

Regulatory Imperatives for Scaling Up DRE in India

Renewable energy, including decentralised renewable energy (DRE), has been promoted through a range of policy incentives. Much of the past work on renewable energy regulatory frameworks has focussed on grid-scale renewable energy-based power generation and to a lesser extent on off-grid renewable energy-powered electricity. With regulations being viewed as disabling or constraining, the lack of regulations is sometimes considered positive. However, it is important to place regulations in a context so that they become enabling and this is evident in the grid-connected renewable energy sector, where clarity on policy and consistent implementation has had positive results. This paper presents critical regulatory issues for DRE in three interlinked but characteristically disparate segments:

- Renewable energy-powered micro grids
- Off-grid renewable energy devices/ systems such as solar lanterns, solar home-lighting systems, vegetable and fish dryers, and solar pumps
- Renewable energy-based clean cooking energy systems such as solar cookers, biogas plants, and improved biomass cookstoves
- Issues pertaining to specific renewable energy resources such as biomass, wind, and solar

Regulations spanning standards, right to energy, enforcement of renewable energy obligations, and stringent norms for sustainable biomass harvesting, all need to be a part of the regulatory framework to foster renewable energy for sustainable energy access (Figure 1).

>> Highlights

- Reliability-based standards must be set and enforced for devices, components and services.
- Regulatory frameworks for renewable energy-powered micro grids need to provide risk guarantee, economic viability, social equity, system longevity, and reliability.
- Mini grids offer the opportunity of combining DRE systems with each other and with the regional grid.
- Metering signals important cultural changes and is a necessary step in India's energy transition.
- A legal framework is recommended to recognise the right to basic lifeline energy.
- Mandating a switch to renewable energy could be considered for certain energy-intensive applications/sectors.

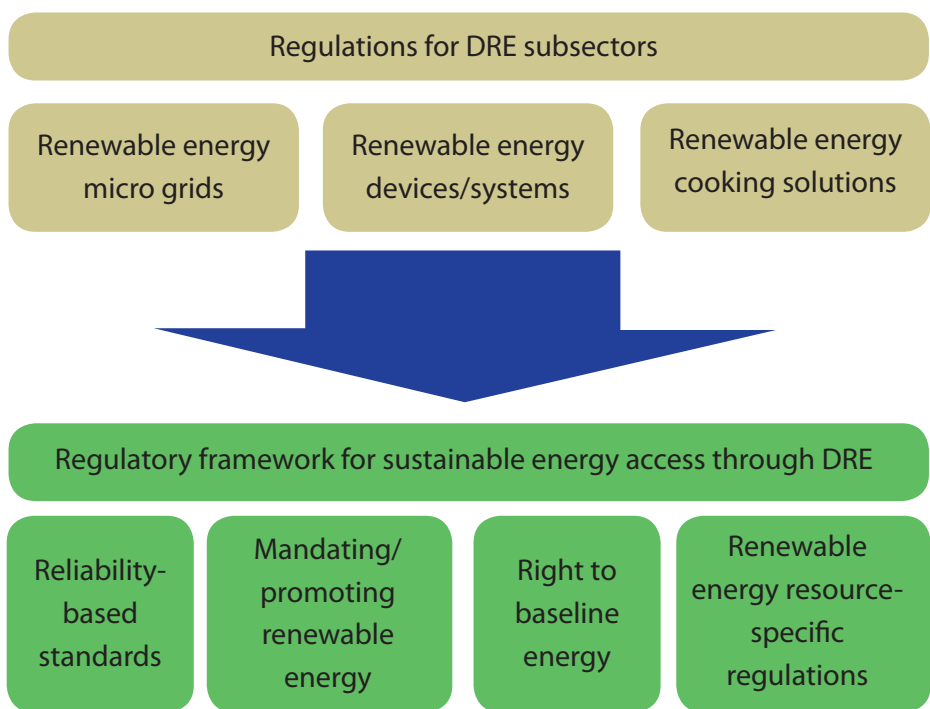


Figure 1: Regulatory framework for sustainable energy access

This briefing paper series has been conceptualised and prepared by the Ashden India Renewable Energy Collective (AIREC) with support from the Shakti Sustainable Energy Foundation. AIREC is a not-for-profit company set up by a group of India-based winners of the Ashden Awards for Sustainable Energy. Shakti Sustainable Energy Foundation works to strengthen the energy security of the country by aiding the design and implementation of policies that encourage energy efficiency as well as renewable energy. For more information, please visit <<http://www.shaktifoundation.in>>

