

# Smart Energy Networks

*Natural gas taking its share  
towards a low carbon society*

Tokyo Gas Co., Ltd.  
October, 2011

# I. Energy policy in Japan

## Before Crisis (BC)

CO<sub>2</sub> reduction :30% or more in 2030

- (1) Energy supply structure **Nuke**  
**Zero-emission power 34% ⇒70%**
- (2) Low-carbon demand structure
  - Industrial Sect.  
**“Conversion to Gas” 10% ⇒20%**  
**CHP 4.5GWh ⇒11.0GWh**
  - Residential & Commercial Sect.  
**Highly efficient water heaters**  
**ZEH/ZEB Smart meter**
- (3) Next-generation systems  
**Smart communities (SG, SEN)**
- (4) Innovative energy technologies  
**Fuel cells(FC), Hydrogen supply**

## After Disaster (AD)

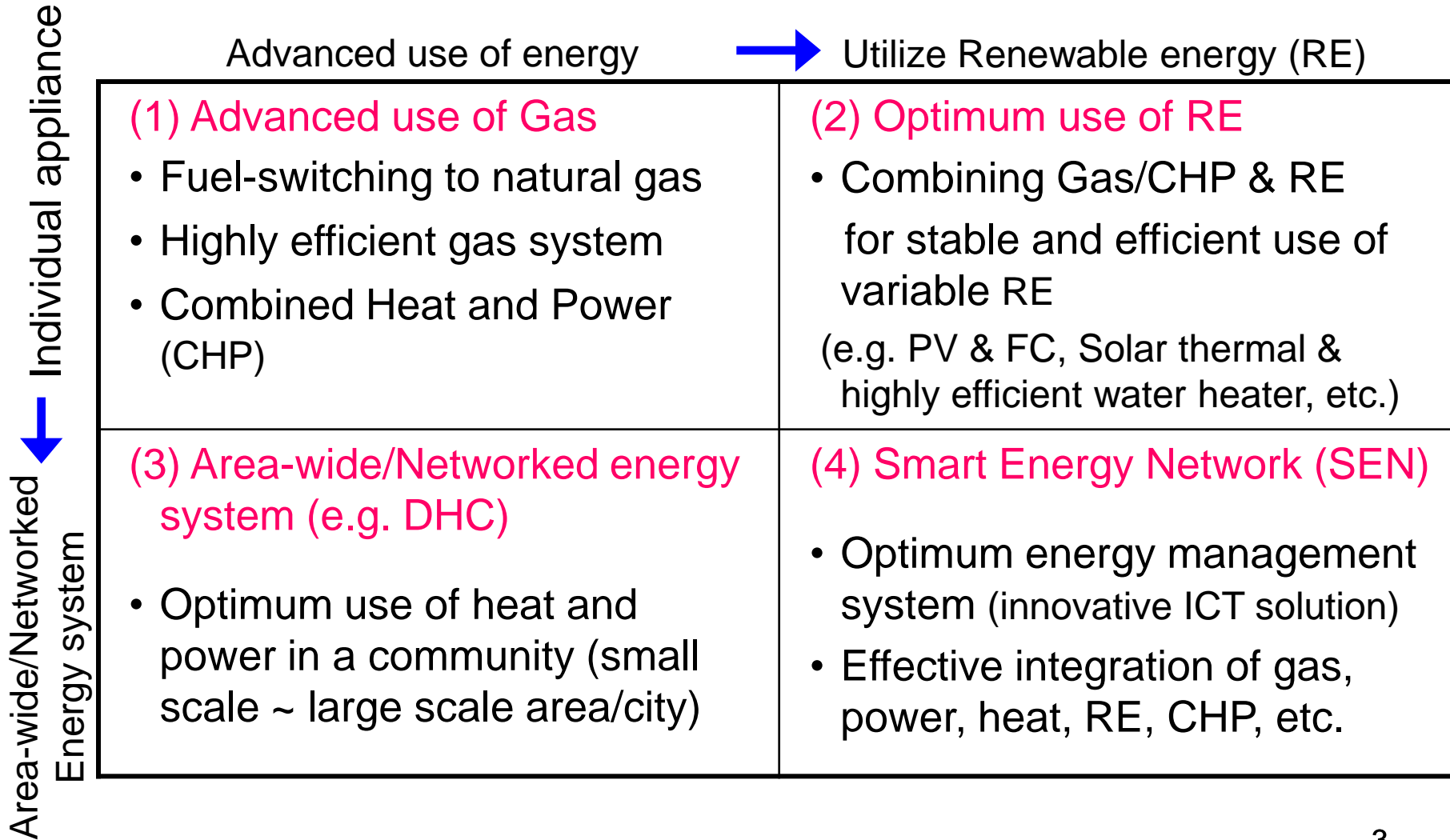
Under consideration (CO<sub>2</sub> big issue)

