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REGULATIONS FOR MINI-GRIDS

TEMPLATE



INTRODUCTION TO THE REGULATIONS FOR MINI-GRIDS TEMPLATE

Notes:

As introduced in the Clean Energy Mini-Grid Policy Development Guide, the following Regulations for Mini-Grids template has been created for the purpose of providing countries with a standardized document to decrease transaction costs for policy-makers and accelerate private sector investment in the rural electrification effort.

Instructions:

To adjust the General Regulations for Mini-Grids to a specific context:

- For each article, please fill in the blank space according to the associated instruction (*as specified in brackets*).
- Adjust the text and any appendices to the country-specific context.
- Add further country-specific forms like Customer Contracts, Community Contracts, etc. as appendices.
- Add any additional article related to a specific context.

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ACRONYMS

ABC	Aerial Bundled Conductors
BST	Bulk Supply Tariff
CAPEX	Capital Expenditure
DSM	Demand Side Management
EIA	Environmental Impact Assessment
EPC	Engineering-Procurement-Construction
FIT	Feed-In-Tariff
HZ	Hertz
ICS	Interconnected system
IEC	International Electro-technical Commission
ISO	International Standards Organisation
kV	Kilo-Volt
kWp	Kilowatt-peak
kWh	Kilowatt-hour
LF	Low Frequency
LV	Low Voltage
MV	Medium Voltage
MW	Megawatt
MWh	Megawatt-hour
O&M	Operations and Maintenance
PPA	Power Purchase Agreement
PV	Photo Voltaic
RE	Renewable Energy
REFIT	Renewable Energy Feed-In-Tariff
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
V	Volt

This Regulation is issued by (*Corresponding Authority*), to vest in the (*Article Num.*), of the..... (*Corresponding Electricity Act*).

It has been hereby arranged as follows:

1.) PRELIMINARIES

1.1 SHORT TITLE

This Regulation may be cited as the..... (*Name of the Mini-Grid Regulation*).

1.2 OBJECTIVE AND APPLICATION OF THIS DIRECTIVE

This Regulation is issued to further clarify Mini-Grid specific licensing procedures, technical standards, quality of service, tariff regulations and related issues pursuant to (*applicable law/Act*).

1.3 COMMENCEMENT

This Regulation shall come into force on the (*approved date*). This Regulation shall be signed by (*Conceding authority*).

1.4 DEFINITIONS AND INTERPRETATION

In this Regulation, unless the context otherwise requires or is acknowledged:

“**Act**” means the (*applicable law/Act*);

“**Authority**” means the (*Conceding regulatory authority*);

“**Applicant**” means an applicant for a Simplified Licence, Full Licence, or Interconnected Mini-Grid Licence under these Regulations;

“**Community**” means a group of people within the same geographic location organized under a local leadership structure or a legally recognised corporate entity and in both cases capable of entering into contracts and being capable of suing and being sued;

“**Connected Community**” means Community connected to the distribution network of a Distribution Network Operator;

“**Connection**” means the electrical equipment and materials, including transformers, switchgear, switch or relay that allow the transfer of electricity between the distribution system and an electrical system at the point of interconnection, but do not form part of the transmission or distribution system;

“**Connection Point**” means an entry or an exit point on a Distribution Network;

“**Customer Contract**” means an agreement between the Mini-Grid Licensee and customer, consisting of standard terms of connection including the terms of service, service level, consequences of not meeting service level, and applicable tariffs, mode of billing and rights and responsibilities of the parties;

“**Community Contract**” means an agreement between the Mini-Grid Licensee and the Community consisting of terms related to rights of way, usage of community land, general provisions of serving electricity to the Community and such other matters as the Authority may prescribe;

“**Distributed Power**” means the active electric power fed into a local Distribution Network on average within any 15 minutes time interval of its operation period;

“**Distribution Network**” means any connection of cables, service lines and overhead lines, electrical apparatus/equipment and having design voltage of 33kV and below used to transport electric power on a distribution system;

“**Distribution Network Operator**” means the holder of a distribution license and who operates a Distribution Network connected to the transmission system operated by the holder of a system operation license;

“**Exclusivity Agreement**” means an exclusivity agreement executed between the Community and the Mini-Grid Developer granting exclusivity for period of 12 months for a specific site to develop a Mini-Grid at such aforementioned site;

“**Feeder**” means a low voltage or medium voltage line of a Distribution Network being capable of supplying or absorbing at least 30 kVA of electricity in compliance with the..... (*National applicable Grid Code*);

“**Full Licence**” means a licence described in Section 3.2 of this Regulation granted by the Authority to a Mini-Grid Developer;

“**Generation**” means the production of electricity to be fed into a Distribution Network or supplied to the consumer directly;

“**Generation Capacity**” means the guaranteed active power that a generation plant can supply to a load or network at any point in time under the given environmental constraints (temperature, humidity, etc.) and a power factor of 0.8 (inductive) for at least one hour under the assumption that the plant is well maintained and fully functional;

“**Interconnected Mini-Grid**”: means a Mini-Grid which is connected to a Distribution Network Operator’s network;

“**Interconnected Mini-grid License**” means a licence described in Section 3.3 of this Regulation granted by the Authority to a Mini-Grid Developer;

“**Isolated Mini-Grid**”: means a Mini-Grid which is not connected to any **other** Distribution Network Operator’s network;

“**Letter of Intent (“LoI”)**” means a letter or document signed and executed by two or more parties which specifies the intention of the involved parties to engage in a specific project with specific roles of the parties;

“**Licence**” means a Licence granted by the Authority under this Regulation;

“**Main-grid**” means the national transmission and distribution network;

