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Ministry of New and Renewable Energy
SPV Division

Subject: Draft National Policy on RE based Mini/Micro grids.

A draft National Policy on RE based Mini/Micro grids is placed for information of stake holders. A point wise comments may be sent by 20th June, 2016 to Sh. Tarun Singh, Scientist-C through tarun.singh@nic.in.

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National Policy for Renewable Energy based Micro and Mini Grids

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1. Introduction

The Ministry of New and Renewable Energy (MNRE or the Ministry) aims to attain a sustainable growth in the country by securing the energy needs through renewable energy (RE) sources such as solar, biomass, water, wind etc. Along with the support to large scale RE, the Ministry promotes decentralized solutions based on sources such as solar, biomass, biogas, wind, small hydro etc. for meeting the lighting needs, other electricity and thermal requirements especially in rural areas through separate programmes. Over time, based on national developmental goals, these programmes have been reformed to focus on the replacement of fossil fuels, and providing energy access to the unserved and underserved populace.

Access to affordable and reliable electricity is crucial for spurring social and economic progress in rural India, and for meeting developmental aspirations. As per the International Energy Agency, World Energy Outlook 2015 report, India has 237 million people that have no access to electricity. The Government has delivered significant progress on rural electrification in the recent past through grid extension, however a large number of households in rural areas still have no access to electricity.

Decentralized RE solutions are being deployed to address the last mile access challenge in rural areas in many parts of the country. With reducing costs and increasing efficiencies of RE technologies, RE based Micro and Mini grid solutions are being perceived as a durable solution – able to provide reliable and cost-effective energy service, cater to productive and commercial loads, accommodate future loads, and connect with grid and feed surplus power if needed.

Already, a few Energy Service Companies (ESCOs) have successfully deployed micro and mini grid projects in the country and many others are in the process of determining a viable business model. The Ministry wants ESCOs to implement RE based micro and mini grid projects, and in order to propel its deployment in the country it is empaneling interested parties as Rural Energy Service Providers (RESPs). The RESPs will earn certain privileges for implementation under the Ministry's programmes.

Certainly, many more such supporting and practical measures will be required to encourage ESCOs and investors in to the micro and mini grid space. The Ministry is keen on working with States (and State Nodal Agencies) to build a supportive ecosystem for development – an environment able to minimize the risk associated with such investments, and mobilize capital. As micro and mini grids are mainstreamed, it will enable in meeting the goals of reducing dependency on fossil fuels, providing clean power to rural households, and meeting their aspirational needs.

2. Preamble

RE based micro and mini grids with its enormous potential are a promising solution to the access to energy challenge in the country. They offer the benefits of boosting local economy by meeting energy needs of residential and commercial activities thereby supporting enterprise development, generating employment opportunities, raising individual/ household incomes etc. The Ministry therefore plans to support its expansion on a large scale through its various on-going programmes. In this regard, the Ministry is issuing a policy offering likely implementation solutions and approaches for overcoming common issues and challenges that hamper the growth of mini grid sector. The States are encouraged to refer to this policy document for developing their respective programmes, policies and regulations. The underlying principles of the policy are listed below:

- Mainstream RE mini grids for enhancing access to affordable energy services, and improving local economy
- Streamline project development procedures for ESCOs
- Provide operational frameworks to operate along with the Distribution Company (DISCOM) grid
- Optimize access to central financial assistance and other incentives
- Foster innovation in mini grid models to cater to rural needs

3. Scope of Policy

The objective of the policy is to promote the deployment of micro and mini grids powered by RE sources such as solar, biomass, pico hydro, wind etc. in un-served and underserved parts of the country by encouraging the development of State-level policies and regulations, that enable participation of ESCOs¹.

The Ministry targets to achieve deployment of at least 10,000 RE based micro and mini grid projects across the country with a minimum installed RE capacity of 500 MW in next 5 years (taking average size as 50 kW). Each micro and mini grid project should be able to meet the basic needs of every household in vicinity, and also aspire to provide energy for services beyond lighting such as fan, mobile charging; productive and commercial requirement.

¹For the purpose of the policy, ESCO means a person, a group of persons, local authority, panchayat institution, users' association, co-operative societies, non-governmental organizations, or a company that builds, commissions, operates and maintains the mini grid

The principal elements of the policy are applicable to all States in the country. The recommendations of the policy are exclusively for RE micro and mini grids and intended to support the development of the sector. The Ministry encourages States to develop their own dedicated policy or programme based on these recommendations.

4. Micro and Mini Grids

4.1 Definition of 'Micro' and 'Mini' Grids

A 'Mini Grid' is defined as a system having a RE based electricity generator (with capacity of 10KW and above), and supplying electricity to a target set of consumers (residents for household usage, commercial, productive, industrial and institutional setups etc.) through a Public Distribution Network (PDN). A 'Micro Grid' system is similar to a mini grid but having a RE based generation capacity of below 10KW. Micro and mini grids² generally operate in isolation to the electricity networks of the DISCOMgrid (standalone), but can also interconnect with the grid to exchange power. If connected to grid they are termed as grid connected mini/ micro grid.

