New & Renewable Energy

# The 4th Renewable Energy Scheme

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# Contents



# I

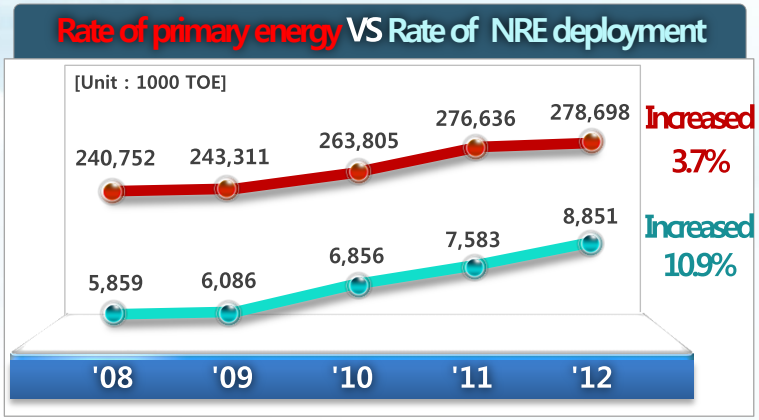
# Status and Conditions

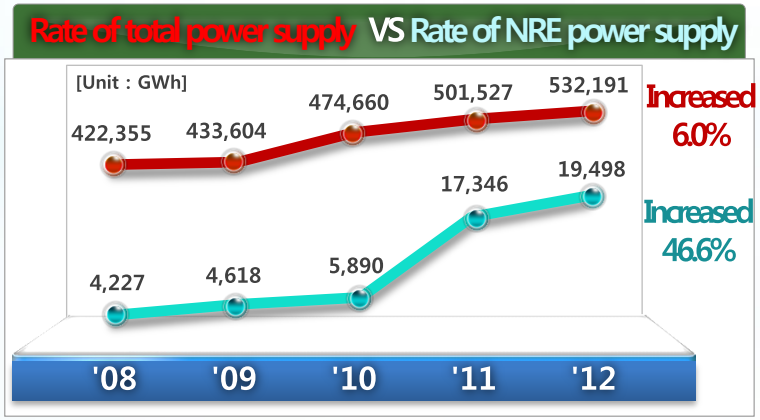
# 1 Development Status

## Deployment

3.18% compared to primary energy , 3.66% compared to power generation (2012)

- NRE deployment and supply have increased largely for the recent 5 years (2008~2012)




## Industries

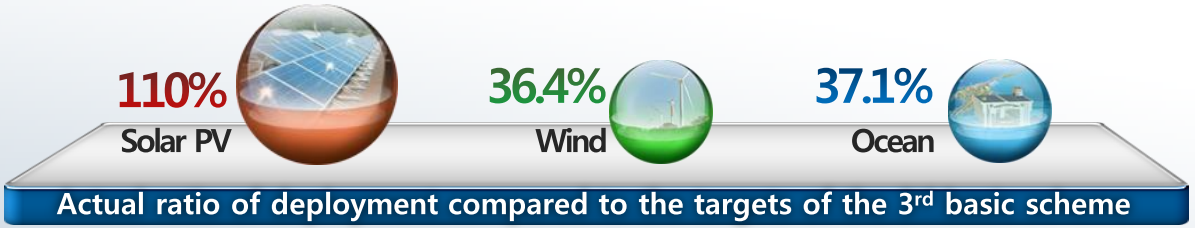
Rapid growth such as 1.5-fold increase in companies, 1.8-fold in employment, amount of sales in 2 –fold for the latest 5 years (2008~2012)

- NRE industry shrunk largely according to the downsizing period worldwide in 2012

| Categories | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Enterprise(#) | 134 | 187 | 209 | 225 | 200 |
| Employment(#) | 6,496 | 10,000 | 13,149 | 14,563 | 11,836 |
| Investment(KRW bil) | 1,901 | 2,955 | 3,537 | 4,584 | 1,385 |
| Sales(KRW bil.) | 3,268 | 4,463 | 7,663 | 9,357 | 6,467 |
| Export(hundred mil.) | 17.1 | 21.3 | 39.3 | 47.7 | 25.2 |

# 2 Conditions of Policies


- Agreement on the expand of NRE deployment is reached, but the conditions for policies are still weak
- Shortage of NRE resources(sun lights, wind, water etc.) from the narrow territory
  * (ex.) wind resource potential(TWh/y) : (ground) Germany 3,200 : Korea 130 = **25 : 1**
- Regulations for environment &location , Limited NRE deployment according to the low receptiveness of residents




