Renewable Energy For Telecom: 3 Steps Approach

Green Power for Mobile & Mobile Enabled Community Services Regional Working Group (04-05 June 2013)

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Technical Expertise

Innovative system integration proof points with blue chip partners

Portable power



Stationary power



Two wheel vehicles



Low power systems







High power systems



CHP systems



Aerospace



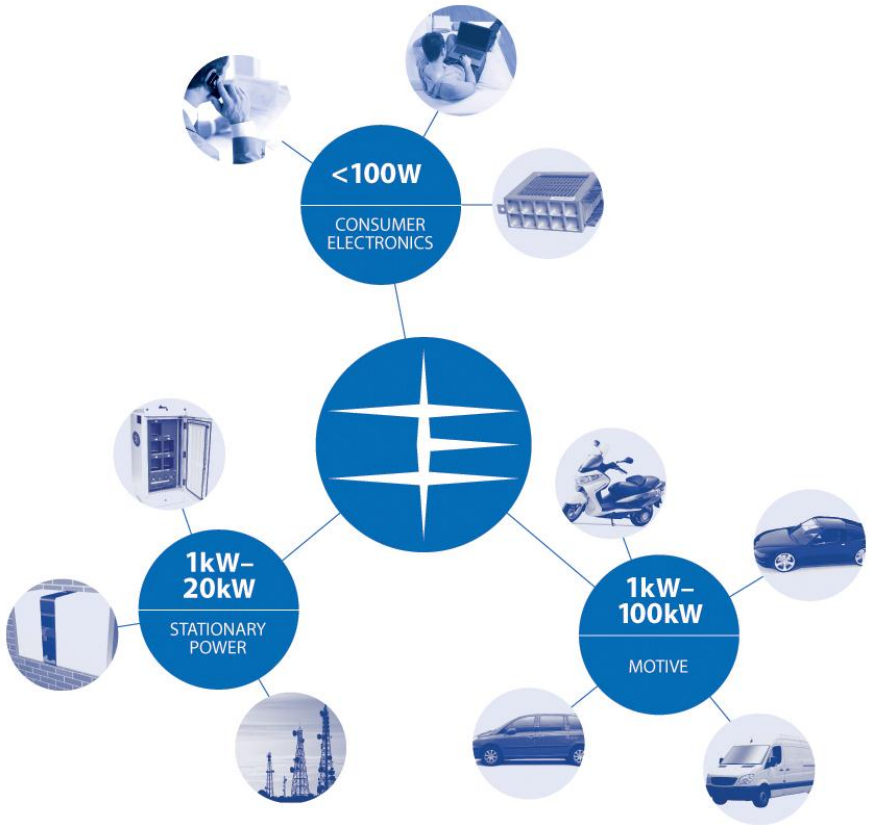
Four wheel vehicles

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Commercial application across sectors

- Intelligent Energy solutions are applied across sector and markets;
  - **Consumer Electronics**; portable & extended operating power
  - **Stationary Power**; CHP, backup power, emergency power
  - **Motive Power**; Two-wheeled vehicles, automotive, commercial vehicles



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Stationary and Backup Power Division



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Stationary Power: Backup Power

Need for reliable power

Rapidly growing demand in telecommunications, particularly in India

The number of mobile phone subscribers in India will reach 1.24 billion in 2015

The number of cell towers will reach over 500,000 by 2015

70% of cell towers in India subject to 8 hours or more of outages per day

Over 2 billion liters of diesel per year consumed.

One diesel generated kWh emits three times as much CO_2 as one grid produced kWh.

