

# **A Repository Concept for UK High-level Waste and Spent Nuclear Fuel**

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**nirex**

# Lessons learned

- Radioactive waste exists
- Credible options allows this generation to deal with it
- Policies and approaches have been fragmented
- Stakeholder involvement is key

# Nirex's Mission

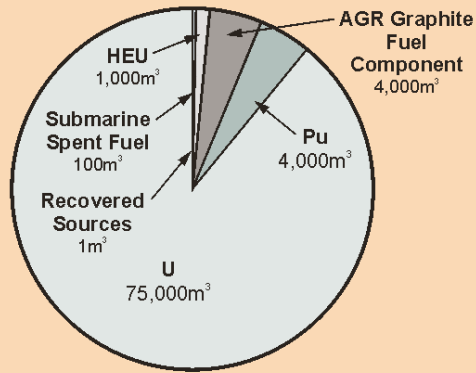
In support of Government to develop and advise on:

Safe, environmentally sound and publicly acceptable options for the long-term management of radioactive materials in the UK

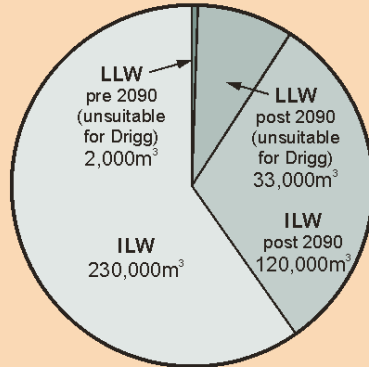
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### Radioactive Wastes and Materials

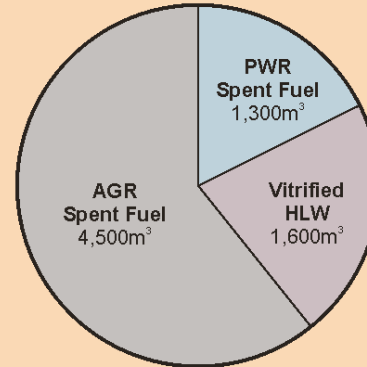
#### Other Materials



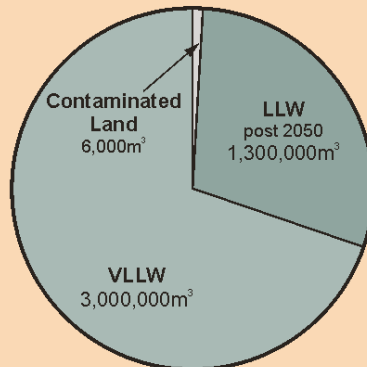
#### Phased Geological Repository Concept



