




# Decommissioning experience of INPP (Lessons learned)

Technical Seminar No.1  
Dismantling of nuclear facilities

Visaginas, Lithuania, 07-11.09.2015  
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## Lessons learnt

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### 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...



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## 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

Period	Operation staff	Decommissioning staff	Total Staff
2001-2003	4600	0	4600
2004-2009	3900	500	4400
2010-2015	2000	600	2600
2010-2015	0	2142	2142

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## Lesson #1: Staffing

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**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

Activity	Current Approach	Target Approach
Decommissioning engineering	All contract	All in-house
Radiological characterisation	Mostly contract	Mostly in-house
Metal inspections	All in-house	All contracted
Low-skill dismantling tasks	All in-house	Under scrutiny

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## 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?

Age Group	2015	2022
≤ 25	23	0
26-30	104	10
31-35	117	60
36-40	142	111
41-45	179	150
46-50	230	158
51-55	654	177
56-60	571	456
61-65	118	716
> 66	4	304

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## Lesson #1: Staffing

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

**But:**

- **Lack of vision on operating company's future role:**
  - required decommissioning skills
  - no "make or buy" strategy
  - impact of age distribution
  - lack of motivation (due to all of the above)

**→ LESSONS LEARNT**

- DO** consider using operational staff for decommissioning
- DON'T** do so without an in-depth organisational strategy

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## 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

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## 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

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## 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

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## 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.

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## Lesson #6: Technical (Spent fuel as example)

### Dry spent-fuel storage casks

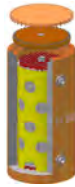
- proven cask design in use since 2000
- **in the frame of decommissioning:** tender led to innovative large-cask concept → fewer casks → cost savings!!

**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**



**Old-type cask**  
Capacity: 51 assemblies  
Diameter: 2.34 m  
Empty cask weight: 71.5 t  
Loaded cask weight: 86.5 t




**New-type cask**  
Capacity: 91 assemblies  
Diameter: 2.63 m  
Empty cask weight: 91 t  
Loaded cask weight: 118 t

- 30 t heavier
- bigger size

**→ LESSON LEARNT**

**☒ DON'T** re-invent already proven solutions

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## Lesson #7: Schedule

### Delays due to external factors

**Extensive delays in:**

- defuelling (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

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

**→ LESSON LEARNT**

**☒ DO** maintain flexibility in the decommissioning plan

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## 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.

<p><b>Disposal Facilities</b></p> <ul style="list-style-type: none"> <li>- Near Surface Repository (LILW)</li> <li>- Landfill (VLLW)</li> <li>- Bituminised Waste Repository</li> <li>- Industrial waste disposal</li> </ul>	<p><b>Interim storages</b></p> <ul style="list-style-type: none"> <li>- Spent fuel dry storage #1 (old-type casks)</li> <li>- ... .. #2 (new-type casks)</li> <li>- Irradiated graphite storage</li> <li>- Interim solid waste storage (B4)</li> </ul>
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## Lesson #8: Autonomy

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## Lesson #8: Autonomy

### INPP is a “decommissioning island”

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the active residues of the entire plant will be  
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#### Disposal Facilities

- Near Surface Repository (LILW)
- 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)

#### 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

#### LESSONS LEARNT

- ☑ **DO** consider possibility of autonomous decommissioning



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## 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!



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## 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**

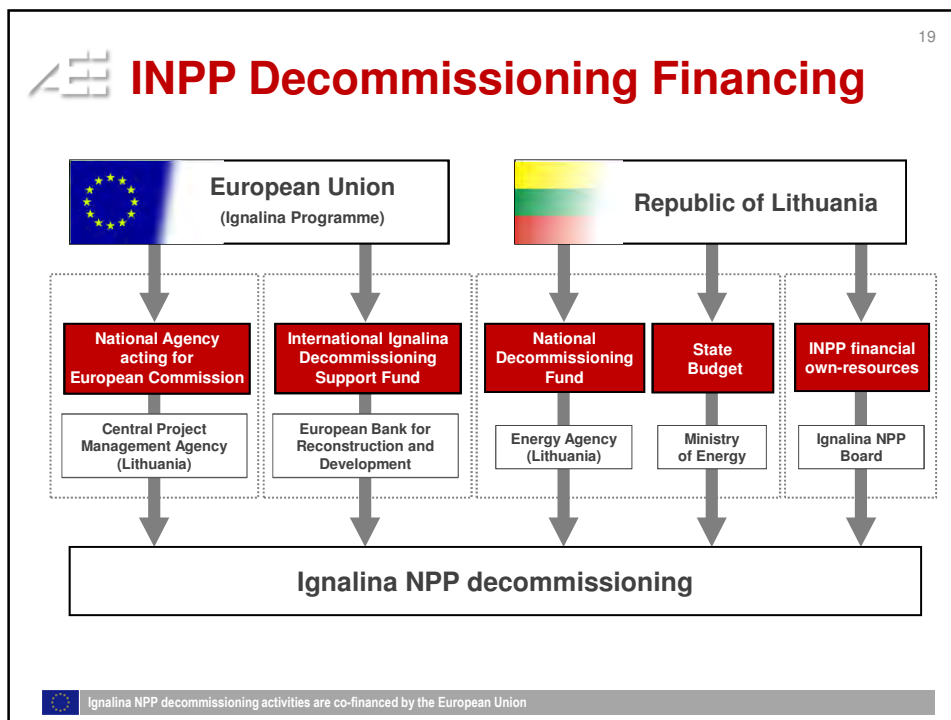
**☒ DON'T** rely on technical monitoring for cost control

## 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**



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**→ 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**

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## Conclusions

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### 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



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## Thank you!



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