

Smart Power for Environmentally Sound Economic Development (SPEED)

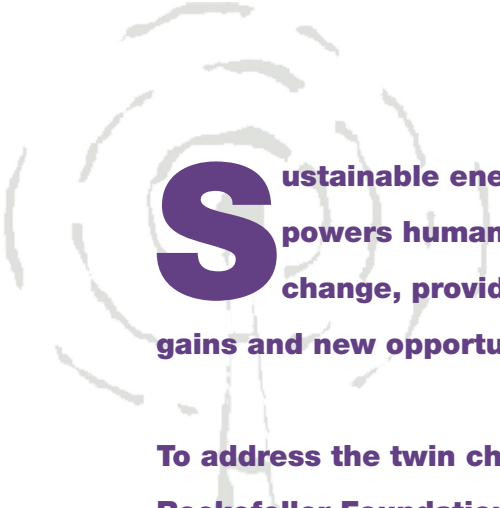


**Leveraging Telecom
Towers to Address
Energy Poverty and
Secure Livelihoods**



Rockefeller Foundation

Innovation for the Next 100 Years



Sustainable energy—energy that is accessible, clean and efficient—powers human progress. Access to electricity is a key driver of change, providing improved quality of life, transformative social gains and new opportunities for long-term economic security.

To address the twin challenges of energy deprivation and poverty, The Rockefeller Foundation, along with a number of partners, established Smart Power for Environmentally-sound Economic Development (SPEED).

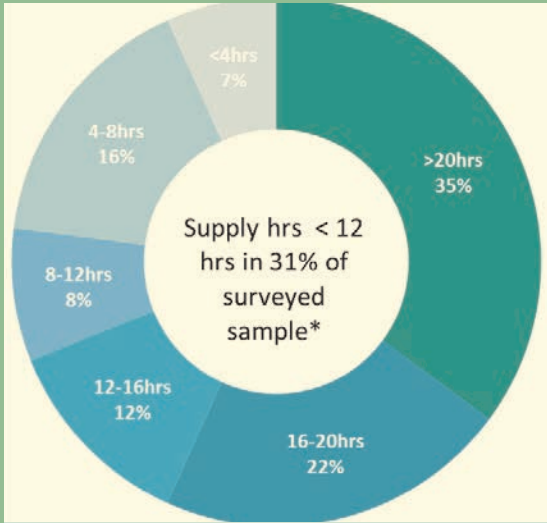
IN INDIA, 42,000 villages are either un-electrified or under-electrified and over 400 million people lack access to electricity, mostly in rural areas. Yet, the mobile network in India has increased exponentially—from 6.4 million subscribers in 2002 to 752 million in 2010.

This dramatic growth has resulted in the proliferation of energy consuming cell towers that rely on expensive diesel fuel. But by leveraging cell towers as anchor loads for alternative sources of energy, there is opportunity to foster an environment for enterprise development and private capital participation, while catalyzing economic development for underserved populations.

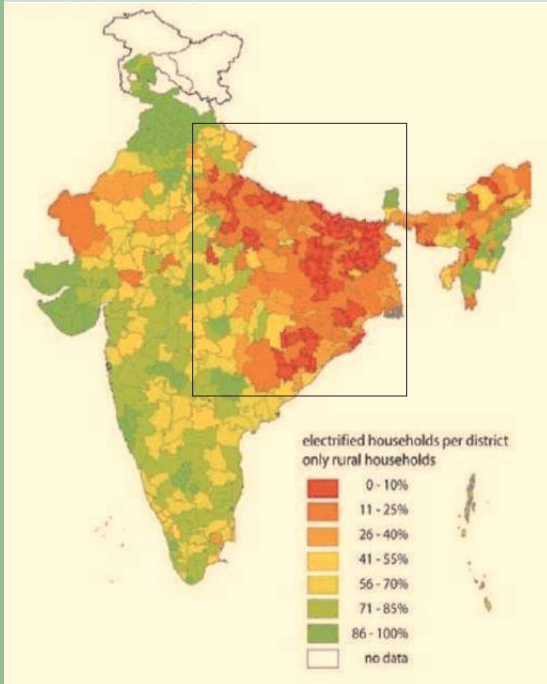
SPEED's ultimate goal is to impact the lives of poor or vulnerable populations by delivering affordable, reliable and clean energy to rural communities, thereby improving their quality of life and facilitating opportunities for economic development.

