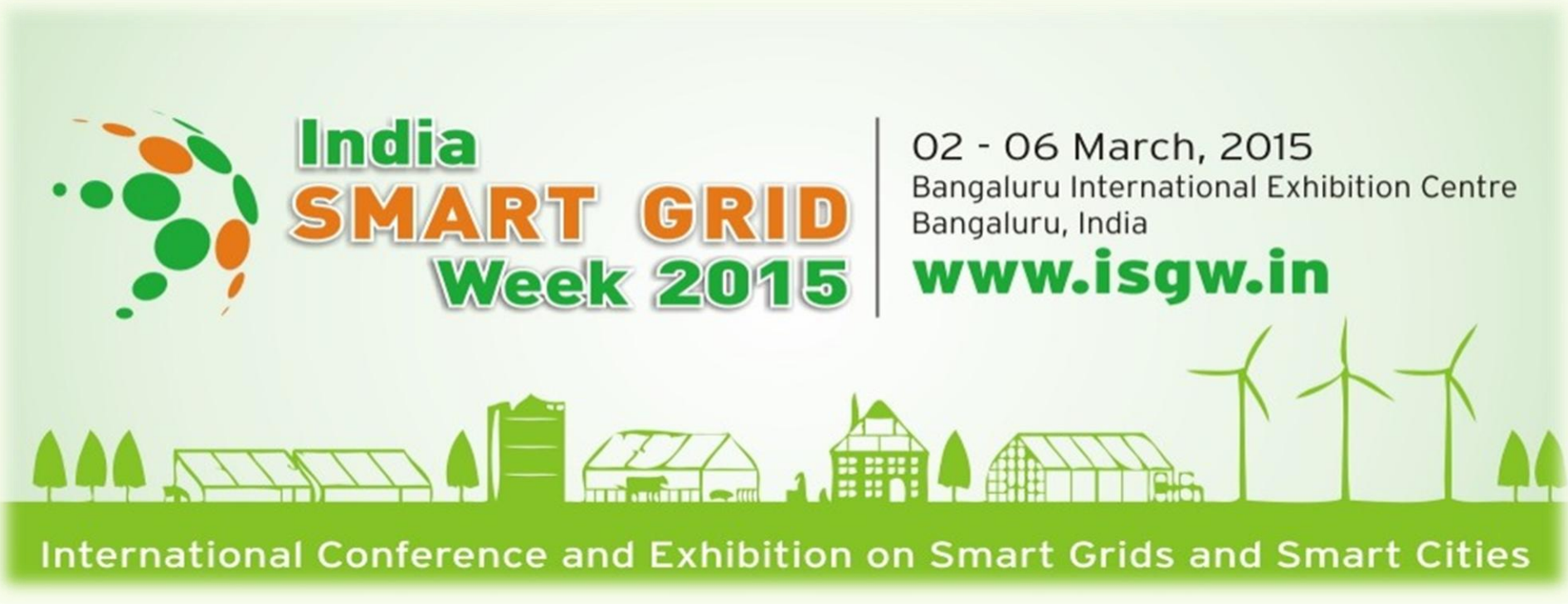


Case Study in Japan

Smart Grid Projects Update: Lessons Learned, Business Models, and Key Emerging Trends

March 3, 2015 | Session 1

Dr. Hiroshi Kuniyoshi

Executive Director

NEDO

Organiser ISGF India Smart Grid Forum

About NEDO

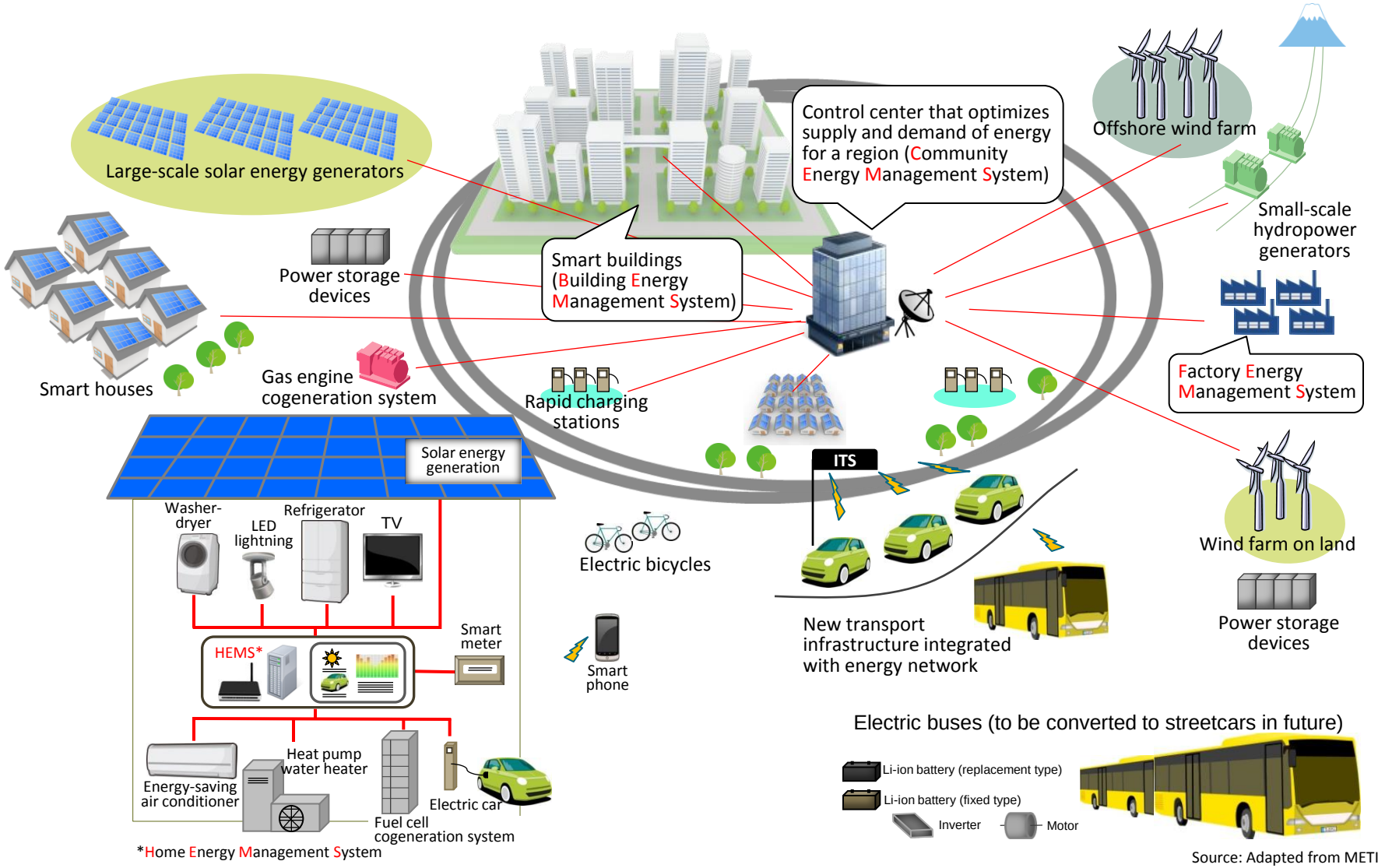
NEDO is Japan's largest public organization promoting R&D as well as the dissemination of energy, environmental, and industrial technologies.

