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DEVELOPING EFFECTIVE NETWORKS FOR ENERGY ACCESS

AN ANALYSIS

AUGUST 2013

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GLOSSARY OF ABBREVIATIONS	
ACORE	American Council on Renewable Energy
ADB	Asian Development Bank
AEEE	Alliance for an Energy Efficient Economy
AIC	Ashden India Collective
AMORE	Alliance for Mindanao Off-Grid Renewable Energy
ARE	Alliance for Rural Electrification
AREA	African Renewable Energy Alliance
AREP	Accelerated Rural Electrification Programme
ASE	Alliance to Save Energy
ATI	Advanced Training Institute
BIS	Bureau of Indian Standards
BRECDA	Barangay Renewable Energy and Community Development Associations
BVT	Bharatiya Vikas Trust
CEEW	Council on Energy, Environment and Water
CGPL	Combustion, Gasification and Propulsion Laboratory
CII	Confederation of Indian Industry
CSR	Corporate Social Responsibility
C-WET	Centre for Wind Energy Technology
DDG	Decentralized Distributed Generation
DGET	Directorate General of Employment and Training
EIL	Engineers India Limited
GAIL	Gas Authority of India Limited
ELDF	EnviroLegal Defence Firm
GOGLA	Global Off-Grid Lighting Association
GSES	Global Sustainable Energy Solutions
IBPA	Indian Biomass Power Association
ICLEI	International Council for Local Environmental Initiatives
IEC	International Electrotechnical Commission
IESA	India Energy Storage Alliance
IFC	International Finance Corporation
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
InWEA	Indian Wind Energy Association
IREF	Indian Renewable Energy Federation
ITI	Industrial Training Institute
JNNSM	Jawaharlal Nehru National Solar Mission
LG-QTM	Lighting Global Quality Test Methodology

GLOSSARY OF ABBREVIATIONS	
M&V	Measurement and Verification
MNP	Minimum Needs Programme
MNRE	Ministry of New and Renewable Energy
NABARD	National Bank for Agriculture and Rural Development
NEP	National Electrification Policy
NGO	Non-governmental Organisation
NIT	National Institute of Technology
NRLM	National Rural Livelihoods Mission
NTPC	National Thermal Power Corporation
NVI	New Ventures India
PRADAN	Professional Assistance for Development Action
R&D	Research and Development
RE	Renewable Energy
REDCO	Rural Energy Delivery Companies
REEEP	Renewable Energy and Energy Efficiency Partnership
REWG	Renewable Energy Working Group
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana
RUDSETI	Rural Development and Self Employment Training Institute
SFCBA	Solar Finance Capacity Building Alliance
SMEs	Small and Medium Scale Enterprises
SPEED	Smart Power for Environmentally Sound Economic Development
TERI	The Energy and Resources Institute
USAID India	United States Agency for International Development India
VLE	Village Level Entrepreneurs
WADE	World Alliance for Decentralised Energy
WWF	World Wide Fund

DEVELOPING EFFECTIVE NETWORKS FOR ENERGY ACCESS: IMPLEMENTATION ROADMAP

1. INTRODUCTION

The challenge: Reduce operational costs and financial risks to stimulate the market and sustainable business models for off-grid renewable energy.

India is the world's fifth largest electricity producer, but 45% of rural households do not have access to electricity. The off-grid sector offers a range of business models, across technologies and scales of operation, through leasing, sales of home systems, community-based products, and mini grids with productive anchor base loads. Moreover, energy access in rural areas offers opportunities that go beyond minimum requirements for electricity and heat. It creates the foundation for livelihoods, investments in more value added activities, and social benefits in the form of access to education or improved health outcomes.

Investments in the energy sector depend on at least one of three necessary conditions: the promise of a long-term revenue stream; reduced risks for investors and entrepreneurs (especially for capital investments); and reduced operational (variable) costs. Barring projects using anchor loads (such as cell phone towers), off-grid projects would generally struggle to guarantee long-term revenue flows. In order to stimulate the off-grid market, either operational costs have to be reduced or mechanisms have to be developed to reduce financial risks. There is, of course, the route of providing direct grants (government subsidies, philanthropic donations, etc.) to off-grid firms, but such measures will not create conditions for the evolution of sustainable businesses in a vibrant off-grid market.

Is there a case to bring together a diverse set of stakeholders?

United States Agency for International Development India (USAID India) through the Council on Energy, Environment and Water (CEEW), sought to understand the potential for a countrywide network to help facilitate and scale-up off-grid renewable energy and energy access solutions. In developing this analysis, CEEW has conducted extensive desk research, had one-to-one interactions with over 100 individuals and held three stakeholder consultations. During the course of the project 250 firms working in this sector in India have also been identified.

A countrywide network for energy access and renewable energy could deliver operational services to off-grid energy entrepreneurs at costs lower than if the firms had to internalize the costs. Extensive analysis and stakeholder consultations across the country have revealed two core sets of services: technology development, testing and certification; and skills and

training. Specifically, the countrywide network would: work towards standardizing performance benchmarks for technologies; facilitate technology testing by leveraging existing academic institutions; and coordinate activities to support innovation linkages between firms and research and development (R&D) institutions. On skills and training, the network would facilitate trainings for technicians and for managers for off-grid enterprises. Any of these tasks would cost individual firms more than if derived from the collective benefit of the network's services. In addition it could deliver range of information and facilitative services in the areas of knowledge and networking, and policy advocacy.

How could financial risks be reduced?

There are potentially large financiers within and outside India looking for opportunities in renewable energy or "impact investing" in rural markets. Equally, there are large numbers of very small firms delivering energy services but which have been unable to scale or replicate for reasons described above. An intermediate institution (National Bank for Agriculture and Rural Development (NABARD), large public sector or private sector bank, Power Finance Corporation, etc.) could create a window or a fund of funds to offer one of two interventions: a loan guarantee for off-grid enterprises; or bundle projects to offer a portfolio that normalizes the risk across projects. In this manner, the intermediary fund could funnel large amounts of money from above to large number of small projects on the ground. The countrywide network could also provide support by organizing investor forums, or connecting entrepreneurs and supply chain vendors.

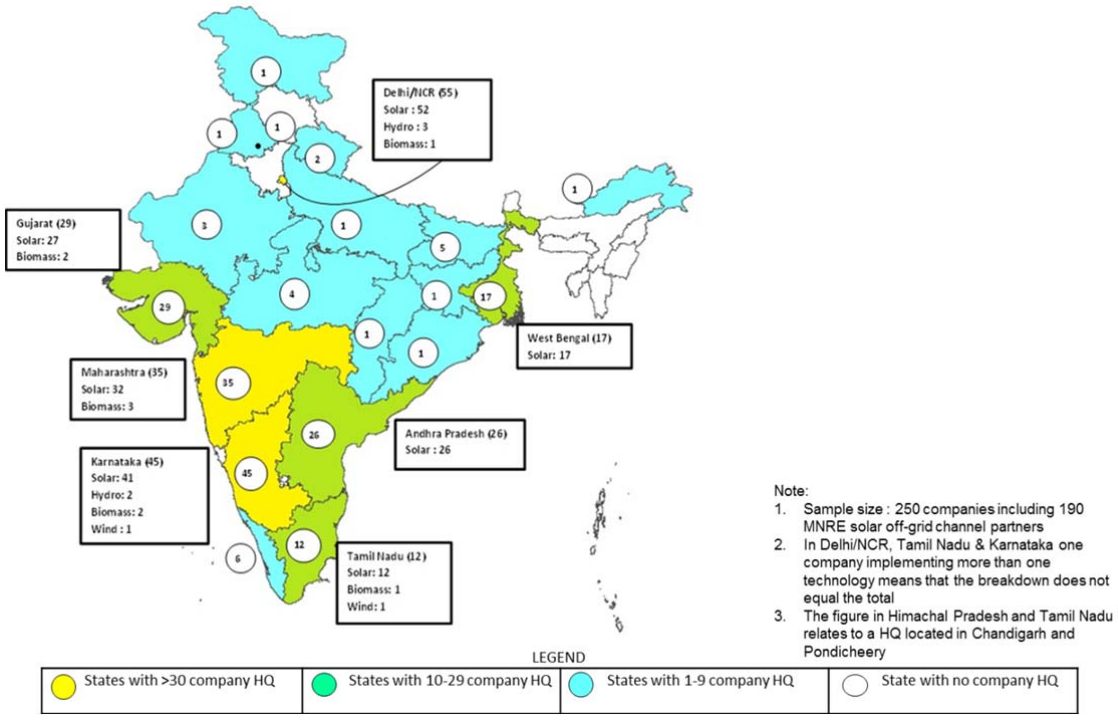
This report outline the key findings from this work to ascertain the need for an alliance or network to facilitate and upscale business solutions; what services and activities such a network may deliver; and how these services may be delivered. Initially major bilateral donors and strategic philanthropists will be required to support the countrywide network, but over time the challenge will be to make such a network financially sustainable.

2. BACKGROUND

2.1 Challenges of diversity and complexity

The 2011 census estimates there are 80 million households in India with limited or no access to electricity.[1] About 250 enterprises were (figure 1) identified around the country that provide solutions to these underserved communities. Although the activities of enterprises may be spread far and wide, the entities themselves often have headquarters in the major cities.

Figure 1: Enterprises providing off-grid solutions

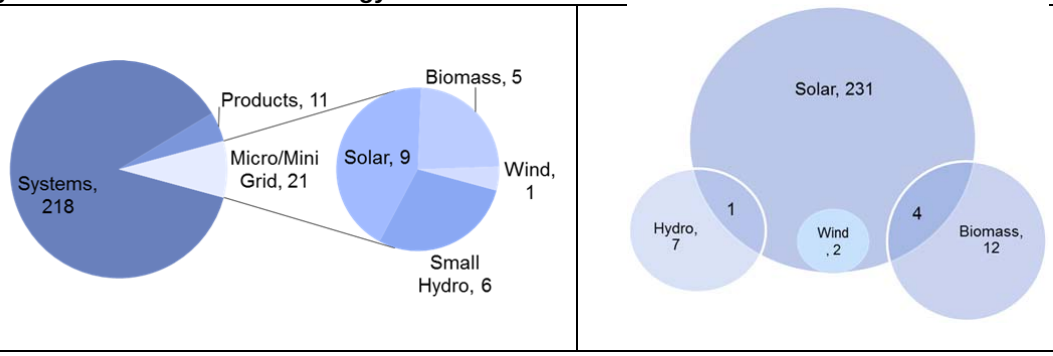


Source: CEEW analysis

The solutions provided range in scale from solar lanterns to micro and mini-grids. There is a mix of technologies being deployed in these communities, such as solar, biomass and hydro, but solar is by far the dominant choice (figure 2).

