

Smart Energy Business Briefing

July 10, 2012

NEC Corporation

Takemitsu Kunio (Senior Vice President)

An information society friendly to humans and the earth

Friendly to humans

- An information society that realizes a safe, secure, convenient and rich life with services anyone can use.



Friendly to the earth

- An information society that enables co-existence with the global environment and sustainable growth by efficient use of limited resources.

NEC aims at the achievement of two information societies through innovation.

1. Business Overview

2. Ongoing Initiatives, Business Policies

2-1. Electrodes/Energy Storage Systems

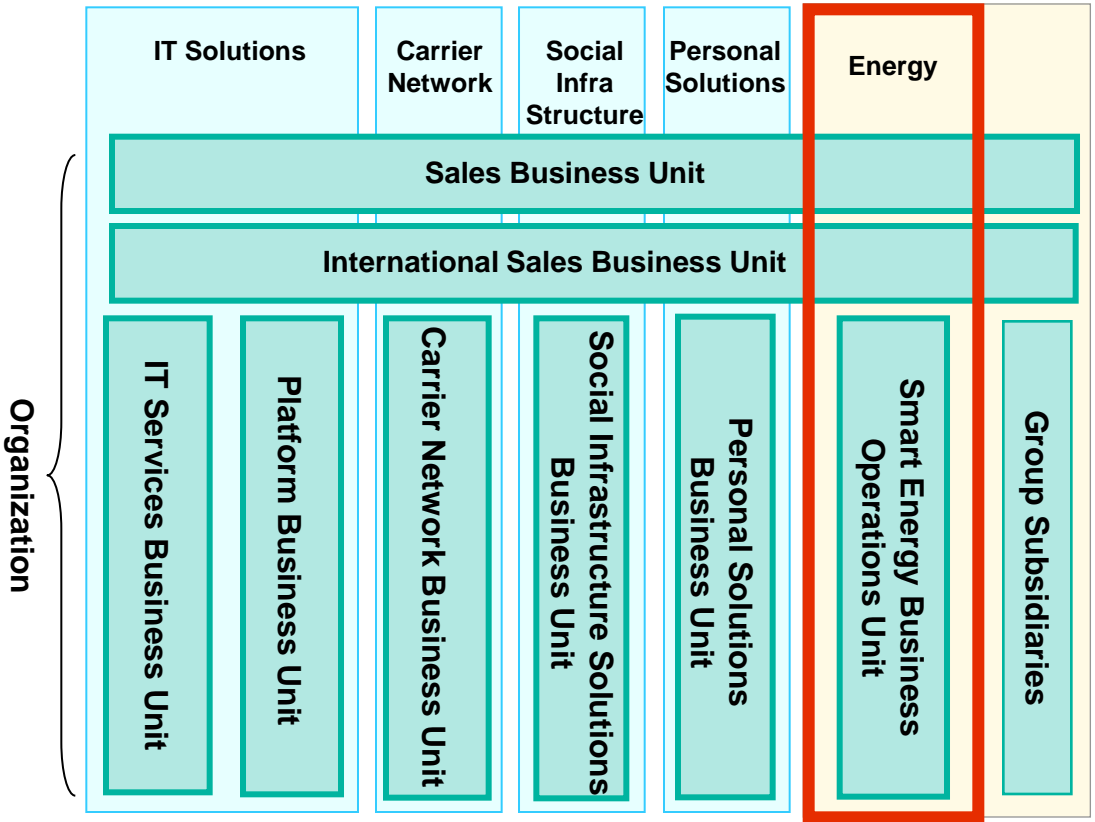
2-2. Energy Management Systems (EMS)

2-3. EV/PHV Charging Infrastructure

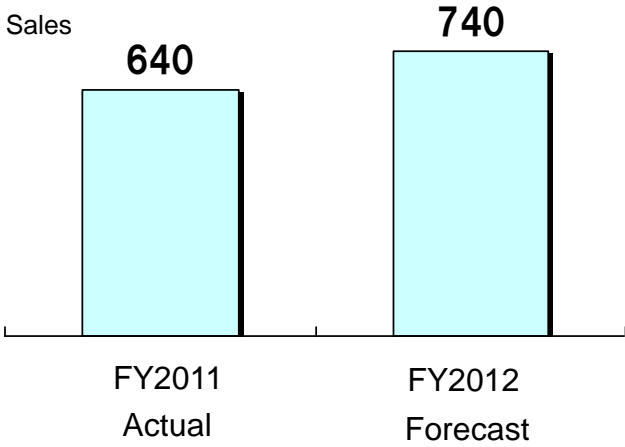
2-4. Solutions for Utilities (electricity/gas/oil)

3. Medium- to Long-term Growth Strategy

Business Organization



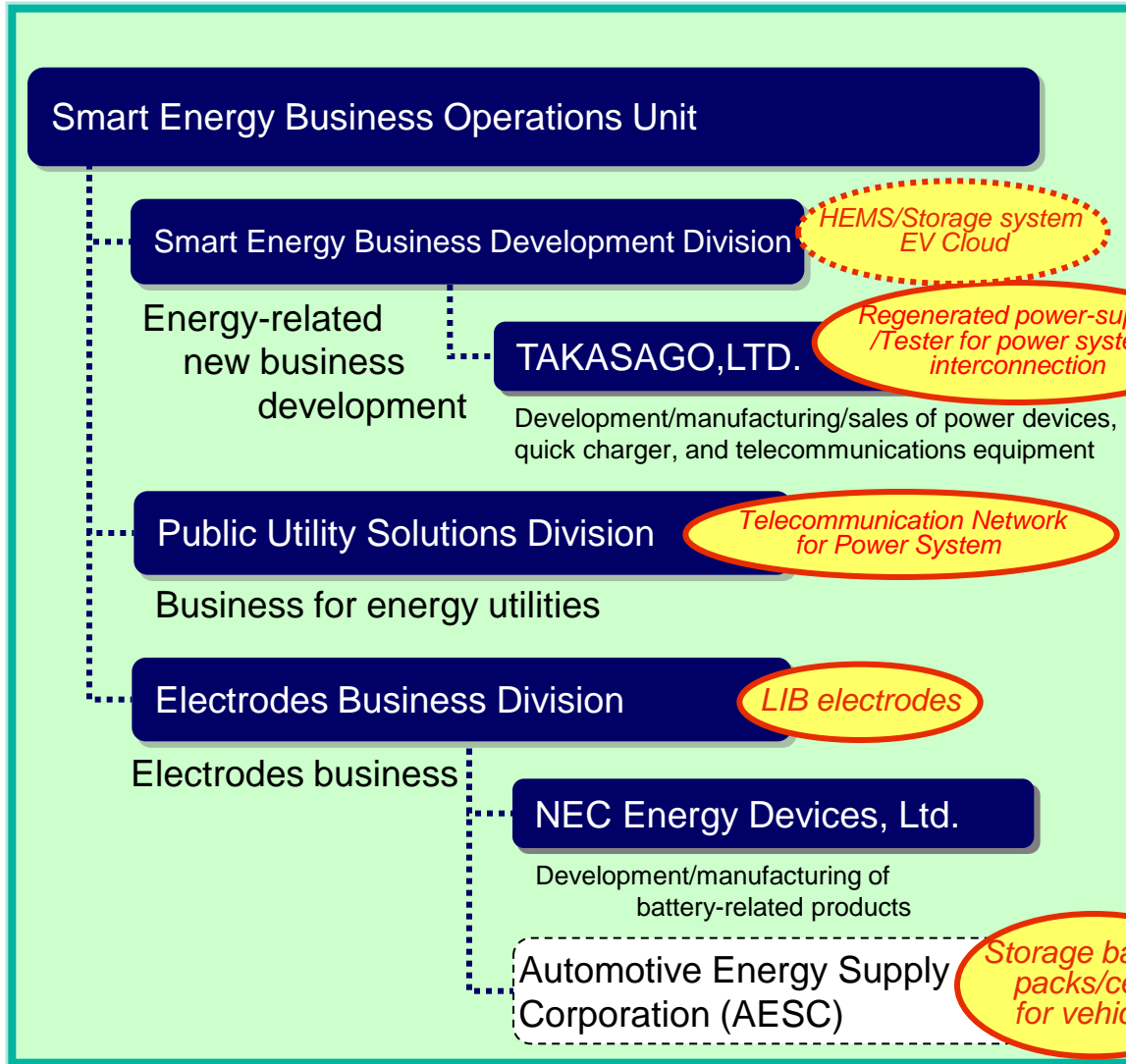
Sales/Operating income
(100 million yen)



* Forecast as of July 10, 2012

Structure of the Smart Energy Business Headquarters


(Established April 1, 2012)



Secure competitive edge by accumulating energy business-related assets

Improve business momentum and speed by integrating related departments

Reinforce ability to plan/develop the energy product and solutions business as OneNEC

 : Top-level product in the industry

Global Energy-Related Issues

Industrialized nations

- High unemployment rate, deflation, low birth rate/aging societies
- CO₂ reduction, energy security
- ↓
- Growth in **renewable energy**
- Safe, peaceful, highly efficient society
- Export and industrialize **environment-related fields**

Developing nations

- Surge in population/income
- Environmental problems due to population concentration in urban areas
- ↓
- Secure **energy**/food/water
- Set up transportation/distribution systems
- Acquire technology in **environment-related fields**

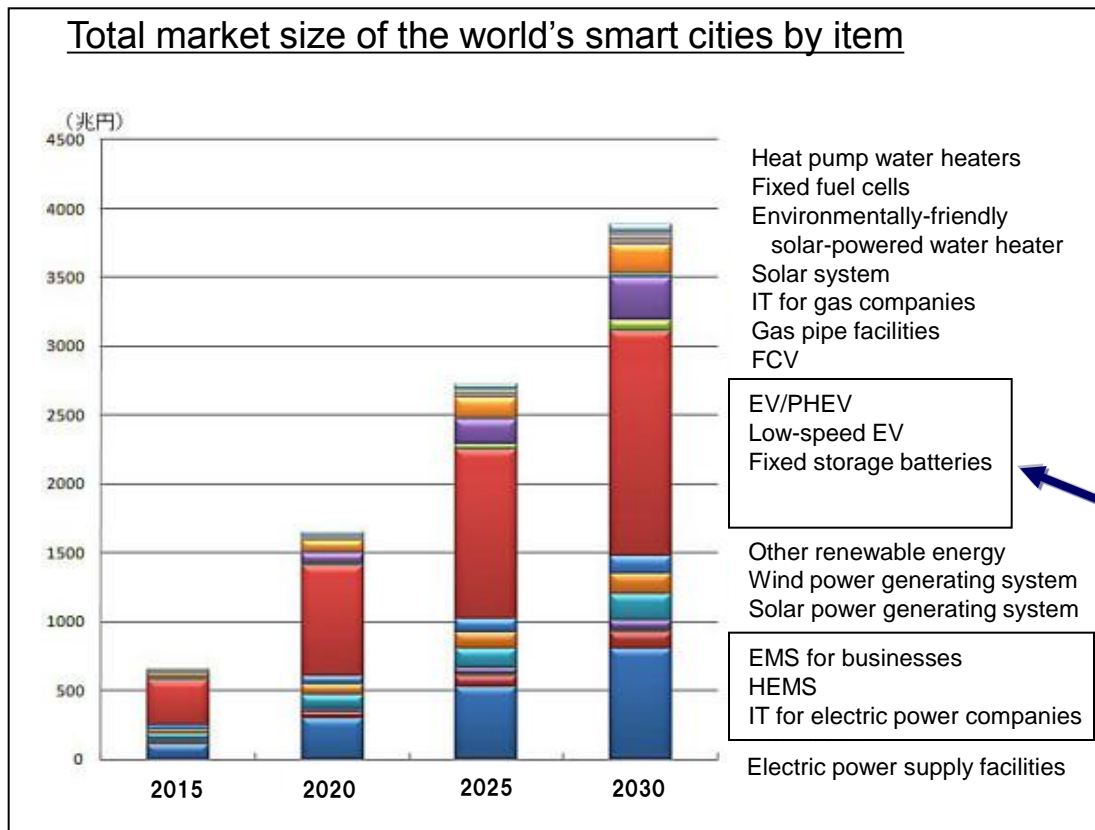
Energy-related problems at the forefront of social/economic issues

- **In the US:** Focus on the Green New Deal/Smart Grid Policy with reviewing shale gas revolution
- **In Europe:** Policy initiatives toward adopting a system of using over 20% renewable energy
- **Developing nations:** Striking balance between setting up electricity infrastructure/dealing with environment
- **In Japan:** METI unveils green growth strategy, Promote spread of storage batteries /renewable energy, support strengthening of international competitiveness

【Reference】 Smart Energy Market Potential

Global market size in 2015 at tens of trillions of yen

(Reference) METI unveils fiscal support initiative (green growth strategy) that aims for Japanese manufacturers to post 10 trillion yen in smart energy-related sales in 2020



The global smart energy market will be worth tens of trillions of yen in 2015



Target market -- centering on storage batteries, EMS -- assumed at around 10% of overall market (several trillion yen)

