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SANERI — Taking Energy Concepts to Market



Energy Innovation For Life

KM Nassiep
Chief Executive Officer

Contents



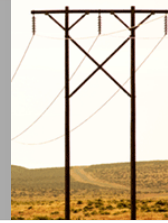
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- ④ Factors precipitating a paradigm shift

- ④ SANERI's role in facilitating a transition to a lower carbon economy
 - SANEDI Establishment
 - Proposed Centres of Research and Development (CORDs)

- ④ Priority activities for 2009/10 and beyond
 - Clean Energy Solutions Programme
 - Green Transport for 2010 Programme
 - Advanced Fossil Fuel Use Programme
 - Energy Policy and Planning Support
 - End Use and Infrastructure Management
 - Working for Energy Programme (WfE)

Are we approaching too many tipping points at once?



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Climate change



Electricity Supply
shortages



Peak Oil



Global financial
recession



Global Depression
/
Market meltdown

Electricity Supply Constraints



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- 🔥 A R343 billion expansion plan (phase 1) to bring Eskom reserve margin up to above 10%
- 🔥 34% tariff increase for Eskom not sufficient to commission new renewable energy projects, nuclear plants (Gen III) or gas-fired (IGCC, CCGT) plants
- 🔥 The price of electricity will have to double over the next 3-5 years to cater for CCS technology (+ FGD), together with options listed above

Sustainability triggers for the electricity industry



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- ☉ Rand / Dollar fluctuations affect the cost of capital goods
- ☉ Inflation affects the price of capital goods purchased
- ☉ Concentration of the capital equipment suppliers is low making the bargaining power of the suppliers high and therefore increasing the price of capital goods, largely exacerbated by the limited manufacturing capacity . Should you wish to shorten the lead times the price goes up exponentially.
- ☉ Coal supply contracts have changed over the years and this has dramatically affected the profitability of the generation industry
- ☉ Skills design resources to manage the design, construction and procurement phases are in very short supply.
- ☉ Climate change issues have gained huge momentum and the need to consider CCS implementations are becoming very real and could drastically affect the cost of new and existing generation (20-40%).
- ☉ Electrification (operations and maintenance underinvestment) and the growing non technical losses has further worsened the financial sustainability of this once thriving industry
- ☉ The above has threatened the sustainability of the electricity industry and important strategic decisions need to be taken by government to avoid a domino effect that would ultimately bring about the collapse of the economy

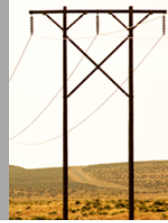
Peak Oil



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- 🔥 Whether we subscribe or not – mounting evidence of sharp decline in outputs from “mature” oil and gas fields
- 🔥 Consensus being reached on 2030 as likely peak for oil production. Local studies suggest even 2015 as likely peak
- 🔥 Question is – are our economies geared towards a rapid, complete shift away from crude oil?

Climate Change



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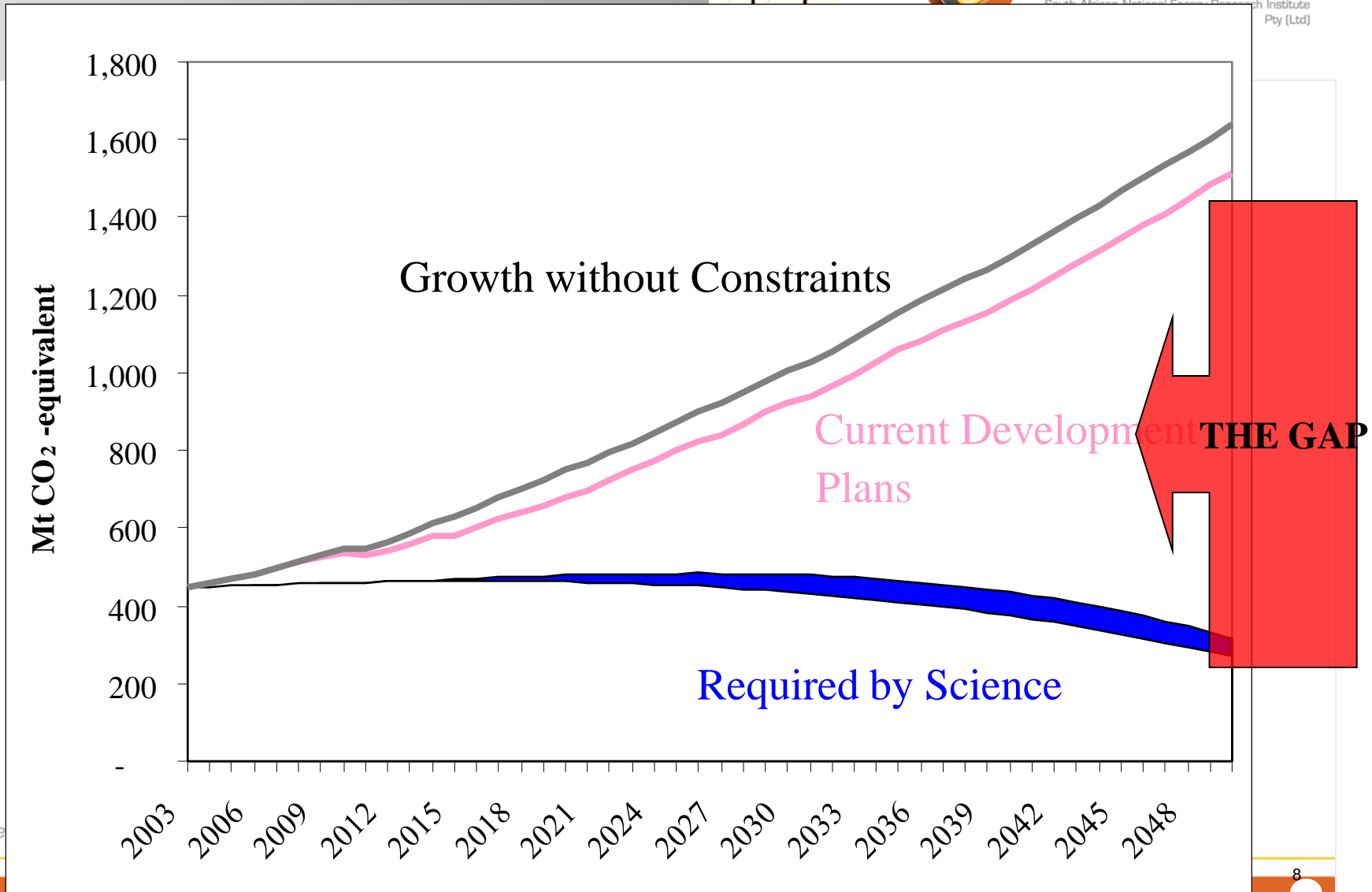
- Indisputable evidence of:
 - increase in mean global temp
 - Rising sea levels
 - Increased incidence of extreme weather phenomena
 - growing need for funding and technology options for adaptation and mitigation
- LTMS study undertaken in SA to help quantify efforts required to reduce emissions in SA by 2050

