Deeya Energy®



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Deeya Locations: Silicon Valley & India

- Deeya US, Fremont, CA
  - Global HQ
  - R&D
- Deeya India, Gurgaon, India
  - Manufacturing & supply chain
  - Sales & service
  - Engineering
  - Reliability & quality

- 2011 & 2009: TiE50 Two-Time Winner
- 2011 AlwaysOn GoingGreen 200 winner
- 2011 California Small Business of the Year, 20th Assembly District
- 2010 Global Cleantech 100, Asia-Pac Top 10
- 2009 Frost & Sullivan Award Product Innovation of the Year
- 2009 AlwaysOn GoingGreen Top 100 Winner
- 2009 Global Cleantech 100 Company

US Govt., Big Corporation and Venture Capital Place Big Bets in Flow Battery

SUMITOMO ELECTRIC

United Technologies

Deeya Energy lands funds to build 'flow battery'

May 6, 2009

Start-up raises $30 million to build back-up storage for cell phone towers with a technology originally developed in the 1970s for NASA.

Premium Power
Energizing the Present, Protecting the Future

GILDEMEISTER energy solutions

redflow advanced energy storage

DOE funds 19 next-gen battery projects with $43M

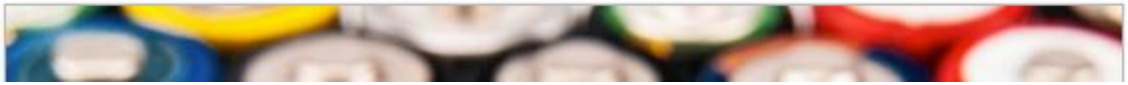
Aug 2, 2012

Primus Power's flow batteries rake in $11M

May 31, 2011



EnerVault raises $15M for environmentally friendly batteries



February 23, 2012

ZBB energy corporation

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Problem: Expensive, Unreliable Electricity for Critical Applications in Emerging Markets