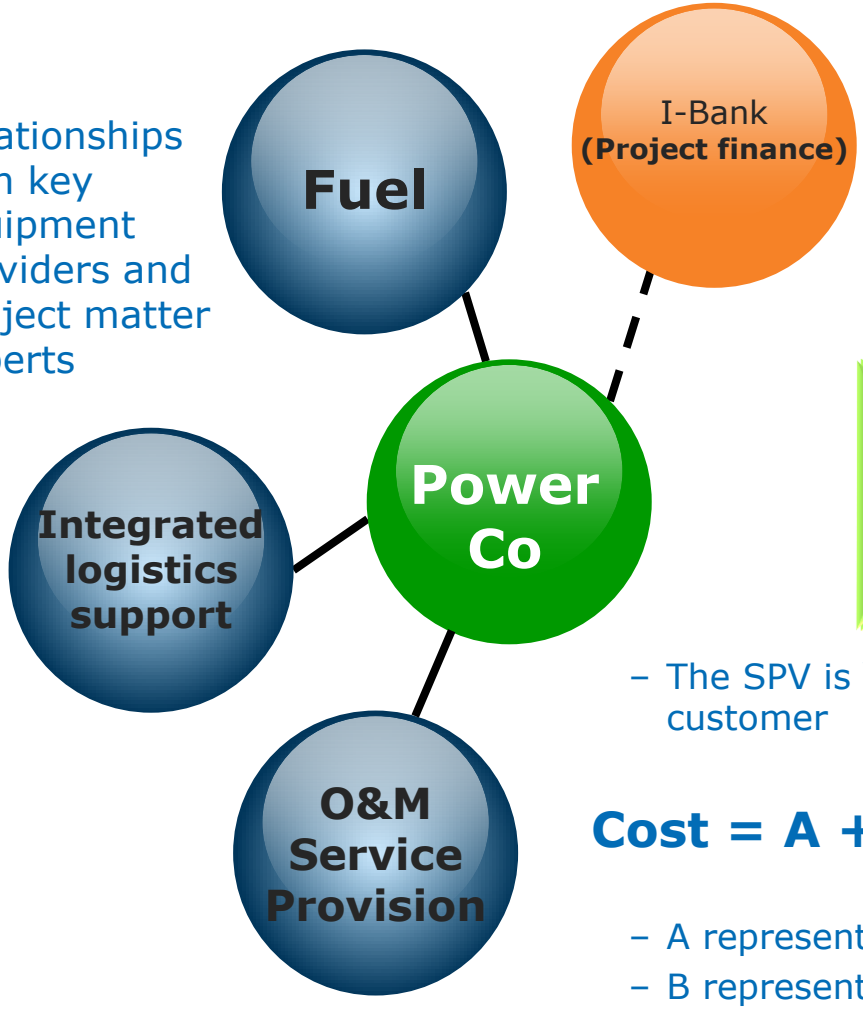




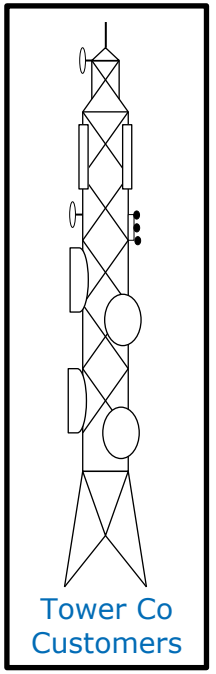
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India - Provision of Power Business

