

IEEJ: November 2009

Northeast Asia Petroleum Forum 2009

Mid-Term Outlook on Petroleum Demand of Korea

26 – 27 October 2009



I. Energy Consumption Trend

II. Petroleum Consumption Trend

III. Energy Outlook Model and Economic Assumption

IV. Petroleum Demand Outlook

I. Energy Consumption Trend

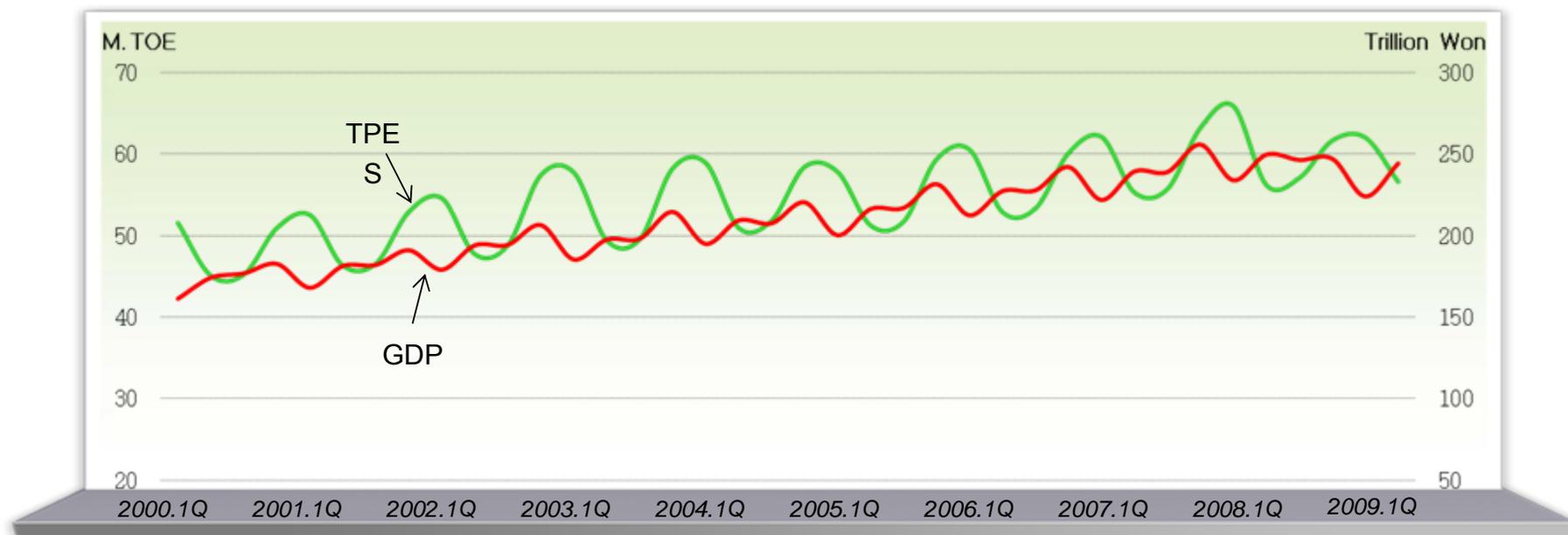
II. Petroleum Consumption Trend

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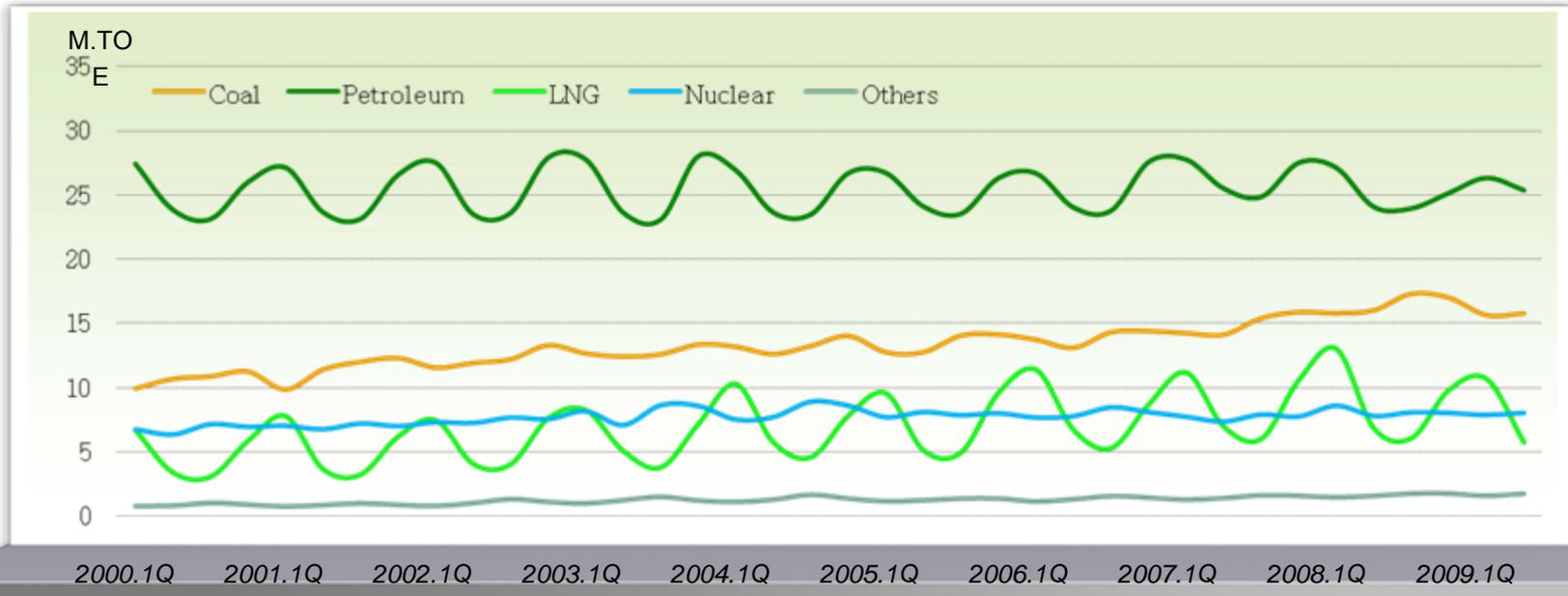
Energy Consumption Trend of Korea

- ❖ **TPES of Korea has increased at the rate of 2.8 percent from 00 to 08 while FEC has grown by 2.5 percent annually during the same period**



Petroleum Consumption Trend

- **Petroleum consumption of 2008 recorded 760.6 million bbl at the growth rate of 0.3% since 2000, while coal and LNG showed fast growth rate**
 - Its share in TPES decreased to 41.8% down from 52.0%

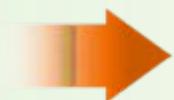


Crude Oil Price Movements

- Crude Oil Price (Dubai)

