



Recycling and Reuse of Materials from NPP Decommissioning

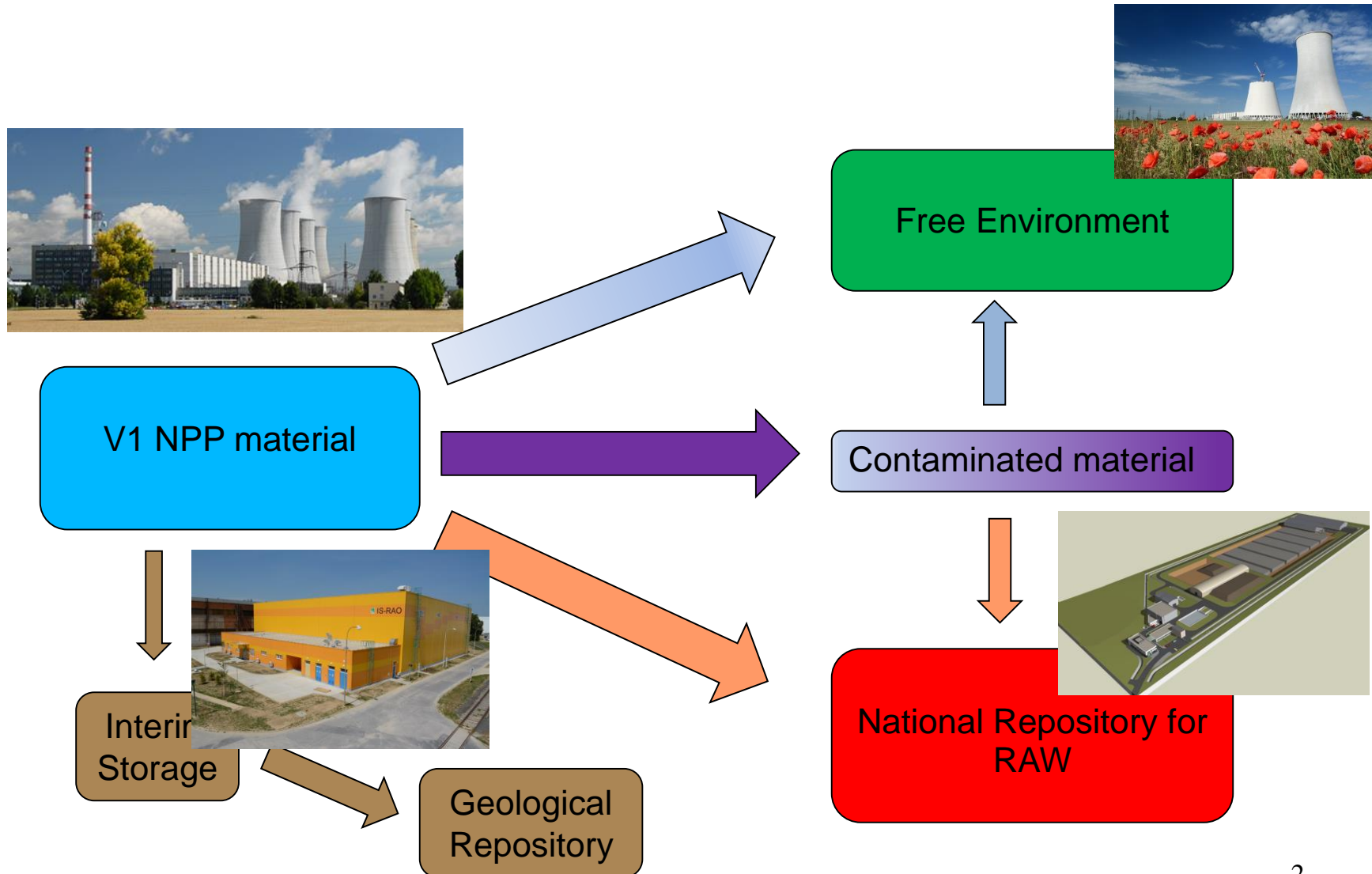
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**International workshop on Application of Sustainability Principles
and Circular Economy to Nuclear Decommissioning**

Rome

18.-21.6.2019

Kilowatts and money are replaced by kilograms and invoices



Although conditions and method for decommissioning and recycling of dismantled materials are always

**country/facility/site/stakeholder/repository/etc.
specific,**

there is still one feature that rules to them all:

**Never ever move anything at all, unless you have
prepared and made ready facility for its final
destination!**

Waste or secondary (recycled) sources?

