

# IAEA activities related to RWM and small inventories

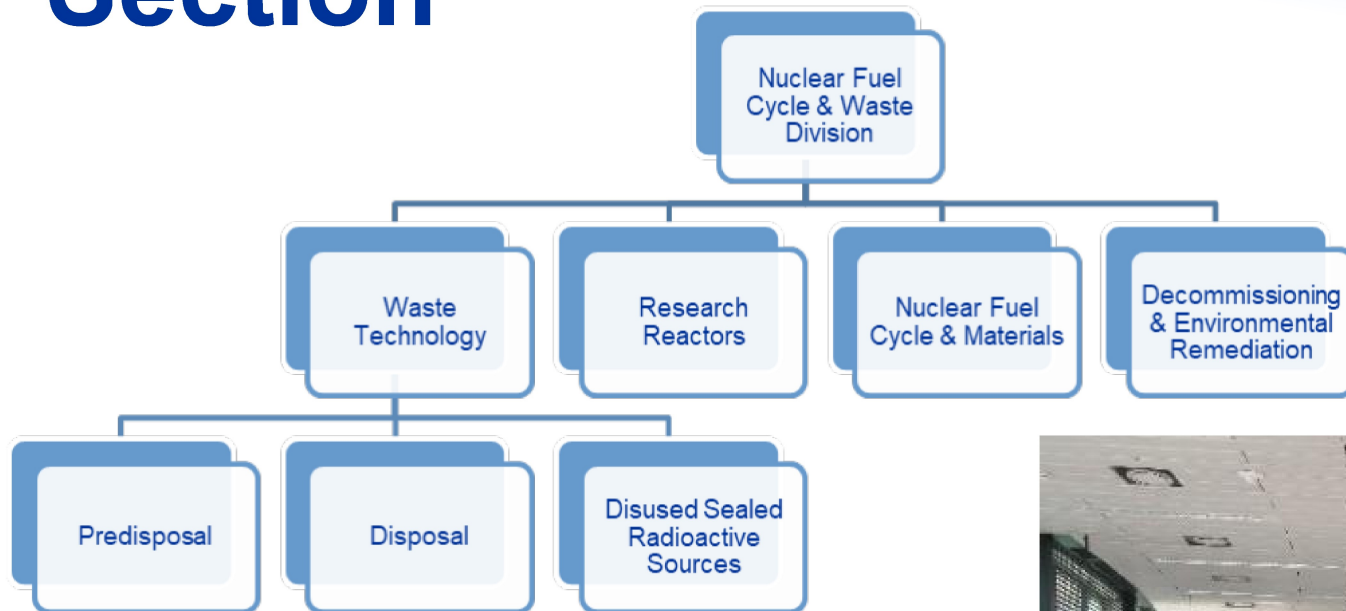
Rebecca Robbins & Stefan Mayer

Waste Technology Section

Division of Fuel Cycle & Waste Technology



# IAEA's Waste Technology Section

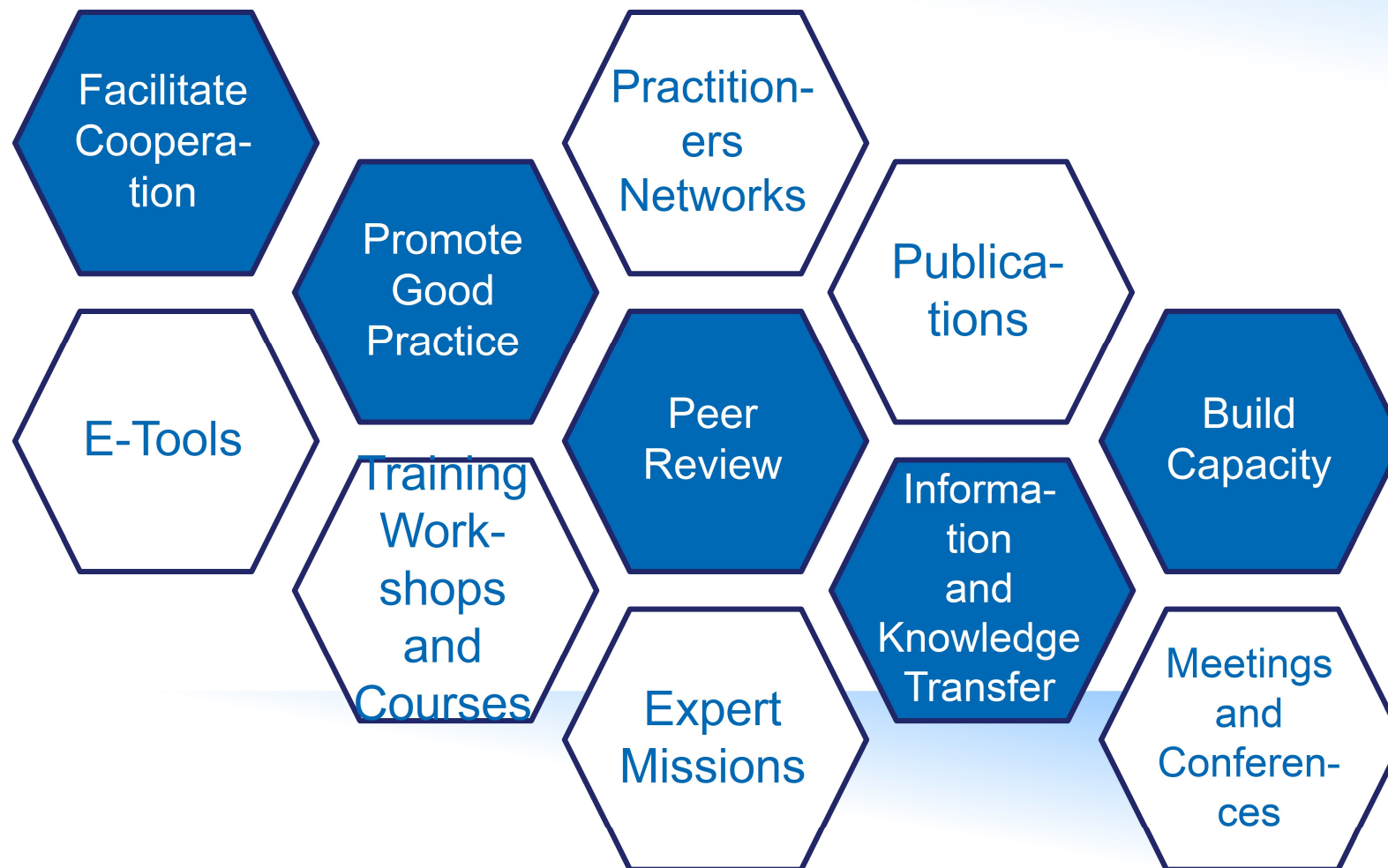


**WATEC Advisory Committee**

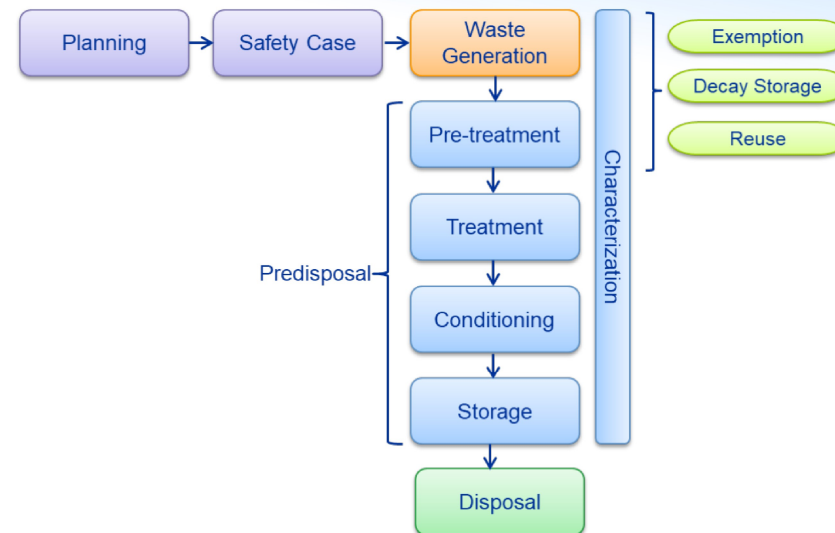
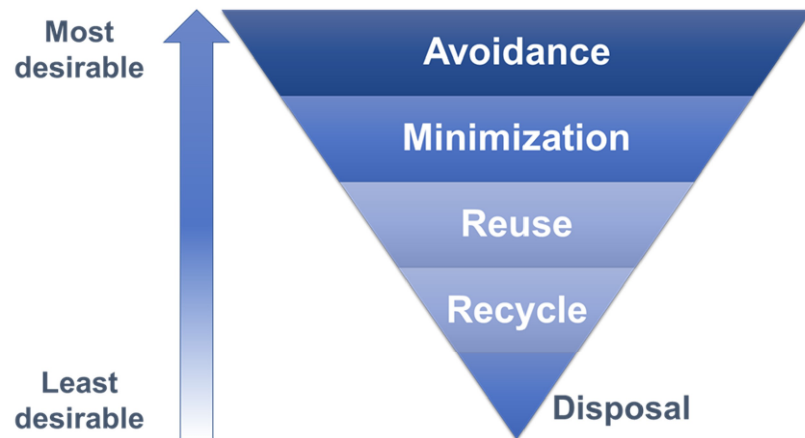


- Promote information exchange
- Cooperative research
- Capacity building in Member States

# Our activities



# Cradle to Grave Integrated RWM



- To ensure the long-term viability and public acceptance of nuclear energy and its applications it is essential that any waste generated is safely and efficiently managed from the **point of generation through to disposal**
- Key is **identifying viable pathways** to move all waste towards disposal while maintaining **flexibility** for future decisions regarding the end-point – disposal is preferred but if not feasible at this time, **storage of well characterized, stable waste packages in a way that maintains flexibility for future disposal options**

# Waste Inventory Systems – SRIS, SWIFT & RWMR



- SRIS is the agency's new waste inventory information tool **Spent Fuel & **Radioactive Waste **Information System******
- SRIS contains information on national radioactive waste management **programs**, radioactive waste **inventories**, radioactive waste **disposal**, relevant **laws** and **regulations**, waste management **policies**, and plans and activities
- SWIFT – an associated **information tool** that allows Member States to compile report to meet their reporting commitments (Joint Convention, EU Waste directive, OECD/NEA, ..
- Fully functional by 2019

