KEPCO's
Demand–Side Management Programs

2011. 11

KEPCO
KOREA ELECTRIC POWER CORPORATION

Index

Korea
Electric
Power
COrporation

I Introduction of KEPCO

Overview

- Power Monopoly in Korea
- Government-Invested Institute

Assets	74.4 billion (USD)
Offices	250 (Head, Primary, Secondary Offices)
Affiliated Companies	16 (Including 6 Generating Companies)
Employees	19,363

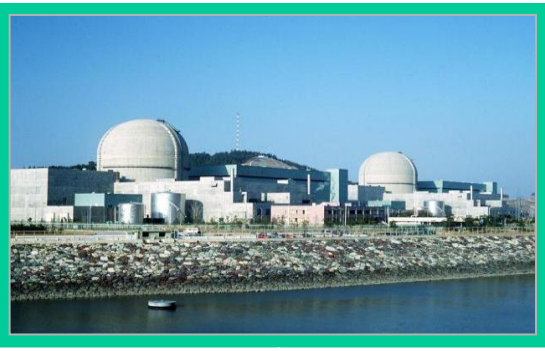
KEPCO

96%*	100%	100%
		
Generation (6 Subsidiaries)	Transmission	Distribution

Statistical Data (As of 2010)

Facilities

Generation



Capacity (MW)	Peak Demand (MW)
76,078	71,308

Transmission

Length (C-km)	# of S/S
30,676	731

Distribution

Length (C-km)	# of D. Tr (MW)
428,259	101,691

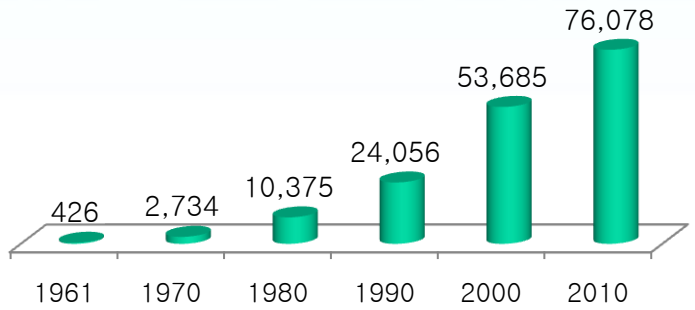
Customer

Customers	Power Sales (GWh)
19,229,450	434,160

Main Index

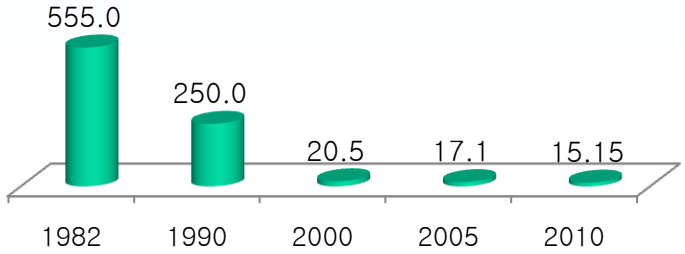
Generating Facilities

Unit : MW



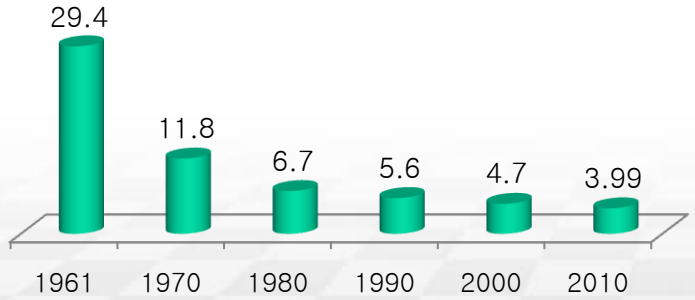
SAIDI

Unit : Min.