Source: The world's smart city guide 2012, by Nikkei BP Clean Tech Institute

Paradigm Shift: Comparison between Telecommunications and Energy

Internet

A world in which telecommunications firms alone support distribution of information

【Exterior environment】

Trade friction

【System revision】

Unbundling of Telephone Network

【Technological reform】

BB & Mobile
Virtualization
Cloud Technology

Paradigm shift

【New entry】

NCC VNO IT vendor

A world in which the end user also participates in information distribution

Smart Grid

A world in which only electric power companies support electric supply

【Exterior environment】

Nuclear energy suspension
Self-supply rate 4%

【Technological reform】

Energy creation & stored electricity
DR, electric power lending/borrowing

Paradigm shift

【System revision】

Purchase electric power companies
Revise Power Generation Business Law

【New entry】

Aggregator PPS

A world in which the demand side also participates in electric supply

Social Network
Web2.0

Progress in self-sufficiency/
decentralization/
diversification

Energy2.0

NCC: New Common Carrier, VNO: Virtual Network Operator, DR: Demand Response, PPS: Power Producer & Supplier

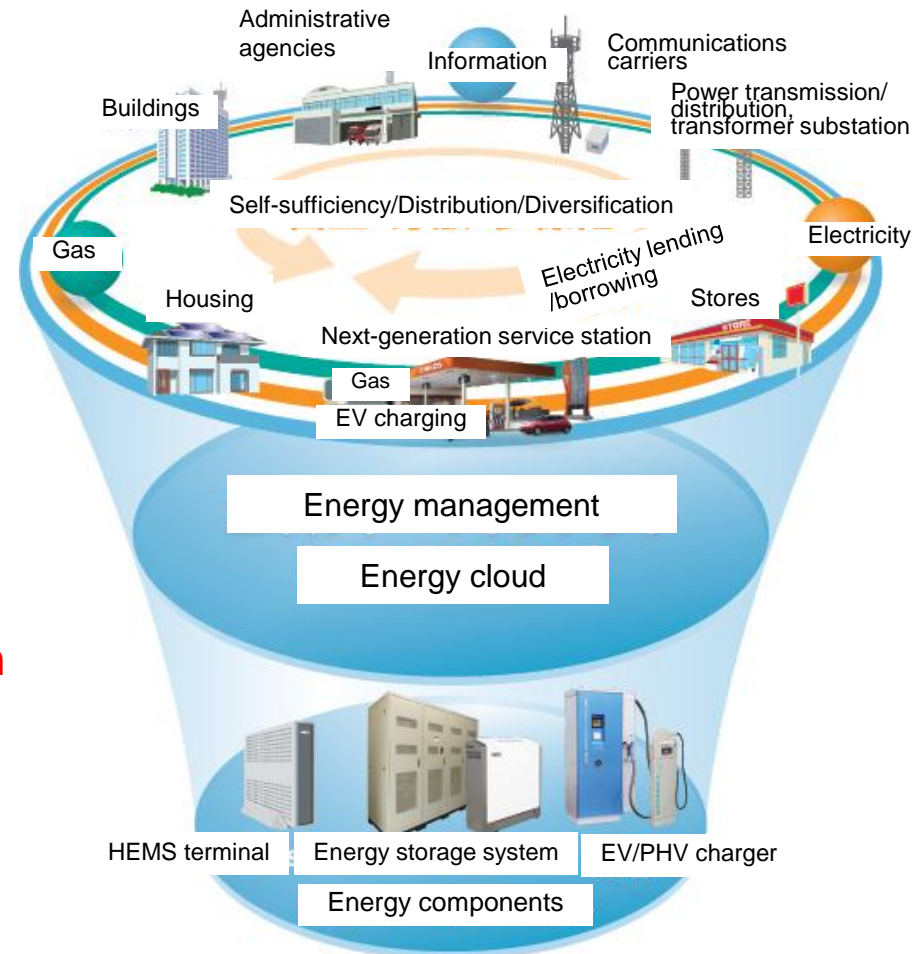
Smart Energy Business

Purpose of business

- On the energy front, become a “global leading company that realizes a people- and earth-friendly information society through innovation” as targeted in NEC Group Vision 2017

Initiatives and main businesses

- Contribute to efficient energy use, cut in greenhouse gas by **offering solutions that support self-sufficiency/distribution/diversification** of energy use
1. Electrodes/storage system
 2. Energy management system
 3. EV/PHV battery charging infrastructure
 4. Solutions for utility companies

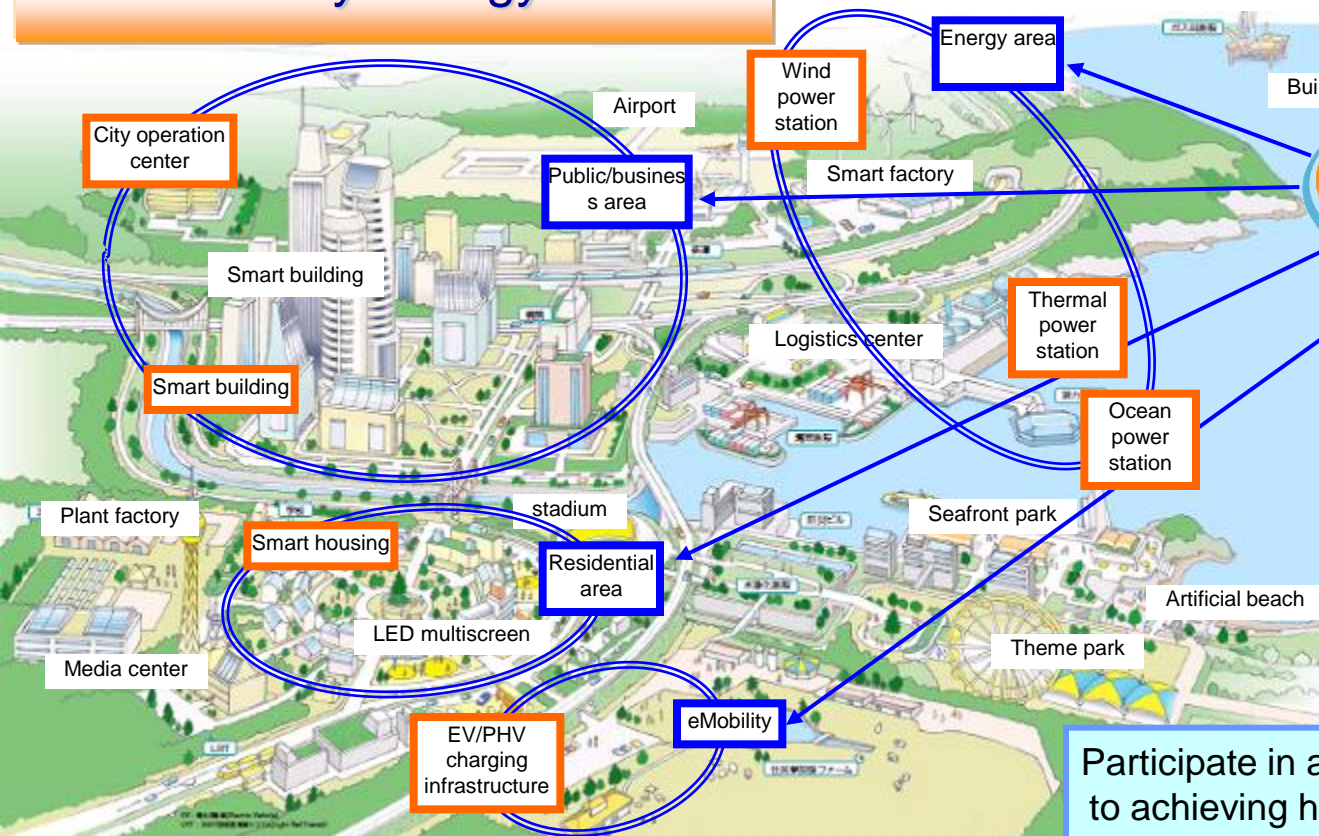


NEC's Smart Energy Business

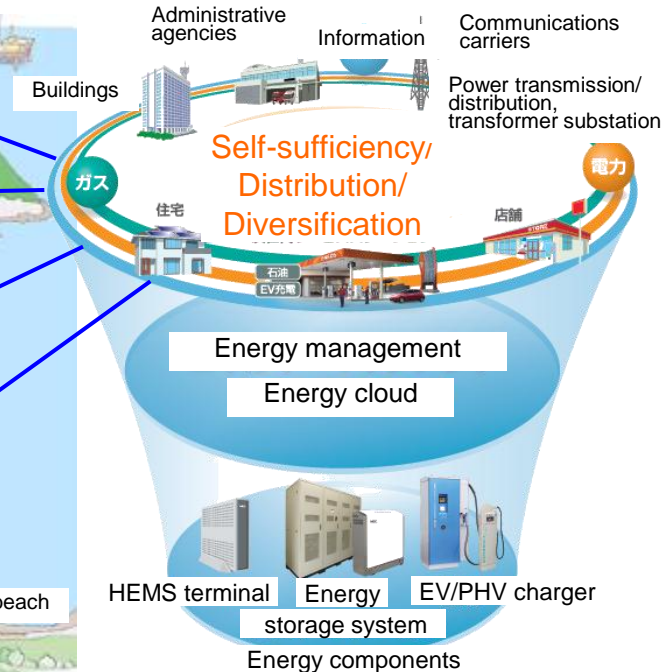
The Next-Generation Energy Society as Envisioned by the Smart Energy Business

- Aims at an eco-friendly, stress-free society as problems from electricity concentration due to urbanization are resolved
- Promote large-scale adoption of renewable energy through spread of smart technology for electricity storage
- Contribute to resolving concerns about energy supply, greenhouse gas reduction

Smart City Energy Base



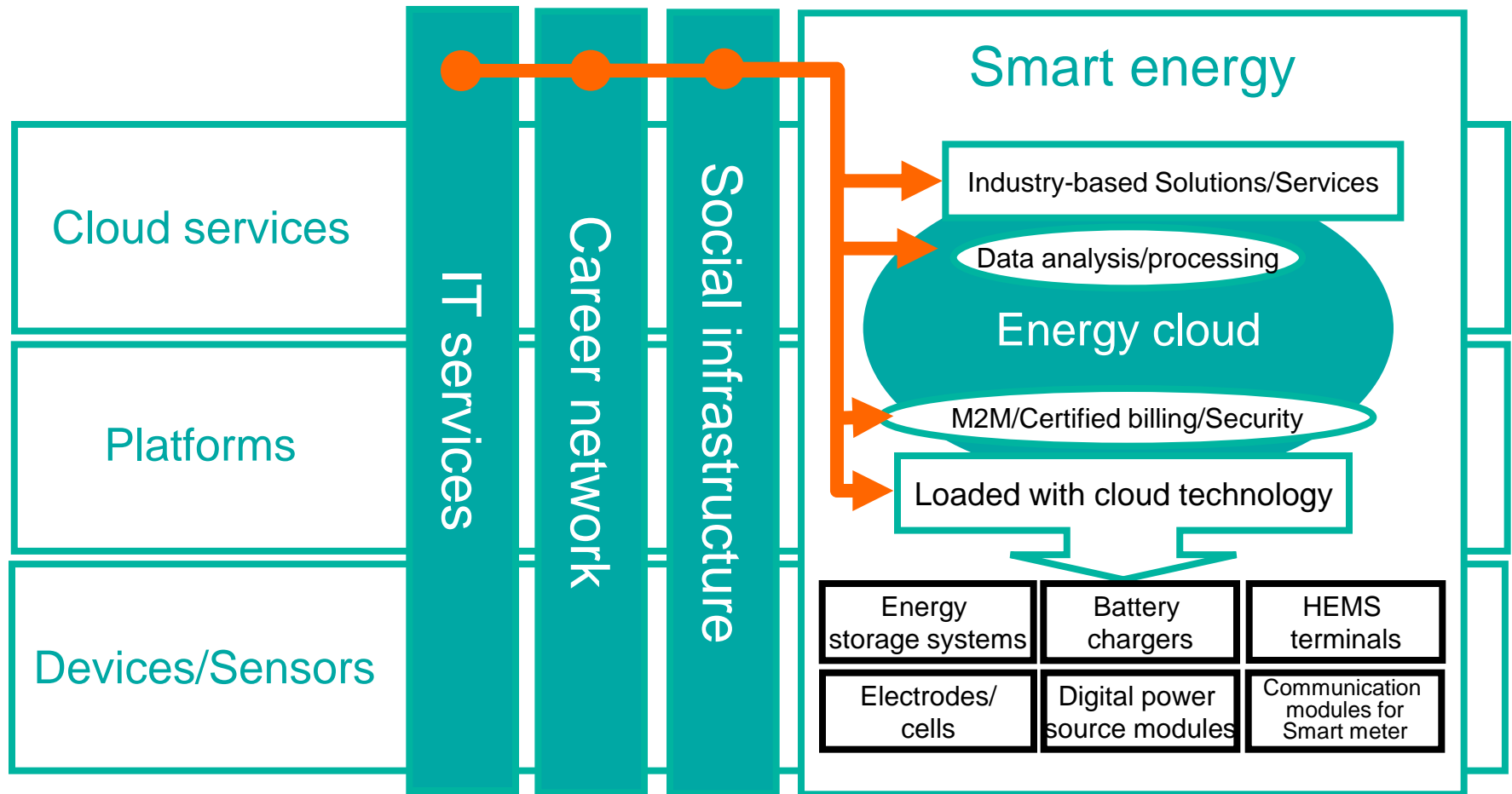
Smart Energy Business



Participate in a digital grid consortium with an aim to achieving highly efficient electricity distribution

