

# Opportunities for Bulgaria-Korea's Renewable Energy Cooperation

**Nov. 24, 2014**

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# **Status and Outlook of Energy Market in Korea**

# Energy Consumption Trend

- ❖ The average annual growth rate (AAGR) of final energy consumption from 2000 to 2012 was 2.8%
  - The share of energy consumption in the industrial sector has been steadily increasing and currently exceeds 60% of final energy consumption.
  - The shares of the household, commercial, public and transportation sectors have steadily decreased.

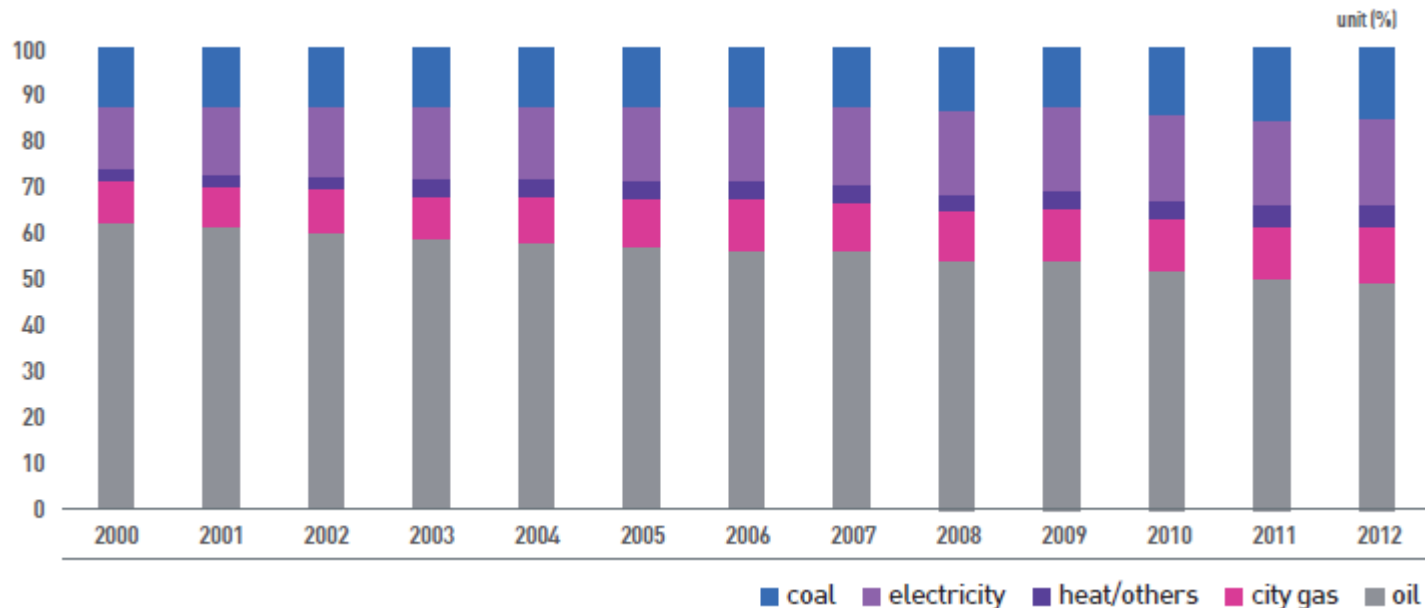
<Energy Consumption Trend by Sector (Unit: million TOE)>

	2000	2008	2009	2010	2011	2012	AAGR(%)
Industry	83.9	106.5	106.1	116.9	126.9	127.3	3.5
Transportation	30.9	35.8	35.9	36.9	36.9	37.1	1.5
Household/ Commerce	32.4	36.2	35.7	37.3	37.5	38	1.3
Public/Others	2.6	4.1	4.3	4.5	4.6	4.4	4.5
Total	149.9	182.6	182.1	195.6	205.9	207.8	2.8

# Consumption by Energy Source

- ❖ Oil: The share of oil in final energy consumption reached a record high of 68.2% in 1994 before steadily decreasing to 48.9% in 2012.
- ❖ Electricity: The share of electricity increased from 10.8% in 1990 to 19.3% in 2012.

