

Introduction of Kansai's “New Metering System” (AMI)

 **THE KANSAI ELECTRIC
POWER CO., INC.**

August 24, 2011

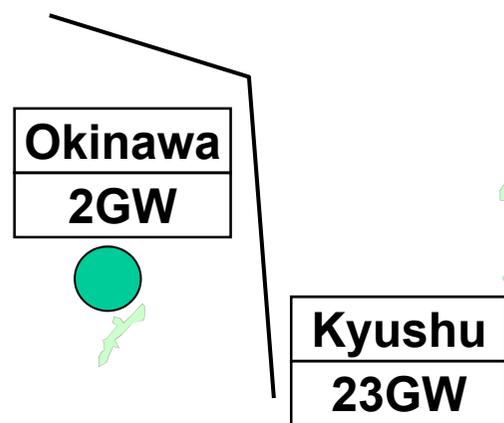
1. Overview of KEPCO

There are 10 utility companies.

All companies:

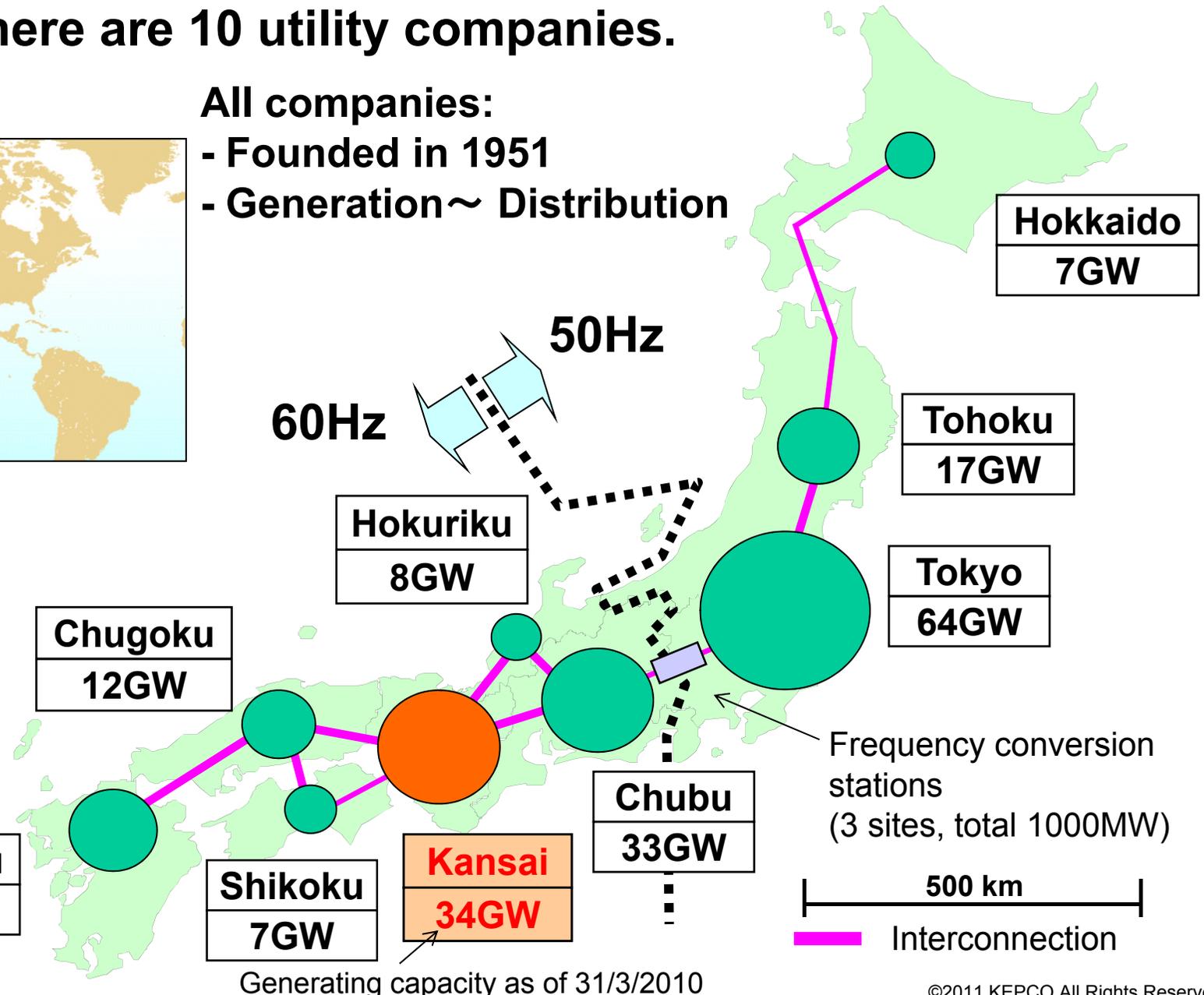
- Founded in 1951
- Generation ~ Distribution

Japan



Total: 207GW

Generating capacity as of 31/3/2010



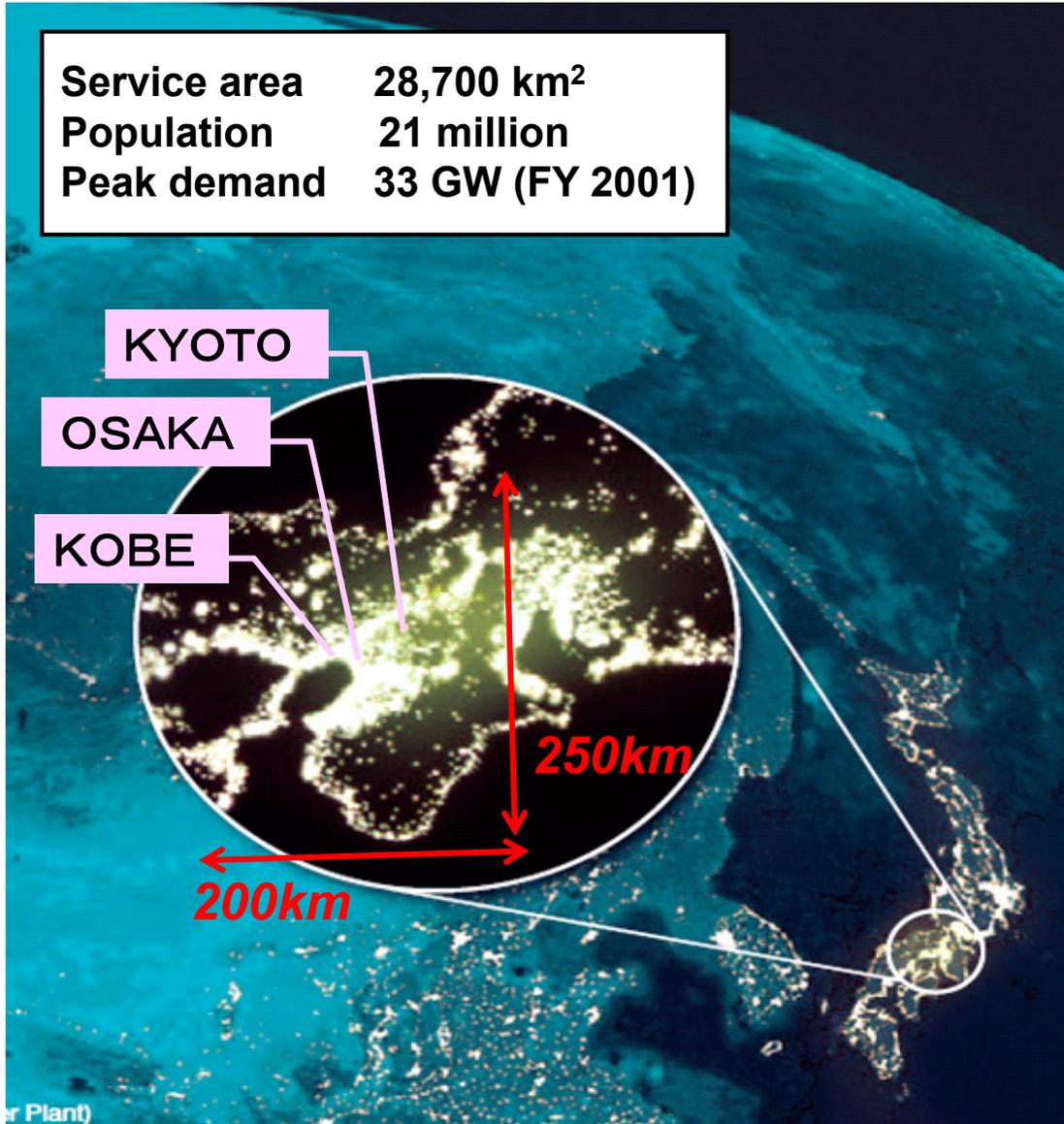
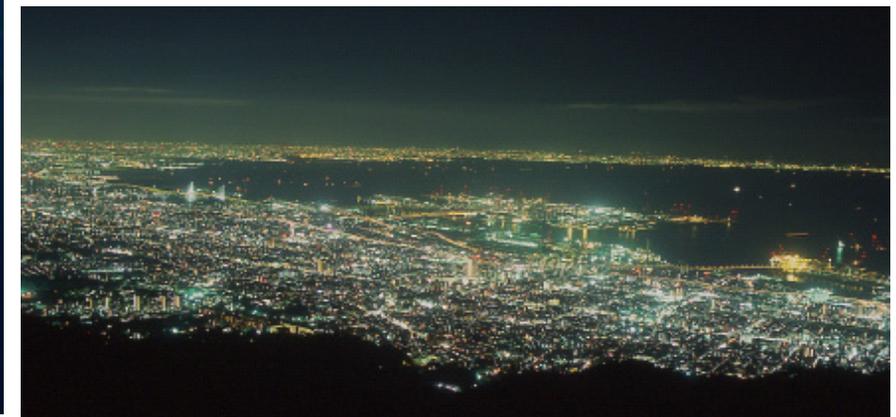
<Company profile>

