

Korean Efforts for Sustainable Energy

Jeju, 28 March 2017

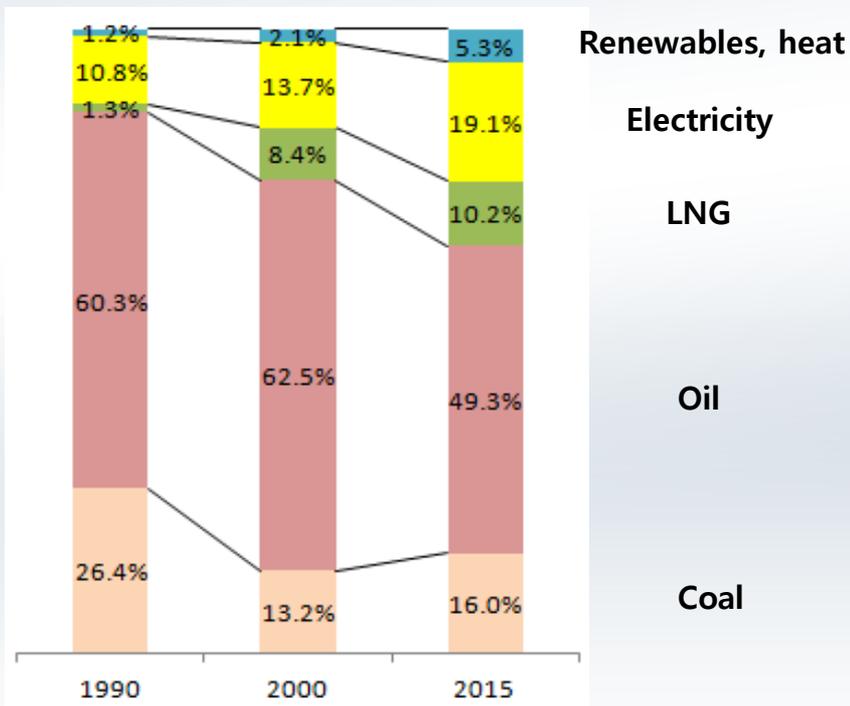
49th APEC EGEE&C/48th APEC EGNRET

- 1 Energy Consumption**
- 2 2nd Energy Master Plan**
- 3 EE Programs by Sector**
- 4 NRE Promotion**
- 5 New Energy Industry**

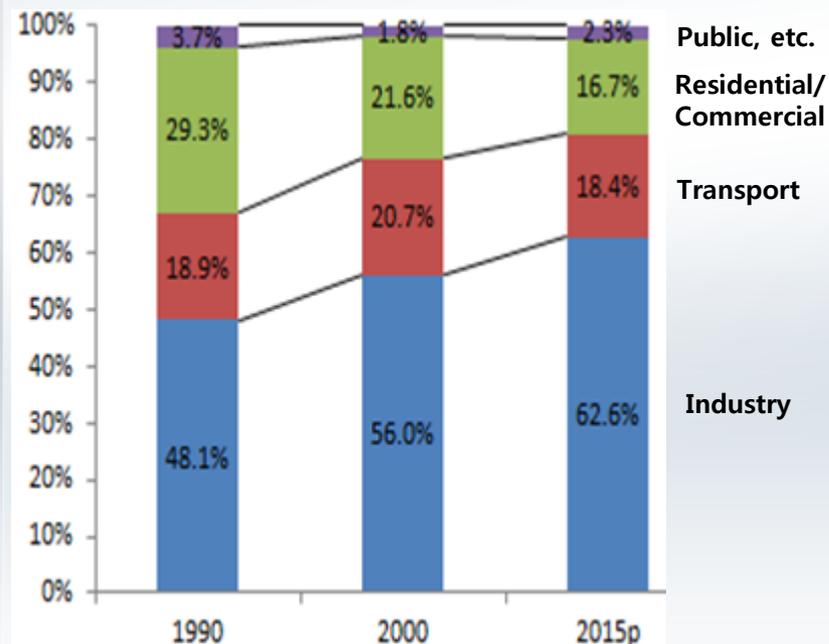
1. Energy Consumption

- High dependency on imported energy : **95.2%**
- Cost of energy import: **USD 102.7 billion** in 2015
 - 23.5% of total import