Business Growth by Achieving Synergy With Existing Businesses

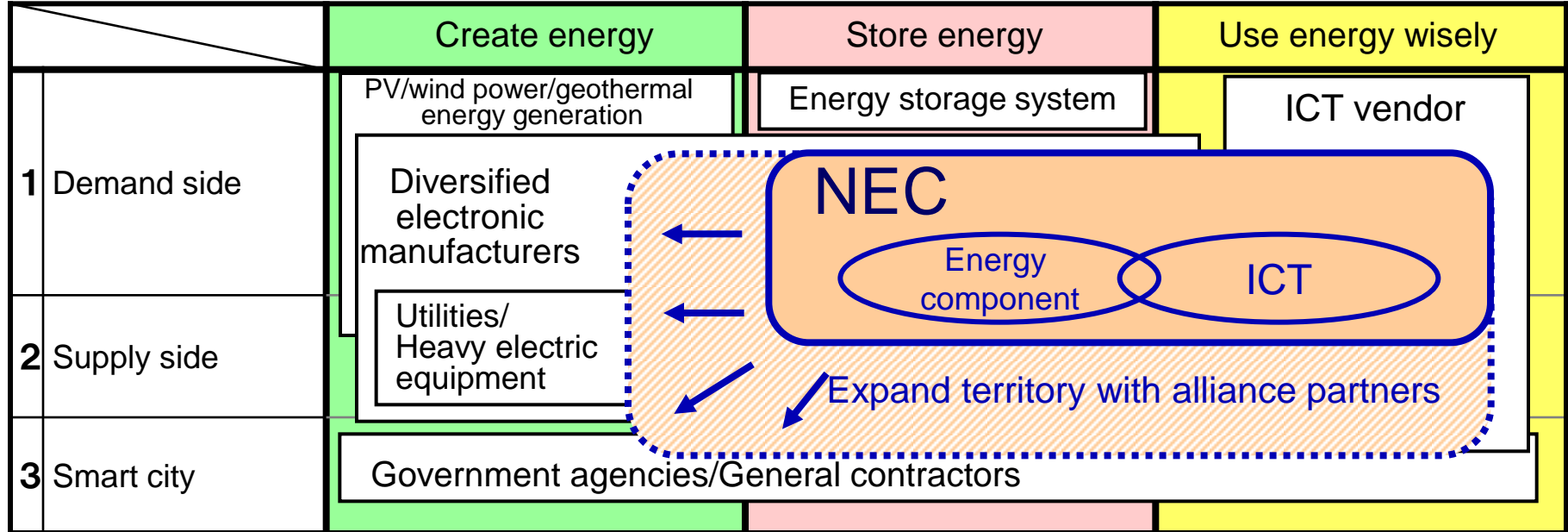
- Secure ability to grow in the energy market by achieving synergy between NEC's assets, such as ICT, industry expertise, customer channels, and new assets created by the smart energy business



M2M: Machine to machine

Our Position Within the Global Ecosystem

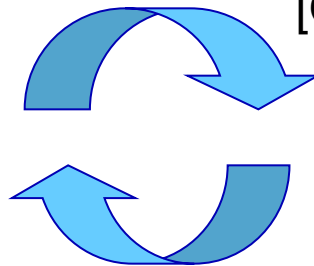
Business development with partner companies into supply-side/energy creation arena, centering on energy storage and ICT



Global activity centering on business expansion to supply-side companies with partners in each region

[Domestic business]

- Promote independence/distribution/diversification
- SL activity utilizing ICT
- Policy guidance based on customer viewpoint



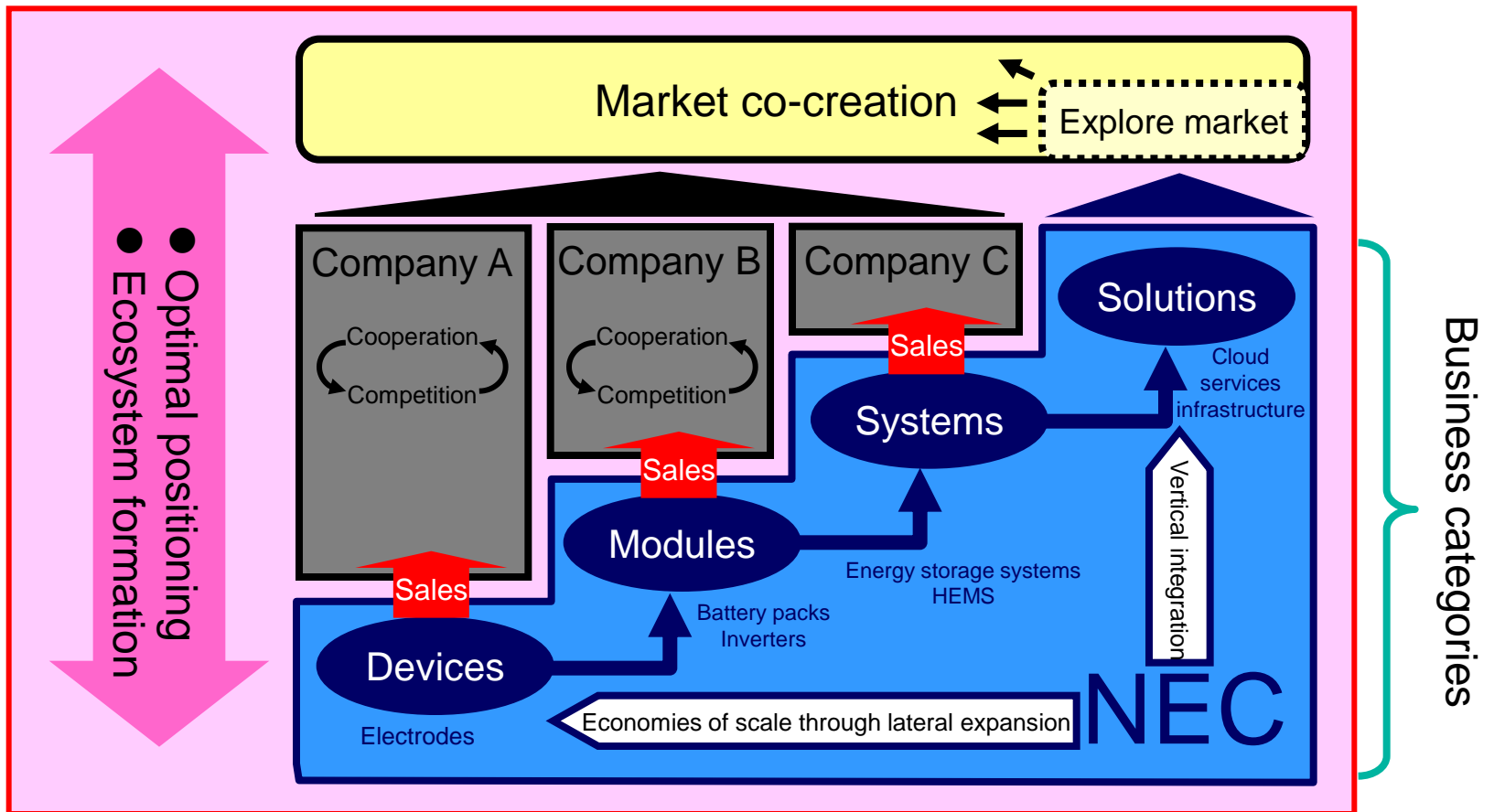
[Overseas business]

- Focusing on demonstration projects for utilities
- Developing large-scale energy storage systems
- Participating in Smart City Projects

Cooperative Work and Co-Creation Toward Forming an Ecosystem

Secure economies of scale through lateral expansion in all business categories from devices to systems

Aim at forming an industry ecosystem, optimal positioning for our Company



1. Business Overview

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2-1. Electrodes/Energy Storage Systems

2-2. Energy Management System (EMS)

2-3. EV/PHV Charging Infrastructure

2-4. Solutions for Utilities (electricity/gas/oil)

3. Medium- to Long-term Growth Strategy

Electrodes/Energy Storage System Business

Electrodes

- The heart of the primary device (storage battery) in the smart energy arena



Electrode sheet

Energy Storage systems

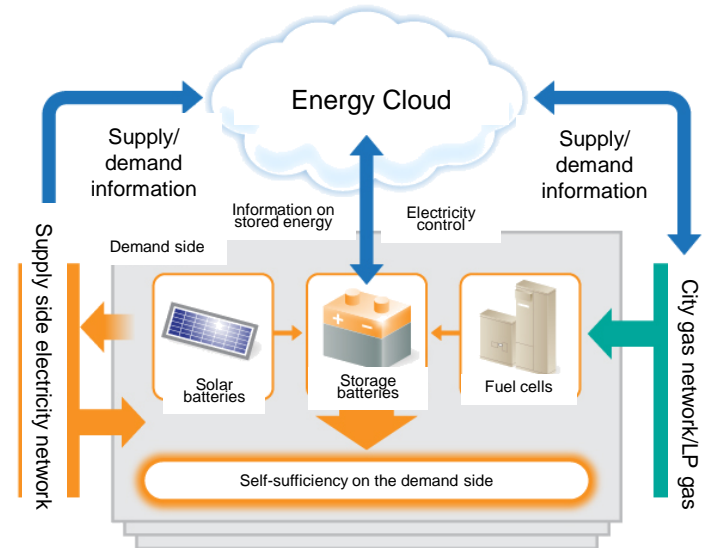
- Various energy access networks and hub for bundling distributed power
- Create self-sufficient energy for the demand side through coordination with Energy Cloud



Large-scale energy storage systems

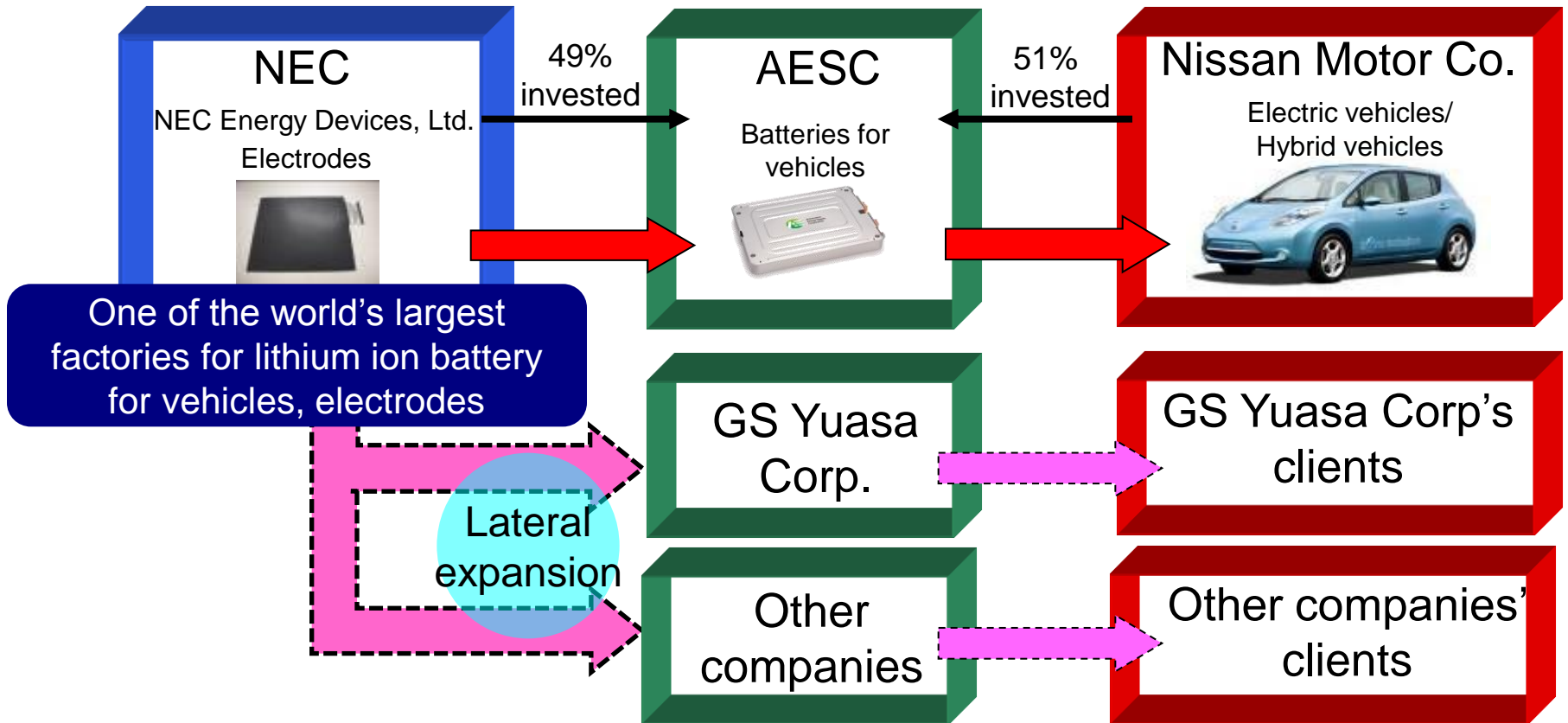


Small-scale energy storage systems



Electrodes Business

- Strength in volume efficiency and vehicle quality through cooperation with Nissan Motor Company
- Exploration of new tie-up partner by utilizing track record in volume efficiency