Relationships with key equipment providers and subject matter experts



>99.95% availability



MOU signed With Infrastructure Provider

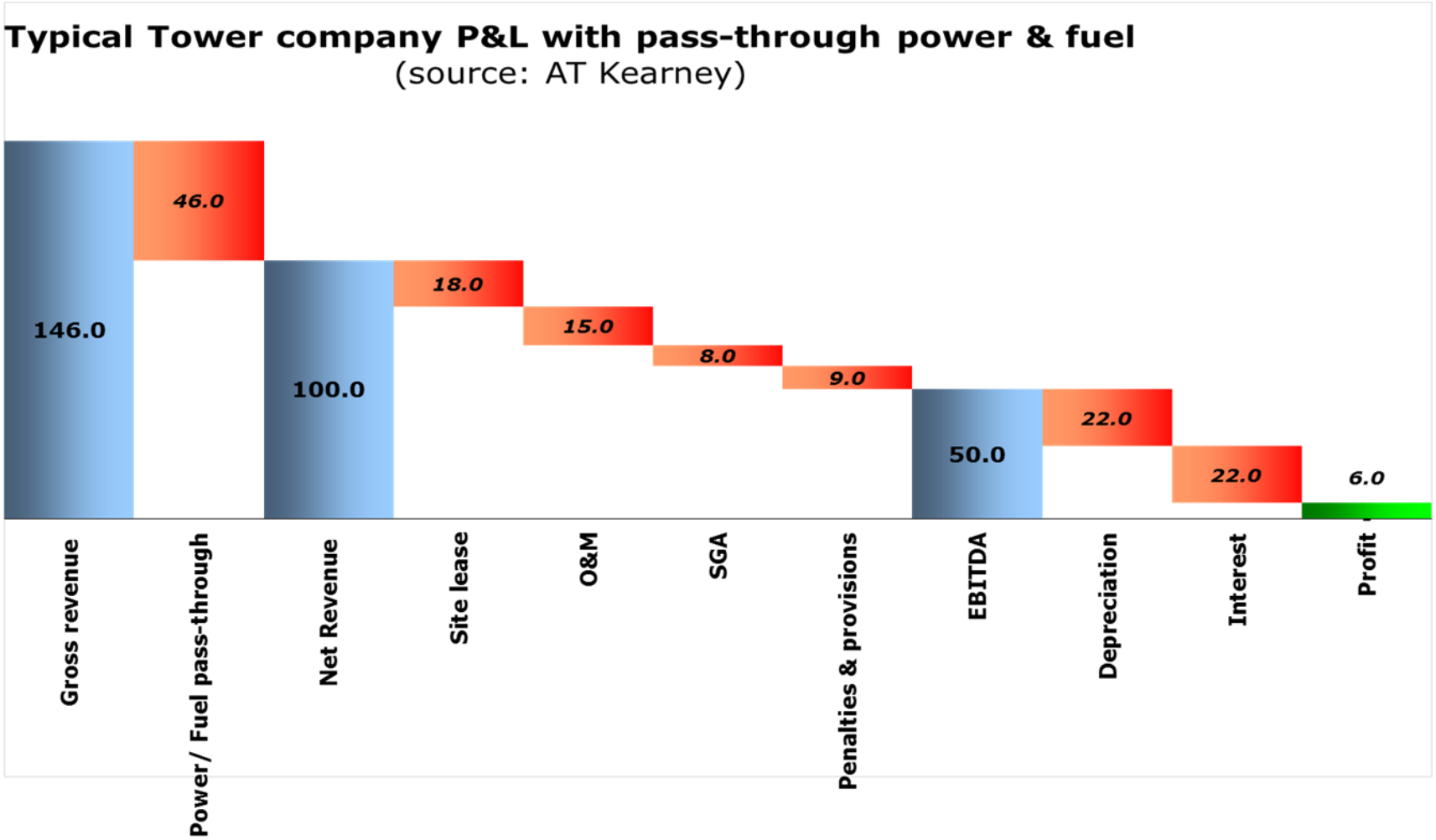
- The SPV is "one-stop-shop" supplier to customer

Cost = A + B + C

- A represents installed kW.
- B represents consumed kWh.
- C represents portfolio fee – a fixed amount per month dealing with unusual inaccessible or remote sites.

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Analysis of Tower company Opex

