Internet of Energy

Generating,

Transferring

Storing

Energy Information Financial Transactions

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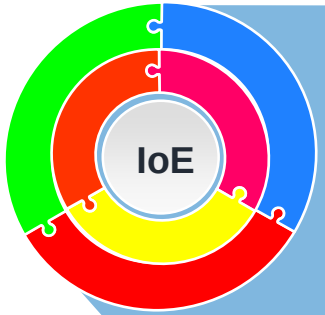
Internet of Energy



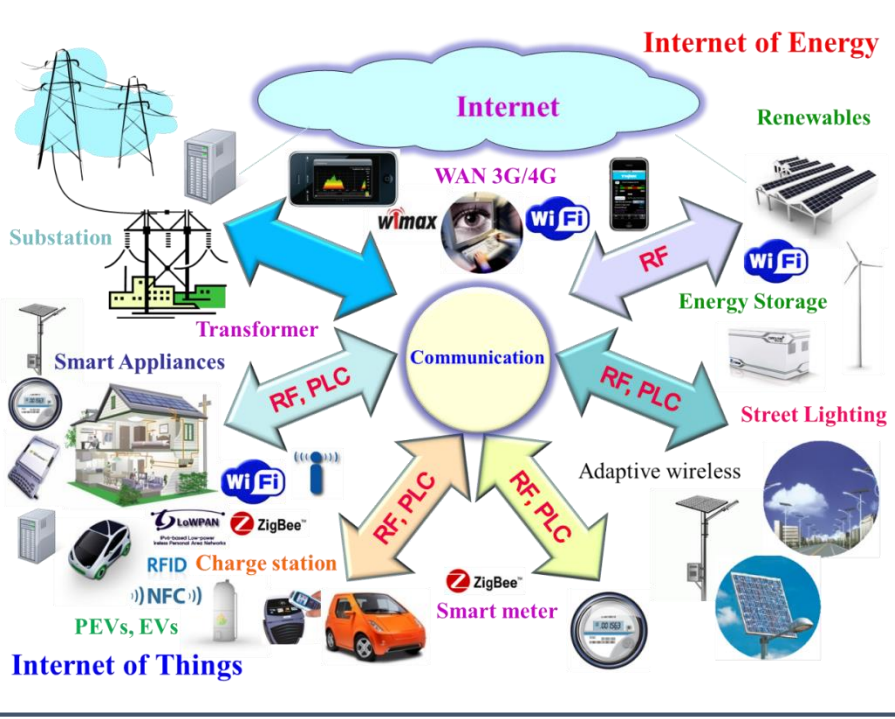
- A dynamic energy network infrastructure including energy cloud storage based on standard and interoperable communication protocols that interconnect the energy network with the Internet allowing units of energy (locally generated, stored, and forwarded) to be dispatched bidirectionally when and where it is needed.

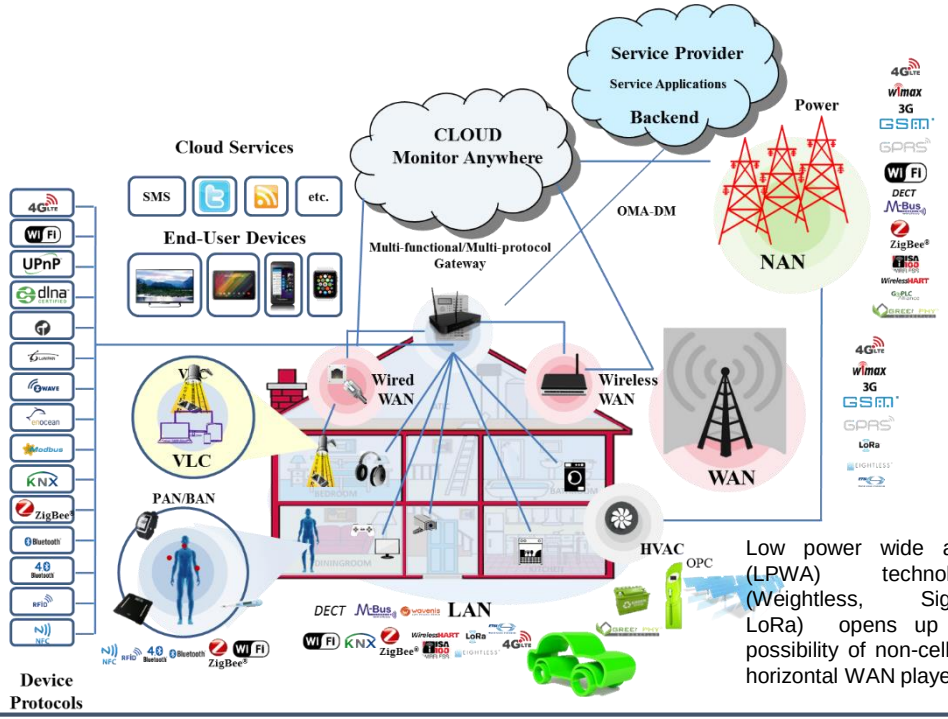
- The related information/data and financial transactions follows the energy flows thus implementing the necessary information exchange together with the energy and financial transfers.

