reeep

renewable energy & energy efficiency partnership

Regulatory considerations for RE and EE in Southern Africa

Foundations course in Utility Regulation in Africa – Session 22

Graduate School of Business, UCT
26th August 2004

Glynn Morris – AGAMA Energy

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Wind electricity

Solar water heating

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Overview

- Why bother about RE and EE?
- A portfolio-based rationale for RE and EE
- Distributed generation and the new paradigm for electricity generation and distribution
- REEEP Sustainable Energy Regulation Network and REILP
- Policy instruments for RE and EE
- Tradable Renewable Energy Certificates as a mechanism for RE and EE policy implementation
- Some conclusions
- Some references

AGAMA energy

reeep renewable energy & energy efficiency partnership

Energy and the environment

- Energy directly affects the environment
  - Resource consumption
    - Use of non-renewable resources
    - Habitat destruction
  - Waste and emissions (see www.wri.org)
    - Scientists estimate that if the increases in greenhouse gas emissions continue unabated, global temperatures are expected to rise between 1.4 to 5.8 degrees C by 2100
    - The extraction, conversion to useful energy, and combustion of fossil fuels releases into the atmosphere approximately 80 percent of human-induced greenhouse gas emissions
    - For the past 30 years, the transport sector's share of CO_2 emissions has increased at a faster pace than other sectors
- Climate change / Carbon finance / CDM

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Energy and social benefits

- Public and personal health
  - Negative
    - Extraction, production
    - Water contamination
    - Indoor air quality
    - Outdoor air quality
  - Positive
    - Electricity (and gas) provide clean energy services at the point of consumption

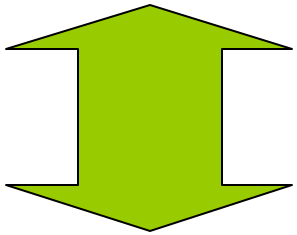
AGAMA energy

reeep

renewable energy & energy efficiency partnership

Energy and economies

- Economic development requires energy services

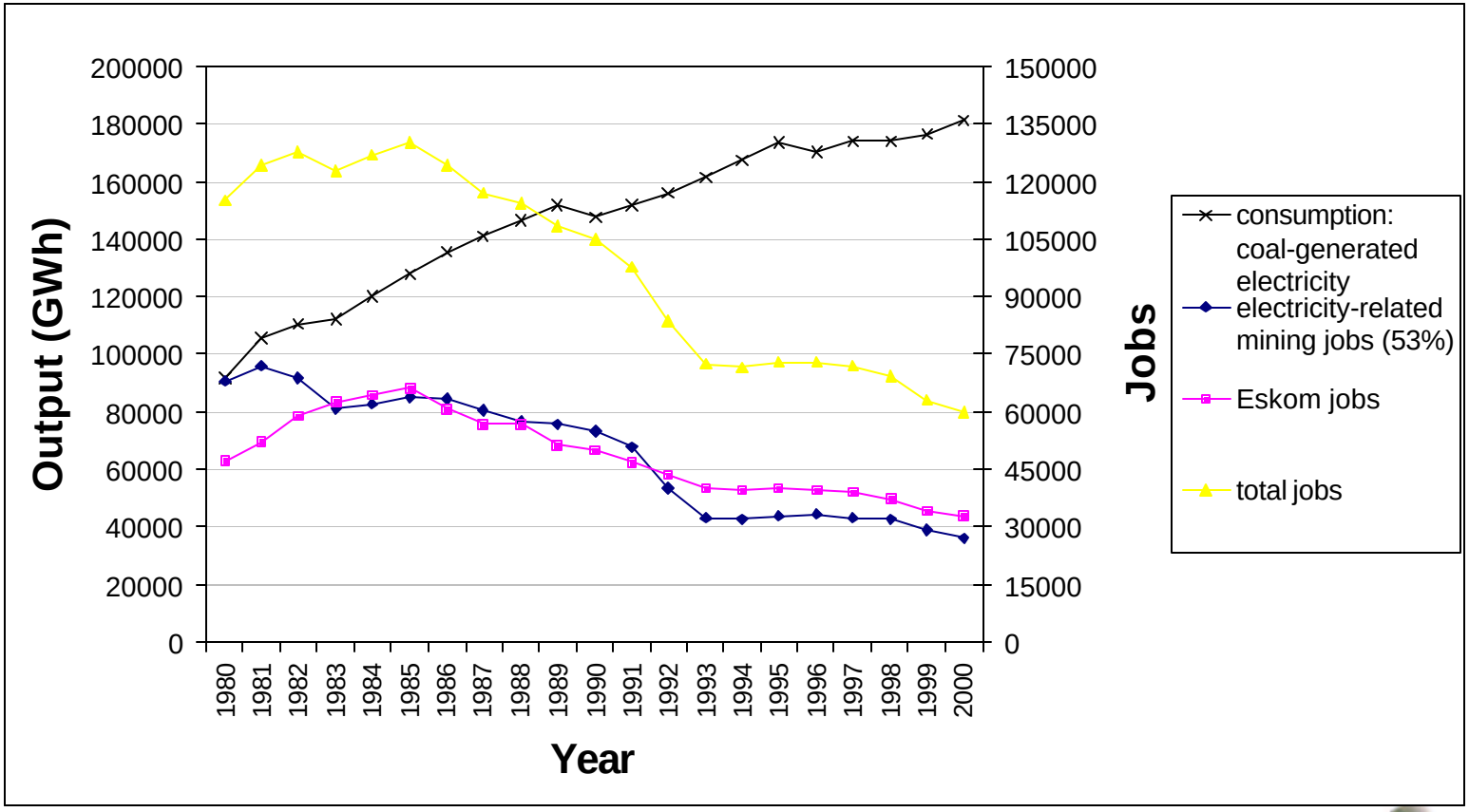


- The energy sector is a significant sector of economic activity (especially in Southern Africa)