New Energy and Industrial Technology Development Organization

Established: October 1, 1980
Chairman: Mr. Kazuo Furukawa

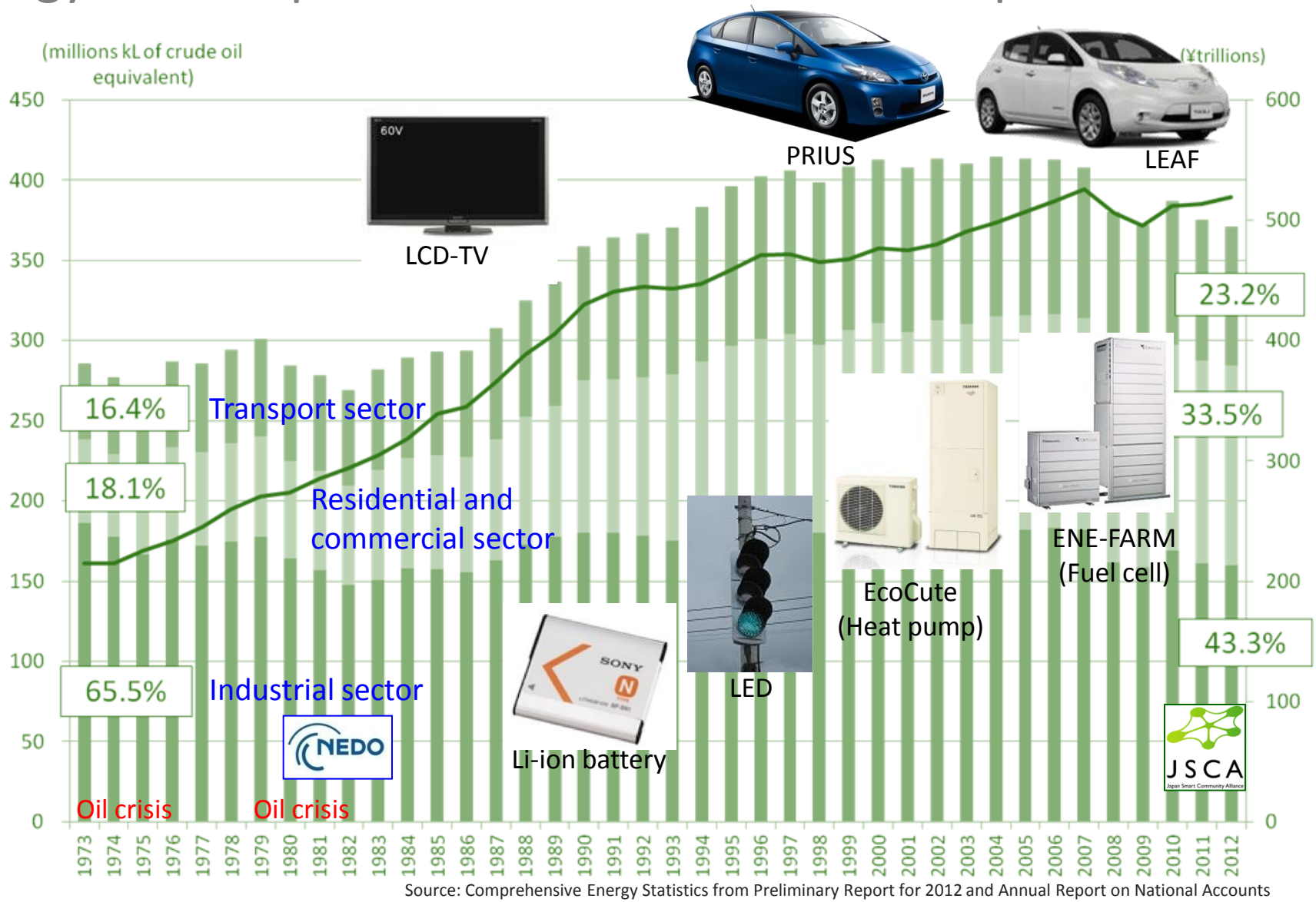
Employees: 800
Budget: About 1 billion EUR