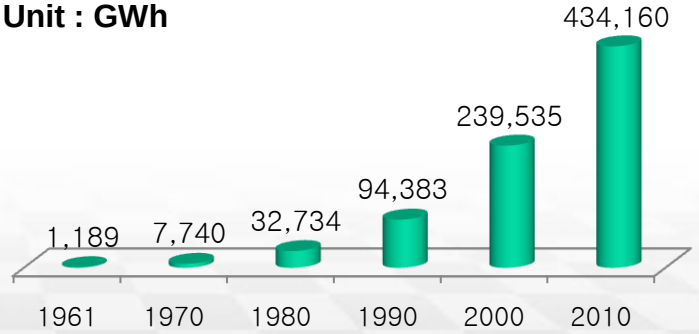
T&D Loss

Unit : %



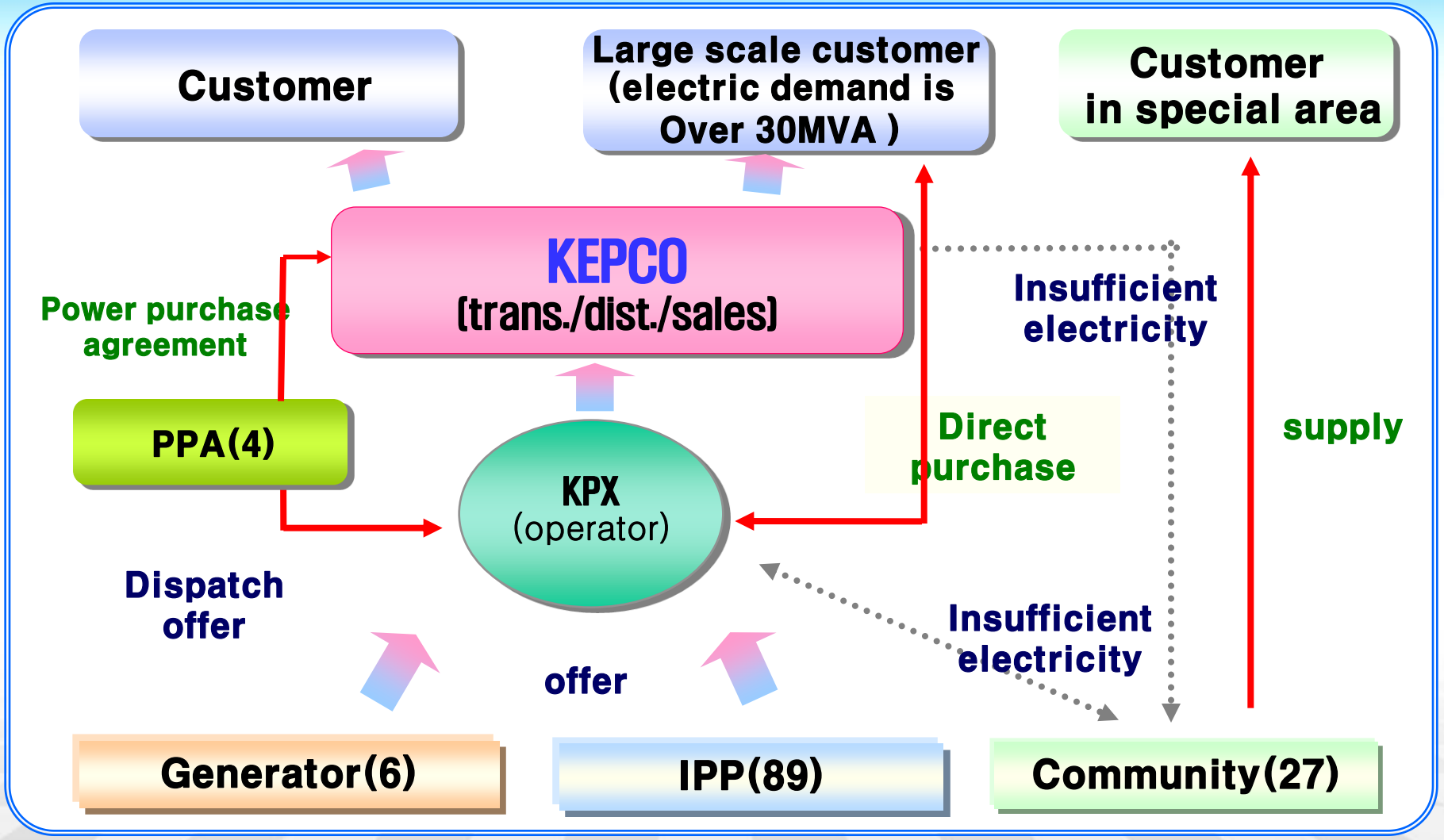
Power Sales

Unit : GWh



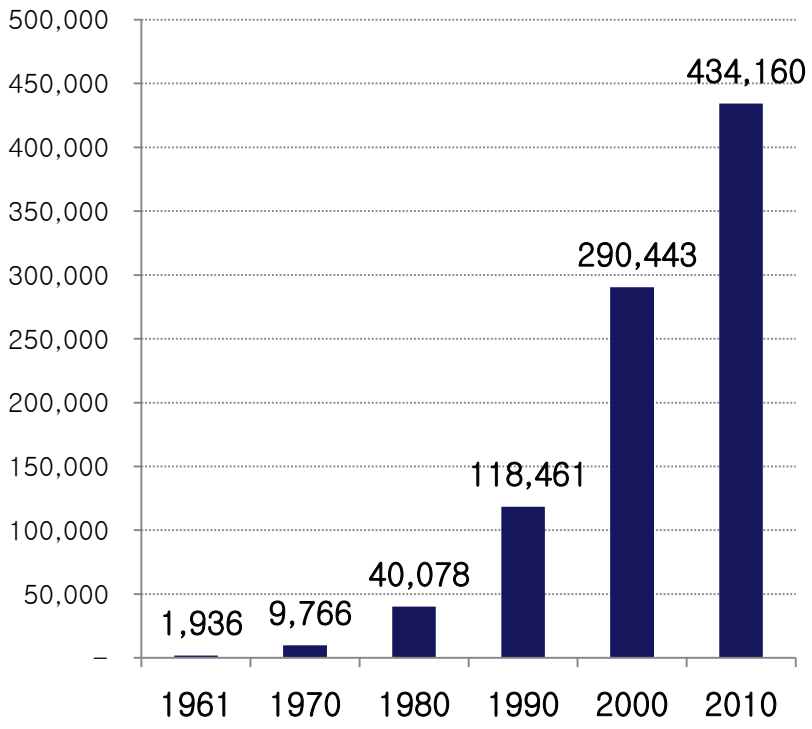
II Power Supply and Demand

Structure of electricity market

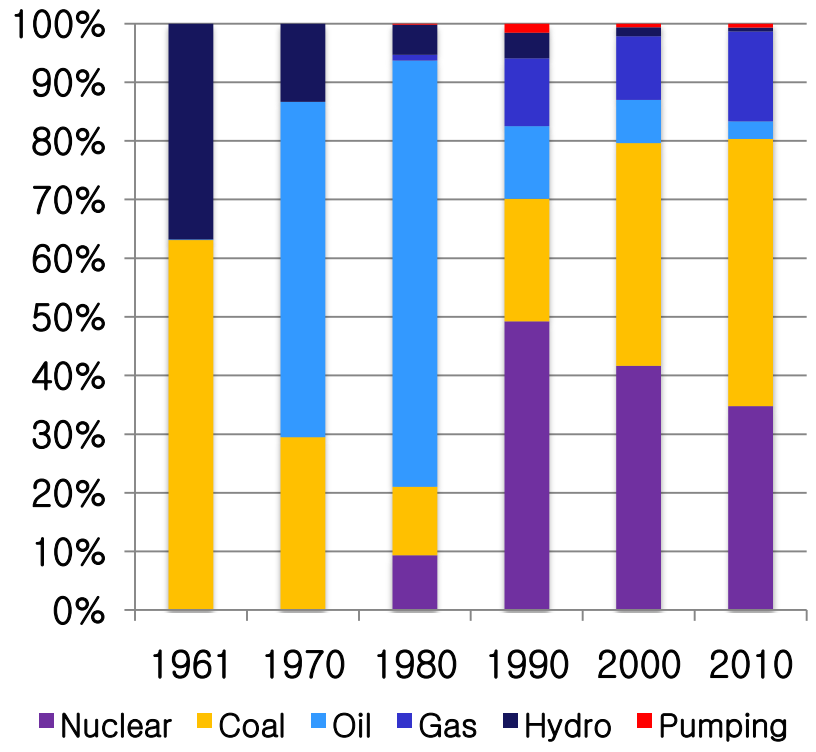


Trends in power generation

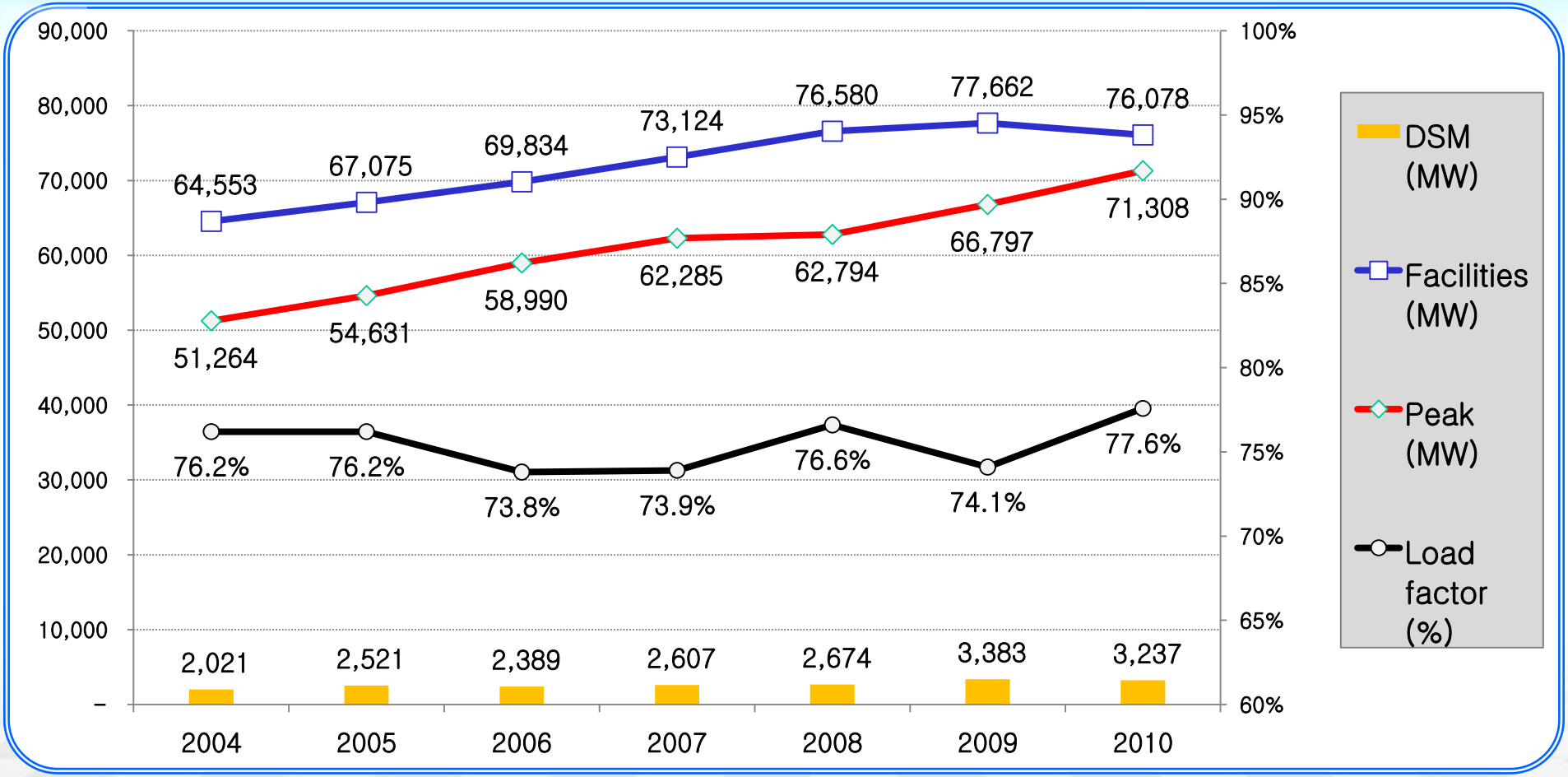
Generation(GWh)



