Development of Rules on Standby Generation

ANALYSIS REPORT

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Submitted to:

Electricity Control Board of Namibia

Submitted by:

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1 INTRODUCTION

1.1 Background and Purpose

This Report outlines a survey conducted for the development of rules on off-grid standby generation, on-grid standby generation[1] and small scale grid feed-in in Namibia as well as a framework for the development of rules in line with the terms of reference.

1.2 Overview

The survey conducted under this Project revealed that there may be around 6 000 small standby generators in use in Namibia (plus an estimated 4000 or more stand-alone generators). These numbers are expected to rise as electricity shortages continue and grid limitations result in under-supply to rural areas. The main drivers for this supplementary generation are security and reliability of supply issues related to power failures, limited access to grid electricity and a general drive towards renewable energy use for environmental purposes. As regards the latter, the increase in more environmentally friendly and greener energies is both national and international. Many consumers see it as an important driver to contribute to decreasing their carbon footprint through the use of more environmentally friendly energy such as solar energy while at the same time reducing Namibia's reliance on electricity imports. This drive is expected to continue to increase in view of increasing environmental concerns regarding global warming.

The current Electricity Act, 2007, exempts certain smaller generation plant (where capacity is under 500 kVA and for own use) but, as shown, this is not a satisfactory state of affairs since, in the absence of subordinate legislation, these smaller generation plants operate unregulated. Simultaneously it appears that there are instances (although small in number) where generation plants of less than 500 kVA are used to supply 3rd parties without them being licensed as required by the Act. As such plants which supply to 3rd parties are expected to proliferate it may place an undue regulatory burden on the ECB. Such cases of unregulated exemption and burdensome regulation (which appears to be currently unauthorised) warrant revision of the regulation scope.

The increasing size of supplementary generation, the unsatisfactory regulation under the Electricity Act and the growing involvement of 3rd parties in such electricity supply options, are all factors which support the need for a revised/broader regulation scope. The ECB is currently at an advanced stage of finalising technical and economic rules under the Electricity Act. Draft rule 29 of the Draft Technical Rules contains a number of sub-rules by means of which standby generation within a licensed distribution area is regulated. In Part II of this Report, the Technical Rules are evaluated in order to establish whether they sufficiently deal with standby generation within licensed areas or whether additional rules are required not only with regard to standby generation but also with regard to small scale feed-in.

Identifying the needs, requirements and concerns of consumers/supplementary generators and licensees formed a crucial part of the study and the findings are summarised in Part I of the Report. Some of the typical concerns are: (a) noise and pollution control; (b) technical standards and safety; (c) grid connection requirements; (d) pricing regimes; (e) the use of renewable energies for environmental purposes; and (f) security of supply. It is therefore important that a proposed regulatory framework for supplementary generation addresses concerns, where relevant, in an appropriate manner.

In the comments received, concerns were raised as regards: (a) not to over-regulate these issues; and further (b) not to increase the regulatory burden on the ECB and/or licensees which may render it difficult if not impossible to oversee. Over-regulation also precipitates the risk of discouraging private sector initiatives and encouraging non-

[1] The TOR for the project refers to "co-generation", however during deliberations it has become clear that what was meant is on-grid standby generation (i.e. operation of a standby generator on the grid under certain circumstances). Co-generation is a standard term for the generation of electricity using excess process heat from industrial processes and is not dealt with here explicitly. The term co-generation would therefore be inappropriate and misleading for what is actually a form of standby generation but linked to the grid.

compliance due to being too burdensome. This is therefore a factor which has been kept in mind in proposing a future regulatory framework for supplementary generation in Namibia.

In the comments received, licensees (and especially distribution licensees) expressed the need to have some form of control over standby generation and small scale feed-in within their licence areas. Particular concerns are expressed as regard the implementation and maintenance of safety requirements and technical standards as well as the avoidance of over-regulation. The expression of such need further validates the creation of a regulatory framework for supplementary generation.

In the legal part of this Report (Part II), the outcomes of the survey are provided together with proposals on how Namibia can benefit from similar regulation in other jurisdictions. In order to avoid the proliferation of cumbersome legal instruments under the Electricity Act it is strongly recommended that the control of activities related to standby generation and small scale feed-in be limited to the Technical and Economic Rules.

PART I

2 STANDBY GENERATORS: CLASSIFICATION AND INTERIM DEFINITIONS

2.1 Interim Definitions For Purposes Of Report[2]

Generator:	A device which converts a non-electrical form of energy (not derived originally from the electricity grid) into electrical energy. [3]
Standby Generator:	A generator which is used to supply electricity at times when the primary electricity supply from the grid fails or is reduced. This includes both off-grid standby generation and on-grid standby generation.
Off-Grid Standby Generator	A standby generator which is never connected to the grid and feeds electricity only into the electrical installation of a customer.
On-Grid Standby Generator:	A standby generator which can be connected and synchronised to the grid. It is not intended to feed into the grid but rather to provide supplementary and/or "top-up" electricity in the event of power failures or load reduction.
Small scale in-feed generator:	A generator which is connected to the grid and normally supplies load in parallel with the grid and/or feeds back into the grid.
Supplementary Generation	Includes standby generation and small scale in-feed generation.[4]
Supplementary Generator	The person operating the supplementary generation plant whether or not the owner thereof.
Grid Feed-in	The supply of electricity into the grid from supplementary generation.[5]
Grid:	The electrical network of an electricity distribution or transmission licensee.
Health and Safety Regulations	The Health and Safety of Employees at Work Regulations, 1997, issued under the Labour Act, 2007, and as published in Government Notice 156/1997.
Stand-alone generator:	A generator which is used as primary supply of electricity for load that is not connected to the grid[6].

[2] Please note that definitions contained herein are only provided for purposes of the Report and do not purport to be legally and technically accurate. Definitions which are legally and technically accurate will be developed in the subsequent rules themselves. At this stage these definitions aim at clarifying expressions for this Report only in order to provide the reader with a basic understanding of the context within which they are used.

[3] This specifically EXCLUDES any device which only stores electrical energy from the grid and retrieves such electrical energy from storage (such as an uninterruptible power supply).

[4] The purpose of this definition is to simplify and shorten references in the Report to the various types of generation and to render it unnecessary to list all types whenever reference is made to such types collectively.

[5] The purpose of this definition is similar to the purpose of the definition for "supplementary generation".

[6] Stand-alone generators are excluded from the scope of this project.

2.2 Classification of Standby Generators

Grouping	Rationale and Description	Est. No[7]	Typical Size[8]
Individual residential (including home offices)	Typically these are small portable generators below 10kVA which are not permanently wired into the electrical installation. Supply does not usually include third parties, but may do so in some cases. Ownership may vest in owners or tenants of premises - usually natural persons but also juristic persons (such as a company owning a house).	up to 5000	< 10kVA
Shared multiple residential (including home offices)	The body corporate (or owner) of a block of flats or housing complex may install a standby generator and use this generator to make standby supply available to housing units forming part of the body corporate (or owner). Output is usually provided to third parties (although this point could be argued since the individual units are part of the body corporate) and may include some own consumption by the owner of the generator. Ownership may vest in a body corporate or the owner of the building which may be a natural person or a juristic person.	None known	< 500kVA
Individual commercial	A person owning or occupying commercial premises may install a standby generator. This includes for example individual shops, filling stations, mobile telecoms operator base stations, radio and TV transmitter stations and individual offices. Also includes lodges and hotels. Supply does not usually include third parties. Ownership usually vests in the tenant or owner of the premises which would mostly be juristic persons but may also be a natural person.	250	< 150kVA
Shared multiple commercial	The body corporate (or owner) of a commercial premises may install a standby generator and use this generator to make standby supply available to commercial units forming part of the premises. Output is usually provided to third parties and may include some own consumption by the owner of the generator. Ownership may vest in a body corporate or the owner of the building which will usually be a juristic person but may also be a natural person.	5	< 500kVA

[7] Estimated number of generators in this category which are installed and/or in use in Namibia
[8] Typical size range in kVA for generators in this category

Grouping	Rationale and Description	Est. No[7]	Typical Size[8]
Individual Industrial and Mining	Industries and mines may install standby generators to supply all or part of their electricity demand during times of grid outage or grid load reduction. Usually the capacity of standby generators is sized to cover critical processes only and not the entire load of normal operations. Output is usually for own use only. Ownership normally vests in the individual industry or mine.	20	> 500kVA
Public services (Government (all levels) and Government Institutions)	The Government and public institutions install standby generators in hospitals, morgues, police stations, airports, border posts, institutions of higher learning and other places which either provide essential services or need to operate on a continuous basis. Supply is not usually provided to third parties, although in some cases this does happen. Ownership of the generator vests in Government or a public institution.	750	10kVA to 650kVA
Licensee owned and operated for standby use during major network maintenance	Licensees may keep mobile standby generators for power part networks during extended maintenance, upgrading or refurbishment activities on their networks. Supply is provided to third parties (customers of the licensee). Ownership of the generator vests in the licensee.	2	>500kVA

2.3 Classification of Stakeholders for Standby Generators

Stakeholder Type	Needs and Issues
Private individuals – own household use	• Stakeholders want to be allowed to have/operate generators for standby use • Subjection only to minimum regulation
Business owners – own business use	• Stakeholders want to be allowed to have/operate generators for standby use • Subjection only to minimum regulation
Body corporate, owners of blocks of flats or commercial buildings	• Stakeholders want to be allowed to have/operate generators for standby use • Stakeholders want to be able to provide standby electricity to individual units forming part of the body corporate • Subjection only to minimum regulation
Government and Public Institutions including local governments	• Stakeholders identified a need for standby generators in many forms of buildings, most important in critical service facilities such as hospitals • Stakeholders identified a need to know the relevant grid connection requirements applicable to them
Industries and Mines	• Stakeholders want to be allowed to have/operate generators for standby use • Stakeholders identified the desire to generate on-grid at times of forced grid load reduction

Stakeholder Type	Needs and Issues
Distribution licensees	• Appears to be only NamPower and NamPower's standby generators are licensed
Importers and retailers of generators	• Stakeholders identified need to know which technical standards/specifications will be allowed
On-grid standby generation owners	• Stakeholders identified need to know which technical standards/specifications will be allowed • Stakeholders identified need to know which grid connection requirements are imposed
Persons engaged in (or wishing to engage in) small scale in-feed	• A feed-in tariff regime is required • Clarification on metering of in-feed (e.g. net metering or other) is required • Stakeholders identified need to know which technical standards/specifications will be allowed • Stakeholders identified need to know which grid connection requirements are imposed
Electrical installers	• Stakeholders identified need to know which technical standards/specifications will be allowed • Stakeholders identified need to know which grid connection requirements are imposed

