

# Korean Green Growth Indicators 2013

## I . Korean Green Growth Indicators 2013

- ▶ 19 indicators including 'GHG absorption by forests', 'Share of new and renewable energy', 'New and renewable energy industries', 'Share of green R&D', 'Number of ISO14001-certified businesses', 'Urban green space per capita' and 'Municipal waste generation per capita' improved for the past five years.
- ▶ 4 indicators including 'Total GHG emissions' and 'Self-sufficiency rate of food' worsened.

### 1. Mitigation of Climate Change and Energy Independence

- Out of the total 9 indicators of 'Effective reduction of GHG emissions', 'Enhancing energy self-reliance for post petroleum paradigm' and 'Enhancing climate change responses', 5 indicators improved. 3 indicators worsened and 1 indicator remained the same.
- ▶ **(Improvement)**  
'GHG absorption by forests', 'Share of self-development of oil and gas', 'Share of new and renewable energy', 'Accuracy of rainfall forecast', 'Government budget dedicated to disaster prevention'
- ▶ **(Aggravation)**  
'Total GHG emissions', 'GHG emissions per unit of GDP', 'Self-sufficiency rate of food'

### 2. Creating New Engines for Economic Growth

- Out of the total 11 indicators of 'Planning green technology development for growth engine', 'Greening industries and fostering green industries', 'Enhancing industrial structures' and 'Forming foundation for green economy', 9 indicators improved. 1 indicator worsened. And 1 indicator remained the same.
- ▶ **(Improvement)**  
'Share of green R&D in government R&D expenditures', 'Share of GDP dedicated to total R&D expenditures', 'Number of international patent applications', 'Domestic material consumption per unit of GDP', 'Share of environmental industry sales', 'New and renewable energy industries', 'Share of knowledge-service in service industries', 'Share of total added value in information and communications industries', 'Number of ISO14001-certified businesses'
- ▶ **(Aggravation)**  
'Share of total added value in service industries'

### 3. Improvement in Quality of Life and Enhanced International Standing

- Out of the total 8 indicators of 'Creating green territory and transportation', 'Green revolution in life' and 'Becoming a role model nation of green growth', 5 indicators improved. And 3 indicators remained the same.
- ▶ **(Improvement)**
  - 'Urban green space per capita', 'Share of public passenger transportation', 'Municipal water user per capita', 'Municipal waste generation per capita', 'Share of ODA in GNI'

## II. Green Growth Indicators by Sector

### 1. Mitigation of Climate Change and Energy Independence

#### 1 Effective Reduction of GHG Emissions

The total GHG emissions and GHG absorption by forests showed a steadily upward trend.

- GHG emissions per unit of GDP showed little change for the past five years.
  - GHG emissions per unit of GDP recorded a downward trend until 2007, but showed an upward trend from 2008.
- The total GHG emissions marked a continuously increasing trend owing to economic growth. The total GHG emissions increased by 3.3 percent on average for the past five years.
  - In 2010, GHG emissions rose by 60 million metric tons to 670 million metric tons of CO<sub>2</sub> equivalent due to abnormal climate changes including heat waves and cold waves, and the rise in steel production.
- The GHG absorption by forests showed a steady increase due to the rise in forest stocks. The GHG absorption by forests increased by 4.1 percent on average for the past five years.
  - In 2010, the GHG absorption by forests amounted to 40 million metric tons of CO<sub>2</sub> equivalent, which occupied 5.9 percent of the total GHG emissions.

#### 2 Enhancing Energy Self-Reliance for Post Petroleum Paradigm

Energy consumption per unit of GDP decreased in 2012, showing an increasing trend overall. The share of self-development of oil and gas recorded a continuous increase. The share of new and renewable energy marked an ever-increasing trend.

- Energy consumption per unit of GDP showed an increase for the past five years.
  - In 2012, energy consumption per unit of GDP, which is an indicator of the efficiency of energy use, decreased to 0.251 TOE per million won compared to the previous year. In general, energy consumption per unit of GDP showed an upward trend from 2007.

