



# Efficient Buildings for a Cooler Planet

Technologies of the Future – GRIHA Summit 2017

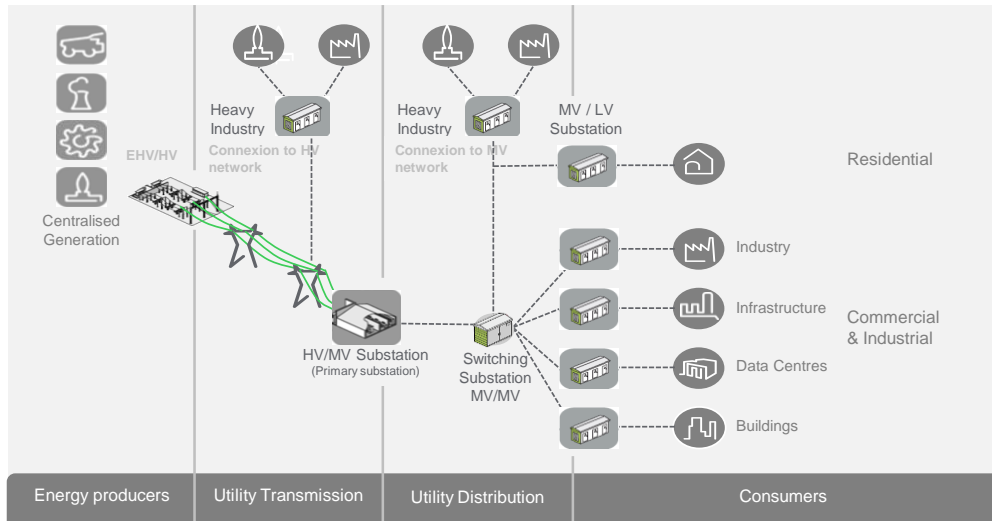
**Aalok A. Deshmukh** LEED Fellow, CMVP, Architect  
02-Mar-2017

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## How is the world of energy changing?

## The Old World of Energy: Singular flow of Electricity from source to load

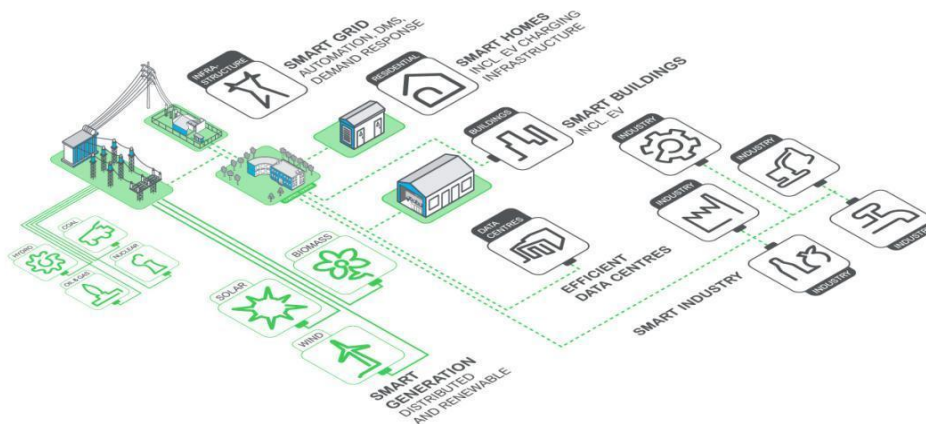


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## The New World of Energy: Electricity is Distributed & Connected



Smart Grid

Distributed Generation

Efficient Demand

CONNECTED FROM PLANT TO PLUG

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# Our **World** will be...

## MORE ELECTRIC

- Demand for electricity driven by sustainability, intelligent devices, and evolution of key energy consumers (e.g., mobility)



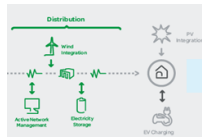
## MORE CONNECTED

- Internet of Things will connect at least 50bn devices by 2020



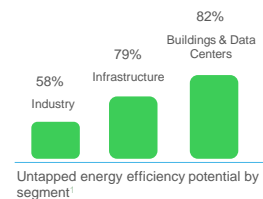
## MORE DISTRIBUTED

- Provide local energy to facilities, around positive energy and micro grids, to empower users
- Falling prices of renewable energy and storage