2.4 Classification of Generators by Location Types

Location Type	Needs and Issues
On residential property within built up area	• Noise pollution from generator being a nuisance to neighbours is a key issue • Exhaust gas emissions from generators may be an issue • Ground pollution (such as from oil or fuel leaks) may be an issue • Fire hazard may be an issue, from generator itself as well as fuel stored on the property
On commercial property in mixed residential/commercial built up area	• Noise pollution from generator being a nuisance to neighbours is a key issue – especially for larger generators which may run more often and make more noise • Exhaust gas emissions from generators may be an issue – especially for larger generators which may run more often and create more significant volumes of exhaust gas • Ground pollution (such as from oil or fuel leaks) may be an issue – greater need for proper precautions to contain any spillages, and fire hazards
On commercial property in commercial area	• Noise pollution from generator bothering being a nuisance to neighbours is an issue – especially for larger generators which may run more often and make more noise • Exhaust gas emissions from generators may be an issue – especially for larger generators which may run more often and create more significant volumes of exhaust gas • Ground pollution (such as from oil or fuel leaks) may be an issue – greater need for proper precautions to contain any spillages • Fire hazard, specifically from fuel storage is an issue

Location Type	Needs and Issues
On an industrial property in an industrial area	• Ground pollution (such as from oil or fuel leaks) may be an issue – greater need for proper precautions to contain any spillages • Fire hazard, specifically from fuel storage is an issue
Outside built up area, such as individual farm or mining site	• Ground pollution (such as from oil or fuel leaks) may be an issue – greater need for proper precautions to contain any spillages • Fire hazard, specifically from fuel storage is an issue

3 RESPONSES TO STAKEHOLDER SURVEYS

3.1 Public Questionnaire – Summary of Responses – Standby Generators

Issue	Reponses
How many generators	• Telecom has 113 generators, sized from 10kVA to 650kVA, the majority being 50kVA or less • Rossing 6x2.5MVA + 4x1.75MVA • [3] – 100kVA x 1 • [2] – 150kVA x 1 • [7] – 1500kW x 2 • [8] – 20kVA x 1 • [9] – 500kVA x 1 + 1000kVA x 1 • [10] – 50kVA x 1 • [11] – 110kVA x 1 • [13] – 8kVA • [15] – 350kVA x 1 • [16] – 60kVA x 2, 20kVA x 1 • [17] – 50kVA x 4
What fuel	• Others - Diesel • [13] – Petrol
Motivation and usage	• Standby and backup when grid fails, at non-grid sites as part of hybrid system • Rossing – security of supply when grid fails for critical loads. Alternative to do load shedding if required by NamPower • Others - Standby for power failures
Licensed?	• Telecom 2 x 650kVA at head office licensed • Rossing yes • [7] – yes • [9] – yes • Others - no

Issue	Reponses
Usage	• Telecom – about 4000 hours p.a. • Rossing - about 80 hours p.a. • [3] – 100 hours p.a. • [2] – 150 hours p.a. • [7] – 16 hours p.a. • [8] – 110 hours p.a. • [9] – 34 hours p.a. per generator • [10] – 60 hours p.a. • [11] – 14 hours p.a. • [13] – 24 hours p.a. • [15] – 4.5 hours p.a. • [16] – 200 hours p.a. per generator • [17] – 150 hours p.a.
Grid operator requirements	• Not allowed to feed into grid without licence and authority • Plant must be electrically and mechanically interlocked to prevent grid feed • Proper circuit breakers must be installed in case of faults • Certificate of compliance required for electrical installations • Rossing – only when grid synchronisation is required • Others - none • [7] – no feed-back into grid allowed
Complaints	• Others - none
Provide electricity to other consumers	• Telecom – yes, supply standby power to MTC, Leo, NBC, DCA, Transnamib, Roads authority and others at certain sites • Others - no • [9] – to other users at the airports
Generator locations	• At Telecom sites and head office • At Rossing mine site • [3] – in separate building at hotel • [2] – in workshop near lodge • [7] – at smelter power plant site in Tsumeb • [8] – at lodge near Katima Mulilo • [9] – HK international airport • [10] – next to farmhouse • [11] – Nelson Mandela Ave, Windhoek • [13] – in garage • [15] – basement of hotel building • [16] – at lodge • [17] – at lodge

3.2 Public Questionnaire – Summary of Responses – In-Feed Generators

Issue	Reponses

Issue	Reponses
Kind of generator	• [1] - Biomass gasification • [6] – solar PV • [12] – solar PV • [14] – solar PV
Licensed	• [1] – yes • Others – no
Size	• [1] - 250kW • [6] – 4.5kW • [11] – 25.5 kWp • [14] – 7.5kWp
Motivation	• [1] – proof of concept for bush to electricity • [6] – environmental consciousness, standby power during power cuts in Klein Windhoek • [11] – Business, generate renewable electricity • [14] – wants to use natural resources
Problems with grid connection	• [1] – Lack of expertise with grid in-feed connections • [1] - Delays in finalising transmission connection agreement with NamPower • [1] - Poor power factor on distribution network to which connected • [6] – Current pre-paid metering gives no credit for energy fed back into grid • [11] – Grid provider lacks regulations and guidelines • [14] - Cannot get meter that measures bi-directional
Grid operator requirements	• [1] – Yes, synchronisation and non-islanding; metering requirements imposed by NamPower • [6] – Not aware that City of Windhoek has requirements
Provide electricity to someone else	• [1] – all sold to NamPower Trader • [6] – no
Receiving compensation for electricity	• [1] – yes, NamPower purchases the power generated • [6] – No. would like at least get credit (net metering). An in-feed tariff would be regarded as a bonus. Tax concessions on purchase of PV equipment would also be appreciated • [11] – As minimum net metering should be allowed – feed-in tariff would be an advantage
Complaints	• [1] – None • [6] – None
Location of generator	• [1] – On farm Pierre, Outjo district • [6] – On roof of building in Windhoek • [14] – Burg Str, Windhoek

3.3 Public Questionnaire – Summary of Responses – General Views

Issue	Reponses

Issue	Reponses
Views on regulation	• Telecom – there should be uniformity on QOS for standby generators and grid in-feed generators to ensure that consumer is protected • Rossing – Specifications required for synchronisation to grid • Rossing – Load shedding should qualify the client to synchronise to grid to take load off the grid while maintaining operations • [1] – Environmental assessment criteria (e.g. clearance required by ECB) should be simplified; dispatching requirements should be simplified; electricity sales to party other than grid operator or NamPower should be made possible and simplified • [6] – Namibia is perceived to be heavily regulated, rather give incentives instead of more regulation. However regulations should compel licensees to allow in-feeding. "Green" tariffs would also be welcomed • [8] – Better power quality would make standby generators unnecessary, reducing need for regulation • [9] – Licence takes long to be renewed • [10] – No more regulations • [11] – US or Australian regulations on in-feed would be a good example • [15] – Standby generators for own use should be allowed without regulation – no grid in-feeding should be allowed in this case • [15] – Grid in-feeding using renewable sources should be encouraged by tariffs • [16] – Feed-in regulations are lacking • [17] – See no need for regulation on farms where nearest neighbour is 10km away
Information to bring to ECB attention	• [1] – A more liberalised market should be developed where a generator can sell electricity directly to one or more clients at premium prices • [6] – Tax breaks on energy efficient equipment and fittings should be pursued (SACU, Ministries of Finance and Trade) • [8] – Namibia is fast becoming over-regulated, this should be avoided. • [11] – Grid licensees should be forced to allow in-feed • [13] – Subsidise those who use solar PV and solar hot water systems

3.4 Distribution Licensee Questionnaire – Summary of Responses – Standby Generators

Issue/Question	Reponses
Records kept by Licensee	• CENORED – no records kept
Require persons to get Licensee's permission?	• CENORED – no requirements – regulations should make it compulsory to obtain permission
Licensee role in ensuring safety	• CENORED – set standards for installers, should have safety interlock to grid, proper earthing and circuit breakers
Key problems with standby generators	• Lack of technical regulations • Sub-standard change-over devices and lack of control over this

Issue/Question	Reponses
Encourage or discourage standby generators?	• Standby generators seen as necessity for anything that cannot tolerate power failures and/or where the cost of power failures exceeds the cost of the standby generator • UPS seen as generator? Definition in the Act? Make sure the right definition is included in the rules
Written agreement with standby generators?	• Agreement only for in-feed • Standby generators should the customer's and contractor's (installer's) responsibility
Threats and issues if allowing generators to be automatically exempt from licensing	• Definition of standby generators needs to improved and clarified (e.g. that it feeds into wiring that is normally grid connected) • What about generators that operate in island mode or off-grid? • Be careful of over-regulation as this slows down response to private initiative and may lead to increased illegal operation

3.5 Distribution Licensee Questionnaire – Summary of Responses – In-Feed Generators

Issue/Question	Reponses
How many small in-feeds?	• CENORED - None
Purchase electricity from small in-feed?	• CENORED – no, although tariffs have been promulgated
Views and concerns	• Feed-in is a way to retain customers on the grid • Needs to be regulated in a simple yet rigorous way • There should be a national register
Key problems	• Standards and codes are not available • Technologies should be approved at national level, not individual licensees • Tariffs need to be available
Encourage or discourage feed-in	• CENORED encourages it, but so far no response
View on concluding a written agreement	• CENORED – yes there must be an agreement, maybe coupled with an application form that then becomes a contract, should be standardised
Threats and issues with exemption from licensing	• Automatic exemption is ok, provided that registration with grid operator is mandatory • Limits on capacity should maybe differ from the current 500kVA • Beware of over-regulation as this stifles initiative

3.6 Distribution Licensee Questionnaire – Summary of Responses – General Views

Issue/Question	Reponses

Issue/Question	Reponses
What extent of regulation?	• Keep regulation to absolute minimum • Cover in technical rules for under 500kVA • Over-regulation will not solve the safety and metering issues
Licence standby generators or exempt them	• Should be exempted • But should be registered, tested and change-over switch must be sealed

4 CONCLUSIONS REGARDING RULES FRAMEWORK

From the above the following conclusions are drawn regarding the drafting of the rules:

4.1 General

- Rules should be kept to a minimum
- Administrative requirements (especially for small standby generators) should be kept to a minimum
- Technical rules for grid connection need to be crafted (include in technical rules, grid code?)
- "Own consumption" per the Act must be carefully scrutinised and defined
- "Generator" must be clearly defined (e.g. exclude UPS?)
- Improved definition of "standby generator" needed

4.2 Standby Generators

- Identify responsibility for electrical safety
- Identify responsibility for connection specifications
- Identify when synchronisation and feed-in may be (or must be) allowed
- Identify whether users may synchronise to provide grid load reduction
- A register of at least medium to large standby generators should be kept (by whom?)
- Noise and emissions must be subjected to some standard (technical rules? Local authority by-laws? Environmental legislation?)
- Prevention of spillage of oil/fuel/other hazardous substances must be addressed (which standard?)

