Direction of Future Energy System of Korea under New Climate Regime

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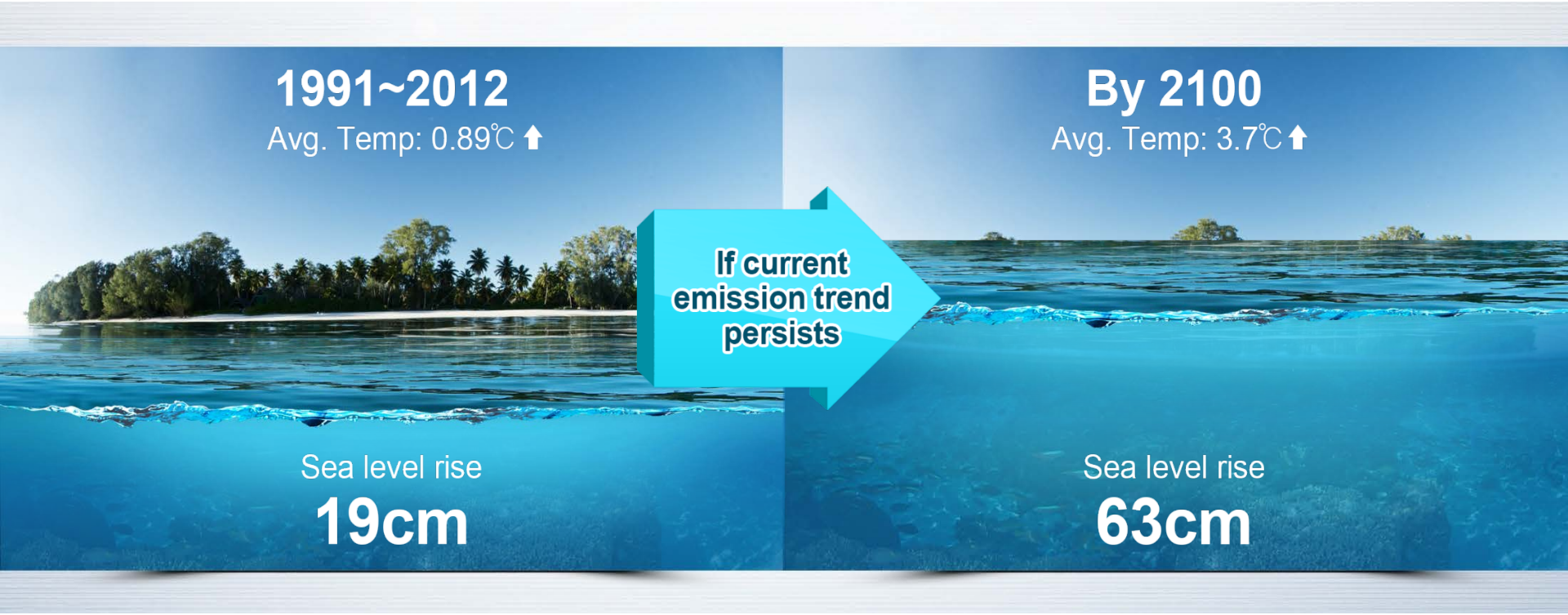
The Impacts of Climate Change

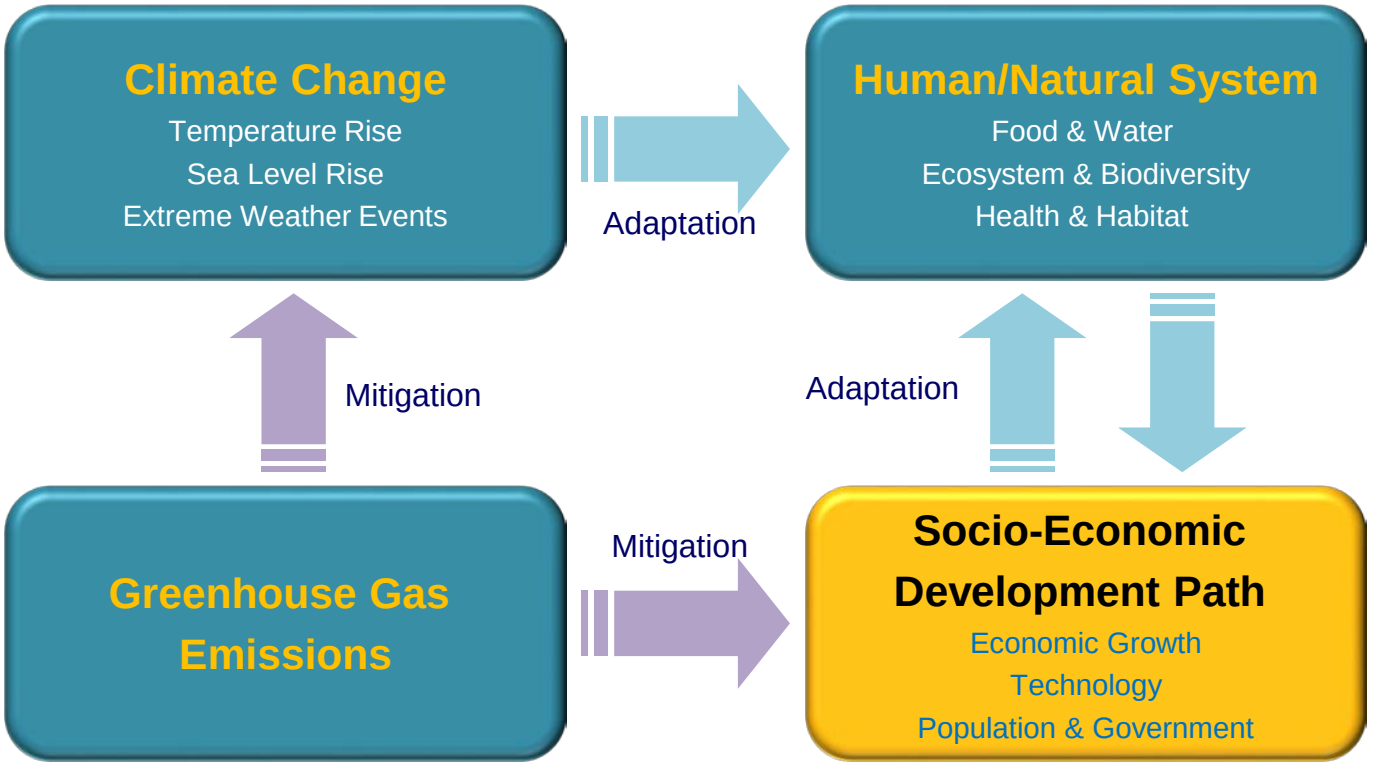
Climate change is real and the impacts of climate change are largely driven by **human-caused GHG emissions**. (IPCC AR5)



