

Korea's Smart Grid Policy Initiatives

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Ministry of Knowledge Economy

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1 Korea's Smart Grid Policy Overview



1-1. Overview of South Korea



- Area: 99,720km² (115th in the world)
- Population: 48 million (26th in the world)
- GDP : U\$929.1 billion (14th in the world[2007])
- Trade : U\$950 billion (10th in the world)
- Key Industries and Global Ranking

Semiconductor

1st

Petrochemical

5th

Automobile

5th

Steel

5th

Shipbuilding

1st

1-2. Overview of South Korea (cont.)

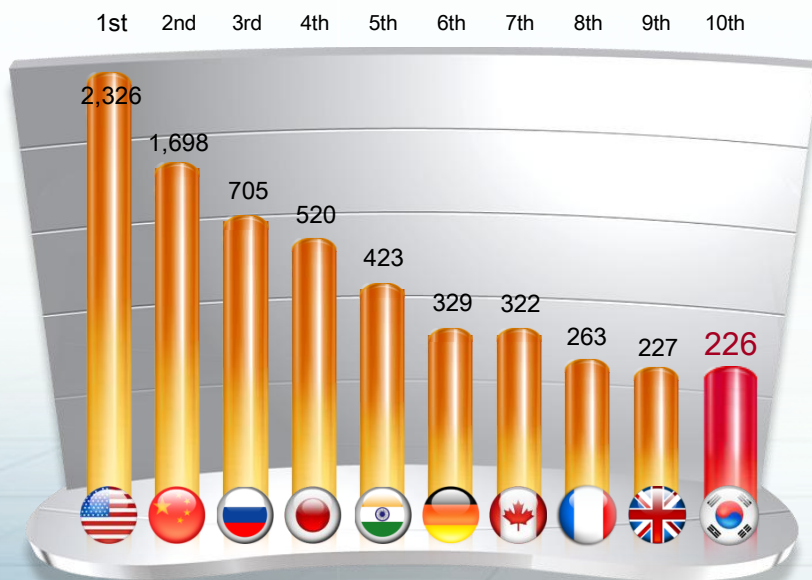
As-Is

- One of 10 largest energy consumption countries
- Foreign Energy Dependency (97%), (2008: U\$141.5 billion)

Objectives

- Secure energy security and improve trade balance through reducing dependency on fossil fuel
- Implement measures on UNFCCC (UN Framework Convention on Climate Change) through increasing the efficiency in using electric energy

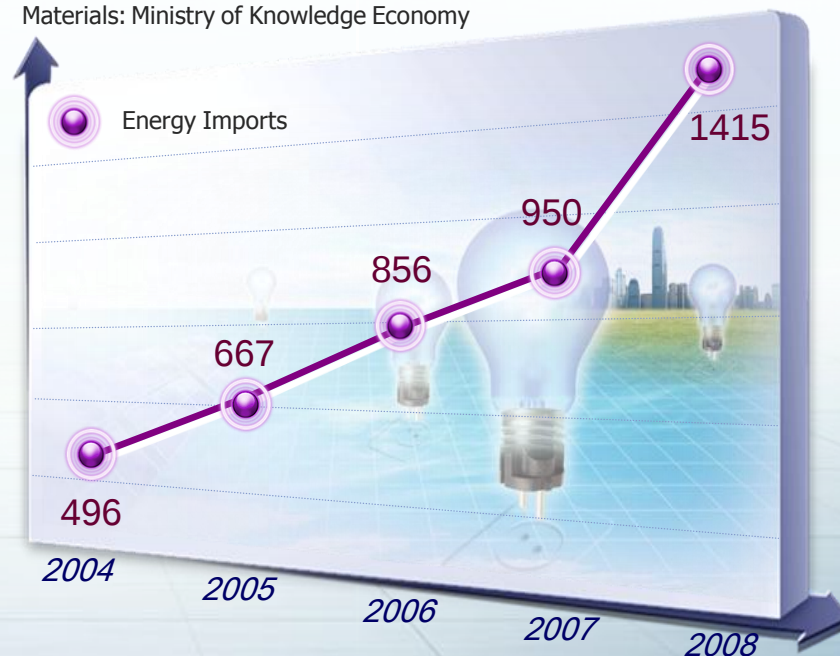
Global Energy Usage



Source) 1. Consumption of Energy and Oil 2006:
BP Statistical Review of Energy(BP, '07.6)