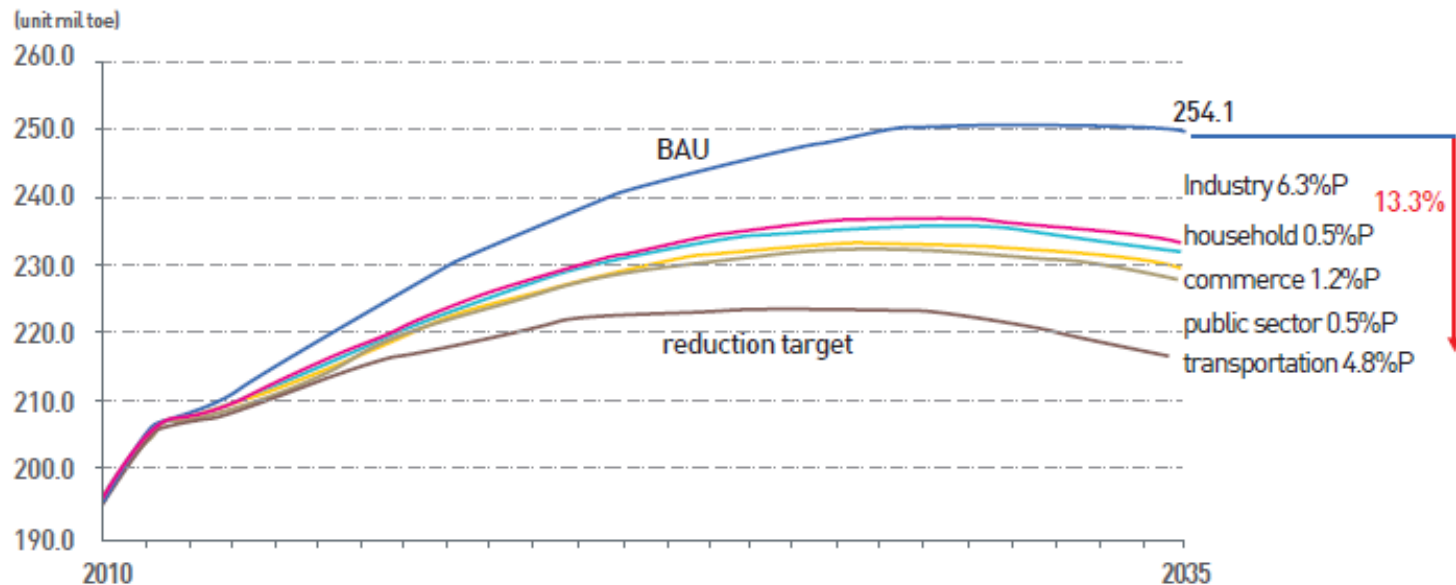
<Final Energy Consumption Trend By Source>



# 2035 Energy Demand Forecast

- ❖ Final energy consumption will be 254.1 million toe in BAU scenario
- ❖ Target : 13% reduction in energy consumption by 2035
  - Using improved demand management, price/tax adjustment, and R&D expansion

<BAU and reduction target by 2035>



# Policy Directions

## Transition to energy policies focused on demand management

- **Reduce electricity demand by 15% by 2035**

## Build a distributed generation system

- **Supply more than 15% of power from distributed generation by 2035**

## Strike a balance with environmental and safety concerns

- **Apply the latest GHG reduction technology to new power plants**

## Enhance energy security and energy supply stability

- **Build overseas resource development capacity+achieve a renewable energy deployment rate of 11%**