## MORE EFFICIENT

- 2/3 of energy efficiency potential remains untapped<sup>1</sup>
- Buildings, industry & infrastructure end-users and datacenters all look to improve performance, efficiency and environmental footprint



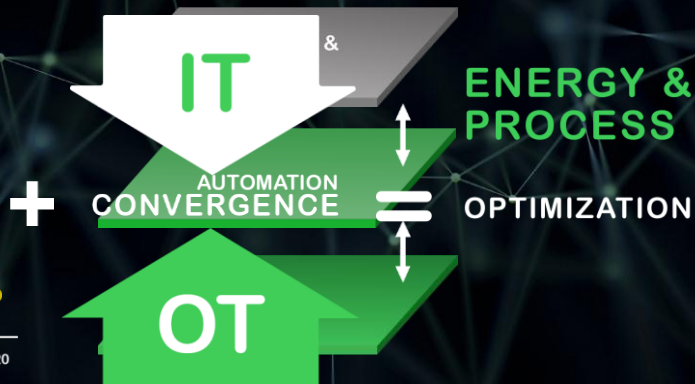
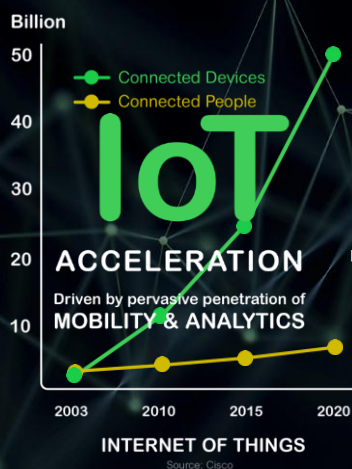
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<sup>1</sup> World Energy Outlook 2012, OECD / IEA, Internal analysis

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## Efficiency gains will come from IT/OT convergence



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## Technology changes fueling innovation



**MOBILITY**



**CLOUD**



**SENSING**



**ANALYTICS**



**SECURITY**

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## Current Energy and Climate Scenario

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We believe access to energy is a  
**basic human right**

...and the present way of managing energy is  
**unsustainable**



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**1.3** billion people currently do not have access to electricity

Another **1** billion people have unreliable and intermittent supply of electricity

Source : IEA, Economist

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## The world in the next 40 years

**×1.5**

Energy consumption  
will double

**÷2**

CO<sub>2</sub> emissions  
need to be  
halved

**↑3×**

We have to become  
4 times more efficient

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Note: Forecast for 2050 compared to 2009 levels

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## Indian Scenario

- A quarter of our population has no access to electricity and another third has only 4-6 hours of daily access to electricity.
- To maintain economic growth and development, our power generation capacity needs to triple by 2030:
  - An addition of a 600-700 MW power plant every week for the next ~15 years.
- We have committed to reducing our emissions intensity by a third

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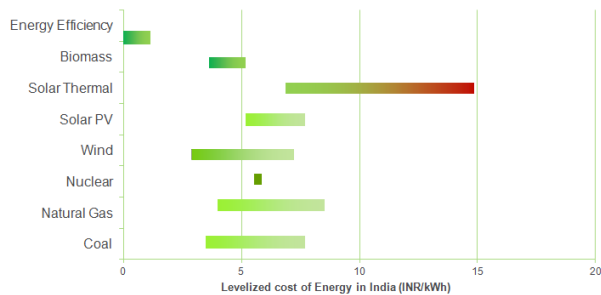
# The Solution

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## Turning to the cheapest, cleanest and most abundant source of energy

### Energy Efficiency as a Resource



Energy efficiency has the least levelized cost of energy in India

- Energy that is NOT used, therefore NOT needed to be generated
  - NEGA-watts
- When done right, energy efficiency comes with a compelling business case
  - A free lunch you get paid to eat!

