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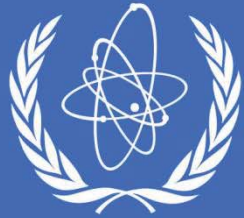
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National Policy & Strategy for Spent Fuel and Radioactive Waste Management

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IAEA

POLICIES AND STRATEGIES FOR SPENT FUEL AND RADIOACTIVE WASTE MANAGEMENT

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ICTP School, Trieste, Italy

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NEFW, IAEA

PRESENTATION CONTENTS

- Definitions
- The need for RWM Policy & Strategy
- Policy development (prerequisites, typical elements, implementation)
- Strategy development (prerequisites, options, development, implementation)
- Updating Policy & Strategy
- Examples

DEFINITIONS

A Standard Definition of Policy and Strategy:

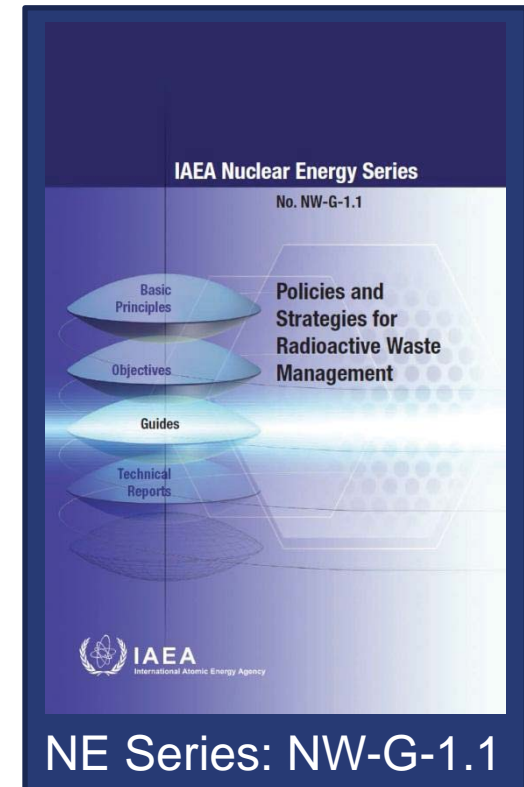
- Policy - A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions
- Strategy - A careful plan or method

(Merriam-Webster Dictionary)

IAEA DEFINITION FOR RWM – Policy

Policy is a set of established goals or requirements for the safe management of SF & radioactive waste; it normally defines national roles and responsibilities. established by the national government.

- Policy mainly established by the national government
- May also be codified in the national legislative system
- Provides principles, infrastructure and formal requirement for its implementation



IAEA DEFINITION FOR RWM – Strategy

Strategy is the means (organizational, technical,) for achieving the goals and requirements set out in the national policy.

- Normally established by the relevant waste owner or operator
- A national policy may be elaborated in several different strategies
- The individual strategies may address different types of waste (e.g. reactor waste, decommissioning waste, institutional waste, etc.) or waste belonging to different owners.

The line separating policy from strategy is not always sharp: **sometimes Policy & Strategy are mixed**

Simply Put - What is policy and what is strategy?

Policy is about establishing the goal and aims.

Strategy is about identifying the means and pathway to achieve the goal and the aims



THE NEED FOR RWM POLICY & STRATEGY

LESSONS FROM PAST EXPERIENCE

- **Countries that first embarked on nuclear energy didn't have any radioactive waste management policy or strategy.**
- **Normally, nuclear technologies were introduced and the waste issue was something to be solved later!**

=> There were consequences:

LESSONS FROM PAST EXPERIENCE

Some of the Consequences:

- Waste not properly characterized as it was generated
- No control over waste generation (waste tracking)
- Liquid waste accumulated
- Loss of control of sources
- Waste stored on an ad hoc basis
- Waste processed without Waste Acceptance Criteria
- Waste “stored” in unsuitable conditions
- Unlicensed disposal
- Unclear links among the involved institutions
- Financial liabilities not defined
- Political ambiguity
- Failure (or more difficult) to implement NPP new build

REASONS FOR ESTABLISHING NATIONAL POLICY & STRATEGY - 1

- To allocate roles and responsibilities for RWM
- Identify and fill missing capabilities (facilities, staff)
- Strengthen planning to optimise safety and resource use
- Improve an inadequate legislative system (nuclear, non-nuclear)
- Support nuclear technology expansion, including new build
- Assure long-term sustainability of nuclear technologies