AGAMA energy

reeep renewable energy & energy efficiency partnership

Employment trends in the SA electricity sector

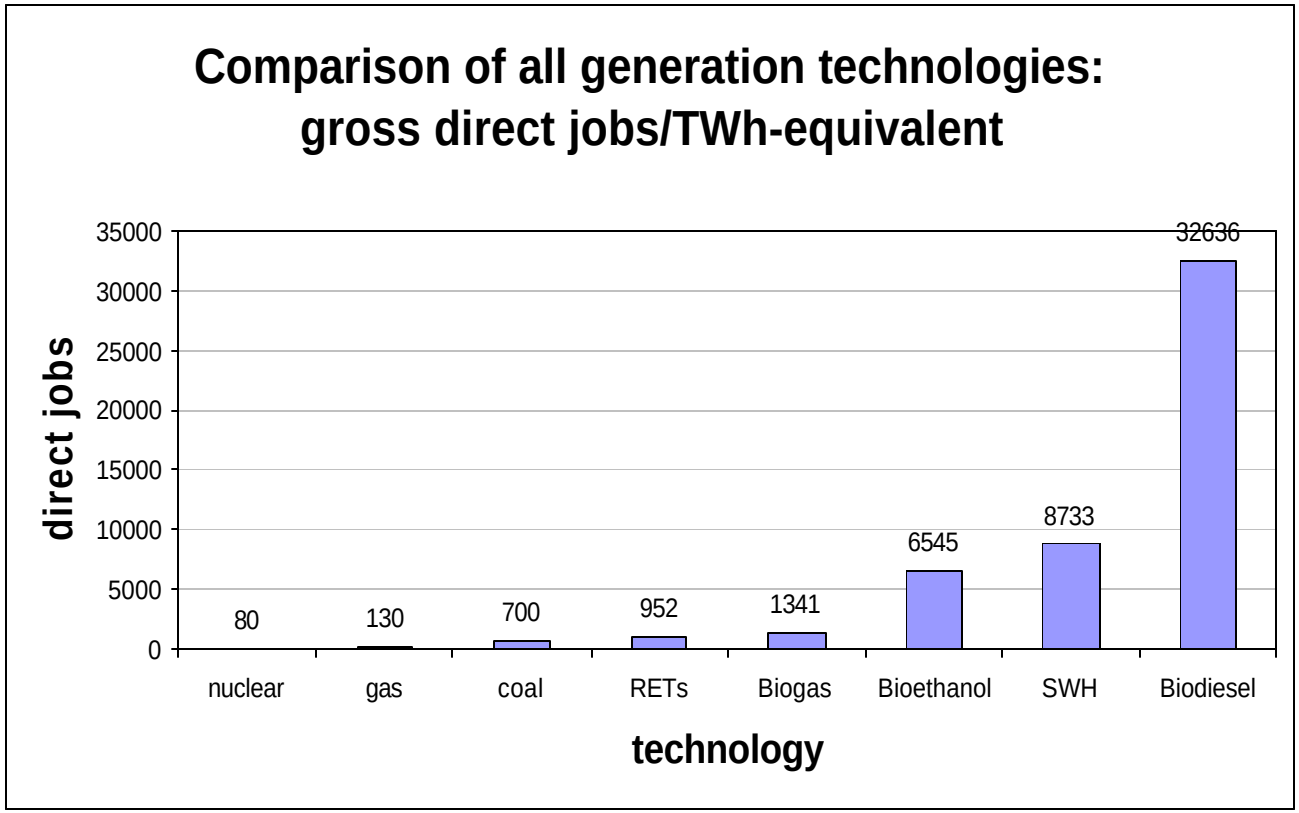


Source: EPRESA report, Earthlife Africa, 2003

AGAMA energy

reeep renewable energy & energy efficiency partnership

Employment potential in RE sector in SA



Source: EPRESA report, Earthlife Africa, 2003

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Institutional considerations

- Institutional arrangements
- National, local and/or regional (RERA) scope
- Capacity
  - Human resources
  - Financial capacity
- Scope of activities
  - Electricity only
  - ‘All’ energy
  - Energy efficiency: ‘negawatts’

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Key findings of a portfolio-based analysis of RE and EE

- **Standard, finance valuation models show that the kWh-cost for many renewables is less than gas-fired electricity**
  - Reflects market risk and the effect of taxes
  - Excludes environmental externality and other additional values
- **Adding renewables to a fossil generating portfolio *reduces* overall generating cost as well as risk**
  - This result derives from basic portfolio theory
  - Renewables have *zero-beta* "systematically riskless" costs
- **Experience in other industries: exploitation of *broadly-applicable* technologies requires changes in organizations, supporting systems and infra-structure**
  - Can produce benefits not easily conceived in advance
  - Renewables/Distributed Generation: changes in network organization, regulation & pricing

