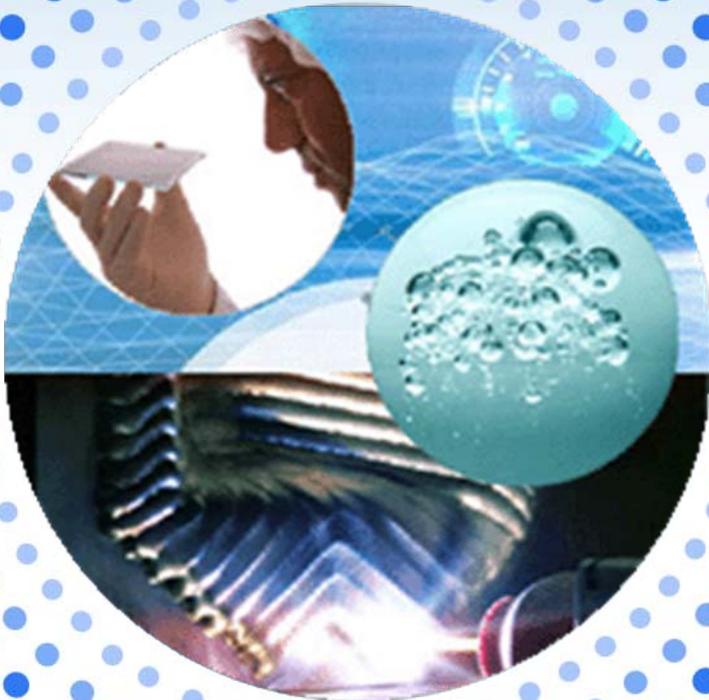


# CEC Smart Grid Workshop

May 14, 2009  
Sacramento



**Richard Schomberg**

EDF VP Research North America  
System Engineering Professor  
Gridwise Architecture Council Member  
IEC Smart Grid Strategic Group  
IEC TC8 *Chair: System Aspects for Energy Delivery*

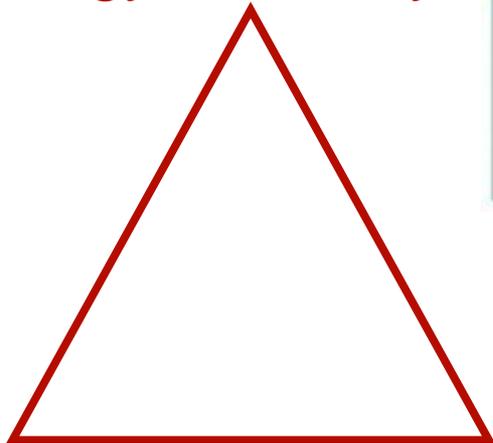
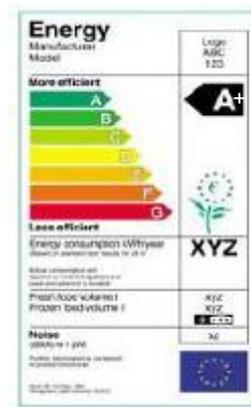
# Different drivers but .... same solutions