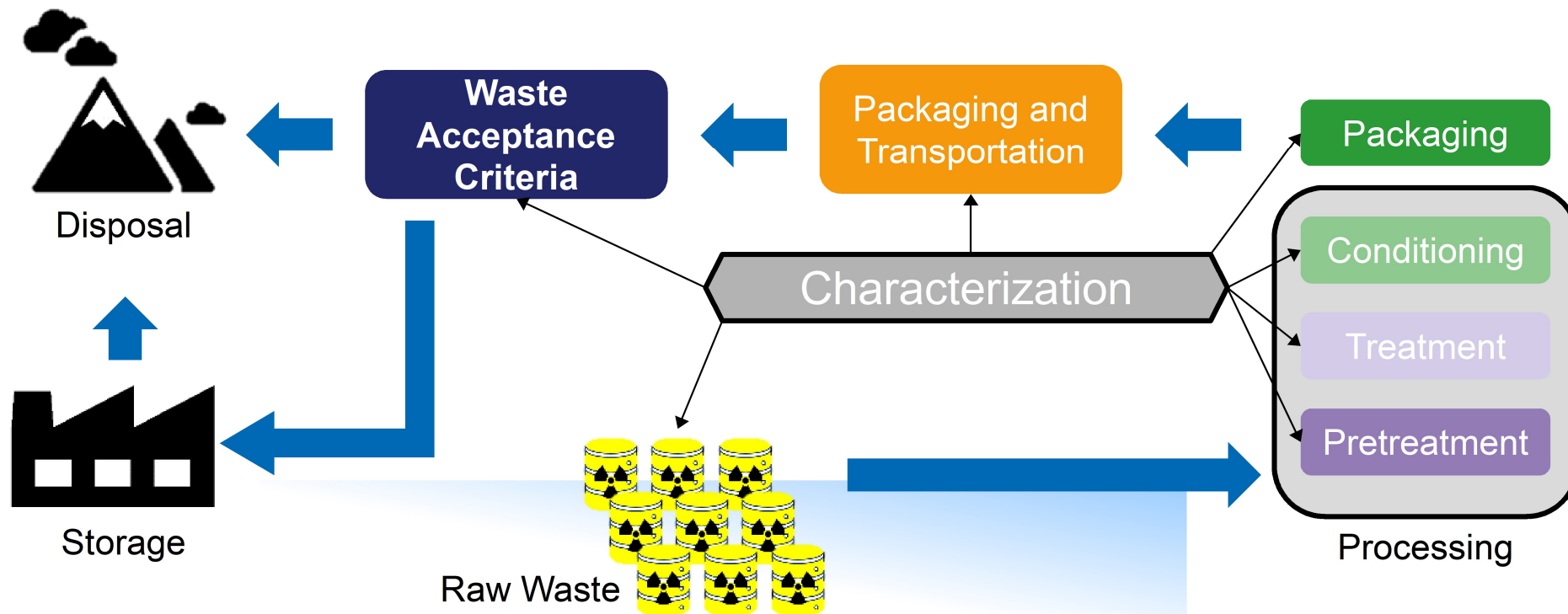


## Radioactive Waste Management Registry (RWMR)

- Server based database allowing MSs to compile, track and manage their waste inventories
- Pending availability of funds – plan to upgrade RWMR to an 'app' to provide flexibility
- Future intention to integrate the inventory tool into the SWIFT information tool

# Integrated Cradle to Grave RWM

Start at the end



# Waste Acceptance Criteria

**(WAC)**

- Under development – joint publication between Predisposal & Disposal teams

**NE Series  
Publication**

**Waste  
Acceptance  
Criteria for Low  
and  
Intermediate  
Waste Packages**



Characterization  
Objectives

Waste Acceptance  
Criteria

Safety Case  
& Assessment

Sampling &  
Characterization  
Plan

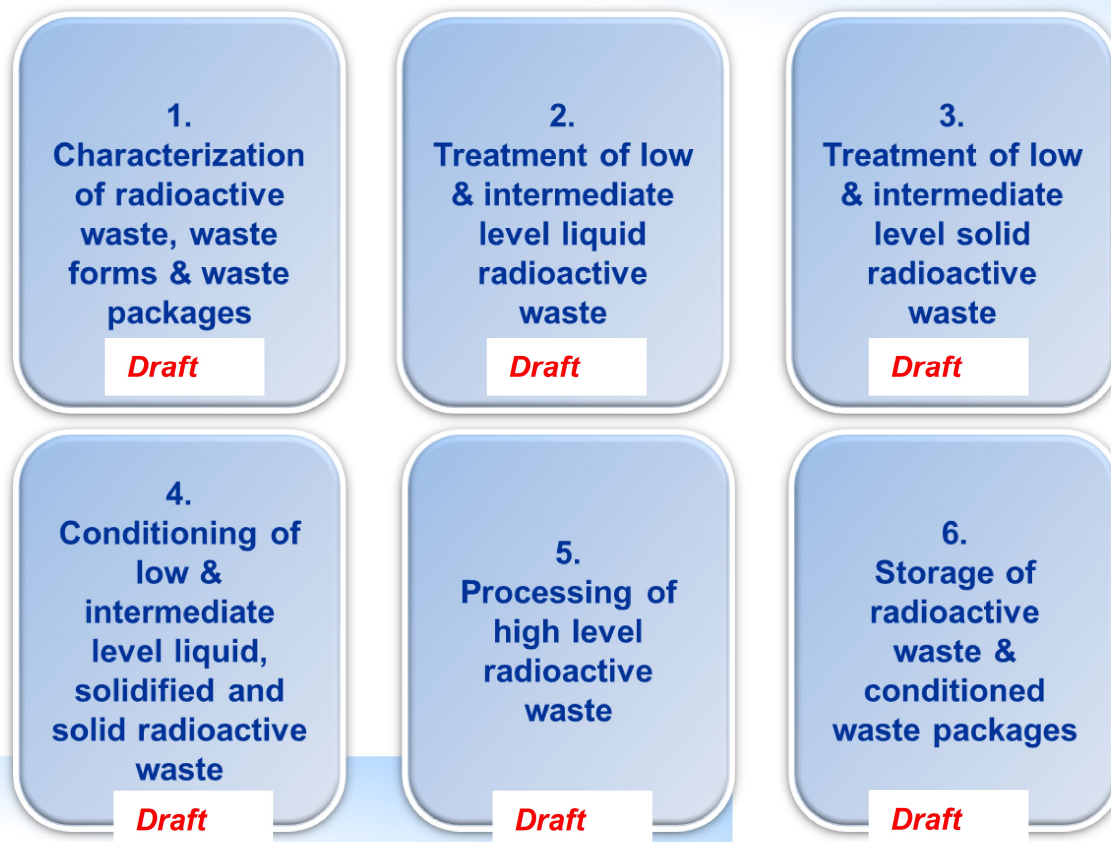
*Includes guidance on how to move forward in the absence of an established waste disposal concept and approaches to demonstrating waste form performance in repository conditions*

# Pre-disposal Handbook Series



**Part I: Technical Overview** – provides a concise summary of technical information.

**Part II: Annexes\*** – provide detailed information on technical options, design basis, operational requirements, best practices, lessons learned, emerging technologies – web/wiki based



Part I published as paper report and Part II will be electronic (network 'cloud' based)



