Decommissioning experience of INPP (Lessons learned)

Lessons learnt

Already important lessons learnt

Lessons learnt in all spheres:
- organisational
- technical
- financial

☑ Positives to commend (DOs)
☒ Negatives to avoid (DON'Ts)

The following are examples…
Lesson #1: Staffing

- **Staffing was a key factor in immediate dismantling:**
  - INPP: by far main employer in local region
  - operators have essential knowledge of INPP technologies

But...

- **Lack of vision on operating company’s future role:**
  - required **decommissioning skills**
  - flawed retention/dismissal strategy

But...

- **Lack of vision on operating company’s future role:**
  - required **decommissioning skills**
  - no “make or buy” strategy
    - unclear which activities should be in-house vs contracted
    - poor understanding of financial and risk criteria
    - evolution of approach in several fields

<table>
<thead>
<tr>
<th>Activity</th>
<th>In-House</th>
<th>Contracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decommissioning engineering</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Radiological characterisation</td>
<td>Mostly</td>
<td>Mostly</td>
</tr>
<tr>
<td>Metal inspections</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Low-skill dismantling tasks</td>
<td>All</td>
<td>Under review</td>
</tr>
</tbody>
</table>
Lesson #1: Staffing

- **Staffing was a key factor in immediate dismantling:**
  - INPP: by far main employer in local region
  - operators have essential knowledge for decommissioning

But...

- **Lack of vision on operating company’s future role:**
  - required decommissioning skills
  - no "make or buy" strategy
  - impact of age distribution
  - not good for physical activities
  - use contractors or develop in-house?

**LESSONS LEARNT**

- **DO** consider using operational staff for decommissioning
- **DON’T** do so without an in-depth organisational strategy
Lesson #2: Organisational structure

Three phases of decommissioning organisational structure

**Phase 1 (pre-closure / 2001-2009)**
Completely separate project management unit “Decommissioning Service” for investment projects and decommissioning planning

- **Drawback:** lack of operator input to investment projects

**Phase 2 (post-closure / 2010-2014)**
Investment project management merged into former operational divisions within Technical Directorate

- **Drawback:** lack of project management skills in former operational staff

**Phase 3 (from 2015)**
- Project management service established within Technical Directorate
- Further organisational changes are under implementation

**LESSONS LEARNT**

- **DO** ensure good communication but...
- **DON'T** use operators as project managers without retraining

Lesson #3: Relation with the Contractors

Good relations with the Contractors while INPP in operation

- projects are financed through own INPP recourses – more flexibility
- staff more motivated for operation purposes orientated projects

- **But for decommissioning** ...

Limiting factors are:
- more strict financing control from the stakeholders / sponsors
- poor operator’s language’s / project’s / contract’s management skills
- differences in regulating frameworks of foreign Contractors (nuclear / civil construction / health and labour safety, etc.)

**LESSONS LEARNT**

- **DO** establish a good relations with the contractors (common rules)
- **DO** develop language / communication / project management skills
- **BE** proactive:
  - explain the initial conditions as far as possible
  - support the Contractor as far as possible
- **DON'T** use preferential engineering
- **DON'T** ”fight” with the Contractor – try to resolve / agree / use contract’s provisions
Lesson #4: Relation with Regulator / Nuclear regulation

Regulation system established while INPP in operation
- effective in maintaining operational safety at INPP
- good relationship between plant and regulator

But for decommissioning …
NPP must be more proactive in ensuring:
- information provided is appropriate to regulator’s needs
- timetable for submittals/approvals is established and followed
- close communication with regulator (daily / weekly / monthly)
- to be involved in regulation documentation preparation / changes tracking

LESSONS LEARNT

☑️ DO establish a specialist group to liaise with the regulator
☑️ DO make a positive view of the projects for Regulator
❑️ DON’T make regulator to be a court between the Employer and the Contractor

Lesson #5: Risk / Risk Management

Need to establish framework for risk management
- Not considered during operation – only nuclear risks are considered in frame of SARs
- Not familiar to operational staff

Approach adopted
- Integrated approach using a common framework adopted
- Joint Contractor/Employer Project Risk Registers and periodic reviews
- Project Risk Action Tracking
- Opportunities exploited

LESSON LEARNT

☑️ DO ensure that Risk Management process is in a place.
Lesson #6: Technical (Spent fuel as example)

Dry spent-fuel storage casks
- proven cask design in use since 2000
- in the frame of decommissioning: tender led to innovative large-cask concept → fewer casks → cost savings!!