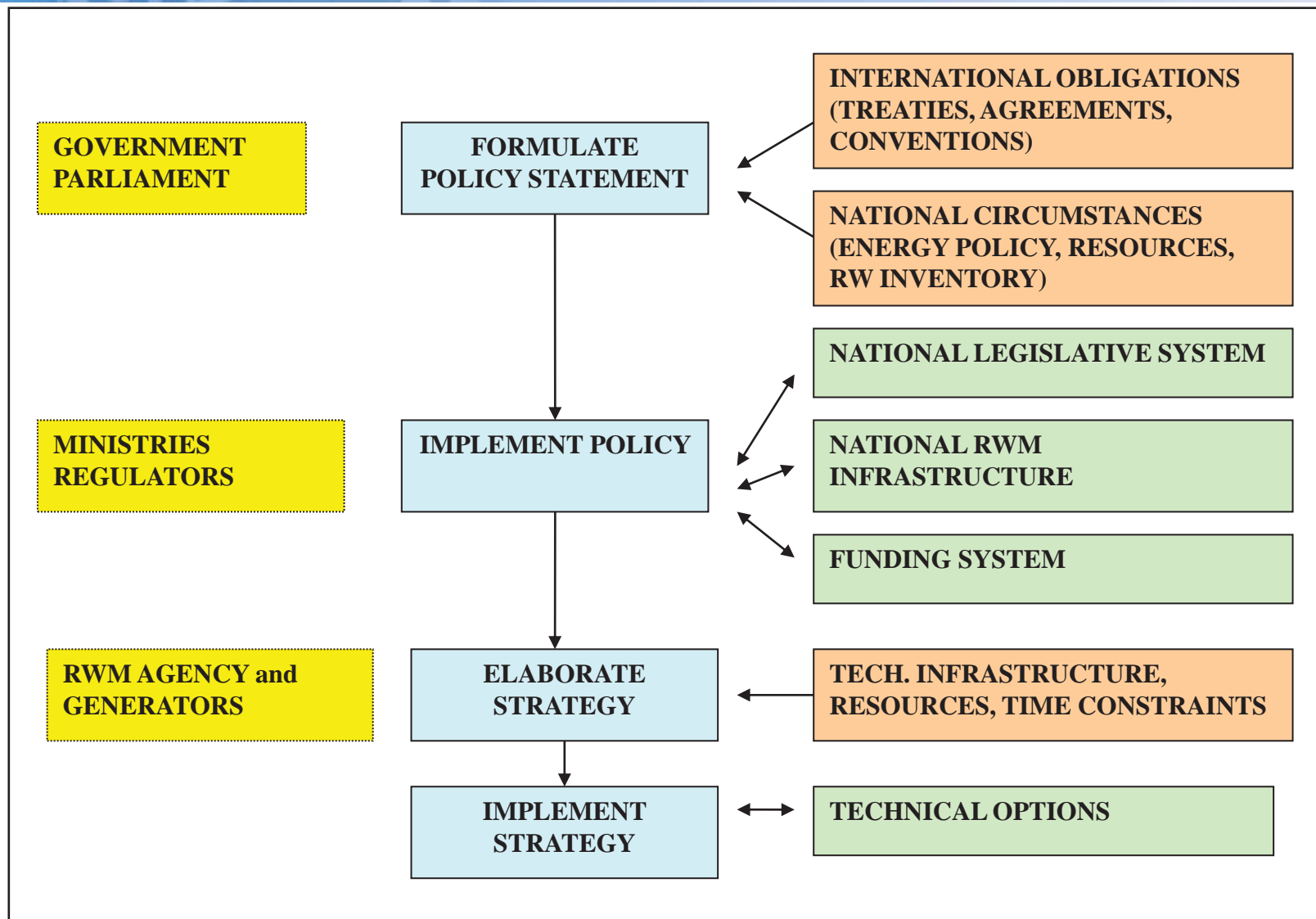
REASONS FOR ESTABLISHING NATIONAL POLICY & STRATEGY - 2

- Address security and safety matters now and in the future
- Create a system for financing RWM
- International harmonisation and cooperation
- Strengthen political commitment for disposal
- Ensuring rational public perception of nuclear activities and to enhance public confidence in Radioactive Waste Management

CONCLUSION

- Every country should have some form of **POLICY** and **STRATEGY** for managing its radioactive waste and spent fuel
- Policy & Strategy should be established early
- Required/recommended in some IAEA publications, but the contents of a national policy and strategy are not well elaborated in these documents
- In some Member States a national P&S is well established, in others they exist but without explicit statements.
- In many Member States P&S do not exist

POLICY & STRATEGY – KEY STEPS, RESPONSIBILITIES & LINKS





POLICY DEVELOPMENT

POLICY ON RWM - Requires a Knowledge of:

- Existing and future SF and radioactive waste inventory
- Present national legal framework
- Present institutional & regulatory structure
- Applicable international conventions (e.g. Joint Convention on the Safety of SF and RW Management)
- Present national policies and strategies (if existing)
- Availability of resources
- Situation in other countries
- Stakeholder interests/involvement