## Establish a stable supply system for each energy source

- **Secure a stable supply of conventional energy sources, such as oil and gas**

## Shape energy policy to reflect public opinion

- **Introduce an “Energy Voucher System” in 2015**

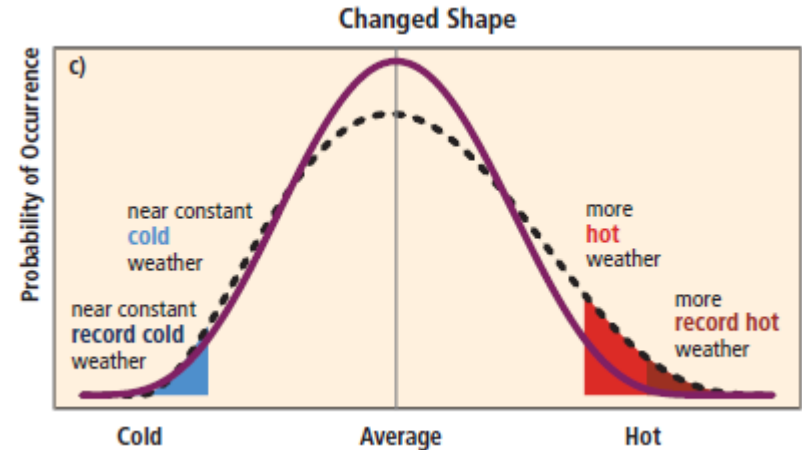
# Renewable Energy Trend in South Korea



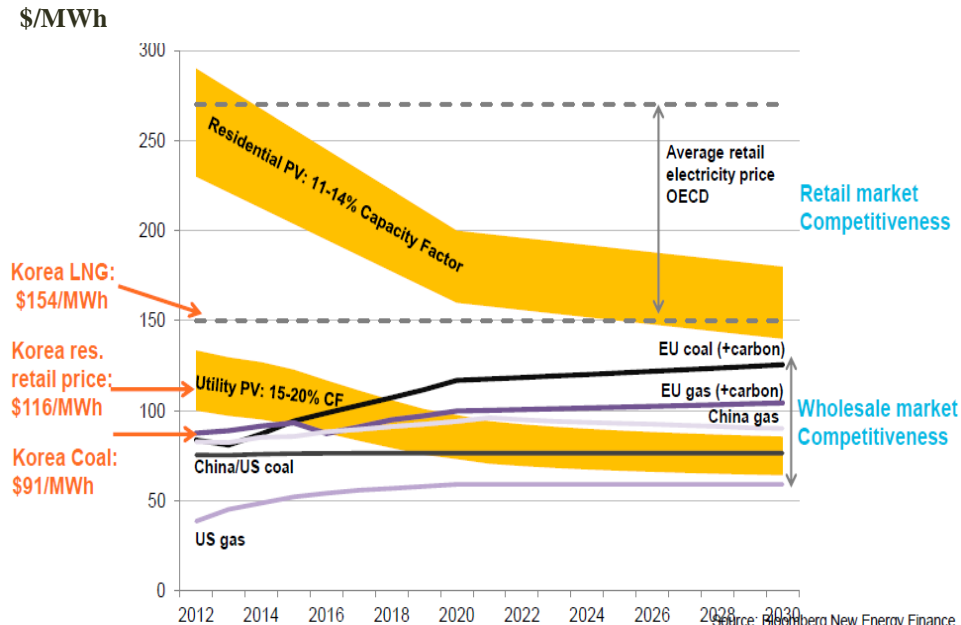
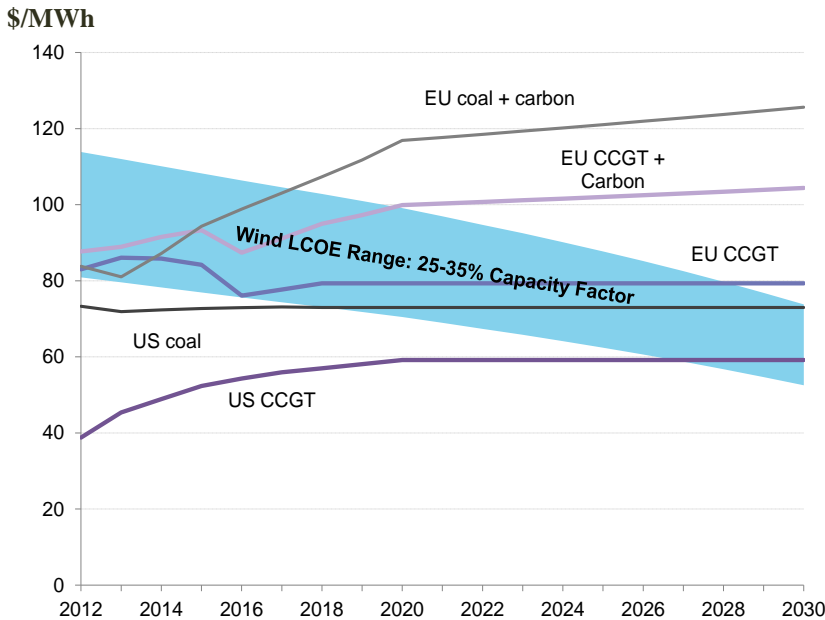
# Why Renewable Energy?