\$140.7/B

July 14, 2008



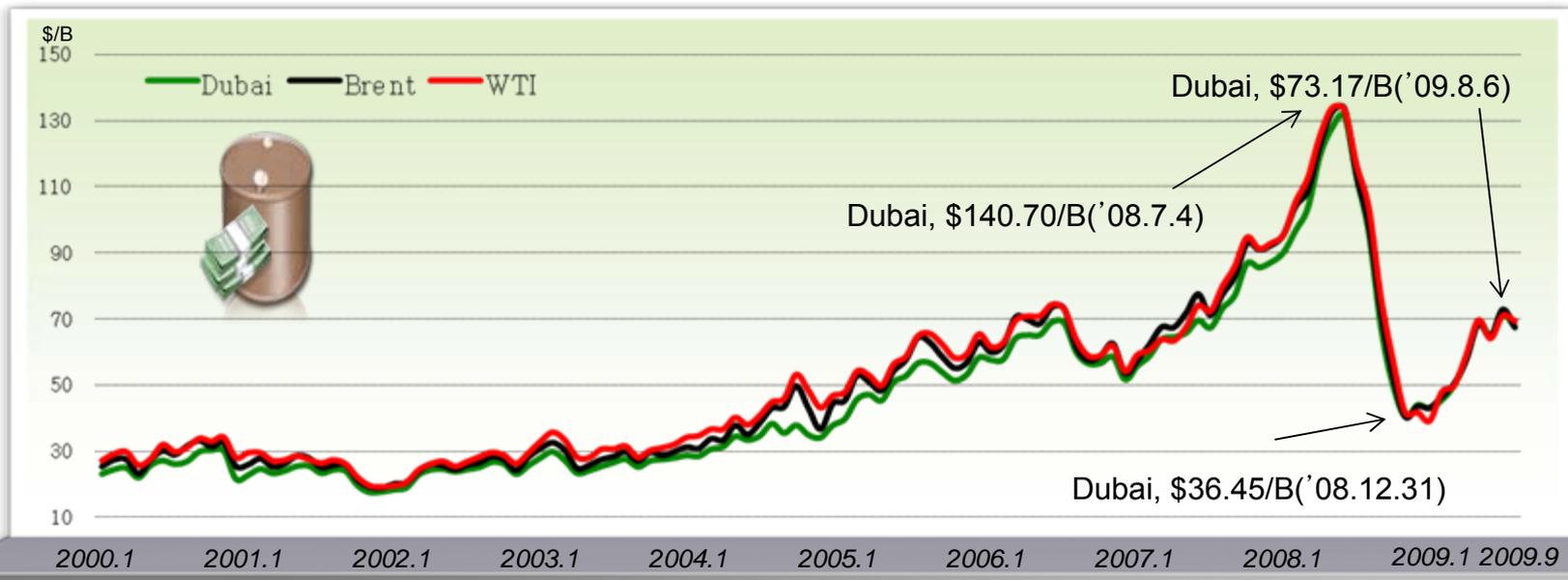
\$36.5/B

December 31, 2008



\$73.2/B

August 6, 2009



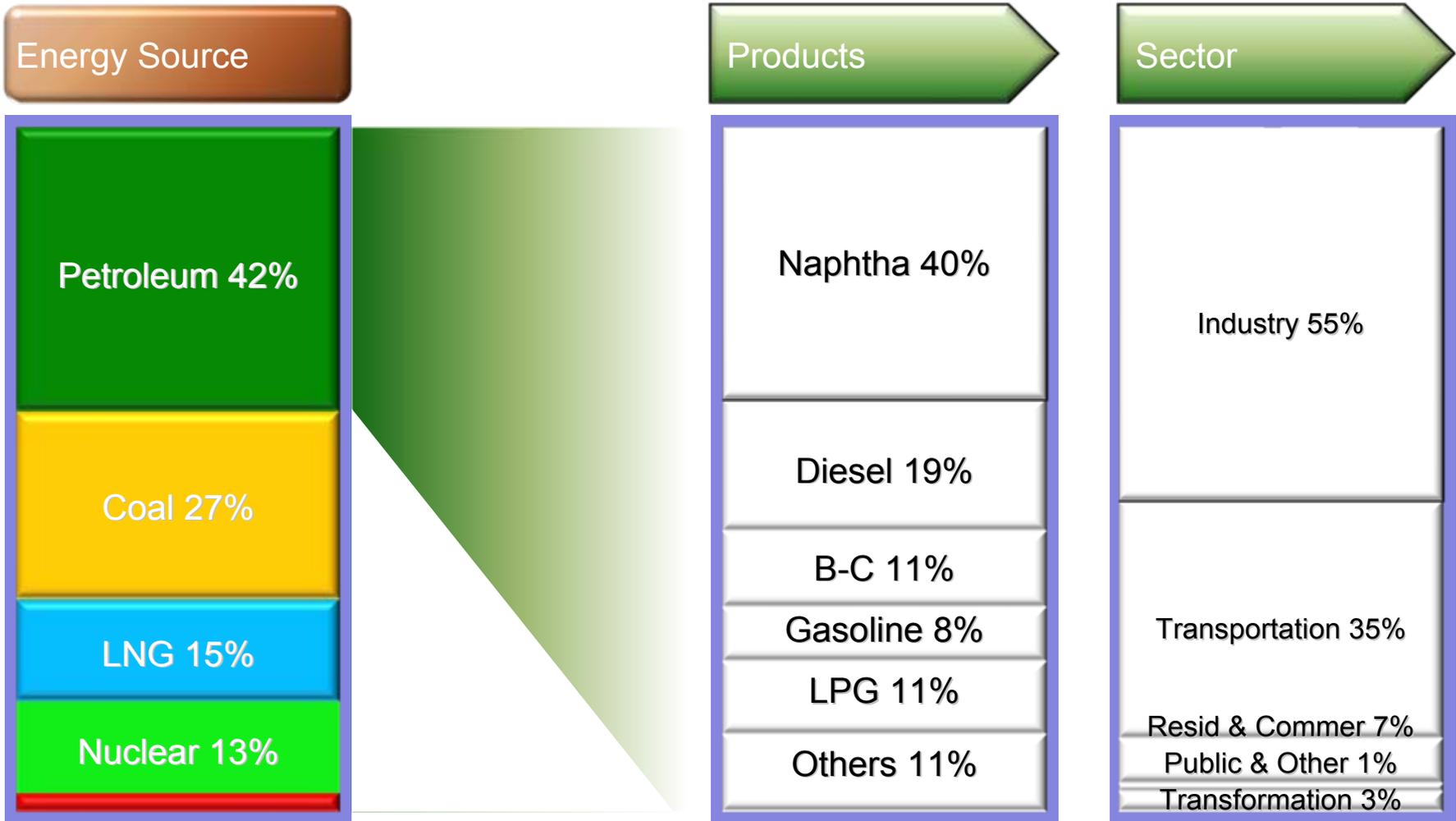
Energy Consumption in 2008 and 2009

World economic recession decreased the energy consumption of Korea by 2.9 percent in the first half of 2009