#### Reference HLW/SF Concept



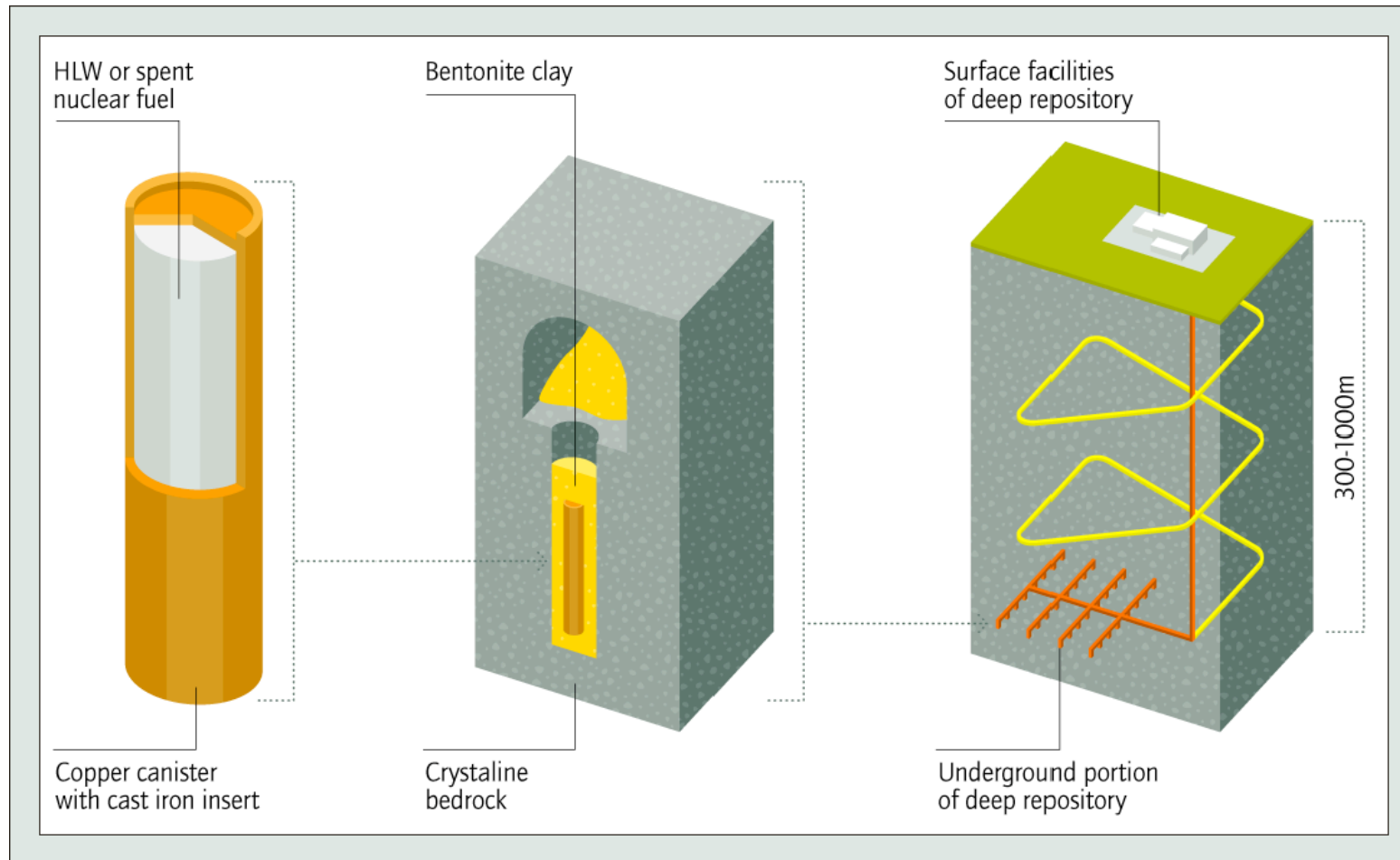
#### LLW/VLLW



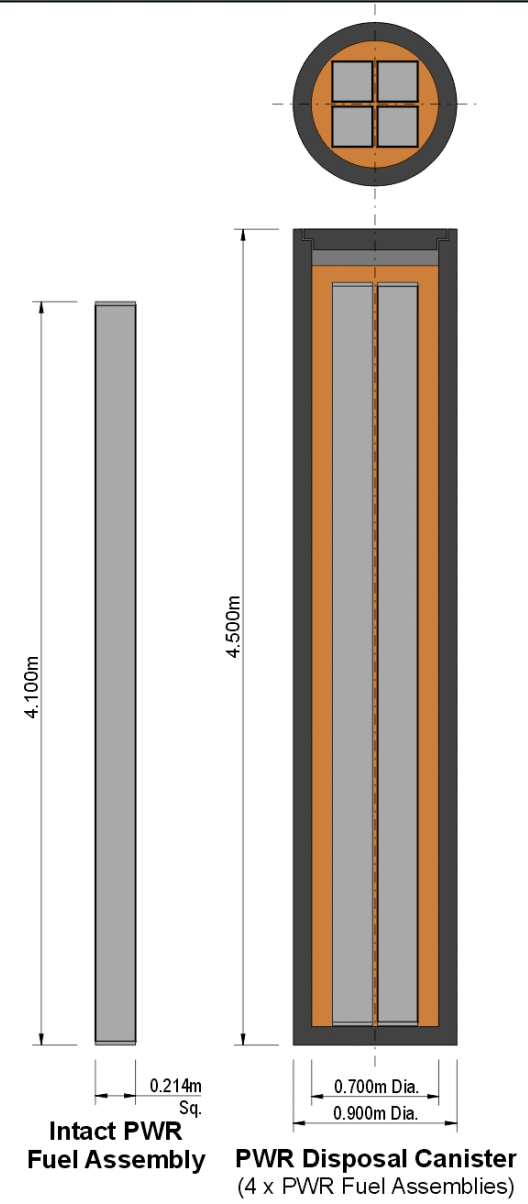
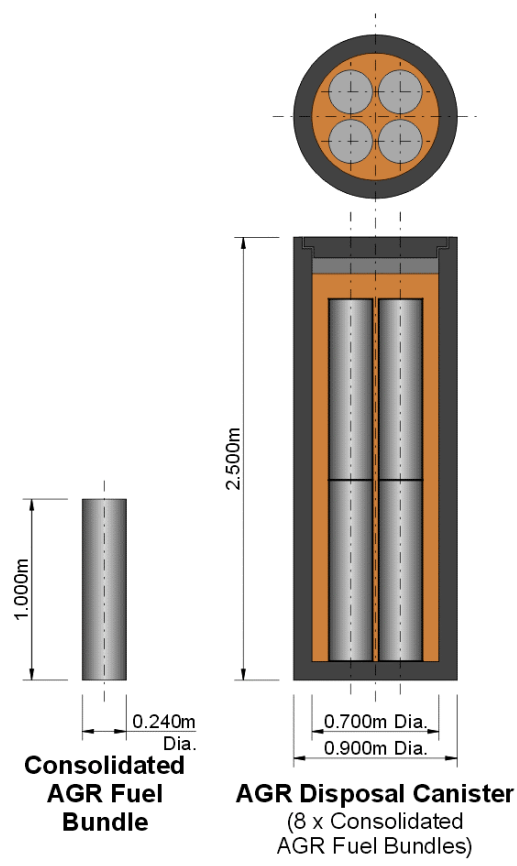
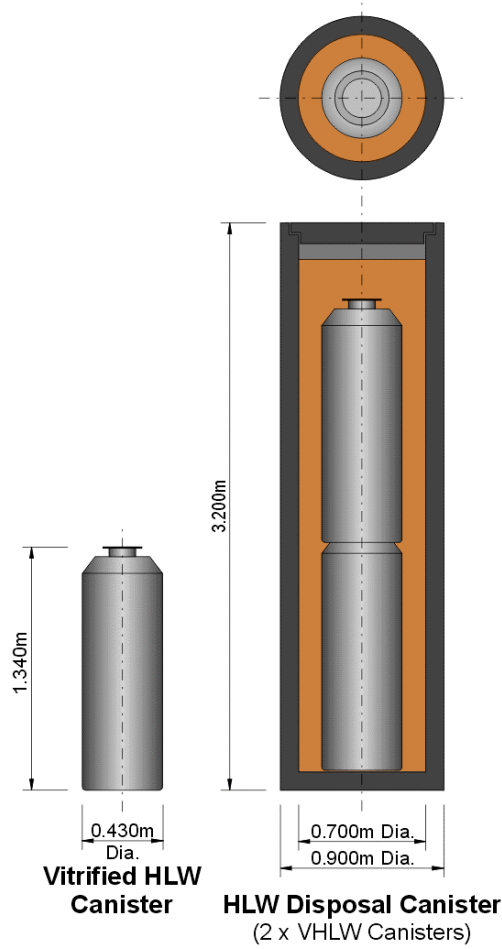
# UK Reference HLW/SF Concept

- Aim to demonstrate viability
- Adopted KBS-3V on the basis of:
  - Credibility
  - Information base – extensive R&D programme
  - High-level of regulatory scrutiny and international review
  - Stakeholder buy in

