



SISA 2016

**Pros, cons and
safety implications**

for South Australia

28 July 20**16**

nuclear**rc**.sa.gov.au

[Exploration, extraction and milling]

Existing frameworks
adequately **address risks**

Expansion of uranium **mining**
in South Australia will
provide additional benefits

Recommend:

Simplify mining **approvals**

Improve integration and
availability of geophysical **data**

Encourage and **support industry**
investment in the exploration of
greenfield locations

Ensure decommissioning and
remediation costs in advance



[Further processing and manufacture]

Risks are manageable

Not commercially **viable**
in South Australia
in next decade

Recommend:

Actively support increased utilisation
of the cyclotron at **SAHMRI**

[Management, storage and disposal of waste]

South Australia has **attributes** and **capabilities** to safely undertake international **waste disposal**

Opportunity to draw on **international experience** from existing programs

Potential for **significant** inter-generational economic **benefit** to the community

Significance of **social** and **community consent**

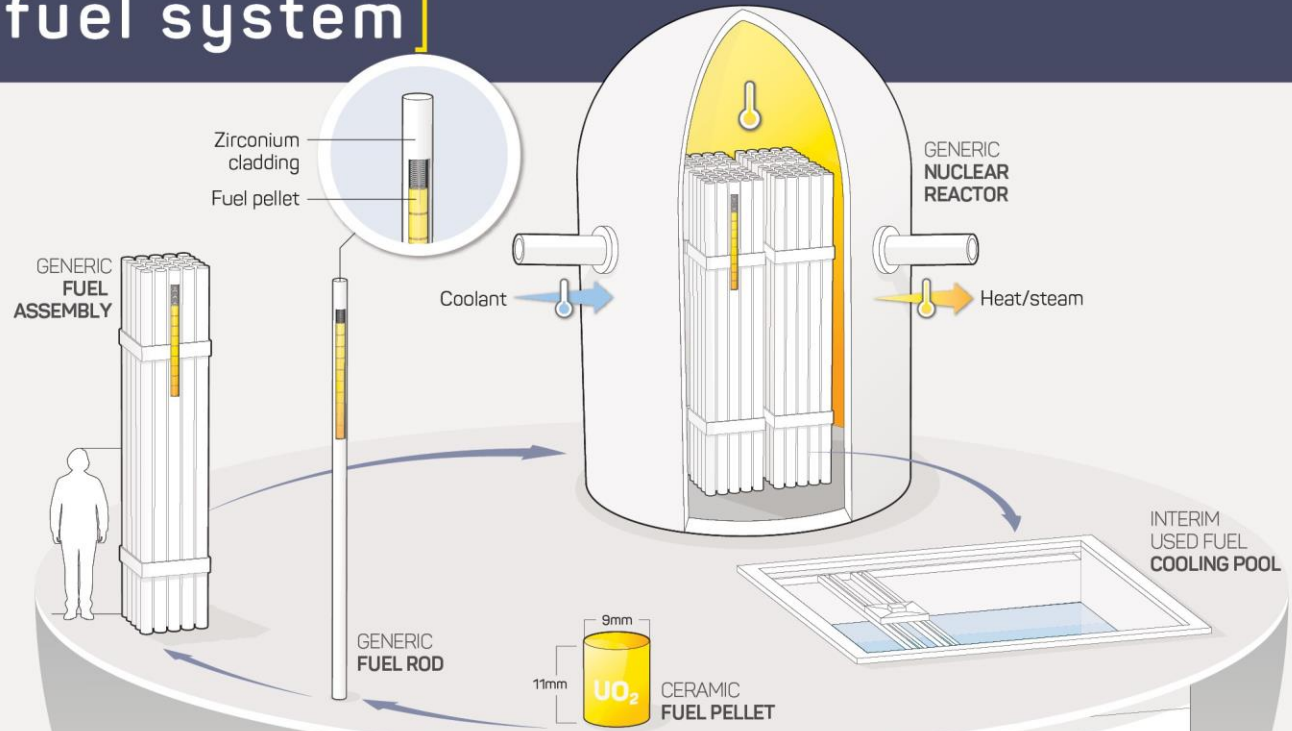
Recommend:

