The Potential to become a Smart City for Hong Kong

Ian Lee

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Speakers' Bio

Ian Lee

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Ian received his MBA in The University of Hong Kong and his Bachelor Degree in The Polytechnic University (PolyU). He had been working in Parsons Brinckerhoff, CLP Power, CLP Engineering before joining Schneider Electric as the Project Director. Recently Ian took up the job as the Solution Director in order to focus on the innovative solutions and Energy Management develop more meaningful sustainable solutions. Ian is also a part-time lecturer for the PolyU, Victoria University as well as the Chinese University of Hong Kong School of Continuous and Professional Studies teaching on courses relating to Building Services design, customer service and project management.

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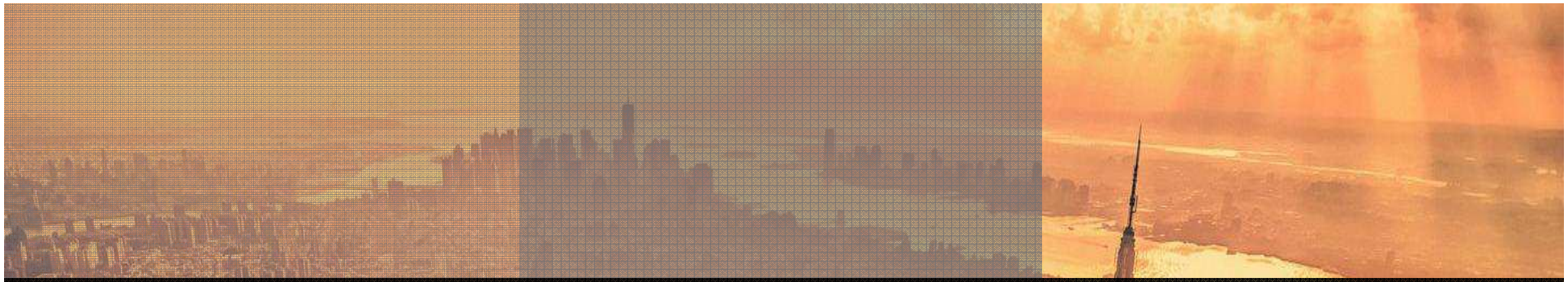
Why we need to have a Smart City


Global energy consumption will double in the next 40 years and electricity consumption will double in the next 20 globally, but in only 10 years in new economies, driven by...
Urbanisation
Industrialisation
Digitisation



…but are also causing massive challenges

Peak demand

Underutilised generation

Increasing energy prices

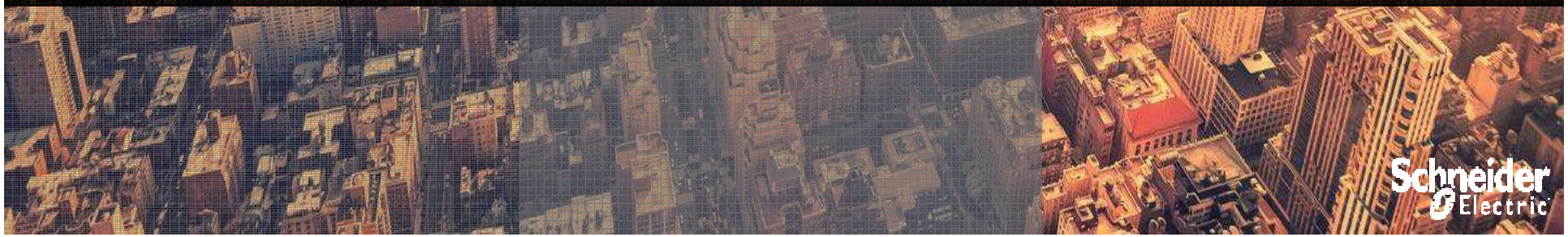
Pollution

Traffic congestion

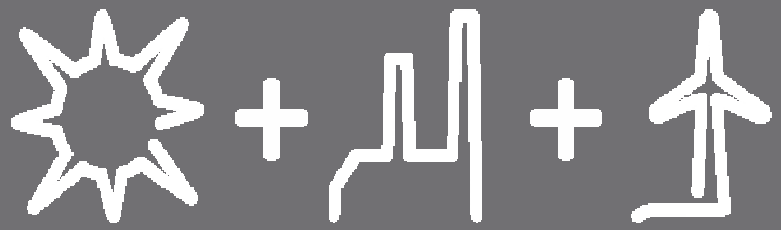
Changing public opinion

Climate disorder

Water scarcity

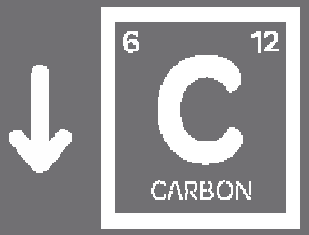


Right now, the focus is mostly on Energy Supply …



Produce Green

Change your energy mix by utilising renewable resource fuels to replace fossil fuels whenever possible.



Produce Low Carbon

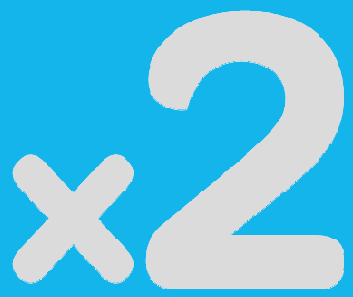
High carbon fuels should be replaced with lower carbon fuels such as shale gas.

But low-carbon and green supply will not keep pace with the growing demand.

We need to eliminate every element of waste and reduce demand, while improving profitability and resource productivity.

Conservation is the priority.

The World is facing a dilemma: in the next 40 years



Energy consumption will double

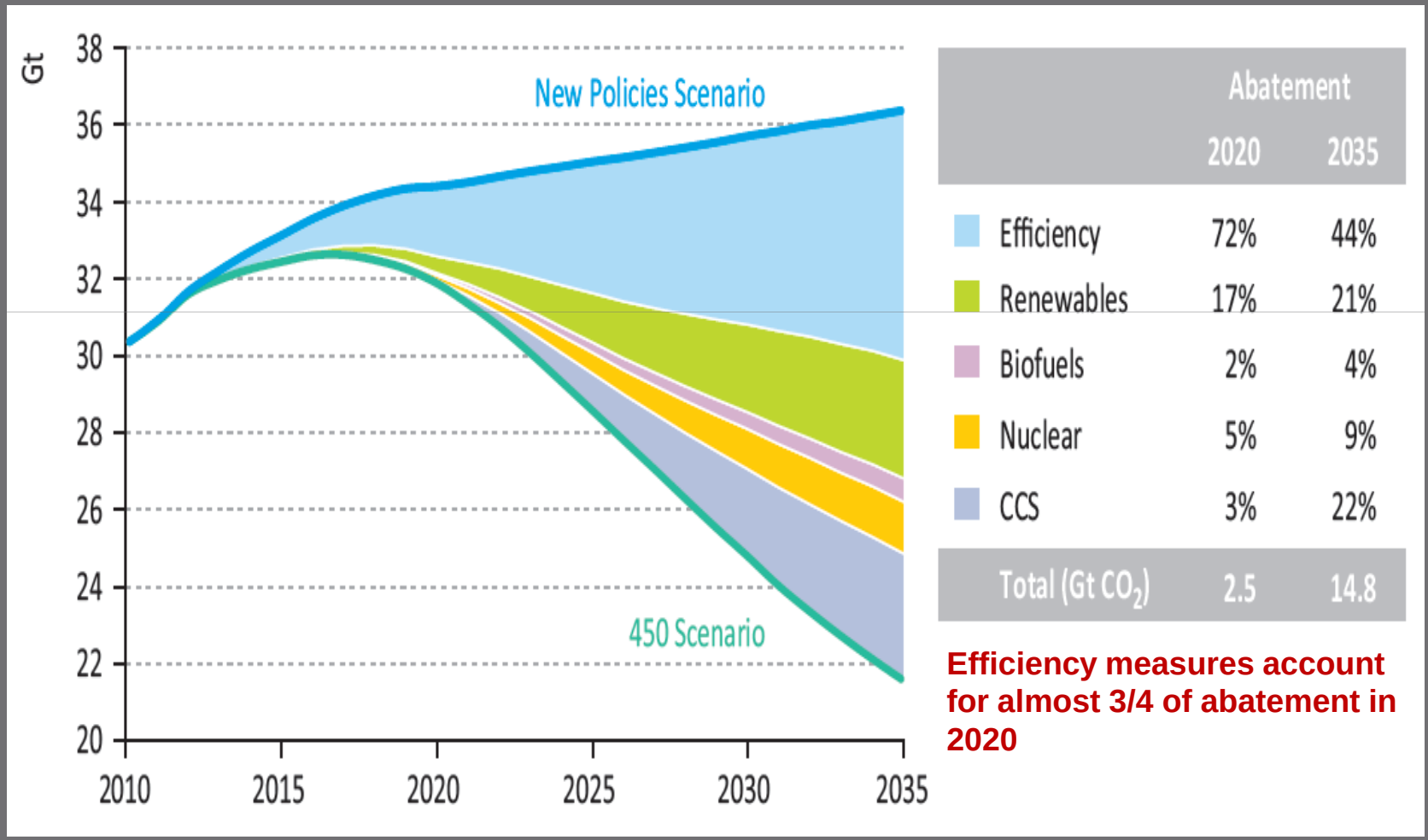
CO2 emissions need to be halved

We must become 4 times more efficient

To confront this dilemma, the solution exists today:
Energy Efficiency

The solution is a combination of:
cleaner generation, greater efficiency and a smarter grid

World energy-related CO2 emissions abatement



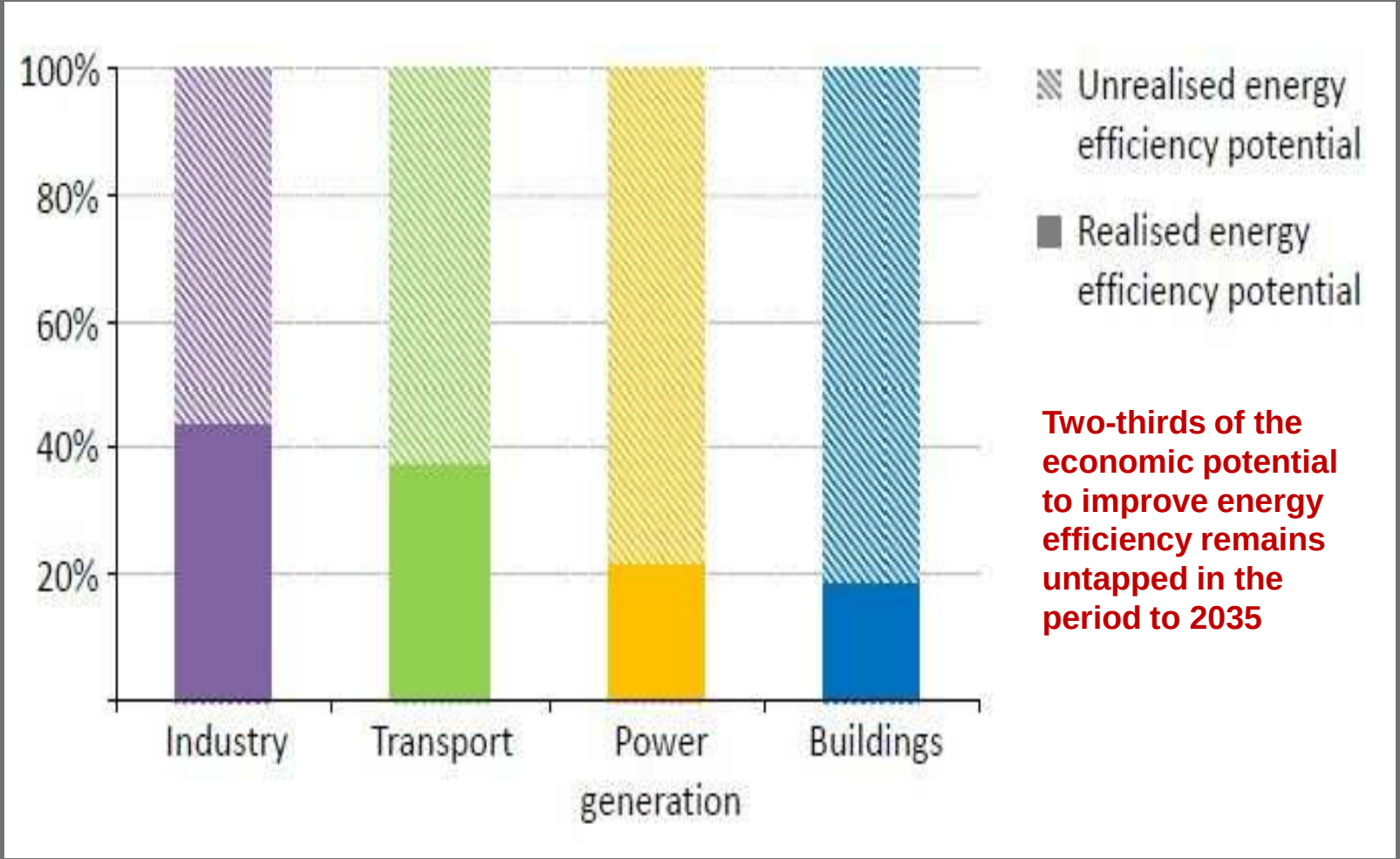
	Abatement 2020	Abatement 2035
Efficiency	72%	44%
Renewables	17%	21%
Biofuels	2%	4%
Nuclear	5%	9%
CCS	3%	22%
Total (Gt CO_2)	2.5	14.8

Efficiency measures account for almost 3/4 of abatement in 2020

Source: World Energy Outlook 2011, OECD / IEA

…and our efficiency entitlement is massive

Energy efficiency potential used by sector in the New Policies Scenario



Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035

Source: World Energy Outlook 2012, OECD / IEA

Schneider Electric

We need to build an Efficiency Economy

…born from the convergence of ENERGY, AUTOMATION and IT, technologies driving resource, process and security optimization

Providing Efficiency Solutions

Combining energy and IT technologies for sustainability and performance

75%

of global energy consumption happen in cities

Supporting urban efficiency

Source: UN State of the World Cities Report 2012

Power grids

worldwide are aging and need huge investment s for upgrade and maintenance

Enhancing the smart grid revolution

60%

of the world's final energy consumption come from buildings and industry

Providing energy efficiency and management solutions

Source: World Energy Outlook 2012, IEA

What kind of Smart Grid we need?

