



Status of GCR programme in Republic of South Africa

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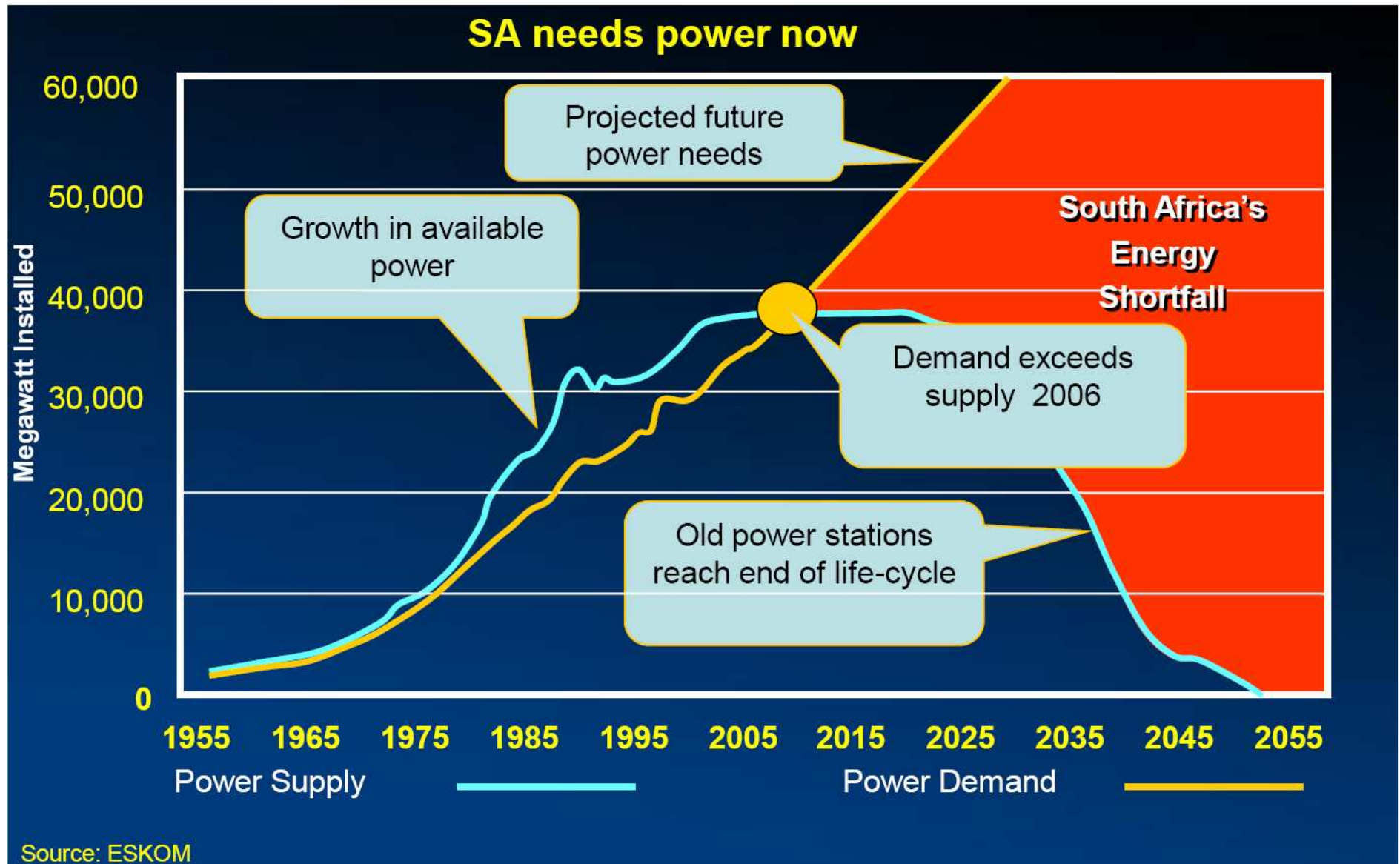
Overview

- Future of Nuclear in RSA (IRP2)
- Status at PBMR
- Status at universities related to GCR
 - North West University
 - University of Pretoria
 - NMMU
- STL (Steenkampskraal Thorium Limited)
- Conclusion

Future of Nuclear (IRP2)

