EDF Nuclear plant under decommissioning programme

CIDEN organization

Projects achievement
Content

- EDF Nuclear plant under decommissioning programme
- CIDEN Organization
EDF Nuclear plants in France

In operation: 58 PWR nuclear plants

34 PWR 900 MW
20 PWR 1300 MW
4 PWR 1450 MW

On 19 sites

PWR: Pressurized water Reactor
EDF nuclear plants under decommissioning

- **9 reactors under decommissioning**

  1. **Pressurized water reactor (PWR)**
     - Chooz A (300MW) : 1967-1991

  1. **Heavy water reactor**
     - Brennilis (70 MW) : 1967-1985 (EDF/CEA)

  6. **Gas graphite reactors (UNGG)**
     - Chinon A1 (70MW) : 1963-1973
     - Chinon A2 (200MW) : 1965-1985
     - Chinon A3 (480MW) : 1966-1990
     - Bugey 1 (540MW) : 1972-1994

  1. **Fast Breeder reactor**
     - Creys-Malville (1240MW) : 1986-1997

- **Graphite sleeves silos at St Laurent A**
Decommissioning strategy (1)

- To perform total decommissioning of 9 reactors within 25 years in tow waves
  - 8 reactors so called “first generation reactors”
  - Creys-Malville

- First wave of decommissioning gathering:
  - Brennilis,
  - Creys-Malville,
  - Chooz A,
  - Bugey 1,

- Second wave of decommissioning with
  - the last 5 GGR (Chinon A1, A2 et A3, Saint-Laurent A1 et A2).
  - And graphite sleeves retrieval from St Laurent silos.
Decommissioning strategy (2)

Decommissioning chronology is based on the following considerations:

- For Brennilis, EDF and CEA undertook to do decommissioning by the horizon 2015 therefore Brennilis must be inside the first wave,

- Creys.Malville belong to the first wave for the same reason with a decommissioning schedule over 25 years,

- Chooz A, is the only PWR reactor and belongs to the first wave as regard to the strategic impact of PWR decommissioning feed back,
Gaz Graphite Reactors have technical and waste generic aspects:

- Regarding graphite retrieval and treatment.
- Regarding decommissioning technique and high volume concrete management.

EDF decided to perform a first in line GGR decommissioning to develop decommissioning technique to be adapted to other GGR, and consolidate the operation safety.

Bugey has been chosen as the first in line reactor because:

- Its radiological state - no alpha inside the bunker.
- Bugey SG integrated technology, assuming that decommissioning difficulties will cover all GGR decommissioning issues.
- The good progress of level 2 working phases allowing to prepare easily the level 3 working phases.
GGR – Decommissioning strategy

- GGR under water decommissioning with Bugey first in line for St Laurent A1 and A2, Chinon A3
- GGR on air decommissioning with Chinon A2 first in line for Chinon A1
  - Strategic port folio issued 2004 and revised 2009

Five “rules” have been guiding the GGR strategy

- EDF attitude since 2004
- Strategic port folio include an internal structure resistance justification
- Graphite retrieval « not after the year 2022 horizon »
  - Writing from French safety authority dated April 2010
- Graphite retrieval in serie to avoid the future disposal center saturation
GGR – Decommissioning strategy

- GGR decommissioning strategy is global – reactors decommissionings are interconnected and linked to graphite waste route

**GGR schedule guided**

1. Feed back from Bugey
2. Graphite retrieval in serie
3. High value tooling reusing (to be confirmed)

- Bugey 1 St Laurent A1 St Laurent A2 and Chinon A3 decommissioned under water
- Chinon A2 and Chinon A1 decommissioned on air
Decommissioning programme
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CIDEN inside EDF

Power Plants Directorate

Direction Production-Ingénierie

Autres Directions

Division Combustible Nucléaire
DCN

Division Production Nucléaire
DPN

Division Ingénierie Nucléaire
DIN

Division Production Ingénierie Thermique
DPIT

Division Production Ingénierie Hydraulique
DPIH

Division Services
DS

CNPE
(des sites en déconstruction)
Bugey
Chinon
Chooz
Saint Laurent

Unités d’Ingénierie
CIPN
CNEN
CNEPE
SEPTEN
CEIDRE
Decommissioning responsibilities in EDF organization

Public

- Nuclear operator (NPP ou CIDEN)
- Owner Master builder (CIDEN)
- Study programme implementation:
  - Budget
  - Scheduling
  - Technical aspect
  - Security (1994’s decree)

- Evacuation
- Schedule

SAFETY AUTHORITY

- ANDRA and other waste producer
- Suppliers
  - Studies and works

Nuclear safety
Radioprotection
Environment
Waste producer
CIDEN Project management

CIDEN Organization IS focusing on project management with supporting structure

- Baker Engineering division director
- Strategic program management CIDEN deputy director
- Operational project management Project manager
CIDEN Organization