Two Scenarios frame the choice for South Africa

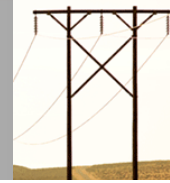


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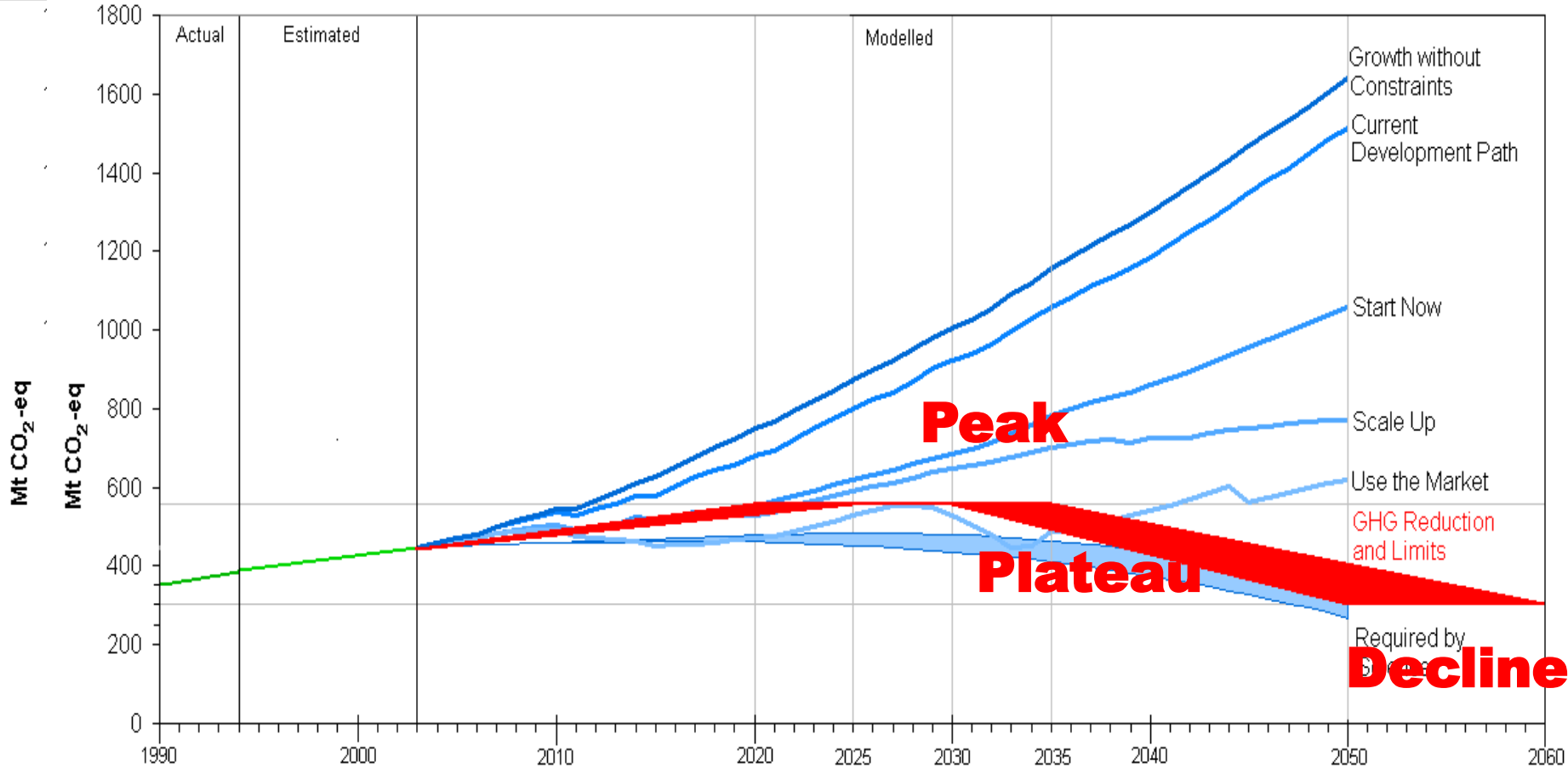
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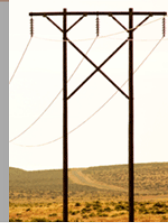
Theme 1: GHG emission reductions and limits



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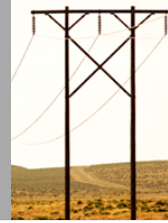
SANERI Origin



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- ④ Cabinet decision to establish national energy research institute – 9Jun04
- ④ State-funded Research Institute focusing on Public Interest Energy R&D
- ④ Focus is on applied research mainly, i.e. Taking pre-commercial innovative products and strategies to market
- ④ Small percentage of funding dedicated to blue sky research
- ④ Supports Human Capital Development at tertiary institutions and research projects that assist in meeting national goals / objectives
- ④ Supports the membership of SA to various bodies such as
 - IEA Implementing Agreements
 - Carbon Sequestration Leadership Forum (CSLF)
 - Renewable Energy and Energy Efficiency Partnership (REEEP)
 - European Commission Framework Programme

SANERI Role in context



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the dme

Department
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

NERSA

Universities

Regulatory

**Implementation
Strategies /
Legislation**

Policy / Planning

R&D Activities

Bursaries

Contract R&D

Research Chairs



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All Spheres of
Government

Commercial

SOEs

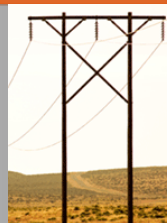
**Private
Sector**

Contract R&D

Human Capital Development

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SANERI is concerned with..



