

Renewables in Korea

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Dae Kyeong Kim

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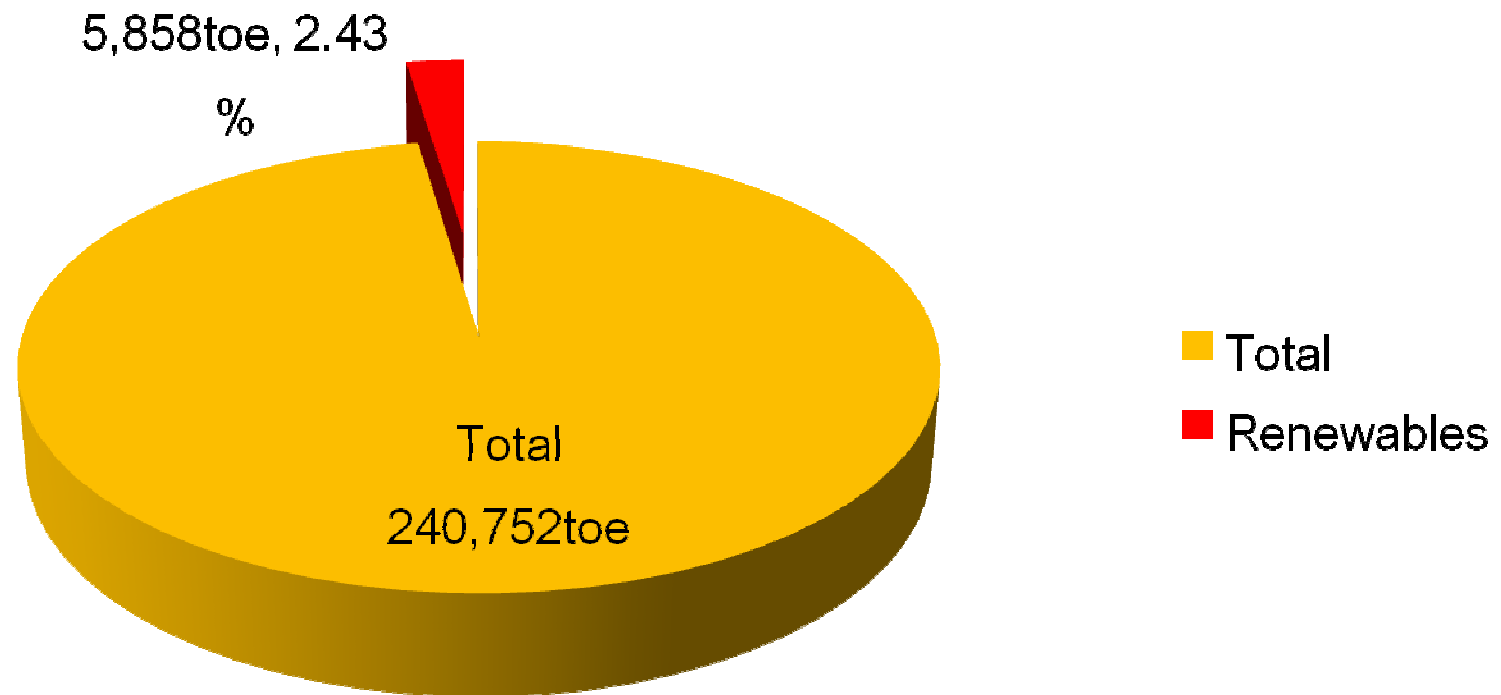