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Regulatory issues for renewable energy-powered micro and mini grids

Consultations with AIREC members and other stakeholders reveal that renewable energy-powered micro and mini grids suffer from uncertainty and lack of clarity due to lack of a cogent framework with a strong legal basis. Regulatory frameworks for renewable energy-powered micro and mini grids, it is suggested, need to provide risk guarantee, economic viability, social equity, system longevity, and reliability (AIREC 2012). Important interventions are required in the areas of quality enforcement, certainty in the post-grid scenario, metering, and mainstreaming of hybrid and grid-interactive systems.

Lack of benchmarks and standards for micro and mini grids

While micro and mini grids may seek exemption from licensing, regulations for technical standards and safety measures (e.g., Sections 10 and 53 of the Electricity Act) will continue to be applicable. AIREC recommends that micro and mini grids should come under the purview of electrical safety rules. Designated personnel, such as junior electrical engineers and other qualified electrical inspectors in blocks or the Public Works Department, could be authorised to take on the role of the Electrical Inspectorate in this respect. Compliance with standards is particularly important for grid connectivity and implementing agencies must collect the clearance before formal commissioning of the project.

The process for obtaining star ratings for various components of renewable energy projects is stated to be under development, but it needs to be expedited. Consumer education on renewable energy products and their performance indicators has to be an integral element of these efforts. Along

with products, there should be a rating and accreditation process established for installers and service providers to ensure quality in last-mile servicing. Approved laboratories and institutions must be identified to provide third party standard certifications for products and services.

Much of the concern around reliability can be addressed if standards are laid down and strongly and consistently enforced. It must be borne in mind that reliability eventually impacts the poorest rural consumers.

Push needed for hybrid renewable energy micro and mini grids

Intermittency and lack of reliability is a major consumer concern. Practitioners concede that intermittency can be a problem with renewable energy systems but it can be addressed through well thought out hybrid systems. For large-scale power generation, the MNRE is considering hybrid biomass-based power plants with solar thermal systems to increase the plant load factor, but there are no such programmes being considered for decentralised electricity generation (see Briefing Paper # 6 (on Hybrid Systems in Decentralised Distributed Generation of Electricity: Potential and Challenges) for more information). The lack of a clear policy and regulatory framework for hybrid DRE (e.g., tariff setting) is an impediment for setting up such systems.

Reducing uncertainty in the post-grid scenario

It is important for DRE projects to be designed in such a way that they will be viable even after the area it services is connected to the grid (as also highlighted in Briefing Paper # 9). This is a critical issue, particularly with the imminent 100% electrification plan of the Government

of India. The United States and Europe had many micro hydro systems that were abandoned when the grid arrived in the 19th century. Similar experiences are reported from Nepal and Vietnam. In India too, it is reported that over 400 micro hydro plants have shut down in the Himalayan states when the costs of continuing operation and maintenance of these off-grid plants exceeded the cost of power purchases from the grid.

Nevertheless, given the unreliability of the grid supply and the fact that power shortages are not expected to be eliminated in the near future, there is a clear role for micro and mini grids, which also offer the opportunity of combining DRE systems with each other and with the regional grid. Energy planning could also provide for dispersed lower loads to be met from the mini grid while bulk connections could be fed by the grid. Off-grid power can also be a solution to meeting peak requirements in a grid-interactive system. The ability to connect to the grid when it arrives is an important feature of decentralised systems to ensure their sustainability. Regulations will need to factor in the following options that the owner/supplier will have once grid connectivity is available:

- Continue as off-grid
- Sell surplus power back into the grid
- Buy from the grid a portion of the total power requirement (could be a mix of conventional and nonconventional energy)

To allow for a smooth transition, the regulations should set guidelines with regard to supporting institutional structure, franchisee agreements, buy-back agreements, responsibilities of DISCOMs (power distribution companies) to enter into agreements, and billing and payment mechanisms.