[1] Census of India 2011 "Source of Lighting" available at http://www.censusindia.gov.in/2011census/hlo/Data_sheet/Source%20of%20Lighting.pdf; accessed 19 February 2013

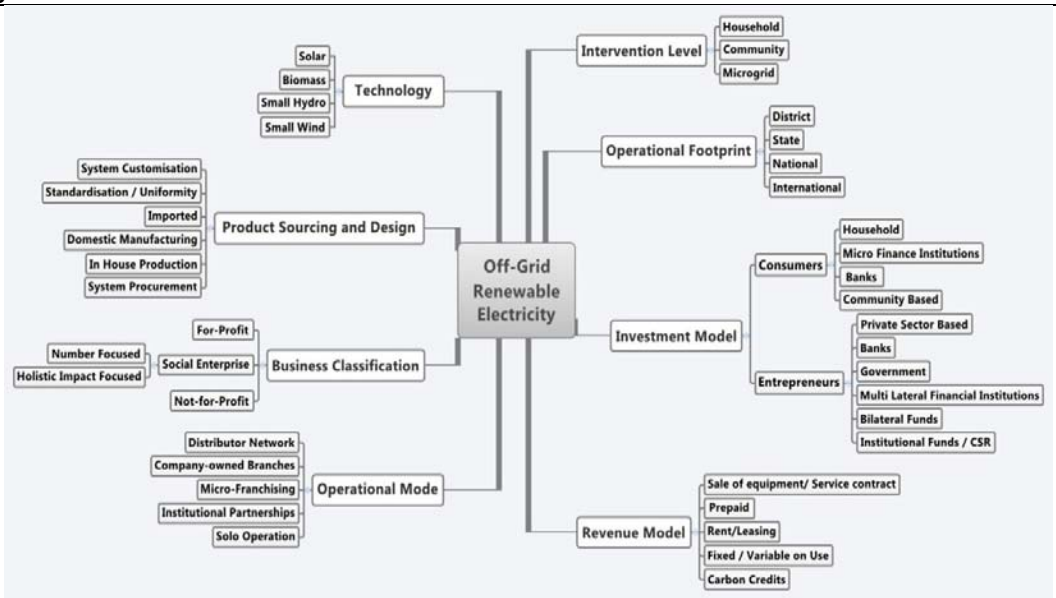
Figure 2: Solutions and technology choices



Source: CEEW analysis

However, choosing what technology and how best to deploy it can be a difficult task. Given the diversity of situations and end user needs, entrepreneurs are faced with a multitude of choices when deciding how best to deliver products and services (see figure 3). They will need to make choices as to whether they are for-profit, or a social enterprise; whether they are selling products, or implementing larger scale solutions and subsequently how they will then service their customers. Many of these choices often result in entrepreneurs finding it difficult to scale their activities, and operating within self-limiting models.

Figure 3: Business models



Source: CEEW analysis

2.2 Policies for expanding access to electricity

In the past 40 years the Government of India has initiated numerous programs aimed at promoting rural electrification. These programs had different mandates and were either discontinued or merged with the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). Launched in 2005, the RGGVY aims to electrify all villages and habitations with a provision of access to electricity to all households through grid extension. For villages where grid may not be extended, projects may be commissioned through the Decentralized Distributed Generation (DDG) Programme. Table 1 lists key past government policies.

Table 1: Timeline of past government policies and programs

Year	Policy
1974 – 2004	Rural Electrification under "Minimum Needs Programme (MNP)"
1998 – 2004	Kutir Jyoti Yojana
2000 – 2005	Pradhan Mantri Gramodaya Yojna (Prime Minister's Rural Development Programme)
2003 – 2004	Accelerated Rural Electrification Programme (AREP)
2004 – 2005	Accelerated Electrification of one lakh (100,000) villages and one crore (10,000,000) households

Source: CEEW compilation

Past schemes faced significant challenges in the form of poor financial health of electricity boards; inadequate sub-distribution system facilities; bureaucratic delays and lengthy administrative processes for routing financial assistance to implementing agencies; and lack of community participation.

The Electricity Act 2003 (hereinafter, "the Act") sought to bring a transformation in the electricity sector seeking to create liberal and transparent framework for power development. It specifically focused on both rural electrification and renewable energy (RE) at the central policy level, which had not happened in the past.

The Act explicitly calls for the formulation of a National Electrification Policy (NEP) and Tariff Policy to support optimal utilization of resources, such as coal, natural gas, nuclear substances, hydro and renewable sources of energy.[2] The Act also mandates the central government to formulate policies for stand-alone power systems for rural electrification based on both renewable and non-conventional sources of energy.[3]

Currently, four major programs are being implemented by the Ministry of Power and Ministry of New and Renewable Energy (MNRE) which aim to promote rural electrification.

[2] Electricity Act 2003, Section 3(1).

[3] Electricity Act 2003, Section 4.

Table 2 : Rural electrification programs	
Ministry	**Programme**
Ministry of Power	• Rajiv Gandhi Grameen Vidyutikaran Yojana (Rajiv Gandhi Rural Electrification Programme) • Decentralized Distributed Generation Programme
Ministry of New and Renewable Energy	• Formerly Remote Village Electrification Programme (to be potentially renamed as the 'Energy Access Scheme') • Off-Grid Power/Energy Programme
Source: CEEW compilation	

The MNRE provides financial support for electrification of villages and hamlets not covered under the RGGVY. Such sites are provided with basic facilities for electricity/lighting through renewable energy sources. In parallel the ministry is also implementing a programme for stand-alone power systems for individual projects with pre-approved specifications. The assistance may differ on basis of technology and project site.

Multiple programs with different mandates often make the policy environment in India complex. At times enterprises find it difficult to understand them and operate in a constraint environment. This has led to building up of few networks which may provide a single voice to their policy concern.

In addition to the Ministry of New and Renewable Energy, other government ministries, such as, the Ministry of Rural Development (MoRD) and the Ministry of Human Resource Development (HRD) have started to focus on energy access solutions.

2.3 Scanning alliances within and outside India

The previous section illustrated central and state government efforts to encourage rural electrification, with increased impetus seen following the introduction of the RGGVY in 2005. Despite these initiatives, expanding energy access to the underserved still remains a daunting challenge for off-grid entrepreneurs.

Off-grid renewable energy service providers have been hampered by myriad obstacles, including lack of skilled workers, markets flooded with inferior quality products, unsupportive policy environments, inadequate financing, and limited knowledge transfer and opportunities for networking and collaboration.

Against this backdrop, several domestic and international alliances and networks, mainly propelled by multilateral funding agencies, have stepped in to alleviate the challenges to the effective delivery of energy services.

Various alliances, networks, and partnerships active in India and overseas were assessed for this report. The analysis drew upon stakeholder consultations and desk research of a sample of seven domestic alliances and fifteen alliances active internationally, particularly those international alliances whose work focuses on extending sustainable, renewable energy solutions to developing countries (table 3). The alliances covered in the study cut across sectors such as energy efficiency and energy storage, and are not restricted to any one particular renewable energy technology. This was crucial to understand what works, and what could be done to ensure that any overarching alliance in India provides access to a basket of solutions that are valuable to any potential members.

Table 3: List of Indian and international alliances mapped in this study

Indian alliances	
Alliance for an Energy Efficient Economy (AEEE)	Formed in 2008, AEEE addresses barriers to energy efficiency through capacity building of energy professionals; policy advancement and networking; research and knowledge sharing. It works closely with international agencies like ClimateWorks Foundation, USAID and has been invited to participate in various national level initiatives such as Super EE Equipment Programme, Advance Metering, etc.
Ashden India Collective (AIC)	Constituted by former India-based winners of the international Ashden Awards for Sustainable Energy so that they can act as a unified voice in influencing energy policy in India to accelerate access to renewable energy; currently working towards a favorable mini-grids policy.
Indian Biomass Power Association (IBPA)	Member-driven organization with the goal of increasing the use of biomass power and creating new jobs and opportunities in the biomass industry.

Table 3: List of Indian and international alliances mapped in this study	
India Energy Storage Alliance (IESA)	Launched in 2012 by Customized Energy Solutions Pvt Ltd to promote commercialization and adoption of energy storage technologies; estimated India market potential of energy storage to be 15 GW by 2020; provided inputs for Rural Electrification Corporation with respect to policies related to annual procurement of solar installations and batteries.
Renewable Energy Working Group (REWG)	Set up in 2010 (outcome of Khemka Forum on Social Entrepreneurship) to act as representatives delivering clean and sustainable energy solutions to the poor.
Solar Finance Capacity Building Alliance (SFCBA)	Constituted in 2003 by InsPIRE Network for Environment (InsPIRE), Syndicate Bank (SB), Centre for Technology Development – Non - governmental Organisation - Resource Centre (CTD NGO-RC), BharatIiya Vikas Trust (BVT), and the United States Agency for International Development (USAID), India; remained functional till 2007.
Smart Power for Environmentally Sound Economic Development (SPEED)	Launched in 2008 and aims to leverage the power needs of cell-towers as an anchor load to create a cleaner power infrastructure for the underserved.
International alliances	
African Renewable Energy Alliance (AREA)	Global platform for policy makers, business, civil society and academia to exchange information and consult about policies, technologies and financial mechanisms for the accelerated uptake of renewable energies in Africa.
Alliance for Mindanao Off-Grid Renewable Energy (AMORE)	Working in Mindanao, Philippines since 2002 to provide energy access to poor, remote, and mostly conflict-affected communities that cannot be connected to the power grid using clean and indigenous stand-alone renewable energy systems such as solar and micro-hydro.
Alliance for Rural Electrification (ARE)	Created in 2006 to focus on the promotion and the development of off-grid renewable energy solutions for rural electrification in developing countries and to facilitate the involvement of ARE members in the emerging rural energy markets.
Alliance to Save Energy (ASE)	Promotes energy efficiency worldwide through research, education and advocacy.
American Council on Renewable Energy (ACORE)	It is a non-profit membership organization, dedicated to building a secure and prosperous America with clean, renewable energy. ACORE provides a common educational platform for a wide range of interests in the renewable energy community, focusing on technology, finance and policy.
Asian Development Bank 's (ADB) Energy for All (E4All)	Formed in 2008 to build platforms for cooperation, exchange, innovation, and project development for solutions to widespread energy poverty.

Table 3: List of Indian and international alliances mapped in this study	
Energy Access Practitioner Network	Launched in 2011 by the UN Secretary-General as “network of networks”, it is a complementary organization to the Global Alliance for Clean Cookstoves and also a component of the Sustainable Energy for All initiative. The UN Foundation launched Sustainable Energy Network Ghana (SENG) in May 2013, which is the first country affiliate of the global Energy Access Practitioner Network; also plans to have a sub-network in India.
Global Alliance for Clean Cookstoves	The Alliance’s "100 by 20" goal calls for 100 million homes to adopt clean and efficient stoves and fuels by 2020. It is currently working on evolving international standards with ISO; formulating field testing protocols; funding R&D initiatives.
Global Off-Grid Lighting Association (GOGLA)	It was conceived out of the joint World Bank/IFC effort to provide a sustainable exit strategy for Lighting Africa initiative and aims to be the voice of all market players involved in off-grid lighting sector.
International Finance Corporation (IFC)’s Lighting Africa Initiative	Launched in 2007 and aims to facilitate the transition from fuel-based lighting to clean, modern lighting.
International Renewable Energy Alliance (REN Alliance)	Established during the Bonn 2004 International Renewable Energy Conference to bridge the gap between policy and practice by building on the synergy of its partner organizations to achieve progress through their collective experience and knowledge.
Renewable Energy and Energy Efficiency Partnership (REEEP)	Established alongside the 2002 World Summit on Sustainable Development in Johannesburg, it acts as a funder, information provider and connector for up-scaling clean energy business models.
Rural Energy Delivery Companies (REDCO) Alliance	Network of rural energy delivery companies (REDCOs) established in 2005 to focus on expanding service to rural areas, particularly with solar energy.
Renewable Energy Policy Network (REN21)	It is a global renewable energy policy multi-stakeholder network to facilitate knowledge exchange, policy development and joint action towards a rapid global transition to renewable energy.
World Alliance for Decentralized Energy (WADE)	Established in 2002 to accelerate the worldwide deployment of decentralized energy systems.
Source: CEEW compilation	

Aside from alliances, incubators in India act as enablers for small- and medium-scale entrepreneurs operating in the off-grid renewable energy domain, for example, New Ventures India (NVI), Ennovent, Villgro, the SELCO Incubation Lab and Small Scale Sustainable Infrastructure Development Fund (S3IDF).

Origin of alliances

The proliferation of alliances within India and overseas is driven by a wide variety of actors and institutions. In some cases, the key driving force behind an alliance is an individual or a group of like-minded individuals. For example, the Renewable Energy Working Group (REWG) was conceptualized by a group of individuals with significant experience in the off-grid sector. Elsewhere, multilateral agencies, such as the International Finance Corporation (IFC), Asian Development Bank (ADB), or philanthropic foundations, such as the Rockefeller Foundation, USAID and United Nations Foundation, have been responsible. Examples include Smart Power for Economically Sound Development (SPEED) constituted by the Rockefeller Foundation; the Lighting Africa initiative launched by IFC; the Alliance for Mindanao Off-Grid Renewable Energy (AMORE); and the Solar Finance Capacity Building Alliance (SFCBA) were conceived by the United States Agency for International Development (USAID); and the Energy Access Practitioner Network was propelled by the UN Foundation. The genesis of the Renewable Energy and Renewable Energy partnership (REEEP) was funded by the U.K. government in 2002.[4]

Moreover, political leaders and private sector enterprises have also played a role. For example, the Alliance to Save Energy (ASE) was founded in 1977, by Senators Charles H. Percy and Hubert H. Humphrey, on the heels of the global energy crisis fuelled by the OPEC oil embargo. The Indian Energy Storage Alliance (IESA) was instituted by a private enterprise, Customized Energy Solutions, to promote the commercialization and adoption of energy storage technologies in India.

