Department of Minerals and Energy
Pretoria

New and Renewable Energy

Tradable Renewable Energy Certificates

Final Report

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Report No. – DME/CE/001/260307

Tradable Renewable Energy Certificates

System Feasibility Study

Final Report

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Abbreviations and Acronyms

AB	Auditing Body
AIB	Association of Issuing Bodies
CBA	Cost Benefit Analysis
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CMO	Central Monitoring Office
CRD	Central Registration Database
DNA	Designated National Authority
DME	Department of Minerals and Energy
IB	Issuing Body
IEMS	Integrated Energy Management System
MRET	Mandatory Renewable Energy Target
NERSA	National Energy Regulator of South Africa
NPO	Non Profit Organisation
PPA	Power Purchase Agreement
PR	Production Registrar
PRO	Principles and Rules of Operations
REC(s)	Renewable Energy Certificate(s)
RED	Renewable Energy Declaration
RECS	"Renewable Energy Certificate System" developed by RECS International
SAWEP	South African Wind Energy Programme
TREC	Tradable REC
TRECASA	TREC Association of South Africa

Executive Summary

At the time of this study the renewable energy sector in South Africa reflects that of a growing recognition of the need for public support of energy supply options supporting security of supply through diversity. Renewable energy is being supported by a very small (R14.2 million 2005/6 – 2007/8) once off capital subsidy in support of the White Paper on Renewable Energy target of 10 000 GWh renewable energy contribution to final energy consumption in 2013. A growing amount of activity in the private sector to produce and procure renewable energy, even within the admittedly restrictive and uncertain local policy and regulatory context and market parameters is starting to require credible verification. There has been some initial activity relating to the establishment of a Tradable Renewable Energy Certificate (TREC) system for this purpose but it awaits clarity on the way to proceed from the Department of Minerals and Energy (DME).

The concept of Tradable Renewable Energy Certificates (TRECs) is based on separating the various attributes of renewable resource-based energy provision from the physical energy carrier, electrical or otherwise. There are therefore, basically three possible income streams for renewable energy electricity generators. These are selling physical electrical power through a Power Purchase Agreement (PPA) into the electrical grid at prevailing electricity (energy) market price, Certified emission reductions (CERs) trading through the Clean Development Mechanism (CDM) of the Kyoto Protocol and issuing of Tradable Renewable Energy Certificates (TRECs). TRECs represent all of the benefits ("green" attributes, excluding greenhouse gas mitigation) associated with the generation of electricity from renewable energy resources. A major advantage, apart from the "extra" income stream, is that TRECs can be traded worldwide and separately from the electricity grid infrastructure, thereby avoiding the complexities of use-of-grid system charges or grid access problems. TRECs are only applicable to renewable energy and can be issued and traded for all types of renewable energy including non-electrical renewable energy systems, such as solar water heating systems, which would offset fossil-based electricity production requirements, and potentially even biofuels although precedents for the latter are not well developed.

In practise, Tradable Renewable Energy Certificates are electronic records that verify the origin of energy from registered renewable energy facilities.

TRECS, therefore provide a good opportunity for verification of financial support to registered renewable energy generators by both the public and private sector. The most important motivation that has emerged in terms of national renewable energy policy is the ability of a TREC system and associated infrastructure to provide a tool for monitoring of renewable energy uptake independently of the choice of incentive or regulatory framework to be put in to stimulate that uptake. Monitoring in turn provides feedback on the success of various policies and for refinement of these or adoption of new policies and support mechanisms. This includes monitoring systems to be used in the setting of policy such as the monitoring of the renewable energy target system. This system, operational in 2004 and 2005, currently has a resolution, uncertainty or confidence interval of little better than 100MWh. A TREC system on the other hand will need an accuracy of 100 times better than this or 1MWh – the size/increment of a single TREC. This gives an indication of both the advantages which the system will provide across the policy spectrum (be the incentive chosen a feed-in tariff, production subsidy or mandatory target) and also a motivation of the focussed financial and human resources which will be required. TRECs are not a renewable energy financial support mechanism per se. They allow for the monitoring of renewable energy production and therefore act to enable implementation of other support mechanisms and evaluation of their success in ensuring increased uptake.

TRECs can be used in either voluntary or mandatory policy environments. Such a system therefore provides an option for bridging the transition from the current voluntary environment to one along the lines of provision for introduction of a regulated renewable energy financing mechanism. The Electricity Regulation Act 2006 envisages regulations regarding the type of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from different energy sources. A TREC system or the infrastructure that would be developed as part of the TREC system could be used to administer a top-up feed in tariff or in monitoring compliance with renewable energy obligations. The feed-in tariff is a system by which public support is provided to meet the difference between the cost of generating electricity from renewable energy sources and the price that is offered for electricity generated from unspecified sources.

The motivations for establishing a national TREC system include:

- TRECs allow for the monitoring and verification of any renewable energy production-based support mechanism. A proposed top-up feed in tariff, for example will be very difficult if not impossible to implement without a suitably thorough (both energy and time resolution) system for monitoring production.

- Purchase of green attributes separate from physical power trade and electrical transmission and distribution infrastructure and
- Administration and verification of the greening of events and products.

The comparative analysis phase of the study found that a SA TREC system should be based on the experience of the general, robust framework of the Basic Commitment as amended by the Principles and Rules of Operation (the PRO), of the Association of Issuing Bodies (AIB) in Europe, and making use of the elements of the TREC systems of those countries that could add value or benefit to that of South Africa, including the Netherlands and Australia. In voluntary systems government's role in these markets has predominantly been to create demand for the TRECs through measures to stimulate or enforce renewable energy uptake. The TRECs system can then be incorporated as a tool in proving compliance with obligations or in administration of claiming production-based public financial support. The development of a TREC system is, therefore, in keeping with the recommendations of the Department's long term renewable energy financing position paper produced in June 2006. A robust TREC system would allow for the ongoing monitoring requirement, perceived as a disadvantage, of a production based support scheme, such as a top-up feed-in scheme, to be addressed (DME, 2006, p18).

The recommendations emerging from this feasibility study therefore are primarily that the European Basic Commitment as amended by the Principles and Rules of Operation should be adopted as the basis for a framework upon which to develop a South African TREC system and that a statement should be issued by the DME spokesperson affirming government support for tradable renewable energy.

A Voluntary TREC system implementation plan was developed. It includes a breakdown and explanation of the necessary activities, time frame, manpower and financial resources, and responsibilities. The following activities with a number of sub activities have been identified. Each activity represents a significant impact on the successful execution of the recommendations.

1. Establishment of the TREC Non-profit organisation NPO (All market participants (including the DME) will be members of the governance structure of this organisation) to operate as the National TREC Issuing Body (IB) appointing organisations to perform the necessary functions including:
    a. Production Registrar (PR) to verify production device compliance
    b. Auditing Body (AB) to audit the continued fulfilment of conditions for registered renewable energy device registration.
    c. Central Monitoring Office (CMO) to operate the CRD

    Figure 3 provides a Schematic representation of the Issuing Body's proposed structure.
2. The approval of the TREC NPO by the Minister OR the gazetting of the entity and its role (should the TREC be formed instead as a government agency in the future),
3. Acquiring the funding for the capitalisation (and operational for the first 2 years) costs of the IB OR the provision of budget within DME's fiscal policy or a mix of the two depending on willingness by private and other organisations to assist in the capitalisation.
4. The adoption of the Principles and Rules of Operation (PRO) as the national TREC system framework;
5. Developing the Issuing Body's business plan
6. Preparation and maintenance of the South African Domain Protocol (outlining National specifics for various renewable energy resources converted to either electricity (both grid and off-grid), renewable liquid fuels or electrical offset energy such as solar water heating)
7. Develop and commission the central registry software. This is the database documenting generation, ownership, transfer and redemption of TRECs.
8. Designing a marketing strategy and campaign to raise awareness of TRECs and implementation of these.

The associated business modelling for the establishment and operation costs of the Non-profit Issuing Body (responsible for the operation of the TREC system), demonstrates that the system could be financially self-sufficient within 3 years of establishment. The administration costs associated with the life cycle of a certificate (1MWh) is less than 0.4% of the estimated market value of the certificate incorporating decreases with increased renewable energy uptake. The model considered volumes of renewable energy certificate traded consistent with achievement of the absolute 10 000 GWh renewable energy target by 2013.

This version of the report was prepared, with guidance from the project steering committee, for a workshop held on the 18th of January 2007 with government and stakeholders with a view to updating the motivation, recommendations and Voluntary TREC Implementation Plan where necessary.

The study was undertaken by a consortium comprised of SAB&T Business Innovations, Hofmeyr Herbstein & Gihwala Inc., Green Billing Systems and Mr. Dirk Ganz and led by Nano Energy (Pty) Ltd.

1. Background

The objective of this study as per the terms of reference was to:

- "provide government with precise and specific detailed recommendations on the establishment of a voluntary and sustainable Tradable Renewable Energy Certificate (TREC) system for South Africa and to
- develop an implementation plan to set about establishment of a national TREC system."

Based on the initial activities taking place as precursors to the trade of renewable energy certificates (TRECs) in South Africa it became apparent that government participation may be necessary. This study sought to examine whether and to what extent this involvement would be necessary and to outline an implementation plan for establishing the system, either driven by the private or public sectors

The study aimed to determine a suitable course of action in relation to the development of a voluntary TREC market in South Africa. The process of renewable energy certificate market development was already underway in the private sector. Very few deals have actually been concluded but several are awaiting further regulatory certainty and the establishment of a suitable TREC system. The physical green power trading market rules as approved in March 2006 by NERSA, stipulated the appointment of a fully resourced reputable institution as a certificate issuing body as a condition precedent for the trade in TRECs to commence. Market participants have expressed the need for a credible system within which trade can commence both nationally and internationally. In particular the necessary elements of such a credible system are:

- clear independence of the certificate issuing entity from any commercial certificate activity and
- avoidance of double counting.

The project was closely guided by five (5) milestones as set out in the terms of reference:

- South African TREC system activity scan,
- System analysis, motivation and recommendation,
- Development of an implementation plan,
- Conducting a stakeholder workshop,
- Market assessment and target impact projection.

The interim report series consisted of the following reports as detailed in the respective appendix:

A. South African TREC activity scan and market status
B. Comparative country analysis with respect to TREC developments
C. TREC system needs analysis, motivation and recommendation including legal and regulatory requirements
D. System implementation plan
E. TREC workshop report
F. TREC market analysis and projected renewable energy uptake contribution

2. Introduction

The concept of tradable renewable energy certificates (TRECs) is based on separating the various attributes of renewable resource based energy provision from the physical energy carrier, electrical or otherwise. There are therefore, basically three income streams for renewable energy electricity generators. These are selling physical electrical power through a Power Purchase Agreement (PPA) into the electrical grid at prevailing electricity (energy) market price, Certified emission reductions (CERs) trading through the Clean Development Mechanism (CDM) of the Kyoto Protocol and issuing of Tradable Renewable Energy Certificates (TRECs). TRECs represent all of the benefits ("green" attributes, excluding carbon trading) associated with the generation of electricity from renewable energy resources. A major advantage, apart from the "extra" income stream, is that TRECs can be traded worldwide and separately from the electricity grid infrastructure (e.g. no Use of grid System charges or grid access problems). TRECs are only applicable to renewable energy and can be issued and traded for all types of renewable energy e.g. aggregated non-electrical renewable energy systems, such as solar water heating systems, which would offset fossil-based electricity production requirements.

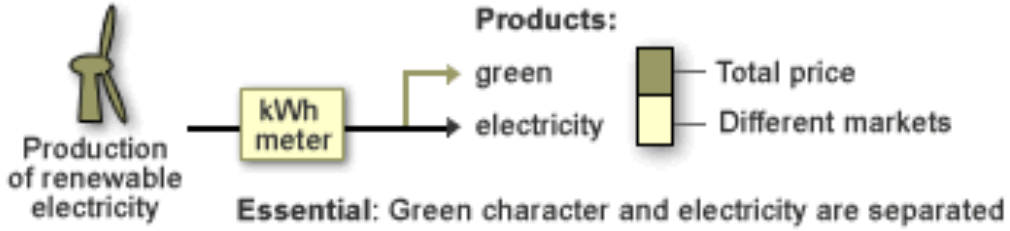

Figure 1 Schematic representation of the separation of TRECs from physical power

(Source EC, 2003)

Since TRECS are traded on the open market, the price depends on supply and demand and on the type of renewable energy source that is represented by the certificate.

TRECs are also referred to as renewable certificates, green certificates, green tags or environmental attributes. A TREC usually represents the renewable attributes of a single MWh[1] of renewable energy. The renewable attributes may be bought and sold together, separately or combined with system electricity at the point of sale by a supplier or power trader/marketer on their behalf.

A renewable energy certificate is an electronic record in a database. Each certificate is uniquely identifiable, containing standard information including: a unique certificate number, issuer, generation plant identity, time of issue, type of technology, installed capacity and an indication of whether public support has been received.

The Principles and Rules of Operation (PRO) previously the Basic Commitment (BC) of the European Association of Issuing Bodies (AIB – the entity overseeing standardisation of TREC systems and certificate issue in Europe and recently elsewhere), defines a RECS certificate as representing "the entire benefit of renewable energy source – electricity [or energy] (RES-E) over electricity from non-renewable sources"[2]. The AIB's PRO is recommended as the framework for South Africa TREC system development.

The life cycle of a RECS certificate is as follows:

- Issue: A RECS certificate is issued for, and uniquely relates to, a specific instance of the production of a standard quantity - one megawatt hour – of renewable electricity.
- Transfer: Each RECS certificate is registered as belonging to a single party at each point during its life, this being adjusted accordingly following each transfer of its ownership.
- Redemption: RECS certificates are redeemed when they are "used". In reality this is achieved by transferring the certificate (electronic record) to a special redemption account of the final redeemer

[1] In certain markets, certificates can be created and transferred and redeemed in increments of orders of magnitude of MWh (such as 10MWh, 100MWh, 1GWh).
[2] It also requires that "A Participating RECS Member and parties represented by it may not separately claim or confer rights or title to any element of this benefit".

(organisation claiming the environmental performance or proving adherence to regulatory obligations. Once redeemed, certificated can no longer be traded.

The benefits of a South African national TREC system, as documented in more detail in appendix C, include:

- Monitoring and verification of any renewable energy production-based support mechanism (such as the feed-in tariff). This is also the primary motivation for the prioritisation of the development of a South African TREC system. Effective monitoring and evaluation of uptake allows the feedback on the success or failure of policy and regulatory steps and the information necessary for the successful development and implementation of such measures (DME, 2005). Current South African monitoring efforts are insufficient for this purpose with statistics obtained being more an artefact of the lack of resources employed in gathering and collating figures than of the actual rates of uptake of renewable energy.
- Purchase of green attributes separate from physical trade. Such as purchase of the green attribute of wind power generated along the coastline by buyers in Gauteng. This avoids the complexities and perceived barriers associated with the physical trade of power in a monopoly environment and allows for the growth of the renewable energy industry while these regulatory issues are clarified and developed.
- Administration and verification of the greening of events and products. This allows organisations and individuals to demonstrate their commitment to environmental sustainable purchases and consumption in a credible market environment. It allows them to support such initiatives and projects financially through auditable transactions. Examples include green energy stadium electricity consumption for the greening of the 2010 world cup and the World Summit on Sustainable Development (WSSD) as detailed in SA Scan Appendix. In the latter example energy was purchased both internationally and from non grid-connected sources, namely from Spain and from the South African Off-grid electrification programme concessionaires. Wine and automobiles are existing examples of products for export to the environmentally conscious European markets benefiting from verified claims of renewable energy based Production and Process Methods (PPM).

Existing international TREC systems mainly focus on electricity generation. Several mandatory and non-mandatory TREC systems are operating worldwide. In voluntary markets TRECs are used to provide verification and tracking of “green” energy supplied to the final consumer. The purchase of TRECs and there redemption is used in the reporting of environmental performance. For example the consumer purchases TRECs to “green” the energy used in the production of his products (“green” products). This tracking can also be used in markets where renewable energy production or consumption in not mandatory but where incentives are provided for such. This is currently the case in fiscal capital subsidies provided to renewable energy projects by South Africa’s Renewable Energy Finance and Subsidy Office (REFSO). Certificates are more commonly used to claim support from production-based financial support mechanism or incentives. Accelerated depreciation and tax rebates provided for Biofuels assets are other support mechanisms provided in South Africa. The latter is a production based support mechanism[3]. In so-called mandatory markets, where either producers or consumers are obligated to produce or consume specified volumes of renewable energy, TRECs provide thorough verification and monitoring of compliance with such obligations.

[3] The draft long term renewable energy finance position paper provides a good summary of policy and regulatory tools used to stimulate renewable energy uptake (DME, 2006).

3. TREC system requirements

The elements of a TRECs system can broadly be categorised into a system of governance, the rules by which trade of certificates proceed and the overall institutional context within which the TREC system is established.

The system of governance refers to a differentiation between mandatory and voluntary governance contexts. In a mandatory environment the TREC system is used to provide verification and monitoring of compliance with such obligations. The obligations are introduced through legislation by government. The TRECs system would similarly be stipulated in such legislation. In contrast, TREC systems in use in voluntary markets are established by the market participants with or without government participation. The current South African TREC market is voluntary. This study also describes the legal, regulatory and institutional requirements and processes to make the TREC system mandatory which could coincide with the mid-term review of the White Paper on Renewable Energy target and the institution of mandatory measures to increase the uptake of renewable energy. This suggests sufficient participation by the DME in the voluntary market structures in order to ease the transition to a TREC system operational in a possible future mandatory environment. It has been the experience that a voluntary TREC system without some government participation (e.g. appointment of Issuing Body and development/endorsement of System rules) is not sustainable and has a low market penetration.

The system rules for the operation of a TREC system have to be clearly defined. This study recommended the adoption of the Basic Commitment of the Association of Issuing Bodies (AIB) as amended by the Principles and Rules of Operation (PRO) to provide a simple, clear, practical, and able to be readily implemented, administratively efficient method of operation and rules for South Africa. As the first step to the establishment of the TREC system with government involvement, is to issue an affirmatory statement to this effect. These rules provide a clear definition of eligible TREC renewable energy resources and technologies and the handling of each of these. As a tried and tested system, the PRO is manageable yet robust, reducing the likelihood of error or fraud. It is complimentary to and compatible with existing policy, the legal and regulatory framework, and sustainable with minimum external financial requirements beyond the initial start-up years prior to sufficient market volume. Furthermore, as the basis for many other international TREC systems, it is compatible with and provides potential for co-operation with other prominent TREC systems. It specifies the rights and duties of market players and the tasks that need to be assigned to various bodies. The rules include verification requirements and procedures for the resolution of disputes. The PRO presents a clear definition of the content of the certificate and ensures that the benefits of renewable energy production are not double counted or sold several times.

In terms of the institutional set-up of a TREC system, there are two groups of institutions. These are the market participants and the TREC Issuing Body. TREC market participants are the renewable energy generators (producers of TRECs), TRECs traders, and TRECs consumers. The organisation which implements the rules and procedures of the system is called the Issuing Body. The Issuing Body is responsible for the following tasks:

- Accreditation of renewable energy generators (this requires a physical device audit)
- Registration of accredited renewable energy generators (A document called a Renewable Energy Declaration (RED) is prepared for this purpose and is renewed on a periodic basis to ensure continued adherence to the rules as set out in the Principles and Rules of Operation)
- Issuing of TRECs (in market participant accounts in the Central Register Database (CRD))
- Operating the TREC register and administration of the accounts (CRD)
- Transferring of Certificates
- Facilitate the import and export of TRECs certificates of different, but compatible, TREC systems
- Redeeming of certificates
- Verification and monitoring that participants act in accordance with the Principles and Rules of Operation
- Ongoing monitoring, evaluation and development of the TREC system with other stakeholders (updating the Domain Protocol (DP))

The Issuing Body's institutional setup must be sufficiently firmly established to allow for recourse to a legal authority in oversight of the operation of its activities and most importantly in the unlikely event of the need for dispute resolution. This authority could be the TREC Association (National Team), South African oversight body such as NERSA or the Competition Commission, or should the South African IB become a member of the AIB it would be accountable to the international structures.

In order to ensure that the TREC system is credible and reliable it is vital that the Issuing Body acts independently from the market actors involved in TREC trade – the Issuing body should not have a vested interest in the TREC market.

3.1. The current situation in South Africa

Appendix A outlines the current and past activities in South Africa pertinent to the development of a national TREC system. This scan of South African activities was important as a first step in assessing the need for government participation or intervention because it sets the basis from which an understanding will be gained of the systems requirements, institutional relationships and structures and ultimately the potential impact of such participation on renewable energy uptake.

The report outlines 7 broad activities or categories of activities which are pertinent. These have been arranged by level of pertinence to the current study in descending order. They are:

1. The formation of TRECSA (the TREC South Africa industry participant body) along with the creation and contracting of a South African Issuing Body (SATIB) by TRECSA
2. The initial activities of an interim issuing body in line with the rules as laid out by the Association of Issuing Bodies (AIB) in Europe and the European Electricity Certification System (EECS). This was undertaken in recognition of the need for a credible, independent body to provide verification of renewable certificates traded or to underpin early negotiations for such trade by early entrants to the green power trading market. These activities have at least to some extent prompted the commissioning of the current study in an attempt to determine the best course of action in response to private sector market drive. To date 1MWh or TREC equivalent has gone through this system from renewable energy device certification to certificate redemption in the pilot project launch. There are negotiations in place for individual deals anything from 1 GWh annually to closer to 2 GWh of 'spill power' per month from individual existing registered renewable energy source (RES-E) devices.
3. The event based exercise undertaken for the greening of electricity supplied to the World Summit on Sustainable Development (WSSD) held in Johannesburg in August 2002, is noteworthy in that it encountered the trials of early trade in renewable energy certificates in the South Africa context first hand and documented some of the lessons learned from which any further market development will do well to draw.
4. The DME voluntary green power trading market pilot project is currently running. It deals with trade in physical power. The conditions of trade in this pilot market state that 'Green Power Trading shall be limited to the physical energy until a fully resourced reputable institution can be appointed as a Certificate Issuing Body for trade in certificates to begin'.
5. The GEF/UNDP funded South African Wind Energy Programme's (SAWEP's) investigation into Green Power Funding Sources and Mechanisms included research into and description of issues related to the certification and trade of green power certificates and into the design of a mechanism to implement the process of certification and trade. In addition of relevance to this project the report:
   - gives an overview of the mechanism for implementing the process of a TREC system
   - outlines results of Green Power Market Survey(s)
   - makes suggestions for an institutional framework for a TRECs system and suggests that the then National Electricity Regulator (NER), now the National Energy Regulator of South Africa (NERSA) continue to be utilised as the issuing and accrediting body, as in the WSSD initiative above, for the initial voluntary TREC market phases.
   - It is also suggested that government support is a critical success factor in the development of an appropriate institutional framework and green power market (voluntary or mandatory). This support has to be more solid than simply ratifying a white paper on Renewable Energy in which targets for green power generation in South Africa are explicit, although this is (and has been) a critical first step
6. TREC component of the PPA drafters guide outlines the requisite elements of the TREC clause of any green power purchase agreement
7. The South African TREC guidance package prepared under the European Commission's TREC Know-how and Information Network (TRECKIN) initiative outlines:
   - the principles of a TREC system and
   - practical steps to implement a TREC system

3.2. Outline of the workings of a TRECs system

The life cycle of a TREC through the system is general described in four steps, registration of the generating facility, issuing, trading and finally redemption of the TREC. This flow of TRECs through the system is presented schematically in **Figure 2** below.

3.2.1. Accreditation/registration of renewable energy plant

Operators of renewable energy plants apply for accreditation. Once verified according to the TREC system rules, the plant becomes an accredited TREC generator and is registered in the TREC system register. An account is created in the Central Registration Database (CRD) in the name of the accredited facility. TRECs can accrue to any renewable energy project as outlined in the South African domain protocol to be developed. . The definition of which projects will qualify towards meeting the national voluntary renewable energy target is contained in the Renewable energy target monitoring system methodology report (DME, 2005). A facility could therefore qualify to produce TRECs but not contribute towards the RE target as activities may not be considered as additional as per RE target monitoring methodology. This will be dealt with in system inception date and certificate validity period stated in the domain protocol but will almost certainly not include new activities or facilities which precede Nov 2003 White Paper target inception.

3.2.2. Issuing and Verification of TREC

The “green” energy produced by the accredited plant is monitored and verified by the Issuing body after which the plant receives certificates for a specified quantity of renewable energy generated as defined and verified by the TREC system rules. The TRECs are created as electronic records in the TREC register (electronic records in the CRD). The issued certificates are accredited to the register account of the plant operator/owner.

3.2.3. Trading and transferring of TRECs

The TREC administrative system enables and tracks trading of electronic certificates between accounts in the register whenever a trade occurred. Trading can take place up until the TREC is consumed (redeemed) or exported from the system, or until the TREC certificate expiry date. In order to maximise the potential for international trade of TRECs, it would be beneficial to adopt system rules and procedures which are compatible with other TREC systems. This enables export and import of TRECs internationally. The South African domain protocol will stipulate that import of TRECs will at least initially not be allowed. It will also make provision for banking of TRECs for redemption once support mechanisms or obligations are in place.

3.2.4. Redeeming certificates

When a TREC is consumed (e.g. to verify that a product is “green”, to fulfil a renewable energy obligation, to claim tax exemption or other financial production-based support) it is redeemed. The TREC is either erased from the register or earmarked that it cannot be traded anymore by transfer to a redemption account.

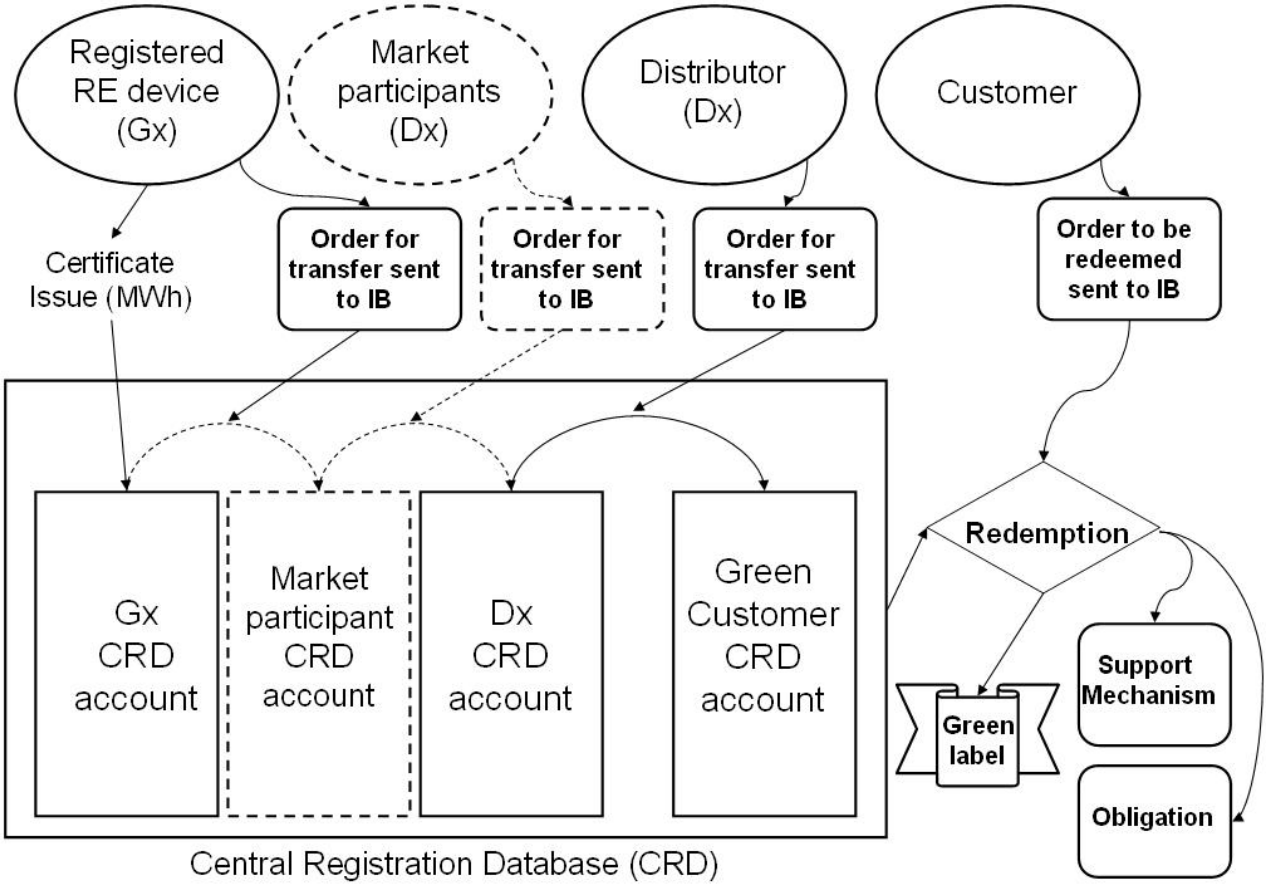

Figure 2 A schematic representation of the TREC issuing, transfer and redemption process

3.3. Determining a suitable framework for South African Voluntary TREC system

In attempting to determine what the framework for development of the South African system should be, the framework emerging as the tested and internationally accepted system is the RECS. RECS is the "Renewable Energy Certificate System" as developed originally by RECS International, a voluntary body of TREC market participants who also spearheaded its development. It enables many types of renewable energy support schemes, rather than being a support scheme itself, and is not restricted by national boundaries.

Within RECS, renewable energy refers to all energy sources excluding fossil and nuclear fuels, and electrical energy derived from these sources. RECS provides a mechanism for representing a specific instance of the production of a megawatt hour of renewable energy by a unique certificate which can be transferred from owner to owner before being used as proof of generation or so-called redemption, or exchanged for financial support, who gives this support and how is the price determined. This support to TREC registered facilities could be in the form of public support in mandatory markets or from willing buyers (private or public) in voluntary markets. To ensure that various national systems around the world (predominantly in the United States and originally in Europe) were harmonised, built to the same standards and compatible with each other, RECS members developed and adopted a set of rules: the Basic Commitment (BC). The BC is the minimum common set of definitions and criteria for the creation, issue, transfer and use as evidence of transfer of ownership and eventually removal from the market of RECS Certificates. RECS is administered within geographical areas by an Issuing Body (IB), which is unique to a particular area and independent of other members of the RECS. All IBs wishing to participate in European TREC trade are members of the international Association of Issuing Bodies (AIB), which guarantees the compatibility and adherence to the BC of the various national certificate systems. In addition, the commercial operations of each IB are subject to peer review by other AIB members.

Recommendations are based on a comparative analysis regarding a representative country or region selected, including selection criteria used, which could form the basis of a South African Voluntary TREC system. The comparative analysis phase of the study found generally that a SA TREC system should be a

unique system addressing the SA internal situation that is not based on the experience of one specific country but should be defined within the experience of a general robust framework such as the Basic Commitment as amended by the Principles and Rules of Operation (the PRO), of the Association of Issuing Bodies (AIB) in Europe, and making use of the elements of the TREC systems of those countries that could add value or benefit to that of South Africa.

The European Basic Commitment as amended by the Principles and Rules of Operation should be adopted as the basis for a framework upon which to develop a South African TREC system.

The development of a national team, the core of a TREC association, for maintaining a framework and providing an institutional basis for issuing and tracking of TRECs by the national Issuing Body (IB) is necessary and there is broad-based support for the development of such a team or SA TREC association. The rationale for creation of such is the necessity for market credibility. There appears to be strong support for the development of a national coordinating body. Conceptually, there is widespread agreement that the simple model (Basic Commitment as amended by the PRO) recommended here is logical and will provide the most efficient solution to many different markets and regulatory needs. The chief barrier to the development of such a network appears to be the initial funding pending sufficient market volume to establish a sustainable issuing body. Figure 3 provides a Schematic representation of the Issuing Body's proposed structure.

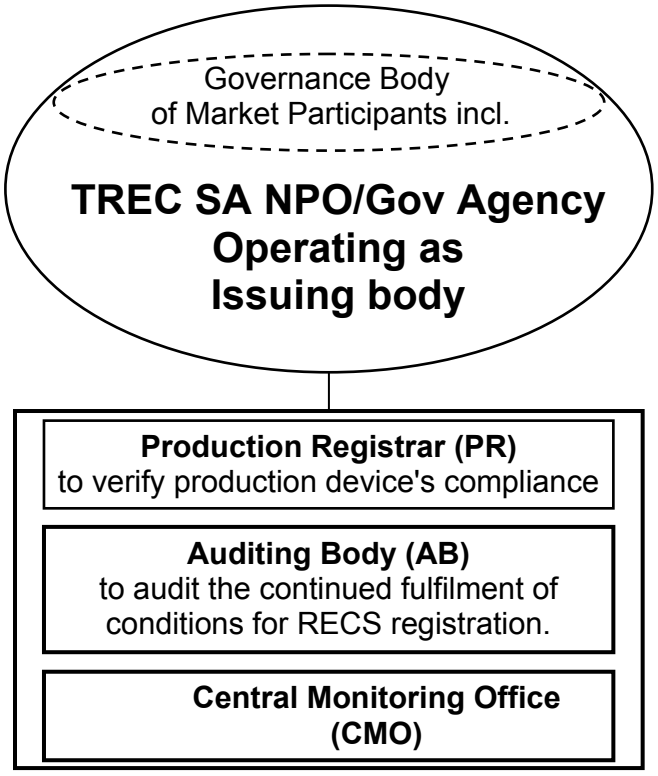

Figure 3 Schematic representation of the Issuing Body's structure

The REC system, having the PRO as its system rules, was chosen because it:

- provides a simple, clear, practical, implementable, administratively efficient method of operation and rules;
- presents a basis for clear definition of TREC eligible renewable energy resources and technologies
- is a tried and tested system is manageable yet robust, reducing the likelihood of error or fraud
- will be supplementary and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum Government involvement and
- as the basis for many other international TREC systems is compatible with and provides potential for interaction with other the majority of prominent TREC systems

The countries from which experience has been drawn, including Australia and the Netherlands were selected by considering:

- countries with existing, tried, voluntary TREC systems,
- potential for export of South African TRECs to international markets
- existing trade and renewable energy relationships

Further criteria upon which the recommendation was based included similarities to the South African policy and regulatory environment, the stage of development of the electricity and liquid fuel industries, success of the TREC initiative in question and compatibility with existing renewable energy support mechanisms.

Possibly the most important element that has emerged in terms of national renewable energy policy is the ability of a TREC system and associated infrastructure to provide an incentive independent tool for monitoring of renewable energy uptake. Monitoring in turn provides feedback on the success of various policies and for refinement of these or adoption of new policies and support mechanisms. This includes monitoring systems to be used in the setting of policy such as the monitoring of the renewable energy target system. This system, operational in 2004 and 2005, currently has a resolution, uncertainty or confidence interval of little better than 100MWh. A TREC system on the other hand will need an accuracy of 100 times better than this or 1MWh – the size/increment of a single TREC. This gives an indication of both the advantages which the system will provide across the policy spectrum (be the incentive chosen a feed-in tariff, production subsidy or mandatory target) and also a motivation of the focussed financial and human resources which will be required.

4. Implementation plan

This implementation plan outlines the projected timeframes and associated costs required for establishment of a national TREC system. The plan also provides guidance on ensuring that resources are allocated timeously and accordingly to ensure efficiency, risk minimisation and effectiveness for the execution of the recommendations.

The approach adopted for the implementation plan is based on project management principles and thus reflects the timeframes for each activity and the costs associated to complete the activities. The implementation plan also incorporates the design, development and implementation of the envisioned Information Technology structure, the creation of the proposed TREC Issuing Body, identifying the personnel as well as the mobilisation of other resources. This will provide the Department of Minerals and Energy a holistic plan to assess the investment risk associated with the implementation of the recommendations and effectively mobilise adequate resources. An amount of R 2 million for the first three years is projected to complete the execution of the implementation plan to the point the revenues from Issuing Body activities render the IB financially self-sufficient.

A Voluntary TREC system implementation plan was developed. It includes a breakdown and explanation of the necessary activities, time frame, manpower and financial resources, and responsibilities was developed. The following activities with a number of sub activities have been identified. Each activity represents a significant impact on the successful execution of the recommendations.

1. Establishment of the TREC Non-profit organisation NPO (All market participants (including the DME) will be members of the governance structure of this organisation) to operate as the National TREC Issuing Body (IB) appointing organisations to perform the necessary functions including:
    a. Production Registrar (PR) to verify production device's compliance
    b. Auditing Body (AB) to audit the continued fulfilment of conditions for registered renewable energy device registration.
    c. Central Monitoring Office (CMO) to operate the CRD
2. The approval of the TREC NPO by the Minister OR the gazetting of the entity and its role (should the TREC IB be established as a government agency in the future);
3. The adoption of the Principles and Rules of Operation (PRO) as the national TREC system framework;
4. Developing the Issuing Body's business plan
5. Acquiring the funding for the capital and operational costs for the first 2 years of the IB OR the provision of budget within DME's fiscal policy or a mix of the two depending on willingness by private and other organisations to assist in the capitalisation.
6. Preparation and maintenance of the South African Domain Protocol (outlining National specifics for various renewable energy resources converted to either electricity (both grid and off-grid), renewable liquid fuels or electrical offset energy such as solar water heating)
7. Develop and commission the central registry software. This is the database documenting generation, ownership, transfer and redemption of TRECs.
8. Designing a marketing strategy and campaign to raise awareness of TRECs and implementation of these.

The indicative timeline for rollout of the implementation plan is presented in Figure 4.