4.3 Small Feed-In

- Sizes for small feed-in must be carefully crafted
- Net metering for very small in-feed should be considered as mandatory minimum requirement
- Technical requirements for synchronisation to grid and safety should be included in technical rules
- All feed-in generators should register with grid provider and/or ECB
- ECB to set tariffs or tariff principles for small feed-in
- Restrict to renewable only (on what grounds?)?
- Requirements of contract with grid provider
- Allow selling of electricity to parties other than local grid operator?

PART II

ANALYSIS OF LEGAL/STATUTORY INSTRUMENTS

5 CURRENT POSITION

Under this heading existing legal instruments in Namibia relevant to supplementary generation are analysed in order to: (a) establish to what extent supplementary generation is currently regulated in Namibia; and further (b) to establish whether sufficient authority exists under the Electricity Act, 2007, to regulate supplementary generation by means of subordinate legislation. The analyses included relevant legislation such as the Health and Safety Regulations and the Petroleum Products Regulations in instances of generation by means of petrol or diesel.

In addition, the supply conditions of a number of licensees were investigated to establish how licensees deal with supplementary generation in their standard conditions of supply. For this purpose the standard conditions of supply of Erongo Red and CENORED were analysed as well as the Model Electricity Supply Regulations as applicable to local authorities supplying electricity.

5.1 Electricity Act, 2007

In terms of section 18(1)(a) of the Electricity Act, a person may generate electricity without a licence where:

(a) The premises are situated in an unlicensed area or where there is no supply network;
(b) The generation plant has an installed capacity of less than 500 kVA;
(c) Where the electricity generated is exclusively for own consumption by the person who controls the generation plant and on that premises.

In terms of section 18(1)(b) of the Electricity Act, a person may generate electricity in a licensed area or where a supply network is available without a licence where:

(a) The generation plant has an installed capacity of less than 500 kVA;
(b) The electricity is generated as standby supply for own consumption by the person in control of the plant and on that premises.

Section 18(1)(d) allows the Minister to exempt persons from the requirement to hold a generation or other licence on recommendation of the Board. It is assumed that the Minister can provide such exemption for both specific situations as well as for general categories. The exemption provided under section 18)(1)(d) is provided in writing by the Minister and is not to be contained in regulations or rules. This is different from the exemption contemplated in section 43(1)(n). In terms of section 43(1)(n) the Minister may, by regulation, exempt any person from the provisions of the Electricity Act in the circumstances and on the conditions prescribed in such regulation. Since the ECB, in terms of section 3(4)(j), may make rules with regard to any matter which the Minister may make regulations, provided that such rules do not conflict with any regulations made by the Minister, the ECB may therefore by means of rules exempt persons from certain provisions of the Electricity Act. This authority may become useful since this Report also investigates the need as to whether provision should be made for exemptions where specifically the licensing requirements contained in section 18 of the Electricity Act may be too prescriptive.

Apart from section 18(1), the Electricity Act does not deal in any further detail with exempted supplementary generation. The Act merely exempts smaller generation plant from the licensing requirements where such plant complies with the conditions set out in section 18(1).

This does not mean that such smaller generation will go unregulated. The Act provides for subordinate legislation in a number of instances, namely:

(a) In terms of section 3(4) the ECB may make rules and codes as regards a number of issues listed in that section as well as matters with regard to which the Minister may make regulations;

(b) In terms of section 43(1) of the Act the Minister may make regulations relating to the issues listed in that section which includes the duties of customers and licensees and requirements for the erection of any generation plant;
(c) In terms of section 44 of the Act the ECB may set standards on the quality of electricity supply and electricity related services.

Section 1 of the Act defines "generation" as "the production of electricity by way of natural or artificial processes".

It is concluded that the Electricity Act contains sufficient authorisation for the ECB or the Minister to issue rules, regulations or standards, as the case may be, whereby currently unregulated smaller generation activities are regulated.

5.2 Draft Electricity Technical Rules, 2010

The ECB is currently in the process of finalising the Electricity Technical Rules. These rules contain provisions dealing with standby supply which are provided below:

(a) Definition: "*standby supply means an alternative source of electricity not normally used by a customer*";
(b) Rule 20 which is quoted below:

"20.1 A customer, who installs or uses a private generating plant on the customer's premises for the purposes of standby supply of electricity, must –

(a) where the standby supply is not permanently connected to the customer's electrical installation, in writing notify the licensee with whom the customer has a contract of supply of such standby supply;

(b) where the standby supply is permanently connected to the customer's electrical installation, the customer must, prior to such installation or use –

(i) in writing notify the distribution licensee to whose electrical system the customer's electrical installation is connected of the customer's intention to so install or use standby supply; and

(ii) obtain the licensee's written permission for such installation or use;

(c) comply with all technical requirements of the distribution licensee, to whose electrical system the customer's electrical installation is connected, for the connection of such standby supply.

20.2 Any generating plant which a customer installs or uses as standby supply must be electrically and mechanically interlocked in a manner which prevents parallel connection to the licensee's supply main.

20.3 The licensee must be notified of the first commissioning test and any subsequent test run to be carried out on a generating plant installed in terms rule 20.1(b), and may at any reasonable time –

(a) require that a test run be carried out; or

(b) inspect such generating plant."

The salient points of the current draft rule on standby supply are:

(a) any person may install a standby generator provided it is not permanently connected to the customer's electrical installation;

(b) where not permanently connected, the customer merely has to notify the licensee but where permanently connected the customer must first obtain the licensee's permission for such installation;
(c) the technical requirements of the relevant licensee must be complied with and the generating plant must be interlocked correctly;
(d) the licensee has the right to inspect and test such plant.

The above proposed rule 29 has been based on a similar provision appearing in the Model Electricity Supply Regulations with subsequent amendments in view of comments received. Pending the outcome of this study, a number of changes and additions to this rule will be recommended.

5.3 Model Electricity Supply Regulations

The Model Electricity Supply Regulations were issued by the Minister responsible for local government under the Local Authorities Act, 1992, and apply to most local authorities in Namibia. The Model Electricity Supply Regulations regulate the relationship between a local authority providing electricity to its residents and augment the Electricity Act. As local authorities become incorporated into REDs the Model Electricity Supply Regulations become obsolete. Once the Technical and Economic Rules are promulgated those rules will to a great extent substitute the Model Electricity Supply Regulations. Local authorities will be encouraged to repeal the Model Electricity Supply Regulations or any similar electricity regulations applying to them.

Regulation 30 of the Model Electricity Supply Regulations deals with standby supply and provides as follows:

*"**30.**(1) Except with the written consent of the Engineer and subject to such terms and conditions as may be laid down by the Council, no person shall be entitled to obtain from the Council a service connection for the purpose of a standby supply of electricity to any premises having a source of electricity supply other than that provided by the Council.*

(2) The owner or occupier of any premises to which electricity is supplied by the Council shall not, except with the written permission of the Engineer, install or use a private generating plant on such premises for the purpose of a standby supply.

(3) Any generating plant which a person under subregulation (2) is permitted to install shall be electrically and mechanically interlocked in such a manner as to prevent parallel connection to the Council's supply main.

(4) The Engineer shall be notified of the first commissioning test and any subsequent test run to be carried out on a generating plant installed in terms of subregulation (2), and may at any time require that a test run be carried out."

Thus, in terms of the Model Electricity Supply Regulations, the licensee's permission must be obtained for every instance of standby supply whether connected to the customer's installation or not. It therefore provides a local authority with total control over standby generation in its area of supply. It can also be construed as prohibiting grid in-feed and on-grid standby generation (although one could possibly argue about the term "for the purpose of a standby supply" in regulation 30(2)).

5.4 Labour Act, 2007, and Regulations Relating to the Health and Safety of Employees at Work, 1997

5.4.1 Labour Act, 2007

The Labour Act contains some general provisions on the health and safety of employees and the following sections are relevant:

Section 39(1) This section requires, amongst others, that an employer must:

(a) provide a work environment that is safe and does not endanger health and safety of employees;
(b) provide and maintain plant and machinery that are safe and without risk to health;
(c) provide employees with sufficient understanding (training) to handle equipment in a manner

that is safe.

Section 40(1)	Every employer must conduct its business operations on its premises in such a manner that, as far as is reasonably practicable, persons who are not employees of that employer are not exposed to safety or health risks.
Section 41	Employees also have a duty in terms of this section to ensure their own safety and health at the workplace.

The application of the Labour Act is limited in that it mainly applies to employees, workplaces and businesses. The Labour Act does not, for example, apply to a residential property where a person has installed standby generation for purposes of backup electricity supply.

5.4.2 Health and Safety of Employees at Work Regulations, 1997

The above regulations were issued under the 1992-Labour Act and continued in existence when that Labour Act was replaced by the 2007-Labour Act. The Health and Safety Regulations were scrutinised and evaluated as part of this Report and relevant regulations identified are summarised below. Note that many of these regulations have general application – i.e. they apply to all machinery, articles, plant, etc. The latter expressions are usually not defined and it is accepted that their ordinary meanings apply. Their application is therefore sufficiently wide to include generating plant and apparatus used with regard thereto.