# Support to Implementing disposal programmes



Disposal Concepts - Overview

*In Publication*

Cost estimation method

*In Publication*

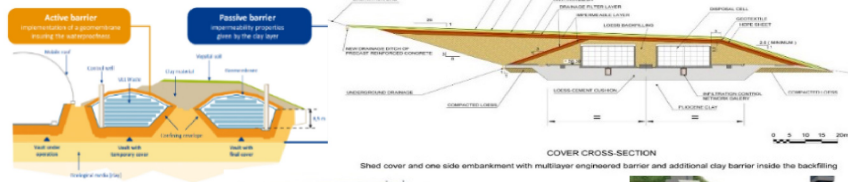
Learning from Stakeholder involvement

*In Publication*

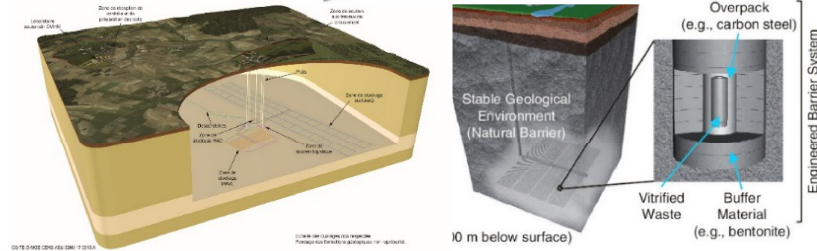
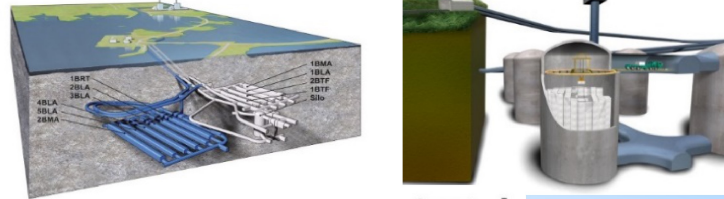
Site investigations

*Final Draft*

## VLLW and LLW - Near Surface



ILW - Geologic disposal at intermediate depths



HLW/SNF – Deep Geologic disposal

Generic DGR Roadmap

*Final Draft*

60 years URF Compendium

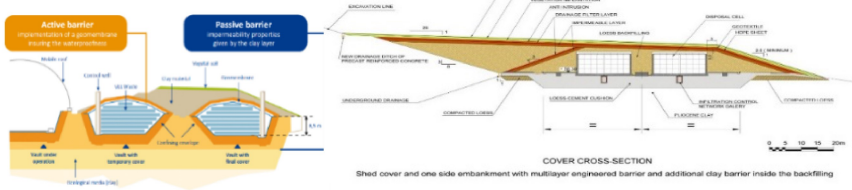
*Draft*



# Support to Implementing disposal programmes



## VLLW and LLW - Near Surface



WAC  
(cradle-  
grave)

*Draft*

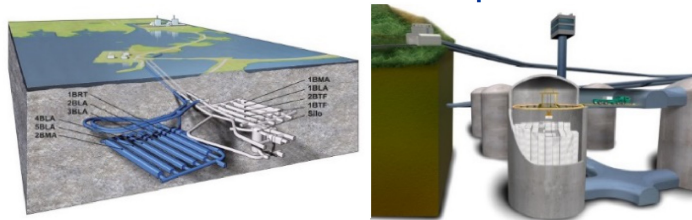
Post-  
accident  
waste

*Draft*

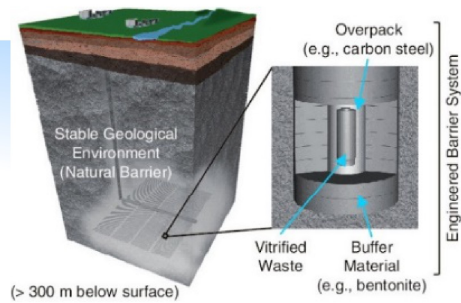
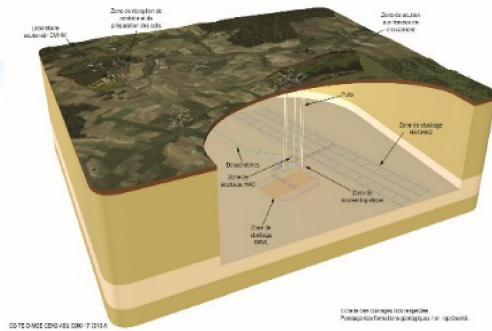
Small  
inventory  
disposal

*Draft*

## ILW - Geologic disposal at intermediate depths



## HLW/SNF – Deep Geologic disposal



Local  
Stakeholder  
experience  
with RWM

*Draft*

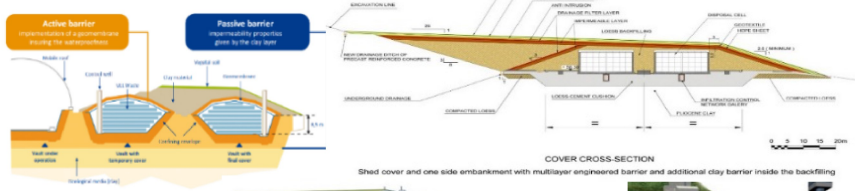
# Support to Implementing disposal programmes



Disposal strategy small inventory <i>First draft</i>	<b>LL-LL Waste disposal</b> <i>Start 2020</i>	Local stakeholders and Nuclear <i>Start 2020</i>
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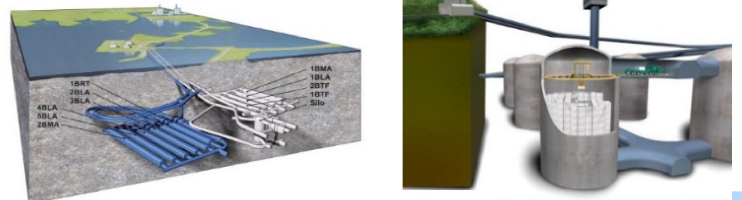
Strategic Plan Disposal RD&D <i>Start 2020</i>	← URF
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## VLLW and LLW - Near Surface