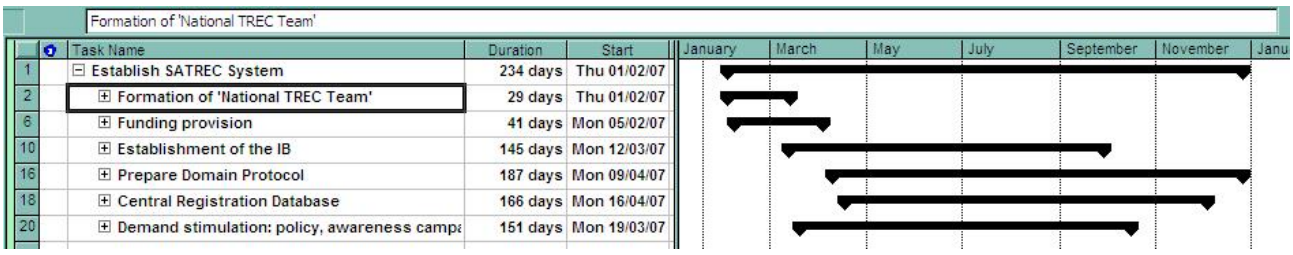

Figure 4 TREC System Implementation timeline

The associated business modelling for the establishment and operation costs of the Non-profit Issuing Body (responsible for the operation of the TREC system), demonstrates that the system could be financially self-sufficient within 3 (and possible even 2) years of establishment. The capitalisation of the Issuing Body will be in the order of R 2 million in total over the first three years as indicated in Figure 5. The administration costs

associated with the life cycle of a certificate (1MWh) is less than 0.04% of the estimated market value of the certificate and has been modelled to decrease linearly in real terms. The model considered volumes of renewable energy certificate traded consistent with achievement of the absolute 10 000 GWh renewable energy target by 2013.

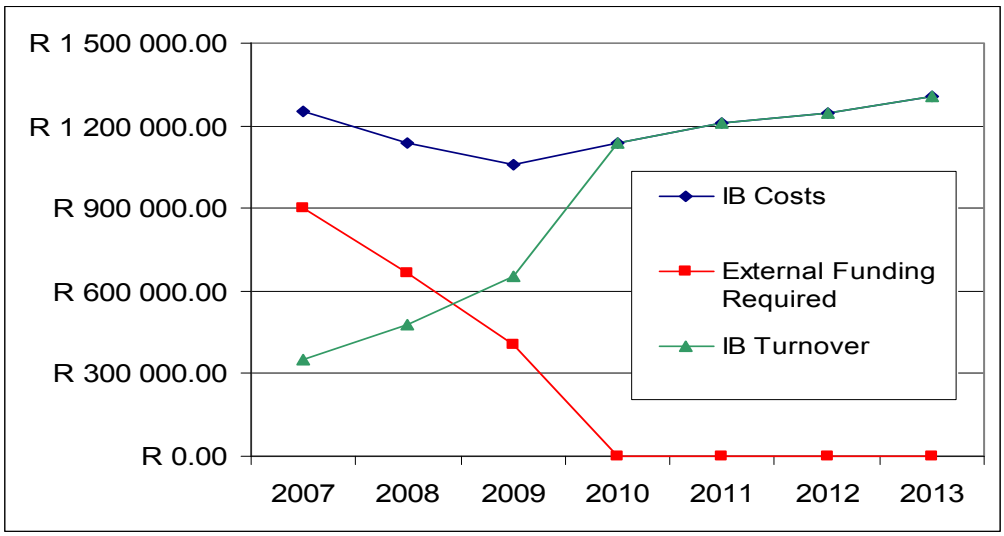

Figure 5 Indicative cost and income stream for TREC issuing body

Further detail on the proposed implementation plan is included in Appendix D.

Table 2 provides an indication in the organisations responsible for the establishment of the TREC system and their responsibility, financial resource contribution and timeframe for participation.

Table 1 TREC System establishment responsibility matrix

Organisation	Responsibility	Resource implication	Financial	Legal and Regulatory	Timeline
DME	• Enabling statement • Facilitate creation of IB governance structure through TRECASA • Endorsement of funding applications	Reduction in resource requirements for a monitoring system provided sufficient public ownership of TREC System	The external funding requirement for the first 3 years is ~R2million. The Department could bear any percentage of this depending on the success in raising it elsewhere.	For the establishment of the IB, the DME participation in the governance of TRECASA and endorsement of the association is essential.	January 2007 to June 2007
TRECASA[4] to be established	• Production Registrar • Auditing body • Central Monitoring office	Appoint functions or capabilities required of IB Cost as per Figure 5	The external funding requirement for the first 3 years is ~R2million. The Department could bear any percentage of this depending on the success in raising it elsewhere.	TRECASA is to be established under the NPO Act.	Established early 2007 in Private Public effort

[4] The prospective members of TRECASA would be all the organisations participating in the TRECs market including producers, traders and buyers.

5. Stakeholder workshop

A government and stakeholder workshop was held on the 18th of January 2007 to present the findings and recommendations of this study. The workshop was held with a view to updating the motivation, recommendations and Voluntary TREC Implementation Plan where necessary. Written stakeholder inputs were sought prior to the workshop and a period of 10 working days has been allowed for comments to this final draft version of the report including appendices from the date of its publication on the DME website.

More detailed documentation of the workshop proceedings is contained as Appendix E.

6. Motivation and recommendation

6.1. Motivation

The benefits of a South African national TREC system, as documented in more detail in Appendix C, are:

- Monitoring and verification of any renewable energy production-based support mechanism (such as the feed-in tariff). This is also the primary motivation for the prioritisation of the development of a South African TREC system. Effective monitoring and evaluation of uptake allows the feedback on the success or failure of policy and regulatory steps and the information necessary for the successful development and implementation of such measures (DME, 2005). Current South African monitoring efforts are insufficient for this purpose with statistics obtained being more an artefact of the lack of resources employed in gathering and collating figures than of the actual rates of uptake of renewable energy.
- Purchase of green attributes separate from physical trade. Such as purchase of the green attribute of wind power generated along the coastline by buyers in Gauteng. This avoids the complexities and perceived barriers associated with the physical trade of power in a monopoly environment and allows for the growth of the renewable energy industry while these regulatory issues are clarified and developed.
- Administration and verification of the greening of events and products. This allows organisations and individuals to demonstrate their commitment to environmental sustainable purchases and consumption in a credible market environment. It allows them to support such initiatives and projects financially through auditable transactions. Examples include green energy stadium electricity consumption for the greening of the 2010 world cup and the World Summit on Sustainable Development (WSSD) as detailed in SA Scan Appendix. In the latter example energy was purchased both internationally and from non grid-connected sources, namely from Spain and from the South African Off-grid electrification programme concessionaires. Wine and automobiles are existing examples of products for export to the environmentally conscious European markets benefiting from verified claims of renewable energy based Production and Process Methods (PPM).

6.1.1. Overview of the need for national coordination

From stakeholder discussions, the five main reasons why a national network of TREC systems is needed are:

- Build the market for renewable energy: The development of a national network to issue, track and verify TRECs will help to expand the market for renewable energy, lay a foundation for current and future uses of renewable energy (will validate renewable certificates as a fungible currency for trade and banking, and will provide a framework to establish property rights of TRECs and lay the foundation for export opportunities and international trade).
- Creating market credibility: The organisation of the TREC market under an umbrella framework can help to build consumer acceptance of renewable energy certificates and market credibility by creating a national, closed loop verification system for renewable transactions.
- Cost savings: There are already two private sector driven systems established in SA and several others needs being contemplated. It is most cost effective to address the issues that will allow communication between existing and future systems now, rather than to try to normalize systems later. In addition, it will be more cost effective to have one, interconnected larger systems than many small and regionalised systems that serve only one purpose.
- Establishing a preferred model in advance of any regulatory requirement to do so will create the most benefit for future market development and coherence for market participants.
- Communication: SA is at a pivotal point in the development of renewable energy markets. If tracking systems are designed to meet only either governmental or private needs, an opportunity to create a national consensus for renewable energy will have been lost. A voluntary effort to develop some common definitions and rules will greatly facilitate the ability for systems to communicate with one another, thereby minimizing inter-related issues, facilitating information sharing, and enhancing the role of each system in the larger renewable market. This includes monitoring systems to be used in the setting of policy such as the monitoring of the renewable energy target system. This system currently has a resolution, uncertainty or confidence interval of about 100MWh. A TREC system on the other hand will need an accuracy of 100 times better than this. This gives and indication of both the advantages which the system will provide across the policy spectrum and also a motivation of the focussed financial and human resources which will be required.

6.1.2. Goals for establishing a SA RECS team

The primary goals for the formation of the institutional structure recommended above include:

- To develop an agreed-upon framework for addressing immediate SA market issues relating to issuing, registering and tracking TREC transactions;
- To develop a legal framework that will establish property rights of TREC owners;
- To meet multiple stakeholder needs including, but not limited to, satisfying verification needs for state regulatory programs or for voluntary programs;
- To ensure emerging TREC markets get a positive start by providing consumer confidence and credibility, by preventing double counting/sales or other types of certificate abuses;
- To establish an ongoing forum to exchange information and discuss topical TREC issues as they arise and to provide a basis for international cooperation on TREC trading;
- To dovetail TREC and renewable energy monitoring activities
-

The intent is to form a coordinated body that will facilitate the development of a TREC market within SA and in future in the SADC region. The network should have sufficient flexibility to allow for individual regional and national differences while not compromising the integrity of individual programs. In addition to facilitating communication among issuing bodies and renewable energy programs within the hemisphere, the proposed network is intended to be compatible with the European system so that global trading and sales can be facilitated in the future as market opportunities present themselves.

6.2. Recommendations

The recommendations on a framework for the development of a local TREC system draw primarily from considerations by the Project Steering Committee (PSC) of the country comparative study (Appendix B) and the recommendation on a legal and regulatory framework outlined in Chapter 4 of Appendix C.

Based on stakeholder input, research conducted and organisational experience it is recommended that a TREC Association of South Africa (TRECASA) be established with membership open to all TREC market participants. Market participants, and other interested bodies and groups, should form a voluntary association, of which they become members, to perform the functions of an issuing body. This would also be the national team as referred to in the Association of Issuing Body's guidelines for establishing a national framework. The association will be formed to develop trade rules, educate market participants, and provide an institutional base for the development of the national system.

This association should control and monitor its activities, to ensure its impartiality as an issuing body, and to ensure that it is not financially dependent on any market participants. There will be closer monitoring and control, if the monitoring entity is the issuing body itself, than if the association of participants were to appoint a separate entity as an issuing body.

The constitution of this voluntary association should be framed in such a manner as to ensure that no single group or special interest can dominate the association's activities as an issuing body. The membership of this association and issuing body should include any Association of Market Participants (with no majority vote), Eskom, the National Energy Regulator, the Central Energy Fund, the Department of Minerals & Energy, the Electricity Intensive Users Group, the South African Local Government Association, the Association of Municipal Electricity Undertakings, and any Regional Electricity Distributors (once they are established).

The Department should provide official Affirmation of the development of a national voluntary TREC system based on the Principles and Rules of Operation of European issuing bodies.

The Department should mandate facilitation of registration of the South African domain Issuing Body by driving the establishment of the TREC Association. Alternatively, the Issuing Body could be created and resourced as a government agency governed by the PFMA.

It is further recommended that the steering committee appoint a project champion to ensure that the implementation plan is executed in its entirety to ensure that the benefits of this endeavour are achieved.

6.3. Legal and regulatory basis and requirements

Market participants, and other interested bodies and groups, should form a voluntary association, of which they become members, to perform the functions of an issuing body. This is based on RECS system of which the requirements for international recognition is accepted and endorsed by Government.

This association should be formed with legal personality (as permitted by common law).

The constitution of this voluntary association should incorporate the RECS Basic Commitment, or (as the Basic Commitment is now also known) the Principles & Rules of Operation (PRO) of members of the Association of Issuing Bodies.

This Basic Commitment (PRO) covers RECS certificates, renewable-energy declarations, inspection of production devices, measures to ensure that renewable energy does not entitle a generator to receive duplicate certificates, the registration of production devices, the issue, transfer and redemption of RECS certificates, a central registration database, and provision for verification, audits and reports.

This issuing body should register under the Non-profit Organisations Act 1997, which promotes governance, transparency and accountability. In terms of that statute, the Welfare Department issues good-practice codes. An organisation registered under that statute must file yearly reports and financial statements.

Meter readers should be officially endorsed or accredited. The closest applicable law is the Engineering Profession Act, which envisages the identification of reserved work, liaison by the Council for the Built Environment (CBE) with the Competition Commission, and the identification by the CBE of a scope of work to be reserved for a category of registered engineers. This will probably amount to an officially-endorsed source of meter readers, for the purposes of the Basic Commitment (PRO). Alternatively, steps must be taken to obtain the approval by the Association of Issuing Bodies of an entity such as Eskom as a measurement body.

For the eventual introduction of a mandatory transferable renewable-energy-certificate system, the Electricity Regulation Act 2006 envisages regulations regarding the type of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from different energy source types.

7. Conclusion

TRECS, provide a good opportunity for verification of financial support to registered renewable energy generators by both the public and private sectors. The most important motivation that has emerged in terms of national renewable energy policy is the ability of a TREC system and associated infrastructure to provide a tool for monitoring of renewable energy uptake independently of the choice of incentive or regulatory framework to be put in place to stimulate that uptake. Monitoring in turn provides feedback on the success of various policies and for refinement of these or adoption of new policies and support mechanisms. This includes monitoring systems to be used in the setting of policy such as the monitoring of the renewable energy target system. This system, operational in 2004 and 2005, currently has a resolution, uncertainty or confidence interval of little better than 100MWh. A TREC system on the other hand will need an accuracy of 100 times better than this or 1MWh – the size/increment of a single TREC. This gives an indication of both the advantages which the system will provide across the policy spectrum (be the incentive chosen a feed-in tariff, production subsidy or mandatory target) and also a motivation of the focussed financial and human resources which will be required. TRECs are not a renewable energy financial support mechanism per se. They allow for the monitoring of renewable energy production and therefore act to enable implementation of other support mechanisms and evaluation of their success in encouraging increased uptake.

TRECs can be used in either voluntary or mandatory policy environments. Such a system therefore provides an option for bridging the transition from the current voluntary environment to one along the lines of provision for introduction of a regulated renewable energy financing mechanism. The Electricity Regulation Act 2006 envisages regulations regarding the type of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from different energy sources. A TREC system or the infrastructure that would be developed as part of the TREC system could be used to administer a top-up feed in tariff or in monitoring compliance with renewable energy obligations. The feed-in tariff is a system by which public support is provided to meet the difference between the cost of generating electricity from renewable energy sources and the price that is offered for electricity generated from unspecified sources.

The benefits of establishing a national TREC system include:

- The primary motivation that the steering committee has increasingly supporting is that of the TREC system as a monitoring system. TRECs are, of course, not a support mechanism anyway. A sound TREC system could therefore provide the monitoring and verification for the top-up feed-in-tariff should it be put in place. Certificate owners would redeem their certificates in return for a feed-in payment or for say, a green label in evidence of improved environmental performance (or against sale to a European buyer). The existing lack of monitoring infrastructure of sufficient temporal and energy resolution could otherwise hamper the rollout of a mechanism such as a feed-in. The two are in fact not only not exclusive but complimentary. TRECs allow for the monitoring and verification of any renewable energy production-based support. A proposed top-up feed in tariff, for example will be very difficult if not impossible to implement without a suitably thorough (both energy and time resolution) system for monitoring production.
- Purchase of green attributes separate from physical power trade and electrical transmission and distribution infrastructure and
- Administration and verification of the greening of events and products.

The comparative analysis phase of the study found generally that a SA TREC system should be based on the experience of the general, robust framework of the Basic Commitment as amended by the Principles and Rules of Operation (the PRO), of the Association of Issuing Bodies (AIB) in Europe, and making use of the elements of the TREC systems of those countries that could add value or benefit to that of South Africa, including the Netherlands and Australia. In voluntary systems government's role in these markets has predominantly been to create demand for the TRECs through measures to stimulate or enforce renewable energy uptake. The TRECs system can then be incorporated as a tool in proving compliance with obligations or in administration of claiming production-based public financial support. It was furthermore found that, in the absence of government participation in the establishment of the TREC system that the systems have not been sufficiently credible internationally and that here has been insufficient market demand to support a sustainable TREC system. The development of a TREC system is, therefore, in keeping with the recommendations of the Department's long term renewable energy financing position paper produced in June 2006. A robust TREC system would allow for the ongoing monitoring requirement, perceived as a disadvantage, of a production based support scheme, such as a top-up feed-in scheme, to be addressed (DME, 2006, p18).

The recommendations emerging from this feasibility study therefore are primarily that the European Basic Commitment as amended by the Principles and Rules of Operation should be adopted as the basis for a framework upon which to develop a South African TREC system and that a statement be issued by the DME affirming this

A Voluntary TREC system implementation plan was developed. It includes a breakdown and explanation of the necessary activities, time frame, manpower and financial resources, and responsibilities. The following activities with a number of sub activities have been identified. Each activity represents a significant impact on the successful execution of the recommendations.

1. Establishment of the TREC Non-profit organisation NPO (All market participants (including the DME) will be members of the governance structure of this organisation) to operate as the National TREC Issuing Body (IB) appointing organisations to perform the necessary functions including:
    d. Production Registrar (PR) to verify production device compliance
    e. Auditing Body (AB) to audit the continued fulfilment of conditions for registered renewable energy device registration.
    f. Central Monitoring Office (CMO) to operate the CRD

   Figure 3 provides a Schematic representation of the Issuing Body's proposed structure.
2. The approval of the TREC NPO by the Minister OR the gazetting of the entity and its role (should the TREC be formed instead as a government agency in the future),
3. Acquiring the funding for the capitalisation costs (and operation for the first 2 years) of the IB OR the provision of budget within DME's fiscal policy or a mix of the two depending on willingness by private and other organisations to assist in the capitalisation.
4. The adoption of the Principles and Rules of Operation (PRO) as the national TREC system framework;
5. Developing the Issuing Body's business plan
6. Preparation and maintenance of the South African Domain Protocol (outlining National specifics for various renewable energy resources converted to either electricity (both grid and off-grid), renewable liquid fuels or electrical offset energy such as solar water heating)
7. Develop and commission the central registry software. This is the database documenting generation, ownership, transfer and redemption of TRECs.
8. Designing a marketing strategy and campaign to raise awareness of TRECs and implementation of these.

The associated business modelling for the establishment and operation costs of the Non-profit Issuing Body (responsible for the operation of the TREC system), demonstrates that the system could be financially self-sufficient within 3 (and possible even 2) years of establishment. The capitalisation of the Issuing Body will be in the order of R 2 million over the first three years. The administration costs associated with the life cycle of a certificate (1MWh) is less than 0.04% of the estimated market value of the certificate and has been modelled to decrease linearly in real terms. The model considered volumes of renewable energy certificate traded consistent with achievement of the absolute 10 000 GWh renewable energy target by 2013.

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Appendix A: South African TREC activity scan and market status

Appendix A (Interim report A) Version 2

Scan of current South African activities

April 2006

Table of Contents

1. Scan of South African TREC related activities

1.1. List of relevant activities

1.1.1. TRECSA and SATIB

The Tradable Renewable Energy Certificate South Africa body was constituted by resolution of an executive interim board of TREC Southern[5] Africa (TRECSA) on the 20th of September 2005 in Bryanston, South Africa. In the absence of a permanent South African TREC Issuing Body (SATIB) entity, trustees were appointed as trustees of the process of forming a legal entity to assume that Role.

The RECS international organisation describes these first steps to market development in saying that:
'The first RECS member from a country takes the role of the National Team Coordinator of RECS in that country. The National Team Coordinator is the contact for potential new RECS members in its country and the contact for RECS until the National Team has been set up with all the required bodies. The National Team has to

- harmonise the RECS requirements with the national operational procedures
- and national laws;
- delegate a person to the Board of RECS international; and
- appoint an Issuing Body.

The members of TRECSA acting as coordinators of TRECs in South Africa have therefore set about constituting both TRECSA and SATIB which it will appoint in due course. These will be Non Profit Organisations registered with the Department of Social Development. Business plans of the respective entities and funding requirements are being developed.

The current TRECSA members are:
GreenX Energy (Pty) Ltd
Amatola Green Power (Pty) Ltd.

SATIB accepts the AIB's basic commitment Release 1- 2 of 7th of June 2004 and the Bagasse component of the South African domain protocol and additional technology or otherwise-based components to be developed as well as amendments to these from time to time. SATIB will be the custodian of the integrity of the South African domain protocol.

SATIB intends to apply for membership of the Association of Issuing Bodies

The emerging voluntary renewable energy[6] market requires verifiable certificates that will be generated automatically as part of market settlement. This outline was written for the renewable energy industry in general and for suppliers, traders and consumers of renewable energy in particular. It proposes a means of enabling and therefore accelerating the onset of credible trade in these certificates in alignment with initiatives by the national government to stimulate the use of renewable energy. It has been prepared on the basis of creation of an entity (SATIB) to undertake the role of the South African domain issuing. TRECSA trusts that the founding of SATIB will be in line with national government initiatives to create a supportive market for renewable energy in South Africa through the renewable energy certificate and other initiatives in the longer term.

SATIB will be a credible institution to issue tradable renewable energy certificates (RECs) at the production devices based on recognised procedures similar to or at least compatible with those used in EU countries. TRECSA will do the appointment of the Issuing Body. SATIB will be responsible for the following:

- to follow all necessary procedures that will result in the Issuing Body being registered with a reputable oversight body
- to ensure that the Basic Commitment and Domain Protocol of the voluntary market are observed
- inspect all RES-E production devices that wish to participate
- Issuing, transferring ownership of and redeeming RECs

[5] TRECSA is the TREC Association of South African with membership open to all TREC market participants. See 6.1 from RECS starter documents. Facilitate interaction with AIB.
[6] This is energy converted from energy resources that are replaced at a rate greater than that at which they are extracted.

- Recording in a Central Registration Database (CRD) all issued RECs
- Appoint other bodies to assist the IB such as:
  - Production Registrar (PR) to verify production device's compliance
  - Auditing Body (AB) to audit the continued fulfilment of conditions for RECS registration.
  - Central Monitoring Office (CMO) to operate the CRD

All other systems for the operation of the voluntary green power market are in place to do verification and monitoring.

The steps required to put the SATIB in place and which we will undertake include:

- developing and refining the South African domain protocol,
- detailing business operation procedures of the IIB including linkage to an oversight body and
- developing the SATIB business plan and assisting to raise funds to put SATIB in place for provision of the service.

Steps

- Form SATIB Company
- Appoint trustees of SATIB
- Apply for membership of AIB.

1.1.2. Market entry by market participants

Some initial activities of an interim issuing body have been put in place in line with the rules as laid out by the Association of Issuing Bodies (AIB) in Europe and the European Electricity Certification System (EECS). This was undertaken in recognition of the need for a credible, independent body to provide verification of renewable certificates traded or to underpin early negotiations for such trade by early entrants to the green power trading market. These activities, have at least to some extent prompted the commissioning of the current study in an attempt to determine the best course of action in response to private sector market forces. To date 1MWh or TREC equivalent has gone through this system from renewable energy device certification to certificate redemption in the pilot project launch. There are negotiations in place for individual deals anything from 1 GWh annually to closer to 2 GWh of 'spill power' per month from individual existing registered renewable energy source RES-E devices.

1.1.3. World Summit on Sustainable Development (WSSD) TRECs project 2002

The WSSD TRECS initiative was the first of its kind in South Africa and could be defined as project (WSSD) specific initiative supported by the Department of Environmental Affairs and Tourism (DEAT) and the then National Electricity Regulator (NER). Through a project grant under the DEAT's climate change program (funded by USAID), AGAMA Energy (consultants) worked with several partners to enable the use of green certificates and a green electricity tariff to underpin the transactions for the sale of green electricity for use by venues of the 2002 WSSD. The National Electricity Regulator (NER) acted as the Issuing Body and City Power (distributor and supplier) purchased certificates in quantities to match green tariff demand from the WSSD venue.

The WSSD pilot project created temporary voluntary structures to oversee the demand and opportunity that existed during the WSSD. The initiative has been endorsed by the NER to supply green power to the different venues, which form part of the WSSD. It could be described as one of the building blocks of the TRECS development in SA that has created awareness and some experience for those participating in the exercise, a step in the right direction. The exercise has not been based on a TRECS framework that meets the credibility requirements of international standards, which could form the basis of a sustainable TRECS system in South Africa.
The pilot phase was completed in 2002/3 and is documented as a case study. (see www.treckin.org) The project supplied 845MWh of green power to two of the main venues of the WSSD. The TRECS, which were bought from renewable energy generators in South Africa, Italy and Costa Rica were used by City Power (electricity supplier to the World Summit on Sustainable Development venues) to back up the supply under its newly developed green electricity tariff.

1.1.4. DME voluntary green power pilot project

The DME voluntary green power trading market pilot project is notable in that the process followed in launching this market initiative was precisely that used according to the European TREC market rules. This initiative dealt specifically with the physical trade of green power rather than with TRECs separate from the physical power. It was, therefore, used as a verification mechanism, as TRECs are often used, rather than as a process put in place to enable a trade in TRECs. The pilot project has not taken off at the rate anticipated. It has perhaps been thwarted by intricacies involved in the wheeling and retail of physical power. The verification according to the TREC system has largely been put in place and provides a useful model for the way that many private sector players envisage the TREC market to potentially be set up in South Africa.

1.1.5. SAWEP investigation

The Green Power Funding Sources and Mechanisms report was one of the elements of the first phase of the South African Wind Energy Programme (SAWEP) funded by the GEF/UNDP. The activities undertaken in preparation of the report were as follows taken for the original project terms of reference:

The following activities have at minimum to be met in order to meet the objective to evaluate green funding sources (such as TRECS) and the mechanisms to make these sources available for wind power incremental funding. To the extent possible these activities should build on already executed – or still to be implemented - activities such as the CCT green power studies, the WSSD green certificate work and the upcoming City Power green power market survey:

1. Green power market survey that could absorb green power produced from wind energy up to a capacity of approximate 100 MW to be developed before 2010. In that context the green power tariff and possible changes (and reasons for such changes) are to be assessed and reported on over the period 2004-2010;

2. More specifically the green power tariff needs to be assessed for:
a. 5-7 MW possible extension of the Darling wind farm (first phase will be 5 MW);
b. False Bay/Strandfontein (20-40MW) wind farm;
c. Military radio station – West Coast (100 MW) windfarm;
d. Wind/Hydro (7/5 MW) wind/pump storage scheme.

3. Research and describe issues related to the certification and trade of green power certificates and design a mechanism to implement the process of certification and trade. The latter possibly on a regional scale, but only if South African sales issues have been thoroughly studied and included into the design for implementation;

4. As part of the mechanisms to be designed for certifying green power and for trading it, it will be required to **design the most appropriate institutional set-up to deal with the green certification process issues**;

5. Once an appropriate design has been prepared for accessing green funding sources to finance the incremental costs of wind power production in South Africa, a detailed proposal needs to be prepared indicating:
a. Activities for a period of 4-5 years to be implemented under the UNDP/GEF full-scale programme;
b. Most appropriate institutional set-up for implementing the activities;
c. Detailed budget.

6. Related to the issue of green power certification, a minor part of the consultancy (an approximate 4-5% of the total time) will have to be spent on assessing the linkage of green power and green labelling of products (for export). The main will be a position paper on the main directions that are to be developed on green labelling based on green power inputs.

The report, deals with the above issues as reflected in A1 to A6 below, the budget discussed in the report is very much linked to the SAWEP full-size project and less relevant to the implementation of a TREC system.

A1. Green Power Market Survey: the SAWEP market surveys for City of Cape Town (three) and City Power (one) were used to do an assessment of the potential of the Green Power Market in SA. Some of the findings in this regard were:
1. The principal deduction from these surveys is that the electricity market is largely uninformed of the implications and business case for switching to Green Power.

2. The levels of willingness to switch are likely to be far too optimistic when it comes to actual commitments over time to a Green Power product. This trend is borne out by experience in other, more mature, electricity and Green Power markets.
The final market assessment on is based on four levels of market penetration, which range from 0.5% to 4% of the electricity market. A 0.5% penetration results in national demand of 309GWh and CCT demand of 50.06GWh.

A2. Green Power Tariff: This section sets out the assumptions and calculations underlying the development of a green electricity tariff for wind energy. This is done firstly for a scenario in which Green Power is sold on the basis of power wheeling agreements and secondly for the case of Green Power being sold within a TREC-based system. The conclusion on the green power premium (wind) is 40c/kWh above the current cost of distributed Eskom Power and the conclusion on the value of TRECs based on the WSSD experience would be 19c/kWh exclusive of the implementation and running costs of TRECs. The TRECs price will be market driven (variable) in a voluntary system while under a mandatory system it will be link to the penalty costs of non-compliance and which are likely to be better defined under such a system.

A3. Outline of a TREC system for SA: The report gives an overview of the mechanism for implementing the process of a TREC system. It, inter alia, deals with the key elements of a TREC system and makes the following statement: Studies conducted on countries that have successfully initiated a functioning framework for the administration of TRECS have shown that the following key questions need to be carefully considered:

- Mandatory or voluntary system?
- The system rules – including eligibility of generators, nature of the TRECs, system procedures
- Institutional issues - separate entity or existing regulatory body assigned the task and should the certificate issuing body be part of or separate from the auditing body?
- Who is to fund the system?

In addition, a market needs to be stimulated, for example through the establishment of incentives (as is the case in the Dutch and Danish markets). Whilst such incentives are primarily designed to stimulate growth in RE production, they can and do at the same time result in growth in profit for stakeholders in the trading chain. The report discusses the key institutional components of a TREC system, as does the Treckin report.

A4. An Institutional Framework for TRECs: The report suggests that as the TREC mechanism for South Africa should be phased in timed with the establishment and growth of a RE market in South Africa. Initially, within the context of a small voluntary market, there is no need for elaborate institutional frameworks for TREC transactions. The initial trades could be bi-lateral deals which are concluded on the basis of the mutual recognition of the other party's credentials and integrity. The need for a generally accepted institutional framework becomes clear when the voluntary market develops beyond the realms of personal or corporate trust. Finally, it becomes essential within the context of mandatory Green Power markets.
The final conclusion it is suggested that that the NER continue to be utilised as the issuing and accrediting body through Phases 2 and 3, with the establishment of a voluntary market. Phase 3 should see the establishment of a separate entity, which would take the market into its mandatory phase. It is also suggested that government support is a critical success factor in the development of an appropriate institutional framework and green power market (voluntary or mandatory). This support has to be more solid than simply ratifying a white paper on Renewable Energy in which targets for green power generation in South Africa are explicit, although this is (and has been) a critical first step.

A5. Phased in Approach: The recommendation of the report in terms of the phasing of a TREC-based system for Green Funding is similar to the phasing recommended by the Treckin report, which suggested the following four phases to be implemented over a period of about 10 years in SA:

1. Green Power for the WSSD.
2. An Interim voluntary scheme supported by the existing utilities.
3. Establishment and participation of the REDs.
4. A mandatory scheme.

A TRECs implementation budget as such is not dealt with in the report, the report deals mainly with the SAWEP budget issues.

A6 Green labelling of products: The report does not deal with this matter in great detail and in summary comes to the conclusion that: A green labelling scheme (By displaying the "Green-e" logo on product packaging, companies can inform consumers that a significant portion of the energy required to produce the product came from renewable sources.) is an excellent complementary mechanism to a TREC system for stimulating demand for Green Power within the context of a voluntary market. There are minimal additional overheads to the institutional and operating requirements for a TREC system. The marginal overhead costs

for green labelling are best covered by the industrial and commercial sectors seeking the benefits of the label.

The SAWEP full-size project, which followed the PDF B phase (of which the AGAMA report has been an element,) has been divided into six components to contribute to the removal of the identified barriers within a 2-phased full-size project totalling a period of 5 year. By successfully implementing activities under these six components the project outputs will contribute towards the achievement of the global and national development objectives; component ii below defines the TRECS project under discussion:

i. Public sector incremental cost funding. To assist the Government of South Africa with detailing the most appropriate financial instruments that should be made available to stimulate commercial wind energy developments.
ii. Green power funding. To assist initiatives geared towards green power marketing and setting up and implementing Tradable Renewable Energy Certificates as well as implementing a green power guarantee scheme developed under the PDF B.
iii. Long-term policy and implementation framework for wind energy. To assist the Government of South Africa with the development of a long-term policy, including implementation strategy, for wind energy development.
iv. Wind resource assessment. To assist public and private sectors entities interested, involved in wind energy development with the generation of reliable wind energy data and other necessary information for wind energy developments.
v. Commercial wind energy development. To assist private sector developers with the (pre-) feasibility – and later engineering and financing plans – of a number of wind farms up to 45 MW installed capacity.
vi. Capacity building and institutional strengthening. To strengthen and support key government departments (e.g. national and provincial environmental departments), public agencies (e.g. financing), wind farm industry (e.g. South African Wind Energy Association) and independent private firms interested, involved in wind energy development.

1.1.6. PPA drafters chapter

"Green" POWER PURCHASE AGREEMENT (PPA)

The SAWEP has supported the development of a "Green" Power Purchase Agreement and a Drafters Guide to assist the negotiating parties in using the model to draft a (green) PPA

Clause 10 & 11 of the Model (green) PPA, which has been based on the CCT PPA and which has a bearing on the South African TRECs process inter alia reads as follows:

CLAUSE 10 "RENEWABLE-ENERGY CERTIFICATION

Airstream (the generator) shall ensure that the electrical energy generated by it at the Facility is certified or guaranteed by an internationally-recognised South African or foreign renewable-energy certificate-issuing body as being Renewable Energy, in accordance with the certification criteria and commitments adopted by such body from time to time.

Airstream and Greenborough (the purchaser) shall jointly share the costs of procuring certification contemplated in clause 0.

Airstream shall, on request from time to time by Greenborough, furnish to Greenborough copies of certificates and guarantees of origin issued as contemplated in clause 0.

Airstream shall, on receipt by Airstream of payment from Greenborough from time to time of the Purchase Price for the Total Output for the month or months concerned, assign, transfer and make over to Greenborough, at no cost to Greenborough additional to the Purchase Price, all certificates and guarantees of origin contemplated in clause 0, and any other similar values and beneficial attributes of Renewable Energy relative to electrical energy from non-renewable sources.

Drafters Guide comments Clause 10: Renewable-energy certification

This clause requires the electrical energy generated by Airstream to be certified by an internationally recognised renewable-energy certificate-issuing body as being Renewable Energy.

Such a body exists in Europe, called the Renewable Energy Certificate System. Participants in the system have formed issuing bodies in their respective countries, and the system has an Association of Issuing Bodies. The system is explained on the organisation's website (www.recs.org), where its current Basic Commitment document (release 2.2 of 5 April 2004) may be found.

CLAUSE 11 UNDERTAKINGS BY AIRSTREAM

Airstream warrants and undertakes to Greenborough that –

Throughout the duration of this Agreement, electrical energy generated at the Facility will be derived only from the wind;

Airstream shall operate and maintain the Facility as a fully functioning installation, and shall repair and replace all equipment and components thereof as and when necessary in order to maintain the Facility in operation;

Airstream shall hold and maintain an appropriate license or exemption under the laws governing electricity entitling it to generate and sell electricity;

Airstream shall comply with its statutory and other obligations under its license or exemption aforesaid and under the laws governing electricity, including applicable standards under the laws governing standards;

Airstream shall take all steps and do all things as are necessary to implement any lawful order by the statutory regulator under the laws governing electricity;

the Wheeling Agreement shall remain in force for the duration of this Agreement;

Airstream shall not perform or omit any act so as to cause certificates or guarantees origin contemplated in or other benefits of renewable-electricity generation at the Facility to be devalued.

Airstream shall furnish to Greenborough such information and documents, relating to Airstream's compliance with the provisions of clause 0 and its other obligations under this Agreement, as Greenborough may from time to time reasonably request.

The Parties record that laws and standards contemplated in clause 11.1.4 that are in force on the Signature Date include the provisions specified in Part 1 of Schedule C.

Comments re Clause 11 Undertakings by the generator

At the time the model PPA agreement and guide were prepared no TREC system exists in South Africa and the EU-RECS system was used as a guide to assist the Parties (generator and purchaser) to reap the benefits of any future South African TREC system in that a TREC system could create certificates, which can detach the environmental and other benefits from the physical energy, so that this benefit can be traded and 'consumed' separately, which could open both the national and international markets to the beneficiaries (purchasers).

The undertakings by the generator in terms of Clause 11 are clearly to protect the purchaser now and in the future in terms of the value and benefits of TRECs, which could flow from any South African TREC system or any new regulatory developments in this regard in future.

The way in which these undertakings has been structured ensures that the generator will have to adhere to and comply with any order issued by the regulator including relevant regulations or legislation made in South Africa including a TREC system that may be developed.

1.1.7. EC TRECKINformation initiative

Tradable Renewable Energy Certificates can be used to show that a renewable energy plant has generated energy. The certificates can detach the environmental and other benefits from the physical energy, so that

this benefit can be traded and 'consumed' separately. TREC systems are emerging as a policy tool to stimulate renewable energy markets in many parts of the world.

The European Commission sponsored a TREC Guidance Package for South Africa, which was executed by Treckin partners. Treckin has a worldwide network that facilitates and stimulates initiatives in the field of TRECS by government authorities, non-governmental organisations and the private sector.

The TRECKIN report will facilitate and strengthen the efforts to establish and harmonize a Tradable Renewable Energy Certificate (TREC) system in SA. The knowledge gathered, prepared and disseminated from around the world will be useful in the development process in order to inform the DME about effective TREC system design and also to inform the private sector about trading opportunities and to set up TREC infrastructure to harvest the social, economic and environmental benefits of renewable energy developments.