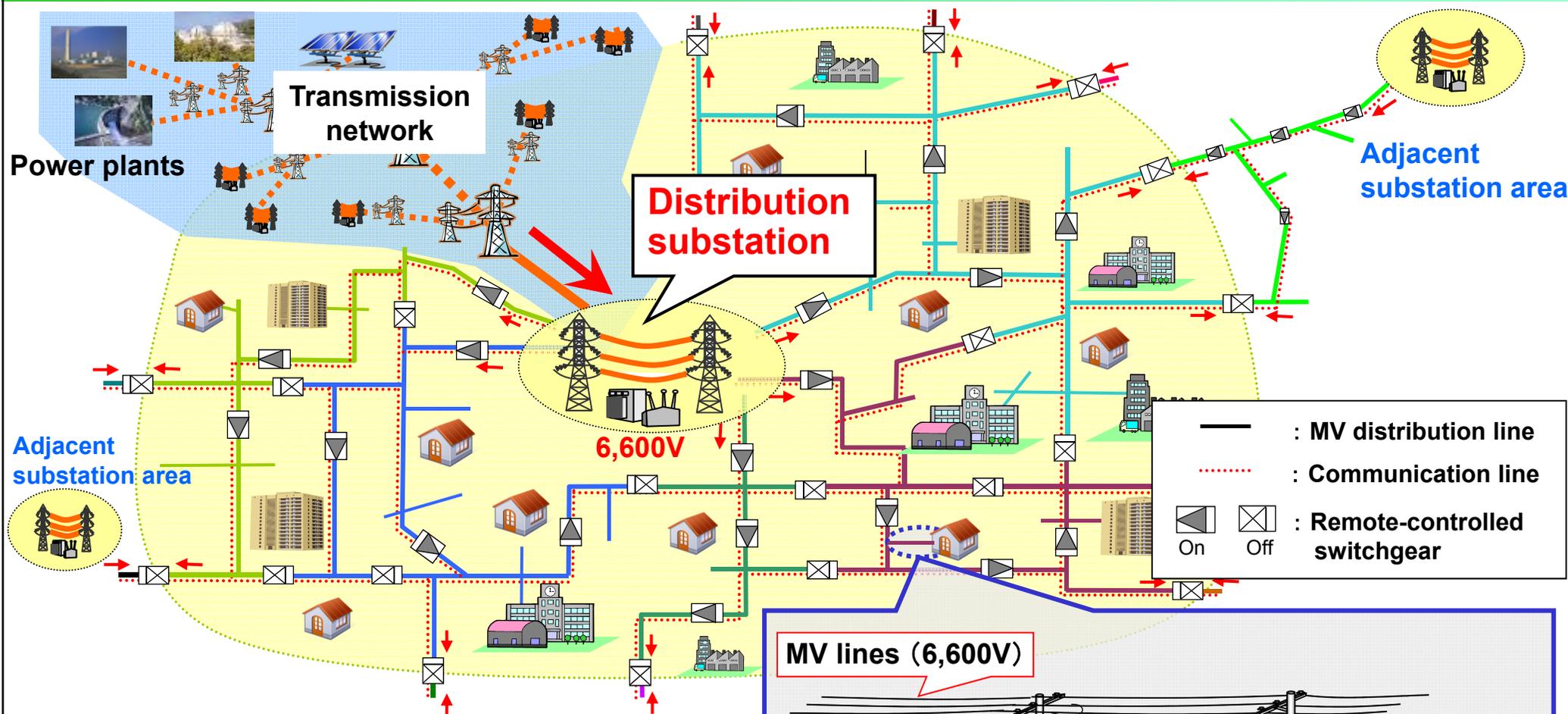
Corporate data

*FY 2009

Capital	5,259 mil USD
Revenue	28,016 mil USD
Sales volume	145,867 GWh

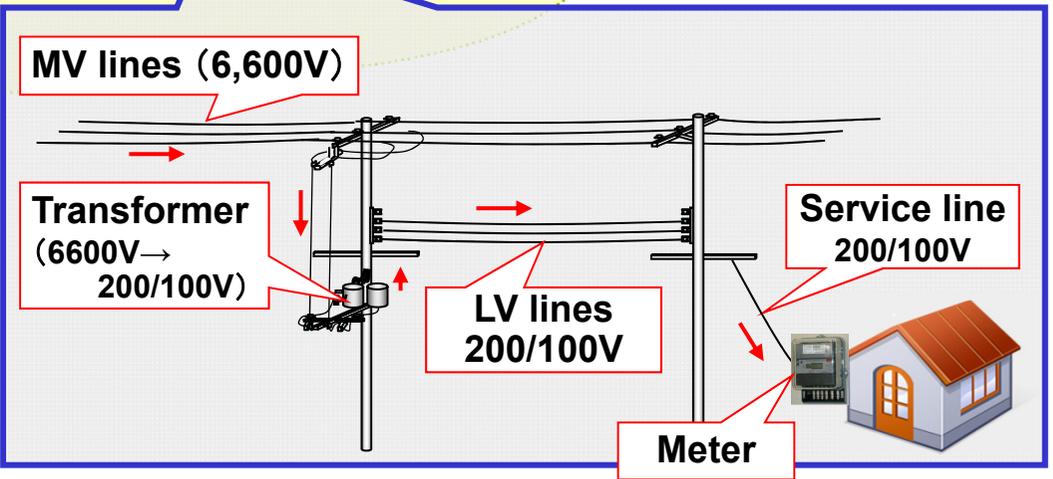
Having over 13 million customers in Kansai Area, including big cities such as Osaka, Kyoto and Kobe.



