



NFCRC tentative findings:

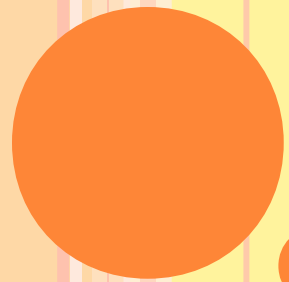
Research and development opportunities

4th May 2016

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(formerly of the NFCRC)



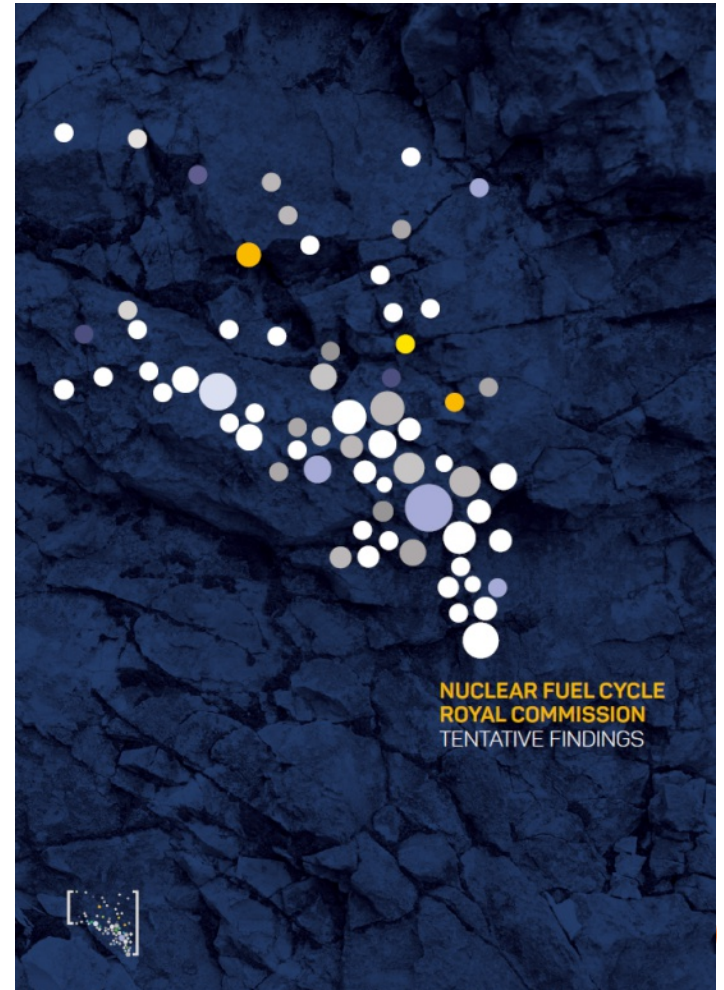


Background



Timeline

- NFCRC established March 2015
 - Independent of government
- Tentative findings February 2016
 - Economic analyses
 - Public responses
- Final report due 6 May 2016
- Response by end of year

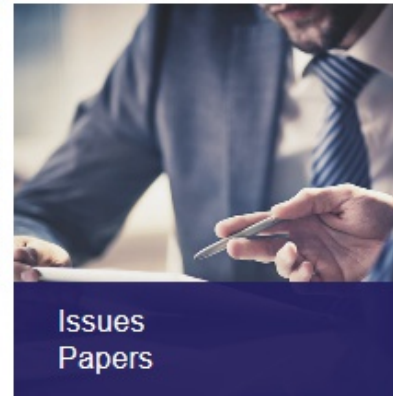
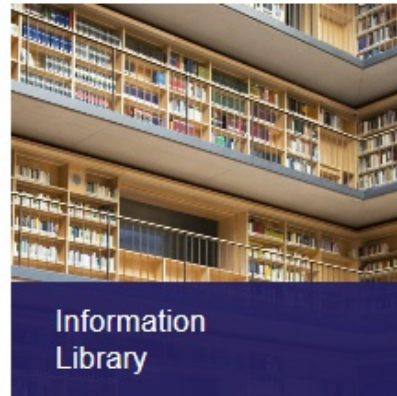
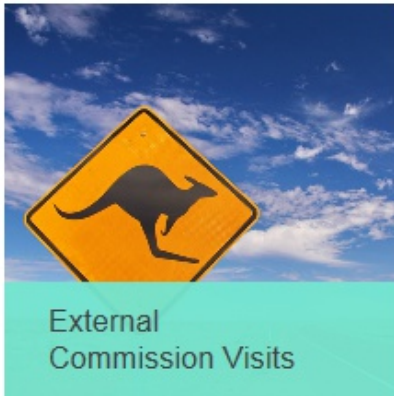