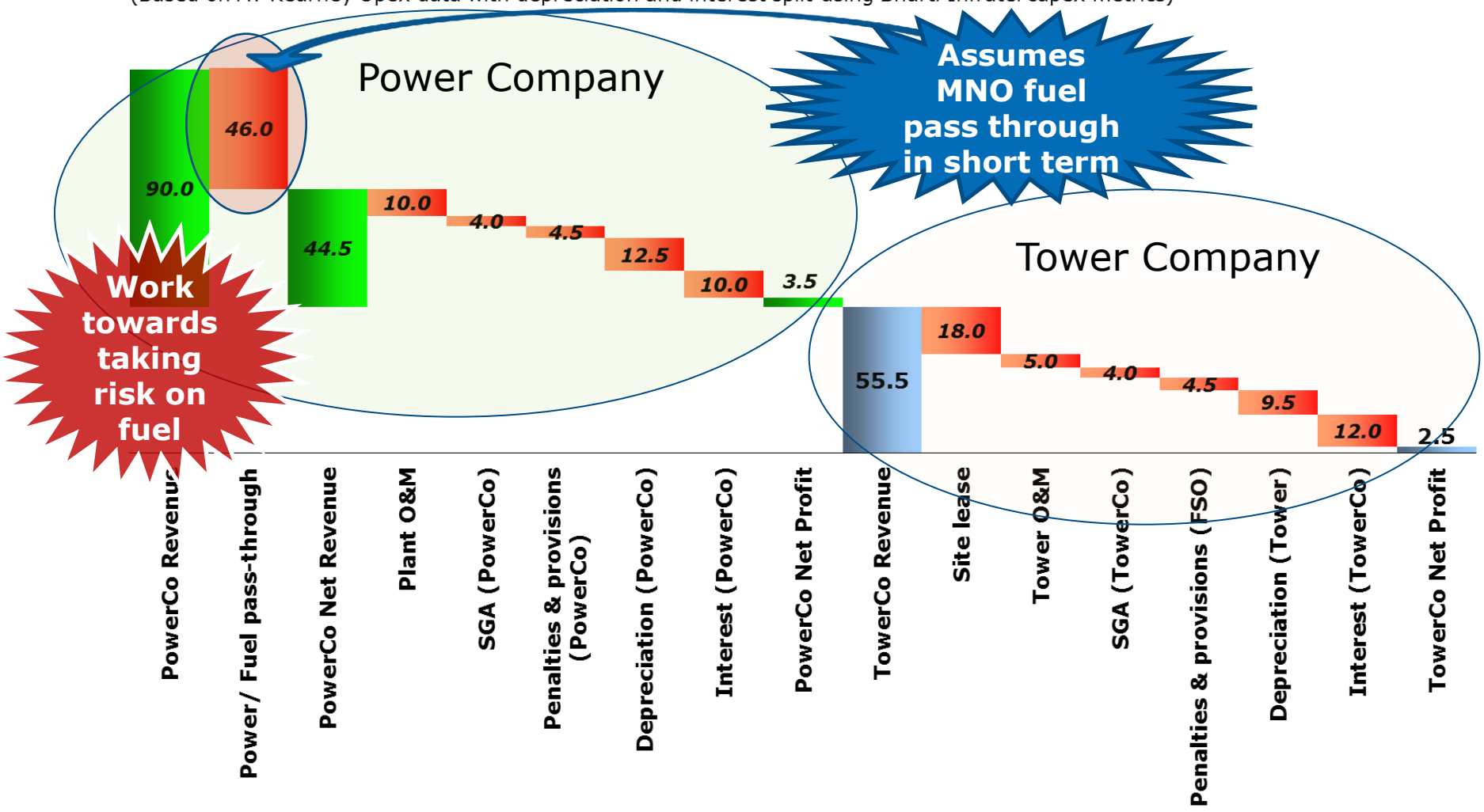


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Impact on P&L of disaggregating businesses

Disaggregated TowerCo and PowerCo P&L's

(Based on AT Kearney Opex data with depreciation and interest split using Bharti Infratel capex metrics)



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Telecoms sites: Three step engagement process

Step 1

Benchmark existing sites

- Site energy efficiency
- Site operational efficiency
- Blended energy cost

Step 2

Optimize existing sites

- Modify operating algorithms
- Monitoring tools to reduce site visits
- Eliminate inefficiencies through replacement or elimination of redundant/non operational equipment

Step 3

Adopt new technologies

- Introduce new technologies that can result in operational and/or energy efficiency improvements
- Scaling tower site to serve other customers reducing cost for IPs

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Technology Agnostic

Select the correct technology to suit the application and location

Download our White Paper Series:

- **The True Cost of Providing Energy to Telecom Towers in India**

  Examines the cost of energy at telecom towers with diesel generator back-up power