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## The energy efficiency opportunity

| Sector       | Best in Class Energy Costs              | Business as Usual Energy Costs           | Energy Efficiency Gap |
|--------------|---|--|-----------------------|
| Offices      | Rs 3.25/sq ft/month<br>Rs 325/emp/month | Rs 14/sq ft/month<br>Rs 1400/emp/month   | 75%                   |
| Hotels       | Rs 11/sq ft/month<br>Rs 9000/room/month | Rs 23/sq ft/month<br>Rs 16000/room/month | 50%                   |
| Hospitals    | Rs 8/sq ft/month<br>Rs 4300/bed/month   | Rs 16/sq ft/month<br>Rs 8500/bed/month   | 50%                   |
| Iron & Steel | Rs 6900/T                               | Rs 9700/T                                | 30%                   |

- Cost-effective when done right, with a compelling business case
- Compounding losses in electricity supply become compounding gains with end-use energy efficiency:
  - Takes 4 units of primary energy input at power plant to provide 1 unit of electricity
  - 1 unit of electricity saved at end use reduces need for 4 units of primary energy input
- Two-thirds of our building stock and electricity generation infrastructure needed in 2030 is yet to be built

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## Making energy use visible, meaningful and actionable



5% savings just  
through increased  
visibility



Energy is invisible. Energy efficiency is the absence of that which is invisible.

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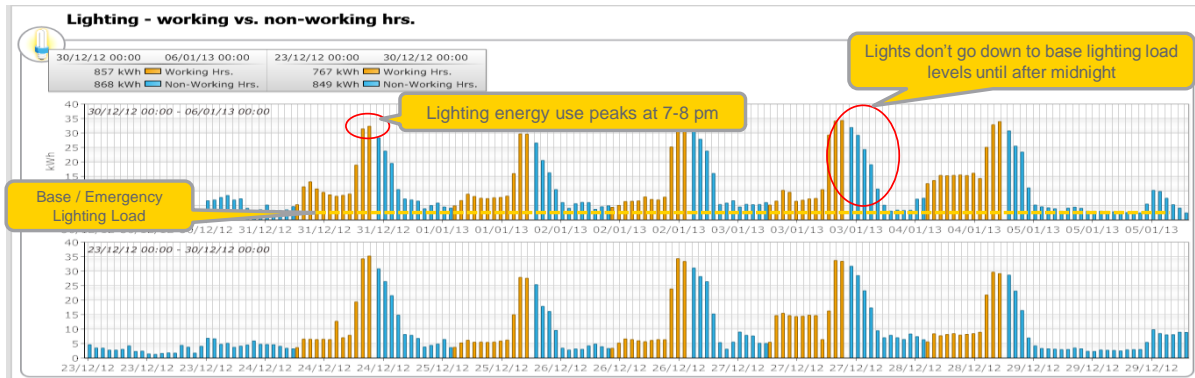
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## Making energy use visible, meaningful and actionable

### Example – Hourly Lighting Profile



#### Observations:

- Lighting controls (daylight and occupancy sensors) working very well during the day time.
- Lighting energy use peaks at around 7-8 pm and does not shut down to lower (base load) levels until well after midnight.
- Base load lighting level appears to be ~3 kWh per hour; significant variation observed above this during non-working hours.
- Possible opportunity for reducing lighting energy use after 8 pm. (~60 kWh X 22 = ~1320 kWh/month)

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## Super-efficient IT/ITES Building

- Hyderabad; 1350 employees, 22,500 sq ft
- Energy Performance Index of 90-95 kWh/m<sup>2</sup>.year
- Helped identify ~5% savings
  - Using energy use visibility to build enhanced analytical capability
  - No audit or on-site assessment involved
  - Low-cost tune-ups, no investment required
  - Validated by facility management team



36°

Hyderabad, India



#### Hyderabad Building 2 - Overview



#### Total energy cost (Jan'13)

Rs. 488,687 (at Rs. 6.23 per kWh)



#### Energy use comparison

-12% (Jan'13 vs Dec'12)



#### Energy cost comparison

-58,400 INR (Jan'13 vs Dec'12)



#### CO<sub>2</sub> emissions comparison

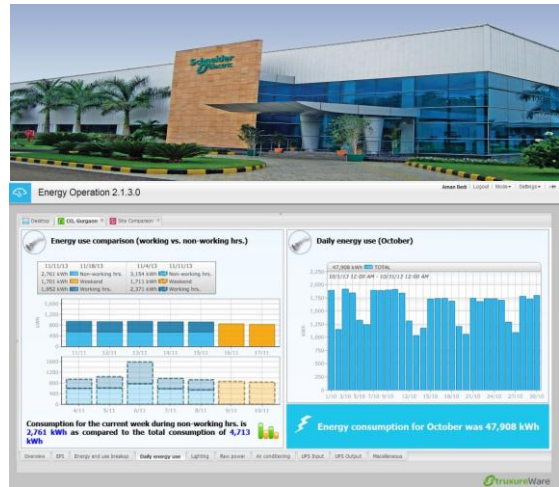
-305 Kg (Jan'13 vs Dec'12)