TYPICAL POLICY ELEMENTS

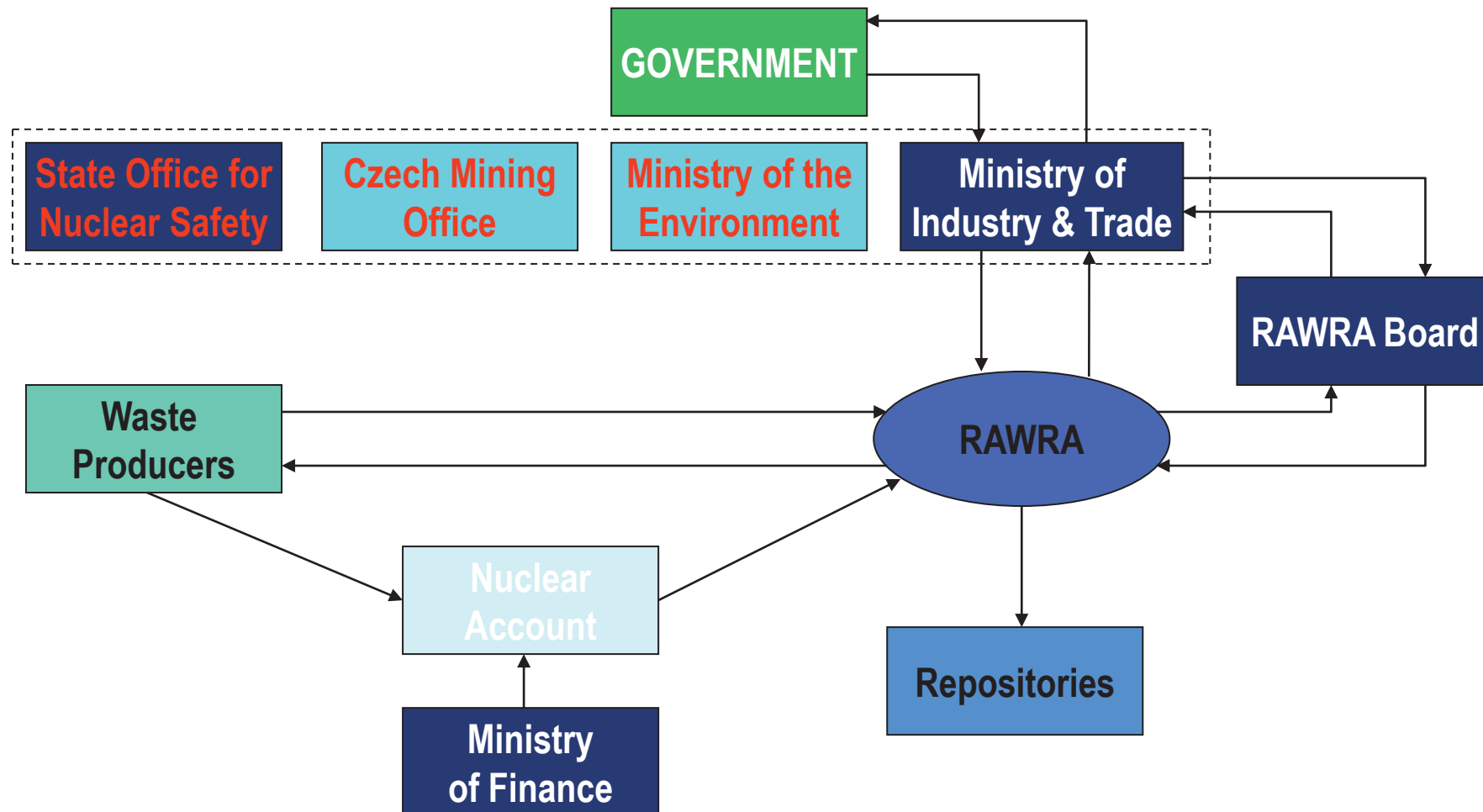
- **Allocation of responsibilities**
- **Provision of resources**
- **Safety and security objectives**
- **Waste minimization**
- **Export/import of radioactive waste**
- **Management of spent fuel**
- **Management of radioactive waste (incl. NORM and DSRS)**
- **Public information and participation**

IMPLEMENTATION OF A NATIONAL POLICY

- Establish an adequate and appropriate RWM institutional framework with defined responsibilities (including allocation of responsibility for strategy development)
- Ensure that the Human Resources involved are competent and equipped to undertake their responsibilities
- Create a funding mechanism to provide adequate financial resources for the whole RWM lifecycle (to finance the necessary facilities, equipment and staff for RWM)
- Have a Strategy

EXAMPLE OF RWM INFRASTRUCTURE

Czech Republic



ALLOCATION OF RWM AGENCY RESPONSIBILITIES

COUNTRY	AGENCY	TASKS for LILW			TASKS for HLW		OTHER TASKS	
		Collection Transport Treatment	Storage	Disposal	Storage	Disposal	R&D	Decom
Belgium	ONDRAF	Y	Y	Y	Y	Y	Y	Y
Czech Republic	RAWRA			Y	Y	Y	Y	
France	ANDRA	Y		Y		Y	Y	
Germany	BfS / DBE			Y		Y	Y	
Netherlands	COVRA	Y	Y	Y	Y			
Spain	ENRESA	Y		Y	Y	Y	Y	Y
Sweden	SKB	Y		Y	Y	Y	Y	Y
UK	NDA			Y		Y	Y	

EXAMPLES OF FINANCING SCHEMES

Country	Agency	Type	Responsibilities	Financing Scheme
Belgium	ONDRAF	Public	Integral Mgmt	Waste producers pays. Commitment to cover all costs. Tariff for small producers, annually revised.
CR	RAWRA	Public	Disposal	Waste producers covers all cost. Tariff for small producers. Fee on nuclear electricity paid by operator
France	ANDRA	Public	Long-term WM	Waste producers and fuel cycle companies pay, annual budget (inc.R&D), tariff covers operational costs
Germany	DBE	Private	Rep Const/Oper	Small producers pay a fee, large producers pay a fee (Morsleben) and finance repository construction
Netherlands	COVRA	Public	Integral Mgmt	Fee for small producers. Payment into a fund for future costs
Spain	ENRESA	Public	Integral Mgmt	Tariff for small producers. Fee on electricity paid by consumers. In future quota paid by large producers
Sweden	SKB	Private	Integral Mgmt	Fee for large producers paid into a fund, proportional to electricity production.
UK	NDA	Public	LL-LILW Disp	Producers cover the costs, proportional to forecasts of required repository volume