# More electricity for less CO<sub>2</sub> to achieve energy savings

Energy efficiency



Renewable energies

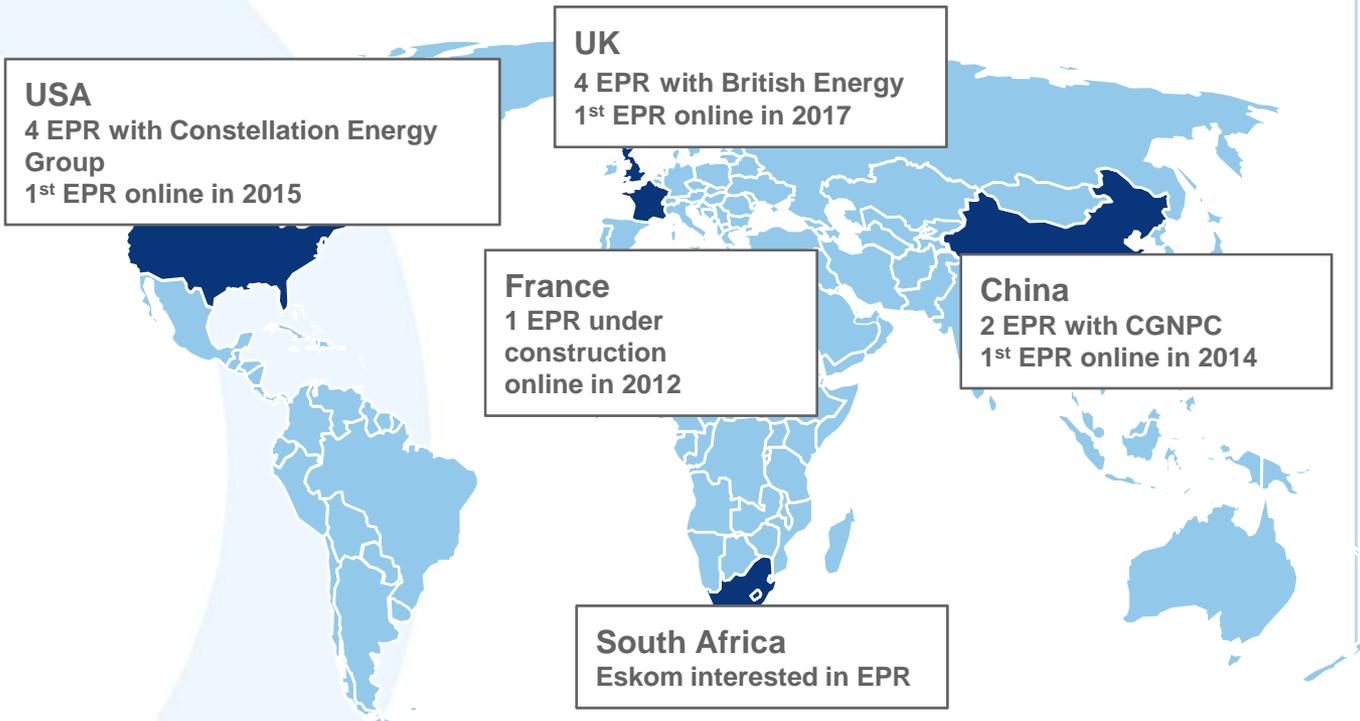
Nuclear energy





# EDF, a key player in global nuclear revival

EDF's strategy in nuclear revival: invest in and operate nuclear power plants in 4 priority target countries



## Key figures

- © Develop, invest in and operate **10 EPR** reactors by 2020
- © 28 reactors currently under construction throughout the world, half of them in Asia; 17 should be commissioned by 2011

