



We are thinking for future value with clients.

Innovative Business Models for Demand Side Management

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5 June 2018



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- 1. Introduction of KMAC**
- 2. Demand Side Management Policy in Korea**
- 3. Challenge and Change**
- 4. Business Model in Korea**



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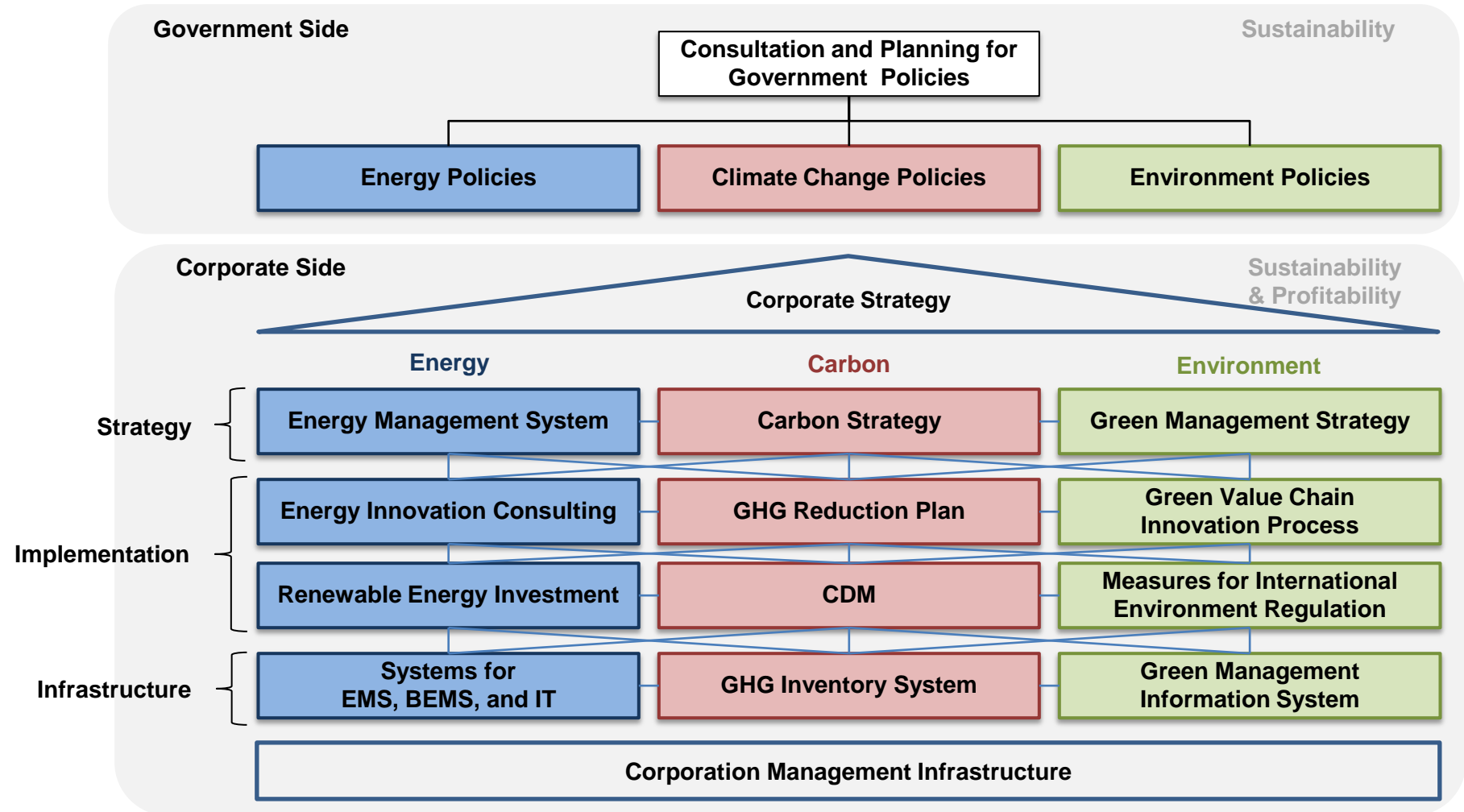
1. Introduction of KMAC

KMAC is one of the high valued local consulting firm in Korea working with over than 500 client with 250 consultants. KMAC founded 1989. And last 10 years, we have focused on energy policy and energy industry.

