PORTFOLIO COMMITTEE ON PUBLIC ENTERPRISES

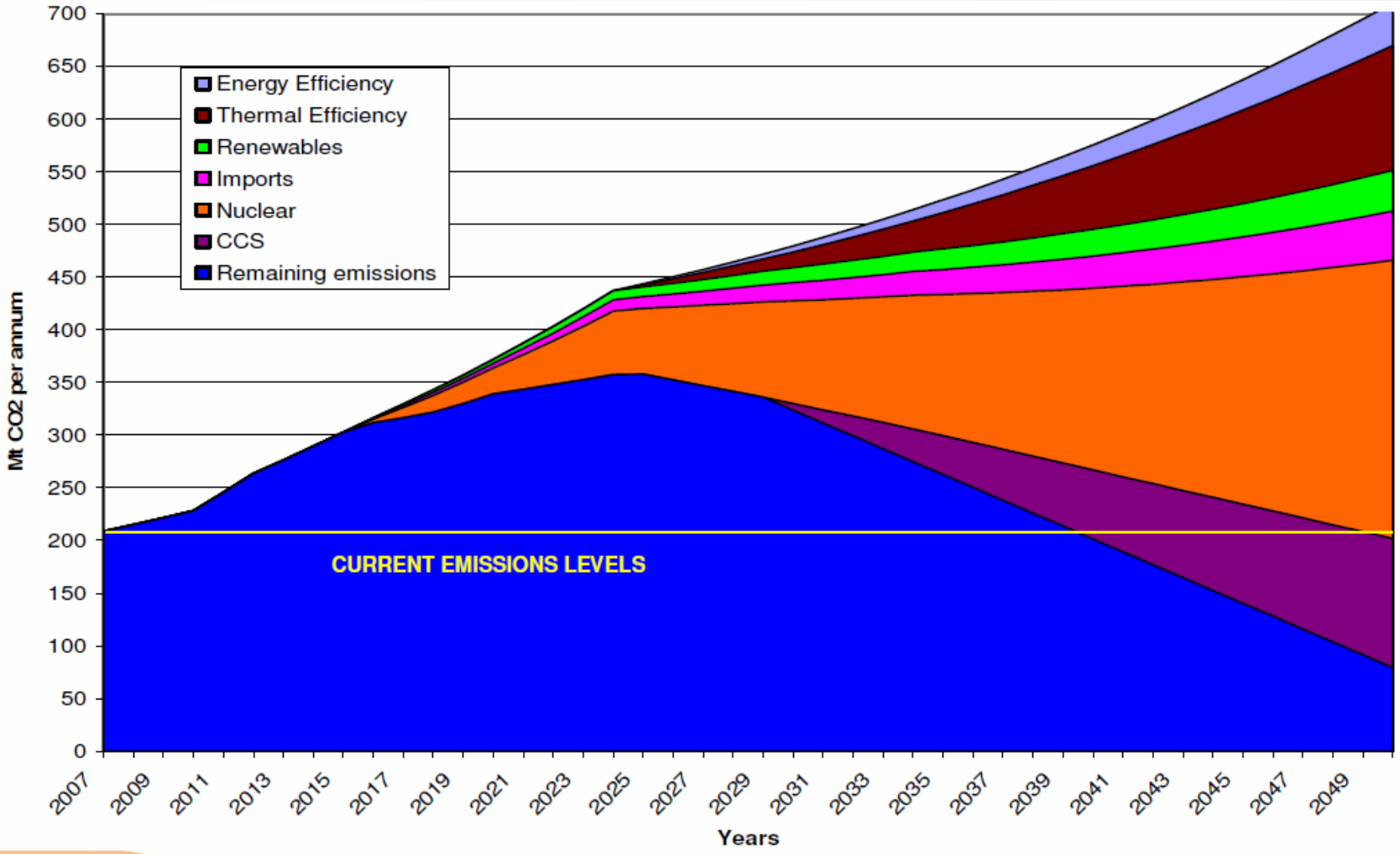
Update on the PBMR COMPANY

Jaco Kriek

CEO

13 August, 2009

Eskom's CO_2 footprint



Courtesy Eskom

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International nuclear build programs

- France
- Finland
- China
- USA
- India
- UAE
- Russia
- UK
- Japan
- South Korea
- Canada
- Italy

Two PWR Reactors at Koeberg, Cape Town

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Role Clarity in SA's Nuclear Industry

NT

DOL

DST

DICO

Nuclear Industry Association of SA (NIASA)

Regulators

DWE

NNR NERSA

DPE
Shareholder
Department

DOE

Necsa - Host & operator of PBMR **Fuel plant**

PBMR Co - Engineering & Design Authority

DPE

Eskom - Host & operator of **DPP200**

Research Labs (DOE & DST)

iTemba Labs CSIR

Mintek

Universities

US UP NMM Wits UCT WC UKN NWU UJ

DTI & IDC

Local supply chain

Why High-temperature gas-cooled reactors?

