How IOT Solutions Enable Building Energy Efficiency

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Schneider Electric, the Global Specialist in Energy Management and Automation

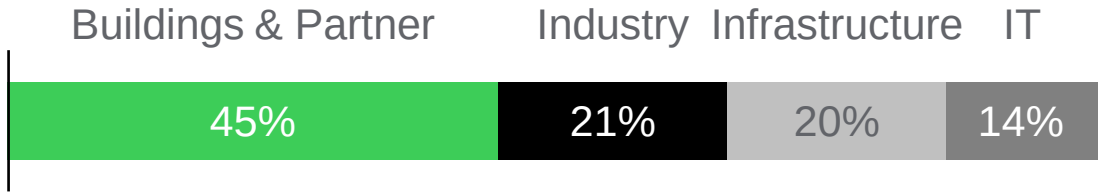
€26.6 billion
FY 2015 revenues

~5%
of FY revenues devoted to R&D

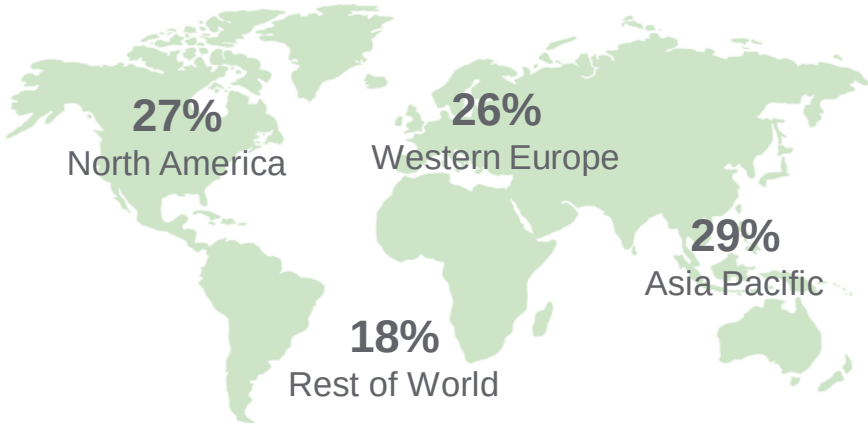
160,000+
people in 100+ countries

Four integrated and synergetic businesses

FY 2015 revenues



Balanced geographies – FY 2015 revenues



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Energy is the base of life.

Life Is On

when energy is on……

We ensure energy is on by making it

- Safe
- Reliable
- Efficient
- Connected
- Sustainable

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

Live

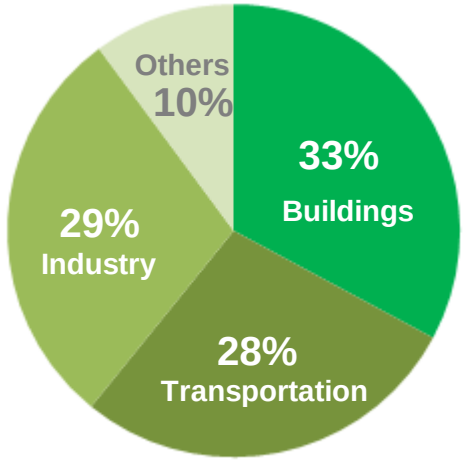
Work

Shop

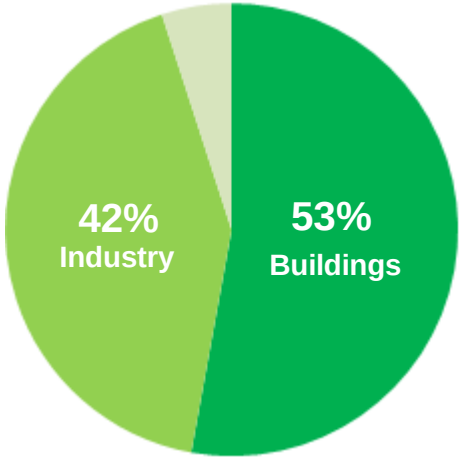
Relax

Study

Get well



Buildings consume **33%** of world energy



Buildings consume **53%** of world electricity

Electricity consumption in buildings will grow by **80%** by 2040

Source : IEA, 4Degree Scenario

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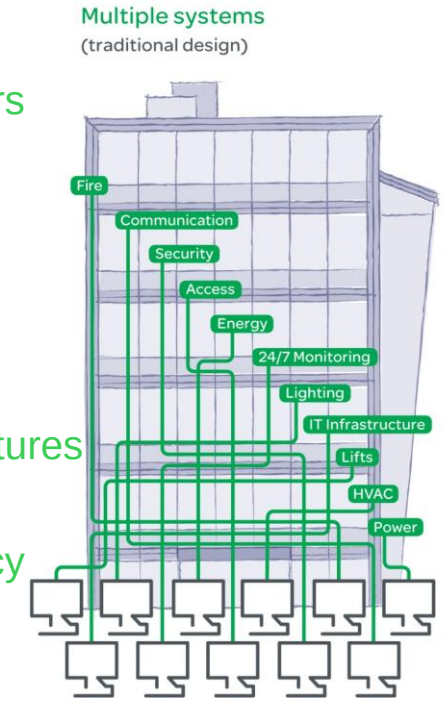
Buildings are complex systems …that are different in every country