The Smart Community Concept



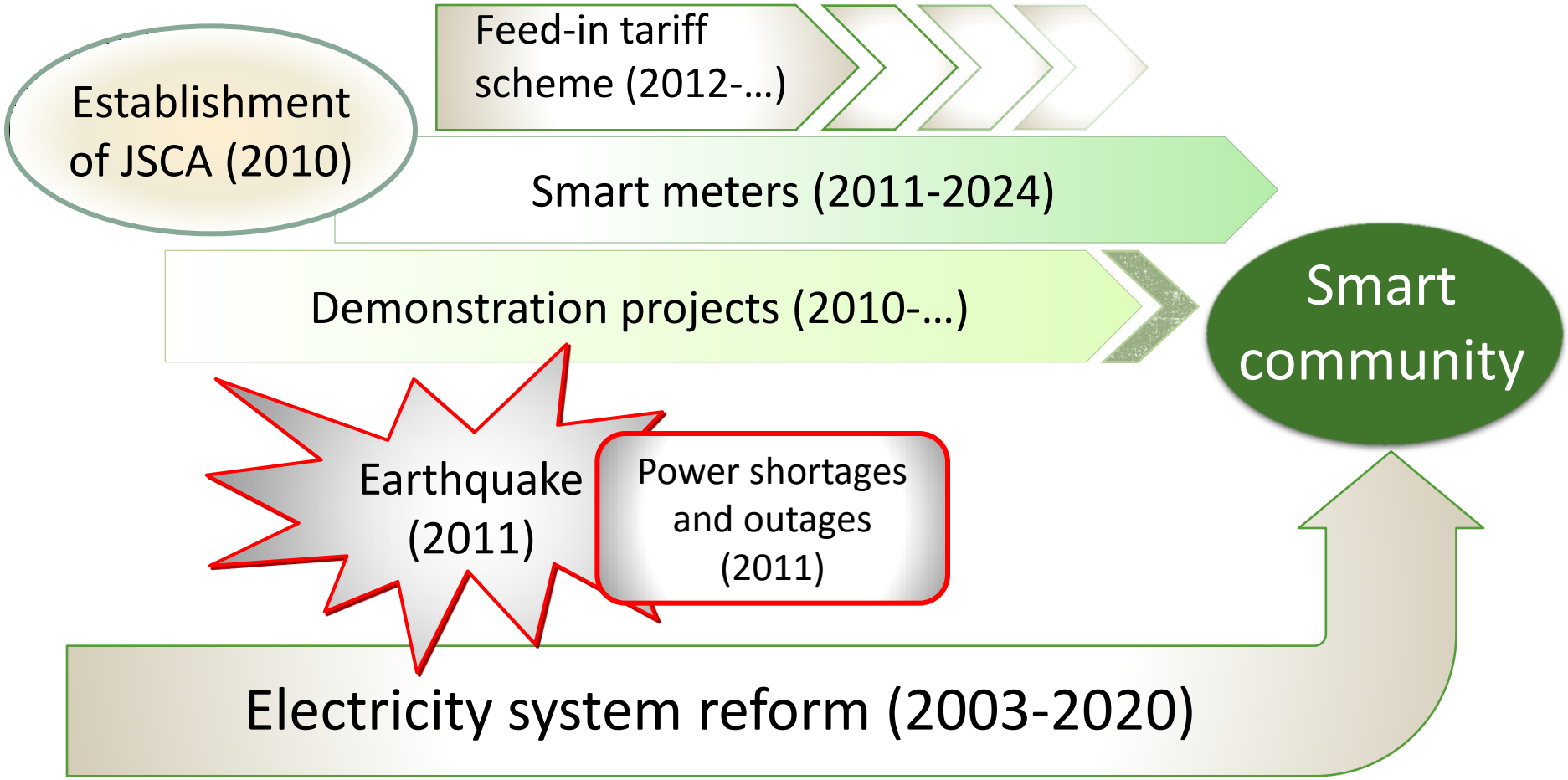
Source: Adapted from METI

Energy Consumption and Product Trends in Japan

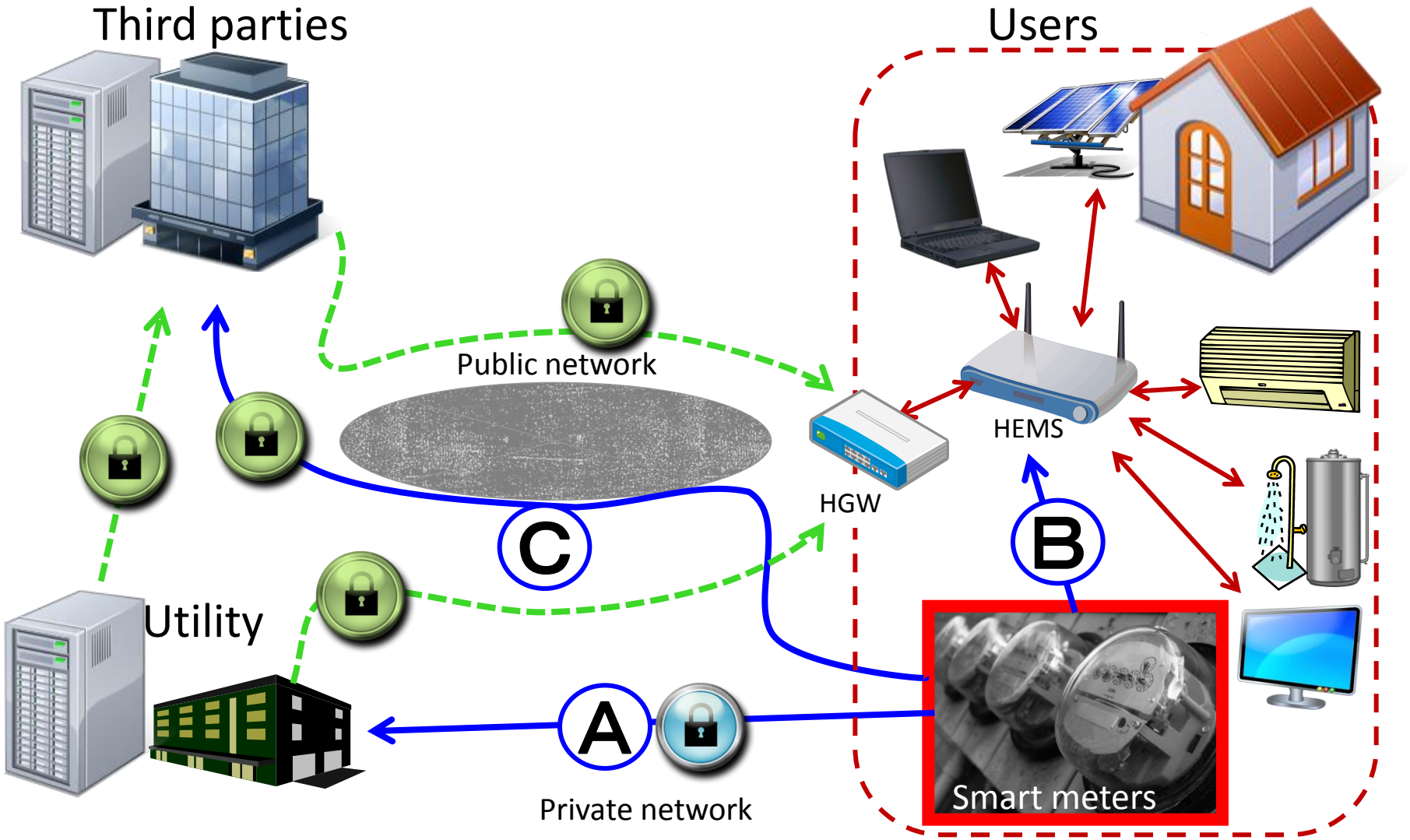


Source: Comprehensive Energy Statistics from Preliminary Report for 2012 and Annual Report on National Accounts

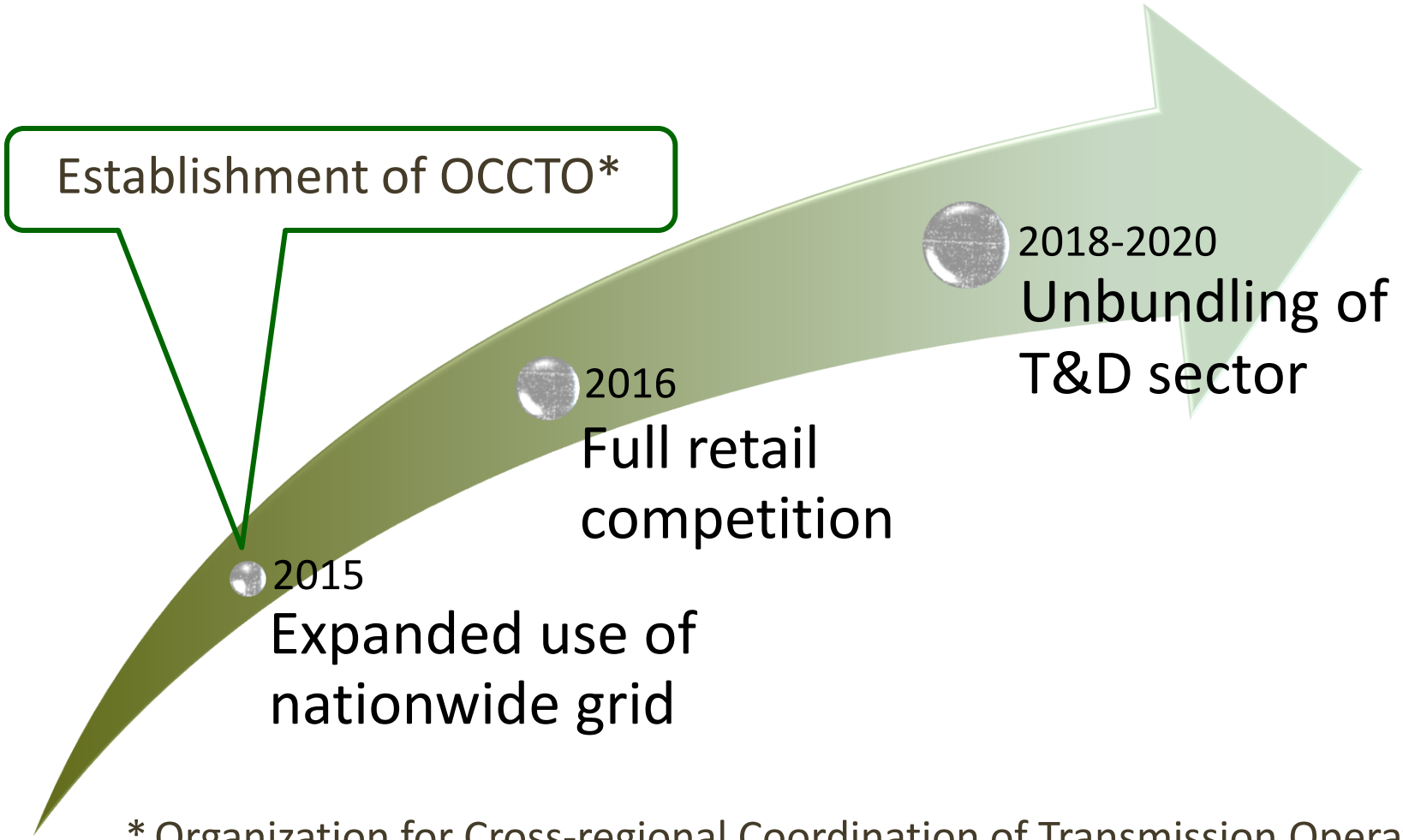
Recent Developments in Japan



Smart Meters in Japan



Electricity Reform in Japan



* Organization for Cross-regional Coordination of Transmission Operators

Source: METI

Why Do We Need Smart Communities?