Actual ratio of deployment compared to the targets of the 3rd basic scheme

## Extensive domestic investment in NRE, Nurture of domestic industries, Reduced costs after RPS has been adopted in 2012

- Achieved 1.7 -fold increase in generation facilities within 2 years after RPS adopted compared to the capacities during the FIT period for 10 years

* RPS fulfillment rates (percent): 64%(2012), 67%(2013)

# II

# Targets & Policies in the Mid- and Long-term

# 1 Targets of deployment

**Primary Energy**

Target rate: **11.0%** (2035)

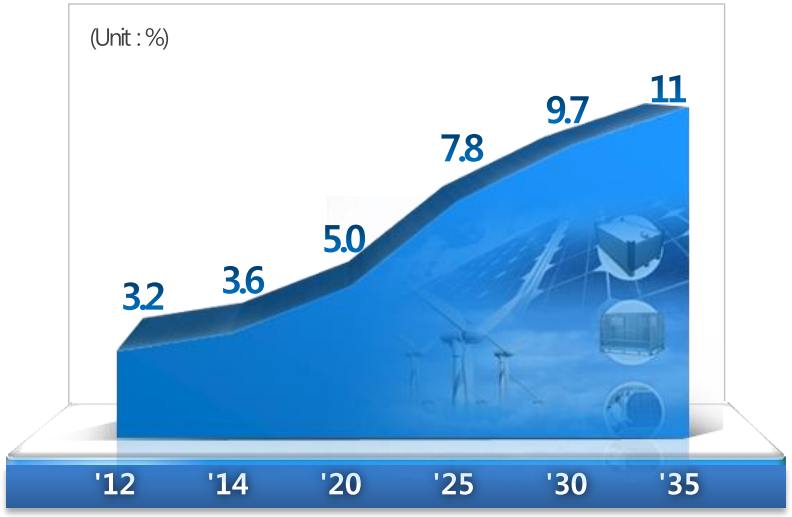
Annual NRE growth rate between 2014 and 2035: 6.3% > Annual demand rate of primary energy: 0.7%

**Electricity**

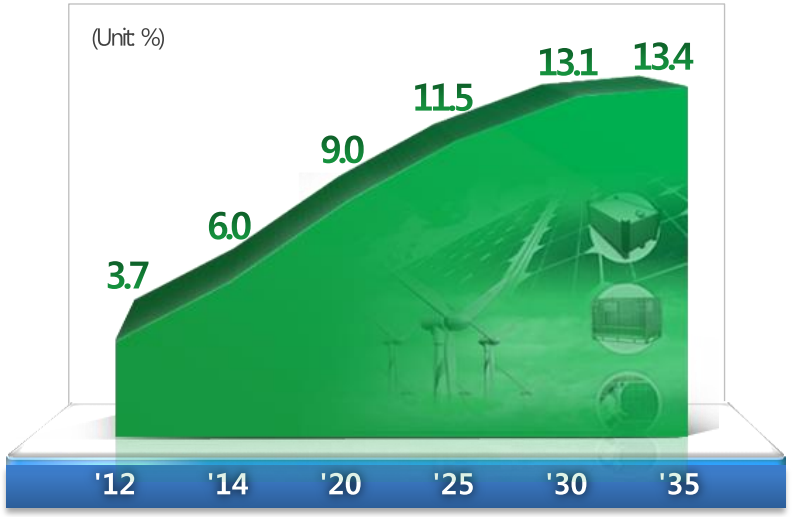
Target Rate: **13.4%** (2035)

Annual NRE growth rate between 2014 and 2035: 5.8% > Annual demand rate of electricity: 1.8%

## NRE share targets based on primary energy




## NRE share targets based on power generation capacity



# Reference Deployment target per sector and resource (Primary Energy Standard)

- While **ratio of waste has decreased largely**, the amount of shortfalls are expected to be replaced with Solar PV and Wind