The Treckin guidance package will assist us to structure and implement a reliable, robust and credible TREC system in South Africa. The document provides an overview of the practical steps that needs to be taken to implement such a system, the institutional set-up needed, the rules and the how to operate and options for the structure of governance. This will greatly assist in the development of an implementation plan for the DME to implement a TREC system in South Africa on a sound, sustainable and economic basis.

The Treckin studies presented cover a diverse range of systems, each designed for a specific purpose. Despite the many differences between systems, there are also many similarities. For instance, for all systems there is a process of registering eligible renewable energy plant and issuing certificates. In all systems described, the certificates exist as electronic records in a registry.

The organisation, which issues certificates, is commonly referred to as the Issuing Body, and the Accreditation Body does determining eligible plant. The operator of the registry is typically called the Central Monitoring Office. Most of the case studies presented are for systems where the Issuing Body is also the Central Monitoring Office. These tasks can be done by one entity or separate entities. However, within RECS International each system operates according to its own protocol and this enables countries such as Germany to have a separate Issuing Body and Central Monitoring Office.

Rules for RECS are dependent on the protocol for each country or region. Many of the system discussed are mandatory systems, which is not the focus of this study, but will support the process of development in the long run as a mandatory system is an inevitable for South Africa in the long term especially should the Government wish to stimulate growth in the RES-E sector in achieving the White Paper on Renewable Energy target.

Which RES-E resource is eligible for accreditation varies from scheme to scheme. None of the schemes deals with bio-fuels other than a RES-E generation source. RES-E resources that forms part of the discussion varies from Country to Country and include the following: Biomass, PV, Solar thermal, Wind, Geothermal, Tidal, Wave, Ocean thermal, small hydro and large hydro. The Project team will therefore have to go beyond this study to address the issue of TRECs for bio-fuels as defined in the TOR.

The Treckin report structured the key characteristics of the different international TREC systems in table format. The project team intends to update the information with reference to issues such as Targets, Penalty/buy-out, Typical price (2006) and developments that have taken place since the report was done. The relevant information will be used and structured to enable the Project Steering Committee to define and guide the way forward in identifying a TRECs framework that can form the basis of the SA TREC system, which supports all of the criteria that would be relevant to the SA TREC system such as: The ability to be compatible with other International TREC systems, promotes international trade and fits in with the SA legal and regulatory framework and has credibility locally and internationally.

The Treckin report has very much a Southern Africa TREC system focus, which is outside the mandate of this project but is certainly an issue that's needs to be addressed in future and needs careful consideration in the selection of a TREC system for South Africa.

2. Summary

The presentation made to the project steering committee on the 31 March 2006 is provided by way of a summary of the above.

DME
New and Renewable Energy

Tradable Renewable Energy Certificate (TREC) System Feasibility Study

Project Steering Committee Meeting
31 March 2006

Jason Schäffler
Nano Energy

Objectives

- **'provision to government of precise and specific detailed recommendations on the establishment of a voluntary and sustainable TREC system for South Africa and the**
- **development of an implementation plan to set about establishment of the system'.**

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Interim report series

A. **South African TREC activity scan and market status**
B. **Comparative country analysis with respect to TREC developments**
C. **TREC system needs analysis, motivation and recommendation including legal and regulatory requirements**
D. **System implementation plan**
E. **TREC workshop report**
F. **TREC market analysis and projected renewable energy uptake contribution**

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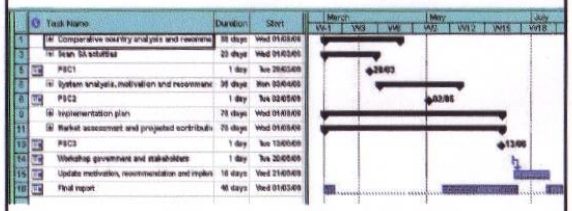
Project tasks and timeline



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PSC schedule

- **PSC1 (28 March): SA activity scan (80%) and comparative analysis (60%)**
- **PSC2 (2 May): System analysis, Implmentation plan and Market assessment (all three at 60%) - previous 2 (SA Scan and comparative analysis) complete.**
- **PSC3: (13 June) All tasks complete except Implmentation plan and market assessment (90% awaiting workshop input and update) and final workshop preparation.**
- **Workshop: (20 June)**
- **Project closure meeting (25 July)**

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Scan of SA Activities

- TRECSA and SATIB
- Market status
- WSSD TRECs project 2002
- DME voluntary green power pilot project
- SAWEP investigation
- PPA drafters chapter
- EC TRECKINformation initiative

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TRECSA and SATIB

- Body of market participants
- Private sector driven to date
- Appointment of issuing body which becomes member of international body
- Agree to basic commitment and develop and maintain South African domain protocol
- Funding and market demand constraints

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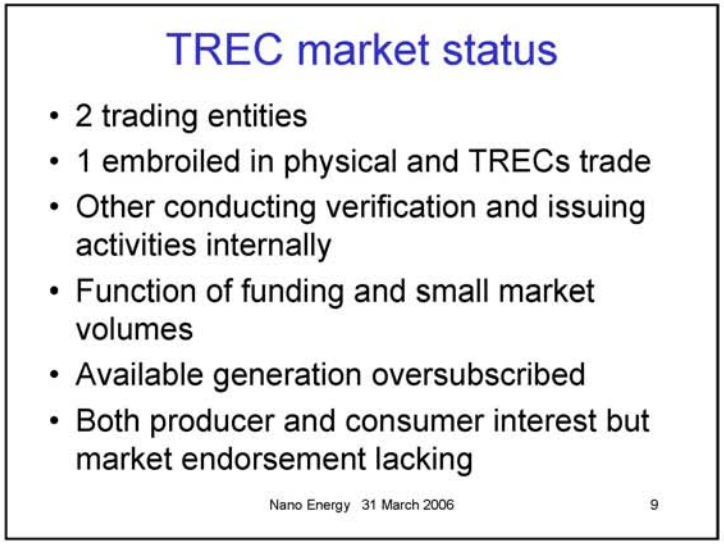

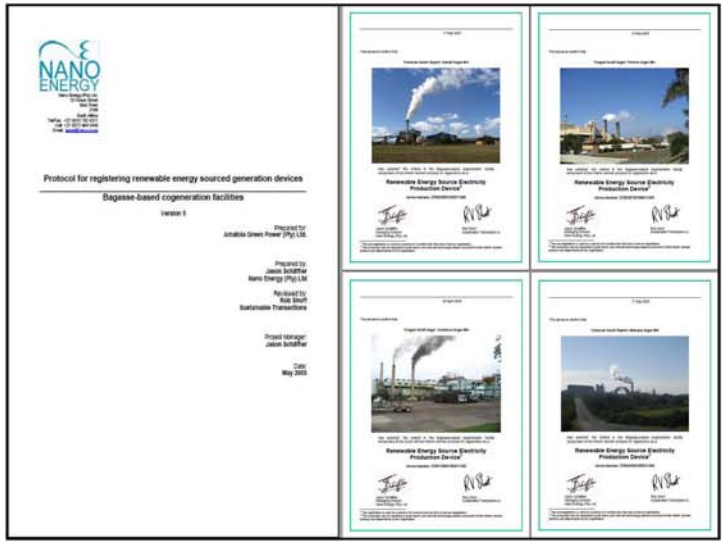

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Figure 6 Development and maintenance of the Domain Protocol

WSSD TRECs 2002

- Greening of world summit venue electricity supply
- ~830MWh or TRECs
- First hand experience with lessons learned
- Donor funded (financial viability questionable)

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List of Licensees:

Facility Name	Owner	Location	Power Source	Auxiliary Power Source	Electricity Conversion System	Generation Capacity in KVA	Proportion from Primary Source	Average Capacity Factor	Ave Monthly MWH
Friedenheim Hydro Power Scheme	Friedenheim Irrigation Board	Nelspruit, Mpumalanga	Water	N/A	Water turbines	2200	100	85	1042
Amatikulu Mill	Tongaat-Hulett Sugar Ltd	Felixton	Bagasse	Coal	Steam turbine/Turbo alternator	12300	99	93	5120
Darnall Mill	Tongaat-Hulett Sugar Ltd	Darnall	Bagasse	Coal	Steam turbine/Turbo Alternator	7500	98	93	5000
Entumeni Mill	Tongaat-Hulett Sugar Ltd	Entumeni	Bagasse	Coal	Steam turbine/Turbo Alternator	4400	98	93	2260
Maidstone Mill	Tongaat-Hulett Sugar Ltd	Tongaat	Bagasse	Coal	Steam turbine/ Turbo alternator	26250	98	93	13450
Felixton Mill	Tongaat-Hulett Sugar Ltd	Felixton	Bagasse	Coal	Steam turbine/Turbo alternator	23000	81	93	12350
Tierras Morenas Wind Power electrical Generation Project	Molinos De Viento Del Arenal, S.A.	Guanacaste, Costa Rica	Wind	N/A	Wind turbine/Generators	24000	100	41	Aug: 4700000 Sep: 30000 Oct: 10000000
Piancastagnaio, 4 Plant	Enel Green Power	Italy	Geothermal	N/A	Geothermal	22000	28	Unknown	10000
BP Service Station	BP (SA)Pty Ltd	South Africa	Solar Photovoltaic	N/A	PV Modules	153	100	110	8
Northern KZN concession area	Nuon RAPS Utility	Umkhanyakude District (DC27), KZN	Solar Photovoltaic	N/A	PV Modules	11.21	100	23	1
Greenhouse Project	Solar-Fabrik (Pty) Ltd	Cnr Klein and Wolmarans Street, Joubert Park, Johannesburg	Solar Photovoltaic	N/A	PV Modules	2.2	100	Unknown	0.00165
Ceres Hydro Power Station	Witzenberg Municipality	Ceres	Water	N/A	Water turbines	1000	100	21.43	100
City Power	City Power	Johannesburg Metro	N/A	N/A	Unknown	Unknown			

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GREEN Certificates:

Certificate #	MWatts	Registered Owner	Electricity Creation Start Date	Electricity Creation End Date	Certificate Status	Registration # of Purchaser
GC00031	1	Nuun RAPS Utility	12/08/02	10/09/02	Registered	null
GC00032	1	Nuun RAPS Utility	12/08/02	10/09/02	Registered	null
GC00033	1	Solar Fabrik (Pty) Ltd	15/08/02	10/09/02	Registered	null
GC00035	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00036	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00037	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00038	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00039	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00040	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00041	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
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GC00054	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
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GC00056	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00057	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null
GC00058	1	Molinos De Veintos Del Arenal, S.A.	26/08/02	26/08/02	Registered	null

Voluntary Green Power Pilot

- Relevant in terms of impact on demand for verification and market credibility
- Deals with trade of physical power and TRECs rather than the green attribute separated
- TRECs an excellent means of monitoring and verification

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SAWEP investigation

- Overview of the mechanism for implementing the process
- Results of Green Power Market Survey(s) – see market assessment and projected contribution
- Suggestion for institutional framework for the initial voluntary TREC market phases.
- Suggests government support is a critical success factor in the development of an appropriate institutional framework and green power market (voluntary or mandatory).

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PPA drafters TREC clause

- City of Cape Town – DarIIIP Power Purchase Agreement as model for understanding
- Requisite elements of the TREC clause of any green power purchase agreement
- Input to regulatory and legislative element of this study
- Appropriate constitution of an issuing body and suitable institutional context

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Appendix B: Comparative country analysis with respect to TREC developments

Appendix B (Interim report B) Version 4

Comparative country analysis and recommendation

June 2006

Table of Contents

1. Introduction

The objective of this phase of the study was to investigate the voluntary and mandatory tracking and verification regimes for Tradable Renewable Energy Certificates (TRECs) and to provide recommendations for the development of a national system to track and verify certificates in South Africa (SA). It is the intention that the development of a coordinated SA system for tracking and verifying renewable energy conversion and TRECs in particular, will build consumer confidence, eliminate double counting of TRECs, and accelerate the market for renewable energy more generally.

The method for developing this paper was to conduct research on the many tracking and verification issues emerging in SA and international TREC markets. A review of the governance structures and coordination mechanisms for selected established TREC markets are outlined below. The countries were selected by considering:

- countries with existing, tried, voluntary TREC systems,
- potential for export of South African TRECs to international markets
- existing trade and renewable energy relationships

This paper, therefore, provides an overview of TREC market and existing tracking regimes in the following countries:

- Australia
- Denmark
- Netherlands
- Sweden
- The United Kingdom

TRECs offer the potential to expand the market for renewable energy by broadening the availability and scope of green power products to customers. The concept of tradable certificates is based on separating the various attributes of renewable power generation from the physical energy carrier, electrical or otherwise. These could be environmental or other attributes. This creates two separate products for sale by the renewable developer, trader or marketer namely the electrical energy and the attributes associated with sustainable power generation including those providing public good. TRECs are also referred to as renewable certificates, green certificates, green tags or environmental attributes. A TREC usually represents the renewable attributes of a single MWh[7] of renewable energy. The renewable attributes may be bought and sold together, separately or combined with system electricity at the point of sale by a developer or power trader/marketer.

As this market grows, there is increasingly a need for coordination among parties issuing certificates, trading and selling certificates to uphold the integrity of the TREC market, build consumer confidence and protect TREC market participants from liability that could result from double counting & fraudulent claims. European market participants have formed an Association of Issuing Bodies that fills this role. This paper elaborates on the concept of such a team and the motivation for assistance in the establishment of a similar entity in SA. We identified parts of the European governance structures that might be appropriate to the SA market and have developed recommendations for a SA structure. This appendix also provides recommendations for facilitating the integration between existing issuing and tracking systems and the recommended system. It includes recommendations for participation in the recommended system by generators and other role-players that do not form part of the existing TREC systems.

[7] In certain markets, certificates can be created and transferred and redeemed in increments of orders of magnitude of MWh (such as 10MWh, 100MWh, 1GWh).

2. Countries operating or participating in TRECs

The following countries were considered for inclusion in the study and a brief overview of their TREC status was conducted with a view to identifying those most suitable to the South Africa situation:

A brief synopsis of those countries chosen in consultation with the project steering committee follows:

2.1. Australia

As opposed to a voluntary renewable energy system Australia was the first country in the world to introduce and operate a nationally mandated renewable energy target. Australia's Mandatory Renewable Energy Target (MRET) was established by the Renewable Energy (Electricity) Act 2000. This came into operation early in 2001 and forms the cornerstones of the Australian Government's renewable energy strategy. The primary overall long term objective of the strategy is to reduce GHG emissions. This Act mandates an additional 9,500 GWh a year in RE electricity generation in Australia by 2010.

This target is of a similar form to that of the South African target – namely an accumulated (as apposed to the South Africa absolute annual) fixed target for additional renewable energy generation to be achieved by a certain year. The Australian target is also an additional generation relative to the baseline established in the Renewable Energy (Electricity) Act 2000. Additionally it is a mandatory target backed up by legislation and penalties for individual wholesalers for not reaching the individual targets set[8]. Finally the Australian target concerns electricity, whereas the South African refers to total final energy consumption (including non-electrical carriers such as solar water heating systems).

The TRECKIN country case study report describes the operation, lifecycle and role of the Australian TREC system in the renewable energy strategy succinctly by saying that 'Renewable energy certificates are created following the delivery of renewable electricity from eligible renewable energy generation devices to the grid, end point user, retailer or wholesale buyer. Some installations of solar water heaters in Australia are also eligible for renewable energy certificates[9]. Renewable energy certificates are traded in financial markets which are separate to the physical National Electricity Market (NEM), so there is no interference with the operations of the NEM and non-NEM markets. Eligible generation devices receive certificates on the basis of their renewable generation from 1 April 2001 (not retrospectively). Each renewable certificate is equal to (or in the case of solar water heaters, equivalent to) 1 MWh of renewable generation. Owners of renewable energy generation devices will hold the renewable energy certificates in the first instance, until traded among liable or third parties.' (European Commission, 2003)

The main conclusion is that by establishing the MRET as a mandatory scheme backed up by legislation and regulation – including monitoring using a TREC- based system and penalties for non-compliance[10] – an effective and transparent implementation has been achieved. Drawbacks have been a certain lack of stimulus for small RE applications as well as the obvious lack of focus on large-scale non-electricity RE applications. The experience with the scheme confirms the findings of the survey that by ensuring a solid "paper trail" available through an internet based publicly accessible registry, monitoring and evaluation is significantly facilitated, and data quality and accuracy greatly strengthened.

2.2. Denmark

Denmark has had a TREC system since 2001. The system is based on the European Basic Commitment, now called the principals and rules of operation (AIB, available on the world-wide web, June 2006). The national Danish system is a mandatory system aimed at achieving a renewable energy contribution to electricity supply of 30% by 2010. The obligation to purchase renewable energy based electricity is on the end-user. These elements are summarised in Table 2. 35.3 million RECs have been issued and 5 million

[8] By ORER – Office of the Renewable Energy Regulator

[9] Generally the generation of TRECs by domestic solar water heaters is determined by considering classes of qualifying products in broad geographic regions and deducing a standardised expected electrical offset over the life of the water heater. A similar setup could be introduced into the burgeoning local solar water heater market. The TRECs are then generally purchased by consolidators from the installers of the heaters to whose register they accrue after a capital rebate to their customers.

[10] The penalty for failure to achieve sufficient purchase of renewable energy is essentially what renders the system mandatory and simultaneously set the upper level for the price of a unit of renewably generated renewable energy.

redeemed[11] since the inception of the system. Denmark is comprised of two domains, a Western and an Eastern domains covered by separate issuing bodies. The Western Domain is handled by the Eltra linked to 'energienet.dk' (http://www.eltra.dk/composite-12026.htm) and the Eastern Domain has Eikraft as its issuing body rendering the requisite services for device registration, issuing of certificates, auditing and management of transfer and redemption of these.

As laid out in the Association of Issuing Body's 'Guidelines for setting up a national RECs framework' the creation of the Danish REC system was spearheaded by a national team consisting of members of RECS[12].

2.3. Netherlands

'In order to provide confidence to customers that green electricity is being generated in a sustainable way, the system of Greencertificates was introduced in 2001. Under the Greencertificates system it is possible to register the production of renewable electricity generated by participating producers, and create Greencertificates and RECS certificates. Greencertificates are electronic documents which declare that a certain quantity of electricity is produced in a sustainable way. In order to be eligible for Greencertificates it is necessary to generate electricity from a hydropower plant with a capacity of less than 15 MW, a wind turbine, solar cells or a biomass plant which does not use plastics[13] as additional fuel. Production locations outside the Netherlands can be used to meet the obligation as from 1 January 2002, but certificates will only be issued after the electricity has been physically imported into the Netherlands by an authorised trader.' (European Commission, 2003)

2.4. Sweden

'The recently prepared Act on the Swedish Elcertifikats System (Lag om Elcertifikat) places an obligation on electricity end-users to buy Tradable Renewable Energy Certificates (quota obligation) each year[14]. The electricity user can pass the obligation on to their electricity supplier. The supplier is therefore required to obtain a number of Elcertifikats in proportion to the amount of energy they sell. The Elcertifikat issuing body is Svenska Kraftnat, which issues the Elcertifikats to accredited generators for each eligible MWh of electricity generated. Svenska Kraftnat also acts as the Registrar of the certificate trading system. Suppliers or end-users demonstrate compliance with the obligation by transferring the required amount of Elcertifikats to the account of the Swedish Energy Agency, who acts as auditor of the quota compliance. The supplier is entitled to charge end users for the Elcertifikats when customers pass the obligation on the supplier. The cost of the Elcertifikats should be included as a new entry on the electricity bill. The price of Elcertifikats is expected to be R115/MWh[15] excluding VAT, tax and any administrative surcharge of the energy supplier.' (European Commission, 2003).

2.5. The United Kingdom

'The Renewables Obligation1 (RO) places an obligation on all licensed suppliers to purchase a proportion of their electricity supply from renewable sources. The UK intends to generate 15.4% renewably by 2015/6. Suppliers demonstrate compliance with the Obligation through the presenting of Renewable Obligations Certificates (ROCs), or paying a "buy-out price" or penalty for failure to generate or purchase sufficient renewable resource-based electricity. ROCs are issued to accredited generators for each eligible MWh of electricity generated. Details of the ownership of ROCs are held in a register. ROCs can be traded at any time, and suppliers, generators and brokers can be involved in trade. The auditing of compliance is carried out annually by the UK electricity regulator, OFGEM, who also issues ROCs, maintains the register and collects the buy-out payments. As of the end of 2002, ROCS were being traded at R455/MWh (which excludes the price obtained from selling the electricity). Electricity generated from renewable energy projects

[11] Redemption is the process whereby the TREC is no longer available for trade and is essentially deleted from the central registry database. The entity which redeems the certificate is also the final purchaser and redeems the certificate against an obligation (mandatory), rebate (incentivised uptake), or environmental credit or image (voluntary).
[12] It is suggested that organisations forming or facilitating the formation of a National Team be members of RECS International, essentially a traders grouping. There are no members of RECS International in South Africa.
[13] This is an example of a very specific environmental or economic (health) criteria introduced in to the rules governing the system – typically captured in the domain protocol. Combustion of plastics causes the release of harmful gases.
[14] The amount that each supplier is obligated to purchase is set through an algorithm which usually has a primary parameters the total electricity (or other carrier such as litres of a liquid fuel) supply and temporal target figures or those as sophisticated as economic structural linkages (depending on the sectors which can most viably contribute to renewable energy uptake.
[15] The Rand/USD exchange rate used was R7.00 ZAR/USD as at the time of writing.

sited outside of the UK are restricted from gaining support under the Renewables Obligation.' (European Commission, 2003)

2.6. The European Union

The evolution of TRECs in Europe has developed in a different way and for different reasons than for instance in the United States[16]. The TREC market in Europe developed as a way to integrate renewable energy into wholesale utility markets and as a mechanism to meet and verify renewable policy goals. There has been considerable work accomplished in Europe on developing the technical aspects – rules, protocol and software – for handling trades between and among large players. TREC activities in Europe have been largely instigated and organised by large electric utilities. At the same time, Europe has had little experience with the development of competitive green retail markets and the implementation of TRECs in the context of sales to large numbers of relatively unsophisticated retail consumers. By contrast, TREC activity in the USA has focused on retail green markets, where TRECs act as an instrument to increase liquidity and overcome barriers to wider deployment of renewable energy on a retail level. This is very much in line with what the SA market is trying to achieve at this point in time.

European interest has been driven by concerns over diversification of power generation sources and security of generation supply, the desire to reduce transmission losses, concerns over local air quality and the reduction of CO_2 emissions in line with Kyoto Protocol commitments[17]. The European Commission's directive to promote renewable energy aims to double the share of renewable energy from current levels of 6% to 12%[18]. To that end, every EU member state is developing or has developed laws to boost the use of renewable energy. Most countries are using feed-in tariffs and renewable obligations, sometimes in conjunction with a TREC tracking program. Domestic TREC tracking systems in countries are unique to the internal situation in each country and have been established for the primary purpose of facilitating national compliance with Kyoto Protocol and national renewable obligations.

The establishment of these systems has ancillary benefits for countries that plan to liberalise their electricity market in that TRECs are highly compatible with the liberalization of electricity markets because the establishment of TREC systems provide a verification mechanism for TREC consumer sales, and helps unite TREC buyers and sellers. Despite the expectation of some that Europe will move toward a single electricity market in the future, not all EU countries are exploring liberalization or TREC systems at this point, primarily because they have opted for other policy measures to try to increase domestic renewable development.

Several important European initiatives are currently underway that are facilitating trade across borders by bringing together private sector players and working through the trade rules. National support schemes run - or ran - in Texas, Australia, UK, Denmark, Sweden and Netherlands. In addition, there are the European Renewable Energy Source and Combined Heat and Power Directives, both of which introduce certificates as evidence of production. In addition to these legal instruments, there is also the voluntary RECS scheme, which runs or ran in all EU countries except Greece. The European EECS scheme, as set out in the PRO, has only been adopted in some countries namely; Belgium, Germany, Denmark, Finland, Netherlands and Sweden.

2.6.1. Governmental TREC regimes in Europe

Most European countries have policies in place to support new renewable development and a renewable electricity market, at either the retail or wholesale level. There is significant controversy over which of these policies is most effective at bringing more new renewable energy on line at the least cost to EU member countries. This policy and incentive controversy is at the heart of the discussion over whether a coordinated TREC issuing and trading regime in Europe can be accomplished. TREC regimes can facilitate trade by providing a currency that substantiates that an amount of renewable energy has been generated that can then be traded or banked for future use. Proponents of this approach argue that creating a competitive market in certificates will increase the economic efficiency of renewable generation (i.e. produced in least cost areas) that will keep prices as low as possible. Differences in domestic TREC trade rules, renewable preferences, and subsidies, however, make this difficult to achieve.

[16] See report by the Center for Resource Solution USA dated 29 May 2002 version 2.4.
[17] "Europe plans trading in 'greenness'", Environmental Finance, October 2000
[18] Directive of the European Parliament and of the Council on the promotion of electricity from renewable energy sources in the internal electricity market, Commission of the European Communities, Brussels, 2000.

A number of European countries have passed renewable energy obligations into law comparable to Renewable Portfolio Standards (RPS) mandates in the USA. Of these Austria, Denmark, Netherlands, the United Kingdom, Italy, Belgium, Norway, Finland, Germany, Spain, Slovenia, France, Switzerland, Portugal and Sweden have TREC systems in place.

Table 2 includes a listing of the key components of national TREC systems in the European Union and elsewhere. A selection of a number of Countries that could inter alia offers a sound and representative view of what is happening in the rest of the world and which could contribute to the SA TRECS development process. Although this study concentrated on those countries that have a voluntary TREC system it considered suitable elements of mandatory systems that could support future mandatory measures in SA.

Table 2 Key characteristics of case study tradable renewable energy certificate systems

	Denmark	**Texas**	**UK**	**Sweden**	**Norway**	**Netherlands**	**Australia**	**Recommended for South Africa**
Involved since	2001	2001	2002	2003	2002	2001	2001	All recommendations to be considered by the PSC
What Framework Based on	European Basic commitment (PRO)	European Basic commitment (PRO)**?**	European Basic commitment (PRO)	European Basic commitment (PRO)	European Basic commitment (PRO)	European Basic commitment (PRO)	Renewable Energy Act 2000	European Basic commitment (PRO)
Mandatory or Voluntary	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Voluntary	Mandatory	Voluntary to be negotiated with suppliers (REDs)
No TRECs Cert issued & redeemed	issued35.3 m red. 5m	2002 2.2m issued 1.2m red	0.9m issued	27.7 issued 3.56 red	35.3m issued 5.7mred	10.2million iss (24.5m/red)	7.4m issued 3.2 red	NA
Target re total consumption	30% 2010	Additional 2,000 MW by 2009	15.4% by 2015/6	16.9% by 2010	90%	8.5% 2010 17%2020	Additional 9 500 GWh by 2010	Additional 10TWh by 2013
Obligation on whom?	End User	Suppliers	Suppliers (passed to suppliers)	End users <10MW	Statnett SF	Voluntary neg quota	Wholesale purchasers	Voluntary neg target on supplier
Umbrella Body Originator	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM	NATIONAL TEAM (NT) to be formalised
Issuing Body	two IB,s & Domains Eikraft & Eltra	ERCOT	Green Cert Co	Svenska Kraftnat	Statnett SF	Groencertificatenbeheer bv	ORER	NT to appoint IB & Then to be established
Accreditation body	Body app. By IB's	PUCT	Green Cert Co	Swedish Energy Agency	Body approv by Statnett	Groencertificatenbeheer bv	ORER	IB to contract & establish AB

	Denmark	Texas	UK	Sweden	Norway	Netherlands	Australia	Recommended for South Africa
Central Monitoring Office	Body app. By IB's	ERCOT	Green Cert Co	Svenska Kraftnat	Body approv by Statnett	Groencertificatenbeheer bv	ORER	IB to contract & to establish CMO
Auditing or Control Body	Body app. By IB's	ERCOT	OFGEM	Swedish Energy Agency	Body approv by Statnett	NA	ORER	IB to contract & establish AB
Banking	Yes (no limit)	2 years	1 year	Yes (No limit)	Yes (No limit)	No	Yes (No limit)	Yes (No limit)
Borrowing	Yes with "security deposit"	No	No	No	No	No	No	No
Validity (Years)	infinite	3	2	Infinite	Infinite	1	Infinite	Infinite
Price c/kwh			41c/kWh					To be establish
Penalty/buy-out	N/Av	R350/MWh	R450/MWh	R115/MWh	N/Av	N/Ap	R190/MWh	N/Ap
Settlement period (years)	N/Av	1	1	1	N/Av	N/Ap	1	NAp
Certiciate size (MWh)	1	1	1	1	1	1 10, 100, 1000, 10000	1	1
Typical price (2002)	N/A	R110/MWh	R400/MWh	R50/MWh	Not available	N/Av	R135/MWh	To be establish
Import eligible?	Yes conditionally	Yes if metered in, all imported into, Texas	No	No	Yes	Yes, with physical electricity	No	No (not in the interim)
Eligibility date	2001	After 01/09/99	After 01/01/90	All new hydro after 31/12/2002	02/02/2028	None		NT to recommend
Interaction with other schemes	Share CDB with Finland, Norway & Sweden		ITO PRO guidelines	ITO PRO guidelines	ITO PRO guidelines	ITO PRO guidelines		PSC to resolve ITO PRO guidelines
Biomass	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PV	small biomass	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Solar thermal	Yes	No	No	Yes	Yes	No	Yes	Yes

	Denmark	Texas	UK	Sweden	Norway	Netherlands	Australia	Recommended for South Africa
Wind	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geothermal	Yes	Yes	No	Yes	Yes	No	Yes	Unlikely
Tidal	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Wave	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Ocean thermal	Yes	No	No	No	Yes	No	Yes	Yes
Small hydro	Yes	Yes	Yes	Yes	Yes	Only < 15 MW	Yes	Yes
Large hydro	No	Yes	Yes	Yes	Yes	No	Yes	Yes

The differences between national TREC systems in Europe greatly affect cross border trade. Only half of the countries that have domestic TREC tracking systems currently allow international trade. Some countries fear that cross-border trade will compromise their national policy interests. The key issues include the effects of international trade on domestic renewable development, effects of international trade on domestic support schemes for renewable energy, and issues concerning the harmonisation of trade rules. The RECS Program described in detail below is aimed largely at addressing the harmonisation of trading rules.

The issue of renewable development is more complex. Countries have different ideas about the types of renewable energy that should be bolstered by trading. Because renewable energy are largely geographically dependent, some countries naturally have more hydro, wind, solar or biomass resources. Though one tends to think of renewable energy as being universally beneficial, they do have significant land and environmental impacts, particularly biomass and hydro resources. Some countries want to encourage a limited subset of renewable generation locally, while other countries want to bolster a broad range of renewable energy. Unfortunately, the countries that want to encourage a broad range of renewable generation are not necessarily the same countries that have a broad range of renewable resources available for exploitation. Moreover, some countries want to allow trading only for new installations in order to encourage development, while others want to support their local existing renewable industry. Developing an international trading regime that allows flexibility without compromising the effectiveness of laws and regulations in another country is challenging.

Finally, the issue of governmental subsidy is politically sensitive in terms of international trade. Governments are wary of neighbours whose renewable producers enjoy a high level of governmental support that would allow them to dump their certificates on the international market at greatly reduced prices. Governmental assistance to renewable power generation is seen as a hidden export subsidy. Some governments fear that the purchase of certificates from outside their country could serve to subsidise the renewable projects in neighbouring states, reducing internal investment. Impediments to international trade are a major issue in many different markets. Provisions to avoid such impediments are included in most international trade agreements (e.g. WTO and NAFTA) with the issues fuelling debate in courtrooms around the globe including the European Union Court of Justice.

2.7. The Renewable Energy Certificate System (RECS)

The Renewable Energy Certificate System, (RECS) is the only international TREC issuing and trading system that is currently operating in Europe on a voluntary basis. RECS is an extra governmental, self-financed group that was formed in 1999 by power companies from the Netherlands, France, Germany, Denmark, Belgium, Italy and the United Kingdom. RECS was also established to act as a platform for interested parties to collaborate and advocate for the international harmonisation of renewable energy certificates trading systems[19]. At the present time, over 157 companies from 19 countries are members of RECS.

[19] www.recs.org

RECS started a two-year trial of international trading in TRECs in January 2000 in order to prove its feasibility and to educate market players about the steps necessary to create a credible market. The RECS "Test Phase" was designed to demonstrate the feasibility of the concept and the technical systems used in the trading mechanism and to give member countries an opportunity to work through harmonisation issues. RECS members have agreed to the RECS Basic Commitment, now called the Principles and Rules of Operation (PR)), a document that represents a Europe-wide agreed "minimum common set of definitions and criteria for the creation, issue, use as evidence of transfer of ownership and eventually removal from the market of RECS Certificates"[20].

2.7.1. Governance structure of RECS

There are currently three governing bodies within RECS:

- the Presidium,
- the Trade and User Group (TUG) and
- the Association of Issuing Bodies (AIB).

While the Presidium takes an overview of and directs the activities of RECS as a whole, the TUG addresses issues associated with trade and consumption. The AIB, originally a working group of RECS has the most formalised role. The AIB was formally established as a not-for-profit Belgian Royal Assent company after the trial phase was completed. The position of the Presidium and the TUG is currently being reviewed. All three bodies were extremely important in establishing and launching the RECS program.

2.7.1.1. The Presidium

The Presidium is a voluntary association with one member elected by each of the participating RECS countries. A European consulting firm manages the administrative functions of the Presidium. The Presidium's main role is to spearhead efforts to harmonise national systems with RECS on a policy level. This is achieved primarily by facilitating discussions with and between national government representatives and environmental nongovernmental organisations. The issue of harmonisation is complex because most European nations have policies in place that restrict internationally traded certificates from being used to meet local renewable policy mandates, which are the primary demand-side drivers in European markets. Most countries do not want their national funds or subsidies to be used to meet another country's renewable obligations. In addition, governments do not want a single renewable project to receive a subsidy from more than one country. To prevent this, most governments have restricted the trade in certificates from subsidised facilities. However, since most supply and demand in Europe is being driven by subsidies and renewable mandates, this has greatly restricted the opportunity of the RECS market to develop and grow. Since early 2000, the RECS Governmental subgroup has provided a forum where governments of these different countries can discuss the issues associated with this problem. It should also be noted, that the efforts of the Presidium are being financially supported by the European Commission because of the benefits international RECS trading will have in helping the EU meet Kyoto protocol targets and improve energy security in Europe. It is also noteworthy that the European Renewables Directive opens the door to the adoption of a TREC scheme at a European level should current legislation not stimulate the building of sufficient new renewable energy facilities.

2.7.1.2. Association of Issuing Bodies

The RECS system is built upon an organisation of individual TREC issuers called the Association of Issuing Bodies (AIB). The Issuing Bodies issue TRECs, register ownership, record transactions and ultimately retire or redeem TRECs. Market participants in their region appoint each Issuing Body. There cannot be more than one Issuing Body in a single geographic region, known as a Domain. In Europe Domains tend to coincide with electricity transportation and distribution systems or geopolitical boundaries. By having only one Issuing Body in a geographic region, RECS ensures that one and only one certificate is issued for a given MWh of electricity generated. Issuing Bodies must be financially independent of market participants and may not buy or sell TRECs or have any financial interest in TREC markets. To obtain accreditation as a member of the AIB, each Issuing Body submits its processes and procedures for review of compliance with the rules of the RECS.

Issuing Bodies have three primary functions within RECS and within their Domain:

- to issue certificates,
- to record certificate transactions and to remove certificates from the market at the request of consumers and

[20] RECS Basic Commitment, Article 1.

- to verify the renewable nature and operation of local generation units.

All Issuing Bodies maintain a database for their domain, known as a Central Registration Database (CRD), which will record the issuance and retirement of certificates in their domain, and the transfer of certificates both within and into or out of their domain. When a transfer of ownership is requested, the Issuing Body will confirm that the transfer has taken place.

The Issuing Body has the sole responsibility for imports and exports of TRECs into and out of its Domain and the Issuing Body from the receiving or sending Domain will be alerted of any such transfers. Upon export, a certificate is retired from the registry of the exporting Issuing Body. Upon import, a certificate is created in the registry of the importing Issuing Body, with the same certificate number as it had upon issue. When the owner of the certificates wants to "redeem" or retire the certificate, the Issuing Body will so annotate the certificate on their system, and will issue a printed record of this if desired. Retirement may occur to comply with a Renewable Obligation (RO), Renewable Portfolio Standard or other renewable mandate, to satisfy consumer green power sales, to advertise or otherwise make statements about purchasing renewable certificates (e.g. an end-user customer who makes claims about buying renewable electricity) such as green labelling.

Issuing Bodies also have the responsibility for inspecting generators periodically as necessary to verify the characteristics of the renewable certificate are correct and that generation is being accurately measured. To sell their TRECs through the RECS system, generators must register with the Issuing Body in their Domain. Registration is strictly voluntary as is participation in the RECS system, however, renewable generators receive value from participation because their TRECs are tracked and verified from cradle to grave. It is assurance of a sound and robust system to provide this tracking that must form the rationale for the development of a South African system.

The Basic Commitment developed by the Association of Issuing Bodies (AIB) is one of the cornerstones of TRECs in the world and could be defined as the basis of TRECs in Europe, it is linked to all TRECs worldwide and has now also been adopted by the USA to form the basis of their TRECs verification, monitoring, tracking and control system.

