EDF Group

NCLEAR GENERATION
LEADERSHIP CONFIRMED

Over 487 TWh generated, including:
+ 403.7 TWh in France
+ 60.5 TWh in the UK

59 REACTORS IN FRANCE

A global leader in electricity
- covering the entire business chain: generation, networks, sales & marketing, trading

An international group
- rooted in Europe and committed for the long term
- to partnerships and cooperation agreements
- In high-growth countries

A responsible group
- A code of ethics for the entire group
- 11 commitments as a responsible industrial firm, employer and partner

EDF, RESPONSIBLE FOR NUCLEAR SAFETY,
FROM DESIGN TO OPERATION AND EVEN DECOMISSIONING,
WITH A UNIQUE INTEGRATED MODEL TO
MASTER ALL THE PHASES, INCLUDING WORK SITE ACTIVITIES FOR CONSTRUCTION AND COMMISSIONING.
EDF EPR Flamanville 3 59th Reactor

3000 workers from companies on site + 700 EDF Staff (construction and operation)

Fully engaged for Start-up in 2016

8,5 Mds euros 91% availability

2 conditions for success on Work-site

- Health and Safety for 3500 men and women daily
- Quality of work, today for nuclear safety tomorrow

1 key factor for success:

WORKING TOGETHER
HEALTH AND SAFETY

identify risks…

An increasing number of co-activities

Constant awareness of risk, with a set of “red cards” to protect ourselves against major hazards (radiographic controls, lifting jobs, work at height, electrical hazards, …)

…and implement related resources…

Housekeeping on worksites: A visible safety booster supporting high professional standards on a daily basis.

Increasing leadership of 1st level manager: to be identified on the field using human performance tools such as prejob briefing obligatory to start the workday

…to reach 0 accident and high standards in operation
COLLECTIVE COMMITMENT

EDF, contractors, company and workers

Starting with training prior to first work access and large communication to all the workers

INDUSTRIAL SAFETY CHARTE

-19th June 2014 -
more than 2800 participants in the 9th

INDUSTRIAL SAFETY DAY

4 winning teams of the
FIRST SAFETY CHALLENGE
organised on site.
NUCLEAR SAFETY AND QUALITY
Reducing the probability of accidents:

- 4 independent systems
- External attacks taken into account:
  - Reinforces concrete shell

EPR: HIGHEST NUCLEAR SAFETY REQUIREMENTS FROM DESIGN STAGE

Most of key nuclear safety improvements have already been achieved:

- Severe accidents taken into account: the reactor water clean-up tank
- Severe accidents taken into account: the core catcher
EDF, as architect Engineer, is in charge of surveillance of suppliers activities to check the quality.

Each supplier provides its own quality program approved by EDF.

EDF surveillance is based on surveillance programs with check and hold points for design, manufacturing and site activities.

Dedicated quality action plan on site depending on deviations to set up corrective and preventive actions, and coming from feedback experience and lessons learned (e.g.: preservation of equipments).
NUCLEAR SAFETY AUTHORITY INSPECTIONS

Systematic points of interest during inspections:

- Construction quality (compliance with requirements): field visit in all cases
- Contractors documentation quality
- Processing of non-conformities
- Conservation/Housekeeping
- Surveillance by EDF

Around 20 inspections per year on worksite, about the same number for 2 reactors site in operation

Inspection reports all public on French Nuclear Safety Authority website
EDF SITE
MANAGEMENT
EDF FLAMANVILLE ORGANISATION

CONSTRUCTION AND COMMISSIONING TEAMS
(350 PEOPLE)

- To Master Contractors activities, with high focus on Quality by surveillance and all HSE/schedule/costs aspects
- To Coordinate multi-activities, with high focus on Industrial Safety, establishing and following overall schedule
- To lead commissioning tests, directly performs by EDF teams or by surveillance of contractors depending on contracts

OPERATION TEAMS
(350 PEOPLE)

- To prepare operation (training, writing procedures, implementation of the organization)
- To gradually take in hand and responsibility the plant, joined into the end of construction and commissioning tests.
CONSTRUCTION ORGANISATION: CONTRACT MANAGEMENT

- Contract management on HSE / Schedule / Costs aspects

10 major contractors representing 80% of global coast, but more than 150 companies on site including subcontractors.
Management of co-activities through integrated multi-disciplinary, organised by building, with focus on Industrial Safety and Overall Site Schedules.

