Institutional Transitions to Mainstream DRE for Sustainable Energy Access

Breaking the institutional confinement of DRE for sustainable energy access

Small-scale decentralised renewable energy (DRE) options are ideal for filling gaps in energy access for energy-poor locations. However, an ill-informed but pervasive view that DRE should be confined to remote rural locations (often characterised by difficult accessibility, low payment capacity, and low levels of energy demand) has thwarted their deployment for sustainable energy access (SEA) on a significant scale. Institutionally, DRE has been mostly limited to programmes of the Ministry of New and Renewable Energy (MNRE), a ministry with limited funds and a narrow focus on renewable energy supply and hardly any history of working across sectors.

Practitioners point out that the evolution of DRE will likely be similar to the evolution of information technology (IT) and environment issues. In 1976, the National Informatics Centre (NIC) was established to facilitate the introduction of IT to improve efficiency and accountability. Today, the NIC, through its ICT Network (NICNET), has institutional linkages with all the ministries and departments of the central government, 35 state governments/ union territories, and about 625 district administrations of India. In this way, IT and e-governance have now moved beyond the NIC and into all levels of government. Similarly, until the 1980s, environmental issues were handled entirely by the Ministry of Environment and Forests (MoEF), but over the decades, all organisations, including government departments, have factored environmental aspects into their planning processes. In the future, we may reasonably expect that energy will also become a mainstream facet of most organisations and agencies within and outside the government.

>> Highlights

- Like information techcnology and environmental issues, we may reasonably expect that energy will become a mainstream facet.

- An inter-ministerial and inter-agency energy access plan needs to be developed.

- A national-level Sustainable Energy Access Advisory should be formed. It will play a key role in building bridges across sectors, and in meeting energy access gaps sustainably and efficiently.

- This advisory can play a lead role in conceptualising a national energy access plan, developing DRE portfolios in various miinistries, and integrating energy access into local development planning mechanisms.

- Recent trends indicate active involvement of NGOs, micro-finance institutions, women's groups and SHGs in rural energy access projects.
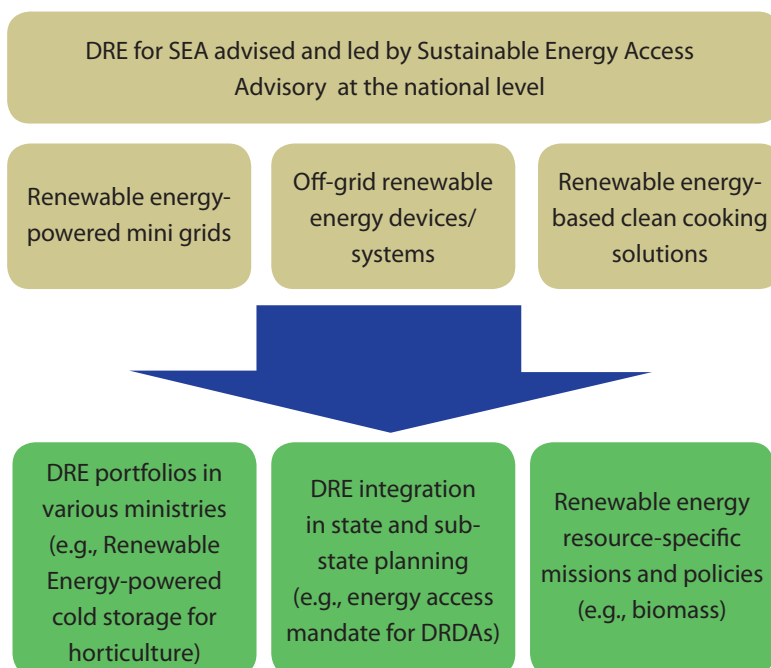
Figure 1: Schematic representation for mainstreaming DRE for SEA at various levels

To scale up DRE for SEA, linkages will have to be forged across other energy ministries as well as with end-use sectors in order to understand energy needs and the ways in which DRE can bridge energy gaps. At the centre of the approach suggested, therefore, is a DRE-focussed multisectoral institution that can steer and guide DRE for SEA efforts. To keep it operationally manageable, it may be useful to consider DRE for SEA in three interrelated activity themes: (1) electrification through renewable energy-powered mini grids; (2) renewable energy-powered off-grid devices; and (3) renewable energy-based clean cooking energy solutions (Box 1). Resource-specific missions (Box 2), along the lines of the Jawaharlal Nehru National Solar Mission (JNNSM) and the proposed wind mission, will have to be mooted and strengthened. Figure 1 summarises the key aspects of mainstreaming DRE for SEA.