\* Ton of Oil Equivalent

- Base effects coming from the rise in energy consumption due to abnormal climate changes in 2011 brought about the decrease in energy consumption in 2012.

- The share of self-development of oil and gas recorded a continuous increase.
  - The share of self-development of oil and gas, which is an indicator of energy independence, reached 13 percent in 2011 and 2012.
- The share of new and renewable energy marked an ever-increasing trend.
  - New and renewable energy occupied 3.17 percent of the total energy supply in 2012, up 0.8%p from 2007.
  - Wastes occupied 67.8 percent of the total new and renewable energy supply, which was followed by bio energy (15.1 percent) and hydropower (9.2 percent).

### **3 Enhancing Climate Change Responses**

The self-sufficiency rate of food lowered recently, but the accuracy of rainfall forecast improved.

- The self-sufficiency rate of food, which is an indicator of countermeasures against food crisis, dropped to under 50 percent.
  - The self-sufficiency rate of food stood at 45.3 percent in 2012. This figure remained the same as the previous year, but dropped by about 10%p from 2009 or 2010.
- The accuracy of mid-term rainfall forecast increased for the past two consecutive years.
  - The accuracy of mid-term rainfall forecast stood at 81.3 percent in 2012, up 0.9%p from 80.4 percent in 2009.
- The share of budget dedicated to disaster prevention in government expenditures stood at under 1.5 percent until 2009. However this share exceeded 2 percent in 2010 and 2011.

\* Accuracy of mid-term (+2 ~ +7 days) rainfall forecast

\* Budget of Ministry of Land, Infrastructure and Transport (management of water resources such as dam construction and river maintenance), Ministry of Agriculture, Food and Rural Affairs (maintenance of irrigation facilities and sea walls), Korea Forest Service (erosion control projects), Korea Meteorological Administration (expansion of meteorological facilities) and Ministry of Public Safety and Security (maintenance of disaster risk districts, maintenance of small streams, installation of rainwater retention facilities, etc.)

## **2. Creating New Engines for Economic Growth**

### **4 Planning Green Technology Development for Growth Engine**

The share of green R&D in government R&D increased compared to five years ago. The share of GDP dedicated to R&D expenditures and the number of international patent application showed a continuously increasing trend.

The share of green R&D\* in government R&D expenditures showed a slight decrease for the past two years.

The share of green R&D occupied 16.0 percent of the total government R&D expenditures in 2012, down 0.6%p from the previous year. However, this share was higher than that of 2007 or 2008.

\* R&D in the environment technology (ET) sector out of 6 new prospective future technologies

The share of GDP dedicated to R&D expenditures, which is an indicator of technology capability, showed a steady increase. The share of GDP dedicated to the total R&D expenditures went up by 0.2%p on average for the past five years.

The share of GDP dedicated to R&D expenditures stood at 4.4 percent in 2012, up 0.4%p from 2011.

The number of international patent applications, which measures technology innovation capability, showed an ever-increasing trend. The number of international patent applications rose by 10.3 percent on average for the past five years.

In 2012, the number of international patent applications filed under the PCT was 0.24 per 1,000 population, up 0.09 from 2007.

\* Patent Cooperation Treaty: The PCT provides a procedure for filing patent applications to protect inventions in each of its contracting states. A patent application filed under the PCT is called an international application, or PCT application.

## **5 Greening Industries and Fostering Green Industries**

Domestic material consumption per unit of GDP showed a decreasing trend. The sales of new and renewable energy industries continued an upward trend.

Domestic material consumption per unit of GDP showed an improving trend. Domestic material consumption per unit of GDP fell by 1.9 percent on average for the past five years.

In 2011, domestic material consumption per unit of GDP recorded 0.625kg per thousand won. This figure declined by 0.035kg per thousand won from 2007.