## ❖ Why Promising?

- Concern about climate change
- Increase of fossil fuel prices
- Lower unit costs of renewable energy by technology evolution and economies of scale



Source : IPCC (2013)



Source : BNEF (2014)

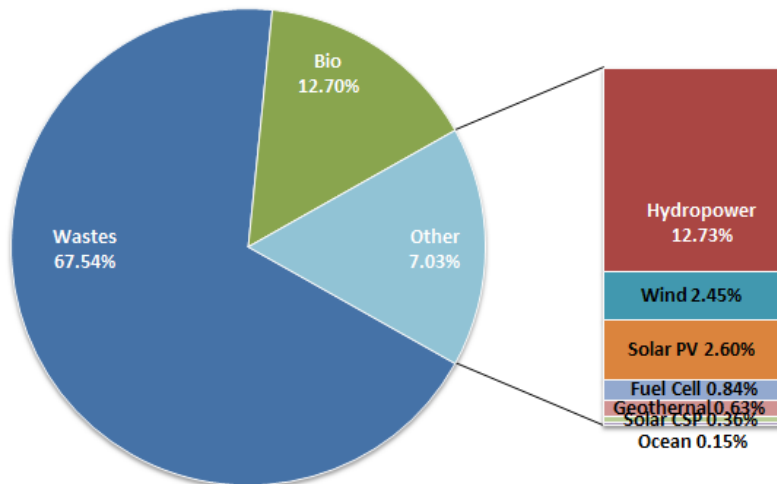
Source: Bloomberg New Energy Finance

# Status of Renewable Energy in Korea [Deployment]

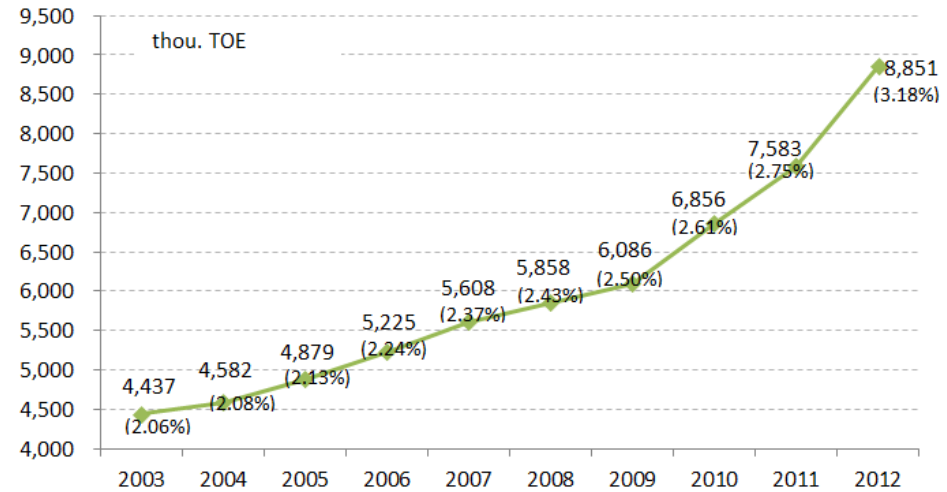
## ❖ 11 Categories of New and Renewable Energy (NRE)

- Solar PVs, Wind, Solar Thermal, Wastes, Bio (LFG, Bio-diesel), Hydro, Geothermal, Marine, Hydrogen, Fuel Cell, Coal Liquefaction /Gasification