The new Grid equation

3 drivers + 3 accelerators

Growing electricity demand:
-new economies: demography, industrialization & urbanization
-mature economies: peak management
-new consumption modes (eg electrical vehicles)

Need to reduce CO_2 emissions:
-development of Renewable Energy sources
-focus on energy efficiency

Constraints on existing networks:
-limited generation capacity
-limits on network extension *(Not In My BackYard syndrome)*
-aging infrastructure and assets
-integration of intermittent & distributed generation

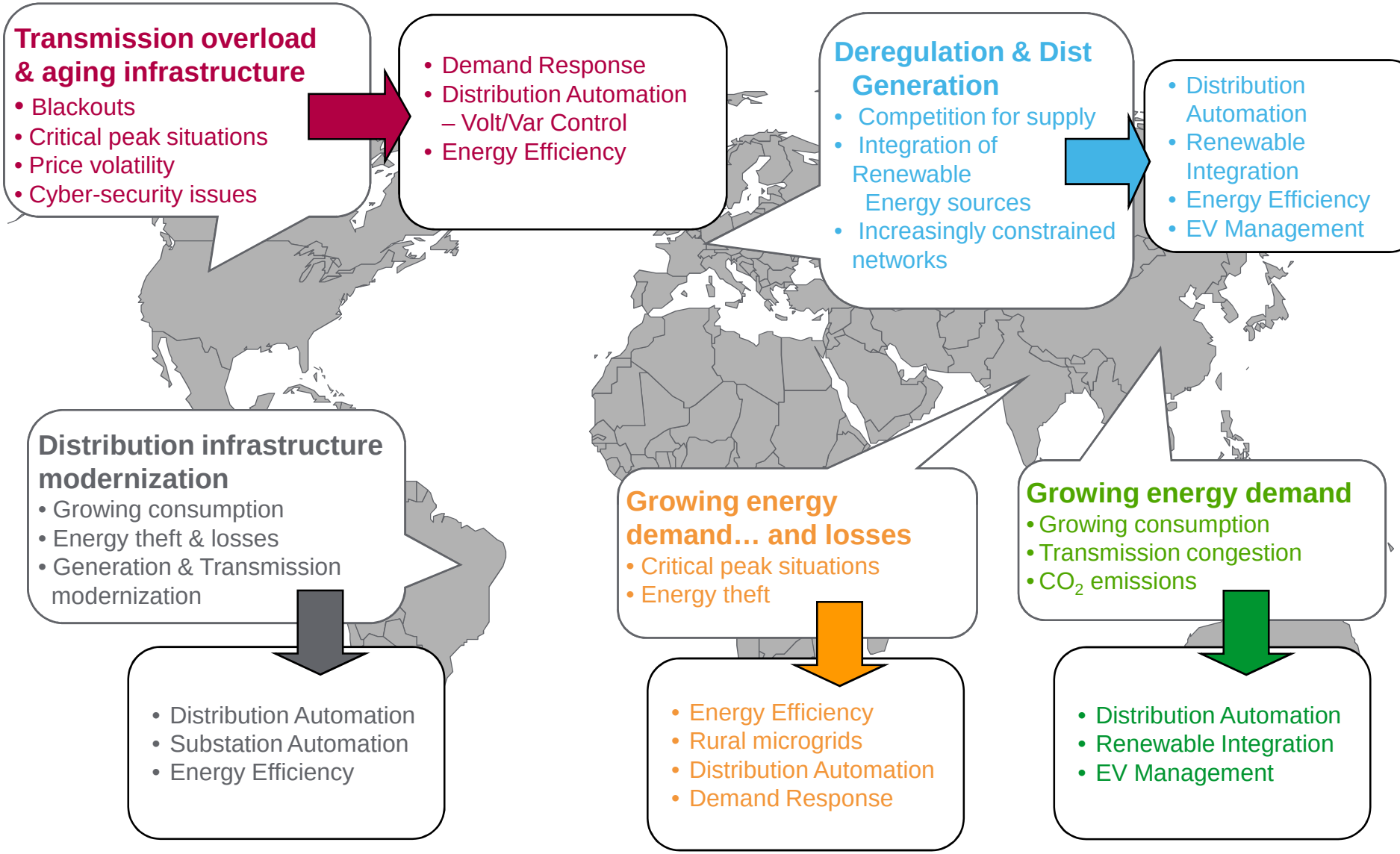
New technology available
-information technology, cyber-security
-energy storage, power electronics…

Active government & regulators:
-deregulation & opening of markets, introduction of price transparency
-need for security of supply & price stability
-increasing economic cost of blackouts
-stimulus packages, investment in electrical vehicles…

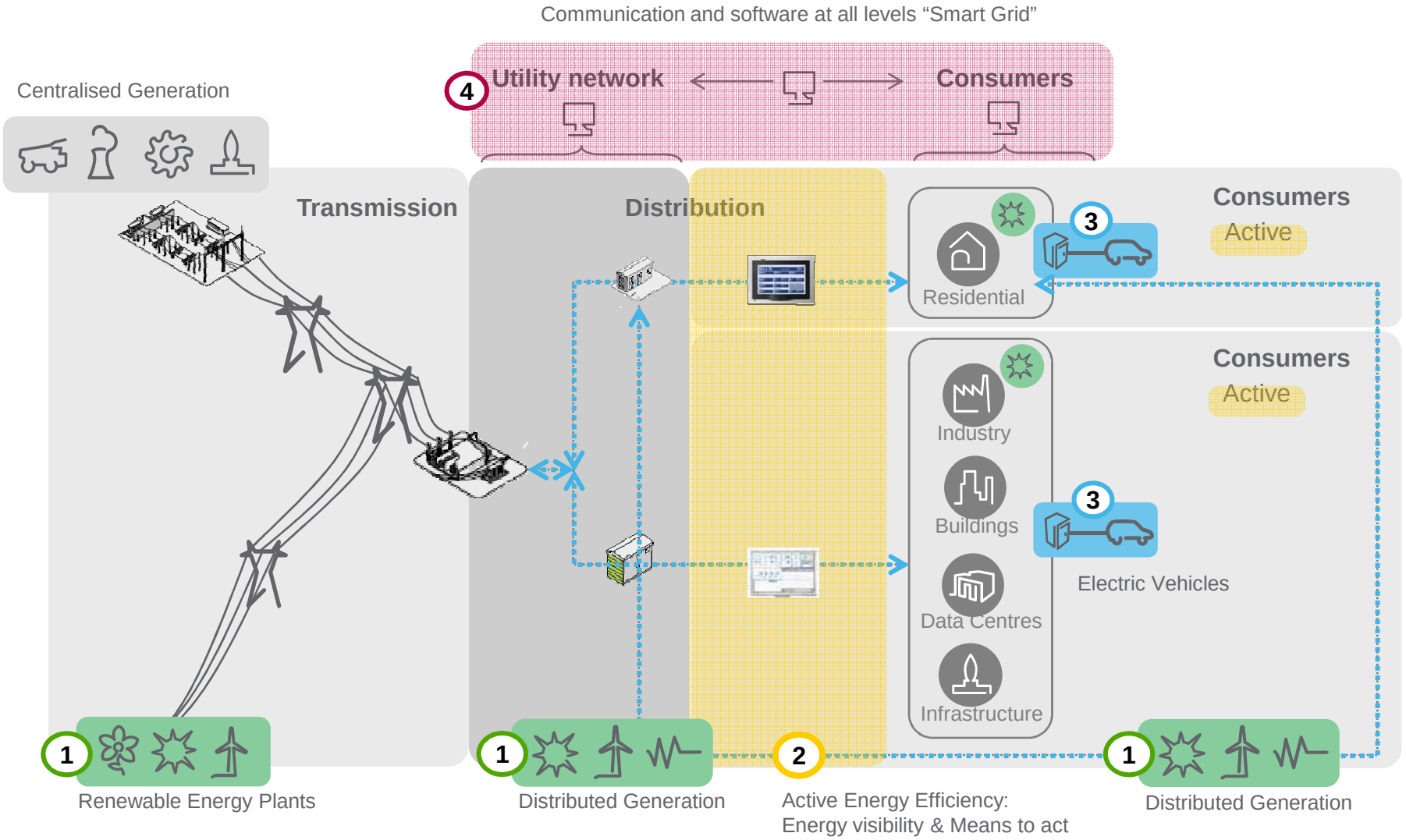
Active end-users:
-look for competitive prices
-want to contribute to CO_2 emissions reduction
-ready to play active role (control consumption, produce energy, drive electrical cars…)