Telecom: Cell towers



Railways: Signaling



Rural Electrification



Cold Food Storage



Banking/Data Centers

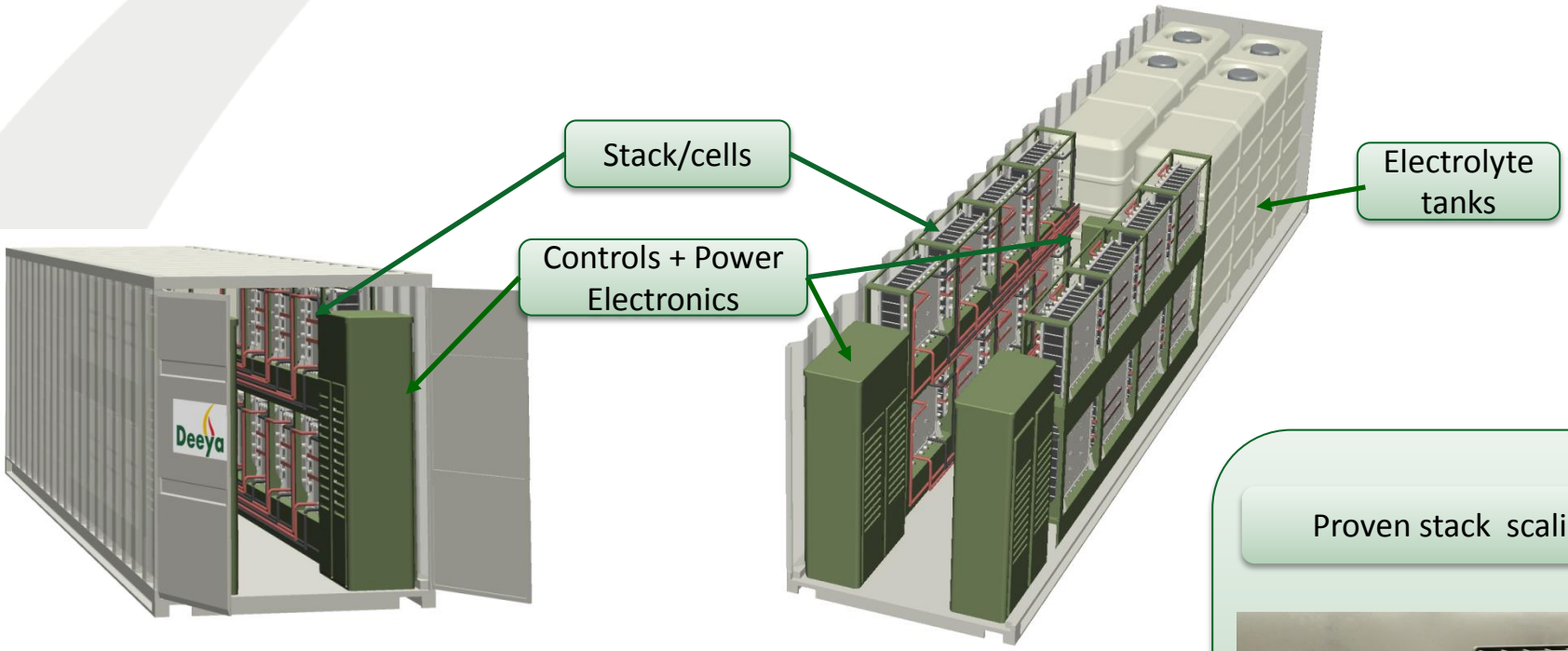


IT Support & Call Centers

- **Many mission-critical applications require 24 x 7 power, *but grid electricity is unreliable or nonexistent in emerging markets***
- **Current solution** is very expensive and polluting: *diesel generators and lead acid batteries*
  - *Diesel generators* – subject to high, rising diesel prices; high level of CO_2 generation
  - *Lead acid batteries* – consumables, need frequent replacement; toxic lead
- **Deeya's solution:** *Breakthrough energy storage that lowers cost and improves reliability of electricity*
  - Fast-charging, long-lasting, runs at high temps, no toxic metals & greatly reduced CO2
  - Highly scalable for many applications (1 - 500 kW+)
- **$20B global energy storage opportunity**
  - $10B in cell phone towers alone; 1.5 million sites globally

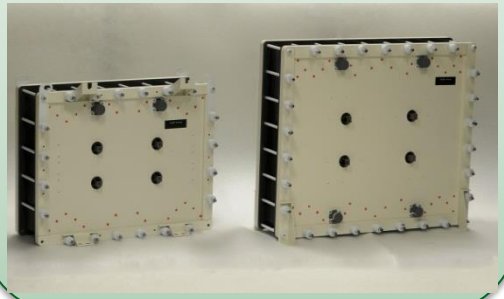
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Inherent Scaling Enables Grid Storage Applications by 2014: 200 kW to Multi-MW



ESP4: ~200 kW, 1 MWh

Proven stack scaling :



Lowest $/kWh/cycle cost for large scale applications requiring long discharge time, fast charging and long cycle life

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Pumped Hydroelectric – Most Widely Used Stationary Energy Storage