BOX 1: Metering is smart

Transitioning to a meter-based payment system (from the current system of lump sum payments) will require regulations to ensure that records are maintained on the energy generated and supplied. Metering aids the smooth collection of tariffs, and reduces inequity in the system as each consumer pays for only as much as he consumes. It signals an important shift away from free power to a paid service. Metering also puts pressure on the supplier to ensure reliability.

Today the trend is towards 'smart metering,' a technology that enables two-way communication between each meter and the central system. Smart metering enables utilities to match consumption with generation, a feature that is particularly useful in the case of power generation from intermittent renewable energy resources. Providing real-time information on power usage and outage, smart meters also allow consumers to become more conscious of their electricity usage.

Metering and tariff-setting

Closely linked with quality and reliability is the payment for services, which share a circular linkage. Unless there is reliability, willingness to pay will remain low, and conversely, unless payments are made and costs recovered, it will be difficult to maintain strong and reliable electricity projects. AIREC strongly recommends moving away from lump-sum charge collection and instead, charging for the number of units consumed. For this, metering and enforcement of metering through regulation is required. Metering signals important cultural changes and is a necessary step in India's energy transition (Box 1).

It is recommended that tariffs for micro grids be fixed by state electricity regulatory commission in association with the independent bodies of local people and micro grid operators. Given the multiplicity of such projects, the SERCs may fix tariffs for projects (categorised by technology and capacity) similar to the consultative process being adopted for grid-connected RE. In the case of micro and mini grids, however, given the likelihood of specific local issues,

there must be a clear provision for local communities or operators to approach the SERC for review of these tariffs in exceptional cases. As mentioned above, lack of tariff-setting regulations for hybrid systems is an important impediment. As grid-tied micro and mini grids become more common, various models and norms for tariff fixing will emerge.

Regulations for off-grid devices

For regulation purposes, it is essential to distinguish off-grid renewable energy devices like solar lanterns and solar home-lighting systems from micro and mini grids. Devices are consumer products that can be made available commercially. Regulations for these products should be even more light-handed to encourage private sector participants and to ensure that end users have access to quality products, qualified repair services, and spare parts over the long term. Regulations should cover accreditation of participating companies, setting and enforcing standards, verification of installations, and monitoring of system performance.

Specifications should pertain to output over the life of the device. For instance, specifications for solar lanterns should be in terms of lumens or lux and life of the device, rather than watts as is the current practice. Practitioners point out that solar lights compete against kerosene lamps and the current specifications in terms of watts do not address the quality issue. It is reported that over 35% of solar lanterns distributed have been discarded due to malfunction, lack of spares, and battery replacement.

The lack of standards for quality and poor enforcement of standards has resulted in substandard systems and parts being dumped in India. Lack of standards also raises costs for project developers who have to engage in maintenance and support as well as awareness creation of users.

Another important gap has been the lack of standards for various off-grid renewable energy devices like spice and fish dryers, cold rooms, and milk chillers. AIREC recommends that standards and ratings be developed for such off-grid RE devices by an independent body like the Bureau of Energy Efficiency (BEE) or the Bureau of Indian Standards (BIS), and the products should be marked accordingly and consumers should be made aware of the standards and ratings system.

Regulations for renewable energy-based clean cooking energy system

The points raised about the need for appropriate performance-based standards are also applicable to cooking energy systems. The standards for improved cooking energy systems and testing protocols will need to be viewed closely. As raised in Briefing

Paper # 3, it is important to expand the testing protocols for cookstoves beyond efficiency and emissions performance, and to move beyond laboratory testing to testing in field conditions. A degree of flexibility in the standards will be needed so as to offer a variety of stoves that meet different cooking needs and suit different payment capacities. It is recommended that subsidies be delinked from standards that are based purely on emissions or combustion efficiency. Instead subsidies on cooking energy systems may be linked with the payment capacities of users rather than with the energy systems that they use. Transparent standards for cooking fuels, including processed biomass (in the form of biomass briquettes and pellets, biogas, etc.) are also imperative.