\* The amount of materials (fossil fuels, industrial minerals, construction minerals, biomass, etc.) directly consumed by the economy

The share of environmental industry sales increased steadily, which exceeded 1 percent in 2010.

The share of environmental industry sales stood at 0.93 percent from 2011, which marked a slight decrease compared to 2010.

\* Consisting of equipment raw material production industry, facilities construction and environmental services that directly reduce pollutant emission (air pollution, waste water, waste, noise, vibration, etc.)

- The sales of new and renewable energy industries continued an upward trend. The sales of new and renewable energy industries rose by 68.5 percent on average for the past five years.
- The sales of new and renewable energy industries amounted to 9,854 billion won in 2011, up 22 percent from 2010.
- \* Only including 'Manufacturing' industries in the sectors of solar photovoltaic, wind power, bio, solar heat, geothermal heat and fuel cells

## **6 Forming Industrial Structures**

The share of service industries in the total industries dropped. However, the share of knowledge-service and information and communication industries showed an increasing trend.

- The share of the total added value in service industries marked less than 60 percent after the financial crisis.
- The share of the total added value in service industries in 2012 remained the same level as 2010 and 2011.
- The share of knowledge-service in service industries recorded 48 percent. This share grew by 0.2%p on average for the past five years.
- The share of knowledge-service in service industries stood at 48.3 percent in 2012, up 0.9%p from 2007.
- \* Including 'Financial activities', 'Information and communications', 'Business activities', 'Education', 'Human health and social work activities' and 'Culture and recreation'
- The share of the total added value in information and communication industries showed an ever-increasing trend. The share of the total added value in information and communication industries grew by 0.3%p on average for the past five years.
- The share of the total added value in information and communication industries stood at 11.8 percent in 2012. This share went up by 0.2%p from 2011 and by 1.4%p from 2007.
- \* Consisting of services and manufacturing of information and communications

## **7 Forming Foundation for Green Economy**

The number of ISO14001-certified businesses per 1,000 population showed a steady increase.

- The number of ISO14001-certified businesses, which is a measure of recognition and implementation of green growth by businesses, continued an upward trend.
- The number of ISO14001-certified businesses was 7,293 in 2012, which increased by 5.1 percent from 2011.
- The share of environmental taxes in overall revenues showed a fluctuating trend due to financial crisis and rising oil prices.

- \* Environmental purpose taxes consist of national taxes such as transportation energy tax and consumption tax for passenger cars and petroleum, and local taxes such as vehicle tax and driving tax

### 3. Improvement in Quality of Life and Enhanced International Standing

#### 8 Creating Green Territory and Transportation

Urban green space per capita recorded a steady increase. The share of public passenger transportation showed an upward trend recently.

- Urban green space per capita showed a steadily increasing trend.
  - In 2011, urban green space per capita recorded 7.95m<sup>2</sup>, which rose by 0.95m<sup>2</sup> (13.6%) from 2007.
    - \* Urban green space per capita to which citizens have easy access and may utilize freely
- The share of public passenger transportation recorded a decrease in 2007 and 2008. Afterwards, it showed a continuously increasing trend.
  - The share of public passenger transportation marked 25.9 percent in 2011, up 1.5%p from 2007.
- The share of GDP dedicated to environmental protection expenditures showed an increase until 2009, but recorded a decrease afterwards.
  - As for the share of expenditures by sector, waste water-related expenditures occupied the highest share of 36.5 percent, which was followed by waste-related expenditures (26.4 percent) and air-related expenditures (17.6 percent).

#### 9 Green Revolution in Life

Household energy consumption per capita and municipal waste generation per capita showed a decreasing trend for the past five years.

- Household energy consumption per capita showed a decrease until 2009, but marked an increasing trend afterwards.
  - Household energy consumption per capita totaled 0.434 TOE in 2011. This figure rose by 1.2 percent from 2010 and remained the same as 2007.
- Municipal water use a day per capita showed a remarkable decrease until 2009. Afterwards this figure showed a slight increase.
  - Municipal water use a day per capita showed a slight increase (2 ~ 3L) compared to 2009 and 2010, but declined by 5L from 340L in 2007.
    - \* Water use per day from houses or workplaces
- Municipal waste generation per capita showed a decreasing trend from 2009.
  - Municipal waste generation per capita marked 0.95kg in 2011, down 1 percent from 2010. This figure recorded a decrease for the past three years.