Great East Japan Earthquake

Regional energy security

Promotion of energy savings

Expectations for Smart Communities in Japan

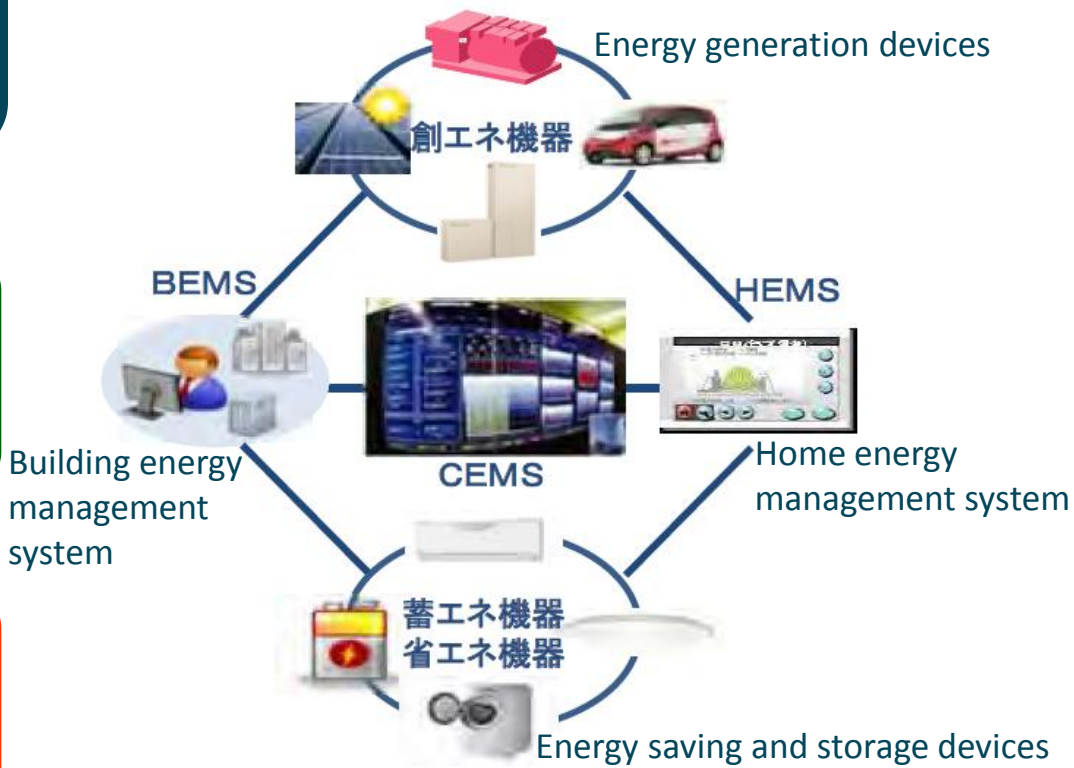
Efficient energy supply:
Supply and demand controlled by encouraging user awareness

At normal times

Energy savings:
Energy use optimization without sacrificing comfort

In an emergency

Securing energy supply:
Renewable energy, cogeneration, etc.