- 1989 • foundation of KMAC
- 1998 • Announcement of the First *“National Administration Service Customer Satisfaction Index”*
- 2003 • Diagnosis of 23 Government Ministries / Responsible for the Transformation of *the Presidential Secret Office*
- 2004 • Announcement of the First *“The Korea’s Most Admired Company(KMAC)”*
- 2005 • Designated as the Responsible Research Institute for *Governmental Innovation*
- 2011 • Hosted *“the Global CSR Conference 2011”*
- ✓ 2012 • Designated as implementation institution for *Bangladesh ODA project*
• Participate a member of designing *“Masterplan for promoting renewable energy in Korea”*
- ✓ 2013 • Hosted private and public joint forum *“Public Conference for Admirable Corporation in Korea”*
- ✓ 2014 • Implemented KSP joint consulting project *“Energy Efficiency Improvement for Low-income Households in Tajikistan”*
- ✓ 2015 • Participate a member of designing *“Clean Energy Tech. Roadmap for Korea”*
- ✓ 2016 • Designing *“New energy business model”* for several Korean electricity power companies
- 2017 • Participate a member of research team *“Feasibility study on renewable energy in Batam Island Indonesia”*

1. Introduction of KMAC

Energy and Environment Centre of KMAC provides comprehensive consulting programs that enable integration of government policy, corporate strategy, execution, and infrastructure.





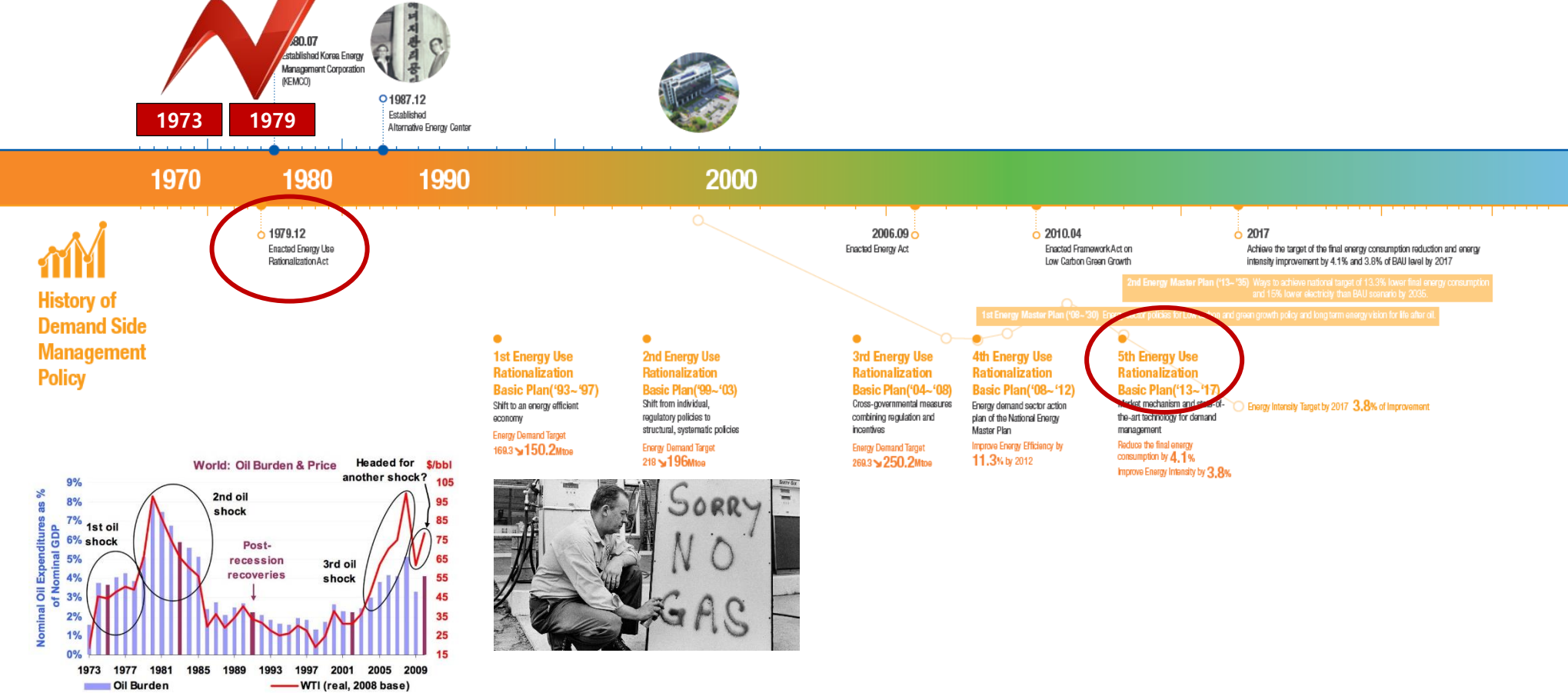
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2. Demand Side Management Policy in Korea

The history of energy efficiency policy have began with 1st Oil Shock and Korean government enhanced ‘Energy Use Rationalized Act’ in 1979. So far,Korean government have made 5th Energy Use Rationalized Basic Plan from 1993.

