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South African National Energy  
Development Institute.



# WASTE ECONOMY WORKSHOP

OVERVIEW OF SANEDI WASTE TO ENERGY  
PROJECTS

RIVER CLUB GOLF COURSE  
MOWBRAY, CAPE TOWN

26 MARCH 2014

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# LEGISLATIVE MANDATES



- 🇿🇦 White Paper on Energy Policy, 1998
- 🇿🇦 SANEDI's mandate is derived from the authority and obligations set out in the following policies, legislation and constitutional requirements.
- 🇿🇦 The SA Constitution , (Act 108 of 1996)
- 🇿🇦 National Energy Act , (Act 34 of 2008)
- 🇿🇦 The following specific plans, directives and public announcements which reinforces SANEDI's responsibilities
- 🇿🇦 Strategic Plan of the Department of Energy



# STRATEGIC OUTCOMES /PROGRAMMES



## STRATEGIC OUTCOMES

All/Crosscutting

Enable well informed and high confidence energy planning, decision-making and support policy\* development

Support accelerated transformation to a less energy and carbon intensive economy

Foster a culture of energy efficiency and more rational energy use

## PROGRAMMES

1. Corporate Governance and Administration

2. Applied energy research and demonstration including sub-programmes for:

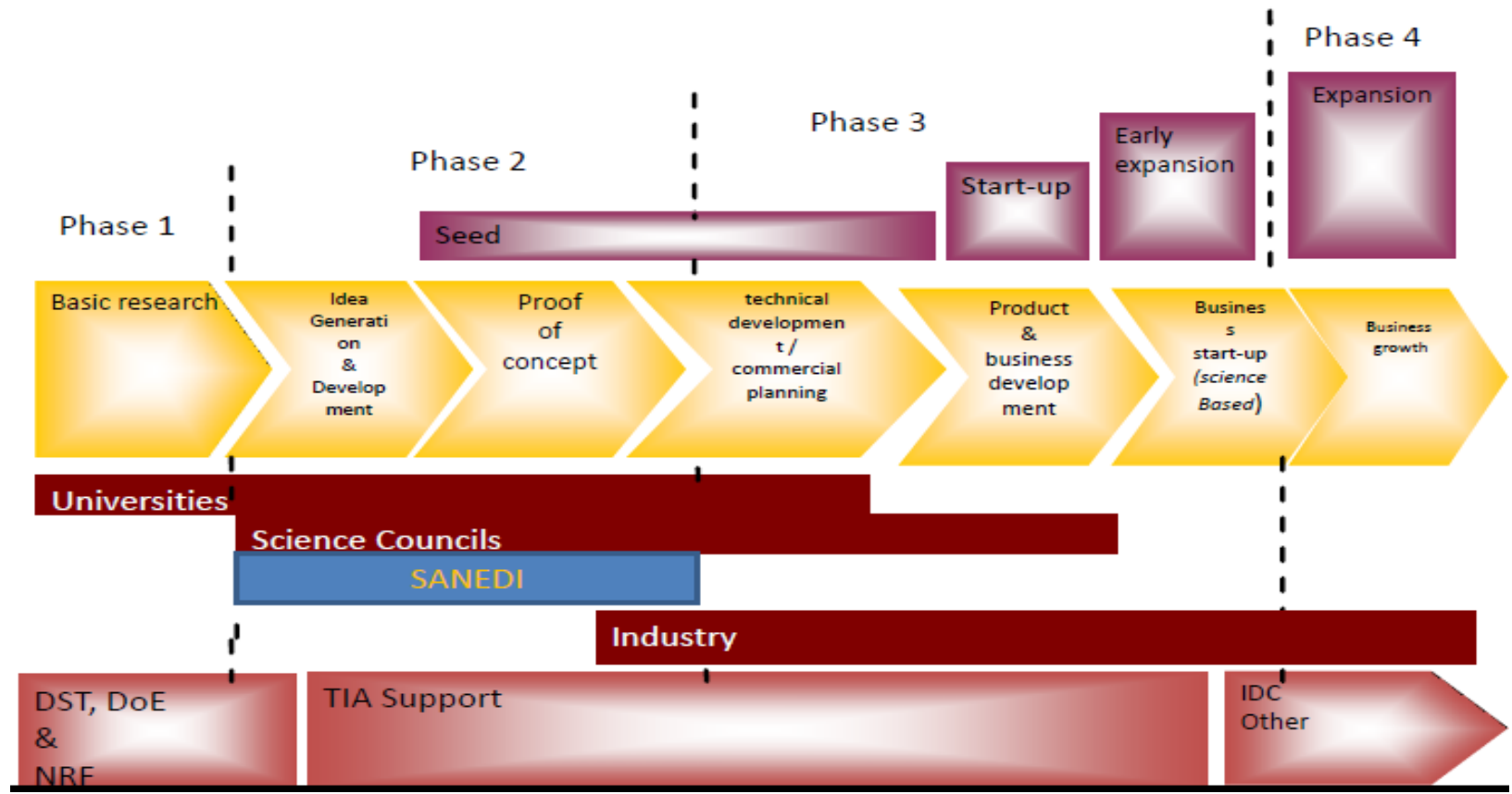
- Advanced fossil fuels including Carbon Capture and Storage
- Clean Energy Solutions
- Smart Grids
- Green Transport
- Working for Energy
- Data and Knowledge Management