The origin/formation of most of the alliances examined in this study has been financially supported by multilateral funding agencies and international foundations such as IFC's Lighting Africa Initiative, USAID, the Rockefeller Foundation, the UN Foundation and Ashden. The genesis of the Renewable Energy and Renewable Energy partnership (REEEP) was funded by the U.K. government in 2002.[5] There is no clear evidence that networks and alliances have been able to move away from grant funding, especially in the case of small scale entrepreneurs such as those found in the off-grid sector. AEEE and the IESA target much larger companies and have had some success in generating revenues from subscriptions.

[4] REEEP (2012) "Policies for Large Scale Adoption of Renewable Energy Technologies -
The Design of adapted Feed-in Tariffs for Developing Countries" available at http://www.reeep.org/sites/default/files/Policies%20for%20Large%20Scale%20Adoption%20of%20Renewable%20Energy%20Technologies.pdfl; accessed 28February 2013

[5] REEEP (2012) "Policies for Large Scale Adoption of Renewable Energy Technologies -
The Design of adapted Feed-in Tariffs for Developing Countries" available at http://www.reeep.org/sites/default/files/Policies%20for%20Large%20Scale%20Adoption%20of%20Renewable%20Energy%20Technologies.pdfl; accessed 28February 2013

Governance of alliances

The governance framework of the alliances, which have been examined for this study, depends on their scale of operation, size and objectives or purpose. A governing Board/Board of Directors assumes the top position in a formal hierarchy of authority for most alliances active internationally, such as Alliance for Rural Electrification (ARE), Global Off-grid Lighting Association (GOGLA), Renewable Energy and Energy Efficiency Partnership (REEEP), and the Global Alliance for Clean Cookstoves. The Governing Boards are often assisted by an Advisory Board or Secretariat (or committee) in its work. The Steering Committee serves as the principal governing body responsible for the strategic direction and operational oversight of alliances, such as ADB's Energy for All (E4All) and REN21.[6, 7]

The importance of a formal governance structure is illustrated in cases when even small groups require consensus on policy positions or other plans of action. For instance, during the consultations, stakeholders noted that the REWG has faced challenges in building consensus and maintaining momentum in the absence of a formal governance structure and a secretariat, even though members endorse the need for such a network.

[6] WBCSD "WBCSD and Energy for All Partnership of the Asian Development Bank - presentation", available at http://www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=34&nosearchcontextkey=true; accessed 5 March 2013

[7] REN21 "Steering Committee", available at http://new.ren21.net/AboutREN21/SteeringCommittee.aspx; accessed 7 March 2013

Activities of alliances

Alliances acting as enablers for renewable energy, energy efficiency or energy storage sectors typically offer a variety of services, the combination of which differs by alliance.

Policy: Although, progress has been made on the policy front over the last few years, as illustrated in section 1, significant policy barriers still persist.

The majority of alliances (both Indian and overseas) in the sample are focused on policy advocacy, as shown in figure 4. However, policy advocacy efforts by Indian alliances seem to fall short due to a lack of consensus and a perception that groups are dominated by a few well-established firms. Several stakeholders also mentioned that they did not have the capacity to engage at a policy level.

Advocating for policy changes is achieved either through direct and active engagement with governments and policymakers or by conducting policy studies and formulating recommendations. For example, several members of the Ashden India Collective (AIC) have provided inputs into plans for the second phase of the government's flagship Jawaharlal Nehru National Solar Mission (JNNSM), which aims to mainstream off-grid solar power.[8] However, at present, the Ashden India Collective is pushing for a favorable policy climate for mini grids.

Financing: Access to all types of finance (start-up funds, operating capital, and project finance) is a key constraint for the entrepreneurs working in the off-grid renewable energy sector, which in turn is exacerbated by additional challenges such as small project size, high capital costs of renewable energy systems relative to the incomes of targeted poor households, lack of proven track record, uncertain legal and policy frameworks, lack of existing retail and distribution channels to scale up deployment, and perceived technology risks due to a lack of familiarity by financiers with off-grid energy delivery solutions.

Eight out of fifteen overseas alliances facilitate financing while only two (SPEED and AEEE) out of seven Indian alliances have financing as one of their focus areas. In the sample of Indian alliances, SPEED is the sole alliance in the renewable energy domain working on securing finance to scale up mini-grid projects. SPEED is considering bundling projects in order to de-risk individual projects, reduce transaction costs, reach financial scale, and attracts sets of diverse finance including government and donor finance, impact investment capital, commercial capital, etc.[9] Project call facilities run by overseas alliances, such as

[8] Ashden India Energy Sustainable Collective "Scaling up Off - grid Renewables- Summary of recommendations" available at http://www.ashden.org/files/pdfs/reports/Ashden_scaling_up_off_grid_renewables.pdf; accessed 28February 2013

[9] Sustainable Energy for All – Workshop on facilitating energy access and security – Role of mini/micro grids, "PowerPoint on Smart Power for Environmentally-sound Economic Development by David Jhirad", available at "http://www.sustainableenergyforall.org/workshop-on-facilitating-energy-access-and-security-role-of-mini-micro-grids; accessed

REEEP and E4All Partnership, present viable ways to secure funding for entrepreneurs operating in the domain of energy access. ADB's E4All Partnership facilitates financial access to shortlisted project implementers via platforms such as the ADB's Investor Forum. Simpa Networks and Frontier Markets are some beneficiaries that received funding as a result of ADB's Investor Forum. It is also observed that consumer financing is not given importance by the alliances in the sample, with the exception of the Alliance for Mindanao Off-Grid Renewable Energy (AMORE). There is a need to develop mechanisms (perhaps by including microfinance institutions) to attract financing for low-income consumers.

Skills and Training: The absence of skilled human resources is a major factor that currently hinders the adoption of off-grid energy solutions. In many cases off-grid solar PV projects fall into disrepair due to the lack of suitable maintenance or the inability to have equipment repaired or replaced when it has failed. Discussions with various experts suggested that this barrier resonates beyond just off-grid solar technologies. Lack of skilled technicians and village level entrepreneurs (VLEs) hampers design, installation, repair and dissemination of improved biomass cookstoves. Likewise, decentralized hydro solutions and biomass gasifier installations are also constrained by a dearth of skilled technicians. Therefore, extending training and capacity building programs to support workforce development in off-grid energy is critical to the expansion of this sector and ensuring the sustainability of the energy solutions installed in communities. Training local people on system maintenance should also be complemented with marketing and selling skills to make the business model more successful.

Three out of the seven Indian alliances and six of the fifteen overseas alliances offer capacity/skill building support to a broad set of stakeholders, such as banks, end users, businesses, village level entrepreneurs, governments, etc. The InsPIRE Network for Environment acted as an implementing partner for the Solar Finance Capacity Building Alliance (SFCBA) in training senior executives of banks across India to convince them of the importance of lending in the area of solar energy by organizing conferences. It conducted 'Training of Trainers' programs in states of Karnataka, Kerala, Tamil Nadu, Punjab, Haryana, Uttar Pradesh, Rajasthan, Gujarat, West Bengal, and Orissa for appraisal and financing of solar energy products/projects.[10] More than 60 banks participated in the process, approximately 200 Branch Manager training programs were conducted across the states where Training-of-Trainers programs were organized, and at least 5,000 bank branch managers underwent training which led to more than 10, 000 solar lighting products being financed.[11]

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14 March 2013

[10] InsPIRE Network - Solar Finance Capacity Building Alliance, available at http://www.inspirenetwork.org/act_proj_ene_solar_financ_sfcba_13.htm; accessed 18 January 2013

[11] Winrock International (2010) "Making Solar products Affordable and Reachable", available at solar2010.renewableenergyindia.org/; accessed 28 February 2013

Drawing insights from the bankers' training programme of the SFCBA, an alliance could look to sensitize bankers regarding lending for off-grid energy solutions. Under the AMORE programme, community members are organized into Barangay Renewable Energy and Community Development Associations (BRECDA), and trained to operate and maintain the systems. AEEE in association with international scientific bodies are working towards capacity building programs of regulatory agencies and utilities to evaluate measurement and verification (M&V) programs.[12]

Technology: Product certification and labeling help to ensure product quality and operability, enhance innovation, build consumer confidence and boost the local off-grid market. Promoting standards for off-grid energy solutions does not feature on the agenda of the Indian alliances unlike overseas alliances, such as Energy Access Practitioner Network, IFC's Lighting Africa Initiative, GOGLA and Global Alliance on Clean Cookstoves. The Global Alliance on Clean Cookstoves promotes international standards for cookstoves to weed out inferior quality products from the market and thus bridge trust deficit with consumers.[13]

The Lighting Global Quality Test Methodology (LG-QTM) instituted under the aegis of IFC's Lighting Africa/Asia programme, was recently incorporated into an International Electrotechnical Commission (IEC) technical specification (IEC 62257-9-5) and has become the world standard for clean off-grid solar lighting products. IFC has partnered with policy and research organization, The Energy and Resources Institute (TERI) and upgraded its lab (in Delhi) that will certify solar lighting appliances based on IEC specifications.[14] The initiative came in the wake of poor quality and performance of products flooding the market targeted at the base of the pyramid consumers.

While standards are not always given the recognition of other focus areas such as financing and policy advocacy, CEEW's broader consultation with stakeholders shows that quality assurance can help enhance investor confidence. It is worth noting that none of the Indian alliances in the sample have this issue as their key focus area (figure 4).

Networking: All the overseas alliances in this study facilitate networking opportunities. These alliances are engaged in networking with partner organizations, international alliances and other key institutions, such as, NGOs and private enterprises at a global level that helps to further their objectives. Networking is facilitated through knowledge partner networks, joint learning online, events and workshops, and through study tours and joint research.

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[12] AEEE "Capacity Building", available at http://www.aeee.in/capacity-building; accessed 14 March 2013

[13] Global Alliance on Clean Cookstoves "Transformation strategies", available at http://www.cleancookstoves.org/our-work/transformation-strategies/#foster; accessed 20 February 2013

[14] IFC "IFC/World Bank Set Global Standard for Clean Off-Grid Lighting" available at http://www.ifc.org/wps/wcm/connect/region__ext_content/regions/sub-saharan+africa/news/ifc_world_bank_set_global_standard_for_clean_off_grid_lighting; accessed on 18 May 2013

All overseas alliances facilitate networking opportunities. Stakeholder interactions reveal that there is a dearth of effective networking opportunities and a common platform for entrepreneurs to come together, collaborate and share knowledge. IESA (in the sample of Indian alliances) and the overseas alliances set a good example for other Indian alliances in the context of building strong networking platforms, which can connect enterprises with not just peers but also investor networks and other stakeholders (government, NGOs, institutions).

Table 4 and figure 4 summarize the activities undertaken by the 22 alliances in the sample.

