Small Wind - Solar Hybrid - Case Studies of various Applications

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WiSH Energy Solutions Private Ltd

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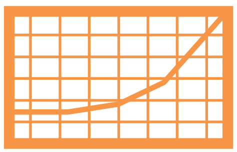
Enzen – The Energy & Environment Company

Revenue Growth

CAGR of 111% since inception



Headcount

3500+ Globally

Industry orientation

Focus

- **Power**
- **Water**
- **Gas**
- **Oil & Gas**

Locations

Major presence in India and UK

Clients

Over 100 clients in 10 countries

Centres of Excellence

Offerings

- **Business Advisory**
- **Enterprise Solutions**
- **Infrastructure**
- **Business Operations**
- **Network & Controls**
- **Clean Energy & Environment**

"Our vision is to make energy and water accessible, affordable and safe *– to support economic and social growth – sustainably.*"

WiSH Vision

WiSH
cleaner · greener · future

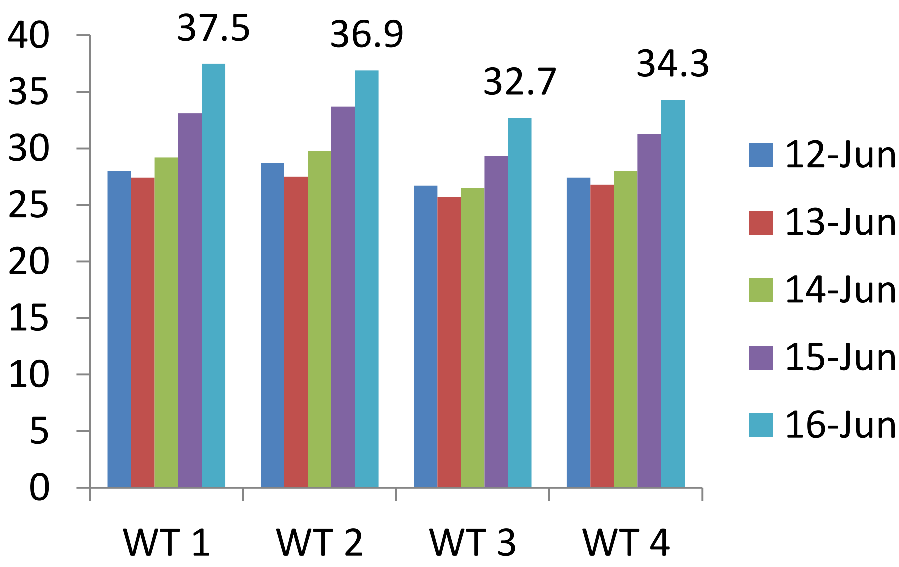
"Transforming natural resources to deliver affordable renewable energy for all"

About WiSH

- Pioneers in mid-range wind turbines in India with 25+ years experience
- Patented technology with over 30,000 installations across 45 countries
- Expertise in wind, solar PV & hybrid technology for sustainable energy solutions – grid / off-grid
- Integrated PCU for wind/solar hybrid operation support
- 24/7 operation with adequate battery storage
- Custom engineered solutions specialists
- Remote monitoring and management