The most abundant GHG, **carbon dioxide** (CO_2), is the product of **burning fossil fuels**.

Climate Change & Sustainable Development

Climate change is an issue that all Parties have to solve for their **sustainable development.**

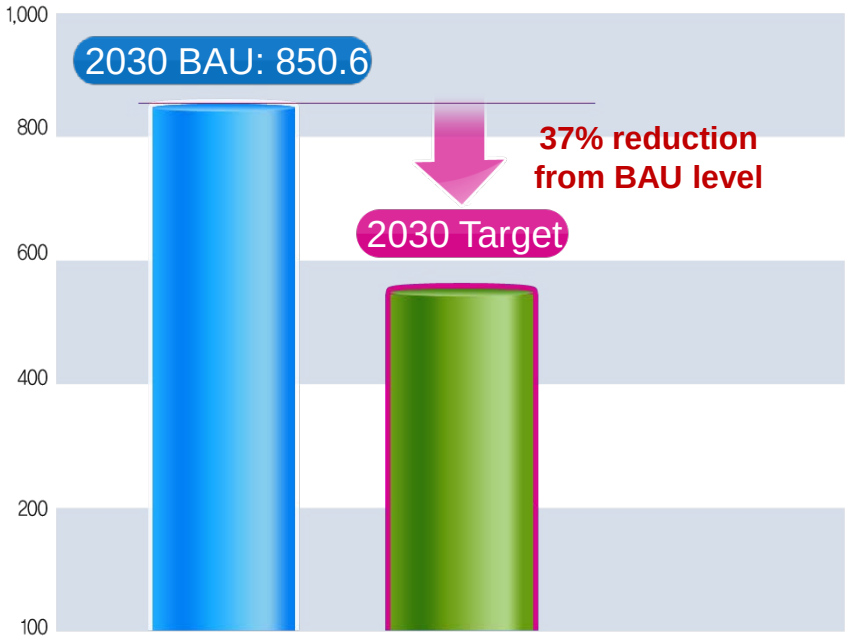


New Climate Change Regime

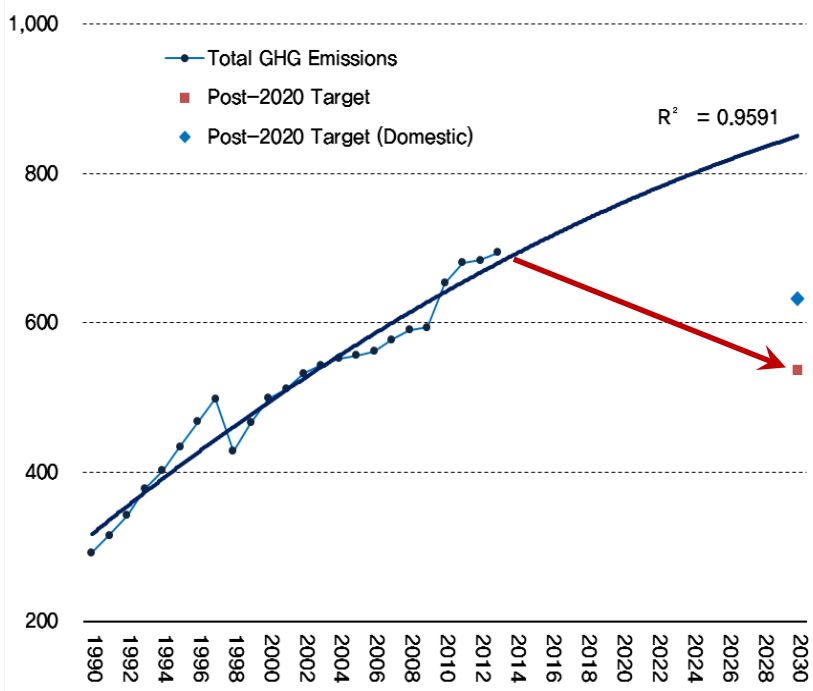
- **Paris Agreement** : a new course in the global climate effort
- **Bottom-up approach**: each Party decides its contribution
  - **All Parties** to report regularly on their emissions and on their implementation efforts
- **All Parties** to put forward their best efforts through NDCs
  - To accelerate and intensify the actions and investments needed for **a sustainable low carbon future**
- All Parties to launch **national strategies and measures** for reducing GHGs
  - Development of **low-carbon & high-efficiency** future energy system

Korea's Post-2020 Target

Korea submitted **ambitious** GHG emission reduction target for Post-2020.