The Oil Shock



2. Demand Side Management Policy in Korea

The national target is to reduce the final energy consumption **by 4.1%** and improve energy intensity **by 3.8%** in 2017 compared to BAU. For achieving target, Korean government have made several program which appropriated for industry, building, transportation and appliance & equipment.

Industry

- Energy Management System (EnMS)
- Soft Loan for Energy Saving Facilities & Tax Incentives
- Energy Service Companies (ESCO)
- Energy Audit
- Energy Audit Assistance
- Investments in Energy Suppliers' Demand-side Management (DSM)
- Integrated Energy Supply
- Green Growth Partnership (GGP)
- Energy Supporter
- Negotiation on Energy Use Plan
- Inspection for Imported Machinery and Equipment subject to Inspection

Building

- Building Energy & GHG Target Management Scheme (BGHG)
- Building Energy Efficiency Certification
- Building Energy Code Compliance
- Performance Evaluation of Eco-friendly Homes
- Rational Energy Use in Public Institutions
- Building Energy Auditor

Transport

- Vehicle Energy Efficiency Labeling and Standard
- Average Fuel Economy (AFE)
- Tyre Efficiency Standards and Ratings
- Greenhouse Gas Reduction in Transportation Sector

Appliances & Equipment

- Energy Efficiency Labeling and Standard
- High-efficiency Appliance Certification
- e-Standby Power
- High-efficiency Electric Product Subsidy



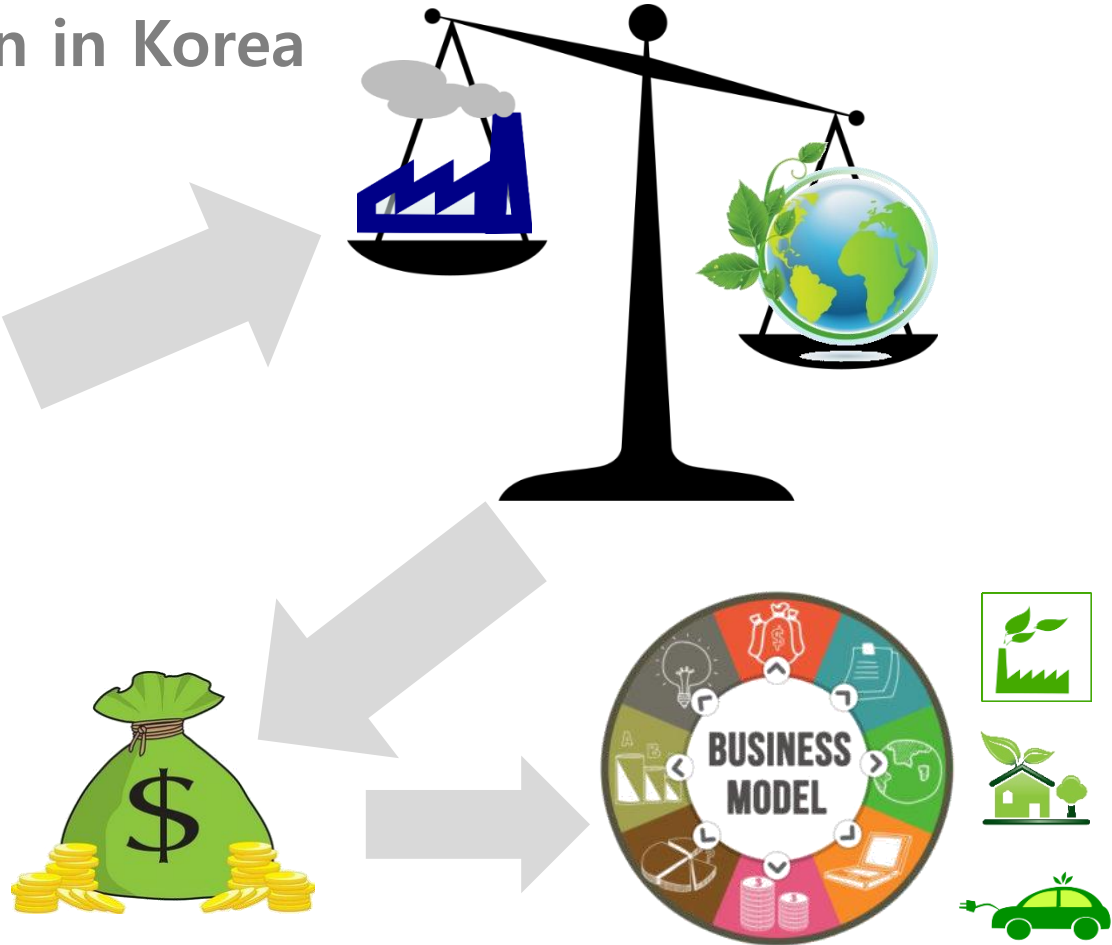
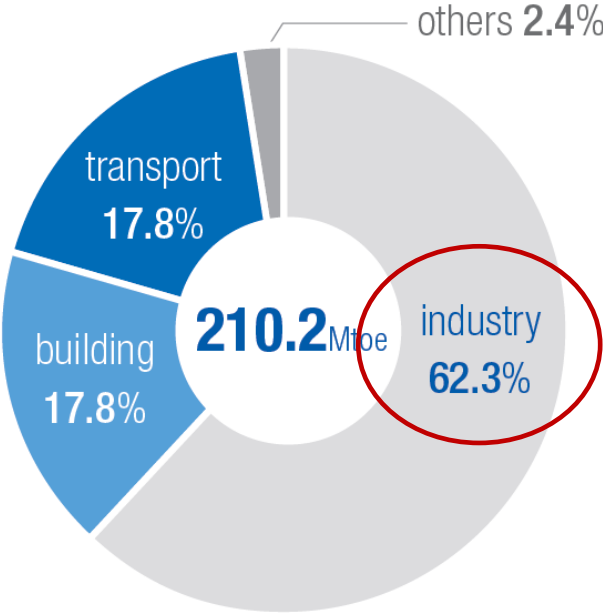
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3.Challenge and Change