= making the smart grid happen

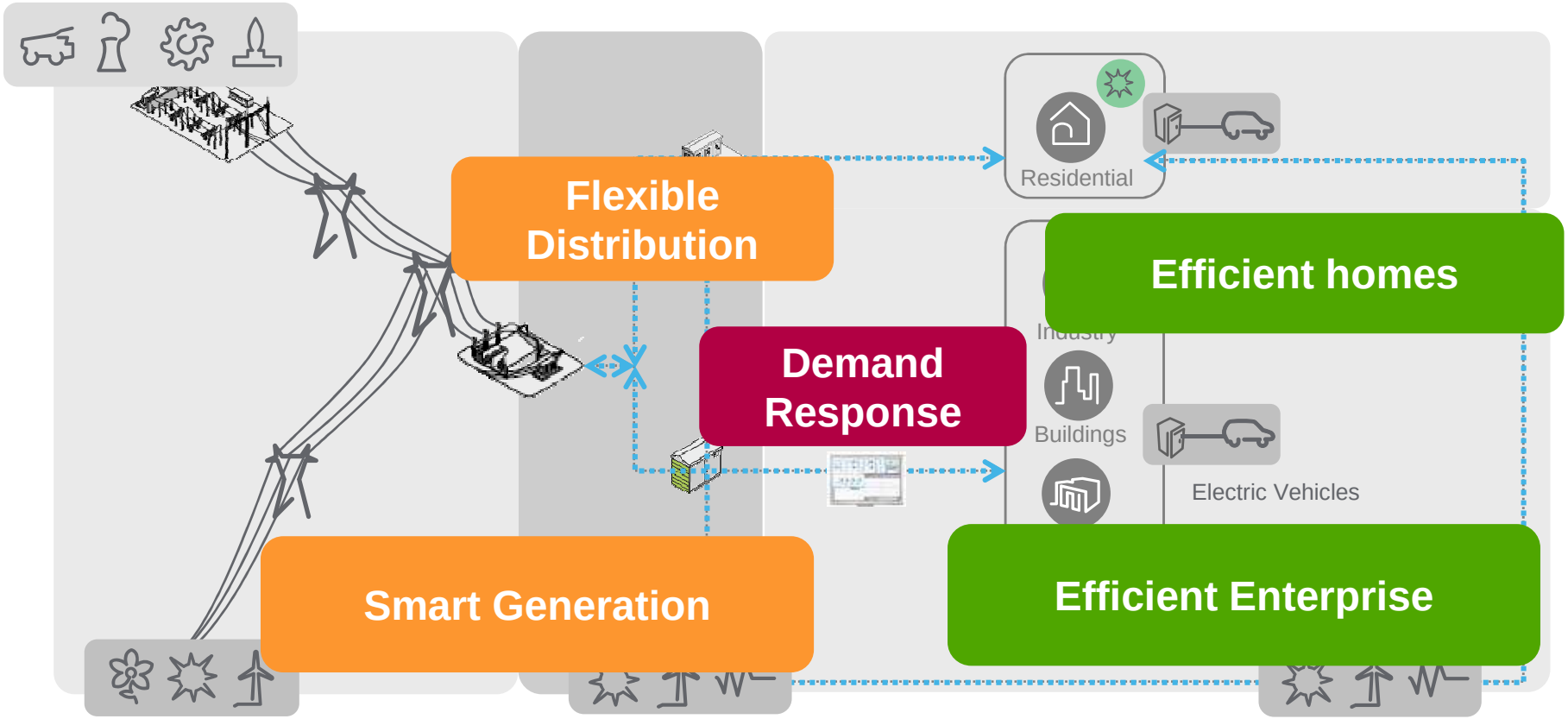
Regional priorities for the Smart Grid



From one-way energy-only grid to two-way energy+data Smart Grid

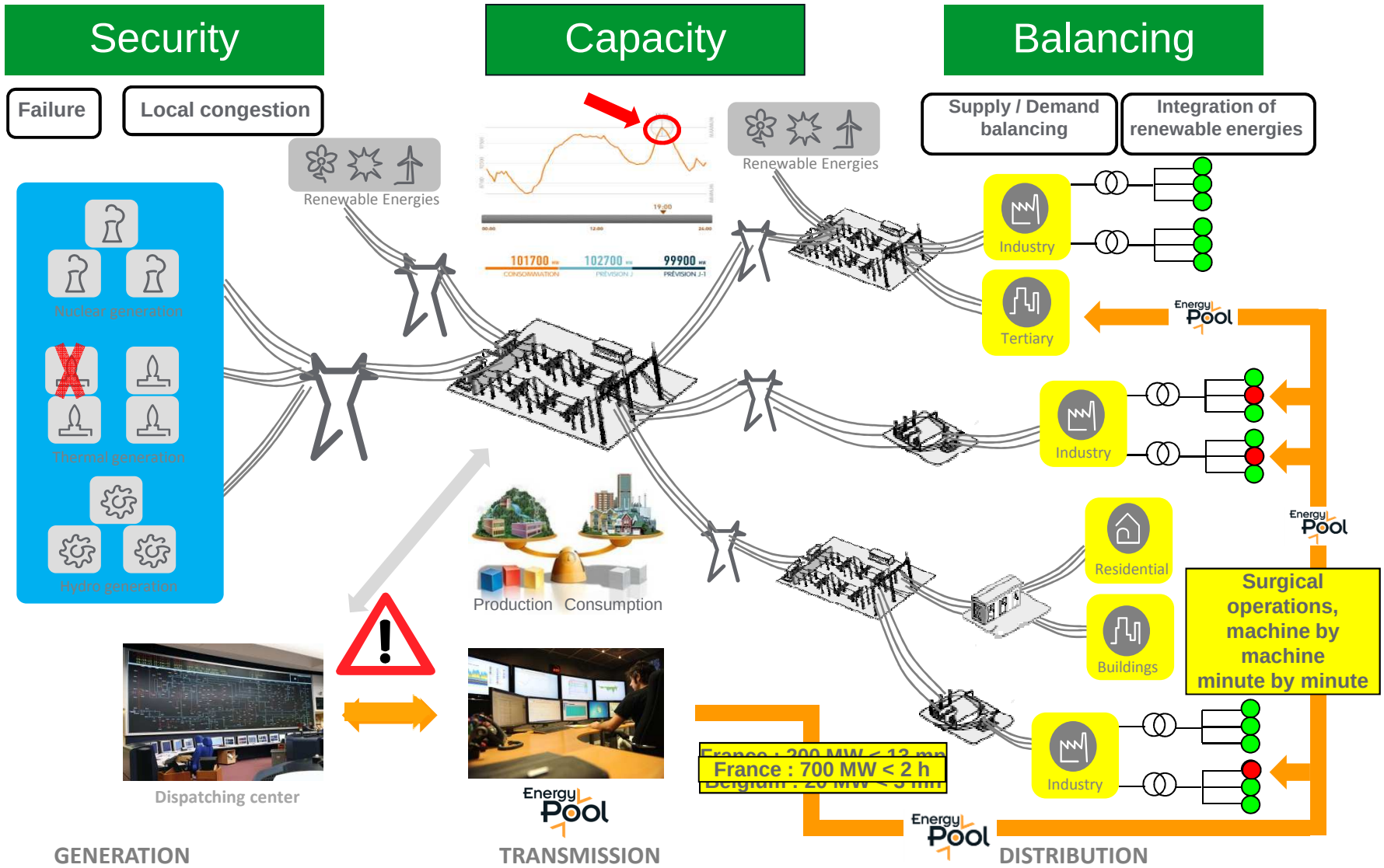


To make the Smart Grid happen

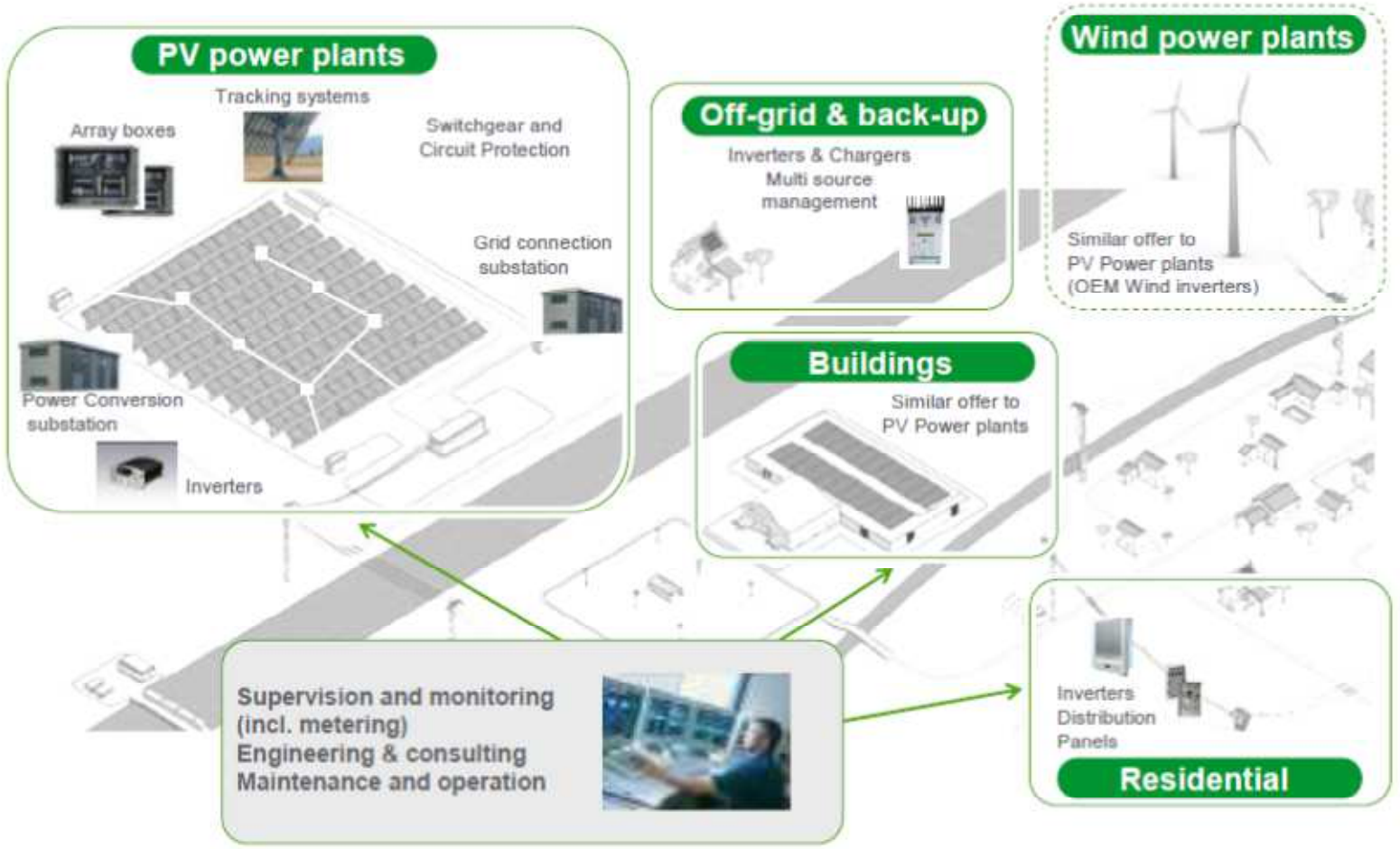


Smarter Demand + **Smarter Supply** + **Demand Response** = **the Smart Grid**

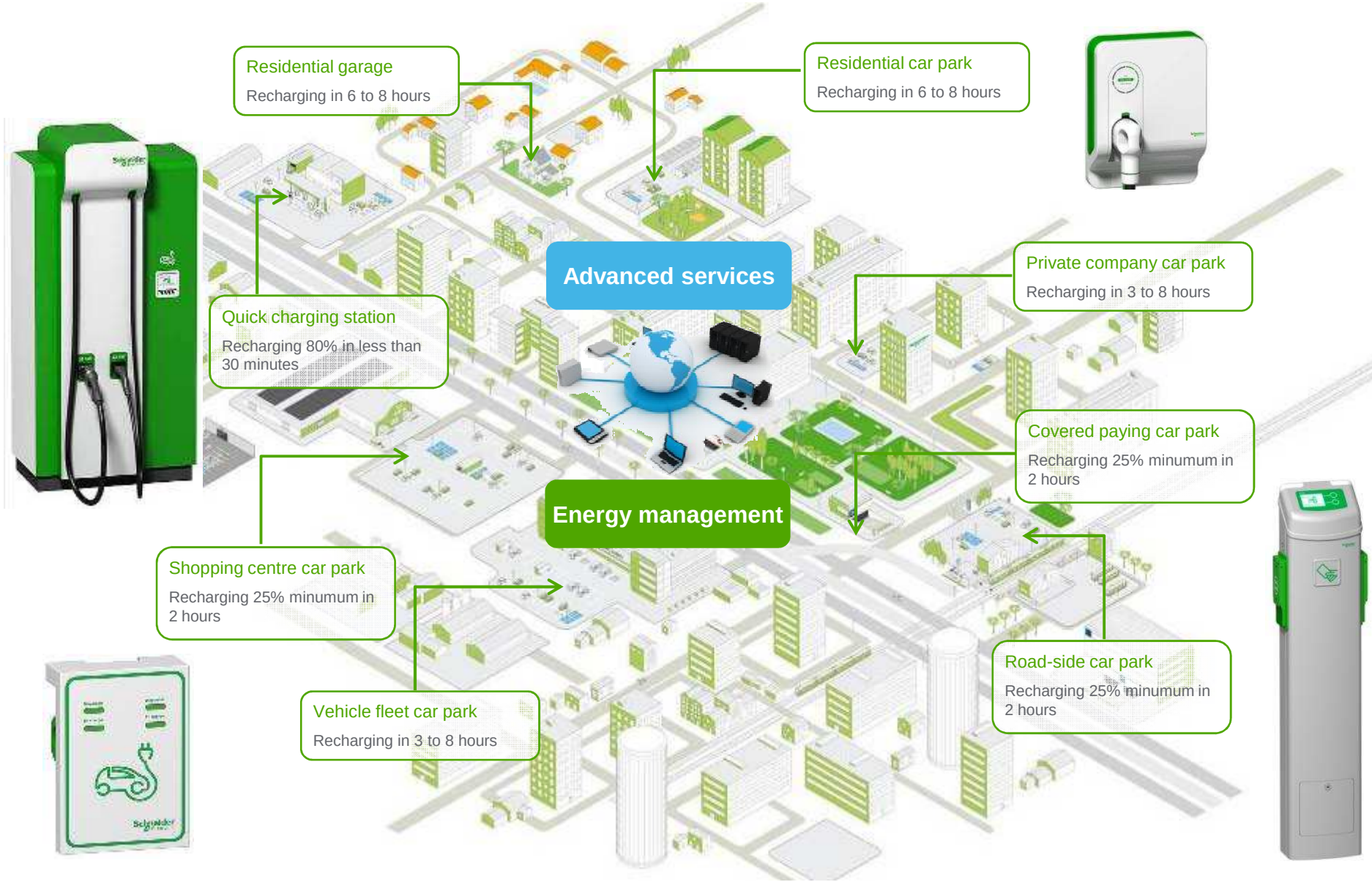
Demand Response
3 different services



Smart Generation: integrating Renewables safely and efficiently into the Grid

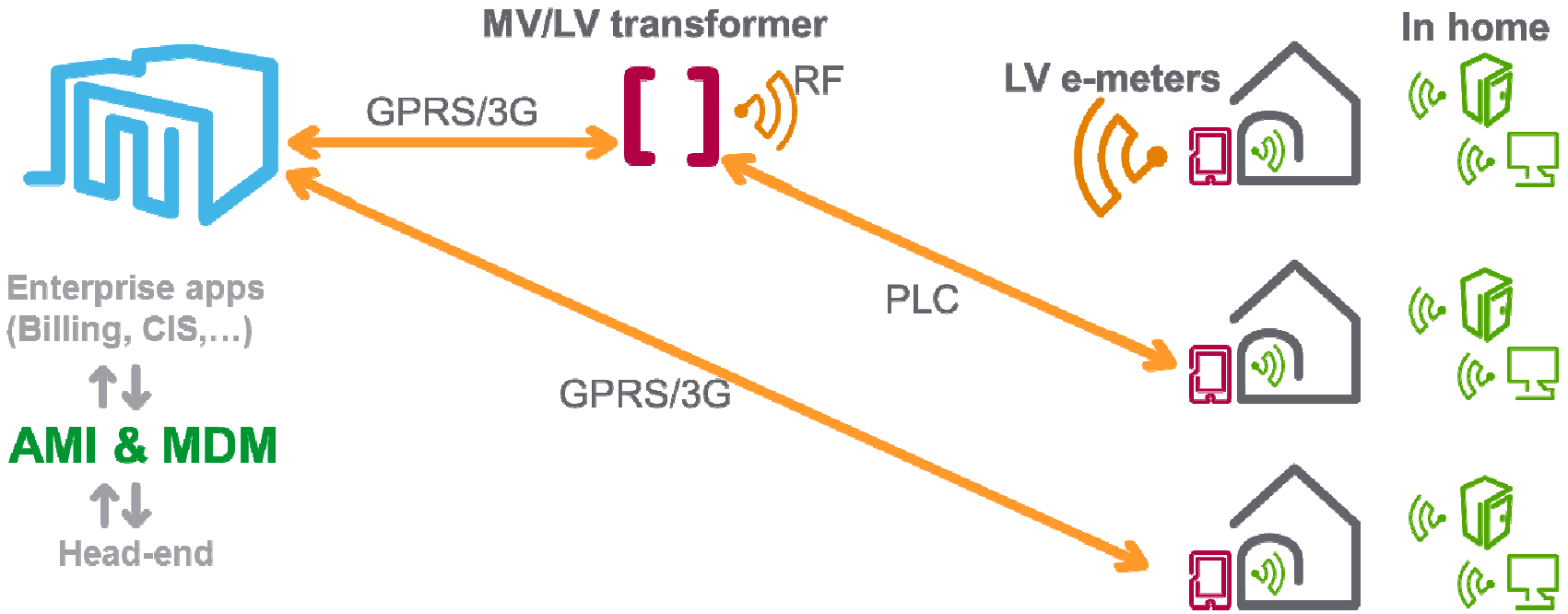


Electric Vehicles charging infrastructure & services



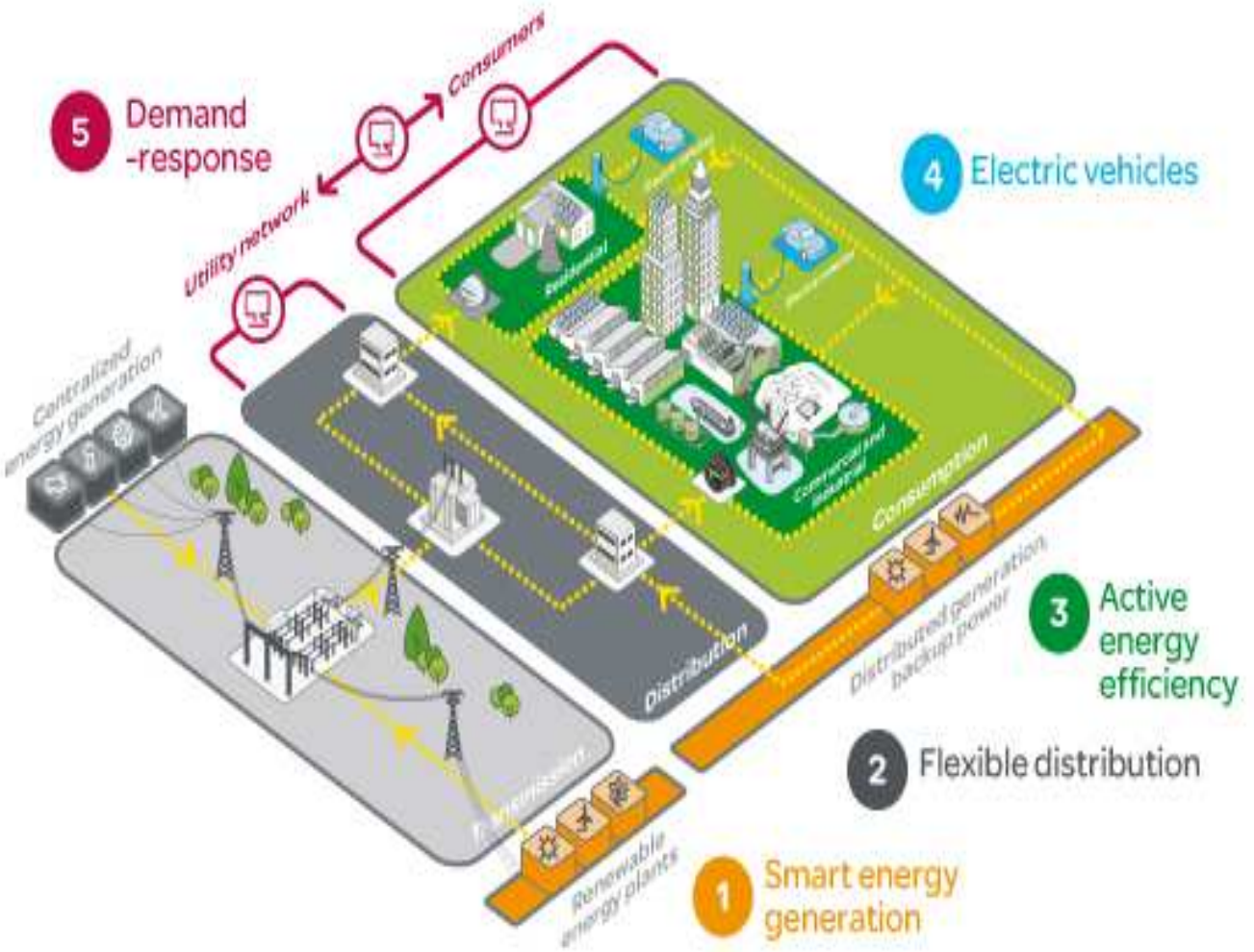
Advance Metering Infrastructure

- AMI system can be used to manage devices at home. Devices can be connected to meters via either wired or wireless media:
  - Gas and water meters for multi-utility
  - Home appliances for demand response
