

Energy Sector Group Knowledge sharing meeting

Smart grid applications

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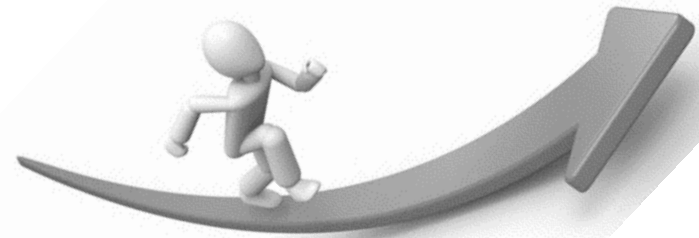


Outline

- My Introduction and experiences
- Overview of smart grid
- Smart grid activities in Japan
- My role and contribution

Self Introduction

- Susumu YONEOKA 米岡 進
 - Energy Specialist (Smart grids)
 - SDSC-ENE / SDCC
 - Expert pool program
 - Apr. 2017 ~
- Major Areas
 - Smart grid
 - Demand side management
 - Renewable energy generation
 - Regional power business



ICT x Energy x Buildings

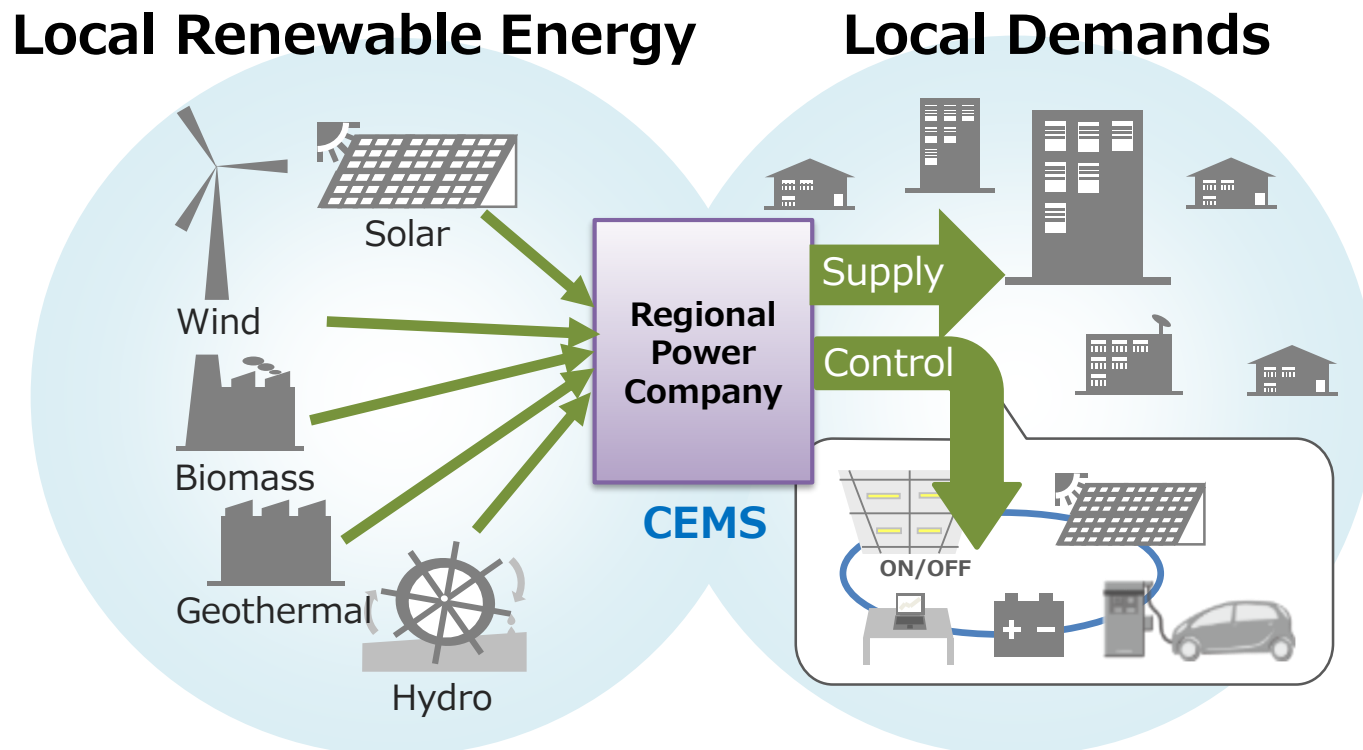
Power + ICT = "Smart Grid"

My past experiences

- Power sales and operation (2007-11)
 - Contribution to market deregulation in Japan
 - Pilot demand-response service
- Electricity use research and consulting (2011-13)
 - Demand response service “Negawatt” with BEMS
 - Demand side energy data analyses and saving action
- Renewable energy wholesale trading biz. Launch (2014-15)
 - Solar PV output forecasting with EMS
 - Feed in tariff, grid code, wheeling service by EPCOs
- Regional power business launch (2015-16)
 - First case of prefectural level of power retailing co.
 - CEMS development
 - International case study