Regulation 9(2)	Where a person at a workplace assembles, erects or installs an article which will be used by another person, it must as far as is reasonably practical be ensured that such assembly, erection or installation is done in a manner that is safe and without risk to safety or health.
Regulation 14	Defines factory as including a premises/part of premises on or in which "electricity is generated".
Regulation 19	Regulation 19(1) states that no person shall operate a factory who is not registered under the regulations. The remainder of regulation 19 contains the details as to how a factory must be registered and that a certificate is issued for such registration.[9]
Regulation 44(9)	Electrical equipment and apparatus which may come into contact with flammable fumes must be flame-proof.
Regulation 49	All machinery must be designed, constructed and installed in a manner that is safe and suitable to its functions.
Regulation 50	Machinery operated in a factory must be placed under the control of a competent person provided that if machinery can generate 3000 KW power or more such person must be a qualified person. Machinery must be maintained in good working order and repair and to ensure safety.
Regulation 178	Duties of suppliers, manufacturers and importers – these persons must ensure that their machinery is designed in such a manner and supplied with such information that it will ensure the work environment is contaminated as little as possible and the machinery does not pose a health hazard to employees.
Regulations 191 and 192	If a process at a workplace causes fumes or vapour which may on ignition cause an explosion, there are specific precautionary steps which must be taken by the owner of the workplace.
Regulation 235	This regulation deals with first aid requirements with regard to employees exposed to energized high voltage electrical conductors.
Chapter 9 –	Chapter 9 of the Health and Safety Regulations (regulations 258 – 271) deals with electrical safety.

[9] This means that all standby, small scale in-feed and co-generation must be registered as factories. It is doubtful whether any of these smaller generators comply with this requirement and is registered as a factory. It is further also impractical to require such registration. To discuss internally with the ECB how to deal with this issue.

Electrical Safety	
Regulation 258	Definition of user: an occupier or builder, or the person or persons owning or using the machinery or electrical apparatus.
Regulation 259	A user shall cause all electricity generating plants, transformers, or switching or linking apparatus, when situated in any factory or structural works, to, to the satisfaction of an inspector, be properly fenced off or enclosed. Note that any premises where electricity is generated is regarded as a factory.
Regulation 260	Requires a user to put up certain notices within electric generating stations and premises where electrical apparatus is installed. This applies to all premises and is not limited to workplaces.
Regulation 261	A user must ensure that electrical apparatus and machinery be installed, operated and maintained in a manner to prevent danger to persons and their injury thereby.
Regulation 267	Safety requirements relating to earthing as regards electrical plant which may become alive – pertains to insulation, earthing, etc.
Regulation 268	This regulation deals with safety requirements for transformer- or switch-rooms and houses.
Regulation 269	Sets out minimum height of conductors requirements for urban areas (5,49 meters) and others specified in regulation. If not urban area and not specified then height must be 4.8 metres, etc.
Annexure F – Noise Regulations	This annexure contains regulations obligating employers to take certain steps to reduce noise levels where possible within areas where employees are required to work. Employers must also monitor the workplace's noise levels.

It is important to take note of the regulation of generators and other applicable matters contained in the Health and Safety Regulations under the Labour Act to ensure that, where possible, rules by the ECB relating to similar matters do not conflict with those regulations. Some matters may also be sufficiently regulated in the Health and Safety Regulations and therefore a proposed regulatory framework by the ECB for supplementary generation can in such instances merely refer to the regulation contained in the Health and Safety Regulations. It must, however, be borne in mind that the application of the Health and Safety Regulations is in many instances limited to employers, employees and workplaces and may, for example, not cover a situation where a standby generator is installed on a residential property.

5.5 Petroleum Products and Energy Act, 1990, and Petroleum Product Regulations, 2000

The above mentioned regulations may be relevant for persons operating supplementary generation plant which is fuelled by petrol or diesel. In terms of the Petroleum Products Regulations a person may not without authority under those Regulations –

(a) store more than 200 litres of petrol and diesel in a local authority area;
(b) store more than 600 litres of petrol and diesel outside a local authority area.

Where a person wishes to have in his/her possession more fuel than the quantities specified above, such person can either obtain a consumer installation certificate under the Petroleum Products Regulations or can, in terms of regulation 3(2) thereof, apply to the Minister of Mines and Energy for permission to store more than those quantities.

5.6 Regional Electricity Distribution Companies' General Conditions of Supply

Subsequent to the establishment of REDs, each RED developed its own conditions of supply. The conditions of supply applicable to standby generation of Erongo RED and CENORED are provided below and are similar to those which appear in the Model Electricity Supply Regulations.

5.6.1 Erongo RED Conditions of Supply on Standby Supply

"29.1 Except with the written consent of Erongo RED and subject to the terms and conditions which Erongo RED determines, the Customer is not entitled to obtain from Erongo RED a connection for the purpose of a standby supply of electricity to any premises having a source of electricity supply other than that provided by Erongo RED.

29.2 The Customer may not, except with the written consent of Erongo RED, install or use a private generating plant on the Customer premises for the purpose of a standby supply of electricity.

29.3 Any generating plant which the Customer under Clause 29.2 above is permitted to install must be electrically and mechanically interlocked in a manner which prevents parallel connection to the supply main.

29.4 The Engineer must be notified of the first commissioning test and any subsequent test run to be carried out on a generating plant installed in terms of Clause 29.2 above, and may at any time require that a test run be carried out."

5.6.2 CENORED

CENORED has different contracts of supply for different categories of customers. We were provided with CENORED's standard of conditions of supply for Large Power Users (LPUs) and its standard conditions of supply for farmers. Articles 14.2, 14.2 and 14.11 of the standard conditions of supply for LPUs provide:

"14.2 The wiring or extension and alterations to wiring and installation and commissioning of associated machinery, apparatus and equipment may only be carried out by a contractor duly registered by Cenored or as approved by legislation.

14.3 The operation, maintenance and operating of the said machinery, apparatus and equipment shall be subject to the Safety Code.

14.11 Any equipment, apparatus or machinery installed for the generation, modification or injection of electricity shall be installed in such a way as to never endanger the safety of workers under any power supply condition and as approved by Cenored only."

In terms of article 14.4 CENORED has the power to inspect and approve the customer's plant, equipment and apparatus.

CENORED's conditions of supply for farmers contain no specific provisions on standby generation or small scale feed-in.

5.7 Namibian Electricity Safety Code

The Namibian Electricity Safety Code governs the minimum safety standards for the operating, maintenance, construction and installation of power systems in Namibia. The purpose of the Safety Code is threefold, namely, to ensure the safety of all persons, to safeguard apparatus and to provide continuity of supply. The Safety Code is an extension of the provisions of the Electricity Act, 2007, and the Labour Act, 2007 (with particular emphasis on the Health and Safety Regulations made thereunder), and all other applicable laws, and does not supersede, overrule or negate any provisions contained in the Electricity Act, the Labour Act or such other laws.

The Safety Code is, as yet, not applicable to the Namibians electricity industry. The Safety Code, once promulgated, will only enter into force and become compulsory on the second anniversary of the date of publication thereof in the

Government Gazette. The Code is clear that it applies only to licensees and will therefore not apply to supplementary generation where such supplementary generation is exempted from licensing requirements.

6 DISCUSSION OF NEEDS, REQUIREMENTS AND CONCERNS

As reflected in the first part of this Report, the analysis showed that there is a clear and definite need for standby-supply in Namibia for a variety of reasons as set out hereinbefore.

Small standby generators (up to approximately 50 kVA) and not connected to the grid, are the most common type of supplementary generation found in Namibia. As far as the Electricity Act is concerned, this type of generation is currently not controlled under that Act. Licensees exercise various forms of control over such generation usually contained in the Model Electricity Supply Regulations (in the event of the licensee being a local authority) or in conditions of supply (in the case of a RED). Where the licensee requires that its prior approval be given before the installation of supplementary generation, it is doubtful that this is being consistently complied with.

There appears to also be a degree of non-compliance with the current licensing requirements for generation under the Electricity Act. Supplementary generation, where supplied to 3rd parties (i.e. not for own consumption), is in many instances not licensed. It is doubtful whether such small supplementary generation activities (for example up to 50 kVA) should be licensed and therefore the requirements of the Electricity Act may need revision as regards its practicality and effectiveness. Consideration must therefore be given during the development of new rules as to the levels of exemption required to ensure that the regulator and licensees are not over-burdened but at the same time to disallow a proliferation of unregulated supplementary generation activities on a larger scale. Much concern was expressed in the comments received as regards the over-regulation of supplementary generation. This is well heeded since it is clear that there is already wide-spread non-compliance with the minimum regulation which currently exists. Extensive future regulation holds the risks of increased non-compliance by both users and licensees and discouraging the development of supplementary generation and the benefits they bring with them.

There appears to be wide-spread confusion and/or ignorance amongst users of supplementary generation as to what requirements are applicable to them (for example the grid connection requirements and technical requirements for supplementary generation). This is aggravated by the different requirements amongst different licensees. This problem can be resolved by means of information distribution processes by both the regulator as well as the relevant licensees as to the regulatory framework for supplementary regulation once it has been developed and approved.

Some of the most widespread problems and concerns expressed by licensees, supplementary generators and consumers in general are: noise control (both in residential and industrial areas), pollution control, environmental protection, endangering property and safety of life through the possibility of fire and explosions and fuel spillage control.

In general, licensees are not that concerned as regards standby generation not connected to the licensee's network (i.e. off-grid standby generation). In some (but not all) instances the licensee merely wishes to be aware of the extent of off-grid standby generation taking place in its licence area. For general safety reasons it is also important that such standby generation is done in compliance with the technical requirements and specifications laid down for the relevant equipment.[10] However, this scenario changes drastically once such supplementary generation has the potential to feed into the licensee's grid. In all instances, licensees require that their prior permission be obtained for supplementary generation equipment which has the capability to feed into the licensee's grid. Some licensees expressed the opinion that only qualified personnel should be allowed to install and maintain supplementary

[10] A comment was received from a licensee that additional generation technologies should be approved on national level and should not be left up to individual licensees. This proposal is in general not recommended for the following reasons: (a) there is already a proliferation of technologies in use in Namibia for some time since to date there has been no regulation on this; (b) this will require capacity and expertise within the relevant GRN institution (MME) or the regulator which does not exist; (c) this will unduly increase the regulatory and enforcement burden; (d) the problem can be addressed by means of a general stipulation in the Technical Rules that the technologies must be sound and safe; and (e) regulation thereof is already contained in the Health and Safety Regulations.

generation equipment in order to ensure the efficient functioning and safe operation thereof and that a certificate of compliance must be issued in this regard. There is currently a proliferation of different supplementary generation equipment in Namibia. It may therefore be almost impossible to regulate detailed standards and specifications for supplementary generation equipment. More detailed safety regulation may be included in codes such as the Safety Code, the Grid Codes and the technical standards. A general requirement that supplementary generation equipment must comply with the relevant standards and specifications of the manufacturer of the equipment and must, in general, be operated in a manner which is safe and efficient should suffice as part of the overall regulation on a national level. Licensees should be allowed the right to regulate such standards and specifications in more detail should they so wish. An issue which will require further consideration is the extent to which a regulatory framework should allow (or give the right to) persons to operate supplementary generation (i.e should licensees have the final say in such matters or should there be a statutory right to such supplementary generation irrespective of whether or not it feeds into a grid as long as certain stipulated requirements are met).