- Significantly improved safety that renders HTR's catastrophe free
- Higher efficiency than conventional nuclear plants
- Attractive economics for decentralised base load energy
- Large market for smaller reactors e.g. Africa
- Smaller reactors lend themselves to distributed generation (advantages relate to grid stability and transmission costs)
- Extended scope of application due to higher temperature availability
  - Supply of process steam for e.g. Sasol & PetroSA processes, Desalination, Oil Sand extraction & hydrogen production.
- Proliferation resistant
- The use of thorium in an HTR with ^{233}U recycle could significantly reduce consumption of uranium ores (co-operation with Necsa)
  - HTRs could themselves become quasi breeders with the ^{233}U - Th cycle.

Establishment of the PBMR Company

- Eskom established the PBMR Company in 1999
- BNFL & IDC join as investors in 2000, Co-operation agreement signed (still in place today)
- Eskom funding stopped in 2003, Eskom Board decision not to be involved in technology development
- Government take over responsibility for PBMR in 2004
- First large manufacturing contracts signed in 2005
- PBMR oversight moved from dti to DPE in 2006
- Component manufacturing stopped in 2008 – lack of funding (PBMR MTEF request not submitted by DPE)
- Sept 2008 – repositioning of PBMR (PBMR role in SA nuclear industry in line with DOE nuclear policy)

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Current PBMR Investors & Corporate Governance

- SA Government (83%)
- IDC (5%)
- Eskom (8%)
- Westinghouse (4%)
- Operate under a Co-operation agreement (Shareholders Agreement to be signed)
- PBMR Board and sub-committees maintain Corporate Governance

Eskom

IDC
Industrial Development Corporation
Your partner in development finance

Westinghouse

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Governance in PBMR

- Nuclear Safety Awareness and Practice
- Clean Audit Reports by Independent Auditor
- Skills based Board, Board sub committees
- Board Effectiveness conducted annually
- Full Compliance with Companies Act, PFMA, IFRS
- Ethics Audit Conducted
- Climate Surveys and Diversity Audits Conducted
- World Class Enterprise Risk Management
- In-house Internal Audit Function
- Developing Integrated Assurance Function
- Audited by IAEA
- Nuclear Safety, Assurance, Licensing & SHEQ
- International Benchmarking with INPO
- Compliance - BBBEE Act, Labour Act, Skills Development Act

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Board of Directors

Dr Alistair Ruiters
PBMR
Chairman

Mr Jaco Kriek
PBMR
Chief Executive Officer

Mrs Lynette Milne
PBMR
Chief Financial Officer

Dr Alex Tsela
PBMR
GM: Nuclear Licensing, Safety & SHEQ

Dr Regis Matzie
Westinghouse
Senior Vice President & Chief Technology Officer

Mr Robert Pearce
Westinghouse
Director, Global Business Development Nuclear Power Plants

Ms Erica Johnson
Eskom
Managing Director System Operations & Planning Division

Mr Gert Gouws
IDC
Chief Financial Officer

Mr Setlakalane Molepo
IDC
Head: Metal, Transport and Machinery Products Strategic Business Unit

Dr Rob Adam
Necsa
Chief Executive Officer

Mr Peter Readle
Consultant (Ex Director, Corporate Projects of BNFL)

Mr Riaan Neethling
Eskom Nominee
(Ex: Senior General Manager: Resources & Strategy)

Dr Xolani Mkhwanazi
BHP Billiton
President: Energy Coal South African (BECSA)

Executive Management Team

Jaco Kriek
Chief Executive Officer

- **Dr Alex Tsela** — General Manager: Nuclear Safety, Licensing & SHEQ

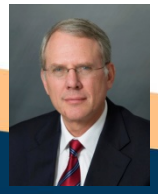
- **Lynette Milne** — Chief Financial Officer

- **Mercy Ranko** — General Manager: Human Resources

- **Frans Monkwe** — General Manager: Corporate Services

- **Daniel Mosito** — General Manager: Corporate Legal Counsel

- **Dr Gideon Greyvenstein** — General Manager: Plant Engineering Business Unit



- **Dr Johan Slabber** — Chief Technology Officer

- **Anita Loots** — General Manager: Business Development
- **Thabang Makubire** — General Manager: The PBMR Way

- **Dr Louis Heyns** — General Manager: Projects

PBMR Core Ideology

Vision

Bringing the benefits of 'pebble power" to humankind.

Mission

To provide friendly, accessible and market-driven nuclear energy systems

Values

Safety and quality without compromising on standards

Customer and stakeholder centric

Care and respect for people

Relentless pursuit of excellence

Partnering to create sustainable success

Brand promise

Your future energy solution today.