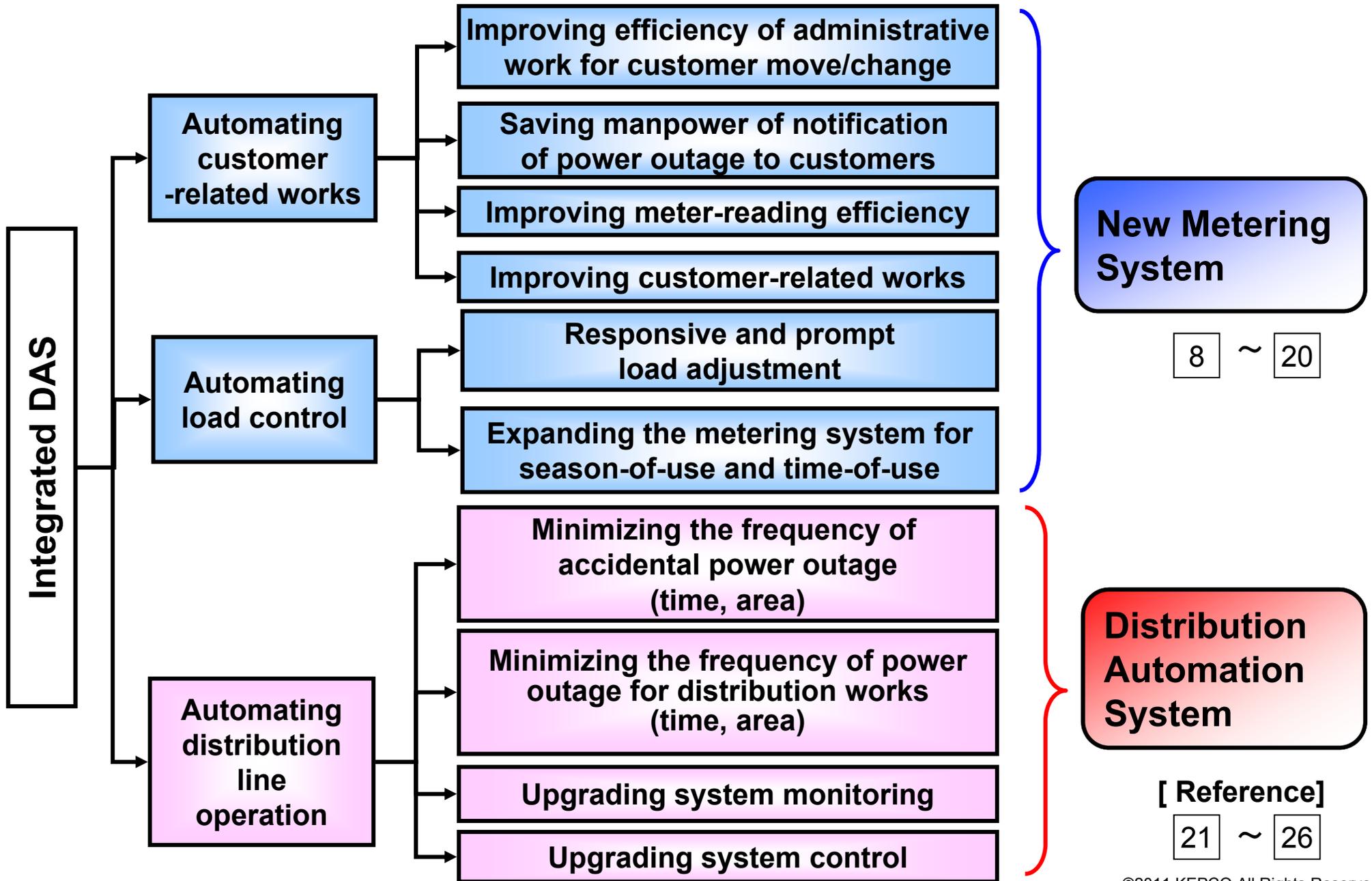


<KEPCO's facilities>

Distribution (# of feeders)	: 13.5 thousand
Lines (total length)	: 127 thousand [km]
Utility poles	: 2.6 million
Remote-controlled SWs	: 101 thousand
Meters	: 13 million



2. KEPCO's Integrated DAS Strategy



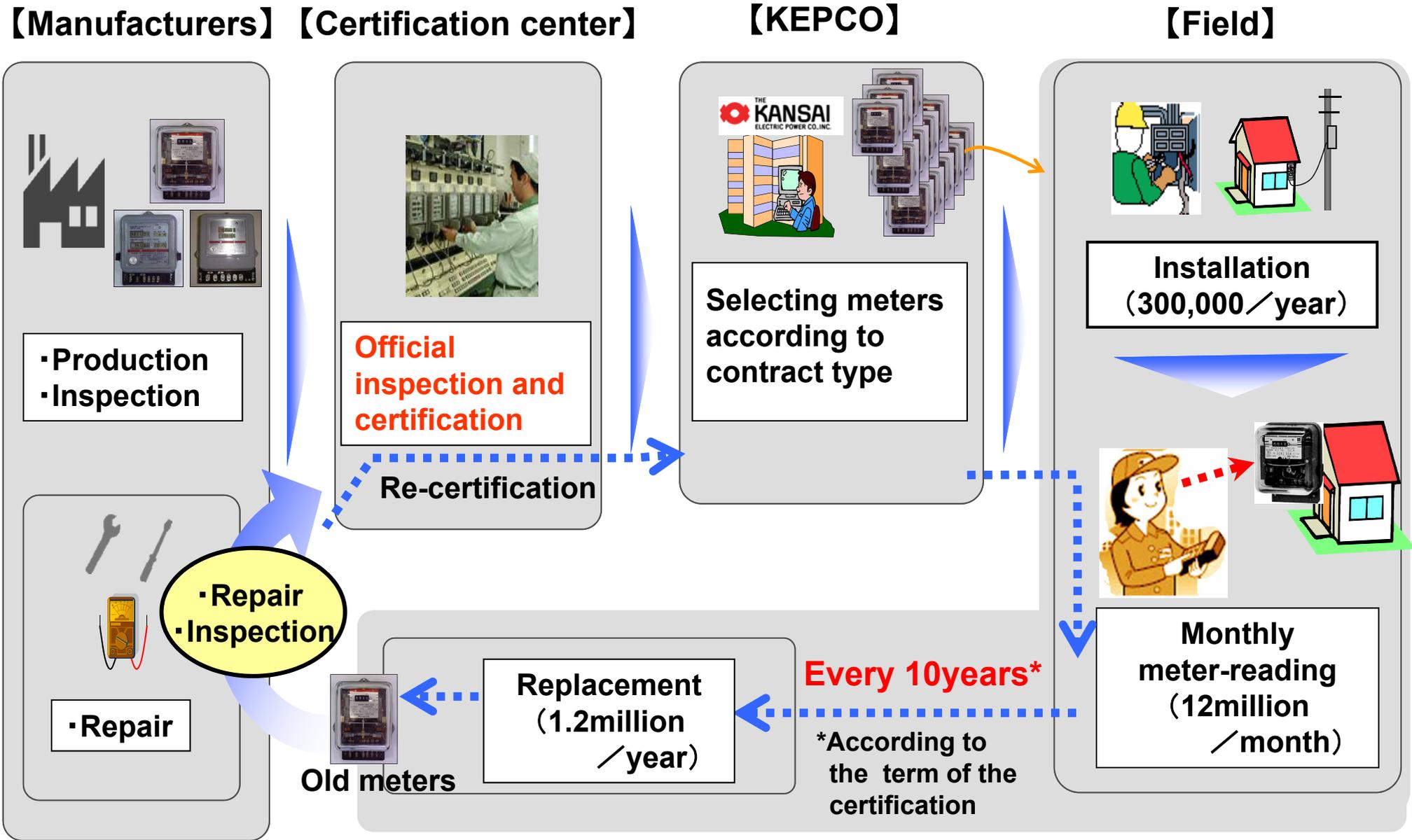
New Metering System

8 ~ 20

Distribution Automation System

[Reference]
21 ~ 26

3. New Metering System (AMI)



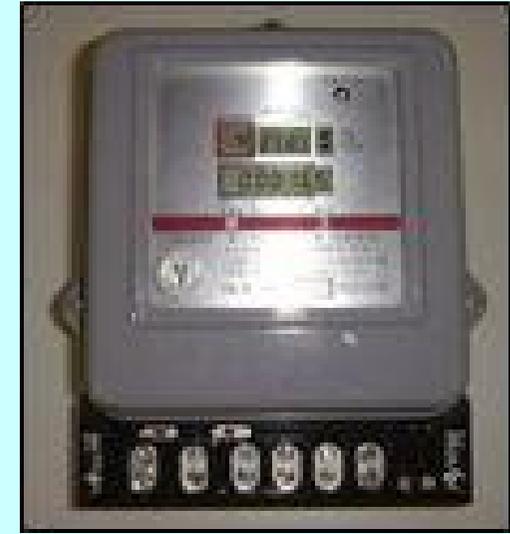
() : Data as of FY2009



- For the contract with single rate



- For the time-of-use (TOU) contract (with two-time bands)



- For the contract with different rate according to the time, day of week and seasons of use (TOU with 4-time bands)
- Calendar is installed

- In order to improve the level of customer services, we have introduced TOU menus, which require dedicated meters.
- The calendar installed in meters needs to be updated, when national holidays are changed.