		2007	2008	2009 1~2q	'09.1/4	'09.2/4
TPES	M.TOE	236.5	240.9 (1.9% ↑)	118.7 (2.9% ↓)	62.1 (5.9% ↓)	56.6 (0.7% ↑)
Coal	M.ton	94.1	104.2(10.7% ↑)	49.6(1.0% ↓)	24.8	24.9
Petroleum	M.BBL	794.9	760.6(4.3% ↓)	391.6(1.0% ↑)	199.0	192.6
LNG	M.ton	26.7	27.4(2.9% ↓)	12.6(17.4% ↓)	8.2	4.4
Hydro	TWh	5.0	5.6(10.3% ↑)	2.3(1.9% ↑)	0.9	1.4
Nuclear	TWh	142.9	151.0(5.6% ↑)	73.9(2.9% ↓)	36.6	37.3
Others	M.TOE	4.8	5.4(11.6% ↑)	2.9(11.2% ↑)	1.4	1.5

note : () indicates the growth rate.

Petroleum Consumption in 2008



Sectoral Issues

Industry Sector

- **Naphtha consumption increase by 2% in spite of the economic recession**

Transportation Sector

- **Tax support for the replacement of aging vehicles**

Residential/Commercial/Public Sectors

- **City gas supply expansion to more than 435 million households**

Transformation Sectors

- **Abolishing plan of petroleum power plants**

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Modeling Approach

Energy Demand = f(demand trend, price, activity level, etc)

❖ Energy demand is estimated by econometrics model

- **ADL (autoregressive distributed lag) model is a basic platform for estimating and forecasting energy demand**

$$\ln D_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \ln D_{t-i} + \sum_{i=0}^n \alpha_{2i} \ln Y_{t-i} + \sum_{i=0}^n \alpha_{3i} \ln P_{t-i} + \alpha_4 HDD_t + \alpha_5 CDD_t + AX$$

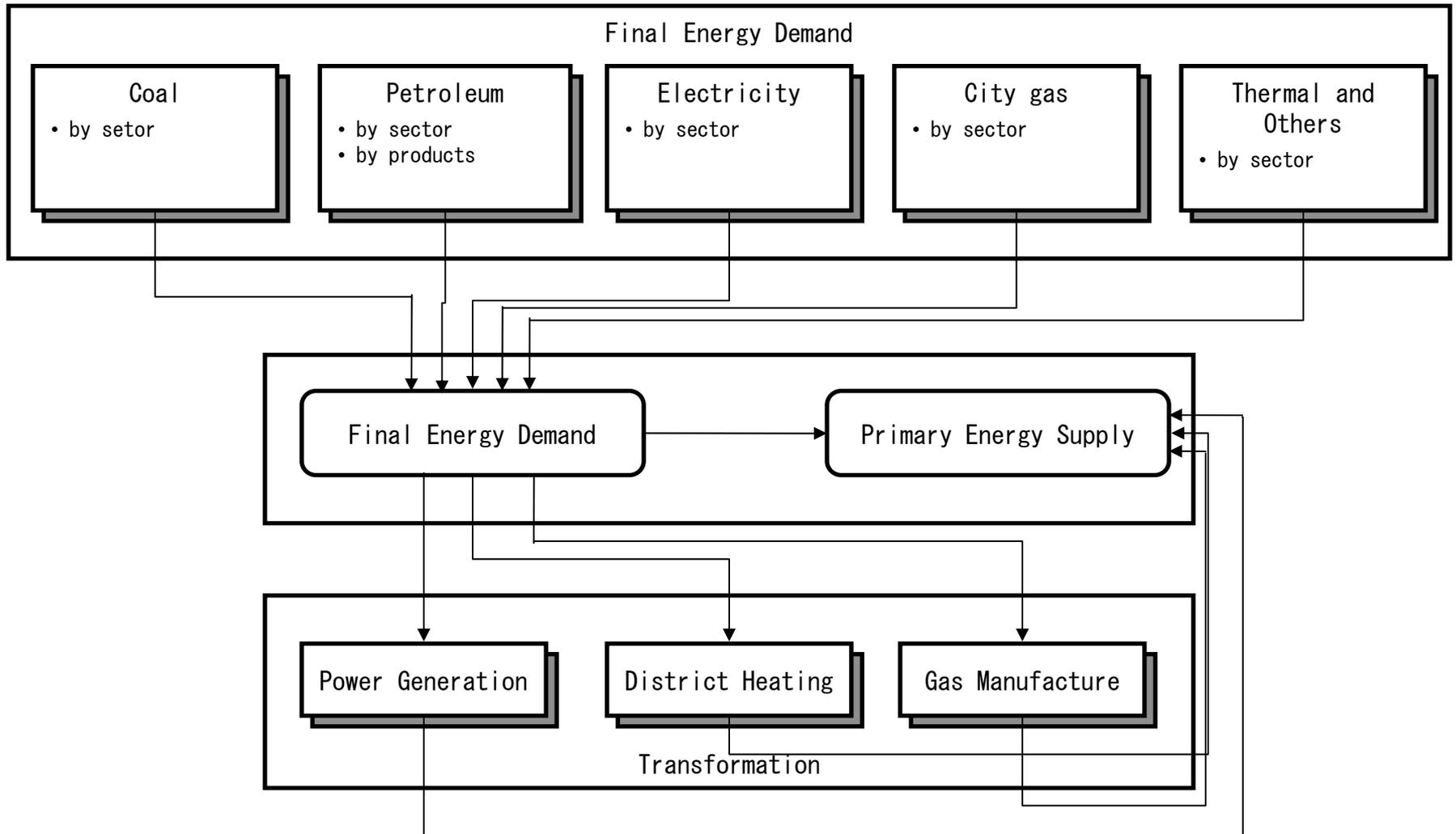
where D is energy demand, Y is income or output, P is real price, HDD is heating degree days, CDD is cooling degree days and AX is other relevant variable including dummy