“**Mini-Grid**” means any electricity supply system with its own power Generation Capacity, supplying electricity to more than one customer and which can operate in isolation from or be connected to a Distribution Licensee’s network. Within this Regulation, the term Mini-Grid is used for any Isolated or interconnected Mini-Grid generating between 0 kW and 5 MW of Generation Capacity;

“**Mini-Grid Developer**” means any entity legally established or recognised under national law which has applied for a Licence by the Authority to develop, install, and operate a Mini-Grid;

“**Mini-Grid Licensee**” means a Mini-Grid Operator that holds a Licence issued by the Authority under this Regulation;

“**Person**” means and includes an individual, a company, a partnership or any association of individuals, whether incorporated or not;

“**Simplified Licence**” means a licence described in Section 3.1 of this Regulation, granted by the Authority to a Mini-Grid Developer;

“**Technical Codes and Standards**” means and includes (*add titles of applicable Grid Code, Metering Code, Technical Code, etc.*) and any other codes or standards approved and enforced by the (*Name of authority*) for the technical regulation of the electricity supply industry;

“**Tripartite Agreement**” means the agreement between a Mini-Grid Developer, Distribution Network Operator, and Connected Community which shall be as agreed between the parties or in the form as may be specified by the Authority;

“**Underserved Area**” means an area within a Distribution Network Operators’ network with an existing but poorly supplied or non-functional distribution system;

“**Unserved Area**” means an area without an existing distribution system otherwise called off-grid.

“**Working Days**” means business days not including Saturdays (*delete if this is a working day in the country*), Sundays and any other national or public holidays, as the case may be.

(1) Unless otherwise specified, in this Regulation:

- a) Words importing any one gender includes the other gender and the singular includes the plural and vice versa;
- b) Words or expressions used in this Regulation, but not defined, shall have the same meanings respectively assigned to them in the (*applicable law/Act*);
- c) Any reference to a statute or statutory provision includes a reference to that provision as amended, re-enacted or replaced and any regulations or orders made under such provisions from time to time; and
- d) If the date on which an event is scheduled to occur by this Regulation is a day which is not a Working Day, then the event shall be deemed to occur on the next Working Day.

2.) EXCLUSIVITY PERIOD AND SITE RESERVATION FOR PROJECT DEVELOPMENT

- (1) The Community may grant to the Mini-Grid Developer exclusivity for the development of a Mini-Grid project within their Community for a period of up to 12 months by execution of an Exclusivity Agreement between the Mini-Grid Developer and the Community.
- (2) An Exclusivity Agreement shall only become valid upon confirmation by the Authority that it received the Exclusivity Agreement and that the Community is not part of any 5 year network extension plan of the Main-grid operator (*using the online portal*).
- (3) The Authority shall confirm receipt of the Exclusivity Agreement within one Working Day following receipt of the Exclusivity Agreement (*by automatically generated email*) stating the date and time of receipt, and shall confirm the status of the site in relation to any 5 year network extension plans of the Main-grid operator within 10 days following receipt.
- (4) Any Exclusivity Agreement with a duration of more than 12 months or an extension of an existing Exclusivity Agreement beyond 12 months shall require the approval of the Authority to become valid.
- (5) The Community, before signing the Exclusivity Agreement, and the Authority, before providing approval for an Exclusivity Agreement with a term of more than 12 months or an extension thereof, may ask the Mini-Grid Developer to provide any proof of its commitment (e.g. Letter of Intent (“LOI”) from investors, endorsement letter from the State Government, and other such letters or documents as deemed necessary).
- (6) The Community shall not sign any other Exclusivity Agreement, and the Authority shall not grant a Licence to any other Mini-Grid Developer for a certain site, where a valid Exclusivity Agreement in respect of that site with another Mini-Grid Developer exists and remains operational.

3.) TYPES OF LICENCE

3.1 SIMPLIFIED LICENCE FOR AN INDIVIDUAL ISOLATED MINI-GRID OR A PORTFOLIO OF ISOLATED MINI-GRIDS WITH A DISTRIBUTED POWER OF UP TO 100 KW EACH

- (1) A Mini-Grid Developer may apply for a Simplified Licence for a single Mini-Grid or a portfolio of Mini-Grids with a total Distributed Power of up to 100 kW that grants the right for the construction, operation and commercial exploitation of Mini-Grid(s) and to generate, distribute and sell electric energy within the geographic area as stated in the Simplified License.
- (2) Tariffs under the Simplified Licence shall be calculated by the Mini-Grid Developer applying the tariff scheme as outlined in Section 6 but do not require any tariff approval by the Authority.
- (3) Under the Simplified Licence, the Mini-Grid Developer cannot enforce a compensation by the Main-grid operator in case of the Main-grid connecting to the Mini-Grid as outlined in Section 15.

3.2 FULL LICENCE FOR AN INDIVIDUAL ISOLATED MINI-GRID OR A PORTFOLIO OF ISOLATED MINI-GRIDS WITH A DISTRIBUTED POWER UP TO 5 MW

- (1) A Mini-Grid Developer shall apply for a Full Licence of a single Mini-Grid or a portfolio of Mini-Grids with a total Distributed Power of more than 100 kW and up to 5 MW that grants the right for the construction, operation and commercial exploitation of Mini-Grid(s) and to generate, distribute and sell electric energy within the geographic area as stated in the Full Licence.
- (2) Tariffs under the Full Licence shall be calculated by the Mini-Grid Licensee applying the tariff scheme as outlined in Section 6 and require approval by the Authority.
- (3) Under the Full Licence, the Mini-Grid Licensee can enforce a compensation by the Main-grid operator in case of the Main-grid connecting to the Mini-Grid as outlined in Section 5.
- (4) Mini-Grid Developers with Mini-Grids up to 100 kW may decide to voluntarily apply for a Full Licence instead of a Simplified Licence.