4.2 Type of System Configurations

The generator of a mini grid can be powered by RE sources such as solar, biomass, wind, small hydro or other notified sources and can have diesel-based generator as a backup. Hybrid systems using a combination of resources like those that of solar-wind, solar-biomass, solar-hydro etc. can also be deployed to improve system reliability and for back up. While the use of conventional fuels like diesel and kerosene to enhance the reliability of RE mini grids is allowed as a back up in rare cases, the Ministry strongly discourages the same. *(The policy encourages all RE sources for mini grids, and the Ministry will facilitate the access to benefits and aggregate incentives (in case of hybrid) like subsidies applicable under the corresponding programmes.)*

The Public Distribution Network of a mini grid can be designed to carry either Alternating Current or Direct Current (AC or DC). AC is intrinsic to rotating generators (wind, hydro, diesel etc.), while solar photovoltaic (PV) generates DC. The decision of AC or DC influences the cost of project, appliances that can be used, and interconnection conditions. DC distribution is acceptable for low power applications (like lighting, radio, mobile, and household appliances like fans, TVs etc.) and that too in a limited geographic area based on voltage levels, and it is also not suitable for interconnection with the

²Here onwards the term mini grid is being used for 'mini' as well as 'micro' grids, unless specifically mentioned

DISCOMgrid. AC distribution can also support high power applications (by using single or three phase) and can interconnect with the grid. *(The policy is neutral towards either AC or DC systems.)*

A combination of AC & DC in mini-grids is also possible. DC Micro grids are recommended where loads are closely located.

The recommended levels are as follows:-

DC Micro grids :-

(i) 24 V DC up to 1 kWp

(ii) 72 V DC above 1 kWp to 10 kWp

AC Micro grids :-

(i) 220 V single phase – up to 10 kWp

(ii) 440 V 3 Phase – beyond 10 kWp

4.3 Types of Consumer Categories

A mini grid can provide the electricity service to consumers for various purposes. Few of the consumer categories and potential service applications are listed below. These will be the 7 categories for fixing tariff/billing :-

- Households - lighting, mobile charging, TVs, fan and other appliances etc.
- Agriculture – irrigation pumps
- Commercial - shops, telecom towers, ice-makers, battery/ lantern charging and renting etc.
- Productive – milling, rice de-husking, wood/ metal workshops, foundry, small & micro industry, village industry, attachakki.
- Social institutions – schools, medical centres, public buildings, community buildings.
- Government or Panchayat Offices.
- Municipal Functions – Street Lights

4.4 Types of Tariff and Revenues

- i. Existing Policy and Regulatory Provisions:

The Electricity Act, 2003 (Eighth provision of Section 14) exempts ESCOs from the mandatory licensing requirement for distribution of electricity in notified rural areas and eligible areas as may be defined under the relevant policy of the State. Because of the absence of license, State Electricity Regulatory Commission (SERC) do not have mandate to govern the tariff, and so private ESCOs can charge the consumers on a mutually-agreed term. Consumers have the default choice of not availing their service if found unacceptable for economic or any other reasons, and choose any alternative offering instead. It is expected that the competition will play a significant role in ensuring electricity access to all.

The existing policy and legislative framework (Section 8.6 of Rural Electrification Policy, 2006) also stipulates that if Central and or State Financial Assistance (subsidies, incentives etc.) are availed, the benefits need to be passed to the consumers. In instances, where mini grids connect to the DISCOM grid and sell excess power, the SERC will need to approve a tariff basing on rules under law that stipulate cost-reflective structures. Some government schemes where subsidy is provided may specify tariff to be charged or may require approval of tariff by a government authority or agency. Therefore tariff may be set as follows:

- (i) Where no subsidy or grid connectivity is provided- As per market
- (ii) Where subsidy is provided – With concurrence of defined State government authority
- (iii) Where grid is connected - SERC

ii. Costs, Revenues and Pricing Mechanisms:

The cost structure of a mini grid project will have the following elements as in any other business – Fixed Costs and Variable Costs.

- **Fixed costs** include cost of project development, generation plant, storage systems (batteries), inverters, distribution network, cost of availing debt including interest charges, fixed taxes and fees (ex: on infrastructure, land etc.). Further, fixed costs may also include management costs, company overhead and transaction costs, which generally tend to be under estimated/ budgeted (These are the cost which will be there even if the plant is not operating).
 - Overheads and transaction costs include costs for administration, coordination, social and technical problem solving, accounting, reporting (to donors, lenders and authorities), and hospitality to guests.