Internet of Energy

- The grid is two-way, networked, distributed, clean, and intelligent. Distributed energy resources (DER), (i.e. solar PV, energy storage, and EVs) are ubiquitous.
- Transactive energy (TE), allows DER owners to trade their self-generated power.
- End-to-end energy services and energy distribution orchestrators
- Utilities rely on IoT, machine learning and analytics-driven automation to manage the grid.

Communication Domains





Low power wide area (LPWA) technology (Weightless, Sigfox, LoRa) opens up the possibility of non-cellular horizontal WAN players

Internet of Energy - IoE

- 10 European countries
- 44 Million € budget
- 38 partners

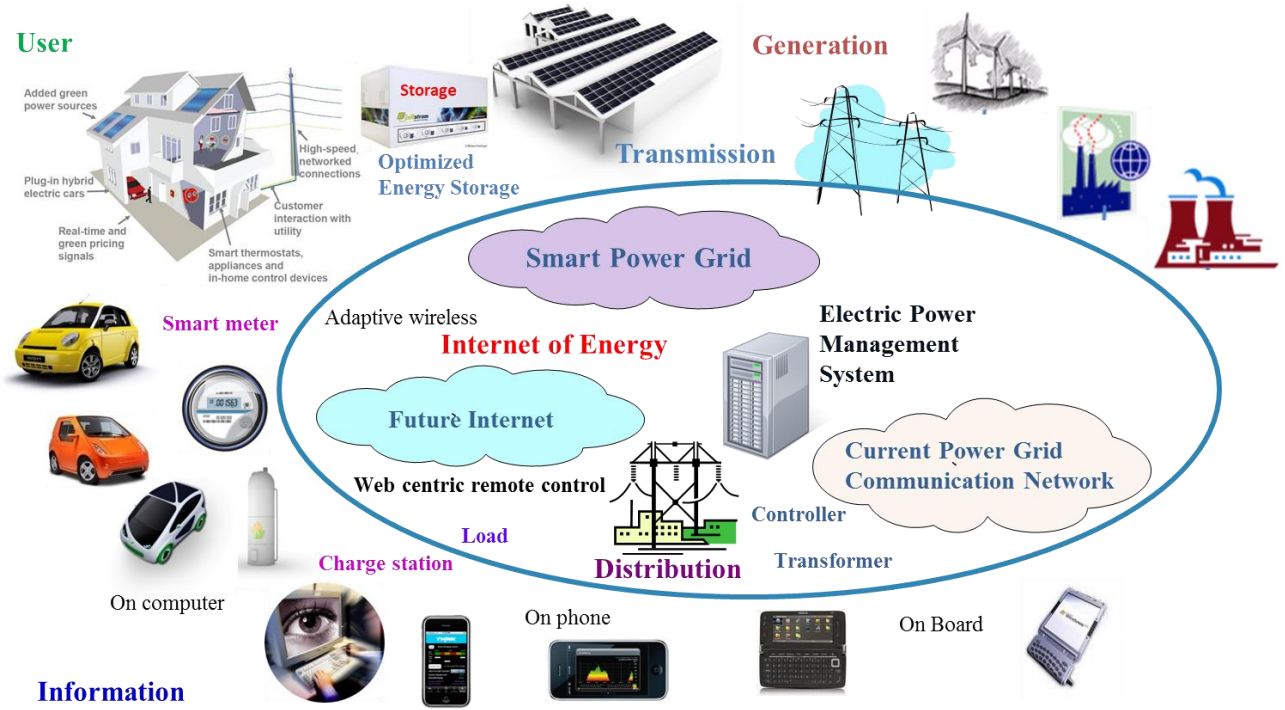
IoE
Internet of Energy

SINTEF	Infineon Germany	SIEMENS	Lantiq Germany	Technische Universität Braunschweig	CENTROSOLAR	
	ZEM	ST Italy	CRF Centro Ricerche Fiat	Enel		Alma Mater Studiorum Università di Bologna
Politecnico di Torino	NXP	Technolution	QinetiQ	Infineon UK	The University Of Sheffield.	
Royal Holloway University of London	GreenPower tech	indra	tecnalia	aicia	acciona Infraestructuras	Infineon Austria
Lantiq Austria	cellstrom	CISC semiconductor	TECHNIKON	ABB		
ON Semiconductor	triphase	VTT	EMTELE	EMPOWER		

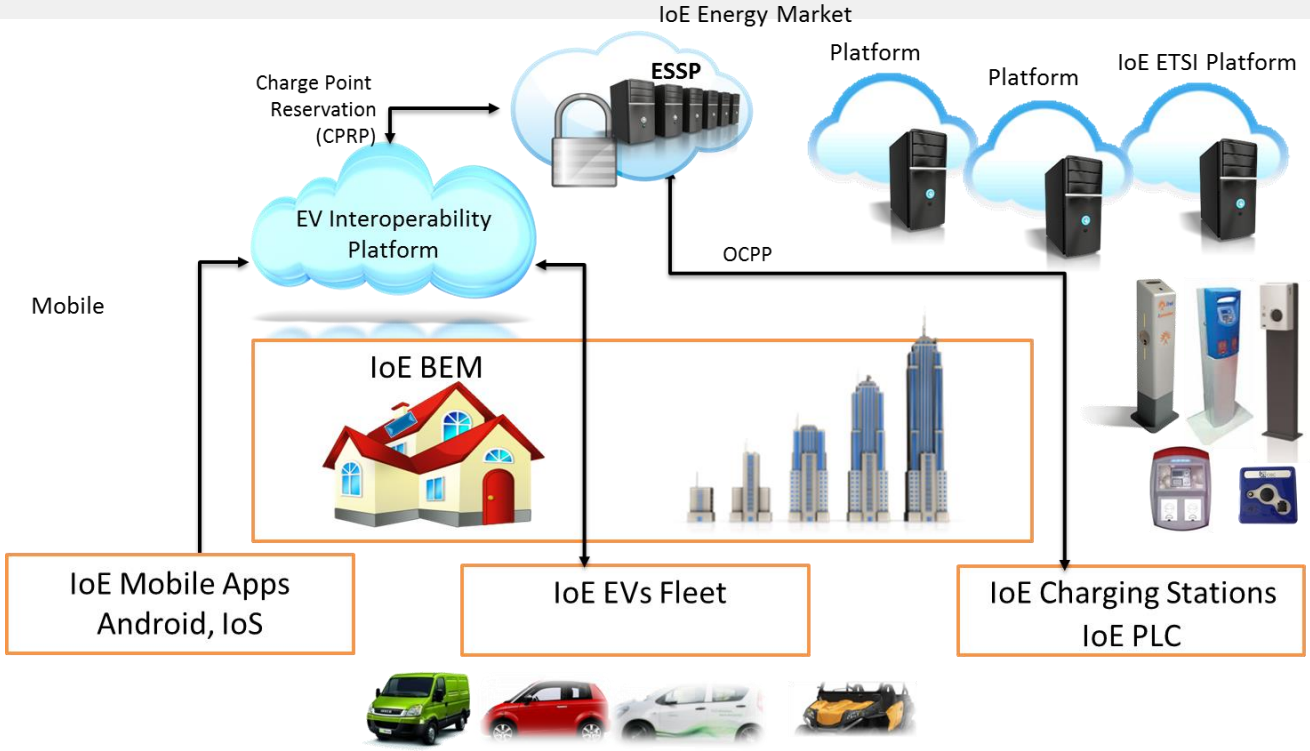
Norway	Germany	Italy	Netherlands	UK	Spain	Austria	Czech Republic	Belgium	Finland