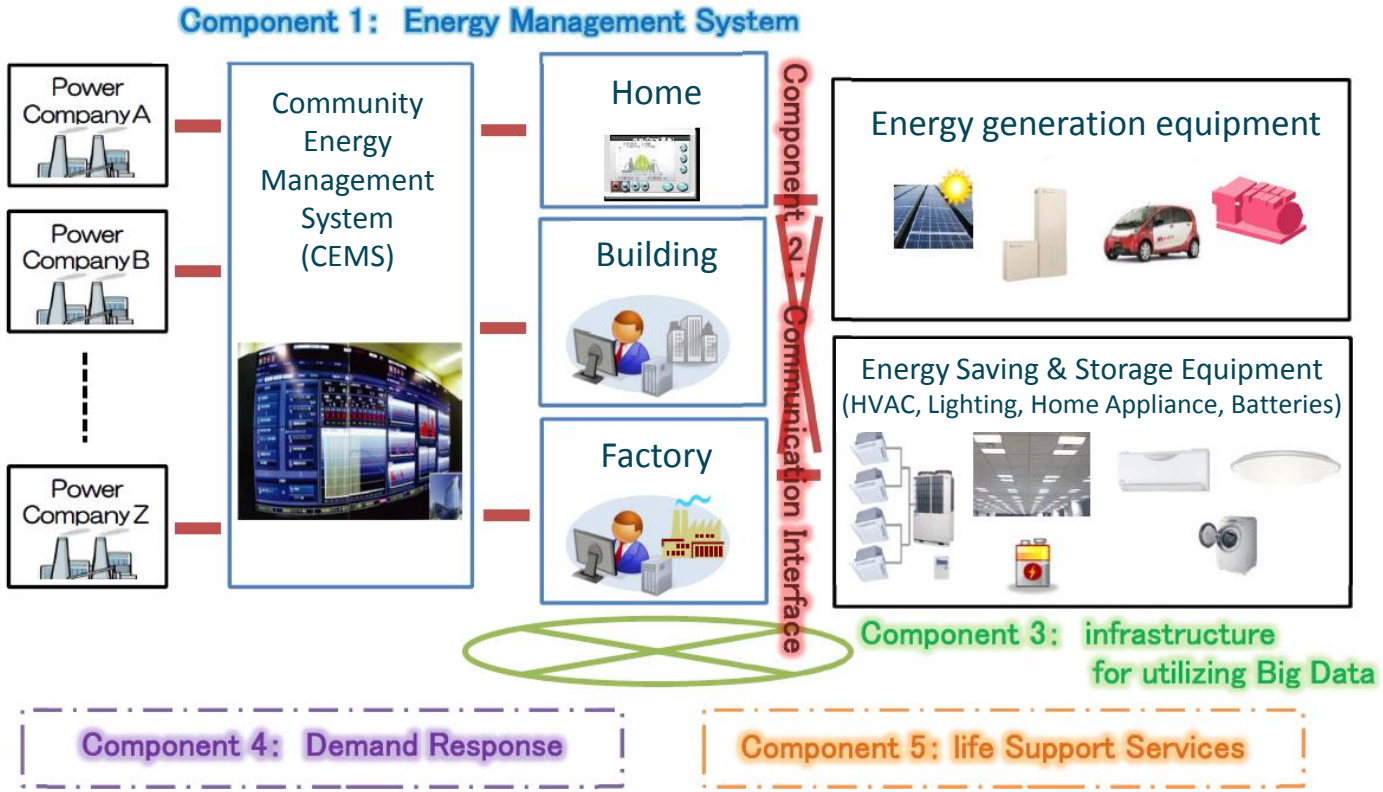
Source: METI

Energy Management Is One Key Enabler

1. Energy Management System **2. Communication Interface**

3. Infrastructure for Utilizing Big Data

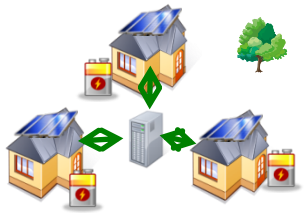
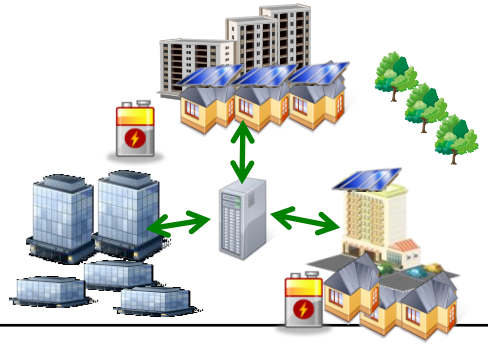
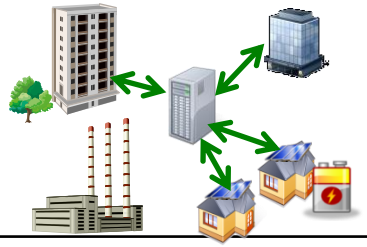
4. Demand Response **5. Life Support Services**



Source: METI

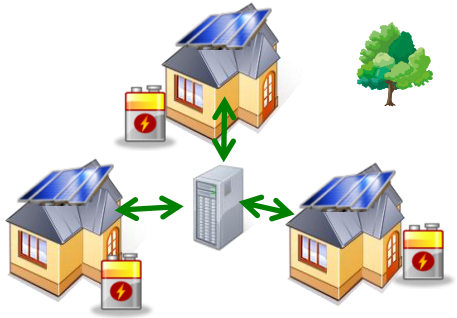
Smart Communities in Japan

Four Categories of Customers

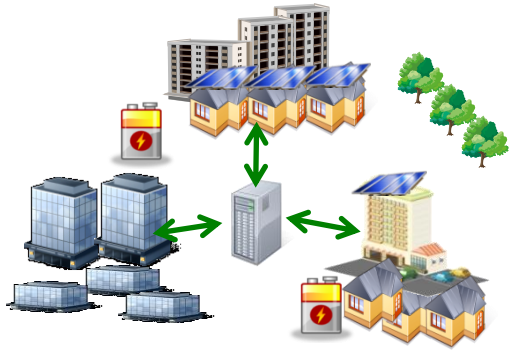
	Single sector (homes)	Multiple sectors (integrated control)
High grid dependence	**Housing subdivision** 	**Metropolis** 
Low grid dependence	**Detached housing with EVs** 	**Local community** 

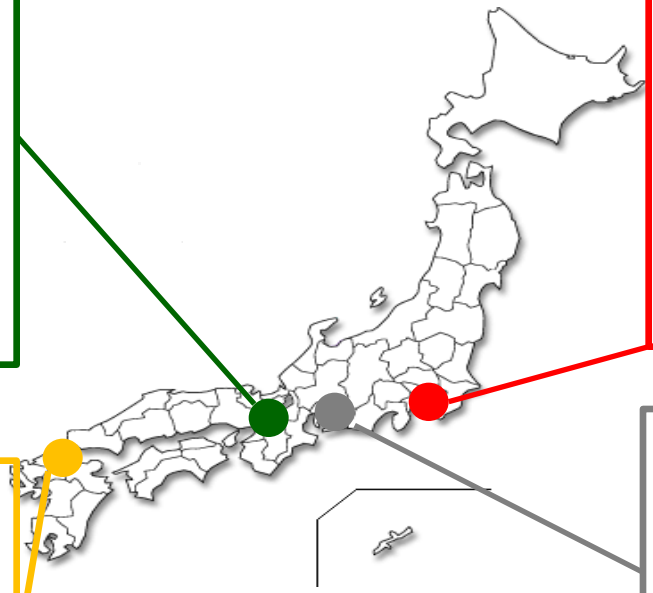
Four Major Demonstration Projects in Japan