My recent project

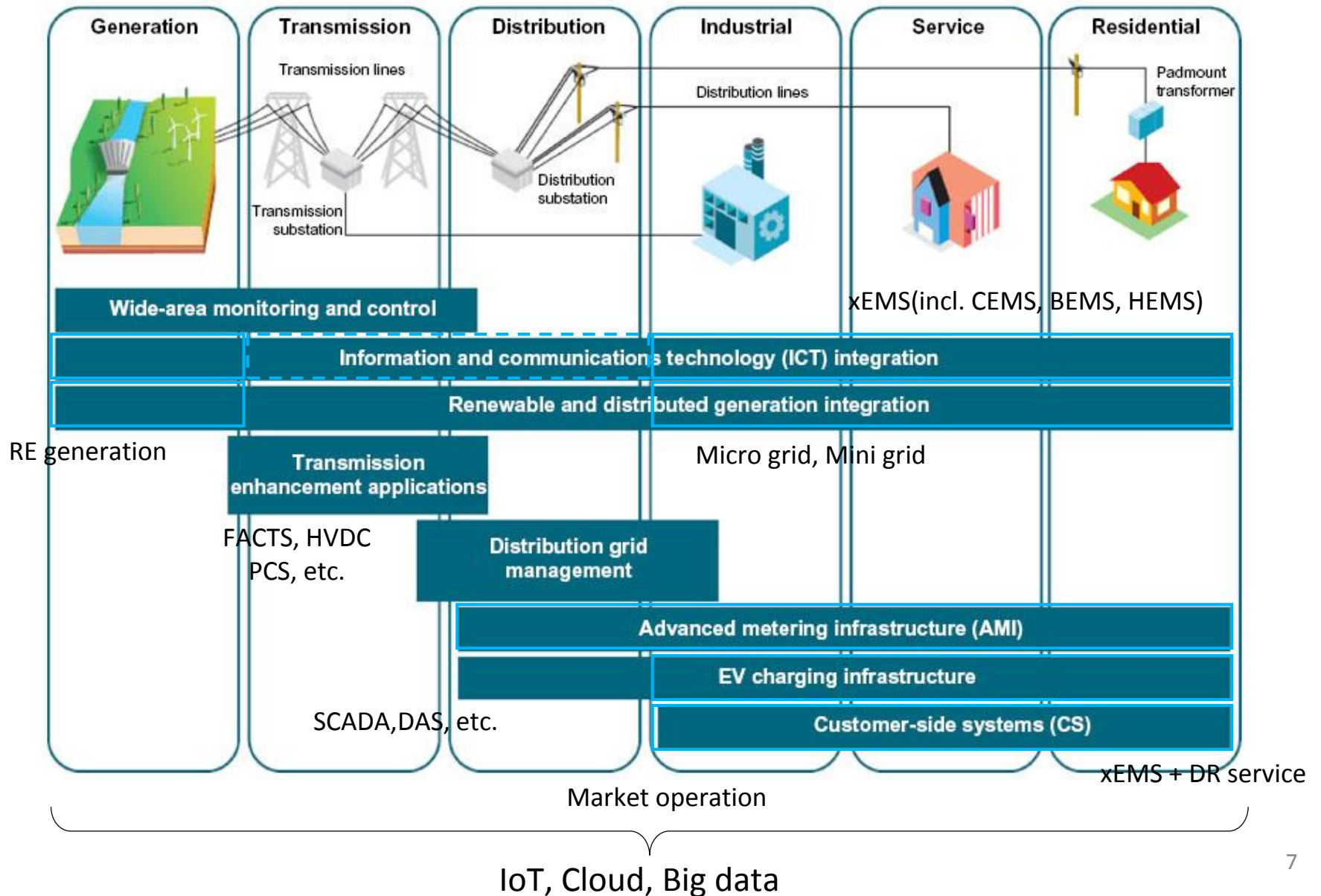
- Regional power business (applied smart grid apps.)
 - Utilize and enhance local renewable energy
 - Accelerate local monetary flow
 - Affordable power supply



Purpose of smart grid

- Reliability and resilience of supply
- Energy security and independence
- Control over rising electricity costs
- Support for demand growth
- Environmental sustainability
- Evolving distributed generation technologies