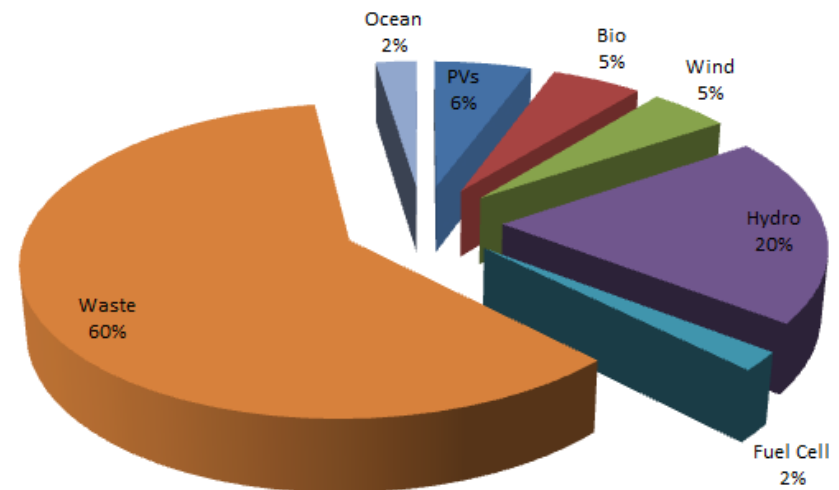
< Composition of NREs (2012) >



<NRE Deployments >



< Power Generation from NREs (2012) >



# Value Creation

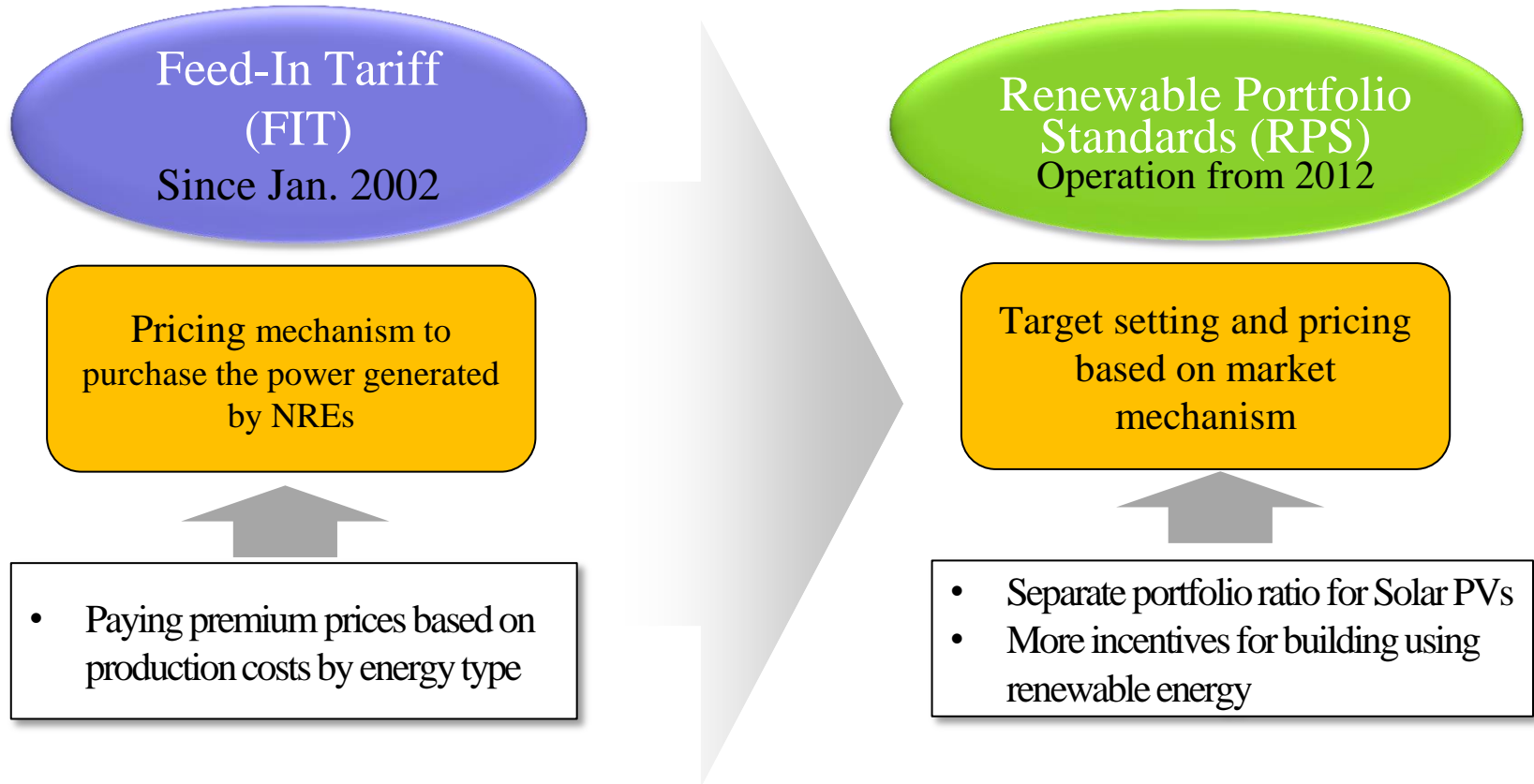
## ❖ Contribution of NRE industry to national economy