STRATEGY DEVELOPMENT

PREREQUISITES FOR STRATEGY

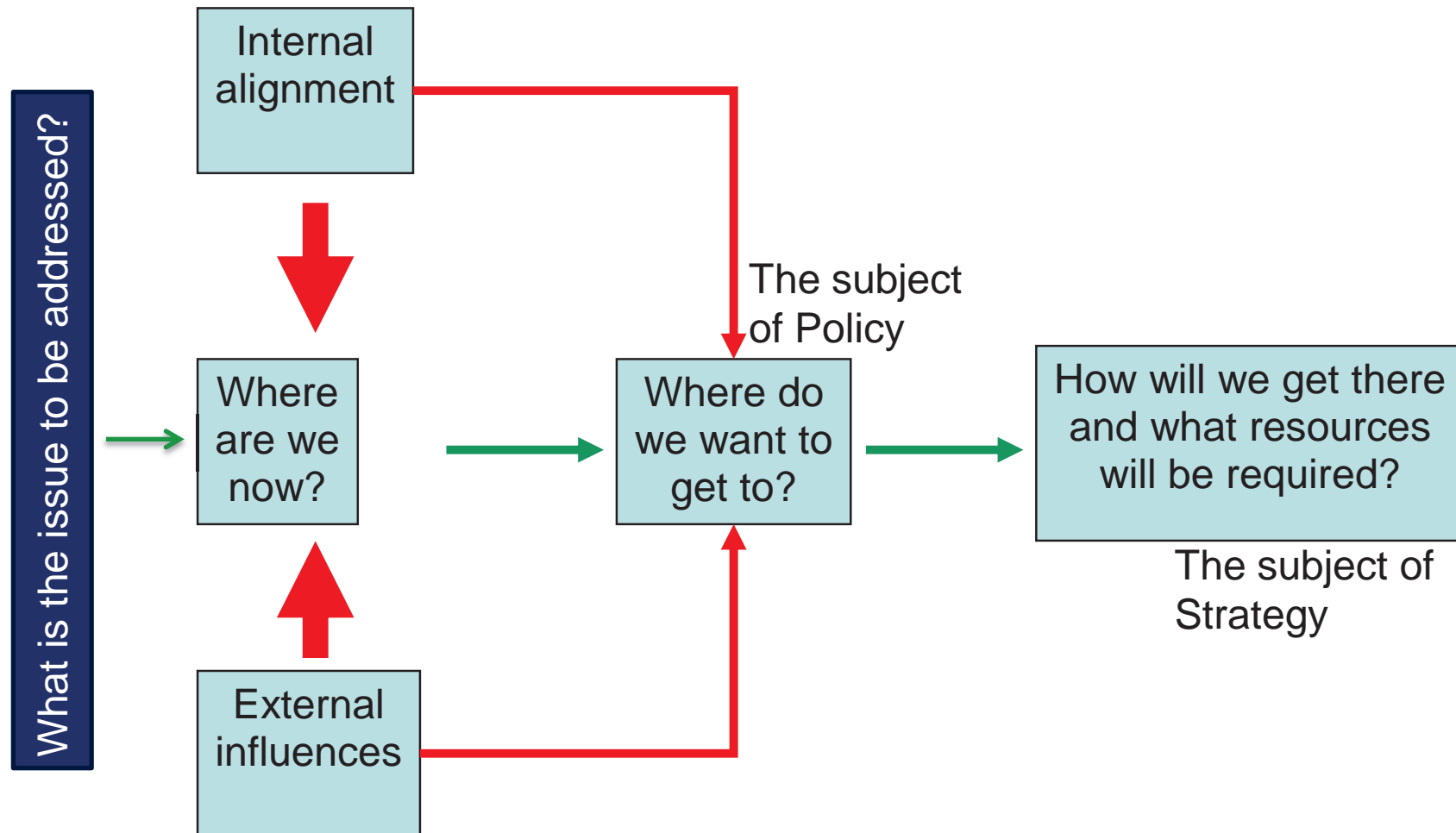
- Inventory of spent fuel and radioactive waste (now and future)
- Waste classification system and ability to characterise waste streams
- Understanding of waste management strategies in other countries
- Appreciation of any existing waste management facilities
- Availability of resources
- Understanding of Stakeholder expectations and interests