An indigenous SWES manufacturer

Small Wind Turbine can beat Solar

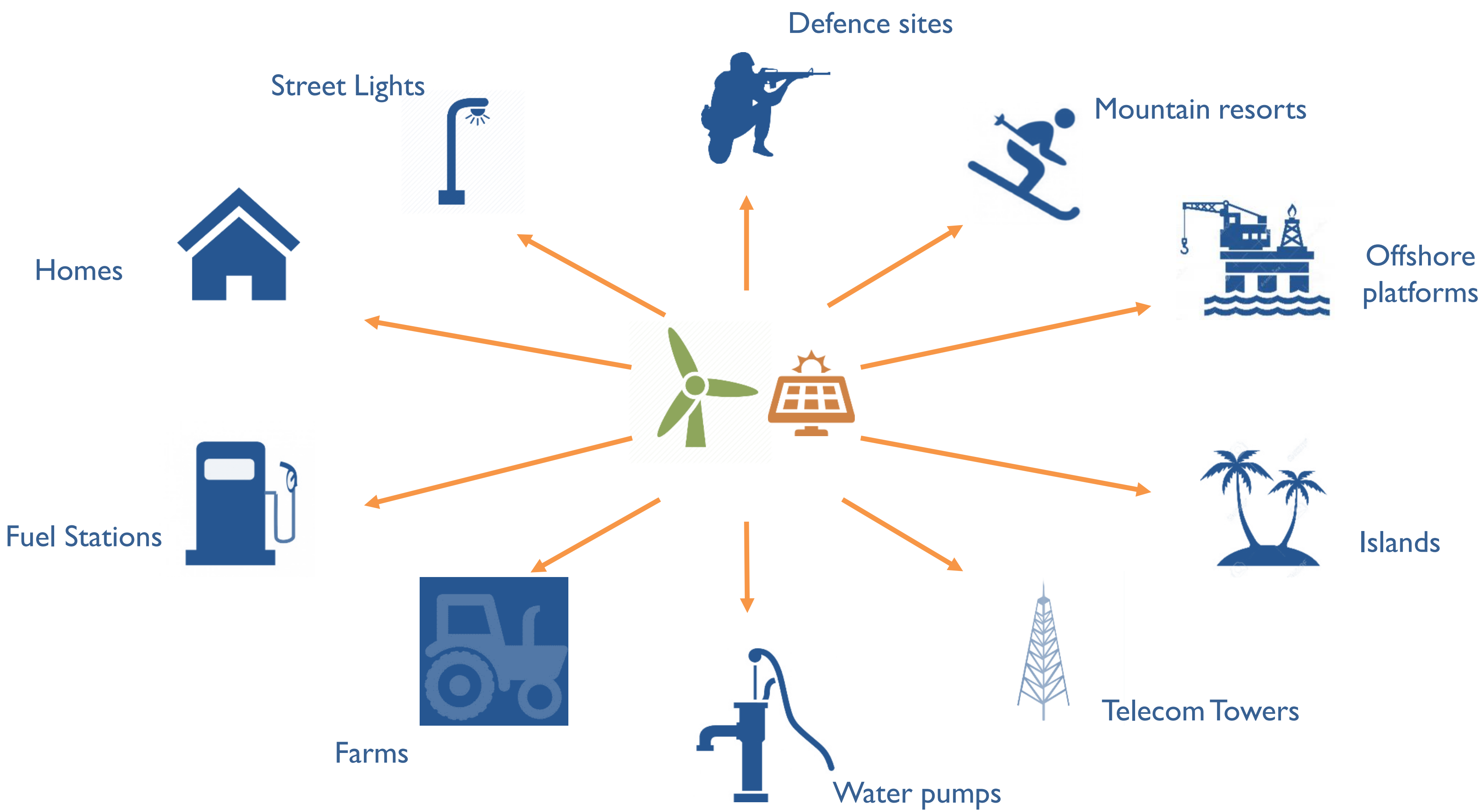


Case Study: *Asian Paints, Shirwal Factory*

4nos. X 4.5 KW Windistar

Generation of 8 units per KW achieved with optimal mix

Connecting the unconnected

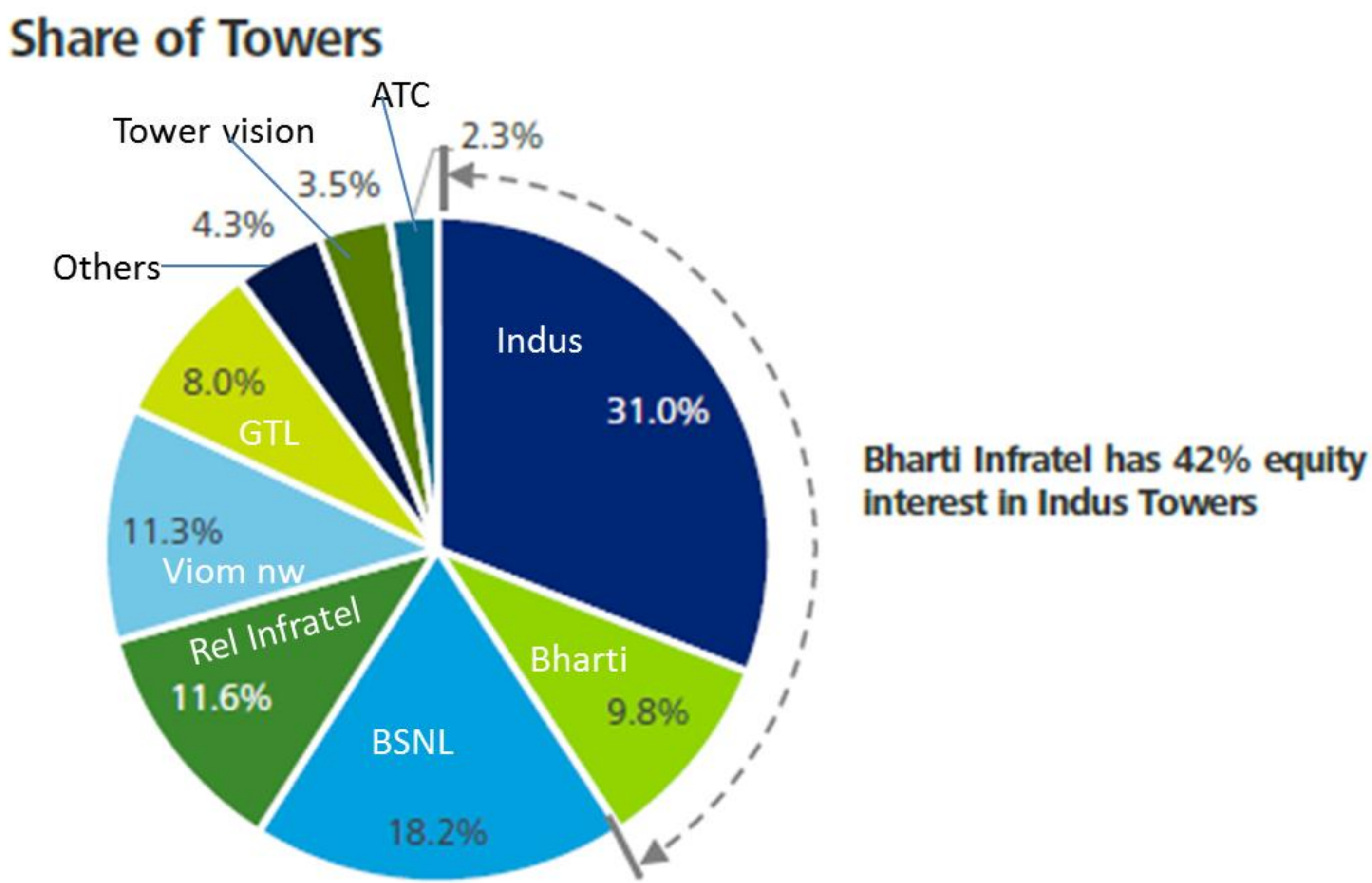


WiSH solutions for Telecom Towers

Whisper Turbines are more reliable than other turbines operating here