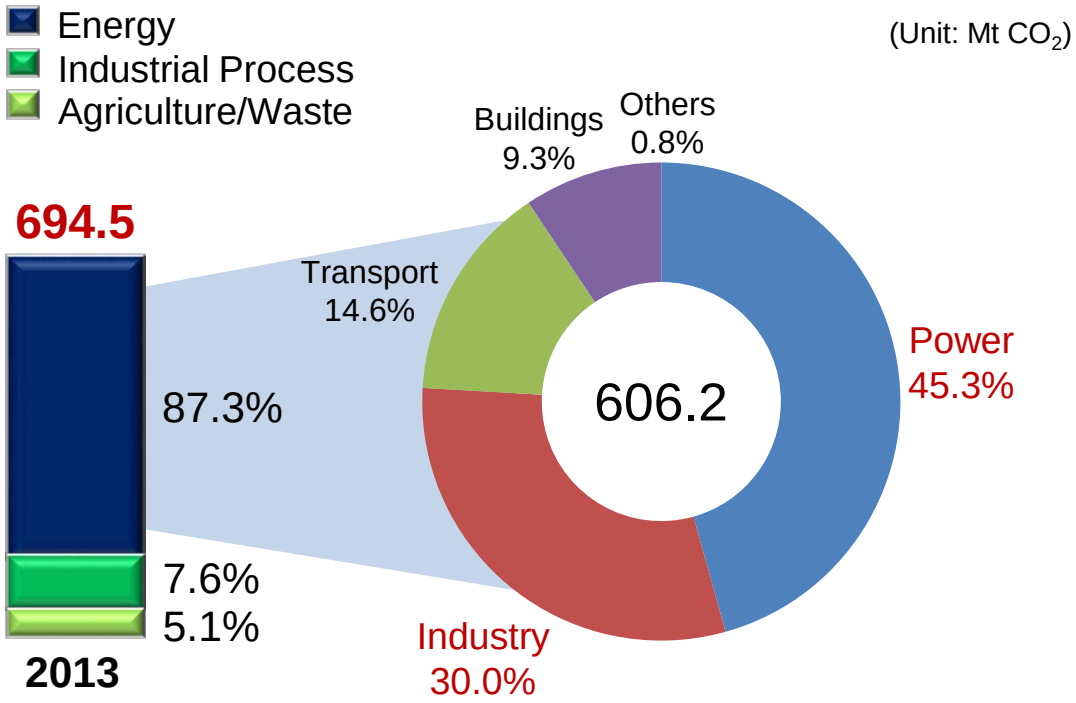
※ Domestic Reduction(25.7%) + International Market Mechanism(11.3%)
※ Industrial Sector : No more than 12% from its BAU level



Korea should **switch** its GHG emissions **to decline in the very near future** to achieve the post-2020 target.

Korea's GHG Emissions(2013)

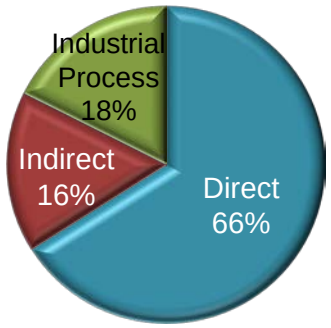
Fossil fuel combustion including fugitive emissions accounts for about 87% of Korea's total GHG emissions, where **industrial** and **power generation** sector accounts for about 75%. (2013)



Industrial and **power generation** sectors will **play a key role** achieving Korea's **Post-2020 target**.

GHG Emissions from Industrial & Power Sectors

1990



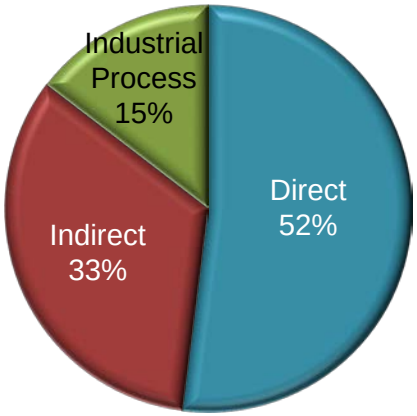
115.9 $MtCO_2eq.$
(39.4%)

Industry

Total 4.9% p.a.

Direct : 3.8% p.a.
Indirect : 8.2% p.a.
Ind. Process : 4.1% p.a.

2013

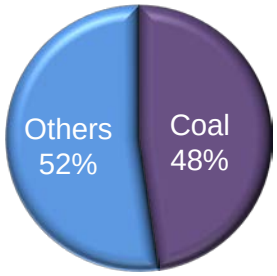


350.0 $MtCO_2eq.$
(50.4%)

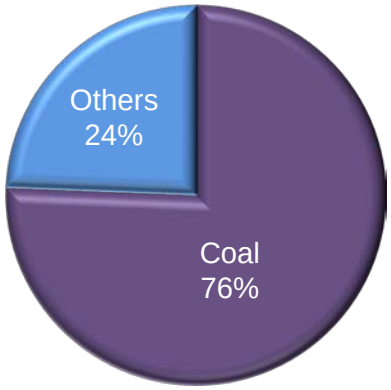
Power Generation

Total 8.8% p.a.

Coal : 11.0% p.a.
Others : 5.2% p.a.