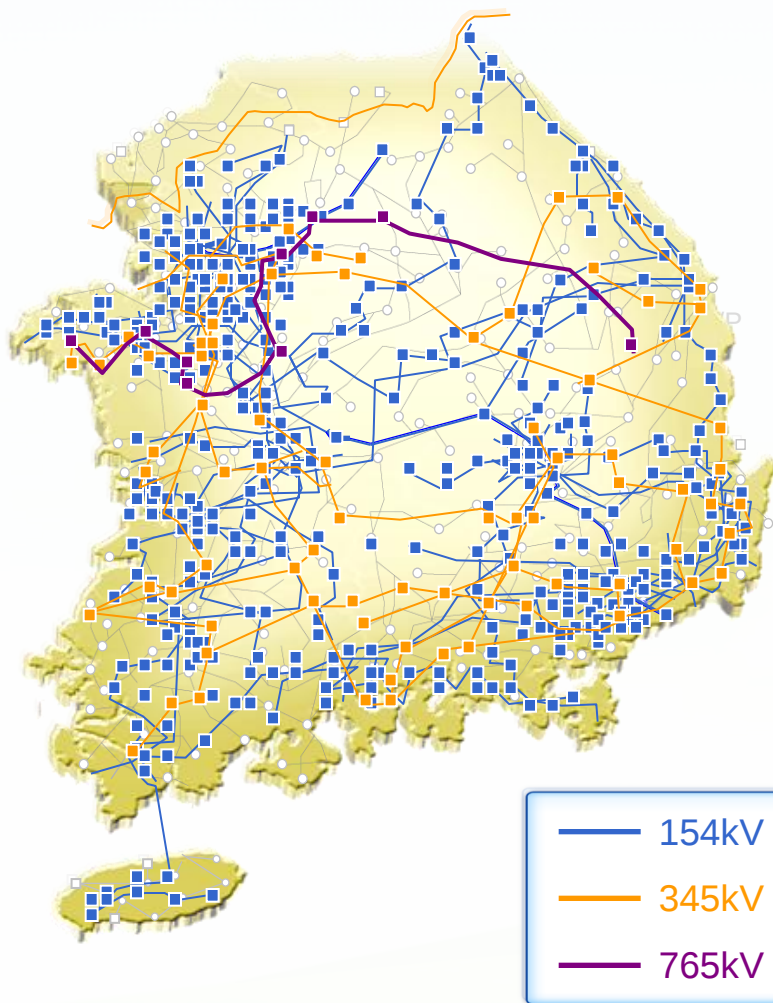
Energy Imports

Unit: one hundred million dollars
Materials: Ministry of Knowledge Economy



1-3. Korea Electricity Industry

Power System in 2008



● Installed Capacity 72,491MW (12th in the world)

- Output : 422,355MWh
- Peak Demand : 62,794MW (2008)
- Trading Volume : 24.3 billion dollars