- Kasun Wijesinghe
Dialog, Axiata PLC
Colombo, Srilanka

Tower Industry Players



Overview of the Indian Telecom sector

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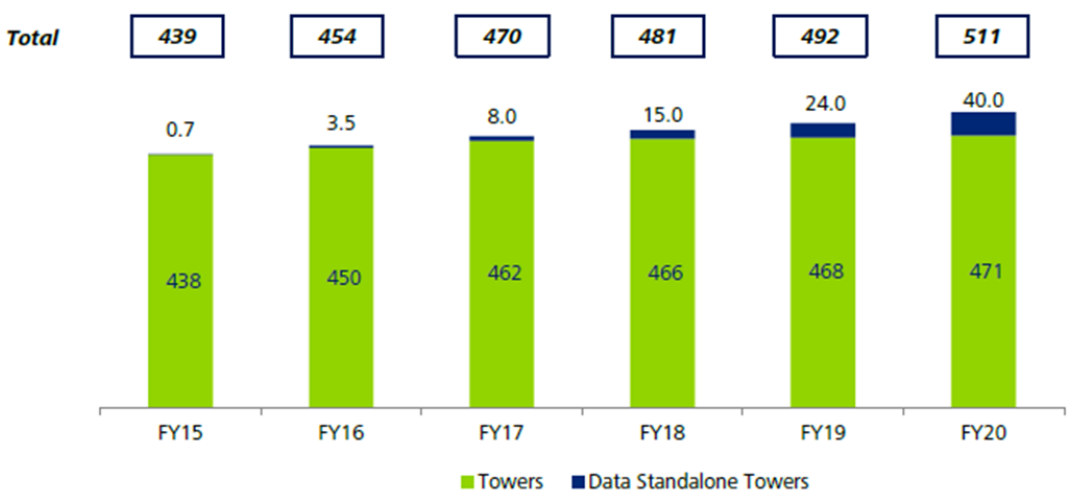
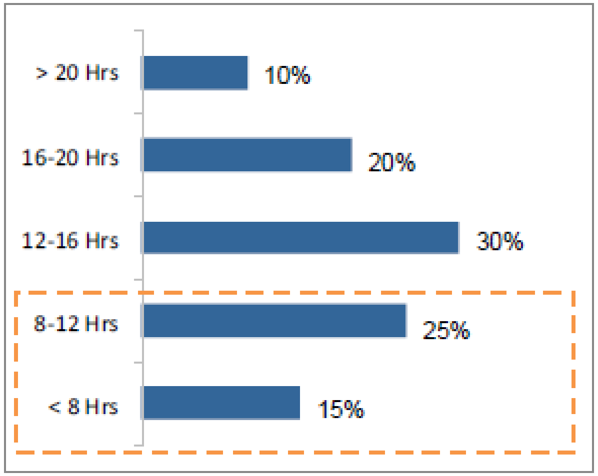
- 4.39 lakh telecom towers in India – Dec 2015 … and growing !
- 40% of the telecom towers face load shedding > 12 hours per day.
- This has led to 60% of all towers depending on diesel generators for their power requirements.
- Energy costs ~ 37% of Revenue - single highest cost element in P & L of Towers Cos.
- Diesel Consumed by Tower Industry – 50% of Indian Railways or 40% of Industrial Gensets
- Power requirement - 1 to 8.5 kw per Tower (Average 3.5 Kw for 80% of Towers)