But...
Lack of appreciation of:
- impact of bigger size and weight to existing systems
- resulting engineering challenges
- complexity of licensing process
→ defuelling is now 7 years behind original schedule

LESSON LEARNT

DON’T re-invent already proven solutions

Lesson #7: Schedule

Delays due to external factors
Extensive delays in:
• de fuelling (due mainly to new cask design)
• construction of waste processing/disposal facilities (various reasons)

But...
Still possible to make good progress in dismantling due to:
- focus on removal of lower categories of waste
- extending buffer storage areas for removed materials
- large areas to dismantle with no impact on spent fuel route

Λ→ 40% of dismantling (by mass) possible with fuel at NPP

LESSON LEARNT

DO maintain flexibility in the decommissioning plan
Lesson #8: Use of existing infrastructure
INPP is a “decommissioning island”

On completion of “green-field” with “brown spots” decommissioning (2038)
the active residues of the entire plant will be disposed of, or in storage, on its own site.

Disposal Facilities
- Near Surface Repository (LLW)
- Landfill (VLLW)
- Bituminised Waste Repository
- Industrial waste disposal

Interim storages
- Spent fuel dry storage #1 (old-type casks)
- ... ... ... ... #2 (new-type casks)
- Irradiated graphite storage
- Interim solid waste storage (B4)

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Many advantages:
✓ Dismantling and waste issues can be fully coordinated
✓ Short distances and no transport of waste on public roads
✓ Single site supervision at the completion of decommissioning

LESSON LEARNT
✔ DO consider possibility of autonomous decommissioning

Lesson #9: Cost estimation

Obviously essential to make cost estimation

But:
• Impossible to assign accurate costs to activities never done before
• Difficult to perform cost planning for a project lasting 30+ years
  - real and inflationary costs increases
  - possible new technologies
  - involving strict regulatory framework (also a subject of update)
• Lack of access to information:
  - not all information is available from designer
  - decommissioning costs at other plants
• Highly interactive cost base (difficult to explain to funding bodies)

LESSONS LEARNT
✔ DO regularly review and update cost estimations
✔ DO be careful how you explain cost estimations to stakeholders!
Lesson #10: Cost control

1) Construct overall cost estimation
2) Carefully monitor spending according to estimation

Appears straightforward but:
• Technical staff more guided by milestones and metrics
• Spending can exceed planned cost due to (inter alia):
  – lower than expected efficiency
  – no proper risks evaluation
  – poor planning
• Overspending often not detected until it has become serious
• Need methodology to monitor and predict cost changes
  ➔ Earned Value Management
  (currently being introduced at INPP with monthly review)

➔ LESSON LEARNT

☒ DON’T rely on technical monitoring for cost control

Lesson #11: Financing resources

Importance of having adequate financial resources at the right time is widely recognised (including in EC Recommendation)

But:
• INPP has limited decommissioning fund due to:
  – no provision enough during operation and lack of opportunity thereafter
  – disproportionate scale of the required funding (∼10% of GDP)
  ➔ wholly dependent on EU and State budget resources
Ignalina NPP decommissioning activities are co-financed by the European Union.

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  - disproportionate scale of the required funding (~10% of GDP)
    ⇒ wholly dependent on EU and State budget resources
    ▪ Government cycle = (not more than) 4 years / Budget: annual
    ▪ EU financial cycle = 7 years
    ▪ INPP decommissioning = 30+ years
• Current funding deficit to completion approx. 1.6 billion euro
• Without additional funding, it may not be possible to operate the waste management facilities in which major investment is already made

LESSON LEARNT
☑ DO ensure stakeholders understand impact of limited resources
Conclusions

Based on lessons learned and experience gained, INPP can now:

– better manage and motivate its staff and make more informed judgments on make-or-buy questions
– move ahead efficiently with dismantling despite unforeseen external problems
– ensure effective communication with regulator reducing the regulatory burdens according to decommissioning needs
– make more realistic planning of further activities and costs
– better control its costs and workload
– more smoothly realize the decommissioning process in future (subject to the availability of funding to do so)
– communicate potential implications of inadequate funding to the stakeholders

Thank you!