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- Infrastructure Optimisation (electricity networks, liquid fuel transportation, road/rail infrastructure)
- Energy Efficiency and DSM
- Renewable Energy and Alternative Energy
- Cleaner fossil fuels (including CCT, CCS, NG)
- Impact of energy use on the environment
- Stimulating socio-economic upliftment through productive use of energy
- Human capital development across all sectors addressed by SANERI
- Support to Departments on data collection, systems analysis and planning tool development

National Energy Act (38 of 2008)



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- 🔥 Bill follows intention of the DME to close the loop on outstanding legislation proposed in White Paper on Energy (1998)
- 🔥 Bill has seen several revisions, following cabinet and public comments
- 🔥 Bill was approved for Public Comment in April 2008
- 🔥 Bill approved by NCOP in September 2008
- 🔥 Act Promulgated by State President in October 2008
- 🔥 Act introduces new entity to be developed, namely, SANEDI, the

South African Energy Development Institute

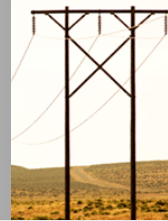
SANEDI Objectives



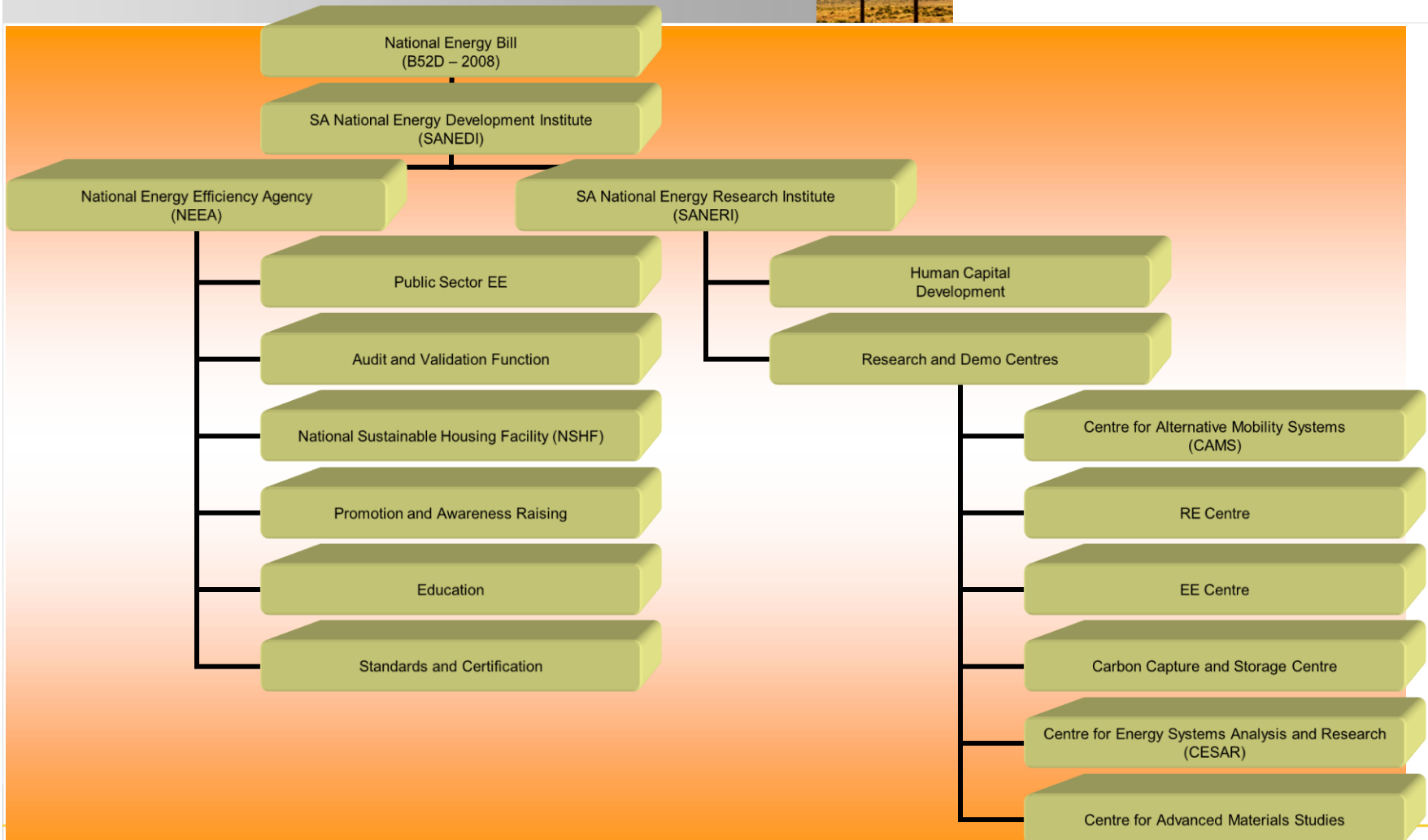
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- SANEDI combines the current state entities, SANERI and NEEA (with a possible renewable energy finance and consulting service to be added later)
- SANEDI strives to bridge the gap between R&D and demonstration & implementation
- Through a combination of state, donor and private sector funding it is anticipated that key projects could be accelerated, leading to faster deployment and consequently, more job and local manufacturing opportunities

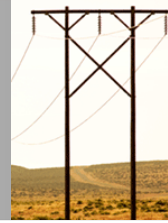
Proposed SANEDI Organisational Structure