- **Green Solutions for Telecom Towers: Part I**

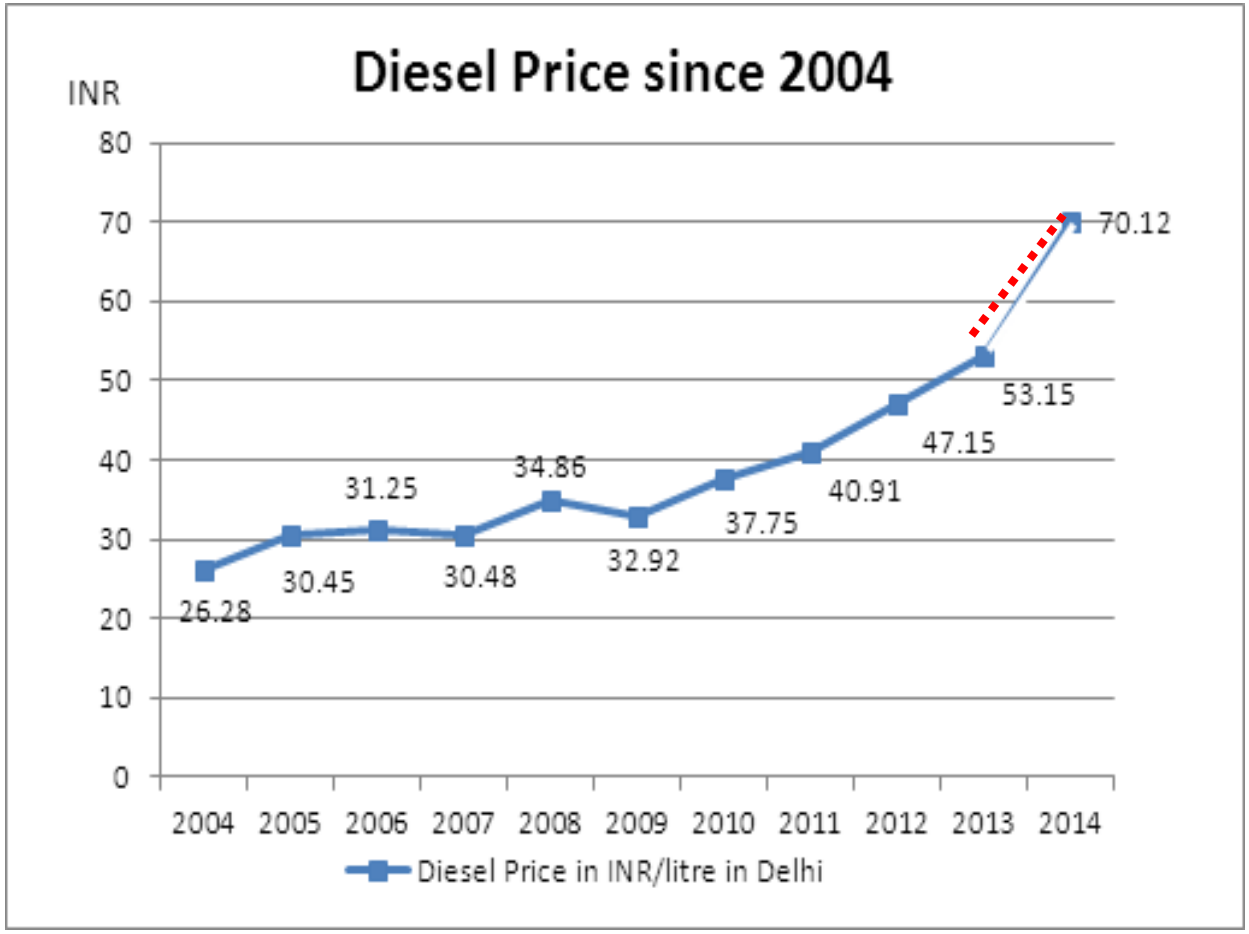
  Overview of energy efficiency and renewable solutions including Solar Photovoltaic, Wind, Biomass and fuel cell

- **Green Solutions for Telecom Towers: Part X**

  Future series looking at green case studies

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The future of Diesel Generation



Projected price of diesel till 2014 considering the INR 0.5 increase per litre per month and including marketing margins.

Adopting renewable solutions will be the economic choice for many sites.