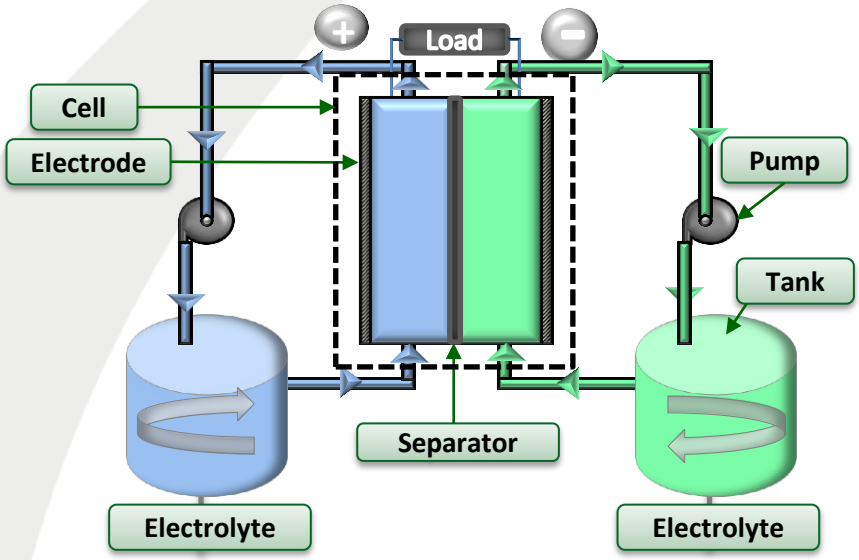
- Pumped hydro is the perfect example of a battery whose energy storage and power are completely de-coupled
- The energy is the mass of a large volume of water (in a reservoir) converted to energy with the support of gravity and a generator
- The battery is recharged by overcoming gravity and returning the water back to the reservoir
- The energy is carried in the water, it is non-toxic, has infinite round trip lifetime, is recycle-able, handles high and low temperature operation and has a reliable balance of system
- The power is handled with the generators and with proper maintenance these balance of system components can last generations
- Has environmental impact of flooding lands for certain animals and plants and not economical at small scale
- One would place pumped hydro all across the utility grid, next to every backed up energy delivery for railroads, hotels, telecommunications tower etc. if one could
- **<u>One can't simply because of space and geography needs</u>**

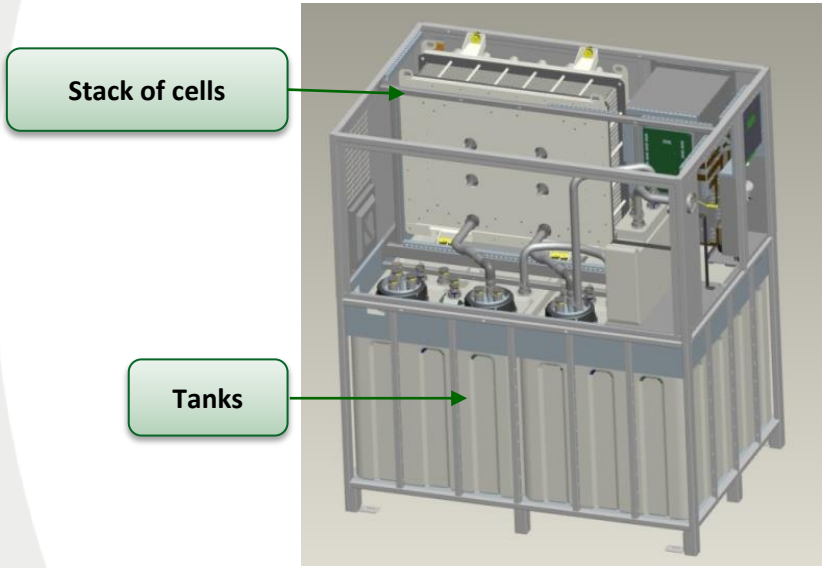


Flow Battery Offer the Same Promise

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Deeya's Flow Battery Technology





- **Energy storage in liquids enables superior performance**
  - ***Unlimited cycles*** – at full or partial state of charge
  - ***Fast charging*** – discharge/charge > 1
  - ***Long product life*** – up to 10 year warranty:
  - ***Up to 50 °C operation*** – no impact on lifetime
- **Lowest total cost flow battery**
  - No replacement of electrolyte or cells
  - Separator, rather than expensive membrane
  - Proprietary electrolyte and catalyst: high energy density with low cost starting materials
- **Scalable** – power & energy decoupled
- **Strong IP** – 60+ patent applications
- **Automated and remote control**