Consumption by sources

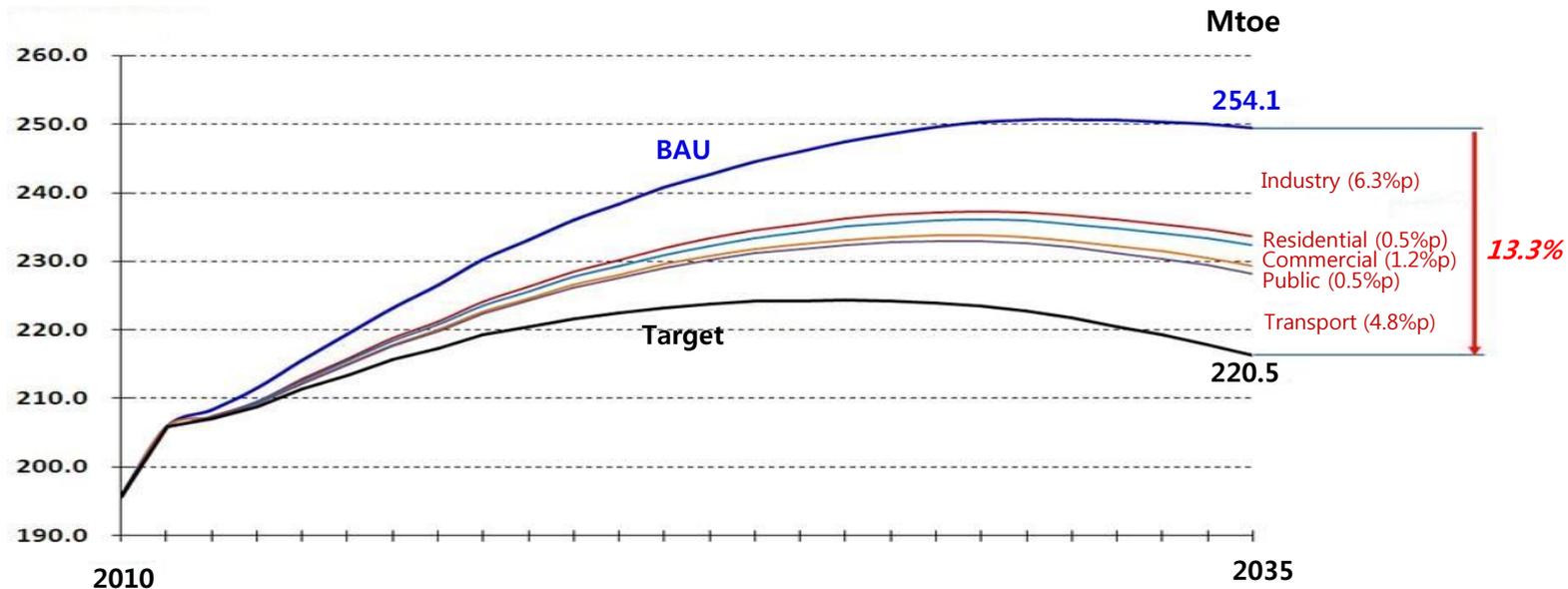


Consumption by sectors

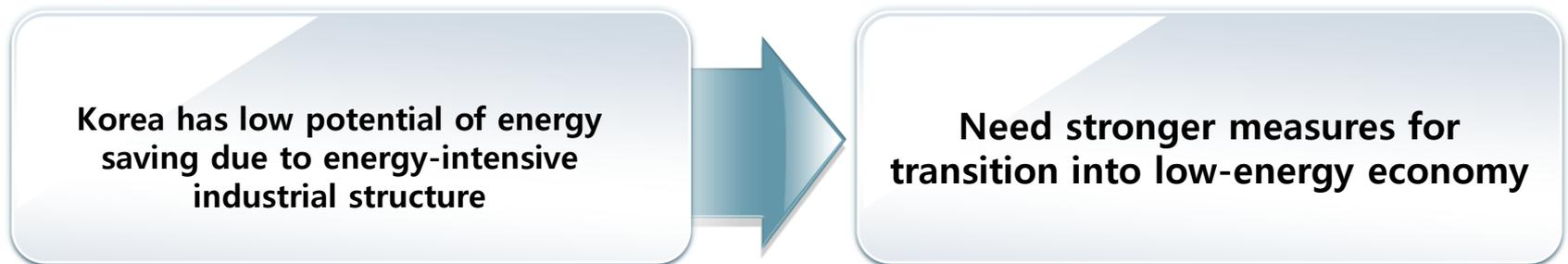


2-1. 2nd Energy Master Plan: EE Target

- Reduce final energy consumption **13%** by 2035



Improve energy intensity **30%** through national energy master plan



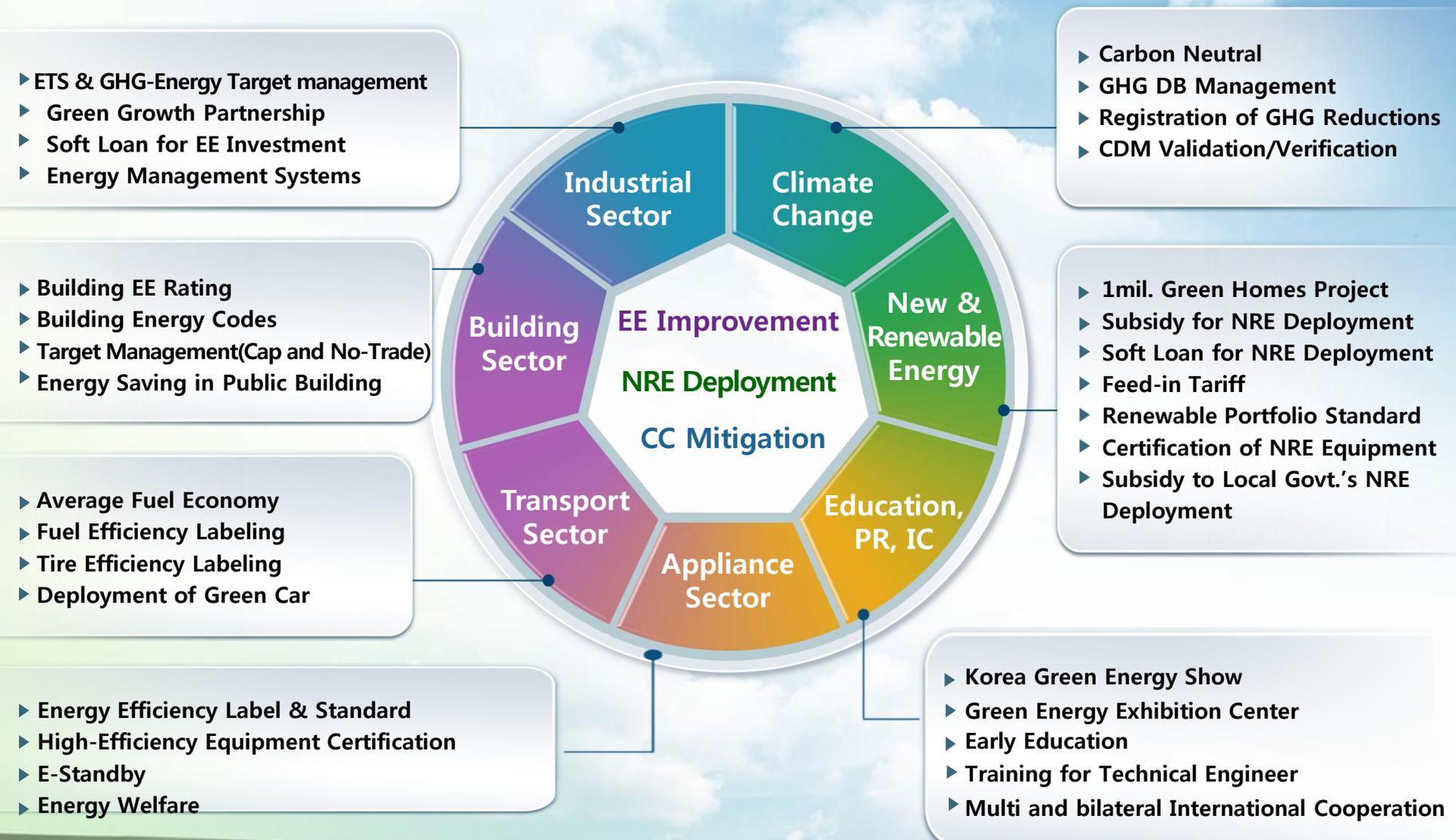
2-2. 2nd Energy Master Plan: 6 Core Plans

1. Shift the Focus from Supply Management to **Demand Management**
 - Reorganize energy tax, improve power tariff, promote ICT DSM
2. Promote **Distributed Power Generation**
 - Supply **15%** of power with distributed system by 2035
3. Enhance **Sustainability of Energy Policies**
 - Improve climate change responses, strengthen the nuclear safety
4. Strengthen **Energy Security**
 - Reinforce national energy/mineral corp., pursue wider NRE deployment
5. Build **Stable Energy Supply Chain**
 - Diversify supply lines, increase domestic energy reserves
6. Pursue **Citizen-friendly Energy Policy**
 - Strengthen energy welfare, respond to energy conflicts preemptively

KEA at a glance

- **Established** in 1980 under Rational Energy Utilization Act
- **Work Scope**
 - Energy Efficiency improvement, New & Renewable Energy Promotion, Climate Change Mitigation, etc.
- **Budget('16)**
 - USD 1,167 million (including Soft Loan, FIT, Subsidies)
- **Organization**
 - 20 Departments. 12 Branches, 1 Affiliate (New & Renewable Energy Center)
- **No. of Staff** : 546

Who we are: Department Store of Energy P&M



3. EE Programs by Sector

3-1. Improving Industrial EE

- ETS, GETM, Energy Audit, Soft Loan, ESCO, etc.

3-2. Enhancing Appliance EE

- EE Standards & Labeling, Certification, etc.