Director
Alain ENSUQUE
Deputy directors
Philippe BERNET– Gilles LABRIAUD

- Human Resources
- Financial Management
- Management System
- Risk Control
  (Nuclear safety, conventional security, health physics, environment)
- Programme Management
  - Communication

Cost Control

Informatics, Provisional and Logistic Department

Project manager

- Brennilis
- Bugey 1
- Chinon A and Saint Laurent A
  - Niv 2
  - Niv 3
- Chooz A
- Creys-Malville
- ICEDA
- Back end of nuclear fuel ANDRA wastes storages
  - Environment
  Support to operating units
  - EPR International
    - ISM
    - Futur of AMI

Dismantling Works and Operation department

- Brennilis
- Bugey 1
- Chinon A
- Chooz A
- Creys
- Saint Laurent

Scopes
- Operations / Wastes
- Dismantling Works

Engineering Studies Department

Specialized Branches

- Decommissioning
- Risks control and Process
- Environment
Reporting - Data management at various levels

● Strategic level, for CIDEN management and backer

 Long term vision (scheduling, reference costs, waste, technical reference scenario)

- A data book updated every 3 years: strategic scheduling, important hypothesis, expenses, engineering and operation resources, waste production by project and sub project and spreading until the end of project
- Risk and solution analysis
- Prepared by program manager and project managers
- Project agreement by project

 Mid term vision (5 years): Mid Term Plan include key stones and allocated resources

- Global indicators allowing to control the projects evolution and data book adequacy: working and financial progress
- Consolidated by program management
- Risk review (semester)

 Annual vision N+1: Annual Achievement Contract includes annual important step and allocated resources

- Monthly checking of business indicators (program management), project expenses and hours (financial support)

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Reporting - Data management at various levels

- **Program/project level for CIDEN management**
  - Annual peer review (project team), quarterly project management chart examination, quarterly report (Program management)

- **Operational level, for project manager and project team**
  - Studies and works plan allowing resources allocations on each projects (project team)
  - Project scheduling quarterly updated according with resources allocations (planner, program management)
  - Project expenses monthly checking and new forecasting (financial support)
  - Project technical progress checking : significant actions (hierarchy, technical department)
  - Project risk management (action plan, progress): project team Lotus Notes software

- **Short term operational level, for project team and technical department**
  - Project weekly meeting to coordinate short term operations
  - Work detailed scheduling update (site, weekly basis)
  - As much as necessary treatment of real time issues (by useful means)
Planning used for project management

Project planning software Planisware (OGOPA), with milestones planning sharing.
Project quarterly management chart: global management

- Digest data from various CIDEN structures and purchasing division

- Objectives control
- Significant actions
- Call for bid control
- Work progress
- Works remaining
- Realized expenses PGI
- MGP Finance
- MGP Program management

- Project manager
- AAICS Purchase

Consolidate by MGP through data from Planisware and PGI Software quarterly updated

EDF/JARCOOPERATION AGREEMENT
Deadline, achievement and cost

Management chart include 6 charts for each project:

- **Deadlines**
  - Work indicators and project milestones control

- **Achievement**
  - Project work and financial progress
  - Significant actions achievement
  - Important contract and call for bid up to respectively 4.5 M€ and 3 M€

- **Costs**
  - Realized purchase and others expenses

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**Example of work indicator and project milestone chart**

**Example of significant actions chart**

**Example of purchase and other expenses chart**
Work and finance progress indicator

Following Baker requirement work progress indicator is calculated and issued on a quarterly basis:

- Subproject ratio is proportional to its financial ratio within the project.
- Each subproject includes limited representative tasks or operations. Progress measurement is based on unit of work (% miles stone, waste weight), with a ratio proportional to the task or operation cost within the subproject.
- Passed mile stone are recorded and compared to the program reference and the new forecast (Excel file).

Work progress indicator is compared to the project financial progress ratio.

Allow to globally know if projects and programme are progressing in the same way and if expenses progress is coherent with works progress (time evolution comparison).
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# Project regulatory achievement

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<th>Public enquiry</th>
<th>Decommissioning /creation decree</th>
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<tr>
<td>Creys Malville</td>
<td>06/05/03</td>
<td>April 04</td>
<td>21/03/06</td>
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<td>Brennilis</td>
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<td>27/07/11 (partial)</td>
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<td>Chooz A</td>
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<td>Bugey 1</td>
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<td>St Laurent A</td>
<td>11/10/06</td>
<td>January 07</td>
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<td>Chinon A3</td>
<td>29/09/06</td>
<td>March 07</td>
<td>18/05/10</td>
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<tr>
<td>ICEDA</td>
<td>05/10/05 (creation)</td>
<td>June 06</td>
<td>23/04/10 (creation)</td>
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<tr>
<td>Chinon A1 A2*</td>
<td>/</td>
<td>/</td>
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</tbody>
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*Plants in care and maintenance situation*