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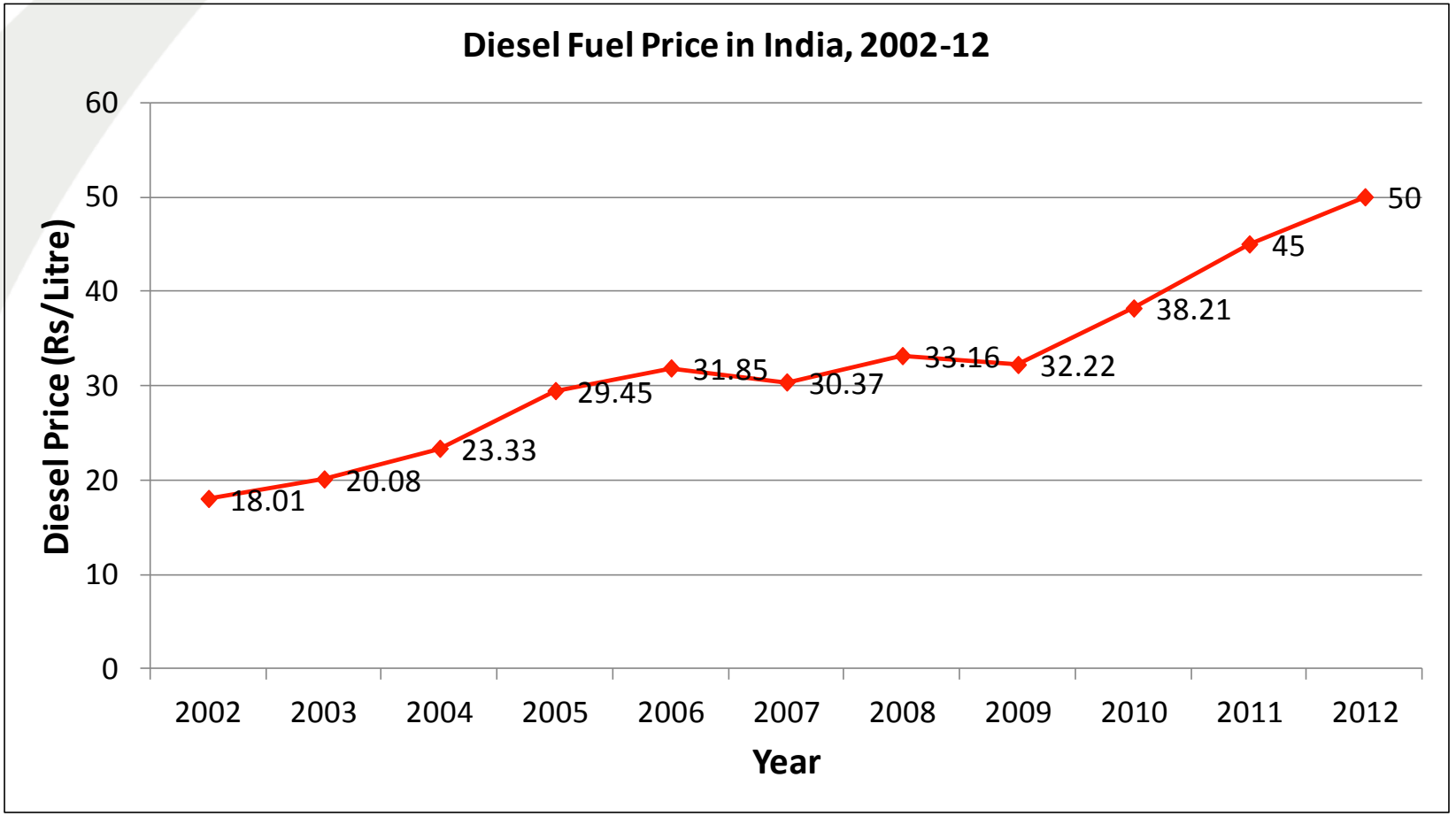
Stationary Energy Storage

