

Global Renewable Energy Markets and Policies Programme

Country profile: South Africa

June 2007

Glynn Morris, AGAMA Energy

Overview



- Background – South Africa
- Energy planning
- RE policies and regulation
- Status of RE markets
- RE production
- Production costs for RE
- RE R&D
- RE policies under development
- Conclusions
- Recommendations

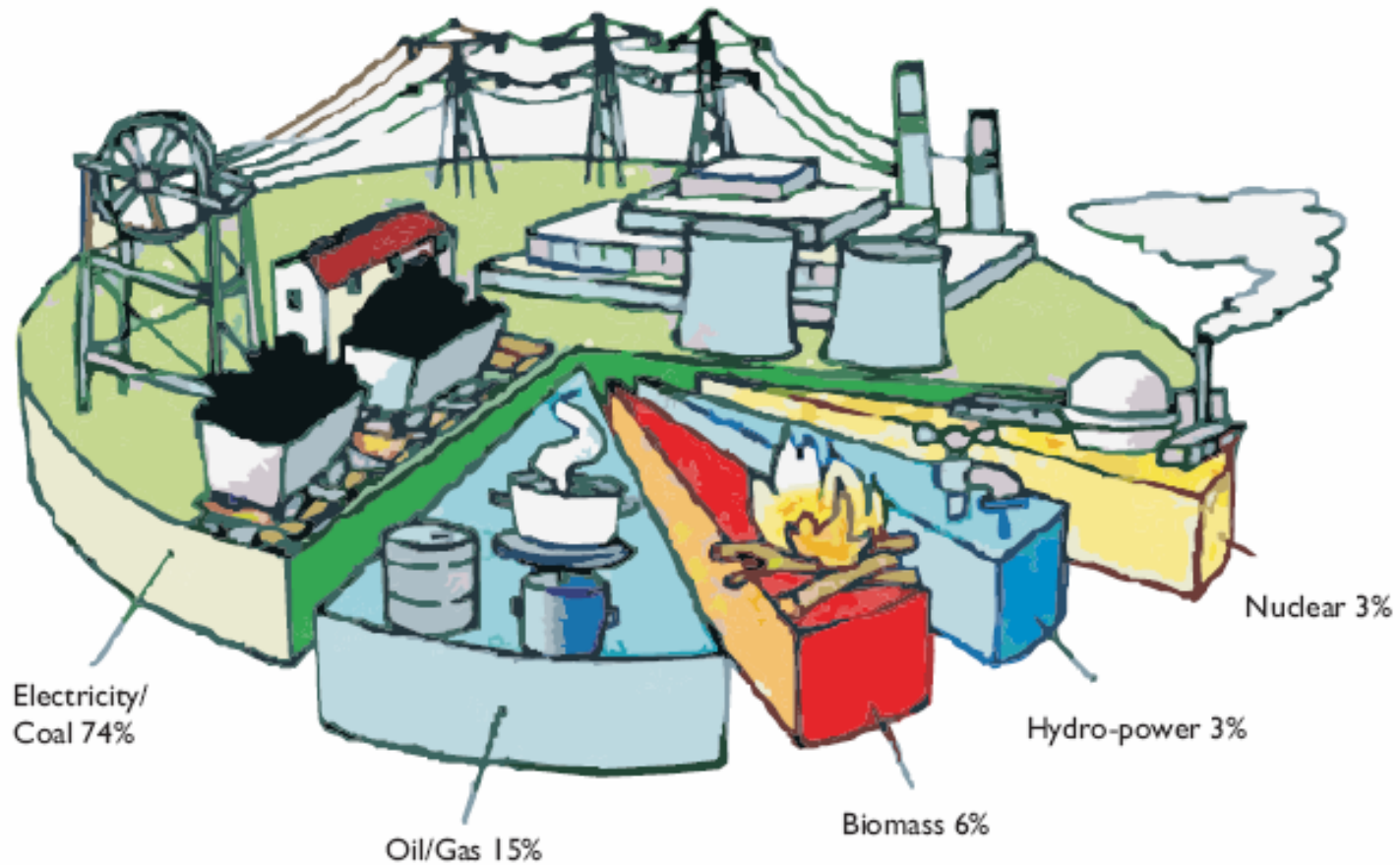
South Africa



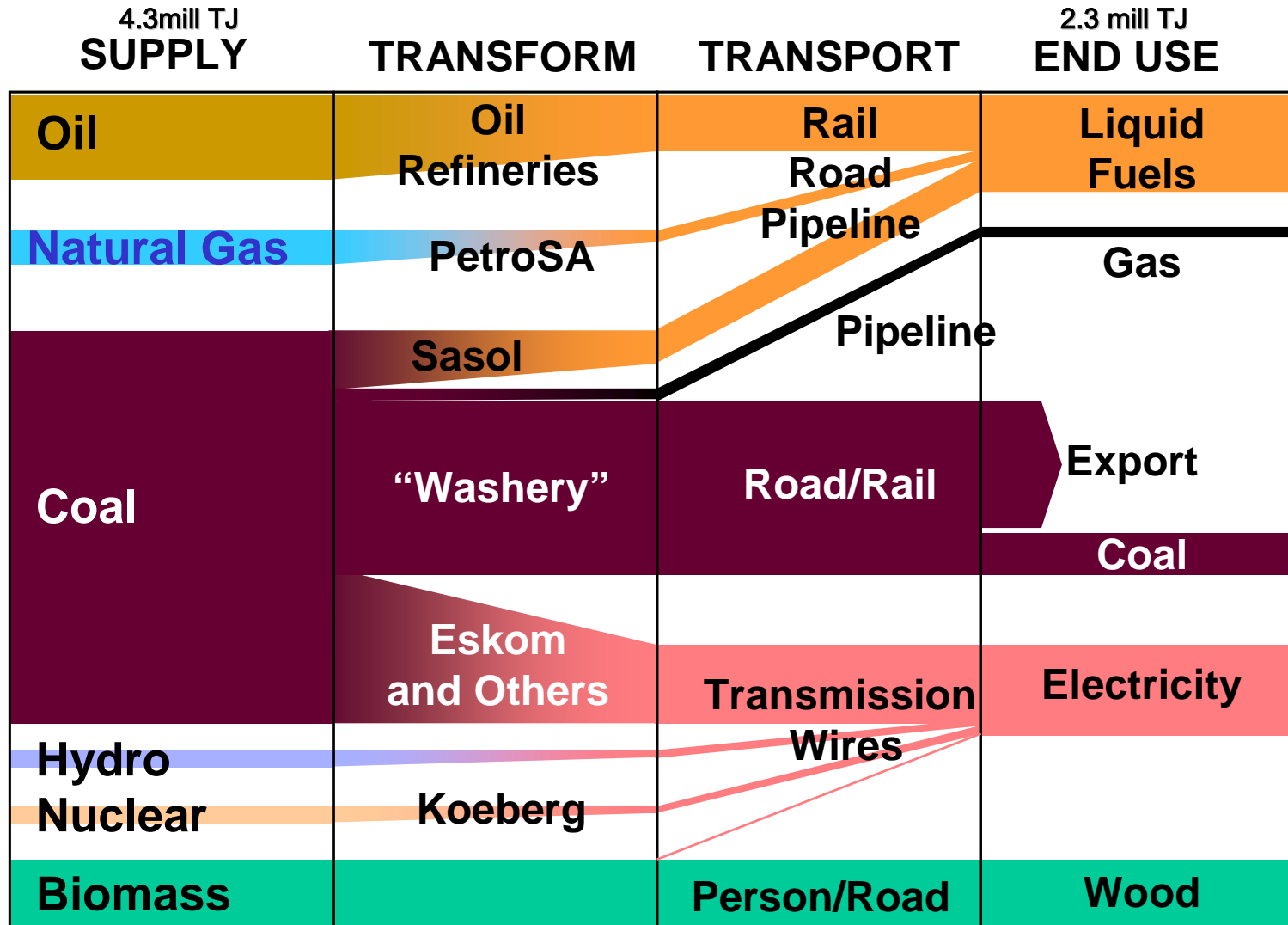
- 47 million people
- GDP: US\$250 billion
- 4.7% growth in GDP
- 125 Mtoe TPES
- High energy intensity – 2.8 TPES toe/US\$ GDP
- High CO₂ intensity – 2.28 kg/US\$ GDP
- 38 GW installed electricity capacity
- Member of SAPP and SACU

