

Smart Homes & Cleanpower 2013

Integrated Smart Energy

A Strategy for Social Innovation

5 November 2013

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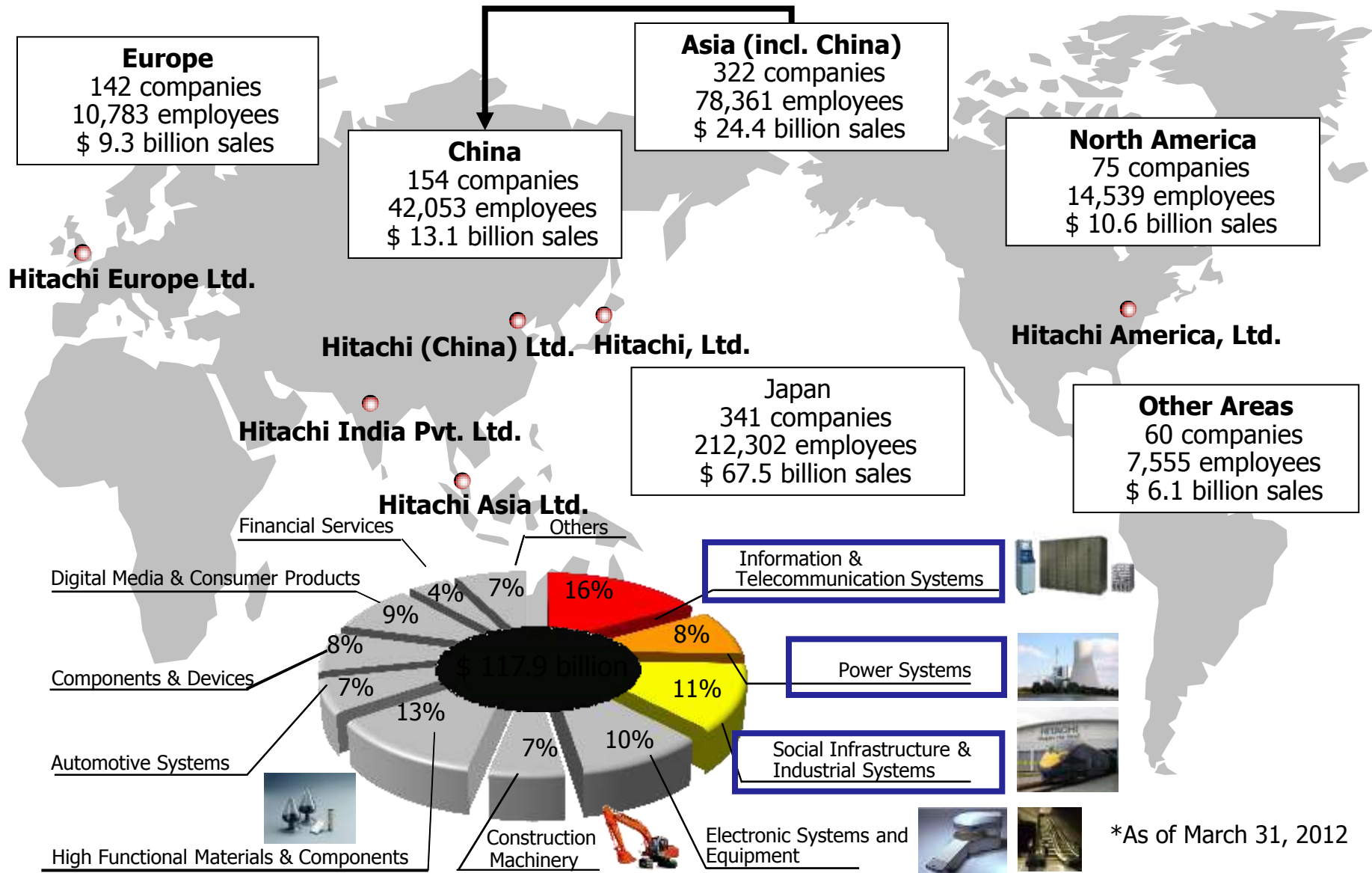
Smart Cities Energy Group
Hitachi Europe Limited