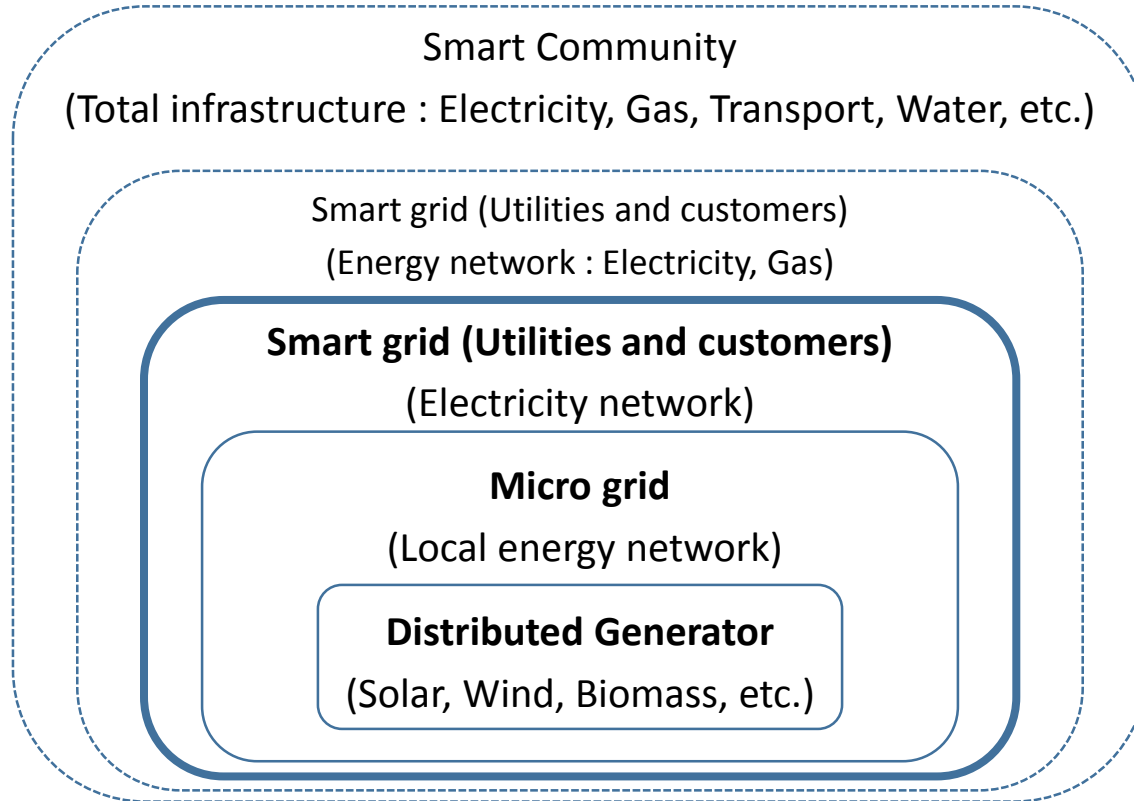
Smart grid applications field



Smart grid apps. in DMCs

- Grid integration of RE
 - Smart meter, Output forecast, Combination with Storage
- Energy access
 - Micro-grid, Off-grid, especially in rural area
- Energy efficiency
 - xEMS, DSM, Demand response
- Grid stability
 - ICT system (incl. CEMS), Monitoring and control

Smart grid activities in Japan



<Private sector>

- Hardware vendor
- Software vendor
- Service provider
- System integrator
- Constructor

DR market

Feed in tariff

Full retail liberalization

Subsidy PJ


Grid code

Standardization

Market reform in Japan

- Step-by-step deregulation
 - From regional-monopoly to Unbundling (Gen, T/D, Retail)
- Feed in tariff (2012-)
- Full liberalization of retailing (2016-)

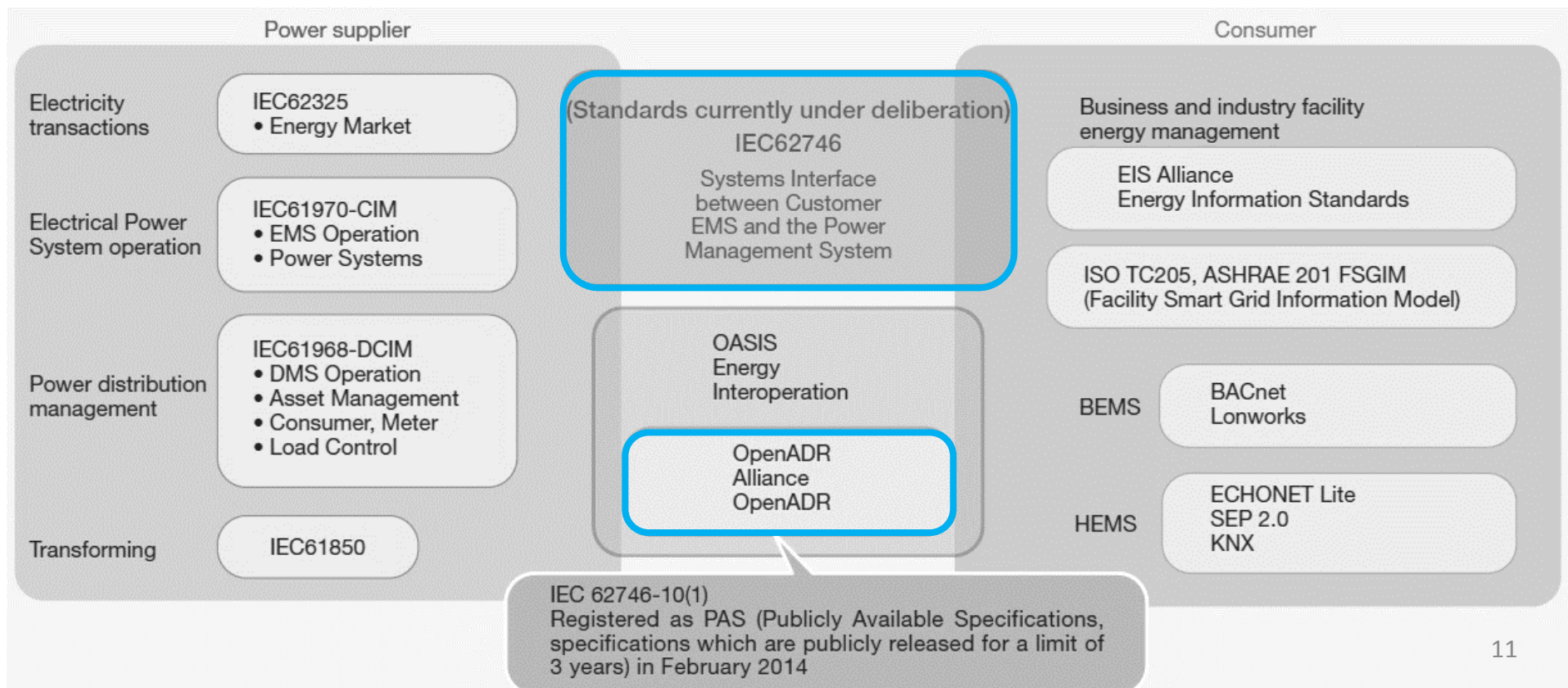
Categories (-2015)		New categories (2016-)		
GEU (General Electricity Unit, 10EPCOs)	→	Generation	Transmission/ Distribution	Retail
PPS (Power Producer and Supplier)	→	Generation	(None)	Retail
Wholesale Electricity Utilities, etc.	→	Generation	(None)	(None)