- **Variable costs**, which is the running charge for operation, maintenance and management depends on the demand and includes costs of fuel, oil, maintenance costs that depend on plant runtime/ output, load-dependent technical (conversion) losses in inverters, copper losses of transformers, in storage devices, energy-related taxes and fees etc.
 - Local operations costs include charges for operating the plant, billing and collecting money from consumers, maintaining and cleaning, guarding the plant, fixed technical losses like self-consumption of inverters, storage devices, and losses in transformers etc.
 - Customer relationship costs are allocated to resolve customer grievances, tend dissatisfaction in the community, and for training purposes on safe and efficient use of services. These tasks could be required to continuously undertaken.
- **Revenue Sources**

Long-term sustainable operations will require that projects recover fixed and variable costs and the ESCOs are able to be earn a reasonable return. The possible revenue sources for mini grids are fee for connections, sale of electricity, and through grants/ subsidies, if available.

As most communities in rural areas are very sensitive to price, project designs need to be extremely thoughtful ensuring affordability of the service. **Certain possible Strategies** are listed below:

- a) **Aligning Demand with Supply**: Like in the case of the DISCOM grids, mini grids may need to meet the electricity demand of varied type of consumers and that too at a time when they require it. Ex: peak time residential load, day-time demand from commercial enterprises, round-the-clock load like telecom towers, emergency and public services like hospitals, schools, banks etc. Projects will have to accurately assess demand (and even need to develop demand at times) and match it with supply efficiently. This will help project to sell as much power that can be generated from the system, thus helping to lower the tariffs, stabilize the revenue flow and ensuring project viability.
- b) **Setting Tariff for Sale of Electricity**: Electricity tariff is determined by accounting capital costs, cost of finance, operating expenses, replacement costs and return on investment. Tariffs should maintain a balance between financial viability (sustainability), and rural households' ability and willingness to pay (affordability). ESCOs may operate varied models offering different service levels and tariffs for maintaining the balance between sustainability and affordability. Tariff offering is mainly categorized in to two – energy tariff and power tariffs.

Energy tariffs depend on the actual electricity consumed (measured in KWh units), and works with a pre-payment (pay-as-you-go model) or post-paid mechanism. Such a tariff mechanism provides an accurate record of electricity consumption, offers flexibility to households on use (depending on their incomes) and usage (time of consumption), and makes energy conservation and efficiency implementable. The main concern in this mechanism is the additional cost of meters and operational costs of meter reading, billing etc.

In the *Pay-as-you-go* model for household services, the consumer pays an advance for a certain quantity of electricity and consumes based on the availability of cash. ESCOs may define an upper bound on the amount of electricity that one household is allowed to contract. This model is quite common among ESCOs and is unique as it instills discipline, offers considerable flexibility, and provides an insight to ESCOs on cash flows from households. Post-paid model comes with concerns on cost of meters and potential high risk of payment default, and hence currently less common among ESCOs.

The risk with the energy-tariff offerings is that household consumption may fluctuate considerably with time, and so balancing the demand-supply equation can be difficult. It is in this context, that energy-based tariffs for low and fluctuating household demands are not considered as an appropriate option by ESCOs for high fixed-cost systems like solar PV based mini grids as it presents a high viability risk to projects. A more flexible system powered by sources like biomass that has comparatively lower first cost and high operating cost are better suited to energy-based tariffs.

Power or Fixed tariff depends on the anticipated power use, which in turn determines the maximum power made available for households (on Watt basis). In such a mechanism, households are offered a fixed package for powering combinations of appliances such as a certain number of lights, a mobile charging point, a fan, TV etc. The household-level consumption may be regulated/ limited through instruments such as timer, load limiter etc. Every package has a fixed tariff and is collected at regular intervals (monthly or weekly).

Such a tariff mechanism is less capital and operation intensive (with no meters and resultant no metering / billing requirements), easy to control and offers multiple advantages – limits peak consumption, avoids overloading and helps ensures access to electricity for all households. Appliance-level energy efficiency (Ex: use of LEDs, efficient fans etc.) is generally built in to packages itself by the ESCOs thus optimizing the system size and improving the price competitiveness. The

controlled nature of power tariff models also brings certainty on demand, allows for easy matching with supply and offers revenue certainty.

Thus, power-based or take-or-pay tariff models are considered better for high fixed-cost solutions such as PV based mini grids, than energy-based tariff models. Such models however, may limit the access to high capacity usage and offer less flexibility on consumption.

The limitations of the above-mentioned tariff mechanisms are primarily for residential or small commercial consumers and can be overcome by inducting large commercial, productive and industrial demands. Such a business model gives flexibility to the project, and a combination of both energy and power-based prices can help in mitigating the financial risk to the mini grid. In addition, tariffs should be designed to recover the recurring cost of replacement of battery, while ensuring competitive price for all costumers.