【Manufacturers】

【Certification center】

【KEPCO】

【Field】



- Production
- Inspection



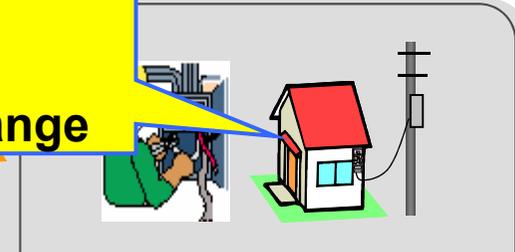
Official inspection certification

[Meters]
Necessity of replacement according to contract change



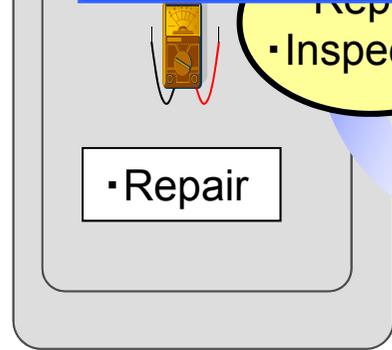
[Contract & Accounting]

- Termination of electric power supply to a bad-payment customer
- Update of internal calendar-setting corresponding to the change of national holidays, etc.



Installation (300,000/year)

[Meters]
Replacement work on live-line induces injury risks for line-man



- Repair
- Inspection



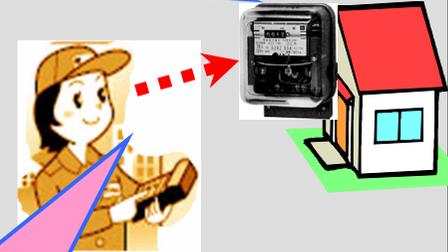
Old meters

Replacement (1.2million/year)

Every 10 years

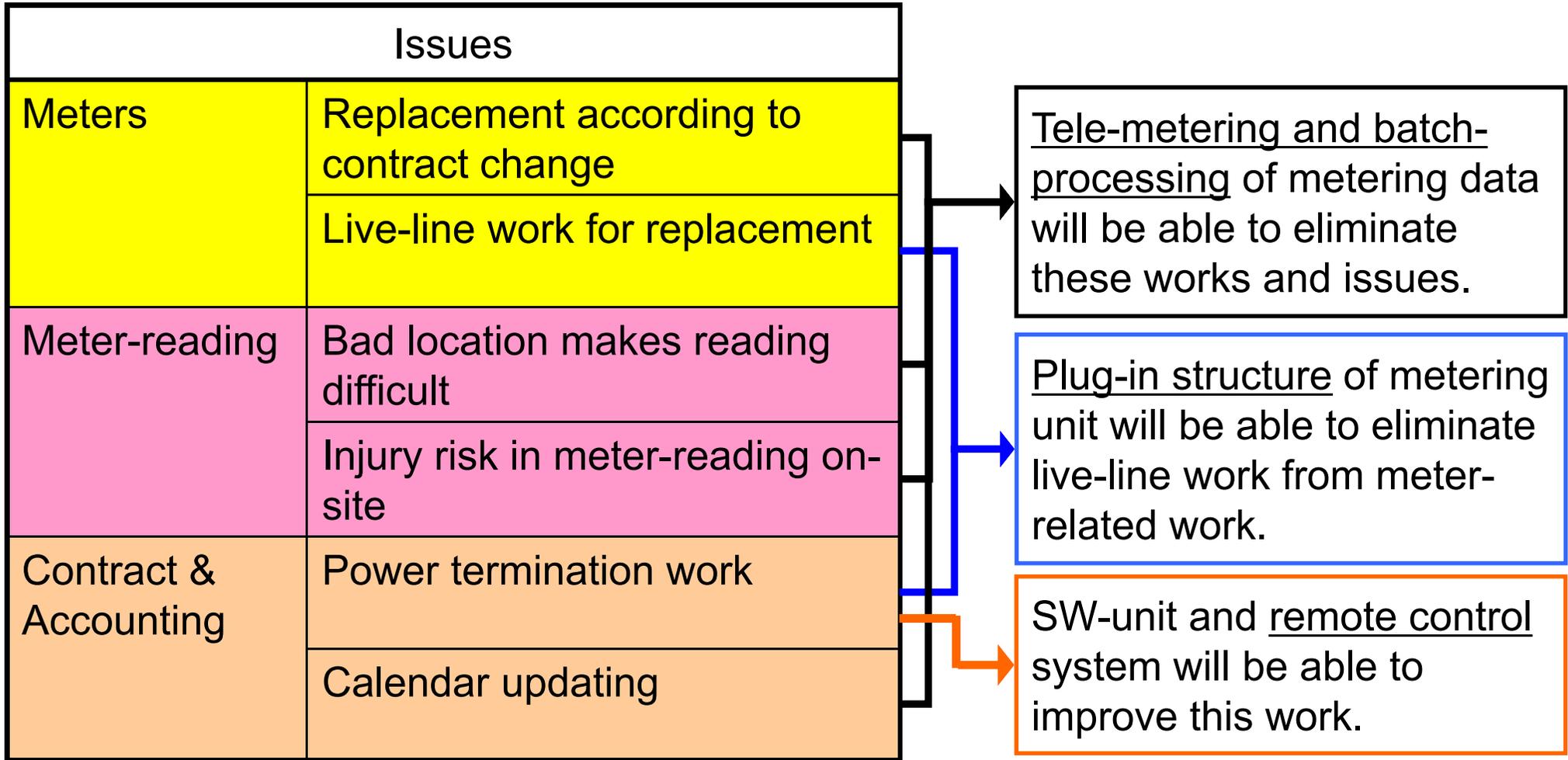
[Meter-Reading]

- Bad location of meter makes reading difficult
- Injury risk in reading meters on-site

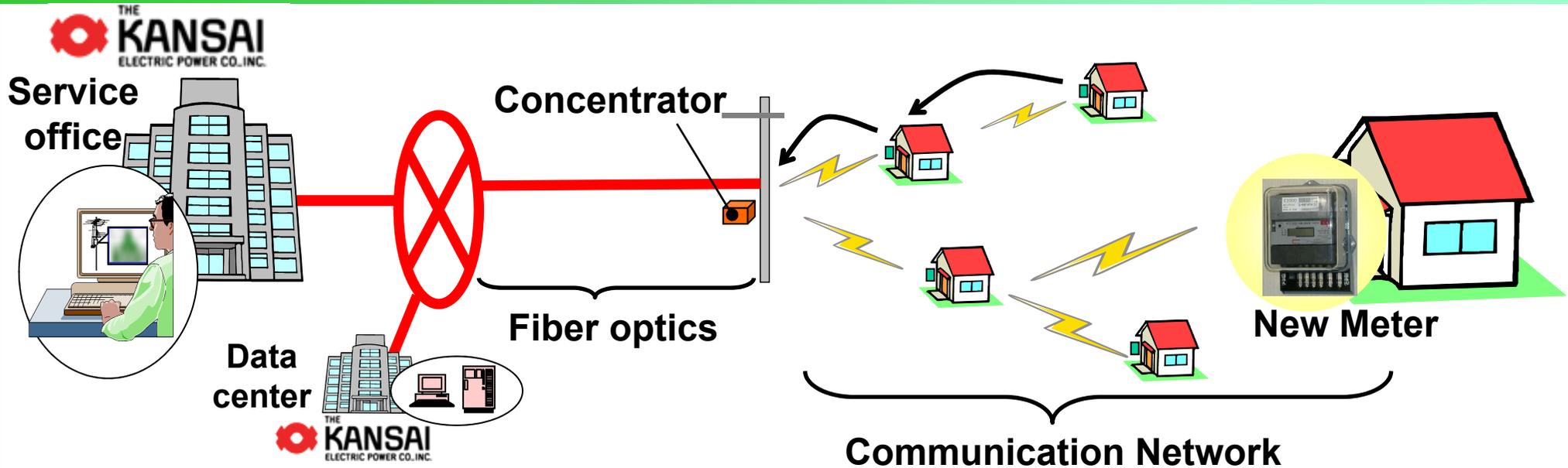


Monthly meter-reading (12million/month)

) : Data as of FY2009



Our AMI, “New Metering System”, which equips these features will solve all issues.