Key Attributes	Ideal Battery	Deeya
Low lifetime cost	☑	☑
Cycle life	☑	☑
Fast charge	☑	☑
Long term stable output	☑	☑
Temperature tolerance	☑	☑

- Conventional rechargeable batteries have solid state reactions. In flow battery NO.
- Deeya transforms batteries from consumables into long-life assets

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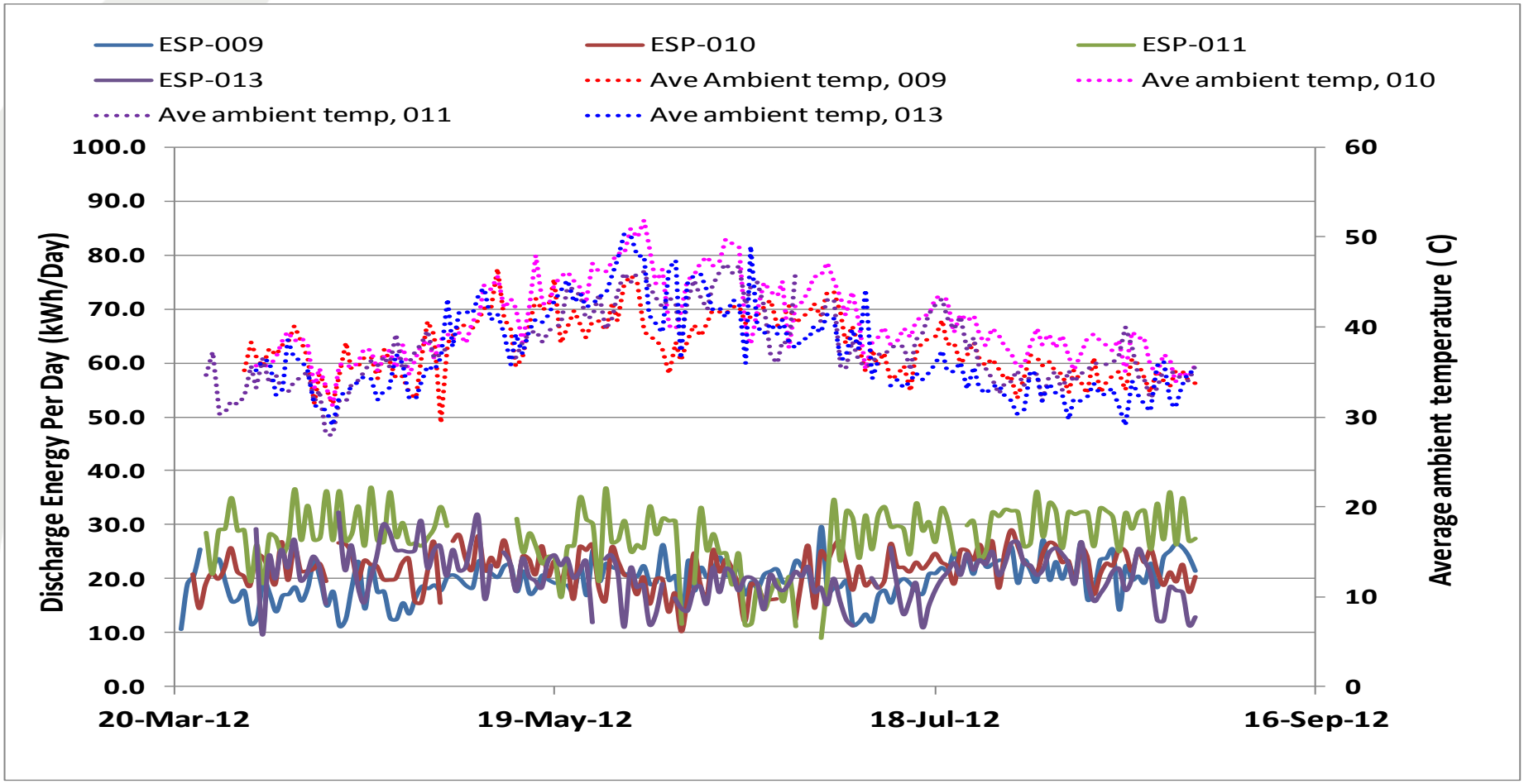
Diesel Fuel Price in India