Able to maintain an overwhelming cost advantage by securing further economies of scale

Energy Storage Systems

YSCP: Yokohama Smart City Project

- Exploring markets with partners by utilizing our competitive advantage in storage batteries
- Accelerated commercialization based on experiences in Japan's demonstration projects, including YSCP

	For the supply side	For the demand side		
	Power transmission/ distribution	Communication base station	Building, commercial facilities	For offices, homes
Application	Adjust change in demand	Peak hours reduction/ Back-up/ Natural energy integration	Peak hours reduction/shift Back-up	Peak shift plan/Back-up
System size	1MWh~150MWh	10kWh~50kWh	10kWh~300kWh	1kWh~15kWh

(For the YSCP verification project)

Medium- to
large-scale



250kWh (Prototype)



50kWh (Prototype)

Small-scale



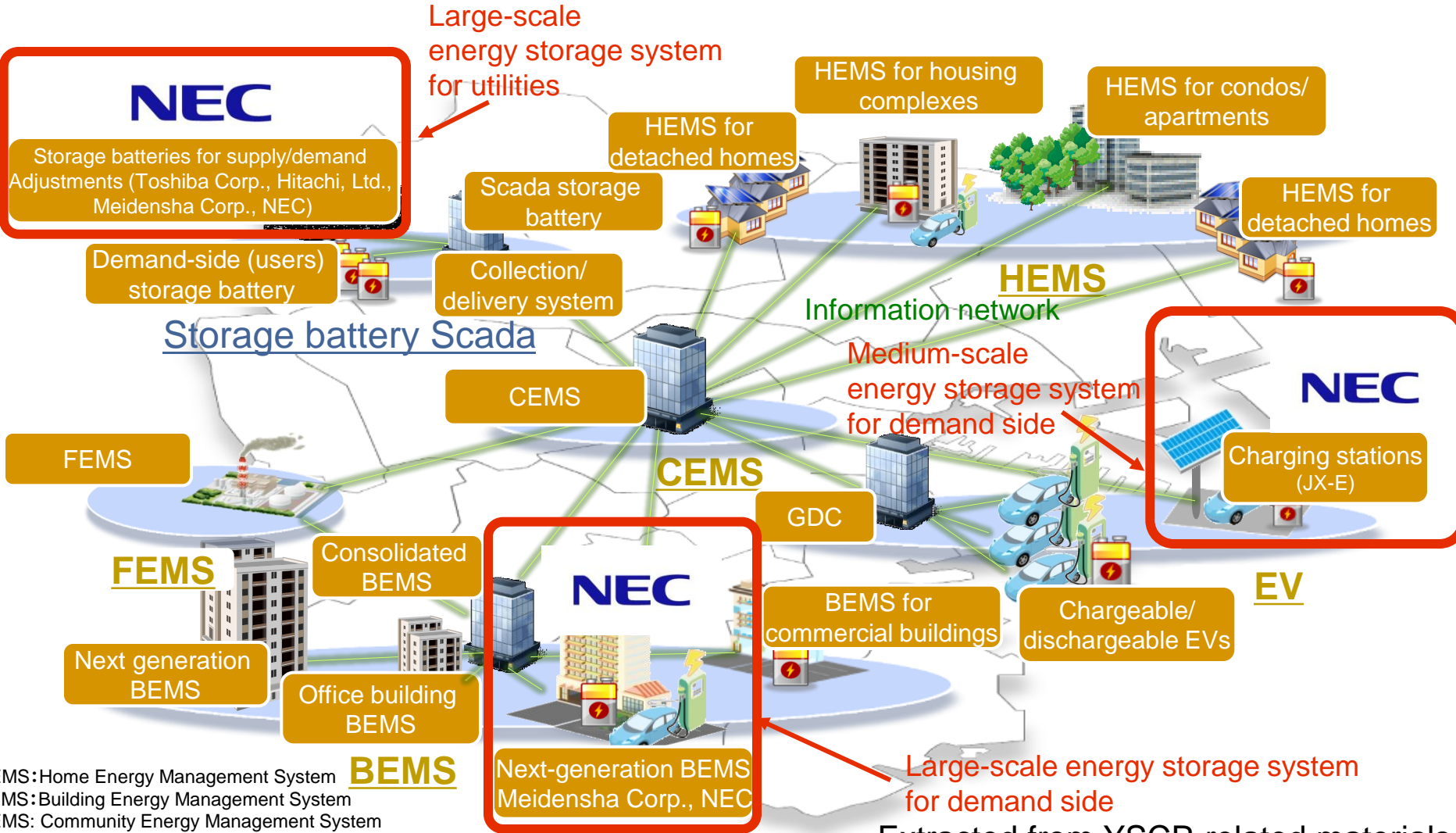
5.5kWh
(Mass production equipment)



0.25~1.5kWh
(Mass production equipment)

NEC's activity in the YSCP (Yokohama Smart City Project)

Developed and adopted regional energy management for an existing large-scale urban area through coordinated use of CEMS and HEMS/BEMS/EV/Scada battery



HEMS: Home Energy Management System
 BEMS: Building Energy Management System
 CEMS: Community Energy Management System
 SCADA: (Control System) Supervisory Control And Data Acquisition

Extracted from YSCP-related materials

YSCP Large-Scale Storage System Field Test (~FY2014)

- To enable concurrent use of new and old battery modules and improve operational management
- To adopt BEMS, SCADA storage system in cooperation with Meidensha for cooperative CEMS experiment

(Building Energy Management System)

Next generation
BEMS



(Supervisory Control And Data Acquisition)
(real time)

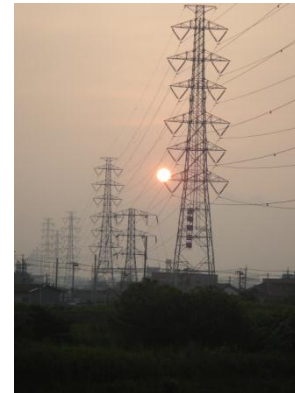
SCADA storage
system

Yokohama World Porters
(Output : 100kW Capacity : 250kWh)



- Proof of success in demand/response system through CEMS coordination

TEPCO Tsunashima substation
(Output : 250kW Capacity : 250kWh)



- Verified assessment of storage capability in the form of final adjusted reserves that CEMS should be able to provide
- International standardization of the CEMS interface

YSCP Medium-Scale Storage System Field Test (~FY2013)

- An integrated system of power storage and charging for next generation SS in cooperation with JX Nippon Oil & Energy Corp.
Developed, adopted (BCIS); loaded with BMU technology that enables capacity expansion
- Proof of success in regional demand/response through coordinated use of CEMS and reducing electricity consumption during peak hours while several high-speed charging equipment were in operation
- Planning mass production of storage systems for small/medium-sized field offices in FY2013



50kWh storage system

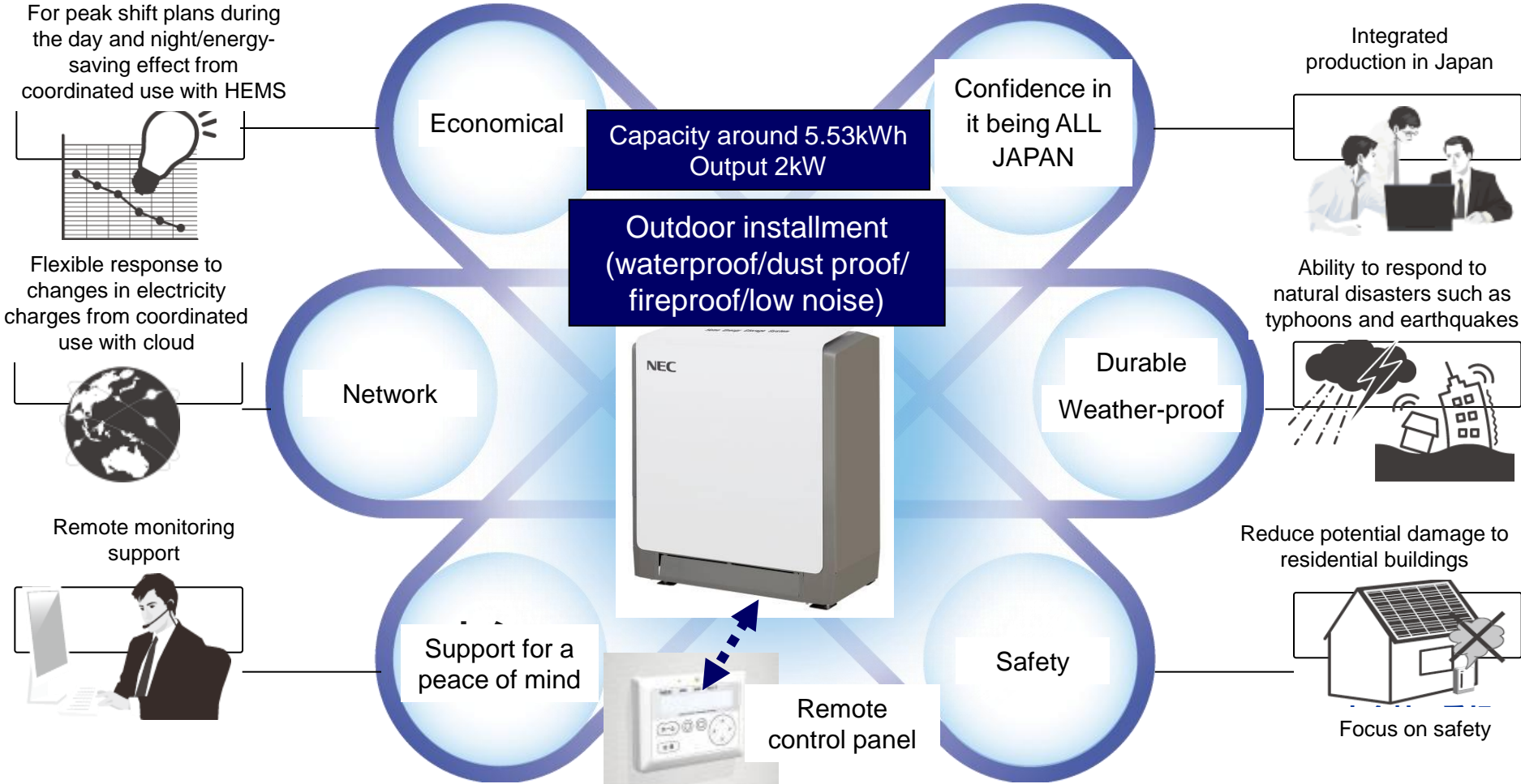


ENEOS Shinkoyasu SS

SS : Service Station
BCIS : Battery and Charger Integration System
BMU : Battery Management Unit

Small-Scale Storage Systems

- Delivery starts for small-scale energy storage system that can be used with HEMS/Cloud (July 2012)
- Reducing electricity consumption during peak hours, peak shift plans, blackouts at the office and at home

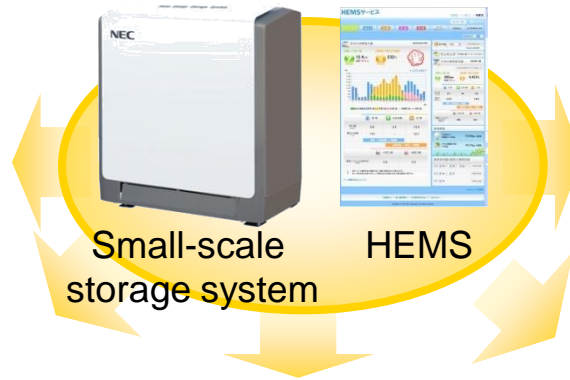


Exploring Small-Scale Energy Storage Markets with Partners

- Exploring markets with partners in various industries
- FY2013 delivery target: 15,000 units

PV industry

Coordinated use of stored energy with electricity purchasing system
Offer PV system solutions



Reconstruction support

Offer solutions to support achieving self-sufficient electricity at local governments, schools, public facilities in disaster-stricken areas

Housing+Reform Industry

Offer solutions for energy-creation/energy storage that are to be the core of the smart house business

Air-conditioning industry

Offer solutions to cut electricity consumption of heating pumps that use air-conditioning during peak hours

Gas industry

Offer solutions to support optimal operational efficiency of cogeneration/fuel cells, self-sufficient energy

Orders received from more than 10 domestic companies (as of July 10, 2012)

