South Korea's 2050 Challenge for Climate Change

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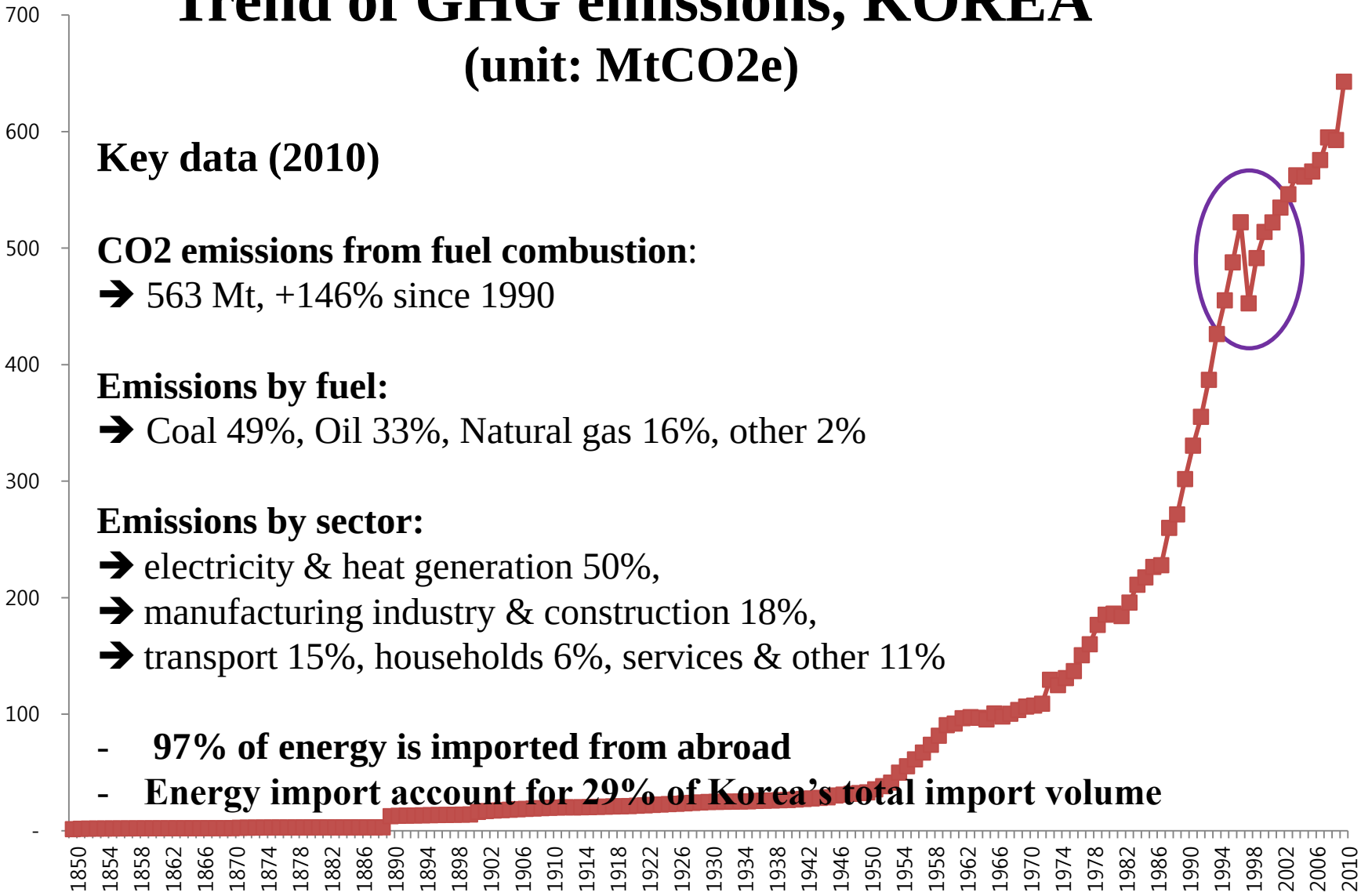
Trend of GHG emissions, KOREA
(unit: MtCO2e)



Key data (2010)