3.3 LICENCE FOR AN INDIVIDUAL INTERCONNECTED MINI-GRID OR A PORTFOLIO OF INTERCONNECTED MINI-GRIDS WITHIN ONE MAIN-GRID OPERATOR'S LICENSING AREA, WITH A GENERATION CAPACITY OF UP TO 5 MW.

- (1) A Mini-grid Developer shall apply for an Interconnected Mini-Grid License of a single Interconnected Mini-Grid or a portfolio of Interconnected Mini-Grids which are located within a Main-grid operator's licensing area and for which a Tripartite Contract has been signed, and that grants the right to generate, distribute and sell electrical energy within the geographic area as stated in the Interconnected Mini-Grid License, the purchase of electrical energy from the Main-grid operator and the injection of electrical energy to the Main-grid together with sales of electrical energy to the Main-grid operator and allows the construction, operation, and commercial exploitation of the Mini-Grid.
- (2) Tariffs under the Interconnected Mini-Grid Licence shall be calculated by the Mini-Grid Developer applying the tariff scheme as outlined in Section 6 and require approval by the Authority.

3.4 LICENSING OF MINI-GRIDS DEVELOPED PRIOR TO THE INTRODUCTION OF REGULATION

- (1) Any Mini-Grids developed and in operation prior to the coming into force of this Regulation would be required to make an application for a license under Section 3.1, or Section 3.2 or Section 3.3 as the case may be within a period of 6 months of the coming into force of this Regulation.

4.) LICENCE APPLICATION PROCEDURE

4.1 SUBMISSION OF AN APPLICATION FOR A LICENSE

- (1) Applicant shall fill and submit the (*online*) application form signed by a principal officer of the Applicant to the Authority.
- (2) Any application for a Licence shall be accompanied by the following documents as attachments (*to be uploaded through the online platform*)
 - a. Certificate of incorporation;
 - b. A company profile also introducing the key personnel of the company related to the Mini-Grid;
 - c. A valid tax clearance certificate;
 - d. Operations and Management plan for the Mini-Grid project;
 - e. Filled Tariff calculation tool with all entries substantiated by references and evidence, where applicable;
 - f. Proof that the Licence application fee has been paid;
 - g. Draft Customer Agreement;
 - h. Roll-out and construction plan;
 - i. Debt and equity contribution, sources of funding and loan agreement, if any.
- (3) Any Application for a Licence shall also be accompanied by a set of documents as attachments for each Mini-Grid under the Application respectively:
 - a. Accurate and geo-referenced geographical depiction of the Mini-Grid distribution network, which also indicates the location and dimensions of the power station plot;
 - b. Technical and feasibility study which provides a qualified demand forecast for the electricity demand outlining different customer groups of the village as applicable, assessing the demand of electrical energy within the Mini-Grid catchment area, system dimensioning calculations, and climate data analysis;
 - c. A technical specification of the facility which outlines the design of generation assets, distribution network layout and quality of the Mini-Grid system components as well as their interrelations;
 - d. Environmental and social impact certificate as issued by the environmental authority in charge;
 - e. Land lease or property certificate;
 - f. Land use and land planning permit from relevant Regional or Local Administration, where applicable;
 - g. Right of way certificate, where applicable;
 - h. Community Contract, where applicable;
 - i. Tripartite Agreement, where applicable.

4.2 CAPACITY OF APPLICANT TO INSTALL MINI-GRIDS

- (1) If the Applicant plans to install and construct new generation and/or distribution infrastructure the Applicant shall indicate in its roll-out and construction plan whether the Applicant intends to construct this infrastructure itself or by engaging the services of an EPC contractor.

- (2) An Applicant shall at the request of the Authority provide evidence of its capability to construct the facility as described in the roll-out and construction plan.
- (3) Where the Applicant will employ the EPC services of a contractor to setup the Mini-Grid, the Applicant shall upon written request furnish the Authority with the written testimony of at least 2 clients attesting to the fact that the proposed contractor has provided such services and a draft EPC contract, if requested.

4.3 CAPACITY OF APPLICANT TO OPERATE MINI-GRIDS

- (1) An Applicant shall indicate in its Operations and Management Plan whether the Applicant intends operating the plant itself or engaging the services of an operation and maintenance contractor.
- (2) An Applicant shall at the request of the Authority provide evidence of its capability to operate the Mini-Grid in relation of which a Licence is sought.
- (3) Where the Applicant will employ the services of an operation and management contractor to manage the Mini-Grid, the Applicant shall upon written request furnish the Authority with the following –
 - a. evidence that the operation and maintenance contractor has performed–
 - i. plant maintenance; and
 - ii. plant and equipment overhaul or retrofitting, where necessary; and
 - b. the written testimony of at least 2 clients attesting to the fact that the proposed operations and management contractor has provided such services.

4.4 RESPONSE BY THE AUTHORITY

- (2) The Authority shall confirm receipt of the application within one Working Day following receipt of the application (by automatically generated email) stating the date and time of receipt;
- (3) The Authority shall review any application and respond to the applicant within 30 days following receipt of the application with:
 - a. a request for additional information, if any,
 - b. a rejection of the application,
 - c. an invitation for tariff negotiation, or
 - d. a Licence award.

4.5 REQUEST FOR ADDITIONAL INFORMATION

- (1) The Authority may in writing require an Applicant to furnish additional information processing the application and the Applicant shall comply with the request within (*applicable number of days, suggested: 14*) Working Days.
- (2) The information shall be in the form prescribed by the Authority.
- (3) The time specified for grant of Licence shall be automatically extended by the time taken for the submission of the additional information requested by the Authority.