Model Structure

Energy	Sector	Sub	# of Equation
Petroleum	Transports, Res/Com, Industry	19	14
City gas	Residential, Commerce, Industry	-	3
Electricity	Residential, Commerce, Industry	-	3
Coal and Others	Residential, Commerce, Industry	10	10
Power Generation		Linear Programming	

KEEI Short-Term Energy Supply and Demand Model



Petroleum Products by Sector

Sector	Products		Notes
Transport	Gasoline		Passenger vehicle
	Diesel		Freight vehicle, Bus
	BC		Marine; B-A, B-B, B-C
	Jet		Aircraft
	LPG (Butane)		Passenger vehicle, Taxi
	Kerosene		
Industry	Fuel	Diesel/Kerosene	Heating
		BC	B-A, B-B, B-C
		LPG	including substitutes for Naphtha
	Non-energy Oil	Naphtha	
		Asphalt	
		Other non-energy oil	Lubricant, Para-wax, etc
Res/Com/Others	Diesel/Kerosene		Heating
	BC		B-A, B-B, B-C
	LPG (Propane)		Heating/Cooking
	Jet		Air forces
	Other non-energy oil		

Economic Assumption for Outlook

	2009	2010	2011	2012	2013
GDP	801.4 (2.0% ↓)	835.1 (4.2% ↑)	872.1 (4.4% ↑)	910.0 (4.4% ↑)	949.1 (4.3% ↑)
IP	8.0% ↓	6.8% ↑	7.1% ↑	7.0% ↑	6.9% ↑
CPI	3.5% ↑	3.0% ↑	2.5% ↑	2.5% ↑	2.5% ↑
WPI	3.7% ↑	3.2% ↑	2.6% ↑	2.6% ↑	2.6% ↑
Population	48,747	48,875	48,989	49,083	49,163
HDD	2621	2621	2621	2621	2621