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New PBMR strategies

- Change in product configuration – process heat & electricity generation (previously only electricity)
- Nuclear Licensing – new process for SA agreed with NNR
- Customer Consortium (PetroSA, Sasol, BHP Billiton, Anglo, ArcelorMittal & Royal Bafokeng)
- Eskom – operator and host of demo reactor at Koeberg
- Necsa – involved in JV to operate fuel plant at Pelindaba
- PBMR Company positioned to be SA's Nuclear Engineering & Design Authority, also for Eskom's program
- Target carbon trading (Copenhagen – December 2009)
- CSDP/Localisation – first reactor & fuel (hosted workshop)
- International collaboration on HTR's – US NGNP, Canada, Europe, China

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International Governance and Political Capital

- Market Penetration (who wants this product – driven by end users)
  - US NGNP, Canadian Oil Sands, Eurotom (Europairs) & China
- Governance Institutions
  - MDEP (NNR, US NRC, UK & China)
  - IAEA (INPRO)
  - GEN IV (12 countries)
  - EU HTR-TN (18 companies)
  - INPO
  - US National Labs – Oakridge, Idaho
- Countries (suppliers & potential country partners)
  - China, USA, Canada, Russia, Japan, Germany, UK, South Korea, India, Algeria, Namibia

Expand Nuclear as part of SA's Energy Mix

Hydrogen

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Lessons learnt

- Lack of co-ordinated planning & understanding what infrastructure is needed for a nuclear build program – created unrealistic expectations on schedule (nuclear takes much longer)
- Maturity/readiness of national environment to host a nuclear build program (DOE implementation of SA nuclear policy – Jun 09)
- Regulatory & legal framework (First of a Kind nuclear build program)
- Created a new company, while designing, licensing & building a reactor and fuel plant (Full term employment only in 2005)
- Business model (need to learn from international programs in Europe & US – consortium approach)
- Funding model for all stakeholders involved
- Roles & responsibilities between departments & role players
- SA Inc co-ordination & collaboration
- Buy in by all stakeholders (pet project status)

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Nuclear Energy Policy Intention Relevant to PBMR

Nuclear Reactor Construction and Operation

- South Africa has declared intention to Pursue
  - A pressurised water reactor (PWR) programme
  - And a nationally developed Pebble Bed Modular Reactor Program, subject to the success of the first demonstration unit.
- Government through the PBMR Company is focused on the electricity and process heat applications of the Pebble Bed technology
- Government's intention is to use the opportunity created by these programmes to establish a modern nuclear technology industry including manufacturing and construction capabilities as well as services. In particular, where viable, the conventional nuclear build programme must be associated with technology transfer, an investment programme and the building of institutional capacity to establish a national industrial capability for the design, manufacture and construction of nuclear energy systems

Nuclear Energy Policy Principles Relevant to PBMR

- P2: Nuclear Energy shall contribute to economic growth & technology development in South Africa through investment in infrastructure, creation of jobs and the further development of skilled workers
- P9: Government shall encourage the development of appropriate institutional arrangements & thereby ensure the development of human resources competent to discharge the responsibility of managing a nuclear infrastructure
- P10: South Africa shall strive to acquire technology know how & skills to enable design, development, construction of its own nuclear reactor and fuel cycle systems. To this end an industry support base for the nuclear sector shall be developed as appropriate, taking into account the scale of the national programmes. Technology transfer shall be optimised in any procurement of nuclear and related equipment.
- P12: Government shall support research, development & innovation in the use of nuclear technology. Government shall also support participation in global nuclear energy technology innovation programmes
- P13: Government shall put in place effective mechanisms to protect & safeguard the South African nuclear energy industry intellectual property rights & innovative technology designs.

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Nuclear Energy Policy Implementation: Relevant to PBMR

Implementation Guideline towards achieving national objectives

- **Phase 1: 2008 -2010**
- Maintain and enhance current national nuclear infrastructure
- Continue research into advanced nuclear energy systems
- Accelerate skills development initiatives in line with expected expansion including increased capacity at institutions of higher learning

- **Phase 2: 2011-2015**
- Demonstration of advanced nuclear energy systems
- Initiate localisation of nuclear equipment and component manufacturing-construction of heavy machinery infrastructure
- Build capacity for nuclear technology transfer

Value Created 1- Capabilities

PBMR has created capabilities as a nuclear engineering & design authority

- PEOPLE/SKILLS CAPABILITY
  - Training of technical people (engineers, scientist, technicians)
- NUCLEAR INDUSTRY PROCESSES & SYSTEMS
  - Original design engineering of nuclear reactors, nuclear fuel plant, and nuclear fuel (pebble fuel)
  - Licensing of nuclear plants
  - Manufacturing of nuclear components
- NUCLEAR INDUSTRY ORGANISATIONS
  - Created industries in energy, High Tech & related fields, HTF, HTTR, FHS, NIASA,
  - University programs

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