

# Smart Grid Project in Dubai

IoT in Dubai)

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**KEPCO**

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# 1. KEPCO in Brief

Government

(51%)

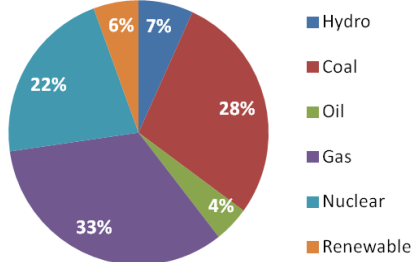


## Generation



- Capacity : 95,681MW
- GENCO(Subsidiaries) : 72,262MW(75.5%)

### Generation Source

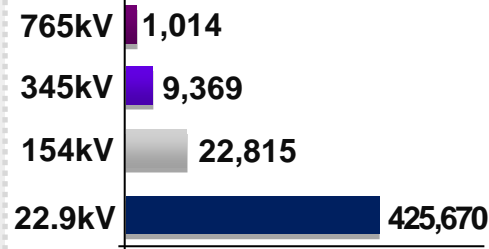


## Transmission & Distribution

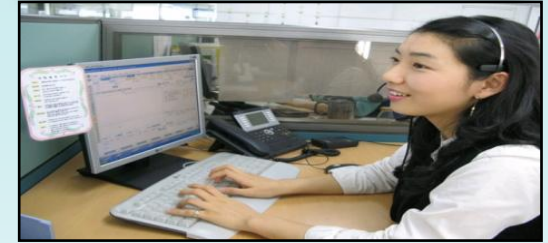


- Transmission : 33,198c-km
- Substation : 295,418MVA
- Distribution : 425,670c-km

### Line Length(c-km)

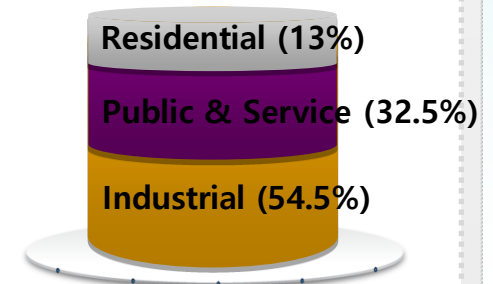


## Sales



- Customers : 21.7million (households)
- Sales Volume : 477,592GWh

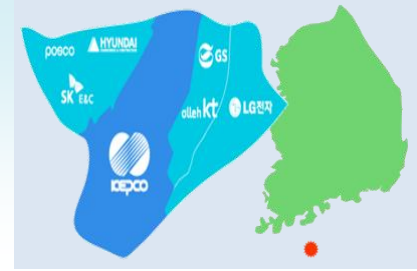
### Sales Percentage



# 2-1. Cases of KEPCO Projects

## Jeju Smart Grid Test-bed ('09~'13)

- 168 companies in 12 consortiums
- Tested in 5 areas, 2 S/S, 4 D/L, 3,000 customers  
⇒ Developed 45 BMs (DR management, AMI, EMS, EVC, ESS, etc.)



## Jeju Gapa Island Microgrid ('11~'12)

- The world's first Microgrid Operation System Model  
⇒ Applied to deploy Energy Independent Island BM
- Replaced 3 Diesel Generators → Wind+Solar+ESS+EV+AMI+DAS



## Advanced Metering Infrastructure(AMI) ('13~'20)

- Installations in 2 stages : '13~'16(49%), '17~'20(100%)

	Stage 1				Stage 2				Total
	'13	'14	'15	'16	'17	'18	'19	'20	
AMI Installed (10,000units)	200	230	250	257.5	250	250	330	364	2,194

- Smart services(AOS, Power Planner) provided to customers

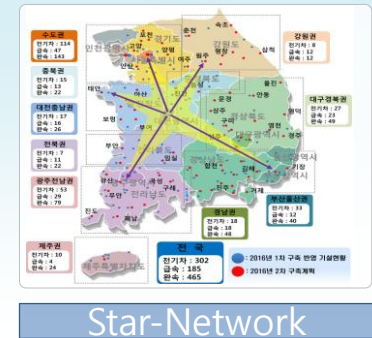


Power Planner

# 2-2. Cases of KEPCO Projects

## EV Charging Infrastructure ('09~'16)

- **EVC Star Network** : 2015(336 chargers), 2016(314 chargers)
- **EVC SPC Established('15)** to build 3,660 chargers ('15~'18)
- **Shorter distance between stations** : '15(100km) → '16(30km)



## Frequency Regulation(FR) ESS ('14~'17)

- **Installation(500MWh)** : 236MWh(~'15), 140MWh('16), 124MWh('17)
- **Replaced FR service(coal-fired power plant) with ESS**  
 ⇒ **95% generation→100%** : power purchasing costs(USD 120Mil./yr) saved