Primary energy sources

Energy Resources of South Africa

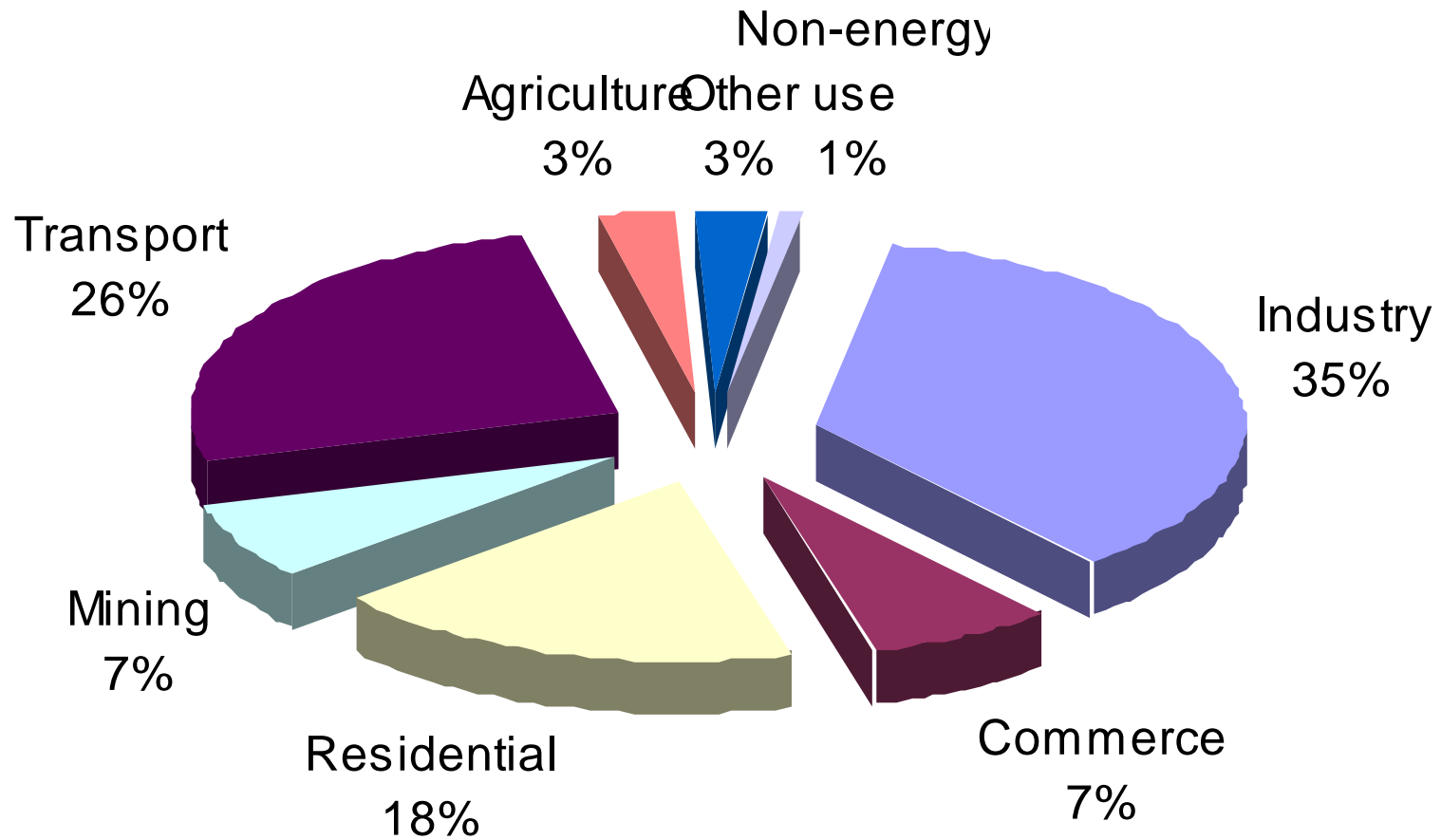


Energy flows in South Africa



Source: DME, 1994

Energy consumption



Energy planning



- Integrated Energy Planning
 - Integrated Energy Plan for the Republic of South Africa, 2003
 - IEP2 currently underway but stalled
- National Integrated Resource Plans
 - Commissioned by NERSA
 - NIRP2 – completed by Eskom, 2004, no role for RE