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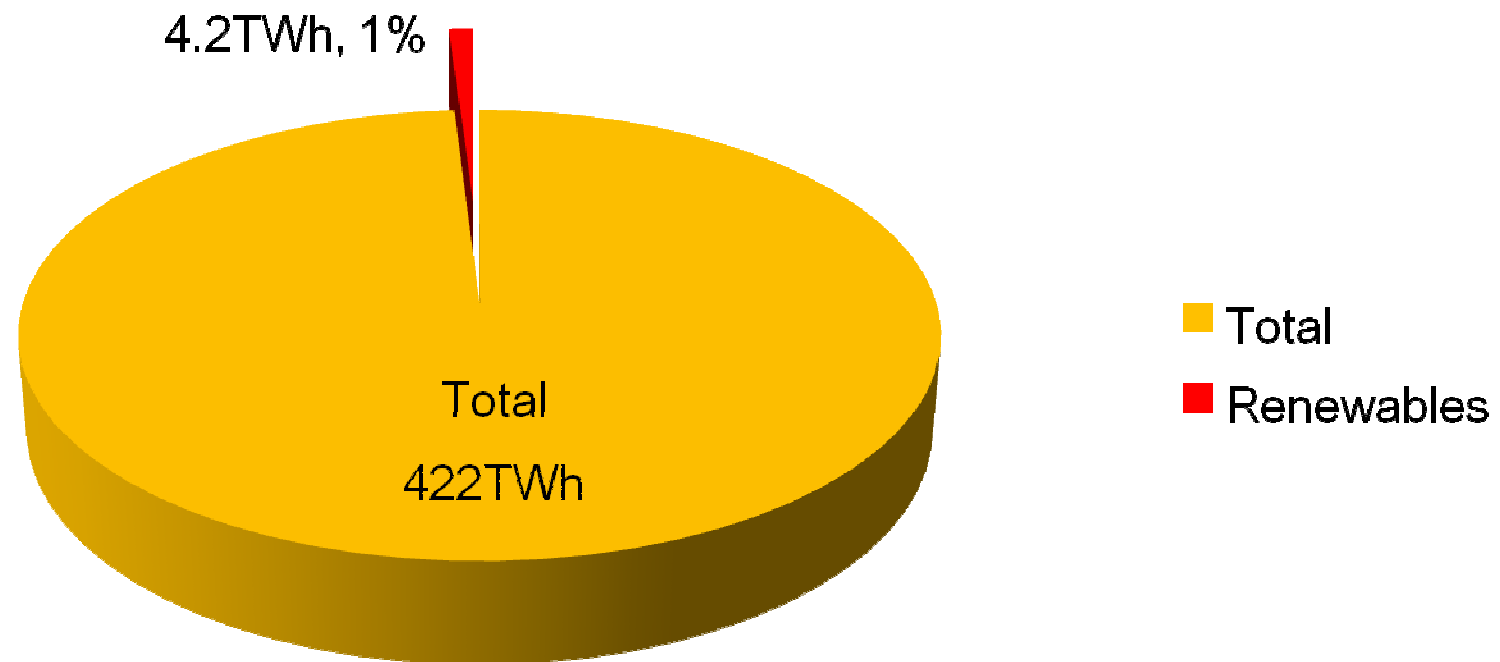
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Status