Multiple Silo Systems

- Multiple networks from multiple vendors
- Too many systems to learn
- Complex troubleshooting
- Higher capital and operational expenditures
- Obstacles to achieving energy efficiency



Multiple Standards

Electrical

International | Regional | Local

HVAC

International | US | UK | Australia | India

ISO 16813

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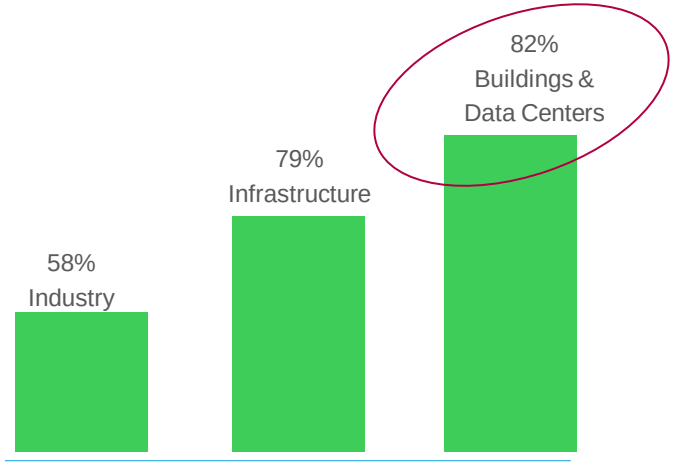
...Homes and Buildings show a huge untapped potential for more…

Energy Efficiency

- 82% untapped Energy Efficiency potential in Buildings and datacenters
- 30-50% energy efficiency potential through active control of the building space

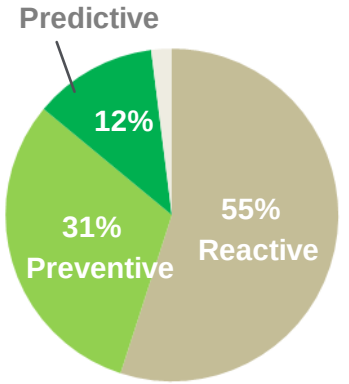


Untapped energy efficiency potential by segment[1]

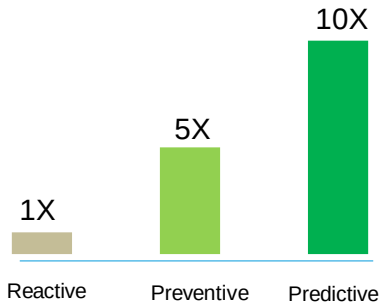
1: World Energy Outlook 2012, OECD / IEA, Internal analysis

Operational Efficiency

- 75% of a building's lifetime costs go to maintenance and operations
- Proactive, predictive maintenance and analytics can save up to 20% per year on maintenance and energy costs*



Typical Maintenance Program Used in all facilities



Lifetime ROI of different approaches to maintenance

Source: US Department of Energy, August 2010

* Energy and Water systems

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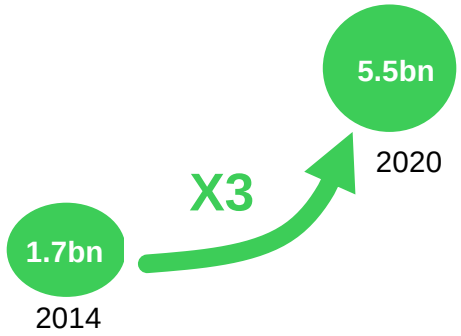
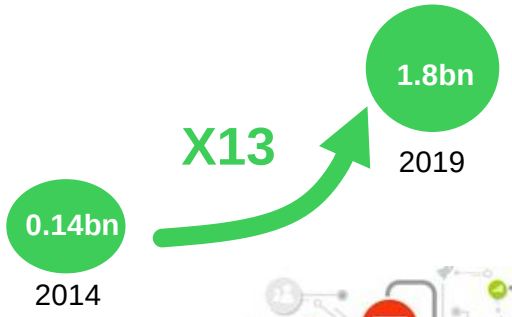
New disruptive technologies are catalysts for huge efficiency gains

Internet of Things

In Buildings: Number of connected devices



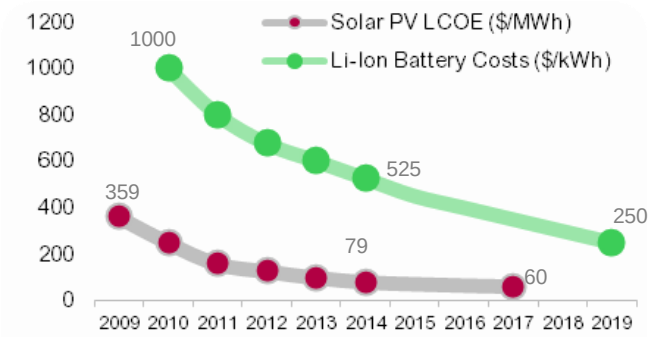
In Homes: Number of connected device shipments