Opportunity to Leapfrog

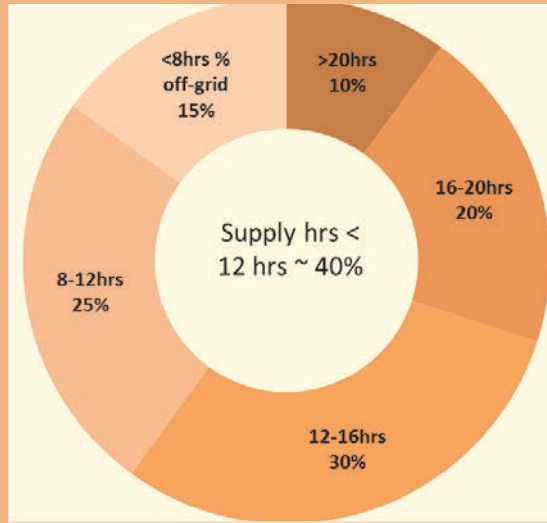
RURAL ELECTRIFICATION



Market opportunity for minimal lighting alone:
USD 1 billion annually



TELECOM TOWERS



Market opportunity to support clean energy based power systems for towers: USD 500 mn annual revenue threshold to address just 25% of the current market



HOLISTIC AND INCLUSIVE SOLUTIONS

To achieve this goal, SPEED has created an ecosystem that aggregates key stakeholders and critical industry players to build an enabling environment that supports the spread of decentralized renewable energy in poor communities. To date, SPEED has focused on:

- **Engaging entrepreneurs and Energy Services Companies (ESCOs)** to gain their confidence and support in order to establish 22 power plants.
- **De-mystifying rural markets and plant economics** by gathering reliable, relevant information and identifying potential sites through a cluster approach and completing detailed analysis of the sites which is available to potential ESCOs.
- **Facilitating community linkages** by assisting ESCOs to negotiate fair community power purchase agreements, helping foster micro-enterprise development to help build demand load aggregation and facilitating local supply chain development.
- **Engaging the telecom industry** by negotiating long-term Power Purchase Agreements with SPEED-supported ESCOs.
- **Supporting favorable policies** that relieve investors' concerns of a policy vacuum following the arrival of grid electricity.
- **Securing viability-gap financing by mapping the financing** needs of various ESCOs with the types and sources of capital available.

Tapping into the Opportunity Requires...

RURAL ELECTRIFICATION	TELECOM TOWERS
<ul style="list-style-type: none"> ■ Need to shape base loads ■ Productized service: Reliability and quality of service ■ Provide for customer choice, particularly critical for Micro-enterprise support ■ Cost effective pricing 	<ul style="list-style-type: none"> ■ Outsourced energy service ■ Single Technology models are a challenge; Hybrids require greater load ■ Current operational experience has demonstrated the need for significant engagement with the community
<p><i>Need for symbiotic working: SPEED enables the same</i></p>	
<p>Clean energy based micro grid system for rural areas which are robust, sustainable and enable productive loads to be supported...</p>	<p>...in a synergistic fashion with supporting the energy needs of the telecom tower industry, fastest growing infrastructure segment in the country</p>