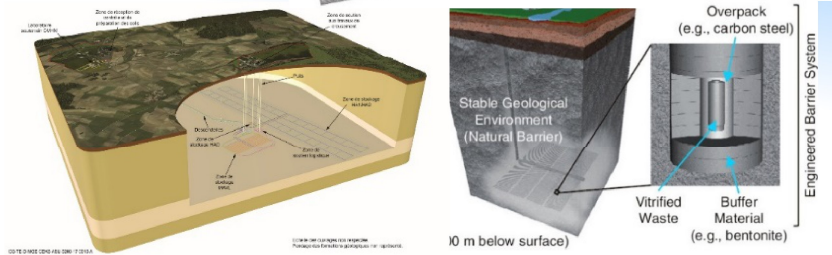


Coordinated Research Project: Framework for borehole disposal  
*Start 2020*

ILW - Geologic disposal at intermediate depths



Pilot Forum for municipalities hosting nuclear facility  
*March 2020*



HLW/SNF – Deep Geologic disposal

# Pilot Forum for Hosting Municipalities



IAEA will organize a **pilot forum offering a dialogue among representatives of municipalities hosting nuclear facilities**, with an aim to:

- enhance awareness of, and share experiences on topics of interest to stakeholders at the local level
- also offer interactions between national and local representatives



*16-19 March, 2020 @IAEA HQ*

*A call for participants nomination will be*



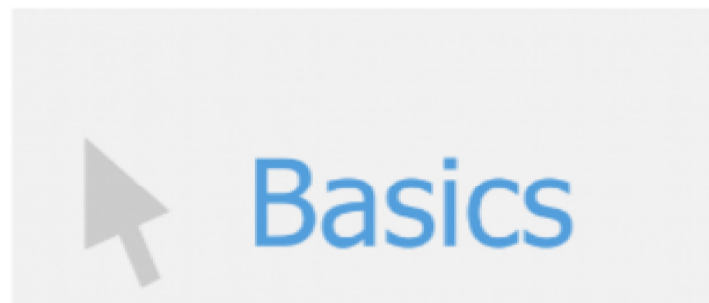
## Nuclear Communicator's Toolbox

### Nuclear Communicator's Toolbox

- > Home
- > Basics
- > Methods
- > Tools
- > InfoCentre
- > Feedback

The Nuclear Communicator's Toolbox has been designed for scientists, engineers and communication professionals who work in the field of nuclear science and technology applications or regulate their safe and secure use. It offers tools to support effective communication on the benefits and risks associated with the use of nuclear technologies. This resource is intended for a variety of nuclear programmes and nuclear activities, including the use of radioactive sources in medicine or industry as well as more complex nuclear cycle activities. Meaningful communication about nuclear matters fosters understanding and demonstrates how science supports society worldwide.

The Toolbox consists of four main sections:



# Nuclear Communicator's Toolbox

# Capacity Building – Training

Courses organized to transfer RWM and SFM knowledge and good practices on topics of interest to Member States

## Workshop on Problematic Waste from Decommissioning

- Expert lectures
- Group exercises where participants can work together on typical challenges
- Technical visit to for example FGUP RADON to observe different treatment technologies being applied in practice

## Training Course on Fundamentals for Developing a Radioactive Waste Disposal Facility

- Expert lectures, e-Learning modules, national program status, practices & lessons learned
- Interactive discussion sessions and working group activities
- Site visit



# Building Capacities - Spent Fuel and Radioactive Waste Management



## eLearning

The IAEA has an [online learning](#) platform (former CLP4Net) available with eLearning materials, free of charge.

The materials on Spent Fuel and Radioactive Waste Management, Decommissioning and Environmental Remediation are organized by thematic areas and distributed into courses for better understanding and use. Altogether, there are currently 45 modules with a total of 93 lectures. Some are available in other languages as well. More are underway.

Access is possible also through the [IAEA CONNECT platform](#), via the professional Networks.



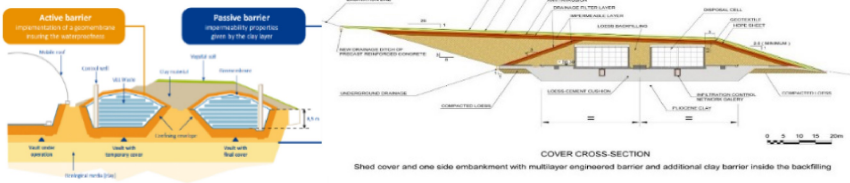
[Link to "walk-through" video here](#)

# Suite of Training Courses

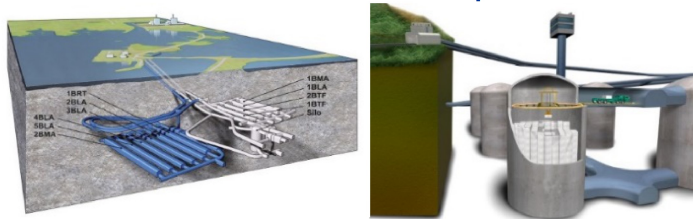
## To support implementing disposal programmes



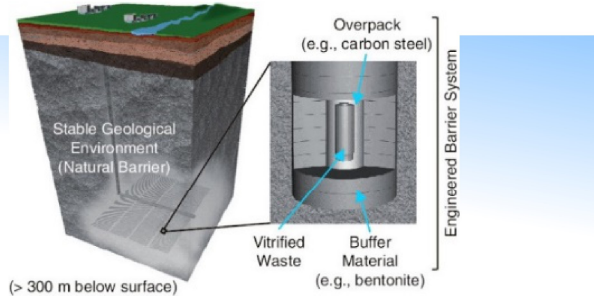
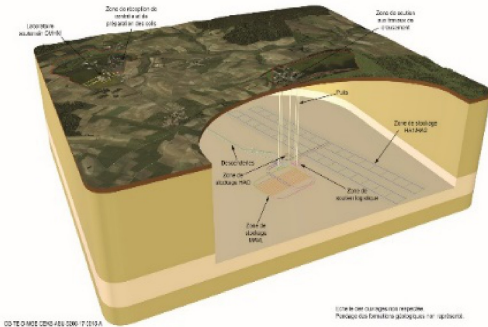
### VLLW and LLW - Near Surface



### ILW - Geologic disposal at intermediate depths



### HLW/SNF – Deep Geologic disposal



Course:  
DGR  
Roadmap

- 1<sup>st</sup> 2019 – Korea
- 2<sup>nd</sup> 2019 – Vienna (TC-RER9143)
- 3<sup>rd</sup> 2020 - India
- ...