Both energy and power-based tariffs can further be designed based on:

- Consumer type: Setting different tariffs according to the consumer group (Ex: households, institutions, enterprise etc.). Commercial and industrial tariffs may be able to cross-subsidize households in certain cases.
 - Consumption level: Setting different tariffs according to consumption level of the consumers.
 - Stepped progressive tariff: Consumers to be charged a low tariff for the initial KWh (or W) and a higher tariff for consumption (even cross-subsidization, if possible) beyond. It may include a lifeline tariff, which is a subsidized tariff providing basic service needs.
 - Stepped regressive tariffs: Larger or bulk consumer will pay a lower unit price reflective of the actual costs.
 - Time of day: Setting a variable tariff based on the time of day. Such a model is mostly applied for commercial and industrial consumers, and can be used for load scheduling.
 - Surplus energy: Setting a flexible structure where tariff changes according to electricity demand or power demand, inducing usage when surplus power is available. Here advanced metering system is needed, and the optimization between fixed and operational costs will have to be carried out.
- c) **Charge for Connections:** The connection charge should cover the cost of providing the connection (poles, wires etc.) through the mini grid from the mini grid main line to the consumer, and it should

be such that it is able to induce a commitment from consumers. However, it is also crucial that the fee remains affordable. One way to overcome this challenge and attract consumers to take connections is to spread the connection charge by reducing the upfront fee and allowing the payment of the balance over a certain commitment tenure.

d) **Grants and Subsidies:** Grants and subsidy support has a bearing on the average tariff influencing affordability and the scalability of the projects. Lower tariffs allow access to more people, may stimulate and enhance demand and drive the energy price even lower. Subsidy support can be in the form of upfront capital funding or grant, or low interest loans, generation-based or operational incentives etc., essentially to support the market for minigrid development.

Therefore tariff can be set in different ways and can also vary across consumers.

It should however follow the following principals:

1. Should be transparently set.
2. Should be fixed for atleast one year to avoid frequent changes.
3. Should not give more than 16% return on equity if it is a business venture
4. Should cover cost of battery replacement
5. Money collected should displayed prominently in the village for everyone information.

5. Policy, Regulatory and Implementation level Interventions

Solutions for specific implementation-related and technical challenges impeding the growth of the micro and mini grid sector have been discussed in the succeeding sections of the policy. Based on these recommendations, States may develop policies, implementation frameworks and supporting regulations as required.

5.1 Implementing Partner

The Ministry will implement the mini grid programme through multiple partners:

- State Nodal (Renewable Energy Developmental) Agencies (SNA)
- Public Sector Organizations (Ex: SECI)
- Rural Energy Service Providers (RESPs),
- Financial Institutions (NABARD/IREDA/RRB/Commercial banks)
- Panchayats

Mini grid projects can be installed in un-served as well as under-served regions of the country.

The SNAs may choose to implement mini grids through any mechanism including but not limited to the tendering route, and should closely collaborate with State governments and/ or the DISCOM to identify such projects. Under this route of implementation, SNAs should adopt robust measures within their program designs, which are able to ensure long-term viability and operational sustainability of the projects.

To fast-track the process, the Ministry is empanelling ESCOs as Rural Energy Service Providers (RESPs) - installer, owner, operator and service supplier - to implement mini grid projects, and envisages RESPs to be one of the predominant vehicles for implementation. RESPs can directly identify and implement project by themselves. All potential ESCOs are encouraged to get empanelled in order to claim the benefits and incentives under the programme for deploying mini grids. (*Refer Section 5.11 for RESP Empanelment and Potential ESCOs*).

Under any route of implementation, only approved mini grid RESPs will be eligible for central financial assistance.

5.2 Project Site Identification and Development

The involvement of the State Government and/ or DISCOMs in the SNA route for implementation makes the process straightforward hence making project identification more certain, and the development and execution easier. While on the other hand for private implementing agencies, specific interventions in policy and/ or programme design will be needed in order to streamline the project development processes. At present, private ESCOs by themselves arrange for land, right-of-way permissions, seek local government and community consent, and deal with other aspects. Following measures should be considered for easing project development activities, and should ideally be applied simultaneously for effectiveness.

i. Single Window Support Channel

The States should focus on simplifying and standardizing project development practices to incentivize the uptake of mini grids. A single window support channel like a special RE mini-grid promotion cell may be instituted for this purpose. The SNA may act as the Nodal Agency for single window clearance for all mini grid projects which include the task related to issuance and facilitation of desired Government orders, necessary certification and authorization, clearances and right of way, other approvals, provide information on taxes and exemptions etc. in a time bound manner.

ii. Project Information System

A record of a sector's progress is crucial for informing infrastructure planning and investments in to the State - a repository of information on mini grid projects will be very useful. All ESCOs (including RESPs) will register the mini grid project in to a Project Information System (PIS) preferably hosted by the designated agency (SNA recommended). The PIS may collect basic but necessary information like area of operation, ESCO details, number of households connected etc. This data should be updated in to the PIS on a regular basis and/ or on specific design and operational changes in the mini grid. The States may use this system to make such information available in public domain. The Investment Promotion Board within a State may also be considered for developing such a PIS.