Source: Memoori

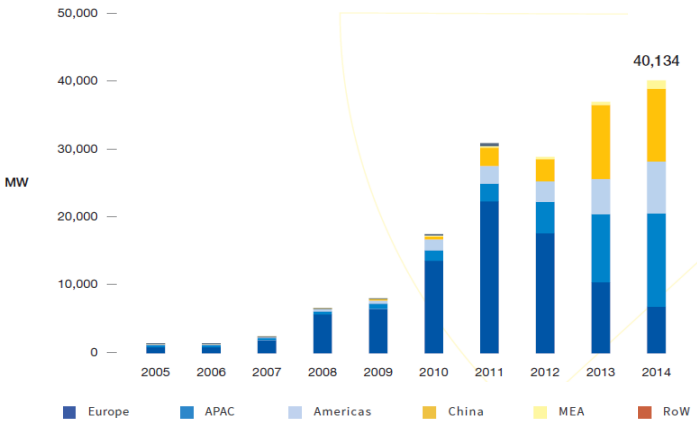
Renewable & Storage

Solar PV and Storage have seen drastic improvements in their economics over the past 5 years …



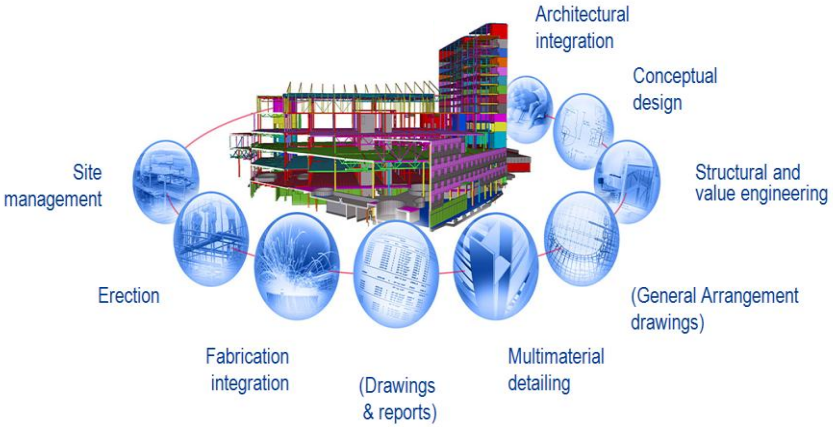
Source: Lazard 2014, BNEF 2014

Resulting in drastic increase in PV annual installed capacity

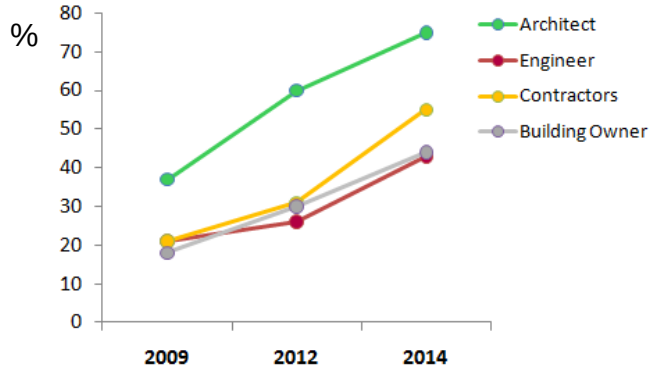


Source: Solar Power Europe - Global market outlook 2015

Building Lifecycle Management



% of players using BIM (Building Information Modeling) on more than 60% of their projects



Source: Autodesk

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The Internet of Things landscape

The integration of a comprehensive and distinct set of capabilities is essential to benefit from digitization