2.7.1.3. The Trade and User Group (TUG)

The TUG was formed as an advisory committee of interested energy traders, green power brokers, and exchanges to provide recommendations and feedback to the larger RECS group. In particular, the TUG helped to define the information and conditions needed to perform international trades for the Basic Commitment. The TUG also worked on establishing extra-governmental trading platforms that will serve the needs of market participants wishing to buy and sell certificates. It is important to note that the Issuing Bodies do not track any financial information in their databases; they only record transfers that are made. Therefore trading platforms are expected to develop outside of the RECS system according to market needs.

The Principles and Rules of Operation (PRO), formerly the Basic Commitment was re-examined following the completion of preparation for international trade and the early days of trading activity. The TUG role has since decreased in the governance of the AIB as it transitioned from the test phase to a permanent operational structure; but has increasing importance as an influential group within the larger RECS group.

2.7.1.4. Operation of RECS vis à vis Specific Country Operations

RECS is fundamentally an umbrella organisation governing an association of independent Issuing Bodies and other market participants that are buying, selling or trading renewable certificates issued by RECS accredited Issuing Bodies. Therefore, the operations of RECS are inextricably linked to the basic operations of the Issuing Bodies. Two directives govern each Issuing Body: the Domain Protocol and the Basic Commitment. The Domain Protocol is developed/maintained by each individual Issuing Body with input from all market participants and contains the operating rules for a particular geographic domain. The Domain Protocol incorporates country-specific program rules into its operating procedures, for example, how to treat certificates from a subsidised facility, and what types of certificates can be used to satisfy a specific country's renewable obligation. The Issuing Body is either responsible for or is the verification agent determining compliance with government regulations. Therefore the Domain Protocol lays out the rules for how the Issuing Body will operate its specific certificate tracking and issuing system in a country or region.

2.7.1.5. The Principles and Rules of Operation (PRO), formerly the Basic Commitment

The PRO is the common thread uniting the operations of the various European Issuing Bodies. The PRO represents a minimum set of definitions and criteria for the creation, issue, transfer, and retirement of renewable certificates. All RECS Issuing Bodies uphold and enforce the PRO within their geographic domain. The PRO governs the following activities of Issuing Bodies:

- Registering generators,
- issuing certificates,
- transferring ownership of certificates,
- recording information in the Central Registration Database,
- verifying generation,
- investigating requests for changes to the PRO, and
- mediating disputes.

It is important to note that although the PRO defines renewable energy as "all energy excluding fossil and nuclear fuels," it does not try to rank or establish an environmental hierarchy between different renewable generation and fuel types. Rather, the PRO is governed by the philosophy that as long as the generator information is adequately recorded on the certificate, buyers can express their preference for different types of renewable energy with different environmental profiles. The RECS system does not therefore exclude any renewable electricity types, yet is still compatible with renewable energy programs in Europe as it helps to substantiate renewable production, prevent double counting, and support verification efforts of such programs.

2.7.1.6. Registering Generators

The PRO governs the process for registering generators in the RECS system. Generators who wish to register their output with RECS must supply the Issuing Body from their domain with information about their facility, which must include:

- Contact details
- Location
- Metering details
- Possible fuel sources
- Technology
- Installed capacity
- Start up date
- Public support received
- Guarantee of exclusive use of this certification system for each unit of energy
- Engineering diagram showing metering, transformer and auxiliary equipment

Registration is valid for five years.[21] Generators are given an identification number that is used to identify certificates from their facility. Generators may not register an individual plant with more than one Issuing Body, but where a generator has plants in more than one country it may register with the Issuing Bodies in each of those countries.

2.7.1.7. Issuing Certificates

The PRO lays out the process for issuing certificates. The Issuing Body is authorised to issue certificates for the net amount of electrical energy generated. The net amount of electrical energy produced is determined by the gross production minus line losses to the busbar and on-site auxiliary use. The Issuing Body must substantiate the amount of generation with data metered according to national standards. The AIB is developing standards for certificates from photovoltaic facilities that may be unmetered. The method for dealing with unmetered renewable energy sources is of particular interest in South Africa where a large proportion of developments in renewable energy are either non-electrical or electrically carried by not via the main electrical network. The frequency with which meter data is monitored and certificates issued is governed by the Domain Protocol, and as such will vary between regions and countries. When a certificate is issued, it becomes the property of the generator until ownership is transferred. The PRO requires that the following minimum information be carried on each certificate:

- Unique certificate number
- Issuing Body
- Generator identity
- Born date of certificate, year, month and day
- Type of generation technology/fuel type

[21] RECS Basic Commitment, p. 6.

- Level of public support (4 categories)
- Installed capacity of generator.

2.7.1.8. Transfer of Ownership of Certificates

The PRO indicates the process for transferring ownership of certificates between RECS members and between Domains. The financial transfer of ownership of RECS may be through private bilateral transactions or through a third party broker or exchange. Either way, the PRO does not govern market-trading mechanisms and the RECS Issuing Body does not provide the trading platform for sales of RECS. It does however, record transfers of ownership, confirm the transaction with both the buyer and seller, and notify any adjacent Issuing Body if the certificate is being transferred into their Domain. In this last case, all certificate information is transferred with the certificate into the new Domain. The PRO allows any RECS certificate owner to bank its certificates for an unlimited period of time, unless otherwise restricted by law.

The PRO also governs the circumstances under which certificates are redeemed or retired from the system. These include,

- sale to an end-use customer purchasing renewable power,
- advertisement of environmental performance from renewable electricity, such as when a company claims to be reducing greenhouse gases or claims to be buying renewable electricity, and
- use of a certificate to meet a policy mandate, such as a tax exemption, a renewable obligation , air quality goal.

The Issuing Body removes a redeemed certificate from the system and the owner of the certificate is credited with retiring the certificate. Retail certificate owners may still sell or trade their certificates but those retail transactions are not tracked.

2.7.1.9. Recording Information in the Central Registration Database

The Central Registration Database (CRD) is the database maintained by each Issuing Body. There is not at the moment a “central” CRD, maintaining all ownership details from all Issuing Bodies. This is expected to be a feature of AIB operations in the future. Issuing Bodies are obligated to record certain information in the CRD for all RECs members to access. This information includes all static information about generators, such as fuel types, technology type and age. As per the PRO, the Issuing Bodies will also record in the CRD the ownership of each certificate; but will only make public the total number of certificates that are issued, retired and exported/imported.

2.7.1.10. Verification, Audits and Reports

The PRO outlines the processes for verifying that meter data being submitted is accurate, that the generator registration accurately represents the current condition of the generation facility, and that the Issuing Body is operating within the rules laid out by the PRO. This is the reason that South Africa should adopt the PRO as a framework for development of our own system. It will then also have a good probability of being consistent with the majority of other regional TREC systems. The Issuing Bodies are also required to supply the AIB with periodic reports on the volume of transactions and general market information.

2.7.1.11. Investigating Requests for Modifications and Mediating Disputes

The PRO establishes protocol for investigating requests for modifications to itself and mediating disputes between market participants or Issuing Bodies. In the event that a dispute cannot be resolved between parties, the Issuing Bodies may take the dispute to the AIB for arbitration[22]. South Africa would require an equivalent entity prior to application for membership of the AIB.

2.7.1.12. Experience of RECS trading to date

Uniting several unique and nationally tailored certificate trading programs into an international system is highly challenging because it requires a level of standardisation that at times conflicts with national policy interests. Even if two countries are open to trading across their borders, differences in their system requirements, definitions, and regulations create difficult issues. The RECS Test Phase was originally intended to have commenced operation in January 2001. However, agreement of the Basic Commitment was delayed until May 2001. Issuing of certificates commenced in July 2001, certificate transfer has initially

[22] RECS Basic Commitment, Article 7.4

been restricted to proving the system, in the absence of an automated link permitting the transfer of certificates between national registries: this link has become operational during April 2002 and transfers commenced the following month. Retirement of certificates commenced during February 2002. So far, over a 120 million 1MWh certificates have been issued, of which 60 million have been retired.

The volume of trade is largely driven by the presence of obligatory systems and voluntary schemes. In view of the natural caution of European governments in agreeing to reciprocal relationships for the promotion of renewable energy via certificate systems and in the absence of mature and well-developed voluntary schemes, the anticipated number of transactions is expected to be limited, at least in the early days.

One interesting development is the ability of an Issuing Body to provide services to participants from countries or regions wishing to participate in the market, but which do not have an Issuing Body that has been appointed by government. In one such instance, the generator was located in a country (Ireland) that does not have a governmentally approved Issuing Body. The generator had a buyer for the certificates in another European country (in this case, the Netherlands – whose Issuing Body was appointed by government) but the buyer wanted the protection and third party verification offered by the RECS scheme. So the generator registered with the RECS Issuing Body for the UK (the Green Certificate Company), which then recorded the generation information per the Basic Commitment protocol and issued certificates to that generator and transferred them to the Dutch registry. The Dutch Issuing Body subsequently retired them on behalf of the buyer. Similar arrangements are in place between the German Issuing Body and Spain. This is an interesting precedent because it provides a good model for Southern Africa where there are several SADC Countries that are not likely to have an established Issuing Body in the next 5-10 years.

Further precedents exist elsewhere in the world. The UK Issuing Body also issues certificates for a renewable generator in Guatemala (using the same procedures as RECS, but for the time being outside of the RECS scheme, which is currently limited to Europe), redeeming these immediately upon issue and passing printed evidence of the retired certificates to a client in Europe. Further such trades are in progress of negotiation.

Each is an example of the success of the fundamental RECS concept, which was designed to accommodate both obligatory and voluntary schemes, and to support certificate transfer both within and between such schemes. This is an important reason for the South African system framework to be based on the Basic Commitment and its soon to be adopted successor the Principles and Rules of Operations (PRO)

3. Common characteristics of successful TREC systems

Through the TREC trading regimes that are running today worldwide, there appears to be several key characteristics that all such systems include as important to a successful TREC system.

3.1. Adequate governance, education and Institutional Support

Deciding upon a sound framework for trade and governance is one of the most important first steps in developing a TREC system. Establishing agreements for registering generators, issuing certificates, transferring ownership of certificates, sharing information, verifying generation, and mediating disputes can be highly complex and subject to political sensitivities. As demonstrated in the European RECS, developing trading rules that harmonize existing governmental TREC systems is no small task. Adequate institutional support to bring parties together, facilitate discussion of sensitive issues, and manage conflict resolution is critical to the success of establishing a sound framework for a SA system. Providing an effective institutional home for managing this process is important.

3.2. Effective network and system design and operation

Besides trading rules, the system itself has to be organised to meet the needs of the market and stakeholders, including the different regulatory purposes of governmental participants. Regulatory purposes, in South Africa may include reporting. As can be seen in US renewable electricity markets, regulatory uncertainty creates risk for new market participants and can act as a barrier to participation. This also appears to be the primary reason that a study into a suitable US TREC system basis suggested adoption of the RECS. The rules governing the network must effectively link together different Issuing Bodies and allow seamless communication between such bodies. Not all the information contained in an Issuing Bodies' system needs to be available to all participants. On the contrary, most information in the databases operated by the Issuing Bodies will remain confidential. However, there needs to be an ability to transfer some information between systems to prevent double counting or double selling of TRECs.

There are several key functions that each Issuing Bodies' TREC tracking system must satisfy including:

- Retirement of certificates after they have been used to meet government mandates or retail sales.
- Prevention of double counting, double sale or double use.
- Ability to ensure the basic information, including fuel type and emissions profile, and quantity of certificates is verified.
- Ability to meet a variety of regulatory objectives, such as verification of compliance with Renewable Portfolio Standards or desire to increase market potential for renewable energy; and
- The ability of the various issuing bodies to communicate between each other in an efficient and secure manner. The individual systems and the network should be easy to use, transparent, flexible, and have low transaction costs.

3.3. Public Acceptance

Public acceptance by market participants, non-governmental organisations (like trade associations and environmental groups) and government is important for the success of a TREC tracking system and consequently a national TREC network. To identify policy objectives and functional requirements of individual systems and to develop appropriate trading rules for trading between systems requires the cooperation of all parties. The development of a network without such cooperation would unavoidably mean the network might not evolve in a way that would satisfy the needs of different potential parties. In addition, lack of confidence in an individual system or the network as a whole, for example by a regulatory body or environmental group, could undermine the potential uses. Public acceptance of the network of systems and the process for developing the network of systems is important for building a strong and diverse coalition of interested parties that have a stake in the success of the project.

3.4. Secure Intersystem Communications

It is critically important that tracking systems located in different geographic areas be able to electronically communicate with each other in a clear and efficient manner. The information common to tracking system functions should be handled in a consistent manner and the systems and their electronic interface must be secure from outside intrusion or tampering. Public information must be transparent and easily accessible while proprietary information must be secure and unavailable to unauthorised acquisition.

3.5. Demonstrated market need and demand

The success of a TREC network requires the support of government and the participation of market participants at all levels, including generators, traders, retail suppliers, and end-use customers. Like all markets, a TREC market needs volume in terms of renewable supply and renewable demand, in order to make participation worthwhile. Without the willing support of a range of market participants, the market simply won't have enough activity to sustain interest. As in the example of the RECS system in Europe, government policy that limits cross-border trade of renewable certificates has a crippling effect on the renewable certificate market because it fundamentally limits the number of participants that have a reason to participate in the market. Similarly, the restrictions imposed by the New England system on exports will greatly limit the opportunities for New England (USA) generators to sell their renewable certificates outside of their region. This may have the opposite effect from what New England desired by ultimately capping the amount of new renewable generation that is developed in New England and limiting the potential market for New England generators. Policies like the Texas RPS that support long-term demand for TRECs help reduce investment risk, drive the supply side of the market and provide a stable environment for market participation.

4. Conclusions

This phase of the study has found generally that a SA TREC system should be a unique system addressing the SA internal situation that is not based on the experience of one specific country but should be defined within the experience of a general robust framework such as the Basic Commitment as amended by the Principles and Rules of Operation (the PRO), of the Association of Issuing Bodies (AIB) in Europe, and making use of the elements of the TREC systems of those countries that could add value or benefit to that of South Africa.

The European Basic Commitment as amended by the Principles and Rules of Operation should be adopted as the basis for a framework upon which to develop a South African TREC system.

The development of a national team for maintaining a framework and providing an institutional basis for issuing and tracking of TRECs by the national Issuing Body (IB) is necessary and there is broad-based support for the development of such a team or SA TREC association. The rationale for creation of such is the necessity for market credibility. There appears to be strong support for the development of a national coordinating body. Conceptually, there is widespread agreement that the simple model (Basic Commitment as amended by the PRO) recommended here is logical and will provide the most efficient solution to many different markets and regulatory needs. The chief barrier to the development of such a network appears to be the initial funding pending sufficient market volume to establish a sustainable issuing body.

It was found that the REC system:

- provides a simple, clear, practical, implementable, administratively efficient method of operation and rules;
- presents a basis for clear definition of TREC eligible renewable energy resources and technologies
- is a tried and tested system is manageable yet robust, reducing the likelihood of error or fraud
- will be supplementary and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum Government involvement and
- as the basis for many other international TREC systems is compatible with and provides potential for interaction with other the majority of prominent TREC systems

The countries were selected by considering:

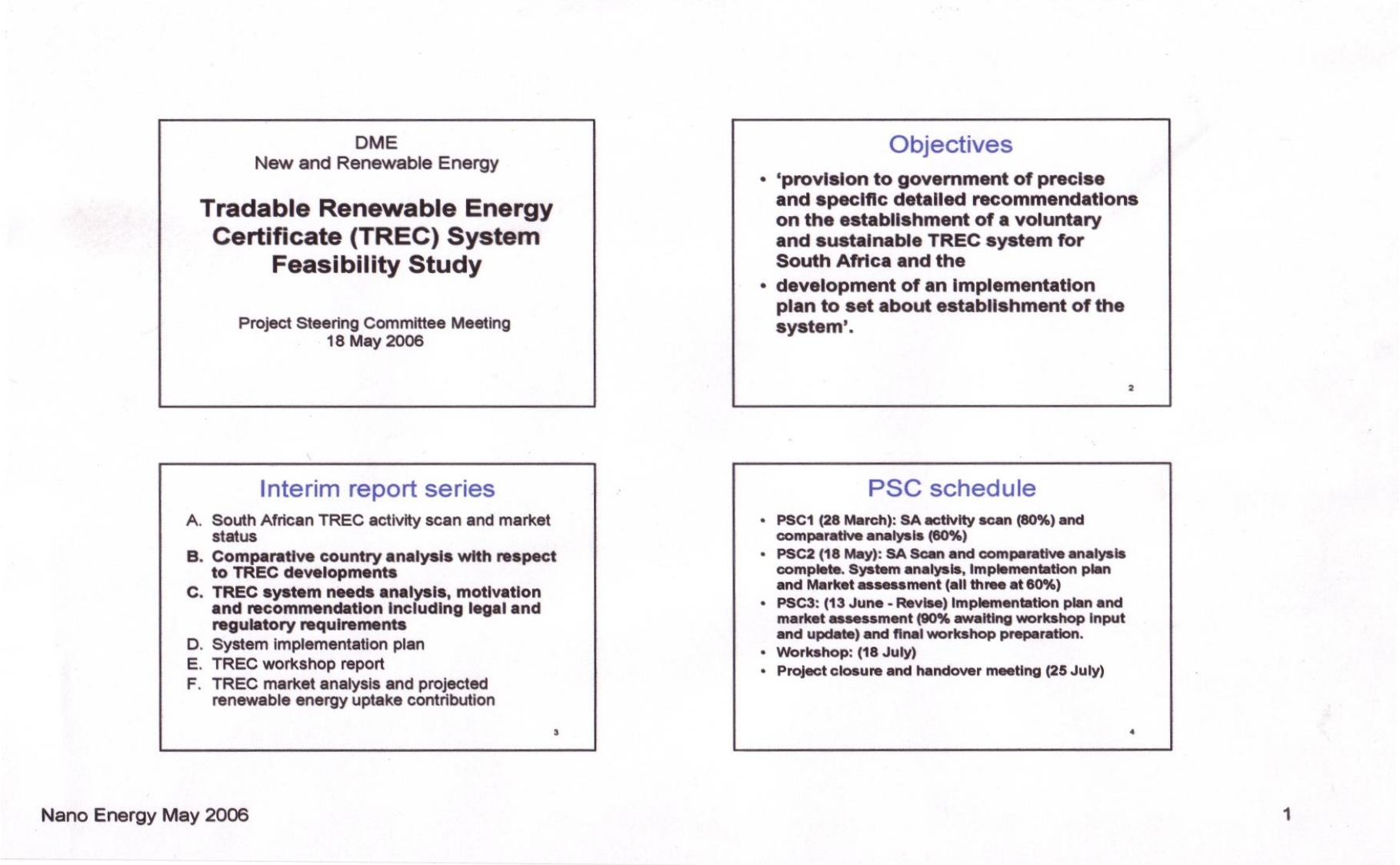
- countries with existing, tried, voluntary TREC systems,
- potential for export of South African TRECs to international markets
- existing trade and renewable energy relationships

Further criteria upon which the recommendation was based included similarities to the South African policy and regulatory environment, the stage of development of the electricity and liquid fuel industries, success of the TREC initiative in question and compatibility with existing renewable energy support mechanisms.

Possibly the most important element that has emerged in terms of national renewable energy policy is the ability of a TREC system and associated infrastructure to provide an incentive independent tool for monitoring of renewable energy uptake. Monitoring in turn provides feedback on the success of various policies and for refinement of these or adoption of new policies and support mechanisms. This includes monitoring systems to be used in the setting of policy such as the monitoring of the renewable energy target system. This system, operational in 2004 and 2005, currently has a resolution, uncertainty or confidence interval of little better than 100MWh. A TREC system on the other hand will need an accuracy of 100 times better than this or 1MWh – the size/increment of a single TREC. This gives an indication of both the advantages which the system will provide across the policy spectrum (be the incentive chosen a feed-in tariff, production subsidy or mandatory target) and also a motivation of the focussed financial and human resources which will be required.

5. Summary

The presentation made to the project steering committee on the 18 May 2006 is provided as a summary of the above.



Comparative analysis

- Countries operating or participating in TRECs with a description and comparison of the TREC system (including number and value of TRECs issued),
- TREC project lifecycle and system of governance (mandatory and non-mandatory examples),
- System rules,
- Use of the TREC system (advertising environmental performances, fulfilling of a renewable energy obligation, to claim tax exemptions etc),
- Compatibility with other TREC systems, international acceptance and trading,
- Integration with existing policy, legal and regulatory framework,
- Government participation,
- Resources (financial, manpower and institutional), skills, administration (e.g. hardware and software applied) and sustainability.
- A breakdown of cost and responsibility for setting up and to sustain the TREC system.

5

Comparative analysis

- Massachusetts
- Texas
- **UK**
- **Sweden**
- **Norway**
- **Netherlands**
- **Australia**

➔Recommended for South Africa

6

Core elements

- Majority of systems based on the Basic Commitment (PRO)
- Negotiated voluntary target as in Netherlands of interest
- Significant volumes
- Establishment of a national team as oversight body
- Allowance for country specific rules in protocol such as eligibility date (all with impact on desired impact on rate of uptake – to implementation plan)

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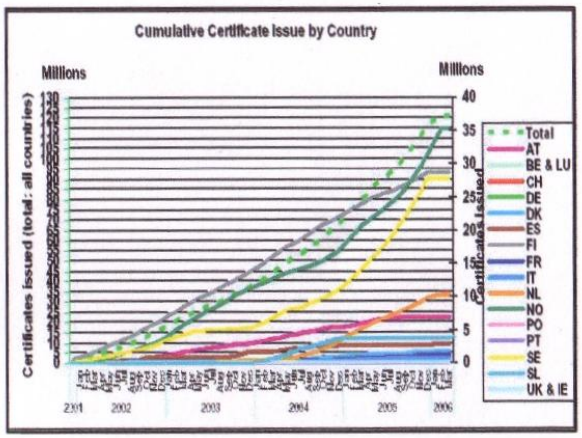

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Recommendation

- Identify one country or region operating or participating in a voluntary TREC system which could be the basis for adopting and customising a South African TREC system
- **Adopt RECS as the framework for development of the SA TRECs system with best practice from top 5**
- RECS
  - provides a simple, clear, practical, implementable, administratively efficient method of operation and rules
  - presents a basis for clear definition of eligible TREC renewable energy resources and technologies
  - as a tried and tested system is manageable yet robust, reducing the likelihood of error or fraud
  - will be supplementary and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum Government involvement and.
  - as the basis for many other international TREC systems is compatible with and provides potential for co-operation with other prominent TREC systems

9

What is a system?

- Framework for trade on which the market participants agree
- System of governance
- Institutional setup
- Market principles
- Rules of operation
- Tracking system
  - Human resources
  - Software (primarily the Central Registry Database CRD)

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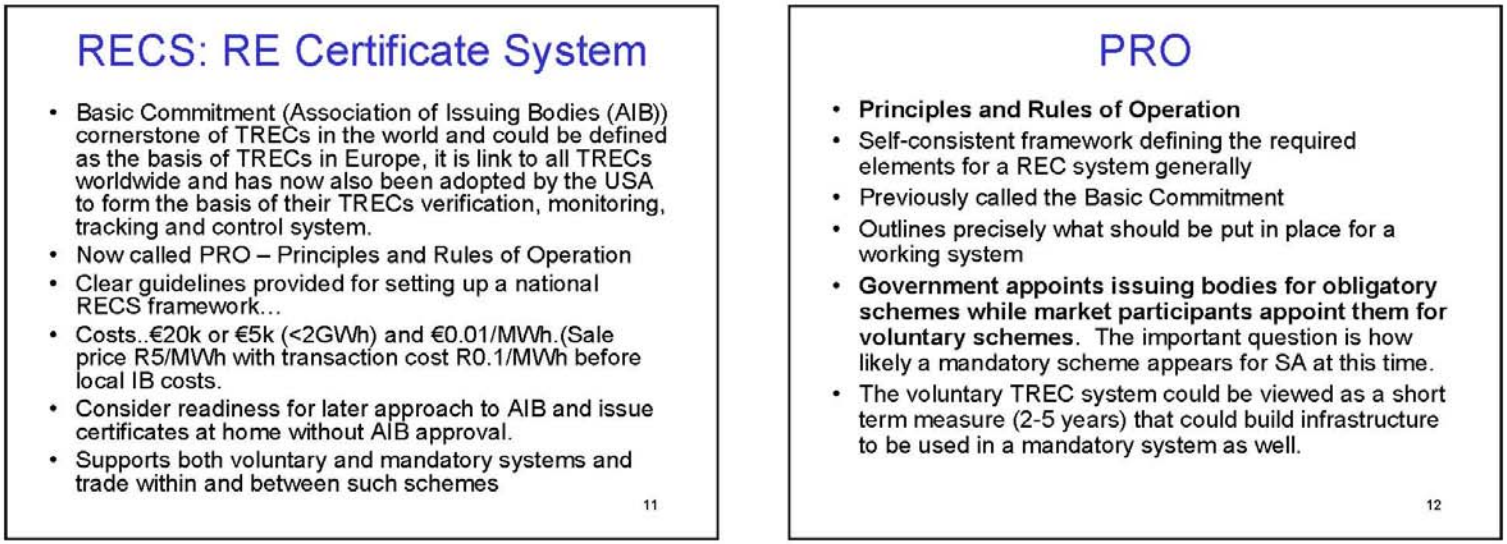
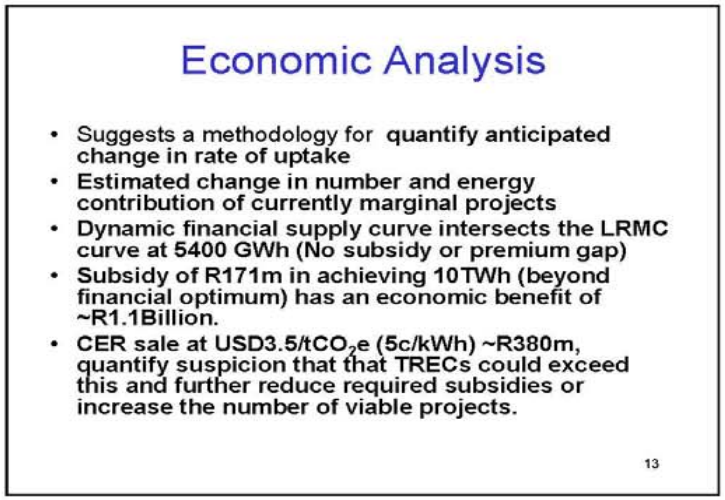


Figure 7 The PRO and the central registry



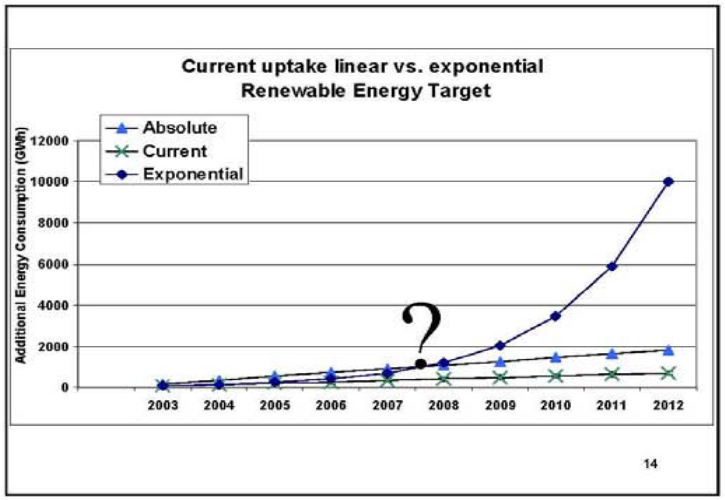


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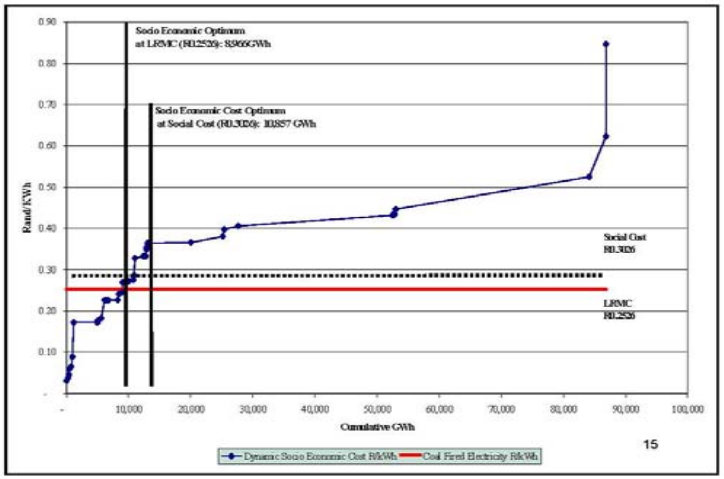
Figure 8 The IB business model is a function of the demand for certificates



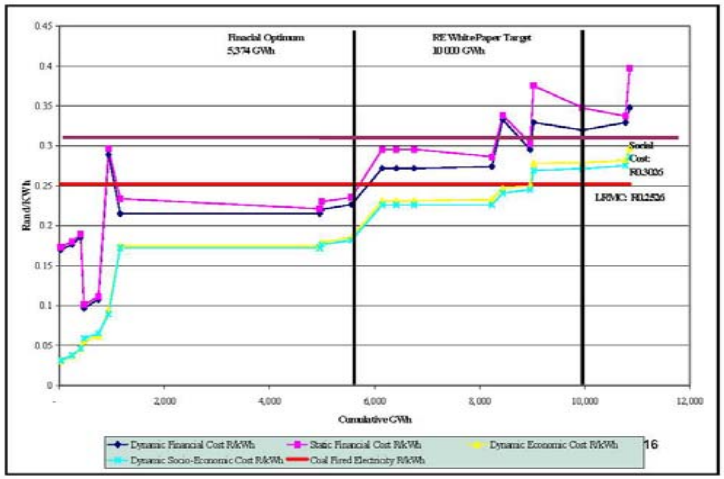


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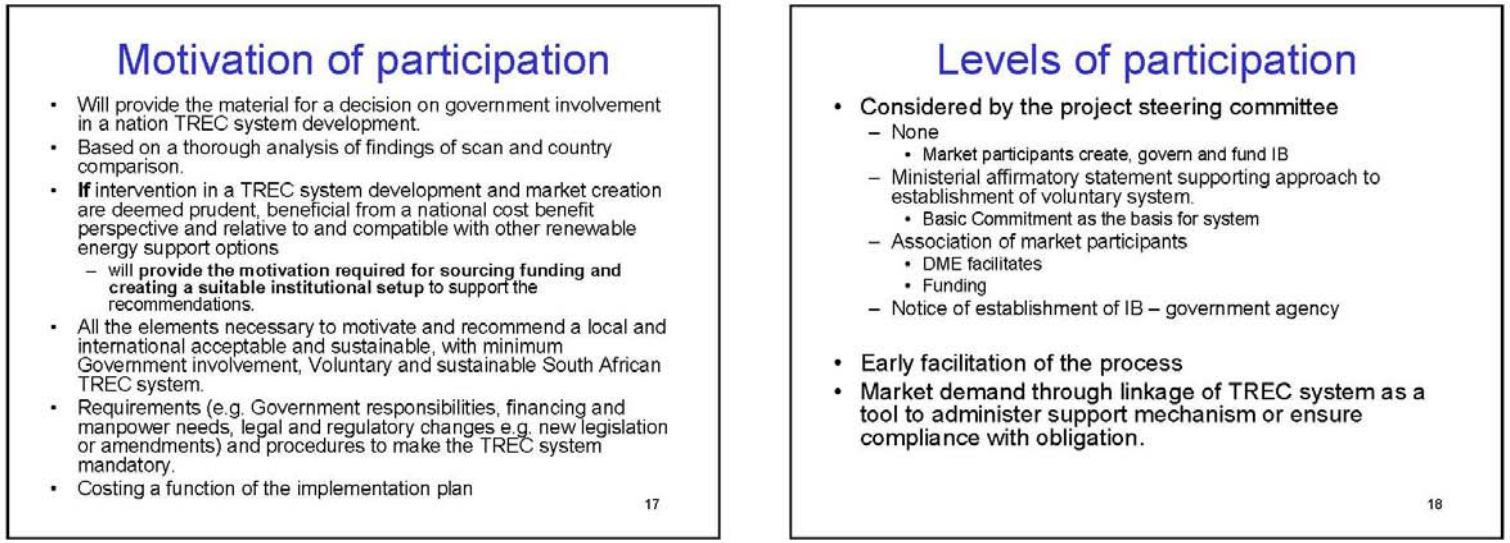
Figure 9 Cost curves from the strategy formulation describe the least cost path



Motivation of participation

- Will provide the material for a decision on government involvement in a nation TREC system development.
- Based on a thorough analysis of findings of scan and country comparison.
- **If** intervention in a TREC system development and market creation are deemed prudent, beneficial from a national cost benefit perspective and relative to and compatible with other renewable energy support options
  - will **provide the motivation required for sourcing funding and creating a suitable institutional setup** to support the recommendations.
- All the elements necessary to motivate and recommend a local and international acceptable and sustainable, with minimum Government involvement, Voluntary and sustainable South African TREC system.
- Requirements (e.g. Government responsibilities, financing and manpower needs, legal and regulatory changes e.g. new legislation or amendments) and procedures to make the TREC system mandatory.
- Costing a function of the implementation plan

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Levels of participation

- Considered by the project steering committee
  - None
    - Market participants create, govern and fund IB
  - Ministerial affirmatory statement supporting approach to establishment of voluntary system.
    - Basic Commitment as the basis for system
  - Association of market participants
    - DME facilitates
    - Funding
  - Notice of establishment of IB – government agency
- Early facilitation of the process
- Market demand through linkage of TREC system as a tool to administer support mechanism or ensure compliance with obligation.

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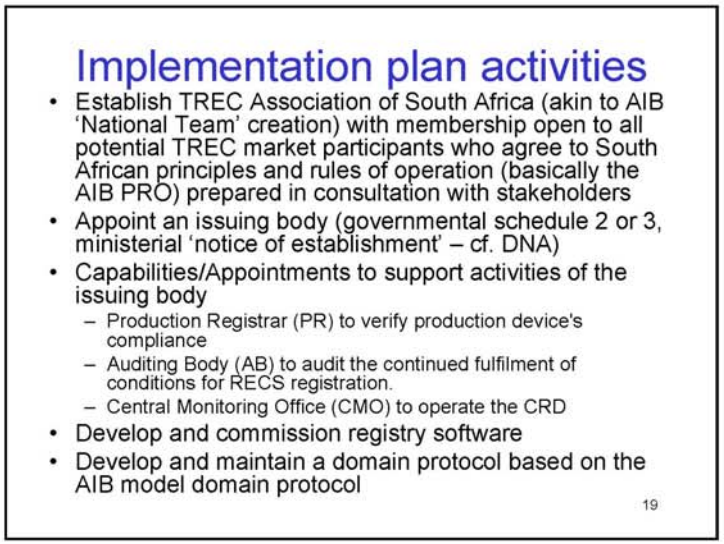
Figure 10 Issuing Body business plan and sustainability



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6. References

European Commission, 2003. TRECKIN Country case-study package.

Appendix C: TREC system requirements, motivation and recommendation including legal and regulatory requirements

Appendix C (Interim report C) Version 2

TREC system requirements, motivation and recommendation including legal and regulatory requirements

July 2006

Table of Contents

1. System requirements

The elements of a TRECs system can broadly be categorised into as system of governance, the rules by which trade of certificates proceed and the overall institutional context within which the TREC system is established.

The system of governance refers to a differentiation between mandatory and voluntary governance contexts. In a mandatory environment the TREC system is used to provide verification and monitoring of compliance with such obligations. The obligations are introduced through legislation by government. The TRECs system would similarly be stipulated in such legislation. In contrast, TREC systems in use in voluntary markets are established by the market participants with or without government participation. The current South African TREC market is voluntary. This study also describes the legal, regulatory and institutional requirements and processes to make the TREC system mandatory which could coincide with the mid-term review of the White Paper on Renewable Energy target and the institution of mandatory measures to increase the uptake of renewable energy. This suggests sufficient participation by the DME in the voluntary market structures in order to ease the transition to a TREC system operational in a possible future mandatory environment. It has been the experience that a voluntary TREC system without some government participation (e.g. appointment of Issuing Body and development/endorsement of System rules) is not sustainable and has a low market penetration.

1.1. TREC project lifecycle and system of governance

The life cycle of a TREC through the system is general described in four steps, registration of the generating facility, issuing, trading and finally redemption of the TREC.

1.1.1. Accreditation/registration of renewable energy plant

Operators of renewable energy plants apply for accreditation. Once verified according to the TREC system rules, the plant becomes an accredited TREC generator and is registered in the TREC system register.

1.1.2. Issuing and Verification of TREC

The “green” energy produced by the accredited plant is monitored and verified by the Issuing body after which the plant receives a certificate for a specified quantity of renewable energy generated as defined and verified by the TREC system rules. The TRECs are created as electronic records in the TREC register. The issued certificates are accredited to the register account of the plant operator/owner

1.1.3. Trading and transferring of TRECs

The TREC administrative system enables and tracks trading of electronic certificates between accounts in the register whenever a trade occurred. Trading can take place up until the TREC is consumed (redeemed) or exported from the system, or until the TREC certificate expiry date. In order to maximise the potential for international trade of TRECs, it would be beneficial to adopt system rules and procedures which are compatible with other TREC systems. This enables export and import of TRECs internationally. The South African domain protocol will stipulate that import of TRECs will at least initially not be allowed.

1.1.4. Redeeming certificates

When a TREC is consumed (e.g. to verify that a product is “green”, to fulfil a renewable energy obligation, to claim tax exemption or other financial production-based support) it is redeemed. The TREC is either erased from the register or earmarked that it cannot be traded anymore by transfer to a redemption account.

