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South African National Energy
Development Institute (SOCI) Ltd.



Exploring waste to energy opportunities

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ENERGY INNOVATION FOR LIFE

About SANEDI



The National Energy Act, No. 34 of 2008 established the South African National Energy Development Institute (SANEDI) by merging the South African National Energy Research Institute (SANERI), also a wholly owned subsidiary of CEF, and the National Energy Efficiency Agency (NEEA).

The National Energy Act, 2008 (Act No. 34 of 2008), Section 7 (2) provides for SANEDI to direct, monitor and conduct energy research and development as well as undertake measures to promote energy efficiency throughout the economy.

The overarching purpose of SANEDI is to assist the Department of Energy in fulfilling its energy mandate and transition towards a sustainable, low carbon energy future.

South Africa's Power Generation – A Snapshot



State-owned utility Eskom dominates generation:

- 🇿🇦 It generates 2/3 of Africa's electricity
- 🇿🇦 It generates 95% of SA's electricity
- 🇿🇦 It also imports and exports regionally e.g. from Cahora Bassa hydro project in Mozambique
- 🇿🇦 Current generation capacity approximately 40,000 MW
- 🇿🇦 >70% access to electricity, compared to SADC average of 20%
- 🇿🇦 Almost 90% of generation is coal, remainder nuclear and hydro/pumped storage
- 🇿🇦 Currently almost no renewable generation

South Africa's Generation Needs



- 🇿🇦 Economy is energy intensive – mining, pulp and paper, smelting
- 🇿🇦 Widespread load shedding occurred in 2007, 2008 and 2014
- 🇿🇦 Reserve margins extremely tight in coming years and load shedding expected to return
- 🇿🇦 10,000 MW of current 40,000 MW expected to be retired in next 20 years
- 🇿🇦 Eskom estimates that 50,000 MW of new generation capacity needed in next 20 years
- 🇿🇦 Private power and renewable power expected to play a significant role in new generation
- 🇿🇦 Rapid deployment of renewables essential to keeping the lights on

A case for Renewables



SA among highest emitters of carbon dioxide in the world:

SA ranked 12th in the world in terms of top emitters

Urgent need:

Reduce fossil fuel dependency

Reduce carbon footprint

Diversify energy mix and supply

Solution (no panacea)

Renewable Energy (RE) – resources abundant, sustainable, can be quickly implemented, offer work opportunities and have a much lower impact on the environment

Renewable Energy Sources



Natural resources
Naturally replenished

Renewable Energy Resources



SA has a reasonable wind energy resource, geographically dispersed allowing for security of supply

SA has a world-class wave energy resource, predominantly along the south and west coasts

SA has one of the best solar regimes in the world - most abundant renewable resource in the country

SA biomass and hydro energy resources are limited

Waste is more readily available and exploitable.



Typical landfill site

Energy from waste offers an opportunity to solve two of today's most pressing issues:



Energy scarcity

Waste-to-energy (WTE) can contribute significantly to the alleviation of **energy supply constraints** through the production of decentralised, sustainable and comparatively clean energy from a renewable fuel source which is available wherever there are communities that requires energy.