Renewable energy resource-specific regulations

Unlike some of the prominent renewable energy technologies like solar and wind, biomass-based technologies are faced with challenges relating to feedstock or fuel. Regulatory frameworks for bio-energy, therefore, need to focus on this aspect (see also Briefing Paper # 5). Key areas for bio-energy regulation include the following:

- Norms for allocation and pricing of biomass feedstock. Large-scale exploitation of biomass energy sources could pose a threat to the energy security of biomass-dependent poor households. Regulations for allocating and pricing biomass feedstock must not prevent biomass energy resources from becoming or remaining competitive and accessible, and being used efficiently.
- Regulating the quality of biomass feedstock. AIREC postulates that

bio-energy feedstock be graded and standards be developed for various key criteria such as calorific value, ash, and moisture content.

- Regulation for environmental sustainability. Given that the 'renewable' nature of biomass resources stem from their relative rates of growth and harvesting, it is necessary to lay down clear principles for sustainable harvesting and growth of various biomass resources. This is a sensitive area that will call for engagement with a range of stakeholders including the State Forest Departments, local development agencies and the communities themselves.

Other regulatory issues relevant to sustainable energy access

Right to energy

It is commonly accepted that lack of access to modern energy services is a serious hindrance to economic and social development. Field studies have repeatedly highlighted the health, safety, social, developmental, and economic costs of lack of access to modern energy for basic household needs such as cooking and lighting, for social services like health and education, as well as for productive applications that help enhance the economic well-being of the poor.

The Electricity Act (2003) indicates a minimum lifeline consumption of one unit of electricity per household per day. This compares favourably with the International Energy Agency's minimum annual threshold level of 250 kWh for rural and 500 kWh for urban households. A legal framework, similar to the Right to Education Act, is recommended to recognise the right to baseline or minimum

energy access. The details in terms of amount and nature of energy would need discussion. Issues that must be factored in include the need for expanding energy access beyond electricity, and beyond basic household needs to include community, development, and productive uses.

Mandating use of renewable energy

In addition to laying down baseline levels of energy that must be made available to all, AIREC recommends mandating and/or incentivising the provision of a certain proportion of baseline energy access (as described above) through decentralised renewables. Similar initiatives underway include regulations to encourage the use of solar water heaters. In eight states of India, 90 municipal corporations and development authorities have changed their building by-laws to encourage solar water heating. Along these lines, AIREC makes the following broad recommendations:

- Shift subsidies from conventional energy to DRE in a phased manner, e.g., moving subsidies from kerosene and/or LPG to renewable energy-based cooking energy solutions.
- All high energy users (factories, municipal corporations, markets and malls, hospitals and hotels) to substitute a certain percentage of their energy consumption with renewable energy.
- All rural livelihoods sectors (many of which are now growing in energy intensity) such as dairy, horticulture, irrigation, water, and sanitation to use renewables-powered devices to a certain extent.

- Promote generation of renewable energy from waste, e.g., biogas generation linked with sewage treatment plants, food processing units, dairy farms to be incentivised by gradually shifting LPG subsidies to generation of biogas from waste.

Well-enforced regulation a necessity for incentives and mandates to be effective

In the design of incentives, all benefits accruing from the adoption of decentralised renewables must be considered. These benefits may

include mitigation of carbon and other emissions, adverse health effects, as well as inefficiency in energy generation, transport or combustion.

The need to manage mandates and incentives simultaneously is best highlighted in the case of the renewable energy certificate (REC)/renewable purchase obligation (RPO) mechanism. The REC is a potentially powerful market-based instrument and did succeed in raising interest in renewable energy, but its robustness hinges upon effective enforcement of the RPO. The strength of the REC now stands compromised due to

lack of stringent RPO enforcement. There is a view that practitioners may find standards and their enforcement constraining. However, for a long-term player in the sector, benchmarks that improve reliability and safety and therefore consumer acceptance would be welcome. This is particularly true of several DRE segments which face unfair competition with spurious and sub-standard devices and components. It is against this background, that AIREC reiterates the importance of enforcement to ensure the effectiveness of several of the recommendations set out in this paper.

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