KEY LEARNING

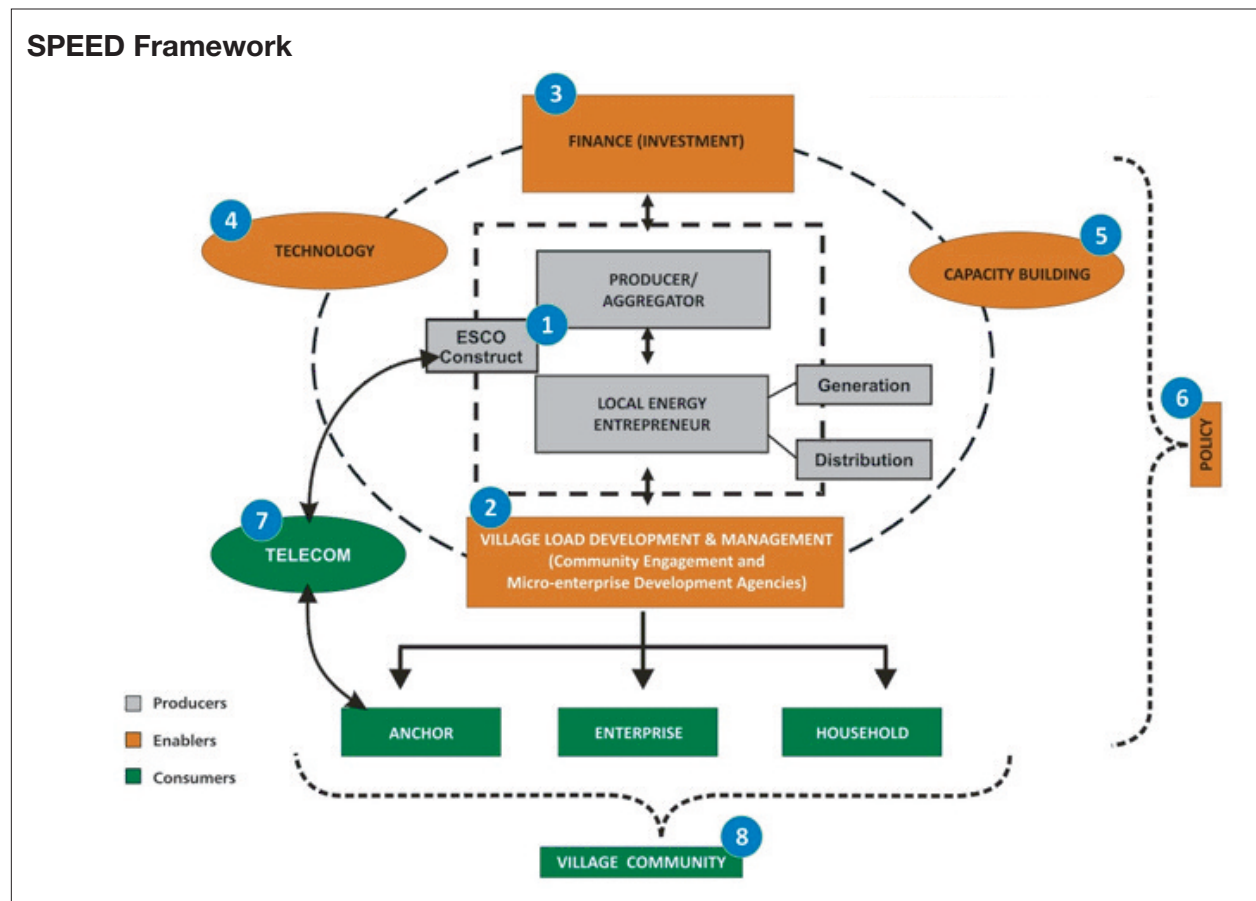
Over the past year, SPEED partners have compiled significant information to ensure that sites are investor-ready for entrepreneurs interested in electricity generation and/or distribution systems for multi-purpose residential or productive use. Interested entrepreneurs will now have relevant, useful information on the following:

- Plant economics
- Technology requirements, including supply chain needs

- Load ramp up potential
- Financial options
- Anchor load linkages with telecom towers and other anchor loads
- Approaches for working with communities.

The team has created eight investment-ready clusters and is currently working with eight entrepreneurs who are interested in constructing plants at 24 sites.