- (1) Stable energy supply & demand
  - Diversification of energy source
  - Enhancing energy infrastructure
  - Energy saving
  - Demand-side management (DSM)**
- (2) Centralized ⇒ Distributed
  - Renewable energy (RE) : FIT
  - Distributed generator (DG) : CHP
- (3) Low-carbon society
  - Alternatives for nuke: Gas, RE, DG
- (4) Economic growth
  - energy cost reduction

**Key Factor : Natural Gas, CHP/FC, Smart energy network**

## II. Our Challenges

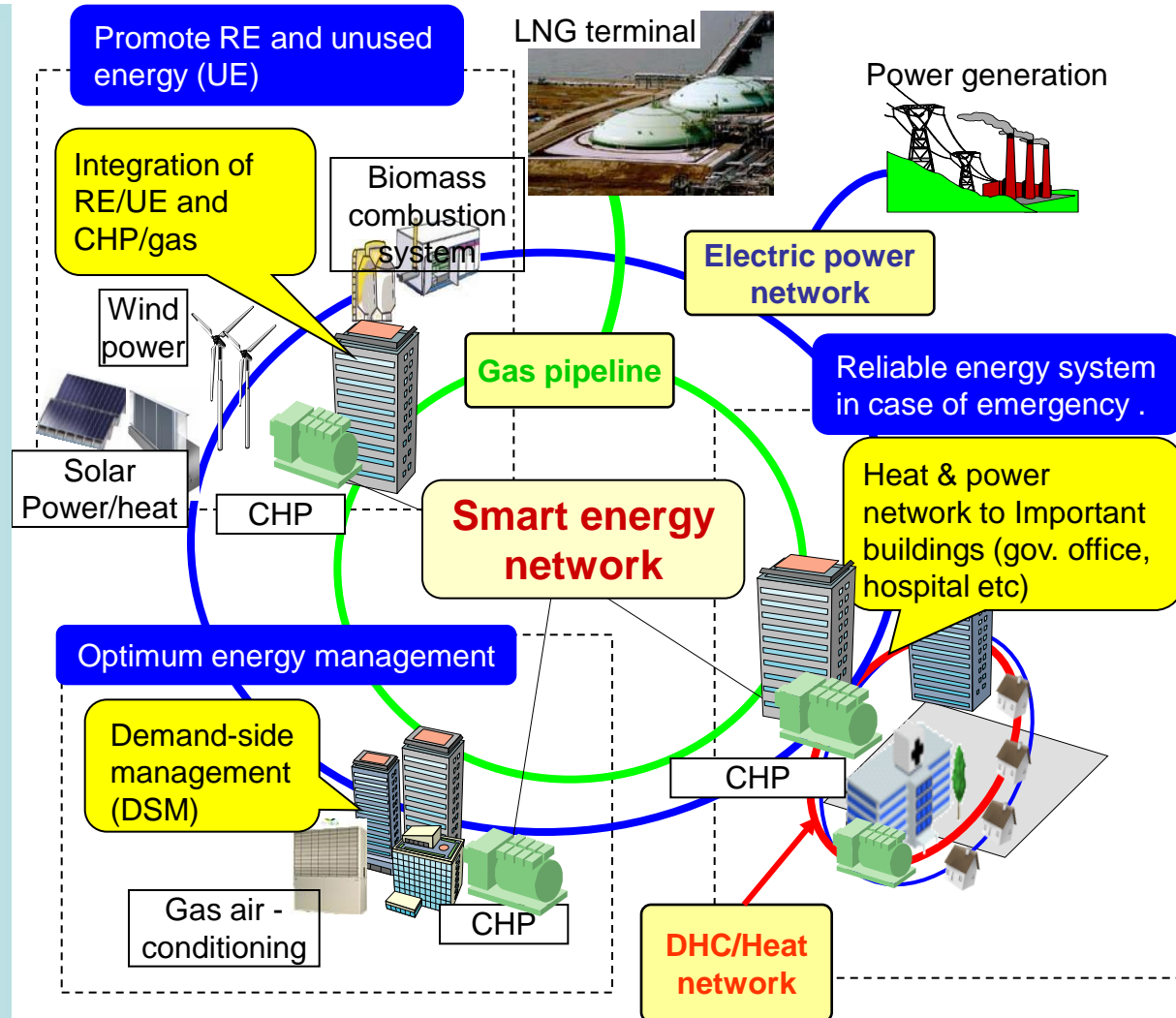
### 1. Toward “Smart Energy Network (SEN)”