Pursue purpose-built **waste storage and disposal** facility

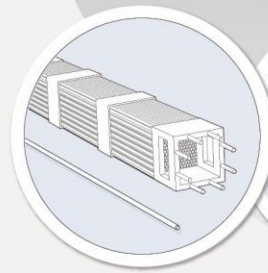
Remove legislative **constraint** to considering this opportunity

Remove legislative **prohibitions** to enable **fuel leasing**

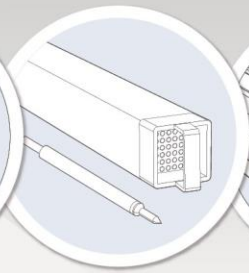
Nuclear fuel system



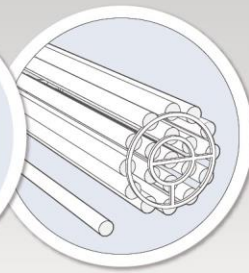
TYPES OF FUEL ASSEMBLY



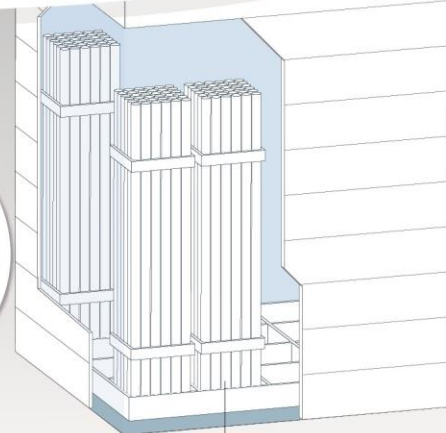
PWR REACTOR
FUEL ASSEMBLY



BWR REACTOR
FUEL ASSEMBLY



CANDU REACTOR
FUEL ASSEMBLY



Used fuel assemblies

[Key considerations]

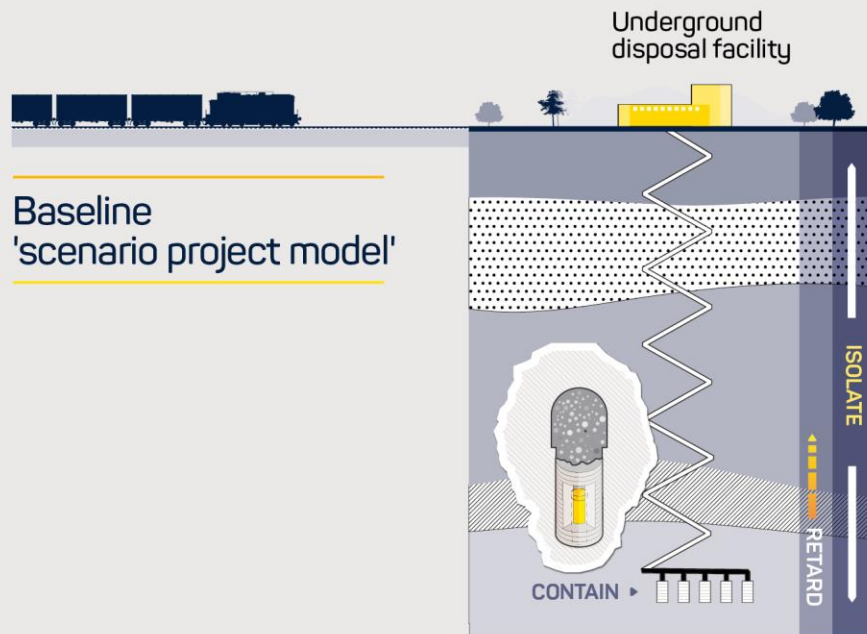
Submissions, responses and **community** engagement

Key themes identified:

Safety

Economics

Industry impacts, transport, security and non-proliferation



[Multi-barrier system]