3. Energy efficiency programme

# CLEAN ENERGY TECHNOLOGY VALUE CHAIN (AND ROLEPLAYERS)



## Technology Development Value Chain





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# WORKING FOR ENERGY PROJECTS

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# ORIGINS OF THE WORKING FOR ENERGY PROGRAMME




- 🌱 Mandate of the Department of Energy.
- 🌱 Set in a predominantly grid based environment of the National Electrification Programme.
- 🌱 Set to demonstrate the application of renewable energy to address energy poverty in far flung areas
- 🌱 Flows from the Working for Water Programme's removal of invasive and alien species programme for energy production.
- 🌱 Essential element of job creation drive of Government under the incentivised Expanded Public Works Programme (EPWP).
- 🌱 Targeting the youth, women, people with disabilities.
- 🌱 Focusing in rural areas (and low income peri-urban areas).

# MANDATE OF THE WORKING FOR ENERGY PROGRAMME

## Renewable Energy



-  The Working for Energy Programme is aimed :
- Applied Research
    - Research into the availability and sustainability of renewable energy resources in targeted areas (rural areas and low income urban areas);
  - Demonstration of Renewable Energy Technology Applications
    - Biomass to energy initiatives from invasive alien plants and bush encroachment;
    - Production of charcoal derived in an environmentally friendly manner from invasive alien plants and grasses;
    - Biomass to bioenergy (biogas) derived from agricultural waste for rural and non-municipal commercial application
    - Development of mini-grid hybrid and smart grid systems fed from various renewable based resources;
    - Mini-hydro systems and run-of-river schemes for non-grid applications.
    - Solar powered electricity generation systems for small scale and minigrid based systems.
    - Waste to energy from municipal and non-municipal solid waste and sewage treatment facilities;
    - Small wind generation for non-grid applications, and
    - Other alternative fuel sources for low cost housing, space heating, cooking and water heating.

# MANDATE OF THE WORKING FOR ENERGY PROGRAMME

## Energy Saving Initiatives



- Energy management planning and methodology framework for social facilities, homes and SMME businesses, including solar passive design;
- Thermal efficiency and energy management for the development and installation of biomass insulation and other materials for application in poor or rural households, subject to SABS approval;
- Energy management planning methodology and framework for the provision of energy (and water saving technologies, water loss management and leakage monitoring and control as part of energy saving initiatives).
- Research studies for energy poverty eradication, sustainable feedstock provisions and alternative fuel sources for low cost housing's low carbon space heating, cooking and water heating.
- Working for Energy Outreach



# ORIGINAL WORKING FOR ENERGY PROJECTS

## Incentivised Projects



Project Type	Location	Status
Bioenergy Cluster	Eastern Cape (Alice, Fort Cox and Melani Village)	Fort Cox-Reticulation Incomplete Melani Village-leaking outlet tank
Bioenergy Cluster	Western Cape (Phillipi)	Insufficient Biomass Unworkable mobile gas transportation system. Relook at sustainable biomass supply options
Greening of Robben Island	Western Cape	Canned
Bioenergy to Power	Bela-Bela	No PPA, No revenue