Where supplementary generation can feed into the licensee's system (i.e. on-grid standby generation and small scale in-feed generation), it is of utmost importance (a concern expressed by all licensees) that the supplementary generation must be electrically and mechanically sound and interlocked to prevent grid feed. Proper circuit breakers and earthing must also be installed and ensured to avoid faults. In this regard a licensee stated that it experienced problems with sub-standard change-over devices and lack of control over standby generation in its licence area.

In many instances the need for the development of a feed-in tariff system is mentioned in comments received. This includes clarity on the metering regime applicable to feed-in electricity even if the latter is only in the form of credit (i.e net metering). A regulatory framework for supplementary generation in the Technical Rules may not be the appropriate instrument by which to deal with feed-in tariffs and consideration is required to be given as to the extent of such tariff regulation and which instrument would be most appropriate for the inclusion thereof (for example the Economic Rules).

As mentioned previously, with regard to small scale feed-in there is no automatic right thereto as with off-grid standby generation. Comments received from such operators indicate demands that they have the right to this type of feed-in. In view of current electricity shortages, demand side management and promotion of renewable energy, it is in general supported that such right be granted (similar to that of standby supply) by means of the rules. In a similar vein such right should also address metering and a form of compensation – even if only net metering.

Consideration should be given as to whether customers with sizable standby generation capacity should be allowed to grid connect in the event of load shedding. Comments provided above on small scale feed-in apply *mutatis mutandis* to on-grid standby generation. In addition customers with a generation capacity exceeding a threshold stipulated in the rules should have the right to undertake on-grid standby generation in the event of load shedding.

Under the current Electricity Act, no matter how small standby supply, if it is not for own use such generation must be licensed. The ECB does not necessarily want to control this and it may be more feasible to allow the relevant licensee to control and regulate. Therefore it will be investigated whether there should not be exemptions by means of the rules (as authorised by regulation 43(1)(n)) and since ECB can make rules on same matters as Minister can make regulations.

Another issue with regard to which comments were received, is whether the operators of supplementary generation should be allowed to sell their electricity to third parties (not the grid operator). An example hereof would be a townhouse complex or business complex such as a mall which has standby generation and provides electricity in the event of electricity failure. This raises a number of questions, such as:

(a) whether in such instances there should be full licensing requirements and detailed tariff regulations similar to those applying to other licensees;
(b) whether there should be exemptions and de-regulation of tariff requirements (for example electricity may be sold to third parties under the conditions stipulated and sold at cost similar to resale of electricity);
(c) as regards conditions under which electricity may be sold, whether this should be limited to instances where electricity stays within an internal network (such as the internal network of the townhouse or business complex) and limited as to size (for example under 500 kVA).

The research showed that information on supplementary generation in licensed areas is not easily available and that licensees currently do not keep record of supplementary generation. Proposals will therefore be made in the proposed regulatory framework as to requirements on licensees to keep registers as regards supplementary generation in their licence areas. Although the ECB can also keep such information, it may be unduly burdensome on the ECB. Notwithstanding, the ECB should be allowed access to such information in the event where it is decided that licensees should keep records. The type of information which they will be required to keep requires further deliberation and consultation with licensees.

In conclusion, certain practical problems are also experienced by supplementary generators, for example lack of expertise within licensees as regards supplementary generation, delays in finalising agreements relating to supplementary generation, poor power factors on distribution networks, absence of equipment facilitating feed-in (i.e. metering equipment and specifically bi-directional meters) and lack of a regulatory environment by licensees. These may require consideration on a practical level and are not necessarily for inclusion in a future regulatory framework.

7 COMPARATIVE ANALYSIS

As per the Terms of Reference of the Consultant, a desktop study was undertaken to investigate the manner in which other jurisdictions deal with standby supply and on-grid standby generation. The comparative analysis covered South Africa, Australia and Tanzania.

7.1 South Africa

7.1.1 Introduction

With demand exceeding supply and looming load shedding, South Africa regards co-generation and standby generation as a mitigating factor in narrowing the gap between supply and demand.[11] Growing emphasis is thus placed on these types of generation with supporting legislation in the pipeline.[12] The process to procure co-generation supply has already begun in order to address South Africa's immediate need to release some capacity within its electricity system. This is regarded as a crucial short terms supply intervention.

Similar as in Namibia, standby generation is becoming increasingly popular to use in the event of power failures. There are also the typical similar concerns as regards safety issues, pollution, health hazards, mitigation of emissions, availability of fuel for generators, cost effectiveness, etc. Under the Occupational Health and Safety Act, 1993, connecting a generator to a home or business electrical power system must be carried out by a qualified electrician and the work must also be certified by an accredited person by means of a certificate of compliance. In general, where standby power generation is installed, precautions must be taken that the generator cannot operate in parallel with the mains supply unless the installation is approved by the supply authority.[13]

Feed-in to the national grid does create concerns about the safety of personnel working on lines which may be energised from both directions and there are also concerns about the quality of supply from small generators.

NERSA and the Department of Minerals and Energy are in the process of working on a tariff regime for co-generation which will be supported by legislation in the form of a Renewable Energy Feed In Tariff and Incentives Bill which is currently in draft format.

7.1.2 Occupational Health and Safety Act, 1993

The responsibility for the safe use and maintenance of electrical equipment (including generators) in homes and workplaces has been placed on the user of such electrical equipment in terms of the Occupational Health and Safety

[11] Eskom estimates that there could be up to 3 000 MW available from standby generators in South Africa.
[12] The supply shortages during the Western Cape winter of 2006 demonstrated that standby generators could be employed to good effect during peak demand periods, providing relief to the national grid supply.
[13] In this regard SANS 10142-1 applies.

Act. In March 2009, the Electrical Installation Regulations were issued under the Occupational Health and Safety Act. According to the Occupational Health and Safety Act:

"Any user of machinery shall –

(a) Ensure that all machinery used by him is suitable for the purpose for which it is used, and that it is installed, operated and maintained in such a manner as to prevent the exposure of persons to hazardous or potentially hazardous conditions or circumstances;
(b) In particular cause every exposed and dangerous part of the machinery, which is within the normal reach of a person to be effectively safeguarded by means of insulation, fencing, screening or guarding, except where an inspector has granted written permission for the omission of such safeguarding;
(c) Ensure that all safety equipment is kept in a good working condition and is properly used; and ensure that the quality of material used in; and the construction of the machinery or safety equipment is suitable for the purpose for which it was intended;
(d) Unless a person has been authorised thereto, no person shall remove any safety equipment, which relates to the machinery in question.
(e) Provide devices to start and stop machinery, and these devices shall –
    (i) Be in a position where they can readily and conveniently be reached by the person who operates such machinery; and
    (ii) Be so constructed and arranged as to prevent the accidental starting of such machinery.
(f) Provide positive means for rendering the controls of machinery driven by an electric motor inoperative while repairs or adjustments are being made, and such means shall not only be the mere tripping of a switch.

In terms of the South African Regulations issued under the Occupational Health and Safety Act, amongst others, where solar power is installed, the installation must be certified by the manufacturer and installer if the voltage exceeds 50 volts. There are also a number of regulations when connecting a portable generator to a building. Amongst others, the generator and mains supply must not run in parallel. A change-over switch must be installed. The supply cable from the generator must be protected electrically and mechanically. The earthing electrode configuration must be confirmed and the generator unit must comply with SANS/ ISO 8528. Finally, a certificate of compliance must be issued by an approved inspection authority.

7.1.3 Electricity Regulation Act, 2006

In terms of section 7(1) of the Electricity Regulation Act, a person may not without a licence operate any generation facility. In Schedule 2 to the Act, a generation plant constructed and operated for demonstration purposes only and not connected to an inter-connected power supply and generation plant constructed and operated for own use (irrespective of size) are exempted from the requirement to hold a licence. Provision is also made in section 8 for the Minister to, by notice in the Gazette, exempt activities from the licensing requirement.

7.1.4 Subordinate Electricity Legislation

South Africa is in the process of establishing REDs and for this purpose Standard Draft Electricity Supply Bylaws for REDs have been prepared. These draft bylaws address standby supply as follows:

(a) Definition of standby supply: "*standby supply means an alternative electricity supply not normally used by the customer*";
(b) Draft bylaw 38: "*No person shall be entitled to a standby supply of electricity from the Service Provider (i.e. RED) for any premises having a separate source of electricity supply except with the written consent of the Service Provider and subject to such terms and conditions as may be laid down by the Service Provider*".
(c) Draft bylaw 39:

"39.1 *No electricity generation equipment provided by a customer in terms of any Regulations or for his own operational requirements shall be connected to any installation without the prior written approval of the*

Service Provider. Application for such approval shall be made in writing and shall include a full specification of the equipment and a wiring diagram. The electricity generation equipment shall be so designed and installed that it is impossible for the Service Provider's supply mains to be energized by means of a back-feed from such equipment. The consumer shall be responsible for providing and installing all such protective equipment.

39.2 Where by special agreement with the Service Provider, the consumer's electricity generation equipment is permitted to be electrically coupled to, and run in parallel with the Service Provider's supply mains, the consumer shall be responsible for providing, installing and maintaining all the necessary synchronizing and protective equipment required for such safe parallel operation, to the satisfaction of the Service Provider. Under normal operating conditions, any export of surplus energy from the consumer to the Service Provider's network shall be subject to special agreement with the Service Provider. In the event of a general power failure on the service provider's network protection equipment shall be installed by the consumer, subject to the Service Provider's approval, so as to ensure that the consumer's installation is isolated from the Service Provider's network until normal operating conditions are restored. The cost of any specialized metering equipment will be for the consumer's account".