36.0 $MtCO_2eq.$
(12.3%)

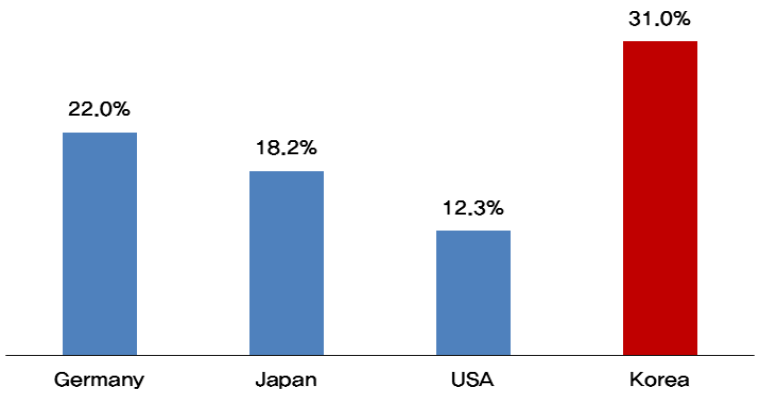


249.3 $MtCO_2eq.$
(35.9%)

Energy Efficiency of Industrial Sector

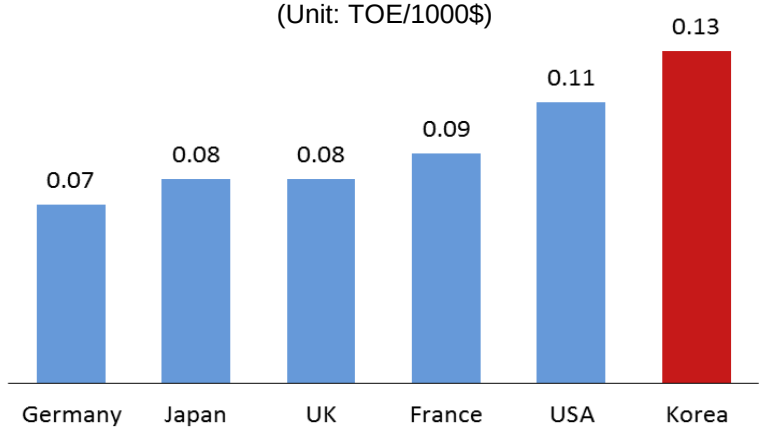
Korea's **industrial sector** is **vulnerable** to further reduction of GHG emissions.

<Share of Manufacturing Sector in Total Value-Added>



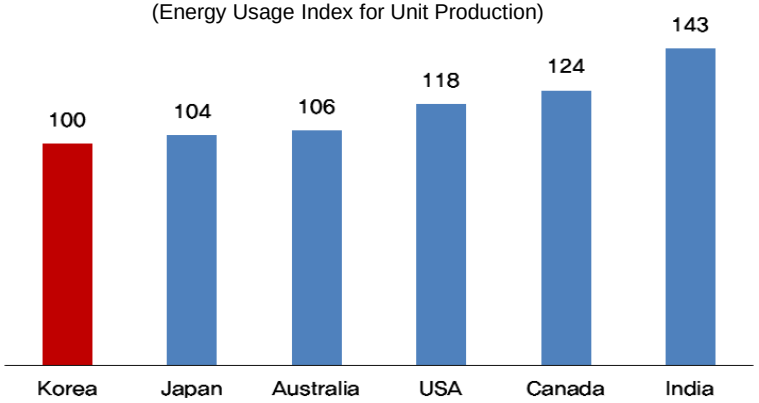
<Energy Intensity of Industrial Sector, 2012>

(Unit: TOE/1000$)



<Energy Efficiency of Steel Industry by Country>

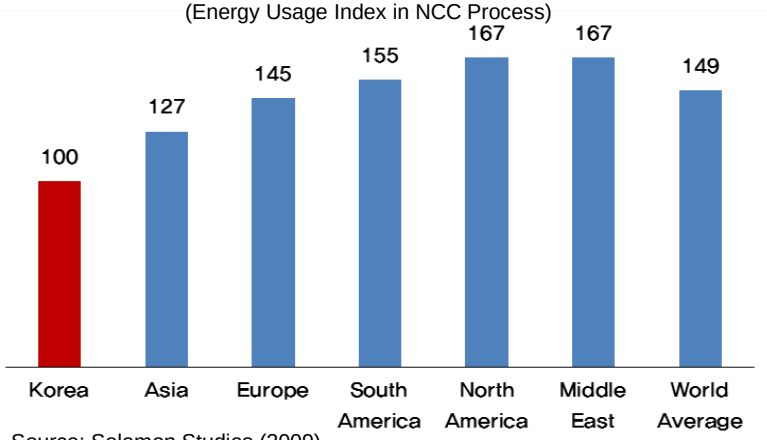
(Energy Usage Index for Unit Production)



Source: APP Steel T/F (2010)

<Energy Efficiency of Petrochemical Industry by Region>

(Energy Usage Index in NCC Process)



Source: Solomon Studies (2009)