  - In-Home Displays and communication bridge for end-customer use



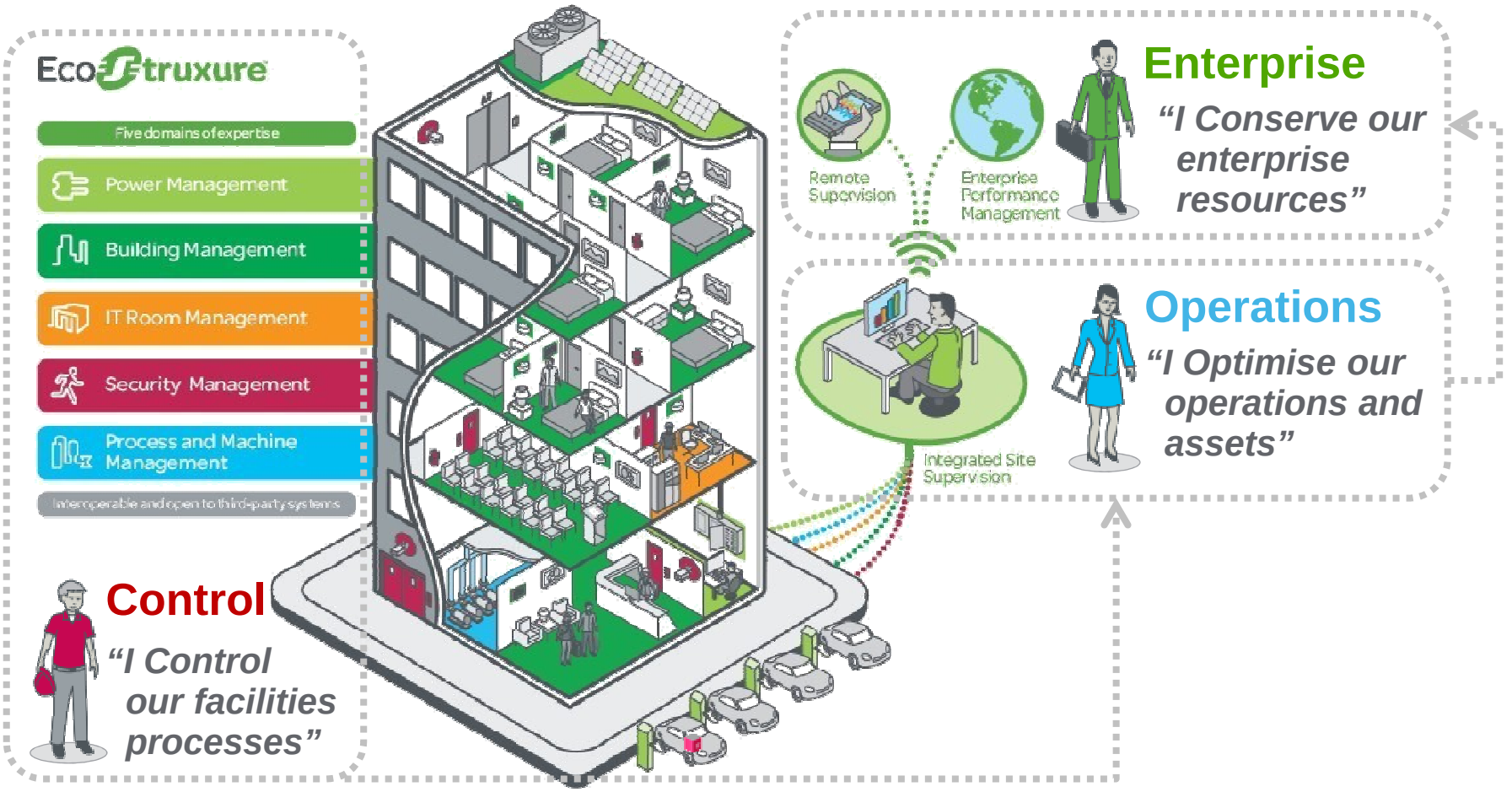
We believe it’s time to share across the grid

Enabling people to consume the cheapest, greenest energy across the smart grid



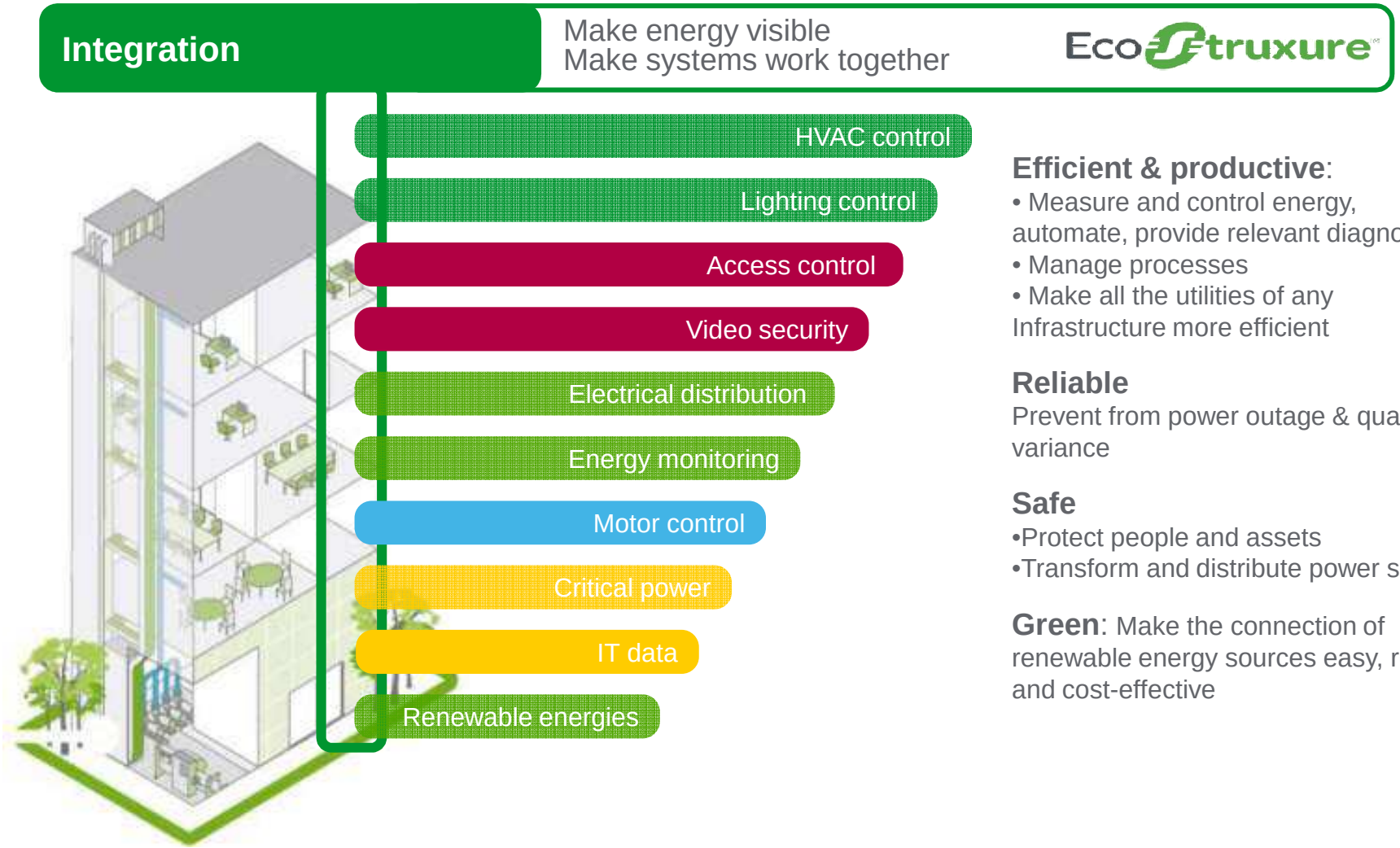
Are we good at Energy Management?

Make the most of your energy



Control your facilities processes, **optimize** your operations and assets and **conserve** your enterprise resources by combining the worlds of energy & IT

Providing integrated solutions



Efficient & productive:
- Measure and control energy, automate, provide relevant diagnosis
- Manage processes
- Make all the utilities of any Infrastructure more efficient

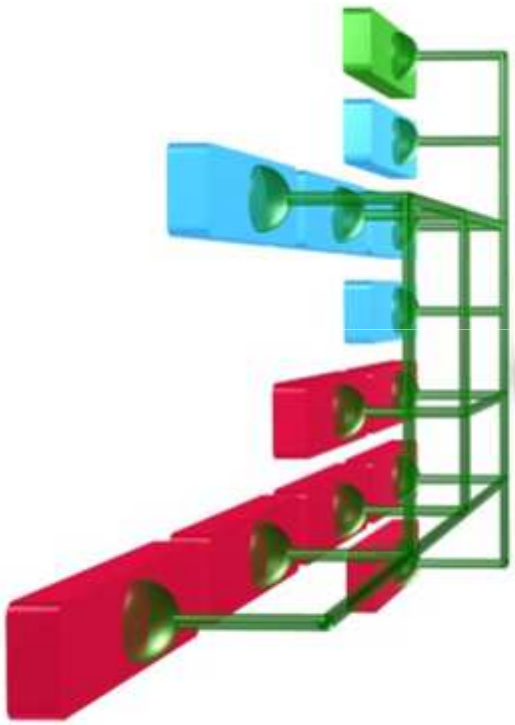
Reliable
Prevent from power outage & quality variance

Safe
- Protect people and assets
- Transform and distribute power safely

Green: Make the connection of renewable energy sources easy, reliable and cost-effective