- Diesel fuel subsidized in India, as in most emerging markets
- Subsidy has been decreased greatly over past 3 years
- Diesel fuel price increase beyond expectations

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ESP3 in India During Record Breaking Heat

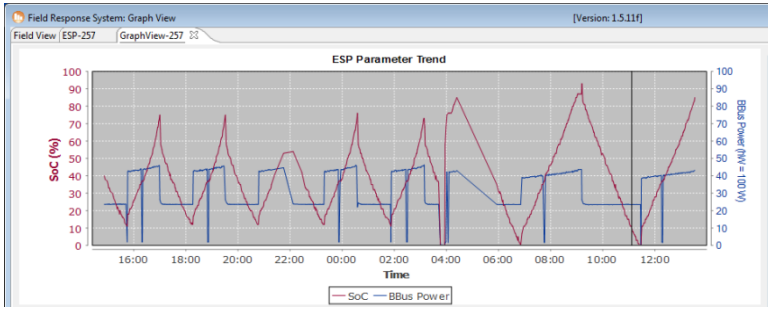


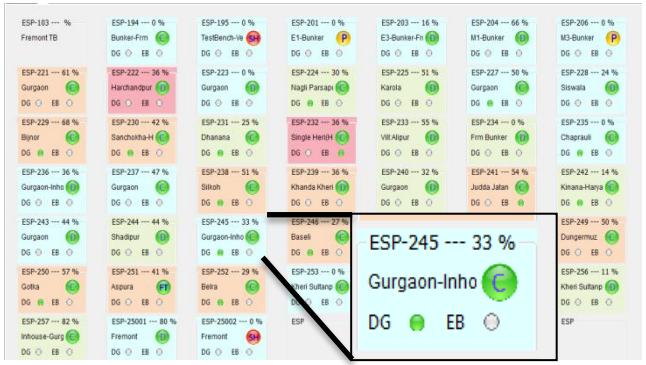
- Discharge capacity depends on site loads, power source, grid availability and temperature
- Stable performance e even after with record-setting high temperatures seen this summer in India (50°C)

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Real-Time Remote Monitoring and Control

- Remote monitoring and control of all ESPs via wireless connection
- Remote monitoring of diesel fuel consumption
- Determines diesel fuel savings
- Real-time view of all ESP operating parameters and notifications
- 24 x 7 control center in India
- SMS messaging for mobile control of key parameters







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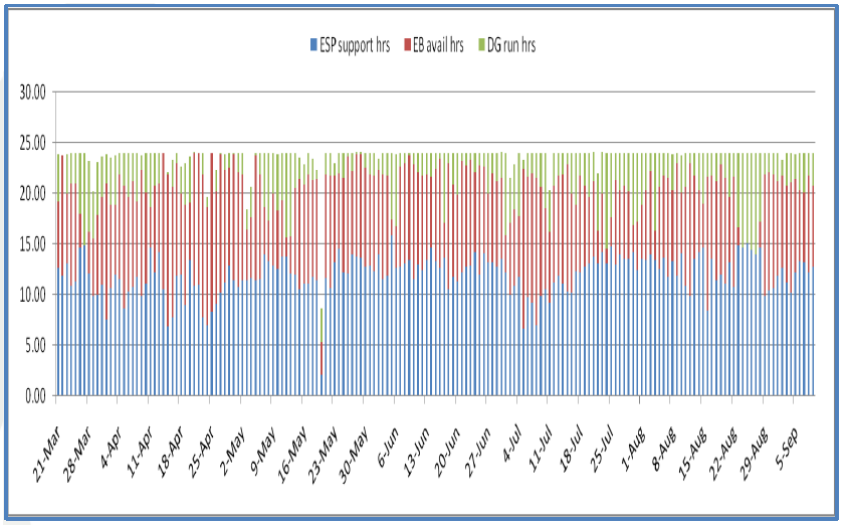
ESP3 Performance