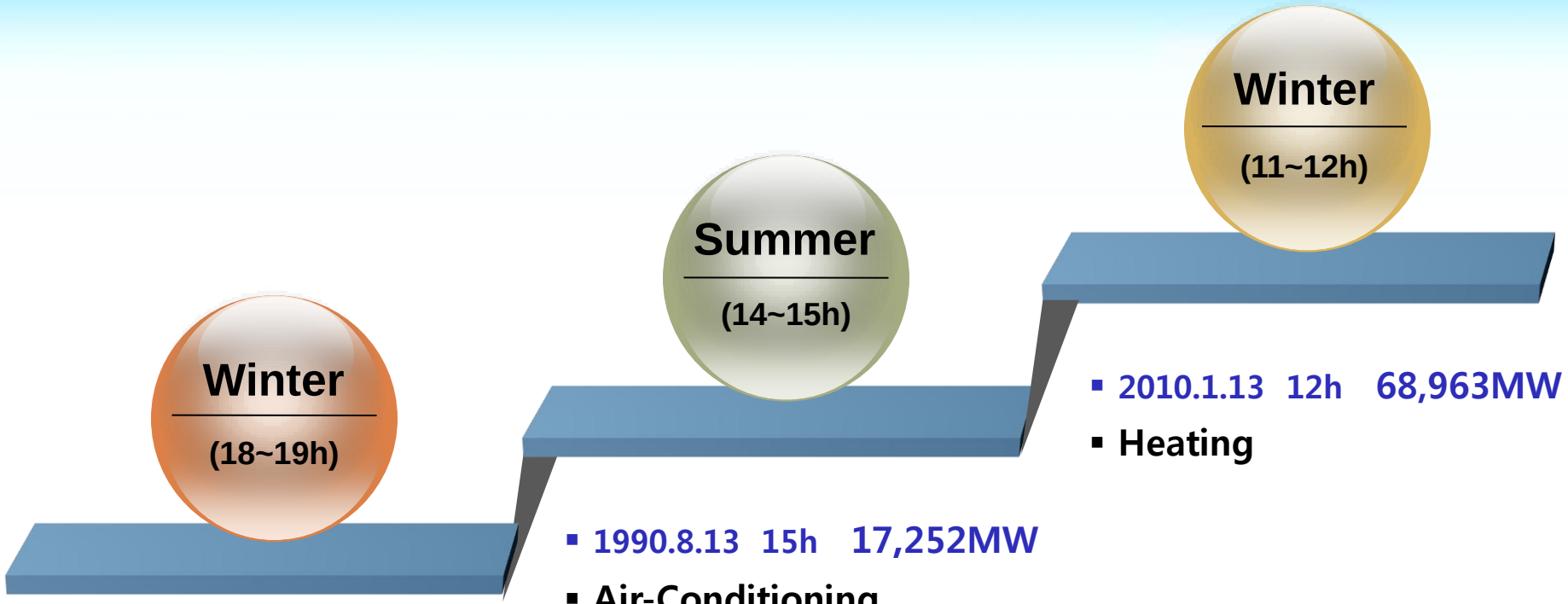
Facilities(%)