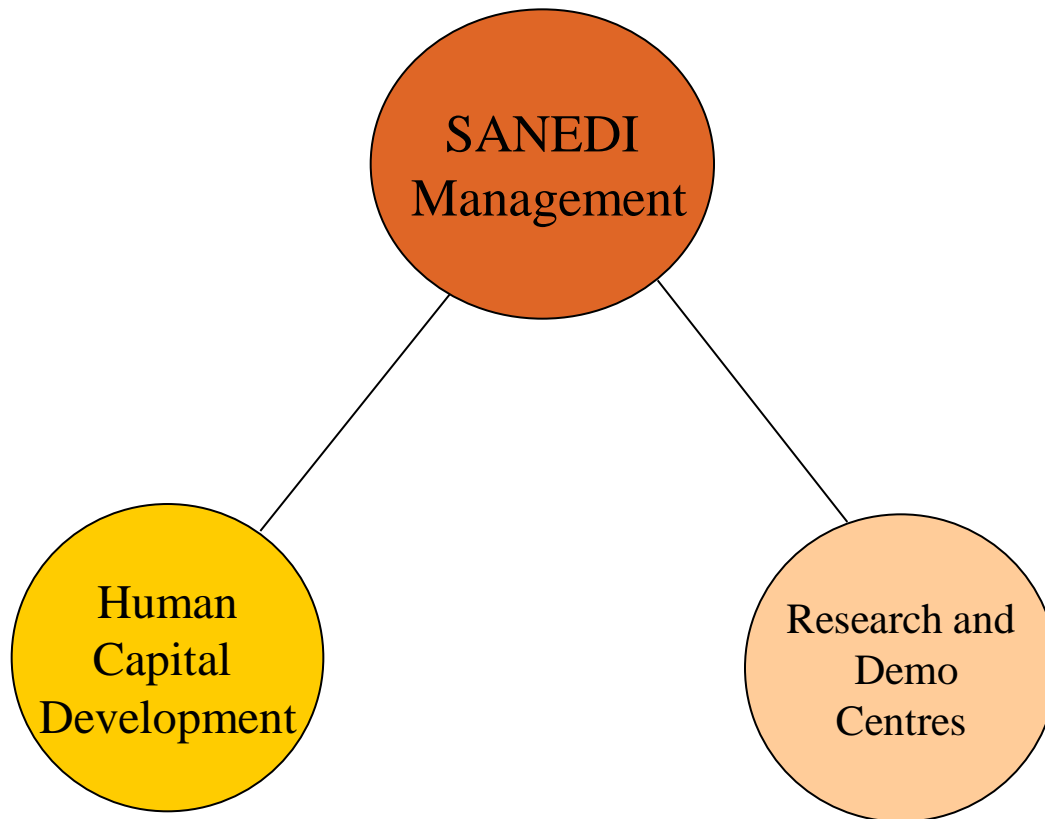
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SANEDI Core Activities

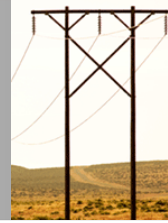


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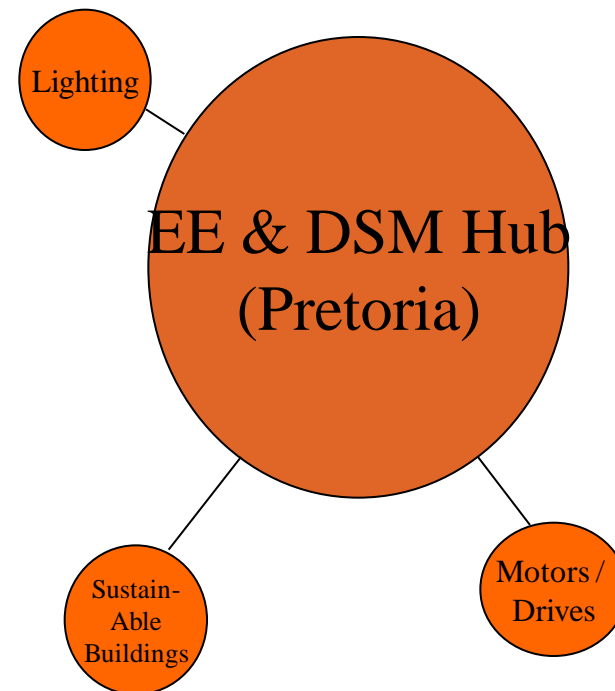
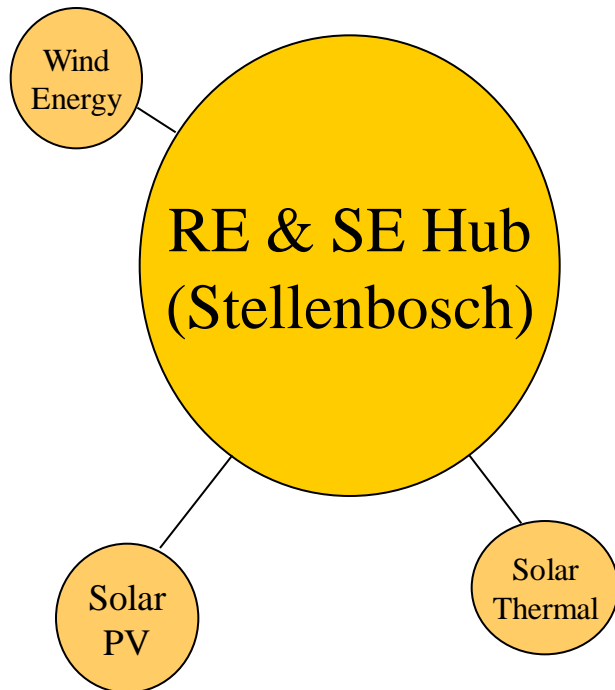


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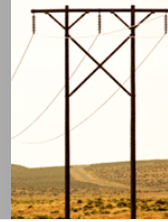
Hub and Spokes