3-3. Promoting EE in Building

- BEMS, Building Energy Code, Building EE rating

3-4. Promoting EE in Transport

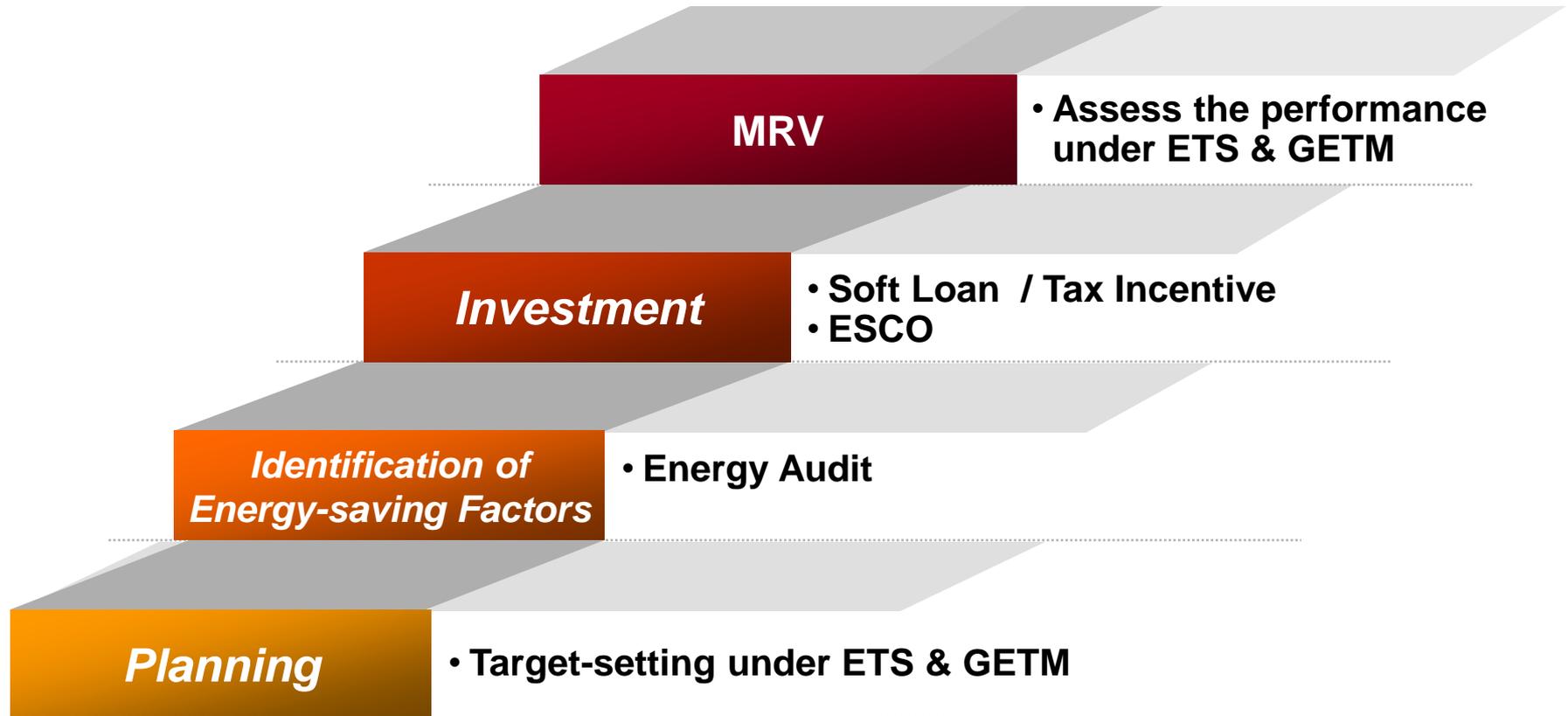
- AFE, Fuel Efficiency Labeling, Tire Efficiency Labeling

3-5. Promoting EE in Public sector

- Investments in Energy Suppliers' DSM

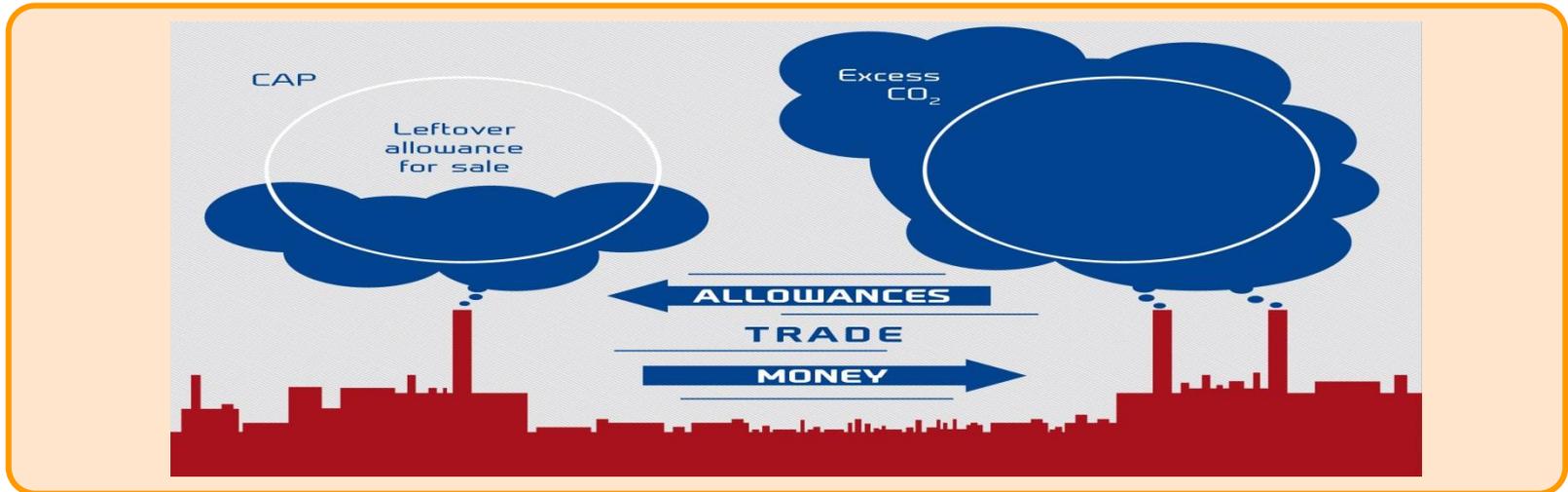
3-1. Improving Industrial EE (Target: Energy-intensive Co.)