Information Backbone

EcoStruxure Web Services



'Nerve system' of
StruxureWare software

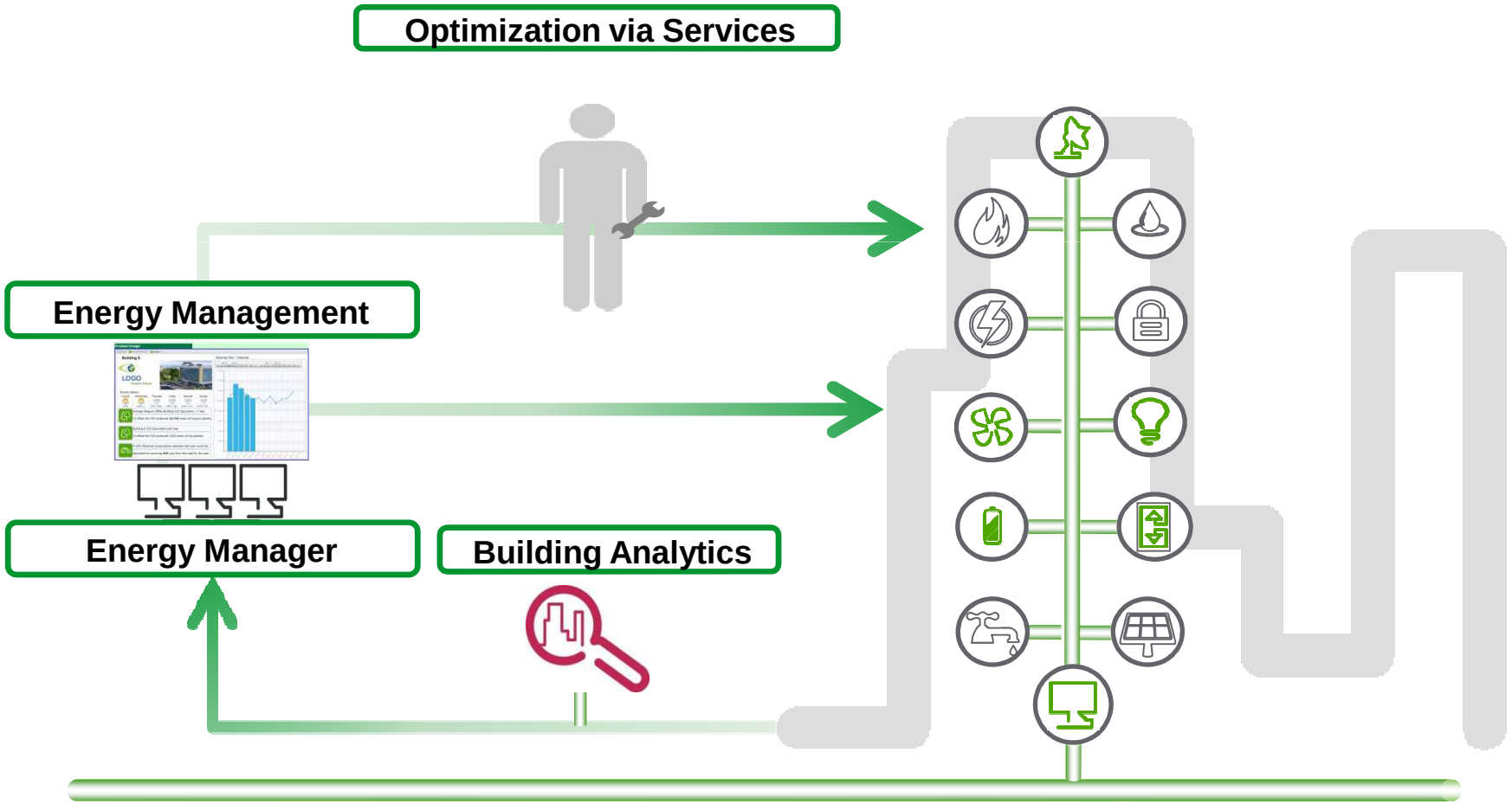
5 Key Customer Benefits

1. Access Data Instantly.
2. Make Informed Decisions.
3. Operate More Efficiently.
4. Share Information Confidently.
5. Create Actionable Reports.

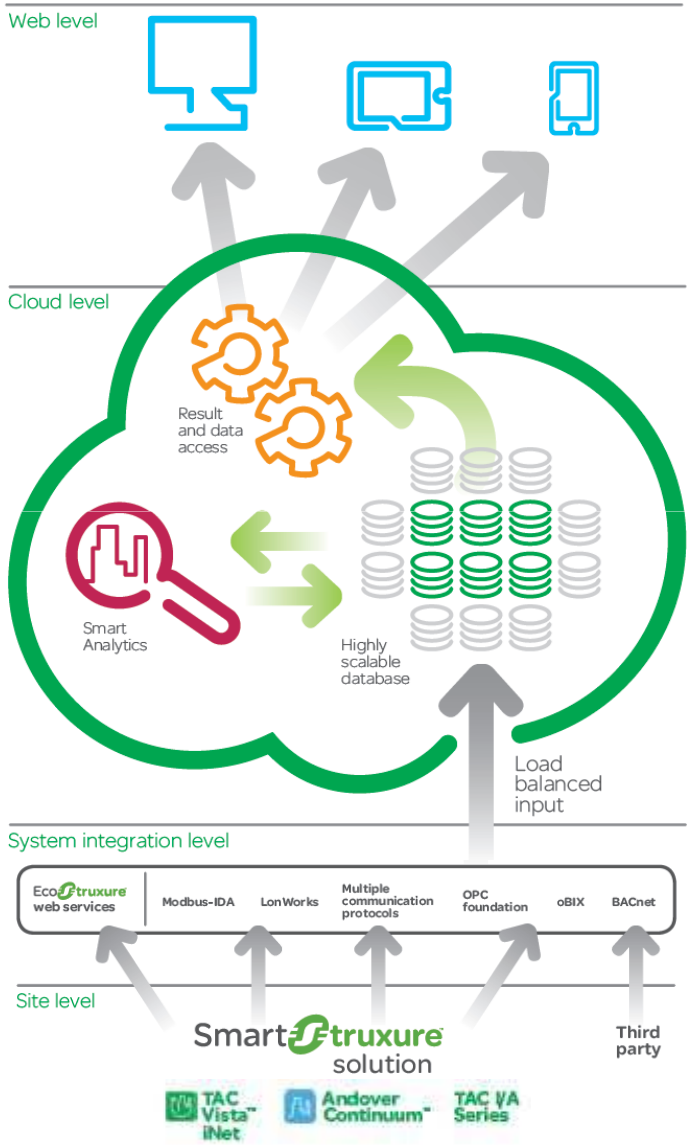
Allowing for data-sharing between applications and enhancing data accuracy and availability.

Energy Management Cycle

Services take action to improve the facility based on information from outputs from the Analytics and Energy Management systems



Building Analytics: Architecture

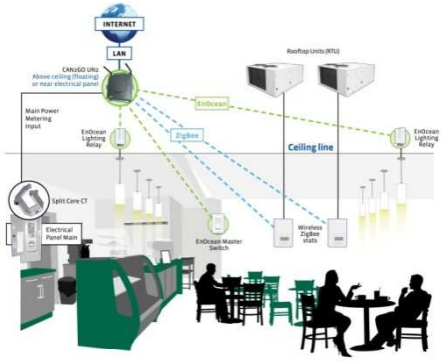


Example of findings…

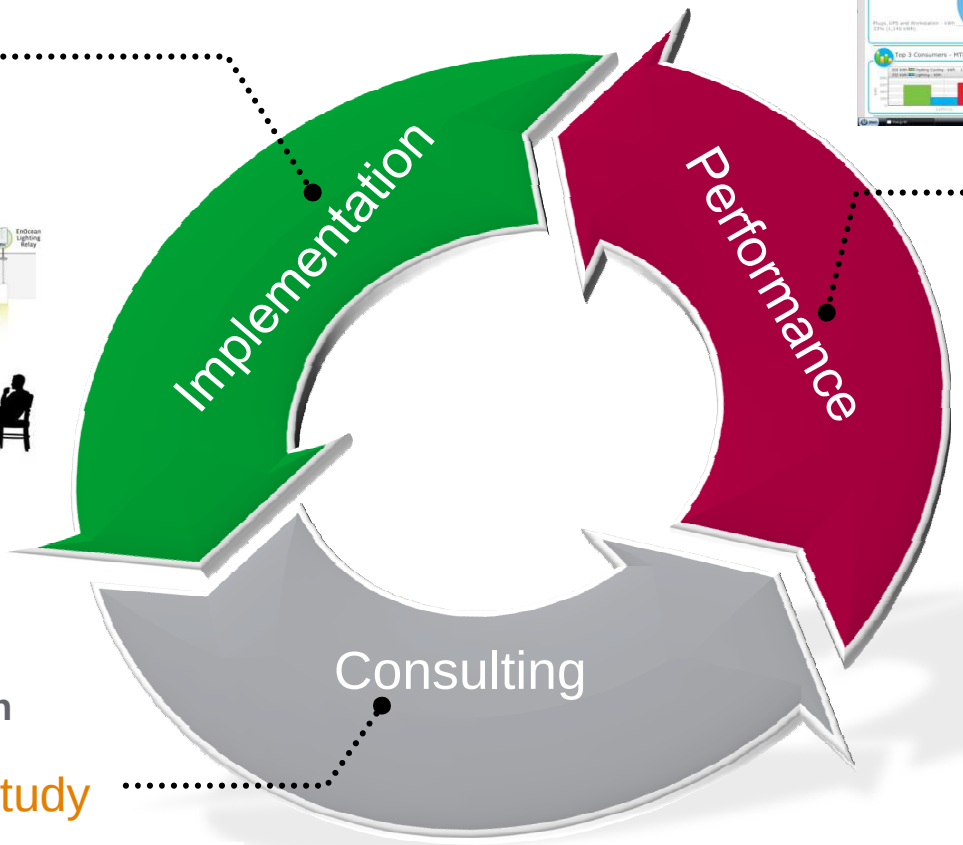
- *Simultaneous heating and cooling*
- *Suboptimal economizer controls*
- *Opportunity for higher/lower loop setpoints*
- *Opportunity for static pressure reset*
- *Leaking valves, broken dampers*
- *Manual overrides*
- *Poor occupancy scheduling*
- *Excessive zone temperature setpoints*
- *Excess reheating*
- *Trends in chiller efficiency*
- *Short cycling*
- *Custom analytics*