## 10 Becoming a Role Model Nation of Green Growth

The share of ODA in GNI continued an upward trend. The share of green ODA in ODA stood at 20 percent or so.

- The share of ODA in GNI showed an ever-increasing trend.
  - In 2012, ODA amounted to 1,550 million dollars, up 17.1 percent from 2011. The share of ODA in GNI stood at 0.14 percent in 2012, up 0.02%p from 2011.
- The share of green ODA in ODA recoded 21 ~ 22 percent for the past three years (2009 ~ 2011).
  - In 2011, green ODA amounted to 210 million dollars.
  - ODA related to drinking water supply and hygiene amounted to 70 million dollars, which occupied 34.6 percent of the total green ODA. ODA related to energy production and supply amounted to 60 million dollars, which occupied 26.8 percent of the total green ODA.

## 4. International comparison of green growth indicators of OECD nations

Compared recent data of 6 major indicators that are collected from 「OECD Green Growth Indicators」 (<http://stats.oecd.org>)

\* OECD Green Growth Indicators are produced according to the OECD standards. Therefore, there might be inconsistencies between OECD and domestic data.

- The CO2 emissions per capita of Korea marked 11.4 tonnes in 2010. This figure was higher than the OECD average (10.1 tonnes).
  - The CO2 emissions per capita of Korea were lower than those of the United States, Australia and Canada. Whereas, they were higher than those of Germany, Japan and the United Kingdom.

### 【 CO2 Emissions Per Capita by OECD Countries, 2010 】

(Unit: Tonnes/Person)

OECD average	Luxembourg	United States	Australia	Canada	Korea	Germany	Japan	United Kingdom	New Zealand	Italy
10.1	21.1	17.4	17.2	15.7	11.4	9.3	8.9	7.9	7.1	6.6

- In 2011, the energy productivity of Korea recorded 5.3US\$/ktoe, which was lower than the OECD average (7.1US\$/ktoe).
  - The energy productivity of Korea was higher than that of Canada. In the meantime, it was lower compared to Germany, Australia and the United States.

### 【 Energy Productivity by OECD Countries, 2011 】

(Unit: US\$/ktoe)

OECD average	Ireland	Spain	Germany	Chile	Australia	Belgium	United States	Korea	Canada
7.1	12.0	9.9	9.2	8.0	6.7	6.5	6.0	5.3	4.8

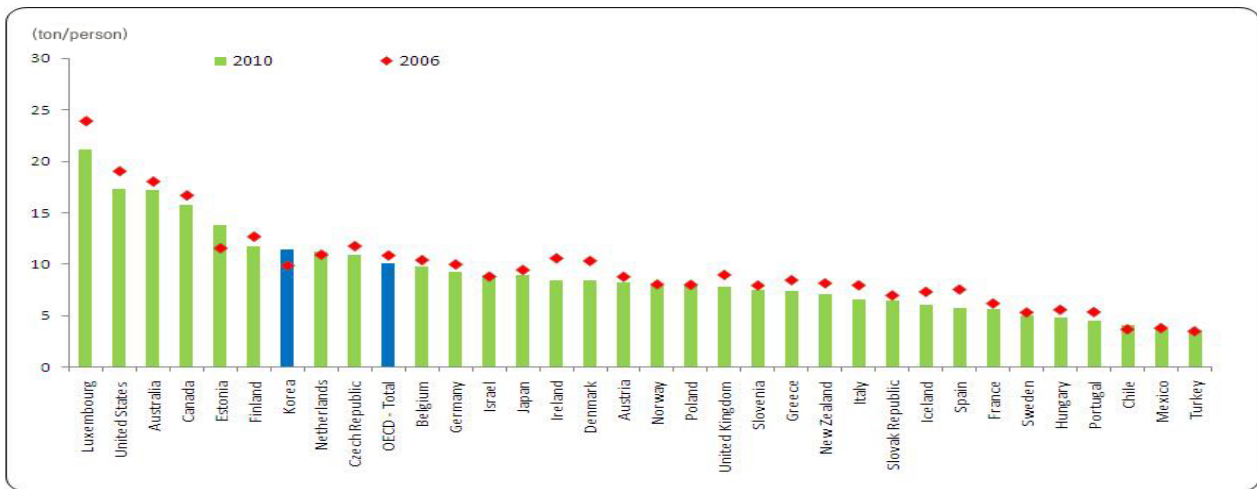
- In 2011, the share of renewable energy was much lower than OECD countries.
- The share of renewable energy of Norway, Denmark, etc. was relatively high. The share of renewable energy of Korea recorded the lowest figure among 33 OECD nations.