- (4) Failure of an Applicant to submit the additional information within the time and in the form prescribed by the Authority will render the application incomplete and may be rejected by the Authority.
- (5) The Authority shall confirm receipt of the additional information within one Working Day following receipt of the additional information (*by automatically generated email*) stating the date and time of receipt.

4.6 REJECTION OF THE APPLICATION

- (1) Where the Authority rejects an application, it must do so with a signed and stamped rejection letter (*attached to an email*) stating the reasons for the rejection.
- (2) The Applicant may issue a new application after the reasons for the rejection have been resolved.

4.7 TARIFF NEGOTIATION

- (1) Where the Applicant applies for a Full Licence or an Interconnected Mini-Grid License, and the Authority decides to invite the Applicant for tariff negotiations, the Authority shall send an invitation letter (*attached to a registered email*) to the Applicant and indicate which entry data of the tariff calculation it wants to negotiate.
- (2) The date of the negotiation must be at least 7 days after the receipt of the invitation letter.
- (3) Where the Applicant does not attend the negotiations at the given date, the Authority may reject the Licence application.

4.8 LICENCE AWARD

- (1) Where the Authority, after comprehensive consideration, decides to award a Mini-Grid Licence, it shall do so by sending a scan of the licence certificate to the Mini-Grid Licensee via email within three Working Days following the award decision, and post the original licence certificate to the Mini-Grid Licensee's physical address within a period of seven Working Days in parallel to publishing related information in a minimum of two newspapers of wide circulation. The Authority shall make the final award within (*specify number of days*) from receipt of license application or additional information, or the date of tariff negotiation, as the case may be.

5.) TRANSFER OF LICENCE

- (1) Any transfer of Licence shall require the prior written consent of the Authority.

6.) TARIFF CALCULATION AND TARIFF REVISION

6.1 TARIFF CALCULATION METHODOLOGY

- (1) The tariff level shall ensure a good balance between the Mini-Grid project's financial viability and consumer affordability, as follows:
 - a. The average tariff in a Mini-Grid or in a portfolio of Mini-Grids shall be determined as the total revenue requirement divided by the total number of kWh sold to customers in a specific year;
 - b. Whereas the total revenue requirement shall be calculated as total operational expenditure, minus operational subsidies, if any, plus depreciation of capital expenditure, plus the remaining value of the assets following depreciation multiplied by the weighted average cost of capital (... *plus/minus other provisions as per specific regulation*).
 - c. Whereas depreciation of assets shall follow the annuity method of depreciation and the lifetime of assets shall be set to follow the national fiscal authority's guidelines;
 - d. Whereas operational expenditure over the three years following first commissioning of a Mini-Grid shall be capitalized;
 - e. Whereas the capital expenditure is the total capital expenditure of the project including project development cost minus any grant provided to the project;
 - f. The average tariff shall then be split into allocations for the various customer groups within the Mini-Grid, whereas the tariff for households shall be as low as reasonably possible and the tariff for productive users shall be competitive with alternative sources of energy supply e.g. through diesel motors.
- (2) The Mini-Grid Licensee shall change tariffs without a tariff review by the Authority according to the following indexation rules on an annual basis:
 - a. The fuel cost component of the operational expenditure shall be indexed with the change in national diesel fuel price;
 - b. The rest of the operational expenditure shall be indexed with the inflation rate.
- (3) During the first year of operation, reference data from other Mini-Grids shall be used to determine the tariff, where available, whereas in the following years, in the event of a tariff review, reference data from an audited financial statement about the same Mini-Grid or portfolio of Mini-Grids shall be used to determine the tariff;

6.2 TARIFF REVISION UNDER FULL LICENCE AND INTERCONNECTED MINI-GRID LICENCE

- (1) For Mini-Grids under a Full License and Mini-Grids under an Interconnected Mini-Grid Licence, tariffs shall only be changed according to the indexation rules until a tariff revision of the Authority is triggered by:
 - a. the Mini-Grid Licensee through the payment of the tariff revision fee to the Authority;or

- b. a complaint of at least 25% of the customers connected to the Mini-Grid or portfolio of Mini-Grids under the same licence with the Authority, without the Mini-Grid Licensee paying a tariff revision fee; or
 - c. by the Authority without the Mini-Grid Licensee paying a tariff revision fee.
- (2) Where a tariff revision has been triggered, the Mini-Grid Licensee shall within 60 days submit to the Authority an audited financial statement of its last financial year and a filled tariff calculation tool for which the data of the latest audited financial statement has been used.
 - (3) Tariff revision shall be conducted by the Authority within 30 days following the receipt of the audited financial statement and the filled tariff calculation tool.
 - (4) Tariffs set by the Authority must be applied by the Mini-Grid Licensee affected by the decision within 30 days following the publication of these tariffs.

6.3 TARIFF REVISION UNDER SIMPLIFIED LICENCE

- (1) Where more than 15% of the customers connected to the Mini-Grid or portfolio of Mini-Grids under the same Simplified Licence submit a complaint to the Authority, the Authority shall initiate a tariff revision process according to Section 6.2.

7.) ADDITION OF MINI-GRIDS TO AN EXISTING LICENCE OF A PORTFOLIO OF MINI-GRIDS

- (1) A Mini-Grid Licensee may add new Mini-Grids to an existing portfolio of Mini-Grids by submitting the documents as listed under Section 4.1 (3) to the Authority (using the online application tool) and if its Licence is a Full Licence or an Interconnected Mini-Grid Licence, it shall trigger a tariff revision according to Section 6.2.