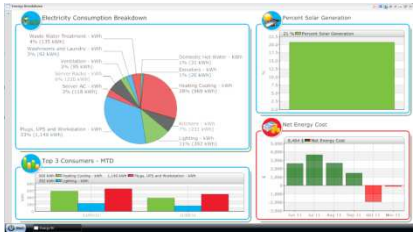
Energy Management Cycle

EE Solutions

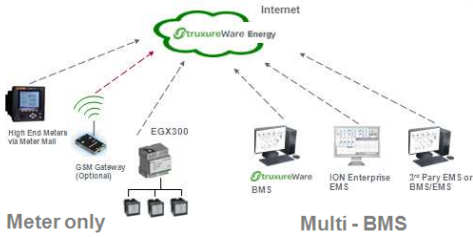


LED Lighting
Chiller Plant
Heat Pump
VFD
Data Centre Solution





Energy & Carbon

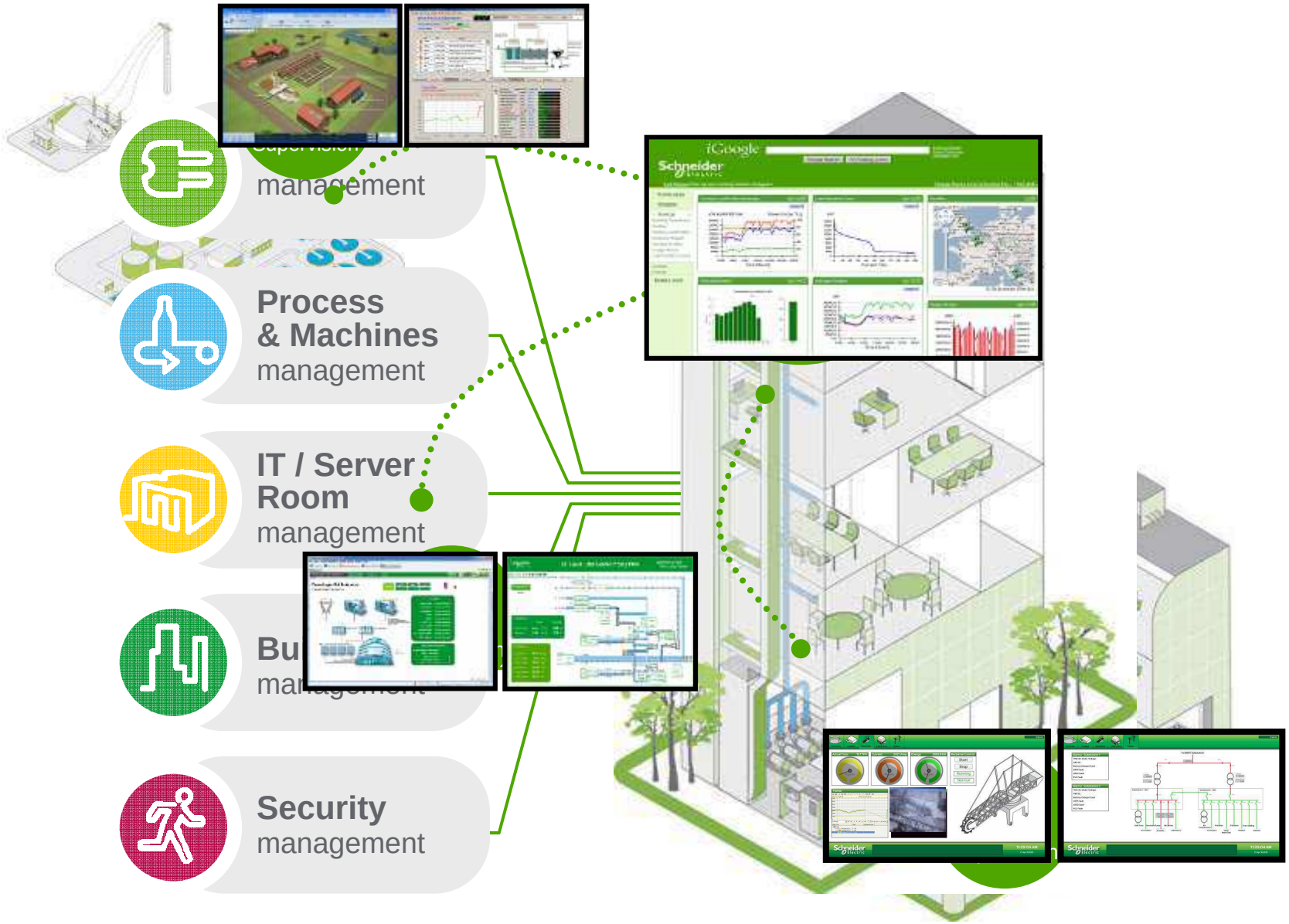


EMS system
Building Analytic

Professional Study

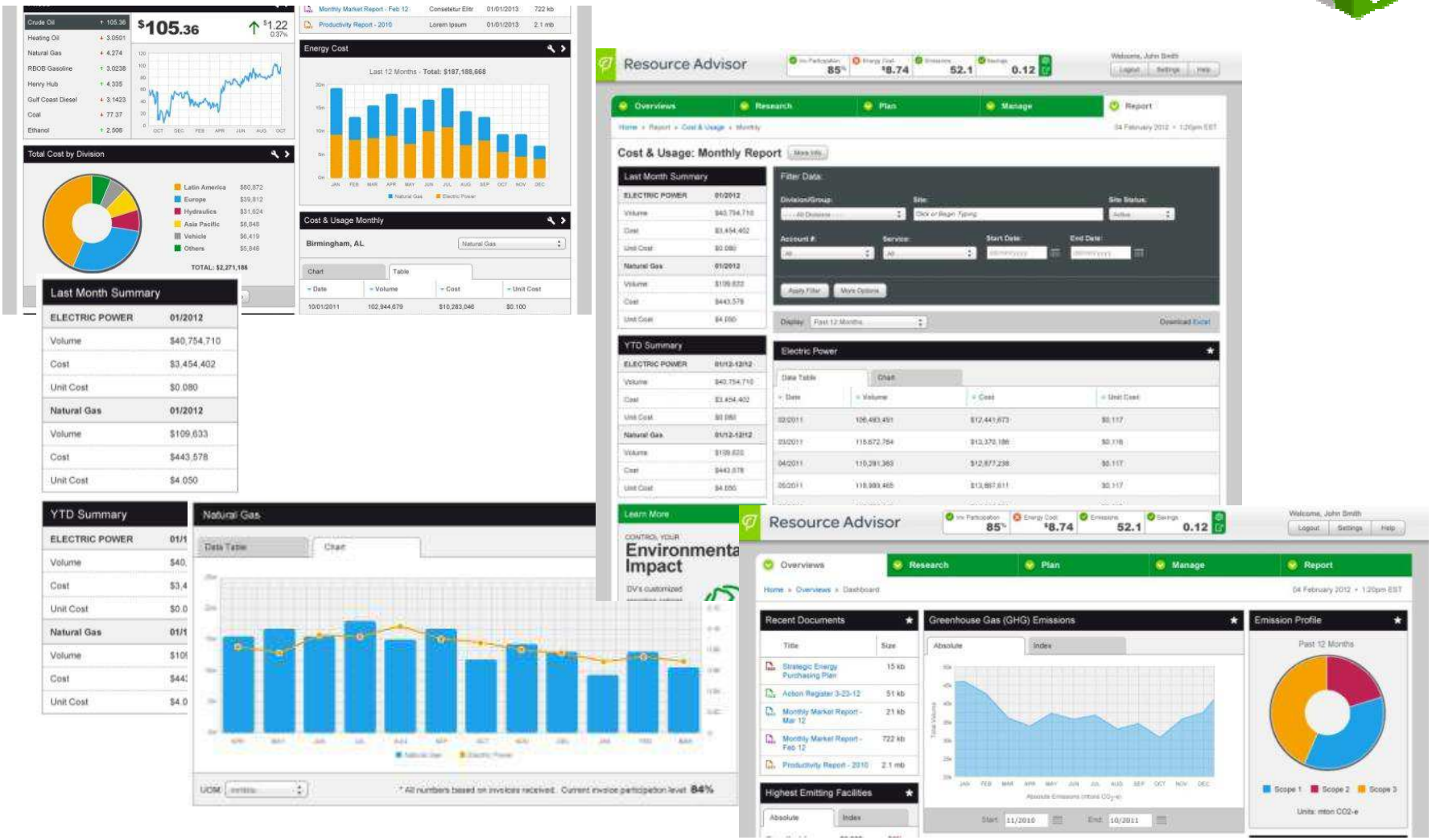
Feasibility Study
Energy Audit
Carbon Audit

Scalable - Clouded based multi-sites / countries



Sustainability Planning & Carbon Emission Tracking

Global view and immediate access key carbon footprint information

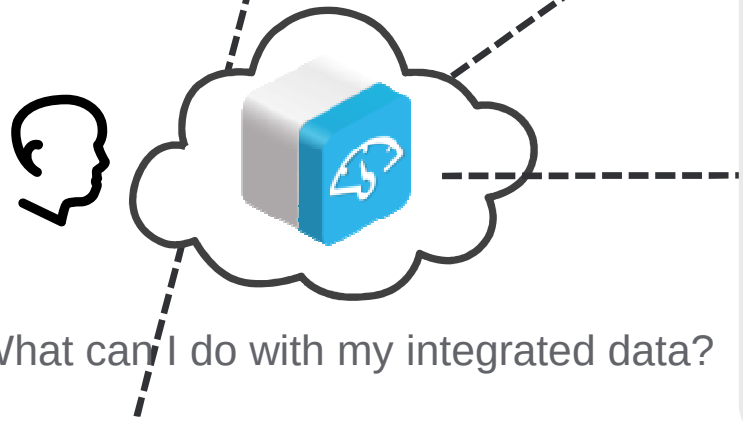


Energy Management & Complex Analytics

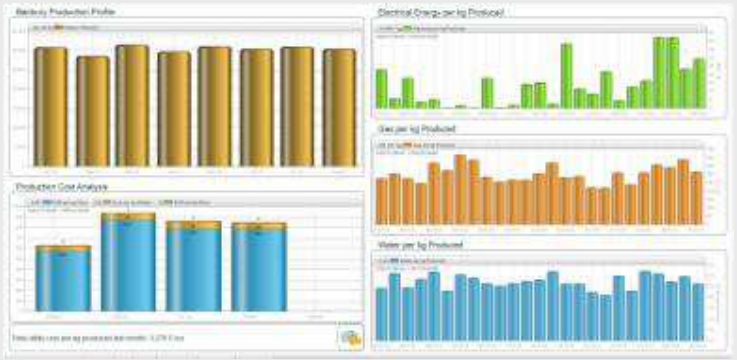
Analytics

Integrate occupancy and Energy consumption data

Correlate energy with weather to understand how it affects consumption



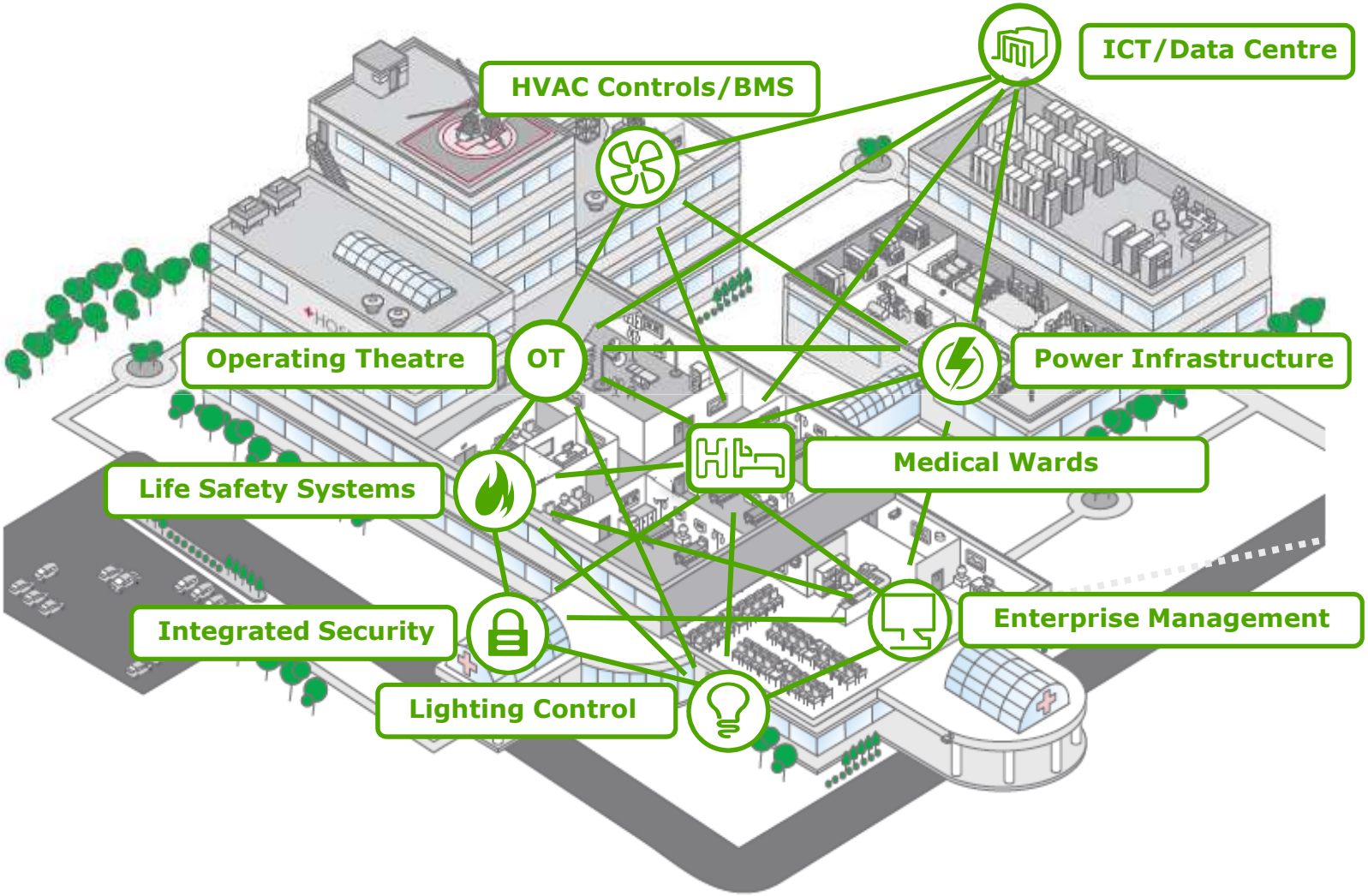
What can I do with my integrated data?



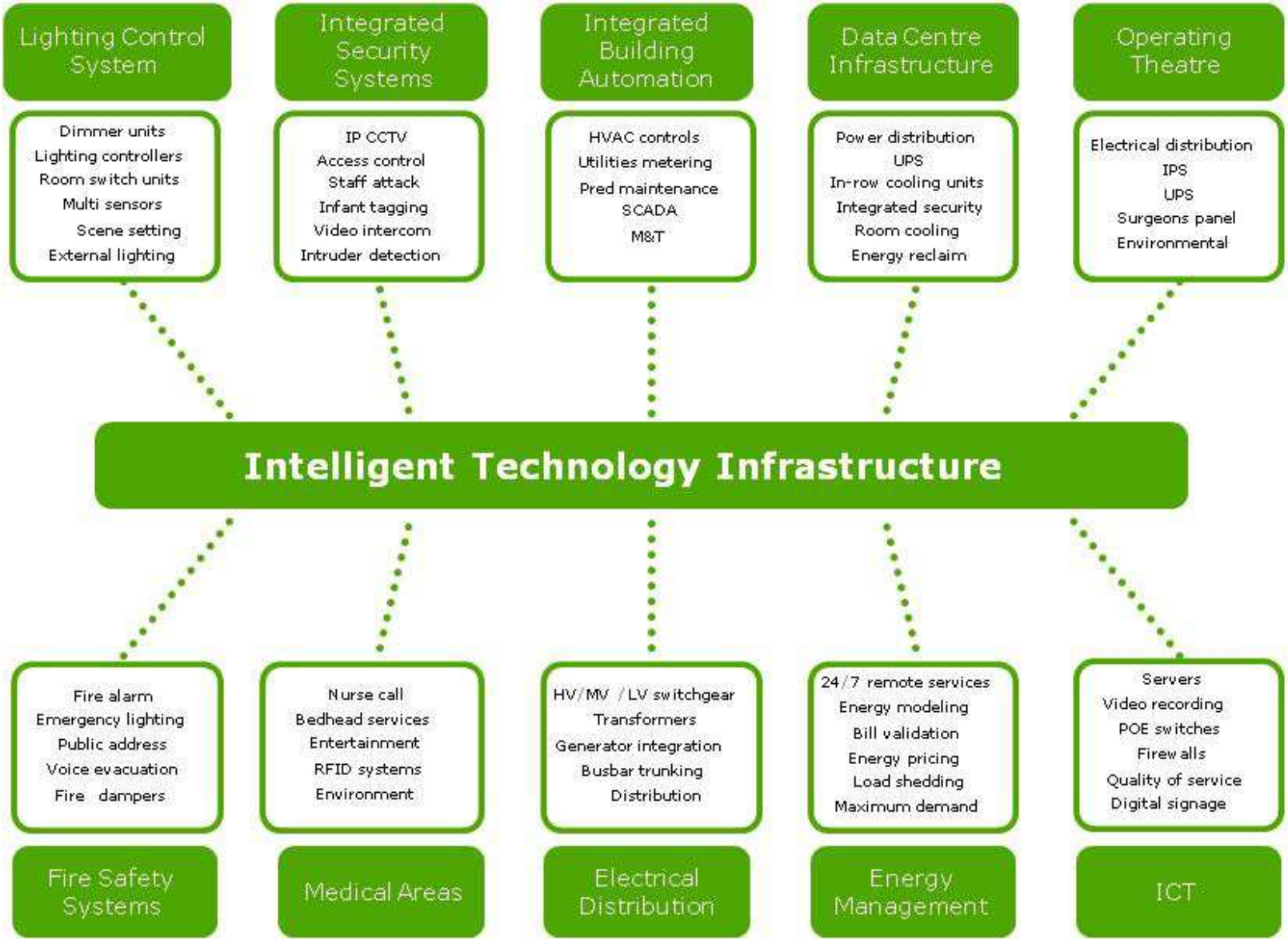
Correlate Datacenter Performance with energy to Optimize energy usage

Are we good at Controls and Integration?