Institutional transitions needed at the national and local levels

It is now a trend for most states to have separate organisations for large-scale renewable energy (typically a public sector or not-for-profit enterprise in which the State Nodal Agency [SNA] may or may not be a partner) and small-scale renewable energy efforts (typically the SNA). In line with this trend, it is assumed that the government machinery for DRE

BOX 1: Three activity themes of DRE for SEA

Electrification through renewable energy-powered mini grids. Electrification efforts in India, though largely in the hands of the Ministry of Power (MoP), have also crossed over to the MNRE for deployment of renewable energy-based grid-connected and off-grid generation of electricity. Thus electrification plans span programmes of the MoP and MNRE in addition to various state-specific schemes. As a result, electricity access as a target has never been tied down to any single agency. What is needed is interactive planning involving the MoP, MNRE, regulatory commissions, Central Electrical Authority, NTPC, Rural Electrification Corporation, and Power Grid Corporation of India.

At the state level, it is important to map unelectrified villages and to develop electrification plans for them through grid extension or through renewable energy-powered micro grids. Village electrification has seldom ensured electricity access to all households and to development-critical points like schools, water pumps, and healthcare centres, partly due to and also despite the definition of 'electrified villages.'[1] Peri-urban areas and several settlements (particularly slums) also suffer from lack of access to electricity. Decision-making templates (especially for grid extensions vs. micro grids) should be developed for clarity on the roles of various agencies.

Clean cooking energy at the national and state levels. Unlike electrification and off-grid solar lighting, there are few visible champions of clean cooking energy. Currently, clean cooking energy is institutionally dispersed through efforts of disparate ministries (MNRE and Ministry of Petroleum and Natural Gas [MoPNG]). It is important to recognise that the challenge in India is so mammoth and diverse that we cannot afford to limit choices to LPG, biogas, or a specific type of biomass cookstove. Like electrification, concerted efforts are required by MoPNG, the oil companies, GAIL, Ministry of Health(given the significant health implications of clean cooking energy), and MoEF (given the environmental implications) as well as MNRE. At the local level, by integrating clean cooking energy provision with local development efforts, it will be possible to better factor in local resource availability and needs (determined by cooking and dietary habits, housing patterns, affordability, etc.) to arrive at locally relevant solutions.

Off-grid renewable energy systems for lighting and other applications. It is now clear that 100% household electrification may not be possible in India for another decade or so and it may take much longer for all electricity demand to be reliably met. It is in this context that a range of renewable energy technologies have an important role to play in meeting not just household electricity needs, but also in meeting energy needs (for electric, thermal, mechanical, and transport applications) in households, the community, and in critical rural livelihoods. The institutional framework to tap opportunities in this space would have to be led by the MNRE, but they would need to forge strong linkages with various development activities through other ministries and departments, including but not only, water and sanitation, irrigation, horticulture, fisheries, dairy and animal husbandry, rural development, and livelihoods missions.

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[1] According to a new improved definition (2007), a village may be considered 'electrified' if
- basic infrastructure such as distribution transformers and distribution lines are provided in the inhabited locality as well as the Dalit Basti hamlet where it exists;
- electricity is provided to public places like schools, panchayat office, health centres, dispensaries, community centres; and
- the number of households electrified is at least 10% of the total households in the village.

BOX 2: National bio-energy mission as a priority resource-specific mission

The JNNSM has emerged as a strong force for the scaling up of solar energy deployment in India. While there have been some gaps (including low emphasis on decentralised solar applications), there is no doubt that a resource-specific mission brings to the fore issues that are specific to the resource within the country and globally, and helps bring together players and thinkers in the sector. A similar mission is being proposed for wind and is expected to have a similar impact.