Contents

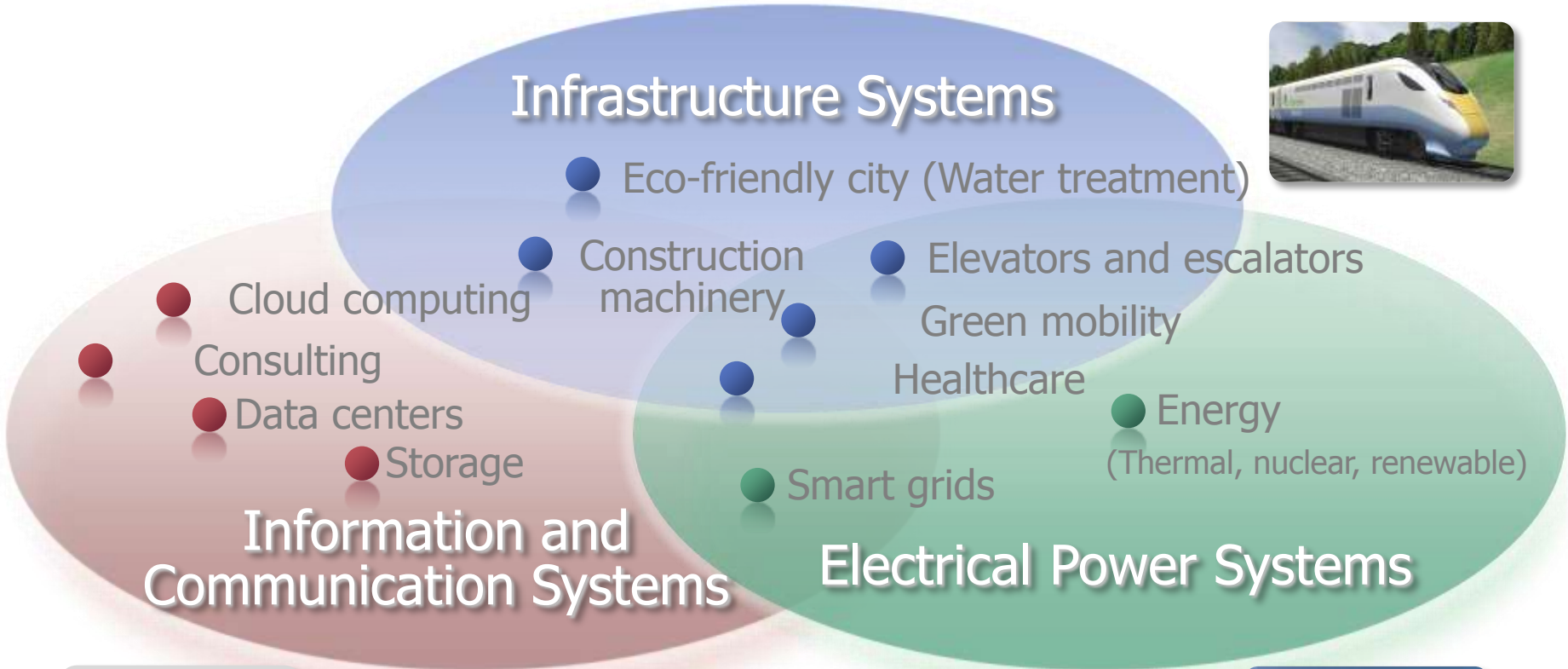
- 1. An introduction to Hitachi**
- 2. The Smart Communities Concept**
- 3. Demonstration Projects**