In summary, as regards supplementary generation in South Africa, the requirements are:

(a) If not for own use, the generating plant must be licensed (no exemption for smaller plants);
(b) The written consent of the relevant utility must be obtained for standby supply before equipment may be connected to an installation;
(c) The specifications of the equipment and a wiring diagram must be provided to the utility;
(d) A person may not energise the utility's supply mains by means of back-feed;
(e) Only by special agreement may supplementary generation by coupled to the utility's mains and in such instance the obligation is on the owner of the supplementary generation equipment to ensure that equipment complies with requirements;
(f) Export of surplus energy is also subject to a special agreement with the utility but no specific mention is made to tariffs or payment;
(g) Detailed technical requirements must be complied with under the Occupational Health and Safety Act.

7.1.5 The Renewable Energy Feed-In Tariff And Incentives Bill (the REFIT Bill)

Favourable feed-in tariffs, especially as regards renewable energy, stimulate interest in generation especially with regard to small and medium sized businesses. The Department of Minerals and Energy has set the target for renewable energy so generated at 10 000 GWh in 2013.

In the REFIT Bill, feed-in tariff is defined as: "meaning the schedule detailing the rates, and terms of service that is filed by an electrical corporation and approved by the Regulator that is applicable to the purchase of electricity, generated by a renewable electric generation facility, by the electrical corporation pursuant to this section". Net metering is defined as: "meaning the installation of small renewable systems at homes or businesses and linking these with the grid".

In terms of the Bill, transmission and distribution operators must as a priority connect facilities generating electricity from renewable energy sources to their systems and guarantee priority purchase and transmission of all electricity from renewable energy sources by such facilities. The purpose of the REFIT Bill is further to guarantee a fixed tariff over a fixed period of time to renewable energy generators. This Bill has not yet been put into operation.

7.1.6 Additional Legislation and Definitions

SANS 10142-1

Portable/standby generator means "a source of electrical power, typically diesel or petrol driven generator, that is used as back-up or an alternative to a grid supply".

NRS 000-2:2009

Defines co-generation as "a process whereby a customer generates electricity for personal use or resale".

Defines standby energy as "energy supplied to the embedded distributed generator or a customer in accordance with a standby agreement".

Defines standby generation as "provided by a customer for the purpose of complying with all or part of its electricity needs during times of an outage".

7.2 Conclusion on South African Analysis

The South Africa position is very similar to that of Namibia but is subject to more intensive regulation on technical and health and safety levels. Much progress has also been made as regards REFIT tariffs in South Africa. From a legislative and regulatory point of view, Namibia may be currently more advanced than South Africa in investigating the regulation of all supplementary generation by its electricity regulator. South Africa, with the introduction of REFIT, has made progress in supporting the development of smaller renewable energy projects but the REFIT has not as yet been implemented and the success thereof must still be shown.

7.3 Tanzania

7.3.1 Introduction

Electricity activities in Tanzania are regulated under the Electricity Act, 2008. The Tanzania Energy and Water Utilities Regulatory Authority (EWURA) was established by the Energy and Water Utilities Regulatory Authority Act (Act 11 of 2001).

EWURA is currently developing a regulatory framework for small power projects (SPPs) for the purposes of promoting the development of renewable resources in Tanzania. In this regard EWURA is developing, amongst others, a standardised small power purchase agreement and the standard small power purchase tariff. This will apply to renewable energy based projects and co-generation with exportable capacities of up to 10 MW.

7.3.2 Electricity Act

Electricity licences in Tanzania are issued by EWURA. Unless exempted, any person intending to generate electricity must obtain a generation licence. EWURA has a general power to exempt any person from licensing requirements which exemption may be provided specifically or generally. In addition, a person who undertakes generation activities in a rural area where the installed generation capacity is less than 1 MW is exempted from having to hold a generation licence. In terms of the Electricity EWURA has the right to approve agreements concluded between licensees and between licensees and their customers. The standardised power purchase agreement and tariffs for small power projects are exempted from this approval requirement. The Electricity Act does not contain any specific provisions customers operating standby generation.

Relevant definitions appearing in Tanzania's Electricity Act are quoted below:

Section 3 – Definition of "generation"	Generation means the production of electric energy and power from any primary source of energy.
Section 3 – Definition of "standardized small power purchase	Standardized Small Power Purchase Agreement (SPP) means the agreement between a utility entity and a developer entered for purposes of selling power to the grid not exceeding 10 MW but not less than 100 kW.

agreement	
Section 3 – Definition of "eligible customer"	Eligible customer means any person who is authorised by the Authority to enter into contract for the supply of electricity directly with any person licensed to generate electricity. Supply means the sale of electricity to consumers.
Section 3 – Definition of "standardized small power purchase tariff"	Standardized small power purchase tariff means the tariff agreed on in the Standardized Power Purchase Agreement.

7.3.3 Development of Small Power Projects – EWURA's Proposed Draft Rules and Guidelines

Under this project, EWURA has developed a standard SPP agreement (SPPA) and a standard SPP tariff (SPPT) for renewable energy based projects and co-generation. EWURA is now in the final stages of developing corresponding rules and guidelines to complete a simplified regulatory framework to support SPPs. The simplified regulatory framework aims at facilitating light handed regulation for SPPs. It is believed that the use of standardised documents holds many advantages including availability of the necessary consents within the minimum time possible, avoiding undue and lengthy negotiations, avoiding repeated requests for similar information by various authorities and effecting systematic and predictable decision making by respective officers in various government agencies. The initiatives are also believed to support the promotion of private sector participation in the power sector, renewable energies and increased access to electricity.

The project will provide the legal basis for entrepreneurs to participate in the development of SPPs based on clean renewable energy or co-generation generators and to export excess power (up to 10 MW) to the distribution network (either the national grid or mini-grids). In some cases, SPPs will complement existing diesel generation of mini-grids. Proposed draft rules and guidelines for the project were submitted for public comment in August 2010.

Relevant proposals contained in EWURA's proposed SPP Guidelines are summarised below:

(a) A utility entity is defined as a distribution network operator;
(b) SPP power may be sold to the grid or a mini-grid;
(c) An SPP means a power plant using a renewable energy source or waste heat or co-generation of heat and electricity with an export capacity of up to 10 MW;
(d) EWURA will follow a light-handed regulatory process for SPPs in order to increase investment and reduce cost;
(e) EWURA developed a standard SPPA which appears to be compulsory for SPPs and to be concluded as developed between the SPP and the grid operator. ERUWA has the power to exempt parties from provisions of the SPPA. The SPPA has the following features:
    (i) It is a must take contract – all energy produced by the SPP will be purchased by the distribution grid operator subject only to such necessary directions and protocols as may be issued by the operator for the protection of its electric system;
    (ii) The SPPT as announced by EWURA is based on the grid operator's avoided costs;
    (iii) The floor tariff over the term is 100% of the tariff in the year in which the SPPA is signed;
    (iv) The tariff is capped at 150% (Tanzanian CPI-adjusted) of the tariff in the year in which the SPPA is signed; and
    (v) The SPPA has a term of 15 years, starting from commencement date of operations;
    (vi) It contains grid interconnection requirements (specifying power quality standards, relay and other technical requirements for safe interconnection with grid);
    (vii) Also included are metering arrangements, billing and payment, limitation of liability and dispute resolution;
(f) The Guidelines contain most documents and forms required by the parties – for example a letter of intent from the grid operator, an application form for interconnection and sale of electricity, etc;

(g) SPPs are required to obtain an electricity licence under the Electricity Act unless exempted. SPPs generating less than 1 MW in rural areas are exempted but will still be required to register with EWURA to enable EWURA to get accurate information on its operations;
(h) Tariffs must be cost-based (i.e. based on own actual or projected costs plus a reasonable profit for the portion of electricity sold to retail customers if it sells electricity directly to the final retail customer and must be approved by EWURA. SPPs not selling directly to final customers are exempted from this requirement;
(i) Grid operators must establish an SPP Coordinating Unit to serve as single point of contact for SPPs in interacting with various divisions within the grid operator's organisation;
(j) Three additional documents form part of the General Guidelines, namely:
    (i) Part A: Guidelines for Grid Interconnection which contain mandatory requirements, test procedures and technical requirements;
    (ii) Part B: Containing further technical requirements;
    (iii) Part C: Appendix – Studies to be conducted, islanding and protection.

7.4 Conclusions on Tanzanian Analysis

It is clear that Tanzania, once the SPP project has been finalised and come into operation, will have detailed regulation of SPPs. Much assistance will be provided to these projects in the form of the applicable guidelines and prepared documentation (for example the SPPA). Except for the one exemption, it appears that most SPPs will be required to licence with EWURA. The law will also be prescriptive as regards the procedures to be followed by the SPP and the grid operator, the agreements they will be required to conclude and the tariffs to be applied. Another interesting feature is that the grid operator must allow SPPs and co-generation and must take all electricity produced by them. Although it will be proposed that Namibia does not adopt such a detailed regulatory framework as proposed by Tanzania, our supply industry would be able to benefit from the Tanzanian project when it comes to issues such as, amongst others, the development of tariffs, technical requirements and legal agreements to be concluded.

7.5 Australia

7.5.1 Introduction

There are a number of institutions involved in electricity regulation in Australia. For the purpose of this Report, a brief summary of the various institutions are provided below:

- ***Ministerial Council on Energy (MCE)*** – the national policy and governance body for the Australian energy market responsible for the national energy policy framework, governance and institutional arrangements and policy oversight;
- ***Australian Energy Market Commission (AEMC)*** – undertakes rule making and market development in the National Energy Market and is responsible for the administration and publication of the National Electricity Rules;
- ***Australian Energy Regulator (AER)*** – performs economic regulation of the wholesale electricity market and electricity transmission and distribution networks in the National Electricity Market and the enforcement of the National Electricity Laws and Rules;
- ***Electrical Regulatory Authorities Council (ERAC)*** – is the council responsible for the liaison between the technical and safety electrical regulatory authorities of the eight Australian States/Territories and New Zealand;
- ***Office of the Renewable Energy Regulator (ORER)*** – is a statutory authority established to oversee the implementation of the Government's mandatory renewable energy target.

7.5.2 Regulation of Supplementary Generation on State Level

Each Australian state/territory and New Zealand administers laws relating to electricity safety, supply and efficiency. These laws also create systems such as electrical licensing and equipment approval. As regards the laws applying on

state level with regard to standby generation, the state of Victoria is selected as example. In the state of Victoria, the Energy Safe Victoria (ESV) is the safety regulator responsible for electrical and gas safety. With regard to supplementary generation, the following requirements apply:

Standby Generation

A consumer may install a standby/emergency power supply arranged to operate on failure of the network operator's supply. Wiring must be arranged and controlled so that it is not possible for the standby supply to be connected to the network operator's distribution system. Where an installation has multiple alternative sources of supply incorporating either automatic and/or manual switching, appropriate warning labels shall be placed at the source and at the connection point informing operational staff of:

- the existence of each supply;
- type of supply;
- point of isolation;
- type of and location of the switching operation;
- the priority sequence for each supply.