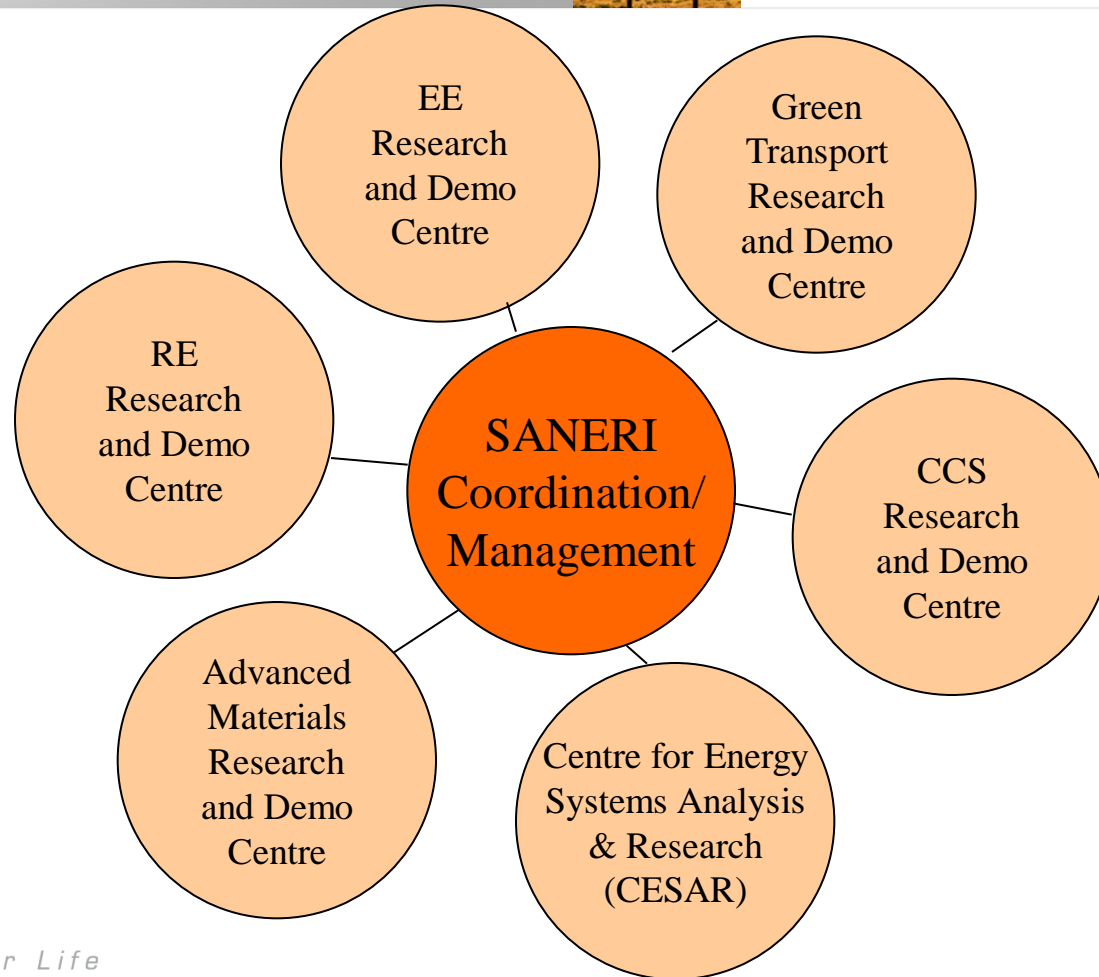
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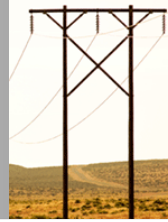
Research and Demo Centres (CORDs)



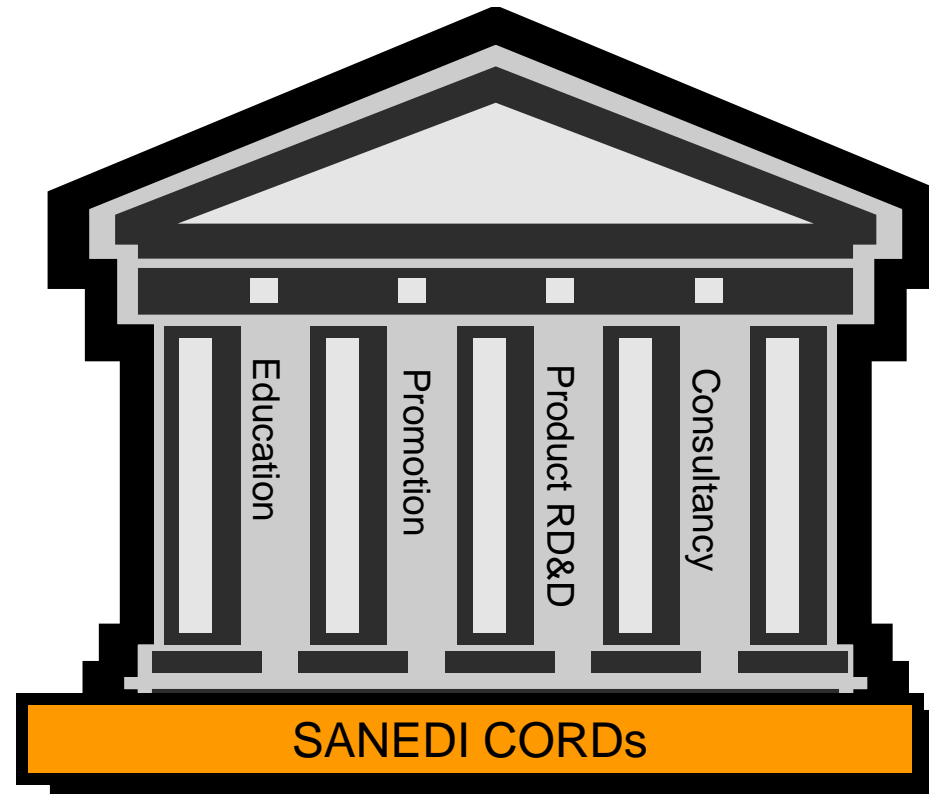
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CORD Fundamentals