Most of energy have consumed by industry side in Korea. The Korean companies challenged two target “Growth & Energy Save”.

Final energy consumption in Korea

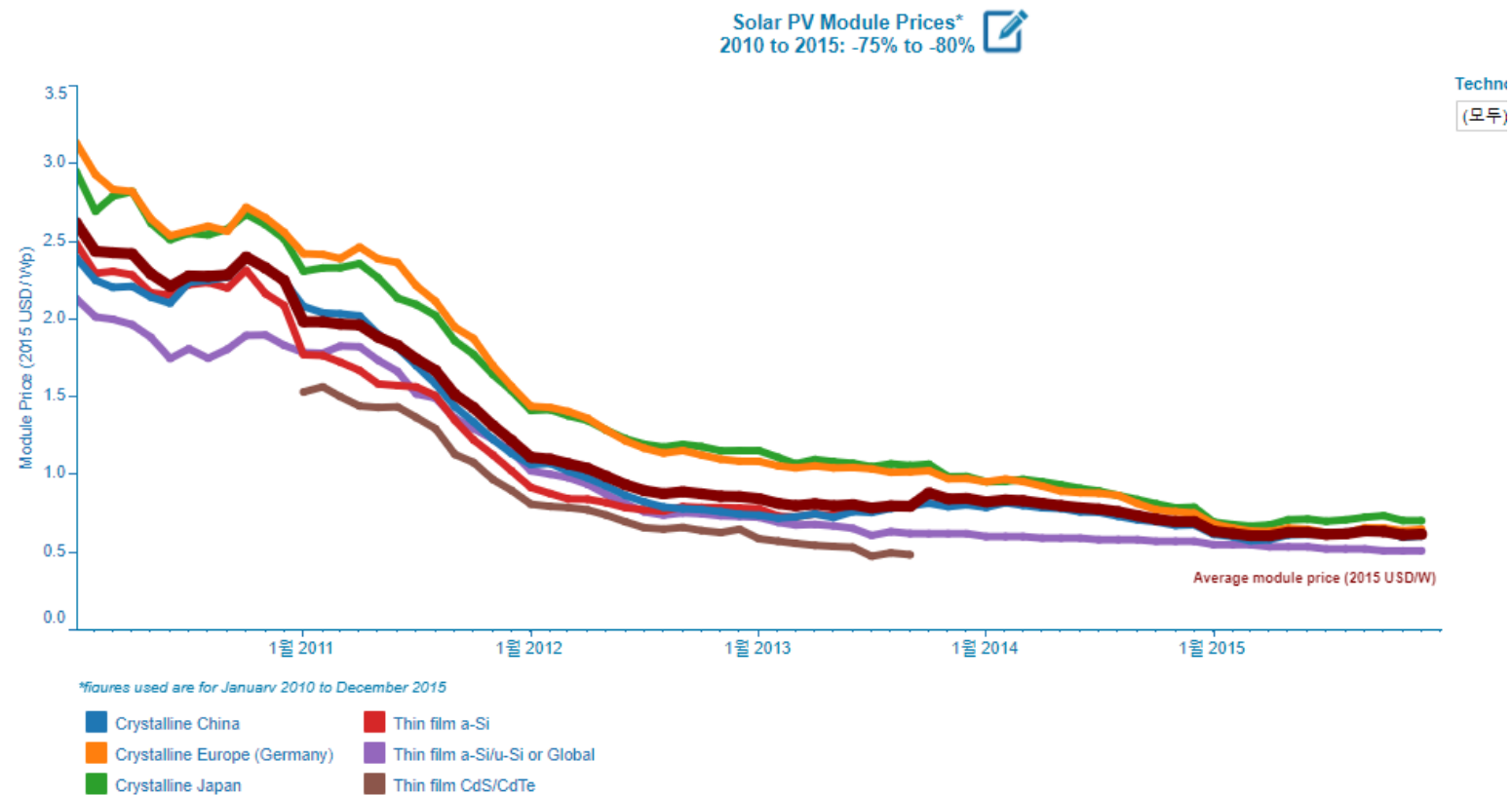


3.Challenge and Change

The change come from PV Price. The price of PV module have drop down dramatically last 8 years from 3.2 to 0.4(dollar/watt).