【 Share of Renewable Energy in the Total Supply of Primary Energy by OECD Countries, 2011 】

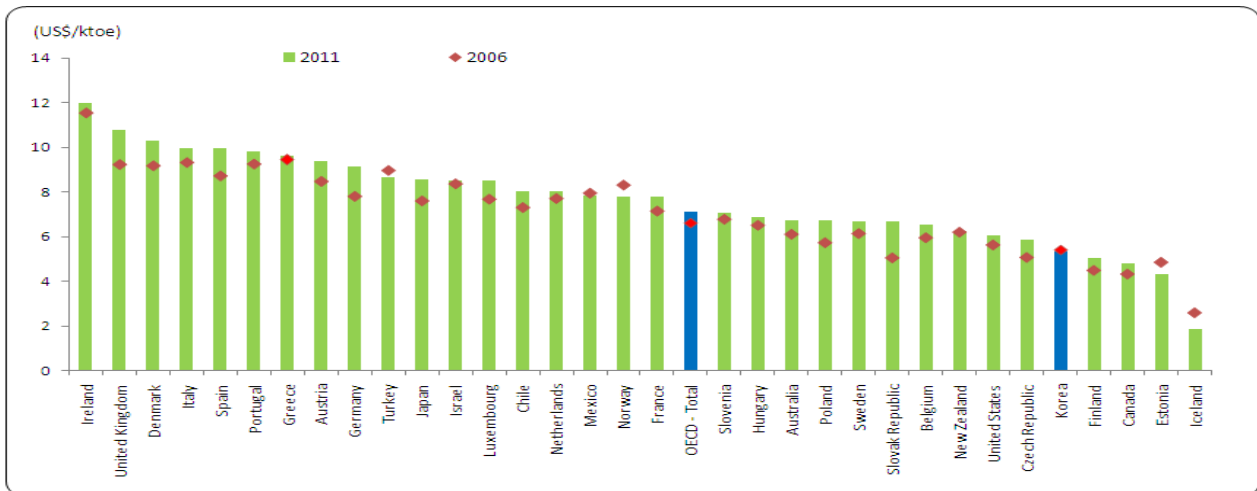
(Unit: %)

OECD average	Iceland	Norway	Denmark	Chile	Germany	France	Australia	United States	Japan	Korea
8.2	84.4	40.1	23.4	21.4	11.3	7.3	6.1	6.1	3.4	0.7