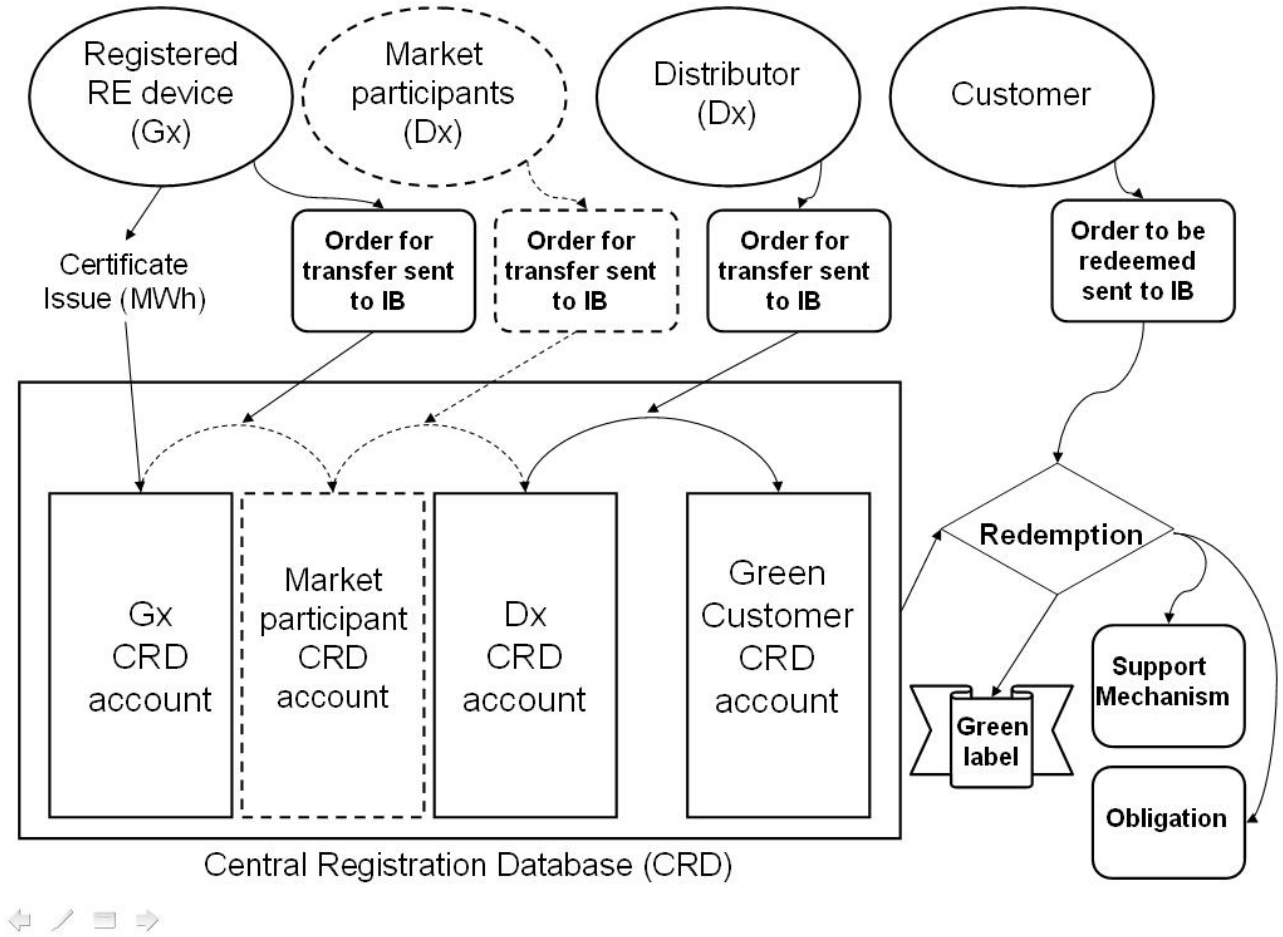


Figure 11 TREC life cycle flow diagram

1.2. Characteristics of a South African TRECS IT System

1.2.1. The system extent

As with the majority of the popular systems in use, a SA TREC system should deal only with energy and not commercial transactions. The Issuing Body receives orders from TREC owners for transfer between accounts but financial detail of the transaction is not provided or recorded. The price is determined entirely by the market. Systems deal only with the authentication and tracking of energy produced from registered renewable energy facilities[23]. The reasons for not dealing with the commercial side is that commercial contracts (confidential between two or more parties e.g. Power Producer and Trader) are part of the business intellectual capital of the parties entering into the contract, that does not belong in the public domain. In the same way that Pick n Pay do not publish their cost price on their products in their stores. The information concerning volumes produced, traded and redeemed on the TREC system is otherwise in the public domain and therefore transparent. The Green Power into the Grid versus the amount of Green Power certificates available/retired is the basic equation that must be kept in balance nationally to ensure that no double counting takes place. In this way the total number of certificates produced will never exceed the total number of MWh of electricity produced.

Traders and Power Producers are understandably reluctant to share their pricing and business viability knowledge with outside parties, as they naturally consider this to be part of their intellectual capital and want to protect their return on investment.

[23] Electrical generation plants and other facilities such as biofuel refineries obtain registration upon submission of a Renewable Energy Declaration (RED) and subsequent renewal and maintenance of registration by adherence to the PRO and South African domain protocol. Examples of facility registration, audits, REDs and proof of registered renewable energy device certificates developed in initial green energy transactions are outlined in the summary of South Africa activities in Appendix A and online at: www.nano.co.za

They therefore use various separate financial broking and billing systems e.g. WIPRO, SAP and Energis to deal with the business transaction, bi-lateral agreements, and revenue collection. These outside systems have read only rights to the TRECS, and feed back the transfer of ownership details and/or retirement of certificates to the TRECS, which are updated on the central controlling database.

Green Labels are optionally issued (at a fee) by the SA TRECS. Green Electricity Labels demonstrate that an electricity product or tariff meets certain independently assessed environmental criteria. Independent accreditation may be offered by official bodies (e.g. government agencies) or by non-governmental organisations (e.g. environmental NGO's) ref. European Commission–4CE Final Report on "Consumer Choice and Carbon Consciousness for Electricity".

1.2.2. Certificate tracking

Green Certificates must be accounted for right from the Production Device through to the meters feeding into the National Grid by a South African TREC's facility proposed in this study. The balancing equation is for every 1 MWh of Production Device Unit run (allowing for line-loss ratios etc) there must equal 1 MWh of Metered Green electricity that feeds into the National Grid. The unit of measure from the meter is MWh so all the half-hourly (or in the case of some older meters, hourly) can be added into MWh bundles. The Meter Id/Ids making up the 1 MWh must be stored for tracking/auditing purposes. One of the first tasks of the S.A. Central Monitoring Office proposed in this study in setting up of the S.A. TREC is to lay out the database design to published EECS Registration Database Standards (September 2005) specifications.

1.2.3. Qualifying renewable energy sources

Different types of sources of Green Energy certificates will be supported including. wind, solar, biomass, bio-diesel and electrical offset technologies such as solar water heating. All the different Green Energy types and accompanying attributes e.g. unit of measure must be 'soft coded', which means they can be altered/enhanced without necessitating changes to the computer programmes. This adds flexibility and keeps the I.T. maintenance costs down. This would be catered for in the SA TREC System proposed in this study.

Operators of renewable energy plants apply for accreditation. Once verified according to the TREC system rules, the plant becomes an accredited TREC generator and is registered in the TREC system register. An account is created in the Central Registration Database (CRD) in the name of the accredited facility. TRECs can accrue to any renewable energy project as outlined in the South African domain protocol to be developed. . The definition of which projects will qualify towards meeting the national voluntary renewable energy target is contained in the Renewable energy target monitoring system methodology report (DME, 2005). A facility could therefore qualify to produce TRECs but not contribute towards the RE target as activities may not be considered as additional as per RE target monitoring methodology. This will be dealt with in system inception date and certificate validity period stated in the domain protocol but will almost certainly not include new activities or facilities which precede Nov 2003 White Paper target inception. Decisions on technology qualification can be particularly complexed. Guidance from the DME will be essential in this regard. The European Union guidelines are useful for making theses decisions but local intricacies will need to taken into account for technologies not yet clearly defined as part of the existing monitoring effort embarked upon in 2005.

1.2.4. Online records

All records kept on-line (complex queries to be emailed back to requester) One of the features of the major UK-based TRECS (Campbell Carr) is that all the history records are currently available on line, which facilitates control and inquiries into history of transactions. They plan to eventually archive the very old data (e.g. certificates retired 10 years ago) because of their forecasted growth in the number of transactions.

Our strong recommendation for SA TRECS is to keep the complete history available on the National Database, as the price of computer storage continues to drop relative to its storage capacity and speed. Very large complex queries involving a large amount of certificates may necessitate the requester being emailed back the results of his query. This saves him/her waiting for the transaction to complete, and also creates a revenue possibility for the service provider.

1.2.5. User interface

A World-wide Web-based front end is important so as to make system available to all market players. The user interface part (sometimes called the Computer Users view) of the system should be Web-enabled so as to make the system available to the widest possible audience: namely anyone in the world who has access to the Internet, and who is authorised to transact (or enquire) on the system. For people who are only browsing, a very low level of authority is required. Serious transactions like authentication of a new Green Device Facility would obviously require a very high level of authority.

The big advantages of making the system widely available is that the greater the transaction volumes the greater the feasibility of the market growth and as importantly, fair access to the smaller players in the industry. This would naturally include any previously disadvantaged groups.

1.2.6. CR Database capability

The back end must allow heavy duty data files to be stored on a recognized D/B e.g. Oracle, SQL Server. This is closely linked to the need for the Web-based user interface described above. If the system is opened up to a very wide audience, it makes little sense to keep them waiting a long time when they request to access information. This transaction server part of the system must be designed using an industrial-strength recognised database engine.

Almost all the more widely used systems around the world started off as simple Access D/B type systems and then reached design or performance limits, and are now in their 2nd or 3rd generation of complete rewrite, with all the associated pains that accompany a major IT system upgrade.

1.2.7. Hierarchical access

Different views of the system with differing authorities to be available i.e. Issuing Body, Power Producers, System Governance (Auditing), Customers of Green Power, Traders
A few examples of the different views required would be;

- The Issuing Body would want a view of the system which focuses on the Production Device, its Units and its flowing into the National Grid (or directly to a Customer Meter).
- The Governing Body would want to focus on the total market growth, the national balance of Green produced versus Green Certificates being retired/traded and the various trends by region.
- The Power Producer would want to see the impact of his power on the National picture and maybe who bought the Green Power he produced.
- Traders would want to know view the available Green Power from the Producers and link them to their Customers wanting certificates.

1.2.8. Old and non-standard data sets

Manual export/import of older format and non-standard data sets of records to be supported e.g. various Euro/US outdated systems, manual systems, early transactions done by Green-X, AGP etc.
Importing or taking on of pre-September 2005 old format records is also clearly defined by the EECS. Obviously some of the crucial elements of data will be missing and this is marked in the system as an older format record (maybe certain allowances will have to be made in the new SA TRECS for this old data).

1.2.9. Carry-over

Remaining Green Power from a particular Production Device Unit run, which does not quite make up 1 MWh, can be added or carried over to the next Production Unit run.

1.2.10. Green labelling

On retirement of a 1 MWh certificate a formal Green Label should be available at a fee for display/or proof of purchase purposes. The Green Label is not a tradable entity like a TREC. It is only an Electricity Disclosure showing fuel source and environmental information.

1.2.11. The balanced scorecard approach

Consider a Balanced Scorecard approach with a 'drill-down' capability.

A Balanced Scorecard in respect of Green Power would use the basic equation which balances Green supply with Green demand as follows:

$$E_{\mathrm{Pr}oduced} = E_{Available} + E_{\mathrm{Re}tired} \qquad 1$$

The running total can be displayed as at the night before on a nationally summarised simple to read 'dashboard' for quick reference, with more and more detail displayed on request until you get down to the lowest level e.g. the meters with the readings adding back to the 1 MWh certificates. Whilst this approach is more complex to design and implement as it necessitates a special reporting data base to be designed and maintained, the added functionality far outweighs the additional complexity in our view. Many handy views can be designed to facilitate management and control, some suggested below are:

- displaying a National view by account holder (generator, trader, purchaser)
- display a National view by type e.g. Bagasse
- displaying a Production Device and Unit view for the Issuing Body/Auditor
- displaying a Production Device Unit versus the meters view
- Traders/Customers will want a view of available stock
- display of National import/export trends

1.2.12. Storage units

The smallest tradable unit must be stored on the National database e.g. in the case of Green Power it is 1 MWh units, for biodiesel another Unit of Measure (Kilolitres) etc.
The rationale for keeping the information discreetly at the smallest unit is that it can always be added together (aggregated) and worked with in the system. This is not true when one transaction represents a number of 1 MWh certificates e.g. 1 coupon of 1000 MWh. Many European systems do not support coupons because of the complexity that it attracts.

1.2.13. Technical Details

1.2.13.1. Worldwide interfacing

Interfacing with all modern worldwide TRECS systems done via the published EECS Registration Databases Standard (September 2005)

1.2.13.2. Old format records

Copying to and from old pre-Sept formats will be as defined in EECS Standards Document

1.2.13.3. Encryption standards

The EECS Encryption standard will be used as defined in the EECS documentation

1.2.13.4. Testing capability

The EECS Testing capability standard also defined in the EECS documentation

1.2.13.5. System growth

The S.A. TRECS must be very scaleable. It must be inherently designed to cope with many millions of transaction records in time. This important design feature prevents a redesign/rewrite of a makeshift system when the market begins to take off.

1.2.13.6. Hierarchical access requirements

Hierarchical password profiles must be supported. These included levels for Administrator, System Governance, Issuing Body, Trader, Customer, Power Producer.

1.2.13.7. System integrity and security

The Central Registry Database (CRD) must be kept on two separate servers in two separate physical locations. The one a full mirror image of the other. The advantage of this is that if the one fails, the system keeps running on the other whilst the original problem gets fixed. So theoretically the normal service should

never be interrupted. The newly repaired server then gets automatically brought up to date and synchronised whilst the service is still available to all market players. This is called full Data Redundancy as one complete up-to-date copy is available on-line just in case the production one fails, and is a function of any top-class Data Base Management System e.g. Oracle, SQL Server etc.

2. Institutional set-up

In terms of the institutional set-up of a TREC system, there are two groups of institutions. These are the market participants and the TREC Issuing Body. TREC market participants are the renewable energy generators (producers of TRECs), TRECs traders, and TRECs consumers. The organisation which implements the rules and procedures of the system is called the Issuing Body. The Issuing Body is responsible for the following tasks:

- Accreditation of renewable energy generators (this requires a physical device audit)
- Registration of accredited renewable energy generators (A document called a Renewable Energy Declaration (RED) is prepared for this purpose and is renewed on a periodic basis to ensure continued adherence to the rules as set out in the Principles and Rules of Operation)
- Issuing of TRECs (in market participant accounts in the Central Register Database (CRD))
- Operating the TREC register and administration of the accounts (CRD)
- Transferring of Certificates
- Facilitate the import and export of TRECs certificates of different, but compatible, TREC systems
- Redeeming of certificates
- Verification and monitoring that participants act in accordance with the Principles and Rules of Operation
- Ongoing monitoring, evaluation and development of the TREC system with other stakeholders (updating the Domain Protocol (DP))

The Issuing Body's institutional setup must be sufficiently firmly established to allow for recourse to a legal authority in oversight of the operation of its activities and most importantly in the unlikely event of the need for dispute resolution. This authority could be the TREC Association (National Team), South African oversight body such as NERSA or the Competition Commision, or should the South African IB become a member of the AIB it would be accountable to the international structures.

In order to ensure that the TREC system is credible and reliable it is vital that the Issuing Body acts independently from the market actors involved in TREC trade – the Issuing body should not have a vested interest in the TREC market.

3. System rules

The system rules for the operation of a TREC system have to be clearly defined. This study recommended the adoption of the Basic Commitment of the Association of Issuing Bodies (AIB) as amended by the Principles and Rules of Operation (PRO) to provide a simple, clear, practical, able to be readily implemented, administratively efficient method of operation and rules for South Africa. As the first step to the establishment of the TREC system with government involvement, is to issue an affirmatory statement to this effect. These rules provide a clear definition of eligible TREC renewable energy resources and technologies and the handling of each of these. As a tried and tested system, the PRO is manageable yet robust, reducing the likelihood of error or fraud. It is complimentary to and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum financial government involvement beyond the initial start-up years prior to sufficient market volume. Furthermore, as the basis for many other international TREC systems is compatible with and provides potential for co-operation with other prominent TREC systems. It specifies the rights and duties of market players and the tasks that need to be assigned to various bodies. The rules include verification requirements and procedures for the resolution of disputes. The PRO presents a clear definition of the content of the certificate and ensures that the benefits of renewable energy production are not double counted or sold several times.

4. Legal and regulatory requirements

This is the legal and regulatory part of the recommendations for a plan to implement a practical voluntary transferable renewable-energy certification system with minimum government involvement. It deals with procedures for monitoring and verification, and to prevent fraud (4.1).

This investigation identifies a region which operates a voluntary TREC system which is appropriate for South Africa (4.2).

A TREC system's operating methods and rules should be simple, clear and practical with minimum red tape, as well as sufficiently robust against error and fraud (4.3).

The Renewable Energy Certification System (RECS) which operates in Europe is examined (4.4).

It is recommended that the South African TREC system should be based on the RECS scheme. RECS is extra-governmental and self-financed, and was formed by power companies in 1999. RECS separates environmental value from physical energy. It is an open transparent system with no dominant participants. The International Energy Agency, as well as American, Japanese and Australian companies, are interested. By June 2004 more than 35 million RECS Certificates had been issued (4.5).

RECS certificates are issued by issuing bodies, which can be appointed by government or by market participants in their region. These bodies are also responsible for assuring the validity of claimed renewable-energy production, and for registering transfers of ownership and redemptions of certificates (4.6).

Although an issuing body can be appointed by government, it appears that it is more usually appointed by its participating members in the domain (country) concerned. Participating members agree to be bound by RECS's so-called basic commitment in the protocol for that domain (4.7).

The country where the issuing body performs its duties is termed a domain. Under RECS, there can be only one issuing body per domain. A domain's issuing body is the only body in that domain which can issue RECS certificates and record transfers and redemption thereof (4.8).

All issuing bodies are members of an association of issuing bodies, a Belgian non-profit entity. To be accepted into the association, an issuing body's internal process must be acceptable to its peers (4.9).

That association prepared the basic commitment as the formal statement of the RECS system. The basic commitment contains minimum criteria for the creation, issue, transfer and retirement of RECS certificates. All participating members must observe the basic commitment (4.10).

RECS certificates evidence the generation of energy which neither depletes resources nor irreversibly harms the environment. The certificates state the source of the energy and type of technology used to generate it. The certificates must represent the entire benefit of electricity produced from renewable-energy sources. Renewable energy is all energy excluding fossil and nuclear fuels. No participating member may claim or give rights to any part of that benefit separately from a RECS certificate. The number of RECS certificates issued reflect the amount of net electrical energy generated as evidenced by meter readings. One certificate records generation of 1 MWh of renewable energy. The certificate can change ownership, and remains valid until redeemed (4.11).

A RECS coupon is an electronic record representing one, ten, 100, 1 000, or 10 000 certificates, and may be divided into small coupons. Each coupon has a unique number, and must state the domain and issuing body where it was issued. A coupon must also specify the production device and technology which generated the electricity, as well as the date when the energy concerned was supplied (4.12).

A person engaged in producing renewable-energy electricity, a so-called generator, who wishes to receive RECS certificates must gain registration from the issuing body for his production device, which is any separately-metered device generating electricity (4.13).

To get his device registered, a generator must make a renewable-energy declaration to the issuing body. This declaration stands valid for a specified period up to five years, when it must be re-submitted. The declaration must specify the location of the production device and its export meter, its fuel sources and type of generation technology, and the device's installed or nominal maximum capacity under continual operation,

as well as its commissioning date, as well as any additional information required by that issuing body's domain protocol (4.14).

A domain protocol must have clear procedures to register production devices, and must require the generator to permit the issuing body to inspect the generator's device and records without prior announcement. The protocol must specify the frequency for monitoring meter data. The issuing body must perform ad hoc checks on registered devices, to ensure that the declaration is still up to date, to confirm that the criteria in the basic commitment and domain protocol are observed, and to take appropriate action if abuses are discovered (4.15).

The generator must in his declaration undertake not to receive tradable certificates representing the benefit of renewable energy for the same unit of electrical energy from both RECS and any other system. The issuing body's registration procedures must require the generator to disclose details of any past infringements regarding certificates, the basic commitment or the domain protocol (4.16).
If a generator meets all these criteria, the issuing body must register his production device. The renewable-energy declaration of each registered production device must be available electronically to each participating RECS member (4.17).

The issuing body's registration procedures must require the generator to give particulars of an officially-endorsed source of meter readings and how these will be collected, and the generator must accept liability for the accuracy of these readings. The basic commitment says that meter data must be collected on the issuing body's behalf by an organisation accredited to do so by the appropriate authorities in the domain, which will usually be the organisation responsible for collecting meter data on the public grid. An alternative body may be used, with written approval from the association of issuing bodies. Evidence of generation of a set quantity of renewal-energy electricity must be provided to the issuing body by an organisation appointed in accordance with national legislation or that has been accredited on the basis of such legislation. It appears that the closest applicable legislation here is South Africa's statute governing the engineering profession, which established an engineering council which registers engineers in various professional categories. A person cannot practise in any such category unless he is registered in it, and an unregistered person cannot perform any kind of work identified for any category of registered engineers. The scope of any such work for a category of registered engineers is identified by another council under a statute for the built environment (4.18). Therefore, to comply with the basic commitment's requirement that renewable-energy production devices' meters must be read by an officially-endorsed or accredited organisation, this could be done under these statutes by identifying such meter reading as being work reserved for a particular category of registered engineers, or the approval of the association of issuing bodies must be obtained to use an alternative.

The central-registration database must record all certificates issued in the domain. The basic commitment says that the information systems implemented by the issuing body must be robust and secure, and allow audit and inspection of any specific certificate transaction (4.19).

A generator who wishes to be issued with certificates for his registered device sends a request known as a production declaration in electronic or paper form to the issuing body or its central monitoring office setting out the amount of renewable energy generated in a period, and requesting issue of the relevant number of RECS certificates (4.20).

The issuing body must then issue to the generator the number of certificates that correspond to the amount of renewable-energy electricity generated according to meter readings. The issuing body does this by recording particulars of the certificates issued in his transferable account in the body's central-registration database. The domain protocol sets out the frequency with which certificates are issued (4.21).

Certificate transfer is when a certificate owner instructs that the certificate be transferred from his account to another account. A certificate owner may keep his certificates until he wishes to transfer them. Transfer is usually through private arrangements. When an owner asks the issuing body to transfer part of a coupon representing more than one certificate to another participating member, the issuing body must split a coupon into smaller coupons. A certificate owner wishing to transfer ownership to another participating member must notify the issuing body, which on receipt of such a request to transfer ownership must record the transfer of title in the parties' transferable accounts in the central-registration database, and confirm the transfer to both parties. Although the language which is used in the basic commitment to describe this transfer of ownership is ambiguous, it would appear that ownership of a certificate is not transferred except by recordal of the transfer in that database. It would thus appear that the RECS central-registration database is akin to the South African deeds-registry system, where ownership is not transferred by ordinary delivery of the property concerned, but only by actual registration in that registry of the transfer of ownership (4.22).

Redemption, retirement or consumption of a certificate is where its owner transfers the certificate to a redemption account and causes it to be removed from the market. This is done by the issuing body's transferring the certificate from the owner's transferable account to his redemption account, to indicate that ownership of the certificate is no longer transferable. The issuing body gives the owner a confirmation that the certificate has been redeemed. A certificate may be redeemed to comply with an agreement for the supply of renewable energy, to advertise the products of a certificate owner who requests that his certificate be redeemed, to comply with an agreement for the supply of renewal energy, in return for tax credits, to discharge an obligation to government, or any other purpose recognised in that domain (4.23). Further investigation might be necessary into the circumstances under which certificates should be redeemed, and what incentives there are for holders of certificates to redeem them.

A domain's domain protocol contains rules which are supplementary to the basic commitment and which apply in one domain only. That domain's issuing body is responsible for ensuring that the basic commitment and its domain protocol are observed in the issue, transfer and redemption of certificates (4.24).

Issuing bodies must be financially independent of market participants. They may not be a subsidiary, parent or affiliate of a market player. Nor can they have any financial interest in or operate as a market player or generator. Issuing bodies cannot themselves hold certificates. Any person holding certificates forbidden to have any controlling financial interest in an issuing body, unless they can prove to the association of issuing bodies that they cannot materially affect the decisions of the issuing body concerned. The association of issuing bodies guarantees issuing bodies' independence from the marketplace (4.25).

Each issuing body must maintain public records of each registered production device, and of each certificate which it has issued including its current owner and the transferability of the certificate (4.26).

An issuing body is responsible for ensuring that claimed renewable-energy production has actually taken place, and for ensuring that its procedures are effective (4.27).

The Basic Commitment is now also known as the Principles & Rules of Operation (PRO) (4.28). It continues to set out the common international standard to which all members of AIB subscribe. The current PRO version was adopted in June 2006. The AIB states that Basic Commitment or PRO is a living document continually being refined to meet developing needs. The PRO recodifies the RECS Basic Commitment as a chapter of the PRO, which elaborates and restates in comprehensive detail the matters which were contained in the RECS Basic Commitment of January 2004, and the PRO restatement is substantially similar to that RECS Basic Commitment.

Currently no South African legislation expressly supports TRECs. In 2004 the government issued a renewable-energy white paper which referred to a proposed energy bill that would allow the minister to prescribe minimum contributions to the national energy supply from renewable sources. Legislation is not required for a voluntary system, although it may be necessary to make any TREC system compulsory. It has been observed that the RECS system used in Europe can be used for both voluntary and obligatory schemes. In South Africa an electricity-regulation statute was enacted this year, 2006. It states that the minister may make regulations regarding the type of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from different sources (4.29). Whether these measures will suffice, in order to make a TREC system compulsory, should be the subject of further investigation.

In April 2006 the South African national treasury issued a draft policy paper investing market-based instruments to support environmental fiscal reform. It stated that a tailored solution is likely to be required for each environmental objective. The paper noted that tradable permit schemes will encourage negative environmental externalities to be incorporated into prices, thereby internalizing external costs. The draft policy paper says that, based on existing experience, key features of an effective tradable-permit system are that the permits must be well defined, free open trade must dominate the market, transaction costs must be minimal, individuals should have the flexibility to save or spend permits according to market fluctuations, and the penalty for permit violation should greatly exceed the permit price. Open trade enables polluters to respond to price signals created by the limited number of permits. The draft policy paper says that open trade will be difficult in South Africa, because many industries remain oligopolistic, which will limit the level of trading. The treasury observes that for these reasons fiscal reform options are more appropriate for South Africa (presumably as a tax-raising measure) than tradable-permit systems, although the latter may have a future niche role which needs further investigation (4.30).

The RECS (Renewable Energy Certification System) is not to be confused with the Guarantees of Origin (GoO) system, which focuses on guarantees of origin which can be issued even for fossil-fuel and nuclear-energy sources, and is based on an EC governmental directive, whereas RECS is voluntary and is for renewable energy only, although both systems are managed by the same association of issuing bodies, the GoO system is being built on the lessons learnt in developing the RECS (4.31).

RECS International is an association of traders of renewable-energy certificates throughout Europe (4.32).

It would appear that RECS is in the course of being adopted as a TREC system in North America. US government agents were present at the investigatory meeting, as were representatives of the association of issuing bodies from Europe. In 2002 a report about developing a TREC system was written, with funding from the US national renewable-energy laboratory, a government agency. The report proposed a basic commitment for an American association of issuing bodies, closely based on the RECS basis commitment (4.33).

Turning to the legal aspects of constituting an issuing body for South Africa, in law a body can be constituted with legal personality apart from its members, merely if its constitution so provides, and no special sanction from the state is required. While an association not-for-gain could instead be formed as a company incorporated under section 21 of the companies statute, this can only be done if the body's main object is promotion of inter alia science, charity, or any other social activity or communal or group interests, which does not appear to be entirely appropriate, or even necessary. It is probably preferable to form the body as a voluntary association with its own constitution, and to have it registered under the 1997 South African statute governing non-profit organisations; this statute's objects include that of encouraging non-profit organisations to maintain adequate standards of governance, transparency and accountability; an organisation registered under this statute must provide the responsible government director with an annual report of its activities (4.34). This would appear to be desirable for a South African issuing body, to stress its accountability, transparency and good governance.

4.1. Introduction

4.1.1 This part contains the legal and regulatory motivation and recommendations for the adoption of a plan for the implementation of a practical and sustainable voluntary transferable renewable-energy certification system for South Africa.
4.1.2 It contains an in-depth legal and regulatory analysis, and includes proposed administrative procedures aimed at the prevention and detection of fraud, and a system for monitoring and verification, for a voluntary system for South Africa.
4.1.3 This section also provides detailed legal aspects of an implementation plan for a voluntary system for South Africa, together with a breakdown and explanation of the necessary legal activities and responsibilities.
4.1.4 This investigation contains all the legal elements necessary to motivate and recommend a local and internationally-acceptable and sustainable voluntary South African TREC system with minimum government involvement.
4.1.5 This legal analysis identifies government responsibilities, and the legal and regulatory changes for making the voluntary system mandatory.

4.2. Region with voluntary system for adoption in South Africa

4.2.1 This legal analysis identifies a region which operates or participates in a voluntary TREC system which should form the basis of a South African voluntary transferable renewable-energy certification system.
4.2.2 It contains recommendations regarding the representative region which has been selected, with an explanation of the selection criteria that have been used.

4.3. Selection criteria used

4.3.1 Pursuant to the Department of Minerals and Energy's terms of reference, this legal investigation has used the selection criteria that the method of operation and rules should be simple, clear and practically implementable with a minimum of red tape.
4.3.2 The system should be sufficiently robust against error and fraud.

4.4. Legal analysis of recommended regional system

4.4.1 This legal section analyses the Renewable Energy Certification System (RECS), which originated in Europe. It is recommended that that system be adopted in South Africa.
4.4.2 In making these recommendations, that the RECS model from Europe be followed, this legal analysis identifies as far as possible what manpower and skills are needed, and the necessary administrative requirements.
4.4.3 This legal section also discusses the legal, regulatory, policy and institutional requirements and implications, in relation to a certificate issuing body, rules of the system, and so forth.
4.4.4 This analysis also examines the recommended system's compatibility with the existing South African legal and regulatory framework, policies and programmes.
4.4.5 It also deals with likely international acceptance of the recommended system.
4.4.6 This legal investigation also deals with how the recommended system can contribute to the national renewable-energy target.
4.4.7 The RECS arrangements contain administrative procedures and systems for the prevention and detection of fraud.
4.4.8 The role of electricity licensing and the Kyoto protocol's Clean Development Mechanism (CDM) accreditation, monitoring and verification is also discussed.

4.5. Recommended regional voluntary system for South Africa to follow

4.5.1 It is recommended that a South African voluntary TREC system should be based on the Renewable Energy Certification System (RECS).
4.5.2 RECS is an extra-governmental, self-financed group that was formed in 1999 by power companies from the Netherlands, France, Germany, Denmark, Belgium, Italy and the United Kingdom (Developing a Framework for Tradable Renewable Energy Certificates, Centre for Resource Solutions, August 2002, p 14).
4.5.3 The Renewable Energy Certificate System (RECS) enables international trade in renewable energy, by uncoupling environmental value from the associated physical energy. Renewable energy certificates have mostly been implemented and planned nationally, but are increasingly being traded internationally. RECS is an open and transparent system with no dominant participants. It grew from the northern European states, and now has participants in most European countries. Organisations like the International Energy Agency and Eurelectric as well as companies from the USA, Australia and Japan are also interested (Association of Issuing Bodies, RECS, The Basic Commitment, release 2.2, 31 January 2004, Introduction.)
4.5.4 The RECS initiative, with assistance from the European Commission sought to develop a market for international trade in renewable energy by commoditizing environmental value, separate from the associated physical energy, and enabling those to be traded internationally. RECS is now operational, and has resulted in the issue of more than 35 million certificates (EECS Basic Commitment, release 1-2, 7 June 2004, Introduction).

4.6. Issuing Body

4.6.1 The bodies that issue RECS Certificates and register transfers of their ownership are known as Issuing Bodies (IBs).
4.6.2 They are appointed by market participants or by governments in their geographic region (RECS Basic Commitment, Introduction).
4.6.3 An Issuing Body must seek and gain recognition under such quality standards as the Association of Issuing Bodies considers appropriate (art 2.11.b).
4.6.4 The IB is responsible for assuring the validity of Renewable Energy Declarations, claimed RES-E Production, Registration of Transfers of ownership and Redemption of RECS Certificates (art 6.3.c).

4.7. Participating RECS members

4.7.1 The Issuing Body of a Domain (about which more below) is appointed by the Participating RECS Members in that Domain (RECS Basic Commitment art 2.11).
4.7.2 Participating RECS Members are persons who have been accepted into RECS by the relevant Issuing Body or the AIB as appropriate, and who agree to be bound by the Basic Commitment and the relevant Domain Protocol for the Domain or Domains in which they are commercially active (art 2.24).

4.8. Domains

4.8.1 A Domain is normally defined by geopolitical boundaries (art 2.11).
4.8.2 For each Domain, the corresponding Participating RECS Members appoint one Issuing Body.
4.8.3 There shall be one Issuing Body for each Domain (Basic Commitment art 2.11).
4.8.4 The Issuing Body in a Domain shall be the only body that is responsible within that Domain for issuing, recording transfers of ownership of, and recording redemptions of, RECS Certificates (Basic Commitment art 11.a.iiii).

4.9. Association of Issuing Bodies

4.9.1 The Issuing Bodies have founded the Association of Issuing Bodies (AIB). This is a Belgian not-for-profit Royal Assent company (RECS Basic Commitment, Introduction).
4.9.2 The Association of Issuing Bodies is the international alliance of RECS Issuing Bodies, and is responsible for approving and accepting all Issuing Bodies wishing to issue internationally-acceptable RECS Certificates (Basic Commitment, art 2.13).
4.9.3 To achieve accreditation as a member of the AIB, each Issuing Body submits its internal processes to review by its peers in compliance with the Articles of Association of the AIB (Basic Commitment, Introduction).

4.10. Basic Commitment

4.10.1 The AIB has prepared the RECS Basic Commitment as the formal statement of the RECS system. The development of the Basic Commitment was undertaken following consultation with the stakeholders in RECS (RECS Basic Commitment release 2.2, 31 January 2004, Introduction).
4.10.2 The Basic Commitment states that it is the minimum common set of definitions and criteria for the creation, issue, transfer and use as evidence of transfer of ownership and eventually removal from the market of RECS Certificates (RECS Basic Commitment, art 1.1).
4.10.3 All Participating RECS Members must observe the requirements of the Basic Commitment. Failure to do so must be referred to the AIB, which may take such action as it considers necessary (art 6.1.a).

4.11. RECS Certificates

4.11.1 RECS Certificates evidence the generation of renewable and sustainable energy, which neither depletes resources nor irreversibly harms the environment. RECS Certificates hold information on the source of the energy and the type of technology used for generation. Buyers of Certificates can then choose the energies they wish to support (RECS Basic Commitment, Introduction).
4.11.2 The RECS Basic Commitment states (art 2.4.a) that a RECS Certificate must represent the entire benefit of electricity produced from Renewable Energy sources (RES-E). Renewable Energy comprises all energy excluding fossil and nuclear fuels, and electrical energy derived from these sources (art 2.2). A Participating RECS member may not claim or confer rights to any element of that RES-E benefit, separately from a RECS Certificate (art 2.4.a).
4.11.3 Only RES-E is eligible to receive RECS Certificates, the quantity issued reflecting the amount of net electrical energy generated as evidenced by meter readings. The net electrical energy generation is the gross production, minus demand of any generated electricity, and minus losses in the main generator transformers (art 3.16).
4.11.4 One RECS Certificate provides a record of the generation of one megawatt hour (1MWh) of RES-E (art 2.4(b)).
4.11.5 A RECS Certificate remains valid until it has been redeemed (art 2.4(c)). Title to a RECS Certificate may change until it has been redeemed (art 2.4(d)).

4.12. RECS Coupons

4.12.1 A RECS Coupon represents one, ten, 100, 1 000 or 10 000 RECS Certificates. A RECS Coupon may be split into smaller coupons with a minimum size of 1MWh (art 2.5).
4.12.2 A RECS Coupon must exist as an electronic record (art 3.14).
4.12.3 A RECS Coupon must have a unique coupon number identifying the main Domain of origin in 30 numeric characters (art 3.14.a). The coupon must state the number of certificates represented by the coupon (art 3.14.b).
4.12.4 A RECS Coupon must give the identity of the Issuing Body and the Domain that issued the RECS Certificate (art 3.14.c).

4.12.5 A RECS Coupon also refers to the Production Device (about which more below) that generated the electricity (art 3.14(d)). A RECS Coupon must identify the Production Device by a 18-numeral number that also identifies the Domain of origin (art 3.14(d)). The Coupon or Certificate must also refer to the technology with which the electricity was generated, by a two-numeral technology code (art 3.14(f)).
4.12.6 The RECS Coupon must state the calendar year, month and day when the energy associated with the RECS Certificate was fully delivered (art 3.14(e)).