# CURRENT WORKING FOR ENERGY PROJECTS



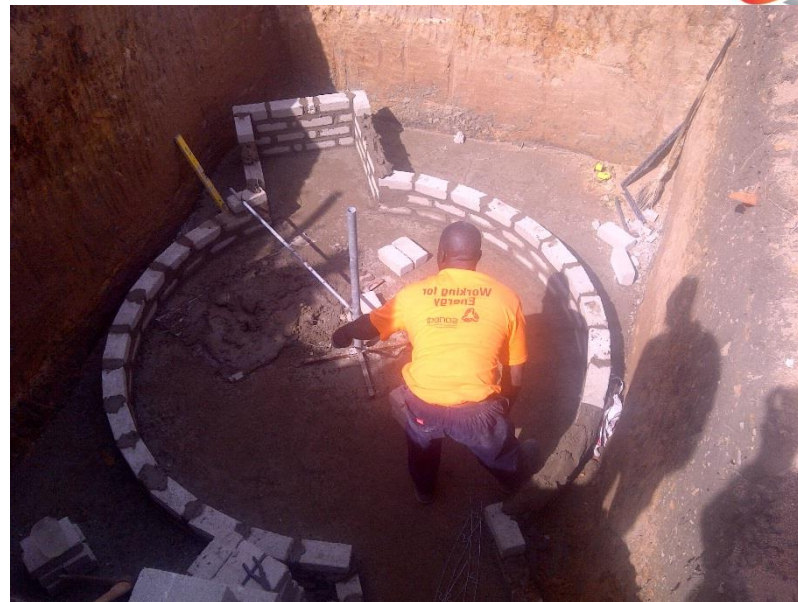
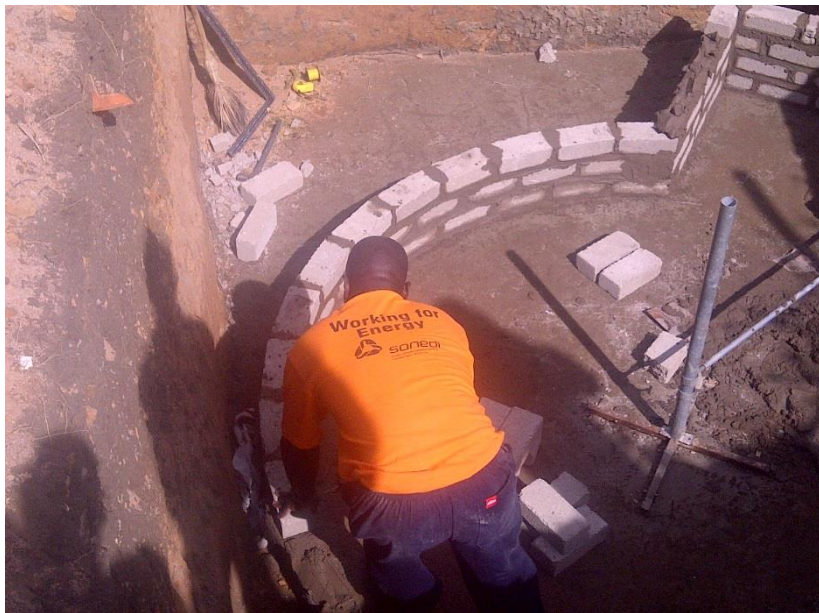
Project Type	Purpose	Location	Status
Bioenergy Cluster Repairs	Generation and utilisation of biogas for thermal applications	Eastern Cape (Alice, Fort Cox and Melani Village)	Work In Process
Bioenergy Cluster	Generation and utilisation of biogas for thermal applications	Western Cape (Phillipi)	Work in Process
Greening of Robben Island	Reduction in the dependency of diesel for offshore applications	Western Cape	Canned
Bioenergy to Power (Bela Bela)	Electricity generation from biogas Reticulation of biogas for domestic use	Bela-Bela	Challenged
Melani Village Biogas Expansion	Generation and utilisation of biogas for thermal applications	Melani Village, Eastern Cape	Ongoing
Illembe District Biogas project	Generation and utilisation of biogas for thermal applications	Illembe District , KwaZulu-Natal	Ongoing
Mpfuneko Biogas Project	Generation and utilisation of biogas for thermal applications.	Mpfuneko, Giyani, Limpopo	Ongoing