【 CO2 Emissions Per Capita by OECD Countries 】

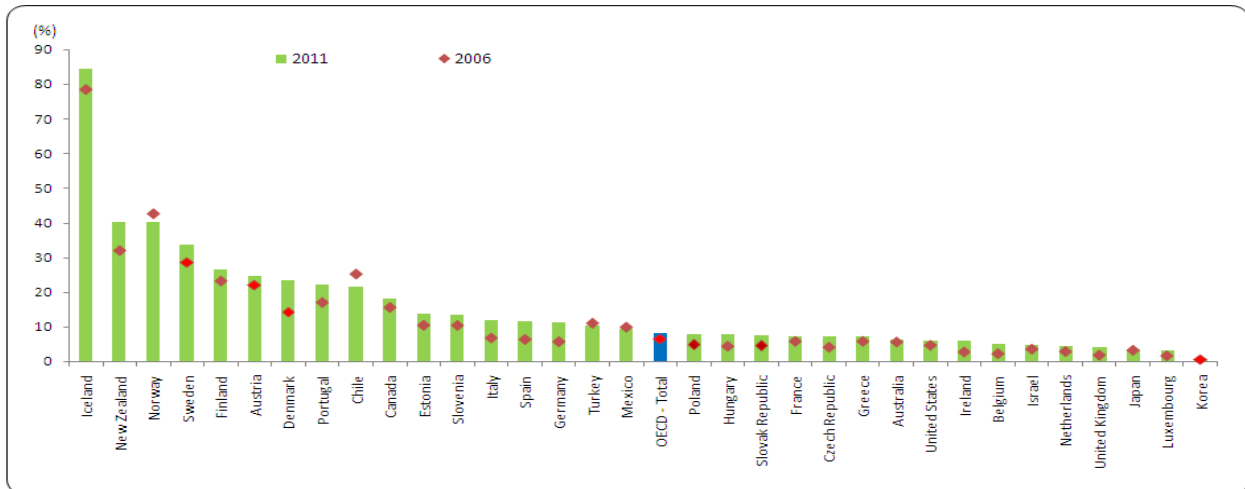


【 Energy Productivity by OECD Countries 】





**【 Share of Renewable Energy in the Total Supply of Primary Energy by OECD Countries 】**



\* Data might be different from each nation's domestic data because these figures are based on IEA standards.

- In 2011, the share of forests in the total land area of Korea was relatively high among OECD countries.
- The share of forests of Finland recorded the highest figure (72.9 percent). Whereas, the share of forests of the United Kingdom was relatively low at 11.9 percent.

**【 Share of forests in the total land area by OECD Countries, 2011 】**

(Unit: %)

OECD average	Finland	Japan	Korea	Spain	Canada	United States	Germany	France	Belgium	United Kingdom
30.6	72.9	68.6	64.0	36.8	34.1	33.3	31.8	29.2	22.4	11.9

- In 2011, public spending in environmentally related R&D of Korea stood at 2.2 percent, which remained at an intermediate level among OECD countries.
- Public spending in environmentally related R&D of Estonia recorded the highest figure (6.7 percent). While, public spending in environmentally related R&D of France recorded a relatively low figure (1.5 percent).

**【 Public spending in environmentally related R&D by OECD Countries, 2011 】**

(Unit: %)

Estonia	Australia	United Kingdom	Germany	Belgium	Korea	Hungary	Sweden	France
6.7	4.9	3.1	2.7	2.4	2.2	2.0	1.9	1.5

- In 2011, the share of environmental ODA in the total ODA recorded a lower level compared to other OECD countries.
- The share of environmental ODA of Finland recorded the highest figure (96.8 percent). The share of environmental ODA of Korea stood at 9.2 percent, which was lower than the OECD average (41.4 percent).