Terms of reference—risks and opportunities

- Exploration, extraction and milling
- Further processing and manufacture
 - Front-end: conversion, enrichment, fuel fabrication
 - Back-end: reprocessing
 - Manufacturing
- Energy generation (in South Australia)
- Management, storage and disposal of waste
 - From industry, research and medicine
 - From power generation



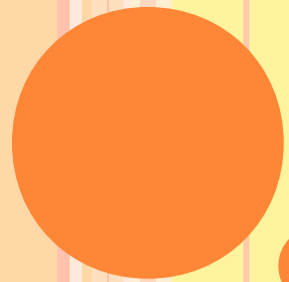
Process



○ Aspects of inquiry

- Issues papers
- Public submissions
- External visits
- Public sessions





Tentative findings



At a glance

- Expansion of uranium mining may be beneficial
- Conversion, enrichment, fuel fabrication not viable
 - Fuel leasing likely to be more commercially attractive
- Nuclear power in South Australia not compatible with current market
- Storage and disposal of spent fuel could be undertaken safely, profitable
- Community consent is essential, no sites investigated



Further exploration, extraction and milling

- Current low uranium price, existing inventories
- Could return to full capacity production (5000 tonnes)
 - Further investment for additional capacity
- Even under high demand scenarios, value is small
- No commercial incentive to development thorium
- No competitive advantage for thorium



Further processing and manufacture

- No technical impediment
- Legislative prohibitions
- Oversupplied market
- At best, marginal returns for proven technology
- Limited range of positive returns for other technology



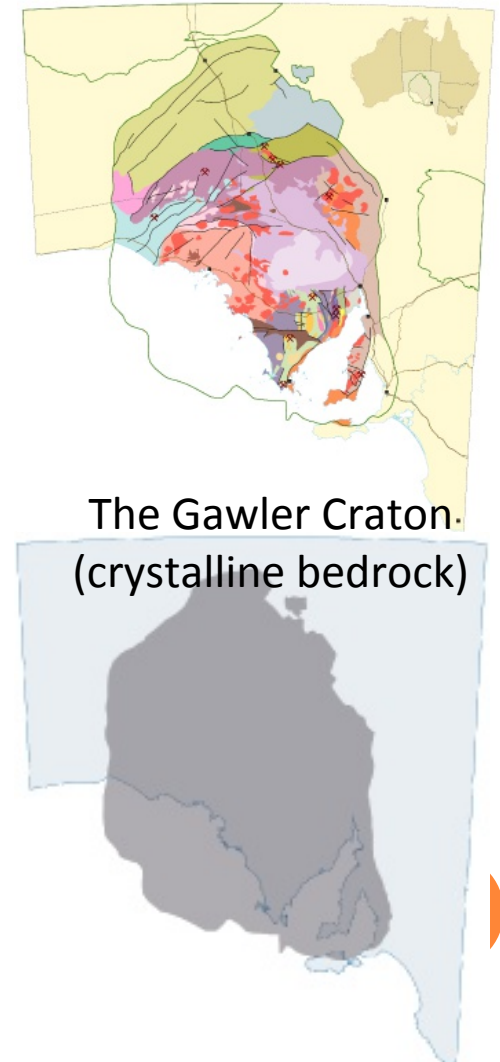
Electricity generation

- Legislative prohibitions
- Energy policy is not technology-neutral
- Not viable (in South Australia) for:
 - Range of electricity prices including with carbon prices
 - Large or small plants
 - Expanded transmission interconnection
 - Range of electricity demands
- Marginal returns if low capital costs, strong climate policies
- Low demand for off-grid applications



Suitability of South Australia for waste

- underlain by Archaean geology at appropriate depth
- low levels of seismic activity overall
- an arid environment in many parts of the state
- a mature and stable political, social and economic structure
- sound regulatory basis that could be built on
- pre-existing sophisticated frameworks for securing long-term agreement with rights holders and the broader community.