 - NIRP3 – currently underway

RE policies and regulation



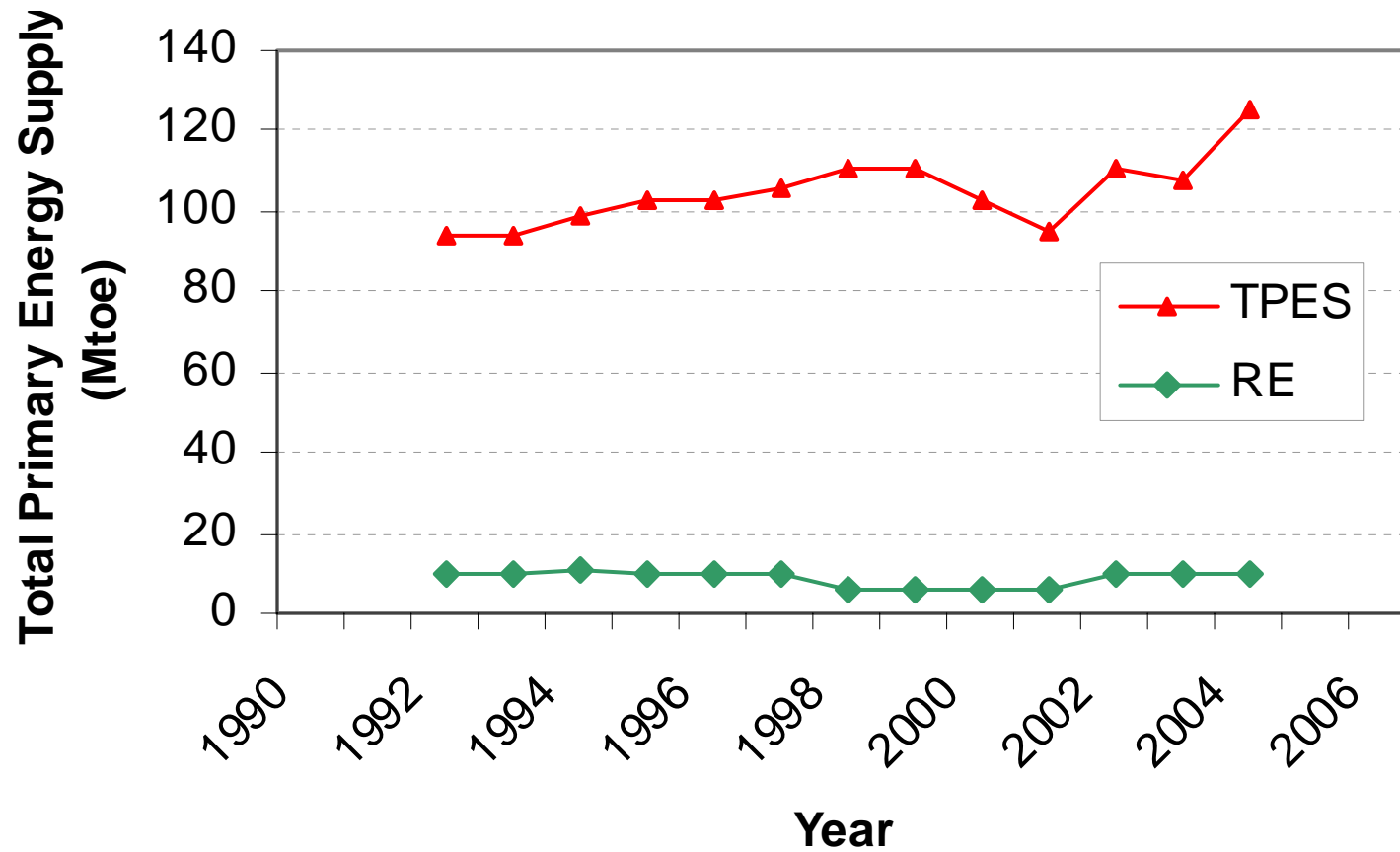
- White Paper on Energy Policy, 1998
- Implementation Strategy for Renewable Energy in South Africa, 2000
- White Paper on Renewable Energy Policy, 2003
 - Aspirational target – 10 TWh of new RE by 2013
 - Review in 2008
- Renewable Energy Finance and Subsidy Office, 2005
- Draft Biofuels Industrial Strategy of the Republic of South Africa, 2007