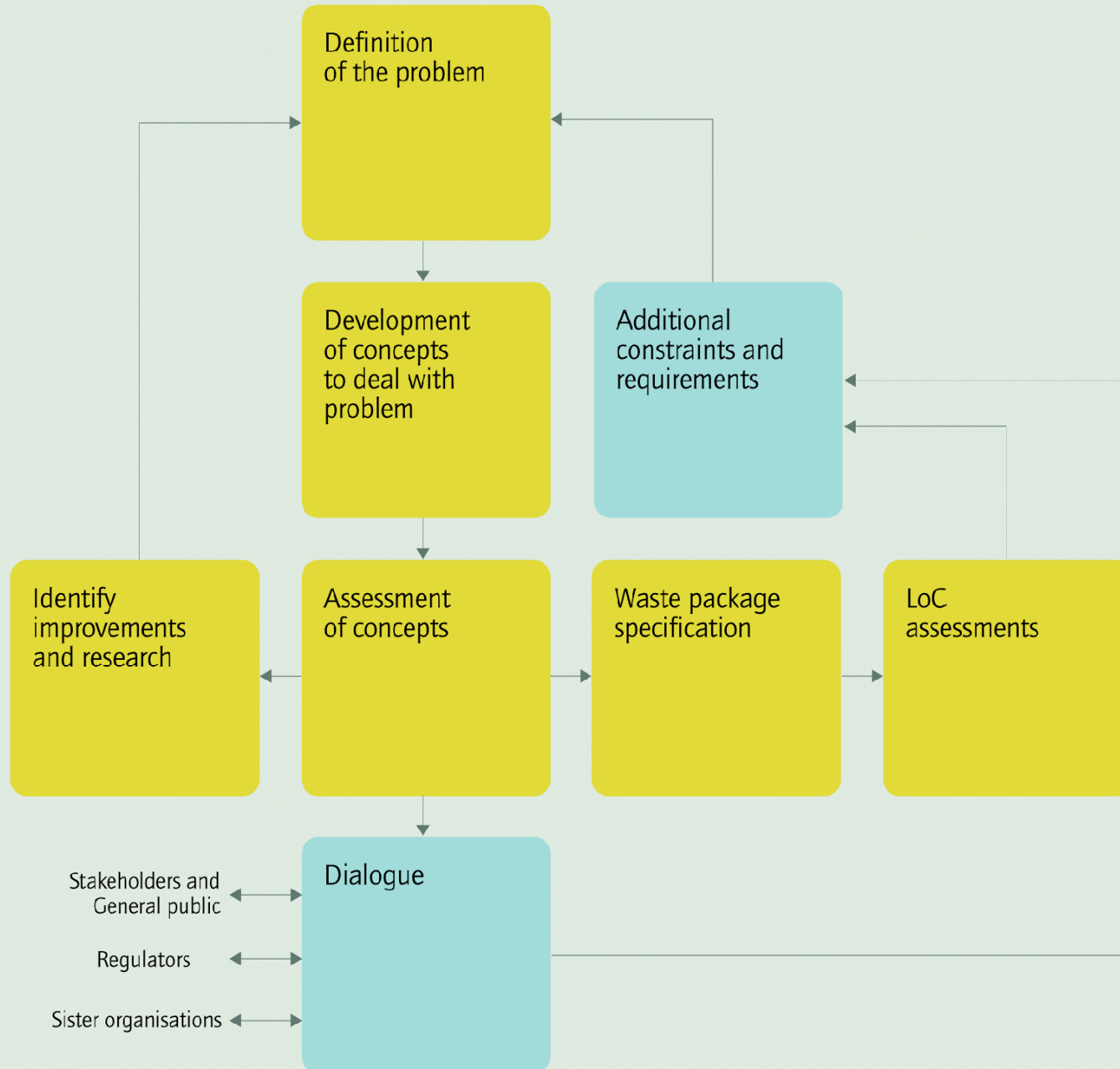
# UK Reference HLW/SF Concept



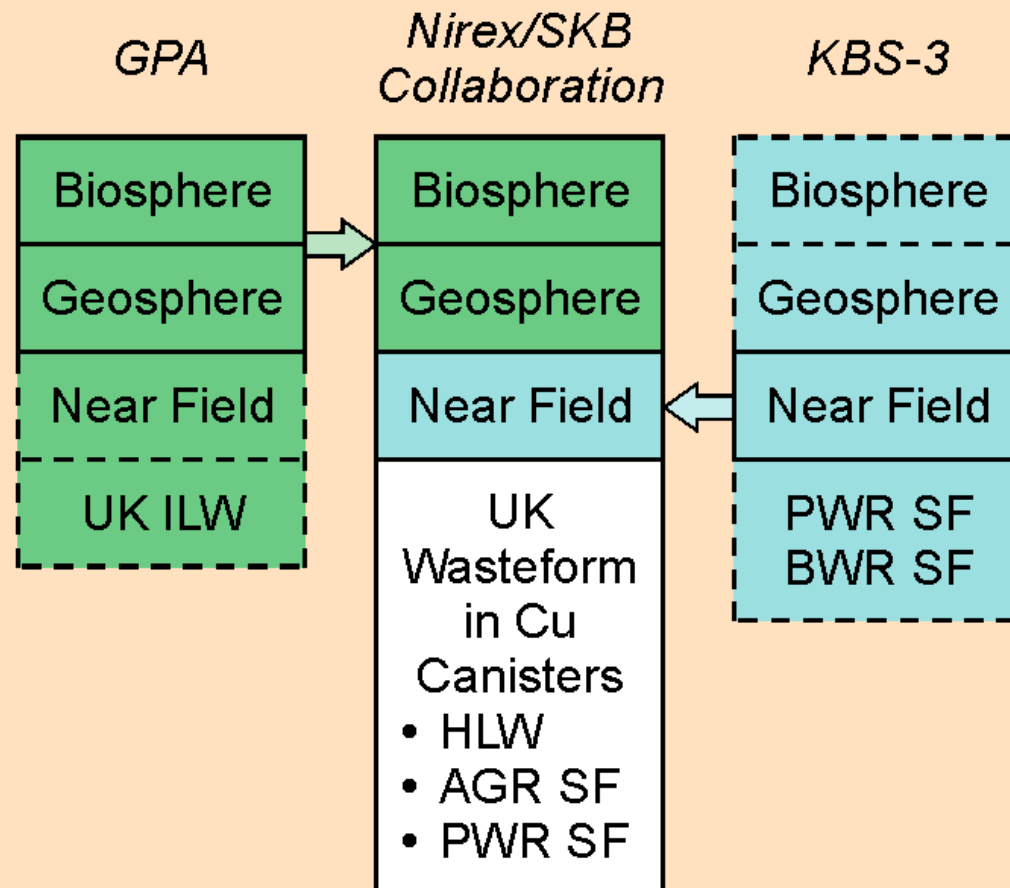
**Note:** Canister designs not optimised and internal furniture and filling materials not shown