An important mission that has been in the offing for many years is the National Bio-Energy Mission (also referred to in Briefing Paper # 5 in this series). This mission has a significant role in that it can potentially touch all thematics of energy access through renewable energy: grid-connected electricity, micro grids, off-grid devices (like biomass-based spice dryers), cooking, and other thermal applications (for both household and commercial uses).

will continue to be anchored around the MNRE and the network of SNAs. It goes without saying that both the MNRE and the SNAs need considerable strengthening in terms of skills and financial resources.

Nevertheless, in order to mainstream the deployment of DRE for SEA, a range of institutional transitions will be required at the national level as well as at the sub-national/local levels. AIREC envisions the need for a national-level organisation to spearhead and advise the efforts. DRE by its very nature needs strong local connections and so there will have to be institutional anchors at the local level.

National-level Sustainable Energy Access Advisory (SEAA)

Fashioned on the model of RITES, which set out as a consultancy organisation for the railways and has now evolved into a 'multi-disciplinary consultancy organisation in the fields of transport, infrastructure, and related technologies,' SEAA is envisioned as a specialist consulting services provider to:

- Central government ministries and agencies
- State and sub-state governmental agencies including SNAs and District Rural Development Agencies (DRDAs)
- Private sector enterprises
- Banks and financial institutions
- Educational, training, and capacity-building organisations and pro-grammes
- Social enterprises and NGOs

AIREC suggests that the SEAA be an independent and autonomous consulting organisation that is preferably (though not necessarily) a profit-making corporate entity. Whatever legal form the SEAA may take, it is important for the organisation to be:

- Accountable for its actions and recommendations

- Self-sustaining
- Deeply committed to the cause of sustainable energy access
- Visionary in its approach
- Technically sound
- Strong on implementation aspects, including project management, financing, last-mile services delivery, and cost optimisation
- Strong on managerial skills
- Technology and resource agnostic

SEAA: Scope of work and mechanisms for delivery of objectives

Given the critical gaps in energy access, some of the priority assignments that the SEAA should be commissioned to undertake include the following:

- Conceptualise a national energy access plan
- Develop DRE portfolios in various ministries
- Integrate energy access into local development planning
- Develop standards for DRE systems and devices
- Provide advisory services to multiple agencies to facilitate DRE deployment

It would be extremely difficult for any new organisation to take on such a large task on its own. Several of these activities would have to be initiated by various interested agencies, who would then commission the SEAA to work with a team of experts that include practitioners, technocrats, and policy specialists, as summarised in the Table below.

Activity	Incubator and/or initiator	Role of SEAA	Key inputs required
Conceptualise the national energy access plan	MNRE	Conceptualise and design the plan, ensure inter-ministerial coordination	Involvement and commitment of MNRE, MoP, and MoPNG
Developing DRE portfolios in various ministries	Various ministries (see indicative list below) and MNRE	Examine energy needs of each ministry; explore DRE options to meet the need reliably and effectively	Practical and technical inputs from renewable energy technology providers
Integrating energy access into local development planning	Ministry of Rural Development through State Rural Livelihoods Mission and DRDAs	Analyse and communicate how energy access is critical to development and livelihoods and how DRE options can provide the much needed energy access	Practical and technical inputs from renewable energy technology providers, SNAs and/or local and community involvement through grassroots agencies like NGOs, and self-help groups (SHGs).
Develop standards for DRE systems and devices	MNRE	Develop performance benchmarks and corresponding field-based test protocols for various applications	Practical and technical inputs from renewable energy technology providers, performance testing laboratories and experts
Provide advisory services to agencies to facilitate DRE deployment	MNRE and SNAs	Develop training resource modules, and prepare a training strategy (who to train, when, for how long, on what topics, pedagogy)	Practical and technical inputs from renewable energy project implementers and technology suppliers, and educational and vocational training institutions

Conceptualising a multi-agency energy access plan

Energy access is now recognised as a vital input for development. Thus far, energy access endeavours in the government corridors have been confined to rural electrification through grid extension, clean cooking energy provision (through LPG subsidies, programmes for improved cookstoves and biogas plants), and technology/resource-specific incentives for renewable energy deployment. These efforts have been driven mainly by various disconnected schemes of the MNRE, the MoP (Ministry of Power), and to a lesser extent the MoPNG (Ministry of Petroleum and Natural Gas).