Status of RE markets



- RE electricity generation
 - Installed generation capacity – 896 MW
 - Ave. production – 1800 GWh/annum
- RE thermal energy
 - Installed generation capacity – 378 MW
 - Ave. production – 500 GWh/annum (excl. woodfuel)
- Less than 10% of TPES
 - mostly traditional biomass

RE production



Production costs for RE



Electricity sector	Busbar costs	2010	2020
	ZAR/kWh	ZAR/kWh	ZAR/kWh
Hydro	0.11 – 0.58		
Wind	0.27 – 0.70	0.60	0.36
Solar PV	1.20 – 5.00	1.50	0.48
Solar Thermal	0.33 – 0.96	0.4	
Solid biomass excl. CHP	0.08 – 0.80	0.45	
Solid biomass CHP			
Biogas	0.17 – 0.30	0.15	
Tide, wave, ocean		0.40	

Exchange rate: 1 USD / 7 ZAR, July 2007

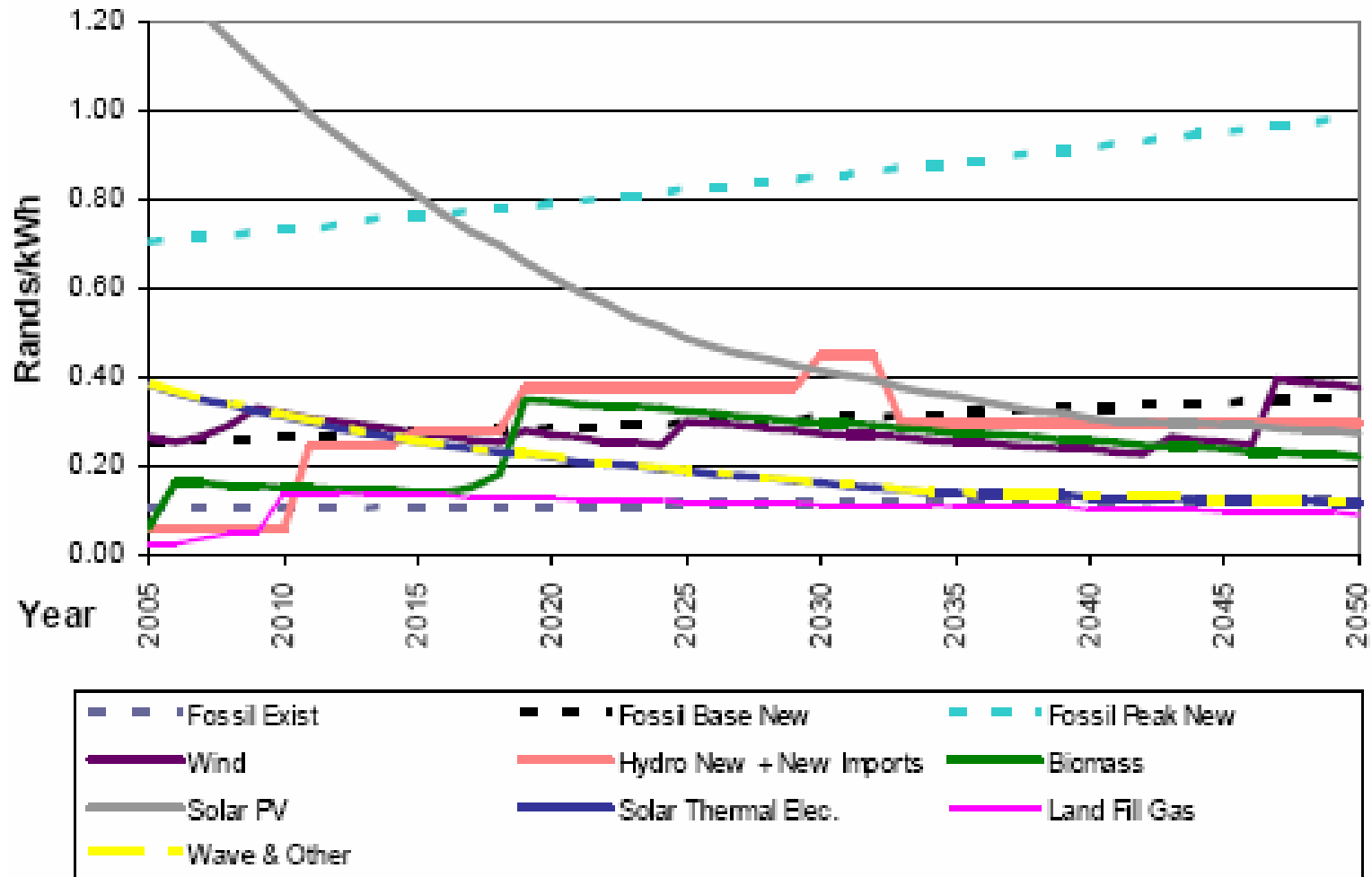
RE production costs, cont'd



Heating and cooling sector	Busbar costs	2010	2020
	ZAR/kWh	ZAR/kWh	ZAR/kWh
Solar thermal	0.33 – 0.41	0.35	0.17
Geothermal	n/a	n/a	n/a