Circumstance of Industrial Sector

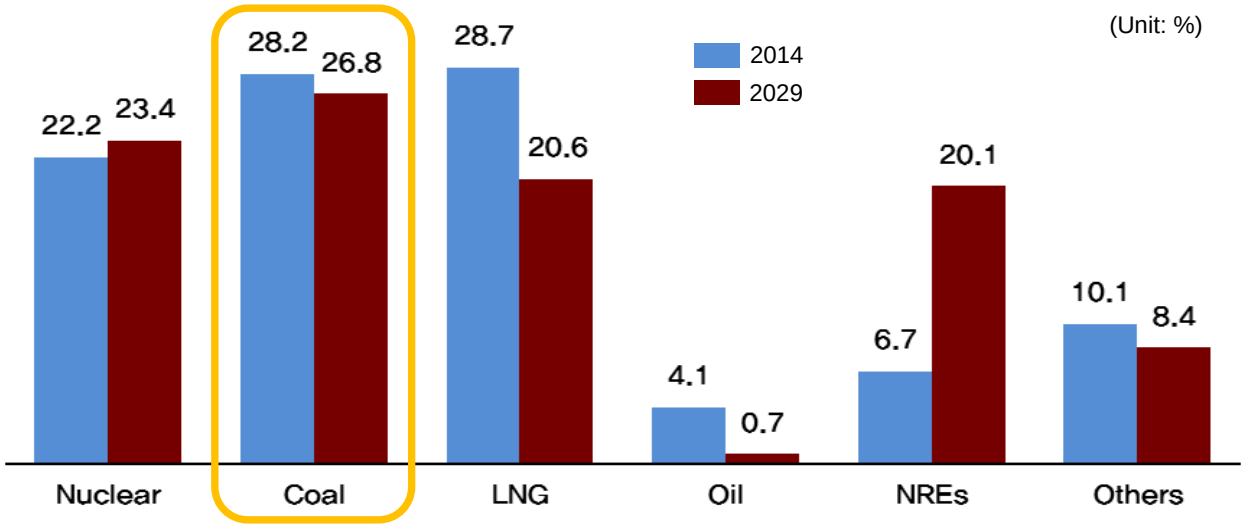
"Significant abatement and reduction in emissions intensity will be required to 2030, if it (South Korea) wishes to hit the target. This will, however, likely prove difficult, as there are ***few cheap abatement options*** *in the South Korean economy.* ***The efficiency of its industrial sectors are among the best in the OECD****."*

Source **: Bloomberg New Energy Finance**, HOW AMBITIOUS ARE THE POST-2020 TARGETS? Assessing the INDCs: Comparing Apples with Oranges, 2015.10

Circumstance of Power Sector

According the 7th Basic Plan for Long-term Electricity Supply and Demand, the **share of coal** is expected to be still much **higher** than others.

<Share of Electricity Generation Sources>



Source: The 7th Basic Plan for Long-term Electricity Supply and Demand (2015)

Including lower coal share, it should strengthen options and policies to reduce GHG emissions from power sector, especially **coal power generation**.

Actions after Paris Agreement

Re-organization of Climate Change Governance

- **Prime Minister's Office** assumes the role of climate change **control tower**.
- The **sectoral ministries** take charge of sectoral policies and measures.
- **The Ministry of Strategy and Finance** oversees the **domestic emission trading scheme**.

Roadmap for Low-carbon and High-efficiency Energy System

- The **sectoral ministries** are developing **options and strategies** focusing on new **market and technology**.
- **The Ministry of Trade, Industry and Energy** supported by KEEI's experts is working on GHG emission reduction paths of **industrial sector** as well as **power generation sector**.

Technical and Policy Options

Technology	Iron & Steel	Fuel switch (heavy oil → LNG), Heat recovery, Efficiency improvement of power using equipment, etc.
	Petrochemical	High-efficiency energy equipment, Optimization of power usage, Heat recovery (steam production, LNG demand reduction), etc.
	Cement	Increase of share of cement binder, Fuel switch (coal → waste plastic), Increase of slag cement production, etc.
	Power Generation	Efficiency improvement of power generation facilities, Decrease of transmission loss, Efficiency improvement of coal-fired power plant, etc.
Policy	Industry	Management of emission intensity, Expansion of SME support, Deployment of FEMS and high-efficiency energy equipment, etc.
	Power Generation	Deployment of NREs, Lowering share of coal power generation, Strengthening power demand management through price system and other options, etc.