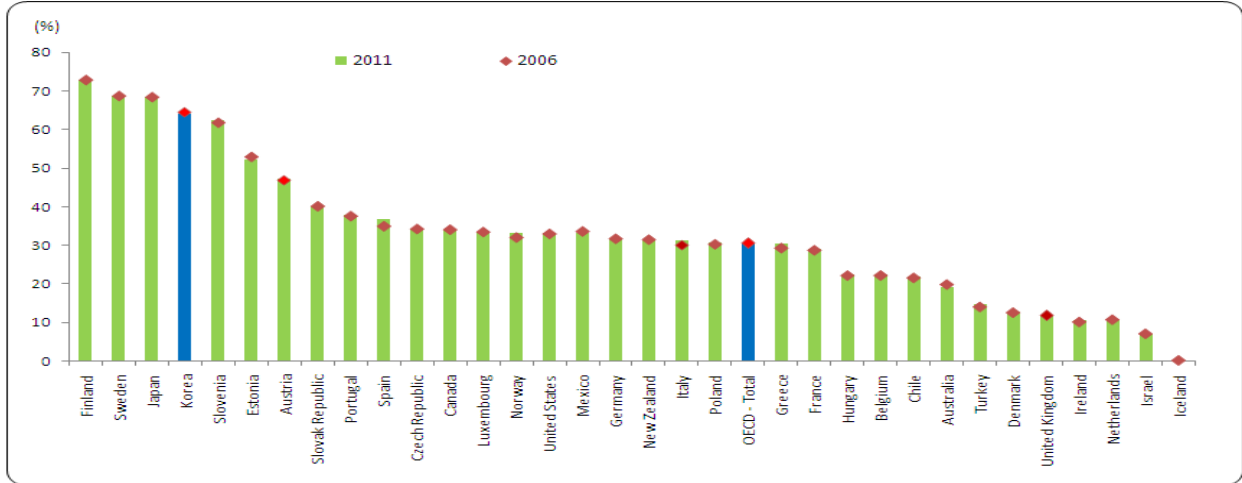
【 Share of Environmental ODA\* in total ODA by OECD Countries, 2011 】

(Unit: %)

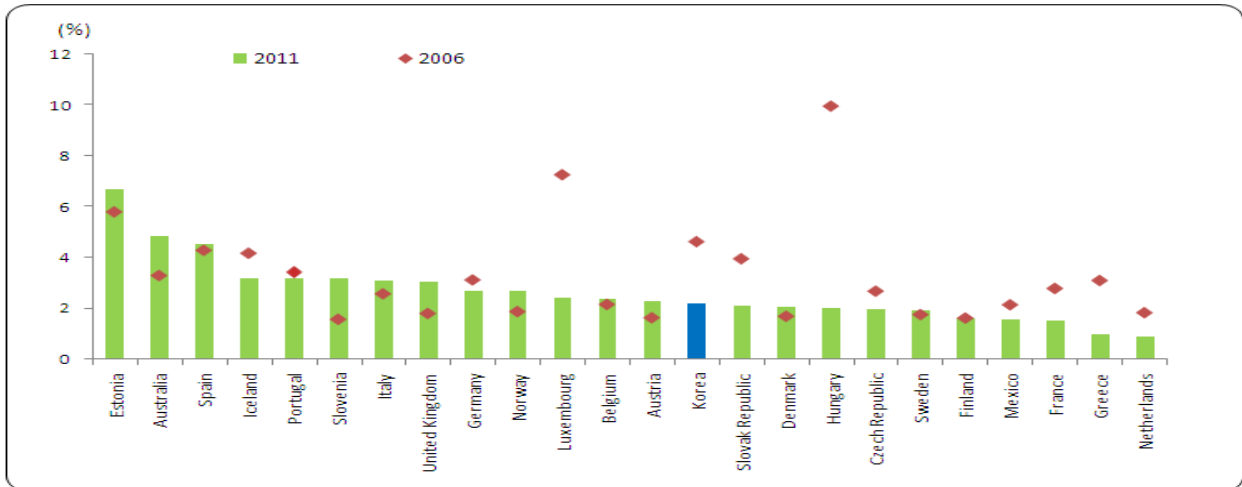
OECD average	Finland	Japan	Switzerland	Australia	France	United Kingdom	Canada	Korea	United States
41.4	96.8	58.8	45.8	41.3	35.3	25.3	22.8	9.2	7.9

\* Including biodiversity, climate change, desertification and environment

【 Share of forests in the total land area by OECD Countries 】



【 Public spending in environmentally related R&D by OECD Countries 】



【 Share of Environmental ODA\* in total ODA by OECD Countries 】