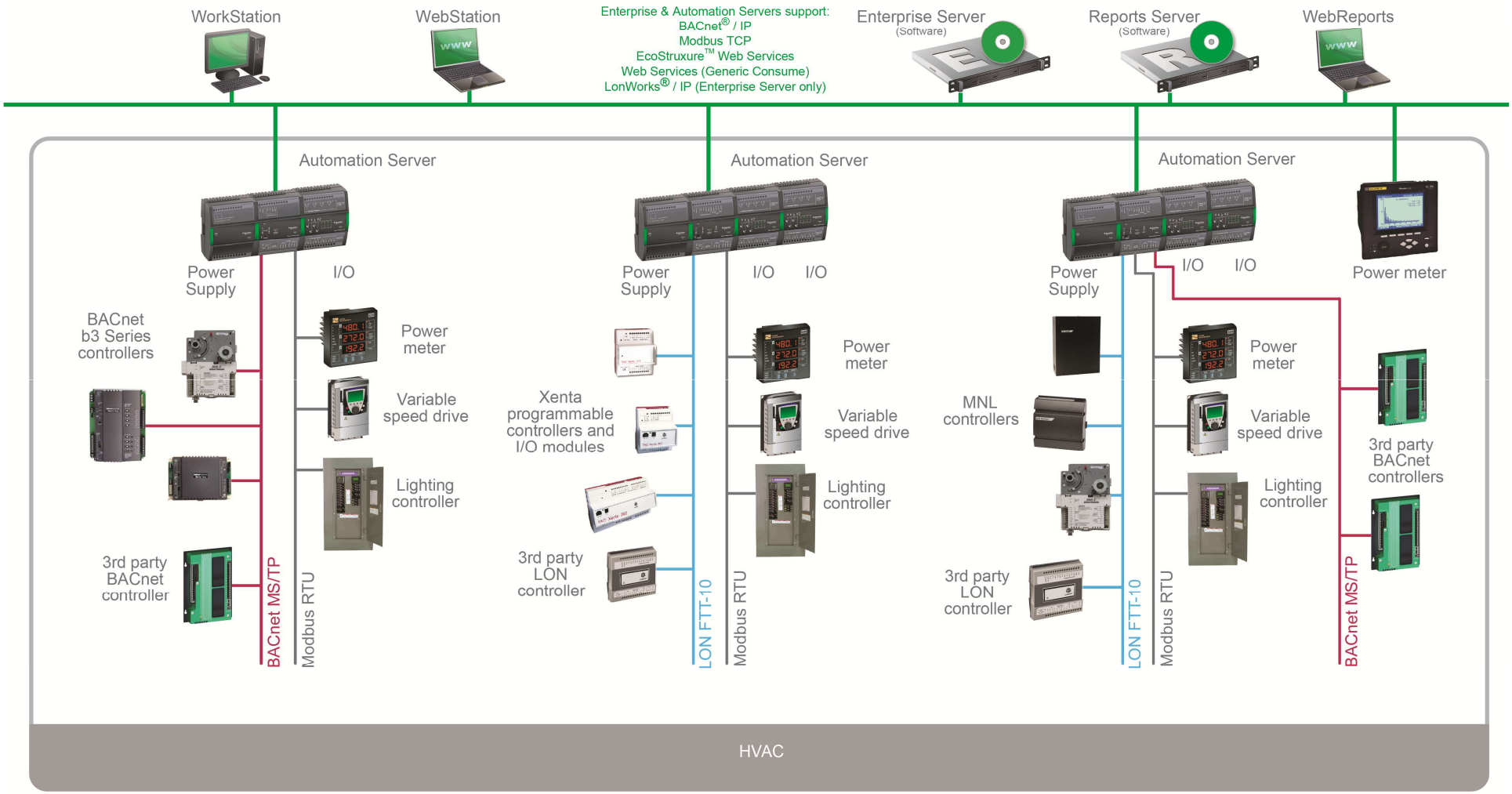
The intelligent infrastructure
(Hospital example)



Interoperation between elements

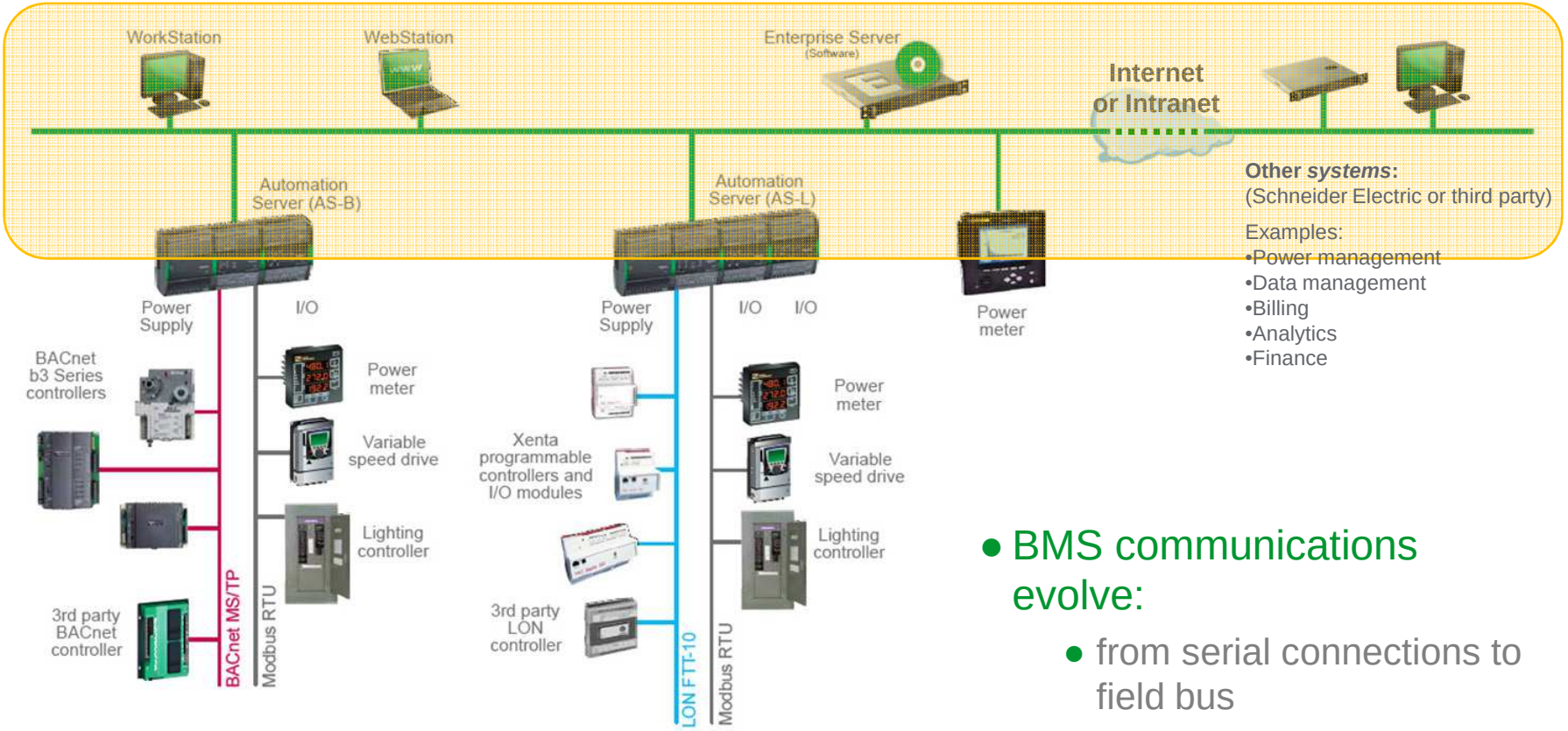


Example of Integrated Building System Architecture



StruxureWare Building Operation software allows all data from multiple devices throughout a building to be collected, analyzed, and managed – turning system data at the automation level into valuable business information at the management level.

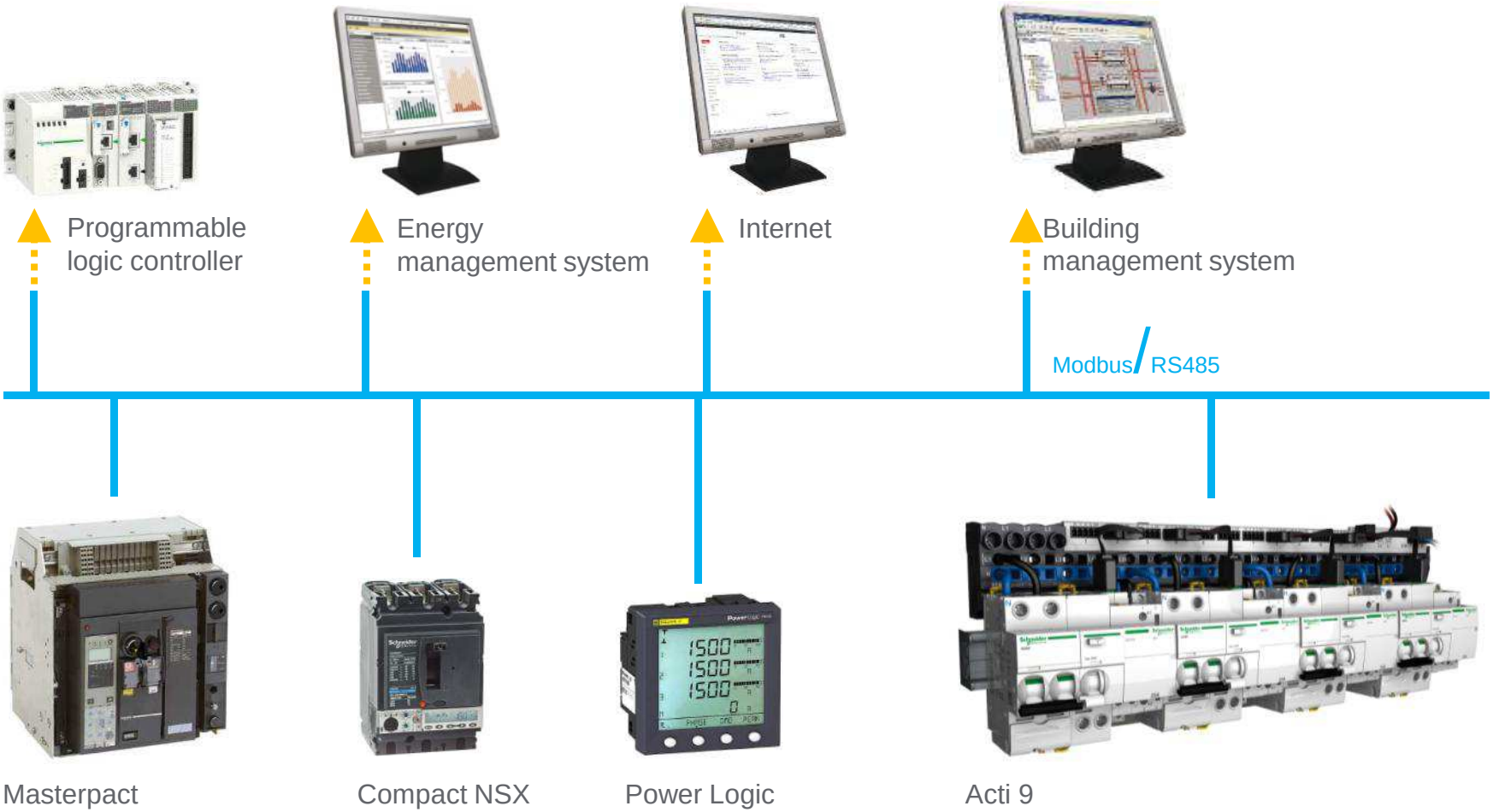
iBMS communications: Web Services



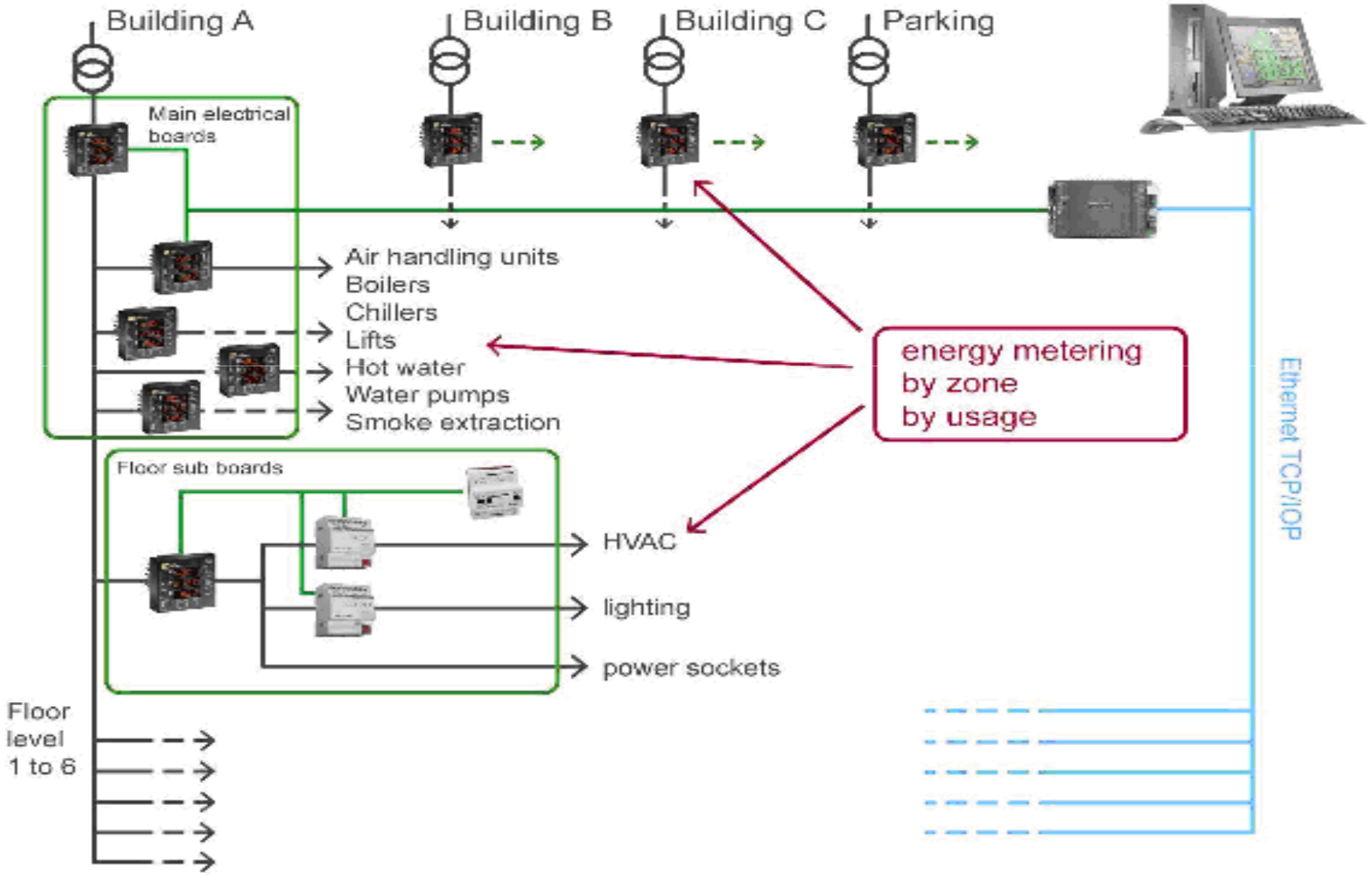
- BMS communications evolve:
  - from serial connections to field bus
  - field bus up to TCP / IP
  - *now between systems through Web Services*