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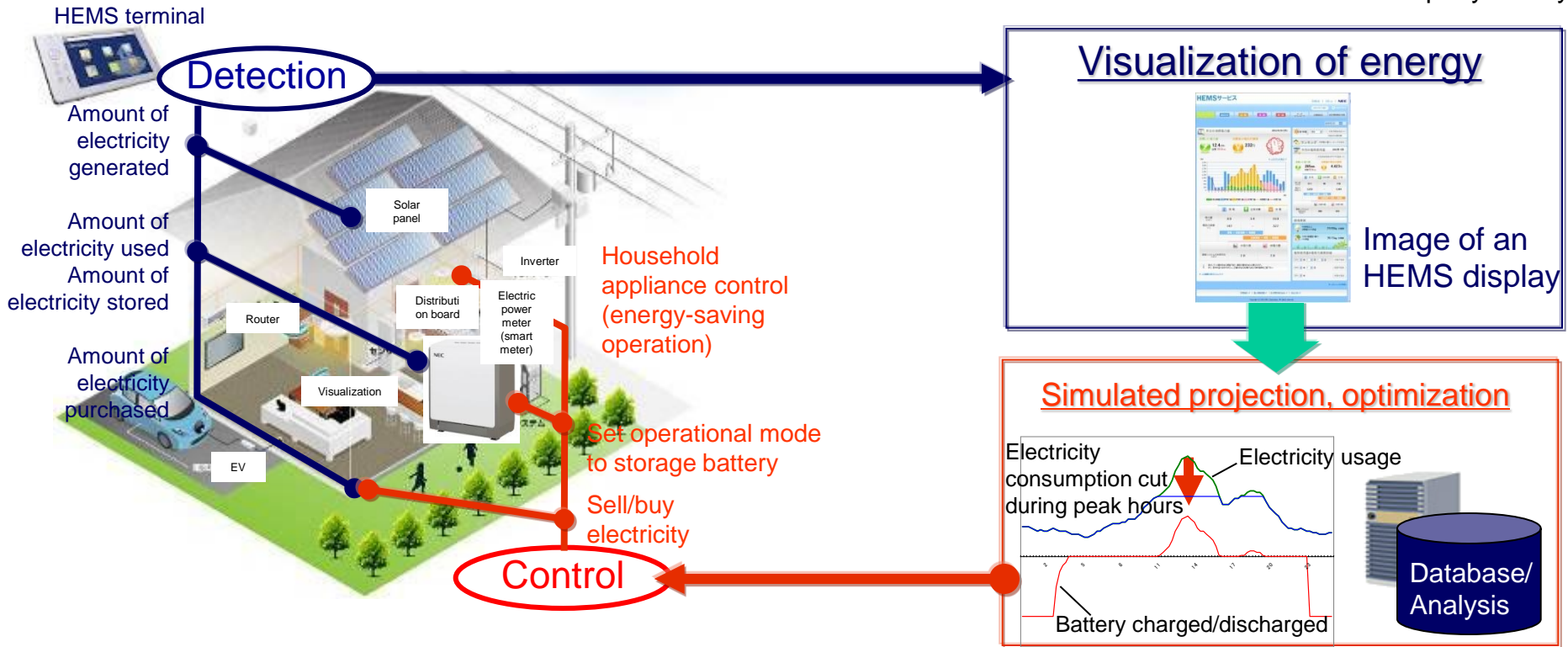
2-4. Solutions for Utilities (electricity/gas/oil)

3. Medium- to Long-Term Growth Strategies

Energy Management System Business: HEMS

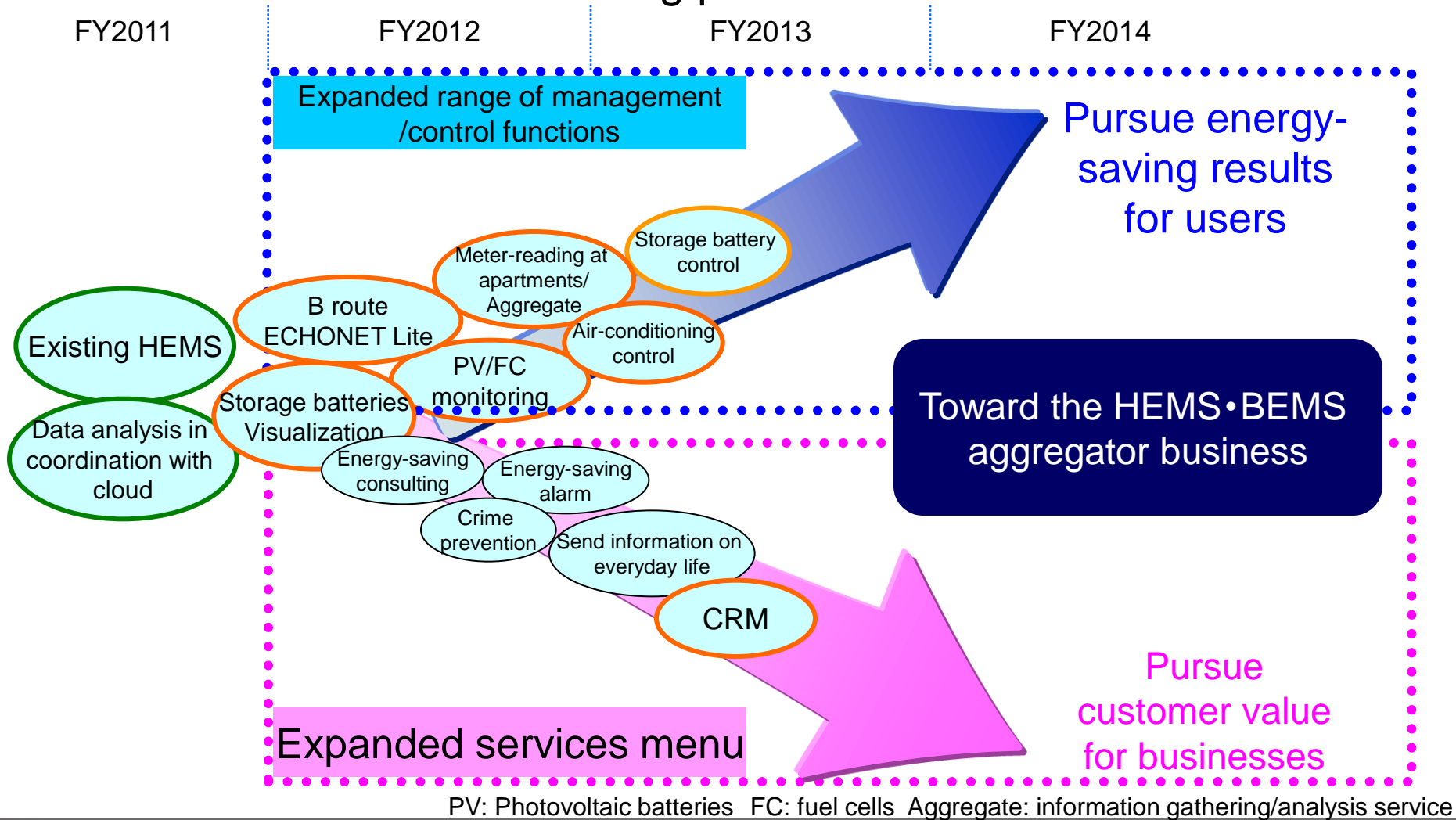
- Enable visualization of electricity throughout the home, optimal control system (46% domestic share in FY2011*) by partnering with housing manufacturers, etc.
- Devices, which are eligible for government subsidy, have been approved for conforming to ECHONET Lite specifications; secured connectivity with energy-related devices, such as smart meters, that are expected to be used widely going forward
- Makes developing information services utilizing cloud computing possible

*Based on a domestic company survey



Direction of the HEMS Business

Expanded range of management/control functions and services menu with households as the starting point



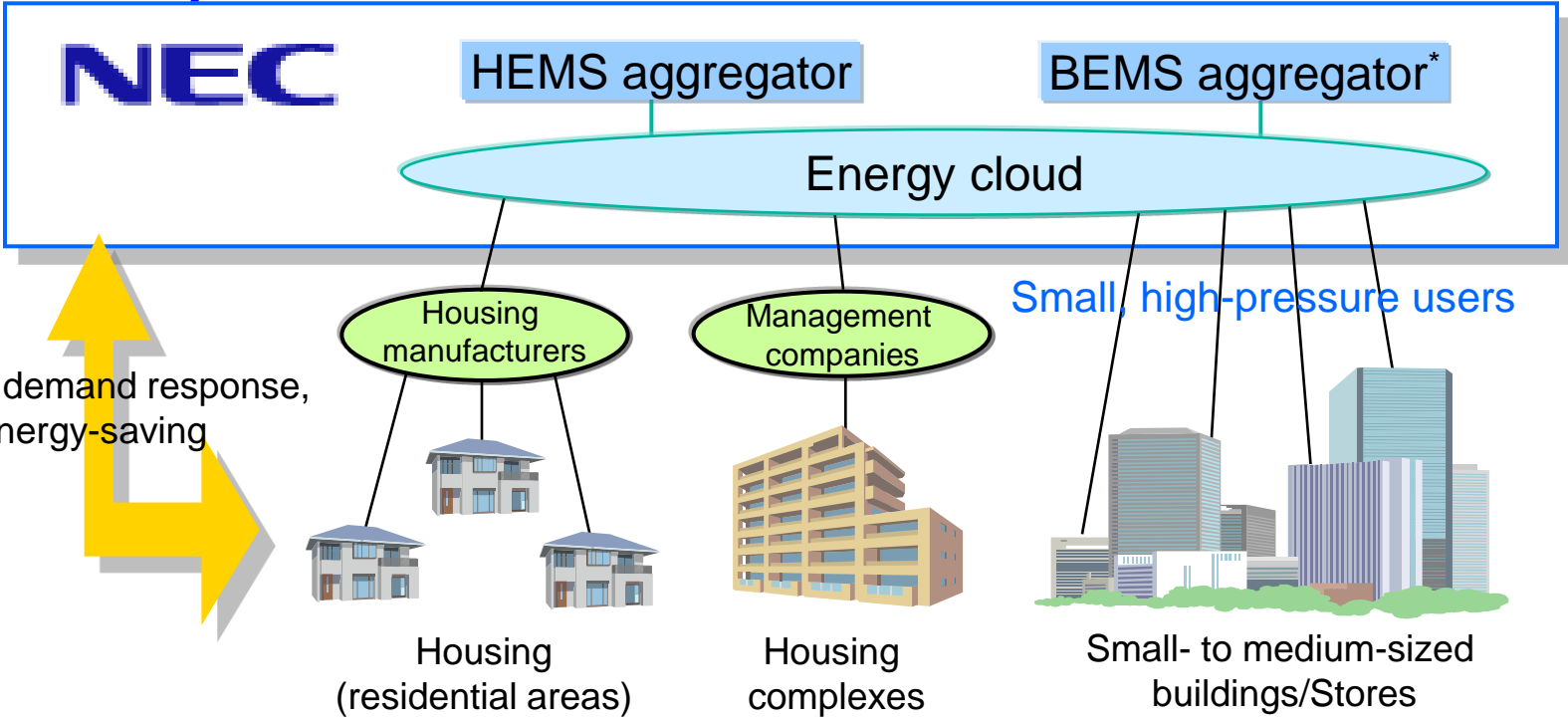
PV: Photovoltaic batteries FC: fuel cells Aggregate: information gathering/analysis service

Moving Toward the HEMS/BEMS Aggregator Business

Move into the HEMS/BEMS aggregator business based on the HEMS and building automation businesses. Support energy-saving in residential areas and housing complexes, demand response (DR) in small- to medium-sized buildings.

Electric power companies

*Selected as a BEMS aggregator business as per METI's Project to Promote Introduction of the Home Energy Management System (FY2011 third supplementary budget)



Support demand response, energy-saving

(xEMS aggregator: Operator that manages energy usage information)

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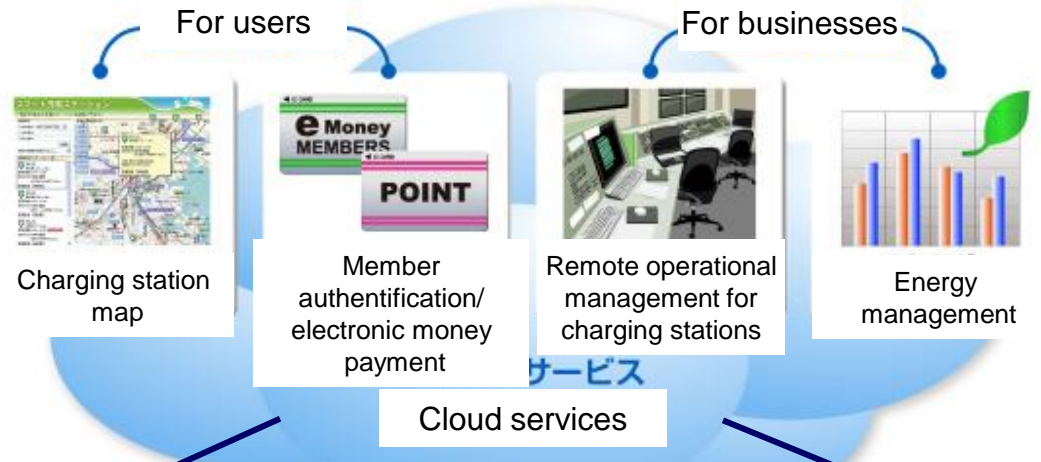
2-4. Solutions for Utilities (electricity/gas/oil)

3. Medium- to Long-Term Growth Strategy

EV/PHV Charging Infrastructure (chargers that accept electronic money)

EV: Electric vehicles
PHV: Plug-in hybrid vehicles

- Utilize electronic money infrastructure cultivated through POS, vending machines, etc., and expertise in authentication and electronic money payment
⇒ Offer integrated EV/PHV cloud charging service
- Develop as a leading-edge business with an eye to EV/PHV's full-fledged popularity starting in 2020



Quick chargers

20-50 kW quick charger;
conforms to CHAdeMO standards

Felica®
Reader/Writer

This block shows a blue and white quick charger. A Felica® Reader/Writer is connected to the charger via a cable. The charger is labeled 'EV QUICK CHARGER' and 'NEC'.