Table 4: What alliances do within India and overseas

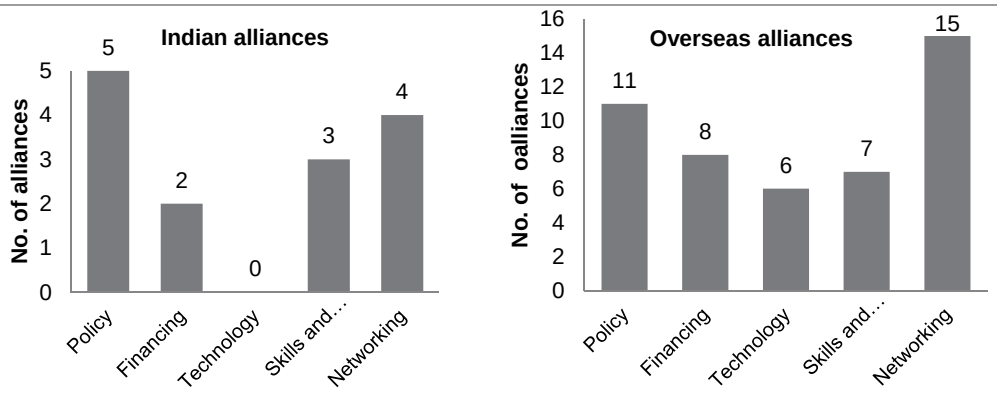
Alliance	Policy advocacy	Financing	Technology		Skills and training	Networking
			Testing & certification	Manufacturing		
Indian alliances						
AEEE	✓	✓	x	x	✓	✓
AIC	✓	x	x	x	x	x
IESA	x	x	x	x	x	✓
IBPA	✓	x	x	x	x	x
REWG	✓	x	x	x	x	✓
SFCBA	x	x	x	x	✓	x
SPEED	✓	✓	x	x	✓	✓
Overseas alliances						
AREA	✓	x	x	x	x	✓
AMORE	x	✓	x	x	✓	✓
ARE	✓	x	x	x	x	✓
ASE	x	x	✓	x	x	✓
ACORE	✓	x	x	x	x	✓

Table 4: What alliances do within India and overseas

Alliance	Policy advocacy	Financing	Technology		Skills and training	Networking
			Testing & certification	Manufacturing		
E4All Partnership	✓	✓	x	✓	✓	✓
Energy Access Practitioner Network	✓	✓	✓	✓	x	✓
Global Alliance on Clean Cookstoves	✓	✓	✓	x	✓	✓
GOGLA	✓	✓	✓	x	✓	✓
REN Alliance	✓	x	x	x	x	✓
Lighting Africa Initiative	✓	✓	✓	✓	✓	✓
REEEP	x	✓	x	x	✓	✓
REDCO	x	✓	x	x	x	✓
REN21	✓	x	x	x	x	✓
WADE	✓	x	x	x	✓	✓

Source: CEEW analysis

Figure 4: Alliance activities (within India and overseas)



Note: Sample size, Indian alliances 7; Overseas alliances: 15; Several alliances in the sample undertake more than one activity
Source: CEEW analysis

Revenue sources

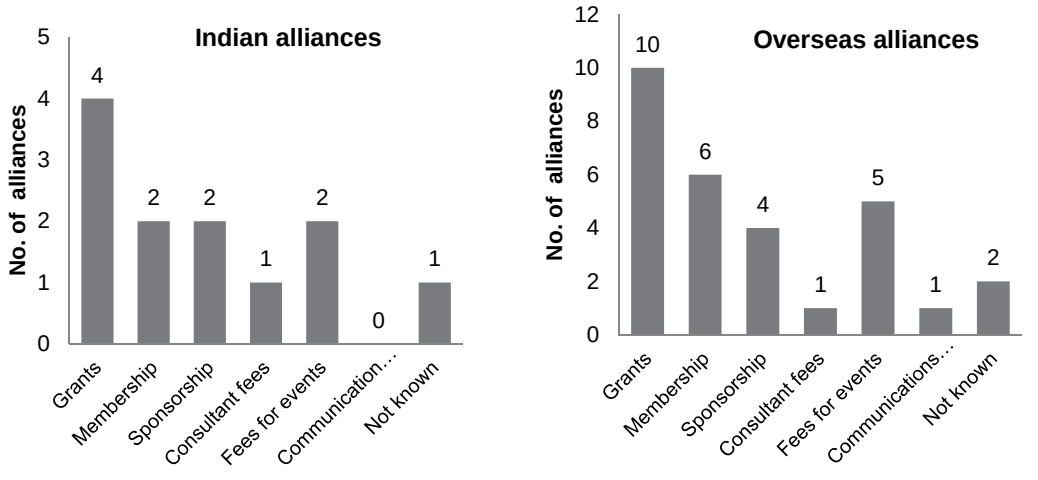
Figure 5 highlights that both Indian and overseas alliances primarily operate on funding from foundations, governments and other third parties. Some generate revenues through membership and fees for services, such as consultancy/advisory work, market studies, events such as conferences, webinars, technical tours, etc. The annual membership fees vary according to the category of members, turnover of member companies, and location (industrialized or developing nations). For example, annual membership rates in World Alliance on Decentralized Energy (WADE) vary according to membership categories – foundations, member companies (factors in turnover), not-for-profits (varies according to geography – whether operating from industrialized or developing countries), and individuals.

It is essential for an alliance to reduce its dependency on grants and broaden its financial foundation in order to sustain and expand its activities. For example, since its genesis in 2009, the African Renewable Energy Alliance (AREA) has been financially supported by the World Future Council. However, taking cognizance of the importance of being financially independent, AREA introduced a membership fee in 2013 that will also aid in enhancing its services. Alliance for an Energy Efficient Economy (AEEE) which was launched based on grant money currently covers its operational costs by generating significant amount of revenue through measurement and verification (M&V) certification and training programs. Thus, once an alliance or network has been created, it needs alternative sources of revenue to cover operational and programme-related costs as well as to broaden its impact.

The origin/formation of most of the alliances examined in this study has been financially supported by multilateral funding agencies and international foundations such as IFC's Lighting Africa Initiative, USAID, the Rockefeller Foundation, the UN Foundation and Ashden. The dependence on grants can be attributed to the fact that the members of an alliance are often small and medium scale enterprises (SMEs) or start-ups with limited ability to pay for services. Stakeholder interactions reveal that an alliance might find it quite difficult to raise money through membership fees since business models of off-grid operators hinge on grants and subsidies.[15] Based on stakeholder interactions, it was identified that willingness to pay is also dependent on the value-add that the alliance has to offer. For example, an attempt was made in late 2010 to establish a network of Indian micro-grid operators. It failed due to lack of value proposition which could encourage enterprises to participate.

[15] CEEW stakeholder interactions, dated 2 January 2013, 11 February 2013

Figure 5: Revenue models adopted by alliances



Source: CEEW analysis

3. ANALYSIS AND RECOMMENDATIONS

Although a number of networks and alliances exist, extensive stakeholder consultations found that there are still challenges in finding the right approach to utilize a network that can help scale enterprises and activities. Using its policy and alliance scan as foundation, CEEW sought to ascertain the correct mix of services and activities that a countrywide network in India may provide.

3.1 Potential activities of a new countrywide network

More than 100 stakeholders were engaged for this report, including energy service companies, manufacturers, financers, technical researchers, policymakers and others.

The research and inputs from stakeholder meetings indicate that, first, there is demand for a network that could consolidate the activities of existing alliances and, secondly, such a network would make sense to many potential members only if it manages to deliver services that are appealing to the wide diversity of stakeholders, while also reducing their transaction costs. However, stakeholders also felt that it would make little sense to have parallel structures that duplicate operational services and costs. In other words, the challenges of developing and operating a network centered (but not limited to) around energy entrepreneurs are three-fold: the need to lower transaction costs; the need to balance different types of actors in the governance structure; and the need to find operational funding for the network/alliance on a sustainable basis.

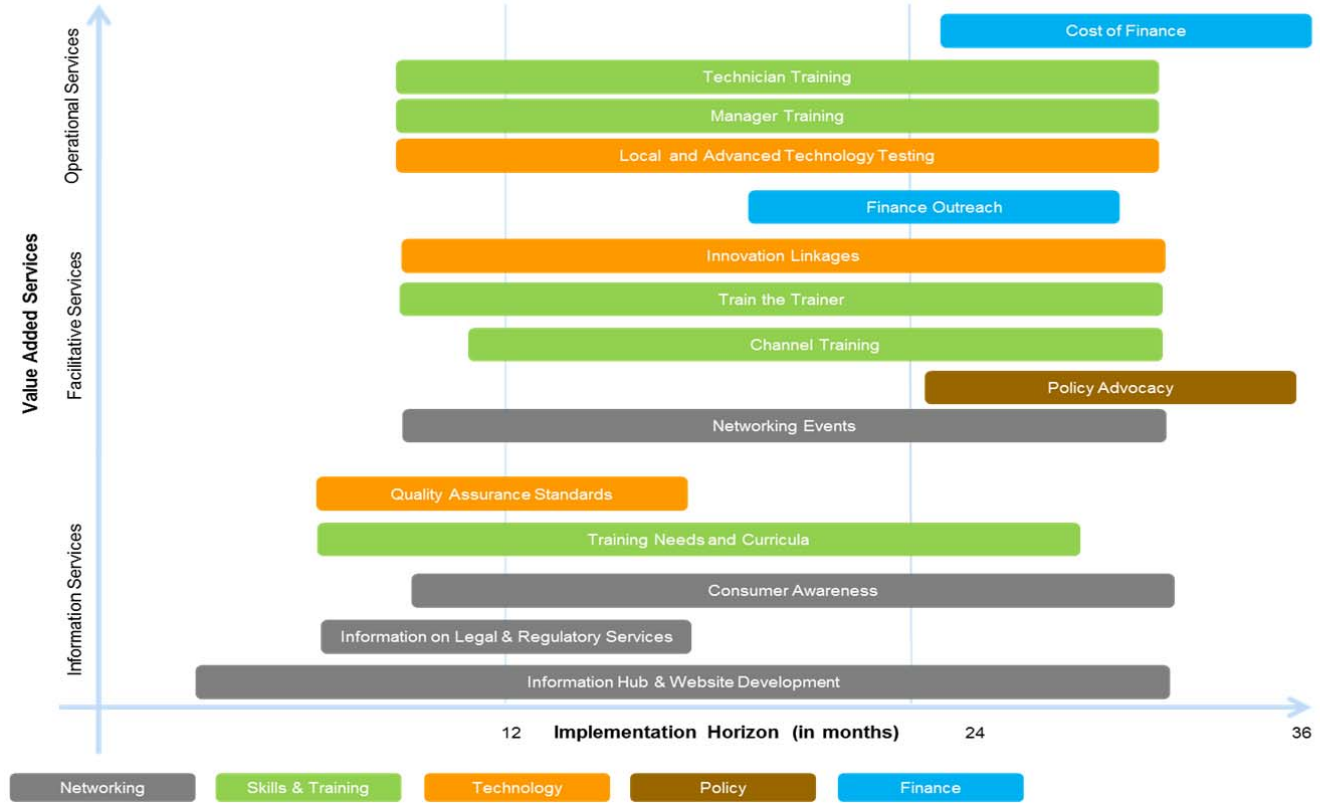
These challenges also imply that there is need for strategic coherence between the alliances that are operating in India already. Better coordination and coherence would help reduce potential for duplication of efforts as well as increase the scale at which potential solutions common across the off-grid sector could be deployed. This, in turn, would increase the benefits that could be derived from a collective network. A countrywide network could, therefore, add value by aggregating activities already on offer and by delivering additional services or targeting stakeholders, which are currently out of the scope of existing networks.

Developing a basket of network activities

Based on extensive research and stakeholder engagement, a long list of proposed interventions for a successful countrywide network in India was formulated focused on the following five areas: **access to finance; skills and training; technology (including testing and certification); policy advocacy;** and **networking** (annex 1).

These services will need to be delivered in a manner that establishes the countrywide network as a trusted information hub for India's off-grid ecosystem, and over time, the delivery of higher value-added facilitative and operational services. **Information services** include offering baseline information, for example through an off-grid information hub, which helps stakeholders assess existing market opportunities (figure 6). **Facilitative services** include interventions such as networking events that can reduce transaction costs but do not necessarily guarantee results in terms of, say, new business opportunities Finally, **operational services** encompass those interventions that benefit enterprises in their day-to-day operations, for example provision of trained technicians and managers. Each category of services is aimed at lowering the barriers that off-grid sector players face, but they would require different resources and are expected to take varying amounts of time to deliver.

Figure 6: Timeline for network evolution



Source: CEEW analysis

Building the foundation for a network: narrowing down on focused activities

The long-list of potential activities was presented to workshop participants in Delhi and Bangalore on 10 and 14 May 2013 respectively. Feedback from participants provided further useful inputs to finalizing the list of potential activities that a countrywide network may focus on delivering, especially in its initial stages.