It is suggested that an inter-ministerial and inter-agency energy access plan be developed. This may be led or incubated by the MNRE but should work in close contact with:

- All other relevant energy ministries (MoP, MoPNG) as well as other ministries that can potentially provide feedstock fuels (MoEF, Ministry of Agriculture).
- Sectors with energy requirements (including livelihoods sectors like agriculture, horticulture, dairy, fisheries, handicrafts, small and medium enterprises, and social services. Services like water and sanitation, education, and healthcare are also critical.
- Agencies that can provide critical inputs and catalysts such as the Department of Science and Technology for technical know-how and advisory, the National Bank for Agriculture and Rural Development (NABARD) for financing mechanisms, and entrepreneurial development institutes under the Ministry of

Education for the development of a skilled manpower base.

Developing energy portfolios: Placing energy access within the larger development context

AIREC recognises that stand-alone efforts, like the provision of solar lanterns, with little regard to their long-term maintenance and with little connection to other development needs (such as drinking water, sanitation, and health care) are bound to meet with limited success. On AIREC's agenda is to place energy access within the larger development policy framework, integrating energy access portfolios (mainly DRE) with interventions and programmes of various government ministries and agencies. This could enable us to simultaneously

address challenges in scaling up DRE while enhancing the developmental and environmental spinoffs from energy access provision. Some initial illustrative examples of DRE integration across ministries and agencies could include the following:

- Ministry of Human Resources Development (MoHRD) and the National Skills Development Council: Integrate DRE into curricula for skills development to address the manpower void that the sector faces.

- Various ministries: Replace unreliable grid power and diesel generators with DRE options in community services like district hospitals (through Ministry of Health and Family Welfare), government schools, anganwadis, and hospitals (MoHRD), water pumping (Ministry of Water Resources), street lighting (municipal corporations and Ministry of Rural Development).

- Various ministries: Provide reliable electricity to facilitate communication and access to information technology (computers in schools, farmer information kiosks, banks and commercial services in rural areas, government offices).

- Ministry of Rural Development: Integrate DRE programmes with the National Rural Livelihoods Mission.

Weaving energy access into local development planning

Recognising that energy access—like all development issues—cannot be addressed through a top-down approach with central planning, SEAA is expected to provide inputs also at the state or sub-state levels. While, at the national level, SEAA's assignments may be strategic or visionary, at the sub-national level, they would provide technical and management advisory services for implementation and operation of specific projects or programmes. SEAA may also be involved in capacity building and technical support for SNAs. It is recommended that state governments approach the SEAA to strategise the integration of energy access into the portfolios of local planning agencies, including DRDAs and village panchayats. If energy access can be woven into local development planning, it has a larger likelihood of materialising and providing more than token energy access.

Developing standards and benchmarks for various categories of DRE systems and devices

The DRE sector is currently segmented into micro grids and various categories of thermal, electric, and lighting devices. Standards for these systems were developed by the MNRE in an ad hoc manner around schemes as and when they were needed. There is an urgent need for a single agency to lay down standards and benchmarks across the DRE sector; standards that reflect reliability, which is the strongly voiced need of the users. Given that most DRE devices are handled directly by users, their involvement in specifying criteria for quality of services and maintenance is important. The SEAA can lead the way in devising a common system of standards across the DRE sector. While the actual norms will vary from device to device, the principles should remain the same. A strong monitoring framework must also be developed.

Capacity building for DRE

While the MNRE works through a network of organisations like the National Institute of Solar Energy and the Centre for Wind Energy Technology that provide both technical inputs and capacity building services, the focus of these organisations is on technical research and their scope is resource/segment specific (e.g., solar or wind). As a technology agnostic entity, SEAA could fill the gap using their rich implementation experience. In addition to conducting training programmes for potential DRE entrepreneurs and trainers, an important role for SEAA will be to strategise capacity building so that 'green jobs' are created and optimised in the DRE sector (as outlined in Paper # 1 in this series).