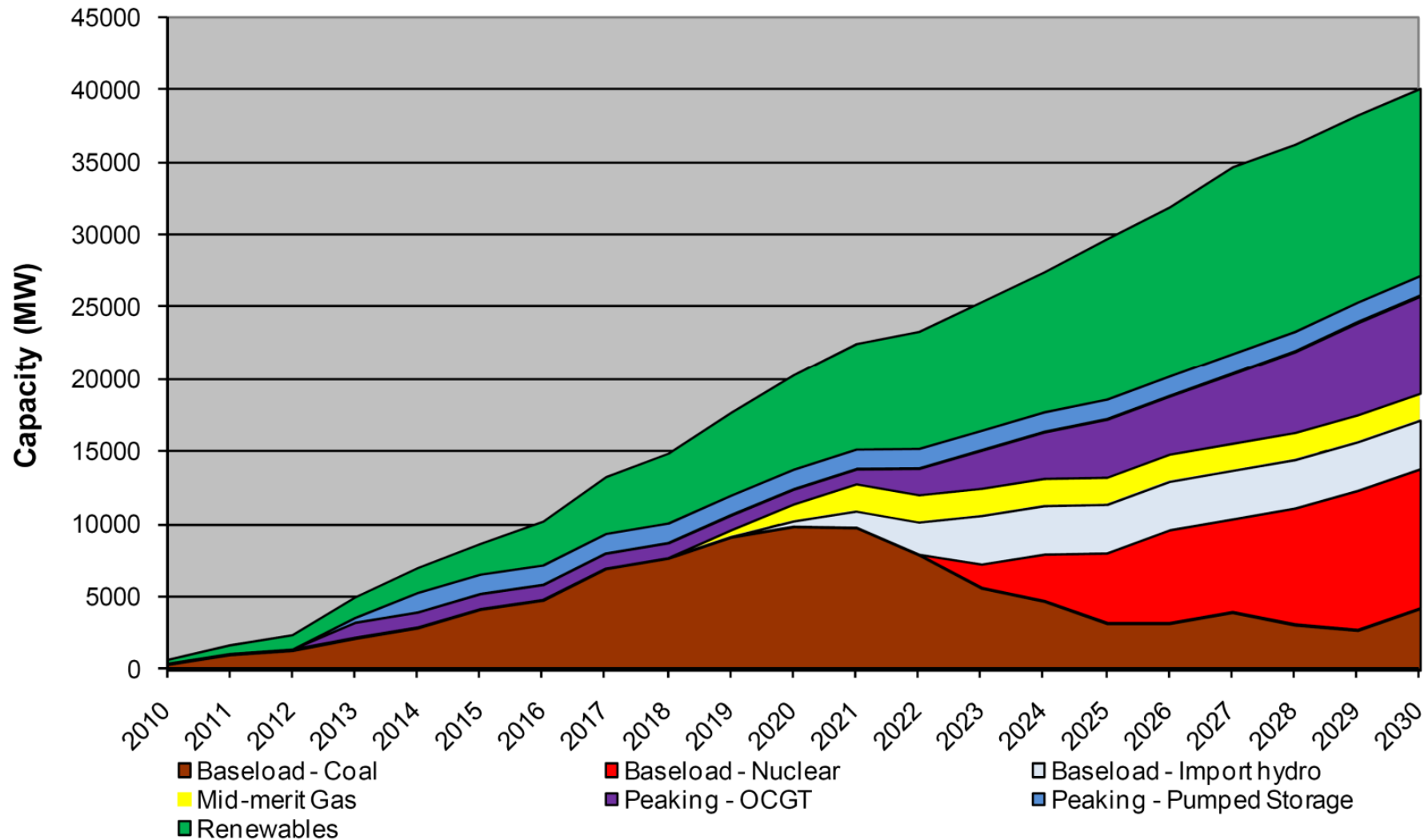
- Currently have two LWR at Koeberg power station, west of Cape Town and a research reactor (SAFARI-1) at Pelindaba, west of Pretoria.
- The Integrated Resource Plan in the South African context is a National Electricity Plan and part of a larger Energy Plan.
- The cabinet approved the country's 20-year energy master plan on 17 March 2011
- the new plan foresees
 - 42% of all new plants coming on stream between now and 2030 to be based on renewable / “green” power,
 - 23% on nuclear
 - and only 15% on coal
- nuclear would supply 9 600 MW of all new power produced in the next two decades
 - The government said in 2011 that it would not put its planned nuclear expansion on hold, despite concerns over nuclear safety given the crisis in Japan.
 - Did however reassess safety implications and implementation was delayed after Fukushima
 - Generally accepted to be only LWR / PWR technology