Course:  
Site  
investigation

- 1<sup>st</sup> 2019 - Japan

Course:  
URF  
Compendium

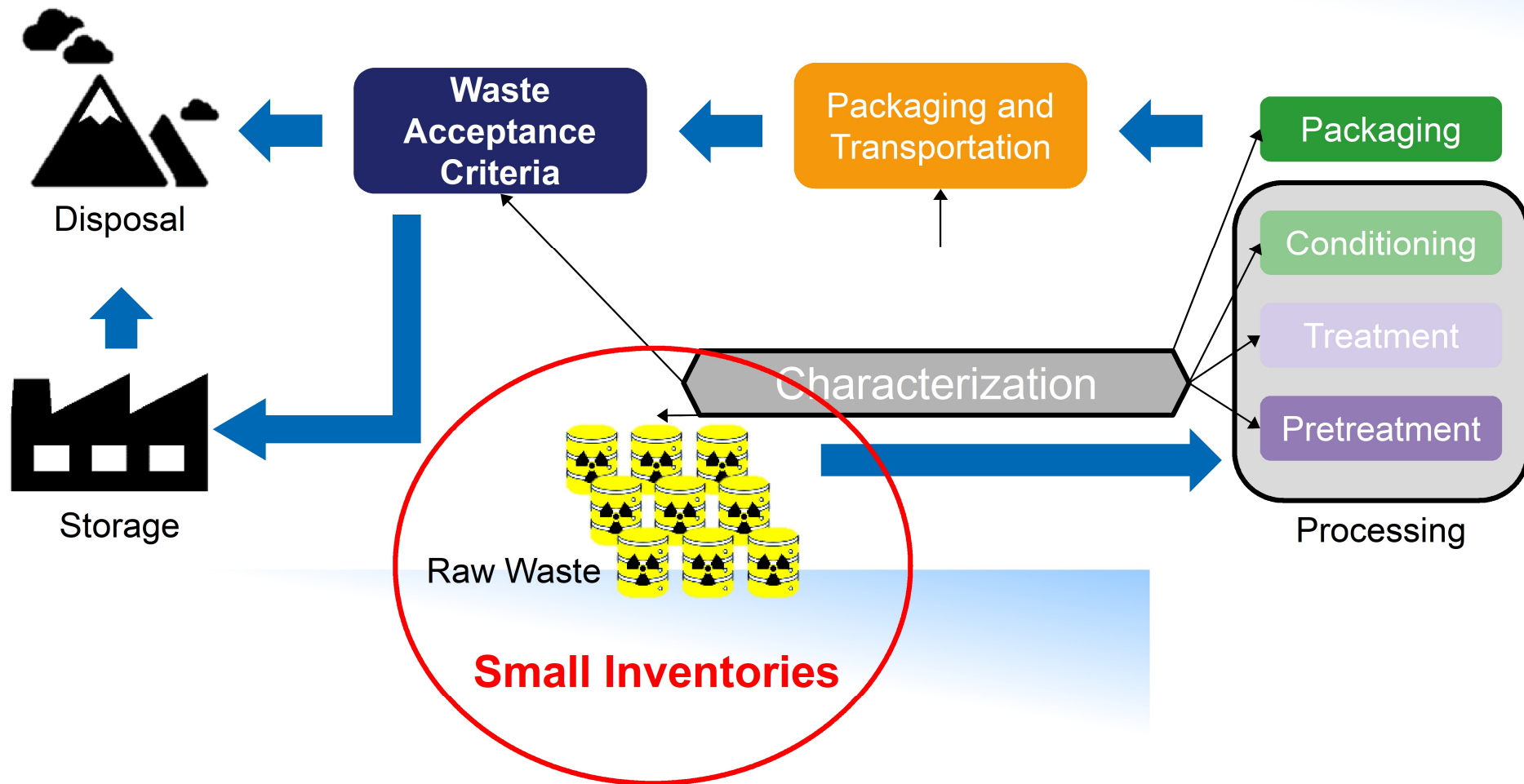
- 1<sup>st</sup> 2020 - Korea

Course:  
Stakeholder  
involvement

- 1<sup>st</sup> 2020 - Japan



# Specific Context – Small Inventories



# Small Inventory Challenges



- Lack of resources
  - Human
  - Technical
  - Financial
- Lack of established disposal concept
  - No defined waste acceptance criteria
- Regulatory framework inadequate or not optimized
- Societal issues

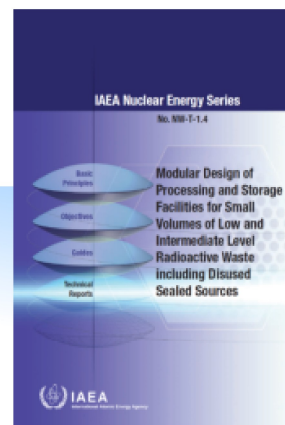
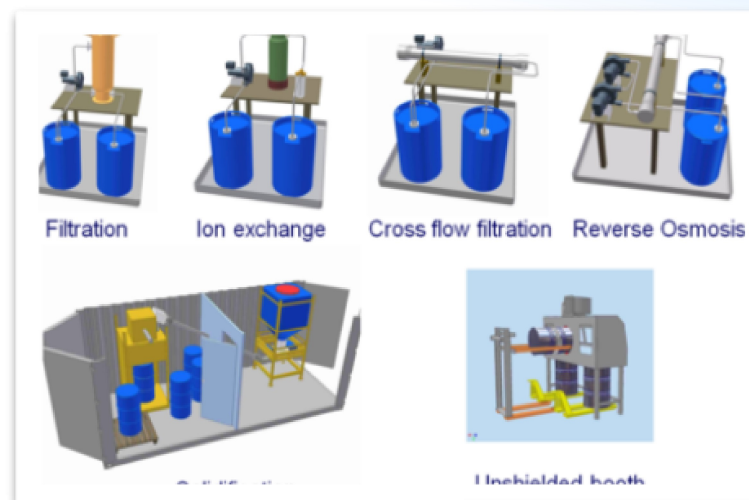
# Guidance under development