Implementation of smart grid apps. and services

Smart grid Information model Standards

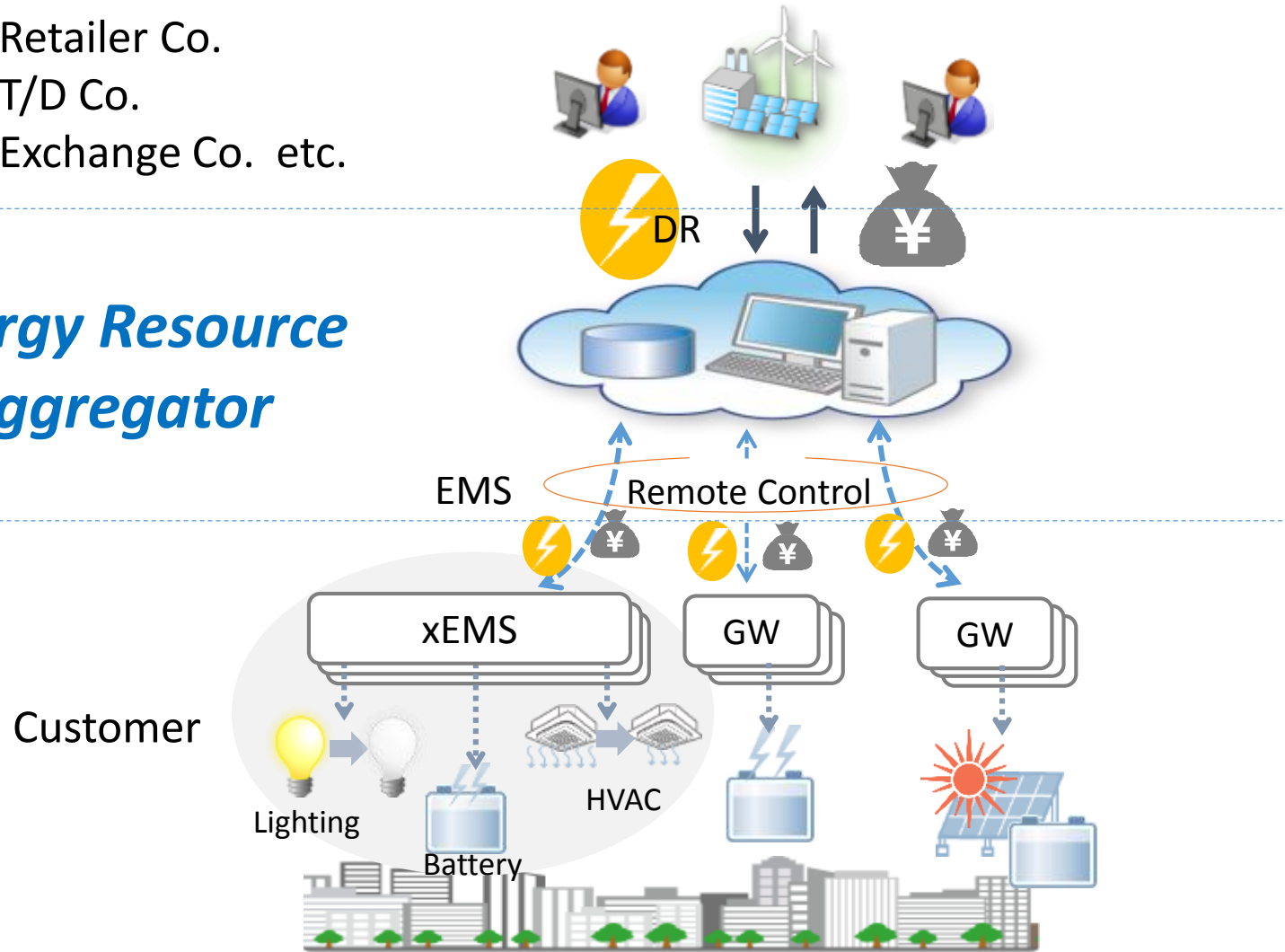
- Various ICT standardization have been prepared
- IEC62746 is under deliberation for Smart grid