Solar PV Costs 2010-2015

This dashboard provides an overview on Solar PV module prices from 2010 until 2015.

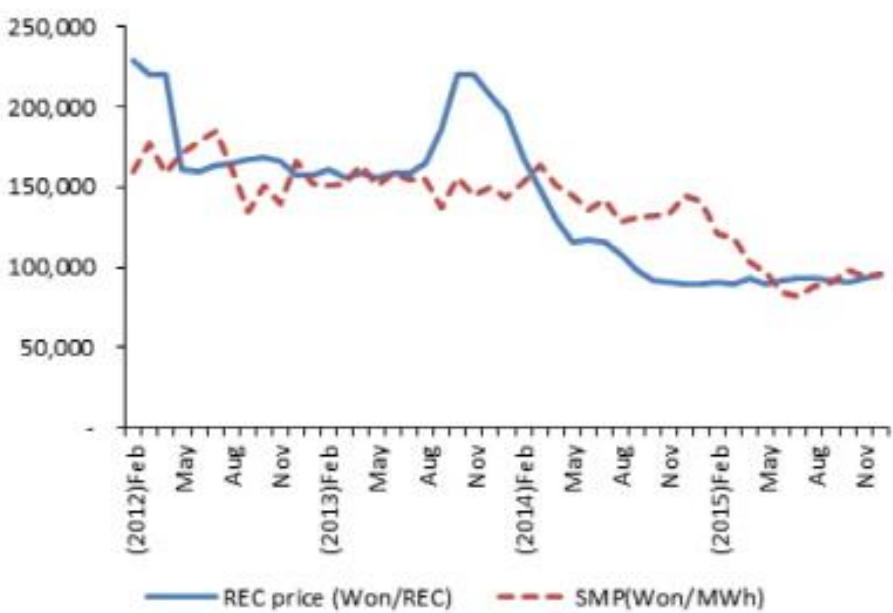


3.Challenge and Change

The speed of downturn of PV module and ESS price can make several new business model in Korea. The electricity market price also contribute to birth of new business model in energy industry.

Market price

Classification	2010	2011	2012	2013	2014	2015	2016
Market price (won/kWh)	117.77	126.63	160.83	152.10	142.26	101.76	77.06
Year-on-year growth rate (%)	12.1	7.5	27.0	-5.4	-6.5	-28.5	-24.3