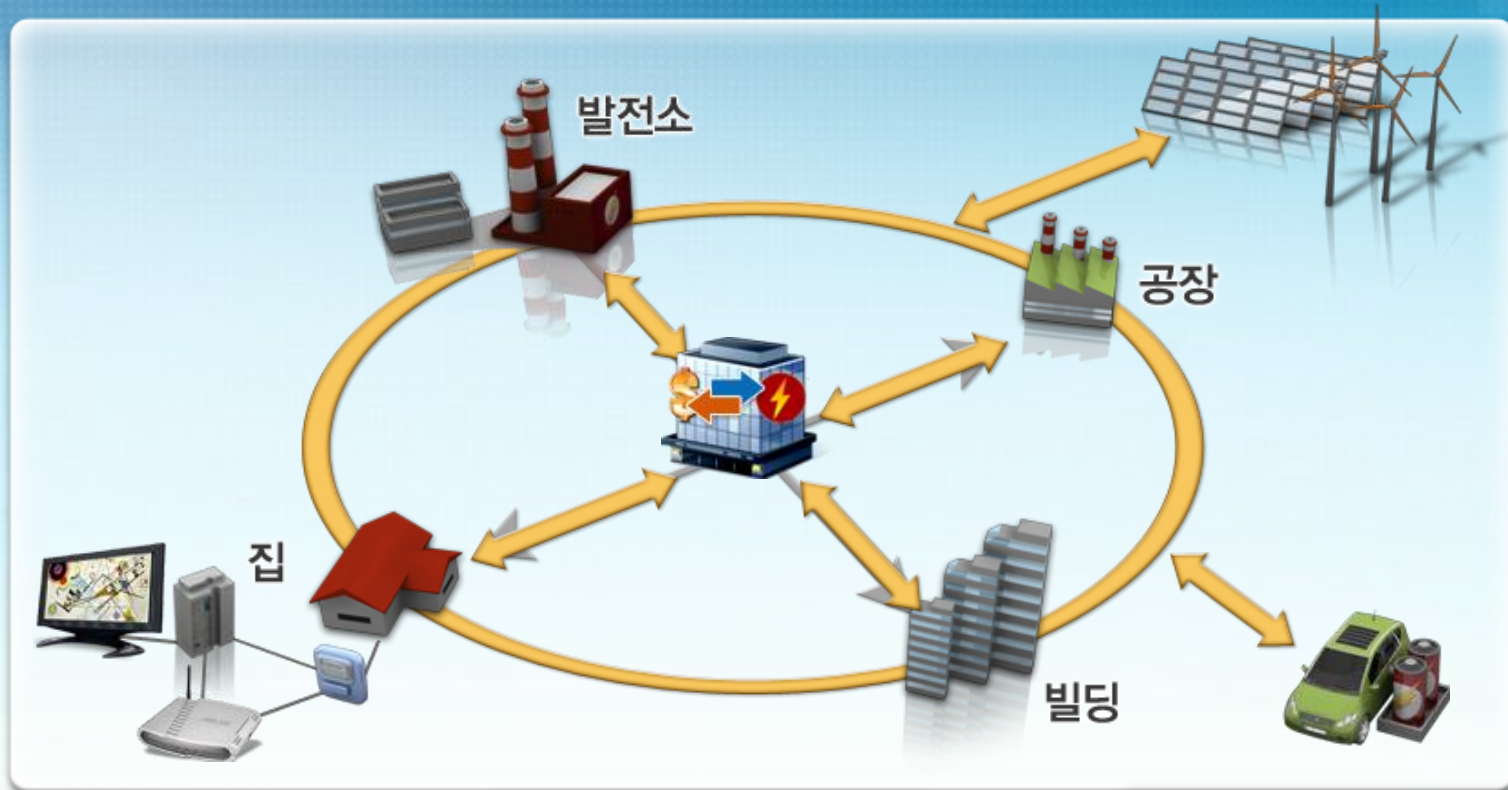
● Transmission lines: 29,929 c-km

● Industry structure

- Generation market share : KEPCO affiliates (88%), IPPs(12%)
- T&D, Retail Owner : KEPCO
- ISO/RTO : Korea Power Exchange



1-4. Smart Grid Concept and Scope



Information communication

- Real time rate information exchange



Existing grid

- Supplier oriented one way System
- Closed platform
- Standard service



Smart grid

- Consumer oriented two way system
- Opened platform
- Dynamic service

1-4. Smart Grid Concept and Scope(cont.)

Concept

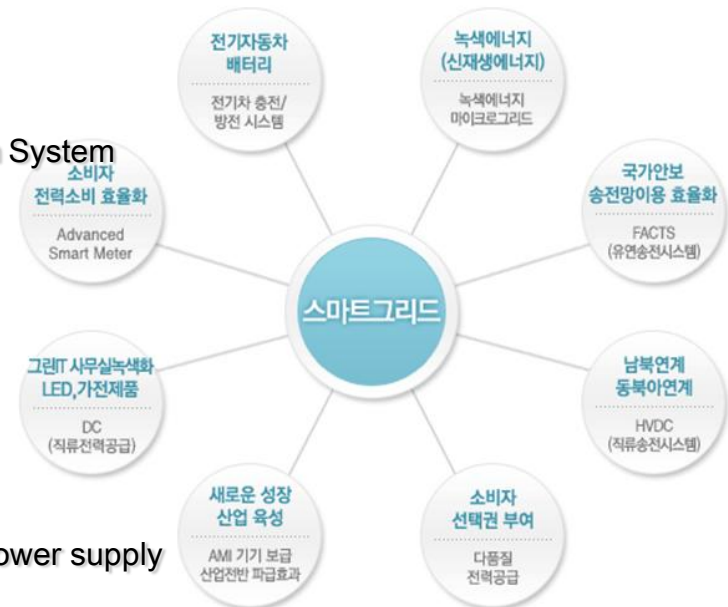


What is smart grid?

