Department of Minerals and Energy
Pretoria

New and Renewable Energy

Report No. – TBA

Tradable Renewable Energy Certificate System Feasibility

DRAFT Final Report

January 07

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Executive Summary

The situation in the renewable energy sector in South Africa at the time of writing is 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) before doing so.

The concept of 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 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 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 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. 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:
    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.

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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

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.

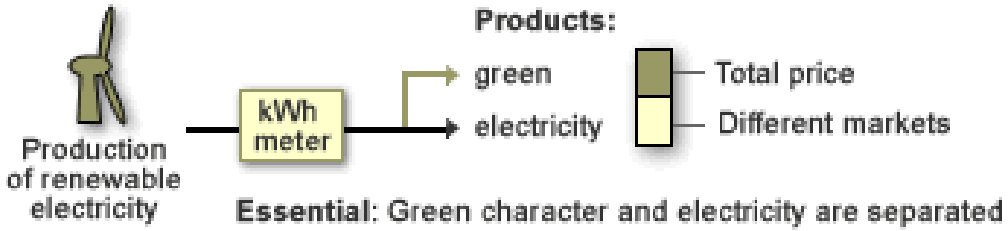


Figure 1 Schematic representation of the separation of TRECs from physical power

(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. Currently TRECs market prices range from 3 to 8 US cent per kWh which compare well with CDM CER prices

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.

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.

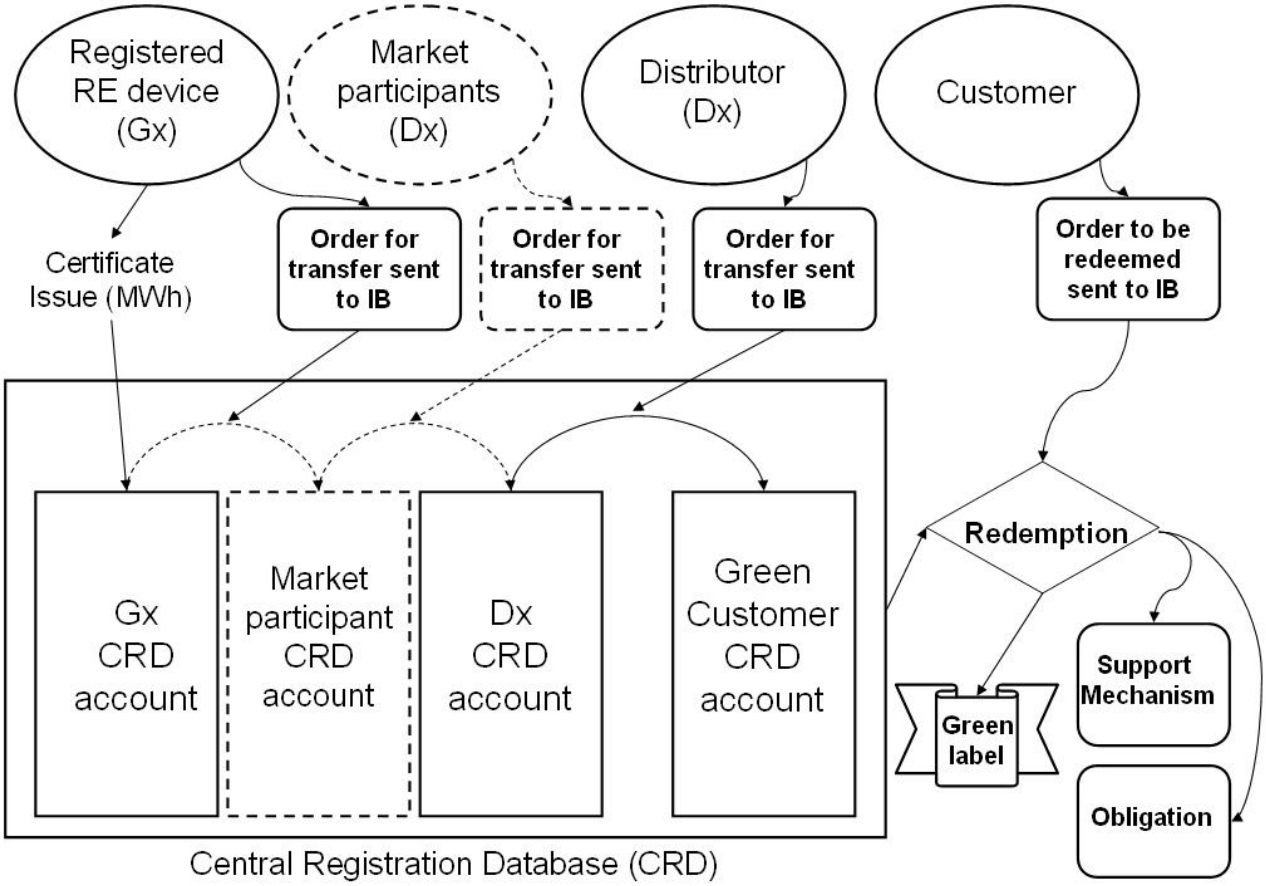


Figure 2 A schematic representation of the TREC issuing, transfer and redemption process

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.