Data source: Korea power exchanges



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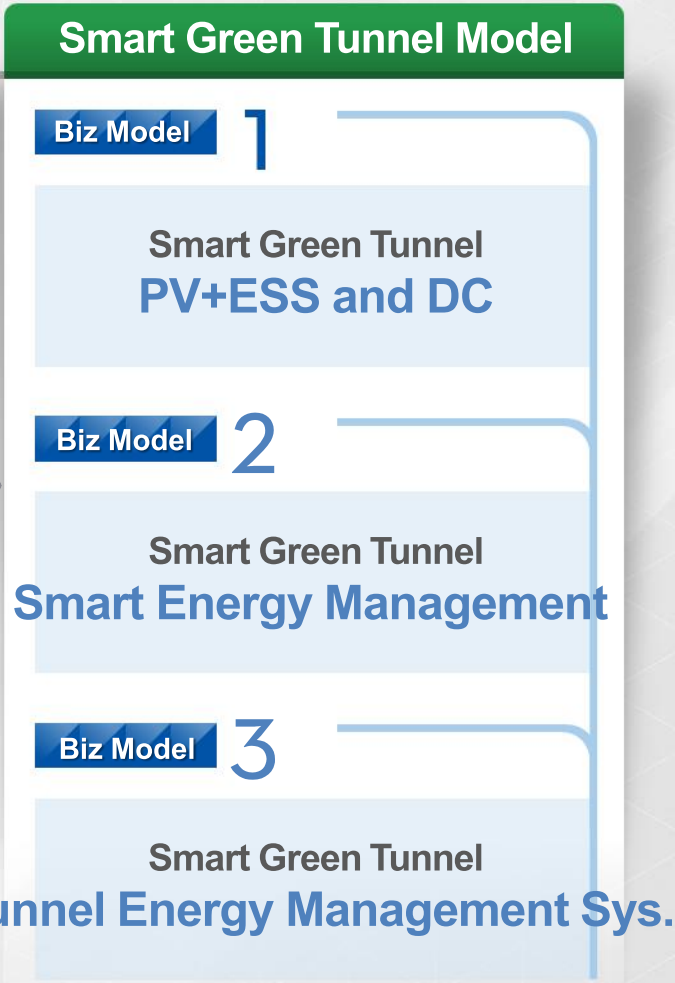
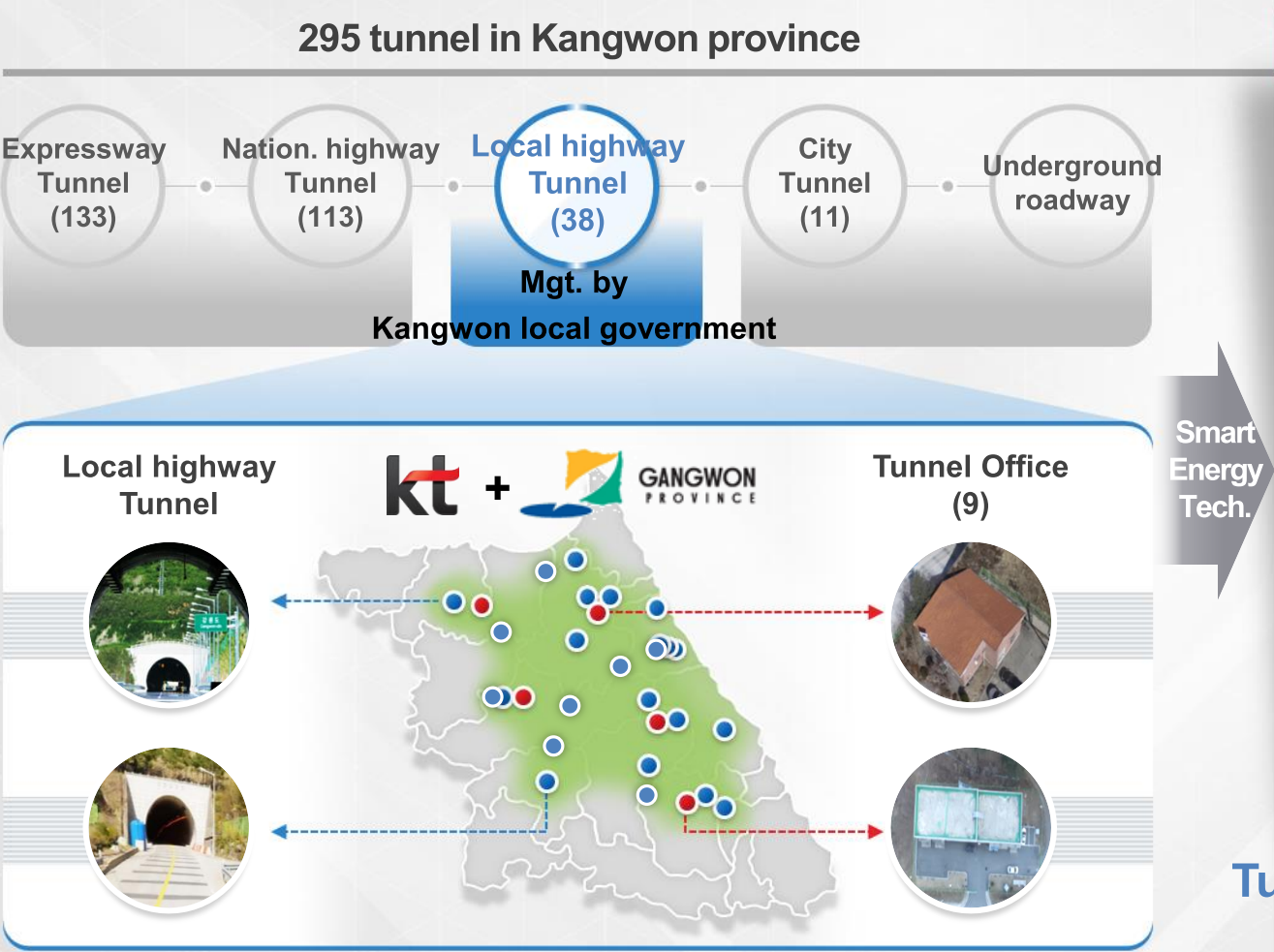
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4. Business Model in Korea



4. Business Model in Korea - #1 Smart Green Tunnel

The mountainous areas covering 81% of the total provincial area in Kangwon province. And, there are 295 tunnel in Kangwon province.



4. Business Model in Korea -#1 Smart Green Tunnel

The first model which is change power supply from grid to independent PV and ESS. And light change from AC to DC. This model can be expand to EV charging.