note : Base year of gross domestic growth is 2000

I. Energy Consumption Trend

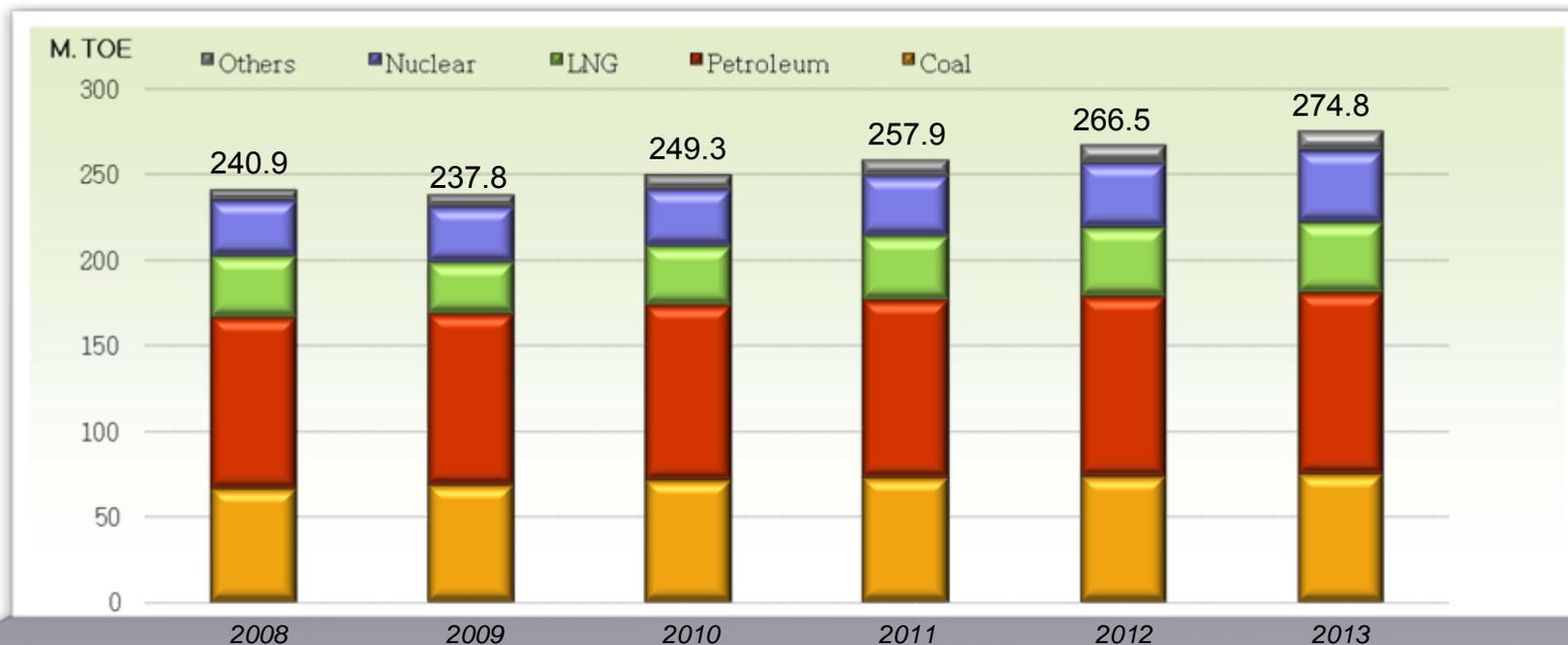
II. Petroleum Consumption Trend by Sector

III. Energy Outlook Model and Economic Assumption

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Energy Demand Outlook

- In the original outlook, TPES was expected to increase to 274.8 million TOE at the annual average growth rate of 2.8% since 2008
 - Petroleum was expected to increase by 1.2% growth rate