Through the course of the research and roundtable discussions it was revealed that two core sets of services: **skills and training**; and **technology and innovation linkages** backed by an **off-grid information hub**, would initially be activities of interest to off-grid stakeholders.

Skills and training

Many of the stakeholders recognize that dearth of skilled managers and technicians is a major roadblock to expanding business ventures. Enterprises lose crucial time and resources in developing a workforce with basic skill-sets. Also brought to the fore was the presence of numerous training outfits operating sans any quality control. On one hand, there are training companies/consultancies that conduct short term workshops (spanning 3-7 days), which are competency focused but don't delve deep enough on specific knowledge aspects. On the other hand, there are several cases which indicate a potential disconnect between what students are taught and the skill-sets that the employers are looking for. Some organizations involved in training and capacity building also revealed that they encounter difficulty in revising the course curriculum since technology is evolving quite rapidly. In view of all these challenges, skills and training was considered a crucial intervention point for the network.

There was a general consensus on the potential role of a network to support **manager and technician training** programs, by leveraging existing training institutions, and training delivery agencies to **develop appropriate curricula** (or building on existing MNRE initiated curricula) and leverage channels to deliver training. MNRE has developed training modules/curriculum for Industrial Training Institutes (ITIs) targeting various off-grid technologies: solar PV lighting, small wind and small hydro.[16] The network could further take on the task to engage various training institutions, enterprises and experts to facilitate designing of training curriculum for biomass gasifiers and cookstoves. In order to enhance effectiveness of technician training programs, it is essential to engage and support Advanced Training Institutes (ATIs). ATIs are usually involved in training instructors at ITIs who then further impart training to students. It is essential to understand that the managerial needs of off-grid RE enterprises differ from that of a corporate setting while developing these courses. It is also considered important when developing such courses to understand the wide range of

[16] Ministry of New and Renewable Energy (MNRE)"Course Material for ITIs" available at http://mnre.gov.in/file-manager/UserFiles/support_hrd_coursematerial_iti.htm; accessed 20 May 2013

motivations that drive participants in this sector, which has a mix of commercial and social enterprises.

Emphasis was laid on utilizing the collective intelligence of enterprises in defining standards for training curriculum and helping enterprises involved in running training centers earn more profits. However, stakeholders have pointed out that standardization must keep in view the nature of business and technology and not occur across the board. It is important that the training courses are certified by official sources such as MNRE or Directorate General of Employment (DGET) to establish and maintain credibility and ensure that students enroll in the training programs.[17] Considering the diverse nature of technologies and enterprises in this domain, some felt that the network could serve well if it charts a way of providing generic training; the enterprises themselves can then provide specific skills tailored for a particular technology or business operation.

Operating a training center could potentially become profitable if several organizations providing complementary training courses such as Schneider Electric (lighting), Anthropower (module development), DESI Power (biomass) were to come together to leverage training infrastructure. Entrepreneurs would also benefit from having ready access to trusted training sources.

It is worth noting that training by itself does not solve the problem and that it is also important to ascertain employability of the trained technicians. Therefore in addition to developing standardized training curricula, the network must facilitate periodic **mapping of demand for skilled workers.** This would ascertain whether the trained personnel are likely to be recruited by the enterprises in future. The network could collaborate with organizations such as the Confederation of Indian Industry which has worked in the past to understand human resource development challenges in the renewable energy sector.

[17] Based on stakeholder feedback and discussions

Table 5: Potential activities – Skills and training			
	Activities	**Sub-activities**	**Possible implementation partners**
1	Training needs & curricula	• Periodically map the demand for technicians and managers, and the particular competencies that are sought	**Implementation:** MNRE, MoRD, Ministry of Labour, Ministry of Human Resource Development, Directorate General of Employment and Training (DGET), Confederation of Indian Industry (CII) **Funding:** MNRE, grant funding
		• Design course material and curricula for Technician and Manager Training / certification / re-certification	**Implementation:** Professional Assistance for Development Action (PRADAN), RUDSETI, ITIs **Funding:** MNRE, grant funding
2	Train the trainer	• Leverage programs of existing training centers or develop new training centers and provide necessary training to trainers and technicians	**Implementation:** Solar: TERI, ATIs Biomass: DESI Power, Husk Power University, Combustion, Gasification and Propulsion Laboratory (CGPL), Indian Institute of Science (IISc) Bangalore; Wind: Centre for Wind Energy Training (C-WET), Auroville Hydro: IIT Roorkee **Funding:** National Skills Development Council, DGET, MNRE, grant funding, enterprises (fees for training)
3	Technician training	• Leverage or develop new training centers and provide necessary training to technicians	**Implementation:** Solar: Schneider Electric, Global Sustainable Energy Solutions (GSES), TERI, Anthropower, ITIs Biomass: DESI Power, Husk Power University, CGPL, IISc Bangalore; Wind: C-WET, Auroville, E-Hands Energy; Hydro: IIT Roorkee

Table 5: Potential activities – Skills and training			
	Activities	**Sub-activities**	**Possible implementation partners**
			Funding: National Skills Development Council, DGET, MNRE, grant funding, enterprises (fees for training)
4	Manager Training	• Collaborate with academic institutes, and other suitable delivery agencies to administer programs	**Implementation:** PRADAN, RUDSETI, Bharatiya Vikas Trust, Management Colleges **Funding:** MNRE, grant funding, enterprises (fees for training)
5	Channel Training	• Train distributors to support delivery and simple maintenance of off-grid products	**Implementation:** New Ventures India, Luminous Batteries, FMCG companies, Frontier Markets, Greenlight Planet **Funding:** Enterprises, distributors
Source: CEEW analysis			

Technology and innovation linkages

Although the emergence of markets for off-grid energy technologies in India holds promise, realizing its potential on a long-term, sustainable basis requires redressal of issues having a bearing on product quality, consumer protection, and market spoilage. Failure of first generation off-grid technologies (and service providers) has contributed to erosion of consumer trust and led to a decline in investor confidence. Many stakeholders voiced concerns that easy availability of cheap but poor quality solar products reduces confidence in the market if products fail or underperform.

Against this backdrop, quality assurance standards/ performance benchmarks targeting products such as biomass cookstoves and solar lighting appliances was deemed a crucial intervention point. Enterprises have pointed that standards for clean cookstoves must give precedence to local needs such as usage and safety concerns rather than meeting global commitments. There were also recommendations for designing star ratings for clean cookstoves and lighting appliances which can enable consumers to make informed product choices.

The countrywide network could seek to work towards formulating **quality assurance standards/** performance benchmarks for technologies which would be accepted across the country. During the course of interactions, it waslearned that MNRE may seek to devise star rating for biomass cookstoves in 2014. This opens up an opportunity for the network to step in and engage with various enterprises and R&D institutions to facilitate development of performance ratings for biomass cookstoves. Where appropriate, the network would aim to leverage existing initiatives and approaches. For example, it can support efforts of TERI and Bureau of Indian Standards (BIS) in launching performance benchmarks for lighting appliances in India. It can communicate the IFC Lighting Global and BIS (once released) solar lighting quality and performance benchmarks to various potential stakeholders including but not limited to end users, product developers, donors and investors.

Stakeholders have also pointed out that R&D efforts in this sector require more impetus to foster commercialization and make off-grid RE technologies more conducive for rural consumers. For instance, SELCO Laboratories' initiative in solving energy access needs of grassroots communities through innovative approaches is supported by USAID. R&D focus must be on building robust products that can withstand consumer mishandling, improving battery storage options for off-grid renewable, unlocking the potential of smart mini grids, and improving turbine design and efficiencies for decentralized hydro projects.

The countrywide network could identify and leverage existing academic and research institutions to establish **innovation linkages** via regional R&D roadshows. Through these roadshows, the network would seek to connect research institutions, technology incubators to

firms operating in the off-grid domain, so that new products could be developed and tested to meet local market needs and conditions.

Regional R&D roadshows will enable research institutions to showcase programs; facilitate exchange of ideas; deliver dynamic updates on industrial developments and technological progress; build collaborations to facilitate field-testing of new technology under commercial conditions and the applied learning opportunities for rural energy service providers facilitate technology transition from R&D to deployment and help garner additional funds for R&D initiatives. This, in turn, could spur new R&D activities.

A dearth of technology testing/certification facilities in certain parts of the country and lengthy certification procedures were seen as major impediments by a number of enterprises. For instance, there exists only a single MNRE accredited lab for pico-hydro solutions at Indian Institute of Technology (IIT) Roorkee which enterprises concentrated in southern part of the country find difficult to access. Likewise, testing centers for solar PV lighting appliances and systems are concentrated in major metropolitan cities - Delhi, Bangalore and Kolkata. There were concerns over expenditure incurred in transporting products/systems to the MNRE accredited testing facilities. This led a few enterprises to propose a hub and spoke model of technology testing wherein preliminary testing could be performed at regional academic/R&D institutions and advanced testing at MNRE centers.

Based on the stakeholder consultations the research also focused on the potential role of a network in facilitating **preliminary and advanced technology testing** by **utilizing** the infrastructure and expertise of existing institutions for testing services in association with MNRE. Discussions with various testing centers revealed that they often find it difficult to generate sufficient revenue owing to limited requests for testing; a nascent off-grid energy market was cited as the main reason for this. A few of the solar PV testing centers (private labs) also mentioned that they had to put lab upgrade plans for advanced testing on the backburner since it wasn't deemed profitable. Lack of dedicated personnel was also underlined as one of the challenges that prevent some of the existing academic institutions to perform testing. Therefore, it is advised that the network conduct demand mapping for preliminary and advanced testing prior to proposing utilization/expansion of existing technology testing facilities or establishment of new ones that aren't self-sustaining. Discussions also threw up names of several academic institutions who are well equipped to perform preliminary testing. Engagement with various labs also revealed that it makes more sense to facilitate augmentation of local/regional academic/R&D institutions for preliminary testing which also involves relatively less expenditure. Another strategy could involve working with MNRE to facilitate accreditation of existing private labs. It must be noted that there wasn't a strong push for advanced technology testing centers from stakeholders.

The network could also look to facilitate local and advanced testing by investigating innovative approaches to reduce testing costs, for example, improving access to testing centers by leveraging distribution network of companies to transport systems to regional/local testing centers (potentially as part of corporate responsibility activities).

Table 6: Potential activities – Technology and innovation linkages

	Activities	Sub-Activities	Possible implementation partners
1	Quality Assurance Standards	• Facilitate development of performance benchmarks/star rating for bio-mass cookstoves and solar lighting appliances (leveraging existing initiatives where necessary)	**Implementation:** IIT-D (Centre for Rural Development and Technology), TERI - Social Transformation Division, IISc-CGPL, various solar and clean cookstoves enterprises, Ashden India Collective, BIS, MNRE **Funding:** MNRE
2	Innovation Linkages	• R&D roadshows to improve interface between research and academic institutions, technology business incubators and off-grid energy enterprises	**Implementation:** IITs, National Institute of Technology (NITs), IISc, etc. **Funding:** CSIR, incubators
3	Local and Advanced Technology Testing	• Facilitate mapping of demand for local and advanced technology testing • Facilitate upgrade of existing R&D and academic institutions/labs to conduct preliminary or advanced testing (where appropriate)	**Implementation** Demand Mapping: CEEW, TERI, InsPIRE Network for Environment Preliminary Testing: IITs, NITs, Jadavpur University **Funding:** MNRE, grant funding
		• Investigate innovative approaches to reduce testing costs	**Implementation:** Various companies dealing with logistics such as DHL, EXL India, Chetak, Atlas Logistics, etc. **Funding:** CSR departments of logistics companies

Source: CEEW analysis

Networking and information hub

The off-grid market is dispersed, but the enterprises delivering services to this market are often headquartered in large cities. Nonetheless, our stakeholder discussions have shown that, even though a number of players within the off-grid ecosystem have close connections with each other, there is lack of effective knowledge exchange and sharing of best practices across the broader ecosystem.