Applications

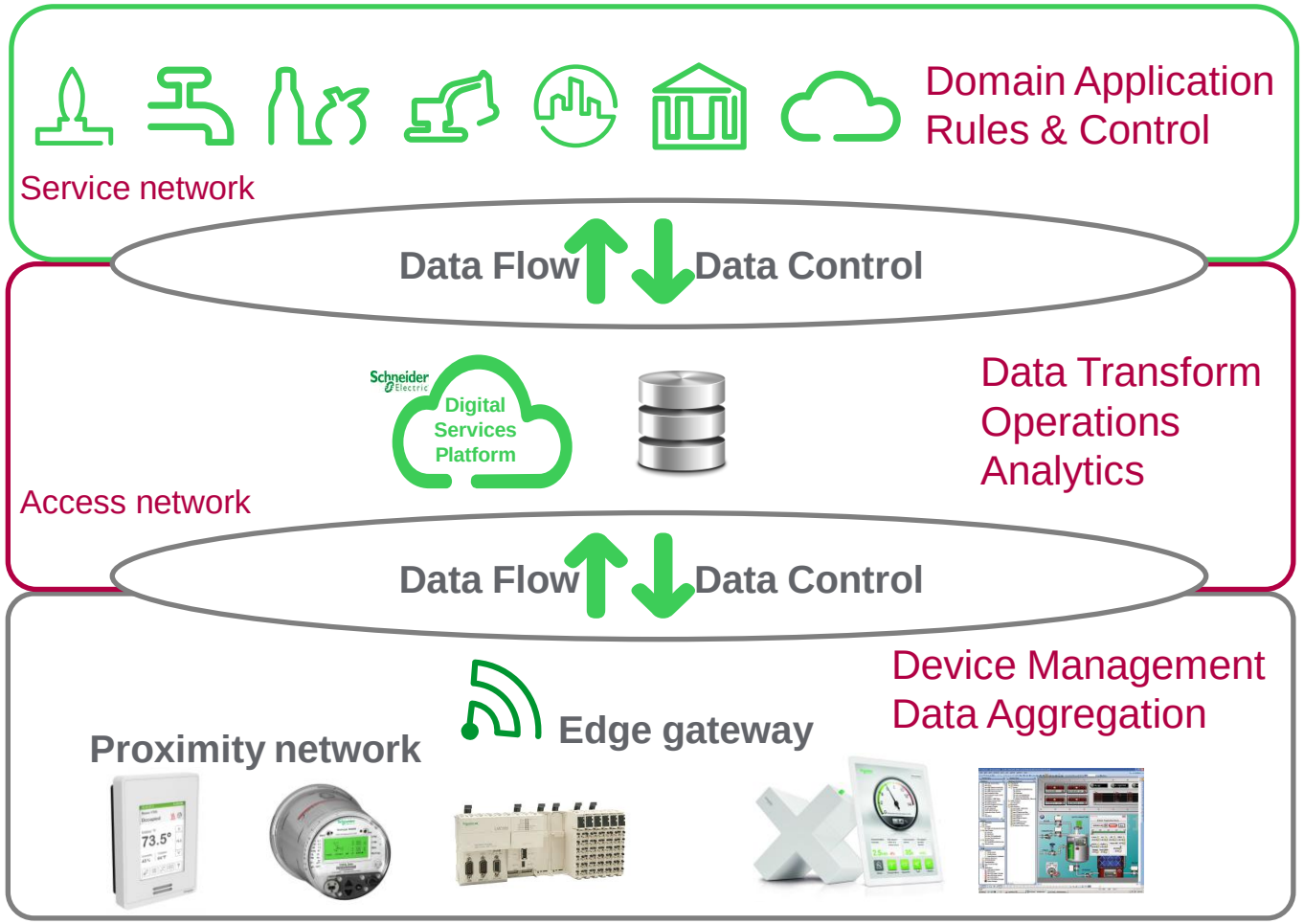
Software | **Services**

On Premise → Private or Public Cloud

On Premise Platform | **Cloud & Mobile Platform**

"The Edge"

Devices and Sensors | **Control Systems**



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Symbiotic combination of **energy**, **automation, and software**

Security Management

Building Management

Power Management

Resource Advisor

Building Analytics

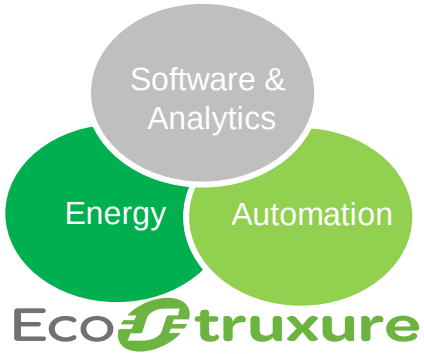
Software

Energy

Busways and enclosures

Circuit breakers and contactors (ACB, MCCB, FD)

Switches and sockets



Automation

HVAC controllers, sensors, valves, and actuators

Power factor correction and power meters

Smart space controls

Voice data image

Through an integrated architecture for buildings

To achieve up to a 30% energy reduction through systematic energy monitoring and real time energy usage control

Software integration

Interoperability and openness
to third party systems

StruxureWare™

EcoStruxure™

- Renewable energies
- HVAC control
- Lighting control
- Energy monitoring & control
- Motor control & variable speed drives
- Access control
- Security
- Critical Power & cooling
- Electrical distribution