4.13. Production Devices

4.13.1 A Generator is a person engaged in the production of electricity by means of a Production Device (art 2.14).
4.13.2 A person or body engaged in the production of electricity from renewable-energy sources (a RES-E Generator) who wishes to receive RECS Certificates for his electrical output, must first gain registration from the Issuing Body for the Production Device concerned (BC art 3.5).
4.13.3 A Production Device is any separately-metered device, or group of devices, which generates electricity (art 2.7).
4.13.4 A Production Device that is not so registered may not be issued with RECS Certificates (art 3.5).

4.14. Renewable Energy Declarations

4.14.1 To obtain registration of his Production Device, a Generator must make to the Issuing Body a so-called Renewable Energy Declaration (RED) (art 3.5) stating that the Production Device concerned fulfils the criteria set out in the Basic Commitment and relevant Domain Protocol (about which more below). A RED must have a period of validity limited according to the Domain Protocol, but in no case longer than five years, after which time it must be re-submitted. Failure to re-submit will result in cessation of certificate issue for that Production Device (art 3.6).
4.14.2 A Renewable Energy Declaration must include particulars of that RES-E Generator, the account into which RECS Certificates are first to be transferred upon their issue, the location of the Production Device and its export meter and any import meter, all possible sources of fuel to be converted into electrical energy by this Production Device whether or not renewable (art 3.7.e), and the type of generation technology (art 3.7.f), and the Production Device's installed or nominal maximum capacity obtainable under continuous operation, being measured in kW on the shaft for prime movers, and for a power station being the sum of the nominal capacity of the machines of the same type normally including main and auxiliary generators of all generator sets including standby generator sets (art 3.7(g)).
4.14.3 The RED must also state the date of commissioning of the Production Device (art 3.7(h)).
4.14.4 The RED must also include a diagram showing the Production Device, the location of export meters used for metering its generation, and the location of transformer substations at the plant site, as well as the location of any generating auxiliaries and any import meters for metering their demand (art 3.7(k)).
4.14.5 The RED must also contain any additional information required by the Issuing Body as contained in its Domain Protocol (art 3.7(l)).

4.15. Inspection of Production Devices

4.15.1 The Issuing Body must publish clear unambiguous procedures for the registration of Production Devices (art 3.11), which must require that the RES-E Generator will permit the Issuing Body to inspect the Production Device and such records as it considers necessary to verify the authenticity of the RED, and that such inspection may be conducted without prior announcement (art 3.11(b)).
4.15.2 The frequencies with which meter data are monitored must form part of the Domain Protocol (art 3.16).
4.15.3 Each Issuing Body must perform ad hoc checks on Registered Production Devices, to ensure that the corresponding RED correctly reflects the current state of the Production Device, and to confirm that the RECS criteria in this Basic Commitment and the Domain Protocol are being observed. Should any abuses be discovered, the IB must take such appropriate action as it sees fit and inform the AIB should that abuse be capable of affecting the conduct of RECS Certificate transfers of ownership outside the Domain (art 6.3.a).

4.16. No duplicate certificates from rival bodies

4.16.1 A Renewable Energy Declaration (RED) must contain a guarantee by the RES-E Generator owning the Production Device that he will not during the period of registration for the same unit of electrical energy

receive tradable certificates which represent the benefit of renewable-energy generation from both RECS and another similar system (art 3.5(j)).
4.16.2 The Issuing Body's registration procedures for the Registration of Production Devices must require that the RES-E Generator must undertake that it will not during the period of registration of the Production Device concerned receive, for the same unit of electrical energy, certificates representing the benefit of renewable-energy generation from both RECS and another similar system (art 3.11(f)).
4.16.3 A registered Production Device may not for the same unit of electrical energy receive tradable evidence such as certificates which represent the benefit of renewable-energy generation from both RECS and another system that similarly certifies the origin or represents the benefits of the associated renewable electricity and can be exchanged for government financial support (art 3.18).
4.16.4 The Issuing Body's registration procedures for Production Devices must require that the RES-E Generator disclose details of any past infringements regarding RECS Certificates, the Basic Commitment and any Domain Protocol, whether by itself or any subsidiary or parent or related undertaking (art 3.11(d)).

4.17. Registration of Production Devices

4.17.1 If a RES-E Generator seeking registration of a Production Device meets these criteria, then the Issuing Body shall accept the application (art 3.12) and register that Production Device.
4.17.2 The IB must assign to each Production Device a unique identifier (art 3.9).
4.17.3 The Renewable Energy Declaration of each Production Device that has been registered must be made available electronically to each Participating RECS Member (art 3.10).

4.18. Meter readers

4.18.1 The Issuing Body's registration procedures must require that the RES-E Generator provides details of an "officially endorsed" source of meter readings, the means for collecting these and approval for their collection, and that the RES-E Generator accepts liability for the delivery, quality and accuracy of these meter readings (art 3.11.e).
4.18.2 Meter data shall be collected on behalf of an Issuing Body by an organisation that has been accredited to do so by the appropriate authorities in the Domain in which the Issuing Body operates. Normally this organisation will be that which is responsible for collecting meter data on the public grid. An alternative body may be used only where written approval has been received from the Association of Issuing Bodies (art 3.17).
4.18.3 Evidence of a set quantity of electricity that has been generated by a registered RES-E Generator shall be provided to the Issuing Body by "an organisation that has been appointed in accordance with national legislation and national regulations", or that has been "accredited on the basis of" such legislation or regulations (art 3.19).
4.18.4 The statute governing the engineering profession (Engineering Profession Act 46 of 2000) established an Engineering Council of South Africa (s 2) whose general powers include taking any steps it considers necessary for the protection of the public in their dealings with registered engineers for the maintenance of the integrity, and the enhancement of the status, of the engineering profession (s 14(g)). A person may register in the engineering profession in various professional categories, including professional engineer, engineering technologist, certificated engineer or engineering technician (s 18(1)(a)), as well as other specified categories prescribed by the Council (s 18(1)(c)).
4.18.5 A person may not practise in any of these categories, unless he or she is registered in that category (s 18(2)). A person who is not registered in terms of this statute may not perform any kind of work identified for any category of registered persons (s 26(3)(a)).
4.18.6 The Council must identify the type of engineering work which may be performed by persons registered in any of these categories (s 26(1), and then submit recommendations to the Council for the Built Environment (s 26(2)).
4.18.7 The Council for the Built Environment must, after receipt of the recommendation of the Engineering Council, liaise with the Competition Commission on behalf of the Engineering Council regarding the identification of work for the profession concerned (Council for the Built Environment Act 43 of 2000 s 4(q)). The Council for the Built Environment may then identify the scope of work for every category of registered persons (s 20(2)).

4.19. Central Registration Database

4.19.1 A Central Registration Database records particulars of all RECS Certificates issued within its Domain, including their current ownership (art 2.11.a.v).

4.19.2 The Basic Commitment states that the information systems, manual and automated, which are implemented by an Issuing Body must be robust and secure, support ad hoc audit and allow inspection of all transactions associated with all or even specific RECS Certificates (art 4.1).

4.20. Requests for Issue of RECS Certificates

4.20.1 A Production Declaration is a request made in respect of a Production Device, to the Issuing Body, or the Central Monitoring Office (CMO) appointed by the IB to operate the CRD in that Domain (art 2.32), setting out the amount of RES-E generated in a period, in order for the Issuing Body or CMO to issue the relevant number of RECS Certificates, which may be less than the total RES-E generated in the relevant period. It may be in a form agreed by the Issuing Body, including electronic or paper (art 2.28).
4.20.2 In the case of Production Devices that have biomass as a fuel source, the Production Declaration must include a Consumption Declaration stating the composition of the fuel consumed by a specific Production Device during the period covered by its accompanying Production Declaration (art 2.29).

4.21. Issue of RECS Certificates

4.21.1 The Issuing Body must then issue to that RES-E Generator such certificates as are supported by evidence of generation by that Production Device of a corresponding amount of electricity from renewable sources, as evidenced by appropriate meter readings, and statements of the proportion of electricity which has been generated from renewable sources, calculated by reference to the energy content of the renewable and non-renewable fuels, in the form of a Production Declaration (art 3.13).
4.21.2 On receipt of evidence of the quantity of electricity that has been generated, the Issuing Body must issue a RECS Certificate to that RES-E Generator, either by creating an appropriate entry in the Transferable Account of that RES-E Generator (art 3.19.a). The issuing of a RECS Certificate is defined as the process of generating a record in a Transferable Account in the Central Registration Database, to reflect the amount of RES-E specified in the Production Declaration relating to a RECS-registered Production Device (art 2.17).
4.21.3 The Issuing Body must record particulars of all issued RECS Certificates within its Domain in a Central Registration Database, including their current ownership (Basic Commitment art 2.11.a.v).
4.21.4 Each Issuing Body shall be responsible for issuing RECS Certificates for Production Devices within its Domain (Basic Commitment art 2.20.a). Only one Issuing Body shall issue RECS Certificates in any single Domain (Basic Commitment art 3.2).
4.21.5 The frequencies with which RECS Certificates are issued shall form part of the Domain Protocol (art 3.16).

4.22. Transfer of RECS Certificates

4.22.1 The transfer of RECS Certificates is a process whereby the owner of a RECS Certificate instructs that it be transferred from his account to another account, whether in the same or in another Central Registration Database (art 2.18).
4.22.2 A RECS Certificate Owner may retain or “bank” its RECS Certificates for an unlimited period, unless otherwise required by law (art 4.12).
4.22.3 Transfer of ownership of RECS Certificates may be through private bilateral arrangements between parties, or through an intermediary such as an exchange or brokerage (art 4.4).
4.22.4 Where a RECS Certificate owner asks an Issuing Body to transfer part of a RECS Coupon that represents more than one RECS Certificate to another Participating RECS Member, then the Issuing Body must split that Coupon into coupons of appropriate smaller size (art 4.8).
4.22.5 A RECS Certificate owner wishing to transfer of ownership of the Certificate to another Participating RECS Member, or any exchange that will be effecting such transfer of ownership, must “notify” the Issuing Body “of the transfer of ownership” of the Certificate (art 4.2).
4.22.6 On receipt of a “request to transfer” ownership of a RECS Certificate from a Certificate owner or any exchange, the Issuing Body must record the transfer of title in the Transferable Accounts of the parties to the transfer of ownership on the CRD, which shall provide “evidence of title” (art 4.3.a), retain all supporting documentation (art 4.3.b), and “confirm such transfer” to both parties to the transfer, where both parties are situated within its Domain (art 4.3.c).
4.22.7 As a general rule, ownership is transferred by delivery in the case of corporeal movables, and by registration in the case of immovables such as land. In the case of land, transfer of ownership culminates in the act of registration. Registration is a specialised form of delivery (Silberberg & Schoeman’s The Law of Property 4 ed pp 167, 207).

4.23. Redemption of RECS Certificates

4.23.1 Redemption of RECS Certificates is the process whereby the owner of a RECS Certificate brings about its transfer to a Redemption Account and its removal from the market, and is then given proof that the RECS Certificate has been "consumed" (also known as "retired"), and that title and rights to it may no longer be transferred (art 2.19).
4.23.2 The Issuing Body is responsible for redeeming RECS Certificates that it has issued (art 2.20.b).
4.23.3 Upon receipt of a request from a RECS Certificate Owner to "issue a printed official RECS Certificate", the Issuing Body with which the RECS Certificate is currently registered will transfer details of that RECS Certificate from the appropriate Transferable Account on the CRD for that RECS Certificate Owner to the corresponding Redemption Account, "to indicate that ownership of the RECS Certificate is no longer transferable" (art 4.13.a), and provide the RECS Certificate Owner with "a printed copy of the RECS Certificate" and "confirmation that the RECS Certificate has been Redeemed" (art 4.13.b).
4.23.4 A RECS Certificate may be Redeemed for any of the following reasons: Upon request from a RECS Certificate Owner for purposes that are agreed in its Domain context, for example to comply with an agreement for the generation or supply of RES-E, to discharge an obligation to government, in return for tax credits, etc (art 4.15.a); to advertise the activities or products of a RECS Certificate Owner who requests that a RECS Certificate is Redeemed (art 4.15.b); or for any other reason (art 4.15.c).
4.23.5 Upon receipt of a request from a RECS Certificate Owner to Redeem a RECS Certificate, the Issuing Body must transfer that RECS Certificate from the appropriate Transferable Account on the CRD to the corresponding Redemption Account to indicate that the RECS Certificate has been Redeemed and that ownership is no longer transferable (art 4.16.a), inform the RECS Certificate Owner of the details of the transfer, confirming in a Declaration of Redemption that the RECS Certificate has been Redeemed, and making available details of the RECS Certificate to the Redeeming Body and its auditors (art 4.16.c).

4.24. Domain Protocol

4.24.1 Rules that are supplementary to the Basic Commitment and apply in one Domain only will be contained in the corresponding Domain Protocol (art 1.2).
4.24.2 The Issuing Body in a Domain is responsible for ensuring that the Basic Commitment and relevant Domain Protocol (about which more below) are observed within its Domain, in the creation, issue and redemption of RECS Certificates and their use as evidence of transfers of ownership thereof (Basic Commitment, art 2.11.a.i).

Existing licensing requirements will be the subject of a relevant section of the domain protocol per energy supply sector for each facility. Electrical facilities for example would need to comply with licensing requirements as set out in the Electricity and Electricity Regulation Acts and amendments.

4.25. Independence of Issuing Body

4.25.1 IBs must be "financially independent of market participants" (RECS Basic Commitment, Introduction).
4.25.2 Issuing Bodies may not at any time be a subsidiary, parent or related undertaking nor shall they operate as or have any financial interest in a Generator or other market players (art 3.4).
4.25.3 Issuing Bodies may not at any time hold rights or title to RECS Certificates, nor may any person holding title to RECS Certificates be a subsidiary, parent or related undertaking or operate as or have any controlling financial interest in any Issuing Body, unless they can prove to the satisfaction of the Association of Issuing Bodies that their owners cannot materially affect the decisions of the Issuing Body (art 3.3).
4.25.4 The AIB states in the RECS Basic Commitment that the AIB guarantees the quality of IBs' processes and their independence from the marketplace (RECS Basic Commitment, Introduction).

4.26. Central Registration Database

4.26.1 Each Issuing Body must maintain and make public records of each Production Device that it has at any time registered within its Domain including details of that Registration including where appropriate the name of the Production Device, its location, energy source and technology, but not necessarily details of ownership or personal particulars. The details made public must originate from the original RED, as that RED may be amended during the period of registration (art 5.1.a).
4.26.2 An Issuing Body must maintain records in a Central Registration Database (CRD) (art 2.11.a.v) of each RECS Certificate that it has issued, including the current owner, and transferability of the RECS Certificate (art 5.1.b).

4.27. Verification, audits and reports

4.27.1 Each RES-E Generator must periodically confirm that the claimed RES-E production is reflected in the physical meter reading (art 6.2.a).
4.27.2 The IB must ensure that the claimed RES-E Production has actually taken place, and may demand ad hoc or scheduled access to all records and meters associated with Registered Production Devices (art 6.3.b).
4.27.3 The IB is responsible for ensuring that the associated procedures are robust, effective, efficient and adequate (art 6.3.c).
4.27.4 Each IB must monitor all activity in the RECS market in its Domain (art 6.4.a), publish regular reports on the number of RECS Certificates issued, and those no longer transferable as a consequence of redemption (art 6.4.b), publish regular reports on the functioning and efficiency of the market (art 6.4.c), and report any instances of non-compliance with RECS rules by market players to national competition authorities and the AIB, which may take such action as is defined in the Domain Protocol (art 6.4.d).

4.28. Principles & Rules of Operation

4.28.1 The Basic Commitment is now also known as the Principles & Rules of Operation (PRO).
4.28.2 The entire PRO, whether for RECS Certificates, Guarantees of Origin, and EECS Disclosure Certificates, has also been given the general label of the European Energy Certificate System (EECS). The PRO of the EECS sets out the common international standard to which all members of AIB subscribe.
4.28.3 The current version of the PRO (Release 3 dated 2 June 2006) is entitled “Basic Commitment, being the Principles and Rules of Operation” of members of the AIB for “The European Energy Certification System”.
4.28.4 The AIB states that the current version of the PRO (EECS PRO Release 3-0) was formally approved by a general meeting of AIB members which was held on 2 June 2006.
4.28.5 The AIB states that the Basic Commitment or PRO is a “living document”, which is continually being refined to meet the developing needs of a maturing market. The AIB oversees ongoing development of the PRO (www.aib-net.org, retrieved on 22 May 2006).

4.28.6 The PRO in effect recodifies the RECS Basic Commitment as an EECS Certification Scheme established by a PRO Chapter (Chapter 2: RECS Certificates). The PRO defines a Certification Scheme as a legislative, administrative or contractual framework establishing a system of Certificates (Part B: Definitions and interpretation).
4.28.7 The PRO elaborates and restates in comprehensive detail the matters which were contained in the RECS Basic Commitment (Release 2.2 of 31 January 2004). The PRO restatement is substantially similar to the RECS Basic Commitment aforesaid.

4.29. South African legislation

4.29.1 There is no South African legislation which expressly supports TRECs directly. Such legislation is not required for a voluntary system, such legislation will of course be necessary to make any TREC system compulsory in South Africa.
4.29.2 In this regard, it has been observed that the RECS system can be used to enable both voluntary and obligatory schemes (TREC Case Study Pack, 2003, sponsored by the European Commission, p 49 “The European RECS System”, para 2).
4.29.3 In May 2004 the government issued a renewable-energy white paper (White Paper on the Renewal Energy Policy, November 2003, General Notice 513 of 14 May 2004), which states that the government’s vision is an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy, thus contributing to sustainable development and environmental conservation (para 1.1). The white paper refers to an energy bill which was proposed in 2003 which would allow the minister to make regulations regarding minimum contributions to the national energy supply from renewable energy resources (para 3.1.6). The white paper says that, to meet the long-term goal of a sustainable renewable-energy industry, the government has set a target of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar & small-scale hydro (para 5). A renewable-energy strategy would be developed to translate the goals and objectives in the white paper into a practical implementation plan (para 11).
4.29.4 The Bill, as introduced in 2005 and subsequently enacted as an Act of Parliament (Electricity Regulation Act 4 of 2006) states that the Minister may, in consultation with the National Energy Regulator, determine the types of energy sources from which electricity must be generated, and the percentages of

electricity that must be generated from such sources (s 46(1)(b)), determine that electricity thus produced may only be sold to the persons or in the manner set out in such notice (s 46(1)(c)), and determine that electricity thus produced must be purchased by the persons set out in such notice (s 46(1)(d)). The Regulator, in issuing a generation licence, is bound by any such ministerial determination (s 46(3)(a)), and may facilitate the conclusion of an agreement to buy and sell power between the generator and the purchaser of that electricity (s 46(3)(b)). The Act also states that the Minister may, by notice in the Gazette, make regulations regarding the types of energy sources from which electricity must be generated (s 47(4)(n)), and the percentages of electricity that must be generated from different energy sources (s 47(4)(o)).

4.30. Proposed tax legislation

4.30.1 In April 2006, the National Treasury in South Africa issued a Draft Policy Paper which investigated market-based instruments to support environmental fiscal reform (Draft Policy Paper: A Framework for Considering Market-based Instruments to support environmental fiscal reform in South Africa", April 2006, Tax Policy Chief Directorate, National Treasury).

4.30.2 This Draft Policy Paper contains a section about choosing between different policy options (part 4.3). It states that it is not possible to be overly prescriptive concerning appropriate policy instruments at a general level. For each environmental objective, a tailored or stylised solution is likely to be required. Some broad guidelines include inter alia that tradable permit schemes will encourage negative environmental externalities to be incorporated into prices, thereby internalizing external costs. In some instances, traditional regulatory approaches alone may be appropriate to the extent that they can be adequately enforced (p 49).

4.30.3 Based on existing experience, key features underpinning the effective operation of a tradable permit system are that permits must be well defined, free and open trade must dominate the market, the transaction costs and other aspects that limit the scope for trading must be kept to a minimum, permits should be bankable such that individuals have the flexibility to spend or save permits according to market fluctuations, and the penalty for permit violation must greatly exceed the permit price (p 51).

4.30.4 Open trade enables polluters to respond to price signals created by the limited number of permits. In a freely-operating market, permits would be traded until the marginal abatement costs are equalized between different polluters. This would be an efficient outcome from an economic perspective (p 51).

4.30.5 Creating the necessary market conditions for open trade will be difficult in South Africa, because many industries are still largely oligopolistic and dominated by a small number of large firms. This is likely to limit the level of trading, which in turn will undermine the effectiveness of these kinds of systems (pp 51-2).

4.30.6 For these and other reasons, tradable permit systems are, at present, less appropriate for use in South Africa than fiscal reform options, both in terms of operational practicalities and their potentially small contribution to revenue-raising objectives (p 52). (Presumably this means that tradable permit systems are less appropriate for use in South Africa "as a tax-raising measure".)

4.30.7 In future, says the Draft Policy Paper, tradable permit systems may have a role under niche circumstances, particularly in improving local-level natural-resource management. Such opportunities would need to be investigated further (Draft Policy Paper: A Framework for Considering Market-based Instruments to support environmental fiscal reform in South Africa", April 2006, Tax Policy Chief Directorate, National Treasury, p 52).

4.31. Guarantees of Origin (GoOs)

4.31.1 The GoO system builds on lessons learnt during the development of the earlier Renewable Energy Certification System (RECS), according to the former's Basic Commitment (EECS Basic Commitment, release 1-2, 7 June 2004, Introduction).

4.31.2 The approach of the GoO system is that energy certificates provide evidence of the source of energy. This source can either be a renewable and sustainable energy source, or even a fossil or nuclear source. An energy certificate can also provide other information, such as the technology to convert energy from one form to another, such as in the generation of electricity. Energy certificates can be used simply as a guarantee of the source of the energy, or they can be traded as commodities. Either way, they enable consumers to choose the energies they wish to support (EECS Basic Commitment, release 1-2, 7 June 2004, Introduction).

4.31.3 There is very little difference between the RECS system and the GoO system. Both are managed by the same Association of Issuing Bodies (AIB). In fact, the only real difference is that a GoO could be issued even in respect of fossil fuels, whereas an RECS certificate is issued in respect of renewable energy only. RECS International (about which more below) state that the only real difference between a RECS and a GoO is that the GoO has legal status based on an EU directive (Council Renewable Energy Directive 2001-77-EC), whereas the RECS is based on the voluntary market (www.recs.org/recs.asp, retrieved 13 May 2006).

4.31.4 The AIB points out that, although the traded volumes of obligatory Guarantees of Origin (GoOs) have now overtaken voluntary RECS Certificates in a number of countries, GoOs are not yet available everywhere, nor will they be transferable in all countries. For this reason, and perhaps due to their more standardised format, RECS Certificates continue to be traded.

4.32. RECS International

4.32.1 RECS International Association is an association of traders of green certificates in Europe. It is a members' organisation, as well as an expert group on certificates trading in general. it was founded in 2001 (www.recs.org, retrieved 19 May 2005).
4.32.2 The RECS International Association is a group of market players that trade in renewable-energy certificates through the whole of Europe. It started as a voluntary initiative to create a uniform system for cross-border certificate trading in 2001. It has more than 100 members, who trade certificates in over fourteen countries.
4.32.3 This Association states that it has good ties with the Association of Issuing Bodies (AIB) who are the system operators. Every three months there are international meeting events with AIB and often other stakeholders such as governments.
4.32.4 The RECS International Association is a lobby towards national and European governments for a harmonized pan-European market for certificate trading (www.recs.org, retrieved 19 May 2006).

4.33. US endorsement

4.33.1 In March 2002 a meeting was held in Washington DC about establishing a North American association for issuing and verifying tradable-renewable certificates. Representatives of the Environmental Protection Agency and the California Energy Commission among others were present. Representatives from Europe of the Association of Issuing Bodies were also present.
4.33.2 Subsequently the convener of the meeting, (Jan Hamrin, of the Centre for Resource Solutions) wrote a final report about developing a framework for tradable renewable certificates (Developing a Framework for Tradable Renewable Certificates, final report, Centre for Resource Solutions, August 2002). This report states that it was prepared as an account of work sponsored by the National Renewable Energy Laboratory, an agency of the United States Government, although the report contains a disclaimer that the views and opinions of authors expressed in it do not necessary reflect those of the United States Government or any agency thereof.
4.33.3 This report describes the RECS system operating in Europe (pp 14 to 20). The report concludes that the development in the US of a national network for issuing and tracking tradable renewable certificates is feasible, and there is broad-based support. There are already two de facto Issuing Bodies in the US (in two regions thereof). There appears to be strong support for the development of a national co-ordinating body to be styled the American Association of Issuing Bodies (AAIB), to help facilitate the development of agreements needed to form a national network of Issuing Bodies (p 46).
4.33.4 Attached to the report was a draft Basic Commitment for the American Association of Issuing Bodies (AAIB) (Appendix II). It is closely based on the RECS Basic Commitment.

4.34. Legal aspects of constituting Issuing Body

4.34.1 An Issuing Body for South Africa can be constituted as a voluntary association, with legal personality apart from its members, and liable for its own debts and obligations apart from its members. The appeal court ruled many years ago that an association of individuals does not always require the special sanction of the state to be a separate corporate body or legal person, able to hold property and to sue in its own name, and liable for its debts to the exclusion of its members, with perpetual succession and capable of owing property and incurring debts apart from its members (Morrison v Standard Building Society 1932 AD 229 237-8).
4.34.2 Under the laws governing companies, any association to be formed for any lawful purpose, having its main object the promotion of certain specified social or other interests, and which inter alia prohibits payment of any dividend to its members, may be incorporated as a company (Companies Act 61 of 1973 s 21(1)). Such an association not-for-gain must include in its name the statement "Association incorporated under section 21" (s 49(3)). To be incorporated as a company in this way, the association must have the main object of "promotion of religion, arts, sciences, education, charity, recreation, or any other cultural or social activity or communal or group interests" (s 21(1)(b)).
4.34.3 There is a statute governing nonprofit organisations (Nonprofit Organisations Act 71 of 1997) which includes among its objects that of encouraging nonprofit organisations to maintain adequate standards of governance, transparency and accountability and to improve those standards (s 2(c)).

4.34.4 This statute states that the directorate of nonprofit organisations in the national department responsible for welfare must prepare and issue codes of good practice for nonprofit organisations (s 6(1)(b)(i)). The minister for welfare may by regulation prescribe benefits or allowances applicable to registered non-profit organisations (s 11). Any nonprofit organisation that is not an organ of state may apply to the directorate's director for registration (s 12(1)).

4.34.5 The constitution of a nonprofit organisation that intends to register under this statute must state that the organisation's income and property are not distributable to its members or office-bearers except as reasonable compensation for services rendered. Its constitution must make provision for the organisation to be a body corporate and have an identity and existence distinct from its members or office-bearers, and for its continued existence notwithstanding changes in the composition of its members or office-bearers (s 12(2)(d) and (e)). The constitution must specify the powers of the organisation and its organizational structures and mechanisms for its governance (s 12(2)(g) and (h)), among other things.

4.34.6 Every registered non-profit organisation must, in writing, provide the director with a narrative report of its activities in the prescribed manner together with its financial statements and accounting officer's report, within nine months after the end of its financial year (s 18(1)(a)).

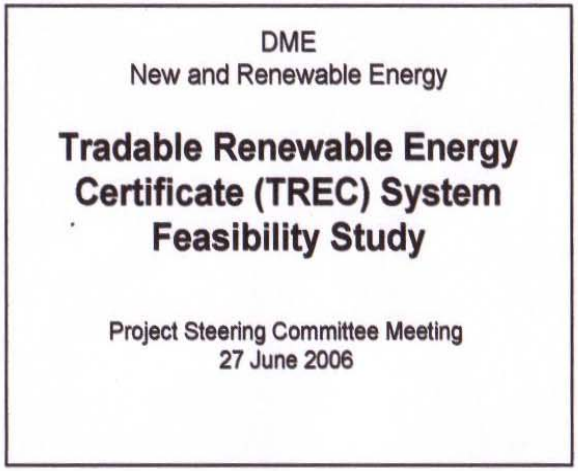
5. Motivation

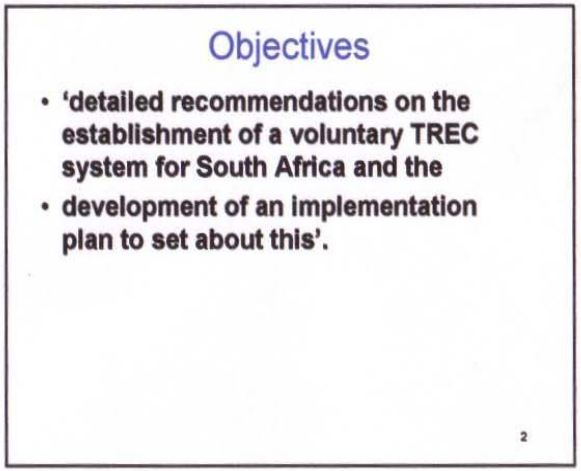
The benefits of establishing a national TREC system include:

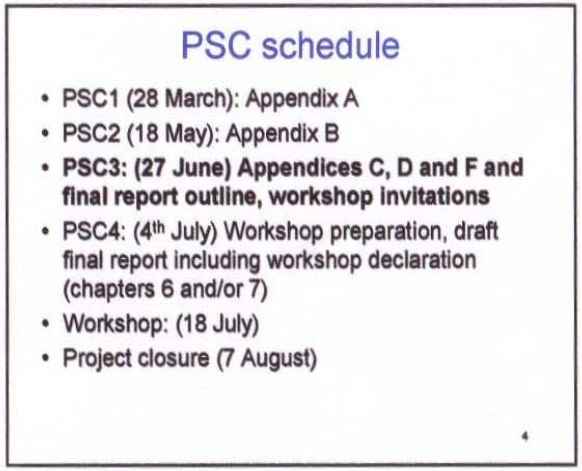
- TRECs allow for the monitoring and verification of any renewable energy production-based support mechanism. A proposed top-up feed in tariff, for example will be very difficult if not impossible to implement without a suitably thorough (both energy and time resolution) system for monitoring production.
- Purchase of green attributes separate from physical power trade and electrical transmission and distribution infrastructure and
- Administration and verification of the greening of events and products.
- Public ownership of system design and infrastructural development allows for the use of the system for national regulatory compliance and support mechanism administration in future.
- TRECs will help to reduce the financial burden on the electricity supply system or fiscus of increased uptake of renewable energy.

6. Summary

The presentations made to the project steering committee on the 27th of June are provided as a summary of the above.







Recommendation

- **Adopt the Basic Commitment as amended by the Principals and Rules of Operation (PRO)**
- RECS
  - provides a simple, clear, practical, implementable, administratively efficient method of operation and rules
  - presents a basis for clear definition of eligible TREC renewable energy resources and technologies
  - as a tried and tested system is manageable yet robust, reducing the likelihood of error or fraud
  - will be supplementary and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum Government involvement and.
  - as the basis for many other international TREC systems is compatible with and provides potential for co-operation with other prominent TREC systems

5

C1: What is a system?

- As outlined by PRO (including IT) plus... human resources and hardware
- Framework for trade on which the market participants agree
- System of governance
- Institutional setup
- Market principles
- Rules of operation
- Tracking system
  - Human resources
  - Hardware
  - Software (primarily the Central Registry Database CRD)

6

C2: RECS: Voluntary REC System

- Basic Commitment (Association of Issuing Bodies (AIB)) cornerstone of TRECs in the world and could be defined as the basis of TRECs in Europe, it is link to all TRECs worldwide and has now also been adopted by the USA to form the basis of their TRECs verification, monitoring, tracking and control system.
- Now called PRO – Principles and Rules of Operation
- Clear guidelines provided for setting up a national RECS framework ('Setting up a national RECS framework Rev.1.2, 2005)
- Costs..€20k or €5k (<2GWh) and €0.01/MWh.(Sale price R5/MWh with transaction cost R0.1/MWh before local IB costs.
- Consider readiness for later approach to AIB and issue certificates at home without AIB approval.
- Supports both voluntary and mandatory systems and trade within and between such schemes

7

C3: PRO

- **Principles and Rules of Operation**
- Self-consistent (?) framework defining the required elements of a REC system generally
- Ammends Basic Commitment
- Outlines precisely what should be put in place for a working system
- Government appoints/supports issuing bodies for obligatory schemes while market participants appoint them with public support for voluntary schemes.
- The voluntary TREC system as infrastructure to be used in a mandatory system as well.

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C5:Motivation

- Will provide the material for a decision on government involvement in national TREC system development.
- If intervention in a TREC system development and market creation are deemed prudent, beneficial from a national cost benefit perspective
  - **will provide the motivation required for sourcing funding and creating a suitable institutional setup** to support the recommendations.
- Public ownership of system design and infrastructural development
- All the elements necessary to motivate and recommend a local and internationally acceptable and sustainable, with minimum Government involvement, Voluntary and sustainable South African TREC system.
- Requirements (e.g. Government responsibilities, financing and manpower needs, legal and regulatory changes e.g. new legislation or amendments) and procedures to make the TREC system mandatory.
- Costing a function of the implementation plan and level of participation

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C5:Levels of participation

- None
  - Market participants create, govern and fund IB
- Ministerial affirmatory statement supporting approach to establishment of voluntary system.
  - Basic Commitment as the basis for system
- Association of market participants
  - DME facilitates
  - Funding (is this possible if not an agency)
- Notice of establishment of IB – government agency

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D1: Implementation plan activities

- Interested bodies and market participants appoint Issuing Body with membership open to all potential TREC market participants who agree to South African principles and rules of operation (basically the AIB PRO) prepared in consultation with stakeholders
- Capabilities/Appointments to support activities of the issuing body
  - Production Registrar (PR) to verify production device's compliance
  - Auditing Body (AB) to audit the continued fulfilment of conditions for RECS registration.
  - Central Monitoring Office (CMO) to operate the CRD
- Develop and commission registry software
- Develop and maintain a domain protocol based on the AIB model domain protocol

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D2: Implementation plan

- Time frame (approx. 18 months maximum)
- Human and financial resources (again cf. DNA, REFSO, AIB for info)
- Assignment of responsibilities as part of a suitable institutional setup
- Legal and regulatory basis and draft requirements (e.g. regulations) for the establishment of a Voluntary TREC system for South Africa (eg. King II requirements), NPO under DoSW.

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Implementation Plan

SA TRECS outline system definition agreed, presented and documented,	End August 2006
Legal, auditing, statutory, financial structures in place	September 2006
Agree financial model	October 2006
Agency/NPO to put out a tender for a South African TRECS in 2 parts; ⊓ build a suitable system which matches the DME specification ⊓ setup hardware, environment and staff to run the facility for a limited period	December 2006
Pilot Project using actual Green Data to stress test system	July 2007
(Optionally) Import any old format Green transactions	October 2007
National implementation of the system	January 2008

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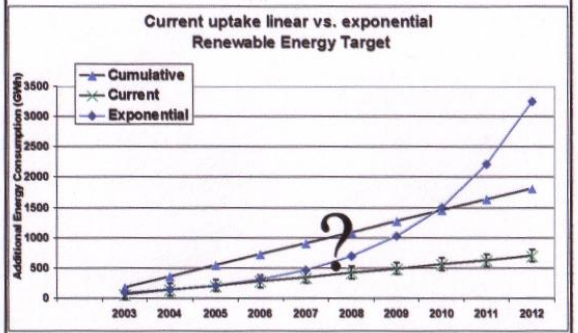
F: Market Assessment and projected contribution

- Current rate is insufficient
  - Market price for renewable energy is unlikely to reach competitive levels at this point in time.
  - See draft Appendix F: Executive summary
- Enabling statement by government for development of RE
- Results from existing market assessments
  - Such as1% of Cape Town consumers equivalent to RE target in 1 year.
  - Estimates of willingness to pay for TRECs
- Green funding and mechanisms report
- Quantify anticipated change in rate of uptake vs. that required by the target (NIRP2, IEP1, other)
- Geographically dispersed green customers, circumventing physical trade barriers.
- Estimated change in number and energy contribution of currently marginal projects included in motivation

14

Current uptake linear vs. exponential Renewable Energy Target



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Thank you.

NANO ENERGY

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Appendix D: System implementation plan

Appendix D (Interim report D) Version 3

Implementation plan

August 2006
Revised: March 2007

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7. System implementation plan

This implementation plan outlines the projected timeframes and associated costs required for establishment of a national TREC system. The plan also provides guidance on ensuring that resources are allocated timeously and accordingly to ensure efficiency, risk minimisation and effectiveness for the execution of the recommendations.

The approach adopted for the implementation plan is based on project management principles and thus reflects the timeframes for each activity and the costs associated to complete the activities. The implementation plan also incorporates the design, development and implementation of the envisioned Information Technology structure, the creation of the proposed TREC Issuing Body, identifying the personnel as well as the mobilisation of other resources. This will provide the Department of Minerals and Energy a holistic plan to assess the investment risk associated with the implementation of the recommendations and effectively mobilise adequate resources. An amount of R 2 million for the first three years is projected to complete the execution of the implementation plan to the point the revenues from Issuing Body activities render the IB financially self-sufficient.

A Voluntary TREC system implementation plan was developed. It includes a breakdown and explanation of the necessary activities, time frame, manpower and financial resources, and responsibilities was developed. The following activities with a number of sub activities have been identified. Each activity represents a significant impact on the successful execution of the recommendations.