## Nation-wide SG Station Installation ('13~'16)

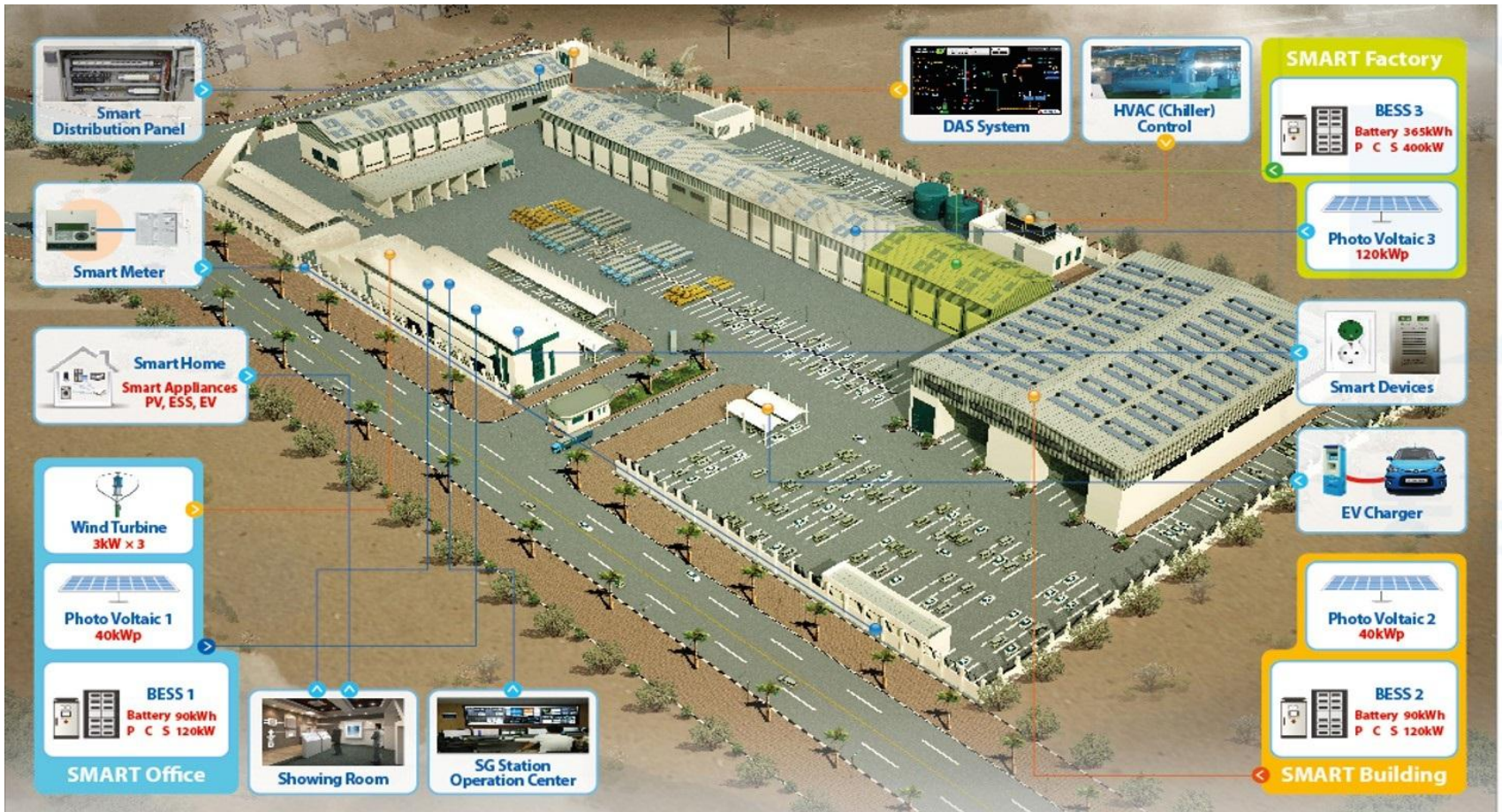
- **Installed SG Stations (R/E+ESS+AMI+BAS+TOC) in 114 KEPCO offices**

No. of Installed Offices	Reduced Peak	Reduced Elec. Consumption	Reduced CO <sub>2</sub>
114	4MW ↓	10GWh ↓	4,700tCO <sub>2</sub> ↓



# 3-1. Overview of SG Station Pilot Project in Dubai

- Objective : To establish an expandable and sustainable Smart City model
- Duration : 2015.10 ~ 2017. 6
- Target : Energy Saving 10%, Peak Cutting 8%, Reducing CO2 Emission 10%
- Device : PV 200kWp, BESS 540kWh, AMI, Smart Sensors, WT 9kW, TOC