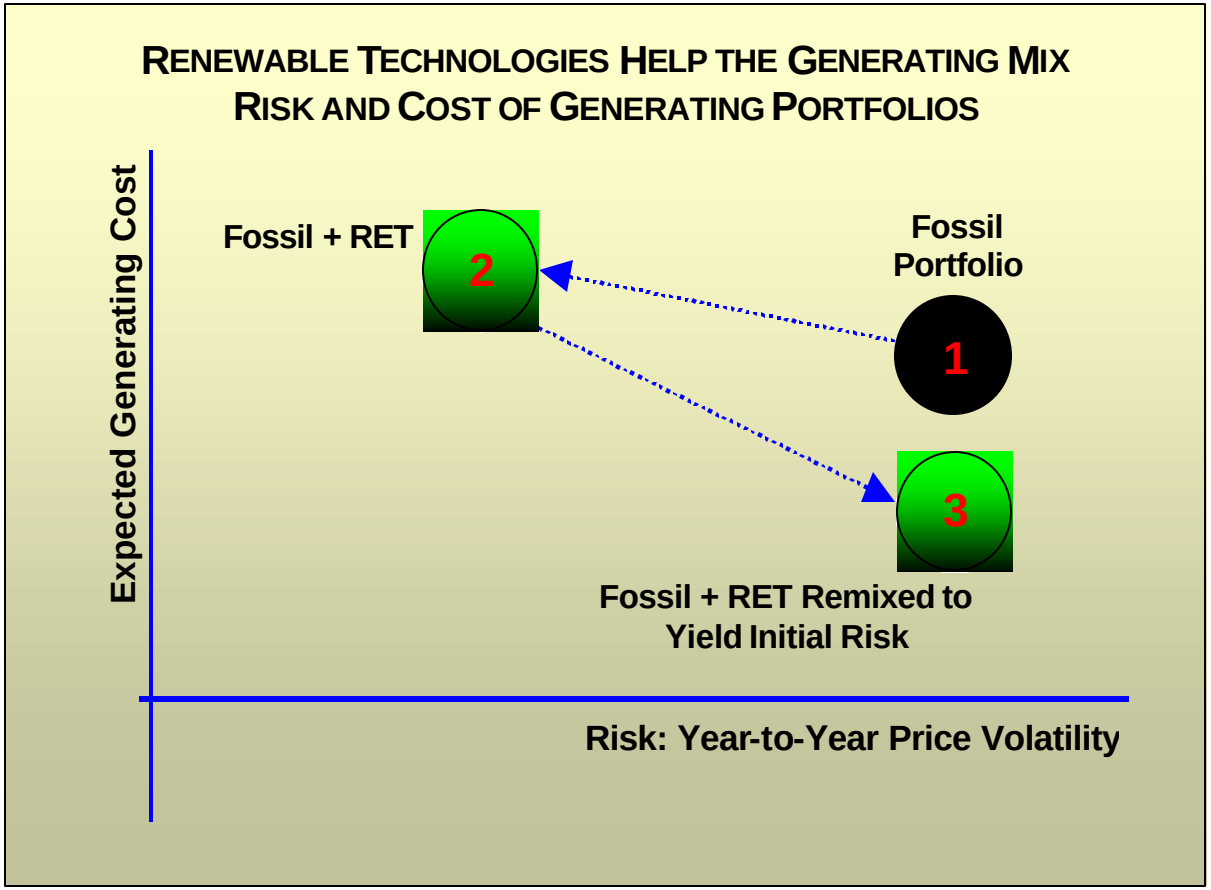
Source: Dr Shimon Awerbuch, Visiting Fellow, SPRU, Tyndall Centre, University of Sussex

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Illustration of portfolio-based generation costs



AGAMA energy

reeep

renewable energy & energy efficiency partnership

Distributed generation

- This is electricity generation capacity which is connected to (or embedded in) the distribution network, rather than the high voltage transmission network
- Examples:
  - Wind Power
  - Combined Heat and Power (CHP)
  - Solar Power
  - Biomass
  - Small Hydro etc.

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Distributed Generation issues

- Considerations:
  - Access to the network
  - Health and safety
  - Net metering
- Lobby groups
  - Rocky Mountain Institute
  - World Alliance for Decentralised Energy, WADE

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Renewable energy in South Africa

- White Paper on Renewable Energy, November 2003
  - Target of 10,000 GWh of new RE by 2014
  - RE implementation strategy under preparation
- Market Rules for RE Study
- SECCP studies
- Eskom's SABREGen – 3.2 MW wind farm
- Darling Independent Power Producer – 13 MW wind farm
- UNDP / GEF SAWEP – 50 MW+ of wind power
- UNDP / GEF and World Bank SWH programme
- City of Cape Town Draft Energy Strategy
- Others...

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Energy efficiency in South Africa

- Draft policy on Energy Efficiency, DME and NER
- Eskom's Demand Side Management Programme – an unregulated market mechanism
- BONESA Energy efficient lighting programme
- DME Energy efficiency in government buildings
- More...

- The cinderella of the energy sector !

AGAMA energy

reeep

renewable energy & energy efficiency partnership

A new regulatory paradigm is required

- Renewable energy and Energy Efficiency technologies are as much a substitute for fossil fuels as computers and word processors were a substitute for typewriters...
  Dr Shimon Awerbuch, Visiting Fellow, SPRU, Tyndall Centre, University of Sussex

- New ways of storing and distributing energy are no longer a distant dream but a foreseeable reality. Switching to these new methods will not be easy,...but with the right policies it can be made both possible and economically advantageous.....the best way to ...promote innovation in oil alternatives is to tell the world's energy markets that the externalities of oil consumption – security considerations and environmental issues alike – really will influence policy from now on." – The Economist, October 25 – 31, 2003, 11-12.

AGAMA energy

reeep

renewable energy & energy efficiency partnership

REEEP Sustainable Energy Regulation Network

- Regulators are key locii of influence
- Aims
  - To secure greater understanding of the benefits of energy efficiency, renewable energy and distributed generation (sustainable energy) amongst energy regulators and government departments
  - To secure regulatory mechanisms that incentivise sustainable energy
- Activities
  - Facilitating exchange of experience and knowledge
  - Training modules development
  - Producing good practice guides & case studies
  - Working with regional networks

AGAMA energy

reeep

renewable energy & energy efficiency partnership

SERN Training modules

- Introduction to regulation
- Market regulation and sustainable energy
- Network regulation and sustainable energy
- Regulation and co-generation/CHP
- Support schemes for Renewable Energy (certificates, tariffs, etc.)
- Incentivising energy efficiency

AGAMA energy

reeep

renewable energy & energy efficiency partnership

SERN good practice / case studies

- Will generate material but will also identify and signpost others
- Topics:
  - network access for distributed generation
  - energy efficiency or renewable energy targets
  - certificates
  - trading systems
- Regions will play an important role identifying examples

AGAMA energy

reeep

renewable energy & energy efficiency partnership

REEEP RE & International Law Project

- Premises:
  - new renewable technology is just now emerging into the international market, and prior laws and agreements may not have adequately considered the inherent characteristics of this technology when drafted;
  - some provisions of international law may unintentionally comprise actual barriers or create a "chilling effect" on the emerging renewables market; and
  - where possible, international agreements in the future should be crafted with an eye to the possible effects on renewable energy markets.
- Objectives
  - identify, evaluate and suggest remedial action where inappropriate barriers to renewable energy exist in international agreements, and
  - facilitate and promote policy and legal instruments that will enhance market penetration for renewables, resulting in the eventual consolidation of a significant market position.

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Green Power for the WSSD Project

The catalyst for a green power market in southern Africa?