RE in Primary Energy

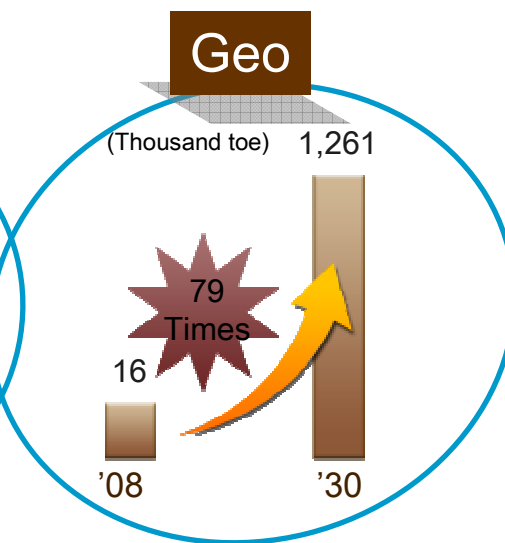
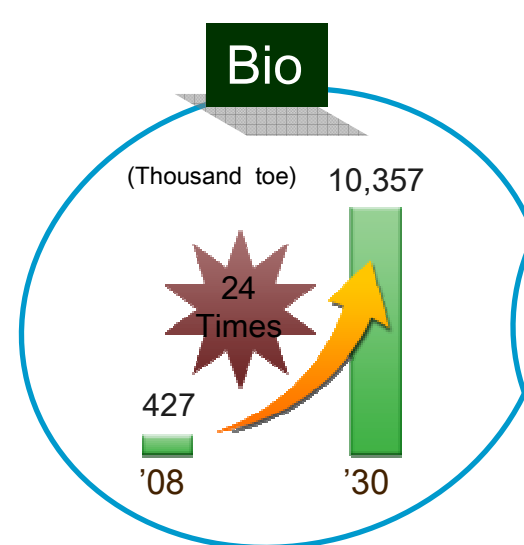
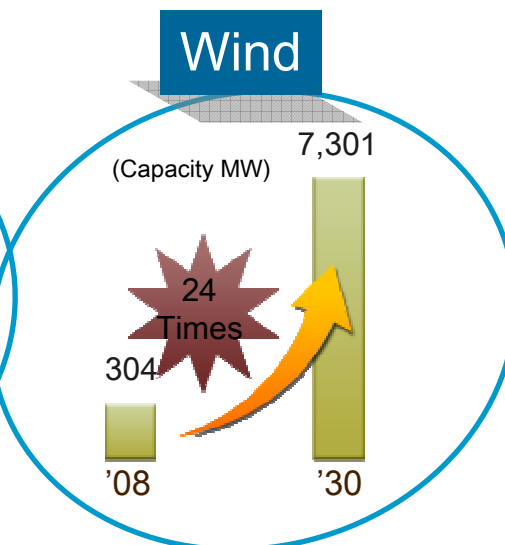
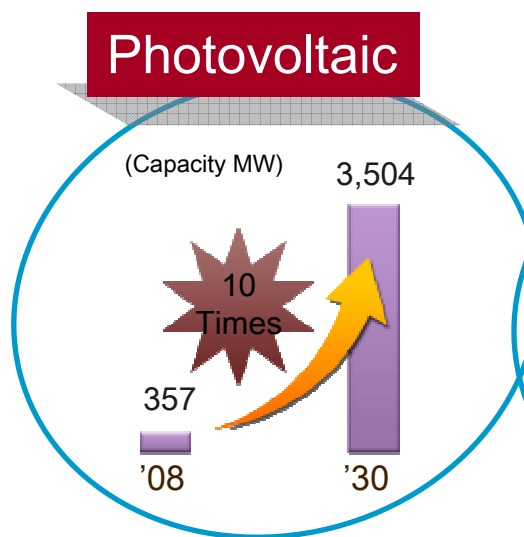
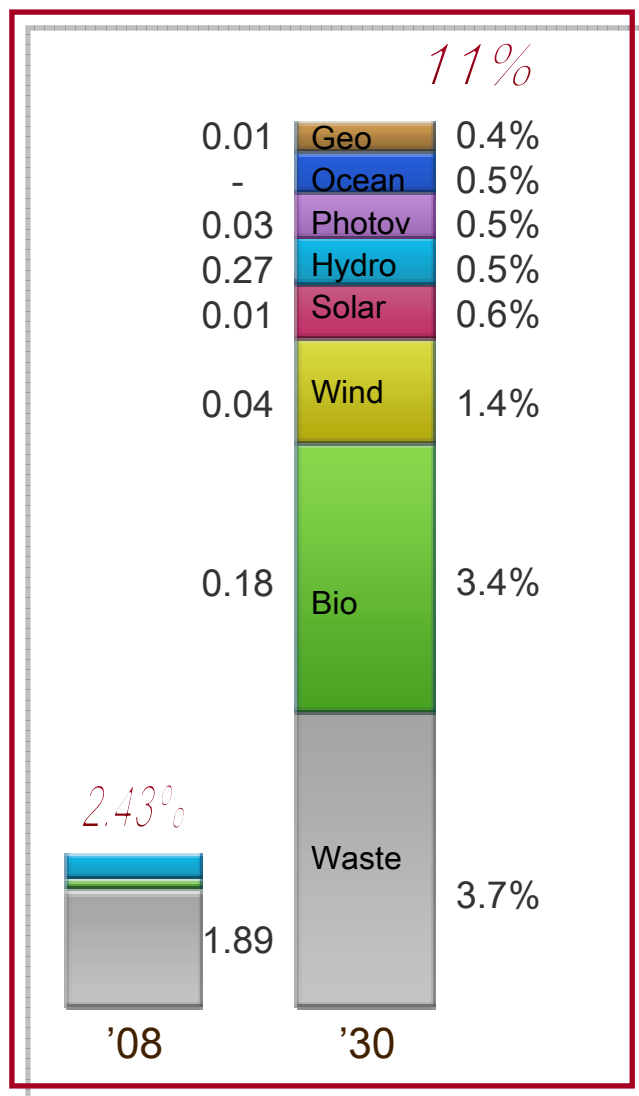