Renewables integration in Buildings

SmartStruxure Lite

StruxureWare Building Operation

Power Monitoring
Power SCADA

Security System

Circuit Breakers

Monitoring Software

Uninterrupted Power Supply

Resource Advisor

Facility Insights

Building Insights

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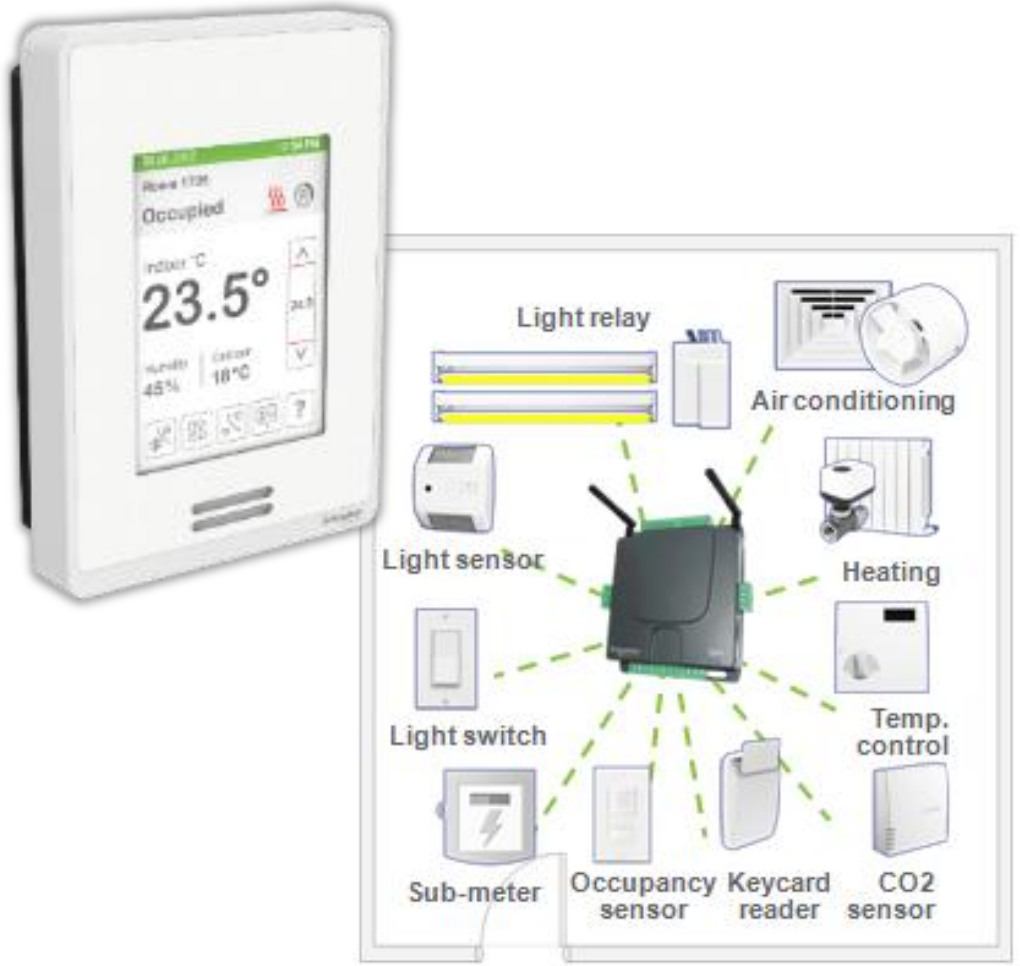
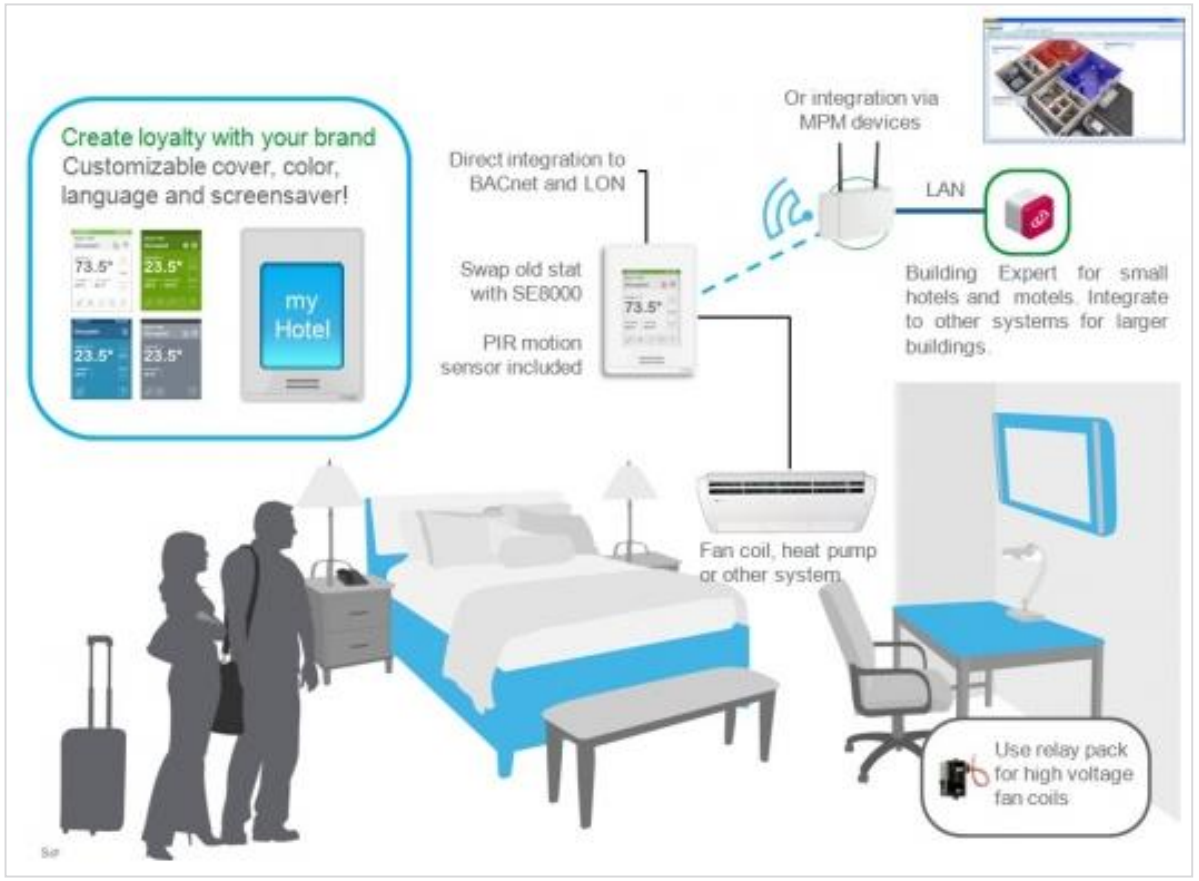
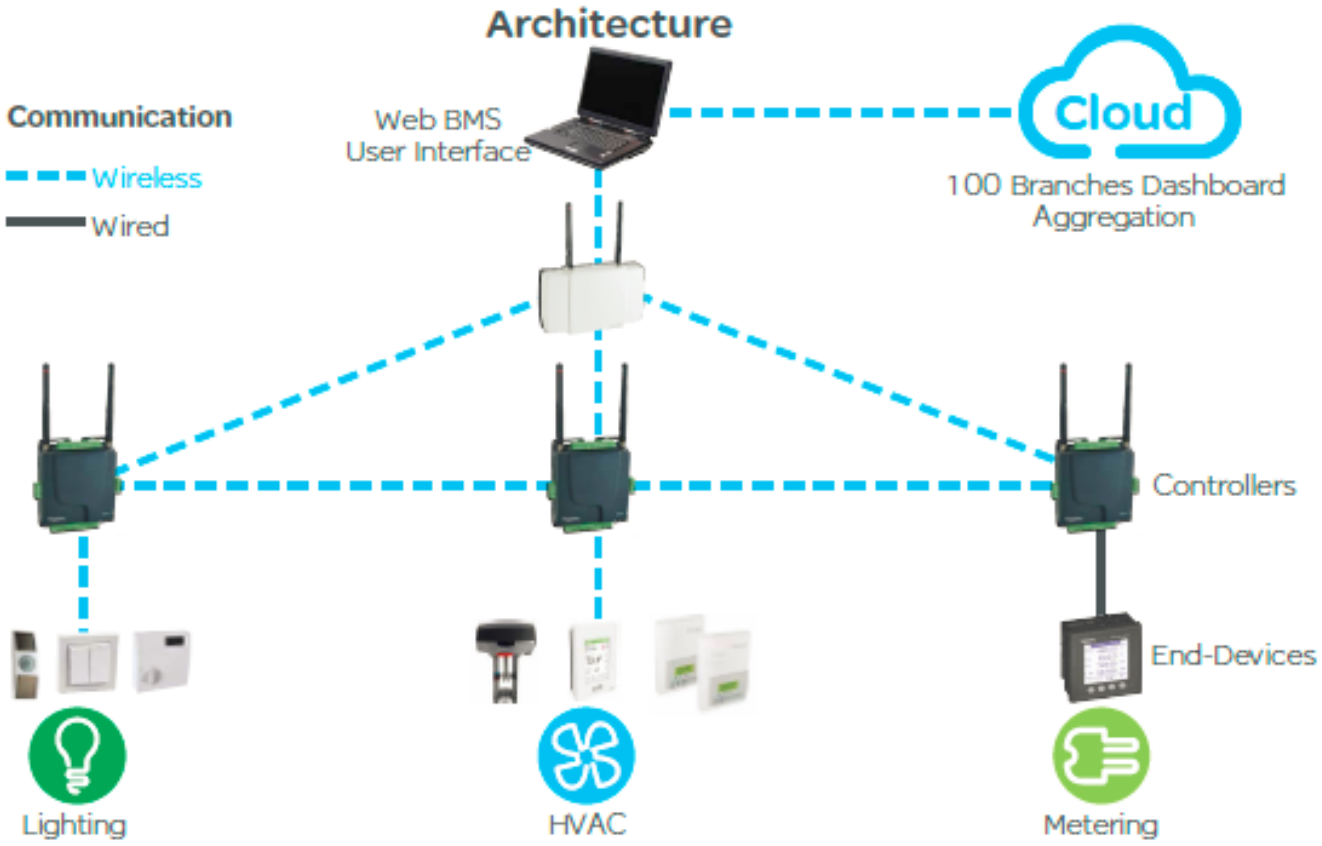
Example: Intelligent Room Controller for Hotel Application