Trends of Peak load & DSM



Trends of Peak



- 1980.11.20 18h 5,457MW
- Lighting, Heating

- 1990.8.13 15h 17,252MW
- Air-Conditioning

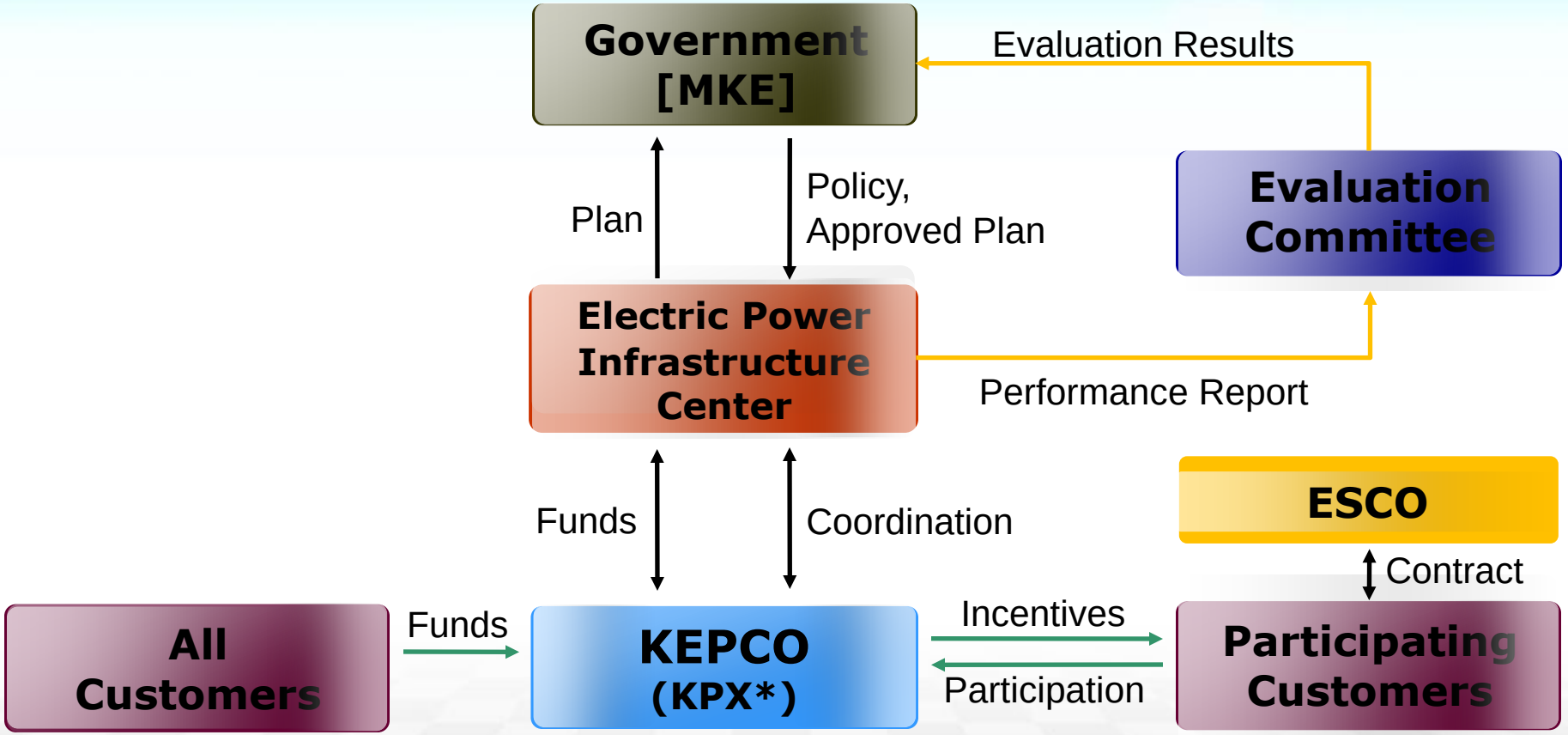
- 2010.1.13 12h 68,963MW
- Heating

1961~1980	1981~2008	2009~

III KEPCO DSM Programs

Objectives of DSM

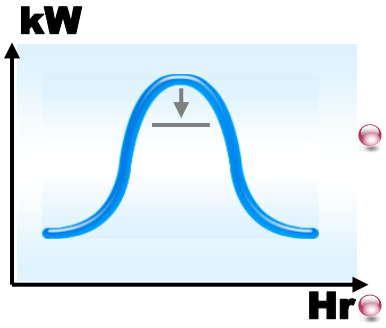
Structure of DSM Implementation



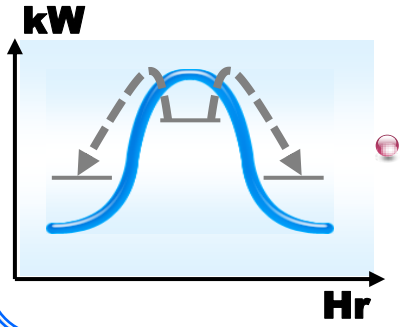
* KPX DSM Programs : Day-Ahead DR, Hour-Ahead DR

KEPCO DSM Programs

Load Management

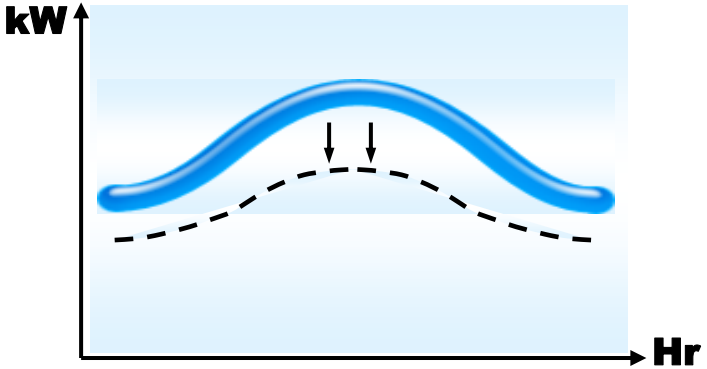


- Demand Adjustment Program of designated period
- Demand Adjustment Program of Advance Notice
- Remote control system for HVAC in building
- Demand Controller



- Cool Storage System

Energy Efficiency



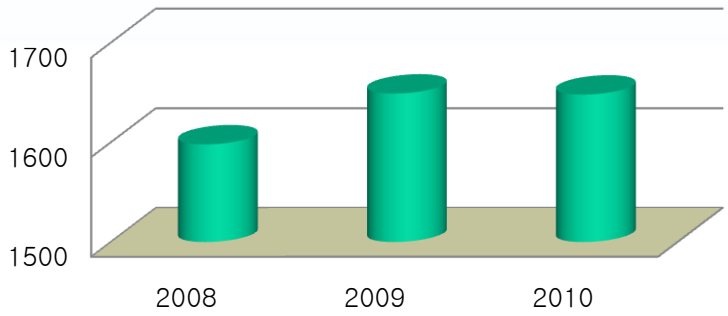
- Energy Efficiency Lighting(LED)
- Inverters for improving Motor Efficiency
- High Efficiency Electric Transformers
- Energy Welfare Program

Load Management Program

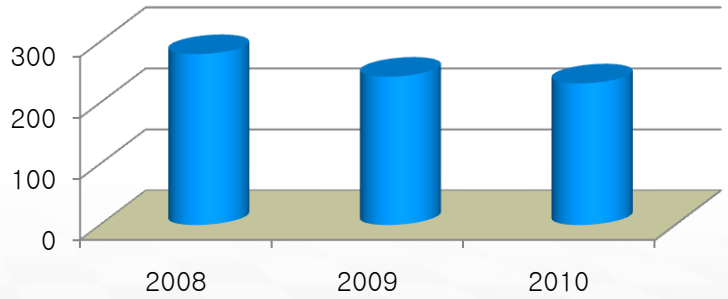
1. Demand Adjustment Program of Designated Period

- **Customers**
  - **Commercial and industrial customers (peak demands ≥ 300kW)**
  - **Peak demands reduction ≥ 30% (at least more than CBL)**
- **Periods**
  - **July 19~23, Aug 9~13,23~27 (15 days excluding holidays)**
- **Incentives**
  - **$0.76~0.93 / peak demand reduction (kW)**

Peak reduction (MW)



Incentive ($MIL)



Load Management Program

2. Demand Adjustment Program of Advance Notice

Customers

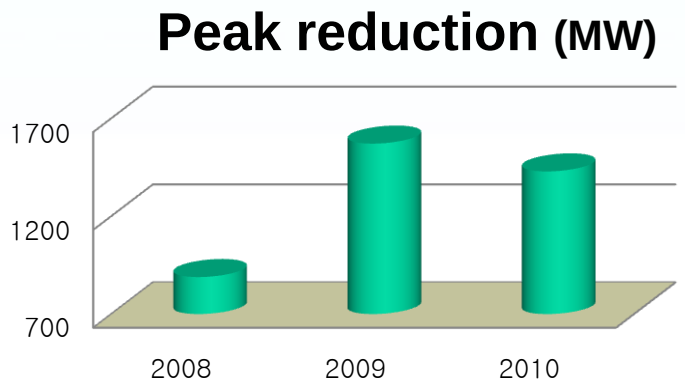
- Commercial, industrial customers
  (peak demands ≥ 300kW)
- Reduction of load for 30-min.
  : ≥ 10%(or 20%) of CBL

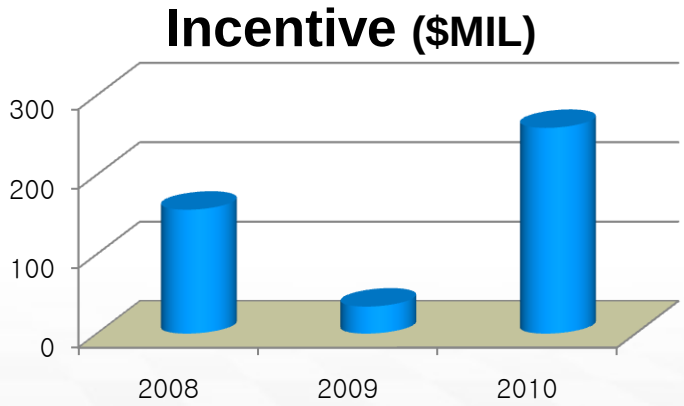
Periods

	Summer	Winter
Month	7, 8, 9	12, 1, 2
Time	11~12am 13~17pm	10~12am 17~19pm

Incentives

- $ 0.36~0.57 /avg. load reduction for 30 min(kW)