Projected number of Towers in '000

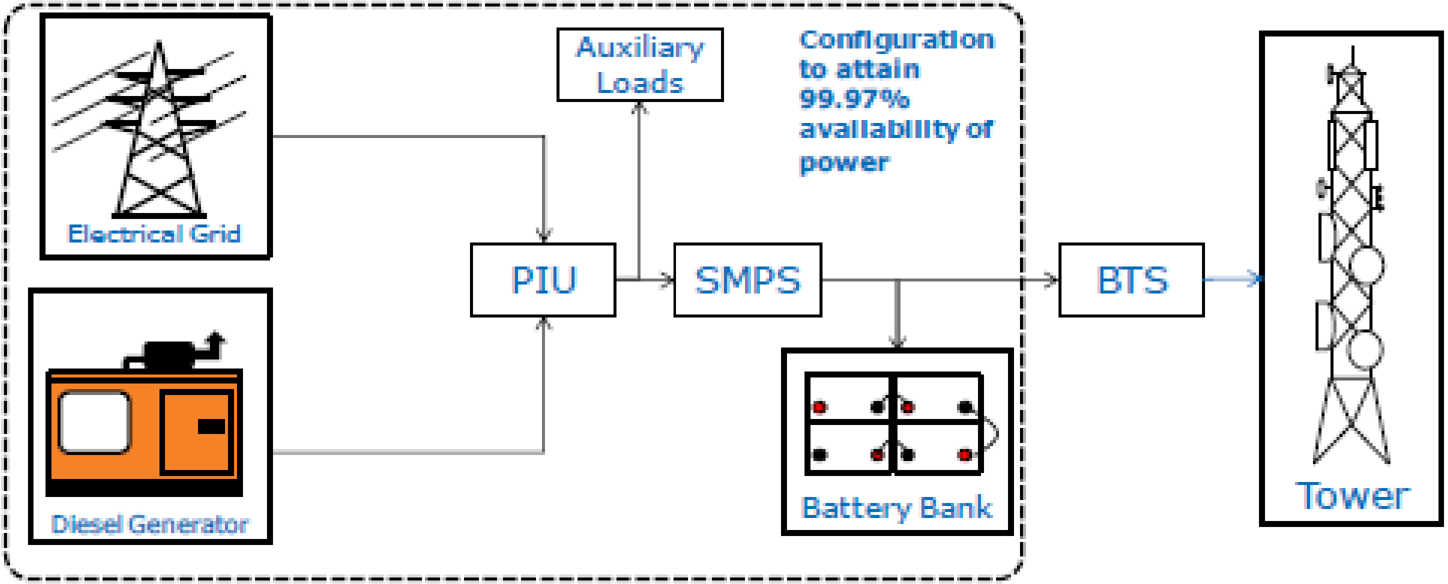


Utility Power availability for Towers



Telecom Towers – Energy Challenges

- High energy related OPEX due to long DG running hours
- High Fuel costs due to fuel transportation costs, pilferage theft etc.,
- Difficulties in measuring actual power consumption
- Rural locations with minimal or no grid power availability – connectivity to be provided
- High Carbon emitting - about 7 mil tonnes annually



Key Trends in the Tower Industry

1. Operational optimization

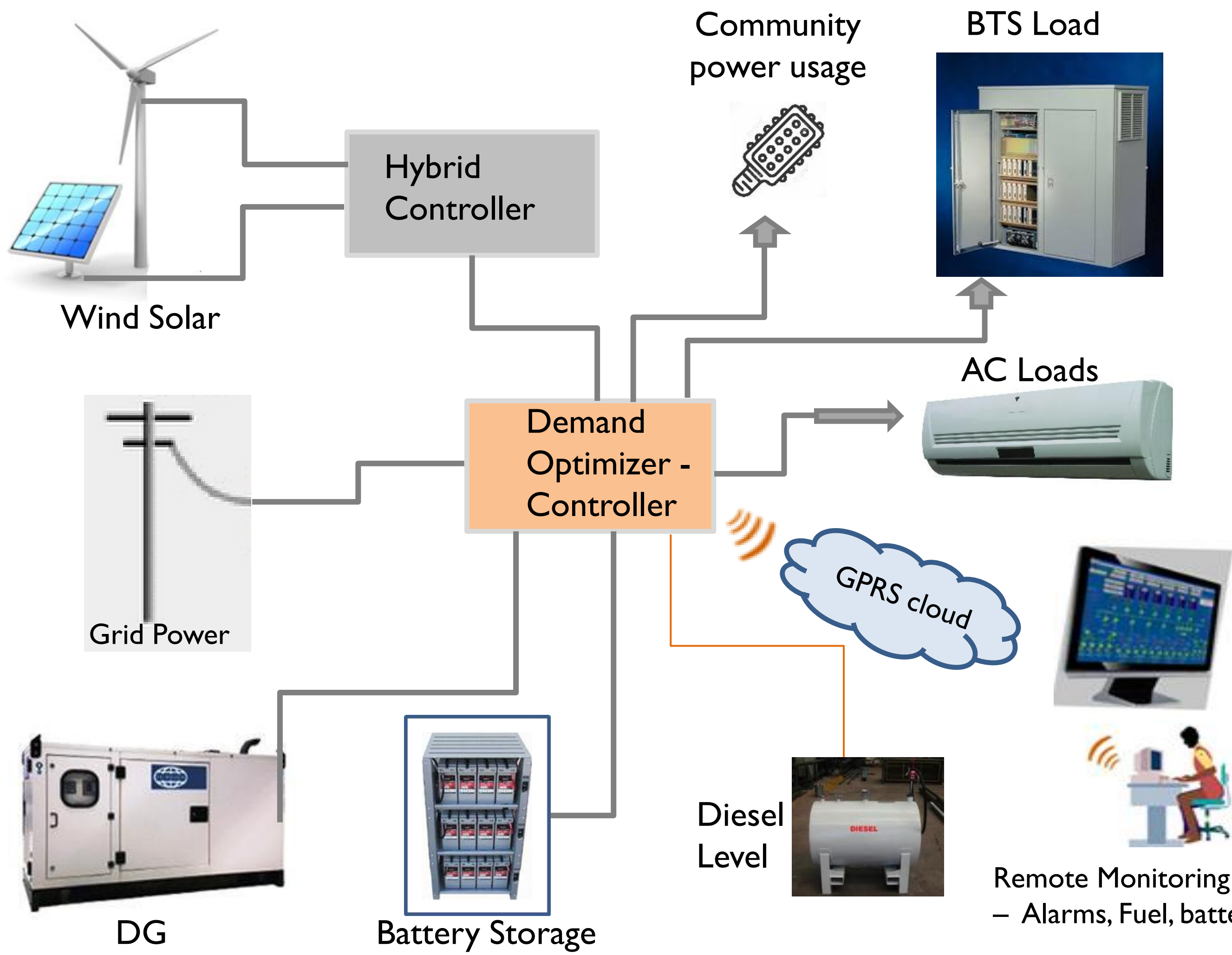
- Focus has shifted greatly to operational optimization and prudence.
- Tower organizations are adopting innovative models, advance fuel management technologies, data analytics and also high efficiency equipment and green energy