- 845 MWh of Green Electricity supplied to the two main venues of the WSSD, 2002
  - Ubuntu Village
  - NASREC Expocentre
- Endorsed and supported by the NER and CityPower
- Based on ‘green’ certificates (or TREC’s)
- Local and imported TREC’s

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Sources of Green Power

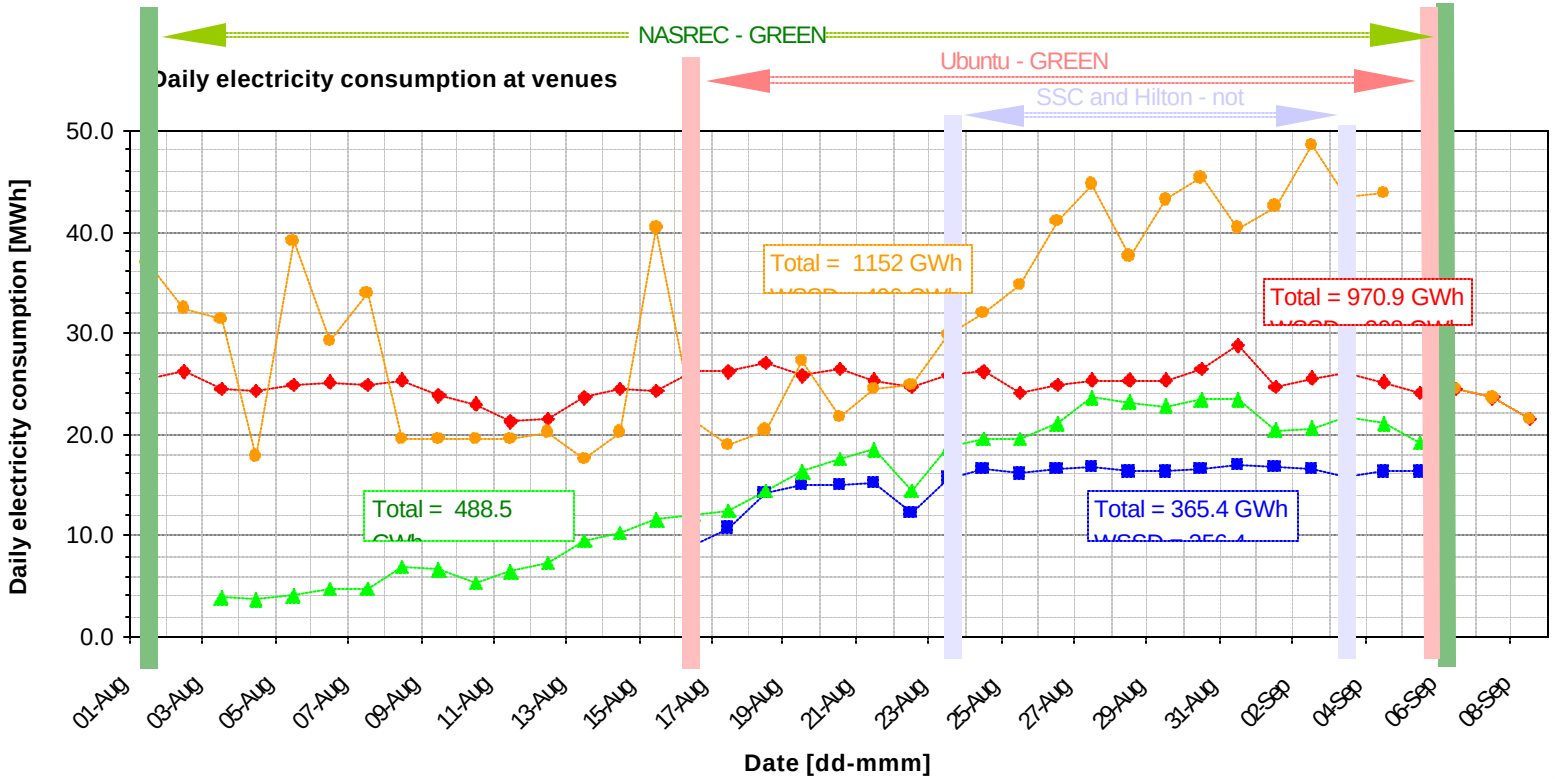
- Registration of >60 MW of green power generators with the NER including:
  - 13 new individual solar PV systems in southern Africa including a system for the GreenHouse Project
  - 1 new wind electricity system in Kimberley
  - 2 existing hydropower systems in W Cape and Mpumalanga
  - 5 existing bagasse co-generators in KwaZulu Natal
  - 1 symbolic trade from a wind system in Costa Rica
  - 1 symbolic trade from a geothermal system in Italy

AGAMA energy

reeep

renewable energy & energy efficiency partnership

What was supplied?



AGAMA energy

reeep renewable energy & energy efficiency partnership

The demand - Green Power markets

- There are two kinds of markets
  - Voluntary markets
    - Voluntary customers for TRECs
    - Contestable customers for Green Power
  - Mandatory, or compliance, markets
    - All distributors required by legislation to procure a % of Green Power – as per CCT/Darling PPA

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Green Power market surveys

- South Africa
  - Eskom Green Power market review, (2002)
  - Green Power Market Study, AC Nielsen (2002)
  - Green power market survey: Businesses and industries, MSSA (2002)
  - Green power market survey: The City Power Businesses and industries, MSSA (January 2004)
- In the region
  - ?????

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Green Power market survey findings

- Levels of awareness are very low
- There is some real interest in Green Power
- There is little confidence in the levels of commitment to buying Green Power
- Perceptions include:
  - Green power is unreliable
  - Green Power is costly
  - New technology

AGAMA energy

reeep renewable energy & energy efficiency partnership

Green Labelling

- A driver for Green Power purchases
- A branding strategy which differentiates “green” from other similar products and provides a competitive advantage in the product or services market
- towards *voluntary markets* for Green Power
- Potential sectors:
  - Manufacturing
  - Services
  - Agriculture
  - Events – such as WSSD (2002) and WWEC (2003)
- Requirements
  - Institutional framework
  - Certification

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Green Power: Some conclusions