5.3 Planning and Development

The State government/ SNA should consider defining a decisive plan or an approach for mini grids in the State. It will build the necessary confidence amongst ESCOs and investors interested in this space. States may consider classifying regions/ areas based on their priority for electrification; means (grid, off-grid or both); and or based on the type of government programme. For example, States may consider adopting the following approaches:

- **Unlimited (Open Market) Approach:** Private ESCOs are allowed to operate in any DISCOM grid connected or off-grid areas, and multiple ESCOs are allowed to operate in any area.
- **State plus Open Market (Mixed) Approach:** State (or SNA) notifies priority (programme) areas, which are to be taken up through state-governed approach. Private ESCOs are allowed to operate in non-programme as well as programmes areas, and multiple ESCOs are allowed to operate in any area. Under this situation, private sector investors will have visibility to undertake investment decisions.

The State may extend certain special privileges or incentives over and above those offered under the programmes of the Ministry.

5.4 Clustering and Size of Projects

The Ministry is in favor of deploying large-sized mini grid projects, and recommends ESCOs to deploy projects with capacities above 10KW. ESCOs interested to deploy micro grids (less than 10kW) are recommended that they install projects in a cluster format - in contiguous areas – to improve operational and cost efficiency. The cluster format offers the possibility of interconnecting projects in the future. The same principle may be applied to mini grids (> 10kW), wherever feasible.

For tracking mini grids development in the country, the projects will be categorized based on installed capacity, and will be identified as under:

- Less than 10kW – Category A
- From 10 KW to 100 KW - Category B
- From 100 KW to 250 KW - Category C
- From 250 KW and above - Category D

5.5 Role of State Nodal Agency

SNA will keep line record of all the Mini and micro grids in the state. SNA will be the supervisor organisation for all mini and micro grids. It will provide guidance and help whenever required. SNA will step in if any micro grid is abandoned and revive it by getting another organisation to takeover. It may also facilitate injection of funds to revive defunct mini and micro grids.

5.6 Panchayat and Village Energy Committee

The existing legislative and policy framework makes each level of governance responsible for electrification, including the Central and State Government, District Committees, and Village Panchayats. Panchayati institutions play a crucial role to facilitate electrification in villages, however their role until now has been limited to local approvals, for instance, providing a No Objection Certificate to deploy a project in the village. For the development and upkeep of long-term infrastructure assets like mini grids in villages, Panchayats need to assume a more active role and should involve the community in the process of growth. The Panchayat should constitute a Village Energy Committee (VEC) to ensure participation and commitment of the community, from the conception phase of the project itself.

The VEC will work with ESCO to develop and maintain the project. Responsibilities of the VEC can include the following (but not limited to):

- Developing a plan and identifying households interested in getting a connection
- Ensuring connections for households on a priority basis, and quality of power supply
- Facilitating regular payment of tariffs
- Protection of the equipment
- Curbing the theft of power
- Facilitating resolution of dispute or grievance(s), if any, and others

- Overall Supervision

5.7 Service, Maintenance and Ownership

The continued service and maintenance of high investment assets such as the mini grids will always be crucial for the project's sustainability, and this in turn can help ensure provisioning of reliable services to the consumers. The primary ownership of mini grid projects, deployed utilizing (partial) financial assistance (subsidies) under on-going programmes of the Ministry, remain with the ESCO. Hence, the ESCOs are responsible for the service and maintenance over the life of the projects.

Every mini grid project should ideally have a dedicated 'operator' –trained local personnel of the community – to operate the project. The ESCO can appoint the operator in consultation with the VEC. In case an ESCO operates a number of mini-grids in the proximity, the same local personnel – operator - may perhaps be appointed for the job. A cluster of mini grids together can be managed by a 'supervisor' appointed by the ESCO who oversees the activities of 'operators', and provides guidance as and when required. The 'supervisor' should ideally be a technical diploma holder and should ideally look after micro/cluster of minigrids catering to 1000 to 2000 connections.

ESCOs operating in a common or adjoining areas/ region should preferably collaborate to appoint common personnel such as 'operators' and a 'supervisor', and consider setting up multi-purpose/ company service stations. The SNA may contemplate a role to coordinate such a resource pooling mechanism, in case feasible. The SNA may appoint a 'SNA Manager' for a block/ district/ cluster of mini grids, for coordinating with the projects on aspects such as project information (as suggested in the Project Information System), regular reporting and monitoring, processing exit options, escalating disputes and grievances etc. The 'SNA Manager' may directly coordinate with the 'supervisor' for this purpose.

In situations where a mini grid is abandoned or stranded and is not operational for certain reasons, the SNA shall assume the responsibility of restoring the condition and operations, by transferring the ownership from the existing ESCO. This is applicable particularly in the case of subsidy-supported projects, and the SNA may consider restoring purely private-led projects too. The Ministry recommends SNAs to earmark a 'contingency fund' for supporting the continued operation and maintenance of stranded assets. The contingency fund can be utilized to train existing ESCOs, contract new ESCOs for the O&M responsibilities of stranded assets, build community capacity etc.

The SNA may issue detailed guidelines on service, long-term maintenance, ownership and transfer conditions for stranded mini grids projects.