1. An introduction to Hitachi

1-1 Overview of Hitachi Group



*As of March 31, 2012

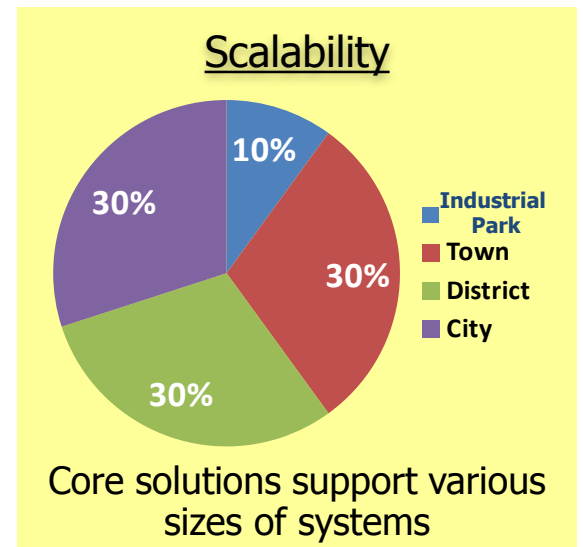
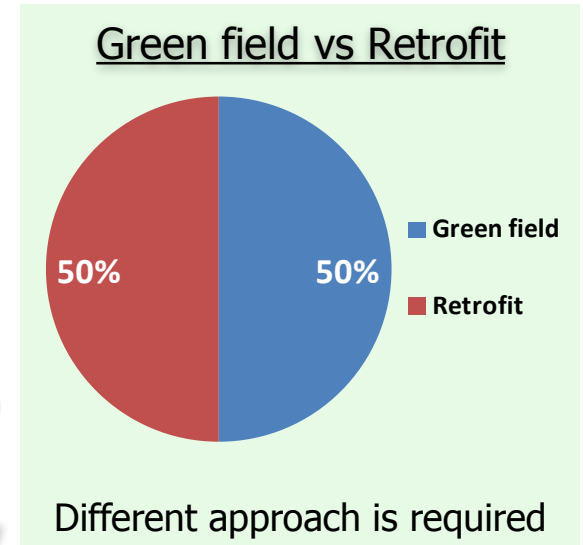


**As a leading global company,
Hitachi provides multiple solutions
within "Social Innovation Areas"**

2. The Smart Communities Concept

2-1 Hitachi's Smart Community Solutions Concept **HITACHI** Inspire the Next

Smart Communities vary in size and character, but are based on a common concept of city management and services enabled by an IT infrastructure



Key Factors for Evolution of Smart Community

1 Sustainability (Scalability)

- Step-by-step expansion/upgrade with **non-stop operation**
- Expanding target systems and **Optimisation of all systems**

2 Interoperability (Flexibility)

- Connection and cooperation among various systems
- Stable management of various systems

3 Reliability

- Normal time : Comfortable usage
- Emergency time : Non-stop operation
- Share and use information safely and comfortably

4 Security

- Protection of information assets in system as a whole
- Cope with change of security standards