RE in Electric Power



Planning

RE Capacity Mix in 2030



RPS in 2012

☐ Mandatory Percentage of Power Supplier

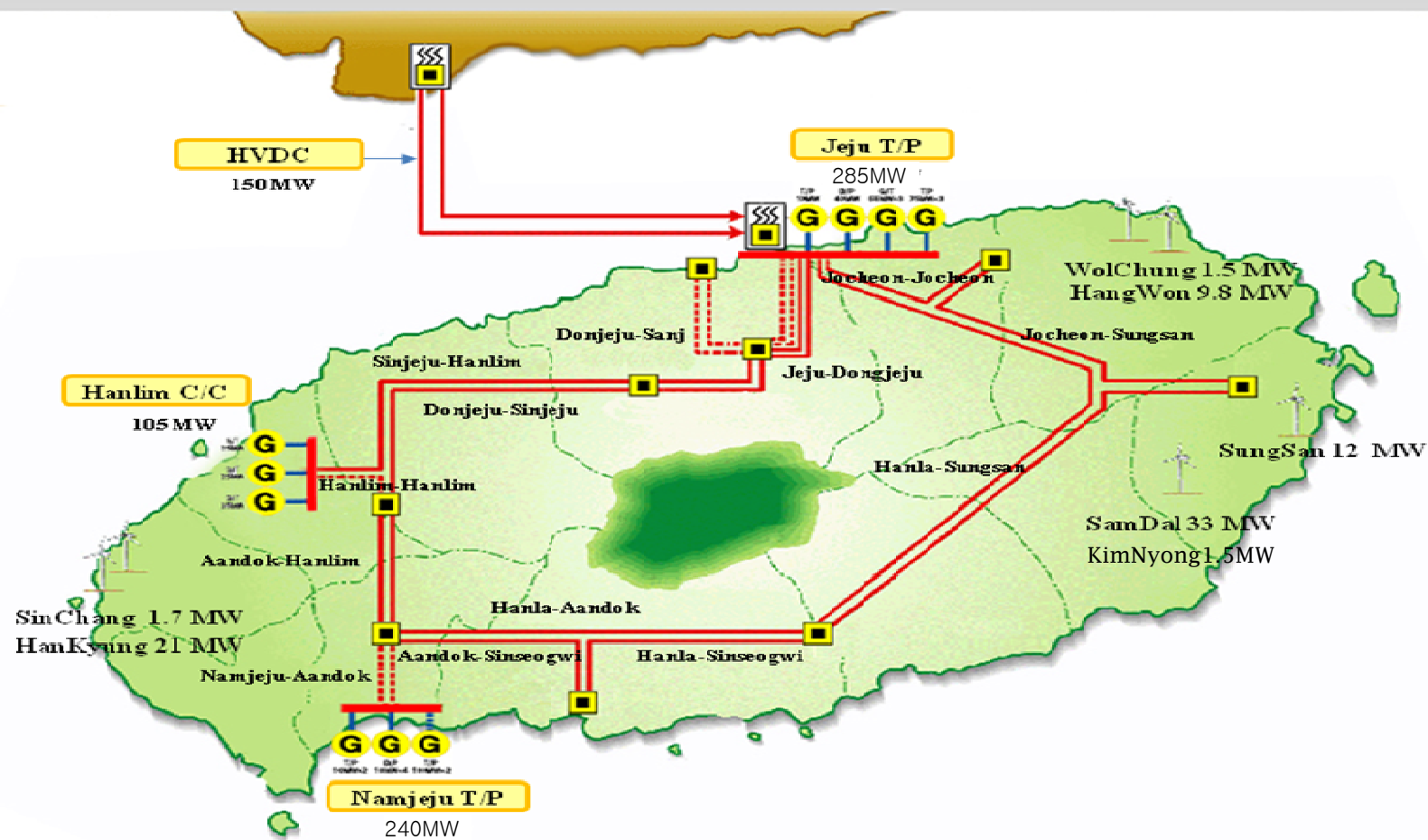
Year	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22
MP(%)	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0	8.0	9.0	10.0