Amongst others, standby generators must comply with the applicable standards also as regards installation, be mechanically and electrically isolated from the network operator's supply and be protected against weather, dampness, fire and over-current.

Embedded generators

Embedded power generation installations, including engine-driven, photovoltaic and wind generators intended for normally continuous connection to the external distribution network, must comply with the network operator's requirements and the connection agreement. Such installations must be designed by competent persons who are competent in electricity network engineering and the effects of embedded generation sources on the operation of a distribution network. The safety of employees working in the installation and on the distribution network must be protected. Consideration must be given to voltage control, power import and export limits, synchronising and islanding, metering, re-closing and fault levels.

All privately-owned generating installations connected to a network operator's distribution system must comply with all statutory and regulatory requirements, including the network operator's requirements and technical rules and the network operator's consumer connection agreement. A network operator may disconnect generating equipment from its distribution system if the continued operation of the equipment is dangerous to the network operator's staff or representatives or if the continued operation of the equipment is dangerous to the integrity of the network operator's distribution system. All installations must comply with all safety-related Australian standards and other statutory requirements.

Connecting Embedded Generation to the Network

The relevant utility to whose network the installer (proponent) of embedded generation wishes to connect determines the requirements for such connection. As an example, the guidelines issued in this regard by ETSA Utilities[14] have been investigated. In terms of these guidelines, the proponent of any small-embedded generation installation must advise ETSA Utilities of all proposed installations where it contemplates the connection of a small-embedded generating unit to the distribution network. Negotiations with ETSA Utilities for the possible connection of an embedded generating unit must precede any detailed design, placement of the Small Embedded Generation Network Connection Revision D - 5 March 2010 orders for equipment and letting of contracts to avoid costs to the

[14] ETSA Utilities operates the distribution network in South Australia.

proponent arising from designs or equipment identified by ETSA Utilities to be unsuitable for connection to the distribution network. ETSA Utilities undertakes all necessary investigations to confirm that the proposed connection of an embedded generating unit to the distribution network will not have any adverse impact on the safety and security of the network. A formal request for connection to the distribution network must be lodged together with the stipulated attached information. Provided the applicant complies with requirements, the proponent is then registered in the Small-Embedded Generation Installation Register of ESTA.

Before connecting the small-embedded generating unit to the distribution network, the Proponent must submit an application to its relevant electricity retailer[15] to have the appropriate import / export metering installed at the site of the small-embedded generating unit installation. An embedded generator must maintain and operate all small-embedded generation installations in accordance with:

- Applicable Regulations and relevant laws;
- Essential Services Commission of South Australia (ESCOSA) Codes (Electricity Distribution, Metering, Retail, etc);
- Electricity Act of South Australia and Technical Regulations;
- Requirements of ESTA's Guideline;
- Good electricity industry practice and applicable Australian Standards; and
- Small Embedded Generator Connection Agreement.

In particular the Proponent / Embedded Generator must:

- submit an application to connect in respect of new or altered equipment owned, operated or controlled by it;
- enter into an approved network connection agreement with ETSA Utilities in accordance with the requirements of Electricity Distribution Code and the Guideline prior to that equipment being connected to the distribution network or altered (as the case may be);
- comply with the reasonable requirements of ETSA Utilities in respect of design requirements of equipment proposed to be connected to the distribution network;
- permit and participate in reasonable inspection and testing of facilities and equipment;
- permit and participate in reasonable commissioning of facilities and equipment which is to be connected to the distribution network for the first time;
- operate facilities and equipment in accordance with any reasonable direction given by ETSA Utilities;
- give notice in writing of intended voluntary disconnection; and
- arrange through its nominated retailer for the installation of import / export metering in compliance with the relevant code.

There are a number of requirements with which the embedded generator must comply, namely:

- maintain the electrical installation in a safe condition;
- ensure that the small-embedded generating unit is inspected and maintained in accordance with the manufacturer's instructions;
- ensure that any changes to the electrical installation at the supply address are performed by an electrician lawfully permitted to do the work and that the customer keeps a certificate of compliance issued in respect of any of the changes;
- ensure that the electrical installation at the supply address, including the small embedded generation installation, complies at all times with the requirements in the connection agreement;
- ensure the protection of ETSA Utilities equipment located at the supply address;
- ensure that any structures and vehicles are kept clear of ETSA Utilities equipment;
- seek approval prior to altering the small-embedded generation installation capacity or inverter;
- provide information to ETSA Utilities, on request;

[15] In Australia, the network operator and retail supplier are usually separated and are different entities.

- ensure that the customer's employees, servants or agents who carry out any electrical maintenance function on the small-embedded generation installation or any other part of the customer's electrical equipment are appropriately qualified and licensed to perform such work;
- comply with all legislation, codes, rules or other regulatory instruments;
- ensure that a notice of alteration form is forwarded to ETSA Utilities or from the customer's electrician when the customer changes the electricity supply requirements by installing additional electrical appliances or equipment of capacity 2.5 kW or greater;
- seek approval prior to installing any additional appliances or equipment of capacity 5kW or greater, so that ETSA Utilities can assess the ability of the network and the customer connection to the network to meet the additional requirements and advise the customer if additional work is required and the associated cost (if any).

Metering that measures both import and export energy is a requirement for all grid connected inverter installations (small-embedded generation) under the electricity regulations. The Embedded Generator must pay the costs of the supply and installation of import / export metering and arrange the metering via its Retailer. Approval from ETSA Utilities to connect a small-embedded generating unit to the distribution network is only an acknowledgement that the small-embedded generating unit is suitable to be connected to the distribution network at the location requested at the time of the application. Small-Embedded Generators are eligible to receive payments, credits or other forms of entitlements from Government or Retailer sponsored energy feed-in rebate schemes.

Australia's Renewable Energy Target Scheme

The Renewable Energy Target Scheme was established to encourage supplementary generation from renewable energy sources to meet the Australian Government's commitment to achieve a 20% share of renewable in the Australia electricity supply by 2020. The scheme falls under the Office of the Renewable Energy Regulator (ORER). The Renewable Energy Target scheme provides renewable energy power stations and owners of solar water heater and small generation unit installations with a financial incentive through the creation and trade of renewable energy certificates (RECs) via the Renewable Energy Certificate Registry. Each such certificate from an eligible source can be sold for a negotiated price and transferred to liable parties (usually wholesaler purchasers of electricity) in a market based online system called the REC Registry. From January 2011 the enhanced Renewable Energy Target will be split into two parts namely the large-scale renewable energy target (LRET) and the small-scale renewable energy target (SRES). The ORER is currently putting regulations and administrative procedures in place for the LRET and the SRES.

RECs are electronically transferred between account holders listed in the REC registry. These transactions are reported automatically to the Regulatory. The process is market driven with the price of RECs determined by supply and demand. The REC price is not regulated by the ORER. Owners of solar water heaters and small generation units can either:

- Assign their RECs to an agent in exchange for financial benefit which could be in the form of a delayed cash payment or upfront discount; or
- Become registered in the online REC Registry and create RECs. Once registered these RECs can then be sold and transferred to a registered agent at any time during the life of the scheme.

The registered agents bundle RECs from owners of solar water heaters and small generation units to sell and transfer in the REC Registry and eventually on-sell to liable parties.

7.6 Conclusions on Australian Analysis

Australia possesses a sophisticated and well-developed electricity regulatory environment on both national and federal level. Although there is a right to supplementary generation, all Australian states require operators of supplementary generators to comply with numerous regulatory instruments as regards standards and safety of equipment. Where electrical equipment, such as generators, has been designated the importers of such equipment must also ensure that equipment complies with applicable standards. An important feature of the Australian

electricity market is that the distribution network operator and the electricity supplier (i.e. retailer) are separate entities. A network operator must accept small scale in-feed and co-generation (embedded generation) subject to the applicable legislation, rules and connection agreements. However, the operators of such embedded generators must separately negotiate with retailers for the acceptance of their electricity supply. With the establishment of the Australian Renewable Energy Target Scheme, electricity wholesalers are liable to obtain electricity from renewable energy sources including small scale renewable and solar water heater projects. This provides substantive incentives for operators of such projects. Although many aspects of the more detailed regulation of supplementary generation in Australia fall outside the scope of this project, Namibian stakeholders (i.e. utilities and supplementary generators) stand to benefit work done in this regard in Australia.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This section contains the conclusions reached in view of the research undertaken, comments received on the questionnaires and the comparative legal analysis. Certain recommendations are made in view of such conclusions. This section of the Report contains a narrative explanation on recommendations made. In the next section, a diagram (mind map) is provided to visually set out the proposed regulatory framework.

8.2 Creation of a Regulatory Framework

The conclusion is reached that a regulatory framework is required for supplementary generation in Namibia. There is a general lack of uniformity amongst licensees in dealing with supplementary generation with different licensees exercising different levels of control. This renders it important to establish a well-defined but sufficiently flexible legal framework within which supplementary generation operators can operate and which efficiently regulates supplementary generation in Namibia. Such framework should further –

(a) ensure the integrity of the overall regulatory framework and application of the Electricity Act;
(b) provide licensees with an environment within which they can maintain their rights and obligations in a manner which is consistent and efficient as regard their control exercised over supplementary generation.

The proposed regulatory framework for supplementary generation must aim at curbing the current non-compliance with requirements under the Electricity Act and as laid down by licensees. It must further ensure a comprehensive (while at the same time avoiding burdensome over-regulation) regulation of supplementary generation on national level. The framework should further provide licensees with sufficient powers/control to allow self-regulation by them in their licence areas. In such newly developed regulatory environment the role and oversight of the regulator must also be clearly defined.

It is recommended that a regulatory framework for supplementary generation be included in the Technical Rules in order to ensure that they appear in an appropriate and enforceable legal instrument and to avoid the proliferation of additional legal instruments. Where financial and/or economic issues are involved (for example selling of electricity derived from supplementary generation to 3rd parties) such would be contained in the Economic Rules.

