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Procedure for registering renewable energy sourced generation devices

Solar Home System Utility

Subsidiary Document to the South African Domain Protocol

Version (23Nov2009)

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Definitions and Acronyms

AIB	Association of Issuing Bodies
CRD	Central Registry Database
EECS	European Energy Certification System
MWh	MegaWatt hour – a measure of electrical energy equivalent to one hour of output at an output power of one MegaWatt.
REC	Renewable Energy Certificate
RED	Renewable Energy Declaration
RES – E	Renewable Energy Source – Electricity
PD	Production Declaration

1. Background

This report outlines the development of the Photovoltaic (PV)-based Solar Home System (SHS) utility component of an interim domain protocol for South Africa in line with the Association of Issuing Bodies Principles and Rules of Operation (PRO). The protocol was informed by device registration audits of the off-grid concession utilities NuRa Off-grid Utility and KwaZulu Energy Service Company. This subsidiary document to the South African RECs Domain protocol Version 1.0 is a public document which is maintained by the South African issuing body with comment, review and periodic update as required by south African REC market participants. It may be broadened by subsequent registration of additional PV-based SHS utility renewable energy production devices in South Africa. The procedural document is essentially a methodology for auditing PV-based electricity generation facilities to satisfy production device registration requirements on the basis of the above documentation and with a view to aligning these with the role of a national Renewable Energy Certificate Issuing Body.

Nano Energy was contracted to develop this protocol, conduct the production device registrations for the above utilities and issue certificates for renewable energy produced by the SHS utility from September 2009 and December 2009 respectively.

The set of definitions and criteria as set out in the European Energy Certification System's (EECS's) PRO have been followed in developing this protocol component. Any deviations from the PRO requirements have been noted. The PV-specific component of the requisite South African domain protocol is an additional step towards and contributes to the development of the South African protocol and follows the development of the same for Bagasse-based facilities which began in 2004. The domain protocol sets the rules that are supplementary to the PRO.

2. PV-based generation protocol

The process required to be followed prior to the issuing of certificates as detailed in Sections 5 and 6 of Chapter 2 of the EECS Principles and Rules of Operations have been followed:

- Identification of the domain within which the market participants are commercially active (South Africa – 27).
- Each RES-E generator must gain registration for the production device (see chapter 3)
- Submission of a Renewable Energy Declaration (RED) by the generator or aggregator acting on its behalf to the issuing body seeking registration as a RES-E.
- Assignment of a unique identifier to the production device.
- An additional requirement has been included to ensure that suitable reporting processes and data collection is in place at the device to ensure suitable transfer of this to the Issuing Body to enable the issuing of certificates.
- Acceptance of the RED by the Issuing Body.

This protocol details the audit requirements for the Issuing body to follow in ensuring that the RED deposited by a PV-based generation facility conforms to the requirements of the EECS PRO and the South Africa Domain Protocol.

2.1. Qualifying Criteria

The qualifying criteria for Production Devices are set out in the Directive (2001-77-EC) and are summarised here. In the event of any differences, the definitions of the Directive take precedence.

- (a) All wind turbine devices.
- (b) All solar devices (This document).
- (c) Energy from water devices except for pumped storage.
- (d) All geothermal devices.
- (e) Biomass devices as defined in the Renewable Energy Directive, the Large Combustion Plants Directive and the Waste Combustion Plants Directive.

For biomass devices deriving energy from waste or by-product sources, only the energy attributable from the non-fossil element will be eligible for Certificates.

2.2. Domain definition

For the purpose of these activities the domain has been defined as the South Africa.

2.3. Production device identifier

The EECS PRO suggests an 18 digit device reference be recorded in the Central Registry Database (CRD). An algorithm has been chosen to assign unique South African device references. The device registration shall be composed of:



- The CMO Company prefix is used as the CMO ID ('00000027')
- The coding identifying the production device ('00000000X'), where 'X' is a numeric digit assigned by the CMO,
- a check integer as a check for reference authenticity ('Y').

The device reference for PV-based Solar Home System (SHS) utility is therefore:

'0000002700000000XY'

3. EECS Requirement for device registration

The European Energy Certification System outlines the following requirements for registration of a RES-E:

A RES-E Generator or a Production Aggregator acting on behalf of a RES-E Generator wishing to receive Certificates for the electrical output from a RES-E Production Device shall first gain Registration for that Production Device from the Issuing Body responsible for the Domain within which the Production Device lies by making a Renewable Energy Declaration (or RED) to the Issuing Body. Any Production Device that is not so Registered may not be Issued with Certificates.