Keihanna Science City

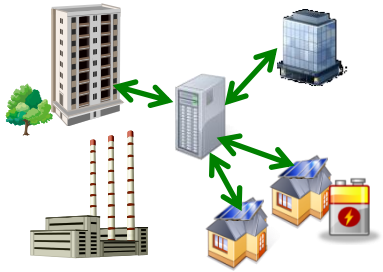


Yokohama City





Kitakyushu City



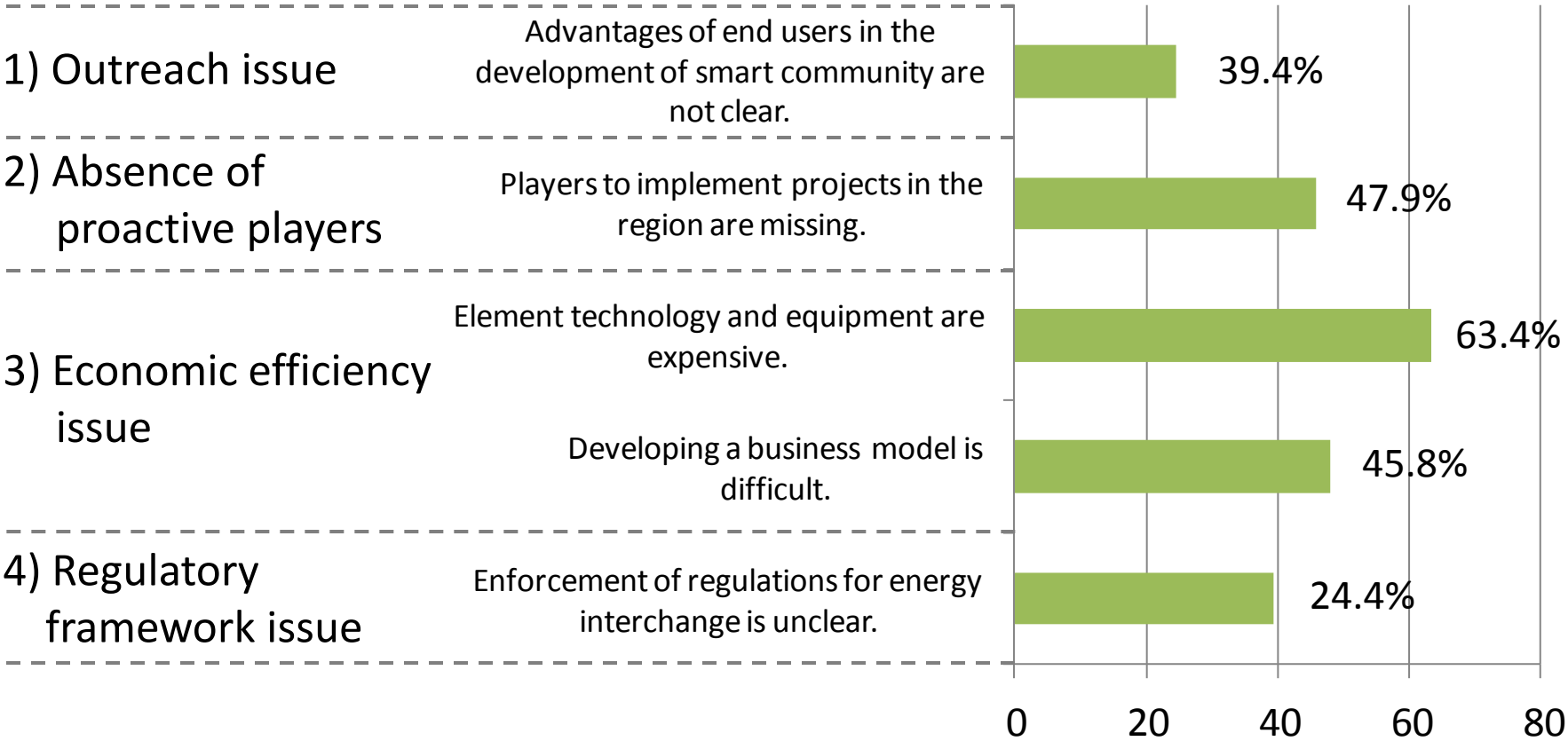
Toyota City

Results of Four Major Demonstration Projects

Region	Number of participating households by groups	Peak shaving results
Yokohama	Control: 400 CPP*: 800	✓ 15.2% in summer 2013
Toyota	Control: 80 CPP: 80	✓ 15% in winter 2012 ✓ 11% in summer 2013 ✓ 10% in winter 2013
Keihanna	Control: 300 CPP: 381	✓ 22.4% in summer 2012 ✓ 21.3% in winter 2012 ✓ 14.7% in summer 2013 ✓ 20.1% in winter 2013
Kitakyushu	Control: 68 CPP: 120	✓ 13.1% in summer 2012 ✓ 12.0% in winter 2012 ✓ 10.1% in summer 2013

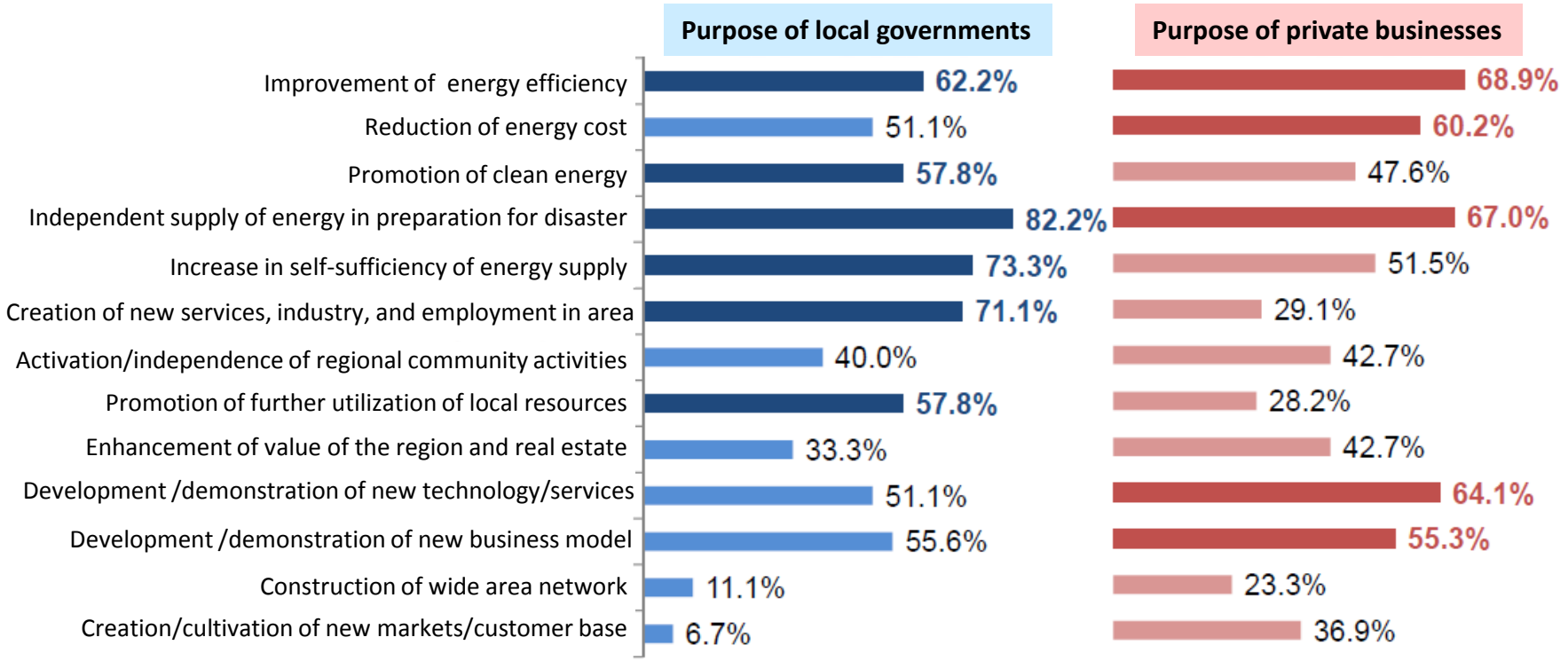
* Critical Peak Pricing

Challenges in Building a Smart Community



Source: METI

Purpose of Participating in Smart Community Project



Source: METI

Lessons Learned

1. Social understanding and interest in smart communities have not been sufficiently promoted.

2. Players to implement projects in the region are missing.

3. Element technology and equipment are expensive.

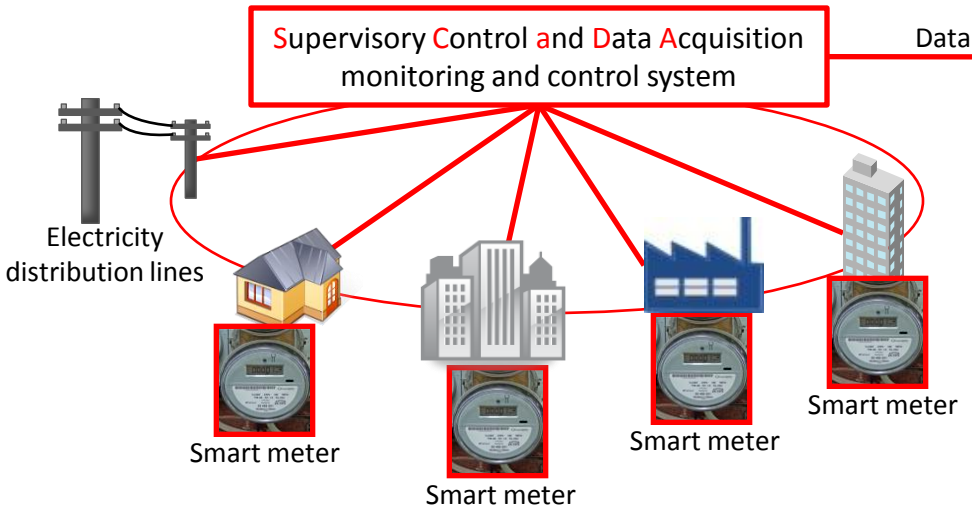
4. Regulatory framework is not clear.