Example: Wireless mini-BMS System for Office Application



Lower Installation Cost

- Simple wireless system
- Easy installation
- Minimize downtime

Operational Flexibility

- Portable and reusable system (ideal for rental branches)
- Easy to expand by adding additional devices
- 3rd party BMS integration
- BMS data transfer to Energy Cloud

Lower Operational Cost

- Precise temperature control
- Built-in occupancy sensor
- Built-in scheduled timer

Managers (MPM)

- One MPM is all you need to gain control of your building
- Multiple MPMs can be networked for scalability
- Controller, gateway, and Web server capabilities all in one box

StruxureWare™ Building Expert

- Mini-iBMS hosted directly by MPM devices
- Included for out-of-the-box functionality
- No license fees
- Remote access via the Web

EcoStruxure™ Web Services, FTP, Modbus®, CANbus™, ZigBee®, EnOcean®, BACnet®, and oBIX®

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Mid-size building

From grid to floor space, we ensure operational efficiency

Software & Analytics

Security Management

Building Management

Power Management

Resource Advisor

Building Analytics

Energy

Busways and enclosures

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Switches and Sockets

Automation

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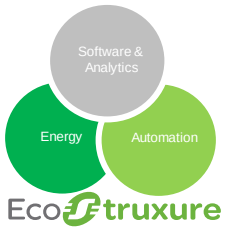
Voice data image



Enabling workplace efficiency

- Occupant comfort & safety
- Building & energy management
- Energy savings

Up to 30% energy savings for buildings of all sizes

Connectivity and collaboration

- Exponential growth of “big data”
- Leveraging the cloud
- Software-as-a-Service