Longstanding international partnerships

# More efficient end uses



High performance heat pumps



Plug-in hybrid vehicles



Solutions for energy storage



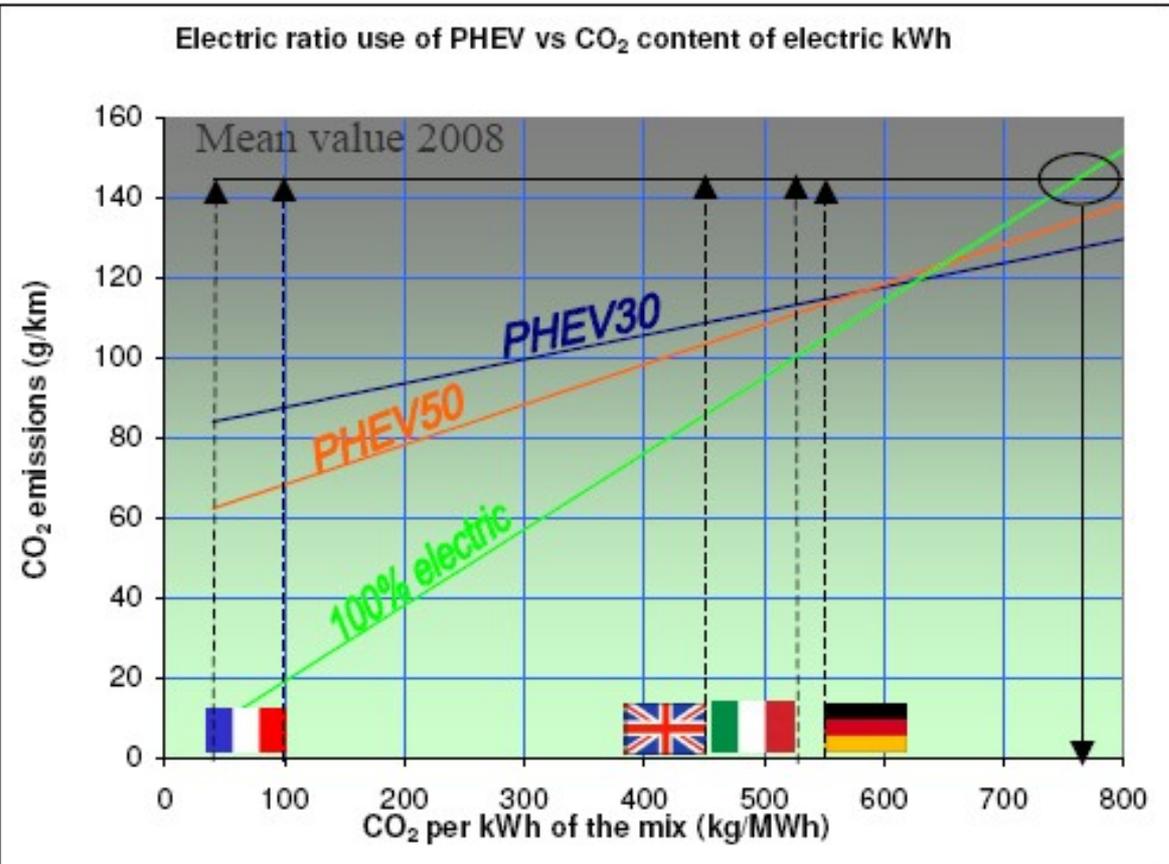
Innovations for insulation



Solutions for industry : induction



# Plug-in hybrid electric vehicles : an effective response to CO2 emissions



**1 million PHEV @50% in France in 2020 ⇒ -1 Mt CO<sub>2</sub> and -0.5 Mtep oil**



# Towards a Home Area Network (HAN) for energy efficiency



DSO



Energy provider  
Vendor  
Agreggator



# Regulated Meters and Unregulated «energy boxes»



## Distribution Operator

Short  
Term

- Automation of metering functions, productivity improvements

Mid  
Term

- New tools for the operation of the distribution network

Long  
Term

- Performance improvement (new services for the suppliers)

Regulated



## RetailerS

26

- New customer offers
- Optimized customer management
- Demand side and sourcing management