Standard chargers

Charging controller operates/manages several chargers

Charging controller

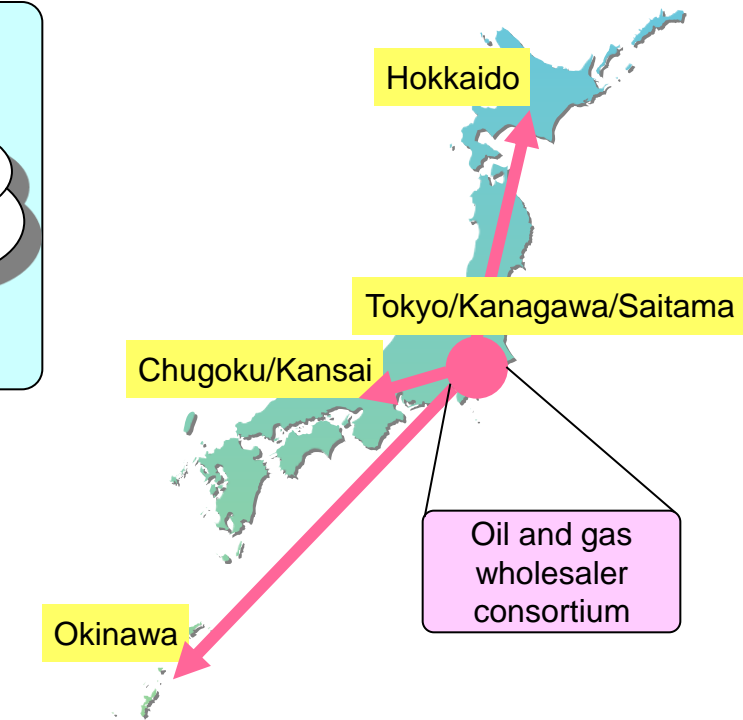
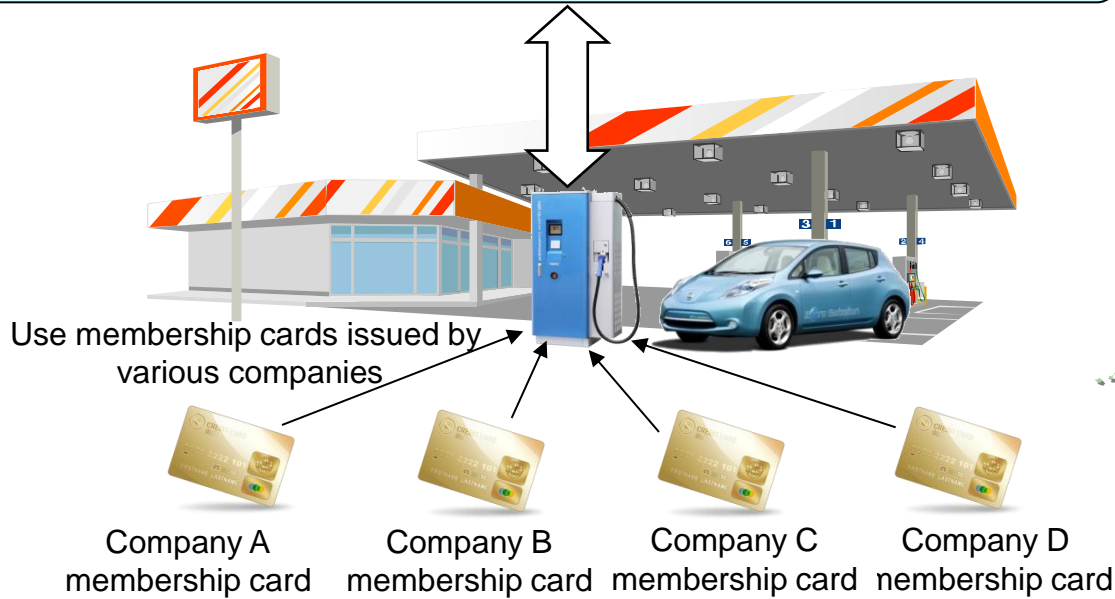
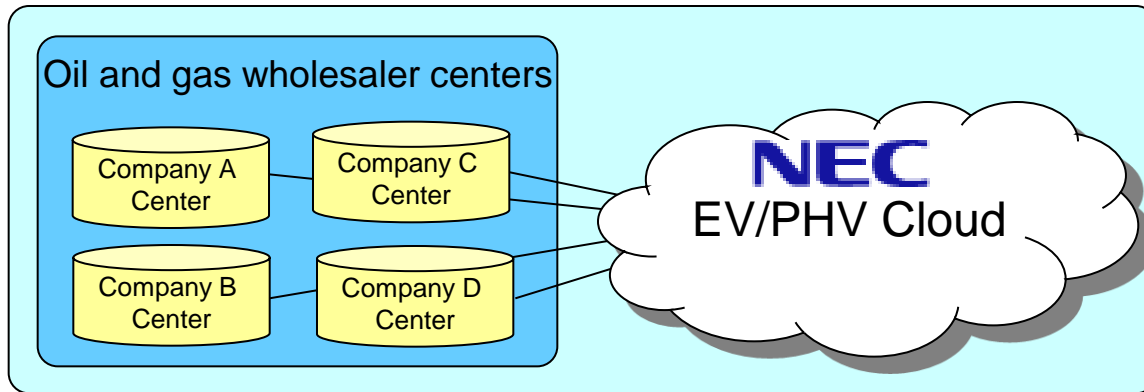
Standard chargers

Communication cable

This block shows a charging controller connected to three standard chargers. The controller is labeled 'EV CHARGER' and 'NEC'. The standard chargers are also labeled 'EV CHARGER' and 'NEC'. A communication cable connects the controller to the chargers.

Build/Develop a Universal Certification System with Oil and Gas Wholesalers

- Offer a certified cloud-based billing service for EV/PHV that can be used for various businesses
- Enable universal use of chargers set up by oil and gas wholesalers with membership cards issued by various companies



- Developing nationwide for major chain stores, local municipalities, etc.
- Also planning to advance into overseas smart city projects

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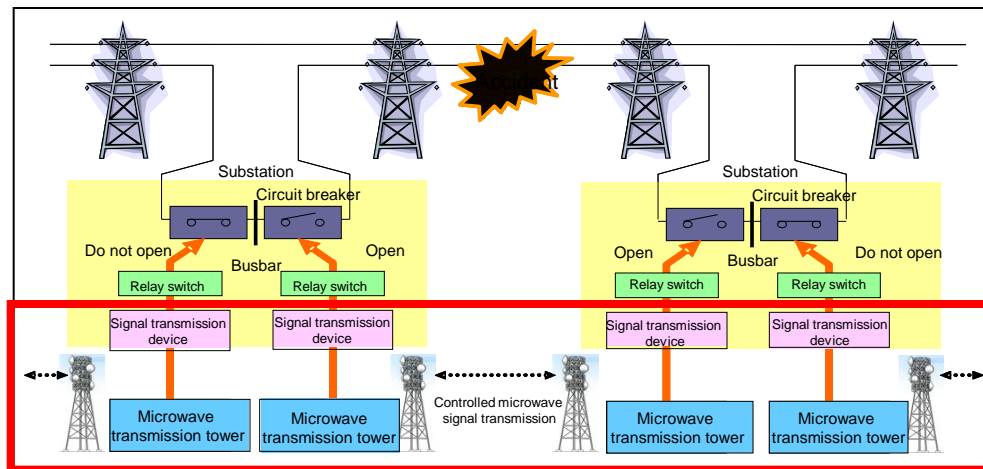
3. Medium- to Long-term Growth Strategy

Solutions for Utilities

Abundant business experiences in ICT solutions for domestic utilities (electricity/gas/oil) for establishing stable electric power supply network (domestic share over 40%*)

*Based on our Company survey

- Electric power protected information transmission system
 - (Microwave transmission device/Optical transmission equipment/Carrier relay signal transmission equipment)
- Electric power supply information system for suppliers, monitoring control system
- Communication network monitoring system for managing electric power facilities, visual transmission system



NEC's
business areas

Example of the electric power protected information transmission system continuing to operate by separating off the site affected by a power supply accident
(Microwave transmission equipment X carrier relay signal transmission device)

Move into the smart energy arena by making use of the experience shown above

- Smart meter information gathering/management infrastructure (AMI: Advanced Metering Infrastructure)

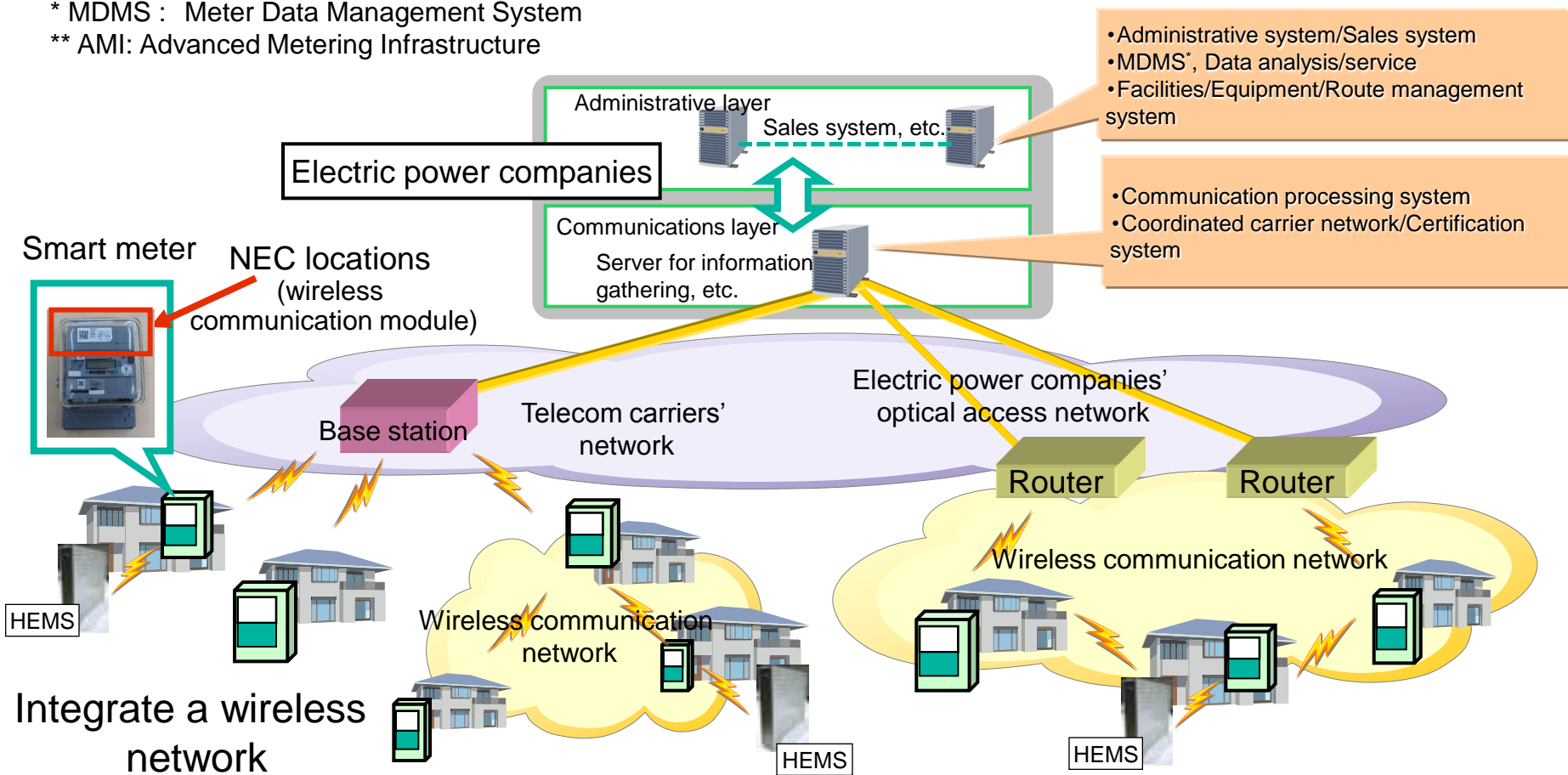
The Smart Meter Information Gathering/Management (AMI) Integrating Business

Enter into the AMI** integrating business based on track record of establishing a stable electric supply network and demand-side solutions such as HEMS

Aim to grow overseas business in developing nations where electricity metering infrastructure is weak