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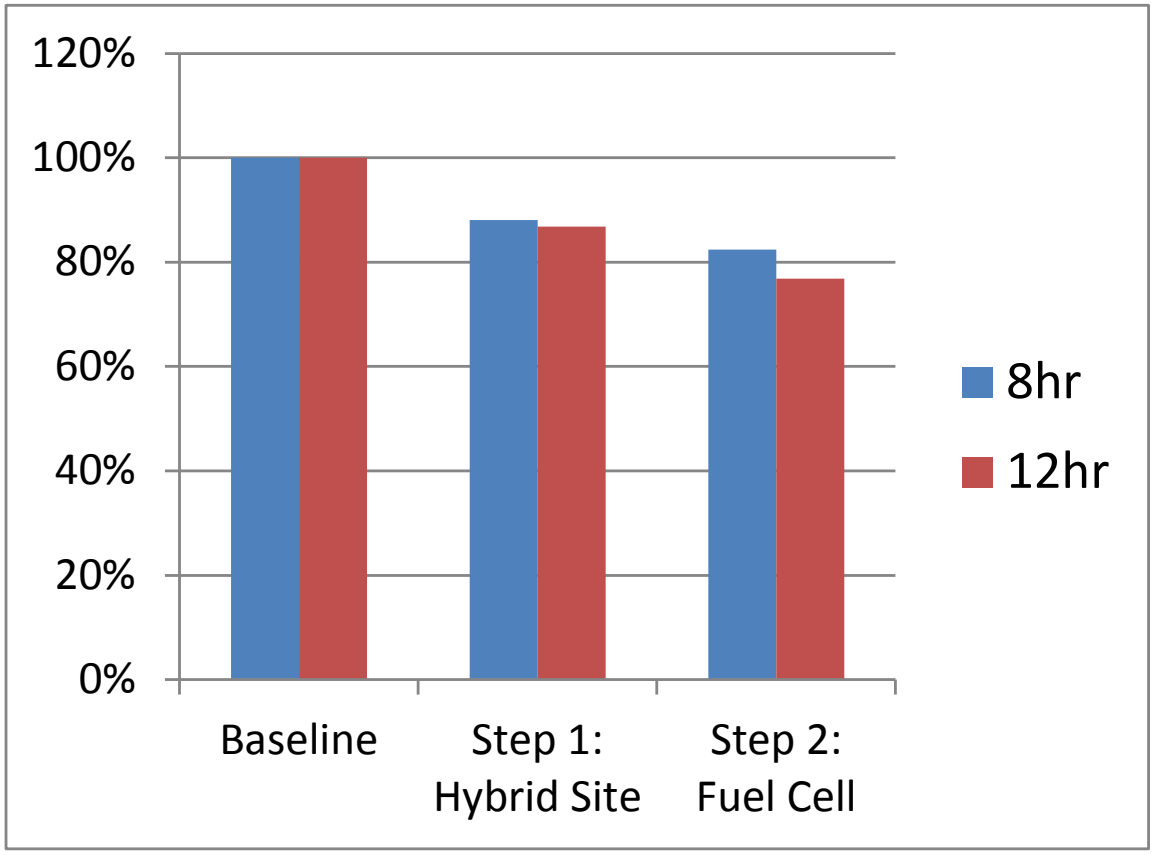
Example - Technology Choices

	Solar Photovoltaic	Wind Turbine	Biomass	Fuel Cell
Energy source	Photovoltaic energy generating systems convert sun's energy into electricity	The kinetic energy of wind is converted to mechanical energy and then into electrical energy	Waste matter composed of parts from living or recently dead organisms are used to produce alternative fuels for producing energy	Chemical energy in hydrogen is converted to electricity, water vapour and heat
Efficiency	6.2-19.7%	20%	20%	40-60%
Carbon Foot Print	Zero at point of use	Zero at point of use	Minimal	Zero at point of use
Limitations	1. Dependent on sunshine availability 2. Requires equivalent storage capacity hence needing additional investment 3. large area required for installation	1. Dependent on the quality of wind speed and duration of wind availability requirement 2. Requires equivalent storage capacity needing additional investment	1. Load uptake cannot be limited to telecom, hence need load aggregation from the other source	1. Underdeveloped hydrogen logistics as of date
CAPEX in INR (may vary per brand)	1,341,589	1,490,196	11,00,000	880,000
Maintenance	Minimal Maintenance	Minimal Maintenance	Biomass fuel cost and plant maintenance	Hydrogen fuel cost and system maintenance

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Example – Site Cost Saving

Site net present cost savings for power assets



8hr or 12 hour EB grid power interruption

Step 1: Correct site maintenance enabling hybrid operation. Delay diesel start and use battery capacity.