STRATEGY DEVELOPMENT FOR RWM

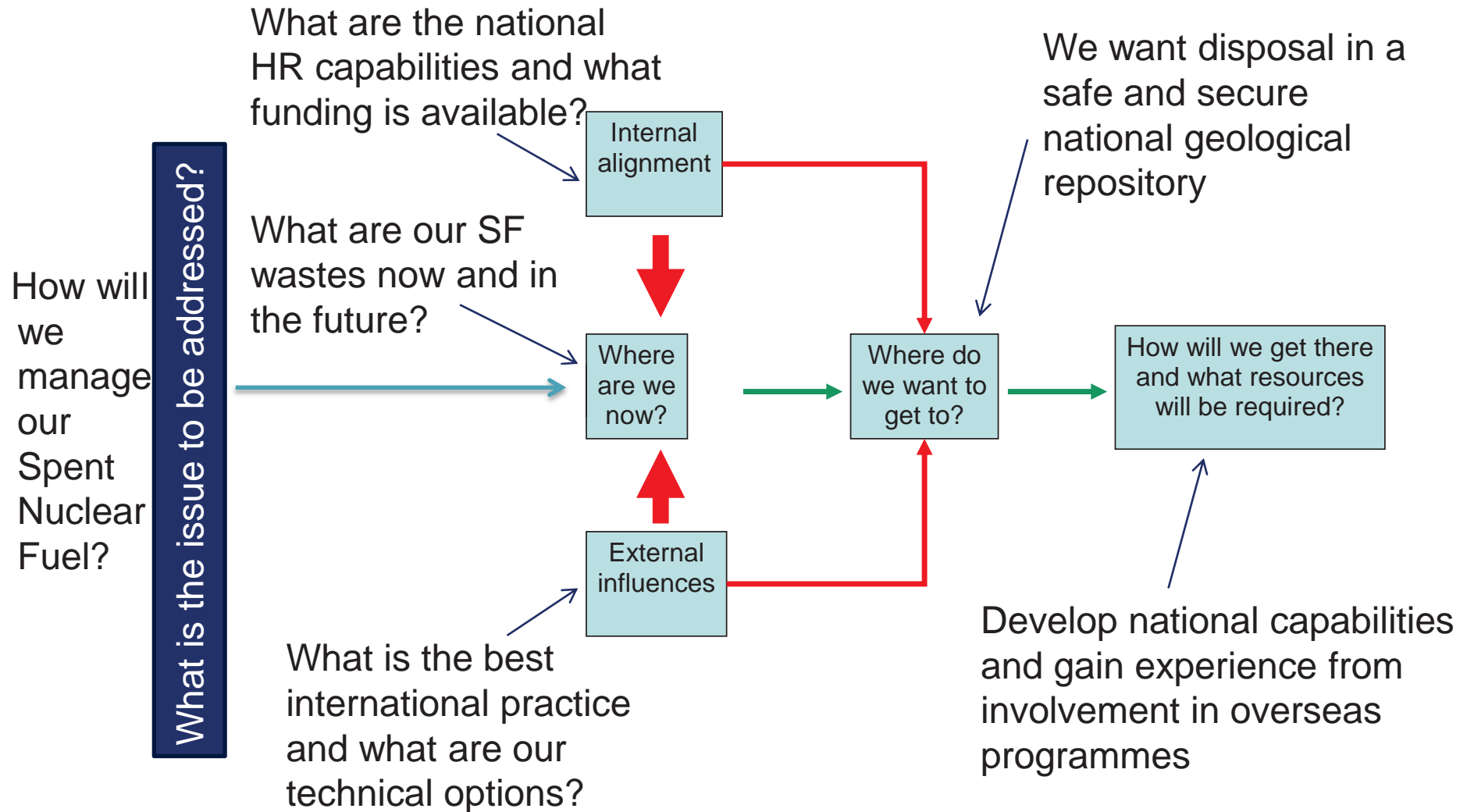
- Strategy formulation should be based on End-point determination (Policy Goal) taking into account factors that will influence choices (e.g. Safety, Political, Economic, Human Resources, Social, Technological, Legal, Environmental).
- Decide on a preferred approach for various waste streams:

e.g. To concentrate SF/HLW waste and to contain the radionuclides in a waste matrix and container followed by geological disposal to provide isolation from the biosphere

Policy & Strategy Links



Policy & Strategy – An Illustration



Strategies for Waste Management

It is relatively “simple” to describe how to formulate strategy to realise a goal for RWM...

- Assess the present situation
- Consider RWM from generation to disposal
- Identify problems/needs for development
- Identify options
- Devise a plan
- Secure funding
- Execute the plan

Strategies for Waste Management

But in practice...

- Need funding
- Need people
- A Political system is involved
- Technological solutions need to be identified (including any “gaps”)
- Availability of technically suitable sites needs to be identified
- Public confidence is needed on key components (e.g. siting)