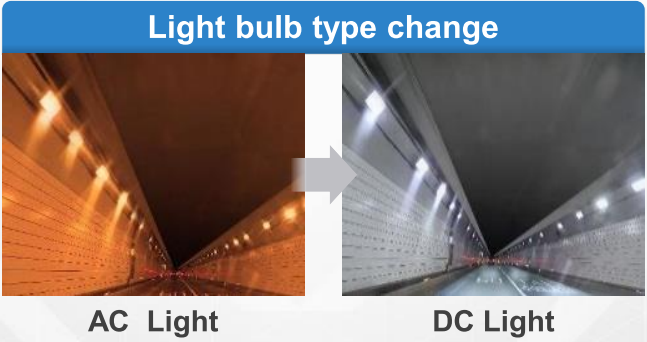
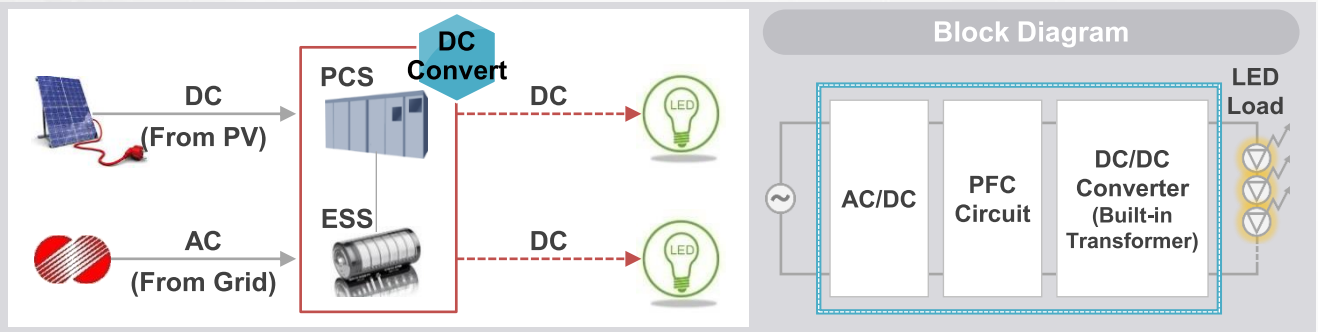
Biz Model

1

Photovoltaics + Energy Storage System

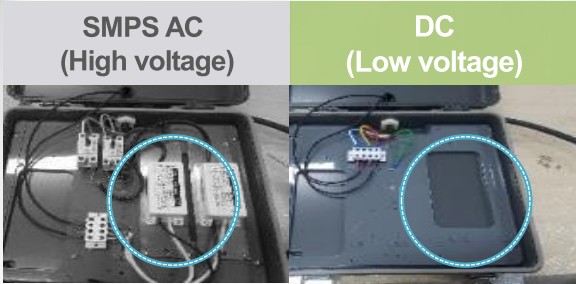
Electricity power supply with tunnel energy consumption

- Power generation by PV / ESS charging/DC power supply
- Light type change from AC to DC



Improvement energy efficiency by DC → DC

- Improvement energy efficiency 15% by DC → DC



Expand EV charging station



DC rapid charger

4. Business Model in Korea -#1 Smart Green Tunnel

The second model which is applying Smart Energy Management by traffic flow and external information of tunnel.

Biz Model

2 Smart Energy Management by traffic flow

- Tunnel light control & save by traffic flow
 - Automatic light ON and OFF by sensing traffic flow with loop sensor

1 Step Entry of vehicle
Light ON

2 Step Vehicle in the tunnel

3 Step Exit of vehicle
Light OFF

Ordinary Time
No traffic
Min. illumination

Inform. gathering

RTU [Remote Terminal Unit]

Loop Coil

Loop Coil

- Light control by eternal information of tunnel
 - Automatic control intensity of illumination by external information of tunnel(weather, day/night)

기상정보 외부휘도계
터널입구부 휘도측정

최적의 터널조명 환경제공

내부휘도계

터널조명

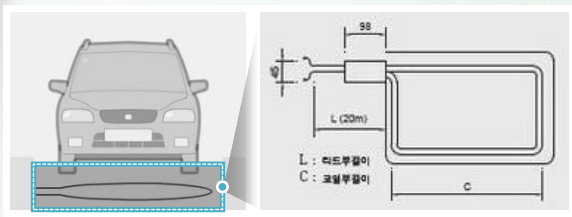
휘도값에 의한 터널조명 연동

	Set stage	Control
Entry part	Weather	Dimming
Middle part	Day/Night	Time
Exit part	Day&Night /Weather	Dimming

Energy consumption Monitoring

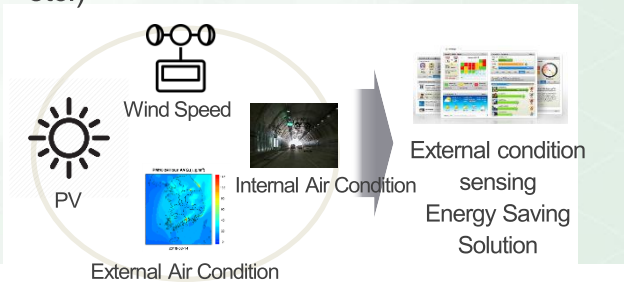
Loop sensing light control technology

- Effective for less traffic tunnel



External condition sensing Energy Saving Solution

- The solution control based on external condition(weather, power supply, air condition etc.)



