IAEA
International Atomic Energy Agency
*Atoms for Peace and Development*

# THE HOLISTIC APPROACH TO NORM MANAGEMENT

Horst Monken-Fernandes[1], Marta Garcia-Talavera[2] and Minja Marijanski[1]

1 - Decommissioning and Environmental Remediation Section
Division of Nuclear Fuel Cycle, Waste Technology and Research Reactors
2- Consejo de Seguridad Nacional - Spain


25 YEARS OF NORM SYMPOSIA
FUTURE: RESIDUES APPLIED IN A CIRCULAR ECONOMY

# Outstanding Issues Regarding NORM

- Harmonization remains a prospect rather than a reality → achieve a common and coherent approach to the regulation of NORM.
- Modelling x Assessment based on acquired data
- Still work to be done in Many Member States
- Need to have consistent involvement from Industry
- Application of Waste Management Hierarchy: Avoid, (Re)use, (Re)Cycle
  - Dilution → Acceptance Regulatory & Social
  - Clearance → Analytical capabilities, dose safety assessment (conditional)
  - Disposal Routes → Landfill, incineration, etc.
  - Environmentally sustainable, socially acceptable and affordable solutions

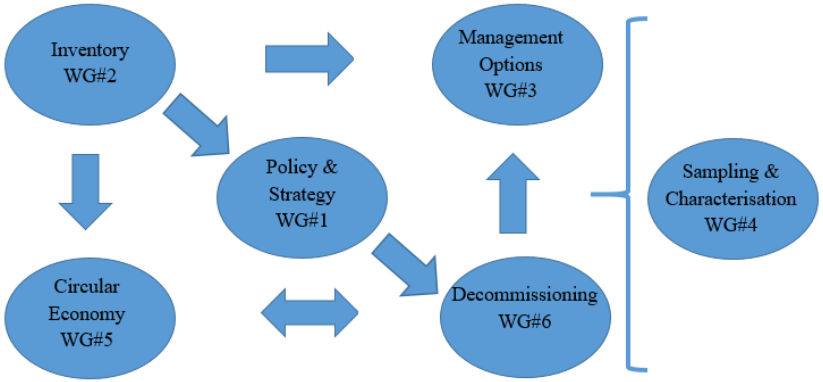
# Assistance requested by IAEA Member States (1/2)

- Analytical Aspects:
  - Improvement and upgrade of the analytical and technical capabilities
- Safety and Regulatory
  - Design and implementation of monitoring programmes
  - Establishment of administrative and standard operating procedures and assessing possible NORM contamination and its impact to the workers and environment
  - Establishment of good operational practices in production in relation to the radiological safety of the workforce and the environment
  - Establishment of an appropriate regulatory framework associated with NORM industry operations (graded approach)

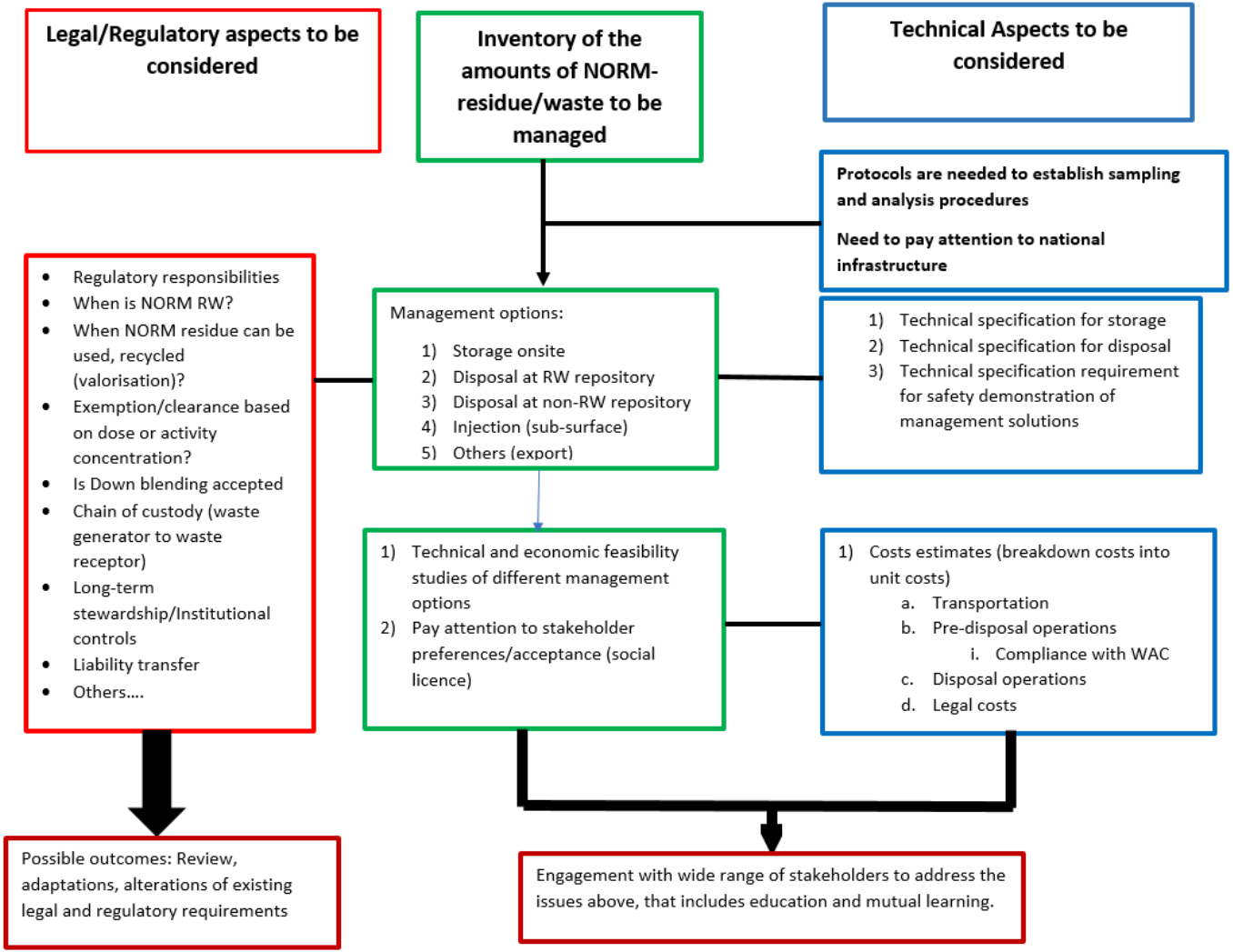
# Assistance requested by IAEA Member States (2/2)