Improvement of utility operation

- Efficiency and safety of on-site operation
- Optimization of distribution facilities

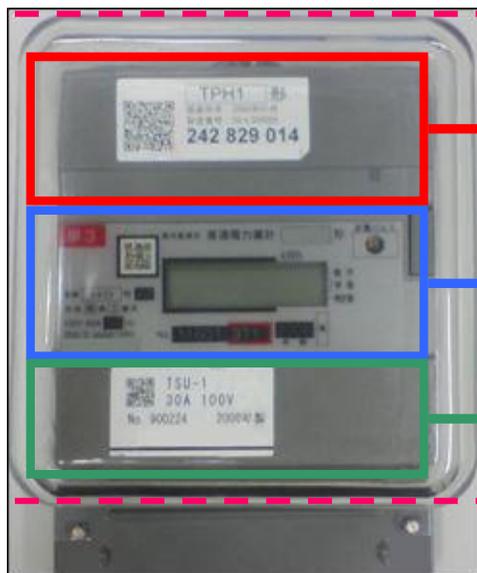
Improvement of customer service

- Enrichment of customer consultation
- Quick restoration of outage

Conventional



New!



Communication unit

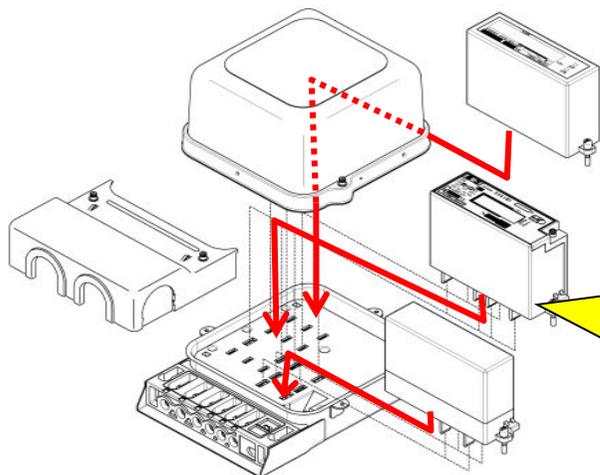
Proper communication media can be selected.

Metering unit

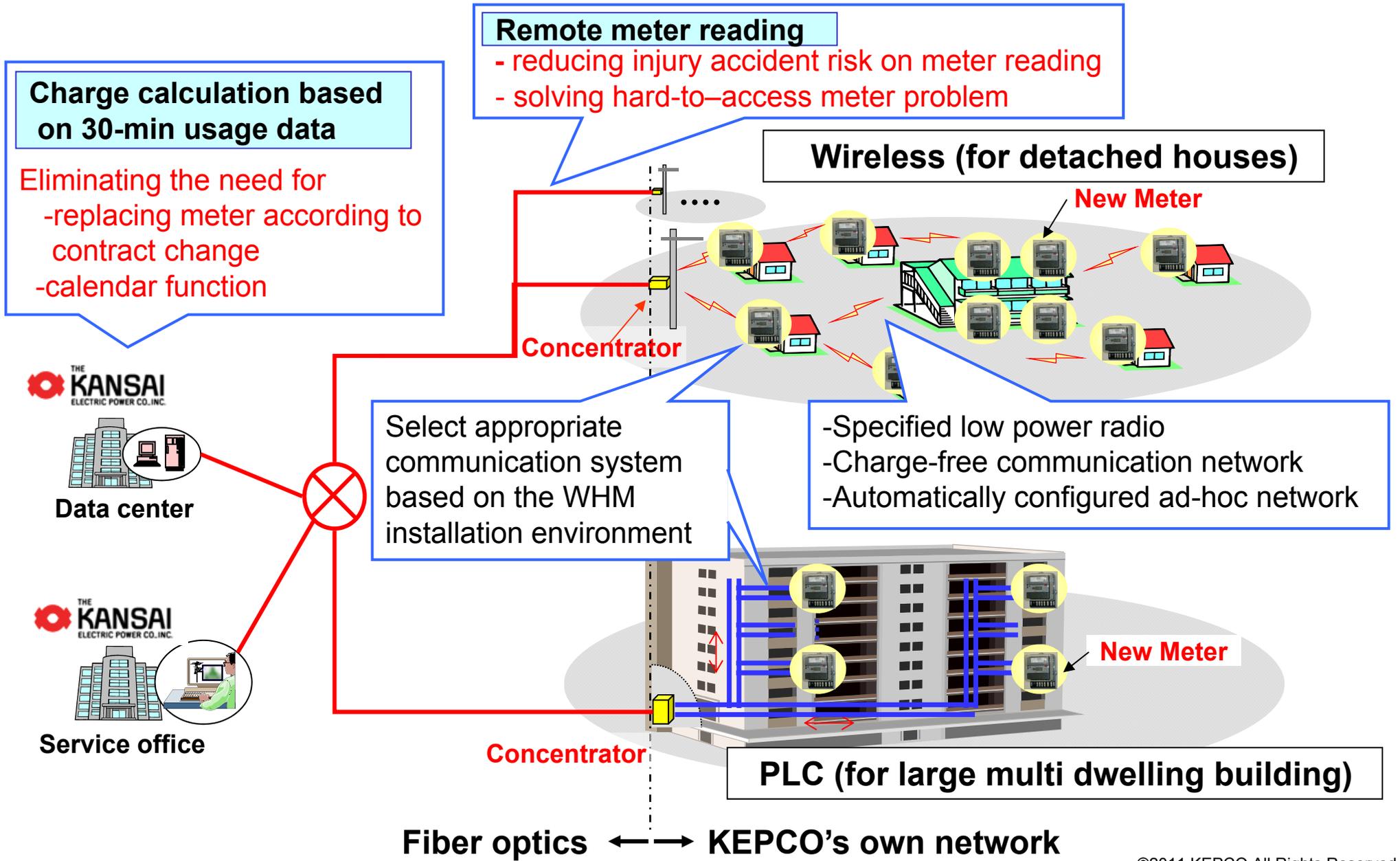
- Certification is only for this unit
- Plug-in structure realize no live-line work

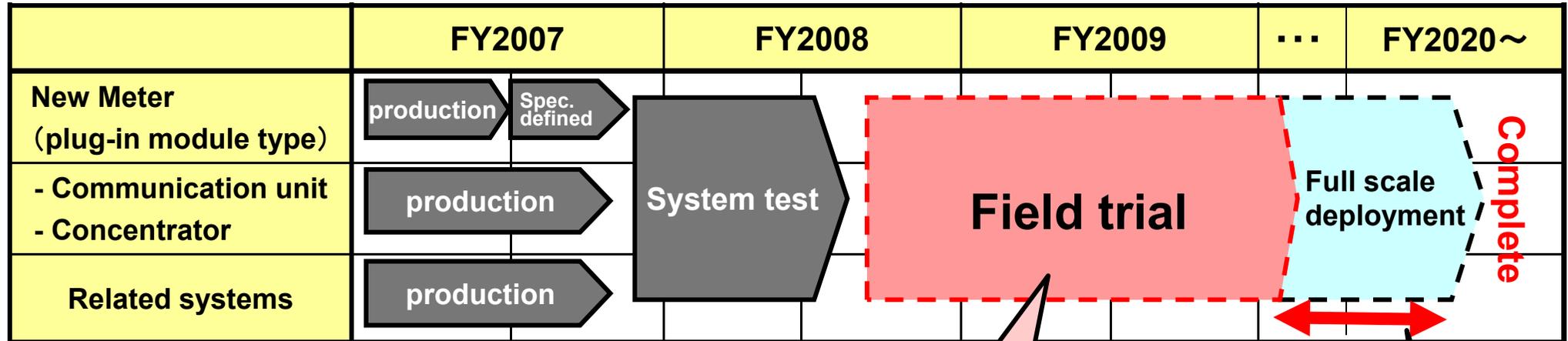
Switching unit (option)