THE INCLUSIVE MODEL

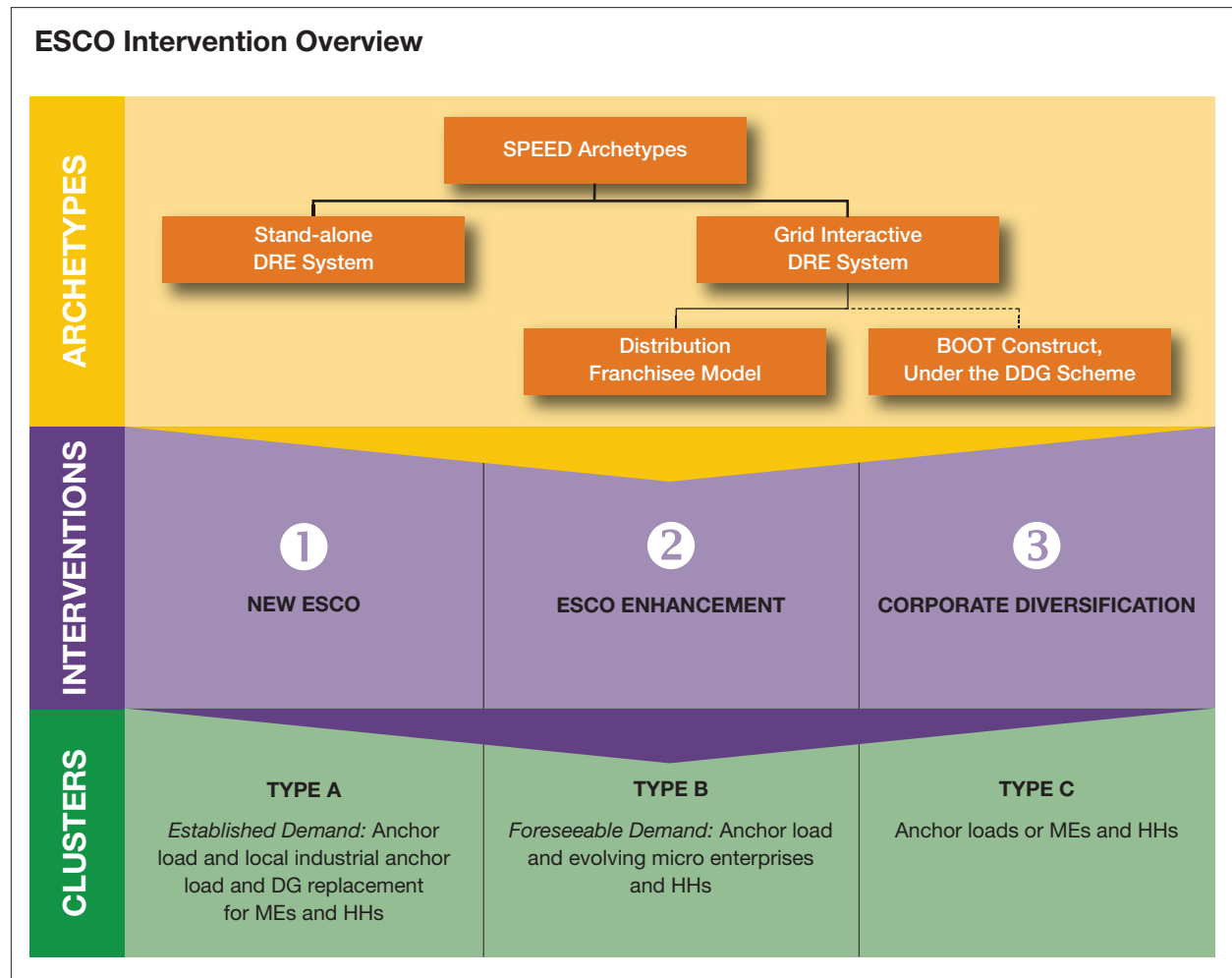


WHAT WE'RE LEARNING

Site clustering is a critical element in ensuring a healthier internal rate of return (IRR) and larger investment options. Several sites that are part of bundled projects with telecom tower and micro-enterprise-based anchor loads have reported IRRs of up to 25 percent.