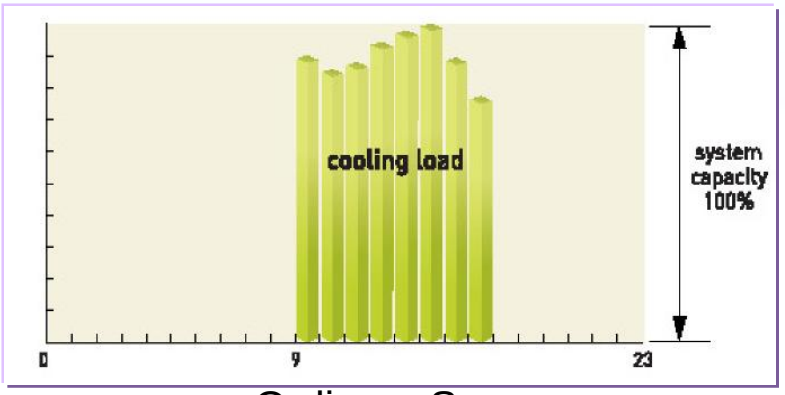
Load Management Program

3. Cool Storage System

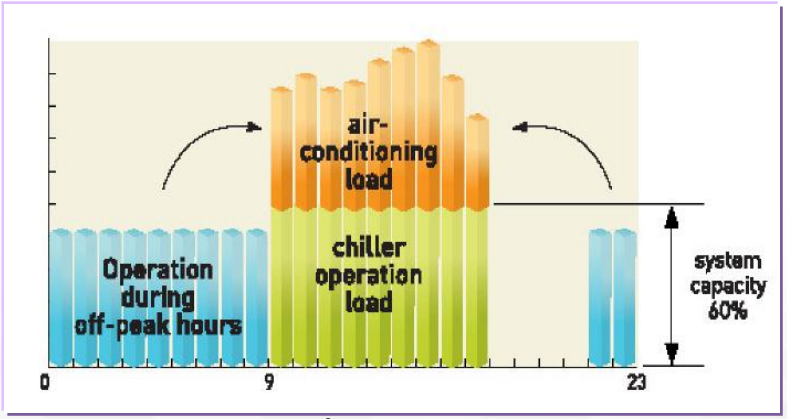
- Storage cold heat during the off- peak period using low-priced electricity
- Using cold heat during peak time for air-conditioning

- **Installation Incentive**
  - $350~$480/kW (peak reduction)
- **Incentive for designing**
  - 5% of installation incentive (to company which design the system)

Comparison of system operations



Ordinary Sys.

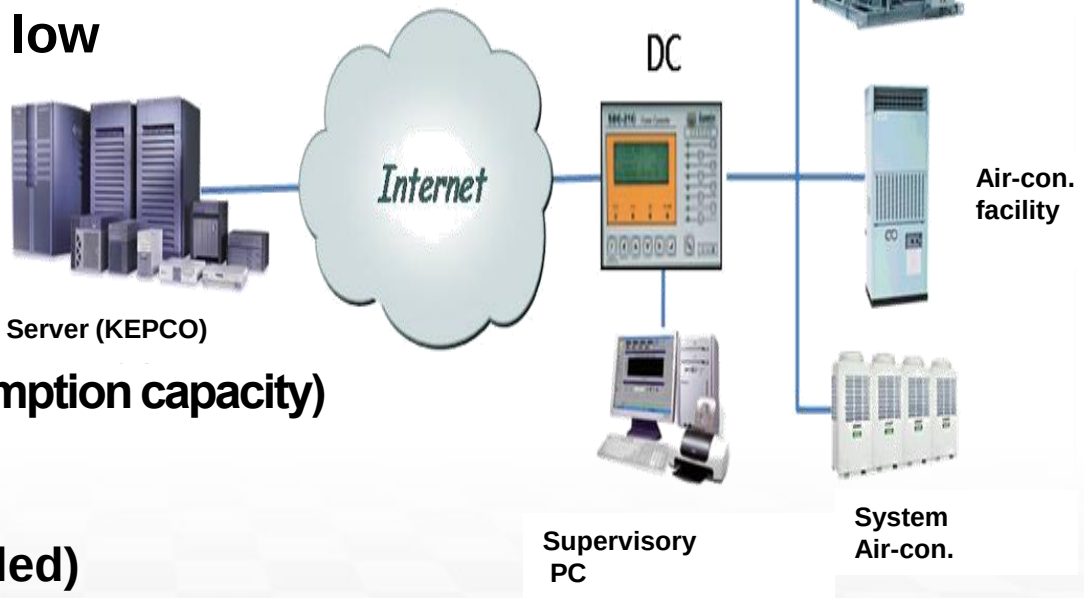


Cool storage Sys.

Load Management Program

4. Remote control system for HVAC in buildings

- Install this system for the purpose of load management and energy saving
- Control electric systems remotely in emergency situations of low supply margins

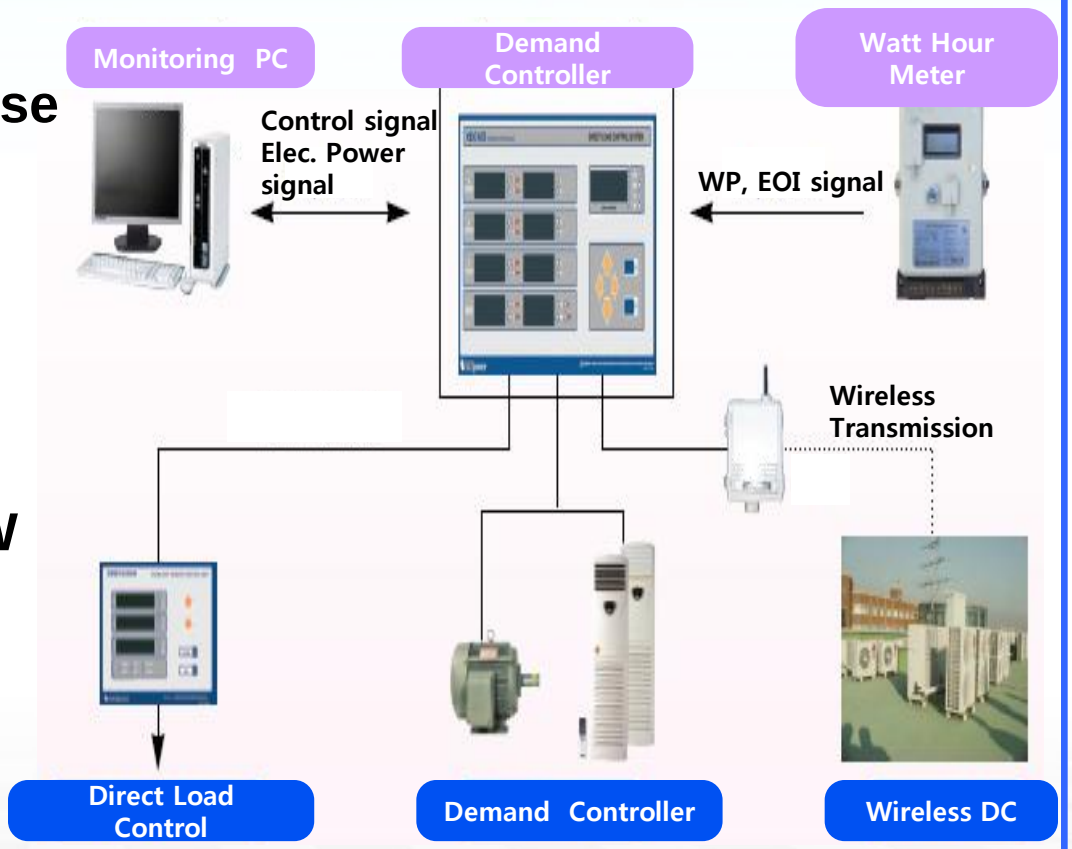


- **Installation Incentive**
  - $35/kW (chiller's power consumption capacity)
- **Incentive for reduction**
  - $0.3 /kWh (if remote controlled)