New business model in Japan

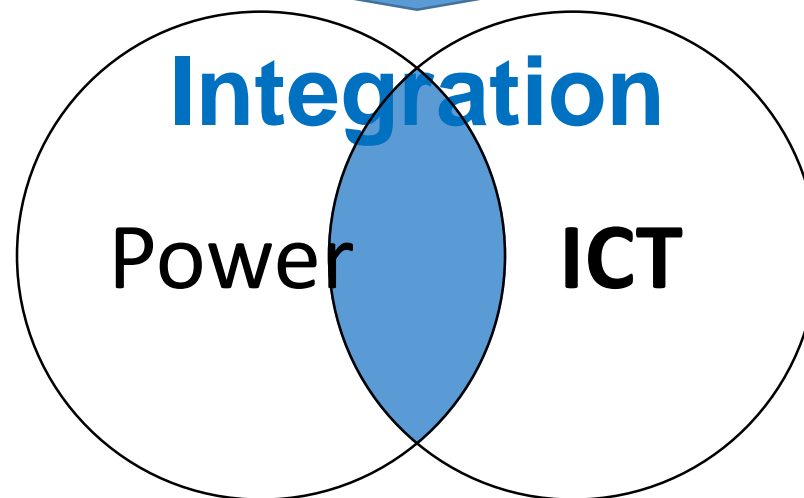
Retailer Co.
T/D Co.
Exchange Co. etc.

Energy Resource Aggregator



Foresight of Electricity service in Japan

Appropriate role-sharing between
supply-side and demand-side



New ideas / New business / Innovation

~~Price competition~~ → Service competition

My role at ADB

- Optimization of smart grid apps.
 - Renewable energy generation mix
 - : Regional features, contexts
 - Development of energy/grid management system
 - : Easy operating, secure ICT, respond to variable Demand-Supply balance
 - Implementation of demand side services
 - : Auto/Manual DR, EMS and metering, respond to variable RE



- Business model planning in DMCs

My role at ADB

- Knowledge management, Projects proceeding
 - Regular knowledge sharing
 - Publishing working paper
 - Energy projects proceeding support



- Strengthening ADB's knowledge and field experience

My Contribution to ADB

- To make a sustainable mechanism of power supply
 - With interoperable ICT technologies
 - With environmental-friendly renewable energy



- Poverty reduction
- Climate change mitigation



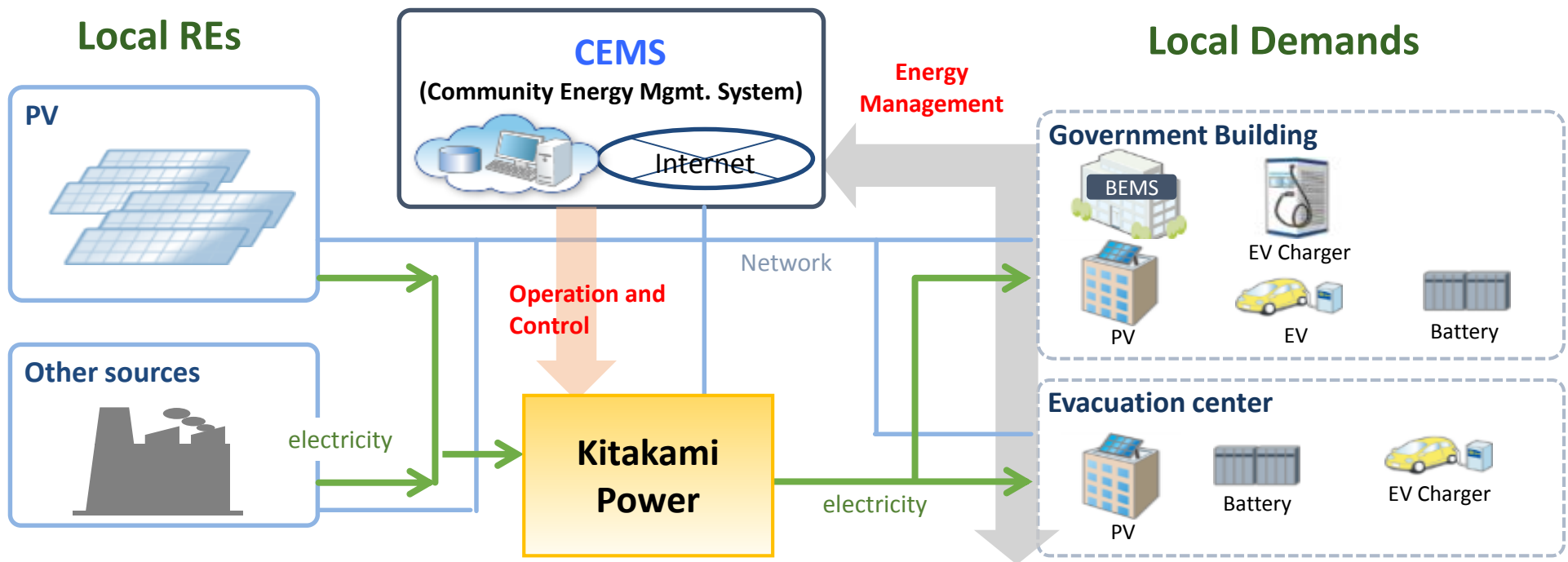
Economic growth in the Asia and Pacific region