# CURRENT WORKING FOR ENERGY PROJECTS



Project Type	Purpose	Location	Status
<b>Special Ministerial Projects</b>			
Greening of Tshireleco High School	Demonstrate renewable energy usage even in urban areas	Galeshewe, Kimberly	Ongoing
Greening of TYGERKLOOF High School	Demonstrate renewable energy usage boarding facilities	Vryburg, North West	Ongoing
Greening of Robben Island	Reduction in the dependency of diesel for offshore applications	Western Cape	Canned
Bioenergy to Power (Bela Bela)	Electricity generation from biogas Reticulation of biogas for domestic use	Bela-Bela	Challenged
Greening of Emerging Farmers Facilities	Demonstrate renewable energy usage even in urban areas	Limpopo, Northwest, Gauteng	Ongoing

# ILLEMBE-NDWEDWE BIOGAS



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# MPFUNEKO BIOGAS PROJECT-LIMPOPO



 energy Department Energy REPUBLIC OF SOUTH AFRICA	 senedi Department Energy REPUBLIC OF SOUTH AFRICA	" Working for Energy"
Project Name	Mpfuneko Rural Domestic Biogas Project	
Project Description	Providing 55 households with Ready-to-Cook Biogas	
Implementing Agent	 MpfunekoCS	
 public works Department Public Works REPUBLIC OF SOUTH AFRICA	 EXPANDED PUBLIC WORKS PROGRAMME	

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# MINIMISATION OF DEFORESTATION-MPFUNEKO





# USAGE OF BIOGAS-MPUNEKO



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# MELANI VILLAGE BIOGAS PROJECT





# FORT COX BIOENERGY PROJECT – ESTABLISHMENT OF THE ORGANIC GARDEN





# FORT COX COLLEGE PRODUCTIVE ORGANIC GARDEN



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# TYGERKLOOF COMBINED SCHOOL GREENING



# WASTE TO ENERGY-PIG WASTE BELA BELA





# PROPOSED GREENING ROBBEN ISLAND PROJECT

## Renewable Energy Conversion Project

Biogas from vegetation & household waste



Retro-fit of Solar Water Heating



2 x Concentrated Solar Plant



Energy Efficiency & Solar Power & LPG for transport services



Wind and Wave Energy



Retro-fit buildings with EE Technology



Reduced dependency on diesel generators



# BIO-WASTE TO PORTABLE BIOGAS PHILLIPI PROJECT WESTERN CAPE



# BIOMASS TO ENERGY



- Renewable energy production and utilization for low income communities.
- Creation of Green Jobs and contribution to the new growth path
- Skills Development



Various forms of Biomass and Waste to Energy initiatives

Biomass Production value added goods and production of fuel pellets

# GREENING OF FACILITIES



# GREENING OF GAUTENG SCHOOLS



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# MUNICIPAL WASTE TO ENERGY



# MUNICIPAL WASTE



## SEWERAGE TREATMENT PLANTS

- There is no concerted effort to rehabilitate the Bio-digesters in in MSWTPs
- There is no beneficiation of biogas produces

## EXISTING SOLID WASTE /LANDFIL SITES

- There is potential to harvest and beneficiate biogas from landfill sites.