- Major source of growth engine for SME and job creation
- New strategic business expansion area for national economy

<Renewable Energy Industry in South Korea>

	2008	2009	2010	2011	2012	CAGR
No. of Manufacturers	134	187	209	225	200	11%
No .of Jobs	6,496	10,000	13,149	14,563	11,836	16%
Sales (\$Mil.)	3,268	4,463	7,663	9,357	6,467	19%
Export(\$Mil.)	1,710	2,130	3,930	4,770	2,520	10%
Investment(\$Mil.)	1,901	2,955	3,537	4,584	1,385	-8%

# Policy Change



## ❖ Total mandatory volume

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>RPS(%)</b>	2.0	2.5	3.0	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0

# RPS Performance

- ❖ Implementation ratio : 65% in 2012, 67.2% in 2013
  - Solar PVs : 96% in 2012
  - Non-Solar PVs : 63.3% in 2012
- ❖ Failing to meet the obligation : 579,889 REC in 2012
  - Penalty : 25.4 million dollars

## < RPS Implementation Result in 2012 >

(Unit : REC)

Mandatory Volume		Implementation	Borrowing	Failure
Solar PVs	276,000	264,180 (95.7%)	11,820 (4.3%)	0 (0.0%)
Non-Solar PVs	6,144,279	3,890,047 (63.3%)	1,674,343 (27.3%)	579,889 (9.4%)
Total	6,420,279	4,154,227 (64.7%)	1,686,163 (26.3%)	579,889 (9.0%)

# RPS Performance in 2012 [Cont.]

❖ RPS performance for 2.75 year = 300% of FIT performance for 10 years

- Solar PVs : 242%

## < Implementation Result of FIT and RPS >

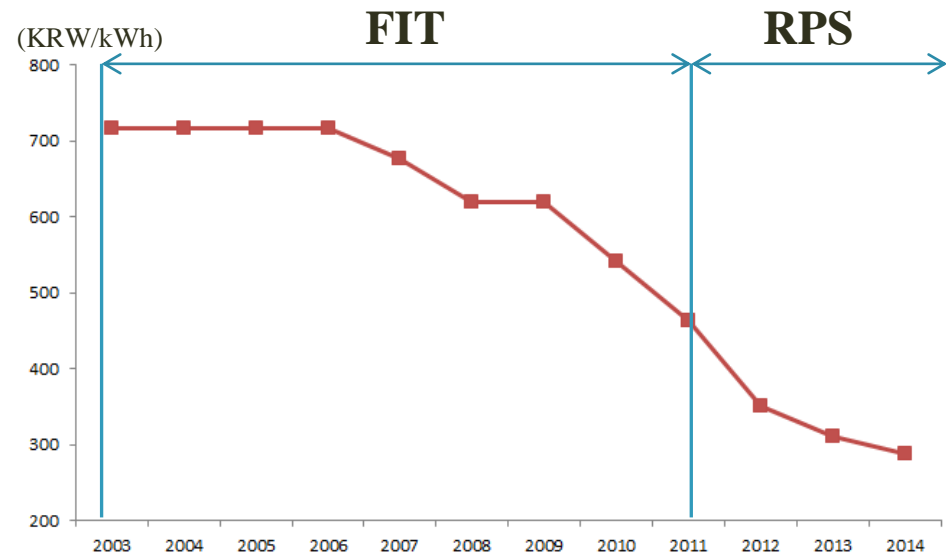
(Unit : MW)

	Renewable Capacity	Solar PVs Capacity
FIT(2002~2011)	1,042	497
RPS(2012~Sep. 2014)	3,166	1,203

❖ Price reduction of Solar PVs (CAGR)