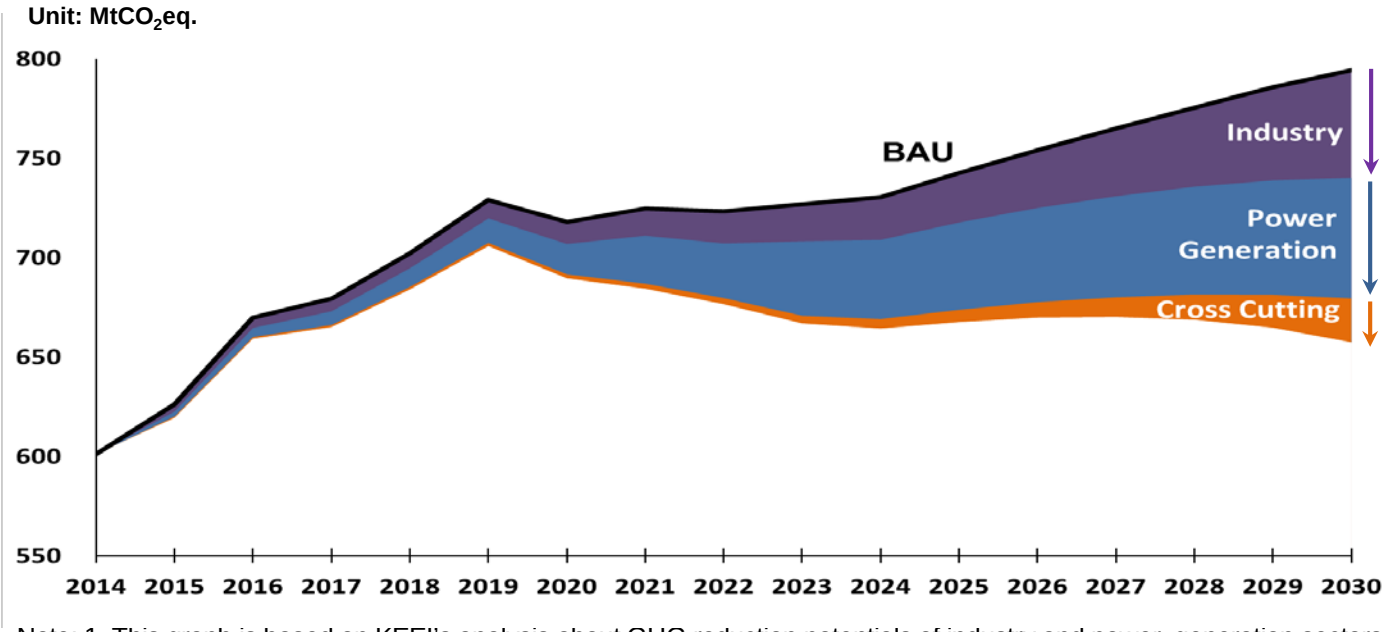
Industrial GHG Reduction Target

GHG emission reduction target of each industrial sector is analyzed and set by utilizing **both top-down(government)** and **bottom-up(industry)** approaches.

Group 1	- Large GHG reduction potentials in the industrial process - International standards for environmentally-friendly process has been strengthened
Group 2	- Consideration on the cycle of process equipment replacement - A high potential to reduce GHG emission through energy efficiency improvement
Group 3	- Insignificant GHG reduction potentials because of high energy efficiency at the international level - Contribution to low-carbon industrial structure through continuous efforts to improve energy efficiency
Group 4	- Long-term decrease or stagnation of production and GHG emissions - Low GHG emission reduction potentials

Roadmap and Strategy to 2030

Prime Minister's Office will compile the outcomes of the sectoral ministries' work and develop **the roadmap and strategy at national level**.

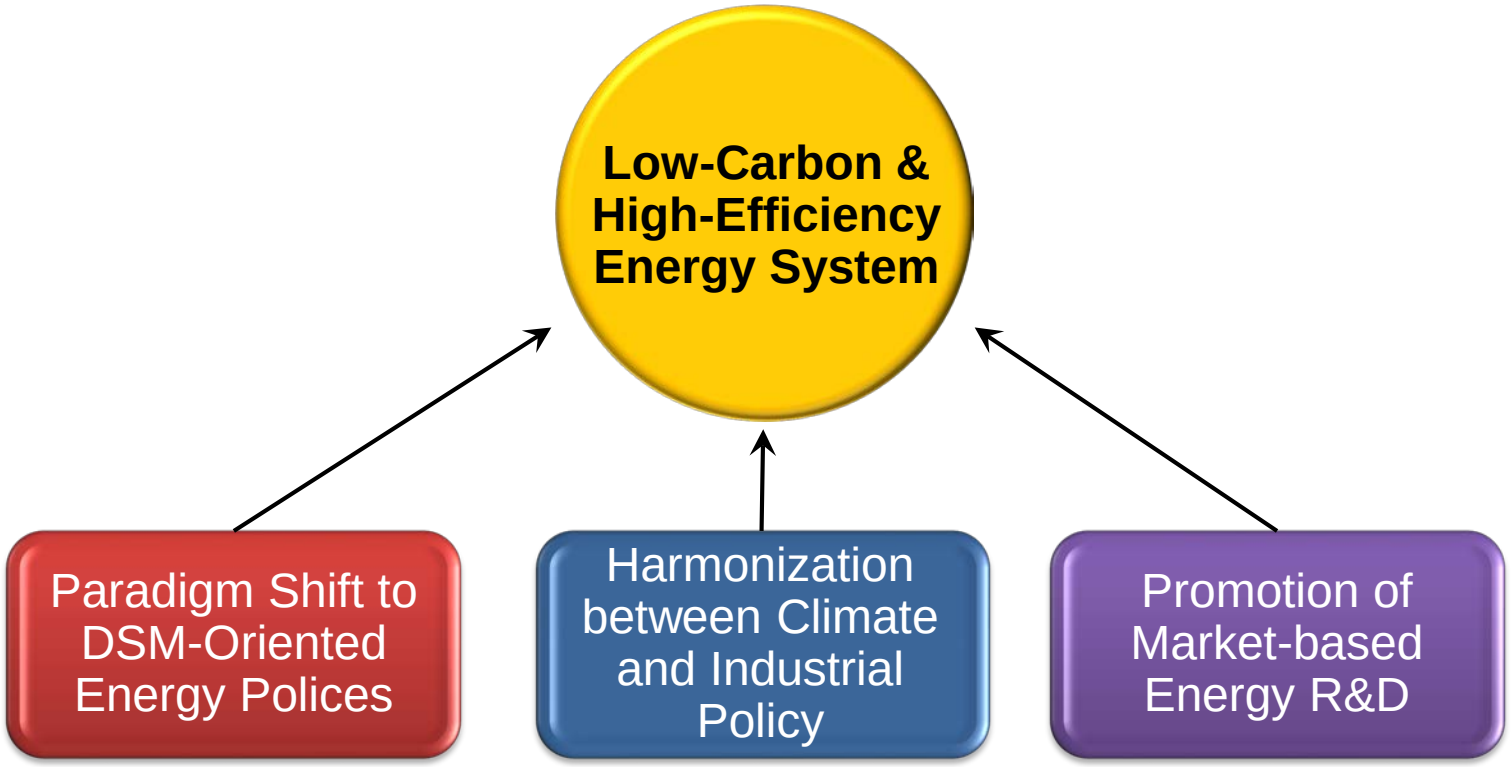


Note: 1. This graph is based on KEEI's analysis about GHG reduction potentials of industry and power generation sectors.
2. Cross Cutting includes GHG reduction potentials through energy-related new industry and other options that are not classified to specific sector.