How we work: Industrial EE Scheme



Emission Trading Scheme

- **ETS:** Government-mandated, market-based approach to controlling pollution by providing economic incentives for achieving reductions in the emissions of pollutants. Target entities are the biggest emitters(over 25,000 tCO₂/yr).



- **Introduced in 2015,** ETS will play an essential role in meeting Korea's 2030 NDC target of 37% reduction based on BAU emissions

GHG-Energy Target Management Scheme

- **Cap and No Trade** : Heavy emitters (over 15,000 tCO₂/yr and less than 25,000 tCO₂/yr) are required to negotiate their GHG-energy reduction target with government, implement actions, get assessed and get penalty if failed.



- **Introduced in 2012, starting from emitters of over 25,000 tCO₂**
Contributed to successful introduction of ETS in 2015, providing test pilot experiences to policymakers, target emitters and various stakeholders

Energy Audit

- Identify Energy Loss Factors & Propose Improvement Measures

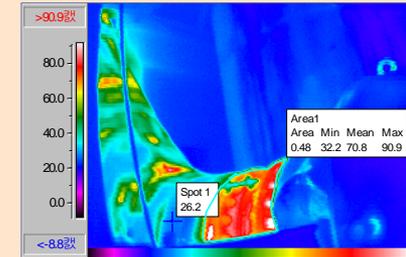
Heat Audit



Electricity Audit



TVS Audit



- Player & Coach in Energy Audit Arena
 - 2,707 factories and buildings have been audited(~2015)
 - * 16 overseas(Mexico, Bolivia, Guatemala, Oman, Thailand, etc.)
 - Train Energy Auditors in Private Sector & Enhancing Audit Quality

Soft Loan & Tax Incentive

- **Soft Loan is provided to support Energy Efficiency Investment**
 - Interest rate is far lower than market rate, currently 1.5~1.75%

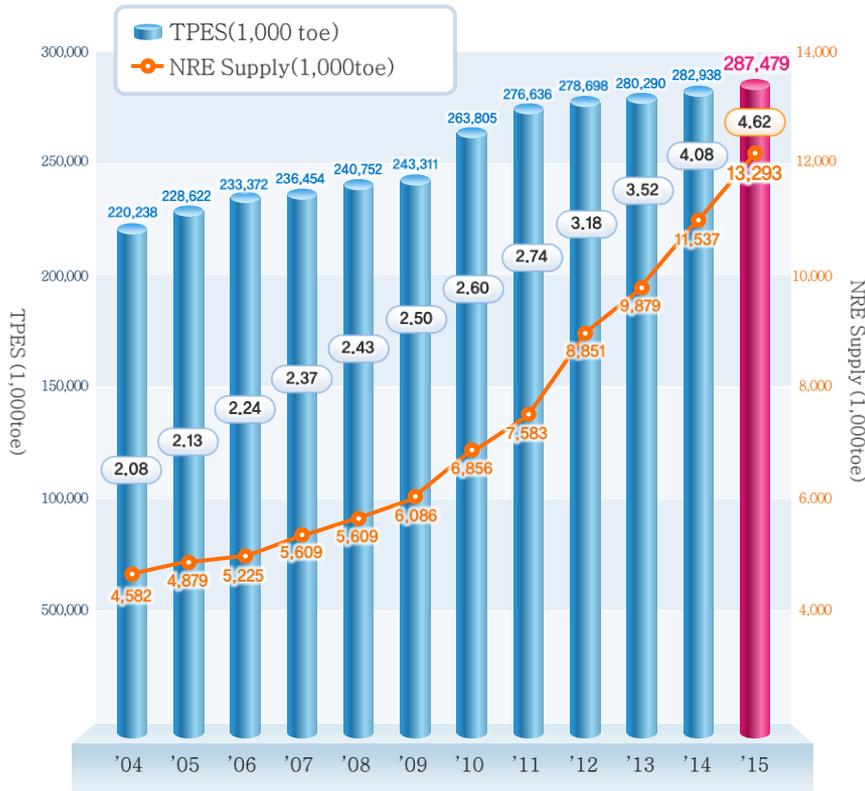
	Interest Rate (%)	Grace Period/ Repayment (yr)	2015 Budget (mil. USD)
ESCO	1.50 (2.75, fixed)	3 / 7	187.5
Energy-saving Facilities	1.5(SME) 1.75(non-SME)	3 / 5	187.5
GETM	1.5	3 / 5	41.7
Total			416.7