- ➔ Next generation network that integrates IT into existing power grid to optimize energy efficiency through two-way exchange of electricity information between suppliers and consumers in real time
- ⊖ **Components:** Advanced Smart Meter, EV charging infra, distributed energy resource, real time pricing, self automated recovery system, integration/ sales of renewable etc

Scope

- ⊖ EV/Battery–EV charger/electric discharge system
- ⊖ Green energy (renewable) – Green energy microgrid
- ⊖ Optimize nation's grid security– Flexible AC Transmission System
- ⊖ North-South /East-West connection – High voltage direct current transmission system
- ⊖ Provide wide range of consumer choices– electricity distribution of various quality
- ⊖ New Growth Engine– AMI installation
- ⊖ Green IT, LED, smart appliances – DC (Direct Current) Power supply
- ⊖ Optimize use of energy efficiency– Advanced Smart Meter

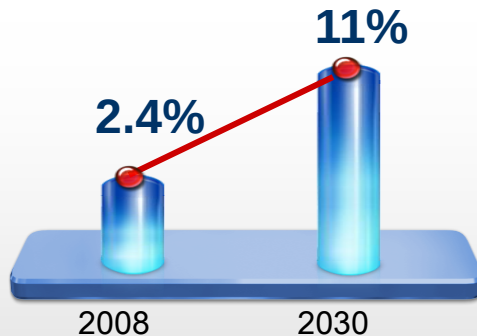


1-5. Need for Smart Grid

Establishment of **Smart Grid platform** for low carbon green growth vision

Innovative Technologies for Year 2030

Address climate change



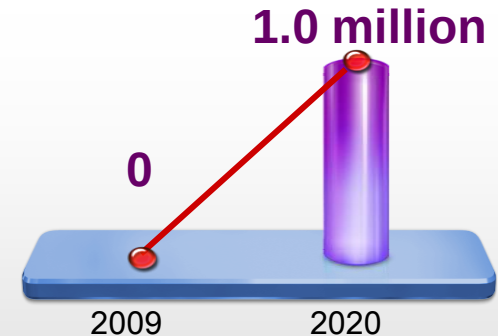
- Wind, solar power development
- Grid-connected technology

Increase energy efficiency

46.7% 
(2006 standard)

- AMI(Smart meter)
- DR (Demand Response)

Implement electric transportation



- Electric vehicle charging station
- Fuel battery, DC distribution

1-6. Policy Progress Overview

**August
2008**

- Proclaimed Low Carbon Green Growth Vision
- 60th anniversary of the founding of the Republic of Korea on August 15, 2008 -

**December
2009**

- Selected consortia and signed a contract of agreement for Jeju smart grid demonstration project