Decoupling generation and distribution assets create potential for blending and securing capital resources and help improve the IRR of some projects in more remote areas. Micro-grids also represent good business opportunities for sites with over 300 households.

Supporting the ramp up of productive loads (including irrigational services, micro-enterprise loads and telecom tower loads) is crucial to ensuring that entrepreneurs can achieve a profitable return from specific plants. In the absence of micro-enterprises or other productive loads consuming at least 30 percent of the energy at a proposed plant site, the IRRs of projects are significantly low (less than 6 to 7 percent). However, the IRR's of projects in the 6 to 7 percent range can achieve the 15 to 25 percent range with bundling and support of productive use of non-lighting electricity.



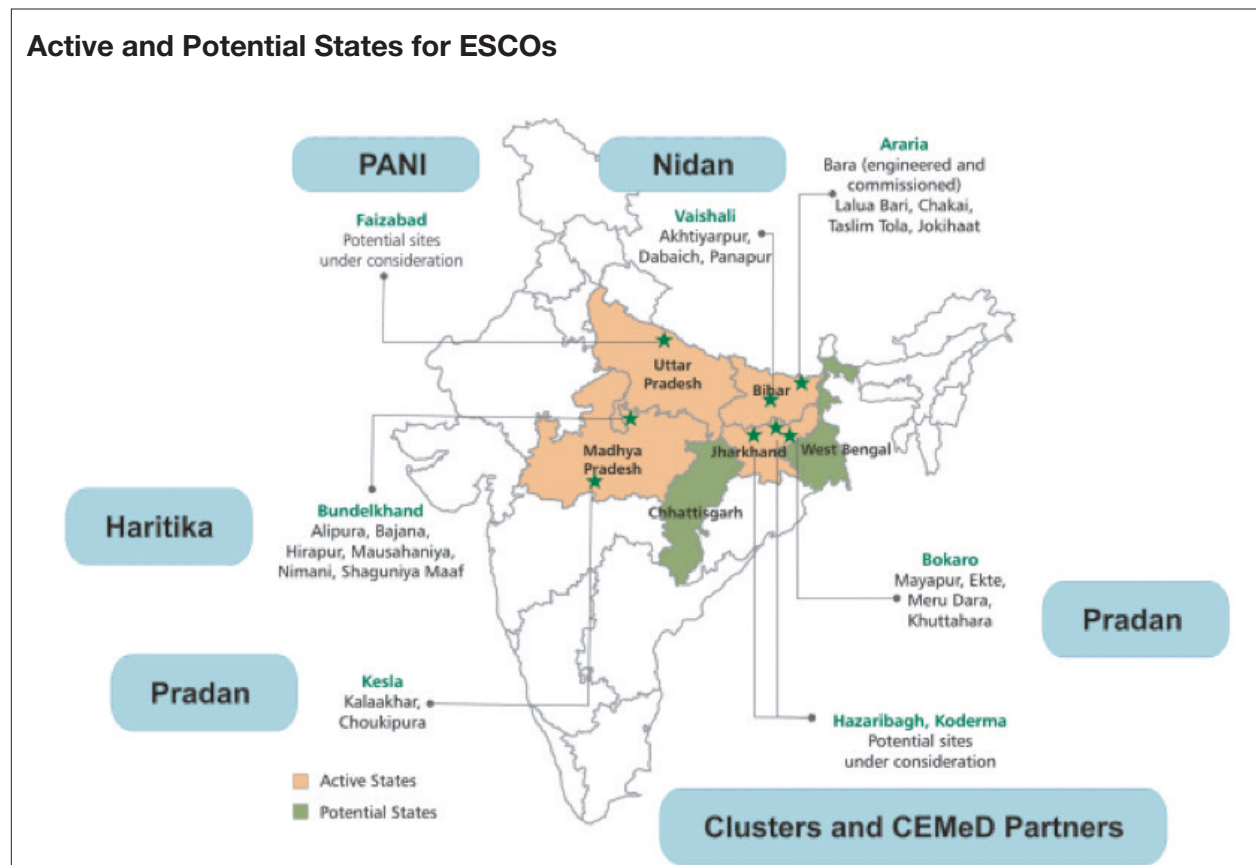
FROM LEARNING TO ACTION

This map illustrates active and potential states for SPEED ESCOs. Based on our learning, SPEED supports load ramp up, conversion and linkages between entrepreneurs and communities, including power purchase agreements, by pairing entrepreneurs with Community Engagement and Microenterprise Development Partners (CEMDEPs). Currently, these CEMDEPs are non-governmental organizations; however, in the future, they can be any entity that links entrepreneurs to communities.