## NEW SOLID WASTE /LANDFIL SITES

- Not designed for landfill gas extraction
- Waste separation at source




## OTHER WASTE

- Waste tyres (Pyrolysis)-REDISA

# POTENTIAL USES

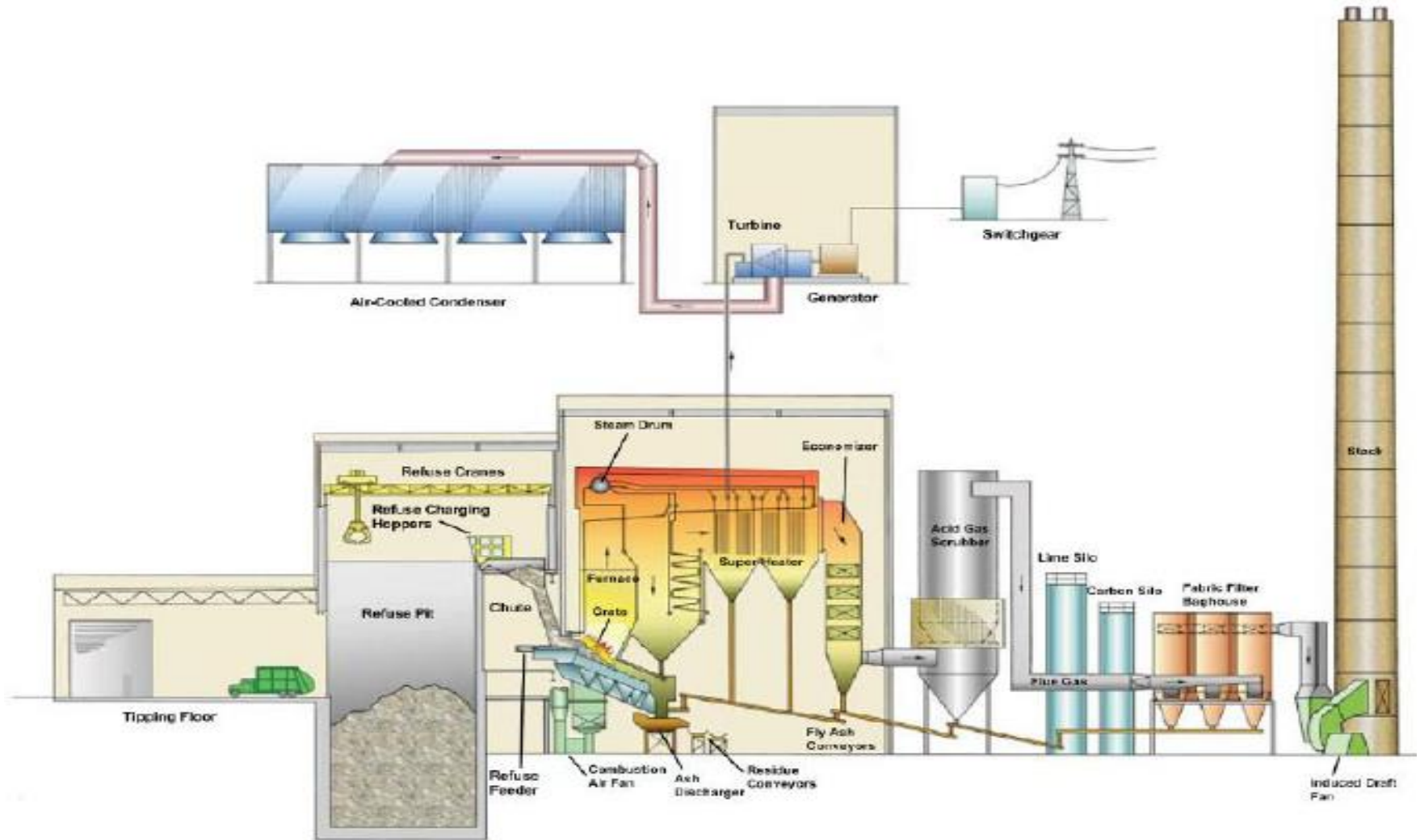
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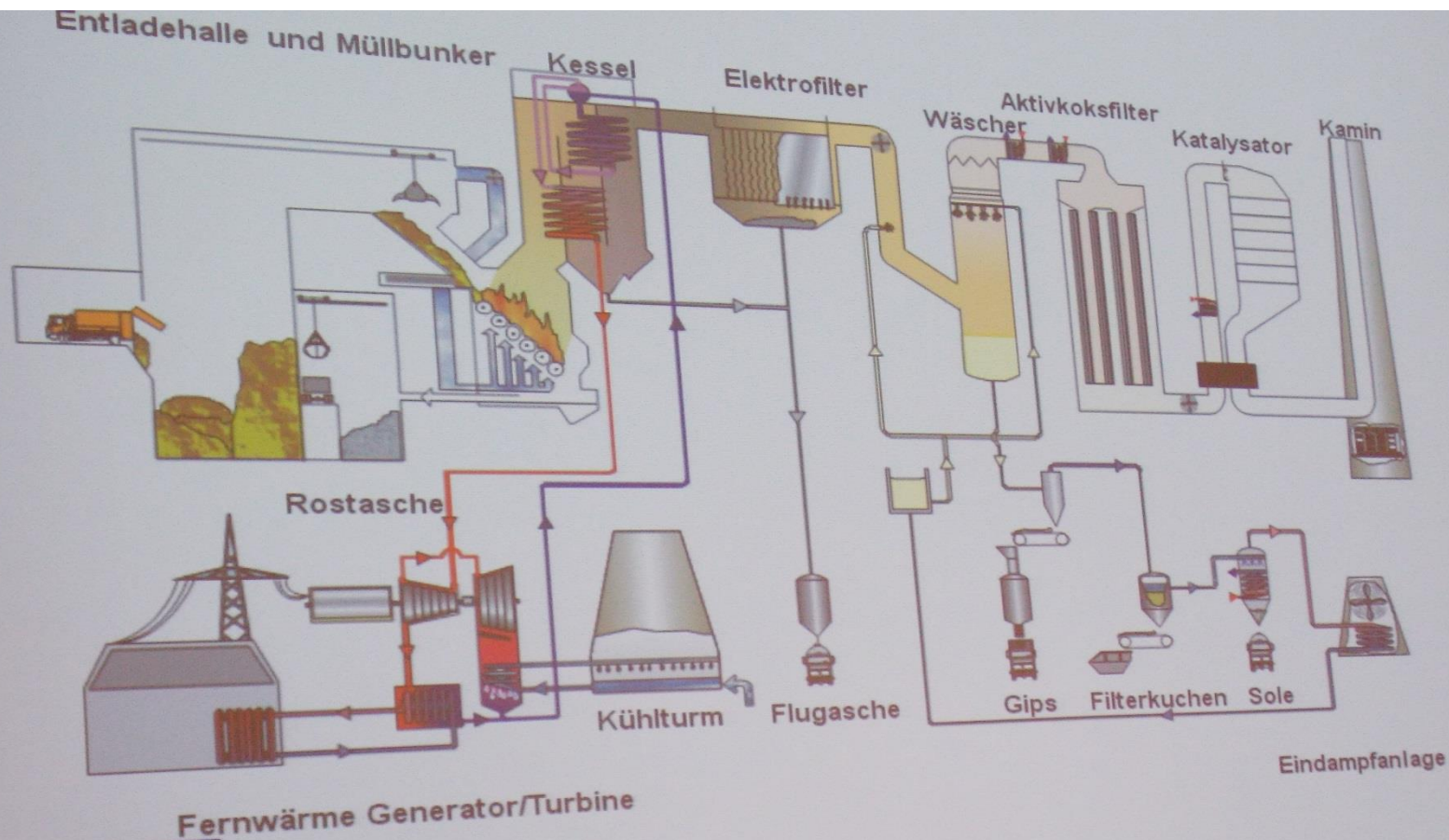


