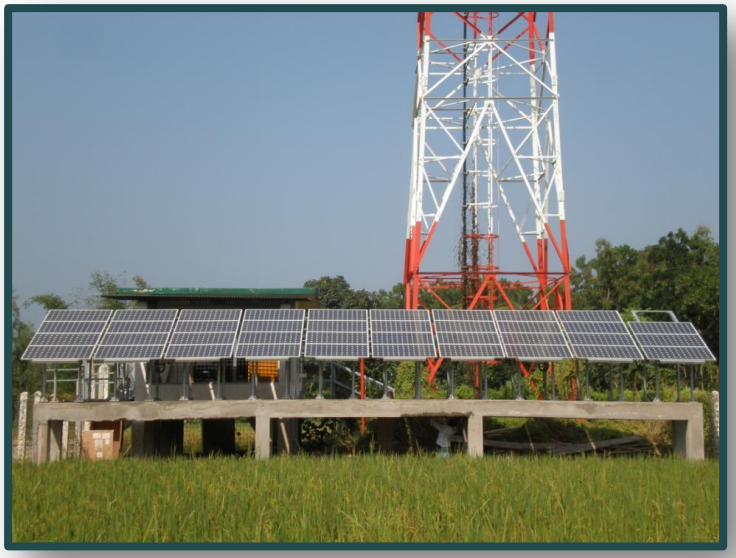
THE ROCKEFELLER FOUNDATION

Smart Power for Environmentally-Sound Economic Development (SPEED), Initiative in Development



Off-grid green power

Decentralized distributed power sources

Defining the Problem

Almost 2 billion people without access to energy services

Traditional grid infrastructure unable to reach the poor in rural locations

Demand broad but shallow – limiting viability of micro renewable energy utilities

Under-developed regulatory environments

Under-developed industry and financing infrastructure to drive growth

Integrated Solution

Micro Utility

Optimize Resources

- *Biomass*
- *Biofuel*
- *Sunlight*
- *Wind*
- *Fossil Fuel*

Produce Power

Candidate Technologies

- *Biomass Gasification*
- *Biogas*
- *Solar PV*
- *Backup Genset*
- *Wind Turbine*

Distribute Power

Tower Power Management System

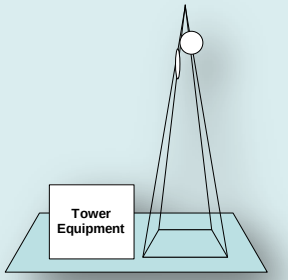
Community Distribution System

- *Marketing*
- *Collections*

- Steady load
- 99.9% uptime

- Varying load
- Cross - subsidized by tower

Mobile Phone Base Station



Host Villages

Public Use
street lighting, schools, clinics

Microenterprise
battery charging, agri-processing, manufacturing

Personal Use
lighting, communications

Gasifier, Araria Bihar

Agricultural waste product

Key Findings from SPEED Phase 1

SPEED approach can create incentives for cell-tower operators

Mobile power demand important, but need early diversification

Technology preferences will likely be hybrids (biomass, solar, biogas)

Regulatory work on tariff and distribution norms is essential

Subsidy / training inputs for building local capacities and ensuring community benefits model requires non-commercial financing

Need to build a set of complementary partnerships that can grow the work beyond direct RF investment