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## Our own energy management story

### Schneider Electric Energy Action

- In-house energy management program
- Targeted 17 of our most energy intensive facilities
- Avoided energy costs of over **INR 7.5 crores** in 5 years (2012-16) over 2011 baseline
- Results vetted by a global team every month; audited by external auditors every year
- 13 ISO 50001 certified sites, 3 IGBC (2 Gold, 1 Platinum) rated sites, 1 LEED Platinum rated site



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## Why do buildings matter?

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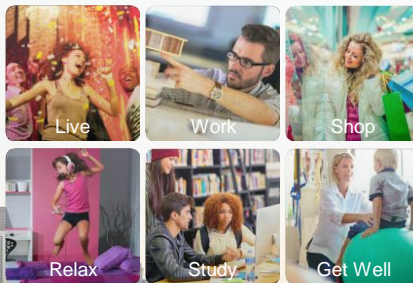
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## World Urban Population



Our cities will get bigger and there will be more of them.  
They will have to be smarter and more efficient

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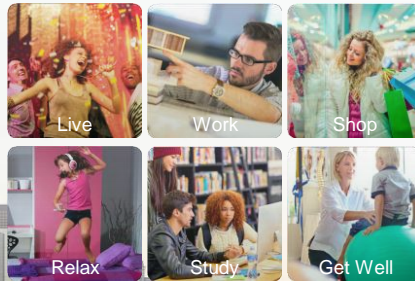
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Buildings consume **53%**  
of world electricity

Buildings are the bedrock of cities...

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Electricity consumption in buildings will grow by

**80%** by 2040

Source : IEA, 4Degree Scenario

**Buildings are the bedrock of cities...  
and totally rely on electricity and energy**

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## CSR achievements in India

Up to 2015

**16,200** remote households electrified with off grid solar in **325** remote villages

Livelihood training to over **52,700** unemployed youth

Outreach to **350** schools on energy efficiency

**686** Green Teachers and **26000** students registered as Green Ambassadors

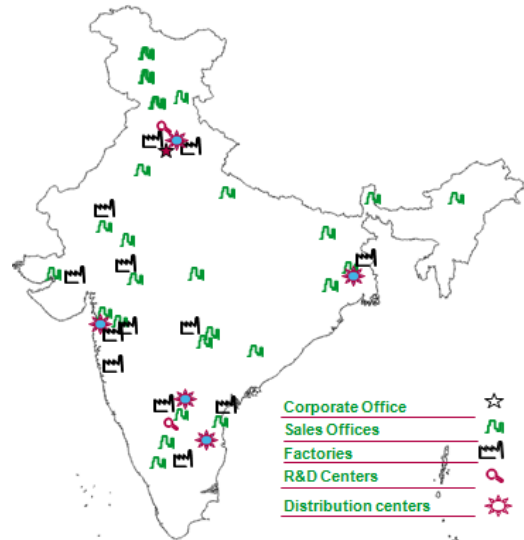
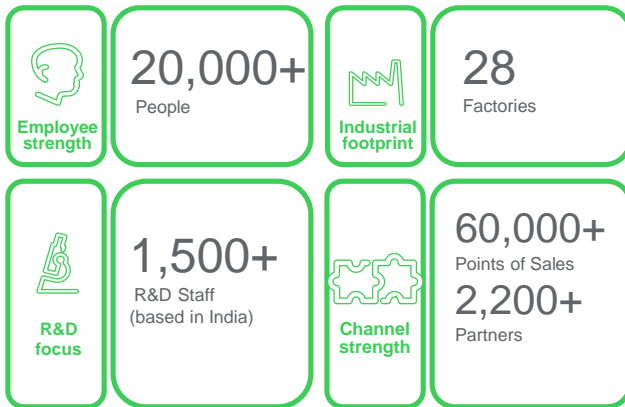
**120** Scholarships to Engineering and Diploma students from financially disadvantaged background



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## Schneider Electric India footprint



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