Disposal Options for Various Waste Streams

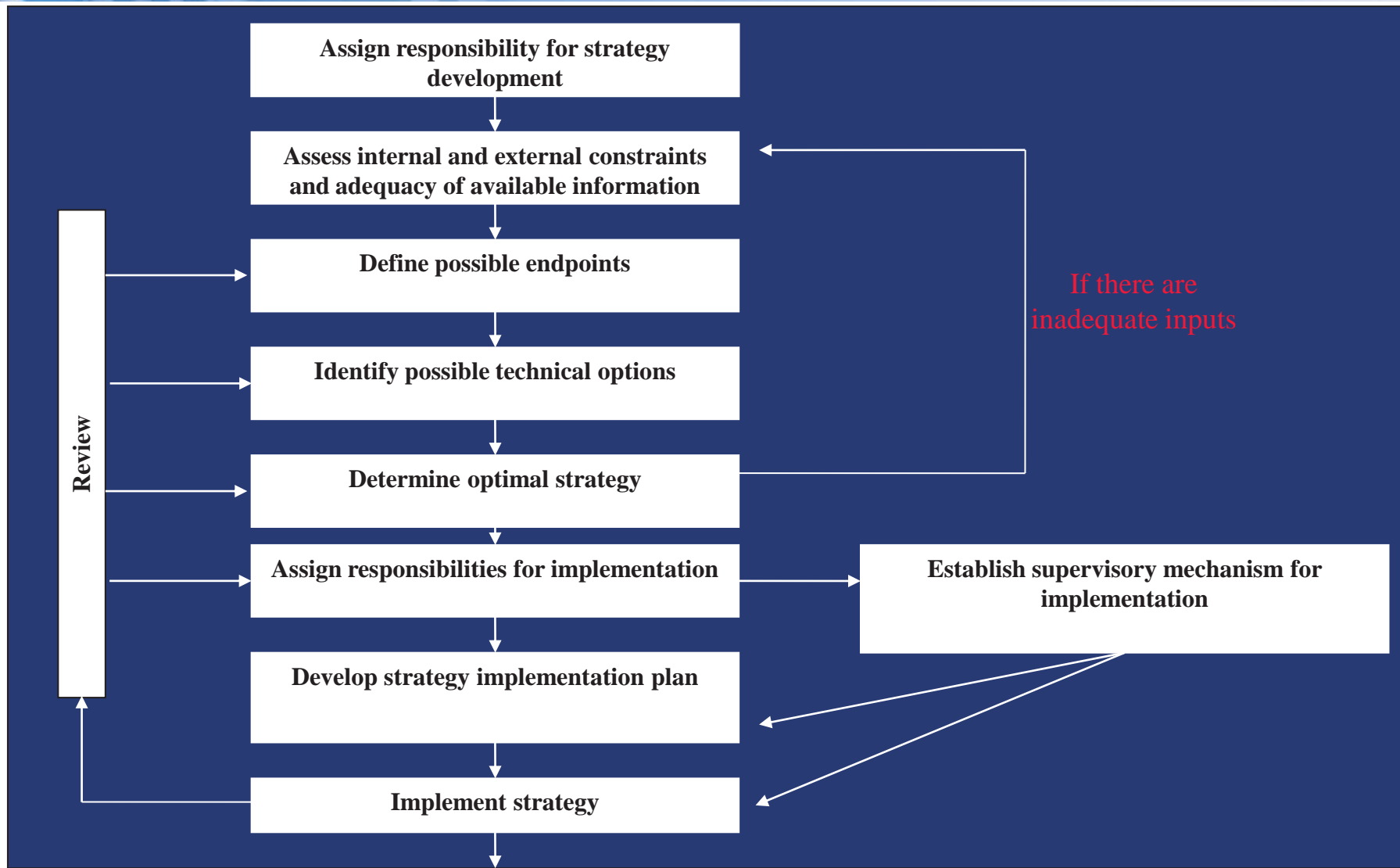
Radioactive waste stream		END POINT							
		Long-term storage	Decay storage	Surface trench	Tailing dam	Engineered surface facility	Intermediate depth facility	Geologic repository	BOSS
VSLW	Low volume	NR	++	+	+	+	NR	NR	NR
	Large volume	NR	++	+	+	NR	NR	NR	NT
VLLW	Low volume	NR	N	++	++	+	NR	NT	NR
	Large volume	NR	N	++	++	+	NR	NT	NT
LLW	Low volume	+	N	+	+	++	++	+	+
	Large volume	+	N	NR	NR	++	++	+	NT
ILW	Low volume	+	N	N	N	N	++	++	+
	Large volume	+	N	N	N	N	++	++	N
SNF/HLW		+	N	N	N	N	N	++	N
DSRS	Short-lived	+	+	+	NR	++	+	NR	+
	Long-lived	+	N	N	N	+	++	++	++
	SHARS	+	N	N	N	N	++	++	++

+ = Suitable ++ = Highly Suitable N = No NR = Not recommended NT = Not Tenable

CONSIDERATIONS IN STRATEGY DEVELOPMENT

- There are usually options in choosing strategic approaches (e.g. recycling, immediate and deferred disposal, disposal concept, multinational facilities)
- Compliance with policy
- Graded approach (ensuring that the preferred safety approach is commensurate with the risks)
- Resources (financial, human, technical)
- Generic technical options (shared, centralised, mobile facilities)
- Country specifics (population, climate, neighbours)
- Public sensitivity
- Recognition of other constraints, uncertainties and risk management

STRATEGY FORMULATION FOR DISPOSAL



UPDATING POLICY AND STRATEGY

- Updating of Policy & Strategy will be required periodically in response to:
 - Experienced obtained
 - New national circumstances
 - New international agreements
 - Policy updating (government)
 - Strategy updating (operator)

Strategies for Waste Management

Disposal – Some typical problematic issues

- What to do with historical wastes?
- What to do when disposal is not yet possible
 - Storage facilities ?
 - Partitioning & Transmutation ?
 - Regional or Global disposal solutions ?
- What to do when there are not enough resources?



Policy & Strategy - EXAMPLES

TYPICAL POLICY FOR A COUNTRY WITH A SMALL AMOUNT OF RW

- The Government of Xland (or identified Ministry) shall establish the legislative and regulatory framework regarding the safe management of radioactive waste. The framework shall include a system for licensing radioactive waste management activities. It shall appoint a regulatory body to enforce the legislation and regulations and to issue licences (this may be the same organization that is responsible for enforcing legislation and regulations on radiation protection). The Government of Xland (or identified Ministry) shall establish a national waste management organization (WMO) responsible for the management of radioactive waste in the country (i.e. the collection, processing, storage and disposal).
- The Government of Xland shall establish the arrangements for providing the resources (financial, technical and human) to sustain the WMO and the regulatory body and for the implementation of the radioactive waste management strategy.
- The licence holders of facilities generating radioactive waste shall be responsible for the safe management of radioactive waste, until the waste is accepted by the WMO. The WMO shall be responsible for the safe management of radioactive waste, including disused radioactive sources, for which no owner can be identified.
- The licence holders of facilities generating radioactive waste shall adopt measures for minimizing the generation of radioactive waste.