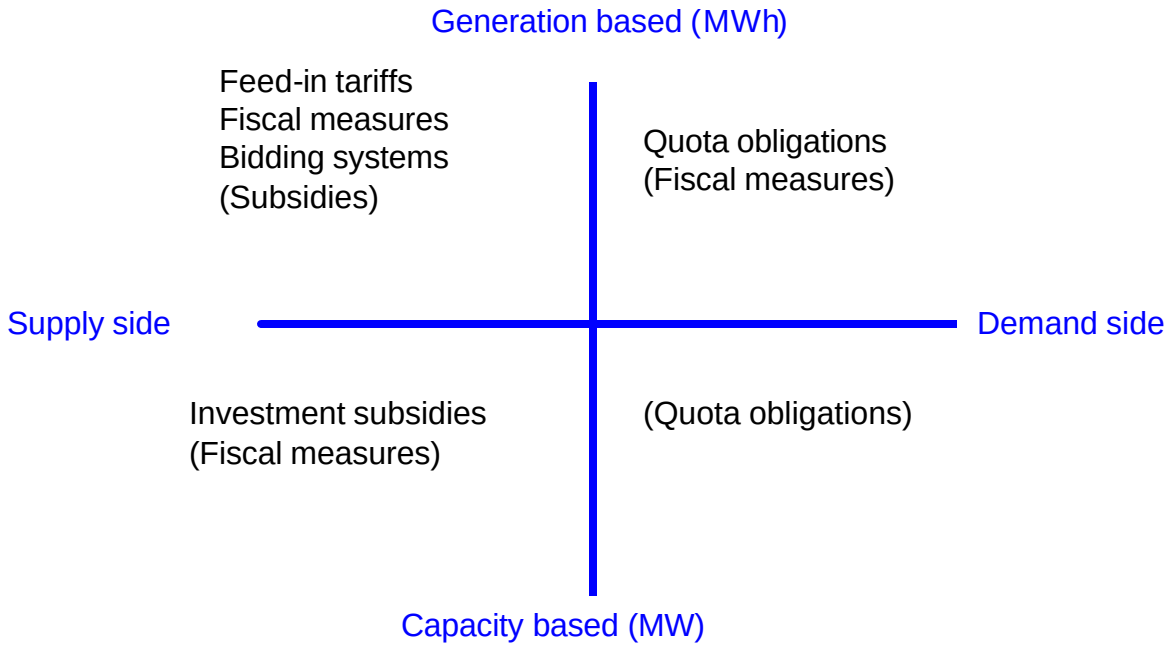
- There is a voluntary market for Green Power in South Africa
- This market is presently untested and unconfirmed
- TRECs can play role in closing the “cost gap”
- Two Green Power suppliers are operating in the market
- Regional and local aspects need to be integrated – and normalised - to benefit from the regional markets
- Stakeholders need to co-operate to determine the rules
- Lessons learnt from existing TREC schemes: Demand on voluntary markets is relatively small and not sufficient to promote large investments in new RE generation plants

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Categorisation of policy instruments



(adapted from: de Vries HJ, et al, (2003). Renewable electricity policies in Europe: Country fact sheets 2003; ECN: Publicatie BS: ECN-C--03-071)

AGAMA energy

reeep renewable energy & energy efficiency partnership

Policy instruments for RE electricity

Investment subsidies	Investment subsidies are intended to overcome the high investment costs of less economically viable technologies
Fiscal measures	Fiscal measures include environmental taxes, tax rebates, tax exemptions, preferential depreciation.
Feed-in tariffs	A guaranteed market and production price for RE generation based on market related costs or based on levels to stimulate investment.
Quota obligations	Government requirements of suppliers for the purchase of fixed minimum quantities of renewable electricity as part of the overall mix.
Bidding systems	A lowest cost option for giving developers a chance to benefit from government RE support mechanisms – such as concessions.

(adapted from de Vries et al, 2003)

AGAMA energy

reeep renewable energy & energy efficiency partnership

Feed-in laws

- Distributors are required to purchase all RE generated electricity within their supply area at fixed rates
- Implemented with huge success in Spain, Germany and Denmark
- Considerations for implementation:
  - Require legislation
  - Cost is borne by all customers
  - Limited to national legislative / regulatory jurisdictions
  - Limited to grid-connected electrical energy
- Unlikely to be attractive in developing countries

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Tradable Renewable Energy Certificates

- Considerations in buying green power across a grid
  - It is impossible to identify the origins of the electrons reaching any particular customer. Therefore, the concept of “buying green electricity” is not strictly valid.
  - Because of the erratic nature of many green energy sources it is conceptually useful to de-couple the instantaneous output of such a station from the instantaneous needs of the customers who are buying that station’s output.
  - Green generation facilities are often far from the load centres (for example, coastal wind farms). Putting commercial grid transport arrangements into place for every green electricity sale would be complicated.
  - The use of Tradable Renewable Energy Certificates (TREC’s) is a way of overcoming these difficulties, and at the same time providing a means of financing *the difference* between the cost of generating