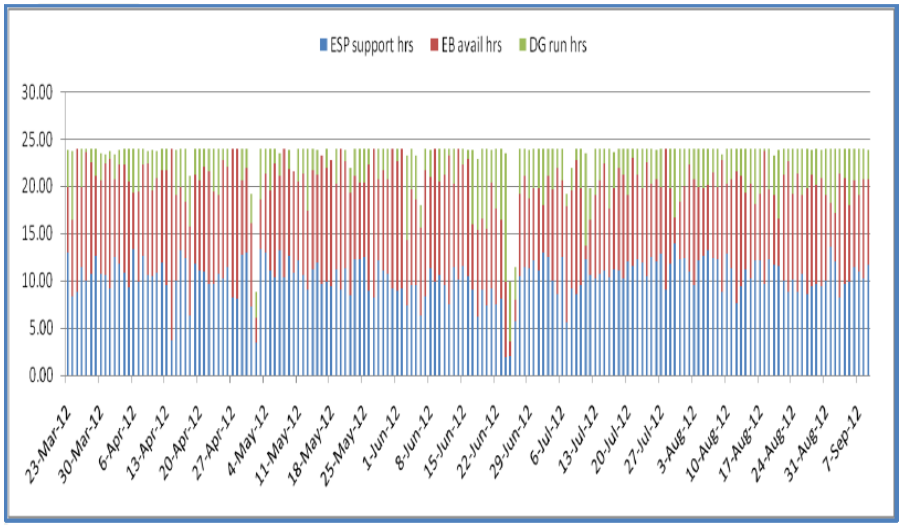
	Site-1	Site-2	Site-3	Site-4
No. of BTS	2	2	3	2
BTS Load (kW)	1.7	2.0	2.5	2.1
Peak Load (kW)	1.9	2.3	2.9	2.5
Power source	DG/EB	DG/EB	DG only	DG/EB
# of Cycles at site	1744	2527	800	2041
Avg. EB hrs avail/day	9.1	10.2	0	10.1
Avg. DG run hrs/day	3.2	3.3	12.1	2.3 *
Total annualized ESP support (MWh)	8.7	7.6	10.9	8.6
% DG reduction	74.4%	73.8%	42.0%	77.2%
% energy savings/day	67.2%	62.4%	25.8%	74.6%

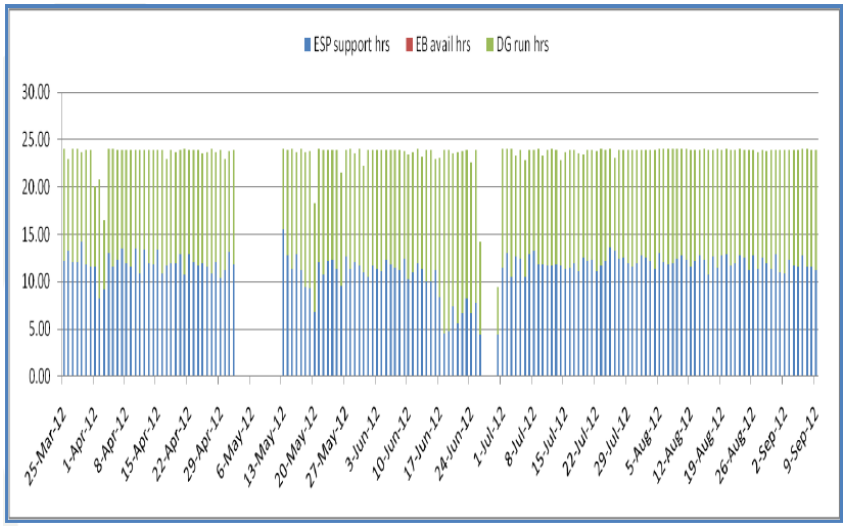
* 39 of 142 days had DG run between 0-1hrs/day, 18 of them zero-DG