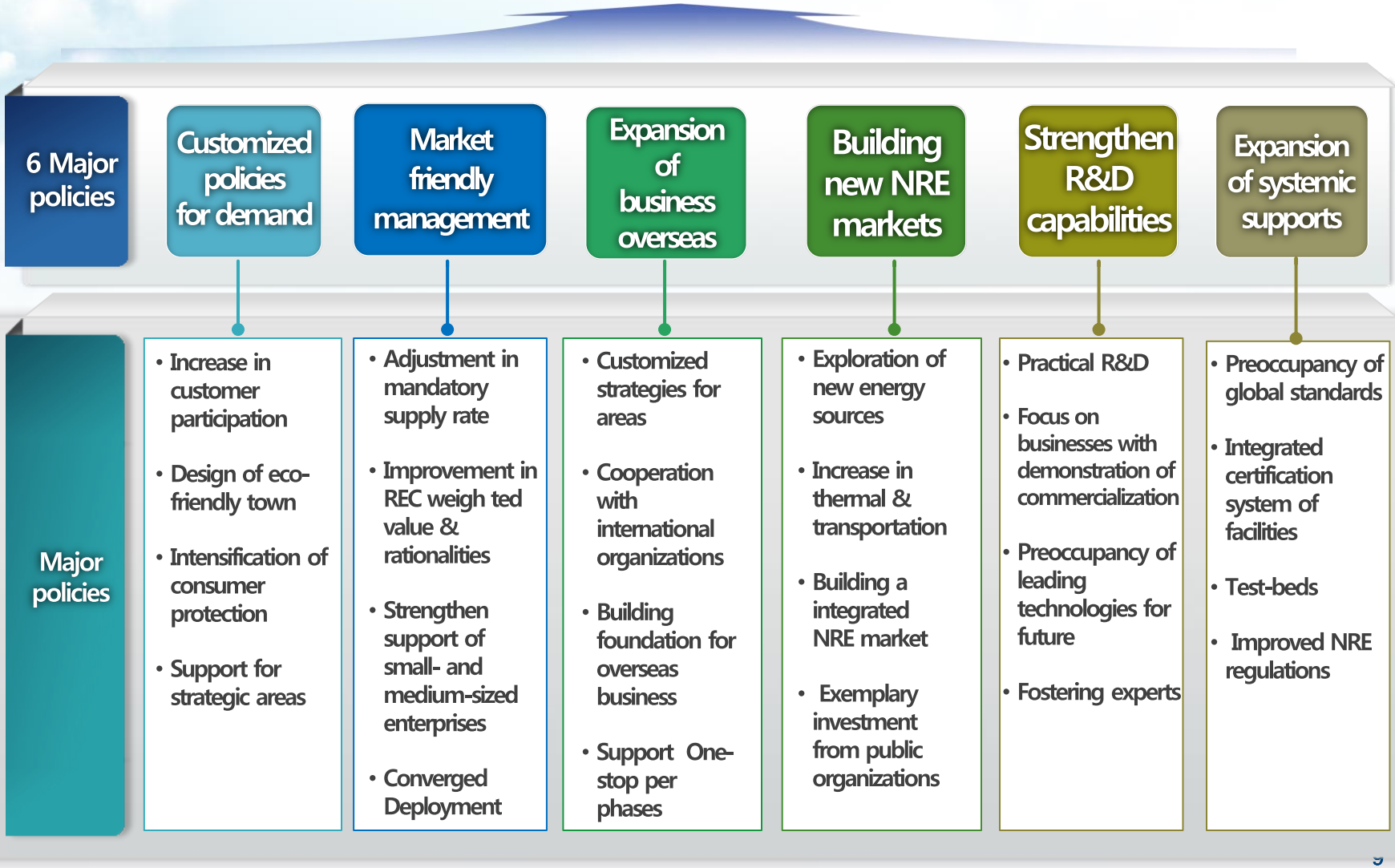
  * Ratio per energy resource(%, '12→'35) : Waste(68.4→29.2), Wind(2.2→18.2), Solar PV(2.7→14.1)

**Ratio targets per energy resource compared to primary energy (Unit : %)**

| Areas | 2012 | 2014 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| Solar Thermal | 0.3 | 0.5 | 1.4 | 3.7 | 5.6 | 7.9 |
| Solar PV | 2.7 | 4.9 | 11.7 | 12.9 | 13.7 | 14.1 |
| Wind | 2.2 | 2.6 | 6.3 | 15.6 | 18.7 | 18.2 |
| Bio | 15.2 | 13.3 | 18.8 | 19.0 | 18.5 | 18.0 |
| Water | 9.3 | 9.7 | 6.6 | 4.1 | 3.3 | 2.9 |
| Geo Thermal | 0.7 | 0.9 | 2.7 | 4.4 | 6.4 | 8.5 |
| Ocean | 1.1 | 1.1 | 2.5 | 1.6 | 1.4 | 1.3 |
| Waste | 68.4 | 67.0 | 49.8 | 38.8 | 32.4 | 29.2 |