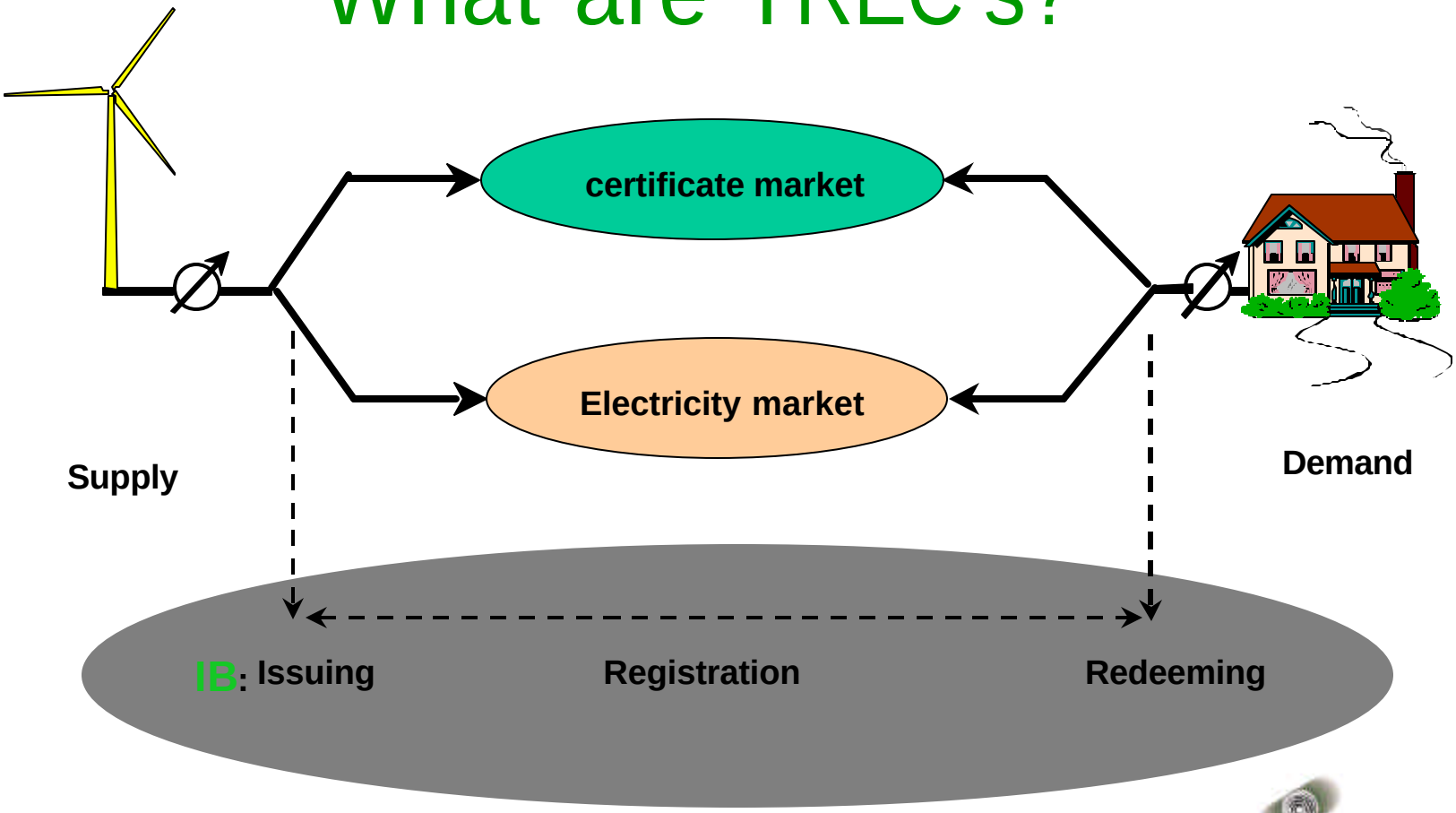
Adapted from Charles Dingley, UCT

AGAMA energy

reeep

renewable energy & energy efficiency partnership

What are TREC's?



AGAMA energy

reeep renewable energy & energy efficiency partnership

What is a TREC cont'd?

- It is a piece of information
- It is a commodity which can be traded
- It represents the benefits (aside from the physical electricity) associated with electricity generation by renewable sources

Renewable Energy Power Generation [Producer]

Environmental and other attributes [TREC's]
Avoided negative environmental impacts
Reduction in fuel / energy resource use
Enhanced employment opportunities
Decentralised generation

Commodity electricity [MWh]

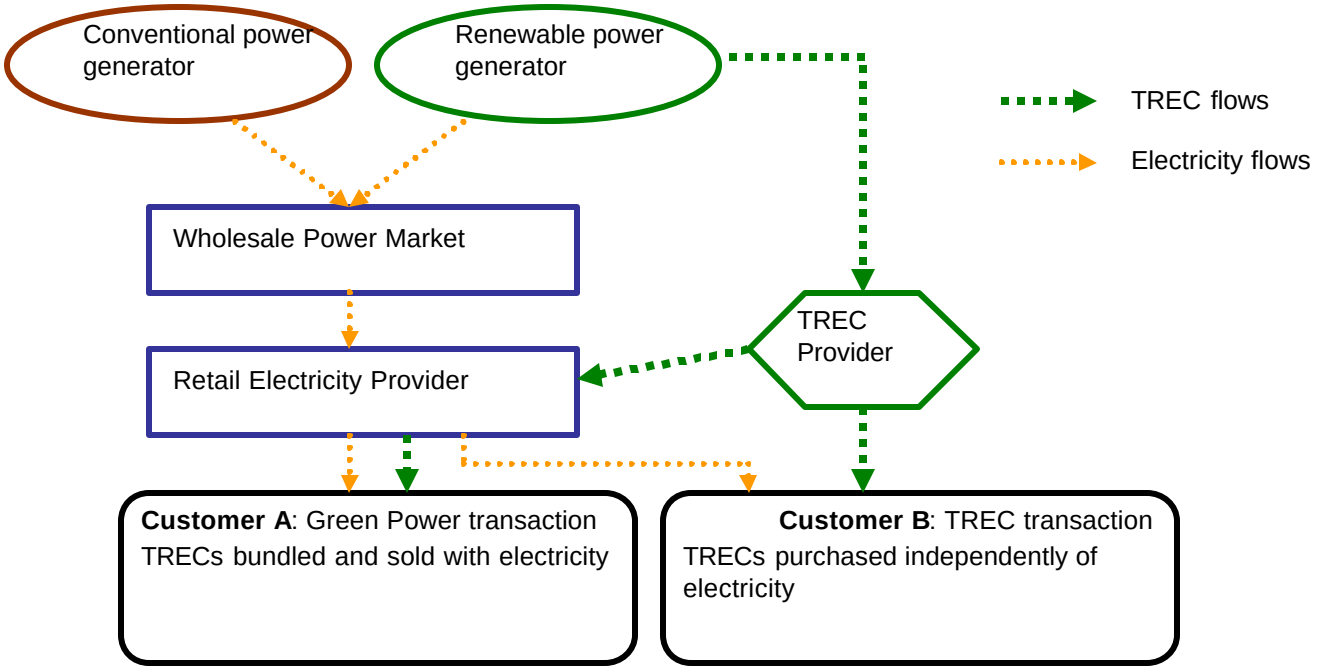
Green Power

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Tradable Renewable Energy Certificates