* MDMS : Meter Data Management System

** AMI: Advanced Metering Infrastructure



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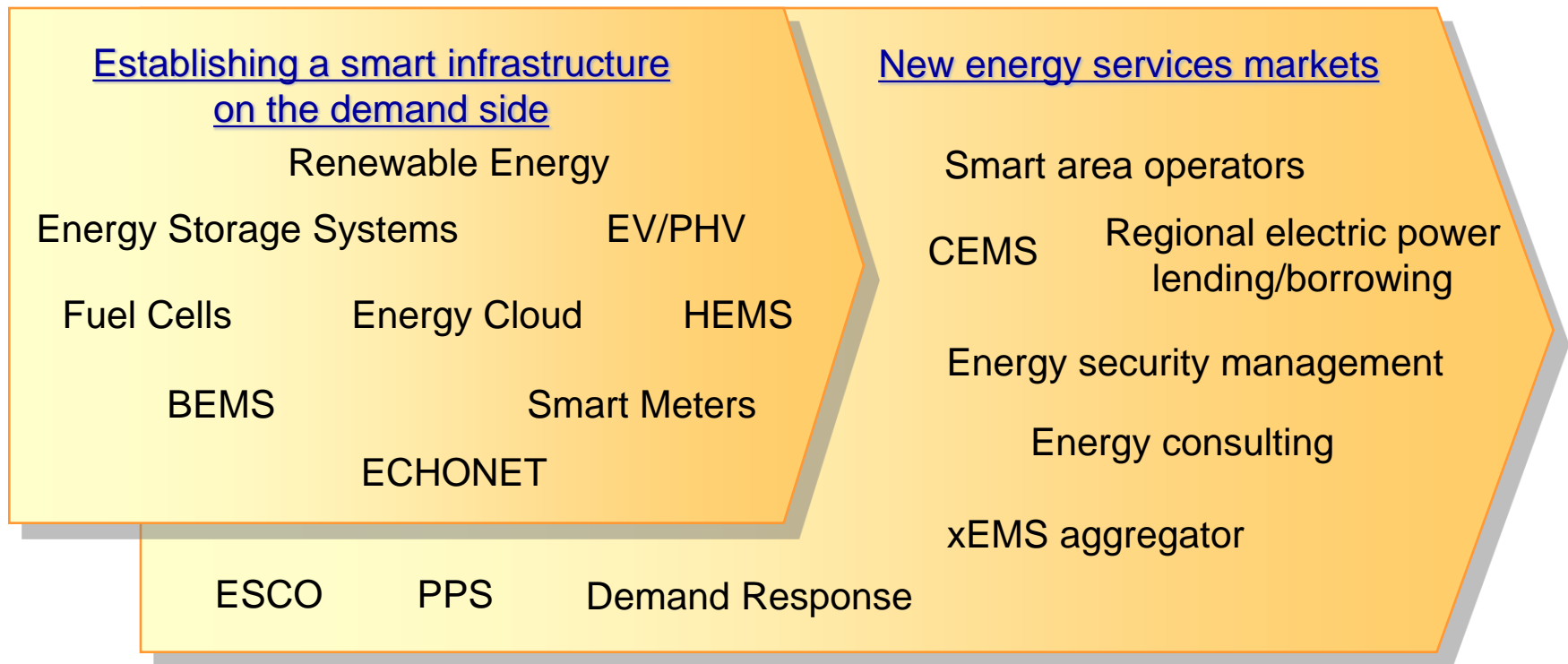
3. Medium- to Long-Term Growth Strategy

Outlook for the Smart Energy Market

Once smart energy infrastructure is established on the demand side, a new energy services market will be spawned by system reforms, entry by new businesses

2012 - 2014

2015 - 2020



System reforms

New fee system/FIT

Separating sending/receiving electricity

Liberalization of sending/receiving electricity

Medium- to Long-Term Business Strategy

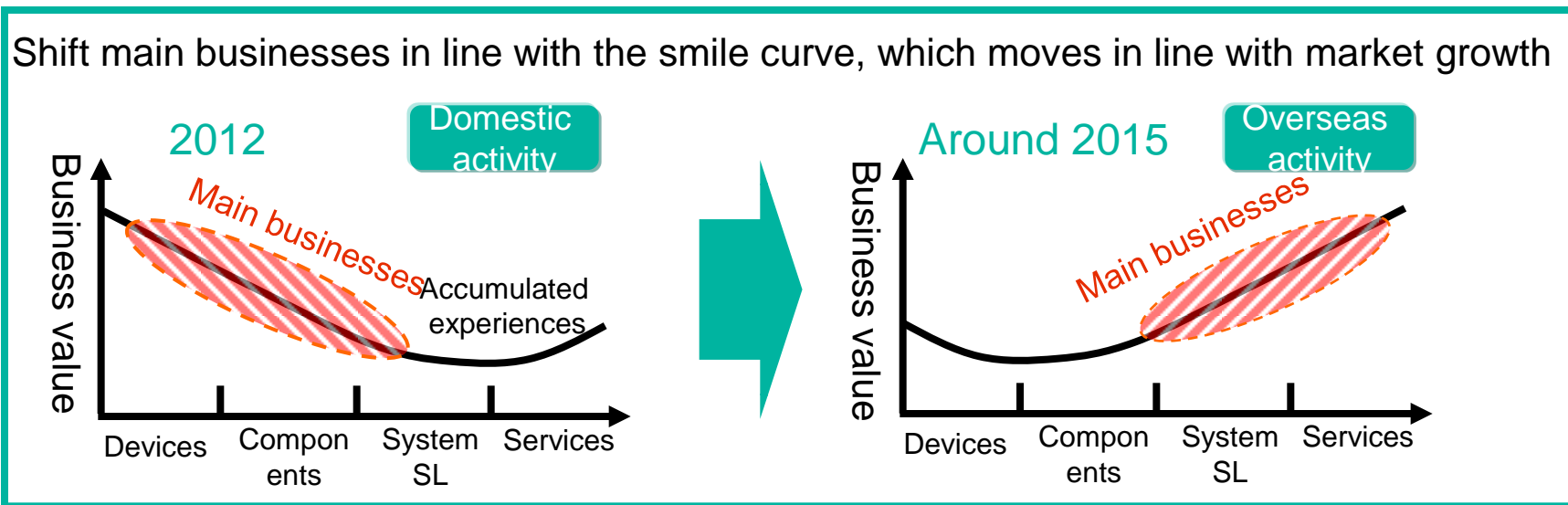
Overview of ongoing initiatives

- Domestic business activity: Co-create market for demand side with business partners
- Centered on device components: Launch electrodes/energy storage systems and EMS business
 - Prepare to move into services business by setting up construction maintenance/training of necessary personnel/rental system

Medium-term business activity

- Overseas business: Large-scale storage batteries for supply-side businesses, power source for wireless base stations
- Focus on solutions services: Energy Cloud, smart area services

Shift main businesses in line with the smile curve, which moves in line with market growth



Overseas Business Development

- Partnering with electric power companies :
Supply-side network adopting energy storage facilities
- Create a smart power source for communications base stations :
Utilize customer channels of existing communications carriers
(PASOLINK users in at least 160 countries around the world)
- Support domestic companies' entry overseas :
Work on local needs to stabilize infrastructure

Large-scale storage systems



Partner with local companies

- Procure power conditioners
- Manufacturing consignment

Medium-sized storage systems



Partner with local companies

- Procure solar power generating system
- Procure power source
- Manufacturing consignment



Energy storage system for the supply side for use by electric power companies in Europe, etc.