8.) MANDATORY CONDITIONS FOR THE MINI-GRID LICENSEE

- (1) The Mini-Grid Licensee shall construct, operate and/or maintain its Distribution Network in accordance with the relevant Technical Codes and Standards for the time being in place and which may be published by the Authority from time to time.
- (2) The Mini-Grid Licensee shall comply with the Act as amended from time to time, terms and conditions of the Licence, the Tripartite Contract, the Exclusivity Agreement with the Community, Customer Contract, any laws, rules and regulations, as well as the decisions, orders and directions of the Authority as applicable.
- (3) The Mini-Grid Licensee shall comply with all other regulations unless expressly excluded in this Regulation.
- (4) The Mini-Grid Licensee shall grant the Authority and its duly authorized representatives' access to the Mini-Grid site, its books of accounts and any other information that is relevant to fulfil the tasks assigned to the Authority under the(*Corresponding Electricity Act*) and this Regulation.

9.) RIGHTS AND OBLIGATIONS OF THE MINI-GRID LICENSEE

- (1) The Mini-Grid Licensee holding a Full Mini-Grid Licence or an Interconnected Mini-Grid Licence has the exclusive right to generate, distribute and sell electricity in the geographic area as depicted in his license.
- (2) The Mini-Grid Licensee holding a Simplified Licence has the non-exclusive right to generate, distribute and sell electricity in the area as depicted in his license.
- (3) The Mini-Grid Licensee shall
 - a. continue to adhere to all obligations as per this Regulation as amended from time to time, incl. tariff regulation, technical and environmental standards.
 - b. maintain separate accounting records for the Mini-Grid business, including the business of utilizing the assets of a Distribution Network Operator's network, in such form and containing such particulars as may be specified by the Authority and in accordance with (*applicable Act, directive, etc.*);
 - c. prepare from such records, accounting statements for each financial year comprising a profit and loss account and a balance sheet; and
 - d. Sign a Community Contract, where applicable, in the forms and manner as be prescribed by the Authority
 - e. Sign a Customer Contract with every customer according to the form and manner as may be prescribed by the Authority.
- (4) The Mini-Grid Licensee holding a Full Licence or Interconnected Mini-Grid Licence shall -
 - a. ensure that the accounting statements prepared in accordance with the foregoing subsections are duly certified by an independent auditor in respect of each financial year, stating whether in the opinion of the auditor, the statement has been properly prepared and giving a true and fair view of the revenue, costs, assets, liabilities and reserves reasonably attributable to the business to which the statement relates.
 - b. Provide reports to the Authority on (*specify the type of reports*), in the form as given under Appendix II or Appendix III as may be applicable, every **two** years.

10.) INSPECTION OF ACCOUNTS

- (1) Any Person authorised by the Authority shall be entitled to inspect and verify the accounts of a Mini-Grid Licensee at any reasonable time and the Mini-Grid Licensee shall be under obligation to render all necessary assistance, including provision of required documents to the Person so authorized to inspect the accounts.
- (2) Where the authorized person inspecting the accounts of the Mini-Grid Licensee proves that the actual costs incurred or the actual revenue earned by the Mini-Grid Licensee deviate from the costs and revenues stated during tariff definition with the Authority at the point of application for the Licence:
 - (a) the input parameters for the **tariff calculation tool** using the methodology shall be adjusted to the actual values; and
 - (b) the tariffs as well as the calculation of the depreciated value may be adjusted and approved by the Authority accordingly.

11.) DESIGN, INSTALLATION, OPERATION AND MAINTENANCE OF MINI-GRIDS

- (1) The holder of a Full Licence and the holder of an Interconnected Mini-Grid Licence shall design, construct, commission, operate and/or maintain and de-commission their Distribution Networks and related facilities in compliance with the Technical Codes and Standards, terms and conditions of the Licence and in accordance with any other standards of design, construction, and maintenance as may be prescribed by the Authority from time to time. Where there is any inconsistency between this Regulation and the Technical Codes and Standards, the provisions of the Technical Codes and Standards shall prevail.
- (2) The holder of a Simplified Licence is not bound by the Technical Codes and Standards for the design, construction, commissioning, operation and maintenance of its distribution systems, but may apply the minimum technical requirements for distribution and generation systems as set out in Appendix IV.
- (3) The generation assets of a Mini-Grid under Licence granted under this Regulation shall be designed and constructed following the relevant Technical Codes and Standards, as well as the guidelines of the component manufacturers.

12.) CONNECTION TO CUSTOMERS

- (1) The Mini-Grid Licensee shall enter into a Customer Contract with each customer.
- (2) Compliance with the Metering Code as applicable shall be mandatory for all Mini-Grid Licensees. The Authority may on request of the Mini-Grid Licensee grant a derogation where it deems fit.

13.) QUALITY OF SERVICE

- (1) The Mini-Grid Licensee shall supply electricity according to a Community Contract signed with the Community and the Customer Contract which shall at least determine the following quality parameters in accordance with national standards or international standards where national standards do not exist:
 - a. Maximum SAIDI (System Average Interruption Duration Index)
 - b. Maximum SAIFI (System Average Interruption Frequency Index)
 - c. System frequency and tolerable deviations from this frequency
 - d. System voltage at point of customer connection and tolerable deviations from this voltage
 - e. Maximum apparent or real power available at the customer connection point

14.) ENVIRONMENTAL PROTECTION AND SAFETY

- (1) All Mini-Grid Licensees shall comply with the existing environmental legislation and any amendments thereof.
- (2) All Mini-Grid Licensees shall comply with the safety guidelines for the design, construction, commissioning, operation and maintenance of their generation and distribution assets, as issued by the relevant national authority.