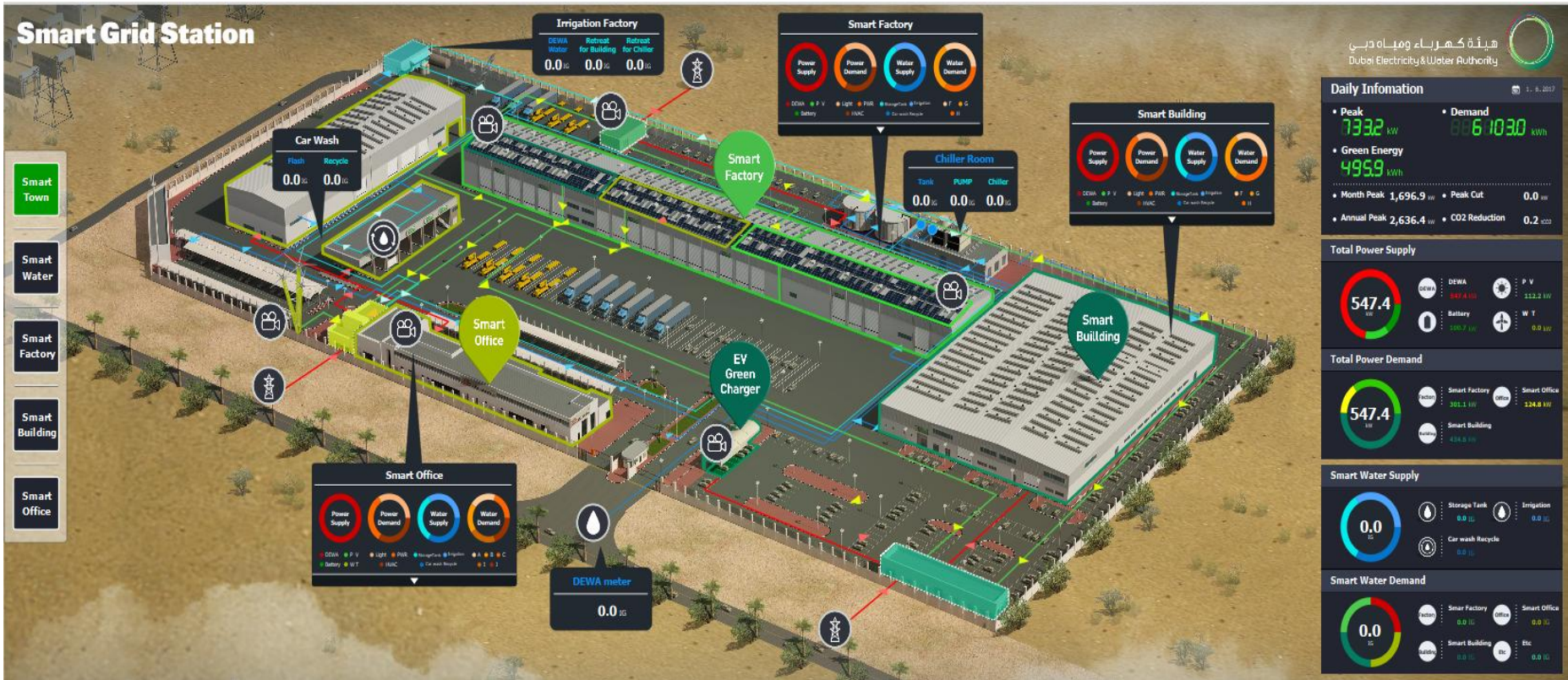


## 3-2. Concept of the SGS Pilot Project in Dubai

- Smart Town Model for various types of buildings was applied such as Smart Office, Smart Building, and Smart Factory.
  - Small SG Station models integrated into one system (TOC)
- Self-sufficient sustainable energy supply system against future fossil fuels exhaustion was demonstrated using renewable energy and Micro Grid System by SG stations
  - Smart Office 20%, Smart Building 15%, Smart Factory 10%

Building	PV	ESS	PCS	WT	System
A, B, C	40 kW	45 kWh	120 kW	3 * 3 kW	SGS 1
D, E	40 kW	90 kWh	120 kW	-	SGS 2
C#1, C#2	120 kW	365 kWh	400 kW	-	SGS 3
Total	200 kW	500 kWh	640 kW	9 kW	TOC (Smart Town)