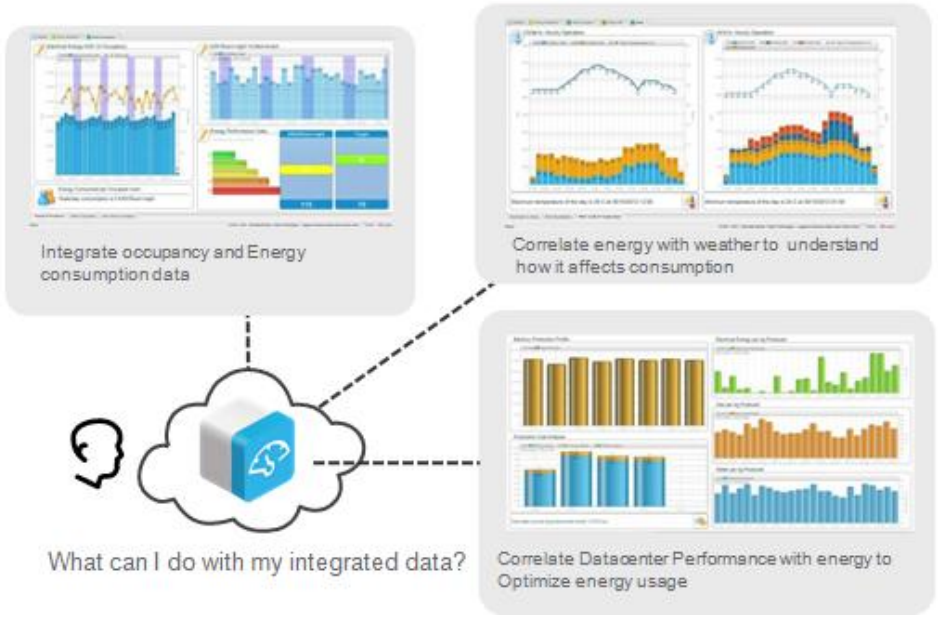
Over 3 billion users worldwide now access Internet

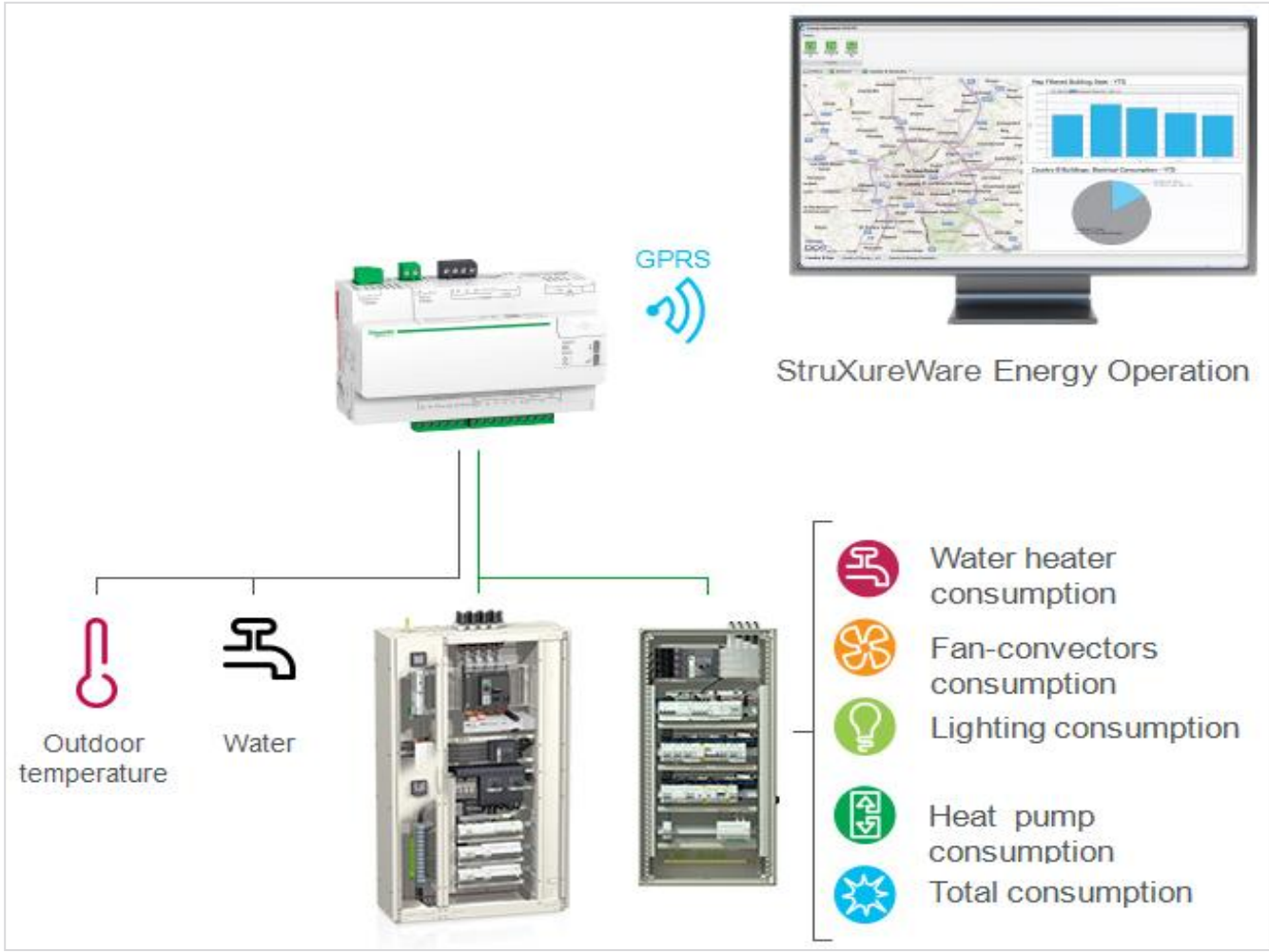
Example: Multi-sites Energy Management via cloud based software platform