- Switching function is achieved by SW-unit
- On/Off work is done remotely



- Plug-in module structure frees us from live-line work !!
 - SW unit or other value-added function unit can be installed if necessary





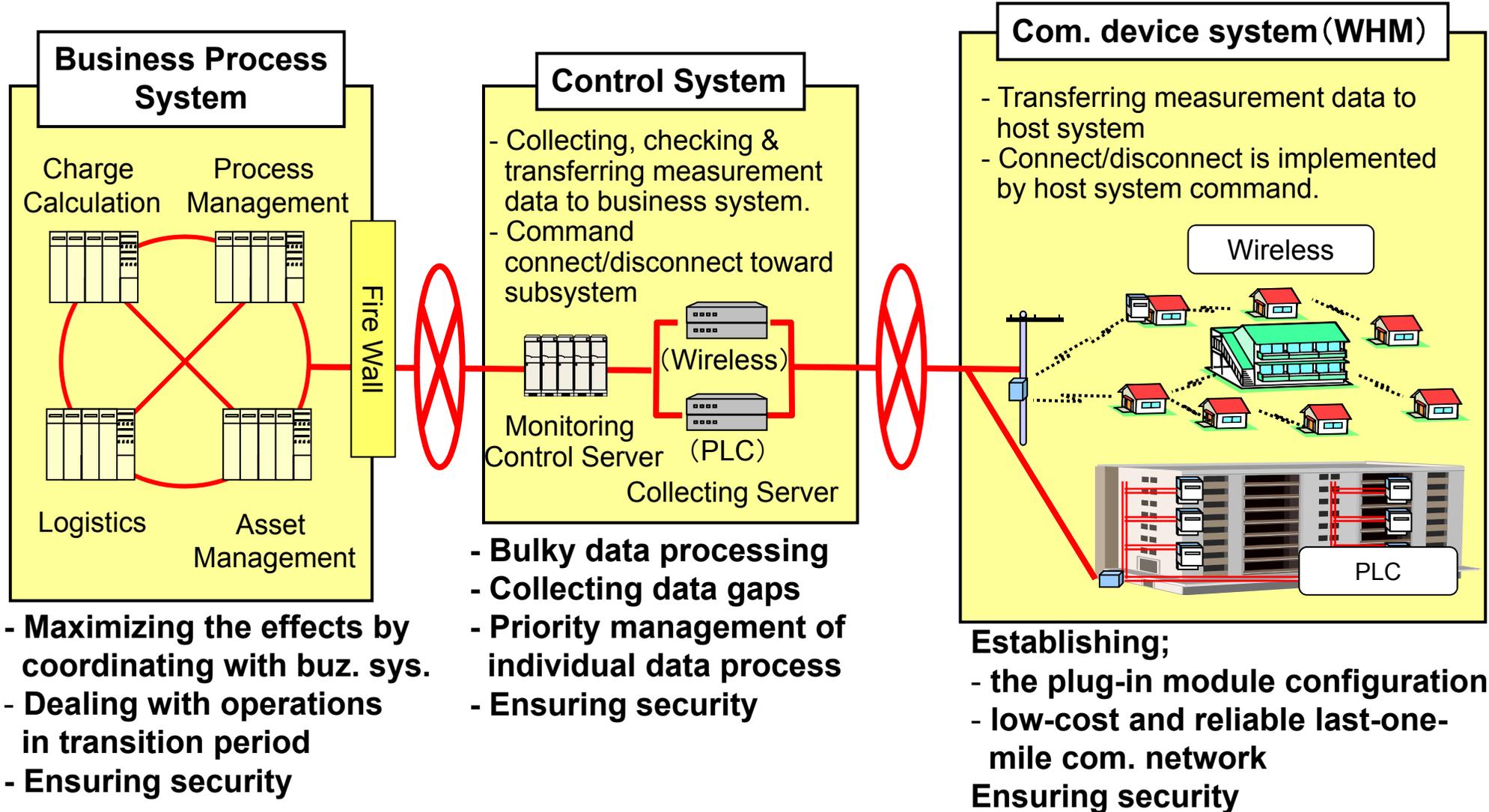
※R&D has been continuing since 1999

Evaluating;

- Long-term reliability of equipment and materials
- Security and reliability of communication
- Smooth operation during the system transition period etc.

870 thousands of New Meters (as of July 2011)

We are soon going to make a decision to move forward to a full scale deployment in entire service area.



Not only meters and communication network, we have established sophisticated whole system covering all of meter-related work.

- **As a result of the achievement of integrated DAS implementation, which was established in 1985, we are now confident that we can solve many problems regarding meter-related work including “Safety issues”.**
- **Even based on 25-year old concept, our system can cope with many issues we are now facing. This is because we have been considering its flexibility and applicability.**
- **“New Metering System” concept was also established for resolving problems on meter-related work before the word of “smart meter” was highlighted.**
- **We are now working toward the accomplishment of our goal to meet the needs of “today’s Smart Meter” with our “New Metering System”.**

Issues to be discussed as “Smart-Meter” related matters

- Demand Response (DR)
- Diversification of electricity tariff
- Home appliance control (direct/via HEMS)
- Visualizing electricity usage and displaying a variety of information
- Effective utilization of tele-metered electricity usage data

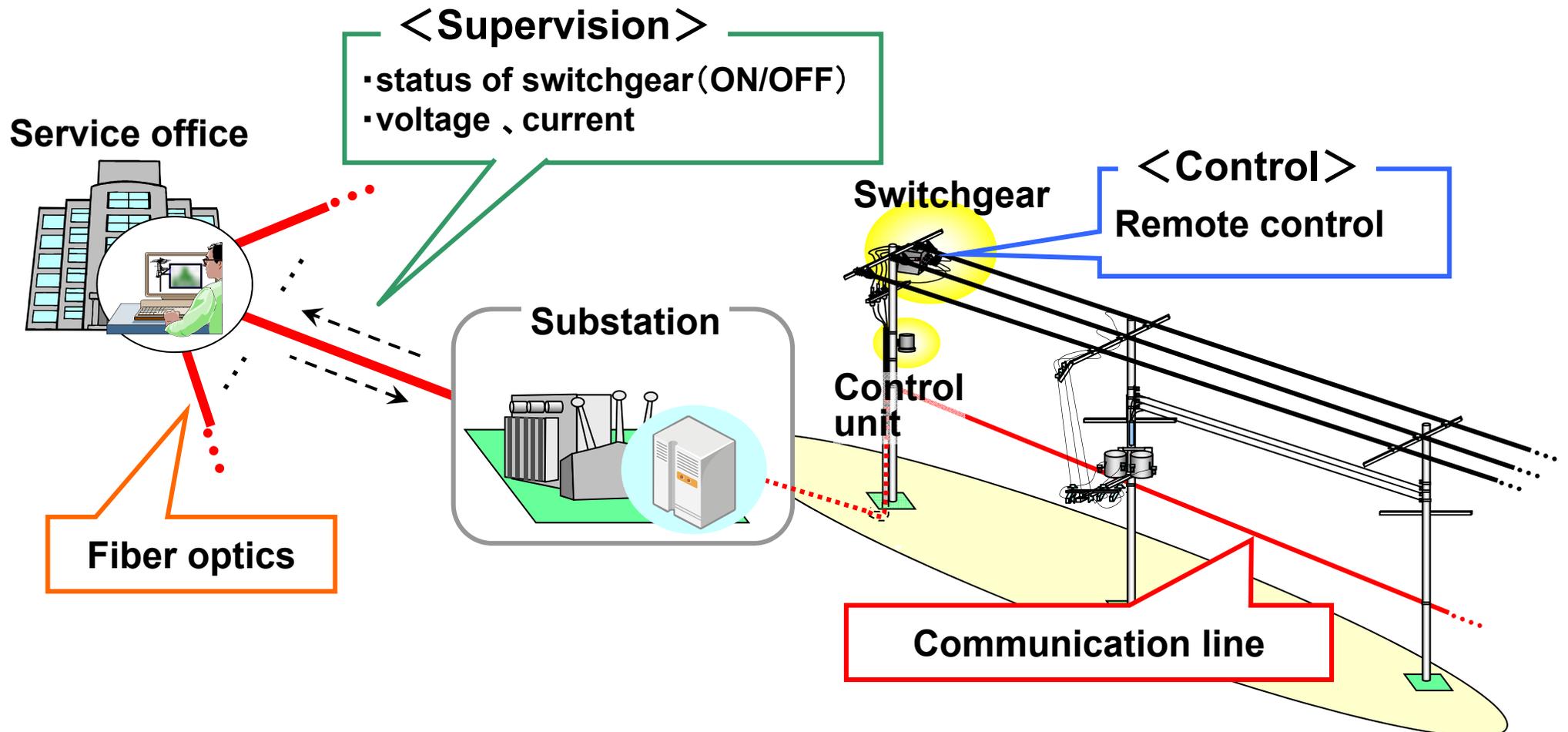
In Japan, we are still discussing what should be achieved by “Smart Meter”. Whatever our goal will be, we are going to cope with it relying on the flexibility of our “new metering system”.