Load Management Program

5. Demand Controller

- Install this device for the purpose of control installers' Electric demand
- **Customers**
  - electric demand is over 500kW
- **Installation Incentive**
  - $1,500/EA



Energy Efficiency Program

1. Energy Efficient Lighting

- **KEPCO gives incentives to those who install high-efficiency lightings.**

  (KEMCO operates High-efficiency Appliance Certification Program)

- **Incentives**

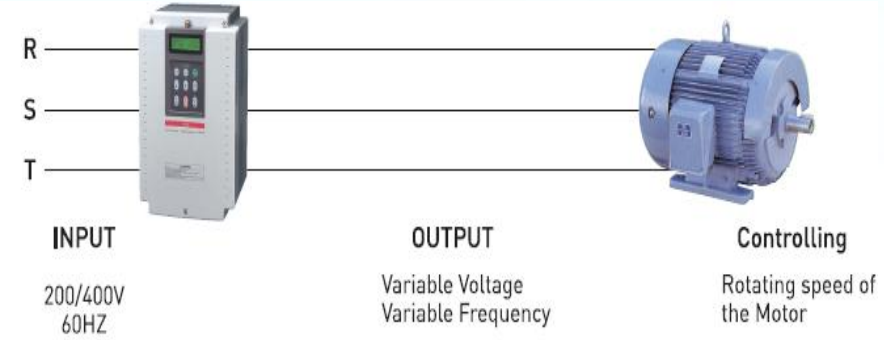
Categories		Reduced Power (W/EA)	Incentive ($/EA)
Led lightings (bulb type)	3~50W	25~90	5.8~15.5
Led lightings (flat type)	8.5~75W	9~37	29.6~80.9
Led emergency lightings	2~7W	15~41	9.0~17.5

High efficiency LED lightings

Energy Efficiency Program

2. Inverters for improving motor efficiency

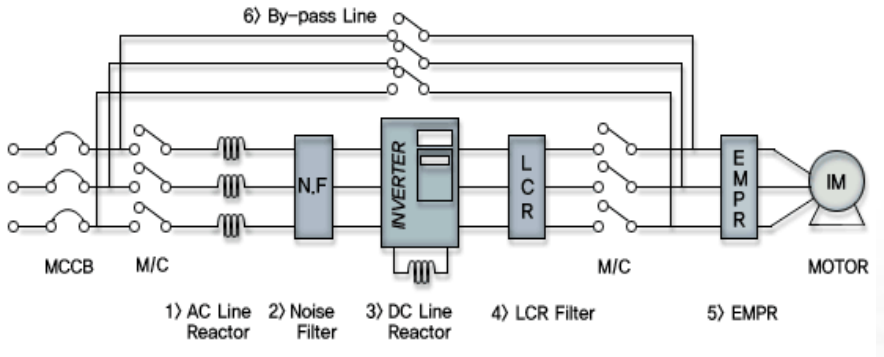
- **Control the rotational speed of an AC motor by controlling the frequency of the electrical power supplied to the motor**



- **Effect : Reduce electricity consumption more than 34%**

- **Incentives : $68 / reduced loss(kW)**

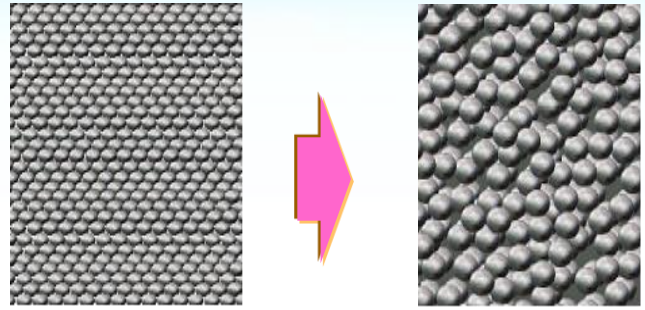
Capacity	3.7	30	110	220
Reduced Power(kW)	1.3	10.2	37.4	74.8
Incentive($)	96	687	2,184	4,368



Energy Efficiency Program

3. High efficiency electric transformer

- **Types**
  - Amorphous Metal Type
  - Refined Magnetic Domain type

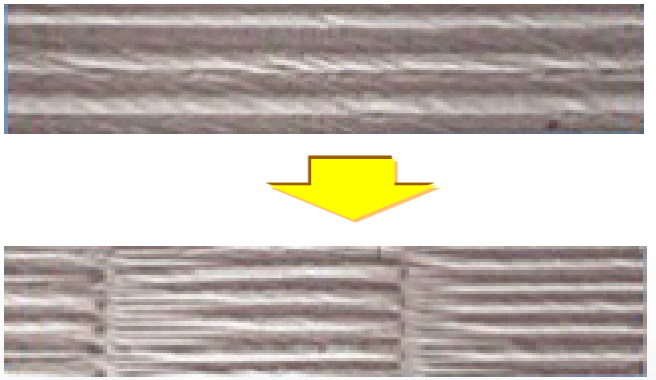


Silicon Steel Amorphous Metal

- **Effect** : Reduce core loss by 70%

- **Incentives** : $450 / reduced loss(kW)

kVA	100	500	1,000	2,000	3,000
Reduced Loss(kW)	0.6	2.5	5.1	8.1	10.6
Incentive($)	360	1,125	2,295	3,645	4,770



Refined Magnetic Domain

Energy Efficiency Program

4. Energy Welfare Program

- For the low income group to live better life and increase the sympathy about efficient use of energy

- **Details of Support**
  - Installing Energy Efficiency Lightings
  - Exchanging CBs and Wall Sockets
  - Security Check-ups
  - Energy Bill Saving : $30/yr per household

- **Results**

Year	'07	'08	'09	'10	Total
households	147,568	131,428	132,220	67,552	478,768
budget(M$)	20.5	19.3	20.6	11.6	72.0

Results from DSM Programs

Programs	'09 Results(MW)	'10 Results(MW)
	Peak Reduction	Peak Reduction
Demand Adjustment Program of designated period	1,649	1,648
Demand Adjustment Program of advance notice	1,571	1,457
Cool Storage System	45	20
Demand Controller	85	42
Direct Load Control (Pledged)	(1,335)	(1,380)
Emergency Electricity Conservation(Pledged)	(2,350)	(2,350)
Energy Efficiency	27	70

Best Practice of KEPCO's DSM

Load Factor

- World's highest level 77.58% (2010)
  - improved 4.5% by DSM

Peak Reduction

- 3,383MW(2009) improved 5.6%(reserve ratio)
- 3,237MW(2010) improved 4.5%(reserve ratio)