**January
2010**

- Released the National Smart Grid Roadmap

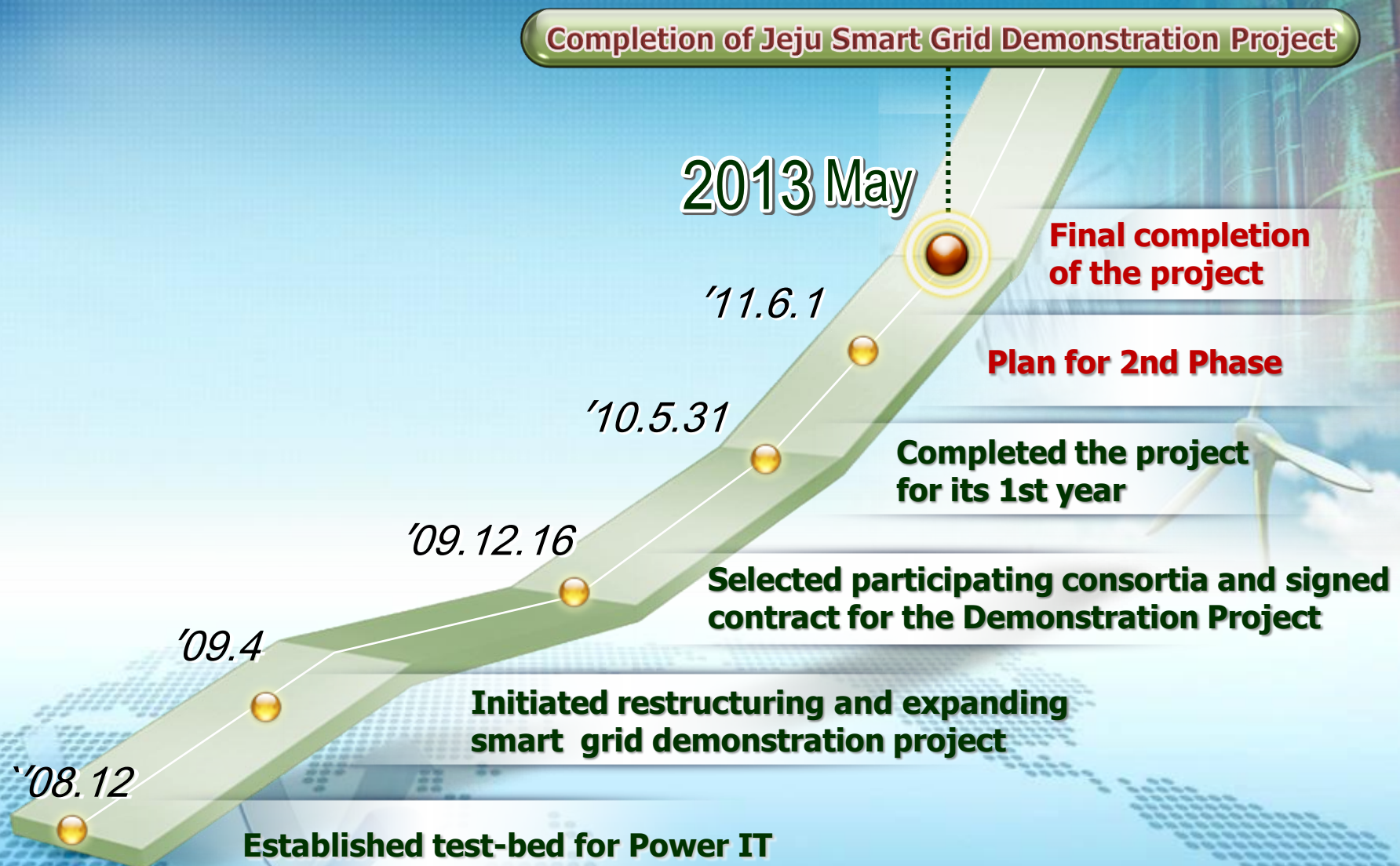
**October
2010**

- Submitted a Bill(Smart Grid Stimulus Law) to the National Assembly

2 Smart Grid Demonstration Overview



2. Smart Grid Demonstration Progress Timeline



3. Why Jeju?



Incubator for Smart Grid Technologies

4. Objectives for Jeju Smart Grid Demonstration

Create business models, and allow immediate commercialization

Strategies

Assess Business Models

- **Assess smart grid technologies and verify effectiveness of smart grid related service for consumers**



Select from open-bid

- **Allow companies to openly bid for different areas of demonstration project to create innovated BIZ models**



Induce Competition

- **Induce competition amongst participating consortia in different domains to make effective assessment**



5. Consortia for Jeju Smart Grid Demonstration

	Leads	Participating	Investment(Dollar)
Smart Place	SK telecom	Samsung electronics, Korea Cable TV, Jeju broadcast etc (29 companies)	Govt : 5 million Private: 25 million
	olleh kt	Samsung SDS, Samsung Trade, Rootech etc (14 companies)	Govt : 4.7 million Private: 30 million
	LG Electronics	LG U+, GS pure cell, GS construction etc (15 companies)	Govt : 4.7 million Private: 17.5 million
	KEPCO	Samsung electronics, Taihan Electric, Nuri Telecom etc (38 companies)	Govt : - Private 10 million
Smart Transport	KEPCO	Samsung SDI, Lotte data communication, P&E Solution etc (22 companies)	Govt : 4.5 million Private:14 million
	SK energy	SK Network, Iljin Electrics, Ientech etc (13 companies)	Govt : 4.5 million Private: 13 million
	GS Caltex	LG CNS, ABB Korea, NexCon Take etc (7 companies)	Govt : 4 million Private 8 million
Smart Renewable	KEPCO	KOSPO, Hyosung, LSIS etc (16 companies)	Govt : 4.7 million Private: 15.3 million
	HYUNDAI HEAVY INDUSTRIES CO.,LTD.	Maxcom, Icellkorea etc (6 companies)	Govt : 4.7 million Private 7 million
	posco ICT	LG Chem, Woojin Industrial System, Daekyung Engineering etc (6 companies)	Govt : - Private: 9 million