-  Public Transportation
-  Electricity generation (own generation or distribution)
-  Heat generation (industrial, commercial and domestic)



# SOLID WASTE TO ENERGY - COGENERATION





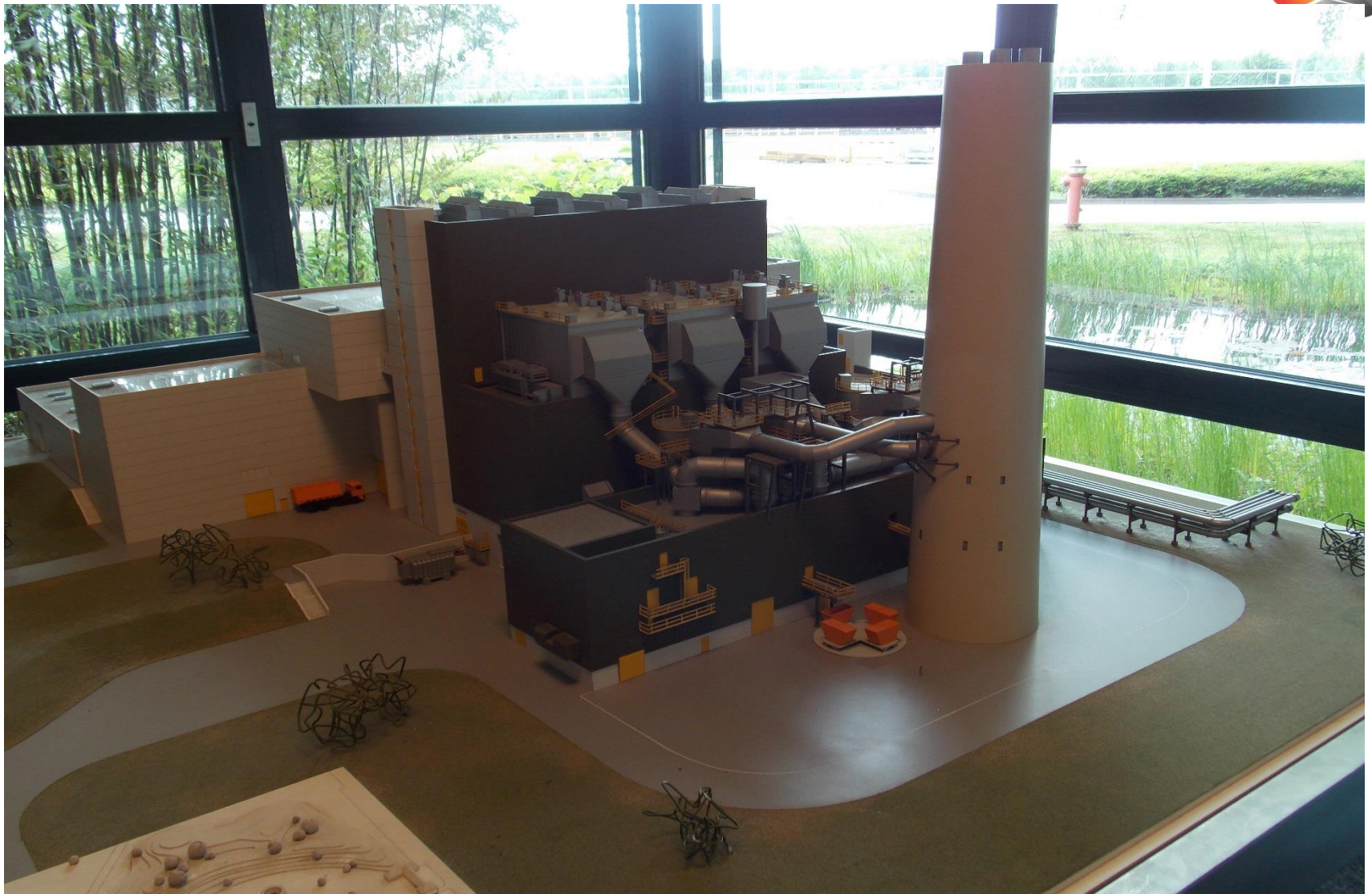
RWE Generation SE 14.05.2013

SETI

**RWE**  
energy to lead



# MODEL OF A SOLID WASTE TO ELECTRICITY PLANT (RWE-ESSEN)





# RWE-TIPPING SITE



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# WASTE HANDLING FACILITY



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# WASTE HANDLING FACILITY



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# BOILER COMBUSTION CHAMBER





## Income for Waste to Energy Facilities

- Preferential PPA on electricity produced
- Tipping fees
- Bi-products
  - Gypsum
  - Bio-fertilisers
  - |





- 🇮🇳 No National Standards on Biogas
  - Quality
  - Residual gasses (CO<sub>2</sub>, NO<sub>x</sub>, Sox)
- 🇮🇳 No National Standards on Biogas installations
- 🇮🇳 Currently LPG standards are being used.
- 🇮🇳 Biogas Platform established by DoE with GIZ

# WORKING FOR ENERGY AWARENESS, CAPACITY BUILDING AND SKILLS DEVELOPMENT



- 🌱 The working for Energy Programme is part of the EPWP, and has the following objectives:
  - Promotion and advocacy of green technologies
  - Skills development
  - Job Creation
  - and empowerment of vulnerable groups (Youth, women and people with disabilities).
  
- 🌱 In future, the Working for Energy Programme will also look at :
  - Collaboration with INEP to determine suitable new and renewable energy options for hot and arid areas such as the Northern Cape;
  - Green Village Initiatives (Water-food-energy nexus)
  - Waste to Energy Options
  - Solar Refrigeration
  - Solar PV paints

# PARTNERSHIPS

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- 🌱 The SANEDI work is intertwined with the mandates of other Stakeholders.
- 🌱 There is a need to formalise ties with all working in the applied research and demonstration space.
- 🌱 Stakeholder engagement process is being developed.





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**THANK  
YOU**

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