Dismantled non-contaminated materials = waste ?

Not necessarily

Current approach – to free release as much as possible
(or the waste costs will skyrocket)



99 % of material volume can be free released (and recycled)

The question is:

How much time is necessary to devote for more (and more (and more)) detailed sorting?
(as the “purer” material provides higher prices)

Answer:

It is a function of time and money*
(estimated costs vs. expected financial/economical profit)

* Flavoured with a grain of politics

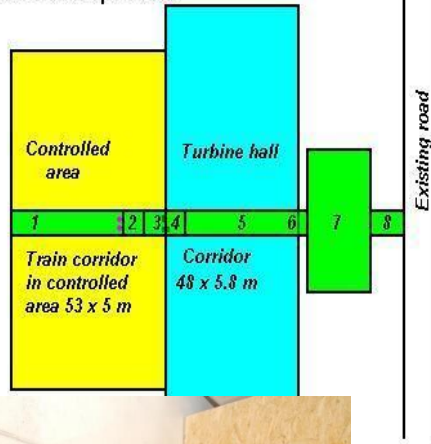
Everything dismantled has to leave the facility as quickly as possible!

(Since every day spent in the nuclear facility decreases its absolute monetary value – due to building up the costs for its storing, safeguarding, moving to/from buffer storages, needed manpower and bureaucracy, etc.)

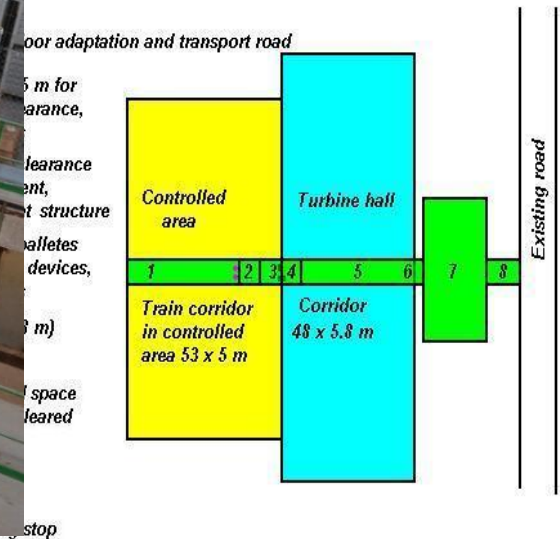
Safeguards and bottlenecks

1 thru 5: Corridor floor adaptation and transport road

- 2 Closed space 5 x 5 m for palletes before clearance, netting from sides
 - 3 Closed space for clearance - devices, equipment, room - light-weight structure
 - 4 Closed space for palletes and manipulation devices, netting from sides
 - 5 Corridor (wide 5.8 m)
 - 6 New gate
 - 7 Reinforced closed space for palletes with cleared material 8 x 20 m
 - 8 New road
- Moved derailing



Free release of materials from the controlled area is time demanding – don't create bottlenecks on way out!



Executing the circular economy (recycling):

- ✓ **Internaly** (on site of the nuclear facility)
- ✓ **Externaly** (shipped out of the nuclear facility)

Internal recycling – concrete debris



Internal recycling – concrete debris (2)



Internal recycling – concrete debris (3)





One general buyer of scrap metal from decommissioning

- Automatisatisation of processes (less paperwork, logistics,...)
- Higher prices due to large volumes of scrap metal
- Long period contract – no need to permanently bid for best price
- Contract tailored to the needs of the current stage



Separate place of the equipment's fragmentation from the place of dismantling

Pros:

- Allows parallel implementation of both activities
- Different technical tools may be required/sufficient
- Better use of buffer storages
- Lower fire protection issues



Cons:

- Requires precise specification of the material flow and
- Rigorous inspection by the operator

Change type of transportation: from trucks to trains

Pros:

- Faster and cheaper in greater volumes
- Low impact on the surrounding traffic/villages/stakeholders