6. Features of Jeju Demonstration Project

Enterprise Competitiveness

- Deduce globally competitive business industries
- Tele-communication, electricity, transportation, smart appliances etc, total of 168 companies participating

Jeju Bigbang

- Convergence of businesses
- Create innovated BIZ models using state of the art technology

Big Investment

- Companies are making greater investments for the demonstration project
- 3X increase in private investment (57.5 million \$ ➔ 173 million \$)
 - ※ 2 of the consortia are participating using own budget

7. Project Domains Per Consortia



8-1. Project Domain

Smart Place

 **Reduce energy consumption by installing AMIs in homes and buildings, and allow consumers to re-sell stored energy**

- **Allow easy access of consumed electricity information via different media, such as internet, TVs, mobiles etc., and provide incentives**
- **Provide integrated service between electricity and telecommunication**
- **Connect all smart appliances to AMI and operate micro grid**

Smart Transport

 **Develop a service model for EV Charging infrastructure and ensure system to minimize the effects that charging may have to the grid**

- **Develop business models for auto repair service, parking management, navigation, etc**
- **Develop charging infra using distributed energy and develop EV charging system**

8-2. Project Domain

Smart Renewable

- ▶ **Test technology of electric power network to prove stability of irregular renewable power generation such as wind, solar power**
- ▶ **Test different modes to improve the quality of stored renewable energy**

Smart Power Grid

- ▶ **Deliver next generation network using smart grid**
- ▶ **Smart grid will allow two-way communication between the supplier and consumer, and perform self-automated recovery system**

Smart Electricity Service

- ▶ **Operate and establish a system that provides real time pricing for consumers and ensure high quality of electricity**



3

Demonstration Progress Report and Next Steps

1-1. Phase 1 Progress Report

Construction plans

Phase	Areas	Contents
Phase 1 (Infrastructure)	• PowerGrid • Place • Transportation	• Grid, consumers, Vehicle to Grid connection
Phase 2 (Operation)	• Renewable • Electricity Service	• New electricity service, Renewable to grid connection

Accomplishments

Smart Place

- Constructed operation centers for each consortia
- Installed 550 residential AMIs / 100 PVs
- Installed energy monitoring device



Smart Transport

- Activated EV charging infrastructure & Deployed EVs
- Constructed infra operating system, Designed security system
- Developed paying method



Smart Renewable

- Constructed renewable generation plant
- Designed systems to stabilize intermittency
- Developed data center model coordinated with total operation center.



1-2. Phase 1 Progress Report

Demonstration Public Exhibitions

- Public consensus is necessary to implement nationwide smart grid
- Companies can present and introduce smartgrid prototypes and educate the public
- The exhibition will be sustained during and after the demonstration project

“ **Experience** ” the State of the Art Technologies and Viable BIZ models

- Main Exhibition center, “**Comprehending**” Korea’s Smart Grid Concepts and Jeju Test Bed
- 4 Smart Grid Themed exhibitions, “**Experiencing**” Smart and Eco-Friendly Daily Life



2. Next Steps

System operation and verification

- Deduce best practices by testing business models under the 5 domains of demonstration project
 - Create platform for energy management; and test demand response solution
 - Provide smart metering service, construct facilities for the operation of micro grid

Induce Competition

- Each consortium will perform in a competitive environment, and the government will provide persistent support to allow creation of new business models
- Business outcomes will be incorporated with national standard and deployment of smart grid

Smart Grid Stimulus Law

- Enact a law to promote smart grid and to help facilitate the execution of the national smart grid roadmap

