site Survey
- Stage 2 Public consultation
- Stage 3 Public consultation
- Nuclear Site Licence Application

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JAITAPUR PROJECT – THE MOST POWERFUL SITE

**GENERAL INFORMATION**

- 6 EPRs on the site of Jaitapur totaling 9,900MW of capacity installed
- Scope of work & equipments manufacturing to be provided by Japanese companies
- First EPR reactors in India

**CURRENT STATUS**

*May 2018*  
Submission of Preliminary Commercial Proposal to NPCIL

*March 2018*  
India and France inked an agreement to expedite the JNPP project

**SCHEDULE**

*End 2019*  
Commercial & Technical offer to be submitted by EDF to NPCIL
KEY TAKEAWAYS

1. EPR is a safe and robust product meeting its promises with its first operational track record

2. Based on EDF experience, main success factors for project performance and long term safe operation are:
   • A stable and comprehensive regulatory framework
   • A strong control of the design (early design freeze, changes management, system engineering) and of the project performance
   • The early preparation and commitment of a knowledgeable Owner-Operator
   • The anticipation of supply chain development and strategic alliances (notably for deep localization ambitions)
   • Robust industrial and contractual schemes to align and incentivize projects participants with project objectives
   • A clear definition and allocation of risks among stakeholders

3. Most of all, quality and safety culture shall never be considered as granted

All lessons learned are managed to benefit to current and future EPR projects