SPEED also provides a strong technology service network and pool of skilled operational and managerial personnel which supports pioneering ESCOs entering this nascent sector. This network may

decreases the capital expenditure for ESCOs by helping them to secure lower prices from equipment suppliers—including solar, biomass and solar-hybrid options, through large-scale orders.

For long term sustainability, SPEED focuses on creating a network of skilled operational and managerial personnel for RE-based power plants. Prior lack of expertise and knowledge gaps have been identified and addressed with the creation of this network, which provides access to technical, managerial and other applicable support services for ESCOs and other agencies. This has also allowed SPEED to be institutionally anchored as an expedient, all-inclusive resource and a key enabler that drives future growth and capacity building.



THE EVIDENCE: WHERE SPEED IS WORKING

BASED ON DATA from over 20 sites being developed under the SPEED initiative, the typical size of a SPEED enabled plant is 32kW. The initial investment per plant is INR 32 lakhs (approx. USD \$70,000 for a biomass plant and the micro-grid). Most ESCOs are operating with a debt/equity ratio of 70:30. Government subsidy varies between 15 to 25% depending on technology and size. For example, for biomass, the subsidy is INR 15,000 per kW). Therefore, financing needed for 50 projects is approximately USD \$5mn wherein plant and micro-grid related investment is USD \$3.5-4mn (depending on the technology) and working capital needs are approximately USD \$600K to 750K. Potential non-returnable incentives/guarantee pay-offs is an additional USD \$600K. The targeted IRR is between 15 to 18% depending on size, location, technology, tariff, community maturity and engagement, etc.

SHAPING MARKET GOING FORWARD

The SPEED team has developed six variants of typical projects for off-grid or grid connected locations taking into account the investment perspective of three different types of companies. Community CEMDEPs conducted surveys to assess the potential for villages at three different levels of economic development and remoteness (in terms of market access). These variants ensure customized and better-fit implementation. Given the plant level economics and the imperatives of each business model, the table alongside provides an assessment of the number of units required to match sustainability and profitability expectations in each business construct.

Type	Typical number of Plants to Achieve Competitive Sustainability*	Potential Number of Plants
Integrated ESCO	Approximately 35 projects with typical project size of app. 35 ~ 40 KW	100
Project developer investing in Generation Asset	Size of approximately 0.5 to 1 MW (i.e. 200 plants of about 20 ~50 KW each). Some developer may prefer lesser plants with size of approximately 100 ~ 200 KW	250 ~ 600 (depending on plant size)
Asset Light ESCO (build and maintain but asset ownership with third party)	Approximately 80 ~ 120 + Projects with typical size of approximately 15 ~ 40 KW	150 ~ 250
Micro-utility (Focus on distribution/revenue collection plus cluster development)	Approximately 80 ~ 120 + Projects for self-funded projects; for those providing O&M support on the Generation Asset, this number may decrease to approximately 40 plus projects	100 ~ 300 (depending on the ability to roll-out as a comprehensive

THE PARTNERS



TARA: Programme Coordination



cKinetics: Business Modeling



Pradan: Community Engagement and Micro-enterprise



Confederation of Indian Industry

CII – Godrej Green Business Centre: Industry Engagement



DESI Power: Capacity Building and Demonstrations



Sambodhi: Monitoring, Learning and Evaluation



Prayas: Policy Research



School of Advance International Studies (SAIS): Global Outreach



For more information visit www.rockefellerfoundation.org/our-work/work-exploration

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