- **10% of Tax Credit is given to Energy Efficiency Investment**

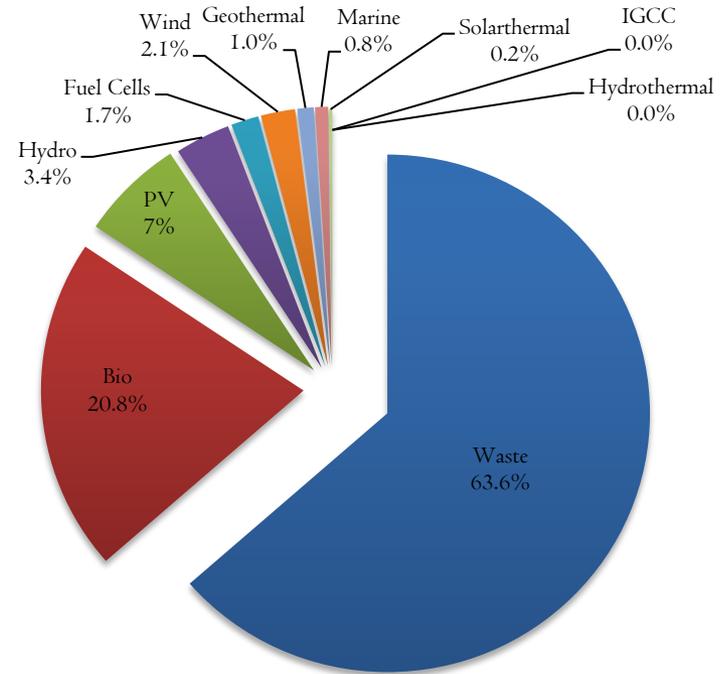
4. NRE Promotion: NRE Supply

✓ NRE Share in TPES: 4.62%

NRE Supply & Ratio



NRE Supply by Sources



Renewable Energy : PV, Solar Thermal, Wind, Waste, Bio(LFG, Bio-Fuels), Hydro, Geothermal, Marine, Hydrothermal
New Energy : Fuel-cell, Hydrogen, Coal Liquefaction or Gasification

4-1. NRE Promotion: Basic Plan & Target

4th New & Renewable Energy Basic Plan (2014)

- Supply 11% of Primary Energy, 13.4% of Power from NRE Sources by 2035
- Average annual growth rate(2014-2035) is targeted to be 6.2%

Target for NRE Production Share(%)

- Waste and Hydro will be decreased / PV, Wind, Geothermal, Solar thermal will be increased

NRE Sources	Waste	Hydro	Bio	PV	Wind	Geo-thermal	Solar-thermal	Marine	Total(%)
2020	47.3	6.3	17.6	11.1	11.3	2.5	1.4	2.4	100
2025	40.2	4.3	19.6	13.3	12.5	4.6	3.9	1.6	100
2035	29.2	2.9	17.9	14.1	18.2	8.5	7.9	1.3	100

4-2. NRE Promotion: Step (1)



1 Development of breakthrough innovative technologies with high potential for leading global market

→ Strengthen public-private partnerships and encourage the participation of SMEs in government funded R&D projects

2 Localization of key components, materials and equipments to enhance price competitiveness

→ Increase government R&D budget for SMEs' components, materials and equipment development

3 Development of Test-bed sites for renewables

→ Support for testing and analysis by renewable sources, performance testing, reliability test of R&D outcomes

4-2. NRE Promotion: Step (2)

Innovation

R&D

Demonstration

Deployment

Commercialization

Various demonstration programs are being carried out.

Onshore wind power performance demonstration



Jeju Island Smart Grid Test Bed



Jukdo Island – Energy independent island(PV 201kW, Wind 10kW, ESS 900kWh)



4-2. NRE Promotion: Step (3)

Innovation

R&D

Demonstration

Deployment

Commercialization

Home & Building Subsidy Program

Home & Building Subsidy Program subsidizes a portion of installation cost of NRE facility

Mandatory Use for Public Buildings

For new or renovated public buildings with the floor area of 1,000 m² or above are obliged to fulfill more than 18% of their total expected energy usage in NRE

RPS

Enforcing 18⁽²⁰¹⁷⁾ power producers to supply certain amount^(2017, 4.0%) of the total power generation by NRE

RFS

Enforcing renewable fuel blend obligators to supply certain amount^(2017, 2.5%) of total transport fuel by renewable fuel(BD)

4-2. NRE Promotion: Step (4)