5.8 Performance and Technical Standards

i. Service Performance Norms

The projects should meet the following minimum standards of service performance:

- Provide connection to all willing domestic consumers within its vicinity on a priority basis, and
- Provide supply to all domestic consumers for a minimum period of 8 hours if demanded so, during the critical hours of the day (mornings, evenings and night), Or during the compulsory - critical or peak - hours as defined under the State's policy or programme.
- Deploy a minimum capacity of the project to domestic loads (if there is a demand) as stipulated under the applicable Central or State policy and programme. Remaining capacity may be utilized for commercial and productive loads. MNRE current norms are at least 30% of the load should be domestic.
- While 8 hours minimum supply is to be ensured, effort should be to supply 24x7. Day time solar power in any case much cheaper to be provided and can help bring down average cost of generation

ii. Components and Sub-systems

All the components of a mini grid such as a charge controller, inverter, storage battery, cables, circuit breakers, junction boxes, PV panels (in case of SPV plants) etc. shall conform to the technical requirements and quality standards specified by the Ministry. The Government of India across its many programmes has stipulated technical and performance requirements for devices like LED bulbs, compact fluorescent lamps, fan etc., and mini grid projects shall conform to such specifications. The Ministry will aggregate all such standards under a common guideline document. MNRE specifications for all components must be followed.

iii. Public Distribution Network (PDN)

The design (sizing) of the PDN in a mini grid depends on the aggregate connected (and anticipated) demand of the various consumers subscribed to the project. The connected demand or a typical load offering for a household is below 100W and even fewer, in mini grids today. In the current scenario, most ESCOs design the PDN adequately to withstand the connected demands, and ensure optimal

investment requirements. In contrast to this, the DISCOMs are mandated to size the PDN based on a pre-approved load known as the sanctioned demand – the sanctioned load for a grid-connected household is typically higher (Ex: DDUGJY provisions 250W for BPL, 500 W for APL households and others). These aspects need to be examined while proposing interconnectivity to the DISCOM grid.

While some micro grids/mini grids may start smaller but the norm under this policy is 200 W per household if demanded. In case a household wants less, it is their choice and it is up to the mini grid to offer higher than 200W.

Safety is an imperative for the occupation of distributing electricity, and so a minimum safety requirement for the construction of PDN shall be binding on all ESCOs. CEA's regulations of 2015 - Measures relating to Safety and Electric Supply – can be adopted/ adapted to ensure safety. However, the stringent requirements may be a limiting factor for small-sized micro and mini grid projects due to the high PDN cost. In this context, it is crucial that technical standards be designed based on the size of a mini grid, capacity to connect with the DISCOM grid, online monitoring requirements etc.

The concerned State authorities (Electricity Board/ Distribution Licensee/ DISCOM/SERC) and or CEA itself may define minimum technical norms for the construction of PDN (poles, cables, JBs, service connections etc.) for mini grids, which will eventually help in standardizing the safety conditions for mini grids.

iv. [Interconnection with DISCOM grid](#)

Mini grids may want to connect with the DISCOM grid in the future to sell excess power. The existing CEA regulation of 2013 - Technical Standards for Connectivity of the Distributed Generation Resources - can guide the interconnection of a mini grid with the DISCOM grid. However, the incumbent regulations require the mini grid generator to cease in case the DISCOM grid supply fails, disallowing the mini grid to supply to its consumers. From a mini grid standpoint, these regulations will need to be followed unless proper controls can be installed to ensure islanding/isolation to the satisfaction of discom.

[5.9 Exit Options, and Interaction and Distribution Company](#)

The parallel existence of the DISCOM grid and mini grids will be quite a common occurrence in the coming time. For safeguarding the mini grid projects and investments, States should offer flexibility and choice to operational ESCOs. A policy framework to facilitate the coexistence of mini grids with the DISCOM grid is as follows:

For both the entry situations – Areas where the DISCOM grid pre-exists Or Areas where the DISCOM grid is yet to arrive - the ESCO will be allowed to:

- “Open Market”: Continue supplying to its consumers and exist in parallel with DISCOM grid, or
- Continue to supply to its consumers and sell excess or unsold electricity to DISCOM grid at the interconnection point and draw power from mini grid if required, or
- Supply all electricity generated to the DISCOM grid at the interconnection point

The ESCO:

- Will be allowed to work in and migrate to an operating option of its choice
- Will abide by the tariff norms as prescribed under the existing policy or programme of the State
- Will be allowed to charge a tariff mutually determined with the consumers, if operating in an open market option
- MAY be offered to undertake the role of a Distribution Franchisee, wherever feasible

The exit options should be exercised in compliance with the terms and procedures of the extant policy or regulation, stipulated by the State government or SERC respectively in accordance with National Tariff Policy. Based on existing principles, the interested ESCO will be technically required to convey the exit option to the SERC, and intimate the concerned SNA as well as DISCOM. The SNA can play a crucial enabling role by administering the overall exit process. They should develop a support-mechanism to help ESCOs in developing and submitting the exit-applications. The SNA should support the ESCO by helping to furnish required information sought by the SERC from time to time.