# 2 Major Policies

## Achieve 11% of NRE deployment by 2035



III

# Details of Tasks

# 1 Customized Deployment & Expansion Policies

## Dynamic Participation of Residents

- Incentive benefits when building a NRE facility in the area with transmission lines

  * Incentives : Loans, special options from RPS weighted values, selection of sales operators

## Building Eco-friendly Towns

- Adopted a Resident Profit Model to the unacceptable facilities such as incineration plants, landfills etc,

  * Three pilot areas(2014): Gwangju(MOTIE), Hongchun (ME), Jinchun(MSIP)

- Dissemination of a business model with participation of local residents such as co-ops, etc.

## Dynamic Rental Project

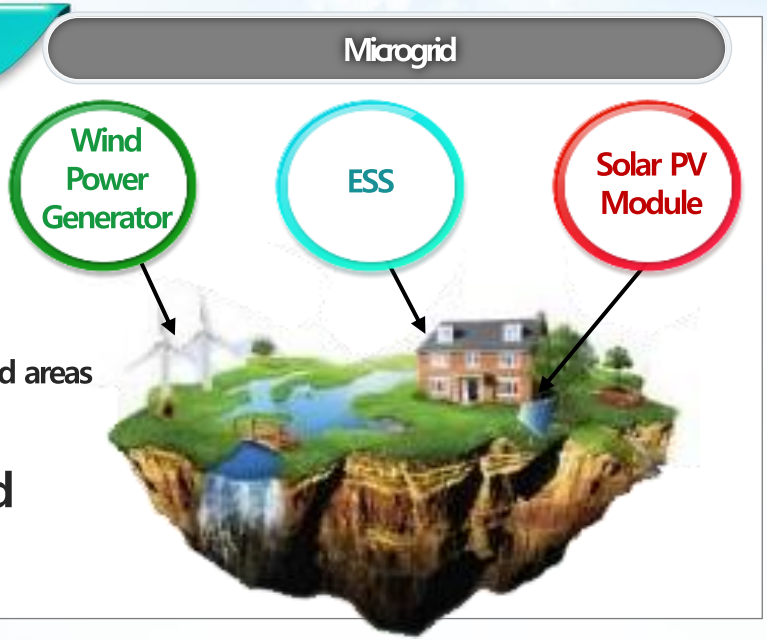
- Dynamic 'NRE Rental project' for private business which is responsible from installment to warranty service without subsidies from government

  * Consumer pays monthly (specific amount of)rental fee during the contract term

# 1 Customized Deployment & Expansion Policies

## Independent Energy Island

- Build microgrid in small island areas instead of independent system which is relied on diesel generators with high-expenditure of fuel currently
  * Supply costs of electricity are app. 4 to 14-fold higher than land areas
- Pilot project of connection of wind, solar PV, geothermal, ESS etc. in Ulleung Island
  * 30MWh of ESS installed, NRE ratio: 3.6% →68% (2017)




## Consumers Protection

### Warranty Service led by Private Sector

Participated in government projects, reflection of ex post facto appraisals, level of customer satisfaction when selecting an operator

### Operator Information

Records of detailed information of NRE companies such as construction, labor forces, finance status etc.

### Statistics

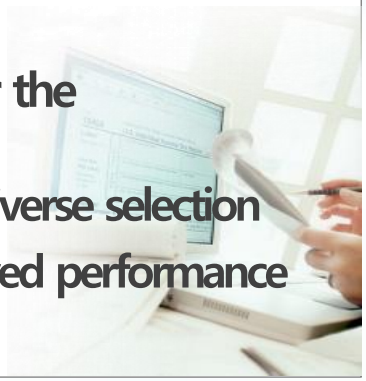
Providing detailed statistics based on demand of consumers such as supply rate of NRE per local government

# 2 Market-friendly Policy Operation

## Improvement in the conditions of RPS

- Extend two years in achievement of supply target of 10% under the consideration of conditions(2022→2024)
- Integration of Solar PV-Non Solar power markets (after 2016) and diverse selection
- Strengthen the flexibility for operators improving conditions of delayed performance

  * Available duration to be postponed was one year initially, but extended 3 years



## Rationality of RPS weighted value

- (Solar PV) Dynamic investment from respective installation models and sizes
- (Non-Solar PV) Adoption of transformative weighted values on onshore wind & wave etc., fostering relevant industries with introduction of weighted values when installing ESS