Currently there is no "go-to" information source for off-grid entrepreneurs, or those interested in the sector. There was a general consensus that the network should work to create an online **off-grid information hub**. By establishing a 'one-stop shop', the information hub will become a go-to point for a broad range of off-grid RE stakeholders, especially those trying to break into this sector. It can also serve as a RE investment guide that can aid in well-informed investment decisions. There are significant opportunities to improve sharing information and best practices, develop innovative distribution relationships, improve supply chains, understand the existing financing ecosystem, build consumer awareness, and understand latest development regarding projects and technologies. However, there were concerns over the challenges that the network might encounter in its endeavor to cater to diverse information/networking needs of disparate players.[18]

The network could consolidate information around the service delivery focus areas, for example on the existing **finance ecosystem** [angel investors, venture capitalists, banks, microfinance institutions, corporate social responsibility (CSR) funders and donor organizations]; various **off-grid enterprises, grassroots organizations, success stories of individuals/organizations** in delivering energy services, case studies around **energy nexus with water, education, health and agriculture** and information on **business accelerators and incubators**; and act as a central point to access information on national and state-level off-grid regulation, **incentives, tenders and modalities**.

Over time the network could aim to develop a **supply chain data bank**, which would consolidate information on manufacturers, distribution channels, local NGOs and self – help groups (SHGs), and VLE networks. The network could also leverage or build on supply chain database developed by organizations such as New Ventures India (NVI) and government-supported programs such as the National Rural Livelihoods Mission (NRLM). The network would then facilitate enterprise-distributor linkages based on information in the supply chain data bank. The network could aim to explore and create partnerships with other stakeholders. For example, food and retail companies or public sector units, with strong nationwide commercial distribution channels and supply chains, could assist off-grid firms acquire

[18] Off-grid ecosystem comprises of enterprises (both corporate and social ventures) of varying size, scale and operating in different locations. The network might find it challenging to aggregate information that meet the needs of this diverse set of players; and create appropriate outreach activities..

deeper penetration in other markets, say outside their fields of current operation. The countrywide network could serve as the intermediary for this effort.

Addressing enterprises' challenge in identifying skilled human resource, the network through its online information hub can showcase **existing training programs** carried out by various organizations for VLEs, technicians and managers. This would enable them to learn more about these programs and hire skilled employees. The network could create a "job bank" or HR intermediation service that allows prospective employees to locate opportunities with off-grid RE service companies, and the latter to screen potential applicants. This "job bank" would also consist of information on graduates (with contact information) from the training programs (offered by network itself) that the rural energy service providers could call on if necessary.

The network may also seek to collate and consolidate information on **R&D institutions** which could form a base from which additional value added activities in the network are formed. Some of this information would be developed by the network itself, whereas other information would be leveraged from existing initiatives.

When establishing a small firm, entrepreneurs recognize the need for professional services, such as lawyers and accountants (for reasons of legal compliance), but are also wary about the costs involved. In India, where doing business isn't easy (it is ranked 132 out of 185 countries on ease of doing business during the last annual survey of the International Finance Corporation), small enterprises need legal assistance that can help them navigate a maze of laws and regulatory complexities.[19]

It is a challenge to find service providers who understand the needs of small off-grid enterprises and are able to provide **information on laws and regulations**. There are lawyers and firms in India involved in offering pro-bono legal services as part of CSR. Cyber platforms are also helping connect such law firms with social projects. The network would thus seek to collate information on such individuals and firms with prior experience in offering legal and regulatory services to SMEs (off-grid RE SMEs in particular), especially those who are providing it for free. In addition to this, information on labor laws and various compliances related to manufacturing, accounting would be aggregated. The network would engage lawyers/law firms offering pro-bono services in order to create standardized template of contracts which can then be made available to members at reduced costs.

Stakeholders involved in various platforms have cited a lack of **consumer awareness** and understanding of off-grid energy products and technologies as a major roadblock to

[19] The World Bank – IFC (2013) "Doing business 2013 – Smarter Regulations for Small and Medium - Size Enterprises", available at https://openknowledge.worldbank.org/bitstream/handle/10986/11857/DB13_Full%20report.pdf?sequence=1; accessed 25 July 2013

increasing uptake of off-grid solutions. Participants suggested that standards pertaining to technology are important but their full potential can be realized only when consumers are educated as to what the standards indicate and how to distinguish various clean technologies. For example, consumers must be made aware of the various clean cookstoves technologies, their benefits and what the standards convey with respect to a particular technology. On several occasions it has been witnessed that banks are not willing to shoulder the responsibility to educate consumers regarding various subsidy schemes. Hence, the network must step in to implement measures that ensure consumers are aware of government policy and programs that can be availed through banks. A network could run consumer education campaigns involving an array of groups such as NGOs, theatre groups, folk groups, panchayats, village youth clubs, and radio channels. Any nationwide awareness generation programme would benefit from strong government engagement.

Taking cognizance of the fragmented off-grid sector, networking platforms were deemed important for engaging on a range of issues that hinders delivery of energy access solutions. The efforts above can be augmented by focused **networking events** such as conferences and forums to showcase network's work and achievements and connect enterprises with potential donors and financiers. This can be done by collaborating with existing RE alliances such as Indian Wind Energy Association (InWEA), India Renewable Energy Forum (IREF), India Energy Storage Alliance (IESA), etc. The networking events should aim to mobilize peer to peer knowledge exchange and provide focused opportunities for key stakeholders to engage with each other. The network's challenge though would be engaging with the lesser known outfits and encouraging them to project their challenges and concerns.

Table 7: Potential activities – Networking and information hub

	Activities	Sub-activities	Possible implementation partners
1	Off-grid information hub	• Consolidate information on: - individuals, enterprises and other grassroots organizations active in the off-grid domain - state tenders and various modalities for accessing government subsidies - incubators and accelerators - training institutes offering technician, VLE and manger training - R&D institutions - on-going and upcoming projects and latest technological developments - supply chain actors - success stories - case studies around energy nexus with water, education, health and agriculture - finance ecosystem - international, national and state off-grid RE policies/subsidies/programs - distributors and suppliers (including logisitics)	**Implementation:** This will largely be carried out by Secretariat staff, but content partners could include NVI (for tapping into supply chain information), TERI (policies, latest technologies, case studies), Prayas (policies); CSR teams of private companies and PSUs, for example EIL, Gas Authority of India Ltd (GAIL), Larsen and Toubro, Tata Steel, Wipro, National Thermal Power Corporation (NTPC), etc. **Funding:** Grant funding, ancillary sources (advertisements)
2	Website development	• Showcase the consolidated information on network's website in a user friendly and easily comprehensible format; content should be updated regularly	**Implementation:** Web design company **Funding:** Grant funding
3	Legal and regulatory framework	• Consolidate information on individuals/firms with prior experience in offering legal and regulatory services to SMEs (off-grid RE SMEs in particular)	**Implementation:** Since this activity hinges on desk research, the network might not need to collaborate with organizations/individuals **Funding:** Grant funding

Table 7: Potential activities – Networking and information hub

	Activities	Sub-activities	Possible implementation partners
		• Engage lawyers and create template of contracts, which can then be made available to members at reduced costs	**Implementation**: TrustLaw Connect; i-Probono; Enviro Legal Defence Firm (ELDF) **Funding:** Grant funding, enterprises (fee for service)
		• Consolidate information on various compliance requirements such as: - labour laws - manufacturing - accounting - import tariffs - tax credits	**Implementation:** Interns having background in law/accounts will be hired from academia, such as Delhi University & National Law University **Funding:** Grant funding, enterprises (fee for service)
4	Consumer awareness	• Generate consumer awareness plans and conduct workshops for organizations (example NGOs) involved in consumer awareness in rural India	**Implementation:** Ministry of Information and Broadcasting(I&B) MNRE, organizations involved in generating mass awareness campaigns for rural areas, Ministry of Panchayati Raj, various advertising agencies, NGOs, consumer awareness generation groups, etc. **Funding**: MNRE, grant funding
5	Networking events	• Conduct conferences to showcase network's work and achievements and connect enterprises with potential donors and financiers	**Implementation:** World Wide Fund (WWF); International Council for Local Environmental Initiatives (ICLEI), Indian Renewable Energy Federation (IREF) **Funding:** Grant funding; sponsorships; over time potential to have a paid conference

Source: CEEW analysis

3.3 Estimated costs

This estimate intends to only provide a broad indication of the budget requirements for such an alliance. To arrive at the real figures a detailed business plan and detailed budget estimate should be developed. Estimates for year 2 and 3 consider an escalation rate of 10%.

Costs have been categorized into two main categories – operational and network interventions/activities. The overall estimated cost of the network is presented below (table 8 and figure 7).

Table 8: Estimated Network costs

Intervention	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)	3 year totals (USD)
Core activities				
Operational costs*	200,000	240,000	260,000	**700,000**
Information hub	25,000	45,000	46,000	**116,000**
Network interventions				
Skills and training	390,000	325,000	520,000[20]	**1,235,000**
Technology and innovation	57,000	500,000[21]	25,000	**582,000**
Finance and policy	Currently budgeted through operational costs			
3 year grand total				**2,533,000**

* Activities would start at least three months prior to 'Year 1'

Source: CEEW analysis

Core activities

[20] Re-evaluation of training needs and curricula as well as an increase in the number of training institutions would take place in third year, increasing costs.

[21] Year 2 may see a substantial increase in costs if there is a need for testing infrastructure.

Operational Costs: The network would be most effective if established as a stand-alone entity (even if incubated within another organization). It would require grant funding to sustain its operations. The operating costs cover employee salaries, travel expenses, website maintenance; fixed costs such as printing and stationary, telephone and internet bills, rent, etc. and; flexible expenses related to hosting events. The above estimate does not include expenses related to managing an advisory or governing board.

Networking and Information Hub: Consolidating information for an off-grid information hub would primarily involve secondary research; and consultations which are included in the network's operational costs head. However, showcasing the consolidated information on the network's website is estimated under the website development costs. Lawyer fees constitute the major chunk of costs of delivering legal and regulatory information.

Network interventions

Skills and Training: The costing for skills and training may vary according to technology. While calculating the costs a number of assumptions need to be taken into account. Some of them are:

- Size and duration of the course
- Annual inflation
- The training center ins
- One time infrastructure cost such as hardware and module preparation costs
- Admin costs per batch
- Printing, electricity and other consumable costs
- Travel and accommodation costs for trainers
- Accommodation costs for students in few courses

For example in this analysis a typical size of a solar technician training is assumed to be of 25 students and would last for five weeks, whereas a biomass technician training would comprise of 20 students and would last for eight weeks.

The costs would also dependent on the number of students trained throughout the year. Demand mapping needed to be pursued by the network. However while calculating the costs of the activities the demand has been assumed to exist, based on the inputs from the stakeholders, current policies and the present skills & training scenario. Assessment of training needs and curricula would take place in the first year and re-evaluation may take place during the third year. The actual demand should be mapped through country wide consultations.