15.) MAIN GRID INTERCONNECTION

- (1) Each Mini-Grid Licensee shall operate in the geographical area specified in its Licences.
- (2) Where the national Distribution Network Operator extends its network to an Isolated Mini-Grid operated under a Full Licence, two options are available to the Mini-Grid Licensee
 - a. Convert to an Interconnected Mini-Grid Licence as per Section 3.3; or
 - b. Transfer all assets the Isolated Mini-Grid Operator does not want to remove from the Mini-Grid system to the Distribution Network Operator in return for compensation. Where the Mini-Grid Licensee elects to take this transfer option, the compensation mechanism shall be as follows:
 - i. where the national Distribution Network Operator extends its Distribution Network within the first 5 years of the commissioning of the Mini-Grid operated under a Full Licence (Initial Period), the Isolated Mini-Grid Licensee shall receive a compensation from the national Distribution Network Operator before handover of assets equal to the remaining depreciated value of assets including the construction and development cost as defined during the tariff definition by the Authority plus the revenue the Mini-Grid Licensee generated from the Mini-Grid, commencing 12 months prior to the date of connection of the Mini-Grid operated under a Full Licence to the Main-Grid.
 - ii. where the national Distribution Network Operator extends its Distribution Network after the Initial Period, the Mini-Grid Licensee shall receive a compensation from the national Distribution Network Operator before handover of assets equal to the remaining depreciated value of the assets as defined during the tariff definition by the Authority plus the revenue the Mini-Grid Licensee generated from the Mini-Grid commencing 12 months prior to the date of connection of the Mini-Grid operated under a Full Licence to the Main-grid.
 - iii. where the system setup has been changed since the latest tariff definition by the Authority, the Mini-Grid Licensee shall initiate an inspection of accounts to determine the depreciated value of assets. Pending the outcome of the inspection, the Mini-Grid Licensee shall receive immediate compensation based on the latest tariff definition by the Authority. Upon receipt of the outcome of the account inspection, the Mini-Grid Licensee shall be paid the difference between the compensation paid and the compensation amount determined following the inspection.
- (3) Pursuant to Section 18, where the parties fail to agree to the terms of the compensation, the Authority shall act as an arbiter to determine the compensation to be paid.

16.) PROCEEDINGS BEFORE THE AUTHORITY

- (1) All proceedings before the Authority under this regulation shall be governed by the Business Rules of the Authority as may be amended from time to time.

17.) PROCEDURE FOR SECURING COMPLIANCE WITH THE LICENCE

- (1) Where the Authority, on the basis of material evidence in its possession, is satisfied that the Mini-Grid Licensee is contravening, or is likely to contravene, the terms and conditions of the Licence, it shall serve an order upon the Mini-Grid Licensee to rectify or avoid any such contravention or threatened contravention of the Licence.
- (2) The order shall specify the period within which the Mini-Grid Licensee shall rectify or avoid the contravention or threatened contravention of any term or condition of the Licence.
- (3) Upon expiry of the period specified in the order, if no compliance is achieved, the Authority shall proceed to enforce the order through the enforcement mechanism established by it, which may result in suspension or cancellation of the License by the Authority.

18.) COMPLAINTS AND DISPUTE RESOLUTION

- (1) Unless otherwise stated in this Regulation, all customer complaints shall be resolved in accordance with the Complaints Procedure Guidelines of the Authority as amended from time to time.
- (2) Disputes between parties in connection with this Regulation shall be resolved in line with the Dispute Resolution Mechanism of the Authority as amended from time to time.

APPENDIX I – APPLICATION FORM FOR MINI-GRID LICENCE

IMPORTANT: Your Application is incomplete unless all required documents as per Section 4.1 are submitted and the application is accompanied by the appropriate processing fee.

In compliance with the General Regulations for Mini-Grids, I am herewith certifying that I [NAME OF PRINCIPAL OFFICER OF COMPANY], hereby apply for a Licence pursuant to Section 4 the General Regulations for Mini-Grids.

1. PARTICULARS OF APPLICANT AND CONTACT PERSON

Organisation:

Physical address:

Postal address:

Tel:

Fax:

Mobile Phone:

E-mail:

Website Address:

Name of Contact Person:

Mobile Phone of Contact Person:

E-mail of Contact Person:

2. LEGAL STATUS OF APPLICANT

2.1 Indicate legal status of Applicant (Tick relevant option)

- a. Sole Proprietorship
- b. Partnership
- c. Public Limited Liability Company
- d. Private Limited Liability Company
- e. Cooperative Society
- f. Incorporated Trustee
- g. Other (*please specify*)

(Attach Certificate of Incorporation, Memorandum and Articles of Association, Deed of Partnership, Deed of Trust, as applicable)

3. NATURE OF APPLICATION

3.1 State whether Application is a fresh Application or Renewal

.....

3.2 Existing Licences

Does the Applicant have an existing Licence issued by the Authority for other systems?

.....

If yes, state the nature of the Licence, date issued and the Licence number

.....

3.3 Refusal, Suspension or Cancellation of Licence

Has the Applicant ever been refused a Licence or had its Licence suspended and/or cancelled by the Authority?

.....

If yes, give details of the refusal, suspension, and/or cancellation.

.....

4. MAIN BUSINESS ACTIVITIES OF APPLICANT

Please indicate the main business activities the Applicant is currently engaged in.

.....

.....

5. DESCRIPTION OF PROJECT

Detailed description of the project:

.....

.....

.....

5.1 Site of the Mini-Grid (State, Local Government Area, Ward, Village, GPS coordinates)

.....

(Attach title document to the land, relevant maps and drawings)

5.2 Generation

	Type of System	Size in kW
Generation	Solar	..... kWp
	Wind	..... kW
	Biomass	..... kW
	Hydro	..... kW
	Diesel	..... kW
		Total : kW
Storage	.....	..... kW
Inverters	.....	..... kW

Location of the Power Plant (geographical coordinates):

Is the Power Plant new? If no, please state number of years the plant has been in operation.

.....