Renovation & Development

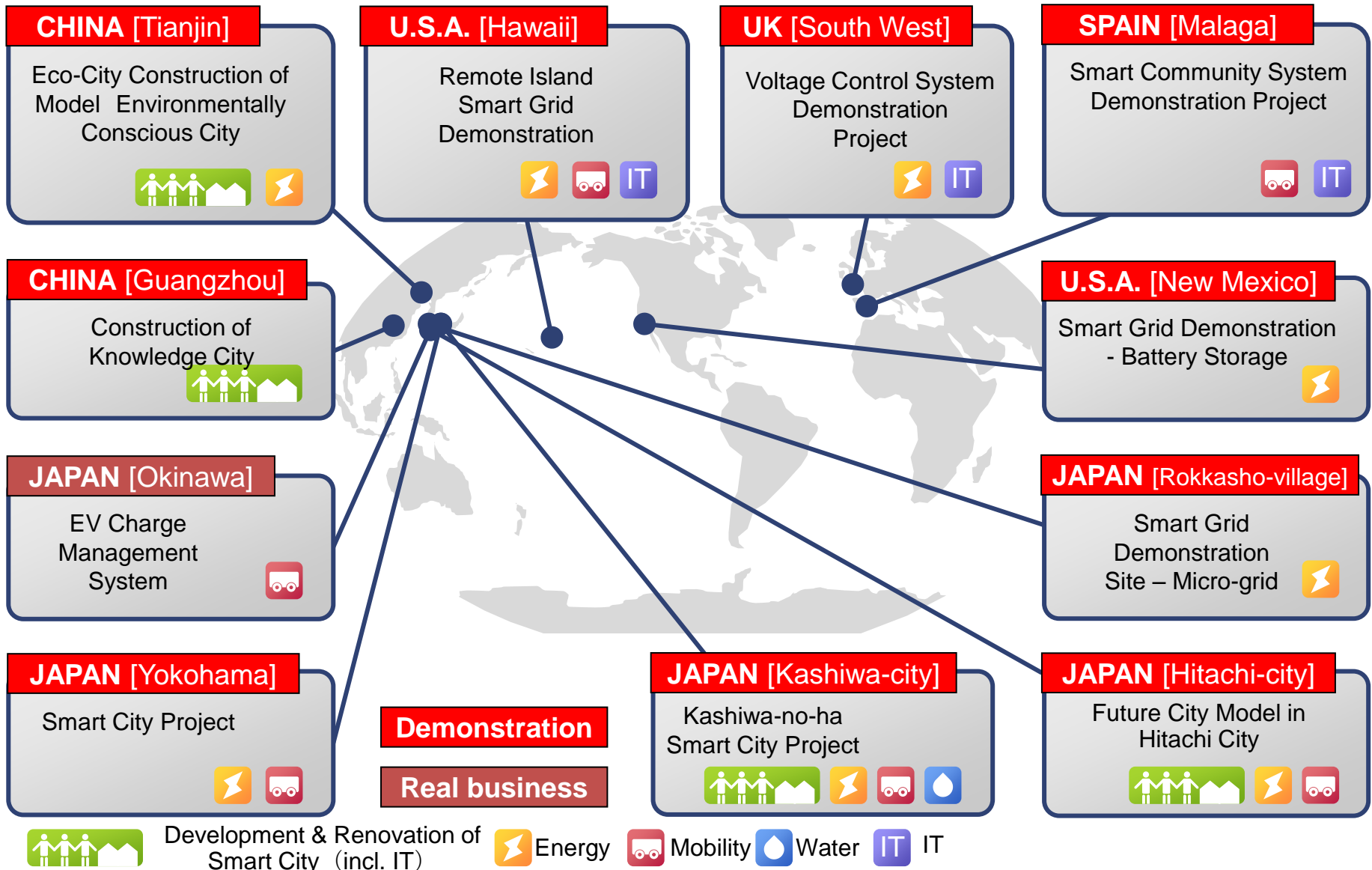
Growing

Basic models

Basic models established through small scale demonstrations

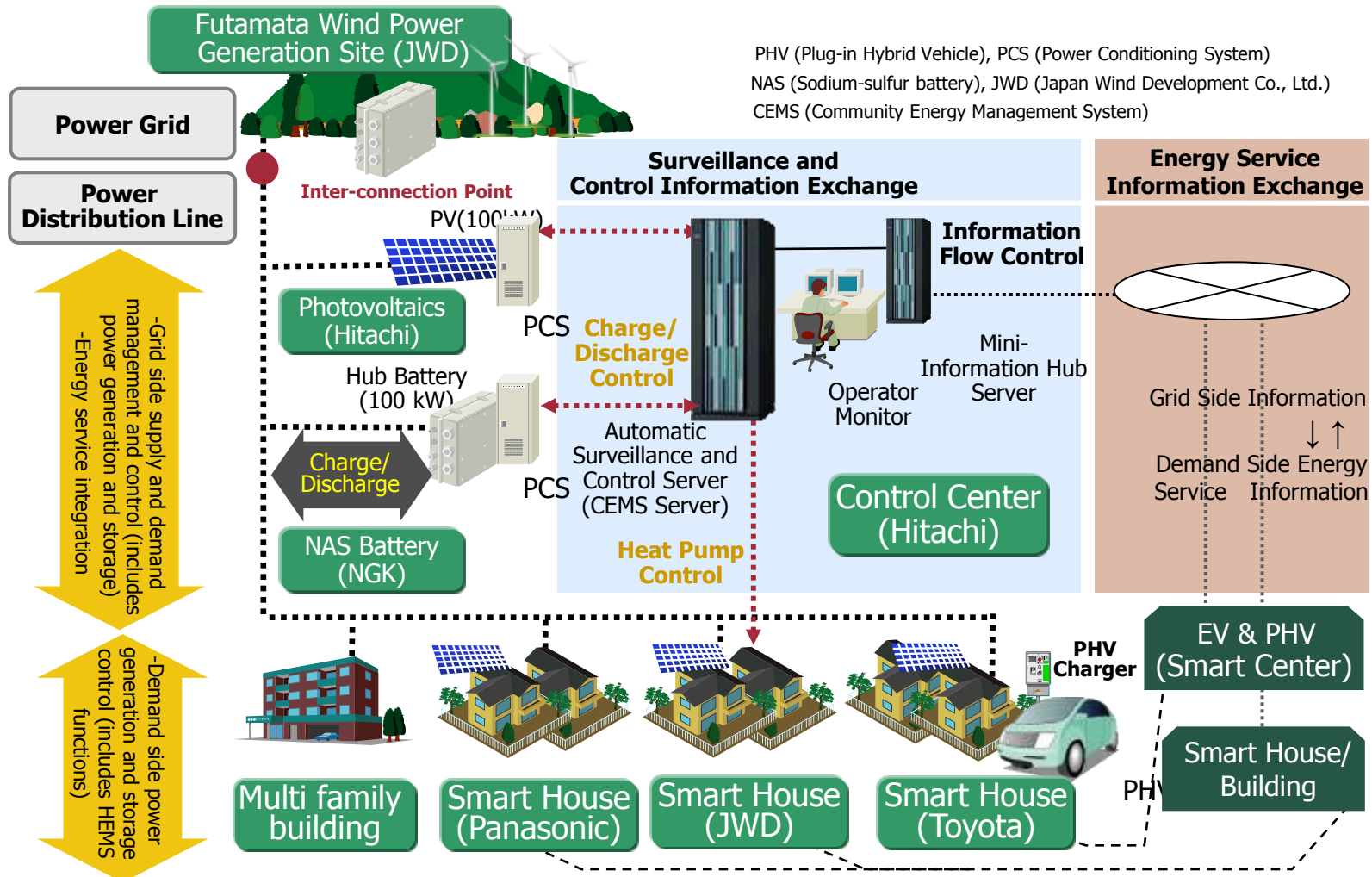
3. Demonstration Projects

3-1 Hitachi's Global Smart Communities Activities



3-2 Rokkasho Village Project

Community Energy Management System (C-EMS) provides an integrated optimization system for mid-size and