THE ROCKEFELLER FOUNDATION

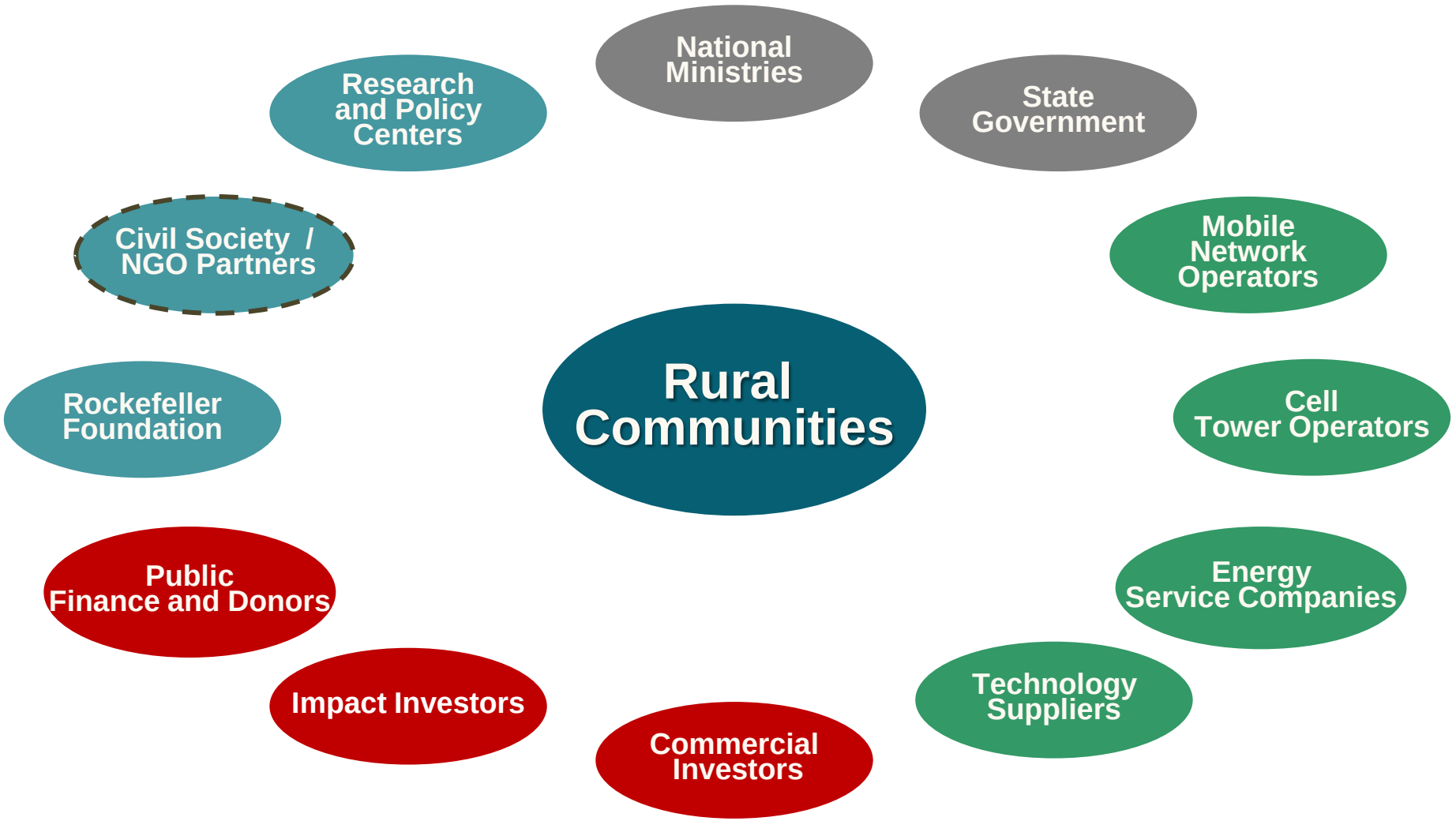
SPEED in Phase 2: 2011-2013 Work Plan

	2011	2012 (expansion decision point)	2013 (consolidation)
Ground-level demonstrations	Pilot cluster (5 units) Baseline established	3 clusters (15 units) Evidence of viability Enterprise development	7-10 clusters (40-50 units) Range of business models Proven community benefits
Building the Enabling Environment	Regulatory mapping Industry partnerships Technology facilitation	Regulatory momentum New demand aggregators	Integrated Regulations Scaled up power purchase agreements
Finance Mobilization	Convene stakeholders	SPEED equity fund Expansion of new entrants	Increased commercial and public finance