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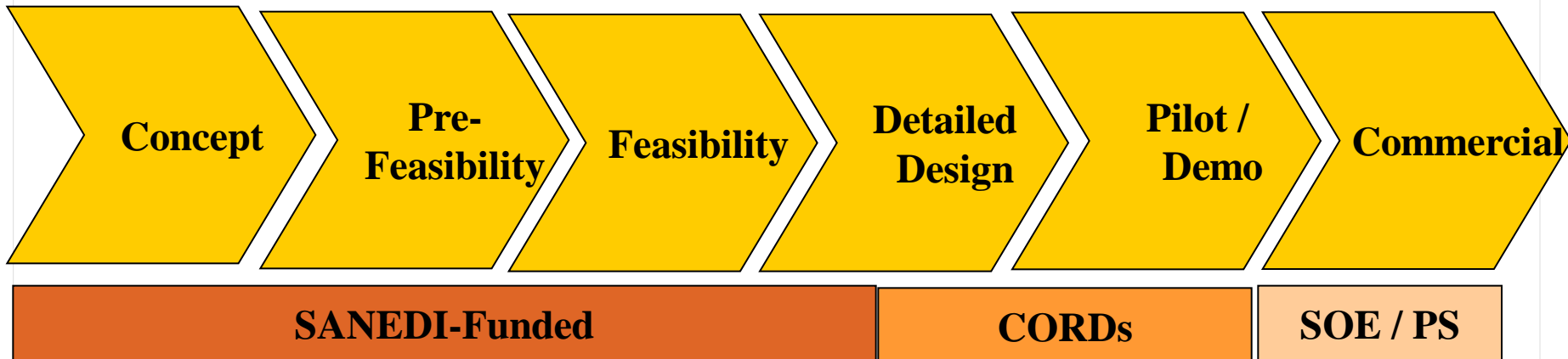


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SANEDI involvement in project life cycle



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Key Deliverables 2009/10

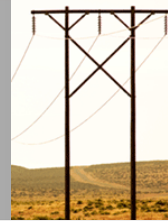


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Clean Energy Systems

-  Development of revised wind atlas for SA
-  Scoping of possible wave energy test facility in SA
-  Scoping of Renewable Energy Research and Demo Centre
-  Testing and development of 2nd Generation Biofuels (with DST)
-  Solar Research Programme (with DST) – focus on applications research
-  Ongoing discussions with potential funders for the different levels of R&D, i.e. pilot scale and a demonstration plant, to evaluate the technology prior to the planning of commercial-scale facility

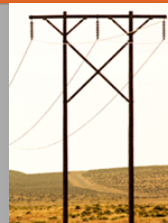
RE Centre of Research and Demonstration



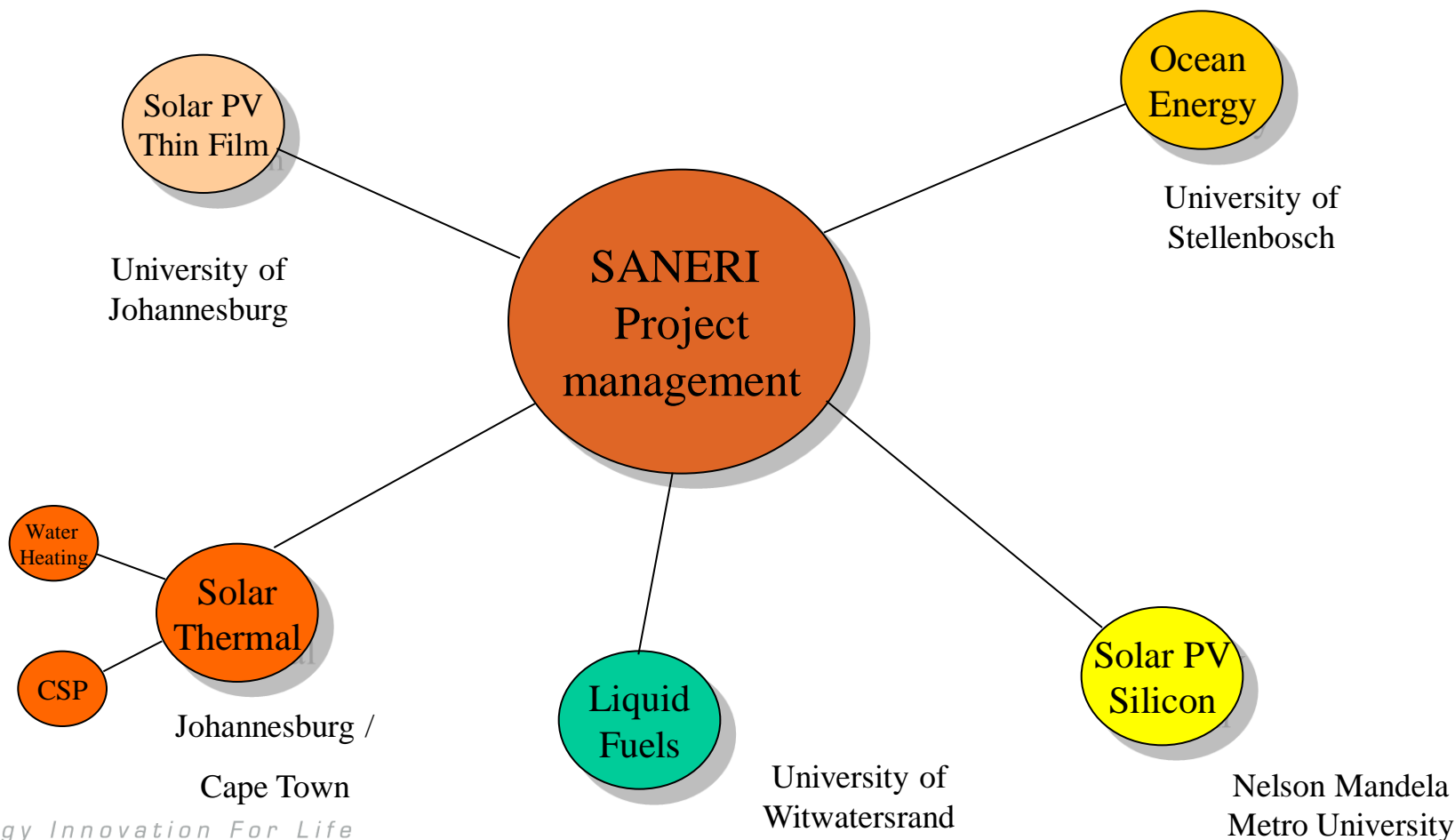
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- Multi-disciplinary centre focusing on three major programmes
 - Education and Training
 - Grade 10-12 Learners
 - Science and Engineering Undergraduates
 - Artisans
 - Product Development
 - Solar PV products, ocean energy technology, cleaner liquid fuels, large-scale concentrating solar power
 - Contract Research aimed at specific requests from public / private sector
- Centre will be project managed by SANERI staff but hosted by different universities to minimise duplication and reduce overheads
- Centre will build on existing strengths from different universities
- Funding will be split between fiscal funding and private sector programmatic funding with UNIDO supporting the proposal and will assist in fundraising for learnership programmes