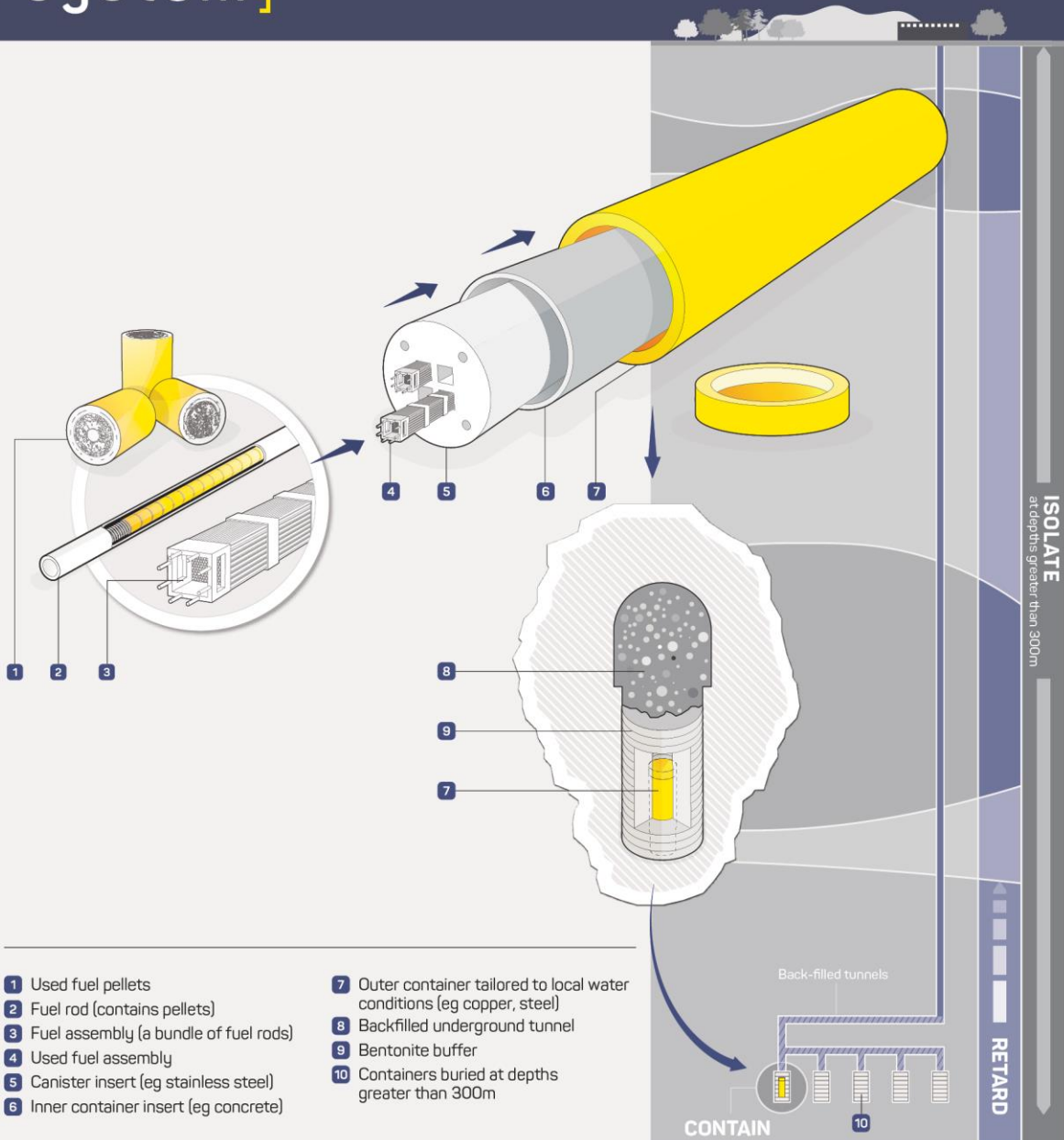
MULTI-BARRIER DESIGN

Layers/barriers may be manufactured from material such as stainless steel, copper and concrete.



GEOLOGICAL & GEOGRAPHICAL CONSIDERATIONS

Containers and disposal structures are tailored to suit geographical and geological requirements.