DSM Programs

- 12 DSM programs
- New 3 programs in 2009
- Various R&D activities

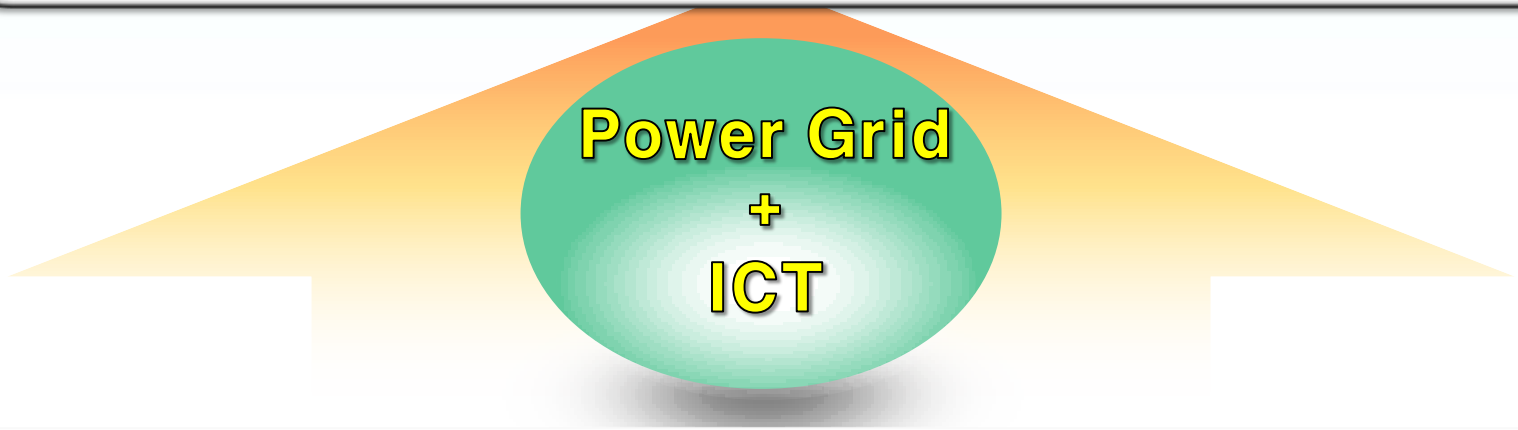
Customer Satisfaction

- Stable Power Supply
- 12 consecutive yr #1 in customer satisfaction survey
- PLMA Demand Response Awards (2006)

IV Future's Plan

Goals of KEPCO's Smart Grid

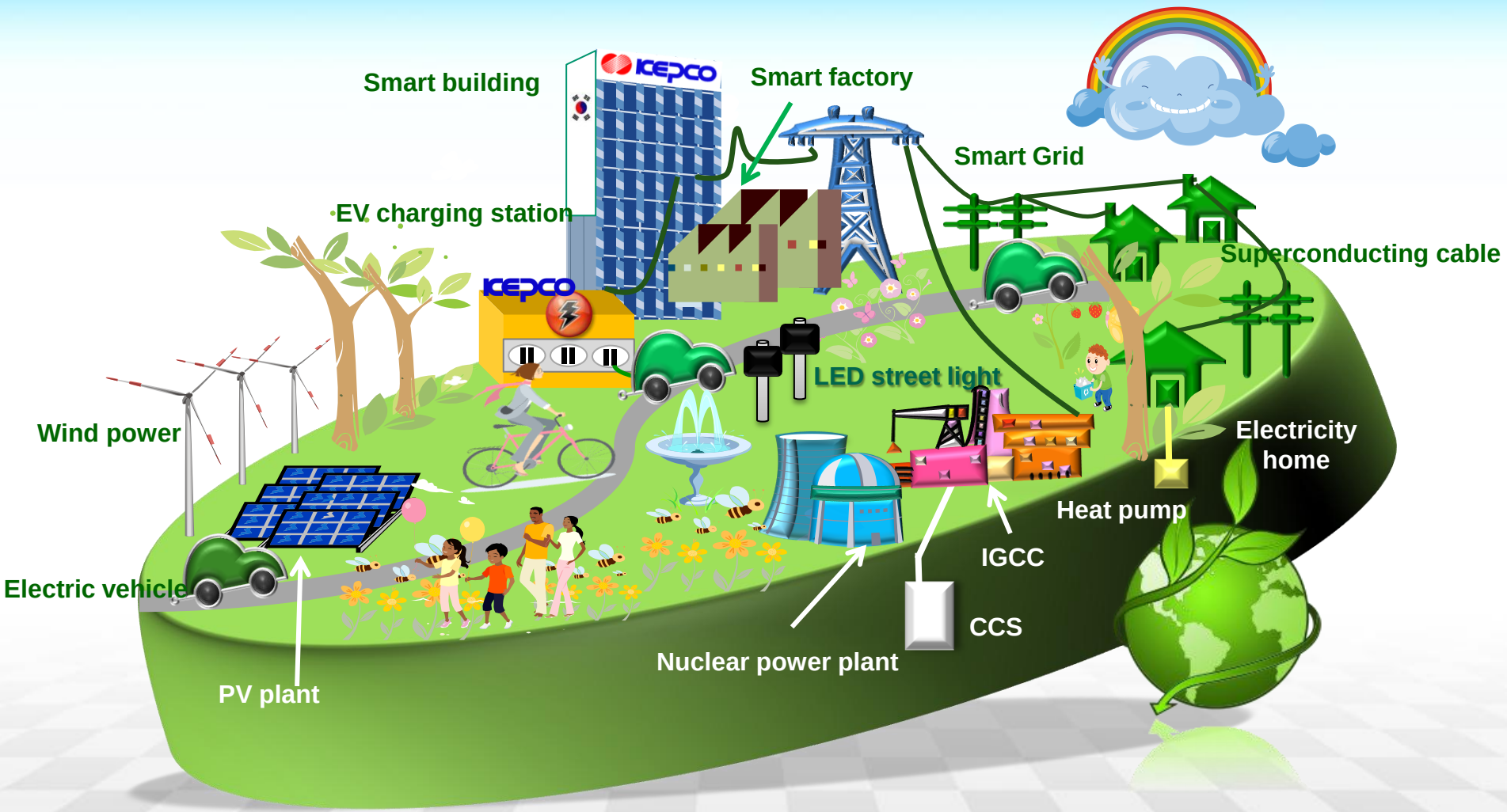
Reduce in Green-house Gas
Improve in Energy Efficiency



- Deployment of No Carbon Energy Sources (Wind/PV)
- Reduction in Energy Loss to Optimize Power Flow
- Advanced Electric Service to Increase Consumer's Value
- Smart-Grid based DR to Shave Peak-Demands

