IEA Smart Energy Systems Roadmap

Scaling up Smart Energy Systems

Paris, 1st of March, 2016

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Demand for higher safety and reliability

4%

of all occupational fatalities per year between 2003 and 2010 were electricity-related

Source: Electrical Safety Foundation International

<$150 bn

impact the US economy each year following losses in productivity or in revenue linked to power outages

Source: Bloomberg New Energy Finance

90%

of all power outages occur along distribution lines

Source: Bloomberg New Energy Finance

Increased renewable generation

US non-hydro renewable generation capacity is expected to grow by

150%

before 2040

Data source: U.S. Energy Information Administration

On 11 July 2015

140%

of Denmark’s electricity was generated by wind power, allowing the country to export the surplus to neighboring countries

Data source: The Guardian

In 2013

143 GW

were added to the world's renewable electricity capacity, compared with 141 GW added by new fossil-fuel plants

Data source: Bloomberg New Energy Finance

Changing customer needs

44%

of utility customers are digitally engaged - they have interacted through digital channels at some time over the past year

Data source: Accenture

Only

36%

of utility customers trust their energy providers to optimize their energy use

Data source: Accenture

57%

of consumers would consider investing in becoming power self-sufficient

Data source: Accenture

Shift from centralized to decentralized system

+1.5 mn

power plants, mainly PV,
Currently in operation in Germany

Source: German Solar Industry Association (BSW-Solar), June 2015

95%

of producers in France are connected to
MV distribution grid

Source: ERDF

Focusing on three priorities can address these challenges

Enhancing efficiency of operations and investments through smart solutions and intelligent devices

Increasing flexibility of power generation, distribution, and consumption by implementing distributed energy resource systems

Matching demand and supply by introducing advanced monitoring solutions and new customer services

Key areas for smart energy systems

Grid modernization

Smarter grids lower operating costs, reduce energy waste, improve quality of service, and enable integrated and flexible networks.

Asset management and operations

Advanced asset analytics deliver precise performance assessments and prioritize repairs/upgrades, resulting in cost savings from right-sized investments.

Cleaner generation

Future-ready power generation requires flexibility for cleaner energy and local systems while stabilizing and monetizing variable distributed resources.

Demand management

Closer cooperation with customers on energy efficiency allows more dynamic supply and demand balancing from beyond the meter.

Smart equipment

Upgrading infrastructure with fully digitized assets opens new opportunities for network management and increases safety and operational efficiency.

Empower smart energy systems for a bright, connected future

through decentralized, decarbonized energy and flexible grids

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Connectivity & efficiency redefined

Weather Intelligence

Geographic Information System

Asset Performance Management

Demand Response

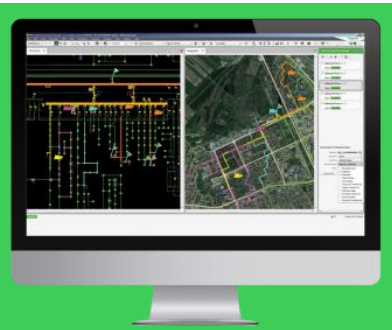
Advanced Metering Infrastructure

Energy analytics

Microgrid Management System

Connectivity : Cloud , Mobility , Security and 24X7 Access

Advanced Distribution Management System



DER management (loads, storage & production assets)

Wiser Home Energy Management

Renewable Portfolio Management

DER Management System

Controllable transformers

Measurement sensors (voltage, temperature, etc.)

Protection & remote communication devices

Digital Switchgear

LV monitoring devices

Home automation devices

Virtual synchronous machine inverters (PV & storage)

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