Non-Regulated



# Smarter Grid : what for?

Advanced Distribution operation

Improve life span of grid assets

DER Integration towards  
active Distribution Network

“Technology pushed” innovations  
for distribution performance

Automatic Meter Management

Energy box  
*(Unregulated business)*

anticipate

optimize

control

observe





# EU Framework Program 7

## ENERGY : 3.6B\$ 2007-2013

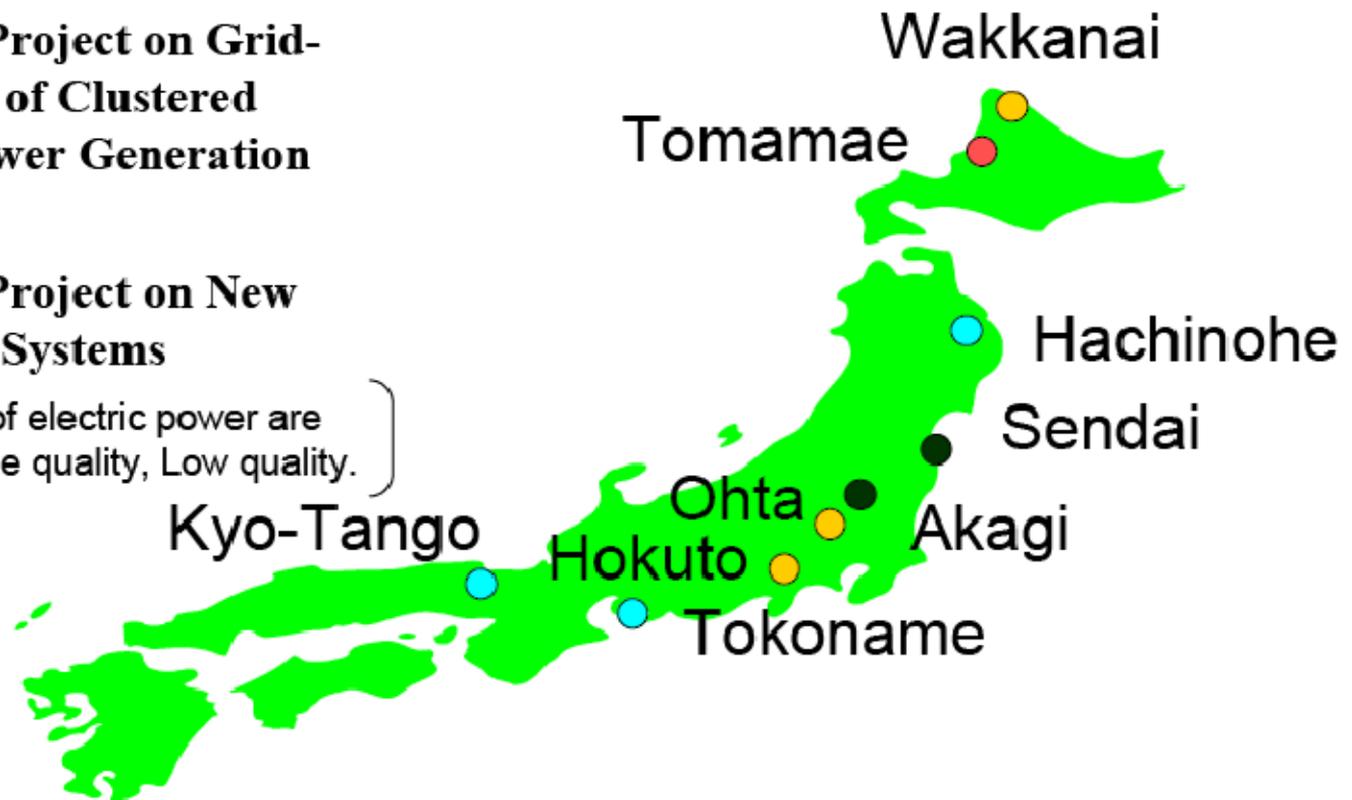
<b>INTER-ACTIVE DISTRIBUTION ENERGY NETWORKS</b>	Control strategies and grid architectures for active networks with large-scale DER & DG
	Simulation and state estimation of smart distribution networks
<b>PAN-EUROPEAN ENERGY NETWORKS</b>	Simulation and state estimation of smart transmission networks
<b>CROSS CUTTING ISSUES &amp; TECHNOLOGIES</b>	Grid assets management
	Storage for smart networks

# (1) What is the purposes of Smart Grid ?

Necessity or Purpose	USA	EU	Japan
Reliability of power Supply	○		
Improvement of Cyber Security	○		
Reduction of investment in plant and equipment Reduction of erection period	○		
Reduction of energy cost (increase Energy Efficiency)	○	○	○
To keep environmental condition (ex. Reduction of CO <sub>2</sub> )	●	○	○
To increase renewable energy resource	●	○	○

## (4) Smart Grid related study in Japan (NEDO's Project)

-  **Demonstrative Project on Grid-Interconnection of Clustered Photovoltaic Power Generation Systems**
-  **Demonstrative Project on New Power Network Systems**  
(In this system, 3 types of electric power are sold, High quality, Middle quality, Low quality.)
-  **Wind Power Stabilization Technology Development Project**
-  **Demonstrative Project of Regional Power Grids with Various New Energies**



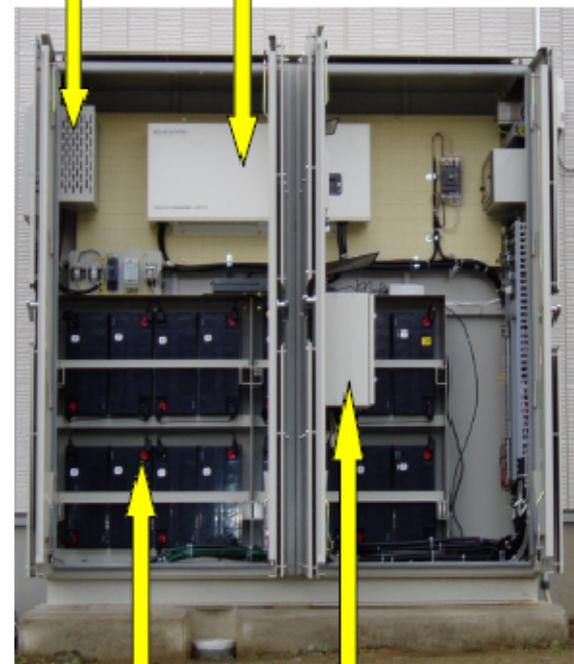
<Note> NEDO : New Energy and industrial  
Technology Development Organization