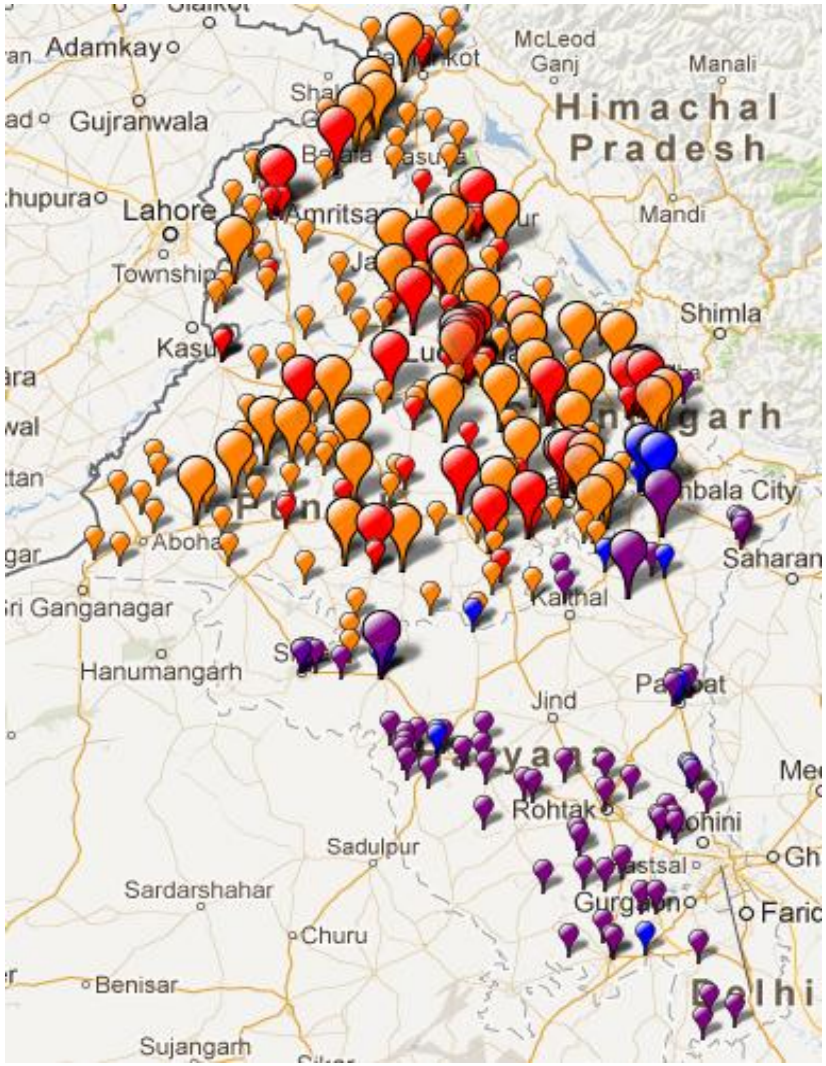
Step 2: Fuel Cell to replace diesel generator.

Includes fuel savings.

Potential to reduce site operating costs by over 20%

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Example – Fuel Cell Suitability



- IE's strategy is to roll out FCS systems circle by circle.
- Over 300 towers in Haryana and Punjab assessed for fuel cell suitability.
- Example: Two circles (red & orange and blue & purple), each pin representing one site.
- In this example, all sites host a diesel genset (DGS) and the orange and purple sites have been identified as potentially suited to replacement of the DGS by an FCS.

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Summary

- Renewable solutions for telecom applications are available and can be implemented with considerable through life cost saving.
- However for most renewable solutions initial capital costs are significantly higher than traditional power generation solutions.
- Renewable Energy Supply Companies (RESCO) can provide renewable solutions and overcome the initial capital cost burden by supplying power on an operational cost (Opex) basis.
- Different solutions suit different applications and locations so RESCO must be technology agnostic.
- **What barriers are left to prevent widespread introduction?**

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