4

Smart Grid Stimulus Law



1. Background

Provide legislative support for Smart Grid

- ▶ **Current** : Smart grid R&D is much dependent on voluntary participations from companies
- ▶ **Future** : : Need legislative support to sustain project and maintain companies' participation
 - Major economies such as United States and EU are designing to enact legislations to support R&D, standards, and smart grid deployment.
- ▶ There's an urgent need to provide legislative support for smart grid to address climate change issues and to compete in the global green market

Transcend current ordinance and institutional constraints

- ▶ **Current** : Electricity Enterprise Act restricts convergence of businesses
 - Electricity Enterprise Act: Applied to generation, transmission/distribution and electricity sales
- ▶ **Future** : Need to transcend current legislative constraints by regulating a law that advocates converged infrastructure

Advocate convergence of businesses

- ▶ Smart grid is a key technology to help save energy, to help deploy electric vehicles and to allow integration of renewable energy
- ▶ Formulated solid framework to facilitate enactment of smart grid regulations.
 - i.e. National Smart Grid Roadmap and Jeju smart demonstration project

2. Progress Timeline



3-2. Legislative Support and Application

Register business licensing for smart grid (article 12)

- ▶ Individuals wishing to initiate a business for managing and supporting of smart grid industry may register to the Minister of MKE
 - The scope of work for smart grid business ranges from manufacturing of equipments, products, and providing correlated services.
 - Business license registration standard will be based on presidential decree

Support investment for smart grid (article 14)

- ▶ The article provides a basis for companies to receive subsidy in the case that they are making business investment for the benefit of the public
 - Plan to finance through utilizing Electric Power Industry Basis Fund, Treasury of Energy Resource and National IT Industry Promotion Agency Fund

Select Smart Pilot City (article 18)

- ▶ If necessary, smart pilot city will be selected for the wide deployment and dissemination of smart grid; government will manage portion of the required expense
 - The selection standard and process will be in accordance with the presidential decree

3-2. Legislative Support and Application

R&D Support (article 10)

- ▶ Provide administrative, financial support regarding technology development, demonstration, policies and workforce development

International Collaboration (article 11)

- ▶ Provide technological and resourcing support regarding international standard, R&D collaboration to help domestic companies to penetrate into international market

Technology Verification and Standardization (article 15, 17)

- ▶ Enforce technology verification and technology standardization to secure safety of smart grid and its compatibility with related equipments and products



3-3. Compiling · Applying · Securing Data

Compiling private information for smart grid (article 22)

- ▶ Compiling private information for smart grid cannot occur without the consent from the information provider
- ▶ Information provider can request access and deletion of his/her personal information and the information holder is required to take appropriate action

Sharing of smart grid information (article 23)

- ▶ To provide efficient service for grid users/consumers, one service provider can request to share collected information from another service provider
- ▶ Request to share information should be carried out, if not, appropriate action will be taken by the Minister