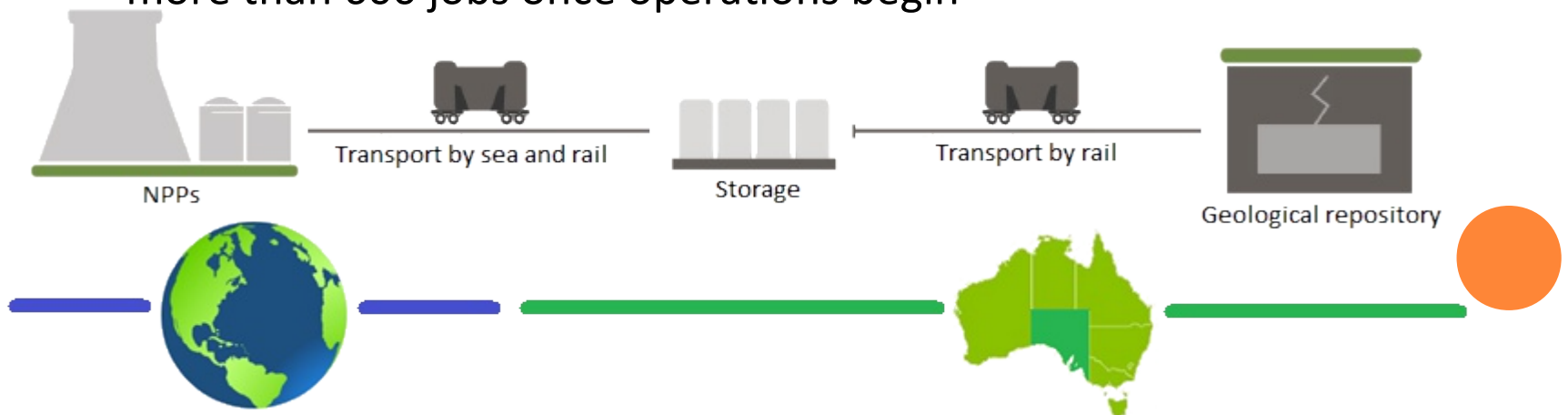
Scenario for financial assessment

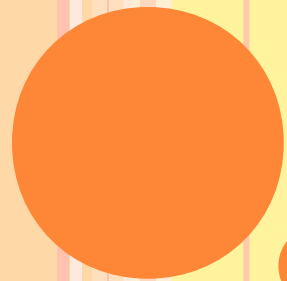
- Worldwide > 1 million tHM spent fuel by 2090
- Baseline assessment considered:
 - customer base of 138 000 tHM of spent fuel over about 100 years
 - price of \$1.75 million per tHM
 - waste imported for storage at year 11, with disposal from year 28



Outcomes

- Combined storage and disposal facilities could generate:
 - total revenue of more than \$257 billion, costs \$145 billion
 - in annual terms, more than \$5 billion revenue a year for the first 30 years
 - a net present value of more than \$51 billion
 - approximately 1500 full-time jobs during a construction
 - more than 600 jobs once operations begin





Research and development opportunities



Exploration

- Limitations from extent and thickness of cover
- Absence of drilling data
- Role of new sensing technology

Nuclear medicine

- Expanded use of cyclotron and laboratories:
 - New techniques for radiopharmaceutical manufacture
 - New therapies



Electricity

- Assessment of total system costs for a future market
 - Needed to assess lowest overall cost option for generation
- Cost of transmission and distribution
 - Not accounted for in levelised cost of electricity
- Cost certainties, Nth of a kind
- Water requirements, even for dry cooling techniques



Waste

- Long-term material behaviour
- Processes for management, storage and disposal
- Possible future uses

- Site characterisation
- Underground research laboratory
- Safety case

- Community engagement
- Investment and transfer models