Smart Community Development Needs

- Further promotion of technological development, especially for integrating renewable energy
- Involvement of consumers for further savings
- Creation of market environment where new businesses can play roles
- International sharing of best practices needed

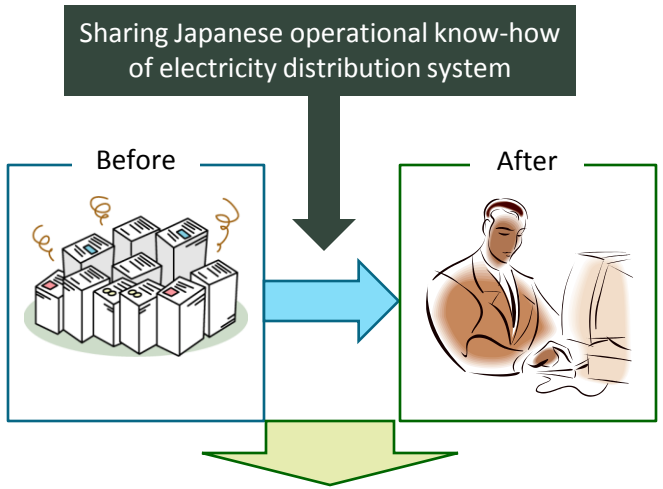
Feasibility Study for a Smart Community Project in Haryana

Smart community demonstration



1. Demonstration of peak load reduction technology
2. Demonstration of grid monitoring and control technology
3. Demonstration of prevention technologies for stealing electricity, alteration of electricity metering, omission of fee collection

Capacity building



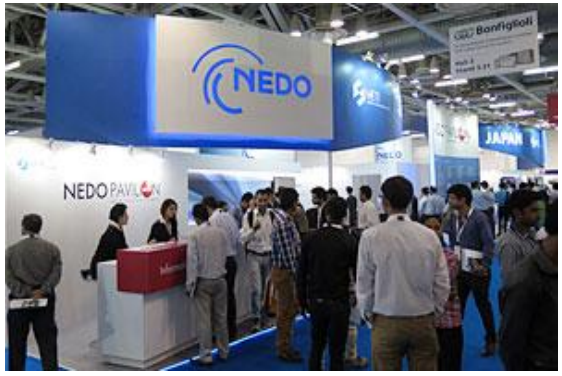
1. Reducing electricity distribution loss
2. reducing failure rate of pole transformers
3. Reducing frequency of power failure

Indian company: Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL)
Japanese companies: FUJI ELECTRIC CO., LTD., Sumitomo Electric Industries, Ltd., and THE Power Grid Solution Ltd.

Ongoing Collaboration with India

Collaboration with Andhra Pradesh since 2014

Collaboration with Confederation of Indian Industry since 2013



India-Japan Energy Forum since 2006

Collaborative Projects in India

Energy management systems in Telecom Towers (62 sites, ongoing)

Solar power microgrid system (ongoing)

Electronic equipment recycling system (ongoing)

Dual-fuel generation system(2008-2011)

High-performance industrial furnace (preparatory stage)

Capacity building project (2009-2011)

Smart grid project (preparatory stage)

Coke dry quenching system (2006-2011)

Waste heat recovery system for a Steel Plant (2008-2014)

Highly efficient coal preparation system (2008-2014)

Sinter cooler waste heat recovery system (2009-2014)

Waste heat recovery system for a cement plant (2001-2004)

Energy center for a steel plant (preparatory stage)

Organiser

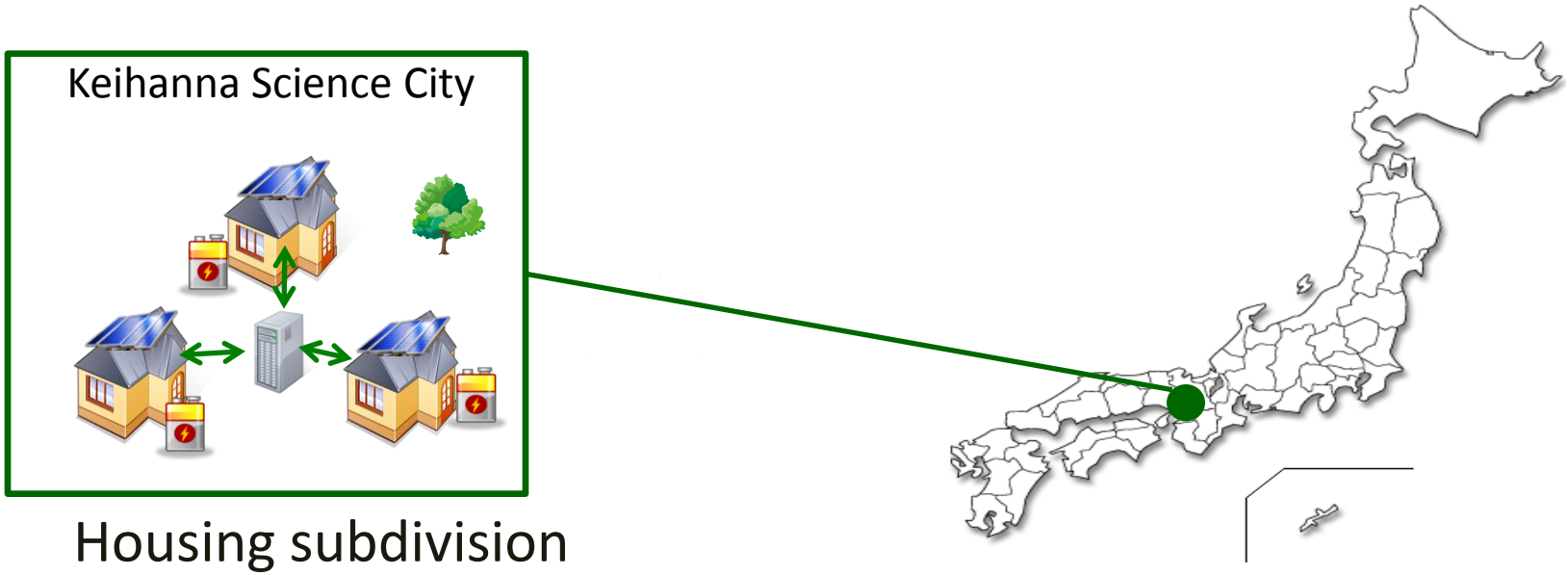
ISGF 20

India Smart Grid Forum

Thank you. Let’s talk!

Dr. Hiroshi Kuniyoshi
Executive Director
NEDO

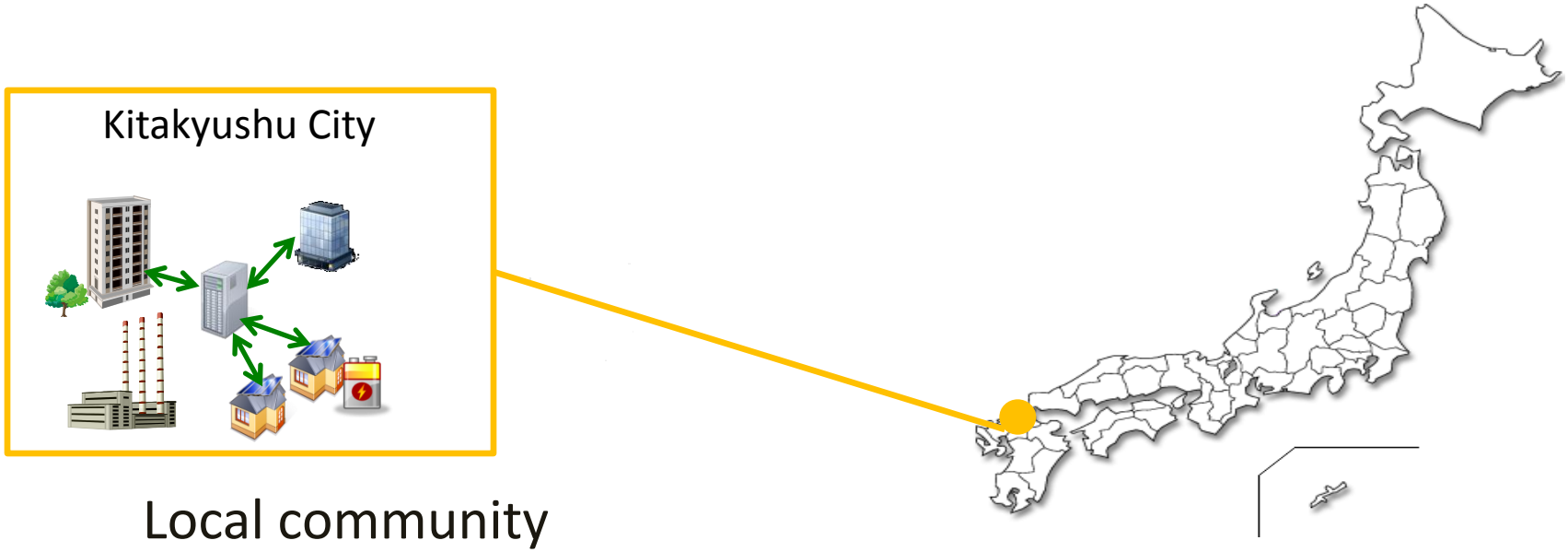
Four Major Demonstration Projects in Japan (1)