- 1 Used fuel pellets
- 2 Fuel rod (contains pellets)
- 3 Fuel assembly (a bundle of fuel rods)
- 4 Used fuel assembly
- 5 Canister insert (eg stainless steel)
- 6 Inner container insert (eg concrete)

- 7 Outer container tailored to local water conditions (eg copper, steel)
- 8 Backfilled underground tunnel
- 9 Bentonite buffer
- 10 Containers buried at depths greater than 300m

ISOLATE
at depths greater than 300m

RETARD

CONTAIN

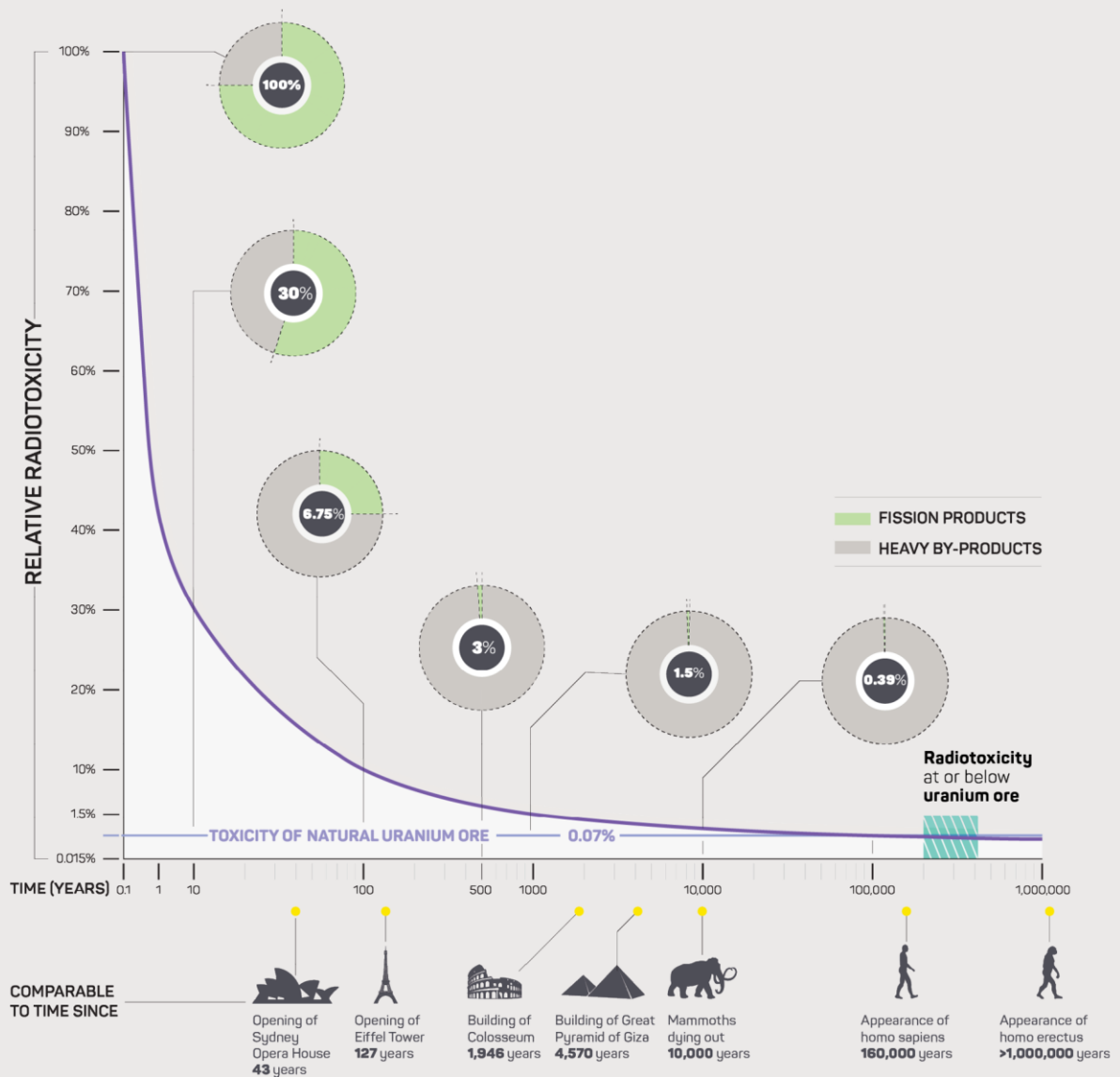
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Safety assured through combination of:

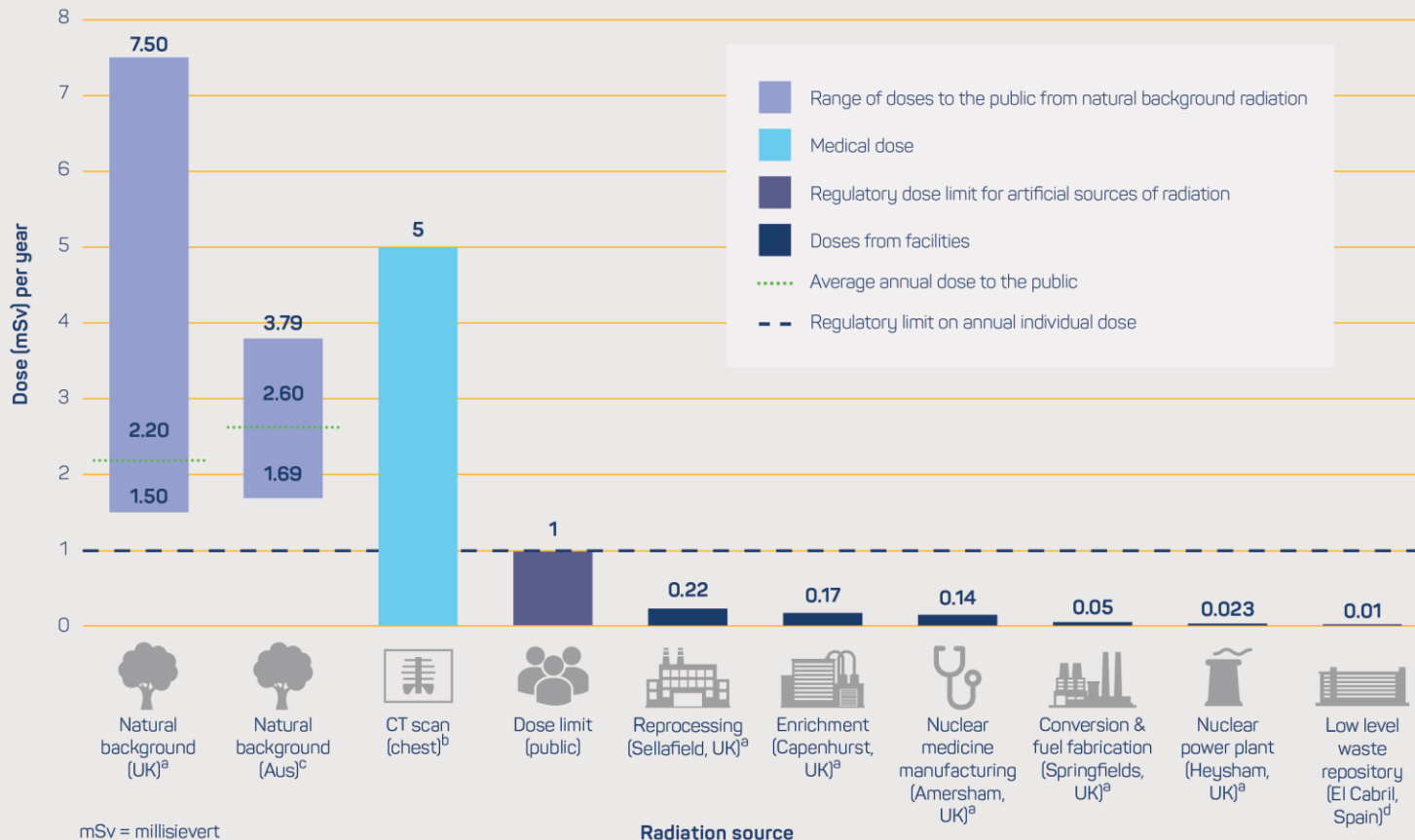
Geology

Engineered barriers

Detailed understanding of the radiological risks



[Radiation doses]