individual renewable energy generation, community energy storage, and Smart houses including HEMS and Plug-in Hybrid cars. C-EMS helps create a 100% CO₂-free community. (Commenced Sep. 2010)

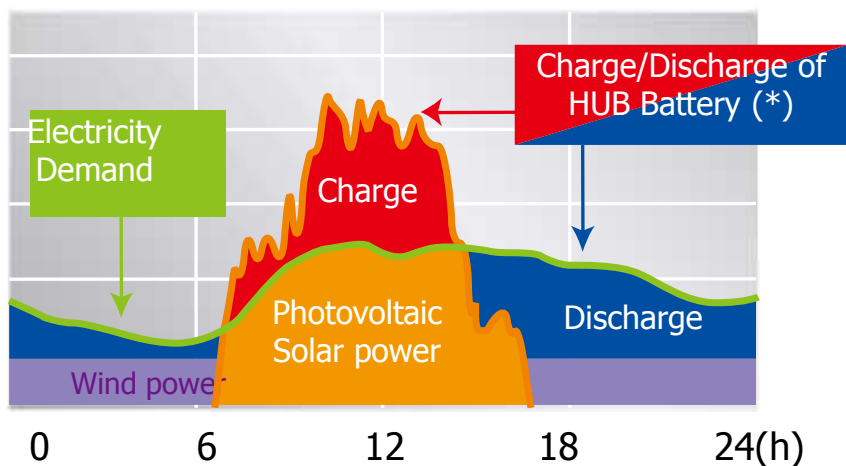


PHV (Plug-in Hybrid Vehicle), PCS (Power Conditioning System)
NAS (Sodium-sulfur battery), JWD (Japan Wind Development Co., Ltd.)
CEMS (Community Energy Management System)