TYPICAL POLICY FOR A COUNTRY WITH A SMALL AMOUNT OF RW (2)

- The WMO shall prepare a strategy detailing arrangements for the long term management of radioactive waste in Xland for approval by the Government.
- Radioactive waste shall not be imported or exported unless approved by the Government.
- The Government of Xland shall approve the import of sealed radioactive sources only on condition that they are accepted for disposal at the end of their useful lives by the supplier.
- The Government of Xland (or the relevant Ministry) shall arrange the return of spent nuclear fuel from the research reactor to the country of its origin.
- All radioactive waste management activities shall be conducted in an open and transparent manner and the public shall have access to information regarding waste management where this does not infringe upon national laws, security and defence.
- The WMO activities shall be implemented according to the long-term strategic plan and annual implementation plans, subject to governmental approval.

TYPICAL STRATEGY FOR A COUNTRY WITH A SMALL AMOUNT OF RW (3)

- The WMO shall develop an inventory of the existing radioactive waste in country, including legacy waste, and a prediction of expected future radioactive waste. The inventory shall be kept up to date and appropriate records maintained.
- The WMO shall establish a waste categorization scheme as a basis for the national radioactive waste inventory.
- The WMO in cooperation with the Regulatory Body shall create and maintain a database of facilities at which radioactive waste is generated with details of the nature and amounts of waste involved.
- The WMO shall establish and operate a system for the collection, characterization, transport, storage and processing of all radioactive waste generated in Xland. For this purpose, the WMO shall specify the conditions under which the waste is accepted from the waste generators.
- The WMO shall provide for the eventual disposal of all radioactive waste in Xland according to the approved strategy.

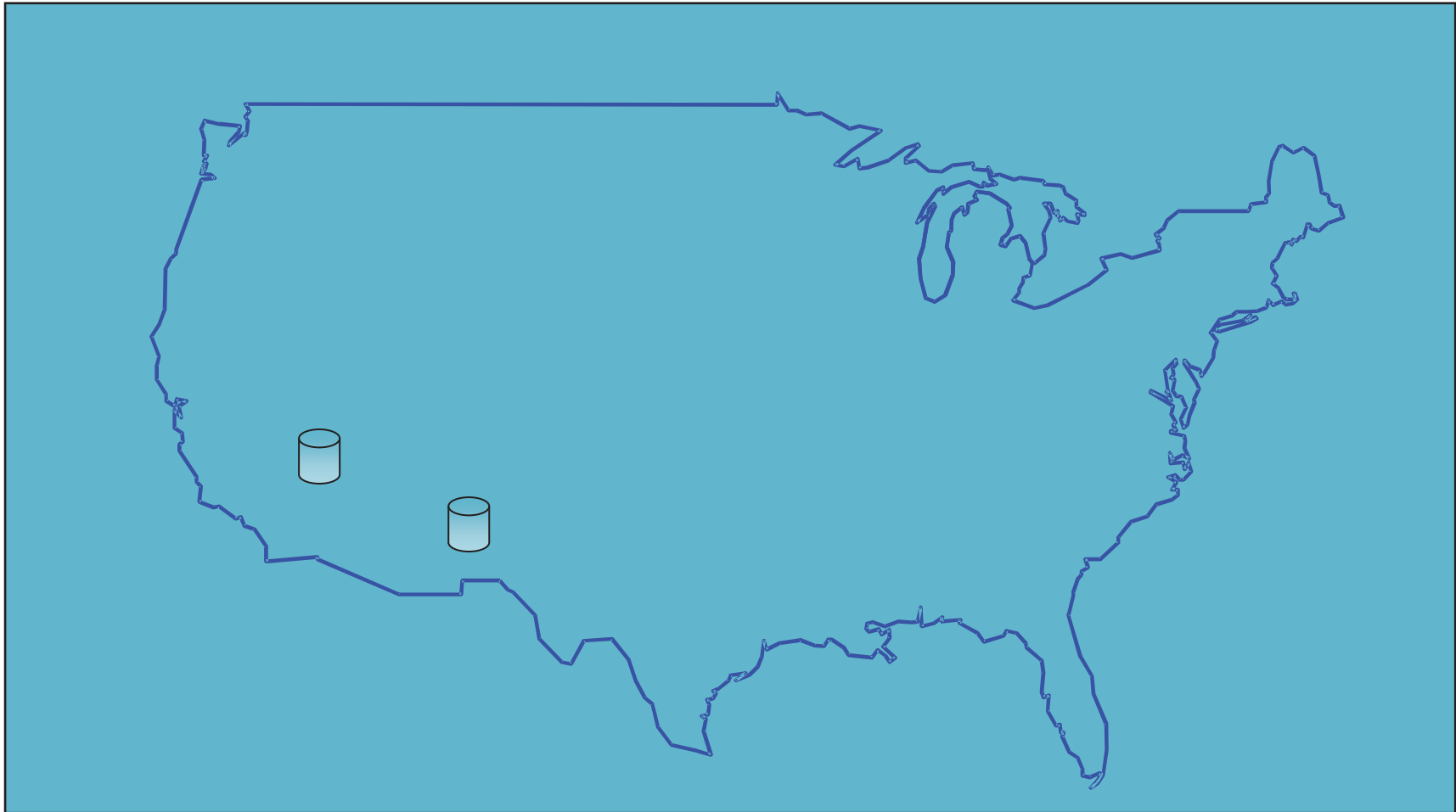
A MULTINATIONAL REPOSITORY ?