Biomass heat			
Transport sector			
Bio-ethanol			
Biodiesel			

- Production costs are generally based on estimates due to the lack of production experience and limited data due to scale...

RE production costs, cont'd



Source: Banks D and Schäffler J (2006)

Research and development



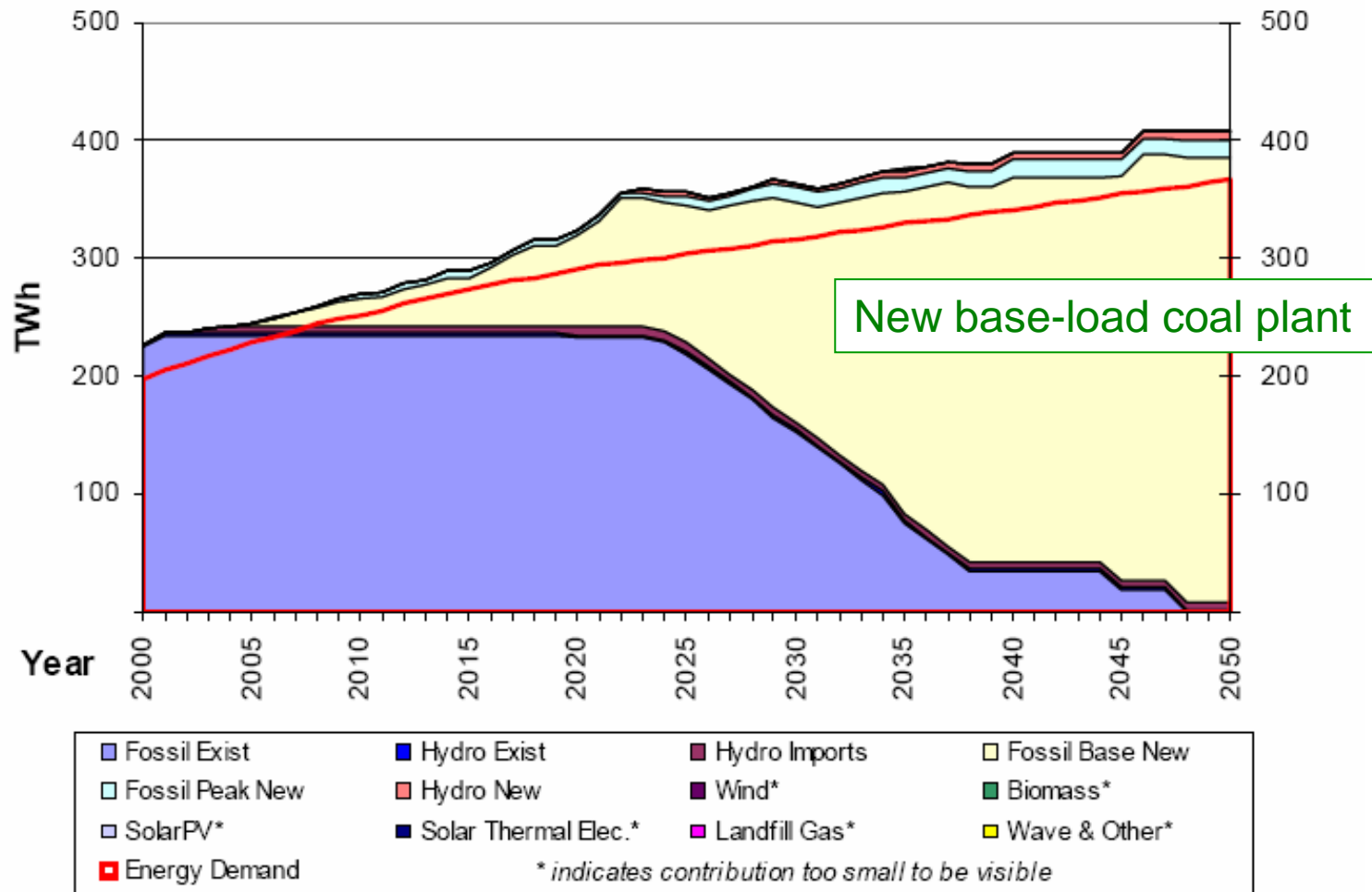
- Very limited and patchy data exist for R&D expenditure
- Overall for SA, ZAR12 billion, or 0.87% of GDP, spent on research and experimental development (R&D) in 2003/04
- Early state-funded RE research was commissioned by:
 - National Programme for Energy Research, NPER
 - National Energy Council, NEC
 - Eskom Technology, Research & Investigations
 - Dept. of Minerals and Energy
- DST funded R&D for innovative solar PV
- SANERI was established in 2006 to co-ordinate and fund energy R&D
 - 2006/7 expenditure: ZAR15 million (= US\$ 2 million)