The model for Supply and Demand balance control

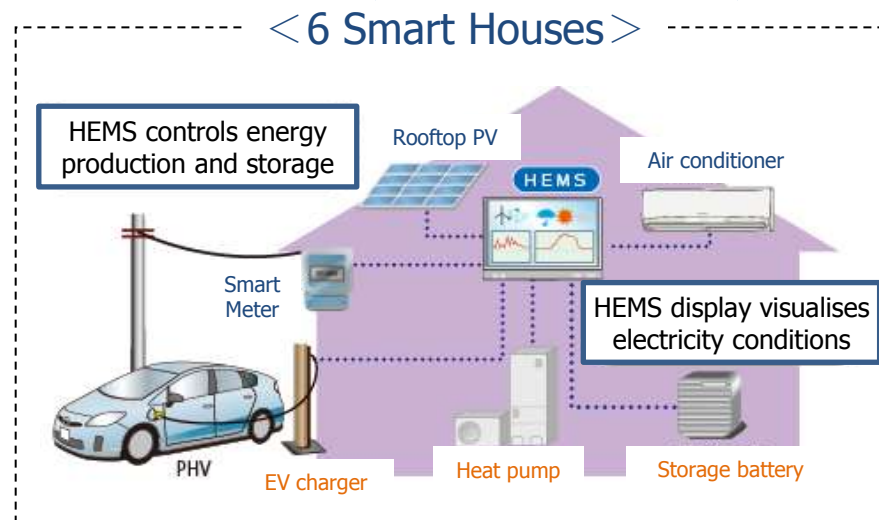


< a case of energy demand and supply >



(*) Assumption for reducing battery capacity:
Includes hub battery and demand-side control (i.e. Heat Pump and PHV charging), these are key to reducing battery cost (= capacity)

HEMS: Home Energy Management System
DER: Distributed Energy Resources

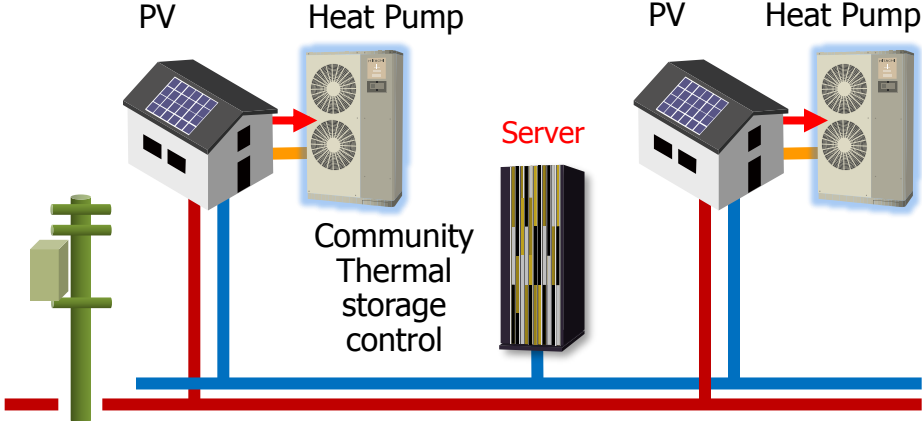


- Each company (Japan Wind Development, Toyota, Panasonic Corp) built 2 houses and introduced their own equipment for demonstration
 - HEMS controls DER, e.g. wind turbine, PV and energy storage