5. Green tower and environment focus

- Public and regulatory pressure to reduce telecom towers' energy consumption and pollution
- RESCO models
- With a holistic approach and collaboration with OEMs and service providers, the tower industry can move to a greener value chain encompassing:
  - Renewable energy
  - Low power green active equipment
  - High energy efficient green passive configuration and equipment

*Deloitte study – Jun 2015

Integrated Energy Transformation Solution for Telecom Towers



Value added options:

- Priority energy source
- Intelligent Demand Optimization
- Storage management
- Monitor generation & Load
- Automation & remote management
- Correlate energy source and fuel level
- Alarms, status, Fuel monitoring
- Visualisation, Analytics & Reporting Dashboard

The scope is immense

- By 2020, there will be an estimated 6 lakh towers in India, out of which 40% ~ 2.4 lakh towers will be dependent on Diesel Generators for energy for >12 hrs a day

- This translates to an energy requirement of 14400 MW, which can be fulfilled by Wind-solar hybrid solutions

- By substituting DG usage with renewable energy, there is a potential to reduce 8.4 million tonnes of CO_2 every year

- The potential savings on OPEX costs from substituting Diesel (including 20% pilferage YOY) is Rs. 12,000 crores

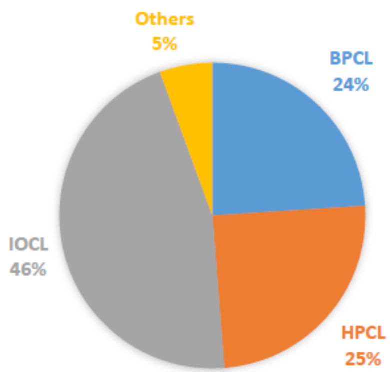
- 4.8 crore rural households stand to benefit under CFA