For the budget estimate it was assumed that **2,160 skilled human resources** would be developed within the first three years of the network's existence. While the number of

technicians and managers increase each year the numbers of trainers trained are kept constant, keeping in mind that the cumulative number would keep increasing. The estimated breakup of 2,160 is presented below:

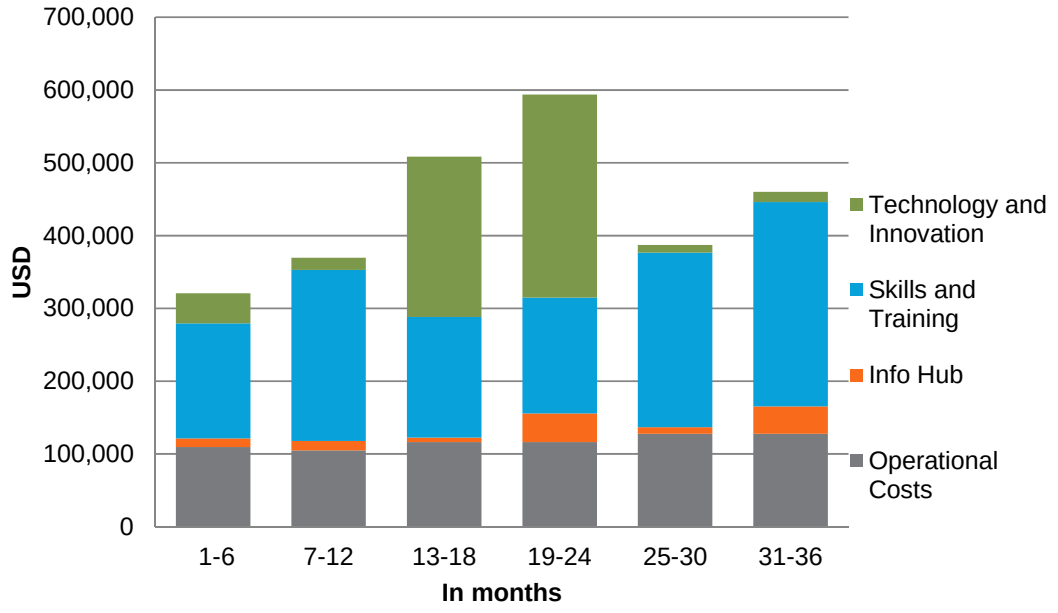
- 120 trainers (solar - 60, biomass – 30 and hydro – 30)
- 1,680 technicians (solar – 1200, biomass – 240 and hydro 240)
- 360 managers (solar – 180, biomass 90 and hydro 90)

Technology and Innovation Linkages: Developing quality assurance standards for off-grid technologies would mainly include costs related to organizing roundtables for seeking stakeholder feedback and communicating findings. Costs associated with mapping of demand for local and advanced technology testing could be covered under consultancy fee. A significant budget will be required for local and advanced technology testing is associated with upgrading labs for preliminary testing. A significant increase in costs (figure 7) for local and advanced technology testing in the second year budget is driven by the potential cost of upgrading testing centers. This cost would only be realized if called for through the mapping exercise in the first year. It is worth mentioning again that that there wasn't a strong push for advanced technology testing centers. Expenditure on equipment and dedicated staff were deduced following interviews with various testing centers (both MNRE accredited and otherwise). An estimated outlay of approximately USD 145,000 would be required to facilitate preliminary testing of various technologies as shown below:

- USD 81,500 - four solar PV testing centers for lighting appliances (one in each region of the country)
- USD 33,000 - two biomass cookstoves testing centers
- USD 300,000 - two pico-hydro testing centers

These costs are likely to vary since few of the labs/institutions might already have the required equipment or staff at their disposal.

Figure 7: Costing of all activities



Source: CEEW calculations

Above figure is based on the broad budget estimate. The actual figures would be arrived after the detailed activity plan. However, this figure reflects how various costs would vary across years and their relative share in each year.

3.4 Potential revenue sources

Four potential revenue sources have been identified that could fund the network's core activities (operational costs and information hub) and other interventions (skills & training and technology & innovation linkages): grants; fee for service; membership fees; and ancillary sources such as sponsorships (table9).

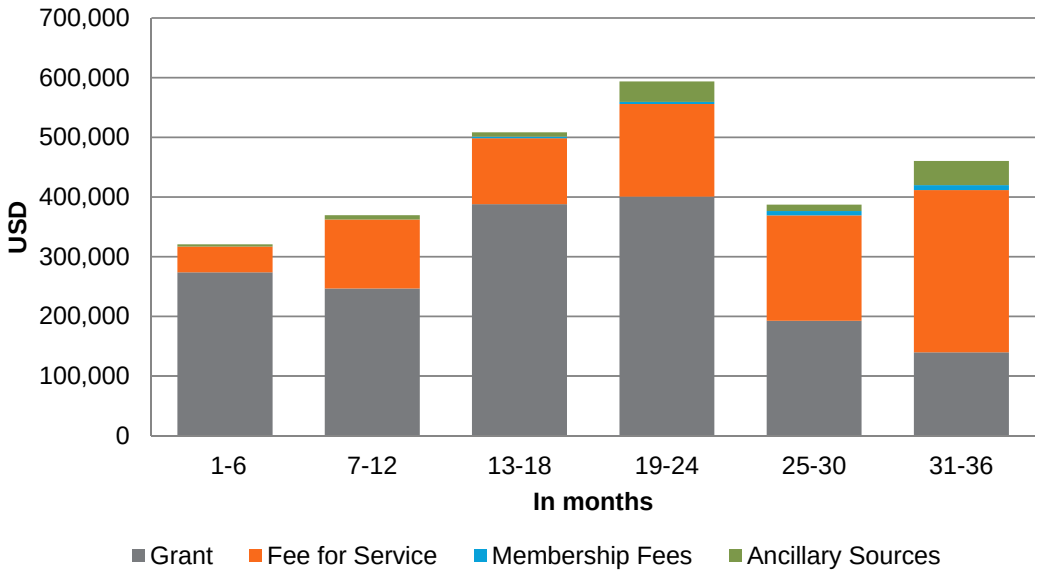
Table 9: Potential revenue sources

Revenue source	Definition
Grants	Financial support from a donor agency (or agencies) with interests aligned with the broad objectives of the network
Fee for Service	Enterprises will pay for some value added services provided/facilitated by the network (e.g. training programs and advanced information from websites)
Membership Fees	Enterprises, which apply for membership, get access to network services such as advanced market information and analysis; discounted access to networking events; and, over time, business facilitation services
Ancillary Sources	Ancillary sources of revenue include specific sponsorship opportunities (e.g. events) advertisements on the network website and fees for business facilitation as the network matures and its reputation strengthens (e.g. acting as an access to finance facilitator)

Source: CEEW analysis

The ideal scenario for a sustainable funding model is built on partial subscription fees paid by participants, backed by grant funding. In the initial stages (first three years) significant grant funding would be required to establish the network and begin to deliver on planned interventions. Once a track record of delivery is established, and the true nature of the cost reduction achieved is understood, charging for services may become an option. Grant funding would be the primary funding source for the network operations and information hub. Figure 8 indicates a potentially large grant requirement in year 2 if testing centers are to be upgraded (depending on the outcome of the planned mapping exercise). Ancillary sources (such as sponsorships) would form an important funding source particularly for R&D roadshows and networking events. Payment of fees (fee for service) would be necessary to obtain access to training programs and advanced sets of information on financiers (including CSR); various laws and regulations; market information on supply chains, etc.

Figure 8: Potential revenue sources for all activities



Source: CEEW analysis

Above figure demonstrates how revenues would vary over time, and gradual reduction on dependence on grants over the years.

3.5 Governance and organizational structure

There is no one solution to the energy needs of underserved communities. This diverse set of needs and situations has spurred varied business models in the off-grid, decentralized energy domain. A variety of actors, technologies, investment and revenue models, and scale of operations are all present in the sector, and all have differing requirements. The challenge is how to represent, and appropriately serve, such diversity within a common network.

Not-for-profit organizations may employ different governance structures to deliver on specific goals. Some of these models are outlined below (table 10).

Table 10: Governance models

Model	Brief description
Operational Model	Board manages, governs and performs the tasks.
Collective Model	There is no hierarchy and the board members and staff operate as a single team.
Management Model	Functional committees report to the board. These committees may or may not have staff representative.
Constituent/ Representative Model	There is an on-going interaction between the board and its constituents. The representatives from the constituents have the responsibility to balance the interests of the constituents along with those of the organization.
Traditional Model	The board governs and oversees operations through committees established along functional lines (finance, human resources, programs) but delegates the management functions to the executive director.
Policy Governance Model	The board governs through policies that establish organizational aims (ends), governance approaches, and management limitations. These policies also should define the relationship of the board with the executive director. The executive director has broad freedom to determine the means that will be used to achieve organizational aims.
Advisory Board	The board is often selected by the executive director (or CEO). The board may provide legitimacy to the organization but have minimal governance powers. Board members provide advice and validate the executive director's recommendations.
Entrepreneurship/ Corporate Model	The chair of the board often acts as the CEO of the organization and the board may often work at levels of ends, means and limitations policies as a focus for the work of the board and its subsequent direction to the organization. This model lays emphasis on innovation and appears to focus on efficiency and effectiveness to achieve best results.
Emergent/	The organizations may be made up of cells that can operate alone but can also

Table 10: Governance models	
Model	**Brief description**
Cellular Model	interact with others whenever necessary. Hence, such organizations show characteristics of independence and interdependence. The core board may be small and effectively use technology to interact with each other and may engage individual experts with unique perspective and experiences.
Source: 1. Bradshaw, Patricia, Bryan Hayday, Ruth Armstrong (2007) "Non-profit Governance Models: Problems and Prospects," *The Innovation Journal: The Public Sector Innovation Journal*, Volume 12(3), Article 5 2. Strategic Non-profit Alliance Partnership "Different types of Governance Models" available at http://www.snapnonprofit.org/snap-nonprofit-exampledocs/#BoardGovernance; accessed 27 June 2013	

The governance framework of the alliances often depends on its scale of operations, size and objectives/purpose. Alliances covered as part of earlier scan had a mix of approaches to governance:

- **Governing Board/Board of Directors**: The governing Board/Board of Directors assumes the top position in a formal hierarchy of authority for most alliances active internationally, such as ARE,[22] GOGLA,[23] WADE,[24] ASE,[25] REEEP,[26] ACORE[27] and Global Alliance for Clean Cookstoves. The Governing Boards are often assisted by an Advisory Board or Secretariat (or committee) in its work.
- **Steering Committee**: The Steering Committee serves as the principal governing body responsible for the strategic direction and operational oversight of alliances such as ADB's Energy for All and REN21.[28, 29]
- **Executive Council/Governing Council**: Alliances comprising a small set of members/associations and having a specific focus area and small scale of operation are governed by an Executive Council of individuals, as in the case of the Alliance for an Energy Efficient Economy (AEEE) and the Indian Biomass Power Association.[30, 31]

[22] Alliance for Rural Electrification " ARE-Team", available at http://www.ruralelec.org/12.0.html; accessed 16 January 2013

[23] Global Off-Grid Lighting Association (GOGLA) "GOGLA – Governance", available at http://globaloff-gridlightingassociation.org/Governance.php; accessed 16 January2013

[24] World Alliance on Decentralized Energy (WADE) "WADE – About Leadership", available at http://www.localpower.org/abt_leadership.html; accessed 16 January 2013

[25] Alliance to Save Energy (ASE) "ASE – Leadership", available at http://ase.org/about-us/our-board-directors; accessed 22 February 2013

[26] Renewable Energy and Energy Partnership (REEEP) "REEEP – Structure", available at http://www.reeep.org/structure; accessed 11 January 2013

[27] American Council on Renewable Energy "Advisory Board", available at http://www.acore.org/about/governance/advisory-board; accessed 4 March 2013

[28] WBCSD "WBCSD and Energy for All Partnership of the Asian Development Bank - presentation", available at http://www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=34&nosearchcontextkey=true; accessed 5 March 2013

[29] REN21 "Steering Committee", available at http://new.ren21.net/AboutREN21/SteeringCommittee.aspx; accessed 7 March 2013

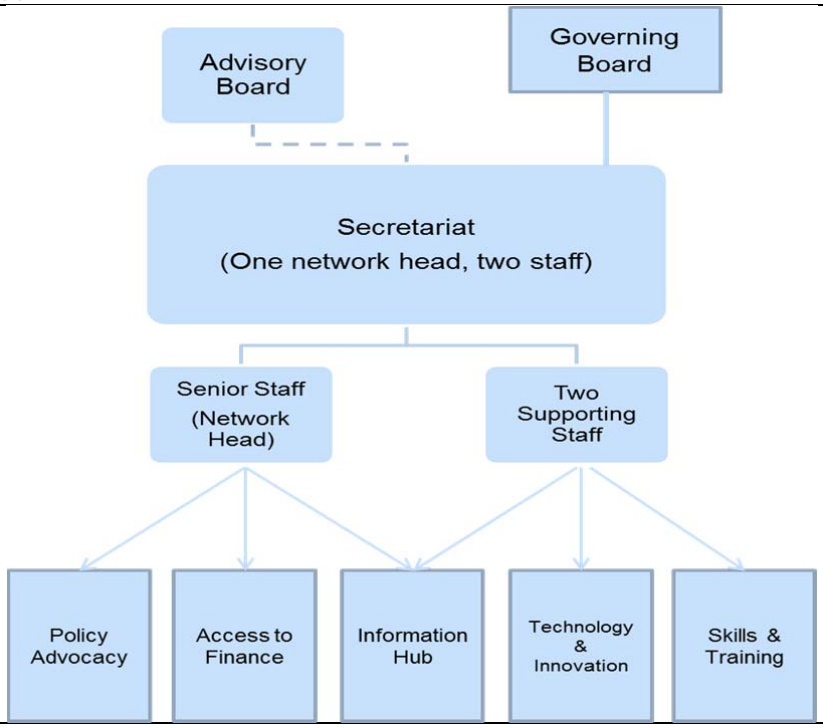
[30] AEEE Board of Directors, available at http://www.aeee.in/about/board; accessed 17 January 2013

Proposed structure of the network

The suggested governance and operational structure is expected to enable trusted practitioners within the off-grid ecosystem, and associated stakeholders to provide appropriate guidance and strategic inputs to ensure the networks activities are well considered and meet the needs of the market. This will be supported by experienced individuals working in the secretariat who would not only be able to manage working groups, but also able to lead on the work needed to build activities in the intervention areas.