- Technical Issues and Waste Management
  - Establishment of a Policy and Strategy (P&S) for NORM Waste
  - Identification of concepts in NORM waste management
  - Training on the identification of NORM generating industries, NORM generation estimates, decontamination techniques, radon measurements and NORM waste treatment and storage
  - Advice on plans for NORM disposal, techniques for conditioning and storage, long term storage design and cost (design + facilities + operations)
  - Training on technical works required for waste treatment, storage, radiological measurements and disposal options
  - Provide and discuss examples of procedures for decontamination, conditioning and pre-storage and calculation of the cost of disposal facilities
  - Build regional capacities of specialists to carry out comprehensive NORM waste management options
  - Management/Remediation of legacy contamination → Programme of action to minimize the impact of radioactive residues on populations and to create a favourable conditions for the sustainable development of the affected territories

# Environet Norm Project
# WG#5 “Valorisation of NORM Residue in the Context of Circular Economy”




- Establishing an overview and inventory of case studies, success stories and lessons learned concerning of the international state-of-the-art residue and waste valorisation technologies relevant to NORM
- Providing WG#5 participants and direct stakeholders, notably industry, regulators and policy makers, and academia /Centres of Excellence (CoE) with the evidence-based tools and good practices conducting safety and cost-benefit assessments for the sustainable recovery, re-use, and recycling of NORM, including social and environmental management and monitoring plans
- Enhance the capabilities of Member States in reaching and maintaining consensus among both direct and stakeholders about risks and benefits of NORM residues and waste valorisation options within the circular economy transition
- Make recommendations to IAEA as to how to update and enhance the range IAEA NORM documents available to the various stakeholder groups identified.


Legal/Regulatory aspects to be considered
Inventory of the amounts of NORM-residue/waste to be managed
Technical Aspects to be considered
Protocols are needed to establish sampling and analysis procedures
Need to pay attention to national infrastructure
Regulatory responsibilities
When is NORM RW?
When NORM residue can be used, recycled (valorisation)?
Exemption/clearance based on dose or activity concentration?
Is Down blending accepted
Chain of custody (waste generator to waste receptor)
Long-term stewardship/Institutional controls
Liability transfer
Others....
Management options:
1) Storage onsite
2) Disposal at RW repository
3) Disposal at non-RW repository
4) Injection (sub-surface)
5) Others (export)
1) Technical specification for storage
2) Technical specification for disposal
3) Technical specification requirement for safety demonstration of management solutions
1) Technical and economic feasibility studies of different management options
2) Pay attention to stakeholder preferences/acceptance (social licence)
1) Costs estimates (breakdown costs into unit costs)
a. Transportation
b. Pre-disposal operations
i. Compliance with WAC
c. Disposal operations
d. Legal costs
Possible outcomes: Review, adaptations, alterations of existing legal and regulatory requirements
Engagement with wide range of stakeholders to address the issues above, that includes education and mutual learning.

# Important Considerations on Circular Economy

CE is not the same or connected with waste management hierarchy

- In Waste Management Hierarchy the final stage is still disposal
- CE envisages a zero-waste approach
- Interim storage till appropriate use is found → procrastination

Innovation is needed, to make it feasible the recovery of valuable resources → market dependent

Subsidies are called upon → tax-payer moneys!!!

Legislation developed for a linear economy → adaptation for a circular economy

Stakeholder perception: do I want something containing radioactivity?