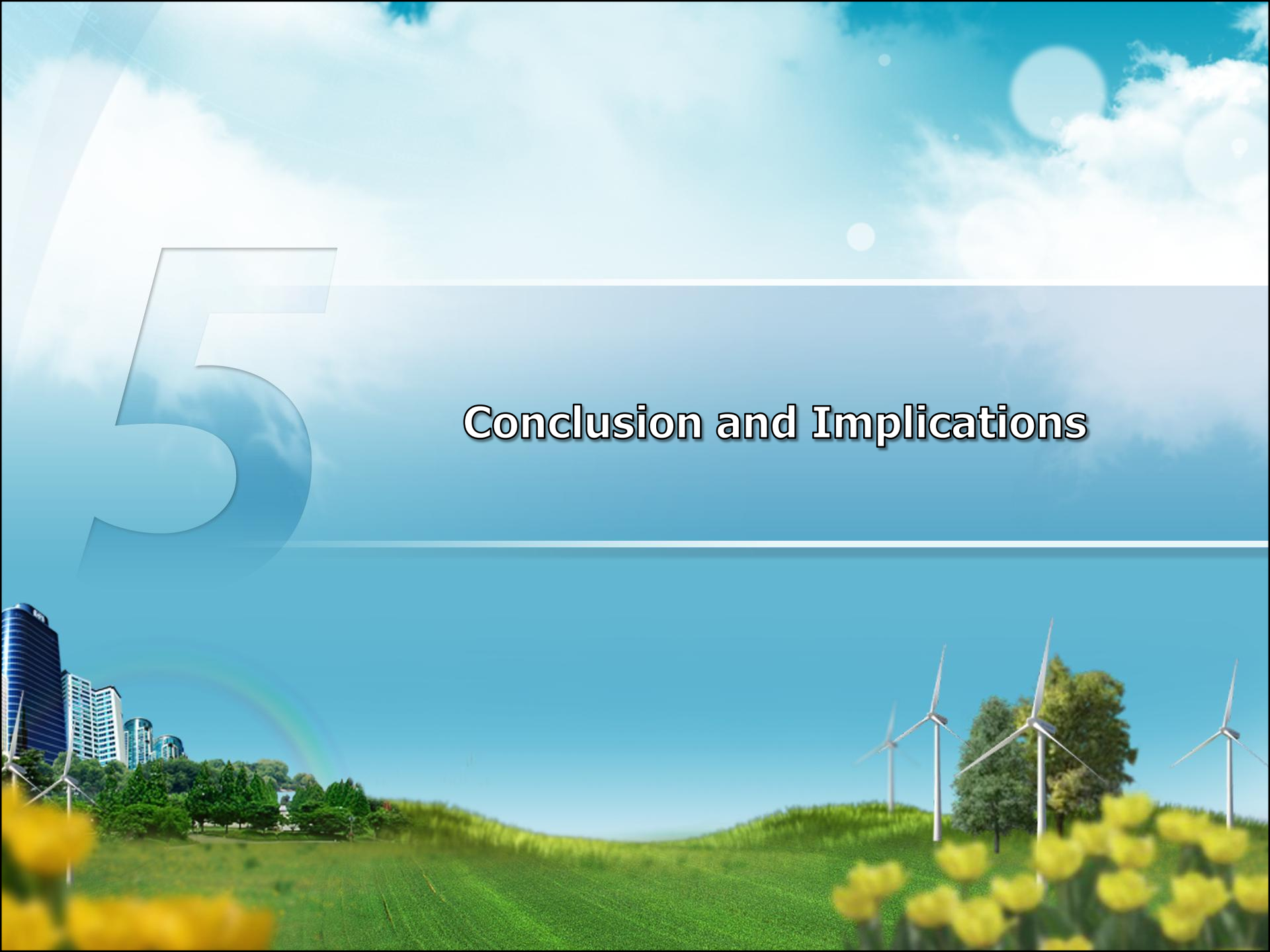
Ensuring optimal use of information (article 24)

- ▶ The Minister of MKE advised to enact a legislation that includes procedural and standard regulation for optimal and appropriate use of collected information.

4. The Significance of Enacting Smart Grid Stimulus Law

Smart Grid Stimulus Law coordinates smart grid roadmap, demonstration and pilot city

- ▶ **Smart Grid Stimulus Law allows technological and institutional progression for smart demonstration and smart pilot city project.**
- ▶ **The project outcome from Jeju smart grid demonstration will help coordinate different aspects of smart grid businesses, such as smart grid deployment, R&D, workforce development, etc.**
- ▶ **Enactment of smart grid stimulus act will provide solid foundation for smart grid related businesses and induce greater investments.**



5

Conclusion and Implications

1. Create New Business Models and Reach Out

- The initial expectation of internet was mainly on providing e-mail service but modern internet opened other business opportunities such as Internet phone, UCC, on-line markets, IPTV etc
- The government will provide support for 12 consortia participating in the Jeju smart demonstration project to induce creation of innovated business models
- Deduce smart grid deployment model for nationwide implementation
- Korea plans to share case study on Jeju smart grid demonstration with the international community. We hope to contribute reduce global GHG emission and continue our support for smart grid.

2. Reinforce International Collaboration

Propose continuous conference on smart grid demonstration

- **Propose to continuously hold Jeju smart grid demonstration conference even after KSGW; conference will allow exchanging of global case studies for smart grid**



Reinforce international collaboration through ISGAN

- **Provides a framework for high-level government coordination amongst member countries to enable seamless global development and deployment of smart grid**



Support participation from companies overseas

- **Foreign companies participating in Jeju project include ABB Korea, Renault Samsung**
- **Plan to encourage and support participation from other foreign companies**



Thank you