1 Support for overseas market expansion



2 Establishment of support system for overseas market expansion



3 Increase the public acceptance of NRE products

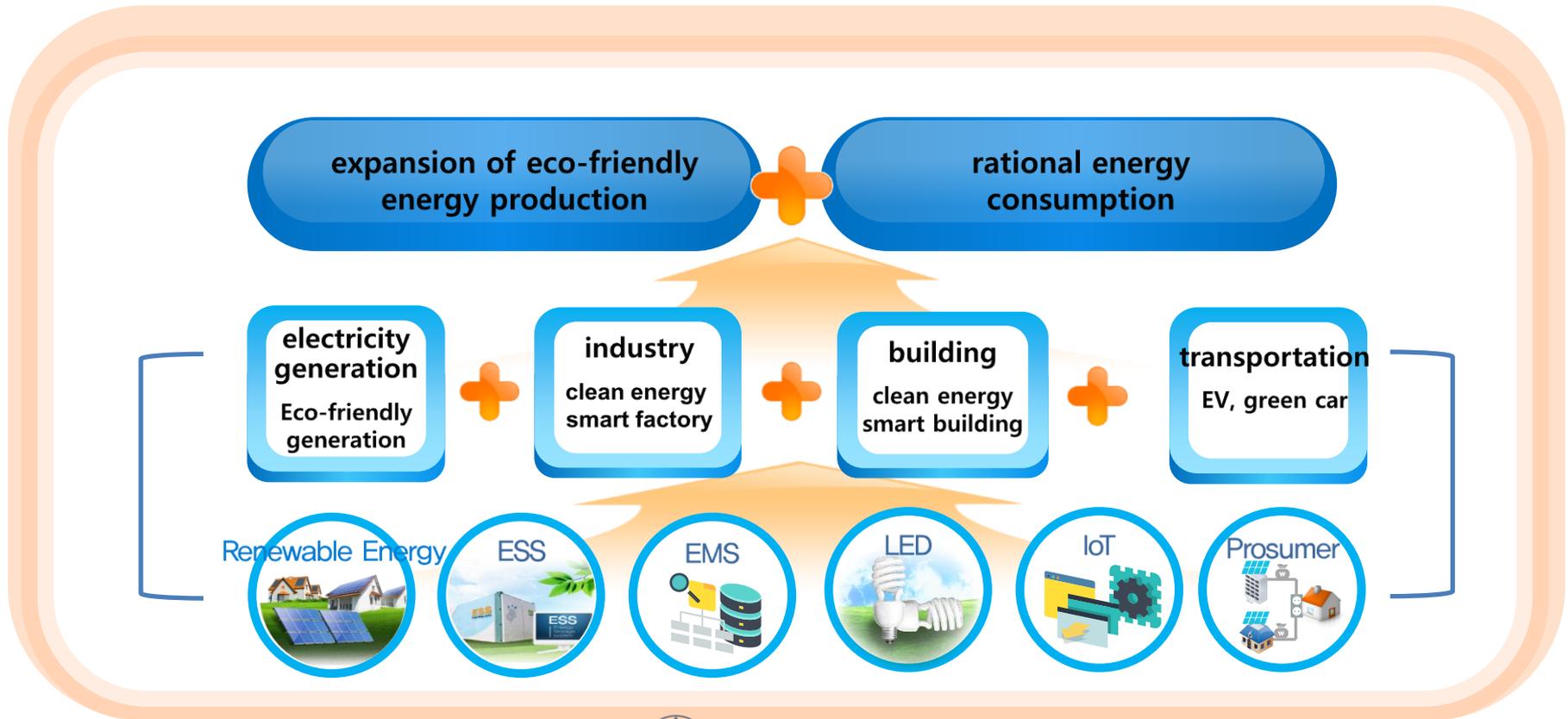
➔ Find innovative energy products that can be used in daily lives, and expand from industrial market to consumer market

4-3. NRE Promotion: Programs at a Glance

Category	Sector	Tools	Programs
NRE Deployment Program	Private Sector	Subsidy	Home Subsidy Program (1 Mil. Green Homes)
			Building Subsidy Program
			Feed-in-Tariffs (FIT) (<i>Ended but lasting 15-20 years</i>)
			Overseas Business Support
		Loan	Financial Support(Installation, Production, Operating Capital)
		Mandatory	Renewable Portfolio Standard (RPS: 4.0%('17) →10%('23~))
			Renewable Fuel Standard (RFS: 2.5%('15-'17)→3%('18-'20))
	Business	Solar PV Rental Program	
	Public Sector	Subsidy	Regional Deployment Program
			Combined Support Program
Establishment of NRE Test-bed			
Mandatory		NRE Mandatory Use for new or renovated Public Buildings(21%('17)→30%('20))	
Infrastructure -building Program	Private & Public Sector	-	Certification, Standardization, and International Cooperation
			R&D(Policy and Regulation)

5. New Energy Industry

- Smart Solution to achieve NDC in New Climate Regime
- 4th Industrial Revolution in Energy sector: Promotion of EE & RE through new tech.