- -4.2% for FIT period
- -14.5% for RPS period

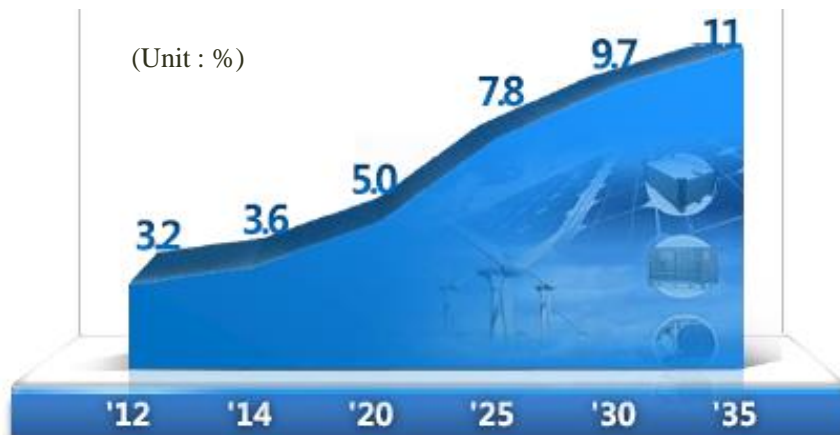
## < Solar PVs price >



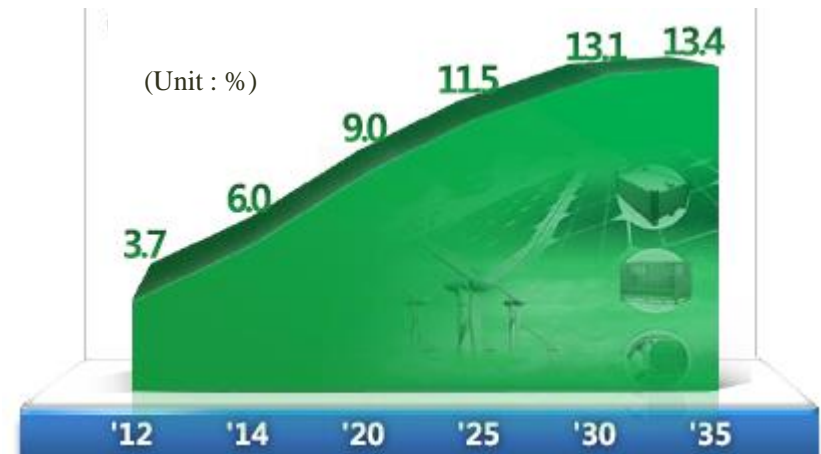
# Long-Term Plan for NREs Deployment

- ❖ Target of 11% renewable energy by 2035
  - Electricity : target of 13.4% renewable energy by 2035
- ❖ The portion of PVs and Wind will increase while that of Waste and Bio will decrease
  - Target in 2035 : Waste(29.2%)→Wind(18.2%)→Bio(17.9%)→Solar PVs(14.1%)

< Renewable energy target in TPES >



< Renewable energy target in TPES in electricity >



# Value Creation of Renewable Energy

❖ From 2013 to 2035 100 trillion value added, 1.5 million job creation, 90 trillion exports are expected.