# Points of discussion

- Interim storage is an issue
- Stakeholder involvement is key to acceptance
- Societies may have reservation about introduction of radioactivity in people's lives → it has to be justified
- Market needs to value what is being made available
- Governmental subsidies → policies towards globalisation deprived countries like USA from producing critical materials and made them dependant on other countries (domestic sources of critical material)
- Setting the scene while avoiding loopwholes

# Points for discussion

NEW EU TAXONOMY

HARMONIZATION OF REGULATION

COOPERATION WITH OTHER UN ORGANISATIONS

HOW MEASURABLY IMPACT ON CIRCULAR ECONOMY COULD BE MADE POSSIBLE

COMMODITIES MINDSET TO SERVICE MINDSET

BLOCKCHAIN CAN DEAL WITH CIRCULARITY IN INDIVIDUAL STEPS OF NFC OR WITH IT AS A WHOLE

ALL MATERIAL FLOWS NEED TO BE CONSIDERED IN THE ANALYSIS

# Points for discussion

- No further mining in the future
- Increase in demand of minerals
- Increase in the energy consumption in a closed cycle
- Liability: where does it stand? Residues will increase radioactivity content
- Has the government approved policies on circular economy (for example in their procurement e.g. purchasing only recycled materials)
- Maybe some benchmarking regarding brand valorisation is something that could be in the workplan

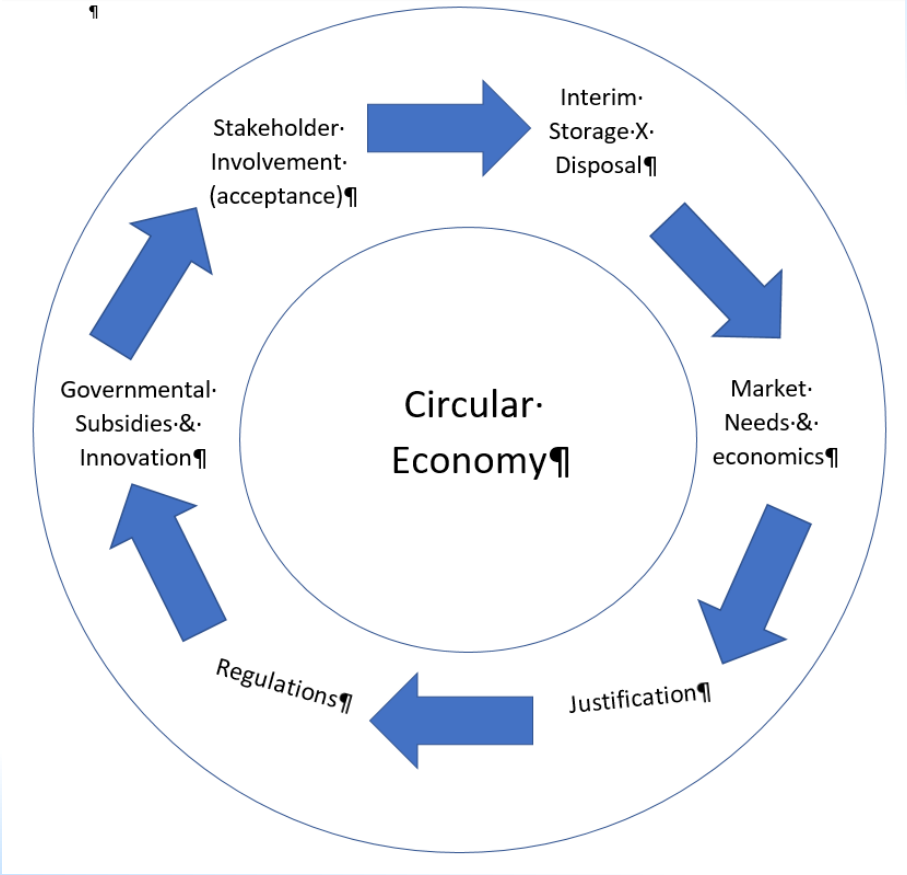
# Motivation·of·Valorisation·of·Waste/Residues·from·different·stakeholders¶

¶

| Waste·Generator· | Market¶ | Society¶ |
| --- | --- | --- |
| Avoid·costs·with·mitigation·of·environmental·impacts/remediation·(capping,·liners,·drains,·monitoring,·long·term·stewardship,·etc.)¶ | Profits·with·revenues·from·the·commercialization·of·the·residues¶ | Sustainability·goals·achieved,·reduced·pressure·under·natural·resources,·etc.¶<br>Avoid waste diposal: reduces burden for future generation |

¶

# Challenges


Stakeholder· Involvement· (acceptance)¶
Interim· Storage·X· Disposal¶
Market· Needs·&· economics¶
Justification¶
Regulations¶
Governmental· Subsidies·&· Innovation¶
Circular· Economy¶

IAEA
International Atomic Energy Agency
*Atoms for Peace and Development*

Horst Monken-Fernandes

H.Monken-Fernandes@iaea.org

*Thank you!*