Back End Nuclear Fuel Cycle Policies and Strategies South Africa
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South Africa

Department of Mineral Resources and Energy
Lerato Makgae
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• SA Energy mix
• Existing operations across the NFC
• Policies and legislation
• Radioactive Waste Management in SA
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• Conclusion
Overview of South African Electricity Mix

- Eskom operates 30 stations with installed capacity of 48,824 MW
- Total generation of 218,939 GWhr
Existing Operations across the Nuclear Fuel Cycle

Koeberg Nuclear Power Plant

Vaalputs Disposal Facility

NUFCOR

Western Cape

Safari-1

Gauteng

SAFARI-1

SAFARI-1
Technical Meeting on Cost Estimation Methodologies for Spent Fuel Management
Policies and legislation for Radioactive Waste Management

- Nuclear Energy Policy, 2008
- Nuclear Energy Act, 1999
- National Nuclear Regulator Act, 1999
Radioactive Waste Management in SA
Management of Short Lived Low and Intermediate level waste (1)
Radioactive Waste Management in SA

Used Nuclear Fuel Management (2)

WET STORAGE

DRY STORAGE
Radioactive Waste Management in SA

Used Nuclear Fuel Management (3) – Central Interim Storage Facility

Siting

Cask Transport

Vertical Concrete Storage Casks

A Vote for Dry Casks

Until a deep geologic repository for spent nuclear fuel opens, the author argues, the U.S. nuclear industry has a very good alternative for storing the spent fuel now accumulating in cooling pools: dry casks. These 100-ton concrete and metal cylinders each hold 10 or more tons of spent fuel. Located at reactor sites, they create little additional risk beyond that posed by the various operations currently conducted there.
Radioactive Waste Management in SA

Fund Bill – currently in legislative process

- **Purpose of the Bill** – to ensure that there are sufficient provisions for the long term management of radioactive waste.

- **Scope** - applies to high-level radioactive waste for storage in a centralised interim storage facility and final disposal in a deep geological repository.

- **Governance** – External Independent Structure (Board of Directors)

- **Funding** – Generator of radioactive waste pays levies to the National Treasury

- **Utilisation of the Funds** – conducting R&D, capacity building initiatives, siting, licensing, construction, operation, decommissioning of waste facilities, storage and disposal facilities for the long term management
Waste Management Organisations (WMOs)
- Strategy formulation and implementation including:
  - site survey and selection
  - public consultation;
  - construction and operation of facilities
  - reception and disposal of waste.
- Collection of contributions for the establishment of an internal fund

Waste

Management of fund (can be entrusted to an external body)

Waste generators
- strategy and plan formulation;
- on-site management;
- transport (to processing/storage or disposal facilities);
- storage until disposal;
- development of cost estimates;
- make contribution to fund.

Authorisation and supervision

Implementation plan approved by the government

Oversight

Definition/adjustment of fee

Government
- policies;
- legislation;
- regulation;
- oversight;
- definition and adjustment of fees.

Fund

Contributions
Financing Model for the Radioactive Waste Management Fund Study (2016)

Assumptions

• New Build NPPs has a power output of 9600 MW (IRP 2010)
• Reprocessing option not pursued at this stage: Spent fuel is HLW
• New CISF site selection process to be followed
• Koeberg operation continues for at least 10 years after 2025
• Waste generators pay for transport and for spent fuel storage casks
• Vaalputs continues as the national LLW disposal site (and possibly also in future for ILW)
• New DGF site selection process followed

• Note: A new approved Integrated Resource Plan (IRP) 2019 is on hand with decision 8 revising the nuclear capacity to 2500 MW. A new study to revise the 2016 financing model for RWM Fund is in preparation.
### Cost of the Back End facilities (% spread of cost)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRWDI Overheads</td>
<td>4.3</td>
</tr>
<tr>
<td>Vaalputs Facility</td>
<td>1.9</td>
</tr>
<tr>
<td>Central interim Storage Facility</td>
<td>11.0</td>
</tr>
<tr>
<td>Transport</td>
<td>2.3</td>
</tr>
<tr>
<td>Deep Geological Facility</td>
<td>60.1</td>
</tr>
<tr>
<td>Encapsulation Plant</td>
<td>20.2</td>
</tr>
<tr>
<td>Safari 1 (research reactor)</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Financing Model for the Radioactive Waste Management Fund Study (Cost drivers)

• Exchange rate – currency fluctuations may negatively affect cost of goods & services;

• Capital cost – variation in international market prices on goods & services may impact project costing;

• Labor costs – additional cost due to development of local skills or import of such a skill

• Size of the nuclear programme – volume of waste generated may negatively affect the funding model and challenge implementation.
Financing Model for the Radioactive Waste Management Fund Study (Risks and uncertainties)

- New Build program size revised, having a significant impact on the scope of the waste management system;
- Premature future closure of NPPs bringing forward the time when certain wastes are generated, e.g. decommissioning waste;
- Changing the Back-end strategy from direct disposal of spent fuel to reprocessing, retrieval and recycling
- Delays in building certain waste management facilities
- Insufficient funds for waste management
Conclusion & Takeaway points

Minister of Energy
- evaluates & recommends plans
- consults
- approves plans

National RWM Committee
(NNR, DOE, DOH, DEA etc.)
- submits plans
- contributes funds (levies) (c/kWh, R/lt)

National RWM Fund
(National Treasury, DOE, Board of Trustees)
- requests for funds
- allocates funds
- pays user-charges

Waste Generator
- On-site waste: collection, treatment, packaging, storage, transportation, plans

Disposal Site
- Consists of facilities for: storage, encapsulation, disposal
- Sites, constructs, operates, decommissions facilities
- Accepts waste
- Delivers waste

Disposal Institute
- WAC development
- Siting
- R&D
- Storage
- Encapsulation
- Disposal
- Monitoring
- Execution of plans

Other Sources of Funds
(loans, donations, sales etc.)

Issues Disposal certificates
Applies for Disposal certificates
THANK YOU