In case where the DISCOM grid arrives later, the DISCOM may preferably choose to use the Public Distribution Network (PDN) of the ESCO if it conforms to the standards by paying appropriate charges or the ESCO is offered to sell the PDN to the DISCOM.

For exit options where the mini grid opts to sell power to the DISCOM grid, the project should be compensated in accordance with the National Tariff policy. Such instances of asset sale, exchange of power (through condition of PPA and FA), and aspects such as wheeling, interconnectivity etc. fall under the technical purview of the SERC. The SERC will be required to develop a regulatory framework for enabling implementation.

In cases where mini grids connect with the DISCOM grid to sell surplus power, the ESCO will have to enter into a Power Purchase Agreement (PPA) with the Distribution Company. In the instance of a

franchisee arrangement, the Distribution Company will have to enter into a Franchisee Agreement with the ESCO. For easing the process of legal and regulatory engagement for ESCOs, the SNA should develop a support-mechanism to help ESCOs on aspects such as procedures, contract preparation, closures etc.

5.10 Grievance Redressal

At the first level, any grievance or dispute between the consumers of the project and ESCO (on issues such as connections, supply quality, safety etc.) shall be redressed through consultation with the VEC, panchayat institution, and as a last resort can be raised to the second level i.e. SNA, for resolution. In matters regarding the technical safety aspects of projects, consumers may directly approach the SERC or may seek help of the SNA for pursuance with the SERC.

Any dispute between the ESCO and the Distribution licensee (in case the exit options have been exercised) shall be redressed by following the due process as prescribed by the SERC. The SNA shall support the ESCO in dispute resolution by providing required technical or operational assistance.

To improve accessibility, the SNA may develop a dedicated website for registering queries and complaints, and providing the status of grievances etc. The website may be used for information sharing and updating project information (in PIS) etc. A toll free number can be created for filing of grievances and its redressal.

5.11 Financial Assistance and Other Incentives

The Ministry shall continue to provide the upfront capital subsidy it offers for deploying mini grid projects under its various programmes. Only approved mini grid RESPs will be eligible for central financial assistance and other privileges. *(Please refer CFA guidelines of various programmes for the eligibility, service and technical criteria)*

Central assistance and incentives to RESPs serving a comparatively larger un-served and or under-served population; and RESPs operating in North East (NE) States, Special Category States (Jammu and Kashmir, Himachal Pradesh, Uttarakhand), Andaman and Nicobar, and Lakshadweep Islands shall be accorded priority for allocation. The potential ESCOs from NE and all other Special Category States are particularly encouraged to participate under the programmes.

A State may consider providing additional incentives over and above the existing central financial assistance for projects, under their policy. The incentives (subsidies or grants) can alternatively be structured to support project planning and pre-investment activities (like feasibility and business plans, capacity building efforts and other transaction costs); or in construction phase (for the PDN, meters, connection fees); or for operations (operational subsidy, tariff top ups, cross subsidy). Result/performance based incentives can be made available to the mini grid operators e.g. on reaching certain milestones.

The Ministry is also exploring mechanisms to boost financial lending for projects. Financing for mini grids through institutions like NABARD/ IREDA is also encouraged. The central subsidy would be channeled from NABARD/ IREDA through to the Regional Rural, Scheduled or Cooperative banks. The RESP mechanism is expected to optimize the project approvals process, and streamline the disbursement and access to programme subsidies. Subsidy will be disbursed to RESPs either directly by the Ministry or through NABARD/IREDA.

Duties such as Value Added Tax, Entry Tax and others have an implication on the cost of service from mini grids. The State governments may consider waiving certain taxes in order to promote the sector. The designated agency for mini grids should make information related to applicable taxes and duties publicly available – this will help ESCOs in making more informed business decisions.

5.12 Empanelment of RESP

All ESCOs interested to deploy mini grids can apply to the Ministry for operating as a Rural Energy Service Providers (RESPs). The Ministry is keen to have a large pool of mini grid RESPs, to be operating under their various programmes. Potential ESCOs' to operate with the following conditions:

- Potential ESCOs will be allowed to access RESP benefits (subsidy, other incentives) for first 10 projects with a maximum cumulative capacity of 200 kWp.
- The operational, technical and service performance of the 10 projects will be validated for a period of two years. The SNA shall be responsible for this verification.
- Upon successful validation of projects, the ESCO will be permitted to undertake additional projects – and be empanelled as a RESP.
- Companies participating in DDG scheme operated by the Ministry of Power would be directly eligible for operating as a RESP, subject to a recommendation submitted to MNRE from REC or the State Government.

A 'Potential ESCO' could be existing energy service provider, equipment manufacturer, supplier or an integrator. A solar, biomass, hydro, wind or a hybrid mini-grid company is eligible to become a RESP. The State Government policies should focus on encouraging entities to participate as RESPs.

5.13 Add-on Services

ESCOs are encouraged to provide energy for ancillary services such as internet, medical and educational services, potable water, skills and training, shops selling mobile phones, cable connections etc. within the community. Such services can be provided at a fee that can be mutually determined in between the ESCO and the end user.