# Iterative Concept Development



## Development of UK Reference Concept for HLW/SF



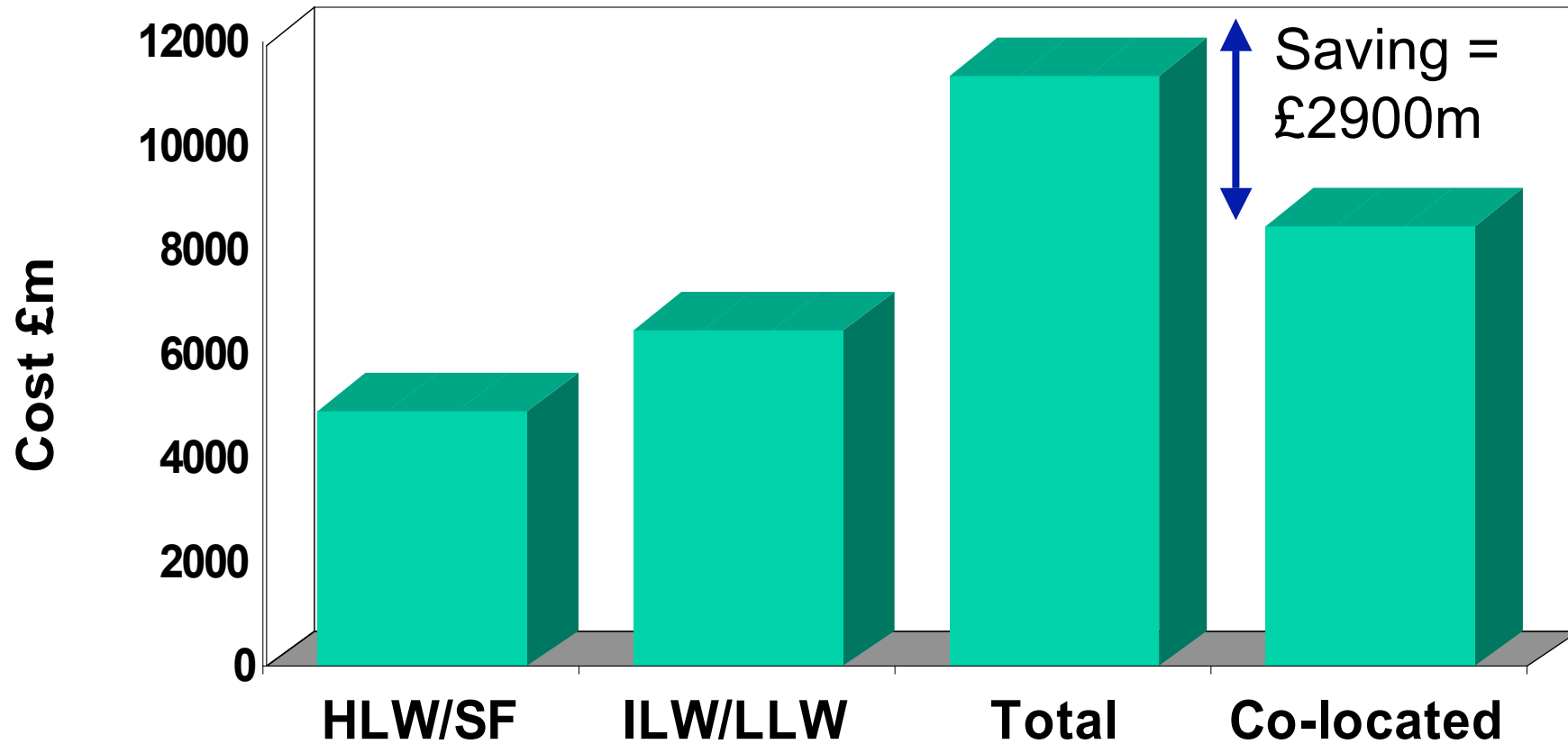
# Key Wasteform Data Requirements

- Inventory
- Bulk Species
- Instant release fraction
- Wasteform dissolution rate
- Solubility
- Gaseous releases

# Results

- The assessment results:
  - Support concept viability
  - Indicate that there would not be any significant risks to future populations
  - Provide guidance on R&D priorities

# Costs



# Further work (1)

- Further develop safety and environmental assessments and underpinning R&D
- Develop waste packaging standards and specifications
- Discuss with UK regulators how the process of regulatory scrutiny for ILW can be extended to cover HLW/SF concept

# Waste Package Standards and Specifications

## Waste Container

- Dimensions and lifting feature
- Materials of construction
- Identification
- Integrity
- Mechanical performance
- Thermal performance

## Waste Package Contents

- Inventory (radionuclide, fissile, non-radioactive)
- Mass
- Dimensions
- Dose rate
- Surface contamination
- Thermal properties
- Radiation tolerance
- Gas generation
- Chemical durability
- Physical properties
- Integrity

## Waste Package

- Activity content
- Gross mass
- Surface dose rate
- Heat output
- Surface contamination
- Gas generation
- Mechanical performance
- Thermal performance
- Criticality safety
- Security
- Safeguards
- Quality management
- Data requirements

# Further work (2)

- Address key challenges
  - establish views on the degree of retrievability and examine technical approaches to retrievability
  - optimising configuration of underground openings
  - investigate combined repositories
  - identify siting requirements
  - investigate options for other radioactive materials

# Concluding Remarks

- Radioactive waste exists and needs to be dealt with
- Phased Geological Repository Concept is a viable option for the management of UK's radioactive materials
- Should be implemented in the UK without further delay