8.3 Exemptions

To require operators of all supplementary generation to be licensed with the ECB in accordance with the Electricity Act may overburden the regulator and create barriers in, amongst others, the development of electricity access and small renewable energy projects. It is concluded that the current exemptions appearing in section 18 of the Electricity Act are in need of expansion and the recommendation in this regard is that the ECB, by means of rules, prescribe further general exemptions. In this regard consideration will be given for the following exemptions:

(a) A level higher than 500 kVA (or for all irrespective of level of generation) for standby generation for own use under specified circumstances;
(b) Exemption even if not for own consumption where below 500 kVA (or meeting other suitable criteria) but electricity distribution is contained within a closed system (for example townhouse and business complexes);

(c) Specified smaller renewable energy in-feed projects.

It is believed that such exemptions will not only relieve the ECB's regulatory burden but will ultimately promote standby generation and smaller renewable energy and other projects. This will increase investment in the electricity sector and increase national electricity supply and access to electricity. Notwithstanding the exemption from the licensing requirement, such operators will be subject to the regulatory framework to be contained in the Technical Rules and will therefore not go unregulated.

8.4 Statutory Rights to Supplementary Generation

Whether or not a person has a right to supplementary generation is currently inconsistently applied in Namibia. Local authorities in general require that their permission first be obtained for standby and other generation. REDs do not usually require their permission for standby generation – permission is only required where there will be in-feed into the system. For the reasons set out in the Report it is recommended that –

(a) A statutory right to off-grid standby generation be granted in the Rules with notification to the relevant licensee for information purposes;
(b) A statutory right to on-grid standby generation and small scale in-feed be provided, subject thereto that the relevant licensee's requirements are met as well as a few other technical specifications. This means that where a person meets those requirements, the licensee must accept the on-grid standby generation and/or small scale in-feed.

An approach as set out above will promote the policy objectives of reducing electricity imports as well as increasing supply from renewable sources and increased electricity access (subject to certain requirements, standards and specifications being met). In the instances of paragraph (b) above, the parties will also be expected to enter into written agreements.

8.5 Approach of Predominantly Self-Regulation by Licensees

Consideration should be given as to whether licensees should be encouraged or obligated to create both a physical as well as a regulatory environment which accommodates supplementary generation – for example, licensees will be required to establish rules, standards, specifications, etc and to install the necessary equipment and meters (the cost hereof mainly to be borne by the customer and not the licensee)for feed-in. This will involve a predominantly self-regulatory approach between licensees and supplementary generation operators subject to broad principles and guidelines set by the ECB. The benefits of this approach include minimising the ECB's regulatory burden, allowing for flexibility and granting the licensees and operators the opportunity to take ownership of supplementary generation within their respective areas.

Rules by the ECB on supplementary generation will thus grant licensees the necessary powers to ensure more uniform and detailed regulation of supplementary generation in order to augment the provisions in the Technical Rules. Specifically licensees themselves should be allowed to specify the technical requirements, standards and specification of plant used in supplementary generation. Although with sufficient flexibility, licensees will be under an obligation to create a physical and regulatory environment accommodating supplementary generation and specifically on-grid standby generation and small scale feed-in. Our comparative research has shown that much progress has been made in this regard in other comparable jurisdictions and the ECB and licensees can benefit from those systems and lessons learned. They will thus not find themselves in uncharted territory.

8.6 Technical Matters to be Addressed in Framework

The proposed rules on supplementary generation will address the respective rights and obligations of licensees and operators of supplementary generation. Although much of the detail will be left to the licensees themselves, the rules will contain general directives in this regard.

It is important that the relevant expressions involved be well defined in order to ensure clarity as to the application of the rules. Distinction will therefore be made between the different types of supplementary generation – in

addition to the distinctions created in the definitions of expressions and clearly indicate the different requirements applicable to them.

General obligations applicable to supplementary generation operators will be to ensure their equipment complies with existing requirements as contained in references laws and other legislative instruments (for example petroleum regulations, labour regulations, grid codes, etc). Additional general obligations will be placed on operators to ensure that their equipment does not cause noise, safety, health, fire, etc hazards. In addition, licensees will be granted the right/obligation to develop requirements to augment existing laws as regards these issues and as regards standards and specifications. As mentioned previously in this Report, the Namibian Electricity Safety Code will not apply to supplementary generation where such generation is exempted from licensing requirements since the Safety Code predominantly applies only to licensees. Consideration will therefore be given to allow licensees to make appropriate parts of the Safety Code applicable to supplementary generation in their licence areas.

8.7 Tariffs Involved in Supplementary Generation

Some form of monetary recognition must be provided for feed-in whether by means of feed-in tariffs or set-off against electricity supplied by the licensee versus electricity fed into the system by the supplementary generator. If deemed not immediately possible, licensees should, at least, be encouraged to develop a system of recognition and/or compensation for supplementary generation feed-in as well as a metering system for such feed-in. Consideration should also be given as to whether licensee should be under statutory obligation to create metering system to measure feed-in. However, these should be contained in the Economic Rules and with a cross reference in the Technical Rules.

The extent to which the ECB will regulate such tariffs will require addressing. Where supplementary generation is licensed (i.e. it does not fall within one of the exemptions) tariffs should be fully regulated. A more informal approach towards exempted supplementary generation is proposed – i.e. guidelines will be developed for licensees as regards applicable feed-in tariffs for the interim until such time as a detailed methodology has been developed by the ECB. As regards the sale of electricity to 3rd parties by supplementary generation operators, again a simplified system would be preferable similar to the one proposed for the resale of electricity (i.e. at cost).

8.8 Requirements to Keep Information and Registers

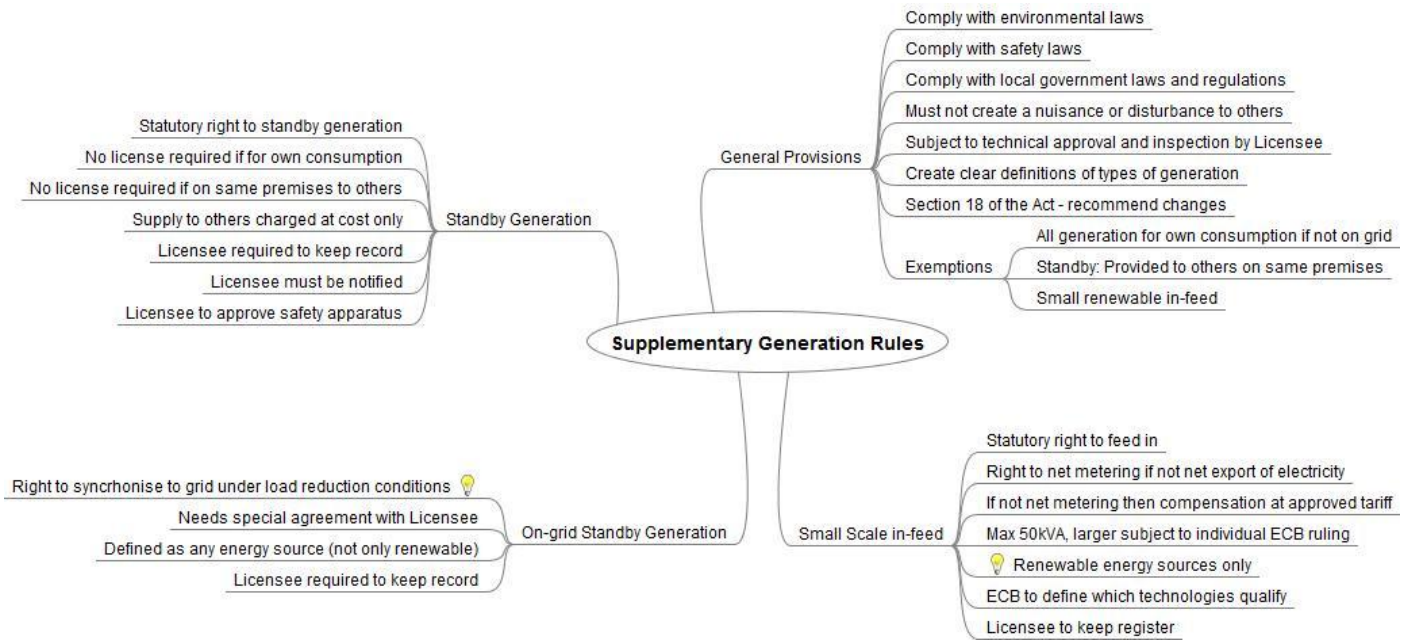
Licensees should also be obligated to keep some form or record of all supplementary generation with regard to which their interaction is required. This information should be made available to the ECB upon request. The rules will specify the minimum information to be kept by licensees.

8.9 Information Distribution

There is a need for information distribution to consumers as to the requirements laid down by the regulator, the laws and the relevant licensees as regards supplementary generation. Licensees must be placed under an obligation to clarify their technical requirements and grid connection requirements with their customers and especially with operators of supplementary generation. Once rules are in place, it is recommended that the ECB, through the media, inform the public of the new requirements.

9 PROPOSED REGULATORY FRAMEWORK FOR RULES ON STANDBY GENERATION

In the diagram below a schematic presentation of the proposed regulatory framework is provided with a distinction being made between the different types of supplementary generation identified in this Report. In addition to the general requirements which will be applicable to all categories of supplementary generation, each specific category will have its own specific rules. The framework provided in the diagram depicts the narrative discussion thereof as contained in section 8 of this Report.


Supplementary Generation Rules
General Provisions
Comply with environmental laws
Comply with safety laws
Comply with local government laws and regulations
Must not create a nuisance or disturbance to others
Subject to technical approval and inspection by Licensee
Create clear definitions of types of generation
Section 18 of the Act - recommend changes
Exemptions
All generation for own consumption if not on grid
Standby: Provided to others on same premises
Small renewable in-feed
Standby Generation
Statutory right to standby generation
No license required if for own consumption
No license required if on same premises to others
Supply to others charged at cost only
Licensee required to keep record
Licensee must be notified
Licensee to approve safety apparatus
On-grid Standby Generation
Right to syncrhonise to grid under load reduction conditions
Needs special agreement with Licensee
Defined as any energy source (not only renewable)
Licensee required to keep record
Small Scale in-feed
Statutory right to feed in
Right to net metering if not net export of electricity
If not net metering then compensation at approved tariff
Max 50kVA, larger subject to individual ECB ruling
Renewable energy sources only
ECB to define which technologies qualify
Licensee to keep register