CONSTRUCTION ORGANISATION: CO-ACTIVITIES MANAGEMENT

LEVEL 1 SCHEDULE: OVERALL PROJECT (~300 tasks)
LEVEL 2 SCHEDULE: OVERALL PROJECT (~10,000 tasks)
LEVEL 3 SCHEDULE: SITE PREPARATION 6 MONTHS (~5000 tasks)
LEVEL 4 SCHEDULE: SITE REALISATION 4 WEEKS (~2000 tasks)
FROM CONSTRUCTION TO OPERATION:
EDF UNIQUE INTEGRATED MODELE FOR COMMISSIONING

**Construction**
- Mechanical: hydro tests
- Electrical: continuity and insulation

**System Tests**
- Individual system tests

**Overall tests**
- Integrated systems functional tests
- Power escalation & performance

**Operation**
- Operation group: in charge of pre-operation (following start-up program instructions) and operation

**Commissioning group**: in charge of tests and reports
- Take-over for commissioning
- Take-over for Temporary Operation
- Plant take-over for Nuclear Operation

**Commissioning organisation**
- Perform the commissioning tests
- System test management and performance
- Technical assistance for system operation
- Leading performance of tests
- Technical assistance for plant operation and nuclear safety

**Operating organisation**
- Support to Commissioning organisation
- System operation, monitoring and maintenance
- Plant operation and maintenance
- Nuclear safety

**Gradual approach of safety oversight from classical to nuclear**
CURRENT SITE PROGRESS
2014 ACTIVITIES IN LINE WITH 2016 TARGET

CIVIL ENGINEERING

End of Reactor Building Internal Containment

Pre-stressing in progress

MAIN PRIMARY SYSTEM

Entry of the vessel

Entry of the first steam generators

welding of the Reactor Coolant System

MECHANICAL ASSEMBLY

Entry of the diesel engine

Entry of the fan units

Cooling system

Fire protection systems
2014 ACTIVITIES IN LINE WITH 2016 TARGET

MAIN CONTROL ROOM
5 June: inauguration of the main control room

ELECTRICAL DISTRIBUTION
Cable pulling
Cabling of the penetrations

POOLS AND WATER STORAGE
Spent fuel pool leaktightness approved on 9 June

TESTING
Hydrostatic testing on part of the cooling system

Hydrostatic testing on the first Moisture Separator Reheater System (GSS)
First test of a pump’s engine of the cooling system
EPR FAMILY

Partnerships to share experience and improve practices together:

- construction,
- commissioning,
- operation
COLLECTIVELY BUILD AND MANAGE THE MAJOR PROJECT OF FLAMANVILLE 3 EPR
Men and women involved in the project on Site

- **700 EDF employees**
- **3000 workers from companies**
  - 56% local workers
  - 19% foreigners
- **28 million hours** since the start of construction

A key strand: Training and employment in our region

3200 positions directly filled on site thank to 3400 job offers

717 people hired on completion of training (88% success) including **295 “return to work” contracts**

55 000 hours of training in 2013 (540 000 hours since the start)
Local development and integration

- Regional development of the Grand Chantier support program
- Contractor association with EDF, in charge of accommodation, catering and transportation
- An association for recreational activities and a concierge service

Work-Site Social Responsibility

- A unique Oversight Committee chaired by EDF with 5 trade union organisations. It serves as a source of information as well as a forum for exchange, discussion and regulation of labour-related issues.
- A reference publication brought out in 2013 to provide workers with more information on the general principle of labour legislation, in several languages
LOCAL COMMUNITY LIAISON COUNCIL

This council provides the public with general safety information, confirmed by the 2006 law “Nuclear Safety & transparency”

The council is competent in the areas of communication, health and safety of the local population, directly or indirectly (e.g. effects on farming, water, environment, etc.).

It seeks to minimise risks relating to these facilities, including in the event of an emergency, by providing the local population and stakeholders with reliable information.

3 to 4 meetings a year, including at least one site visit per year
EDF EPR FLAMANVILLE 3 THANKS FOR YOUR ATTENTION
APPENDICES
FA3 FIRST-OF-A-KIND SCHEDULE CONSISTENT WITH PREVIOUS EDF PLANTS, WITH x2 QUANTITIES

**EPR quantities vs. N4**
- Concrete: x1.8
- Rebars: x3.5
- Pipes x1.7

**Historical duration of EDF 58 reactor fleet**

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- **N4 - 1500 MWe**
  - 34 units
- **1300 MWe**
  - 20 units
- **EPR - 1650 MWe**
  - 4 units

- **FLA3**
  - 108

EDF
FROM BASIC TESTS TO SYSTEM PERFORMANCE TESTS

1. Basic tests
2. Testing of one loop
3. Testing of plant system
4. System performance tests

Prior to fuelling
Tests up to 100% power

Equipment installation
Power supplies
Valves
Pump
Heat exchangers