5-1. Integrated ESS Service

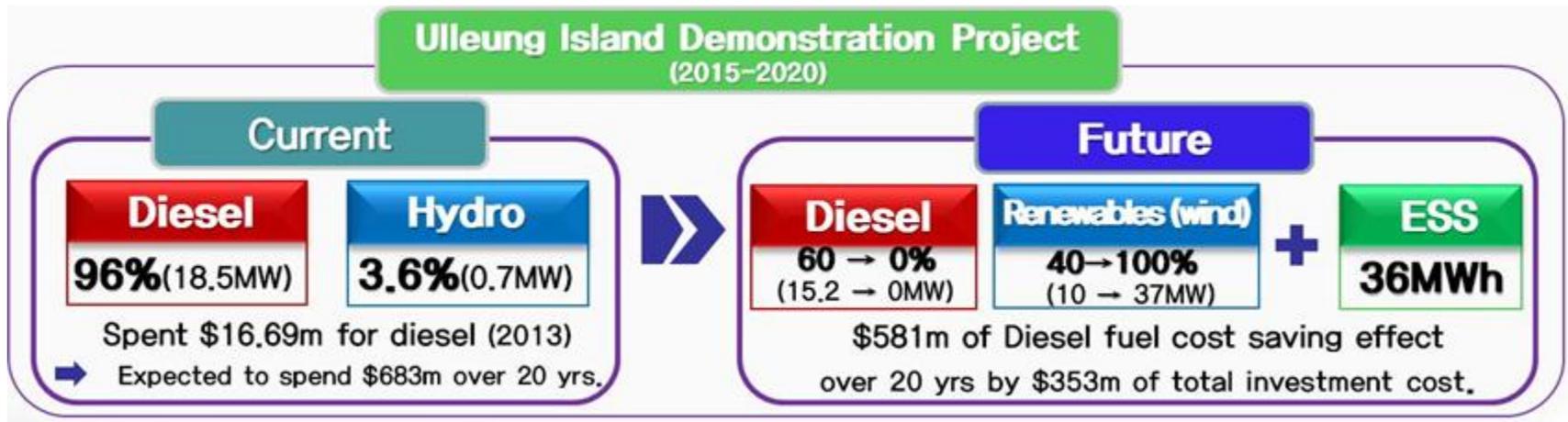
- Integrated ESS service providers provide a total package service to energy intensive consumers, ranging from ESS installation and financing to follow-up management.



- Special electricity rate system has been established to improve the profitability of Energy Storage Systems (ESS)
 - Wind + ESS system has been given higher REC multiplier to raise the profitability of the system
- * REC : Renewable Energy Certificate

5-2. Energy Independent Island

- Replace high-cost diesel generator system in remote off-grid islands with micro-grid system, a combination of renewables and ESS.



- Demonstration is going on in Ulleung Island. Planning to expand a micro-grid model to other off-grid islands in Korea

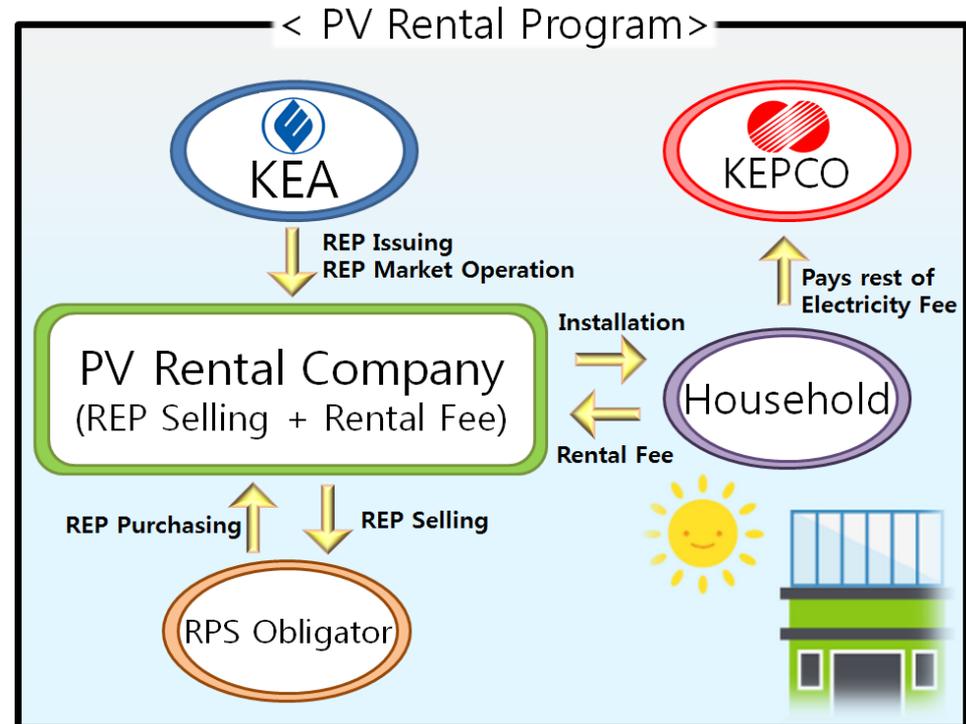
5-3. Solar PV rental

- PV rental companies install and rent PV systems to households and get paid back through rental fee and get additional revenue by selling REP

* REP : Renewable Energy Point

- Household owners pay cheaper power bill, less than 80% of average bill

Year	2013	2014	2015	2016
Number of Rental companies	3	4	6	8
Number of Households	60	2,006	8,796	10,362
Capacity (kW)	180	6,018	8,569	7,971
TARGET By 2030	0.4 mil. households			



5-4. EV

- **(EV subsidies) Central local government provide subsidies to EV purchasers**
 - **Ministry of Environment : USD14,000**
 - **Local government : USD 3,000 to 12,000**
- **(Charging Infrastructure) Effort is on-going to expand public EV charging stations and foster private EV charging stations**
- **(Public Procurement) Public agencies are required to equip 25% of their vehicle fleet with EV**

Thank you