☐ Mandatory Percentage of Public Building

Year	'11	'20
MP(%)	10	20

Jeju Island Demonstration

Smart Renewables



Capacity Mix in 2010

Mix	Capacity (MW)	Percentage (%)
Thermal Power	630	61.5
Wind Power	90.5	9
Solar Power	5	0.5
HVDC	300	29
Total	1025.5	100

Future Wind Power in Jeju

Facility Name	Capacity (MW)	Installation Year
Nan San	10.5	'11.3
Ocean Demo	6	'11.6
Esidol #1	20	'11.11
Han Sin D&P	45	'11.12
Esidol #2	20	'12.6
Sang Do	30	'12.6
Pampas	20	'12.6
Sam Mu	30	'12.12
Wol Chung Ocean	50	'13.1
Jeju	20	'13.12
Han Kyung Ocean	50	'14.10
Total	301.5	

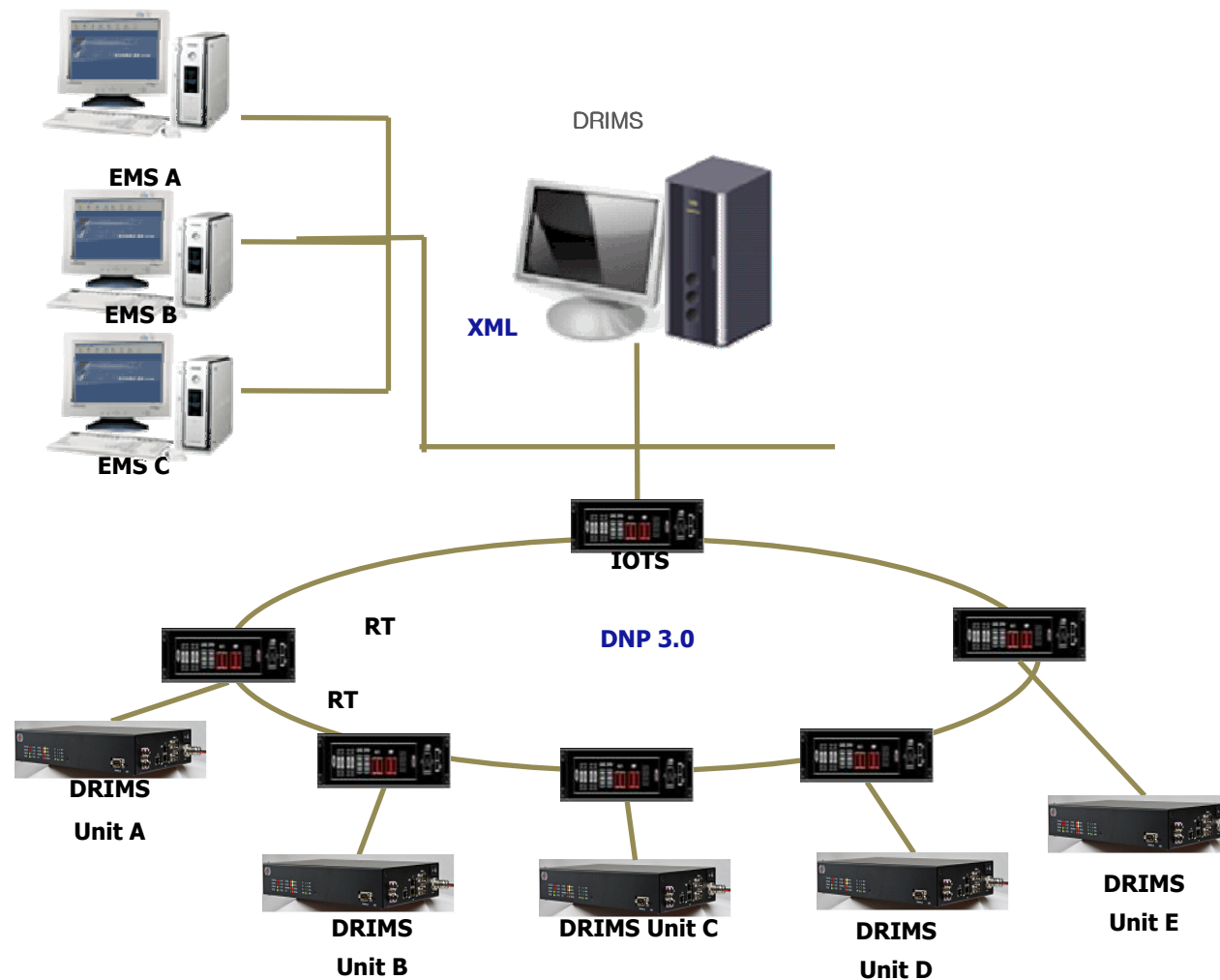
Jeju Island Demonstration



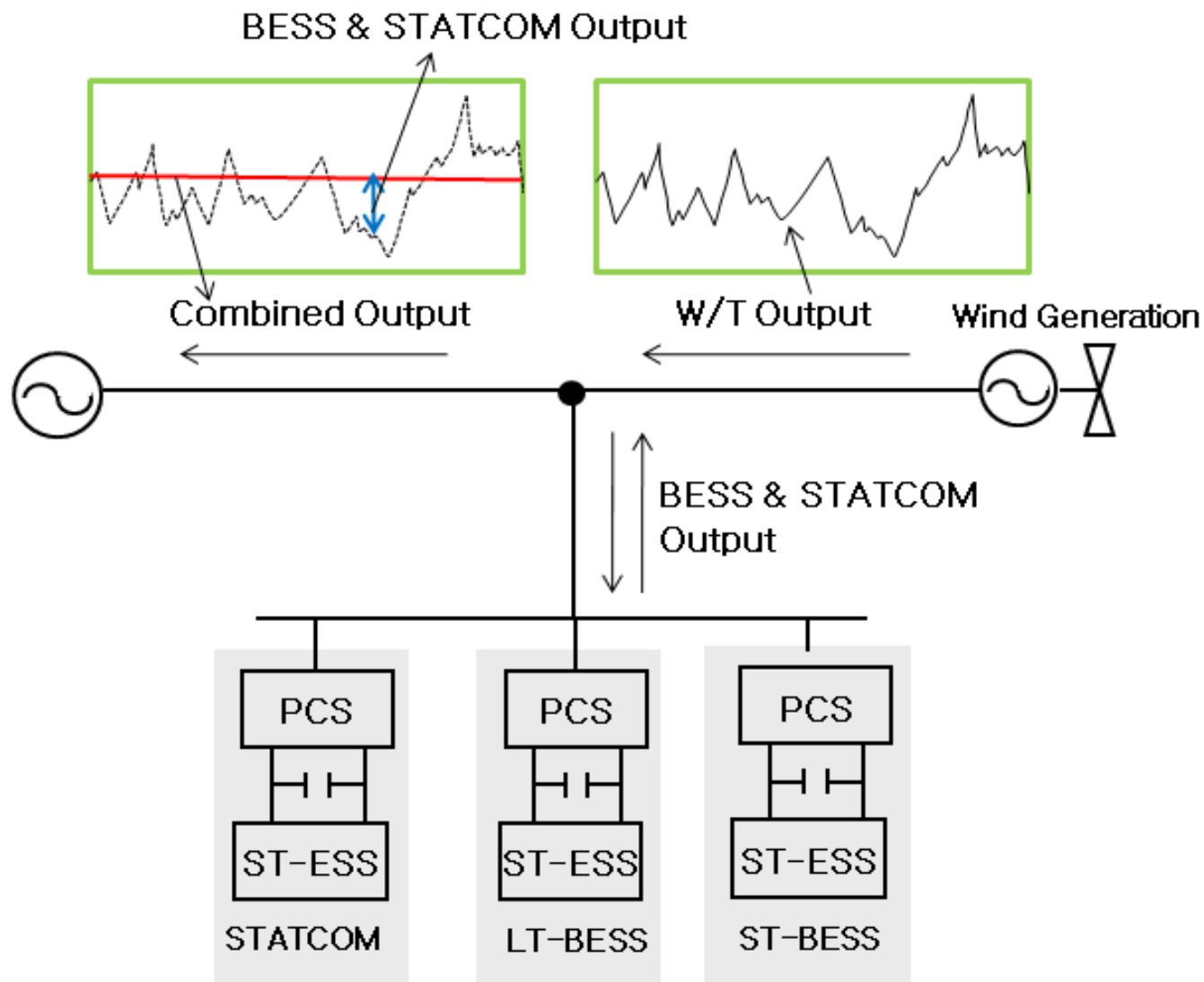
- ❖ Schedule: December 2009 to May 2013 (first 18 months to build infrastructure; next 24 months to test integrated operation of smart grid)
- ❖ Location: Gujwa-eup, Jeju Island (185 km²; 6,000 households)
- ❖ Budget: \$200 million (\$50 million public funds; \$150 million private investment)