5.3. Distribution

	Type of System	Size of System
Lines	Single phase MV	..... metres
	Three-phase MV	..... metres
	Single phase LV	..... metres
	Three-phase LV	..... metres
		Total : metres
Type of Lines	Overhead	
	Underground	

Poles	Cement	..... poles
	Wood	..... poles
	<input type="checkbox"/> Other (state)	
	.....	Total : poles

Transformers No: **Rating** kW

5.4. Customers

Number of customers:

- Residential:
- Commercial:
- Industrial:
- Special (*state*):

5.5 Revenue and Sources of Funding

Expected electricity sales [kWh/year]:

Electricity tariff [**Currency**/kWh or flat rate per W]:

Share Capital contribution (specify foreign or local):

Loan capital (specify source and provide evidence):

Others (specify):

6. DECLARATION BY THE APPLICANT

The project is not unlawful or contrary to the interest of the (*Name of the Country*).
I/we hereby declare that the details stated above are, to the best of my/our knowledge, true and correct.

Dated this _____ day of _____ 20 _____.

THE COMMON SEAL OF THE WITHIN NAMED APPLICANT

(Name of Applicant)

Has hereunto been affixed in the presence of:

Sign: _____ Sign:

Name: _____ Name:

Sworn to this _____ day of _____ 20_____ at

BEFORE ME

NOTARY PUBLIC/COMMISSIONER OF OATH

APPENDIX II – REPORTING FORM FOR MINI-GRID LICENCE (SINGLE MINI-GRID)

1. PARTICULARS OF COMPANY or ORGANIZATION; CONTACT PERSON AND MINI-GRID

Organization's Name:

Physical address:

Postal address:

Mobile Phone:

E-mail:

Website Address:

Name of Contact Person:

Mobile Phone of Contact Person:

E-mail of Contact Person:

Name of Mini-Grid site:

Geographical coordinates of the Mini-Grid:

2. SYSTEM SIZE; COST AND REVENUE REPORTING

3. INCIDENTS AND ACCIDENTS

Description of incident 1:

Date and time of incident:

Description of incident 2:

Date and time of incident 2:

4. SIGNATURE

I herewith confirm that the above information is true according to the best of my knowledge.

Name:

Signature

Date

APPENDIX III – REPORTING FORM FOR MINI-GRID LICENCE (PORTFOLIO OF MINI-GRIDS)

1. PARTICULARS OF COMPANY or ORGANIZATION; CONTACT PERSON AND MINI-GRID

Organization's Name:

Physical address:

Postal address:

Mobile Phone:

E-mail:

Website Address:

Name of Contact Person:

Mobile Phone of Contact Person:

E-mail of Contact Person:

Name of Mini-Grid site:

Geographical coordinates of the Mini-Grid:

2. CUMULATIVE PORTFOLIO SYSTEM SIZE; COST AND REVENUE REPORTING INCL. OVERHEADS

3. SINGLE SYSTEM SIZES; AND INDIVIDUAL COST AND REVENUE REPORTING EACH SITE

3.1 Incidents and accidents for each site

Description of incident 1:

Date and time of incident:

Description of incident 2:

Date and time of incident 2:

4. SIGNATURE

I herewith confirm that the above information is true according to the best of my knowledge.

Name:

Signature

Date

APPENDIX IV – MINIMUM TECHNICAL STANDARDS, SAFETY AND ENVIRONMENTAL STANDARDS FOR MINI-GRIDS UNDER SIMPLIFIED LICENCE

1. Technical Standards

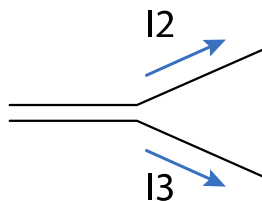
DIMENSIONING OF CABLES

There are three design criteria for cable and conductor dimensioning:

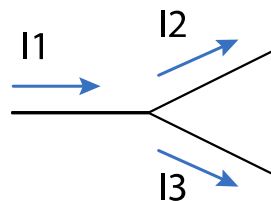
- (1) The heat that is produced by the current flowing through the resistance of the cable must be dissipated without risk of melting the insulation and without risk of causing fire.
- (2) The voltage drops along the cable must result in a voltage at the last customer which is high enough for appliances to work. For most appliances it is recommended that voltage losses not exceed 10% of the nominal grid voltage.
- (3) The resistance of the cable must be low enough so that a short circuit current at all customer connections causes circuit breakers or fuses to trip reliably. This, together with criterion 1 (above) protects from fire and electrocution from bare cables with molten insulation.

In small Mini-Grid systems, distribution of electricity is sometimes done on a house-to-house wiring basis by looping from one house to another. The use of such type of distribution system is not recommended for safety reasons. However, where Distribution Code compliant distribution grids are not financially viable and house-to-house wiring or similar approaches are required for financial feasibility, the following dimensioning of cables can be used for alternating current (AC) and direct current (DC) electricity supplies together with circuit breakers of B10 characteristic (see chapter “Circuit breakers and fuses” below) typical for a household or shop at the end customer connection. The max current values are meant to be continuous currents for 30 minutes or more on a specific line. In three phase systems, the current indicates the current over one of the line-conductors in the three phase system.

In radial distribution systems, currents of lines which split into more lines to connect more customers are larger than the currents in the split lines. In order to design the cross sections of lines that split



Assume that line 2 and line 3 are connected to the source individually and identify the right cross-section of line 2 and line 3 from the tables below.



Then add the cross-sections of line 2 and line 3 to calculate the proposed cross-section for line 1.

Cross-sections of conductors in copper cables

The following table indicates recommended conductor cross-sections for certain currents and cable lengths of a copper conductor. Below 0.75 mm² of conductor cross-section, the mechanical strength of the cable is rather low and the cable may break easily causing the risk of electrocution and fire. Therefore, it is not recommended to use these low diameters. As in very small Mini-Grid systems, these small cross sections are sometimes the only economically feasible option, they are indicated in the table below anyway but marked red. Special attention should be given to safe installation of these thin conductors.