6. Programmes – Innovation, Pilot and Capacity Building

The Ministry provide support for training potential ESCOs interested in mini grids towards becoming competent service providers. MNRE will specially focus on incubating ESCOs in NE and all other Special Category States, and for research, innovation, testing technology (hybrid systems, ICT for smartness and M&V etc.) and financial instruments among others. The Ministry is supporting REbased mini grids for supporting and prototyping innovative business models, technology (ex: grid interconnectivity, remote monitoring, hybrid systems etc.), regulatory interventions and others.

7. Role of Stakeholders

7.1 Energy Service Company (or RESP)

The ESCO (or RESP) is responsible to do the following (not limited to, and in addition to the roles described in the previous sections of this policy):

- Implement the mini grid after due intimation of project details to the SNA, and following the procedures as per the extant State policy or regulatory stipulations.
- Generate and supply electricity to consumers
- Conforming to technical and service standards, and safety measures as specified in this policy or per the State level policy and regulations.
- Abide by procedures and execute functions as stated in the operating framework for interconnection, under the State's policy and regulations.
- Take necessary steps as per State policy or regulations in case of any default and breach of conditions by the consumer including but not limited to non-payment, theft, misuse, misrepresentation, fraud etc.

- Support local enterprise development through energy services.
- Capacity building and training for VEC and consumers for smooth operation of projects.
- Promote efficient use of energy by offering energy efficient appliances.

7.2 Consumers

- Regularly pay electricity charges to the ESCO(RESP) as based on the mutually agreed tariff or the tariff as approved under the State' policy, as may be applicable.
- Adopt energy efficient measures to reduce the overall electricity consumption.

7.3 State Government (or State Nodal Agency)

For promoting RE based mini grids, the State government and the State Nodal Agency shall do the following (not limited to, and in addition to the roles described in the previous sections of this policy):

- Develop and implement RE mini grid projects in the State.
- Develop a State-level Policy for supporting deployment of RE mini grids.
- Coordinate with energy department, distribution utilities for identification of project sites, implementation models and other planning aspects.
- Design State-level programme for mini grids by:
 - Devise financial assistance – incentives and other instruments
 - Classify priority areas for the State (as may be applicable)
 - Prepare bidding documents and bidding strategy, allocation of projects,
 - Support preparation of technical norms (e.g. on PDN, interaction with grid etc.)
 - Develop various modes of engagement with potential ESCOs
 - Create centralized mechanisms - single window support channels, PIS etc.
 - Establish a dedicated mini grid promotion cell (if required)
- Develop and implement monitoring and verification mechanisms to evaluate against stipulated Standard of Performance norms, and technical requirements.
 - Create reporting formats that need to be submitted by ESCOs
 - Develop third party audit mechanism for verification
 - Develop remote monitoring protocols wherever feasible
- Set up a grievance redressal mechanism to facilitate consumer participation in the process.
- Review ongoing schemes regularly - share information in public domain, and inform policy.

- Coordinate with appropriate authority like the State Electricity Regulatory Commission to develop guideline for Feed-in-Tariff (FiT) for technologies, franchisee frameworks etc.
- Induce or build capacities of potential ESCOs to deploy mini grid projects.
- Support projects for availing benefits under Central programmes, and
- Support in other matters as and when required.

7.4 Electricity Regulators

Electricity Regulators such as the Central Electricity Regulatory Commission and the State Electricity Regulatory Commission are crucial in safeguarding the interests of the various stakeholder parties – like consumers, ESCOs, Distribution Companies and others. They will play an important role for providing the required regulatory support on matters such as determining FiT for various resource technologies, principles/ details of power purchase, wheeling arrangements and asset charges, franchisee frameworks among others. The State governments should request the appropriate Commission to develop necessary regulations.

Central Electricity Regulatory Commission

- Tariff guidelines for RE mini grid projects
- Incentives for fulfilment of Renewable Purchase Obligation (RPO) with a multiplication factor for the electricity purchased from mini-grid projects
- Incentives for fulfilment of Renewable Energy Obligations for certain consumers such as telecom towers, and others

State Electricity Regulatory Commission

- Allow installation of mini grid projects in eligible electrified areas.
- Develop regulatory provisions or viable models for mini grids.
- Develop regulatory measures for interconnectivity with the grid.
- Develop payment security mechanism for exit options.
- Specify technical design parameters and performance standards based on appropriate guidelines and regulations:
 - Ensuring minimum hours of quality electricity supply to the consumers
 - Promoting sale of electricity to domestic households
 - Promoting supply reliability through hybrid solutions
 - Ensuring performance guarantee of projects

- Return on Capital or Return on Equity approach for tariff determination where connected to main grid.
- Higher rate of return on tariff for RE mini grids to compensate higher risks

8. Review of Policy

The Ministry may from time to time modify, amend or repeal any provisions of this policy. The Ministry shall review the policy after three years, if necessary.