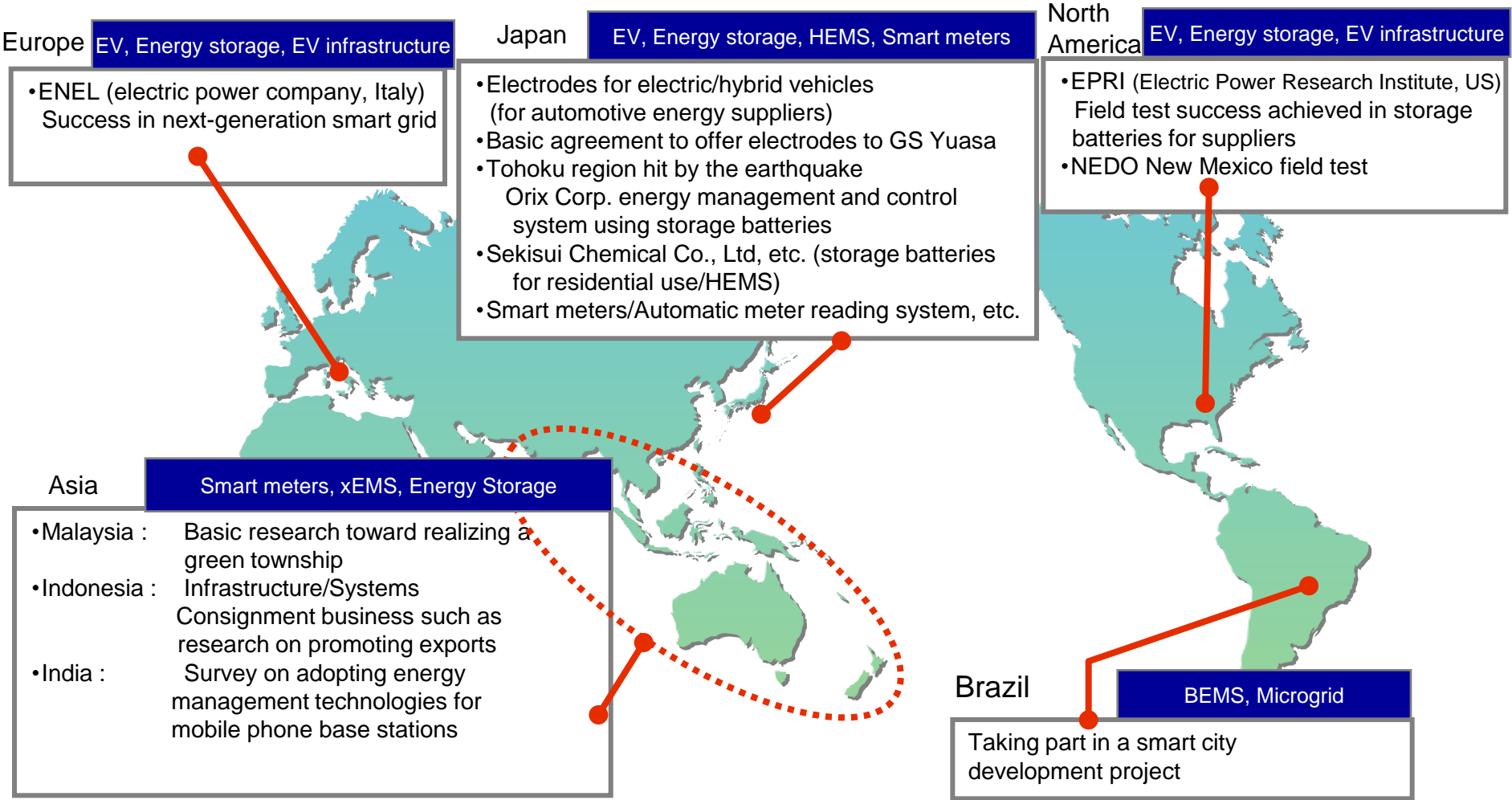


Green power system at wireless base stations for developing nations



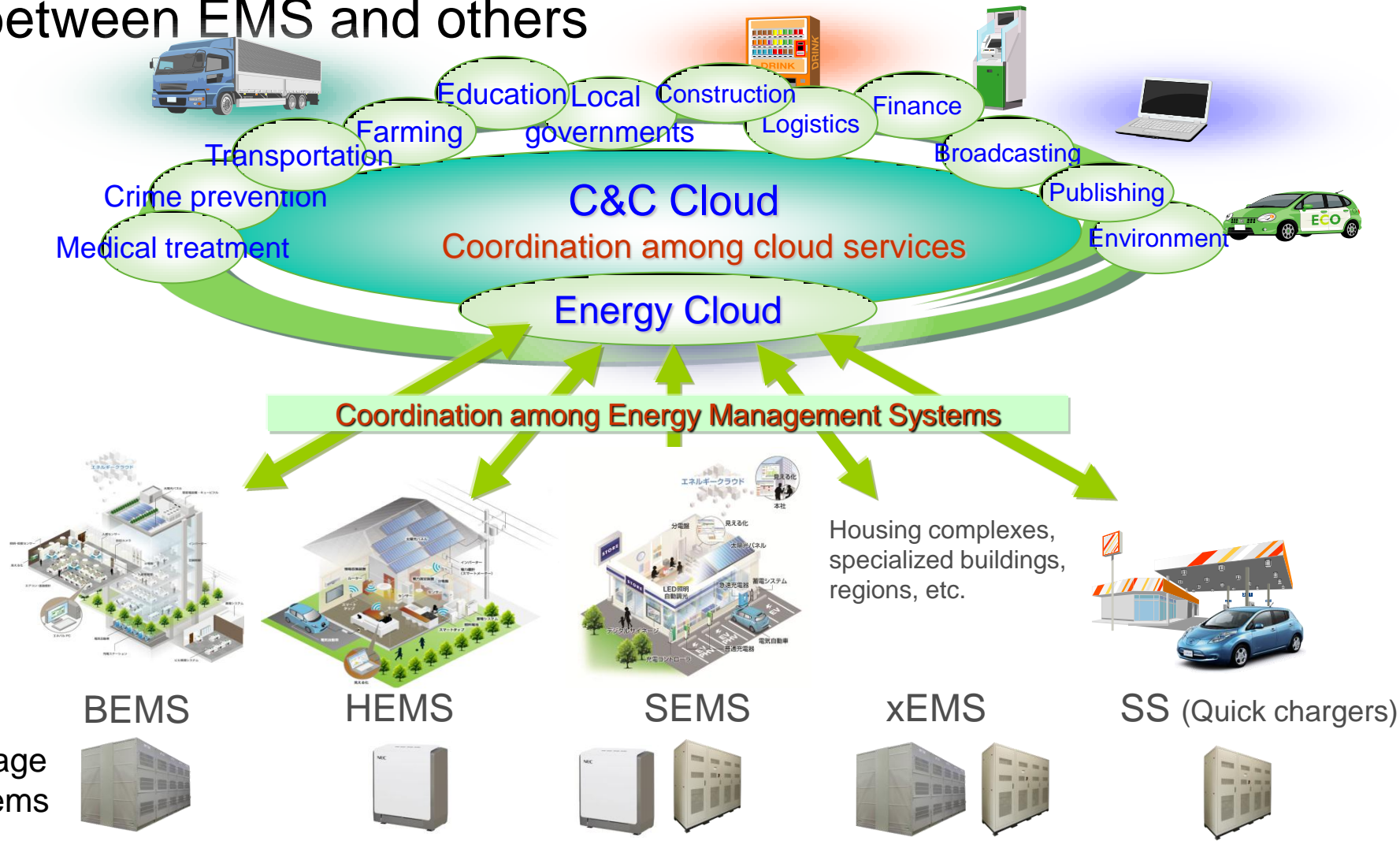
Global Business/Field Test Initiatives

- Market entry via partnering in various regions, government-related field tests
- Expedite business development via partnering



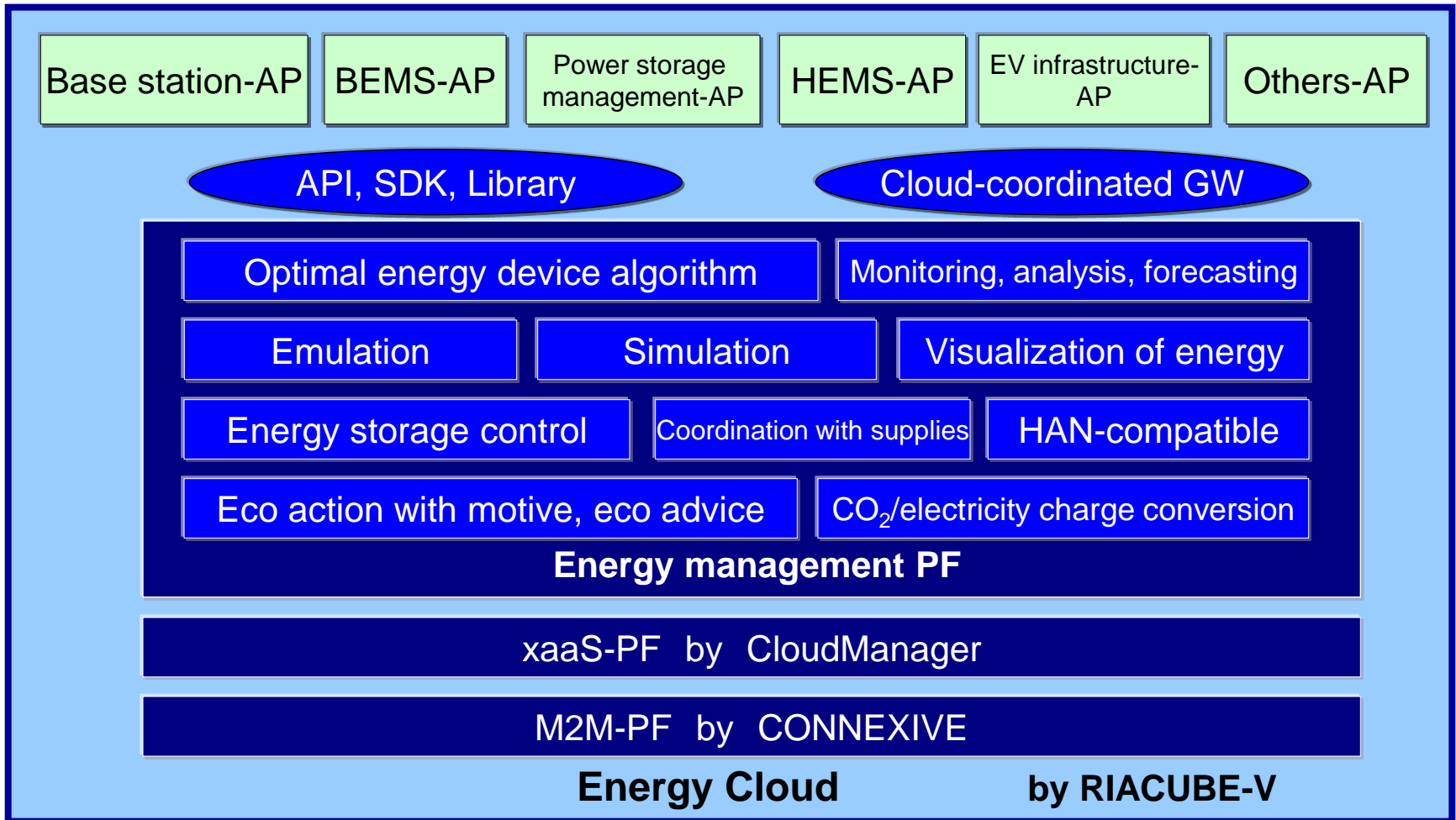
Coordinated Service Utilizing Energy Cloud

Energy Cloud at the core of coordinated services between EMS and others



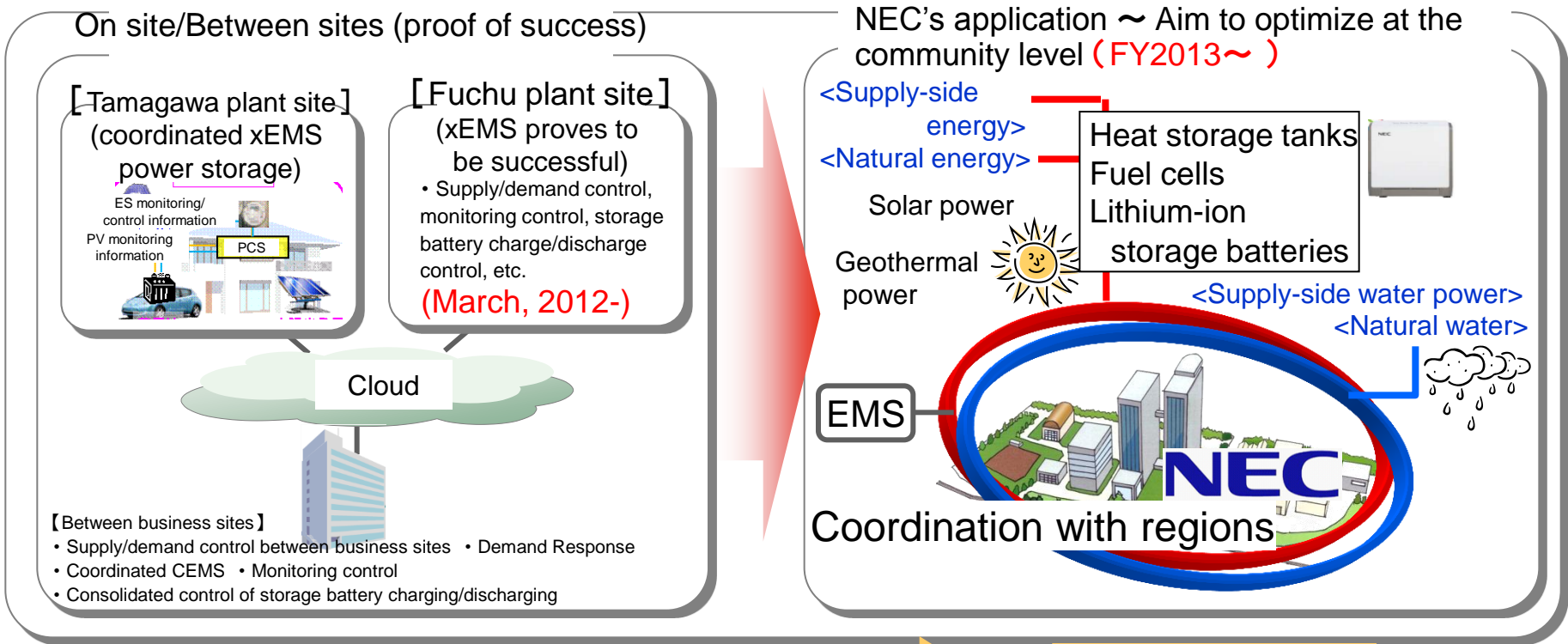
【Reference】 Composition of Energy Cloud Functions

- Accommodating demand-side systems as a common service base for xEMS aggregators, etc.



Moving Toward the Smart Area Services Business

- Promote efficient use of regional energy by integrating solar batteries, storage systems, EMS
- Field tests conducted at NEC's Tamagawa and Fuchu plant sites
- Aiming to operate in leading smart business regions by 2015



Energy savings/
Peak shift plan

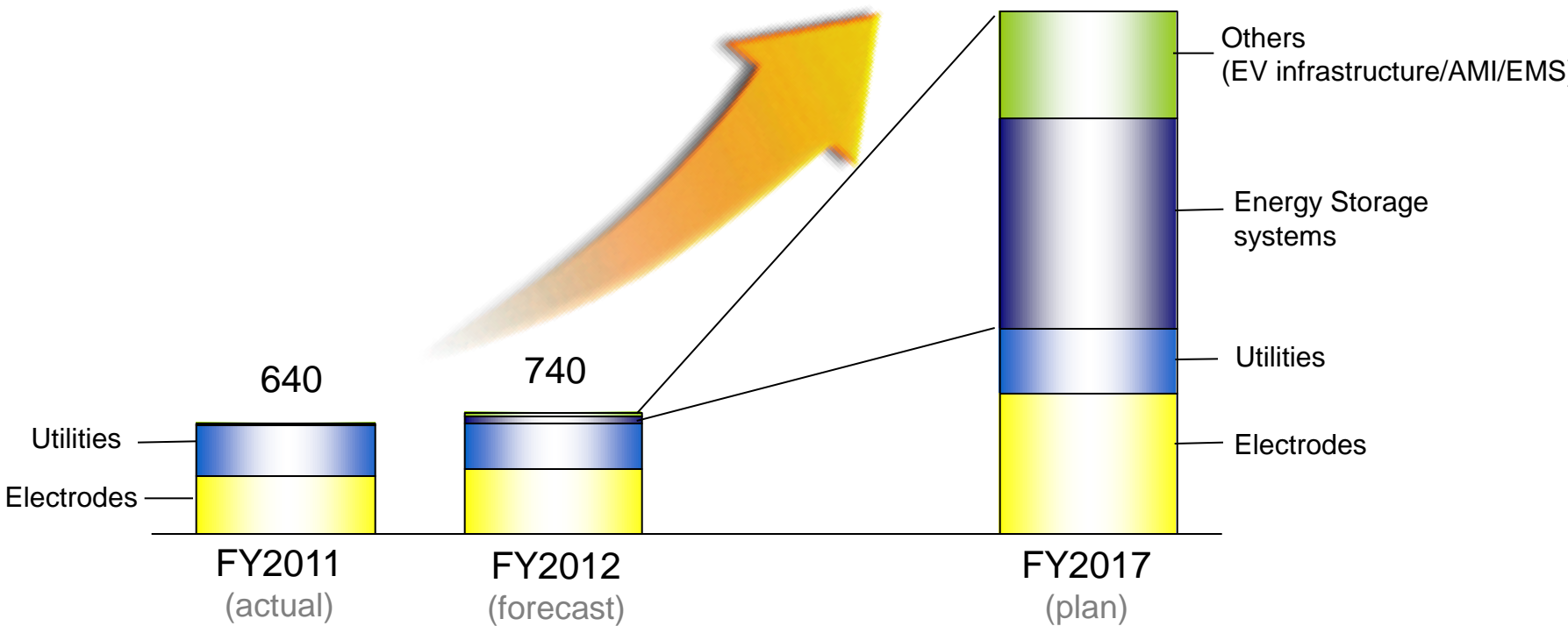
Expertise

Offer solutions

Develop a business in the form of smart area services

Move Toward the Early Establishment of Energy as the Fourth Pillar

Integration of energy component technologies × ICT
 Positioning and creating an eco-system with partners
 Move into the services arena utilizing C&C Cloud



* Forecast as of July 10, 2012

Empowered by Innovation

NEC

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