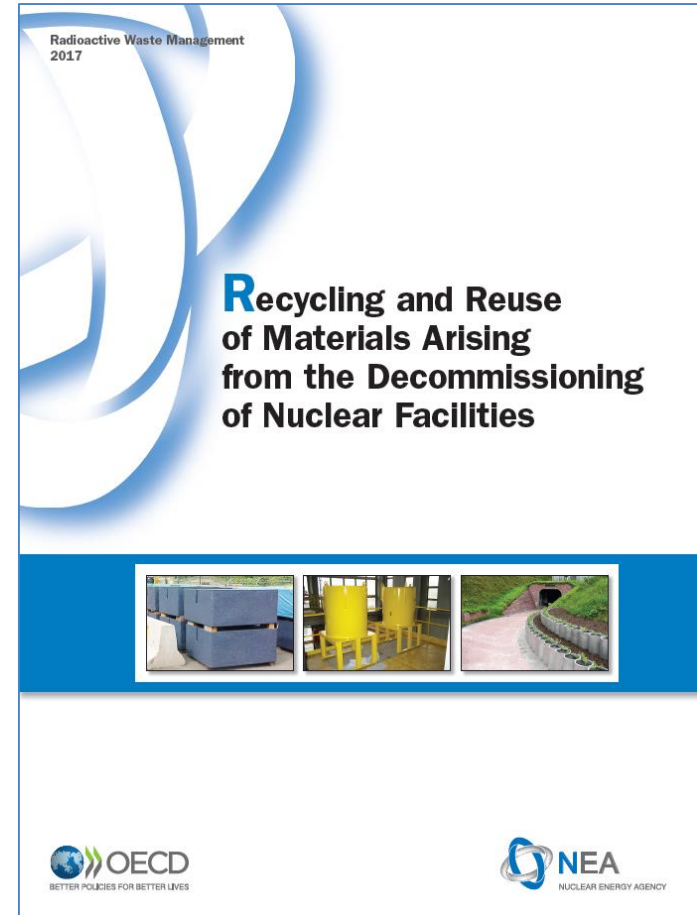
Cons:

- Mass weight and radiation monitoring must be installed

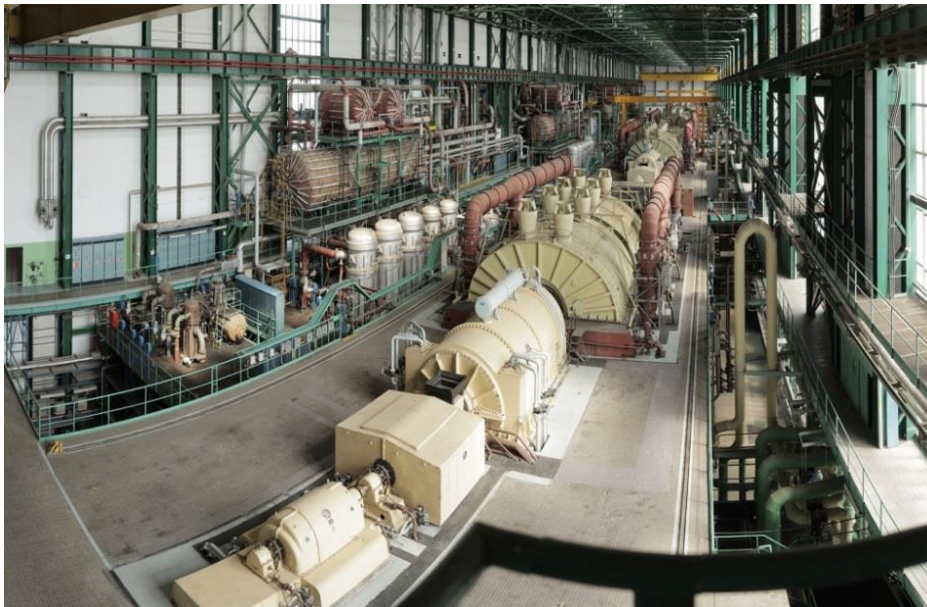


Current TR on Recycling and Reuse of Material

- **Methodology:** Survey, results summarized in a report
- **Status: Published in 2017**
- Key conclusions
 - Case histories show that release of materials is feasible and cost effective
 - Key drivers for recycling are generally the lack of disposal facilities and the comparison of costs between recycling options and disposal
 - Stakeholder acceptance of R&R remains a barrier
 - Instrumentation may not be capable of meeting the requirements of risk-based very stringent clearance standards



Re-use of the history – Document “Before and After”



Re-use of the history – Museum/school exhibition





Thank you for
your attention