- Strategy & implementation considerations for small inventories
- Current status of predisposal management of institutional waste
- **Disposal strategies and options for smaller inventories**
  - Guidance is being propagated through IAEA Technical Cooperation workshops

# Modular Designs for Small Volumes

- Ideal for small waste quantities
- Flexible size & configuration
- 11 pre-designed modules that can be assembled & factory-tested off-site before being transported to waste processing/storage site
- **Processing modules** available for:
  - High & low volumes of liquid waste
  - All types of solid waste:
    - compactable & non-compactable
  - Sludges, ion-exchange resins, DSRS
- Can be **combined** to form an integrated process scheme
- **Storage modules** are available for all types of LLW packages/DSRS and sizes of inventory



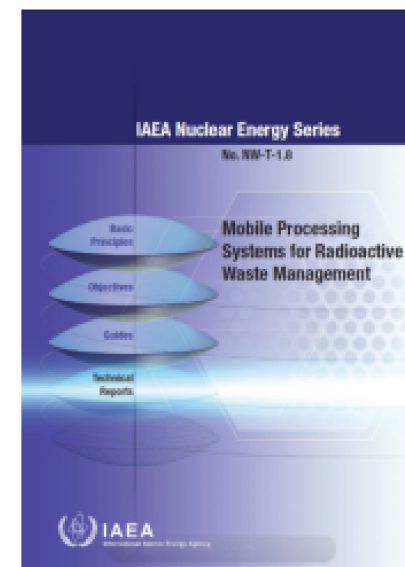
# Mobile Processing Systems

## Key benefits:

- Lower capital cost
- Alternative to centralized facilities
- Easy replacement
- Shared use
- Useful for small volume streams
- Potential to cross borders
- Disposability
- Ability to schedule processing campaigns

## Common uses:

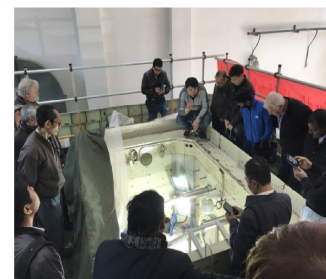
- Smaller volume, problematic waste streams
- Accident/urgent response situations
- Decommissioning & remediation



# Modular Design & Mobile Treatment Workshops



- Many MSs with small volumes of RW are considering a modular or mobile approach to waste management
- Over the last 5 years via the technical cooperation department, led **>10 workshops** world-wide for **>150** participants to develop **waste managers, operators and decision makers** with options for processing & storage of small volumes of radioactive waste



# CRP on shallow borehole disposal

- To support future borehole disposal projects, a standardised framework is developed for the borehole disposal of DSRS and small quantities of other wastes
- The framework consists of a **consistent, comprehensive and more robust** package of guidance, information, tools and training across all of the borehole disposal programme.



# Wiki – covering all aspects of RWM



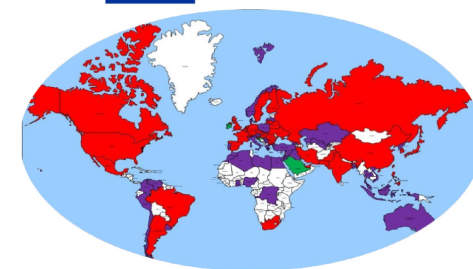
- Decommissioning wiki fully functional on IDN Network
- Currently expanding wiki content to cover of radioactive waste management – Predisposal



Toolkit for Predisposal



Existing Technologies and Practices



Disposal Facilities World-wide





# Professional Networks

<https://nucleus.iaea.org/Pages/connect.aspx>

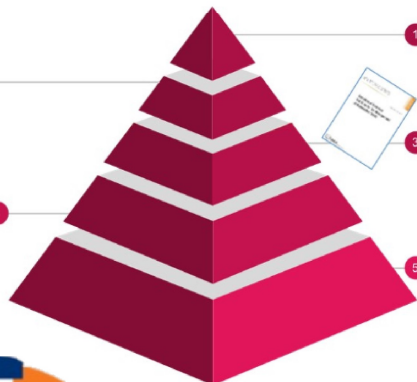


Predisposal Publications (Not older than 10 years)

Nuclear Energy General Objectives + Policies and Strategies for Radioactive Waste Management.



General Handbooks for Predisposal Technologies.



1 Nuclear Energy Basic Principles



3 Technical Support Documents for RWM Policy and Strategy

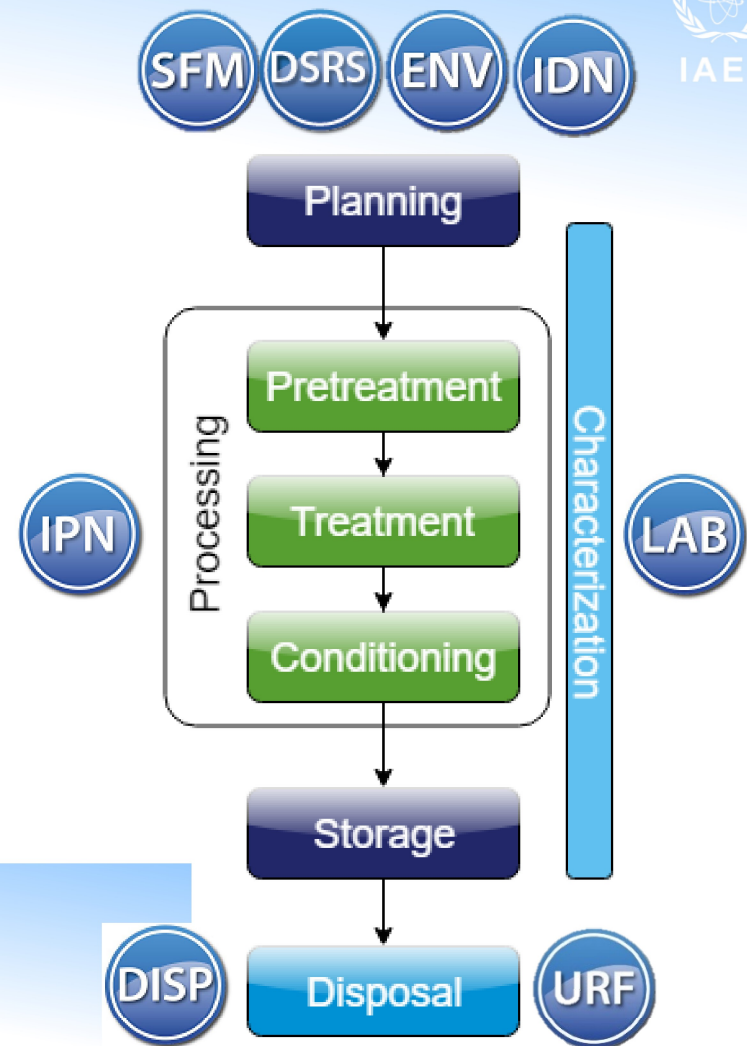
5 Topical Documents on Predisposal Technologies