1. Establishment of the TREC Non-profit organisation NPO (All market participants (including the DME) will be members of the governance structure of this organisation) to operate as the National TREC Issuing Body (IB) appointing organisations to perform the necessary functions including:
    g. Production Registrar (PR) to verify production device's compliance
    h. Auditing Body (AB) to audit the continued fulfilment of conditions for registered renewable energy device registration.
    i. Central Monitoring Office (CMO) to operate the CRD
2. The approval of the TREC NPO by the Minister OR the gazetting of the entity and its role (should the TREC IB be established as a government agency in the future);
3. The adoption of the Principles and Rules of Operation (PRO) as the national TREC system framework;
4. Developing the Issuing Body's business plan
5. Acquiring the funding for the capital and operational costs for the first 2 years of the IB OR the provision of budget within DME's fiscal policy or a mix of the two depending on willingness by private and other organisations to assist in the capitalisation.
6. Preparation and maintenance of the South African Domain Protocol (outlining National specifics for various renewable energy resources converted to either electricity (both grid and off-grid), renewable liquid fuels or electrical offset energy such as solar water heating)
7. Develop and commission the central registry software. This is the database documenting generation, ownership, transfer and redemption of TRECs.
8. Designing a marketing strategy and campaign to raise awareness of TRECs and implementation of these.

The indicative timeline for roll-out of the implementation plan is presented in **Figure 12** below.

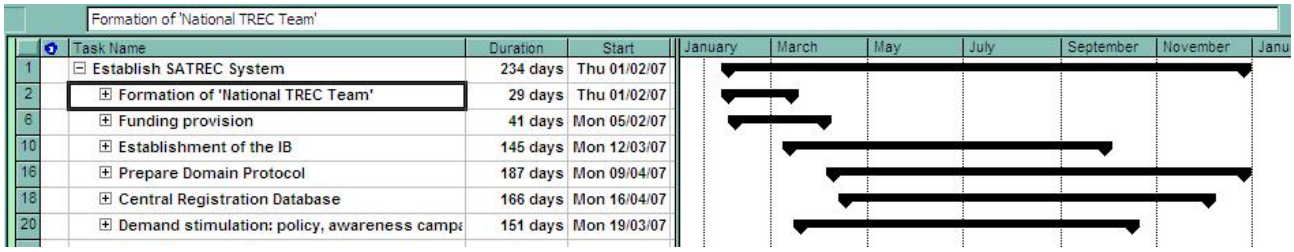

Figure 12 TREC System Implementation timeline

The associated business modelling for the establishment and operation costs of the Non-profit Issuing Body (responsible for the operation of the TREC system), demonstrates that the system could be financially self-sufficient within 3 (and possible even 2) years of establishment. The capitalisation of the Issuing Body will be in the order of R 2 million in total over the first three years as indicated in Figure 5. The administration

costs associated with the life cycle of a certificate (1MWh) is less than 0.04% of the estimated market value of the certificate and has been modelled to decrease linearly in real terms. The model considered volumes of renewable energy certificate traded consistent with achievement of the absolute 10 000 GWh renewable energy target by 2013.

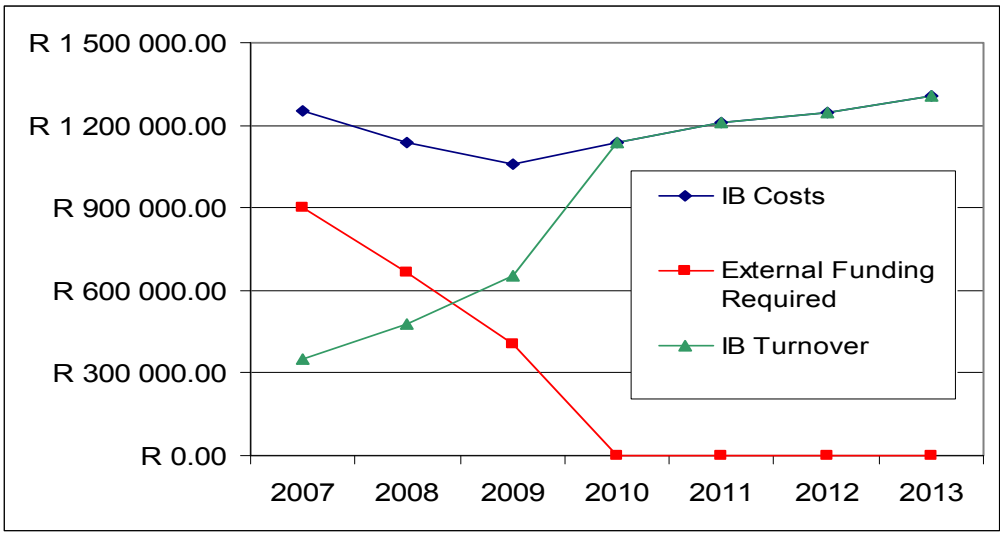

Figure 13 Indicative cost and income stream for TREC issuing body

The modelled administration costs as a percentage of the certificate market value is inversely proportional to the volume of TRECs issued. This is outlined on slide 32 of **Figure 15**. The cost of issuing certificates is probably the most important parameter whish will emerge from development of a detailed business plan for operation of the Issuing Body.

Table 2 provides an indication in the organisations responsible for the establishment of the TREC system and their responsibility, financial resource contribution and timeframe for participation.

Table 3 TREC System establishment responsibility matrix

Organisation	Responsibility	Resource implication	Financial	Legal and Regulatory	Timeline
DME	• Enabling statement • Facilitate creation of IB governance structure through TRECASA • Endorsement of funding applications	Reduction in resource requirements for a monitoring system provided sufficient public ownership of TREC System	The external funding requirement for the first 3 years is ~R2million. The Department could bear any percentage of this depending on the success in raising it elsewhere.	For the establishment of the IB, the DME participation in the governance of TRECASA and endorsement of the association is essential.	January 2006 to June 2006
TRECASA[24] to be established	• Production Registrar • Auditing body • Central Monitoring office	Appoint functions or capabilities required of IB Cost as per Figure 5	The external funding requirement for the first 3 years is ~R2million. The Department could bear any percentage of this depending on the success in raising it elsewhere.	TRECASA is to be established under the NPO Act.	Established early 2006 in Private Public effort

[24] The prospective members of TRECASA would be all the organisations participating in the TRECs market including producers, traders and buyers.

7.1. TRECASA

A TREC Non-profit organisation (NPO) must be established. All market participants (including the DME) will be members of the governance structure of this organisation. The organisation will undertake the activities of a National TREC Issuing Body (IB) by appointing organisations to perform the necessary functions or developing these capabilities internally, including:

- Production Registrar (PR) to verify production device's compliance
- Auditing Body (AB) to audit the continued fulfilment of conditions for registered renewable energy device registration.
- Central Monitoring Office (CMO) to operate the CRD

The new entity's strategy, mission and vision must be formulated

7.1.1. Establishment of TREC NPO

The creation of the TREC NPO includes the administrative processes to register with the various statutory bodies as well to identify suitable personnel to carry out these tasks and obtain licensing agreements. It is expected that this task duration is twelve (12) months.

Table 4 Indicative TREC system establishment budget

Task ID	Task Description	Sub Activities	Duration (days/months)	Costs
1	Establishment of TREC NPO	Capitalisation Costs	12 months	R 242 000
		Operating Expenditure	12 months	R 641 000
		Total		**R 883 000**
		Capitalisation Costs are made up of the following:		
(i)	Application for the formation of an NPO			R 10 000
(ii)	Application to SARS (exemption and enquiries)			R 8 000
(iii)	Appointment of personnel/ secretariat			R 60 000
(iv)	IT Licensing and resources			R 119 000
(v)	Office furniture and equipment			R 45 000
		Operating expenditure		
(I)	Accounting and Auditing Fees			R 16 000
(ii)	Administrative costs			R 20 000
(iii)	Communication costs			R 4 200
(iv)	Levies, rental, utilities. administrator			R 120 800
(v)	Salaries			R 480 000

The sub activities include the design and development of the Production Registrar, the Auditing Body and the Central Monitoring Office. The indicative salaries for auditing and CMO operations within the IB as pre item (v) of operational expenditure annually above are as follows:

Task ID	Sub Activity Task Description	Sub Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Production Registrar	Design and development of Production registrar	12 days[25]	R500	R60,000
(ii)	Auditing Body	Formation of Auditing Body	12 months	[26]	R180,000
(iii)	Central Monitoring Office	Formation and operating of CMO	12 months	**[27]	R240,000
		Total			**R480,000**

[25] This cost is per production facility registration/renewal on an ad hoc basis rather than an annual salary/cost.
[26] Based on a salary of R15, 000 per month.
[27] Based on a salary of R20, 000 per month.

7.2. Approval or affirmatory statement by the Minister

The Minister of the Department of Minerals and Energy must give a statement to ensure that the renewable energy market is credible and thus provide a stimulus in the market to create awareness and to support market uptake. This will involve the gazetting of the statement and is driven and budgeted internally. A nominal sum for external input where pertinent is included as part of this indicative budget.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Gazetting	Statement gazzette	10 days	R500	R5,000
		Total			**R5,000**

7.3. Formulation of the new entity's business model strategy, mission and vision

The formulation of the new entity's business model, strategy, mission and vision must be in place:

i. for the submission of its registration with the Department of Social Welfare (DoSW)
ii. sets the platform for the achievement of its long term goals
iii. adequate strategies, business model and risk strategies, mission and vision must be agreed upon with all stakeholders including government, state owned entities participating in or making use of the TREC system. These include the Central Energy Fund (CEF), Eskom and NERSA.

These strategies should comprise the following principles:

- Strong governance and independence
- Non profit entity
- Effective tax and risk management
- Transparency

Figure 8 and **Figure 9** describe the origin of some of the parameters used in planning for a sustainable issuing body business model.

This will involve the engagement of the department with stakeholders and the assistance of suitably qualified personnel to be contracted to formulate a credible business model and professional strategy, mission and vision for the new entity.

This activity is projected to take twenty-one (21) to sixty (60) working days depending on the availability of the Minister or representative of the Department and other stakeholders. Three (3) dedicated TRECs team members are envisioned to lead in the formulation of the strategy.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Formulation of Business Model	Stakeholders	21 - 60 days	R500,00	R120,000
		Total			**R120,000**[28]

7.4. Adoption of the PRO[29]

The adoption of the Principles and Rules of Operation (PRO) as the national TREC system framework is fundamental in the development and support of the renewable energy market in Southern Africa. The duration of the adoption is expected to be between three (3) to four (4) months.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Adoption of PRO	Stakeholders	3 – 4 months	R1000,00	R168,000
		Total			**R168,000**

7.5. IB Business Plan and sustainability

The draft business plan considered as part of this feasibility study will need to be refined in using it to raise the necessary finance for the capitalisation and initial operational cost of the issuing body. The services which the Issuing Body must sustain are listed in slide 18 of **Figure 10**.

[28] A sound business will ensure the sustainability of the issuing body by mitigating risk, particularly around uncertainties in both anticipated market volumes and prices and therefore the administration cost which the market can in turn support.
[29] A summary of the PRO is provided in slide 12 of **Figure 7**.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Adoption of PRO	Stakeholders	21 days	R1000,00	R156,000
		Total			**R156,000**

7.6. Domain Protocol design and maintenance

The design and maintenance of the Domain Protocol will outline the national specifics to ensure it meets the South African economic environment. Preparation and maintenance of the South African Domain Protocol (outlining National specifics for various renewable energy resources converted to either electricity (both grid and off-grid), renewable liquid fuels or electrical offset energy such as solar water heating). The Bagasse-based component of the domain protocol has already been developed, funded by the private sector. See slide 10 of **Figure 6**.

This activity consists of the design of the Domain Protocol and the maintenance of the Domain Protocol. The design is projected to take twenty (21) days and the maintenance will occur on a bi-annual basis.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Domain Protocol	Design	21 days		R84,000
		Maintenance	Bi-annual		R20,000
		Total			**R156,000**

7.7. Central Registry Development

The Central Registry database is crucial to the trading of renewable energy certificates. The database should document the generation of the tradable renewable energy certificate, ownership and transfer and redemption. The pivotal role of the CRD is depicted schematically as part of the TREC lifecycle flow diagram in **Figure 11** and its part generally in the TREC system in **Figure 14**.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Central Registry	Design and Development	12 months		R64,000
		Maintenance	On going maintenance		R20,000
		Total			**R84,000**

7.8. Market strategy formulation and raising awareness

The designing of marketing strategy and campaign to raise awareness of TRECs and implementation of these in South Africa will provide a platform for stimulating demand for renewable energy certificates. This will ensure that the renewable energy market in Southern Africa will be sustainable in the long term as well as less vulnerable and susceptible to the volatile oil market. These costs should be bourn by market participants. The Departmental 'roadshows' during which the, interest, roles & responsibilities of various stakeholders will be determined, will have the concomitant effect of creating interest in the intiative.

Task ID	Task Description	Task Activities	Duration (days/months)	Rate Per Hour	Costs
(i)	Market Strategy Formulation and market campaigns	Formulation of market strategy	21 days		R20,000
		Marketing campaigns	On going maintenance		R185,000
		Total			**R205,000**

Appendix E: TREC workshop report

Appendix E (Interim report E) Version 1

Workshop Report

February 2007

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1. Stakeholder workshop overview

A government and stakeholder workshop was held on the 18th of January 2007 to present the findings and recommendations of this study. The workshop was held with a view to updating the motivation, recommendations and voluntary TREC implementation plan where necessary. Written stakeholder inputs were sought prior to the workshop and a period of 10 working days has been provided for comments to this final draft version of the report including appendices from the date of its publication on the DME website.

61 government and stakeholder representatives attended the workshop.

The Chief Director for Clean Energy, Mr. Sandile Tyatya, welcomed those present and wished them well is deliberations regarding the TREC system feasibility study and its role in assisting to achieve the renewable energy target and to develop the renewable energy sector in South Africa.

Mr. Silas Mulaudzi of the Clean Energy Chief Directorate outlined the background to the study and the terms of reference for the study.

Messrs Schäffler, Sanan Moore, Moses and Ganz presented the findings of the study focussing on the recommendation, motivation and implementation plan with special thanks to participating members of the Project Steering Committee, those who has submitted comments and those present.

Mr. Silas Mulaudzi presented the way forward and closed the workshop.

2. Questions and comments

The following questions with recorded responses and comments were received:

Table 5 Workshop questions, answers and comments

Question or comment	Response
Ms. C. Terblanche (Anglo): • Is the income from TRECs taxable?	• Yes, unless specifically stated otherwise by the National Treasury.
• Is it possible to take energy amortisation and nett energy production/ nett emissions reductions into account? This is important when considering fiscal impacts and measures as strong as mandatory targets.	• Yes, these are details that must be stipulated in the South African TREC domain protocol to be developed.
• How is it ensured that true local progress is made towards a sustainable energy future without accidental counting of fossil inputs to renewable energy production.	• Technology specific components of the South African domain protocol will need to cover these issues.
Mr. K Naaidoo (DBSA): • What costs would producers of TRECs incur?	• Producers pay a fee for registration with the Issuing Body as a renewable energy device (A Renewable Energy Declaration (RED) must be produced and signed after a detailed facility inspection) and periodic renewal of this registration. The administration fee for certificate issue, transfer and redemption is usually borne by participants downstream of the producer but this need not necessarily be the case.
• What drives the pricing of TRECs?	• It is generally market driven. Some South African indications come from early market surveys and anticipated municipal green power offerings. In mandatory markets buy-out prices for non-compliance set the upper price limit.
Mr. V. (Aldus Capital) • Can both TRECs and CERs accrue to a project	• Yes
• What is potential TREC market demand and price in South Africa?	• The consulting team has been instructed to model the system requirement on the assumption that the 2013 voluntary renewable energy target is obtained. The City of Cape Town is considering a 25c/kWh premium on power from the Darling Wind Farm.
• Is there any TREC activity in the USA?	• Yes, and the formation of an American Association of Issuing Bodies is being considered in line with the European AIB.
• What does the validity period of the certificate refer to and what are the justifications for its inclusion in the record?	• The validity period is the period over which the certificate is allowed to be redeemed after its issuance. Notably it allows for retrospective inclusion of certificates after the system inception data and allows for added acceleration of renewable energy uptake when a period is specified – usually a number of years aligned with policy or strategy objectives and planning cycles.
• What work has been undertaken on potential demand and market price?	• Mr. Dirk Ganz outlined some of the finding of Interim Report F (Appendix F) pertaining to a

Question or comment	Response
The revenue stream to projects is perhaps more important to the private sector as a motivation of this system than the public monitoring benefit	TREC market analysis and potential contribution of the introduction of a national system.
Mr. M Tanton (Central Energy Fund) CERs and TRECs should be kept separate. The inclusion of a biofuel TREC category should not be allowed to slow down the development of a national TREC system.	
Prof. J Blignaut (University of Tshwane) • A TREC system should clearly be supported but how will the low market volume phase be bridged. • What is magnitude of the transaction costs compared to the price of TRECs.	• One solution would be for first-mover market participants to pay an elevated administration fee on a sliding market volume scale. There are others. • The benchmark of R250.00/MWh with an administration fee of R0.10/MWh at a market volume of 5 000 000 TRECs provides a guideline. Similarly the AIB charges Euro0.01/MWh for certificate transfer within their member domains.
Mr. L van Heerden (Eskom) • Could you please comment on the market volumes and expected versus current renewable energy uptake? • Nowhere in the world is the full life cycle cost (energy) accounting undertaken (In response to Ms. Terblanche) • What is the way forward? Will there be a further round of discussions in concluding this.	• Discussion of market volumes in line with attainment of voluntary renewable energy target. • This argument also becomes redundant in energy mixes with high renewable energy penetration in which case renewable energy inputs to renewable energy production become the norm. • We form a national team and embark on the suggested implementation plan. Additional forums could be part of the Department's 'early facilitation' of the process.
Mr. L van Wyk (Amatola Green Power) • How does the IB capitalise itself prior to the period of sufficient market volume to remove external financial dependence.	• If external funding sources are not forthcoming in line with public participation in and ownership of the process, early voluntary market participants should be rewarded through retrospective inclusion of their contributions in the domain protocol stipulation of the certificate validity period.
Mr. A Otto (DME) The latter half of 2006 in particular marked a significant increase in pressure to ensure increased renewable energy uptake. The electricity regulation act makes provision for the Minister to make generation of electricity of specified sources mandatory (In response to question from Ms Collins).	
Ms. Name?? (Tshwane) A verification process must consider nett renewable energy production.	
Mr. Roberts (CSIR): • How could Solar Water Heating be supported using TRECs given that there is no electricity generation.	• The offset electrical energy is considered over the period of the lifetime of the system or over which it is under warranty and certificates issued at installation. The Australian example is noteworthy.
Ms. S Collins: • How seriously is an obligation being considered?	• See response by Mr. Otto above.
Mr. G Morris (Agama Energy) The public sector could assist by participating in the market.	

3. Workshop presentation

DME
New and Renewable Energy

Tradable Renewable Energy Certificate (TREC) System Feasibility Study

Stakeholder Workshop
18 Jan 2007

Agenda

09:30 – 10:00	Coffee and Registration	
10:00 – 10:05	Welcome and introductions	DME (Mr. S. Tyatya)
10:05 – 10:10	Project Overview	DME (Mr. S. Mulaudzi)
10:10 – 10:30	Introduction to TRECs Overview of the feasibility study	Nano Energy
10:30 – 11:00	Motivation and recommendations	Nano Energy
11:00 – 11:30	Implementation Plan.	Nano Energy
11:30 – 11:45	Coffee	
11:45 – 12:45	Group discussion	Workshop
12:45 – 13:00	Way forward & Closure	DME (Mr. S. Mulaudzi)
13:00	Lunch	

2

Overview

- **Overview of the feasibility study**
- **Introduction to TRECs**
- **Motivation and recommendations**
- **Implementation Plan.**

3

Objectives

- **'to provide recommendations on the establishment of a voluntary TREC system for South Africa and the**
- **development of an implementation plan to set about this'.**

4

Nano Energy 16Jan07

1

Interim report series

A. South African TREC activity scan and market status
B. Comparative country analysis with respect to TREC developments
C. TREC system requirements, motivation and recommendation including legal and regulatory requirements
D. System implementation plan
E. TREC workshop report
F. TREC market analysis and projected renewable energy uptake contribution

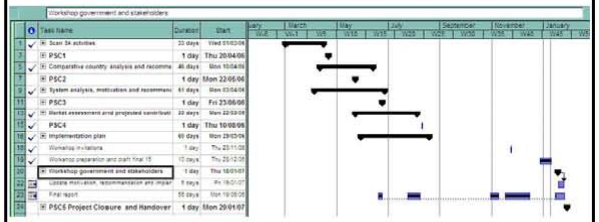
5

PSC schedule

- A series of 5 project steering committee meetings Mar06
  - PSC1 (28 March): Appendix A
  - PSC2 (18 May): Appendix B
  - PSC3: (27 June) Appendices C, D and F and final report outline, workshop invitations
  - PSC4: (10 August) Workshop preparation, draft final report including workshop declaration (chapters 6 and/or 7)
  - Workshop: (5 September)
  - PSC5 Closure

6

Project tasks and timeline

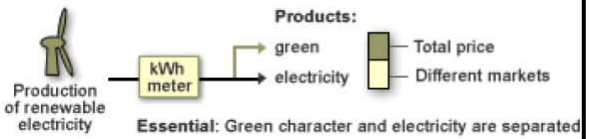


7

Introduction to TRECs

TREC = Tradable Renewable Energy Certificate

- In practice, TRECs are electronic records that verify the origin of energy from registered renewable energy facilities.



Essential: Green character and electricity are separated

Source: EC 2000

8

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2

Different revenue streams

- Physical power
- Emissions reductions
  - consideration given to use of existing infrastructure (Designated National Authority (DNA) or generation licensing)
- TRECs – 'green' attributes
  - Attributes include:
    - Local environment
    - Public benefit – job creation…
    - Other externalities – avoided morbidity

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TREC system process

- Device registration
- Certificates are issued upon production
- Record of transfer between market participant accounts and redemption is retained by the Issuing Body (IB) – not financial details of transaction
- Certificates are redeemed when they are no longer available to be traded.
- They are redeemed:
  - prior to green labelling in voluntary markets (products, events or general disclosure of environmental performance)
  - in claiming production-based support
  - in proof of compliance with purchase or supply obligations
  - upon international export (transfer to intl. customer's CRD account)

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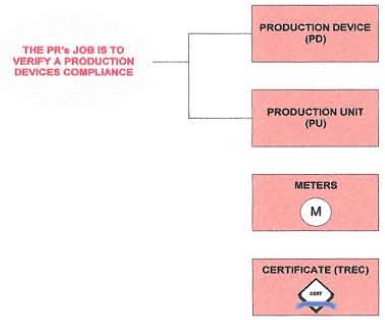
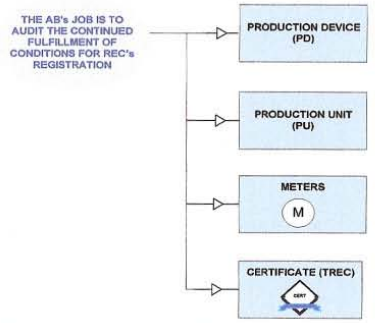
TRECS RESPONSIBILITY MATRIX (OVERSEEN BY ISSUING BODY)

PRODUCTION REGISTRAR (PR)



TRECS RESPONSIBILITY MATRIX (OVERSEEN BY THE IB)

AUDITING BODY (AB)



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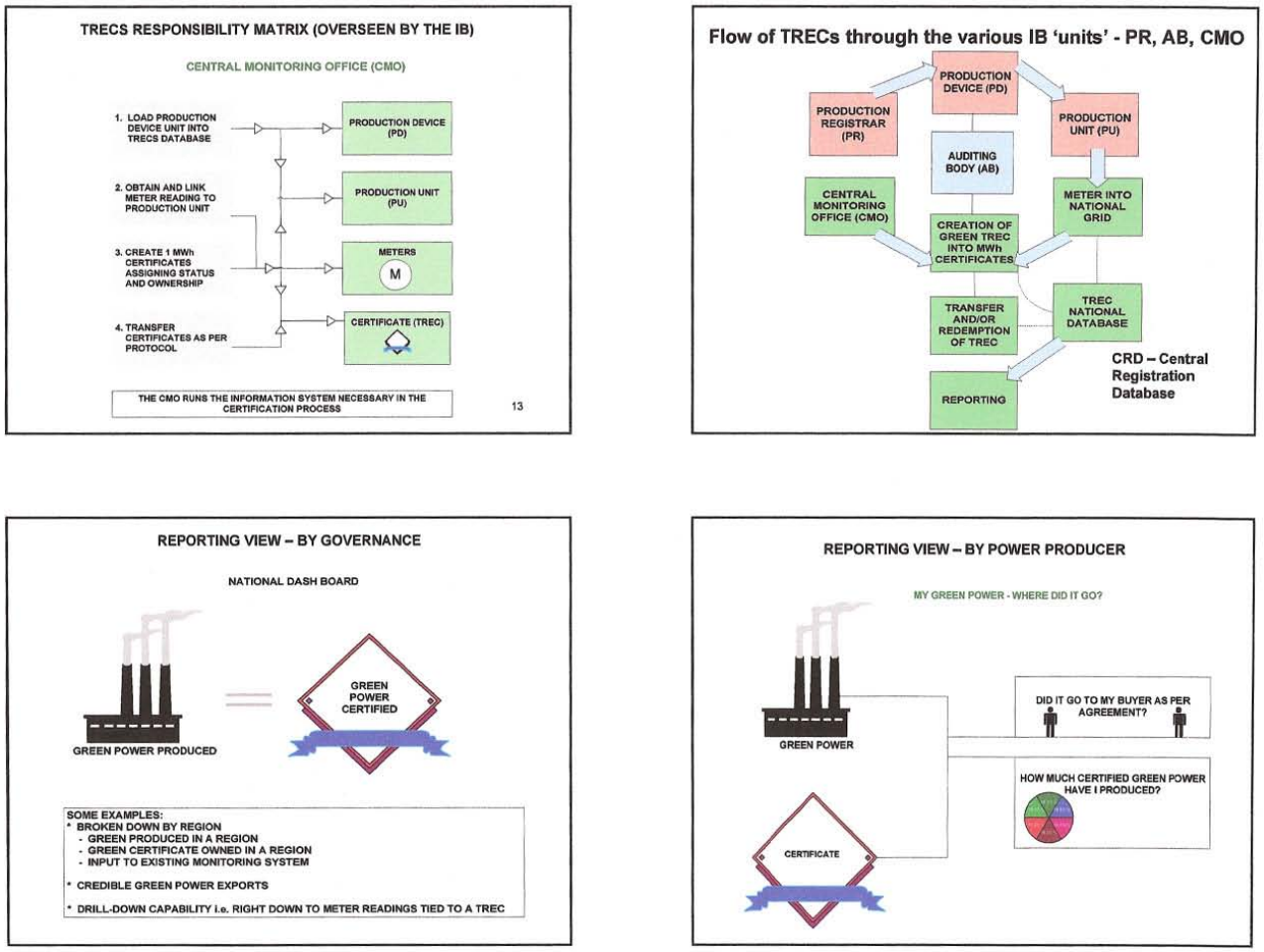
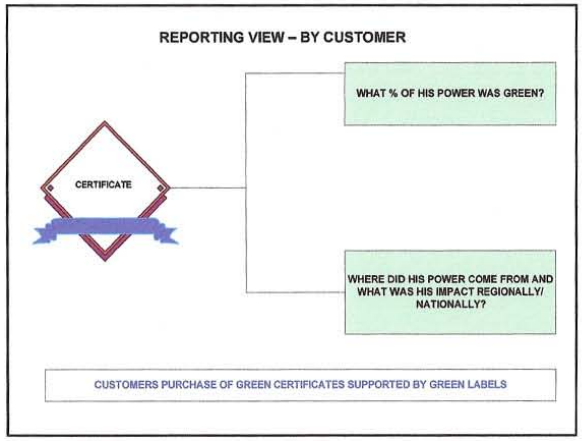
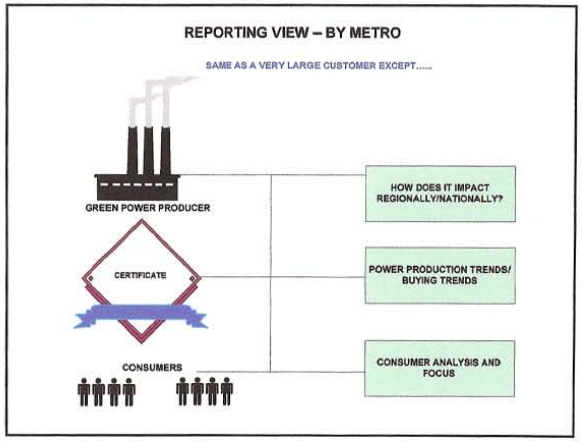
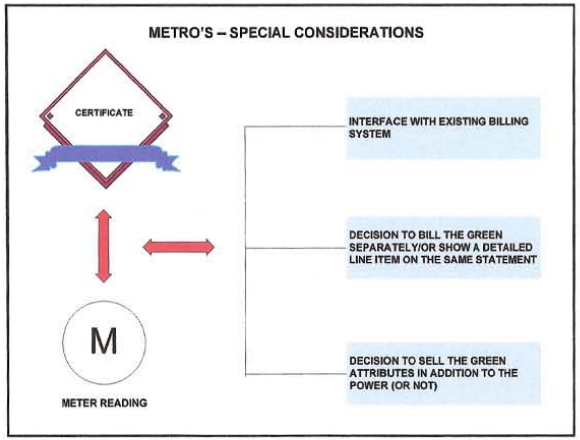
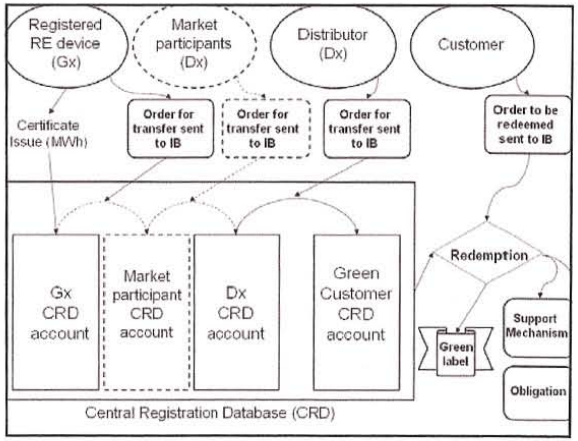


Figure 14 The operation of the Central Registration Database









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5

Issuing Body

- Market participants or government appoint IB
- Either:
  - Market participants form Association which appoints IB;
  - Market participants, among others, form IB as voluntary association and are members;
  - Government (by law) forms IB.
- IB cannot be:
  - financially dependent on market participants
  - subsidiary, parent or affiliate of market players

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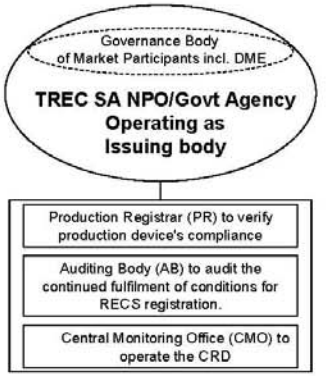

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Issuing Body

- If separate Assoc of Market Participants appoints separate IB, needs to be some body/method of controlling, monitoring and ensuring impartiality of IB.
- Possible membership of Assoc/IB:
  - Assoc of Market Participants, with no majority vote
  - Eskom
  - NERSA
  - CEF
  - DME
  - EIUG
  - SALGA
  - AMEU
  - REDs
- No single group or special interest can dominate

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Suitable status of IB

- Voluntary association
- Voluntary association can have legal personality
- Section 21 company, only if main object is promotion of
  - Science
  - Charity
  - Other social activity or communal or group interests
- Non-profit Organisations Act 1997
  - Promotes governance, transparency and accountability
  - Welfare Dept issues good-practice codes
  - Organisation may be registered under Act
  - Files yearly reports and financial statements

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Establishment of IB

- Constitution of voluntary association incorporate RECS Basic Commitment/PRO
- Basic Commitment/PRO covers
  - RECS certificates
  - Renewable energy declarations
  - Inspection of production devices
  - No duplicate certificates from rival bodies
  - Registration of production devices
  - Issue of RECS certificates
  - Transfer of RECS certificates
  - Redemption of RECS certificates
  - Central registration database
  - Verification, audits and reports

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Energy Policy and RE

- May 2004 - renewable-energy white paper (White Paper on the Renewable Energy Policy, November 2003, General Notice 513 of 14 May 2004).
  - government's vision is an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy, thus contributing to sustainable development and environmental conservation (para 1.1).
  - energy bill which was proposed in 2003 which would allow the minister to make regulations regarding minimum contributions to the national energy supply from renewable energy resources (para 3.1.6).
  - to meet the long-term goal of a sustainable renewable-energy industry, the government has set a target that approximately four percent of the estimated electricity demand by 2013 should be contributed by renewable energy, mainly from biomass, wind, solar and small-scale hydro (para 5).
  - A renewable-energy strategy would be developed to translate the goals and objectives in the white paper into a practical implementation plan (para 11).

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Electricity Regulation Act

- The Bill, as introduced in 2005 and subsequently enacted as an Act of Parliament (Electricity Regulation Act 4 of 2006 - 5 July 2006) states that the Minister may, in consultation with the National Energy Regulator,
  - determine the types of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from such sources (s 46(1)(b))
  - determine that electricity thus produced may only be sold to the persons or in the manner set out in such notice (s 46(1)(c)),
  - determine that electricity thus produced must be purchased by the persons set out in such notice (s 46(1)(d)). The Regulator, in issuing a generation licence, is bound by any such ministerial determination (s 46(3)(a))
  - may facilitate the conclusion of an agreement to buy and sell power between the generator and the purchaser of that electricity (s 46(3)(b))
  - the Minister may, by notice in the Gazette, make regulations regarding the types of energy sources from which electricity must be generated (s 47(4)(n))
  - the percentages of electricity that must be generated from different energy sources (s 47(4)(o)).

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Recommendation

- **Adopt the Basic Commitment as amended by the Principles and Rules of Operation (PRO)**
- RECS
  - provides a simple, clear, practical, implementable, administratively efficient method of operation and rules
  - presents a basis for clear definition of eligible TREC renewable energy resources and technologies
  - is a tried and tested system, is manageable yet robust, reducing the likelihood of error or fraud
  - will be supplementary and compatible with existing policy, legal and regulatory framework, and self sustainable with minimum Government involvement and
  - as the basis for many other international TREC systems is compatible with and provides potential for co-operation with other prominent TREC systems including the European Electricity Certification System (EECS)

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Motivation

- Monitoring of policy measures
  - be it support or obligation
- Separation of green attributes from physical power
- Avoidance of double-counting
- A tool to underpin market stimulation
- Export potential
  - USA, Canada, Pakistan and Jamaica
  - Iceland - even though it is not interconnected to any other country - is now selling renewable benefit into Austria, having acceded to the EC Renewables Directive (along with Norway).

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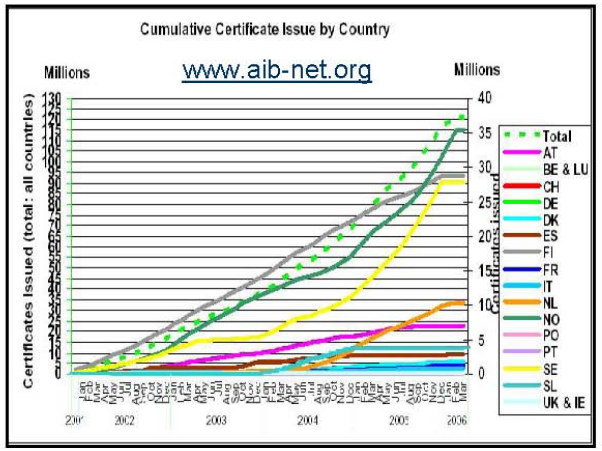

Market assessment and contribution

- Current rate is insufficient & without Government support the 10 000 GWh will not be attained
  - Market price for renewable energy is unlikely to reach competitive levels at this point in time because of Eskom price pool.
  - TRECs will support the environment to reach the target set 2013.
- The present SA energy industry structure is not conducive to (RE) TRECs development and will need government support for sustainable dev.
- Results from existing market assessments
  - 1% of National consumers equivalent to RE target of 1780GWh.
  - Surveys reflects estimates of a much higher willingness to pay for TRECs
- European market has a market potential of 6 394 TRECs.
- TRECs will enable supply to geographically dispersed green customers, circumventing physical trade barriers.
- SA TRECs (compatible to RECS system of AIB) with the support of the Government, will open up the TREC'S markets world wide to energy generators & traders (including SA green products).

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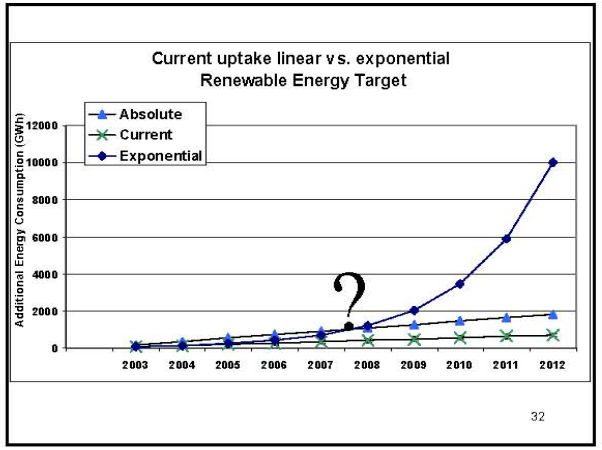

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Figure 15 Factors influencing the cost of certificate issuing

Electrical RE regulation

- The Electricity Regulation Act 2006 envisages regulations regarding the type of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from these different energy sources.
  - production/distribution/consumption obligation
- The introduction of a Tradable Renewable Energy Certificate (TREC) system will allow for monitoring and administration of obligations or other support mechanism
  - such as a 'top-up feed-in tariff'

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Levels of participation

- Considered by the project steering committee
  - None
    - Market participants create, govern and fund IB
  - Ministerial affirmatory statement supporting approach to establishment of voluntary system.
    - Basic Commitment as the basis for system
  - Association of market participants
    - DME facilitates
    - Funding
  - Notice of establishment of IB – government agency
- Early facilitation of the process
- Market demand through linkage of TREC system as a tool to administer support mechanism or ensure compliance with obligation.