RE policies under development



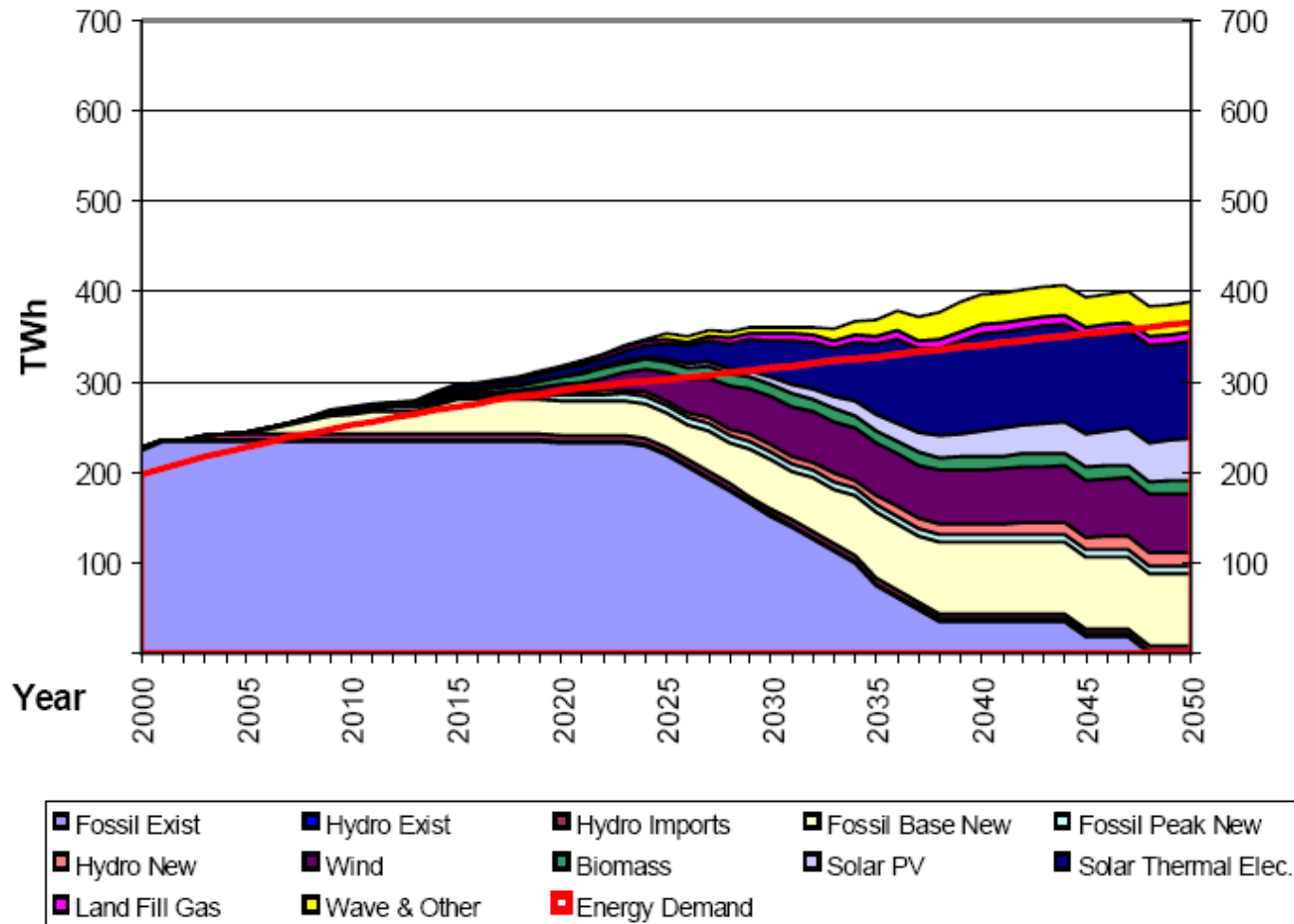
- National
 - Tradable RE Certificates, DME
 - Top-up feed-in tariff, NERSA
 - Biofuels blend, DME
 - Eskom DSM subsidy for SWH (budgeted at USD45 million over 5 years)
- Provincial
 - Sustainable Energy Strategy for the Western Cape
- Local authorities
 - RE services PPP for Nelson Mandela Bay Metro
 - SWH by-law for City of Cape Town
- Projects
 - The first bulk renewable wind IPP project: 4 x 1.3 MW Fuhrlander turbines at the Darling Wind Farm with a PPA with the City of Cape Town currently under construction
 - A 20 MW wave energy generation project under development on the West Coast by Finavera Renewables