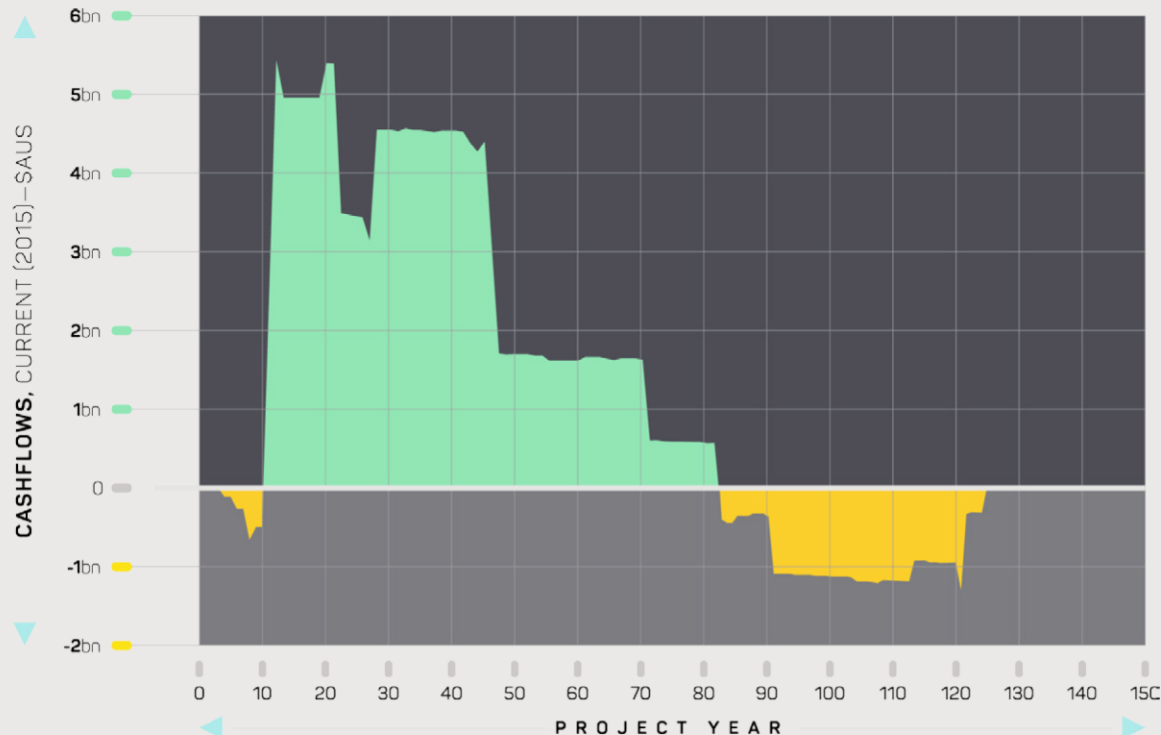
ECONOMIC MODELLING (BASELINE SCENARIO)

\$257 billion revenue, costs
of \$145 billion

costs include \$32 billion
reserve fund

equates to \$51 billion
discounted at 4%

State Wealth Fund
could accumulate around
\$445 billion over 70 years



[Impact on image and other industries]

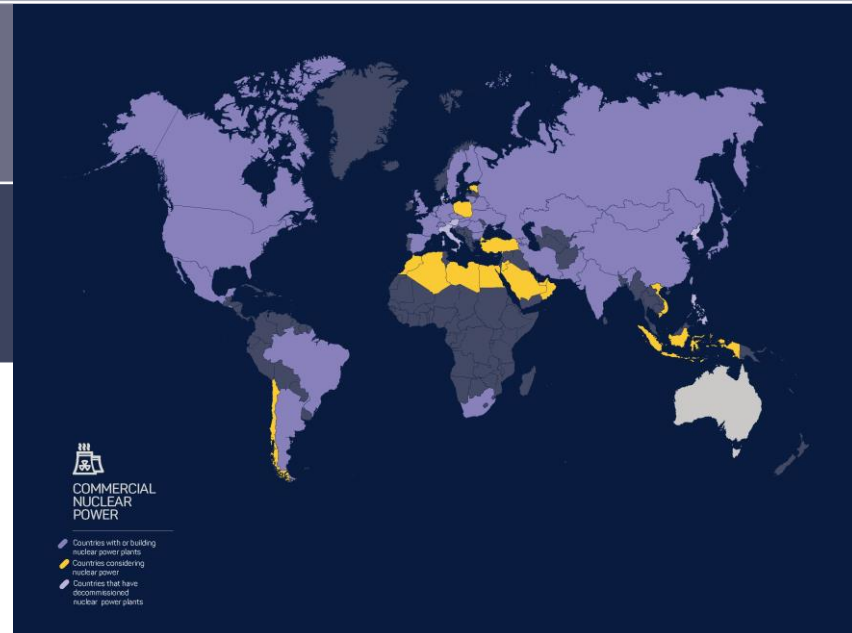
No evidence of an **adverse impact**
from the presence of a nuclear facility