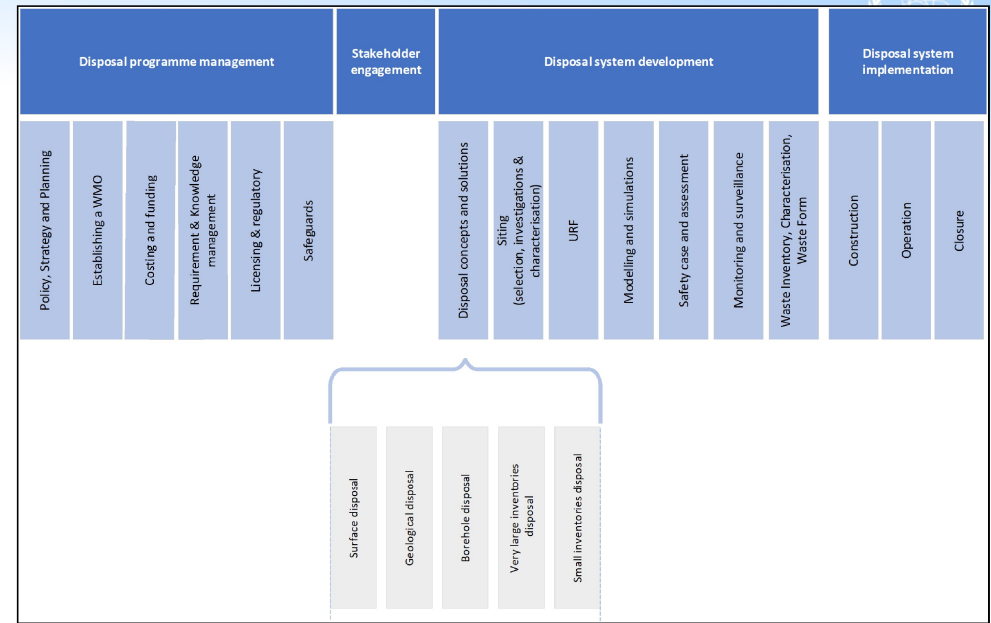
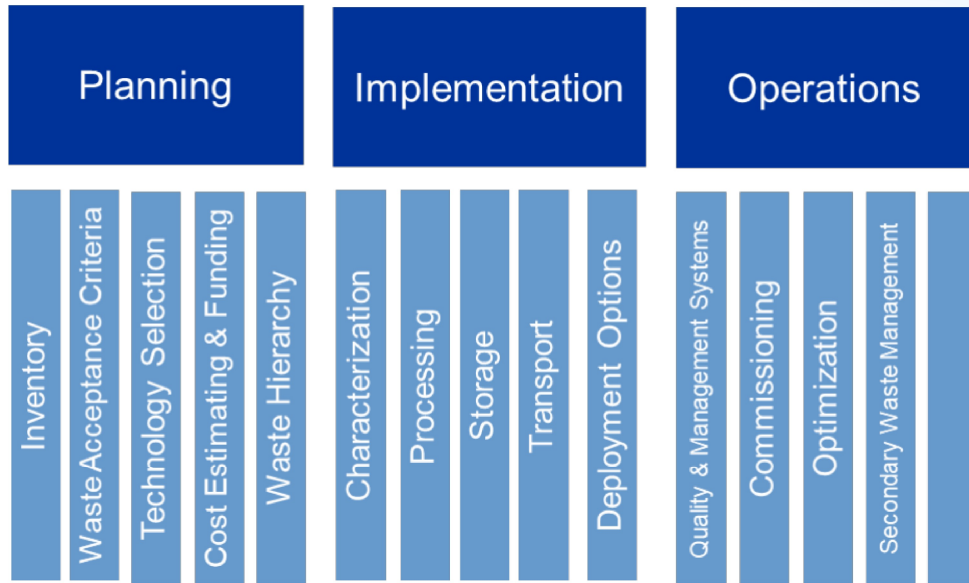


Toolkit for Predisposal



Existing Technologies and Practices





# Identifying Gaps in IAEA RWM Guidance

Standardized RWM metadata for tagging our resources - wiki

# Useful Links

- Wiki : [https://idn-wiki.iaea.org/wiki/Main\\_Page](https://idn-wiki.iaea.org/wiki/Main_Page)
- Networks : <https://nucleus.iaea.org/sites/connect/Pages/default.aspx>



- eLearning: <https://nucleus.iaea.org/sites/connect-members/LMS/Pages/Module-Mindmap.aspx>

- INIS information repository: <https://inis.iaea.org/search>



[www.iaea.org/ne](http://www.iaea.org/ne)

@IAEANE



**IAEA**  
International Atomic Energy Agency

International Conference on  
**Climate Change and the  
Role of Nuclear Power**

7–11 October 2019, Vienna, Austria



Organized by the



#Atoms4Climate 08-276

The 43rd MRS Symposium on  
**Scientific Basis for  
Nuclear Waste Management**

21–24 October 2019  
Vienna International Centre



Symposium proceedings  
to be published by  
"MRS Advances"  
Special Volume Editors  
N.A. Smith and R.A. Robbins

Registration details and Call  
for Papers will be announced  
in early 2019

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*Thank you!*