# (A) Demonstrative Project on Grid-interconnection of clustered Photovoltaic Power Generation



Demonstration Site (Pal Town- Jyosai-no-Mori, Ohta City, Gunma Prefecture)

Ventilation fan      Inverter (4kVA)



Lead Acid Battery      Control Terminal  
(4,704Ah·cell)

## Outdoor Battery BOX

There is a storage box beside of PV system at each house. Inside of this box, Inverter, battery and measuring instrument are installed.

# (B) Wind Power Stabilization Technology Development Project



*Generation data are collected at Nikaho-Kogen, Green power Kuzumaki, Tahara-Rinkai, Aso-Nishihara and Nagasaki- Shikamati Wind Farm for the simulation to evaluate effect of introduction of battery system.*



**Redox-Flow battery**

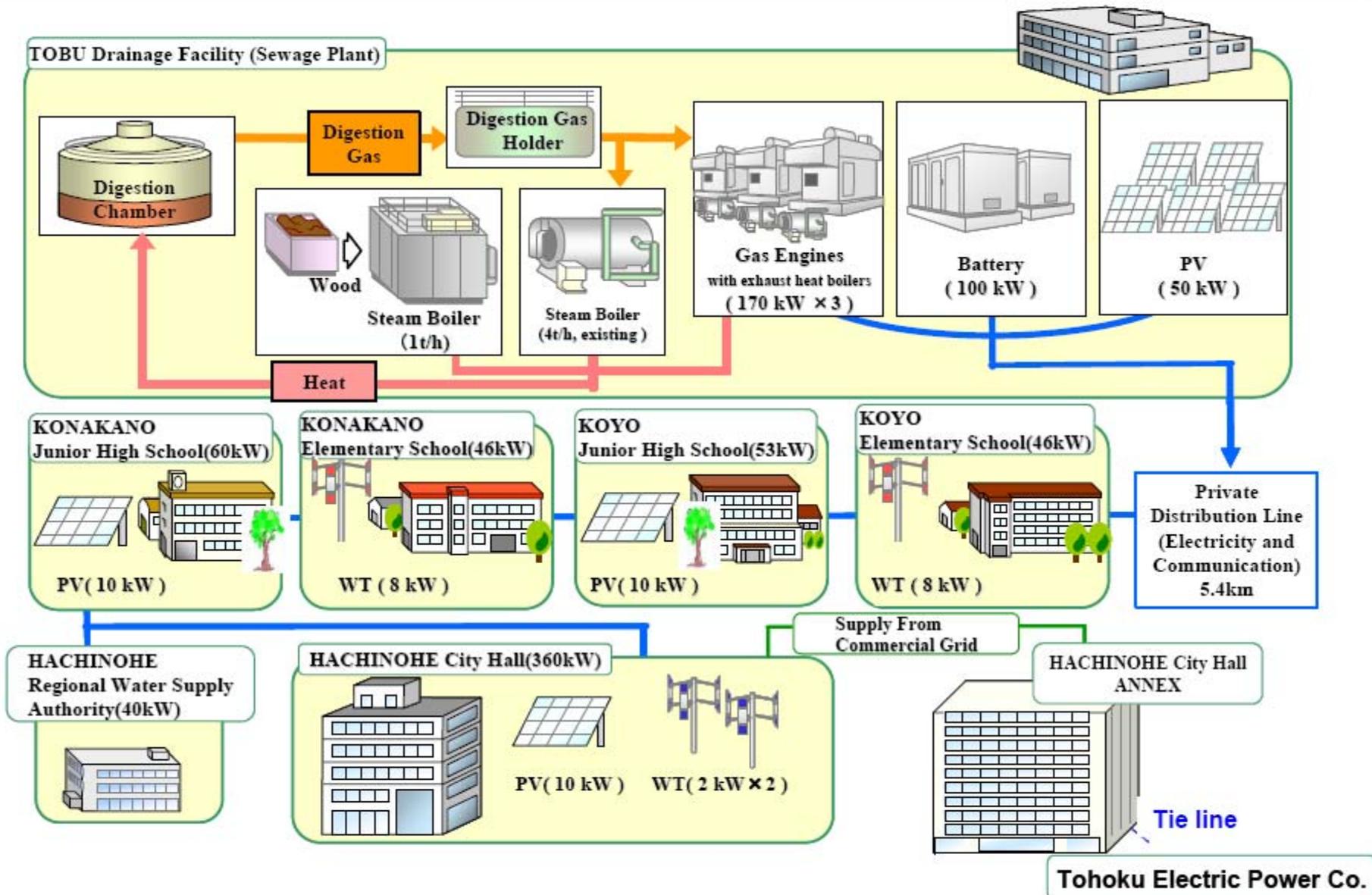
**Inverter Capacity : 6000kW**

**(Same as short term output rate of battery)**

**Battery nominal capacity : 4000kW**

**Storage capacity : 6000kWh**

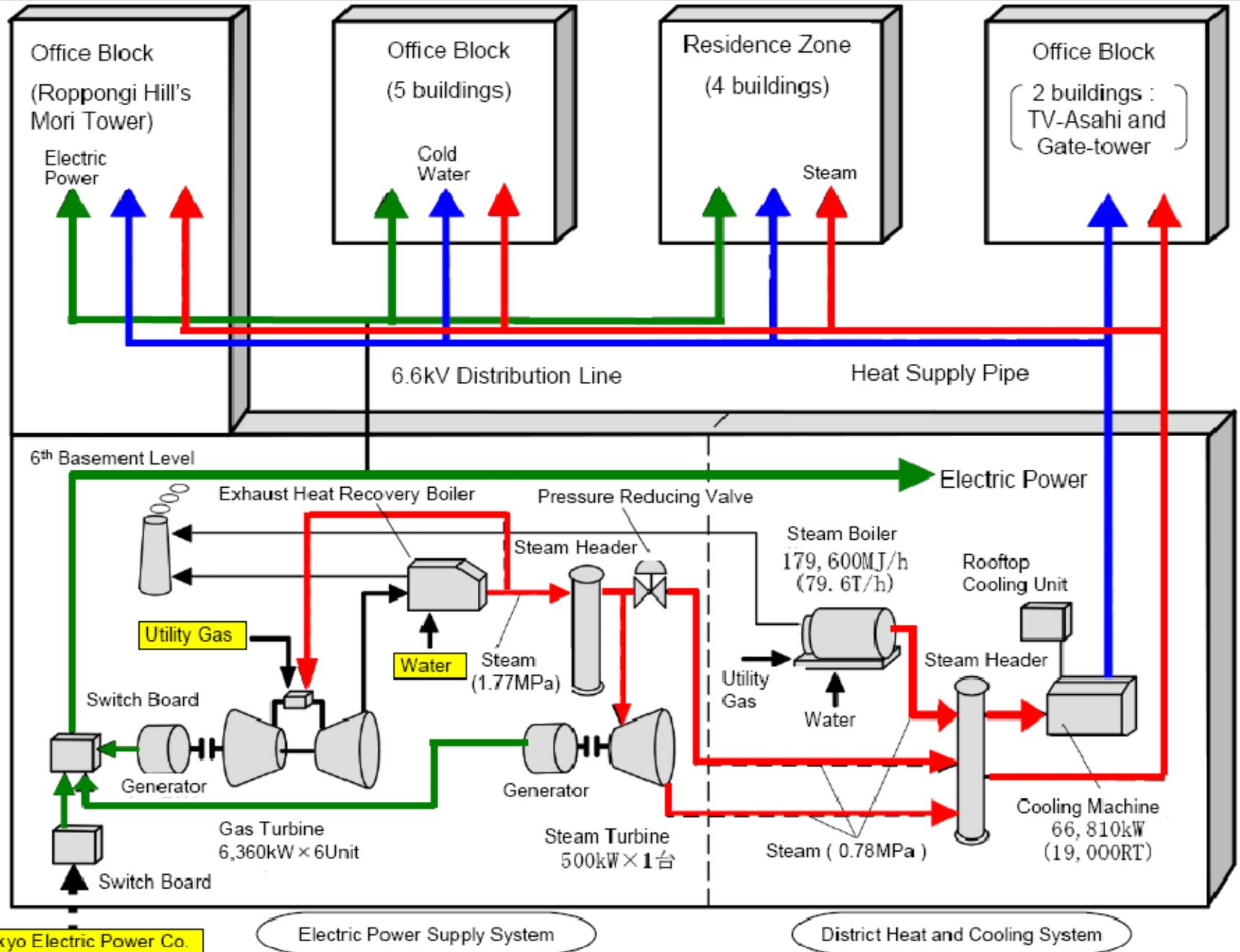
# (C) Hachinohe Microgrid Project (System Configuration)