Max continuous current (for 30 min or more)	Up to 100 m distance between source and load	Up to 300 m distance between source and load	Up to 300 m distance between source and load	Up to 400 m distance between source and load
< 1.5 A rms	0.15 mm	0.5 mm	1.5 mm	2.5 mm
< 5 A rms	0.5 mm	1.5 mm	2.5 mm	4 mm
< 10 A rms	1.5 mm	2.5 mm	4 mm	6 mm
< 16 A rms	2.5 mm	4 mm	6 mm	10 mm
< 25 A rms	4 mm	6 mm	10 mm	16 mm
< 40 A rms	6 mm	10 mm	16 mm	25 mm
< 60 A rms	10 mm	16 mm	25 mm	35 mm
< 100 A rms	16 mm	25 mm	35 mm	50 mm

It is a requirement to attach cables to guy wires where cables are connected from one house to the other and no fixed attachment to walls can be made. Where cables are moved during operation, flexible (stranded) cables are required.

Cross sections of conductors in aluminium cables

The following table indicates required conductor cross-sections for certain currents and cable lengths of an aluminium cable assuming a B10 circuit breaker at the last customer's connection and a maximum of 10% voltage drop at the customer's connection.

Max continuous current (for 30 min or more)	Up to 100 m distance between source and load	Up to 300 m distance between source and load	Up to 300 m distance between source and load	Up to 400 m distance between source and load
< 1.5 A rms	4 mm	6 mm	10 mm	16 mm
< 5 A rms	6 mm	10 mm	16 mm	25 mm
< 10 A rms	10 mm	16 mm	25 mm	35 mm
< 16 A rms	16 mm	25 mm	35 mm	50 mm
< 25 A rms	25 mm	35 mm	50 mm	70 mm
< 40 A rms	35 mm	50 mm	70 mm	95 mm
< 60 A rms	50 mm	70 mm	95 mm	120 mm
< 100 A rms	70 mm	95 mm	120 mm	150 mm

Aluminium cables with the dimensions mentioned above may be used without a guy wire carrying the cable. Distance between poles carrying the cables should not be more than 50 m.

CIRCUIT BREAKERS AND FUSES

Circuit breakers switch off short circuits and overloads. They protect the lines from getting too hot and therefore prevent fire or electrocution from bare cables with molten insulation. Circuit breakers have a rated current and an instantaneous tripping current. If the actual current is larger than the rated current, the circuit breaker will trip with a delay. If the actual current is larger than the instantaneous tripping current, the circuit breaker will trip immediately within 100 milliseconds.

There are circuit breakers with rated currents of 6A \ 10A \ 13A \ 16A \ 20A \ 25A \ 32A \ 40A \ 50A \ 63A \ 80A \ 100A available on the market. The immediate tripping current is determined by the letter in front of the number indicating the rated current. Breakers can have B characteristic (immediate tripping at 3 to 5 times the rated current) for usual household and shop loads, C characteristic (immediate tripping at 5 to 10 times the rated current) for machines and a larger number of lamps and D characteristic (immediate tripping at 10 to 20 times the rated current) for heavy machines and transformers.

Each connection to the distribution grid should be protected using the smallest circuit breaker possible. Households in rural villages typically need B6, B10 or sometimes B16 circuit breakers single phase. Mills, wood, metal and welding workshops may require three phase C20 or similar.

The line dimensioning in the tables above was prepared for B10 circuit breakers. If the rated current of the circuit breakers is higher or the characteristic of the circuit breaker is C or D cross-sections of cables need to be larger. Please consult an electrician in this case.

Fuses are available in the ratings of 3A \ 5A \ 10A \ 15A \ 20A \ 25A \ 30A \ 45A \ 60A \ 80A \ 100A. The fuse is a slow disconnecter. If the actual current is higher than the rated current for a certain time, the fuse trips. The fuse rating should be the same as the maximum continuous current used for line dimensioning.

GROUNDING

Mini-Grids for village electrification are typically TN-C-Systems or TN-C-S-Systems. This means that there needs to be grounding of the PE and N conductor or the combined PEN conductor in order to operate the system safely. Grounding takes place at the generator, in the distribution grid, at the end of each line of the distribution grid and at the customers' buildings.

Depending on the conditions of the ground and the ground water level, different methods of grounding can be applied. In predominantly wet soil, grounding can be performed through ground rods that are driven into the ground. In dry areas, a conductor with a large surface needs to be dug in. After installation of the grounding equipment contact between the conductor and the soil can be established by pouring large amounts of water on the surface to be soaked up by the soil around the grounding material.

The ground resistance should preferably be smaller than 2 Ohm but in no case greater than 10 Ohm. To measure this resistance value, special measuring equipment is required.

FREQUENCY AND VOLTAGE

For quality and safety reasons, the generator should be operated to maintain a stable voltage and frequency at the electricity consumer. The voltage shall not deviate more than +-10% from its nominal value at the consumer's site. The grid frequency shall not vary more than 20% from its nominal value.

(1) Environmental Protection and Safety

Type of equipment	Phase in project	Link to environmental protection	Health and safety
Batteries VRLA	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		

Lead Acid Batteries	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Lithium Batteries	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Diesel Generator	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Solar PV	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Wind Turbine < 150 kW	Transport & Storage		
	Installation		
	Operation		

	Decommissioning & Disposal		
Wind Turbine < 100 kW	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Biomass	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Inverters, charge controller and other electronic equipment	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		
Switch Gear and Distribution Box Conductors Transformers	Transport & Storage		
	Installation		
	Operation		
	Decommissioning & Disposal		