CO2 emissions from fuel combustion:
➔ 563 Mt, +146% since 1990

Emissions by fuel:
➔ Coal 49%, Oil 33%, Natural gas 16%, other 2%

Emissions by sector:
➔ electricity & heat generation 50%,
➔ manufacturing industry & construction 18%,
➔ transport 15%, households 6%, services & other 11%

- **97% of energy is imported from abroad**
- **Energy import account for 29% of Korea's total import volume**

Energy Consumptions by Sectors (unit: MTOE)

Sector	2000		2008	2012		Annual growth rate (%)
Industry (excl. raw materials)	83.9 (42.0)	**56.0**	106.5 (50.1)	127.3 (54.5)	**61.3**	3.5 (2.2)
Transportation	30.9	**20.6**	35.8	37.1	**17.9**	1.5
Households & commercial	32.4	**21.6**	36.2	38.0	**18.3**	1.3
Other	2.6	**1.7**	4.1	4.4	**2.1**	4.5
Total	149.9	**100**	182.6	207.8	**100**	2.8

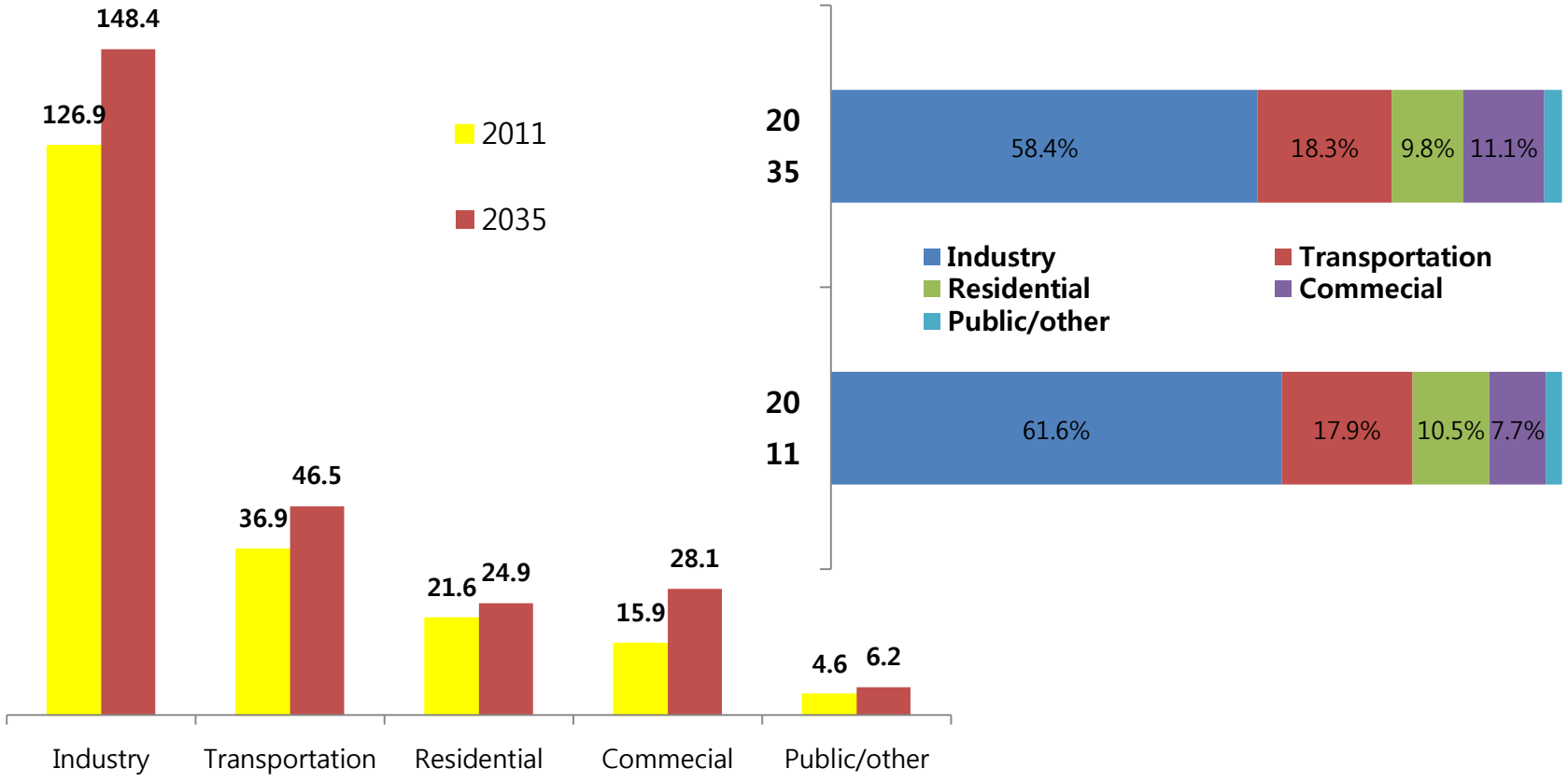
Prospect of total primary energy & final energy (BAU)