(e.g.)

- easy to adapt to various tariff structure by collected metering data at data center
- possibility to access to in-home devices by selecting proper communication media
- possibility to utilize collected metering data for "Smart-Grid" purpose

4. [Reference] Distribution Automation System (DAS)

- Remotely control switchgears from service office via communication line
- Automatically minimize outage section





Remote-controlled switchgear

- Isolate outage section
- Connect normal section to adjacent D/L

Control unit

- Control switchgear
- Monitors status of switchgear (On/Off), voltage and current of distribution line

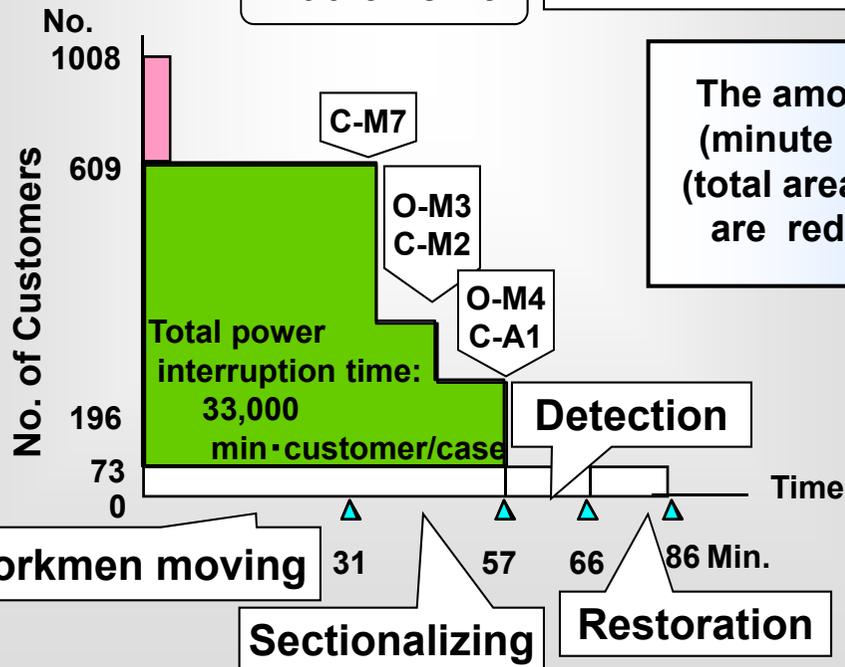
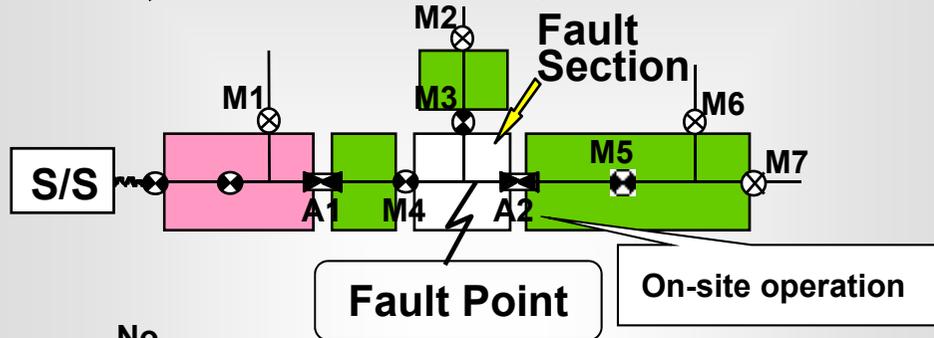


Communication line

- Transmit & receive data for switchgear control and monitoring distribution line

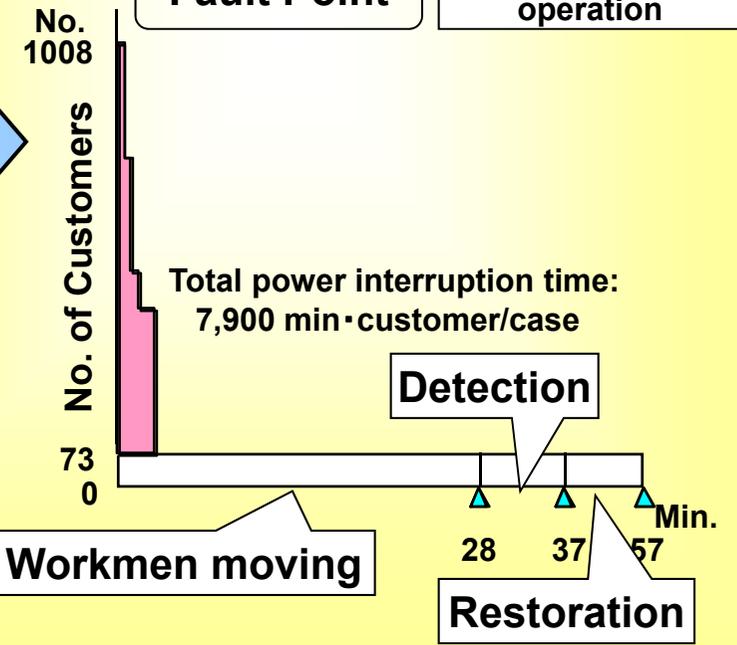
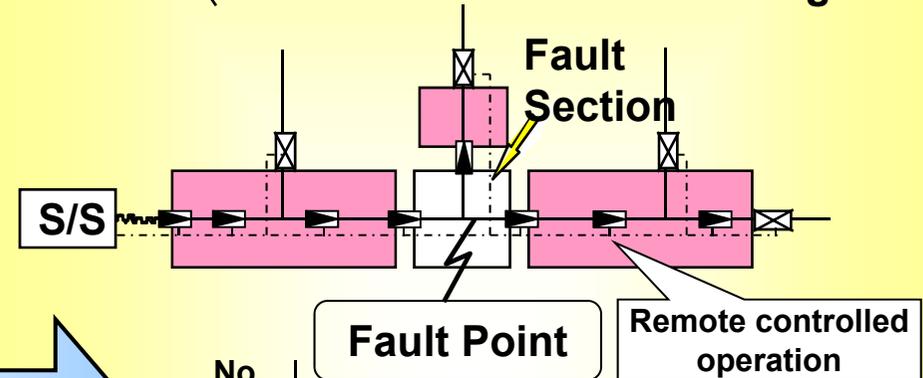
Conventional time sequential auto re-closing system

Symbol:
 ☒ Time-sequential switchgear
 ⊗ Manual switchgear (normally closed)
 ⊙ Manual switchgear (normally opened)