Fuel Pumps

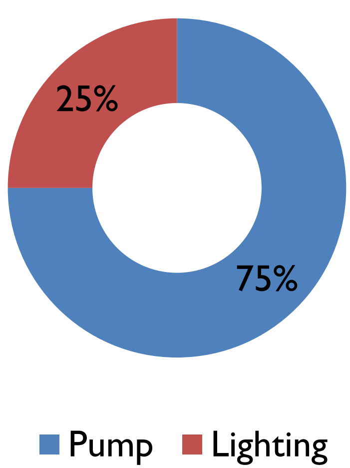
Indapur Petrol Pump

Fuel Pumps – Market Size

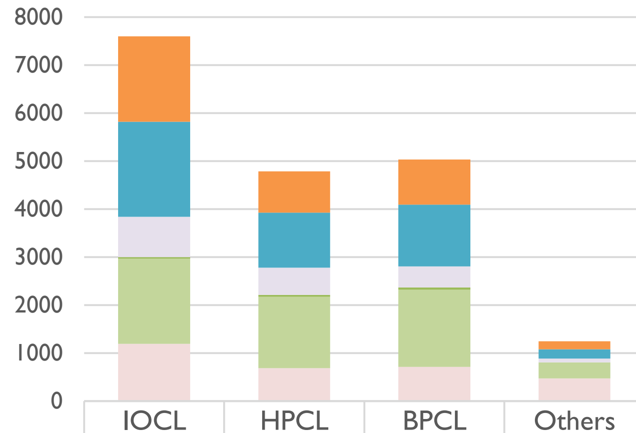
Market Share



Energy consumption

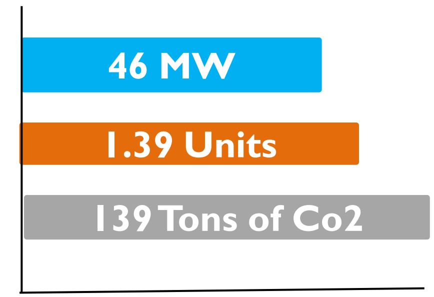


Addressable Market

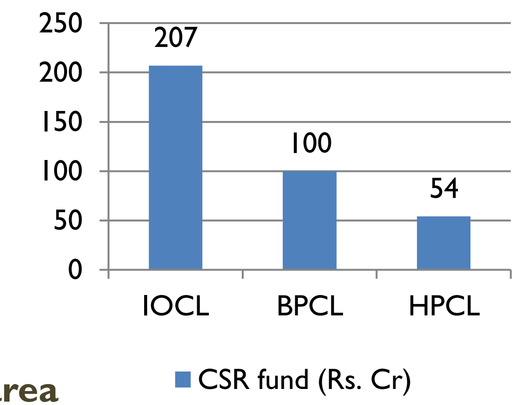


	IOCL	HPCL	BPCL	Others
Karnataka	1774	859	938	166
Tamil Nadu	1983	1152	1287	195
Kerala	843	566	444	79
Goa	29	36	46	0
Maharashtara	1778	1489	1606	334
Gujarat	1187	684	710	469

> 18000 petrol pumps in target area



Potential savings



Strategy for Funding

Testimonial from Artic

I work in support of the US National Science Foundation's Arctic Program. I design/build/deploy power systems for use in very remote and extreme Arctic environments. We currently have four Whisper 200 machines in operation, and I was planning on additional installations. They are good machines for low to moderate wind sites, common on Alaska's North Slope.

- Tracy Dahl
NABCEP certified PV installer
Polar Field Services, Inc.

Other Applications for Wind-Solar Hybrid

Resorts

Lonawala

Educational Institutions

Nagarcoil

Other Applications for Wind-Solar Hybrid

Lighthouses

Telecom Towers

Other Applications for Wind-Solar Hybrid

Offshore/Onshore Oil Platform

Border Defense Power and Communication

Thank You!!

Annexure

WiSH Wind turbine portfolio

Name	Name
• Whisper 200	• Whisper 500 / 500+
Rated Capacity (11 m/s - MNRE)	**Rated Capacity (11 m/s - MNRE)**
• 570 W	• 2000 W
Annual Output (5 m/s - MNRE)	**Annual Output (5 m/s - MNRE)**
• 1063 Kwh/year	• 3673 Kwh/year
Potential Carbon Savings	**Potential Carbon Savings**
• > 700 Kg of CO_2 per turbine per year	• > 2500 Kg of CO_2 per turbine per year
Applications	**Applications**
• Small houses, offshore platforms, telecom towers	• Resorts, Defence sites, Fuel Stations
Certifications	**Certifications**
• IEC 61400 / CE	• IEC 61400 / CE

WiSH Wind turbine portfolio

	WindiStar 400	WindiStar 4500
Name	WindiStar 400	WindiStar 4500
Rated Capacity (11 m/s - MNRE)	400 W	4500 W
Annual Output (5 m/s - MNRE)	(To be tested)	(To be tested)
Potential Carbon Savings	> 500 Kg of CO_2 per turbine per year	> 5000 Kg of CO_2 per turbine per year
Applications	Rural homes, street lights	Rural homes, street lights
Certifications	CE	IEC 61400 (in progress) / CE

Our Clients

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