## Intensified small business supports

- Continuation and expansion of supports between operators and solar PV sales operators who can sign long-term contracts

  * 100MW(2012 ~ 2013) → 150MW (2014 ~ 2015) → 200MW (2016 ~ 2017) → 250MW (2018 ~ 2019)

# 2 Market-friendly Policy Operation

## Reform of deployment and loans

**Deployment**

| Previous | | After reform |
|---|---|---|
| • Based on individual household · building<br>• Subsidies for initial investment | Transferred → | • Combined Support Program led by local communities<br>• Support post –incentive from the amount of energy generation proportionately |

**Combined Support Program**

| | |
|---|---|
| Ulsan Hydrogen Town | Utilization of industrial byproduct hydrogen, installation of 150 self-generated fuel cells |
| Gochang New Town | Installed Solar PV, solar thermal, geothermal facilities on the 100 households in the newly constructed town |
| Baek –a island | Achieved the goal of 100% of energy independency with installation of solar PV, Wind, ESS |

**Loan**

Offers another loan program for technologies in addition to budgets of manufacturing, facilities, operation areas

## Increase in mandatory rate of public buildings

- Increase in mandatory rates from 20% to 30% by 2020 and a reform of annual rates as well

- Annual NRE supply rate for public buildings (%) -

| Categories | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020~ |
|---|---|---|---|---|---|---|---|
| Previous | 12 | 13 | 14 | 15 | 16 | 18 | 20 |
| After reform | 12 | 15 | 18 | 21 | 24 | 27 | 30 |

# 3 Expansion of Overseas Business

## Expansion of supports in finance for overseas business

- Establishing new funds when NRE small- and medium- sized companies are running a business overseas
  * Expansion of NRE loan programs to the businesses overseas, size of financing: KRW 103.4 bil. (2014)→ KRW 105 bil.(2015)
- Providing a benefit of 'Special case of Trade Insurance' to beginners
  * Special support to small- and medium companies without export records (planned in Sep, 2014 with KRW 300 bil. annually)

## Marketing supports in NRE overseas

- Supports in inspection of validities for overseas and specialized exhibitions of NRE overseas
  * Inspection of validities overseas: KRW 2 bil. (2014), Supports for specialized NRE exhibitions of overseas: KRW 0.45 bil. (2014)
- Supports in acquisition of foreign certification to eliminate barriers of technologies when running business overseas
- Operation of on-site advisory pool for NRE export supports

# 3 Expansion of Overseas Business

## Set-up of customized strategies on respective areas

- Through analysis of conditions for entering foreign markets such as states, policies, resources, status of supplying energy etc. Build「Strategies on NRE Oversea Project」according to respective areas
  * Designing Task Force with experts from industries, KOTRA, Finance facilities etc.
- Supports for concrete projects based on the results from analysis of promising states

## Entering the developing countries` markets through international organizations and Official Development Assistance(ODA)

- Supporting overseas business for Korean companies with assistance of the international organizations` NRE funding programs (ex. ADB) and retaining track records for entering foreign markets
- Entering the international market based on previous engagements with conditional/unconditional experience through Official Development Assistance(ODA)

# 4 Create a new NRE Market

## Ambitious exploration of new energy resources

- Utilization of wasted heat from power plants as categorized into NRE resource

  * Offering thermal energy with low prices using wasted water from power plant to beaby greenhouses, cattle sheds etc.

- Fostering technology development, deployment, including geothermal, wave etc. into RPS implementation measures

## Enlargement based on transportation & thermal energies, besides previously electricity

- Renewable Fuel Standard(RFS) mixing specific rates of NRE resources with transportation fuels is planned from 2015
  - After adapting to Biodiesel, further options with Bioethanol and others would be considered
- Adapting Renewable Heat Obligation(RHO) supplying specific amounts of NRE among thermal energy consumptions on the newly constructed buildings is currently under the consideration

# 5 Intensified NRE Capabilities

## Short-term subjects based on commercial technologies

**Reduction of power generation costs**
Connection with roadmap of power generation costs and set-up of new R&D to reduce investment costs

**Business**
Expansion of R&D for virtuous cycle between development of technologies and business such as improvement of bottlenecks for business etc.
* Bottlenecks(ex.) : Process technologies, packages, automation, mass production, demonstration, verification of reliability etc.