A Renewable Energy Declaration shall state that the installation fulfills the criteria set out in this Basic Commitment and relevant Domain Protocol. The RED must have a period of validity limited according to the Domain Protocol for the Domain in which this Production Device is registered but will in any case be no longer than is stipulated in Annex 4 (Domain Protocol for South Africa) to this Basic Commitment, after which time it must be re-submitted. Failure to do so will result in cessation of certificate issue for this Production Device. The criteria and the procedure for the RED may change over time.

A Renewable Energy Declaration shall include:

- A.) The name, address, contact details (including person responsible, phone, fax and e-mail) and Issuing Body for that RES-E Generator or of a Production Aggregator acting on its behalf;
- B.) The account into which the Certificates are first to be transferred upon issue and the device registration number;
- C.) The date of last registration and the period of production
- D.) The location of the Production Device;
- E.) The location and detail of the export and, where appropriate, import meter(s);
- F.) The type of generation technology in place at this Production Device, from the agreed list as set out in Annex 2 of the AIB Basic Commitment [code '03'];
- G.) The installed capacity of this Production Device. This is the "nominal capacity" (the maximum capacity obtainable under continuous operation which is usually determined by the manufacturer's specification and often appears on the "nameplate" of the equipment and need not relate to any operational reality). Photovoltaic power capacity is measured as maximum power output under standardized test conditions (STC) in "Wp" (Watts peak). The actual power output at a particular point in time may be less than or greater than this standardized, or "rated," value, depending on geographical location, time of day, weather conditions, and other factors. Solar photovoltaic array capacity factors are typically under 25%.
- H.) The date of commissioning of this Production Device;
- I.) Any schemes associated with any Public Support that are or have been received in addition to Certificates by this Production Device, together with an indication as to whether they are currently being received;
- J.) A guarantee that the RES-E Generator owning this Production Device will not during the period of its Registration and for the same unit of electrical energy receive tradable evidence such as certificates which represent the benefit of renewable electricity generation from both this and another similar system that similarly certifies the origin or represents the benefits of the associated renewable electricity and can be exchanged for financial support;
- K.) A diagram showing the Production Device, the location of export meters used for metering its generation and of transformer substations at the plant site. If there are generating auxiliaries for the Production Device and/or import meters for metering their demand these shall be also shown on the diagram.
- L.) Any additional information required by the Issuing Body as contained in the Domain Protocol.

It is furthermore stated that:

Should any planned or unplanned change to a Production Device, including changes to any Public Support received by it, render the statements made in the RED inaccurate, then the corresponding RES-E Generator or the Production Aggregator acting on its behalf shall:

- Inform the appropriate Issuing Body prior to planned changes coming into effect or immediately where such changes are unplanned; and
- Not receive Certificates in association with this Production Device other than in its original state until it has been re-Registered by the Issuing Body.

Each Production Device shall be assigned a unique identifier.

The current details as set out in the Renewable Energy Declaration of each Production Device that has been Registered shall be made available in electronic form to each Participant.

The Issuing Body shall publish clear and unambiguous procedures for the Registration of Production Devices. These procedures shall require that the RES-E Generator or the Production Aggregator acting on its behalf:

- a) Completes and provides to the Issuing Body a RED;
- b) Will permit the Issuing Body to inspect the Production Device and such records as it considers to be necessary to verify the authenticity of the RED and that such inspection may be conducted without prior announcement;
- c) Requests an account on the CRD where the issued Certificates for the Production Device will be deposited;
- d) Discloses details of any past infringements of Domain or inter-Domain agreements regarding Certificates and including the Basic Commitment and any Domain Protocol by itself or by any subsidiary, parent or related undertaking;
- e) Provides details of an officially endorsed source of meter readings, the means of collecting these, approval for their collection and accepts liability for the delivery, quality and accuracy of these meter readings; and

If a RES-E Generator seeking Registration of a Production Device meets the criteria for participating then the Issuing Body shall accept the application.