The final outcome of **roadmap and strategy at national level** is expected to be formalized in near future after in-depth review and expert consultation.

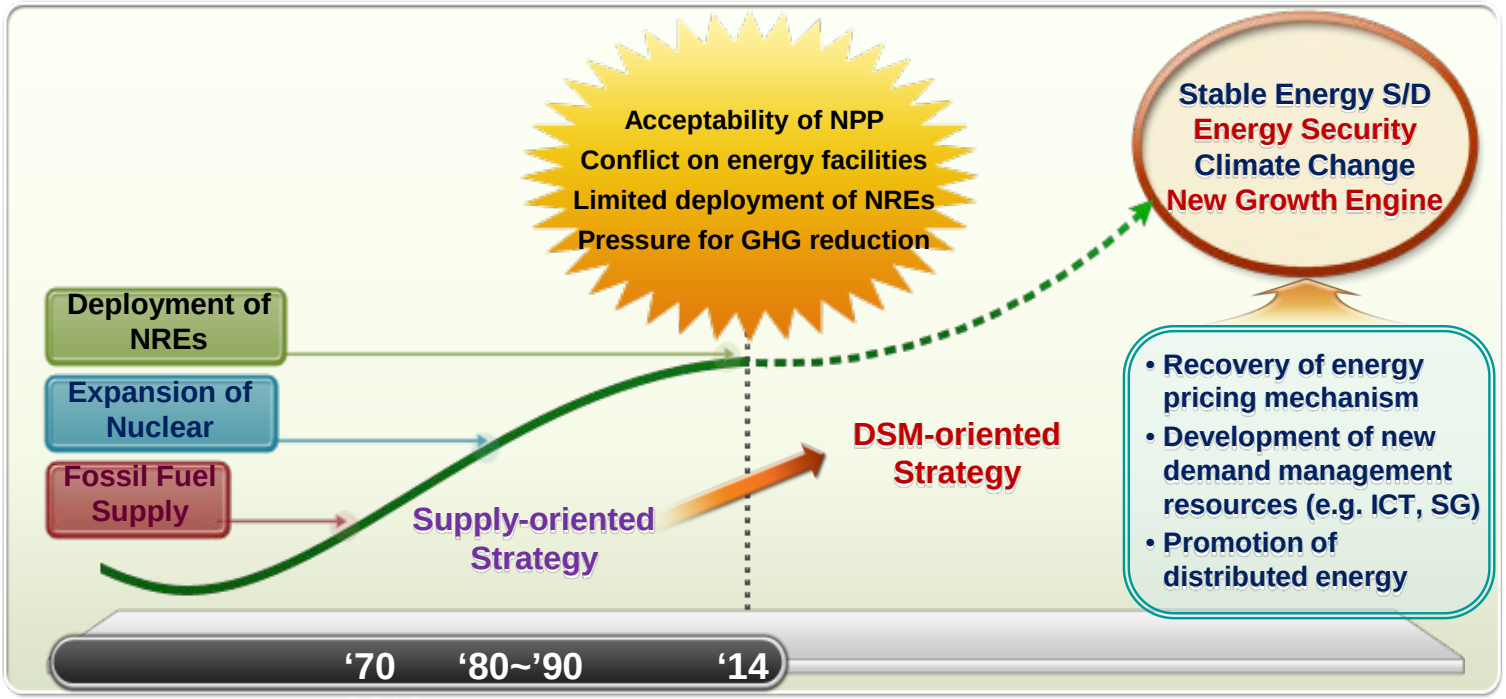
Policy Issues towards 2030

Energy and climate change policy Issues for future development of **low-carbon and high-efficiency energy system** of Korea include:



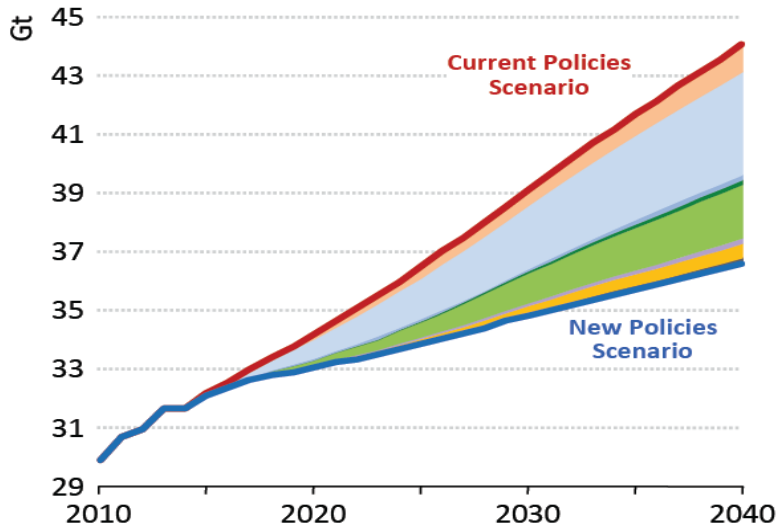
Paradigm Shift to DSM-oriented Energy Policy

The **conventional fossil-fuel based & supply-oriented energy system** is **NOT sustainable** under the new climate regime.