CREATE-IoT

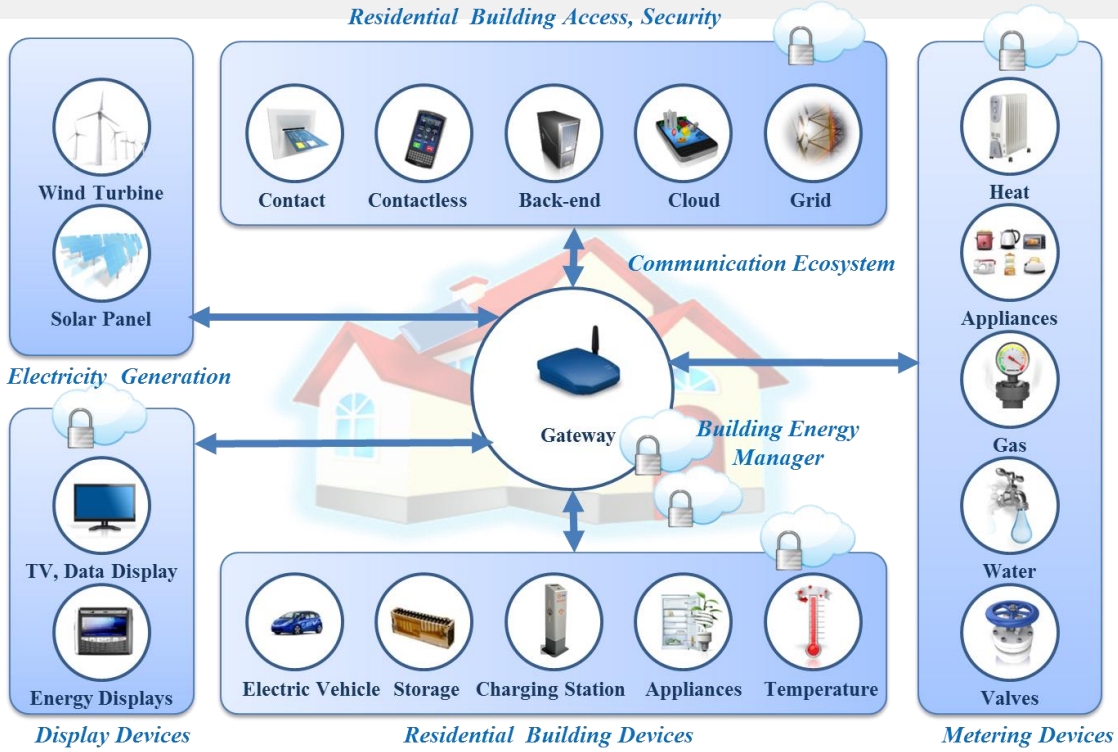
Overview


User
Added green power sources
Plug-in hybrid electric cars
Real-time and green pricing signals
High-speed networked connections
Customer interaction with utility
Smart thermostats, appliances and in-home control devices
Storage
Optimized Energy Storage
Generation
Transmission
Smart Power Grid
Smart meter
Adaptive wireless
Internet of Energy
Electric Power Management System
Future Internet
Current Power Grid Communication Network
Web centric remote control
Controller
Load
Charge station
Distribution
Transformer
On computer
On phone
On Board
Information