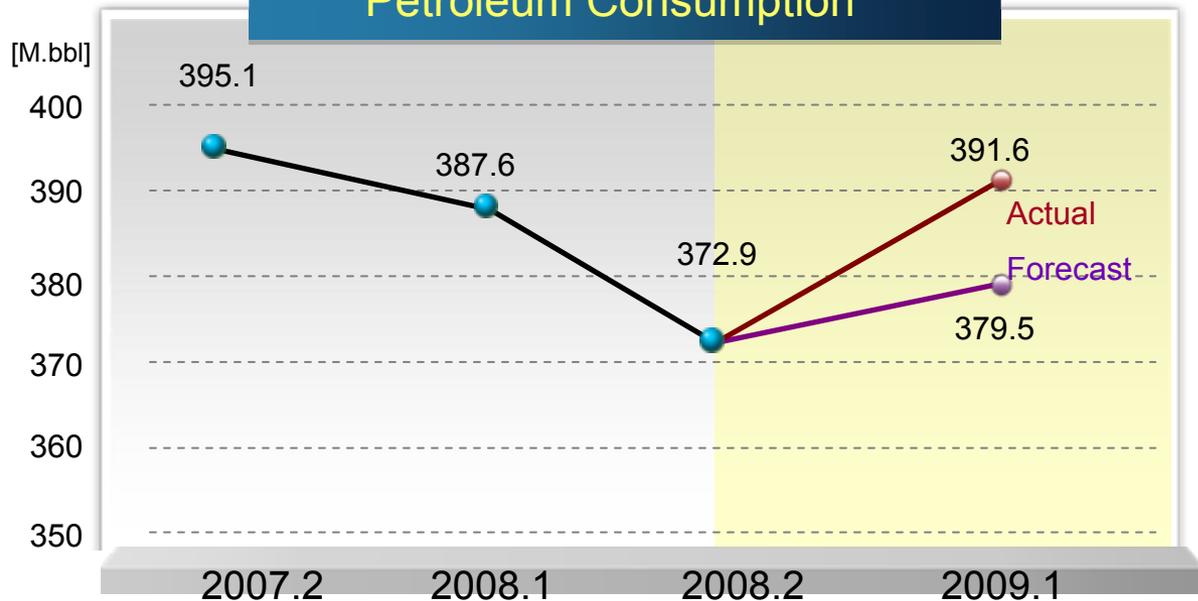


Revised Petroleum Demand Outlook

However, actual consumption of petroleum products in the first half of 2009 increased 31.1 million bbl more than expected due to ...

- less serious economic downturn, delayed petrochemical facility expansion in china and middle east, tax cut for replacement of aging car, etc.

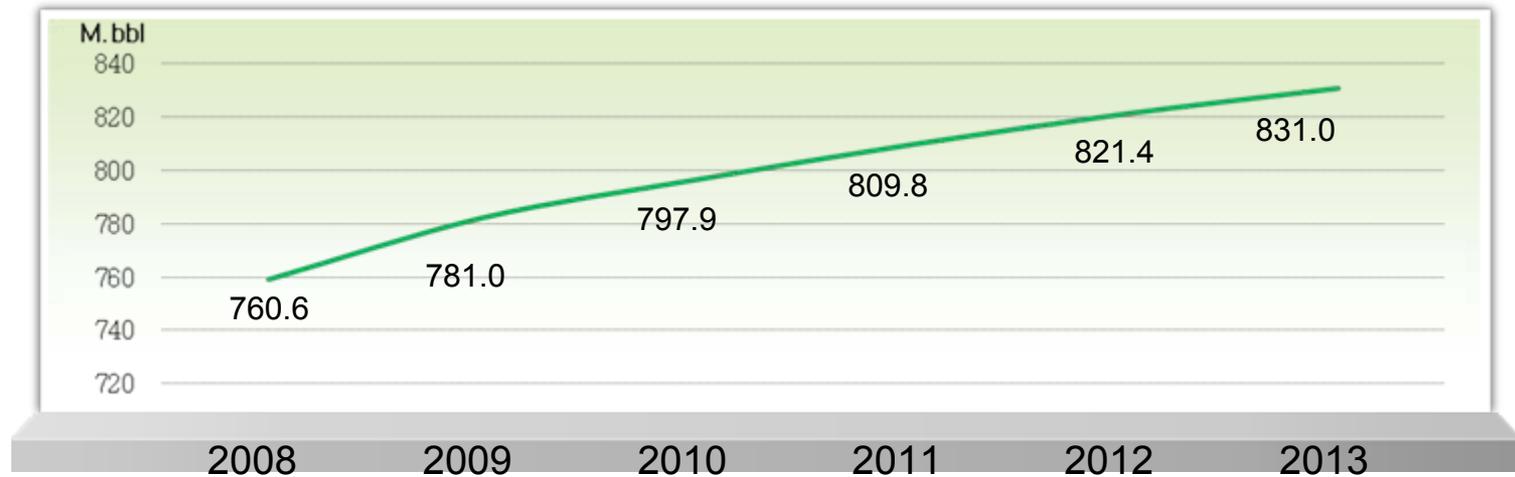
Petroleum Consumption



	Forecast	Actual Result	
GDP	5.3% ↓	3.2% ↓	1.1%p ↑
Petroleum	379.5 M.bbl	391.6 M.bb.	12.1M.bbl ↑
Naphtha	151.4 M.bbl	161.5 M.bbl	10.1M.bbl ↑

Revised Petroleum Demand Outlook

- In considering the updated petroleum consumption, economic activity and price movements, petroleum demand is expected to be 831 million bbl with annual average growth rate of 1.8%