unit: MTOE

Primary energy	2011	2035	Annual growth rate	Final energy	2011	2035	Annual growth rate
Coal	86.6 (30.3)	112.4 (29.7)	1.24%	Coal	33.5 (16.3)	38.6 (15.2)	0.58%
Petroleum	105.1 (38.1)	101.5 (26.9)	-0.15%	Petroleum	102.0 (49.5)	99.3 (39.1)	-0.11%
LNG	46.3 (16.8)	73.3 (19.4)	1.93%	City gas	23.7 (11.5)	35.3 (13.9)	1.68%
Hydro	1.7 (0.6)	2.0 (0.5)	0.70%	Electricity	39.1 (19.0)	70.2 (27.6)	2.47%
Nuclear	32.3 (11.7)	70.0 (18.5)	3.28%	Heat	1.7 (0.8)	3.3 (1.3)	2.82%
Renewables /other	6.6 (2.4)	18.8 (5.0)	4.44%	Renewables	5.8 (2.8)	7.4 (2.9)	1.01%
Total	275.7 (100)	377.9 (100)	1.32%	Total	205.9 (100)	254.1 (100)	0.88%

Prospect of Energy Demand by Sectors in 2035

unit: MTOE

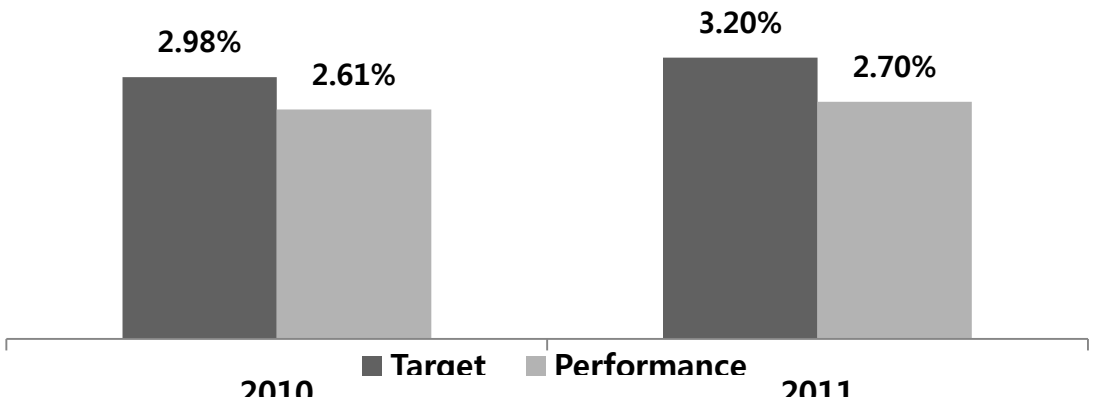


- **Carbon dioxide emissions will continue to grow.**

Dilemma :

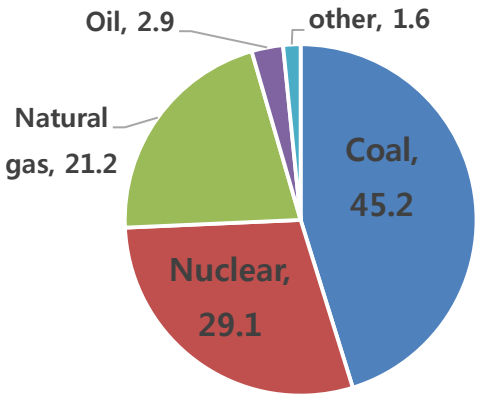
Practical interest (實利) *vs* Rationale (名分)