Business as usual



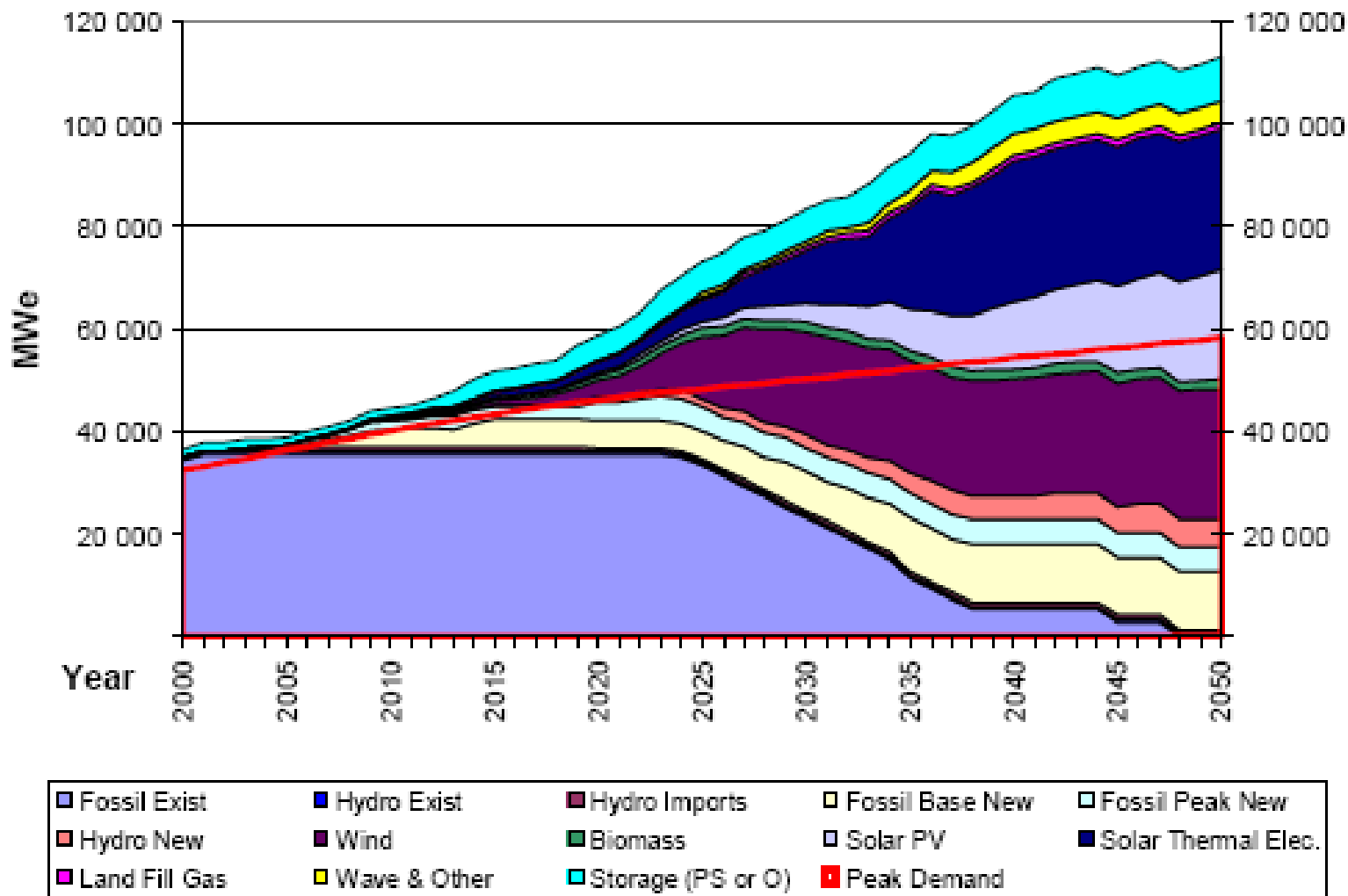
Source: Banks D and Schäffler J (2006)