- The multinational repository concept assumes that waste originating from more than one “partner country” is being disposed in a common repository of a “host country”.
- The term “Regional Repository” is applied when the host country and the partner countries are located in the same geographical region of the world.
- “International repository” implies the authority of a supra-national body, like the United Nations.

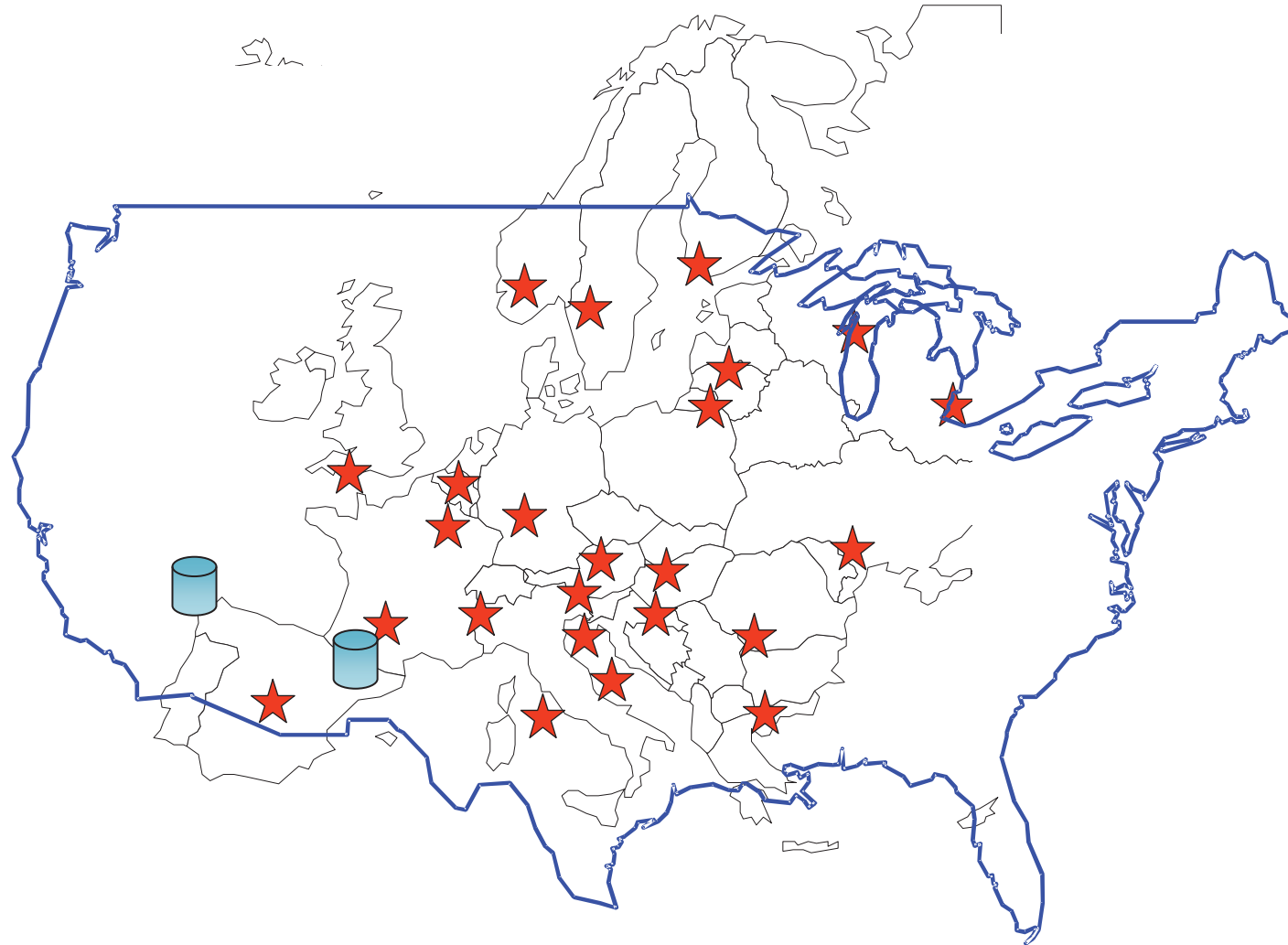
Can every country have its own geological repository?



Can every country have its own geological repository?



Can every country have its own geological repository?



MULTINATIONAL APPROACHES

- Requires a co-operative effort, where a group of countries coordinate and collaborate on a joint solution for the disposal of their waste
- An alternative scenario considers that what is today a national repository project might at later stage become a facility able to offer to accept foreign waste
- Voluntary approach essential

TO SUMMARISE

- **National Policy Development is a Logical Consensual Procedure Requiring high level Decision-Making. Its Implementation Needs Time And Money**
- **Strategy Development is largely a Technical Procedure involving choices among options – It also Needs Time And Money**
- **Revision of Any Existing P&S requires a thorough review of the Current Situation (Weak Points, Future Needs, Available Capacities, Obligations)**
- **Allocation of Responsibilities and the Provision of Adequate Resources is a Key Issues**
- **No Single Recipe – There are always National Specifics (Do Not simply copy)**
- **Whatever Exists – it is Better Than Nothing**

Thank you for your attention