Access to energy and site information through real time monitoring and control or on-line services

StruxureWare Energy Operation

- Friendly to use and customized dashboard
- Multi-site and multi-customer application
- Energy consumption tracking
- Asset monitoring





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Creating the Homes & Buildings of tomorrow which Sense, Think & Adapt

Some of Schneider Electric references & supported projects

Green Office Meudon France
The world's largest positive-energy building

TNT Center Netherlands
Carbon neutral headquarters
One of Europe's most sustainable buildings

GROW Home Solar Decathlon

Seasonally adaptive
Positive energy home

More Reliable & Safe	100 years reliability track record in electrical distribution
More Connected & Secure	IP Connected Devices + Analytics uncovering efficiency opportunities Enhanced and more robust cyber security
More Renewable	Onsite Renewable Integration Near Zero/ NetZero, Positive Energy Buildings
More Collaborative	Collaboration through Digital Twins & Building Information Modeling in Design, Build ,Operate
More Efficient	Active Energy Efficiency Preventive/Predictive Maintenance
More Flexible & Comfortable	Activity Based Workspaces, Workspace on demand Optimum lighting, temperature and indoor air quality

Home

From grid to living space, we enable comfort and safety

Energy

Luminous storage units

Uninterruptible power supplies, surge protectors, and power conditionning

Solar power systems

Main circuit breaker

Switches and sockets, weather-proof switches and sockets

Solar Power systems

Luminous storage units

Connected home system

Automation

Motion and light sensors

Indoor and outdoor light control

Smoke detector

Door entry system

Temperature sensor

Curtain control

Increase energy awareness with monitoring solution

Multi-energy monitoring

Electricity Gas Water Calorie

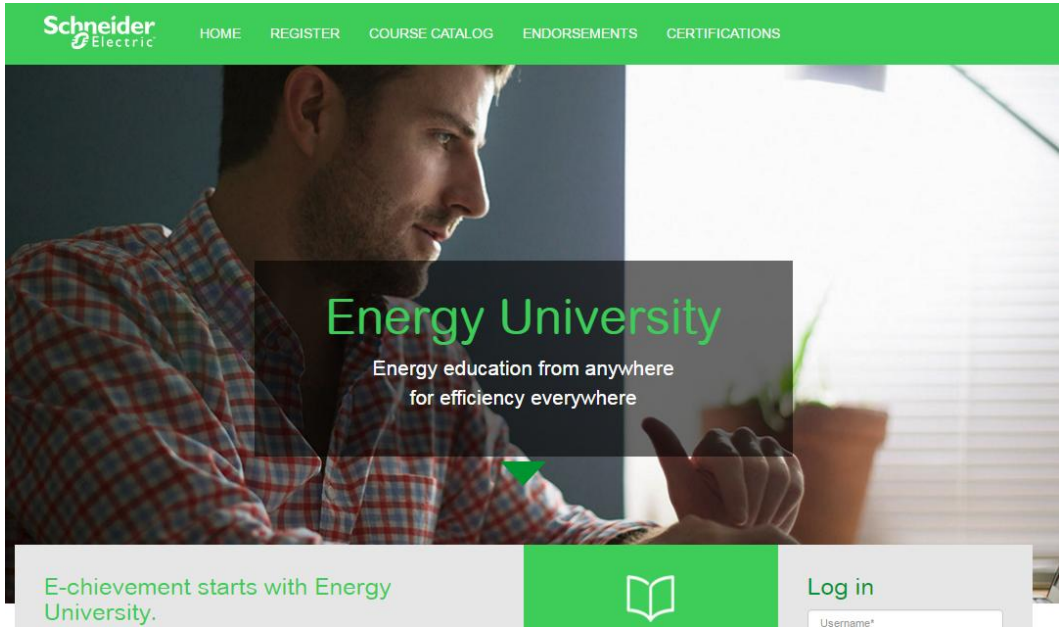
+

Panelboard Alarming
Simple Load Control

Energy University by Schneider Electric

Energy University is a **FREE**, online, educational resource,
offering more than 200 vendor-neutral courses on energy efficiency and data center

www.myenergyuniversity.com



to **simplify complexity** in Home & Buildings

combining an **unmatched portfolio** of core **electrical** offers and **building automation** with **digital** innovation

to create **Buildings** that can sense, think and adapt making them **safer, more reliable, efficient, comfortable and sustainable**

Buildings, where we spend most of our lives, where **Life is On**

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….ensuring that Life Is On

everywhere, for **everyone** and at **every moment**.

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