…with StruxureWare Building Operation

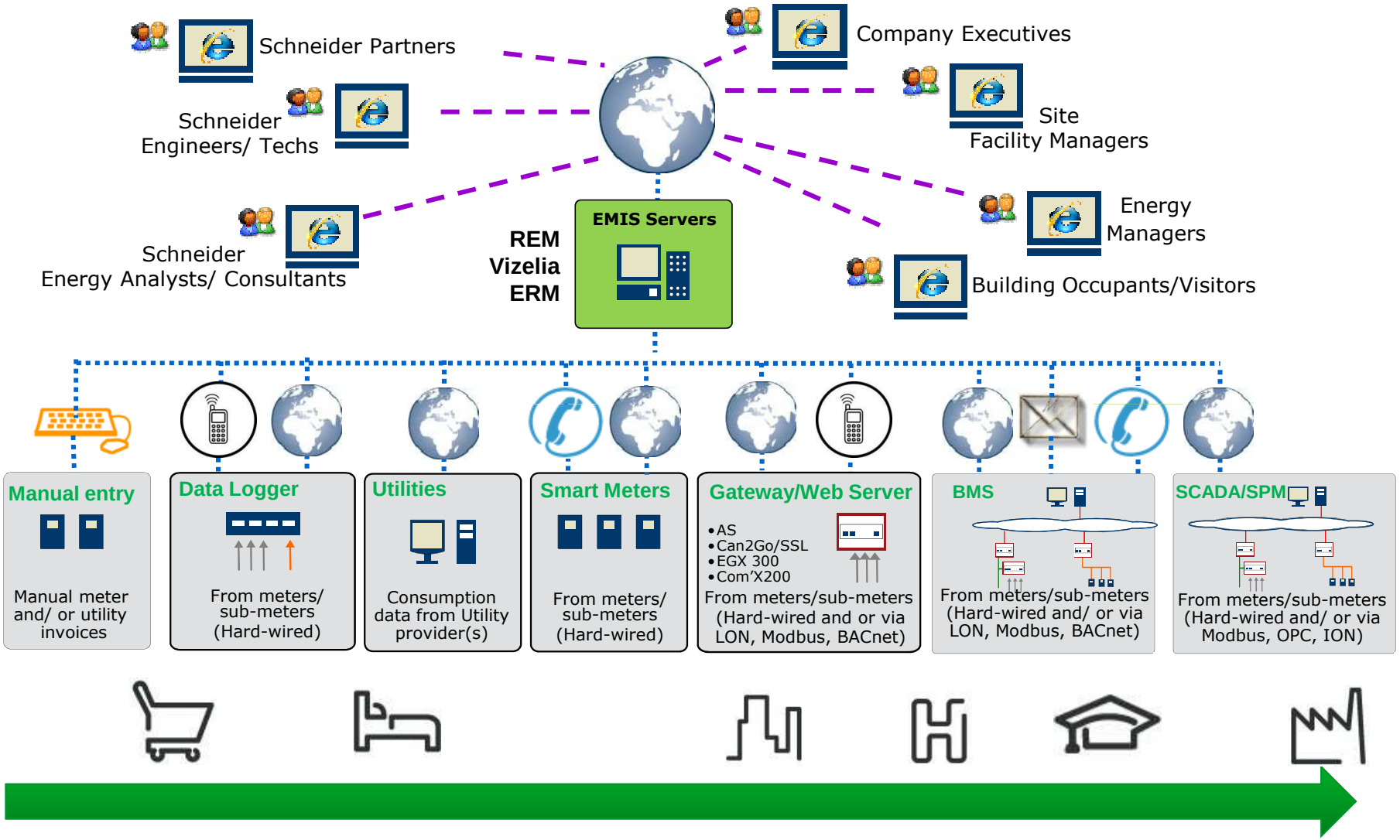
The most universal and open communication protocol



Metering for Building



Global Architecture & Connectivity



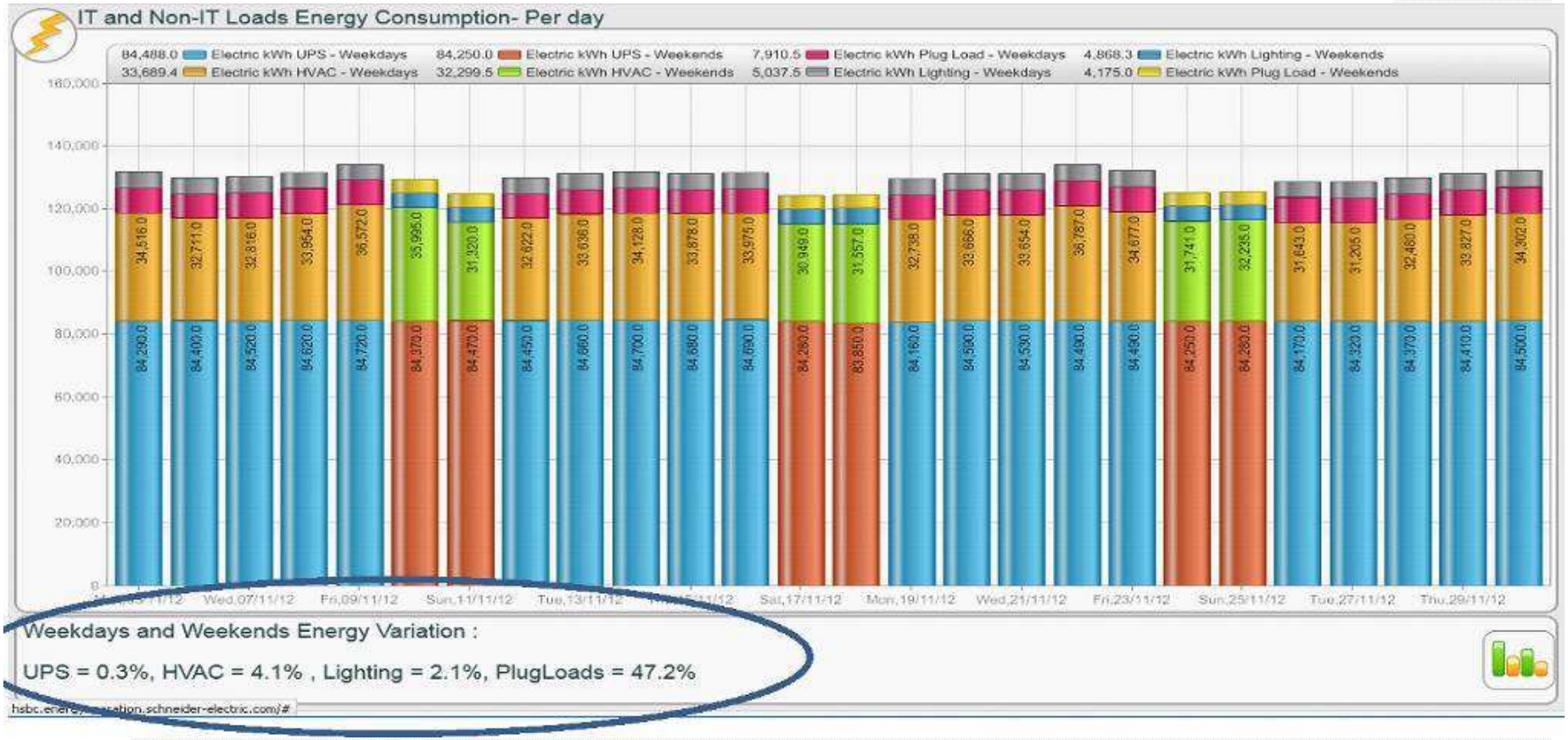
* SXWBO, Vista, Continuum, Satchwell Sigma, Satchwell BAS2800+, I/NET, Trend

System Snapshots

View energy benchmarks, consumption vs. expected

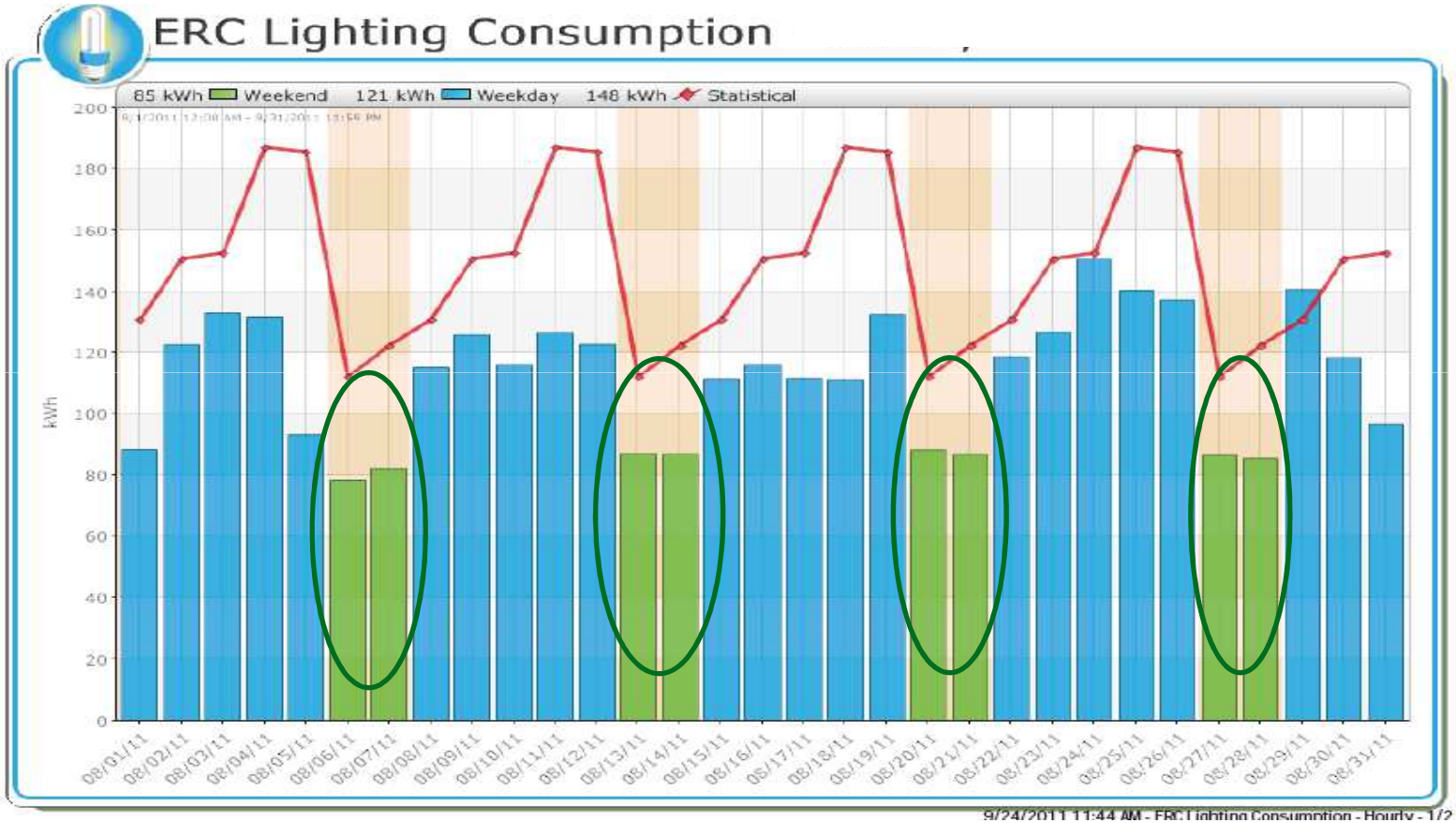
View energy benchmarks according to defined criteria, normalized energy and actual vs. expected

From Invisible to visible



Plug Loads drops 47% vs Lighting drops 2%

Show invisible to visible



Observation: **Continuous Lighting Energy usages on Week Ends should be controlled for substantial Energy Savings**

Asset Management & Building Analytic

View results by building, equipment, type of problem or date

Cost of energy wasted over diagnostic period (1 month)

View details or data, comment on findings

Building	Equipment Class	Equipment	Analysis	Start Date	Notes Summary	Cost ($)	C	E	M
BLDG	Air Handler	AHU01	AHU coil analys...	12/1/2011	Heating and cooling valve issues. Simultaneous heating and cooling.	24194	0	10	6
BLDG	Air Handler	AHU03	AHU coil analys...	12/1/2011	Heating and cooling valve issues. Simultaneous heating and cooling. Supply temp off setpoint.	10919	0	10	6
BLDG	Air Handler	AHU07	AHU coil analys...	12/1/2011	Heating and cooling valve issues. Simultaneous heating and cooling.	3163	0	4	6
BLDG	Air Handler	AHU06	AHU coil analys...	12/1/2011	Heating and cooling valve issues. Simultaneous heating and cooling.	1499	0	2	6
BLDG	Terminal Unit	Rm6169	VAV box analysi...	12/1/2011	Room temp off setpoint. Supply flow off setpoint. Leaky reheat valve.	525	10	10	4
BLDG	Group	AH09_VAVsystem	VAV system stat...	12/1/2011	Low damper position. No static pressure reset. Static pressure off setpoint.	290	0	3	6

Summary of findings

Prioritize by Comfort, Energy, and Maintenance Value

Prioritize repairs and control adjustments based on diagnostic results.

Other considerations

Are we ready?

1. Mindset – Government, Utilities, general public… still too commercial
2. Talents – from overseas, locally trained
3. Technology – integration, simulation software (BIM)
4. Cyber security

Questions ?

Schneider Electric