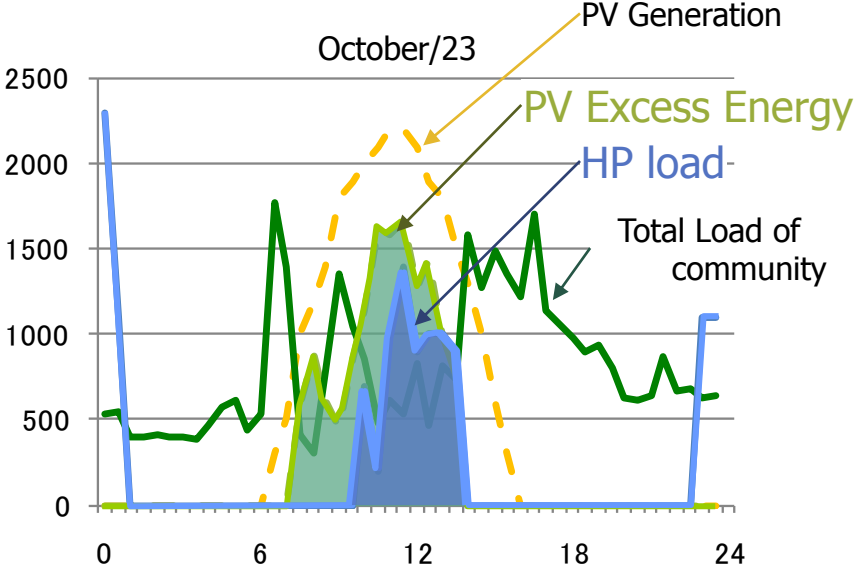
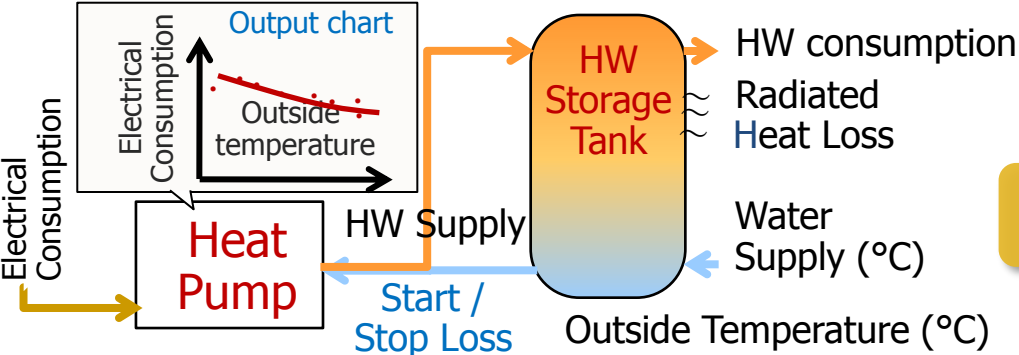
3-4 Rokkasho Village Results

Direct Load Control function controls Heat Pumps together with PV generation prediction. These functions convert electricity into hot water which is then stored in a tank.

DLC Load Shift for a group of HPs



Heat Pump control parameter



50.1% of Excess Energy consumed

The figure would be 24.5% with DLC Load Shift for individual HPs

Self-sufficiency ratio = 83%

The figure of DLC load shift for individual HPs is calculated by simulation

ETI Smart Systems & Heat Programme



Launched in April 2012, the focus of the programme is the design, development and demonstration of a first-of-a-kind energy system aligned with the needs of UK consumers in the domestic and small commercial sectors with a particular focus on heat delivery. Hitachi is a Programme Associate.

There are four key themes:

- Understanding real mass-market consumer behaviour in order to design and communicate effective service products
- Providing energy services and integrated products to consumers in domestic and commercial buildings (primarily domestic & retrofit)
- Space and water heating – but including other energy service needs in or connected to buildings
- Understanding the evolution of the whole energy system out to 2050, including building retrofits and energy distribution choices

ETI Smart Systems & Heat Programme



- Budget of £100mil allocated over 5 years, culminating into the demonstration of a first of its kind Smart Energy System in the UK
- Hitachi is involved in the delivery of several WAs awarded through open competitive tendering:

WA1.1 – Enabling Technologies

HITACHI
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elementenergy

Imperial College
London

+ other
sub-
contractors

WA3.1 – Data Management and Overall System Architecture

HITACHI
Inspire the Next

+ other
sub-
contractors

WA5 – Consumer Response and Behaviour



frontier
economics



NatCen
Social Research that works for society

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END

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