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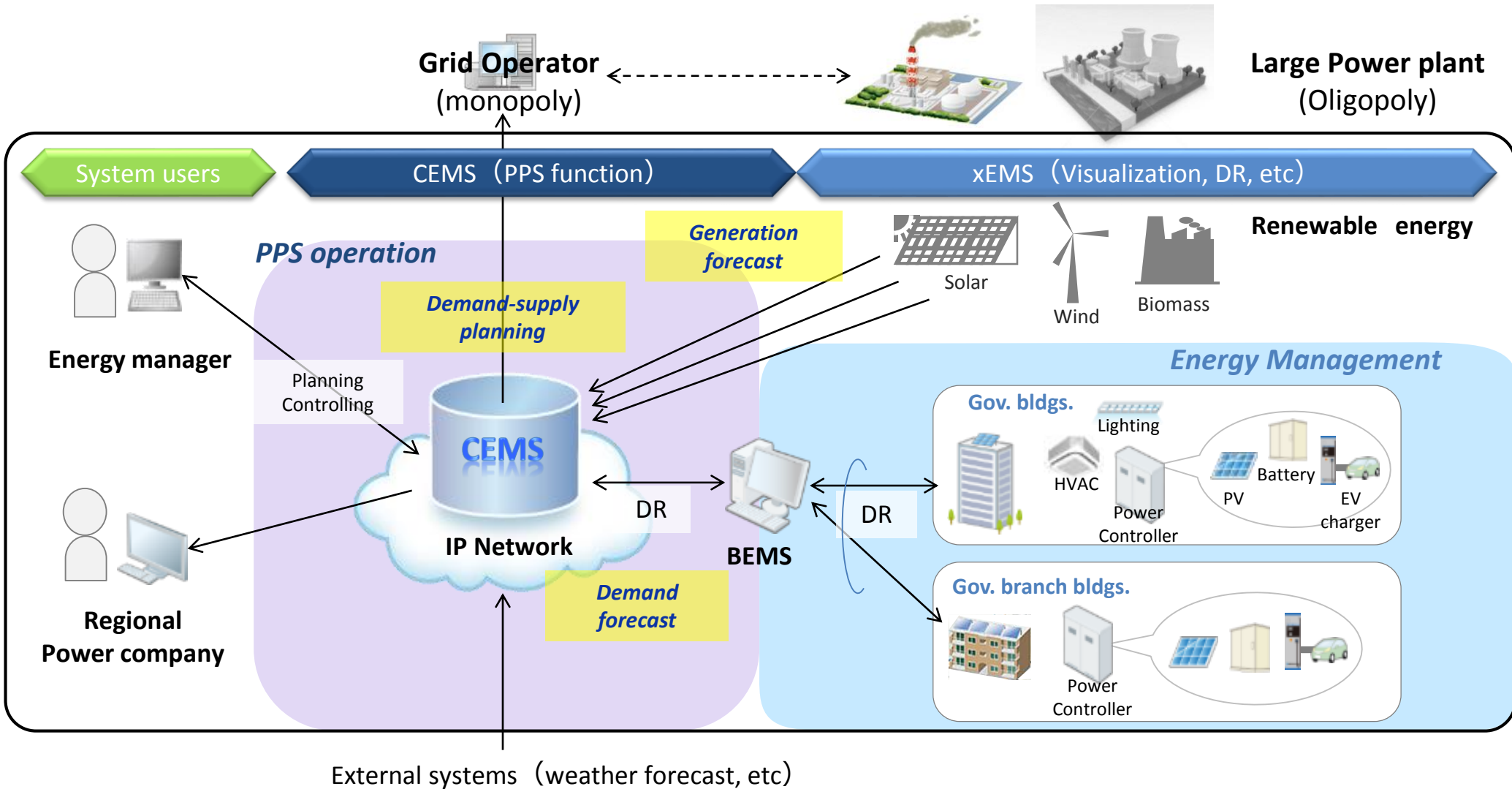
Appendix.