4. Device registration inspection methodology

The issuing body can appoint a production registrar for the purpose of initial and periodic device inspections. For the purpose of the initial device inspection for first registration of the device as a RES – E generator the Production Registrar as appointed by the Issuing Body shall:

- Send a request prior to a site visit for the following documentation to be available on site:
 - documentation for the preparation of the Production Declaration including specifications for the device(s), the meters/|devices to be inspected and internal measurement methodologies
 - any documentation supporting data to be supplied in completion of the Renewable Energy Declaration by the device owner.
- Send a RED template (included as Appendix A) for the device owner to prepare for the device inspection and subsequent lodging of the RED with the Issuing Body.
- Conduct an on-site device inspection accompanied by suitably qualified device owner members of staff in order to verify data to be specified in the RED.
- Identify device owner staff members to be interviewed regarding relevant data collection methodologies and procedures
- Satisfy them self that suitable procedures and data collection are in place to provide an accurate RED and reliable Combustion and Production Declarations.

5. Reporting process and data collection

The declaration of production from a device for the purpose of issuing certificates must make a statement of the volume of electrical output to the exporting grid. The statement of electrical export is to be deposited with the Issuing Body quarterly and is referred to as a Production Declaration (PD).

The issuing body must satisfy itself that systems and procedure are in place at the device or facility for data of a suitable resolution to be captured and transferred to the issuing body in accordance with preparation of monthly PDs.

The maximum quantity of renewable energy available per month is calculated using the following formula:

$$E_{net\max} = (N_{50} \times 50 \times n \times 24) + (N_{100} \times 100 \times n \times 24) \quad (1)$$

Where $E_{net\max}$ represents the maximum potential electricity produced by the modules, N_{50} is the number of 50 W modules in operation in the specified month and N_{100} is the number of 100 W modules in operation in the specified month. 50 and 100 is the capacity of each module (50W and 100W respectively), and n represents the amount of days in the period and 24 is the amount of hours in a day.

This quantity will serve as the theoretical maximum amount of electricity produced in a 30 day month of continuous operation.

Uncertainty in production of electricity is identified in the following:

- Insolation: The solar resource is location and time dependant. The theoretical maximum assumes that the location under consideration will experience radiation in the order of 1000 W/m², which may not be the case.
- The Solar Home modules are an off-grid application and produce electricity according to load requirements of the individual user. Technically the modules will not produce more power than is being consumed or stored at any one time.

Because there is currently no measure for consumption in each of the Solar homes, the IB will base the total electricity consumption on the average production capacity per household. The value used in this case is 185 Wh/day for a household utilising a 50W module.

In this case, it is assumed that the electricity produced will equal:

$$E_{net} = (N_{50} \times E_{prod-a} \times n) + 2(N_{100} \times E_{prod-a} \times n) \quad (2)$$

Where

E_{net} = The total electricity consumed in the considered period

N_{50} = Number of 50W households with operational system

N_{100} = Number of 100W households with operational system

E_{prod-a} = Average Electricity produced per household per day (185Wh)

n = number of days in period (monthly = 30 days)

It is therefore up to the RES-E generator to provide the IB with monthly data indicating the following:

N_{50} and N_{100} - the total amount of households with installed systems that are in operation. This data will be taken from the total monthly sales figures.

$E_{net\ max}$ as calculated from Equation (1).

E_{net} as calculated from Equation (2).

Due to the uncertainty of the consumption of electricity the IB will only issue certificates on 80% of the potential production capacity. This is done in order to prevent overstating the amount of renewable energy produced. Therefore the final calculation for the amount of renewable energy consumed will be:

$$E_{Issue} = E_{net} \times 0.8 \quad (3)$$

Where

E_{Issue} = the total electricity production the attributes of which are eligible for certificate issue in considered period

E_{net} = The total electricity consumed in the considered period

6. Conclusion

The Issuing Body shall provide a decision on the acceptance of the RED lodged by the device owner within 10 working days. This shall be provided to both the device owner and to market participants with a period of comments on the RED and the decision of a further 10 working days being allowed. Thereafter the Issuing Body will provide final acceptance of RED and issue the device identifier and ensure that it has been captured in the CRD. If there are objections to the RED or its acceptance the Issuing Body may require the device owner to re-submit the RED for re-evaluation as per the above procedure.

7. References

AIB, 2009. EECS Basic Commitment PRO (Release 6) 1 Jan 2009

AIB, 2009. RECS AIB-PRO-SD03: EECS Registration Databases, 29 July 2009.

AIB, 2004. RECS basic commitment Annexes Release 2.2. 31 January 2004.

SATIB, 2009. RECS Domain Protocol for Republic of South Africa, Ver. 0,1, Nov 2009

8. History of Versions

Version 1
Version 2

09th November 2009
23rd November 2009