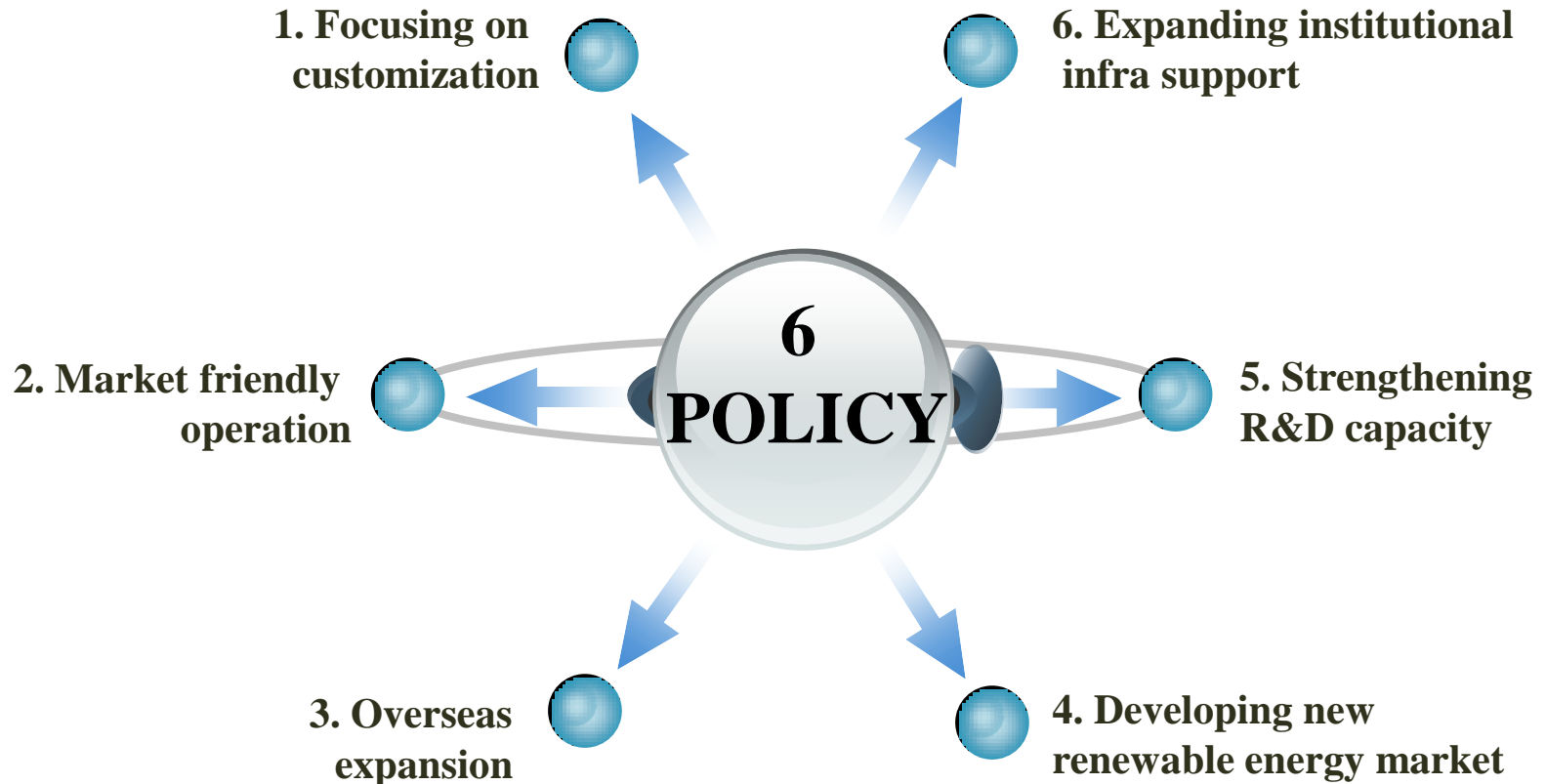
- Input-Output Analysis

(Unit : 100 million won)

	2015	2020	2025	2030	2035
Production Inducement Effect	325,727	1,078,712	2,019,825	2,898,197	3,721,720
Value Added Effect	88,834	300,900	561,507	804,633	1,029,593
Job Creation Effect (persons)	133,233	463,600	851,393	1,199,236	1,497,812
Export Effect	79,876	261,317	487,538	696,454	890,576
Forward Linkage Effect	154,124	470,542	913,420	1,321,873	1,701,431
Background Linkage Effect	165,704	547,003	1,026,737	1,474,494	1,893,773



# Renewable Energy Policy Directions



# Opportunities for Bulgaria-Korea Cooperation

# Suggestions

## Problems

- **High overseas energy dependence**
  - Bulgaria : 60%, South Korea : 96%
- **Developing new energy market and policy**
- **Mitigation of climate change**
- **Necessity of new growth engine**

## Cooperation (Goal : create low-carbon country)

- **Create joint renewable energy research and development**
  - develop new industrial sectors
- **Share experience in renewable energy policy and information**
  - joint seminar for business-government-research-scholar
  - cooperation network for information exchange
- **Promote trade in renewable goods**
  - construct joint value chain of Solar PVs and Wind
- **Demonstrate renewable energy on the ground**
  - pilot program and feasibility study
  - secure track record and accumulate experience for renewable energy

Q & A