Institutional Framework (RE Research Demo Centres)

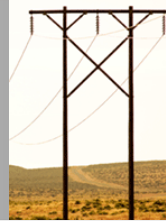


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Key Deliverables 2009/10



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Advanced Fossil Fuel Use

- Establishment and Operationalisation of Centre for Carbon Capture and Storage
- International Representation at:
 - IEA GHG IA
 - Global Carbon Capture and Storage Initiative
 - International Performance Assessment Centre
 - Oversight Chair Clean Coal Technologies at Wits
- Initiation of New CCT Contract at NWU
- Oversight of existing five CCT Contracts
- SANERI Participation in SA Coal Road Map
- Management of Carbon Geological Storage Atlas



Energy Policy and Planning Support

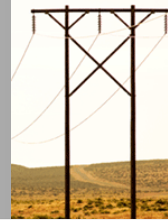
Energy Planning

- Appropriate energy model system with sound assumptions
- On going updating of energy data
- Consistency in data collection

Energy Policy Development


- Needs to be from an informed view
- Proposed policies need to be modeled to study likely impacts
- Impacts need to be continuously monitored / evaluated

Key Deliverables 2009/10





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Research on trends in energy statistics

-  Study correlations of energy data with other related data series
 - Will better inform assumptions in energy models
 - Will study impact of policies
 - Might help develop appropriate regional energy planning models
 - Will ensure human capital development in energy planning and modelling

Collection and Updating of energy data (with mandate from DoE who is the custodian of energy data)

-  Development of data collection methods
-  Updating of Local & national data
 - Will ensure data collection is systematic and consistent over time
 - Might improve data collection methods and increase consistency

Proposal :Smart Grid –research focus areas



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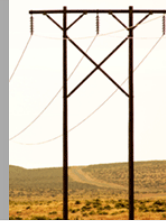
Integrated communications

High speed, fully integrated, two way communication technologies that make the modern grid dynamic, interactive “ mega infrastructure” for real time information and power exchange. An open architecture creates a plug and play environment that securely networks grid components and operators, enabling them to talk, listen and interact

Advanced components

Advanced components play an active role in determining the electrical behaviour of the grid. These power system devices apply the latest research in materials, superconductivity, energy storage, power electronics, and microelectronics to produce higher power densities, greater reliability and power quality, enhanced electrical efficiency that produces major environmental gains and improved real-time diagnostics.

Proposal :Smart Grid –research focus areas



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Advanced control methods

New methods and algorithms monitor power systems components, enabling rapid diagnosis and timely, appropriate response to any event. They also support market pricing and enhanced asset management and efficient operations.

Sensing and measurement

Technologies that enhance power systems measurements and enable the transformation of data into information. They evaluate the health of equipment, the integrity of the grid and support advanced protective relaying. They enable consumer choice and demand response, and help relieve congestion.

Proposal :Smart Grid –research focus areas



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Improved interfaces and decision support

The smart grid will require wide, seamless, often real-time use of applications and tools that enable grid operators and managers to make decisions quickly. Decision support and improved interfaces will enable more accurate and timely human decision making at all levels of grid, including the consumer level, while also enabling more advanced operator training

Electrification of transportation

Energy security

Electric vehicles

Electrification of public transportation

Key Deliverables 2009/10

End Use and Infrastructure Management



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- Smart-grid Stakeholder participation and buy-in
- Review of transmission and distribution systems
- Development of Tx and Dx smart-grid strategy
- Business plan and motivation for funding to DoE and treasury

Working for Energy (WfE)



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- 🔥 New programme, following on success of Working for Water Programme – remove invasive vegetation and in so doing conserve water
- 🔥 WfE has as its primary objective the creation of sustainable jobs, energy provision using natural resources such as biomass (from invasive vegetation primarily), run-of-river and small hydro potential as feedstock, as well as the energy efficient utilization of other scarce or polluting natural resources
- 🔥 Programme to be introduced as of 1st April 2009
- 🔥 Additional pilot project budget (to support Public Private Partnerships on Commercial Pilot Projects) – roughly \$18.5 million for 2009/10

Green Transport Activities



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- ④ The intention of the programme, supported by the Department of Science and Technology is to develop, demonstrate and incubate sustainable green options for mainly mass transit schemes during 2010 World Cup
- ④ Legacy projects have to remain in place after 2010
- ④ Focus is currently on alternative fuels and propulsion systems for buses and cabs
- ④ Growing interest in electric vehicles is prompting renewed focus on local manufacture of components to support the hybrid and electric vehicle market
- ④ Sustainable job creation in the sector can only come about through state-supported development of manufacturing capacity (70% local content in component manufacture?)
- ④ Programme involves business case development, facilitation of business to business linkages and possible financial support for pilot projects
- ④ Other SANERI projects support 2010 GTP while CAMS Centre will support broader RD&D in the alternative mobility sector