KEPCO

Smart-Grid City mapped out by KEPCO



Advanced DR Systems based on SG

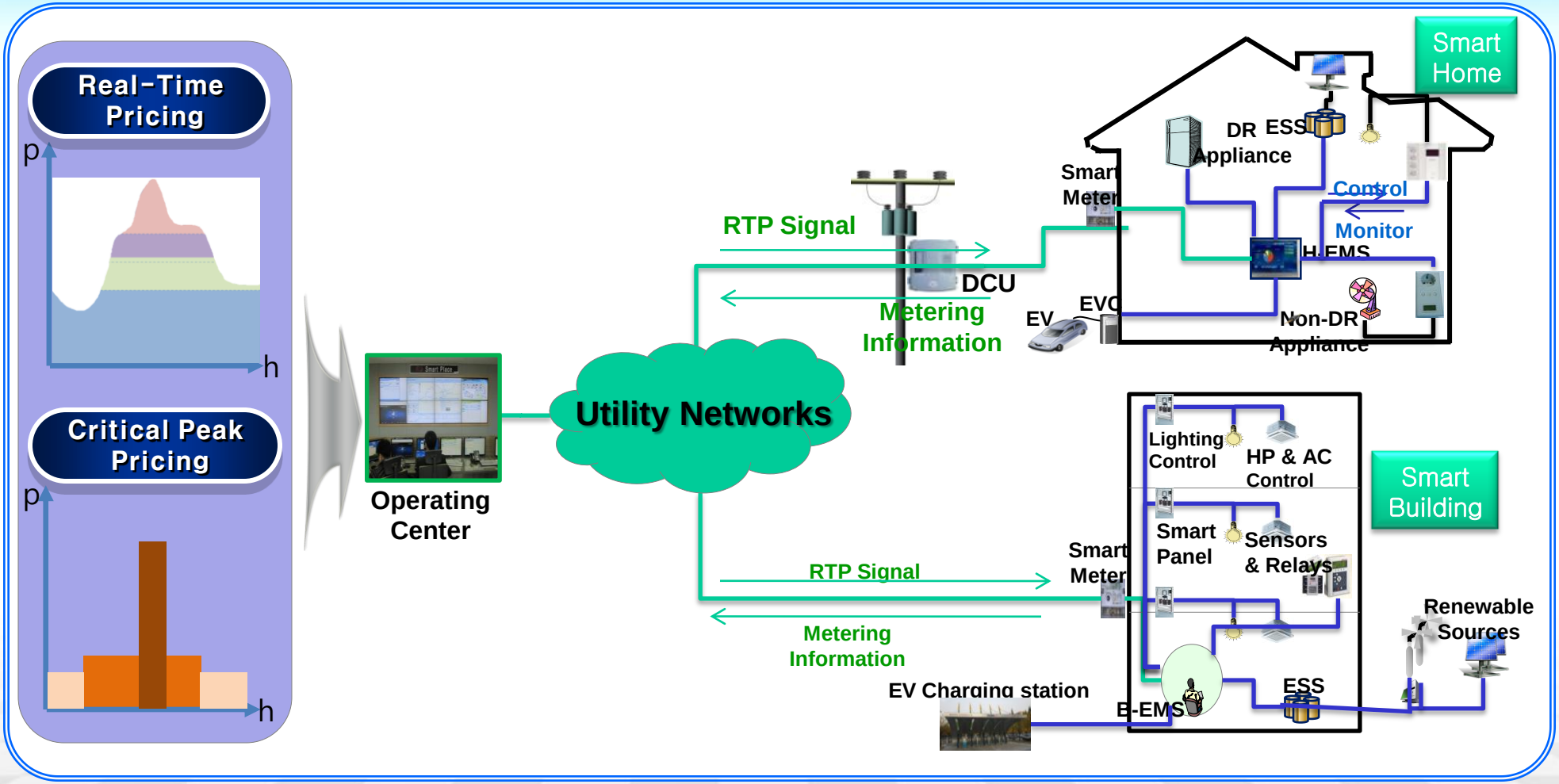
• DLC(Direct Load Control) through AMI

Kinds of Customers		As-Is	To-Be
Communication Media		• Public lines (CDMA, Internet, etc)	• Utility owned lines, such as PLC
Target Devices	Small C&I	• HVDC	• Target to all customers • User specified devices
	Large C&I	• User specified devices	

• Incentive-based DR linked to Wholesale

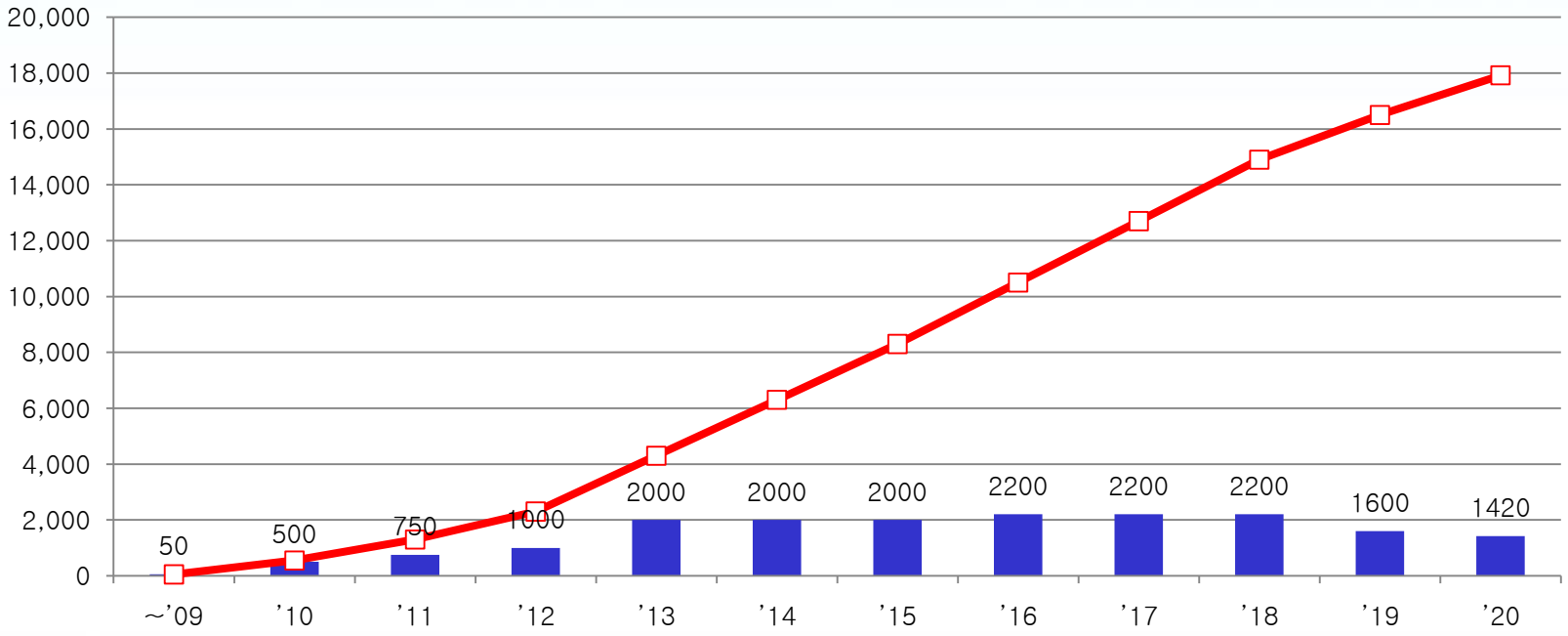
Kinds of Customers		As-Is	To-Be
Range of application	Small C&I	• N/A	• Target to all customers • On a regular basis
	Large C&I	• Under emergency only	

Advanced DR Systems based on SG



Plans to Deploy Smart Meters

The number of smart meters to be installed (unit: thousand)



Year	~'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Total
# of meters installed (thousand)	50	500	750	1,000	2,000	2,000	2,000	2,200	2,200	2,200	1,600	1,420	17,920

Thank You