# 3-3. SGS Operation System (Main - Layout)



# Pictures

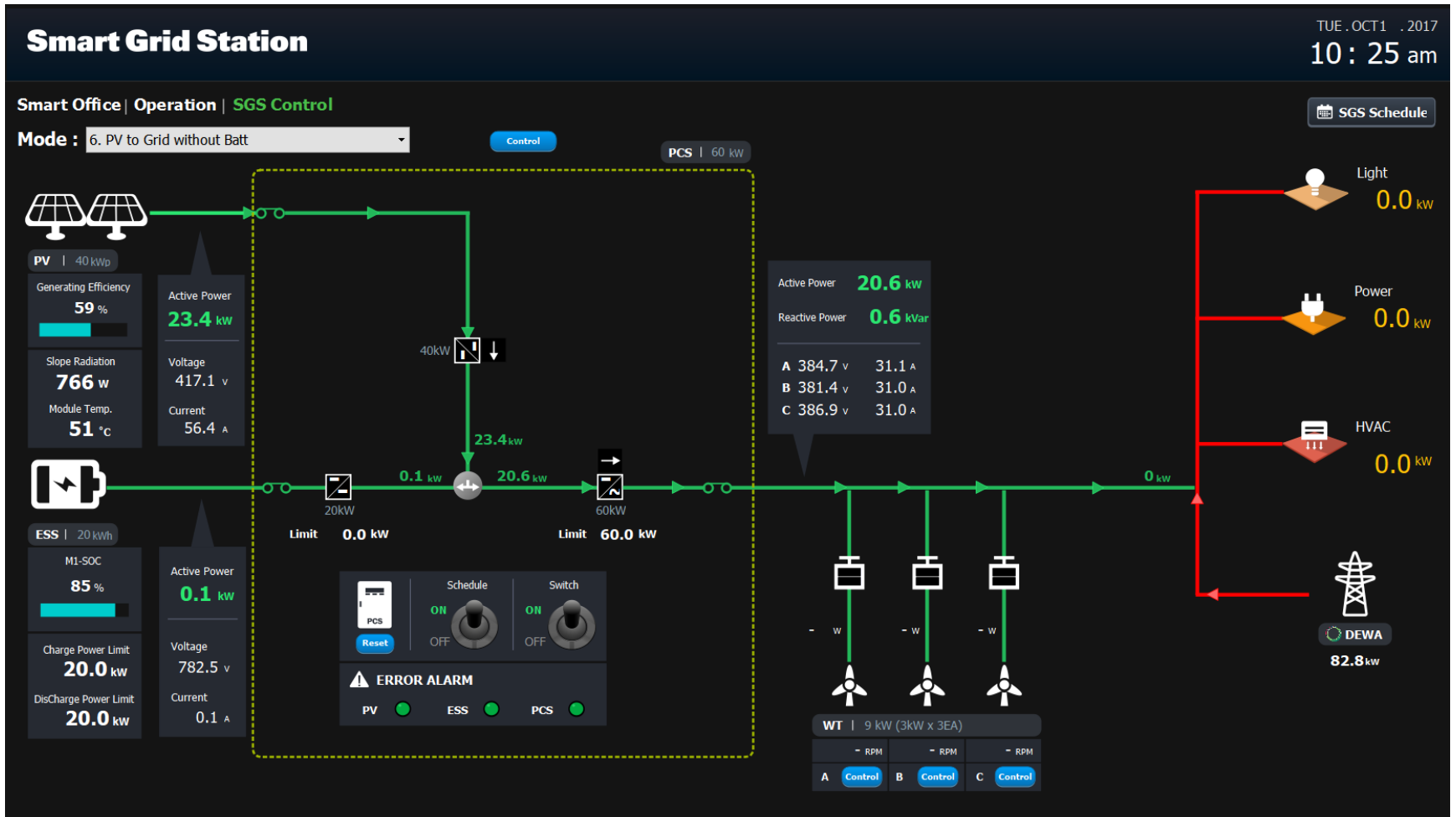




# 3-4. SGS Operation System (Smart Town)



# 3-5. SGS Operation System (Control)



# 3-6. Function of SG Station S/W

## Power Generation and Usage Monitoring as a real time

- Each Building Power Usage, Each Floor Power Usage, Outlet, PV, ESS, Wind Turbine etc.

## Analysis and Statistics

- Power supply by PV, battery and power usage, etc.

## Forecast of Power supply

- Forecast of electricity usage for demand by the artificial intelligent technique

## Remote Control Equipment

- PCS, VSD, Smart Light, Outlet, Air Conditioning Equipment, etc.

## Operation Automatization

- PV Generation, ESS charging/discharging control, Outlet

## Fault Diagnosis Management

- PV, ESS, Smart penal, Outlet, Light, etc.

# 4-1. Smart City Model for utility oriented

- Smart City Model



- Steps to Smart City



## 4-2. Lessons learned

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- **Smart Grid with Building EMS**
- **IOT with Building EMS**
- **SGS & DSM resources**
- **SGS & Grid operation efficiency**

# Thank You

Smart Energy Creator  
**KEPCO**