KEPCO Consortium



Hyundai Consortium



The diagram illustrates the power system architecture for the 61850 Gateway. It shows a central 61850 Gateway connected to a Sub-EMS 1 (computer icon) and a Main-EMS (L2 switch icon). The gateway is connected to three 22.9kV/690V 900kVA transformers, each with a PQM (yellow box) and a Pad SW 4-Way (red box). The first transformer is connected to two PCS (blue boxes) which are connected to WT1 and WT2 (green ovals, 750 kW each). The second transformer is connected to a BESS (Li-Ion) 1.5MW/500kWh (blue box) and a Grid Stabilizer 1MVar (blue box). The third transformer is connected to a BESS (L/A) 30kW/150kWh (blue box). Dashed blue lines indicate communication links between the PQMs, the gateway, and the EMS systems.

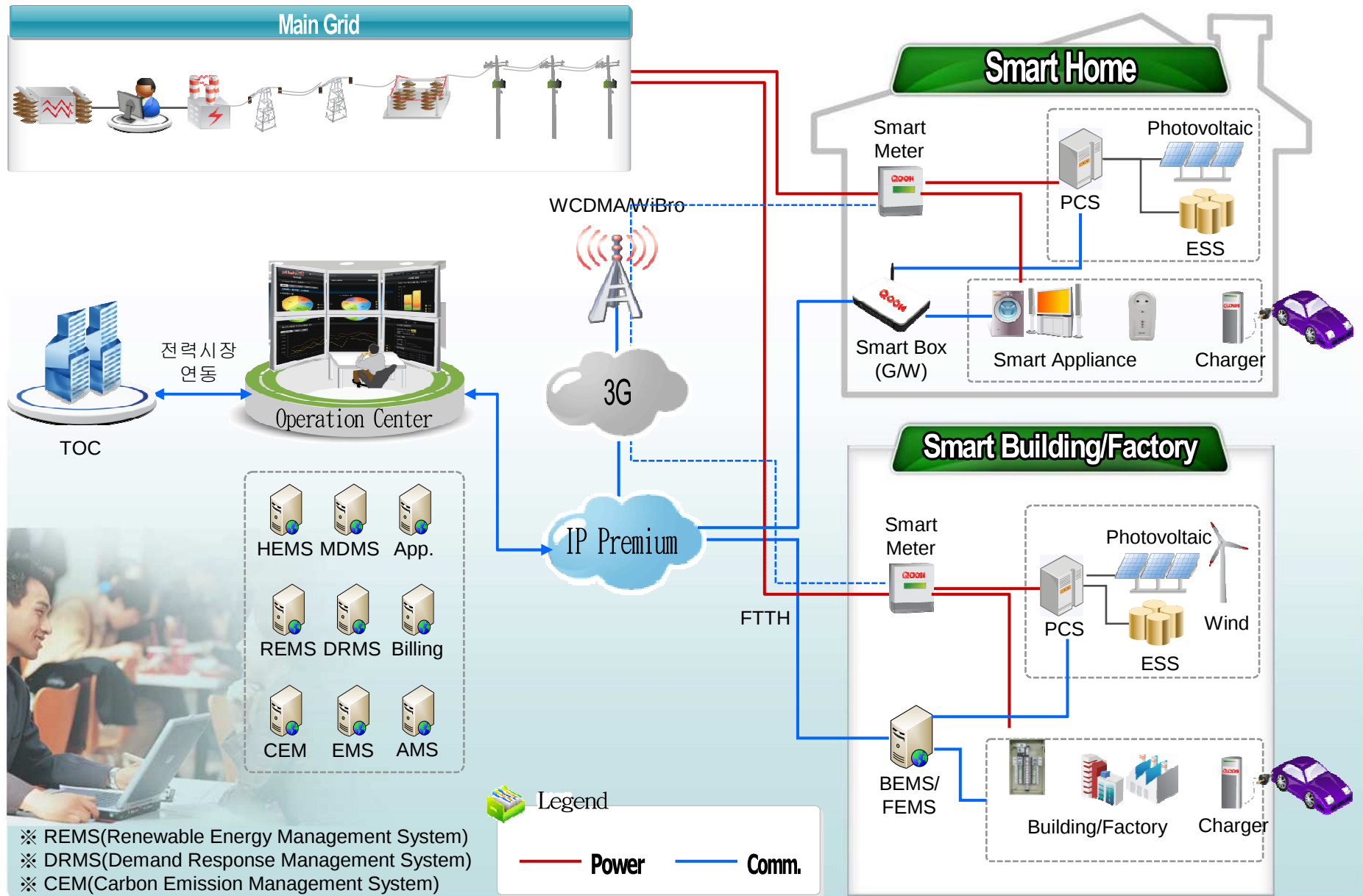
The diagram illustrates a power system architecture for a hybrid energy storage system (HESS) in a power plant. It shows the integration of various energy sources and storage technologies with a central power management system.

Key Components and Connections:

- Sub-EMS 2:** A computer icon representing the local energy management system, connected to the Main-EMS and the L2 switch.
- Main-EMS:** The central energy management system, connected to the L2 switch and the 61850 Gateway.