Catalyzing Diverse Financing Approaches

- **Grants** for research, convening, M&E, capacity building, rural enterprise promotion
- **Government and donor finance** for capital expenditures, working capital, technology promotion (grants, loans)
- **Impact investment capital** for early-stage investors - ESCos, technology providers, enterprise promotion (equity, loans, micro-finance)
- **Commercial capital** for expansion (equity, loans)

The SPEED Eco-system



THE ROCKEFELLER FOUNDATION

SPEED Partners

Development Alternatives Group

D.E.S.I Power ™

CII - Sohrabji Godrej Green Business Centre

Green makes Business Sense

THE ROCKEFELLER FOUNDATION

Case Study

DESI Power

SPEED Phase 1

Validation Pilots

DESI Power Biomass Plants
Location, Loads and Towers

- DESI Power is operating biomass-based power plants in three villages in Bihar where 6 telecom towers are connected to the plants in two of the villages
  - 3 Villages in the District of Araria (Bihar): Baharbari, Bhebhra, Gaiyari
  - Electrification of 3 villages and power supply to surrounding telecom towers
- Types of Load:
  - Home Lighting, Market Lighting
  - Irrigation
  - Small Agro Mills, Ice Factories, Workshops
  - Cinema Hall
  - Telecom Towers
- Telecom Towers in the vicinity of the plants:
  - Bharti Infratel & Viom (BSC Site at Jokihaat)
  - Vodafone at Jokihaat
  - Bharti Infratel at Zero Mile
  - Vodafone & Viom at Zero Mile
  - Viom at Gaiyari

THE ROCKEFELLER FOUNDATION

Status of Tower Connections

List of Towers connected and to be connected from Bebhra and Gaiyari Plants

No	Place	Plant name	Tower Name Owner	Tenant	Infrastructure Provider	Load (kW)	Remarks
1	Jokihat	Bhebhra	Bharti Infra	Tata Indicom	Bharti Infratel	10	Technical issues in connecting the load. BI identified technical issue but testing awaited.
2	Jokihat	Bhebhra	Vodafone	Idea	Vodafone	6	Connected. Power supplied.
3	Jokihat	Bhebhra	Tata Docomo		Tower Vision	5	Cable laid but not connected. Waiting confirmation from Tower Vision.
4	Gaiyari 1	Gaiyari	Tata Indicom		Viom Networks	6	Cable laid but not connected. Waiting confirmation from Viom Networks.
5	Gaiyari 1	Gaiyari	Vodafone		Vodafone	6	Cable laid, Vodafone HQ is ready but no support from ground level personnel.
6	Zero Mile, Araria	Gaiyari	Vodafone	Idea + Tata Docomo	Vodafone	6	Connected. Power supplied.
7	Zero Mile, Araria	Gaiyari	Bharti Infra		Bharti Infratel	4	Connected. Power supplied.

8-10 hours of power supplied to three towers replacing 20 liters of diesel per day per plant??

Challenges & Suggestions

- Lack of support from ground level staff of tower. Resistance due to local diesel economy.
- Electrical imbalance of at the power plant as the tower needs single phase power supply.
- Loads from towers are too low to economically operate the existing power plants.
  - These plants were not designed for such low loads
  - Supporting load being identified and sought after for viability
- Finding supporting load to provide 12hr or 24hr power supply to the towers. New designs and load management schemes being worked on to address this issue.
- Contractual Issues – Corporate v/s circle level clarity; delays in payments etc. It must be streamlined.
- The power supply can be streamlined better if the complete energy supply is outsourced to the local micro-grid operators.
- Power supply is easier if a cluster of towers are supplied from a single power plant to maintain reasonable PLF.

THE ROCKEFELLER FOUNDATION

Thank You.