New distribution automation system

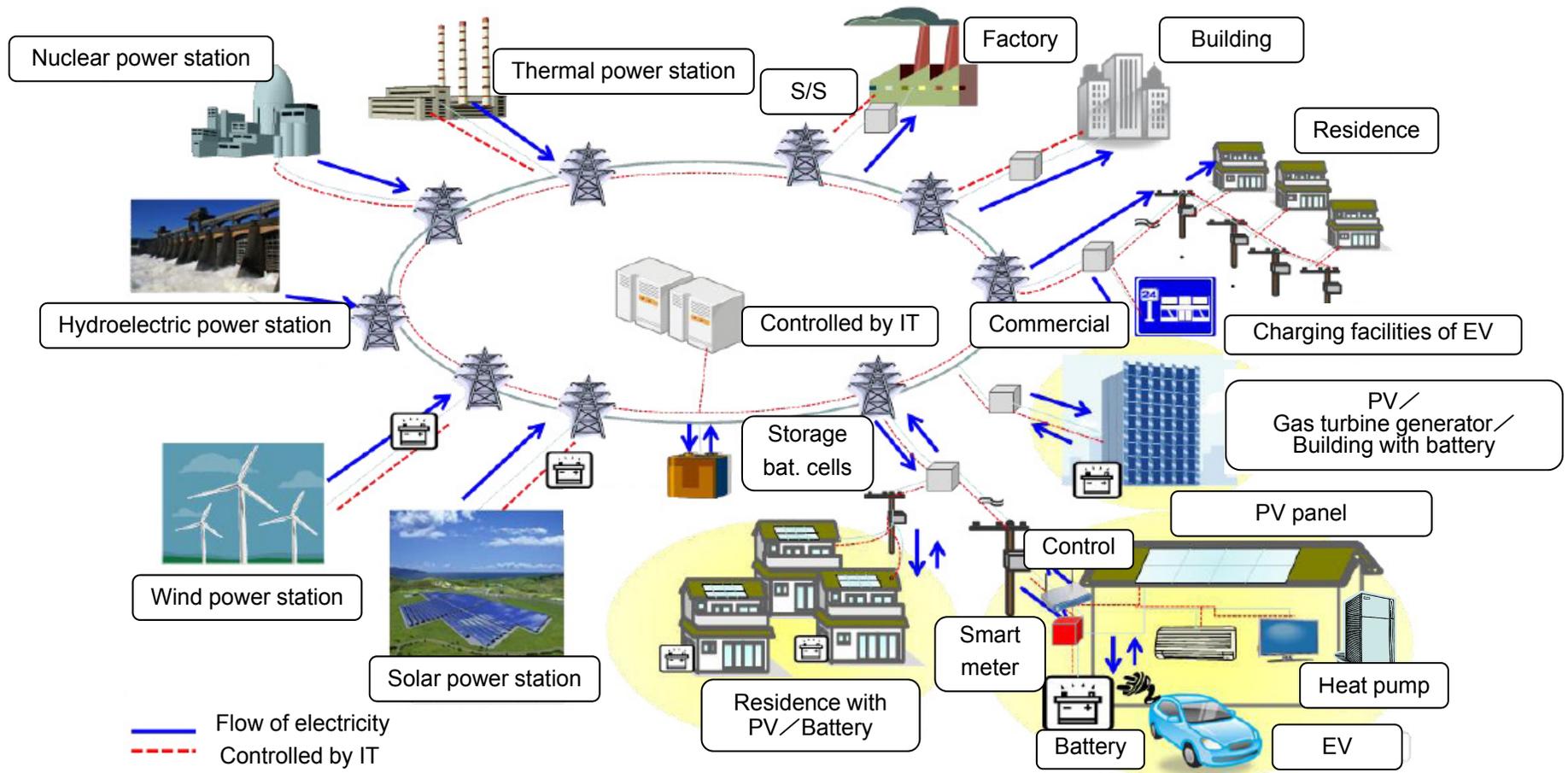
Symbol:
 ☒ Remote-controlled switchgear with time-sequential transmission
 ☒ Remote-controlled switchgear



The amount of outage (minute × customers) (total area of bar graph) are reduced by 76%

Manually restored section (green) Automatically restored section (pink)

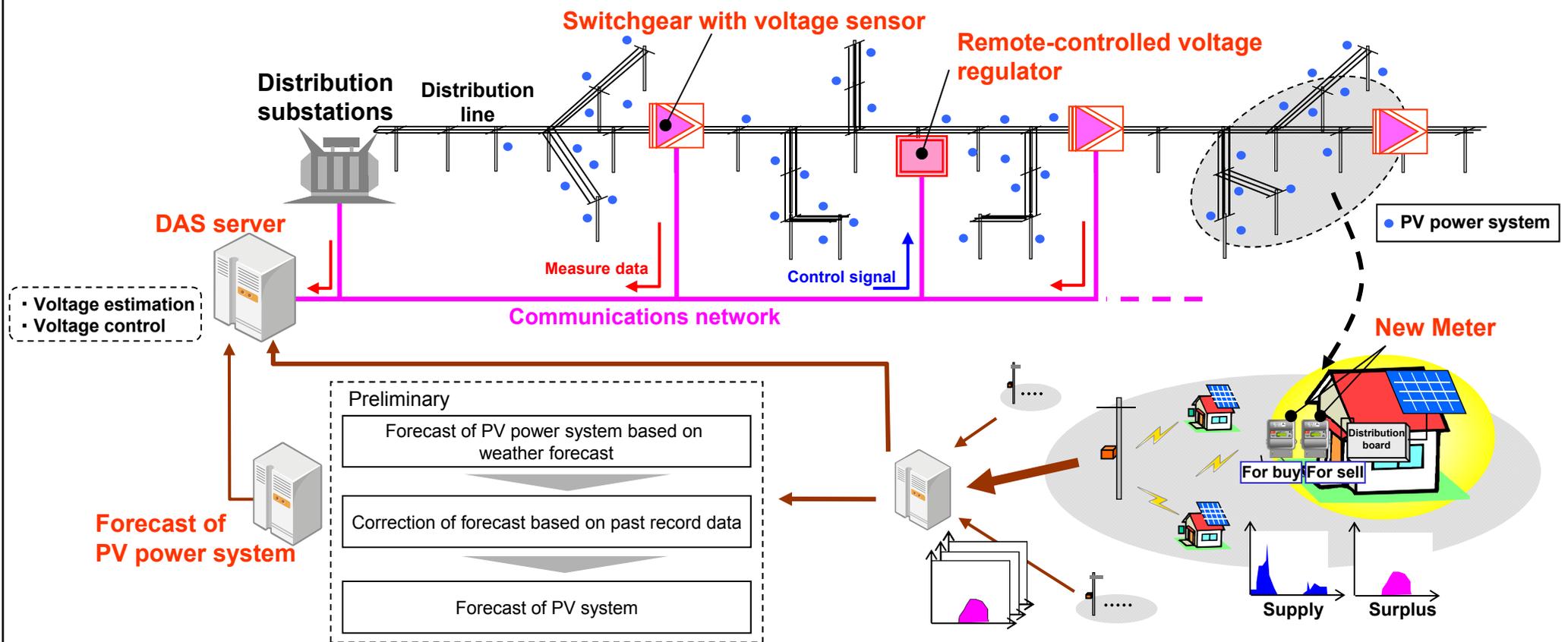
Through electric power system with “high efficiency”, “high quality” and “ high reliability” by using ICT, realizing a low-carbon society and a better energy supply to customers



Grid technologies related to renewable energy (, mainly PV power system,) are required.

Our target is to enhance the function of supervising and controlling voltage in order to improve electric quality **in spite of mass PV introduction**

- ① Switchgear with voltage sensor supervise the system voltage
- ② Voltage regulation are remotely controlled
- ③ Watt hour data transmitted by New Meters can be used to estimate system voltage more accurately
- ④ Further more, weather forecast information can be used to estimate PV power system more accurately



Thank you!

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Educational Background	Koji Maegawa was graduated from Osaka University in March 1994 with a Master's Degree in Communication Engineering.	
Work Experience	<p>Koji Maegawa joined Kansai Electric Power Co., Inc in 1994.</p> <p>He has been mainly engaged in R&D work of distribution division.</p> <p>From 2006, he has been responsible for the communication between WHMs, and the data collection system from WHMs (a part of MDM).</p>	
Autobiography		