Major nuclear power plant accidents have an impact,
but a waste facility **does not pose** this **risk**

Most of SA's food and wine export **customers** and
competitors are from **nuclear countries**

Facilities need **not** be located **near**
prime agricultural **land** in SA

Risks from **transportation** incidents
are **negligible**



[Transporting used fuel]

Done successfully for **50 years—20000+** shipments of highly radioactive material since 1971 with no incident of container breach or leak

Success attributable to **cask design**—greater than 100 t, shielded, steel & lead

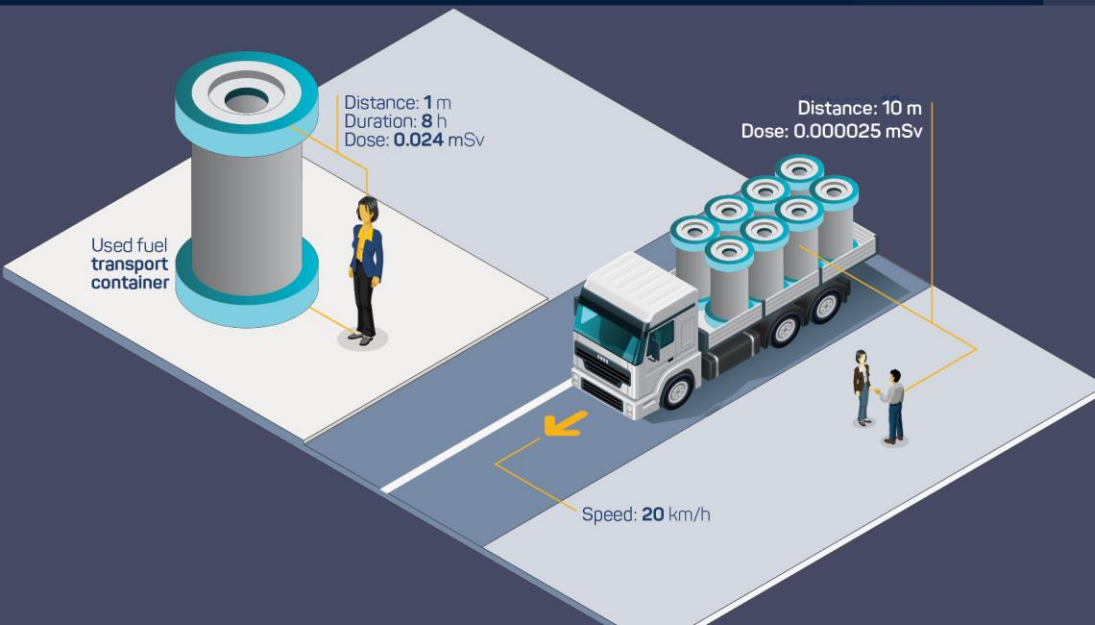
Transportation carefully **planned**—regulated, escorted, dedicated planned routes

Public's exposure to radiation

- ▶ **0.000025 mSv** during transit—equal to 10,000th of background radiation
- ▶ No **explosion** or **criticality** risk
- ▶ **Worst case** scenario, a **damaged** seal

Probability of incident

- ▶ By rail **1 in 2 billion**
- ▶ By sea **1 in 1,000 trillion**





[Insurance]

Operator is exclusively liable

Minimum liability limit

Liability cover **mandatory**

Equal treatment of victims

Liability:

Lies with **operator** of nuclear facility (not a carrier)

Jurisdiction lies with **incident state** (not installation state)



[Next steps: Future]

Assuming immediate steps lead government to proceed further:

Pass legislation to **facilitate** and **regulate** proposed **development**

Support detailed project **proposal**, including consent-based siting process



QUESTIONS