**Overseas markets**
Expansion of R&D projects for export specialized in promising countries

**Connection with deployment policies**
Building virtuous cycle between development of technologies and deployment to explore assignments and other requirements for deployment policy

## Mid- and long-term projects based on leading technologies for future

**Technologies for future**
Increase in long-term investment for securing promising technologies aimed at industrialization within 10 years
* Floating type of mega wind power technologies, super-high-efficiency, next generation type of solar batteries

**Convergence**
Expansion of converged R&D with NRE resources, systems(NRE+Smart Grid etc.) etc.

# 6 Expansion of Systemic Supports

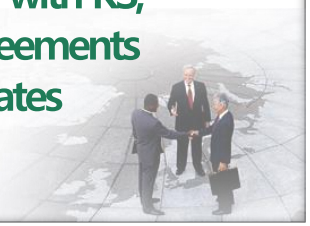
## Intensified regulations of standard and certification

### Standard

Enhancement of meeting global standard and preoccupancy of international standards in markets

### Certification

Integration of NRE facility certification with KS, mutual agreements between states



### Test-bed

Two-phases cluster scheme of relevant industry-academia-research institute

* First phase Test-bed:
(Solar PV) Chungcheong/Daegu-northern Kyungsang, Honam
(Wind) Southern East/Honam
(Fuelcell) Daegu-northern Kyungsang

## Improvement of regulations

- Abolition of RESCOs registration and building certification systems with low effectiveness
- Irrational regulations and systems after reviewing concerned subordinate guidelines of public organizations, as well as concerned laws of MOTIE
- Improvement and amendment of irrational conditions with simplification of loan application forms, reflection of recent trends of technologies to standards of facility construction, etc.

# IV

# Investment Plans and expected Effects

# 1 Investment Plans and expected Effects

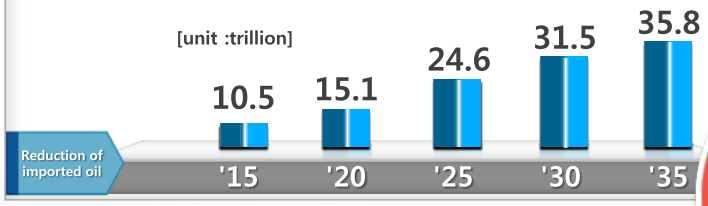
## Investment Plans

- Total KRW 154 trillion is required for target of deployment by 11% (2035)
- Total KRW 30 trillion is required for development of technologies, deployment, loan programs etc. by 2035

## Expected effects

### Substitute effects of imported oil

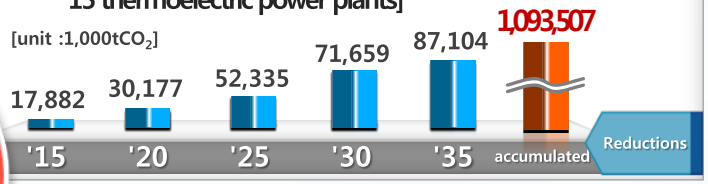
App. KRW 36 (substitute for 0.27 bil. barrel of imported oil




### Environmental benefit efficiency

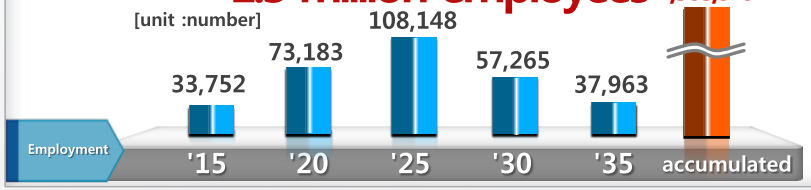
Reduction of greenhouse emission: 1.1 bil.$tCO_2$

[Greenhouse emission levels from 15 thermoelectric power plants]



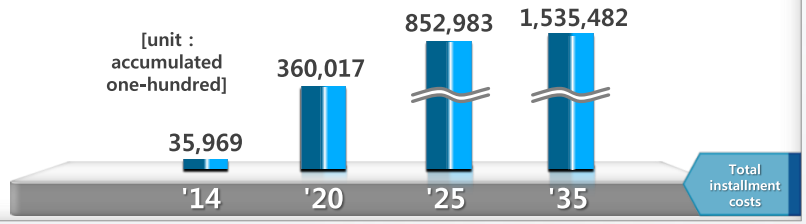

### Employment effects

Effects of newly hired 1.3 million employees 1,305,819




### Enlargement of domestic market effects

New Investment: KRW 154 trillion



# Thank You!

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