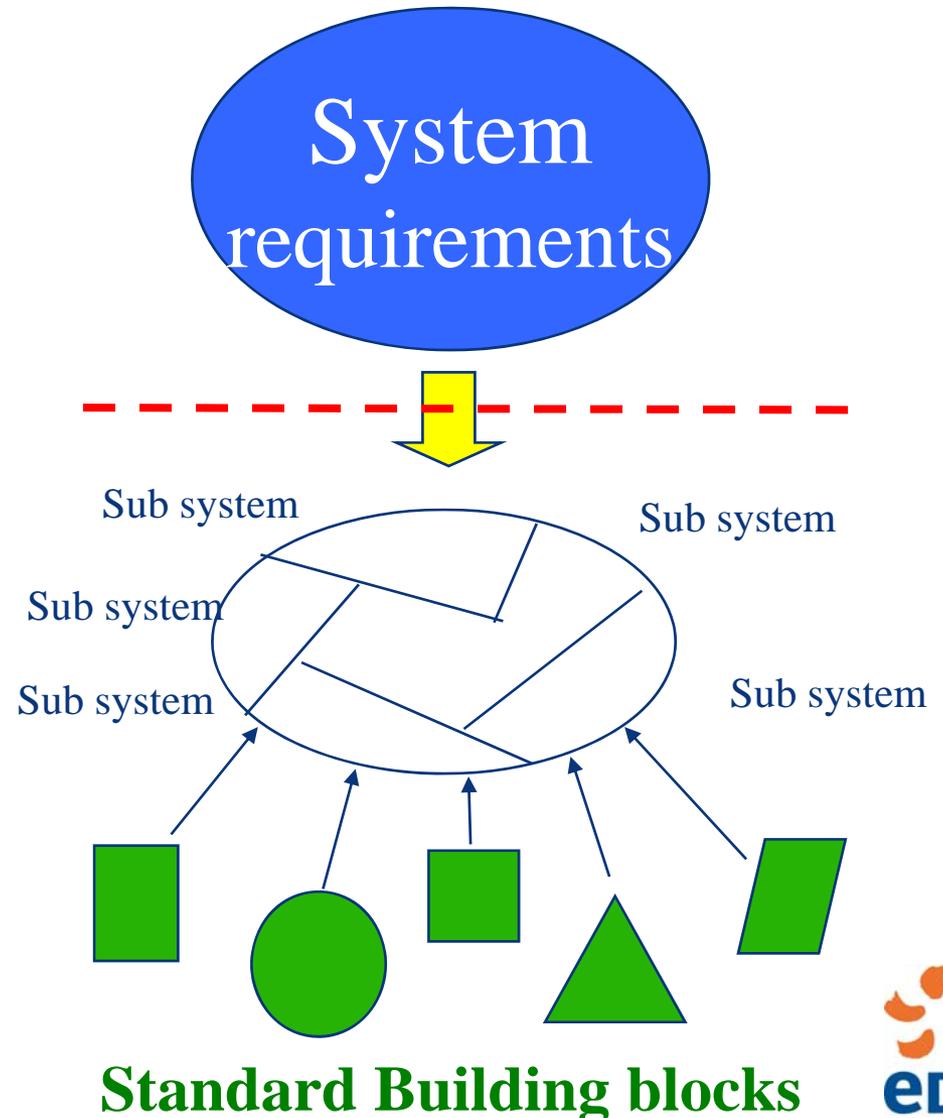
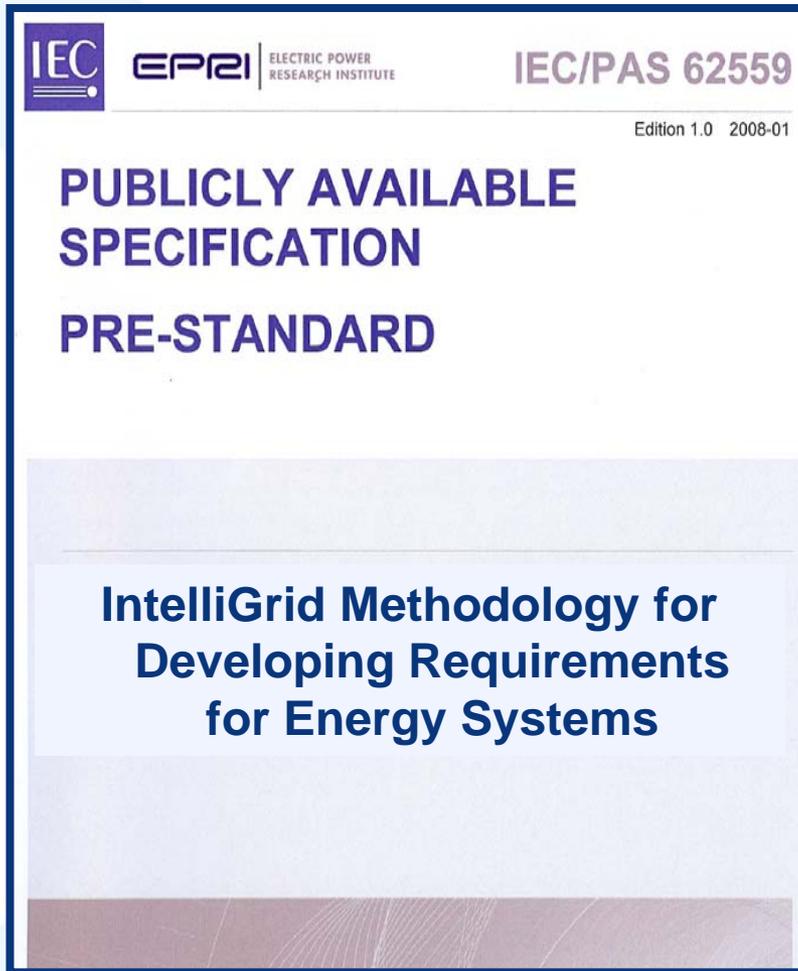
# (D) Energy Supply System in Roppongi Area