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Implementation plan

- Activity summary and costs
- Critical Success Factors
  - Stakeholder buy-in and support
- Assumptions
  - Stakeholder availability
  - Funding

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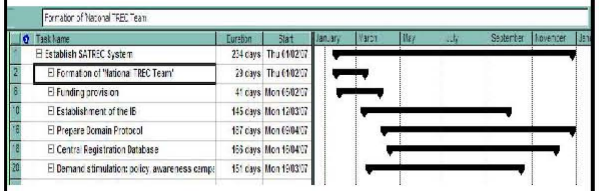
Implementation timeline



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Implementation plan activities

- Formation of the 'National Team' analogous to that outlined in AIB 'Developing a National RECS framework' guidlines
- Capabilities/Appointments to support activities of the issuing body
  - Production Registrar (PR) to verify production device's compliance
  - Auditing Body (AB) to audit the continued fulfilment of conditions for RECS registration.
  - Central Monitoring Office (CMO) to operate the CRD
- Approval of Mininster of TRECs NPO (Pvt. Sector or Govt Agency)
- NPO in consultation with Min acquire and invest funding
- NPO adopt PRO as national TRECs
- IB business plan developed
- Preparation, adoption and maintenance of Domain Protocol
- Implement relevant functions including PR, AB & CMO including
- Develop and commission registry software

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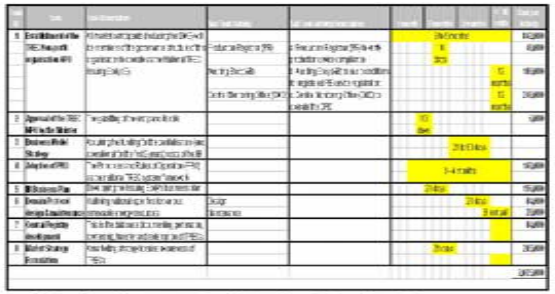
Implementation timeline



* Prices are based on current prevailing market conditions and thus subject to change.

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Thank you.

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Appendix F: TREC market analysis and projected renewable energy uptake contribution

Appendix F (Interim report F) Version 6

Market analysis and projected contribution

July 2006

Table of Contents

4. Executive Summary

This part of the study deals with the task of **Market assessment and target impact projection** and as a desk based research will focus on the reports link to the projects discussed or referred to in the task South African TREC system activity scan. The projects relevant to this study that will be focus on include:

- Supply curve study for DME strategy development (2004).

- SAWEP with reference to the report that deals with "Green Power Funding Sources and Mechanisms" also referred to as the AGAMA report.
- Darling Wind Power and City of Cape Town project with specific reference to market surveys done in respect of "Green" Energy Market Potential and related issues.

The SAWEP sponsored three surveys of which two were link to the DWP/CCT project and one was done for City Power looking at the "Green" Energy Market Potential in the Gauteng (Johannesburg) area. The Studies are:

- The ACNielsen household survey including NGO's and an in-depth follow-up with the Business-to-Business sector resulting from the MSSA (CCT) report;
- The MSSA (CCT) report;
- The MSSA (City Power) report;

5. National Government Policies and Strategy

The White Paper on Energy Policy of the Republic of South Africa, which was approved by the Cabinet on 2 December 1998, sets objectives and specific priorities of the South African energy policy within the broader policy framework of the Government's Reconstruction and Development Programme (RDP). Among the objectives of the sector are:

1. Increasing access to affordable energy services;

2. Improving energy governance;

3. Stimulating economic development;

4. Managing energy-related environmental and health impact; and

5. Securing supply through diversity.

The Government believes that renewable energy can in many cases provide the least cost energy services, particularly when the social and environmental costs are included, and will therefore provide focused support for the development, demonstration and application of renewable energy. Furthermore, renewable energy would lead to the introduction of a new technology and possibly new industry into South Africa with a high potential for job creation, an important goal of Government's Growth, Employment and Redistribution (GEAR) strategy. The government also undertook that the; "Government will provide focused support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications."

March 2002, the SA Government signed the Kyoto Protocol, which means that the SA Government has reaffirmed its commitment to pursuing solutions to "green" house gas reductions. It also opens up opportunities and access to Clean Development Mechanism (CDM).

November 2003, National Cabinet approved the White Paper on Renewable Energy and target: 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar & small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is equivalent to replacing two (2x 660 MW) units of Eskom's combined coal fired power stations or 1100 million litres of diesel (14%) replaced with bio-diesel.

The Government acknowledges the need for Renewables and hence the motivation thereto in the White Paper. These policy and strategy statements by Government are a clear signal to all in the Electricity Industry as to the direction in which the Government is moving. It creates a positive environment for the development of the Renewable Energy Trade which emphasises the need for the development of TRECs in order to create an open (National & International) market for renewable energy and its attributes.

The Government including regional, local and semi government organisations however control 95% plus of the total Electricity Industry and should therefore play an important role in any restructuring process that could benefit the development of renewable energy. With out the National Government's involvement there is little hope of any meaningful progress in a market dominated to this extent.

The overall market for Green Power over the next decade has the potential to grow substantially given external pressures and the internal implementation of the White Paper. In order to make this happen in a Government owned industry you need more than just a positive environment; you need National Government to be actively involved in steering the process.

6. Financial and economic analysis for the RE strategy formulation (DME, 2004).

In 2003, the DME commissioned a study to developed supply curves for renewable energy to assist them in selecting the optimal mix of technologies for fulfilling the 10,000GWh White Paper Target.

The bulk (59%) of the least-cost 10 TWh comes from *biomass-based generation*, mainly waste biomass plants in agro-industries (bagasse) and pulp and paper plants. *Small-scale hydro and refurbishment of large-scale hydropower* provide 10 percent; *solar water heating* systems located at commercial buildings about 23 percent, and landfill-gas based power generation 6 percent.

Table 6 Least Cost Composition of the 10 000 GWh with key parameters

Item	*Biomass*	*Landfill Gas*	*Hydro*	*Solar Water Heating*	*Wind*	*New Coal fired Plant*
Contribution to the 10 000 GWh target	5,952 (59%)	598 (6%)	1,045 (10%)	2,341 (23%)	63 (0.6%)	-
Dynamic Financial cost per kWh (Rand)	0.10 - 0.29	0.17 -0.29	0.11 - 0.34	0.30 - 0.35	0.38	0.25
Employment impact (no) per GWh	4.25	1,73	3.13	2.35	3.12	1.46
CER / CO2 revenue R/kWh	0.03	0.03	0.13	0.03	0.03	-
Import impact R Mill / GWh	0.05 - 0.10	0.07	0.05 -0.07	0.09	0.09 – 0.10	0.07

(1) Compared to Long Run Marginal Cost of Electricity of 25 c/kWh. (2) Low Income Household Income.
Source: Compiled from "Economic and Financial Modeling for RE Strategy formulation", February 2004

Thus, 77% of TWh-production is expected to come from RE-based power generation and 23% from replacement of electricity consumption at consumer premises by solar heaters. For RE-power generation the cost and price of bulk power from coal fired power plants is the relevant cost benchmark, for solar heaters it is the retail price paid by business and household consumers.

The SAWEP project document[1] remarks as follows with reference to the Conningarth report: The least cost investment package identified in table 1 leads to an installed RE-capacity in 2013 of 1670 MW, which is 4 percent of the year 2013 peak electricity demand of 41.5 GW. If the Government implements a RE-strategy, which phases in RETs according to the least-cost path towards the 10 TWh-target, the contribution of wind energy to RET-generated power supply will be a mere 0.6%, coming from an installed windfarm capacity of 20 MW

The bulk (59%) of the least-cost 10 TWh comes from *biomass-based generation*, mainly waste biomass plants in agro-industries (bagasse) and pulp and paper plants. *Small-scale hydro and refurbishment of large-scale hydropower* provide 10 percent; *solar water heating* systems located at commercial buildings about 23 percent, and landfill-gas based power generation 6 percent.

The supply curve report postulates that the optimal market penetration for RET is reached at the point of intersection between the RET-supply curve and the LRMC-curve (0.25 ZAR/kWh) for thermal power. The financially viable quantity of RE-supply is defined in the supply curve report as the quantity, which can be produced at a financial cost of production below or equal to the financial LRMC of coal-fired power of 0.25 ZAR/kWh.[2] It is estimated at 5,400 GWh, as can be seen from table 2 below; i.e. the point at which the dynamic financial supply curve intersects the financial LRMC curve of coal fired power.

[1] SAWEP report with reference to Economic and Financial Calculations and Modelling for the Renewable Energy Strategy Formulation; Conningarth Economists, February 2004, pp.5

[2] The LRMC is significantly above the average cost of ESKOM's power generation of 8-10 c/kWh in 2003. Part of the increase stems from the cost of investment in new power capacity, part of it stems from the higher price paid for higher-quality coal expected to be used in the future. The cost per ton of "second grade coal" used in South African power plants is 75 ZAR/ton; whereas the cost of "first grade coal" is exported at a price of around 250 ZAR/ton.

Table 7 Financially viable renewable energy technologies

Resource Categories	*Dynamic Financial Cost R/kWh*	*Cumulative GWh Output*
Biomass Pulp & Paper: Mill1	0.10	65
Small-Hydro: Large Refurbishment	0.11	339
Landfill Gas: Large	0.17	371
Landfill Gas: Medium	0.18	586
Landfill Gas: Small	0.19	746
SWH Commercial: Office and Banking Space	0.22	969
Sugar Bagasse: Include Tops and Trash	0.22	4,764
Biomass Pulp & Paper: Mill2	0.22	4,804
Sugar Bagasse: Reduced Process Steam	0.23	5,374

Source: Economic and Financial Calculations and Modeling for the Renewable Energy Strategy Formulation; Conningarth Economists, February 2004, pp.11

In theory, as new conventional power capacity is needed around 2008, the market price for new supply should move towards the LRMC of 0.25 ZAR/kWh, giving investors the financial incentive to invest in RETs cheaper than that. Thus, in theory, no subsidies are needed to move the 5,400 GWh into the market, which is why they are termed financially viable.

In practice, the market price for power in SA is an Eskom pool price and it is therefore impossible and rather unlikely to move to 0.25 ZAR/kWh in the foreseeable future. As pointed out in the supply curve report, the current market price for electricity in South Africa, based on ESKOM's 2003 average cost of production, is in the region of ZAR 0.08 to 0.10 per kWh. This market price will probably increase, in real terms, as the current oversupply of electricity comes to an end in 2006/7, but is likely to remain at levels that are significantly less than the LRMC of ZAR 0.25/kWh for some time to come. In addition, there will be financing, operating, attitude and regulatory barriers that will increase the cost of capital for RE-projects and prevent a spontaneous market based realization of this potential. The fact is that a substantial portion of this "financially viable" quantity is likely to require some subsidy support.

One of the obvious barriers for RETs, which is a major problem, is the matter of getting your product to the client (negotiating a wheeling of energy). Apart from TRECs potential financial benefits it would be able to remove the stumbling block of negotiating a wheeling agreement which includes the cost of wheeling and losses that's link to wheeling energy. These benefits should be taken into consideration when one considers the market potential and the cost of introducing TRECs in SA.

The significance of the results of the Financial and economic analysis for the RE strategy formulation (DME, 2004) study with reference to the development of a TREC system for SA is that it emphasises the need for the development of potential financial resources to unlock the potential of renewable energy which includes the option of TRECs that can contribute (significantly) to the funding and therefore the development of the renewable energy industry, especially if one considers the potential of the production of renewable energy from wind resources and the need for capital investment in the Industry vis a vi the production cost of wind energy and the retail price of energy in SA.

7. SAWEP Market Surveys for Renewable Energy

7.1. Market Surveys in the Western Cape:

ACNielsen conducted a number of surveys in the Western Cape including a household survey with a sample of approximately 2500 contacts. For household's survey, the universe was defined as adults, 16 years and older, living in cities, large and small towns and villages throughout South Africa. This sample of 2 478 was post weighted to represent 92% of South Africa's urban adult population. An area-stratified probability sample was drawn from ACNielsen's computerised dwelling unit census. Personal, in-home interviews were done with selected respondents, in their preferred language, by fully trained interviewers in the employ of ACNielsen.

The results of the household survey indicated that around 1 in 5 respondents (22%) of Cape Metro respondents indicated that they would definitely buy at a premium, whilst a further 15% said that they would probably buy at the relevant premium:

37% indicated that they would definitely/probably buy at 23c per kWh,
32% indicated that they would definitely/probably buy at 25c per kWh,
28% indicated that they would definitely/probably buy at 27c per kWh.

For the NGO's, a Consumer group sample of 21, names were drawn on an equi-interval basis from a lists supplied by client and obtained from other published sources. The interviews were done using CAPI. With the CAPI system (Computer-Aided Personal Interviewing), interviewers are equipped with lap-top computers which display the questionnaire on-screen, and into which they record respondent answers directly, at the time and place of interview and personal interviews with 21 NGO's were done.

For the NGO's and consumer groups, (although positive) very few indicated that they would be likely to buy "green" energy. Their main concerns were the financial affairs of the NGO/consumer group. They indicated that they work with donor money and that they have to carefully select what the funding is spend on.

An In-depth follow-up with 20 energy intensive consumers in the Business-to-business sector resulting from the MSSA Commercial and Industrial consumer survey were done in greater detail with personal interviews to get a more detailed response and a better understanding of the results of the MSSA survey.

ACNielsen has done an in-depth follow-up with the Business-to-business sector identified by the MSSA survey: This report summarises the results of the "Green" energy Market Survey In-depth follow-up with the energy intensive business consumers and those who are known to be concerned about the environment.

Of the total sample of 20, the following was found:
Definitely/probably would buy: 4 mentions
Not sure: 15 mentions
Definitely/probably would not buy: 1 mention

The companies indicating that they would "definitely/probably buy" were" prominent top National companies which could really absorb the total offered "Green Energy" from the CCT/DWP project. This however would not be possible without a TRECs system in place as these companies have business centres and activities all over SA.

Most of the reasons (by the 15 companies mentioned as not sure) for the high level of "not sure" were that it would be a decision taken at management level. The following comments were received:
"Make a presentation to exco – approach the Principal directly"
"Decision would be made by the Production Director"
"Would be a corporate decision, we are strongly into Solar Power internationally"
"Would be a national board decision, address proposal to CEO"

7.2. Market Survey in the City Power area (Johannesburg).

MSSA did a Green power market survey: The City Power Businesses and industries (January 2004) survey. 82 consumers in different sectors were interviewed of which 99% indicated a willingness to use Green power. Table 3 give us an indication of the percentages willing to switch at the different premiums:

Table 8 City Power Businesses and industries survey January 2004

	% electricity switch to Green Power
• No premium:	97%
• 17c premium:	46%
• 27c premium:	27%
• 37c premium:	5%
• 47c premium	0%

The interviews were done within the following sectors to the extend indicated below:

Financial and Real Estate	40%
Manufacturing	27%
Personal Services	18%
Retail & Hotels	11%
Mining	02%
Government	02%

The following advantages and disadvantages were highlighted.

ADVANTAGES

- Less pollution/ cleaner environment (37%)
- Will be cheaper/ cost saving (eventually) (29%)
- Contribute to sustainability of environment (20%)

DISADVANTAGES

- Not tested in country/ New technology (26%)
- Additional cost/ Strain on budget (23%)
- Reliability of supply – consistency (15%)

8. Green Funding Sources & Mechanisms

8.1. Background to Green Power market assessments in South Africa

The extent to which (voluntary) Green Power (market) can provide funding for a SAWEP is almost entirely dependent on the size and nature of the market for Green Power in South Africa. Market surveys are required to determine the characteristics of the voluntary Green Power market. The mandatory market is immediately defined once the level(s) of Green Power procurement for distributors are legislated.
Key questions include:

- What are the levels of awareness around energy, electricity and renewables?
- How many customers will actually switch to a Green Power service option at realistic pricing levels?
- What is the segmentation of this market?
- How sticky is the habit of 'non-Green' electricity?
- What is the expected rate of switching?
- How will the market grow (or contract) and what will determine this?

However, it is particularly difficult to establish the extent of the voluntary Green Power in South Africa with confidence due to:

- The prevailing lack of consumer awareness of the nature, costs and benefits of Green Power - it is an entirely new concept for most consumers and consequently they are generally unable to give reliable feedback on their willingness to use and pay for Green Power. The AC Nielsen study (2002) indicated that only 6% of Cape Metro respondents knew something about Green Power[3].
- The lack of any comparable studies in developing countries.
- The relatively limited detail in the information available from the studies, which have been undertaken in South Africa. These are discussed further in Section 8.2.

The MSSA report and the AC Nielson study[4] have answered these questions and issues to some extent, but analysis of these surveys reveals that further work is necessary.

8.2. Available research material for South Africa

Until now, there has not been a thorough national assessment of the Green Power market in South Africa. However, four initial market survey activities have been undertaken in South Africa. The scope and high level findings of these are summarised in **Table 9**.

Table 9 Green Power market survey initiatives in South Africa

Title (date)	Author	Scope	Findings / comments
Green Power Market Study (2002)	Amanda Meyer, AC Nielsen	Personal interviews with 348 residents in Cape Town; total sample of 2478 in SA Personal interviews of 21 NGOs and consumer groups Assessed perceptions of Green Power and willingness to buy Green Power	Awareness and level of knowledge of Green Power and wind-based electricity generation is very low Green Power is perceived to have disadvantages: not reliable due to: • insufficient wind • more expensive An awareness campaign is required A reasonably high % of Cape Metro residents would buy Green Power at a premium – 37% of Cape Town households would buy Green Power at a 23 c/kWh premium A strong marketing campaign would be worthwhile
Green power market survey: Businesses and industries (2002)	Marketing Surveys and Statistical Analysis (MSSA)	Focus on Cape Town Metro area Interviews with: • 66 companies using >	88% (n=106) willing to buy Green Power, but not at a premium of 27 c/kWh 33% (n=39) willing to buy Green Power at a 7c/kWh premium Perceptions include:

[3] This is not a uniquely South African phenomenon. Zarnikau (2003) cites a study conducted by El Paso Electric Company in USA in which 49% of the respondents admitted that they were *totally unfamiliar* with renewable energy resources.
[4] Green Power Market Study as conducted by AC Nielson in the Cape Town market in 2002

Title (date)	Author	Scope	Findings / comments
		1MW/month (sic) • 54 companies using < 1MW/month (sic)	• Too costly (43%) • Green Power too unreliable (28%) 22% needed info to assist their decision
Green power market survey: The City Power Businesses and industries (January 2004)	Marketing Surveys and Statistical Analysis (MSSA)	Focus on City Power area of supply, JHB 82 interviews	99% of companies willing to use Green Power 50% are willing to buy Green Power at a premium: • **38% at a premium of 17c/kWh** • 11% at a premium of 27c/kWh Perceptions include: • New technology (26%) • Too costly (23%) • Green Power too unreliable (sic)

The principal deduction from these surveys is that the electricity market is largely uninformed of the implications and business case for switching to Green Power. The levels of willingness to switch are likely to be far too optimistic when it comes to actual commitments over time to a Green Power product. This trend is borne out by experience in other, more mature, electricity and Green Power markets.

8.3. Comments on the surveys conducted to date

How many customers will actually include a green power service option in their energy mix at realistic prices?
MSSA indicates that whilst 99% of respondents surveyed demonstrate willingness to use green power, only 50% are prepared to pay a premium. Given that a premium is necessary for at least the 2013 timeframe, only the latter figure is immediately useful in terms of the first part of this question "will actually include green power in their energy mix". The relationship (within that 50%) between the willingness to buy and the extent of the premium is strong which brings the second part of the question into focus, "at realistic prices". It is clear therefore from MSSA's market survey results that the market is not prepared to carry a 37c/kWh premium and that the market is currently unable to bear **realistic premiums for green power.**

What is the size of the market?
None of the studies ventures to quantify the market in terms of

- Number of customers – the numbers and as a proportion of the customer base
- Types of customers
- The volume of sales – in terms of MWh/month or per annum
- The likely revenue

What is the segmentation of the market?
Whilst the MSSA survey has revealed that the manufacturing and mining companies surveyed are higher energy consumers, this is a factor that could have underpinned the survey with potentially different results. Given that manufacturing and mining are energy intensive consumers and given that the export market is under greater pressure to give consideration to environmental issues and to demonstrably utilise green power **as part of their mix[5], it** would appear that this sector is probably going to be more receptive to paying higher premiums and that different market drivers may have more emphasis in the different sectors.

How sticky is the habit of non-green electricity?

[5] Trevor Manual, Minister of Finance, SA, introduced a tax rebate for companies using biofuels in 2001, in direct response to pressure form European and Japanese importers of SA manufactured goods to demonstrate usage of green power in their energy mix.

Neither the AC Nielson nor the MSSA reports go into this directly. However, the mere fact that the bulk of the respondents in both studies are not averse to using green electricity and that environmental factors are largely cited, it would seem safe to assume that the market is not particularly attached to fossil fuels.

What is the expected rate of switching and over what time frame?

Neither study examined deals explicitly with timing of converting part or all of energy mix to green power usage. For example, a phased in approach to conversion could be an option for consumers voluntarily purchasing green power, which would assist with budget **planning and forecasting. It** can also be assumed that as the green power market increases, so will the demand for green power increase as (probably for a limited period of time) the former will assist in the market awareness and education process (where lack of market knowledge and awareness is a currently identified barrier).

According to the surveys conducted, the extent of the green power premium, will determine the rate of conversion, and that this will be in the range of 11-38%, where 11% will pay a premium of 27c/kWh and 38% will pay 17c/kWh. These figures do not provide any confidence as the MSSA report also says that only 40% indicated that they have the ability to pay – which is quite an important factor.

What premium will the market realistically bear and does this premium narrow the gap sufficiently between current electricity prices and green power prices?

As expected, the surveys indicate that the lower the green power premium, the greater the ability to attract green power customers. The lowest premium mooted in the MSSA survey was 17c/kWh and the highest, 37c/kWh. Whilst scale can be, and is, a factor in reducing the gap between existing electricity prices and anticipated wind energy prices, thus lowering the premium, there are a number of other factors that are key influencers too

Key market drivers identified in the MSSA report are positive environmental effects (37%) and long term cost benefits (29%). Further market drivers could include export market pressure and in the mining sectors case, a heightened sense of responsibility to "clean up the environment" from a social and ecological perspective. Mining companies that have subscribed to MMSD[7] have obligations to reduce their emissions, clean up their polluting activities and to reduce the (related) health impacts on workers and peripheral towns and communities. Whilst membership is voluntary, the subscription levels are high and the targets and requirements rigorous. Such organisations may thus be willing to pay higher premiums for greater portions of green power in their mix.

Furthermore, more depth could be given to the issue of relating market knowledge of green power to market sensitivity to environmental issues. The MSSA study reveals a fairly high sensitivity to environmental issues in the market, and the report in fact makes the comment that "it is interesting to note the strong sense of environmental responsibility that emerged through the advantages given"[30], although the report is not explicit as to why this is interesting. It is possible that a greater understanding of how utilisation of green power can assist in addressing these environmental concerns could result in a willingness and perhaps ability to pay a premium for green power. This issue could be dealt with in an education and awareness campaign and tested in further surveys.

8.4. Green Power market scenarios

The overall market for Green Power over the next decade has the potential to grow substantially given external pressures and the internal implementation of the White Paper. The Government acknowledges the need for renewable energy and the motivation thereto in the White Paper.

AGAMA look at some market scenarios based on the existing electricity market in South Africa and some likely penetration levels. The national market for electricity is shown in Table 5.

Table 10 National electricity market in SA[31]

	Eskom		Municipalities		Totals	
	No	**GWh**	**No** (est.)	**GWh**	**No**	**GWh**

[7] Mining Minerals and Sustainable Development and related voluntary regulatory initiatives such as the Global Mining Initiative

[30] 5.3, on p 14 of the MSSA report, January 2004

[31] NER Electricity Supply Statistics for South Africa, 2001

Domestic	3131502	7422	3272388	27200	6403890	34623
Agriculture	74294	3485	26103	690	100397	4175
Mining	1338	30603	799	344	2137	30947
Manufacturing	3480	46594	56520	28927	60000	75521
Commercial	25165	1059	499106	17242	524271	18301
Transport	8995	3789	9982	1774	18977	5562
General	25066	5101	21324	3786	46390	8887
Totals	**3269840**	**98053**	**3886222**	**79963**	**7156062**	**178017**

The size of the potential Green Power market can be estimated based on a few scenarios for penetration, as shown below in Table 6.

Table 11 Power market projections (based on 2001 data)

	Levels of market penetration				**Levels of market penetration**			
	0.5%	**1.0%**	**2.0%**	**4.0%**	**0.5%**	**1.0%**	**2.0%**	**4.0%**
	No				**GWh**	**GWh**	**GWh**	**GWh**
Domestic	32019	64039	128078	256156	173.1	346.2	692.4	1384.9
Agriculture	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0	0	0
Commercial	2621	5243	10485	20971	91.5	183.0	366.0	732.0
Transport	0	0	0	0	0	0	0	0
General	232	464	928	1856	44.4	88.9	177.7	355.5
Totals								
	34873	**69746**	**139491**	**278982**	**309**	**618.1**	**1236.2**	**2472.4**

The estimated potential market size in SA is 618.1GWh on the basis of a 1% market penetration over a period of 5 years. The figures are almost certainly conservative. Such an estimate is not straightforward. Firstly, the estimates of the numbers of manufacturing and commercial clients are not well defined and the data available in the public domain is limited. Secondly, these projections are based on 2001 data, and finally, the consumption levels per household are based on averages of the entire spectrum of household customers and it is more likely that those participating in a voluntary Green Power scheme will be the higher consumption segments of the overall household market. This (potential market size) is roughly 20% of the Australian market (in terms of total green power consumption)

The estimate above used the Domestic, Commercial and General sectors only in projecting the Green Power market in SA, no arguments or reasons have been given why the projection of the market should not be based on penetration levels based all of the sectors. Should all the sectors be considered in projecting the Green Power market size on a basis of a penetration level of 1% it results in a voluntary Green Power market of 1780 GWh nationally, which if effectively developed could grow substantially over the following years.

There are a number of factors that exist in the market in general that could support the growth of the green power market. However, to realise this potential realistically, a number of issues need to be addressed, Government has a major role to play in facilitating realistic market growth in the short term for longer-term gain. This would include a major drive to create an awareness of the benefits of switching to Green power and support for example in the development and implementation of a TRECs system in creating a mechanism for Green Power Customers to access to the benefits of renewable energy.

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The SAWEP Project Brief document (p26) with reference to the financing of the incremental costs for wind power (RETs) has concluded that based on the above studies (including the market surveys) that 17 cents of the incremental cost of RETs (wind in this case) per kWh could be funded through a green premium, which the green power market seems willing to contribute. This means that the envisaged results of the SAWEP would be difficult to achieve without the introduction of a TREC system.

One should bear in mind that the price of generation does not account for pollution and resultant health costs, nor the loss of production by commerce and industry and losses by the public and household sectors (valued as high as 80c/kWh in the Western Cape due to insufficient supply capacity by Eskom and outages experience also in other parts of the country, the total cost estimated in the Western Cape at R6 billion) nor

does it account for the loss of development investment due to the lack of generation capacity (investors hesitant to invest due to a anticipated lack of supply capacity).

9. International (Europe) Export Potential

Since the inception in 2001 of the TRECs in the European Countries until March 2006 they have issued a total of 120.7 million TRECs of which 59.5 million have been redeemed. Four out of the twenty-two countries participating have redeemed more than what they have issued:

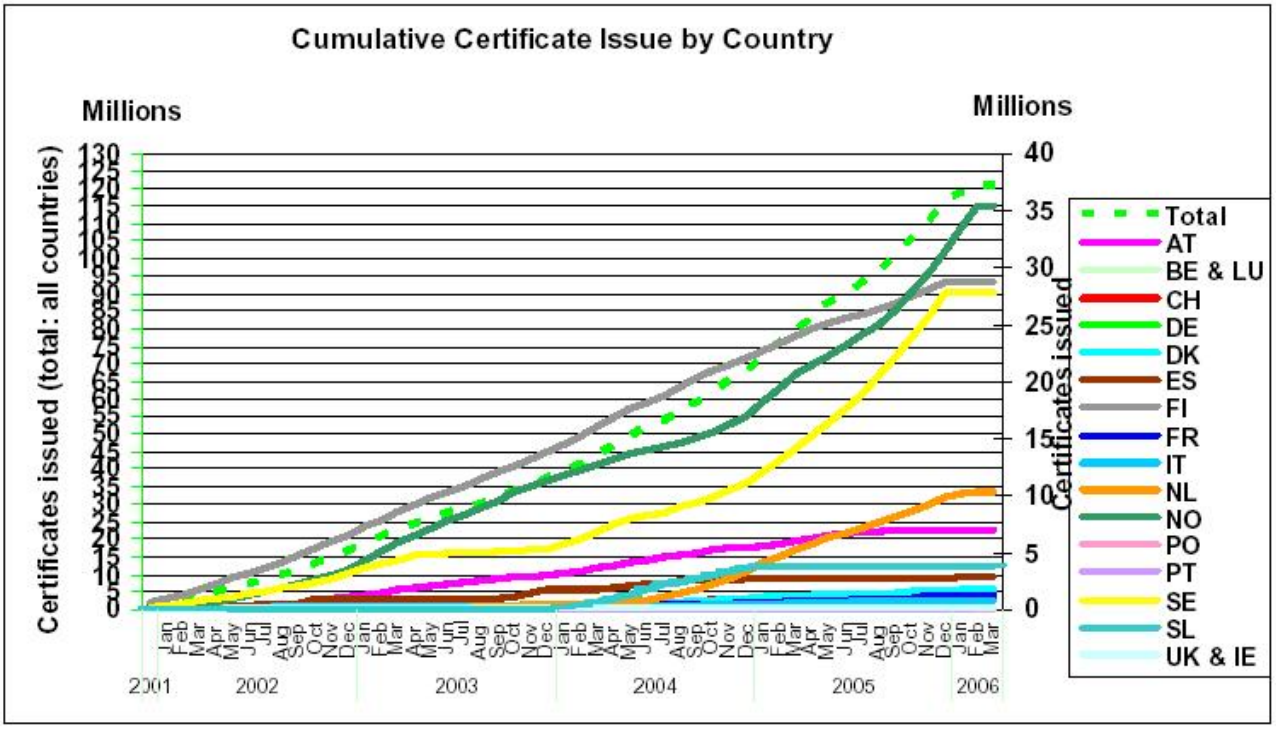

Figure 16 Scale of international trade in TRECs

The Netherlands during the same period issued 10.2 million and redeemed 24.5 million.
Austria during that period issued 7.0 million and redeemed 11.49 million.
The net import of the countries mentioned above including Belgium and Germany add up to 19.182 million TRECs Certificates over a period of approximately three years which means a potential yearly average of 6.394 million certificates adding up to 6394 GWh renewable energy and which could be defined as the potential European market.
It is a clear indication that these countries are importing TRECs, We therefor asked Servicedesk CertiQ the Issuing Body in the Netherlands the following questions:
The Netherlands Protocol does allow the import of RECs certificates into their domain; are their specific conditions attached to this process? Do you allow International trading, do you need to import for any specific reason, and for instance does the local demand exceed the local supply? Would you as a Country considers imports from South Africa and if so under what conditions?

Servicedesk CertiQ responded as follows:

International trade of RECS certificates involves 4 parties:

- the transferor (the trader to send the certificates);
- the transferee (the trader to receive the certificates);
- the database operator of the domain in which the transferor is situated;
- the database operator of the domain in which the transferee is situated.

There are several conditions for international trade. For example, transfers have to be executed electronically. In order to facilitate this, the connection between the computer systems of the database operators has to have been thoroughly tested and approved beforehand. Furthermore, both the transferor and the transferee have to be registered for RECS. Finally, the registration codes of both parties as well as the certificates to be transferred have to correctly be included in the request for transferral.

The reason for importing certificates may vary. While traders may import certificates because local demand exceeds local supply, RECS certificates also represent a certain value and as such, the traders might also just be out there to make a profit.

It is not entirely up to the Netherlands as a country to consider imports from South Africa, as the decision to import certificates lies with the Dutch traders. However, in order for CertiQ to accept certificates from South Africa, we would have to be sure that South African RECS shall be issued under conditions similar to our conditions for issuing RECS. In other words, your procedures would have to be such that:

- the certificates issued would have the same attributes (i.e. the unique EAN-code of the production device, the generating capacity of that production device, whether or not public support has been or shall be received by the registrant with respect to that production device, etc. etc.);
- 'double counting' of generated electricity and 'double selling' of certificates would be impossible.

To achieve these goals, we would ask you to become a member of the AIB.

Stefan Sizler, chairman of RECS Deutschland e.V., the association which represents the German team members in the board of RECS International and treasurer of RECS International responded as follows. According to your questions below I'll try to provide some information:

- The RECS / EECS system that we have implemented here in Germany is a voluntary system. We started in 2000.
- Yes, we are mainly importing certificates. The reason for this is a feed in law for renewables which gives much higher tariffs than a producer could earn by issuing certificates. Thus only very few certificates are issued in Germany as producers prefer to receive the feed in tariff which in consequence does not allow you to issue tradable certificates for this electricity.
- International trading is allowed on voluntary basis. There is no special need to import other than creating end-consumer products with certificates. If there is demand for certificates e.g. from South Africa we would not hinder trading. The import should be done via the RECS/EECS system of AIB.
- You can use EECS Guarantees of Origin (GoO) for disclosure. If you want to use them they have to be from the year you want to disclose and they have to be GoOs.
- as it is a voluntary use for green products that would depend on the regulations/definitions of the respective product. If you want to use the certificates for disclosure than they have to be GoO from the same year.
- The price heavily depends on the quality of the certificates. Cheapest ones e.g. are RECS certificates from hydro power (< 0.5 Euro/MWh) GoO are more expensive than RECS certificates, PV probably is most expensive.
- No, we use a software system provided by Campbell Carr Ltd which we are happy with.

It is clear from both the Netherlands and German response that market opportunities for TRECs do exist in Europe and that access to these markets will only becomes a reality once a AIB compatible system has been introduced. Apart from a proper TRECs system one would need the support of the SA Government to develop these markets.

10. Findings

- That it be noted that a reliable and credible TRECs system is one of a number of tools that the SA Market needs to reach its targets set for renewable energy development in the Country.
- That the following important matters and recommendations be noted and considered with the implementation of a TRECs system (voluntary or mandatory) for SA.
    - That the Government including regional, local and semi government organisations control 95% plus of the total Electricity Industry and market and should therefore play an important role in any restructuring process including the implementation of TRECS that could benefit the development of renewable energy. With out the National Governments (the DME) involvement there is little hope of any meaningful progress in a market dominated by Government Institutions to this extent.
    - That the National Government (DME) has to be involved in TRECS in order to make it work and to steer the industry (Government owned) successfully through the development process.
    - That the Financial and economic analysis for the RE strategy formulation (DME, 2004) report calculates the technically feasible renewable energy based production (excluding bio-fuels, solar thermal power, ocean, wave generation) to equals almost 87,000 GWh, corresponding to about 49% of the electricity consumption in South Africa in 2001.
    - That the supply curve report (Financial and economic analysis for the RE strategy formulation (DME, 2004)) postulates that the optimal market penetration for RET is reached at the point of intersection between the RET-supply curve and the LRMC-curve (0.25 ZAR/kWh) for thermal power.
    - That in practice the market price will probably increase, in real terms, as the current oversupply of electricity comes to an end in 2006/7, but as the market price is based on an Eskom pool price it is likely to remain at levels (in the region of between 0.10 to 0.15ZAR/kWh) that are significantly less than the LRMC of ZAR 0.25/kWh for some time in the foreseeable future.
    - That in addition to the ESKOM pool price as defined above, there will be financing, operating, attitude and regulatory barriers that will increase the cost of capital for RE-projects and prevent a spontaneous market based realization of its potential.
    - That should the total SA electricity consumption market be considered in projecting the Green Power market size on a basis of a penetration level of 1% it results in a voluntary Green Power market of 1780 GWh, which if effectively developed could grow substantially over the next seven years.
    - That a TRECs system with a potential TRECs market of 1780 GWh and an anticipated TREC value of 0.17ZAR/kWh has the potential to contribute substantially to the funding of new generation.
    - That one should bear in mind that the price of generation today does not account for loss of production by commerce and industry including losses by the public and private sector (valued as high as 80c/kWh in the Western Cape) due to insufficient supply capacity and outages (already experience in many parts of the country and estimated in the Western Cape at R6 billion) nor does it account for the loss of development investment due to the lack of generation capacity.
    - That a TRECs system if implemented should contribute to and improve the uptake of the projected renewable energy target set by the National Government.
    - That a TRECs system will open up the whole South African renewable energy market to a supplier of renewable energy and will remove most of the barriers link to the power wheeling agreements process.
    - That with out a proper TREC system (compatible to RECS system of AIB) and the support of the Government, SA renewable energy generators & traders would not have access to the TREC'S markets in the European countries estimated at 6.394 million certificates per year representing 6394 GWh of renewable energy generated.
    - That the implementation of a TRECs system in SA would include a major drive to create an awareness of the benefits of switching to Green power and how support for example in the development and implementation of a TRECs system would create a mechanism for Green Power Customers to access to the benefits of renewable energy.