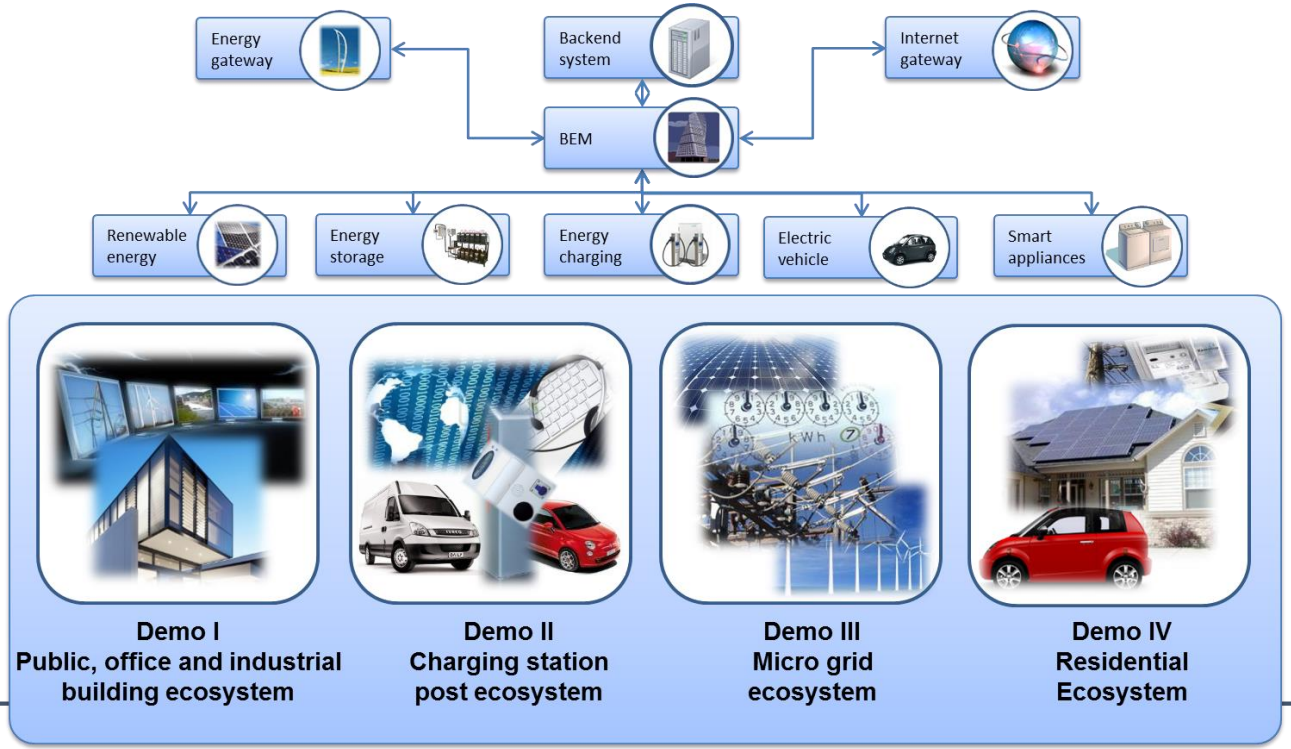
Demonstrators



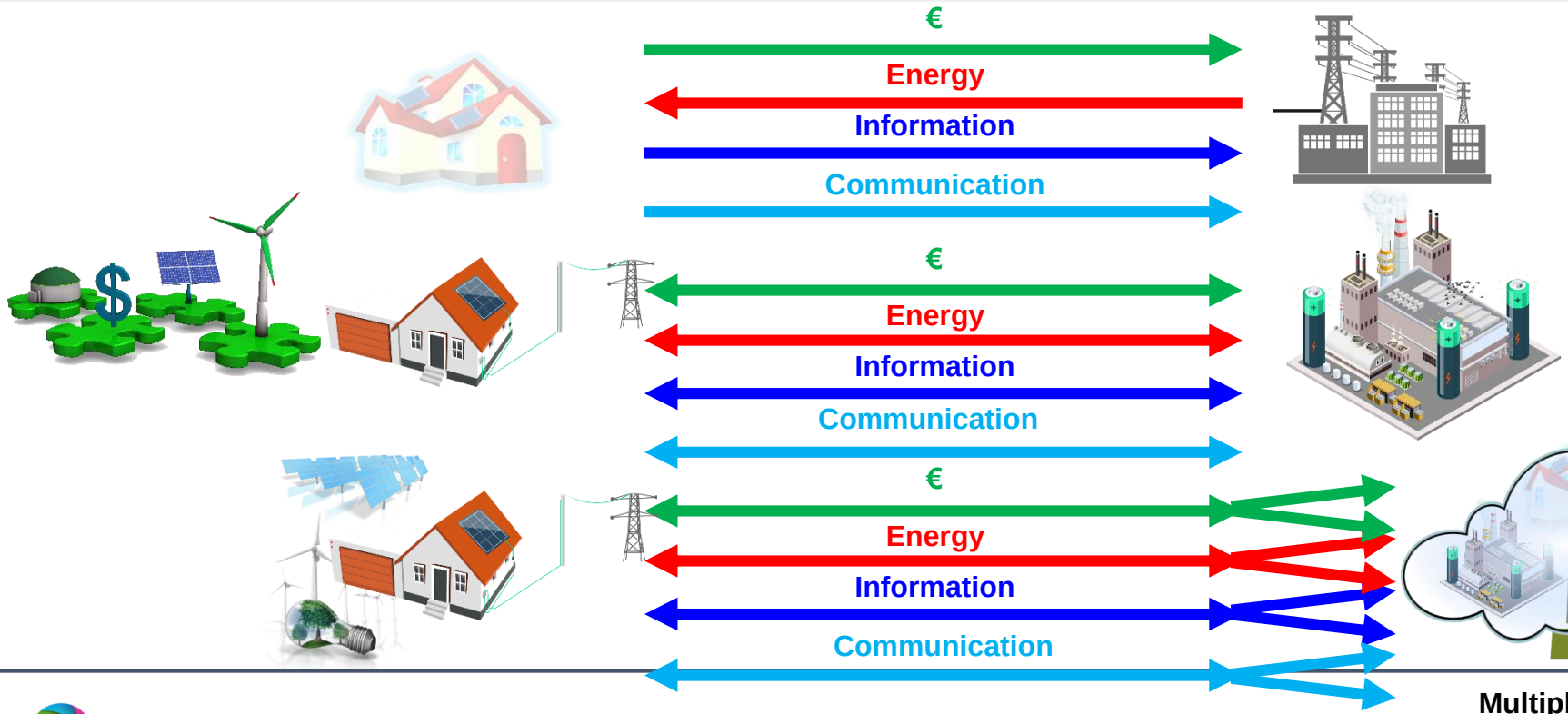
Residential IoT Integration



Integration



Flow of energy, data and money

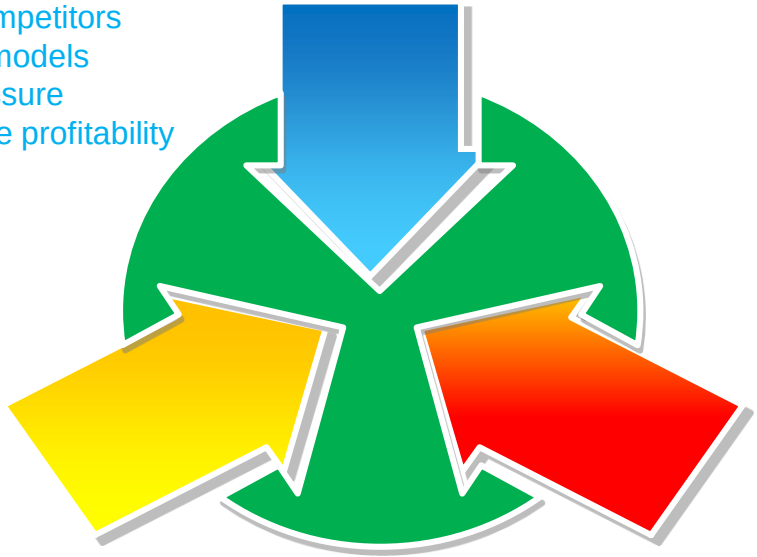


Challanges

Economic, political, regulatory constrains

- Regulatory changes, unbundling
- New actors, competitors
- New business models
- Investors's pressure
- Need to improve profitability

Security
Saftey
Robustness
Resilience
Self healing



New technologies

- Internet of Things
- Smart metering
- Battery
- Analitics
- AI

New energy sources

- Demand side management
- Distributed generation
- Renewable energy
- Storage