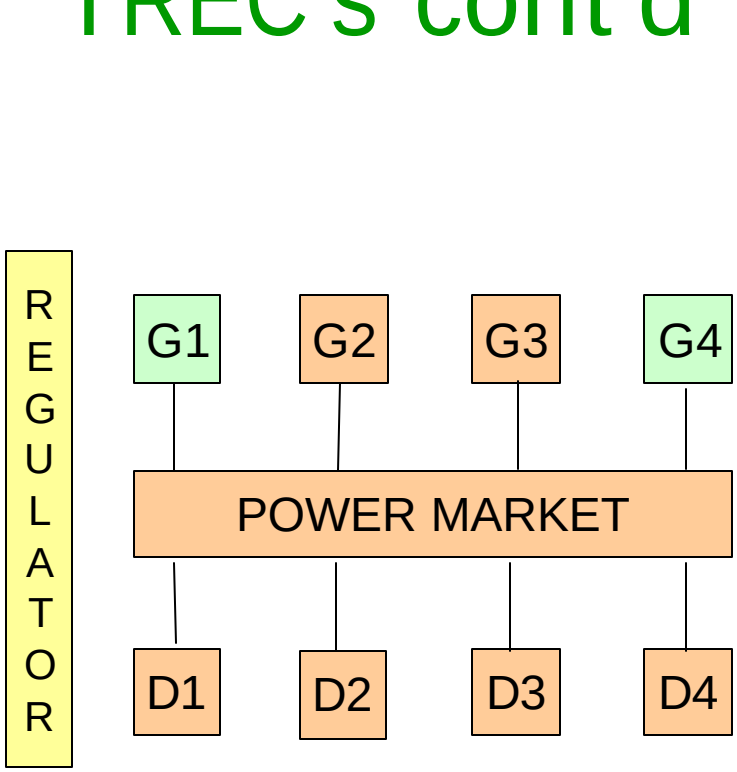


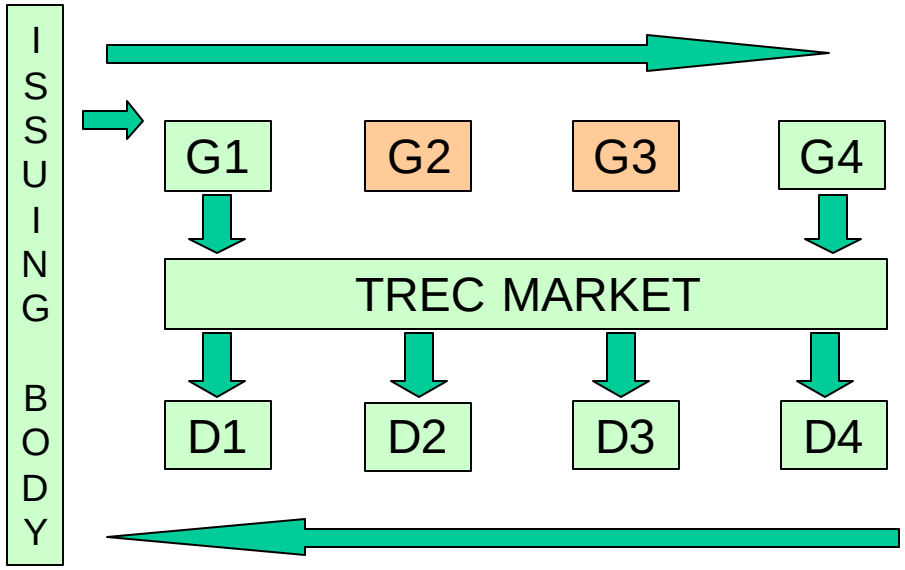
AGAMA energy

reeep

renewable energy & energy efficiency partnership

TREC's cont'd





AGAMA energy

reeep renewable energy & energy efficiency partnership

Governance of a TREC system

- Options include:
  - Government system: System completely established and operated by governmental bodies
  - Government supervision: Cooperation between government and market players
  - Non-government system: System design and operation is left to electricity industry and buyers

AGAMA energy

reeep renewable energy & energy efficiency partnership

System rules for TREC's

- It is recommended that the basic system rules are laid down in a document which is publicly available.
- Determination of eligible RES-sources
- Determination of TREC specifications (information content, size, validity)
- System procedures
  - accreditation of RES-E facilities
  - issuing and registration of certificates
  - operation of certificate registry
  - transfer and redemption of certificates
- Institutional set-up (allocation of responsibilities)

AGAMA energy

reeep renewable energy & energy efficiency partnership

The institutional set-up for TREC's

- Three groups of institutions involved:
  - Government – policy, legislation
  - Market participants (e.g. operators of RES-E facilities, certificate traders, electricity suppliers)
  - Organisations which implement the rules of the system and supervise the system (i.e. the Issuing Body)

AGAMA energy

reeep renewable energy & energy efficiency partnership

The issuing body

- Responsibilities of Issuing Body
  - accreditation and registration of RES-E facilities
  - issue, transfer and redemptions of certificates
  - operation of TREC registry and administration of the accounts of system participants
  - operation of interface to other TREC systems
  - verification and monitoring of the system

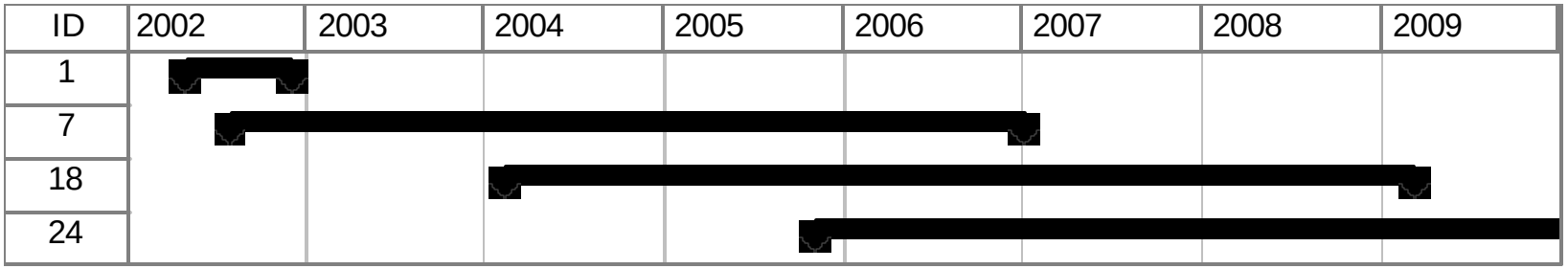
AGAMA energy

reeep

renewable energy & energy efficiency partnership

A TREC roll-out plan for SA

- Phase 1: The Green Power for the WSSD Project
- Phase 2: An voluntary scheme supported by existing utilities
- Phase 3: Establishment and participation of the REDs
- Phase 4: A mandatory scheme