(IRP2) RSA needs



The scenario – 2010 version

New generation capacity: Revised Balance Scenario (Net of decommissioning)





Recent developments

- IAEA Director General Mr Yukiya Amano visited South Africa
 - Presented lecture on “The Future of Nuclear Energy Post-Fukushima”
 - Institute for Security Studies: 8 February 2013
- IAEA Integrated infrastructure Review Team
 - Access the status of the RSA nuclear infrastructure and help identify future development needs: 30 January – 8 February 2013
 - Team of IAEA and international experts
 - 1st such mission to African country
 - 1st such mission to a country that already have nuclear power
 - Tangible evidence how serious SA government is addressing the issue of nuclear power
 - Robust framework for the expansion program
- Final decision still to be made / seems to be imminent

Status at PBMR

- PBMR SOC Ltd, is a South African engineering company that was dedicated to the design, licensing and realisation of the Pebble Bed Modular Reactor.
- The project to build a demonstration unit was abandoned in 2010 and all the employees were formally retrenched on 30 September 2010.
- The PBMR company still exist as an entity and according to a government decision in 2010 was maintained till at least March 2013.
- Its new role is to Care and Maintain the Intellectual Property is largely completed and most important data has been packaged and captured
- Test facilities in Care and Maintenance:
 - FDL (fuel development laboratory on Necsa site)
 - HTF (helium test facility on Necsa site)
- Final decisions on closure / future existence / possible strategies on role and activities still under discussion

Status of GCR/PBMR activities at universities



- North West University (Prof Eben Mulder, Dawid Serfontein, Vishnu Naicker)
 - Continual good support for nuclear engineering program
 - Continued studies on GCR / Pebble bed / Thorium fuelled reactors / fuel cycles
 - NWU has limited participation in ARCHER
 - Flownex-N code development continues for other nuclear applications (now also LWR focus after development in cooperation with PBMR)
- University of Pretoria
 - Prof Johan Slabber, Waldo Stumph, Frederik Reitsma
 - Establishing a "Energy Institutional Research Theme"
 - includes a much wider list of activities in energy-related research than just nuclear
 - also included are other energy resources
 - nuclear remains an important part of the focus
 - Has established Nuclear engineering courses

Status of GCR/PBMR activities at universities

- Nelson Mandela Metropolitan University
 - Prof Japie Engelbrecht, Prof Jan Neetling
 - Continued research on coated particles and SiC
 - Includes other applications of coated particle fuel
 - PWR fuel rods
 - liquid salt cooled pebble bed reactor
 - Access to a state-of-the-art electron microscope

Steenkampskraal Thorium Limited

- STL is a privately owned SA company who owns:
 - Some of the world's richest thorium resources at Steenkampskraal Rare Earths mine in South Africa,
 - A 15% share in THOR Energy in Norway, where an irradiation program is underway to characterize and qualify thorium-based fuel for deployment in Light Water Reactors (LWRs)
 - First irradiation of historically manufactured Th-Pu fuel started earlier in 2013, own manufactured fuel pellets to be introduced soon.
 - A completed concept design of the TH-100 a 35 MWe (100 MWth) pebble bed generator. Th-100 is a high temperature, gas-cooled reactor (HTGR) with a thorium-based fuel cycle.
 - The project is presently in the process of putting together a consortium of interested parties to fund the basic design phase, licensing and construction of the TH-100 generator and associated fuel manufacturing capabilities.

Conclusion / Future outlook

- The LWR new-built will be the main nuclear project for the foreseeable future
- PBMR Company future was secured till March 2013 in care and maintenance
 - Government final decision under discussion
 - Packaging of all information being finalised in next few months
 - Hosted by ESKOM (services, legal, etc.)
- Other initiatives (universities, STL etc) to continue to participate in international HTR / pebble bed projects
- X-Energy (USA company) submitted a proposal for US DOE funding under SMRs programme (the technical team currently from RSA)