Advisory services to various agencies

Beyond involvement with government at the central, state and sub-state levels, SEAA will have an important mission to reach out to various agencies and activities that are required to catalyse and facilitate the scaling up of DRE for SEA. These include banks and financial institutions, including microfinance institutions, NGOs, product developers, and project implementers. All of these agencies have a key role to play in ensuring the success of DRE projects and programmes being planned. While in some cases SEAA would provide specialised technical inputs on DRE, in other instances (e.g., financial institutions), the SEAA will enable organisations to assess appropriate risks and potential of an endeavour. Indirectly, through its various assignments, the SEAA will contribute to the creation of confidence in DRE technologies and also in busting myths and clearing up misperceptions. It is now widely recognised that the risks around DRE tend to be overstated and misunderstood, especially among the financial community.

Institutional transitions at the local grassroots level

Alongside the development of the SEAA at the central level, with offices at various locations across the country as required, it is also important to explore institutional transitions that are needed at the local level. Whether an institutional transition or development is likely to be useful may be examined through the following four-point checklist:

- Does it build a better connection with the local community?

- Does it help to scale up benefits for the local community?

- Does it improve the economics and efficiency of delivery?

- Does it help forge cross-sectoral linkages?

Some on-the-ground developments that are already taking shape and meet these criteria include the following points. Each should be examined carefully and taken up for further development.

- **Involvement of microfinance institutions (MFIs) as financing, distribution and service agents,** DRE financing has always been a challenge given the small, scattered financing requirements and resultant high transaction costs. To overcome this challenge, DRE players have approached MFIs (who are already in touch with the locals and understand their finance flows and payment capacity). MFIs have increasingly been roped in as end-use financiers with additional roles of distribution and maintenance. MFIs have little motivation towards energy access per se, so there is a risk that they may switch to other products or services if they find them more attractive or less challenging. Securing continued commitment of MFIs to energy access will be a challenge.

- **Evolution of MFIs and NGOs as aggregators.** DRE device manufacturers and suppliers have opted to work with MFIs and NGOs who act as intermediaries and aggregators to help them overcome the challenge of low operating margins resulting from dealing with large numbers of low-value items. The use of intermediary agencies has the negative result of a disconnect between suppliers and endusers.

- **Involvement of women's groups and SHGs in manufacture and service.** There are several instances of local women being involved in manufacturing cookstoves and working in biogas plants. This has several positive spinoffs: women are gainfully employed, and users are able to source and maintain their devices easily and locally. Decentralised manufacture encourages the use of local materials and local human resources, but can be a challenge in terms of maintaining standards and quality.

- **Retraining local technicians and skilled youth to work in DRE.** Masons retrained to also build cookstoves and biogas plants, local plumbers as solar pump engineers, local electricians and refrigeration technicians as micro grids service persons—these are some examples of local technicians and youths who could double up as DRE specialists through sound training.

- **Local entrepreneuship incubators.** The development of entrepreneurship incubation facilities at larger DRE setups and in academic institutions and business schools would provide a career path for local youth desirous of venturing into DRE for SEA.

- **Parallel development of DRE enterprises that employ the pay-as-you-use model alongside of a device ownership model.** Previously, villagers visited solar charging stations to charge their solar lanterns and mobile phones. Today, there are numerous models being tried: renting solar lanterns, offering drinking water or hot water (purified or heated centrally at an renewable energy-powered kiosk), renewable energy-powered community centres equipped with small machines like a sewing machine or bamboo splitting machine, which are operated on a pay-per-use model. While these models are useful, as economic activity picks up and household incomes rise, the desire to own devices will grow and these 'renting' models may fizzle out.

Principles of institutional transitions

In summary, whatever institutional reform is being considered—whether or not it involves the setting up of new agencies or is merely a recasting of existing ones—should in the very least ensure that some basic criteria are met. A range of practitioners and other stakeholders with on-the-ground experience must be involved. Local needs and aspirations must always drive institutional and other transitions if DRE is to provide SEA effectively. It is important for DRE to break out of the MNRE to network with the rest of the energy sector and to reach out to potential energy end-use sectors. The SEAA is seen as a centrepiece of the proposed institution transition. It will play a key role in building bridges across sectors, and in meeting energy access gaps sustainably and efficiently. SEAA is also seen as evolving into an exporter of specialist advisory services to other countries looking to expand their DRE portfolio.