Smart City Kitakami project

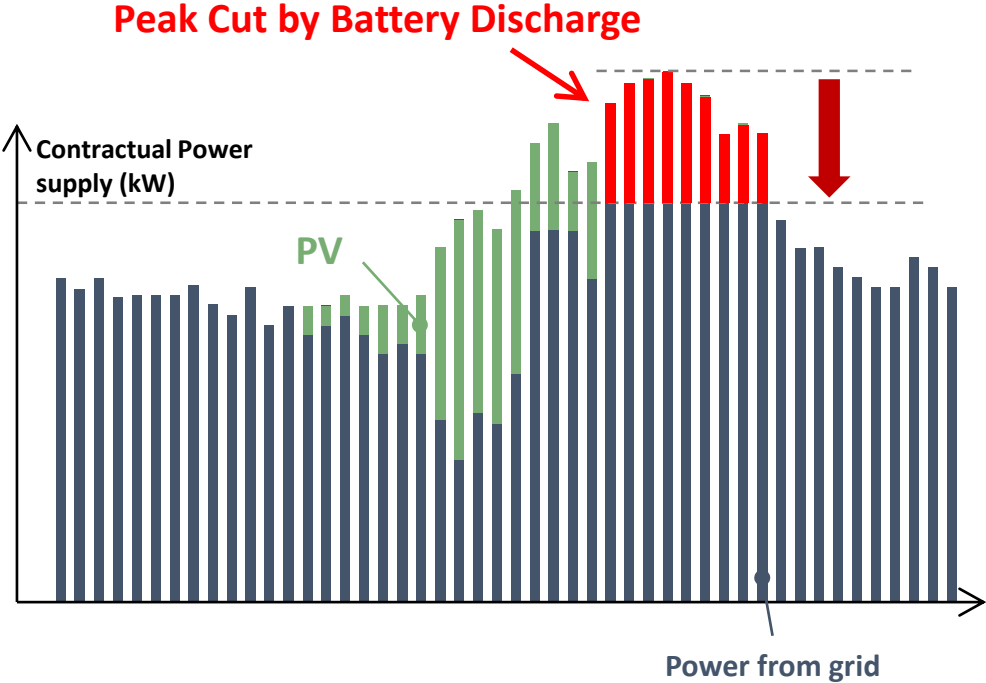
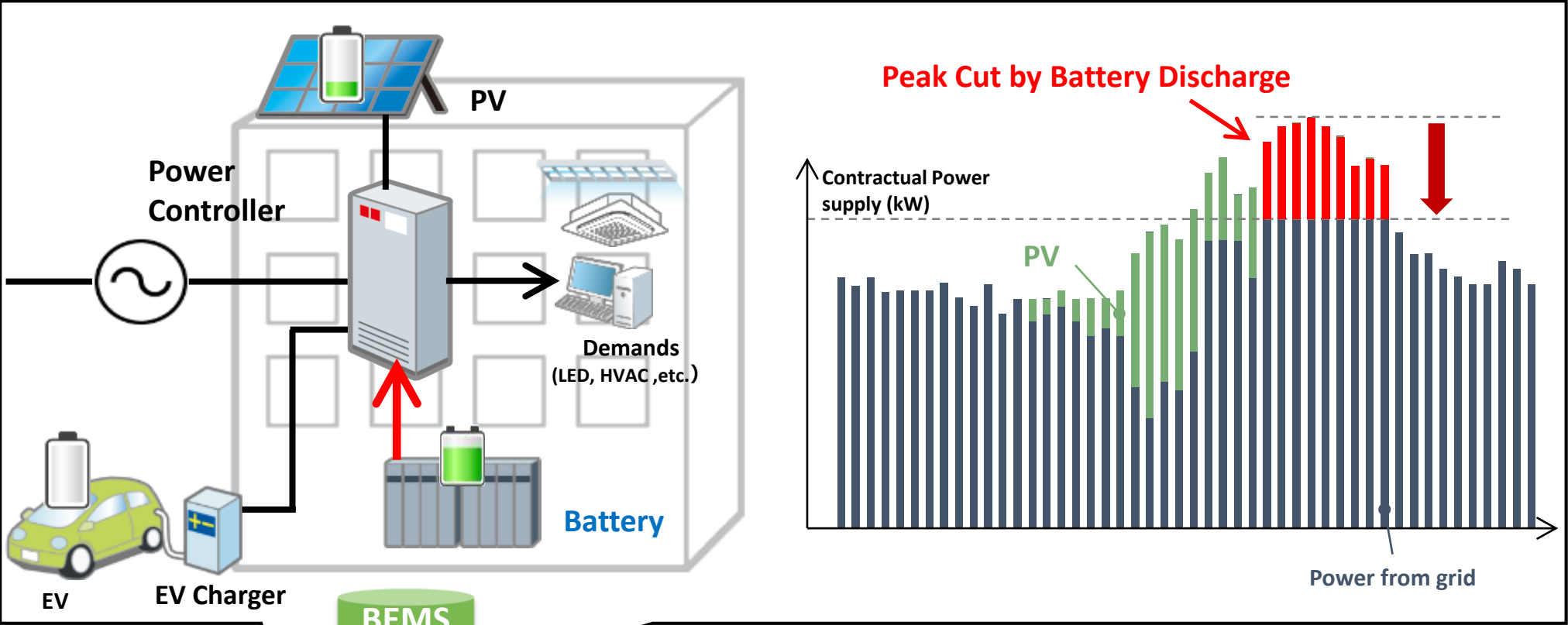
- Local energy production and consumption
- Visualized and controlled power demands