Electricity mix	2012	1st master plan for national energy (2030)	2nd master plan for national energy (2035)
Period		2008~2030	2013~2035
Nuclear	**26%**	41%	**29%**
Coal	**31%**	32%	n.a. (2014.6.)
LNG	**28%**	19%	n.a. (2014.6.)
Renewable	**2.7%**	11%	11%



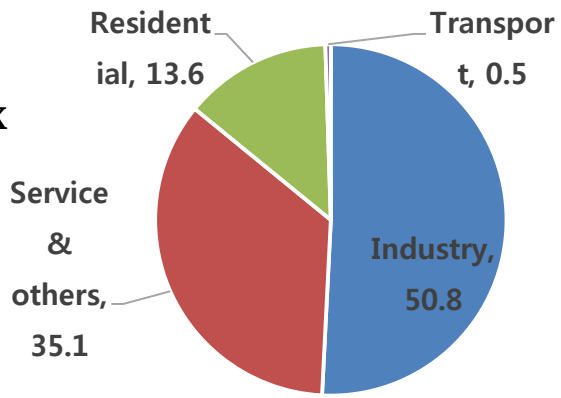
Fit-in-Tariff (FIT)

➔ Renewable Portfolio Standard (RPS)



← **Electricity generation mix (2011)**

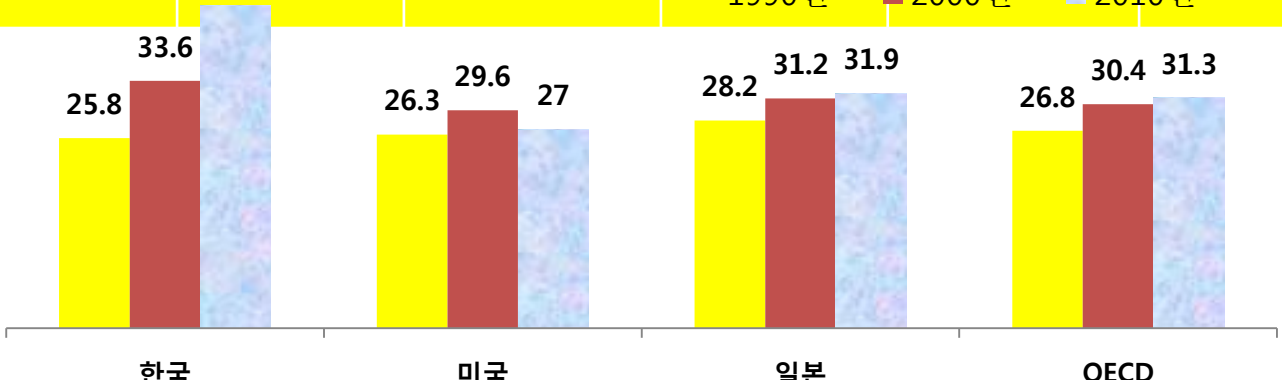
→ **Consumption (2010)**



Recovery rate of electricity price by sector in 2010

	average	general	residential	industrial	educational	Agriculture
Unit price (KRW/kWh)	86.8	98.9	119.9	76.6	87.2	42.5
Total unit cost (KRW/kWh)	96.3	102.7	127.2	85.7	103.1	116
Recovery rate in 2010 (%)	90.2	96.3	94.2	89.4	84.6	36.7

Power consumption of manufacturing sector (%) →



Other issues of policy measures

- **Target Management Mechanism (2012)**
- Korean **Emission Trading Scheme (2015)**
  - Restrictions on using **offsets** from international sources in the first two phases.
  - **Price volatility**
    - government may take required actions such as **reserving** up to 25 % of permits & setting **price ceilings and floors** to stabilize the market.
- RPS (**Renewable Portfolio Standard**)
  - FIT (**Fit-in-Tariff,** 2001 - 2011) ➔ RPS (2012 -)