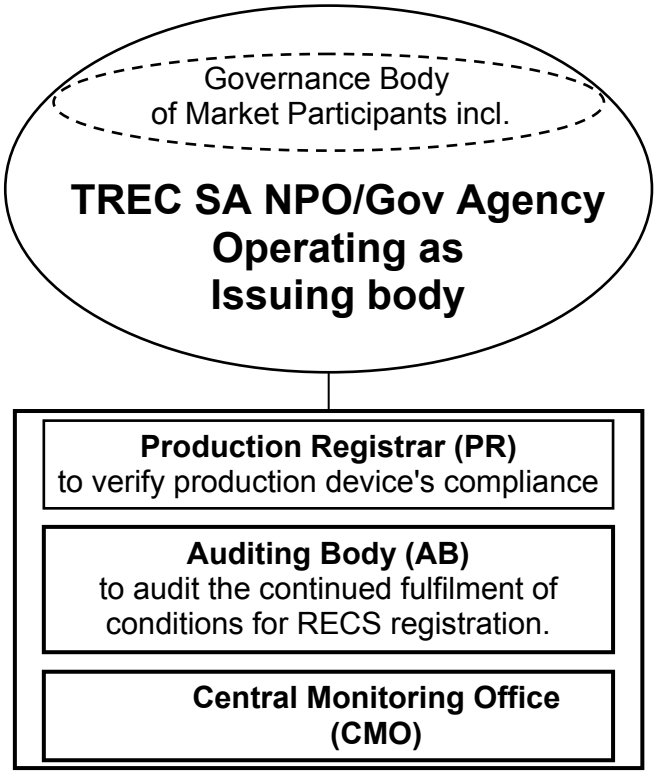


Figure 3 Schematic representation of the Issuing Body's structure

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 costs associated with the 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.

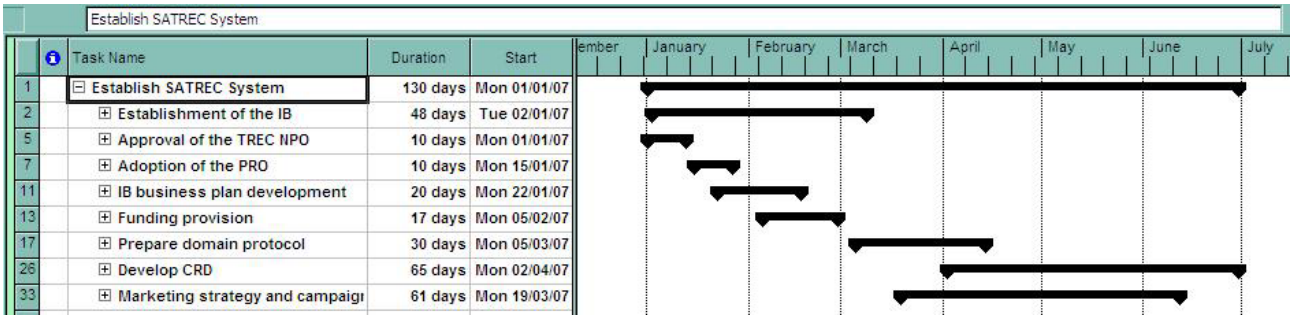
The approach adopted for the implementation plan is based on project management principles and thus reflects the timeframes for each activity and the costs associated to complete the activities. The implementation plan also incorporates the design, development and implementation of the envisioned Information 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 proposed implementation plan is presented in **Table 1**

Table 1 TREC System Implementation Project Plan



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 4. 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.

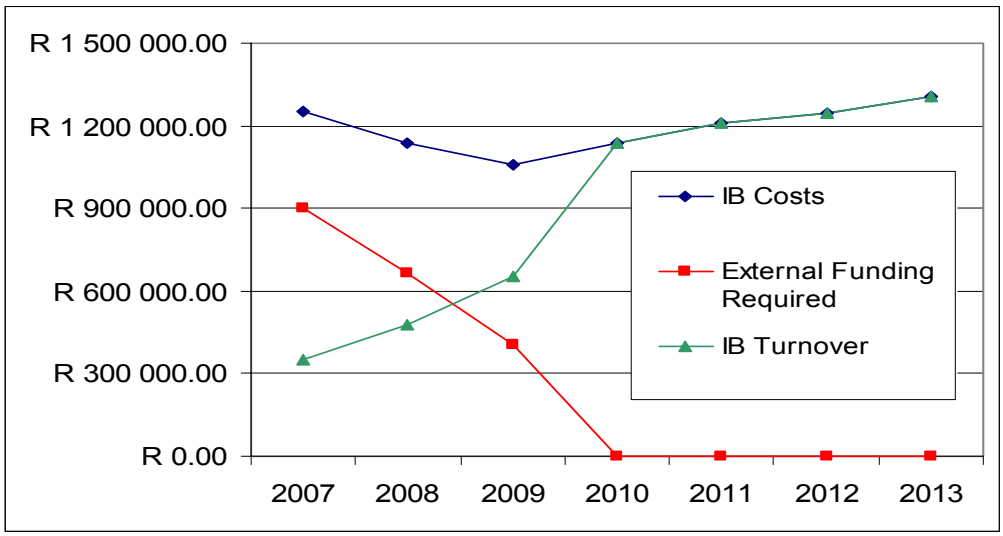


Figure 4 Indicative cost and income stream for TREC issuing body

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 2 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[4] to be established	• Production Registrar • Auditing body • Central Monitoring office	Appoint functions or capabilities required of IB Cost as per Figure 4	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

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

5. Stakeholder workshop

This version of the report was prepared, with guidance from the project steering committee, for today's 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 items that required updating are:

-

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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