Community Energy Mgmt. System



Cost efficient energy management

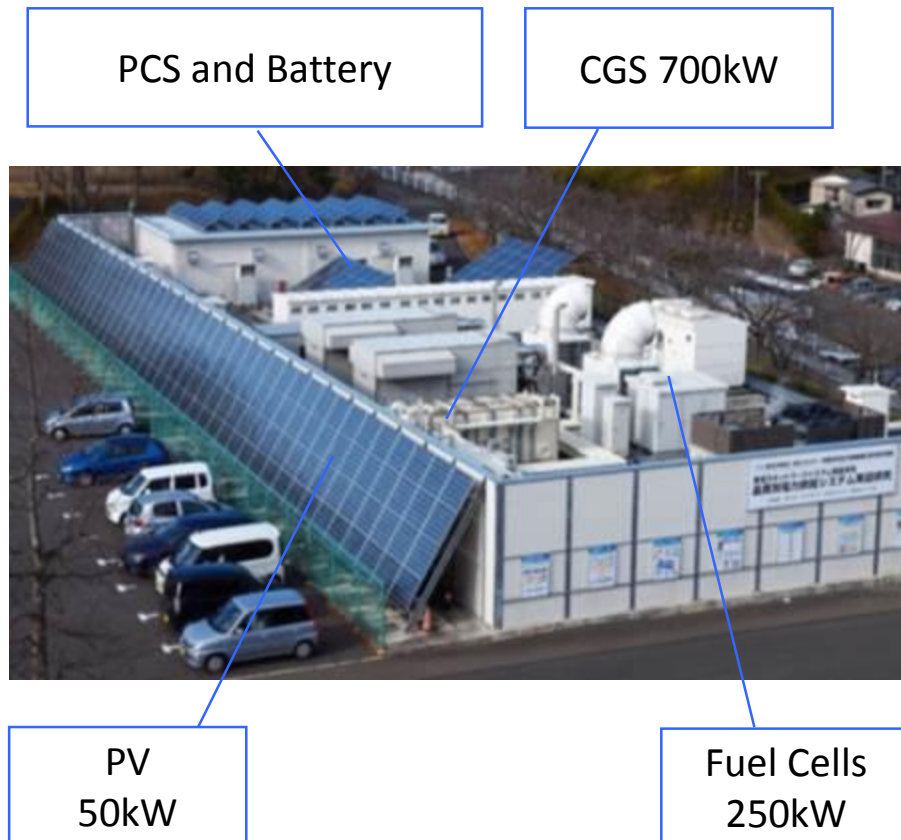


Monitor the real-time power demand, and control the power appliances and battery

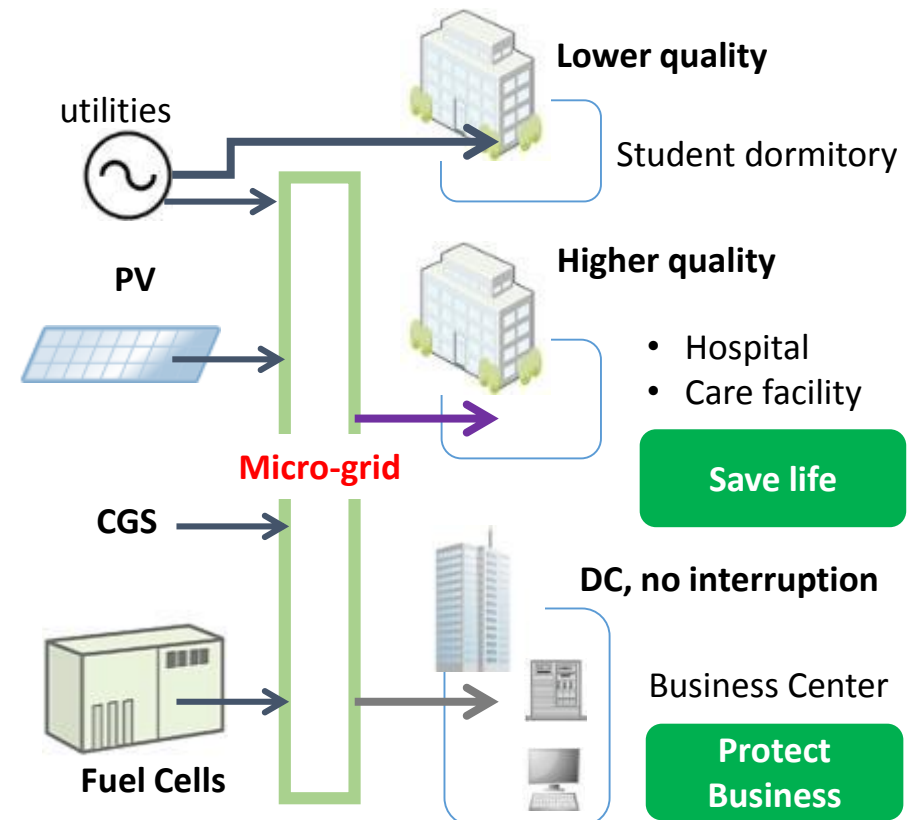
Sendai Micro-grid project

Supported by 

- Continuous operation in time of Great East Japan Earthquake in 2011



Choose levels of power quality based on customers' needs



Condition during 11 Mar. 2011

System	Mar 11	Mar 12	Mar 13	Mar 14
Utility Grid	Grid Connection	14:47 Voltage Collapse → Grid Outage	Outage	Grid Recover Grid Connection
Gas Engine	Grid Connection	Disconnect	Around 12:00 Islanding operation	Grid Connection
DC supply	Grid Connection	Supply from Battery	Supply from Gas Engine	Grid Connection
A Quality	Grid Connection	Battery	02:05 Stopped Manually Outage	Supply from Gas Engine Grid Connection
B1 Quality	Grid Connection	Battery	Outage	Supply from Gas Engine Grid Connection
B3 Quality	Grid Connection	Outage	Around 14:00 Dispatch Start (because of customer's wish)	Supply from Gas Engine Grid Connection
C Quality	Grid Connection	Outage	Supply from Gas Engine	Grid Connection

Layout of Sendai micro-grid