# II. Our Challenges

## 2. Feature of SEN

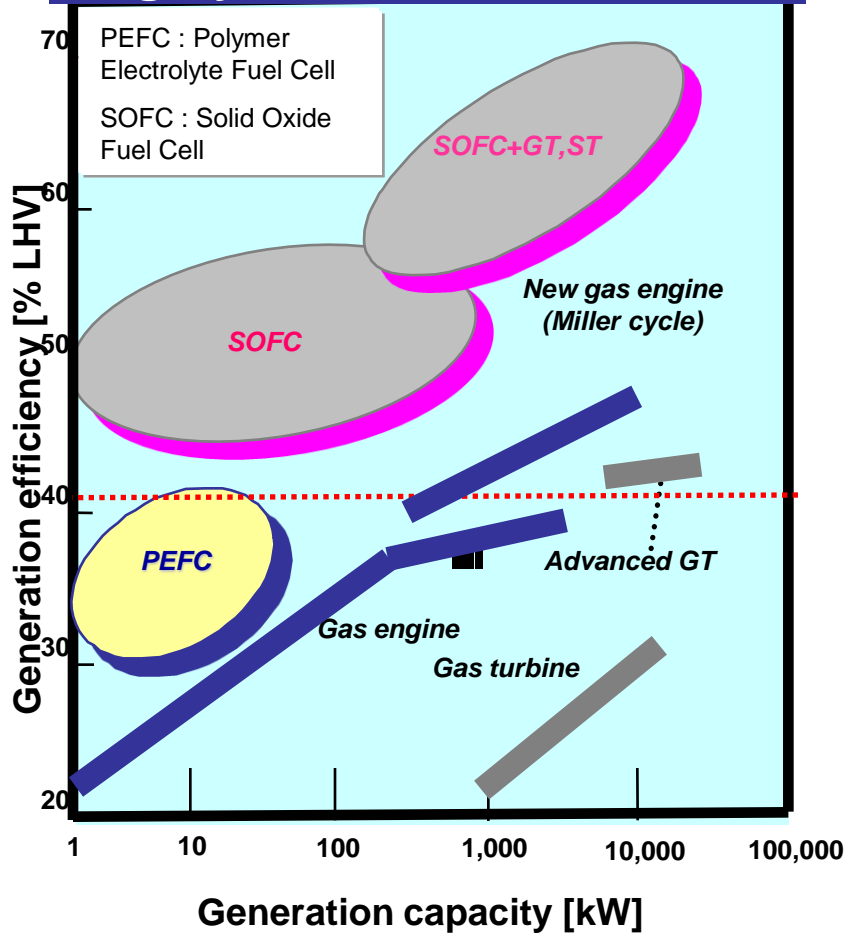
1. **Optimum use of heat and power** in a community by **networking** distributed energy sources (CHP, RE, UE etc.), controlled by **ICT**.
2. **Optimum energy management** (distributed & centralized, demand & supply, etc.)
3. **Optimum use of RE**  
Combining Gas/CHP & RE for stable and efficient use of variable RE.
4. **Reliable and stable energy system** (CHP as emergency power system).



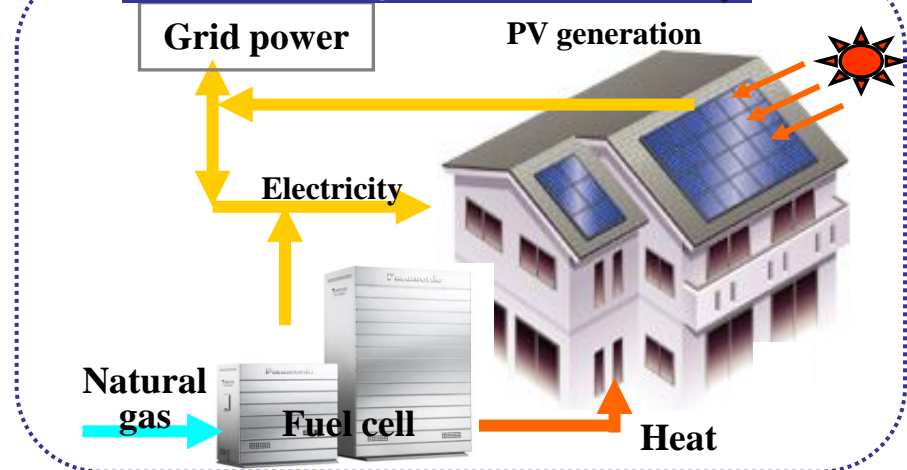
# II. Our Challenges

## 3. Technologies for SEN

### Highly efficient CHP (FC/GE/GT)



### Combining FC & RE (PV)



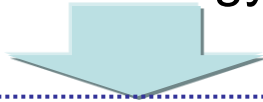
### Ultrasonic Smart meter



High reliability,  
Small &  
Lightweight

# III. Conclusions

- After the disaster, creation an “Efficient,” “Safe,” “Environment-friendly,” and “Energy-secured” energy structure is required.



- SEN (new best-mix of distributed & centralized energy systems, demand & supply, heat & power) is one of the best solution for
  - “Low Carbon Society” : 10%~30% or more reduction of CO<sub>2</sub>
  - “Large-scale introduction of RE” : stable and efficient use of variable RE with back-up of CHP/gas systems
  - “Energy-security & safety ” : Reliable and stable energy supply (e.g. DG), and energy management (e.g. DSM, DR etc.)

Natural gas and CHP play important roll for SEN

## Our next challenge

- Develop and spread “SEN”
- Innovations (e.g. highly efficient CHP & FC, ICT technology)
- Energy management (solution for customers & society)