Progressive RE scenario



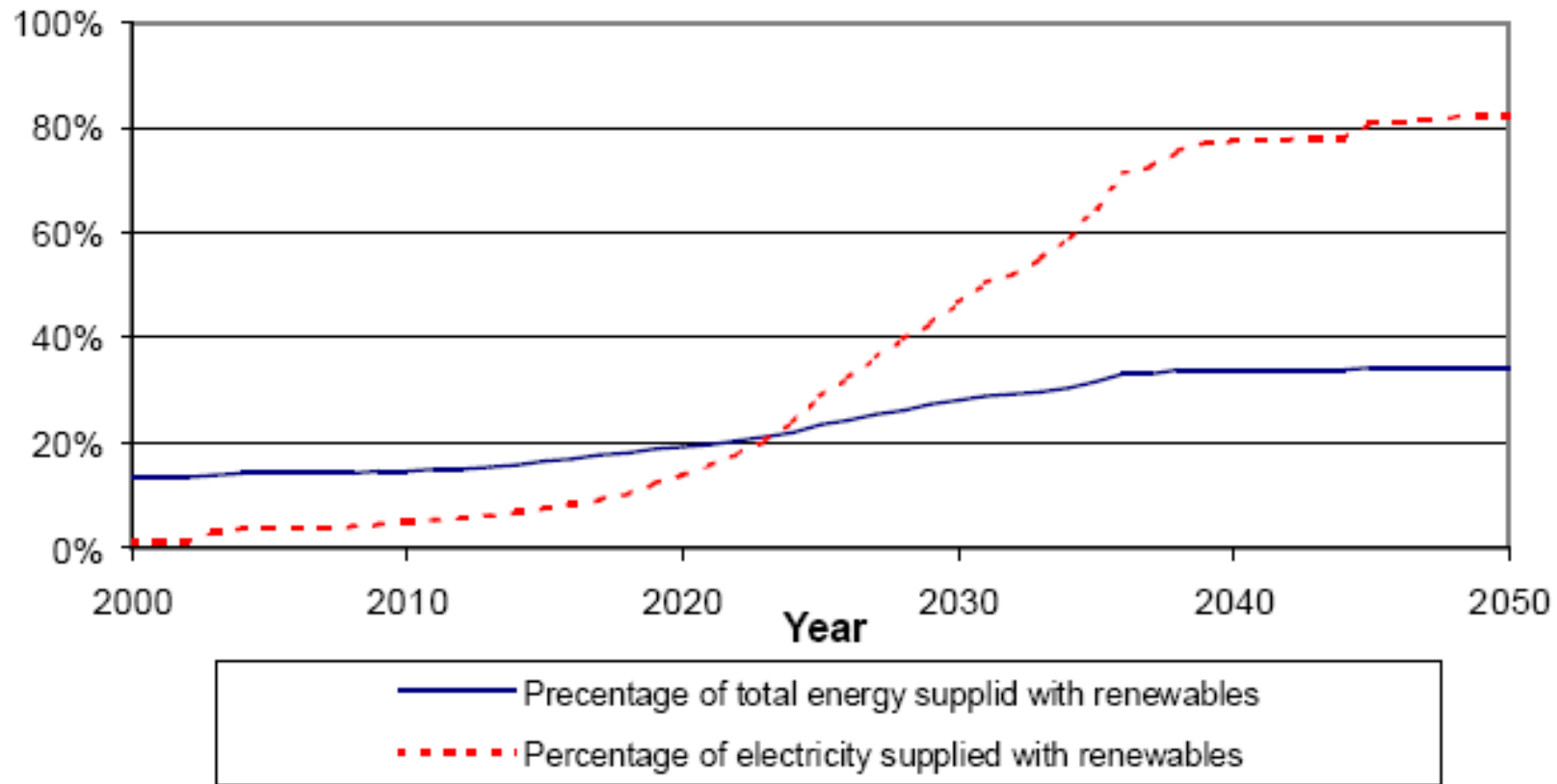
Source: Banks D and Schäffler J (2006)

Progressive RE scenario – installed capacity



Source: Banks D and Schäffler J (2006)

Progressive RE scenario - % RE contributions



Source: Banks D and Schäffler J (2006)

Projected trends



- RE will remain at less than 10% of TPES unless:
 - policy and legislation is enacted to establish mandatory targets
 - the investment environment is given confidence through long-term PPA's or pricing policies
- Initial opportunities include:
 - SWH
 - Biogas
 - Some new hydro
 - Wind in the Western Cape and Eastern Cape
 - Solar thermal in the Northern Cape

Conclusions



Overview...

- Energy demand is stretching the available supply
- The SA economy is heavily carbon encumbered
- RE could provide between 35 to 50% of primary energy by 2050

However...

- Governance in the energy sector is weak
 - Indirect reporting and accountability
 - Limited review of investment decisions
- Energy planning is incomplete and uncoordinated
- Human resources are stretched
- No progress in terms of RE target

Clear and courageous leadership is required to establish a clean energy future....

Recommendations



- Short term
 - Establish improved governance
 - Extend policies and regulation to cover all RE technologies, including thermal / direct energy
 - Commit at least 10% of ZAR150 billion new-spend for electricity generation on RE

- Long term
 - Review ToR for IEP
 - Complete IEP and NIRP using portfolio-based planning approaches
 - Legislate for a cleaner and more sustainable energy mix
 - Establish reasonable R&D budgets



Thank you !

Glynn Morris

+27 21 701 3364 (office)

+27 83 780 9460 (mobile)

glynn.morris@agama.co.za

www.agama.co.za