Waste disposal

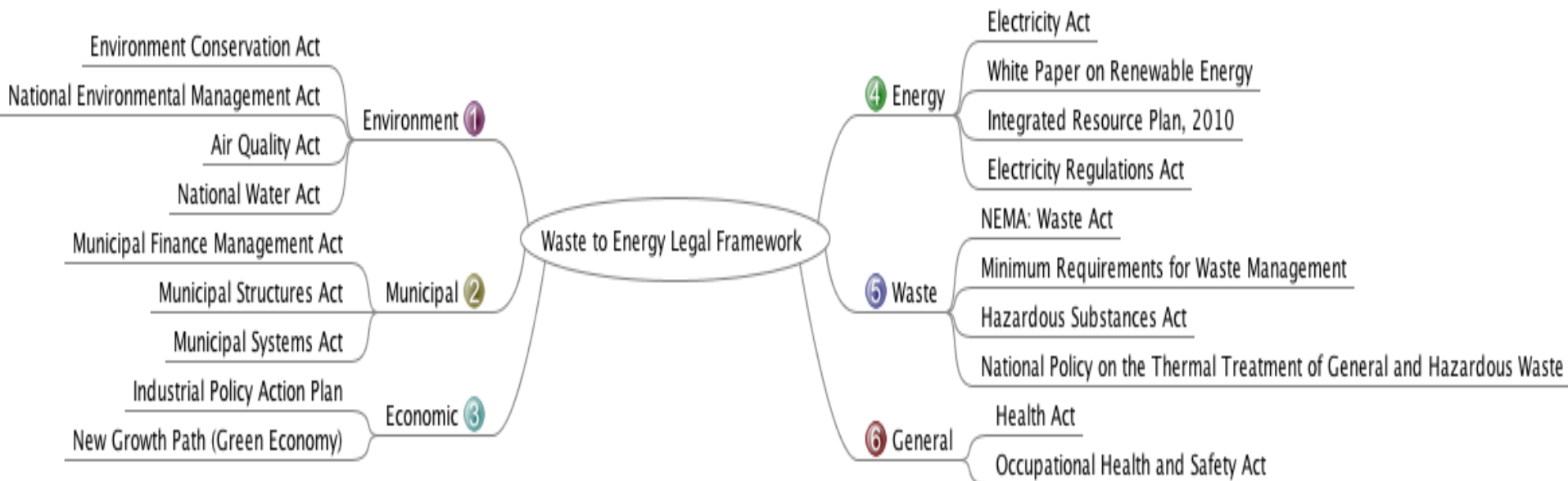
WTE has the potential to reduce the **volume of solid and liquid waste** that is required to be disposed by up to 80%. Compared to traditional landfilling, WTE requires minimum land, can typically be operated in any weather conditions and generates stable odour-free residue. A reduction waste disposal also reduces methane emissions and other environmental impacts associated with landfills.

Reduce, reuse and recycle and power South Africa.