Other related SANERI Transport Projects



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- Integrated Mass Transit Model Development
- Alternative Propulsion System for Mass Transit Vehicle – City of Johannesburg possible pilot project
- Development of high torque, low speed double permanent magnet motor for selected electric vehicle applications
- Development of high speed electric motor for electric vehicle applications (e-Corsa Lite demonstration project)
- Development of remote sensing technology for highway emission monitoring

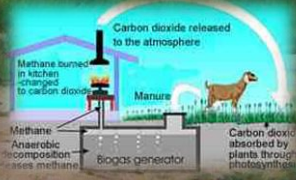
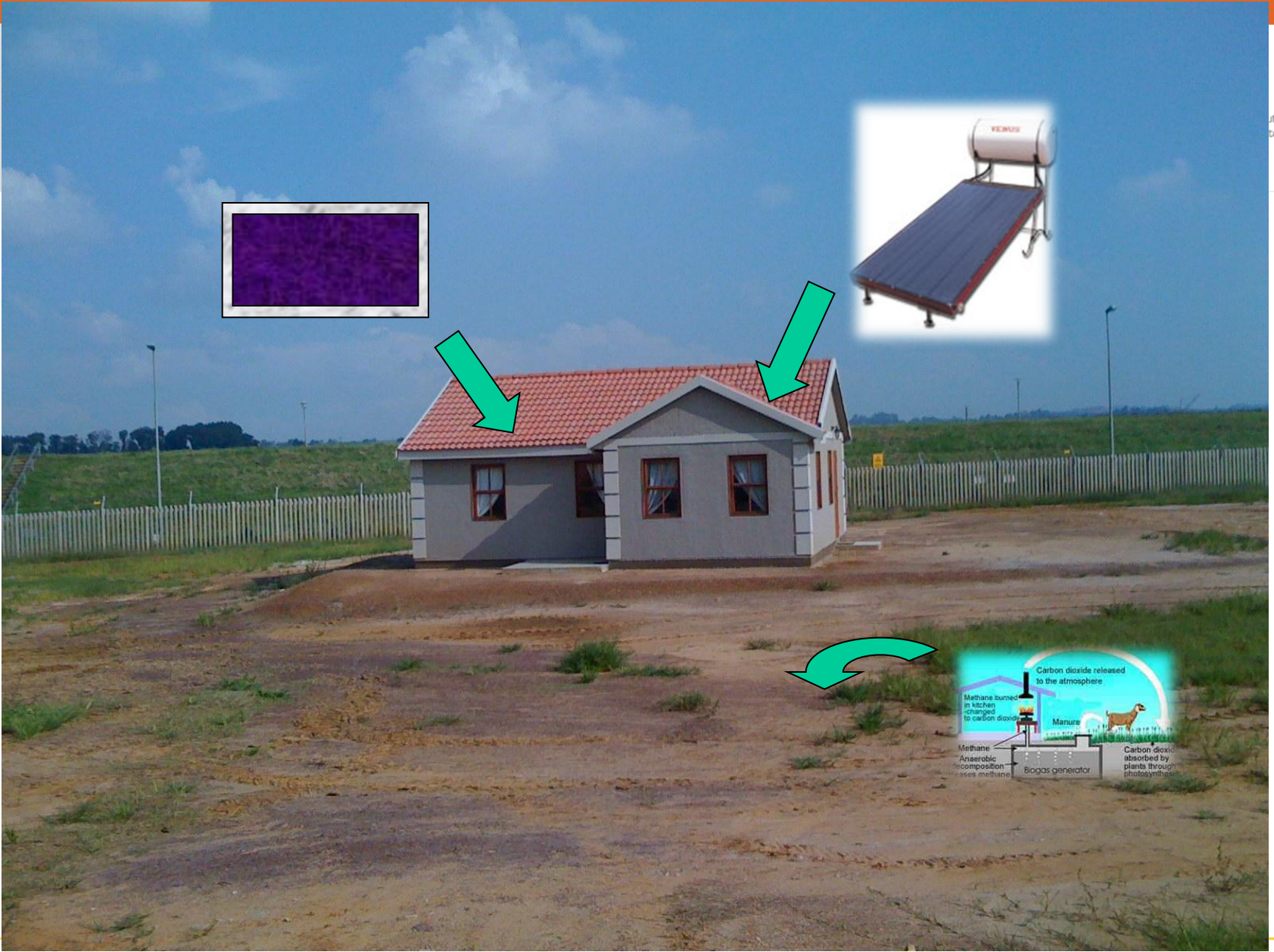


Other Major Projects

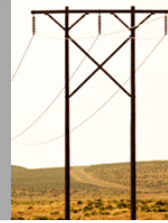


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-  Low-cost sustainable housing with integrated energy supply
 - Some 2,6 million RDP houses built since 1994
 - Backlog of 2,2 million houses still
 - Backlog of 3,3 million houses to be electrified still



SWH Rollout in SA



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- About 7,500 units sold in SA on average (2005)
- Cf. Over 3,000,000 conventional geysers in market at present
- Potential to replace 1 six-pack power station with SWH
- Current national target is 1,000,000 units over 4 years (till 2012)

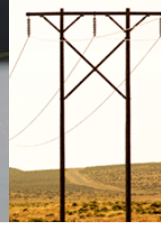
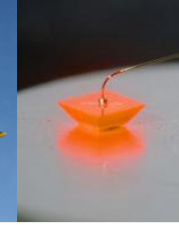


SWH Rollout Strategy



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- ☉ CEF and large Metro's engaged in plans to introduce utility model for SWH rollout
- ☉ CEF has commenced with tender for 60,000 units for NMMB
- ☉ SANERI focus is on skills development for installation and maintenance + local manufacturing of tanks and collectors



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Thank You



*First solar traffic light intersection installed by SANERI /
NEEA in 2007 in Cape Town*

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