Revised Petroleum Demand Outlook

● Petroleum Demand by Sector

	Total	Industry	Transport	Resid/Commerce	Transform
2008	760,641 (-4.3)	421,209 (-1.9)	258,279 (-3.8)	61,453 (-6.3)	19,701 (-37.2)
2009	782,204 (2.8)	438,033 (4.0)	257,001 (-0.5)	58,879 (-4.2)	28,290 (43.6)
2010	796,608 (1.8)	449,823 (2.7)	262,600 (2.2)	57,881 (-1.7)	26,305 (-7.0)
2011	809,760 (1.7)	458,189 (1.9)	268,339 (2.2)	56,980 (-1.6)	26,251 (-0.2)
2012	821,355 (1.4)	466,679 (1.9)	272,713 (1.6)	55,955 (-1.8)	26,008 (-0.9)
2013	831,029 (1.2)	474,844 (1.7)	275,285 (0.9)	54,963 (-1.8)	25,937 (-0.3)
AAGR(%)	(1.8)	(2.4)	(1.3)	(-2.2)	(5.7)

note : () indicates the growth rate.

Revised Petroleum Demand Outlook

● Petroleum Demand by Products

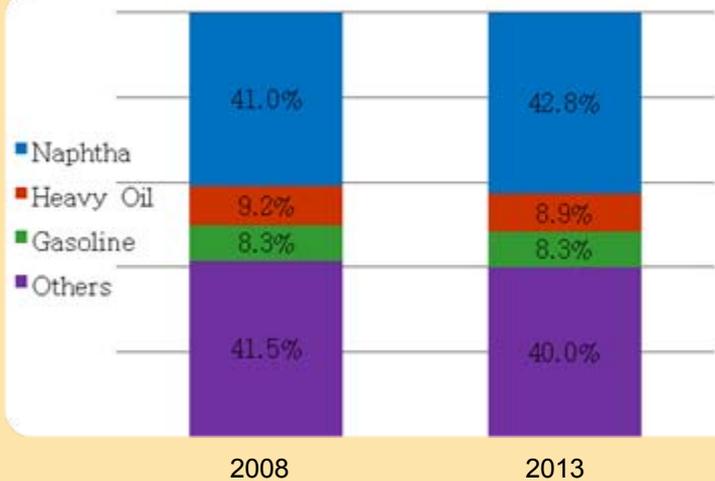
	Gasoline	Diesel/Heating	BC	LPG	Naphtha
2008	62,937 (0.7)	162,172 (-5.5)	69,996 (-24.6)	101,881 (4.9)	311,368 (-1.7)
2009	66,024 (4.9)	157,537 (-2.9)	76,240 (8.9)	101,700 (-0.2)	324,998 (4.4)
2010	67,986 (3.0)	157,990 (0.3)	73,775 (-3.2)	102,176 (0.5)	335,381 (3.2)
2011	68,457 (0.7)	159,693 (1.1)	73,594 (-0.2)	104,931 (2.7)	342,562 (2.1)
2012	68,915 (0.7)	159,812 (0.1)	73,587 (-0.0)	107,868 (2.8)	349,392 (2.0)
2013	69,367 (0.7)	158,133 (-1.1)	73,773 (0.3)	110,825 (2.7)	355,886 (1.9)
AAGR(%)	(2.0)	(-0.5)	(1.1)	(1.7)	(2.7)

note : () indicates the growth rate.

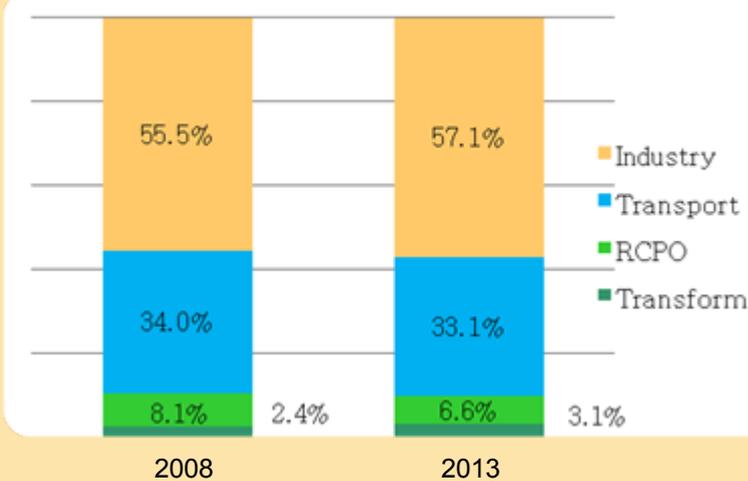
Revised Petroleum Demand Outlook

- The share of industry is expected to grow as demand for naphtha increases

Products form reliance



Sectoral reliance



Thank you for your attention

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