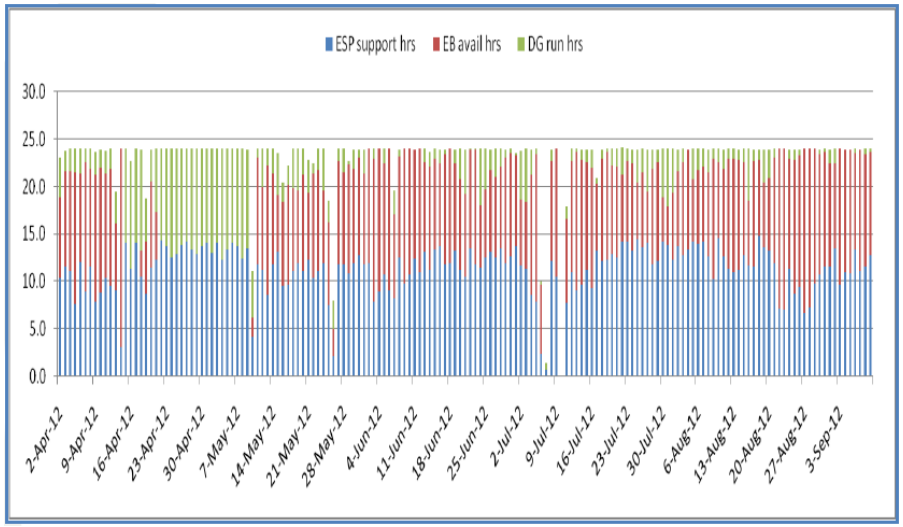
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ESP3-2.5-10: ESP/DG/EB hours data









ESP Support hrs EB available hours DG run hrs

Many Days with No Diesel Generator Use

Proven Field Performance: Telecom Customer Sites









































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ESP3-2.5-10 Product Specifications

Average Output Power	2.5kW
Support Capacity	10.0kWh
Peak Power	3.0kW
Cycle Life	Unlimited over 5 years
Discharge Time	≥4 hours @ 2.5kW load
Charge Time	<4 hours @ charge power of 5.3kW
Ambient Temperature Range	0°C to +50°C (45°C sustained)
Peak Ambient Temperature	50°C, 2 hours
Charge Voltage Range	55VDC ±3VDC
Output Voltage Range	49.5VDC ±1.5VDC
Monitoring	Integrated Deeya Comm System, (DCS) SMS, GPRS, RS232
Maintenance	Preemptive via DCS - No User Maintainable Parts
Footprint	1.63m^2
Dimensions (WxDxH)	152.4 x 106.7 x 160 cm
Shipping Weight	Approx. 400 kg
Total System Weight	Approx. 1400 kg

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ESP3-3-30 Product Specifications

Average Output Power	3.0kW
Support Capacity	30.0kWh
Peak Power	3.5kW
Cycle Life	Unlimited over 10 years
Discharge Time	≥10 hours @ 3kW load
Charge Time	<9.1 hours @ charge power of 6.2kW
Ambient Temperature Range	-5°C to +50°C (45°C sustained)
Peak Ambient Temperature	50°C, 2 hours
Charge Voltage Range	55VDC ±3VDC
Output Voltage Range	49.5VDC ±1.5VDC
Monitoring	Integrated Deeya Comm System, (DCS) SMS, GPRS, RS232
Maintenance	Preemptive via DCS - No User Maintainable Parts
Footprint	$2.1m^2$
Dimensions (WxDxH)	190.5 x 107.9 x 191.1 cm
Shipping Weight	Approx. 540 kg
Total System Weight	Approx. 2200 kg

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Thank you