Housing subdivision

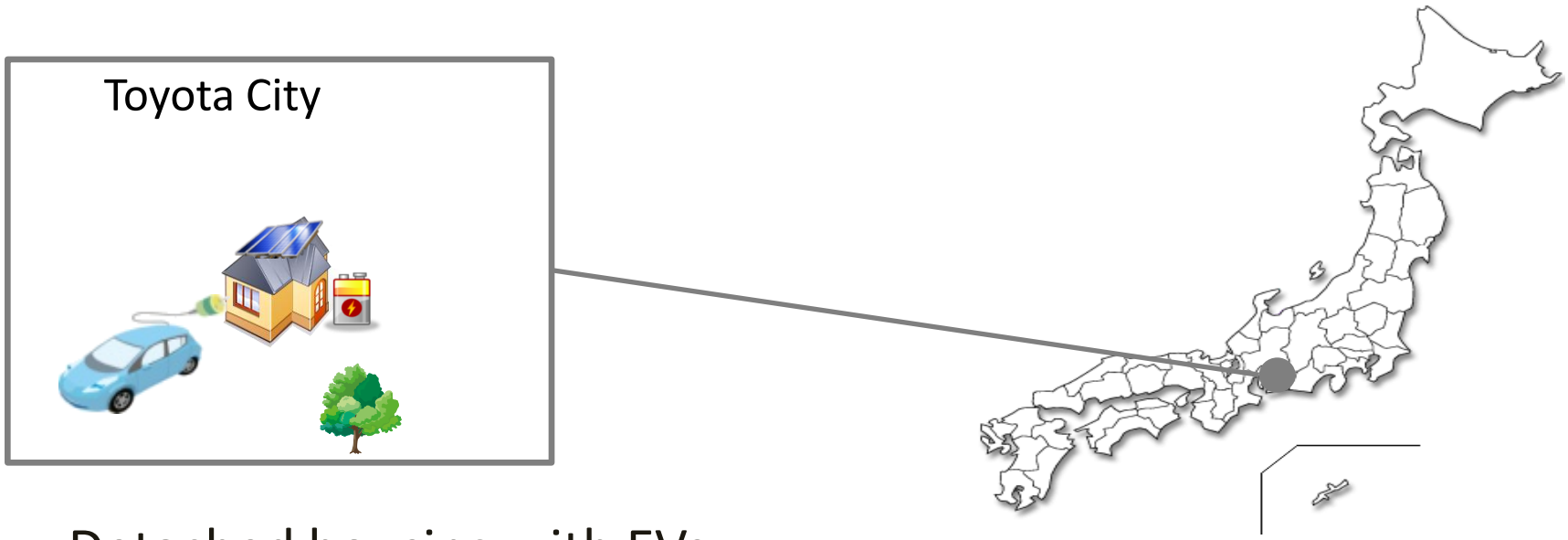
- Demand-side management of load (700 households)
- Energy-saving consultations
- Kansai Electric Power Company, Mitsubishi Electric Company, and Mitsubishi Heavy Industries

Four Major Demonstration Projects in Japan (2)



- Cogeneration plant as base load station
- Smart meter used for real time pricing (180 customers)
- Fuji Electric Co., Nippon Steel and Sumitomo Metal Corporation

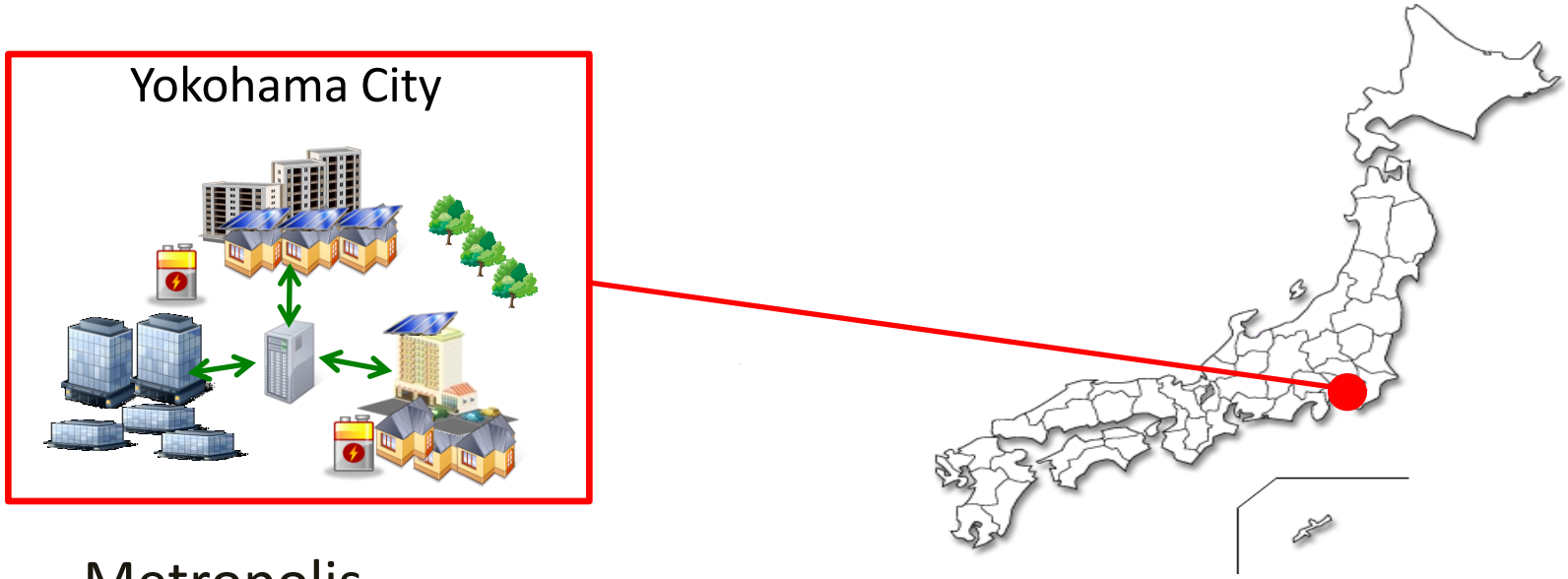
Four Major Demonstration Projects in Japan (3)



Detached housing with EVs

- Automatic control of home appliances in 67 homes
- Next-generation transportation system with next-generation vehicles from Toyota Motor Corporation and Chubu Electric Power Company

Four Major Demonstration Projects in Japan (4)



Metropolis

- Energy management system for 4,000 households and 10 large buildings
- VPP through integrated management of large storage batteries using technologies from Toshiba and Tokyo Electric Power Company