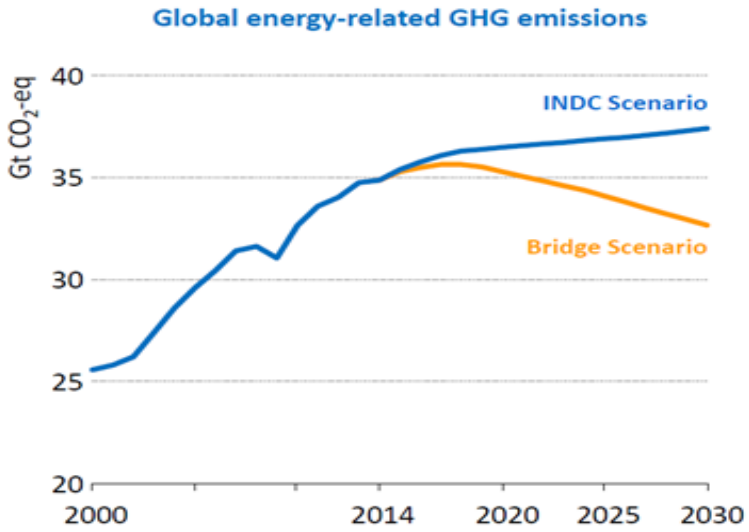
The **DSM-oriented energy policy** will contribute to (1) stable & efficient energy supply and demand system, (2) strengthening energy security, (3) **GHG emission reduction** and (4) development of **new growth engine** of Korea.

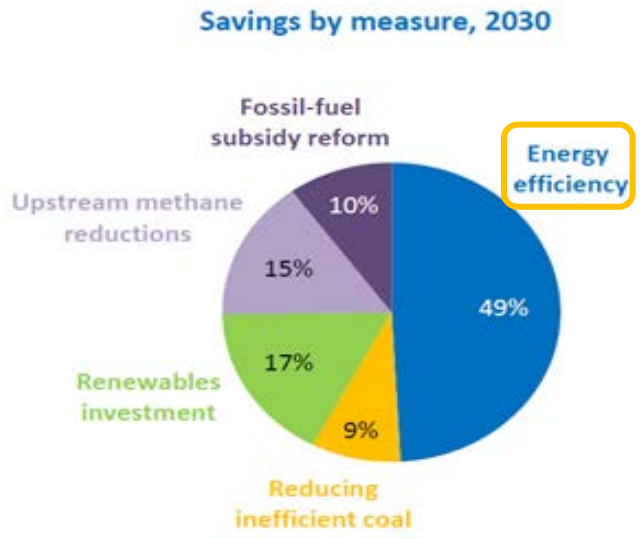
Potentials of Efficiency Improvement



CO_2 abatement	2025	2040
Energy service demand	16%	12%
End-use efficiency	53%	48%
Supply efficiency	3%	3%
Fuel and technology switching in end-uses	2%	2%
Renewables	19%	24%
Biofuels	2%	2%
Nuclear	4%	7%
CCS	1%	2%
Total (Gt CO_2)	**2.6**	**7.5**

Source: IEA(2015), World Energy Outlook 2015





Source: IEA(2015), Energy and Climate Change, World Energy Outlook Special Report

Climate Policy + Industrial Policy

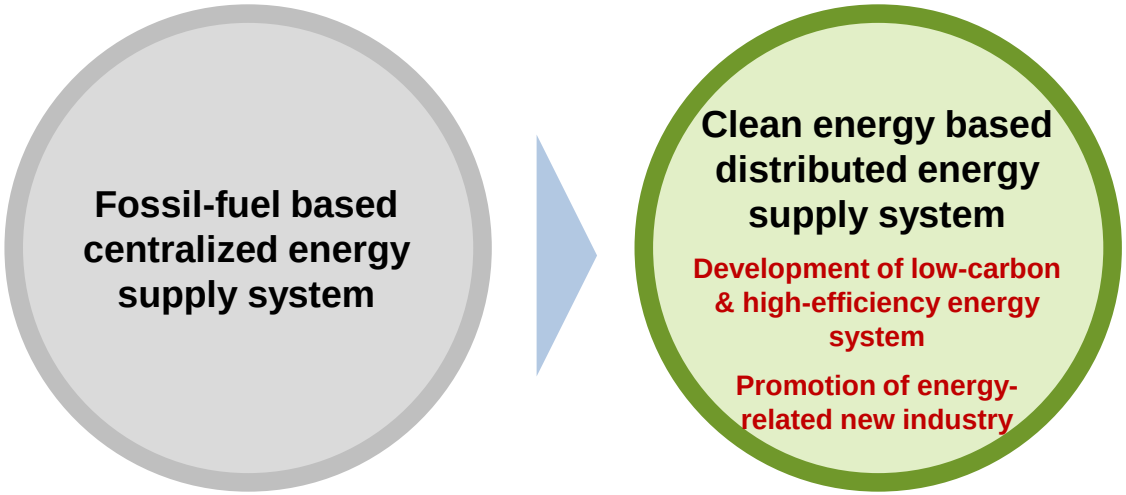
The **current climate change policies** heavily centered on **regulations** don't provide the right signals for **the improvement of Korea's economic fundamentals**.

The promotion of an **integrated climate policy and industrial policy** will lead to **low-carbon innovation** in the manufacturing industry, especially conventional key industries and energy intensive industries.

Introduction of **Incentive Scheme for GHG Emission Intensity Management** of Industrial and Power Generation Sectors

Promotion of Market-based Energy R&D

The **energy R&D** focused on **unit technology improvement** does not reflect the needs of the recent **dynamic energy market**.



Expansion of the **market-based energy R&D** for improvement of the success rate of **commercialization of the unit technology energy R&D,** at the point of **climate change response and industrial competitiveness**

Two-Trach Approach of the **unit technology** and the **market-based** energy R&Ds

감사합니다

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