- L2 switch (Industry):** A switch connecting the Main-EMS and Sub-EMS 2 to the power distribution network.
- 61850 Gateway:** A gateway device facilitating communication between the Main-EMS and the power distribution network.
- Power Sources:**
 - WT (Wind Turbine):** 30 kW, connected to a PCS (Power Conversion System) and a 380V/380V transformer.
 - PV (Photovoltaic):** 20 kW, connected to a PCS and an AC/DC converter.
 - Diesel:** 50 kW, connected to a PM (Power Management) unit.
- Energy Storage:**
 - BESS (Li-ion):** 70kW/35kWh, connected to a PM unit and a 380V/350V transformer.
 - BSS (EDLC):** 150kW/4.5MJ, connected to a PM unit and a 380V/380V transformer.
 - Grid Stabilizer:** 20kVar, connected to a PM unit.
- Power Distribution:**
 - 380V Bus:** The main distribution bus, connected to the L2 switch and the 61850 Gateway.
 - 380V/380V Transformers:** Two transformers connected to the 380V Bus, feeding the BSS (EDLC) and APF (Active Power Filter) units.
 - 380V/350V Transformer:** A transformer connected to the 380V Bus, feeding the BESS (Li-ion) unit.
 - 380V Bus:** A secondary bus connected to the 380V/380V transformers and the 380V/350V transformer.
- Load:** A 30kW load (p.f. 0.9) connected to the 380V Bus.
- STP (Steam Turbine Power):** A 22.9kV/380V, 220V, 300kVA or 650kVA unit connected to the 380V Bus.

Microgrid Stabilization

Smart Consumer



Thank you!