AGAMA energy

reeep

renewable energy & energy efficiency partnership

Pilot project studies for TREC's

- Green Power for the WSSD
- SWH: potential for over 2 million TREC's in meeting the 10,000 GWh RE target, at anticipated price of R167/TREC
- Wind: Luderitz 19.2 MW wind farm to generate 54,000 TREC's per annum, at R159/TREC
  - requires regional normalisation of policies and regulation

AGAMA energy

reeep

renewable energy & energy efficiency partnership

Some conclusions on TRECs

- TREC systems are an instrument to facilitate implementation of RE policy instruments but they do not substitute them
- Common standards are key to harmonisation
  - Definitions
  - Roles, procedures and responsibilities
  - Technical standards
  - Levels of verification
- Creating demand is as important as system development
- Interaction of TRC systems with regulatory policies must be clarified
- TRC systems can be a very flexible instrument for imposing voluntary and/or mandatory renewable energy premiums on electricity sales.
- Demand for TRECs higher in mandatory schemes
- TRECs can also be used as the basis for regional or international trade in green electricity / energy

AGAMA energy

reeep renewable energy & energy efficiency partnership

Some resources

- SADC – www.sadc.int
- SAPP – www.sapp.co.zw
- REEEP – www.reeep.org
- WADE – www.localpower.org
- World Resources Institute – www.wri.org
- Rocky Mountain Institute – www.rmi.org
- TRECKIN – www.treckin.org
- Centre for Resource Solutions, USA – www.resource-solutions.org
- Renewable Energy Certificate System – www.recs.org
- Registry For Renewable Energy Certificates, Australia – www.rec-registry.com
- Office of the Renewable Energy Regulator, Australia - www.orer.gov.au
- Office of Gas and Electricity Markets, UK - www.ofgem.gov.uk
- Small is profitable, Amory Lovins - www.smallisprofitable.org

AGAMA energy

reeep renewable energy & energy efficiency partnership

Contacts

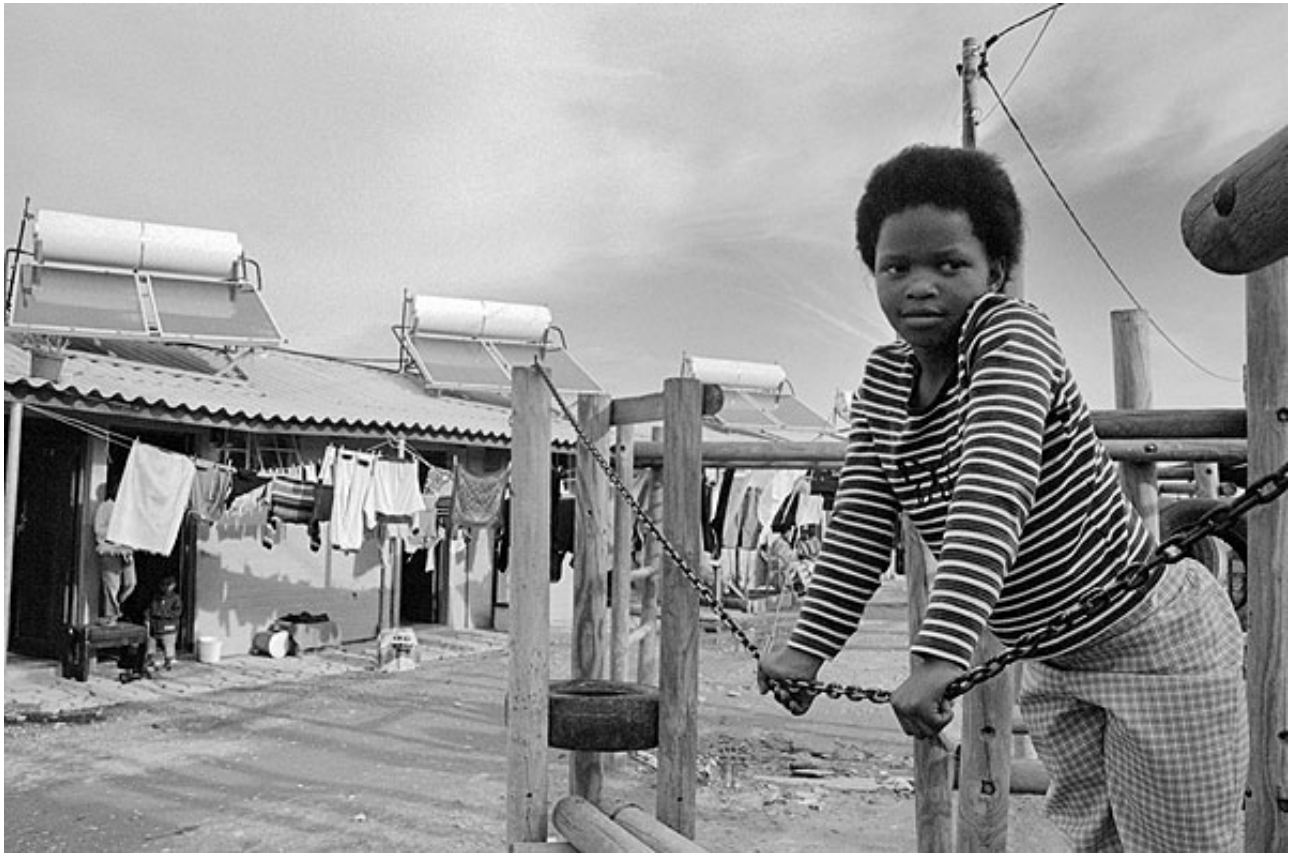
- REEEP – www.reeep.org
  - A type II partnership which emerged from WSSD in 2002
  - Launched in October 2003, London
  - Established secretariat in Vienna, February 2004

- AGAMA Energy – www.agama.co.za
  - Green energy consultancy and services provider
  - Co-ordinator of the REEEP secretariat for the Southern African region

AGAMA energy

reeep

renewable energy & energy efficiency partnership



Thank you ...

AGAMA energy