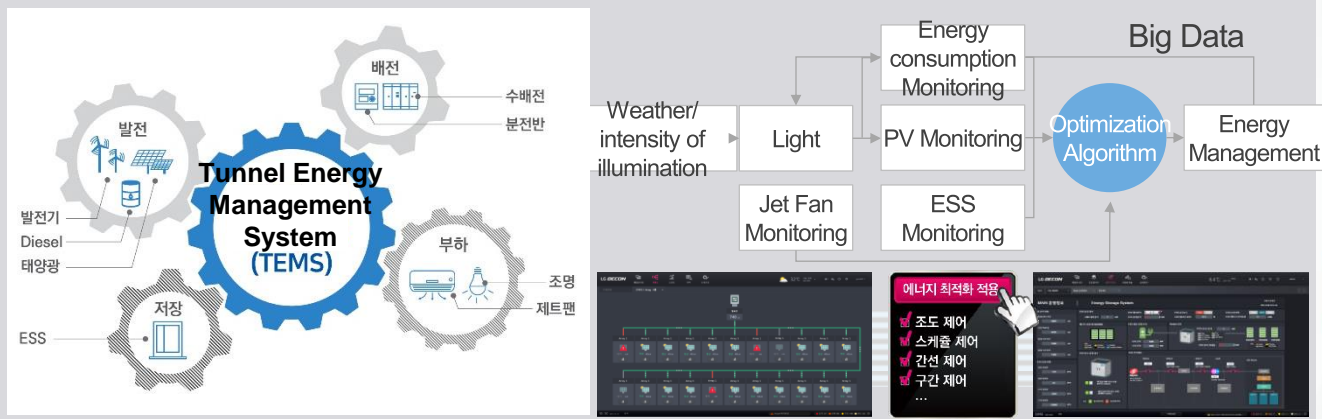
4. Business Model in Korea -#1 Smart Green Tunnel

The third model which is applying Tunnel Energy Management System. TEMS can control energy equipment and also monitor every condition.

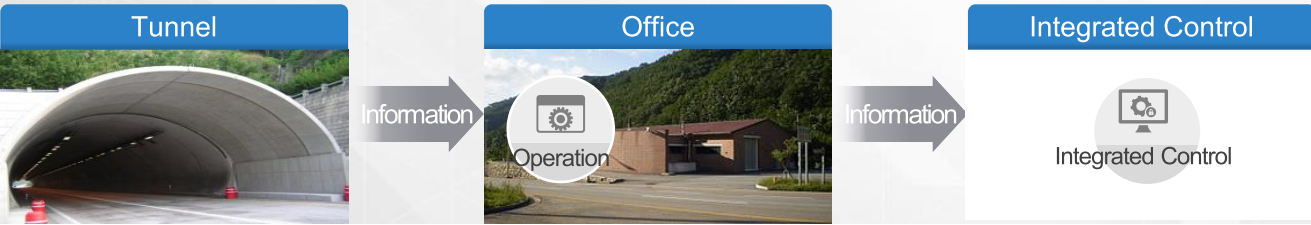
Biz Model

3 Tunnel Energy Management System

- Tunnel Operation information analysis and make optimization algorithm.
 - Automatic light control and energy equipment monitoring by tunnel energy management system
 - Electric equipment(Jet Fan + Light) monitoring and make optimization algorithm.



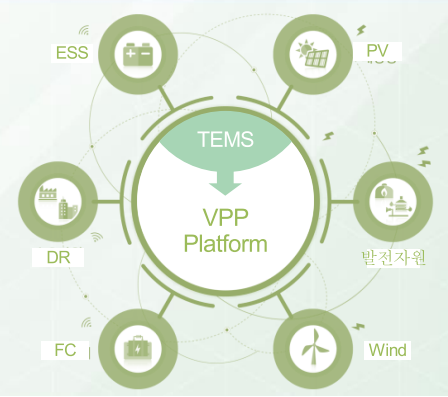
- Distributed energy operation/management/control in tunnel



Energy control technology specific to tunnel

Distributed Power Mgt.	Minimize Power dissipation by power distribution mgt.
Statistical Predict Mgt.	Energy consumption predict Power generation predict
Power Load Mgt.	Efficient tunnel energy operation by optimized control algorithm

Virtual Power Plant Platform



End of Document