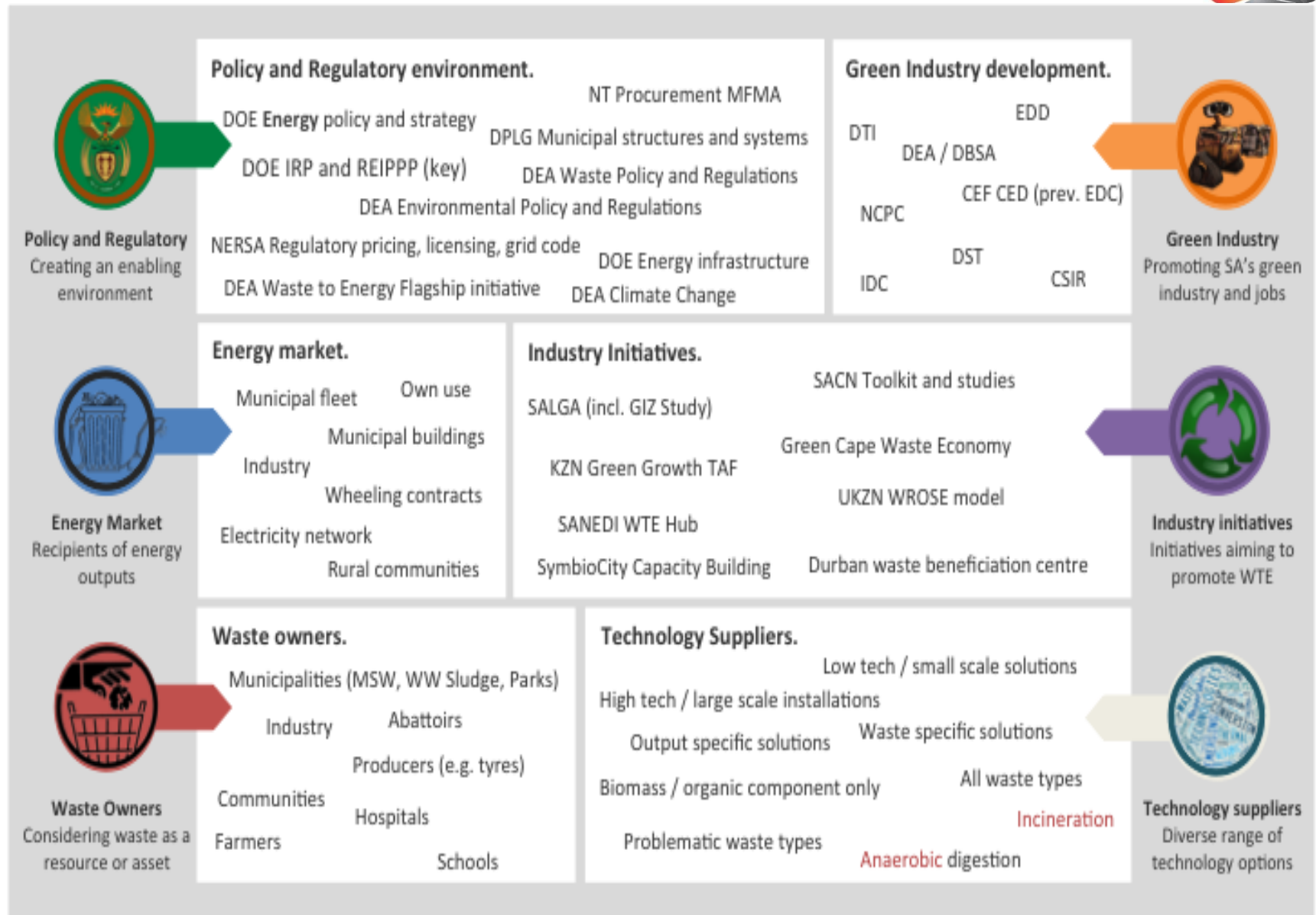
Rationale

- 🌱 Waste to Energy technologies offer most opportunity for job creation and local economic development in the semi-skilled and unskilled segment of our economy
- 🌱 South Africa disposes almost all of its waste into landfills mostly owned by Municipalities, e.g.
 - 🌱 Johannesburg 1.6 millions tons of waste disposal/year at 4 landfills. If no intervention-10 years landfill airspace available
- 🌱 The Economic and Financial Calculations and Modelling for the Renewable Energy Strategy Formulation document (DME, 2004) identified 57 feasible landfill to energy sites ranging from micro (646 kW Capacity) up to Large (4000 kW Capacity) in South Africa that are estimated to produce 43 million m³ of methane gas per year with an estimate potential of 598 GWh of electricity per year.
- 🌱 *eThekweni Africa's 1st LFG, CDM project, 7.5 MW Generation of Electricity, 216 000 MWh by July 2012, 20 000 Tons CO₂ equivalent destroyed /month (www.dbnlandfillgas2elec.co.za)*

A high level overview of the legislative context for WTE in South Africa



Stakeholders with interests in WTE



Our challenges

- Low tariff for landfill tipping.
- Difficult to find market for Heat produced or Tri-gen for additional revenue.
- Electricity prices in SA competing with cheap coal based power (**changing!**).
- Securing off take/market for electricity challenges due to PPA, access to grid/integration, etc.
- Challenges in dealing with Municipalities due to capacity, MFMA, MSA, etc.
- No clarity on green fuel taxes and other levies by NT.
- Lack of biogas standards, certifications, etc. (**SABIA busy developing!**)
- No mandatory blending (**about to change**)
- Project Developers with limited resources, experience and own funding.

A suite of bioenergy related initiatives

- Various household level bio-digesters erected in some rural & peri-urban parts of the country (applications – *cooking, heating, lighting*)
- Woody biomass modernisation (*charcoal, pellets*)
- Municipal solid waste-to-modern energy (*landfill gas-based power plants*)
- Fairly small-scale 1st generation biofuels
- 2nd generation biofuels research work
- Biomass co-firing with coal (*Biomass Co-firing Demonstration Facility at Arnot power plant*)
- Farm waste-energy (*biogas from pig waste*)
- Compressed biogas (application – *transport fuel*)
- Sugarcane bagasse (*process steam & electricity generation*)
- 34 MW currently under the Renewable Energy Independent Power Producer Programme

REIPPP Megawatts to Date

	MW in window 1	MW in window 2	MW in window 3	MW remaining
Solar PV	632	417	435	1 041
Wind	634	563	787	1 336
Concentrated Solar Power	150	50	200	200
Small Hydro (less than 40MW)	0	14	0	121
Landfill Gas	0	0	18	7
Biomass	0	0	16	43
Biogas	0	0	0	60
TOTALS	1 416	1 044	1 456	2 808



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**THANK
YOU**

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