# Electric Energy and Thermal Energy Supply System



# Decouple Functional Requirements from Technical Specifications





# IEC Takes Charge of Setting Global Standards for Smart Grid

- IEC established a Strategic Group on Smart Grid with the primary responsibility for the development of a framework to achieve interoperability of smart grid systems. A workshop was held on April 29 & 30 at 'La Maison des Polytechniciens' in Paris, France, sponsored by EDF Group R&D.
- Thirteen nations' are represented in the group (BR, CA, CH, CN, DE, FR, GB, IT, JP, KR, NL, SE, US)
- *Smart Grids is the concept of modernizing the electric grid. The Smart Grid is integrating the electrical and information technologies in-between any point of Generation and any point of Consumption.* IEC has been delivering highly valuable standards that create a world market for solutions. But interoperability is a new challenge to integrate large numbers of complex technology bricks across the board, and it becomes absolutely necessary to separate out user requirements from any kind of solution.
- During the 2-day workshop, 19 IEC technical committees have been identified who currently have published standards that play a role in Smart Grids.
- "IEC is a 'beacon' for the electrical industry in terms of Smart Grids, and is starting to provide a 'one stop shop' for the large number of Smart Grid projects that are being launched around the world" says Richard Schomberg convener of the group.
- IEC is developing a web window allowing Smart Grid projects an easy access to a first release of the *IEC Smart Grid Framework* offering ready to use standards as well as some guidance to make the most of them in their current status.
- In addition, an action plan guiding the different TCs towards a comprehensive set of harmonized global standards supporting the smart grid requirements is in preparation.



# QUESTIONS?

