QUO VADIS
NUCLEAR
Integrated Resource Plan for Electricity Generation 2010-2030

Total additional new capacity until 2030 in GW

- Coal: 6.3 GW (15%)
- Nuclear: 9.6 GW (23%)
- Hydro: 2.6 GW (6%)
- Gas - CCGT: 2.4 GW (6%)
- Peak - OCGT: 3.9 GW (9%)
- Renewables: 17.8 GW (42%)

- Solar PV: 8.4 GW
- CSP: 1.0 GW
- Wind: 8.4 GW

Import: 2.4 GW
Preparing for Nuclear New-build

- Some key policies and strategies:
  - Nuclear Energy Policy (NEP)
  - Beneficiation Strategy for Minerals Industry
  - Nuclear Energy Research, Development and Innovation Strategy (NERDIS)

- National Nuclear Energy Executive Coordination Committee (NNEECC)
  - Chaired by the deputy president of RSA
Necsa’s Main Functions
(in terms of the Nuclear Energy Act, 1999)

- To undertake and promote research and development in the field of nuclear energy and radiation sciences and technology and ... to make these generally available.
- To process source material, special nuclear material and restricted material and to reprocess and enrich source material and nuclear material.
- To co-operate with any person or institution in matters falling within these functions.

Also: Execute institutional responsibilities on behalf of government, e.g. operation and utilisation of SAFARI-1, decommissioning and waste management, international obligations.
Greenhouse Gas Emissions from Electricity Production

- **Coal**: 1017, 176 grams CO₂ equivalent / kWh
- **Gas**: 575, 77 grams CO₂ equivalent / kWh
- **Hydro**: 236, 4 grams CO₂ equivalent / kWh
- **Solar PV**: 280, 100 grams CO₂ equivalent / kWh
- **Wind**: 48, 10 grams CO₂ equivalent / kWh
- **Nuclear**: 21, 9 grams CO₂ equivalent / kWh

Source: IAEA 2000
The disposal of high level nuclear waste is a leading public concern. Countries such as Finland and Sweden have licensed HLW disposal sites. However, this is not happening fast enough, and the US Yucca Mountain site is almost full at the time it is being licensed.
Proliferation Concerns


Discussion on system to guarantee countries’ supplies of nuclear fuel, while minimizing proliferation risks. Proposals include a nuclear IAEA "fuel bank" administered on a non-discriminatory, non-political basis reducing the need for countries to develop their own uranium enrichment technologies.
Drivers for investment in nuclear technology in South Africa

- Long term uranium price buoyancy means fuel cycle investment is attractive.
- Geographic factors in Western Cape & Eastern Cape rule out other baseload generation sources.
- Costing over the 60 year life time of power stations in a world that is gathering momentum towards rejecting carbon means nuclear comes out cheaper, even in other regions of SA.
Uranium Resources (RAR - $130/kg U)


World Total = 3296689 t

- Canada 345200 t
- USA 342000 t
- Brazil 167700 t
- Namibia 182556 t
- South Africa 255593 t
- Niger 180486 t
- Jordan 30375 t
- Kazakhstan 513897 t
- Mongolia 46200 t
- China.conti 38019 t
- India 42568 t (24)
- Uzbekistan 78936 t
- Ukraine 66706 t
- Russia 131750 t
- Australia 747000 t

(t = metric tonne · NA = Data not available)
SA Uranium Resources

Uranium Provinces and Deposits in South Africa

Known uranium resources = 432 500 tU
The Nuclear Energy Stance in SA
How much fuel could be made from SA Uranium?

- The amount of nuclear fuel that can be made from the uranium that may be mined in SA, rises from 110 tons/year today to 840 tons/year in 2030.
- The remainder of the fuel would be used in the PWRs and similar reactors in other countries.
South Africa …

- Has very large reserves of uranium and a very active mining industry on which many other countries will rely for their supplies of uranium.
- Can add value to the uranium that it produces by enriching it, in order to maximize its earnings in export markets.
- Has already developed and used substantial facilities for the conversion and enrichment of uranium. These were dismantled but the expertise was developed and still exists in SA.
- Built a nuclear fuel fabrication factory and a plant for making zircaloy tubing. These were used to make the fuel for Koeberg. They were taken out of service when SA discovered that it could obtain the fuel more cheaply by purchasing it from other suppliers. The expertise was however fully developed and still exists in SA.
Nuclear Waste Management

- SA has a waste management policy that has been approved by Cabinet.
- Resources need to be provided to ensure that SA remains abreast of international developments in research and development, for example transmutation and deep geological disposal.
- Possible technologies – albeit ambitious – need exploration.
Overall Conclusions

- SA is to increase its nuclear power capacity over the next 20 years.
- This will provide an impetus for a local nuclear industry and growth in tertiary industry.
- The local mining industry is likely to partner with local and foreign nuclear players to create this industry.
Thank you!