[31] IBPA Governing Council, available at http://indbiopower.com/governing-council.asp; accessed 17 January 2013

Figure 9: Suggested structure of the network



Source: CEEW analysis

How will the suggested structure work in practice?

The structure seeks to provide robust governance by bringing in a mix of experienced off-grid practitioners, as well as individuals with significant network and association building experience. The **Governing Board** would be slightly removed from the day-to-day activities of the network, whereas **Advisory Board** members may realistically be invited to help drive certain interventions in-line with their expertise.

At a strictly operational level it is envisaged that the services of the network will be delivered by a three person **Secretariat.** The secretariat staff should possess extensive knowledge and understanding of the off-grid energy ecosystem enabling them to drive content related initiatives, rather than focus on largely administrative activities that sometimes tends to happens in a number of networks (e.g. working group management).

Although **Policy** and **Access to Finance** is not suggested be focus areas in the initial stages of the network, it will be important that these areas still form part of the backdrop to the network's activities. It will be the responsibility of the secretariat lead to take part in policy and finance related discussions.

ANNEXES

ANNEX 1: LONG LIST OF INTERVENTIONS

Potential interventions – Access to finance		
	Potential interventions and activities	**Implementation horizon (in months)**
1.	**Portfolio of Investable Projects** • Act as an aggregator of projects • Develop a portfolio of projects through issuing call for proposals. Facilitate engagement with CSR teams at companies with a potential interest in energy access initiatives.	12-24
2.	**Finance Outreach** • Engage with the finance community to understand investment criteria/preferences. • Facilitate capacity building programs to train officers of finance institutions regarding enterprise and consumer lending. • Undertake on-going training and capacity building, leveraging partner initiatives and building strong links with bank training academies.	12-36
3.	**Loan Guarantee Fund** • Facilitate activities to develop and mobilise loan guarantee facilities to reduce credit risk.	24-36
4.	**Low Interest Loans** • Engage with financial institutions (and policy makers) to develop loan products with interest rates in a manageable range.	24-36
5.	**Administrative Costs for Finance** • Reduce the administrative burden associated with providing and accessing finance.	24-36
Source: CEEW analysis		

Potential interventions – Skills and training		
	Potential interventions and activities	**Implementation horizon (in months)**
1.	**Train the Trainer** • Organize training workshops for NGOs to impart training on off-grid energy projects and associated livelihood opportunities. • Support trained NGOs to then train VLEs, SHGs.	12-24
2.	**Manager Training** • Design clean energy fellowship/certificate programs. Either as short courses, or longer duration training programs. • Collaborate with academic institutes, and other suitable delivery agencies, (e.g. NGOs, training start-ups) to administer programs. • Engage with CSR and HR teams at companies to leverage training and work placement schemes or career break initiatives.	24-36
3.	**Technician Training** • Support industrial training institutes (ITIs) and polytechnic institutes to deliver off-grid energy focused course modules.	24-36
Source: CEEW analysis		

Potential interventions – Technology		
	Potential interventions and activities	**Implementation horizon (in months)**
1	**Quality Assurance Standards** • Develop a harmonized approach to quality assurance standards.	0-24
2	**Innovation Linkages** • Promote development of marketable products/technologies by linking together research and academic institutions, technology business incubators and off-grid energy entrepreneurs. • Conduct R&D roadshows to help connect off-grid enterprises with a range of on-going research and technology development activities throughout the country.	0-24
3	**Local Technology Testing** • Facilitate easy access to appropriate local technology testing centers across the country.	24-36
Source: CEEW analysis		

Potential interventions – Policy advocacy		
	Potential interventions and activities	**Implementation horizon (in months)**
1	**Policy Advocacy** • Provide an easy access point to policy positions of alliances and networks involved in advocacy. • Provide a platform to bring together policymakers, enterprises, donors, local organizations, and other stakeholders. • Act as a focal point for workshops, webinars, and issue specific discussions at a regional and national level.	24-36
2	**Policy Repository** • Create an inventory of existing international, national and state off-grid RE policies/subsidies/programs. • Leverage policy studies conducted by various research institutions, national and overseas networks/alliances.	24-36
Source: CEEW analysis		

ANNEX 2: STAKEHOLDERS ENGAGED

Organization	Name
Andromeda Solar	Narasimha Rao
Anthropower	Siva Rama
Aryavrat Gramin Bank, Founder Chairman	Naresh K Joshi
Ashden India Collective	SP Gon Chaudhuri, Rekha Krishnan
Asian Development Bank	Amit Jain
Aspen Network of Development Entrepreneurs	Sucharita Kamath
Avani Kumaon	Rajnish Jain
Barefoot Power	Vernie Sanoo, Purnima Kumar
Bharathiya Vikas Trust	Manohar Katgeri
Boond	Rustam Sengupta
British High Commission	Dattakiran Jagu
CenotecIndia Pvt Ld	S.K. Singh
Center for Study of Science, Technology and Policy	Murali Ramarkrishnan Ananthakumar, Nihit Goyal, Sharath Chandra Rao
Centre for Science and Environment	Joel Kumar
CIIE - IIM Ahmedabad	Mohsin Bin Latheef, Shashank Rastogi
cKinetics	Upendra Bhatt
Claro	Abhishek Sharma, Amarjeet Yadav, Isha Dua, Sonal Adlakha
CTI PFAN	Nagaraja Rao
Consultant	Eddy Roddy
d.light	Darin Kingston
DD Solar	Vijay Singh
DESI Power	Aklavya Sharan
Development Alternatives-TARA	Shrashtant Patara, Rakesh Khanna, Sharad Tiwari
Development Environergy Services Limited (DESL)	GC Datta Roy
Dudhwa Power	Anup Agarwal
Duron Solar	Deepak Chauhan, Venkatesh K
Ecoforge	Sagar Gubbi
E-Hands Energy	Raghuraman C
Emergence Bioenergy Inc	Mateen Abdul
Emergent Ventures	Vinod Kala

Organization	Name
Energy Alternatives India	Narasimhan Santhanam
Ennovent	Saurabh Lahoti
Envirofit India Pvt Ltd	Harish Anchan
Enzen Global Solutions	Amol Shende, Manish Asija
ERC Eye Care	Daniela Gheorghe
FemS3	Nalini Andrade
FreeEnergy	Karthik
Frontier Markets	Ajaita Shah
Gautam Polymers	Shubhra Mohanka
Grace Electronics (India Energy Solutions)	Subbaiyan Sargunam
Gram Oorja	Anshuman Lath, Sameer Nair
Gram Power	Yashraj Khaitan
Greenlight Planet	Aravind Kumar
Greenpeace	Naveen Kumar, Kaisa Kosonen, Manish Ram, Mrinmoy Chattaraj
Greenway Grameen Infra	Umang Maheshwari
HBL Power Systems Limited	Brajesh Kumar Sinha, Suresh Babu, T V Venugopal
Husk Power Systems	S.B. Mishra
IIM Bangalore	M S Sriram, Sourav Mukherjee
IIT Delhi	Rajendra Prasad
IIT Roorkee, Alternate Hydro Energy Centre	Arun Kumar
Indelectric	Nagaraj Ramanna
India Energy Storage Alliance	Rahul Walawalkar
Indian Clean Energy Enterprise	Michael Francis
Indian Oil Corporation Limited (IOCL) Research and Development Lab	Umish Srivastva
Indo – German Energy Forum Support Office	Kerstin Graebner
Intercooperation India	Nakul Sharma
International Finance Corporation	Naomi Bruck, Lakshmi Krishnan
Intertek India Limited	Abhishek Chhabra
InWEA (Indian Wind Energy Association)	V. Subramanian
IT Power	Akanksha Chaurey
Karnataka Renewable Energy Developement Ltd (KREDL, Solar)	Prasad
Karnataka Renewable Energy Developement Ltd(KREDL, Pico Hydro)	Selva Raj
kfW	Usha Rao

Organization	Name
Kuvam Microgrid	Jyoti Dar, Sumant Dubey
Maharishi Solar	A.P. Shrivastava
MART	Nidhi Singh
Mera Gao Power	Nikhil Jaisinghani
Minda NextGen Tech	Praveen Bhasin
MNRE – Former Secretary	B.R. Prabhakara
Ministry of Rural Development	Neelakshi Mann
New Ventures India (NVI)	Sanjoy Sanyal, Sreyamsa Bairiganjan, Pamli Deka
Nexant	Ronnie Khanna, Sanjay Dube
Nidan	Ratnish Verma
Noble Energy Solar Technologies Ltd. (NEST)	Bharat Barki
Non – Conventional Energy and Rural Development Society	Sathiajothi Kamaraj
Nuru Energy	Siddharth Jain
ONergy	Vinay Jaju
Persept Solar	M Srinivas Prasad, Rajendra Prasad
Practical Action Consulting	Deepika Gupta
Prakruthi Power	C.V. Rao
Prakruti Hydro	Muralidhar, Sampath Kumar
Prayas Energy Group	Ashwin Gambhir
Rays Power	Monica Agarwal
REEEP	Siddha Mahajan, Sonya Fernandes
Renewable Energy Working Group (REWG)	Hari Natarajan
Rudset Academy	H Somashekar
Schneider Electric	Ravi Bhushan, Amitabh Rath, Amresh Deshpande
Selco	Ananth Aravamudan, Harish Hande, Surabhi Rajagopal, Ashis Sahu, Revathi
Shakti Sustainable Energy Foundation	Deepak Gupta
Sheetak	Ravi Prasher
Simpa Networks	Michael MacHarg, Paul Needham
SKAND – Agri – Power Pvt Ltd	Mamta Dalmiya
Solar 4 Rural Villages	Jordi Castella
SPEED	Sanjay Khazanchi

Organization	Name
Sterling and Wilson	Navratan Katariya
SunEdison	Manik Jolly
SunMoksha	Ashok Das
Syndicate Bank	Kulkandri
The Energy & Resource Institute (TERI)	Debajit Palit
TERI Solar Lighting lab	Richie Brian Stephen
The Nand and Jeet Khemka Foundation	Don Mohanlal, Payal Randhawa, Priyanka Anand
Thrive Energy Technologies	Dhanumjaya Kadiyala
TIDE	Svati Bhogle
Titan Energy	TV Rao
UNDP	SN Srinivas, Ramesh Jalan
UN Foundation	Tripta Singh
Urja Unlimited	Puneet Ahuja
Villgro Innovation Foundation	Nilima Achwal, Thomas Pullenkav
West Bengal Renewable Energy Development Agency (WBREDA)	Sushobhan Bhattacharya
Wifinity Tech	Vinay Raveendran
World Bank	Kanv Garg
World Institute of Sustainable Energy	Sanjeev Ghotge
XLRI	Madhukar Shukla

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