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Korea Mid-term Energy Demand Outlook

(2020-2025)

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Published by the Korea Energy Economics Institute (KEEI), Energy Demand Outlook takes a closer look at the global energy market and supply and demand trends in domestic energy and examines the outlook for short-term energy demand.

This report outlines the recent changes in the supply and demand of energy and provides important data and policy implications in an effort to contribute to the establishment and adjustment of a series of energy policies by the government.

This report is written by the Energy Demand and Supply Division of the Center for Energy Information and Statistics in cooperation with the Energy Statistics Research Division of KEEI and other related research divisions.

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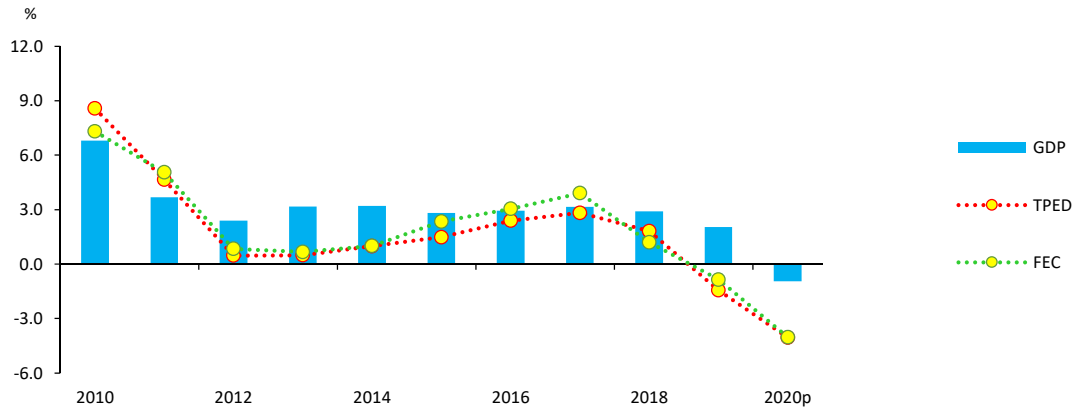
1. Total Primary Energy Supply and Total Final Consumption

☐ **Total Primary Energy Supply ("TPES") recorded an annual average growth of a mere 0.3% from 2015 to 2020 due to the recent decrease in TPES for two consecutive years**

- From 2016 to 2018, TPES kept increasing at a level of 2-3%. However, the annual average growth of TPES declined to around 0% from 2015 to 2020 as TPES increase rates for 2019 and 2020 were 1.5% and -4.0%, respectively, posting a drop for two years in a row

Figure 1.1 TPES, TFC and GDP growth rates



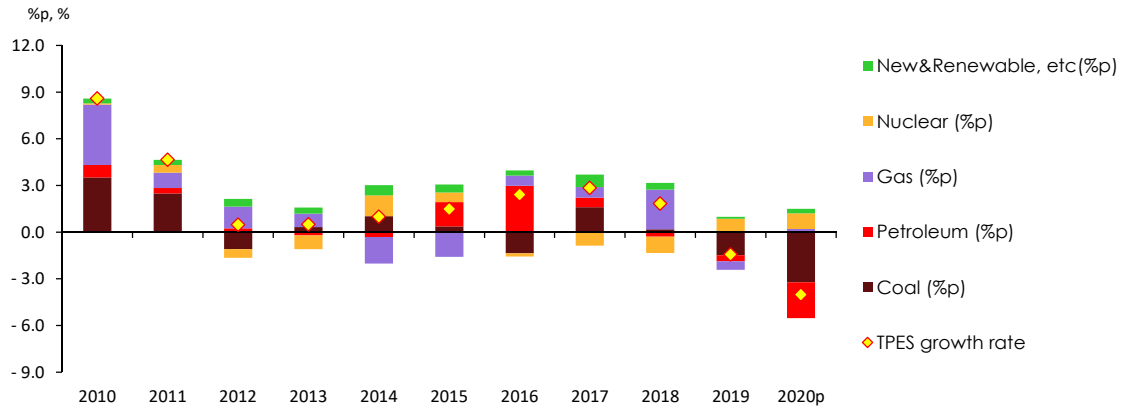
- Similarly, Total Final Consumption ("TFC") posted annual average growth rates of 1-4% from 2016 to 2018. For 2019 and 2020, however, the growth decreased by 0.9% and 4.0%, driving TFC to post an increase of a mere 0.6% from 2015 to 2020
- In recent years, overall energy use went up at a slower rate with slow economic growth and industrial structure changes and in 2020, energy consumption fell considerably as production activities suffered a downturn amid COVID-19 pandemic. As a result, the annual growth rate of energy consumption experienced a significant fall to a 0% level from 2015 to 2020

☐ **Energy Intensity rapidly recovered with a slowdown in energy consumption growth and decreased use in recent years**

- Energy Intensity (toe/million KRW), an index used for measuring national energy efficiency, recovered (declined) from 2015 to 2020 at a rate faster than before

- However, caution should be exercised when assuming that these changes in energy intensity are directly related to improvement in energy efficiency. Because in 2019, there were unrelated factors such as temperature effects, and in 2020, the unexpected COVID-19 pandemic played a greater role in declining energy consumption

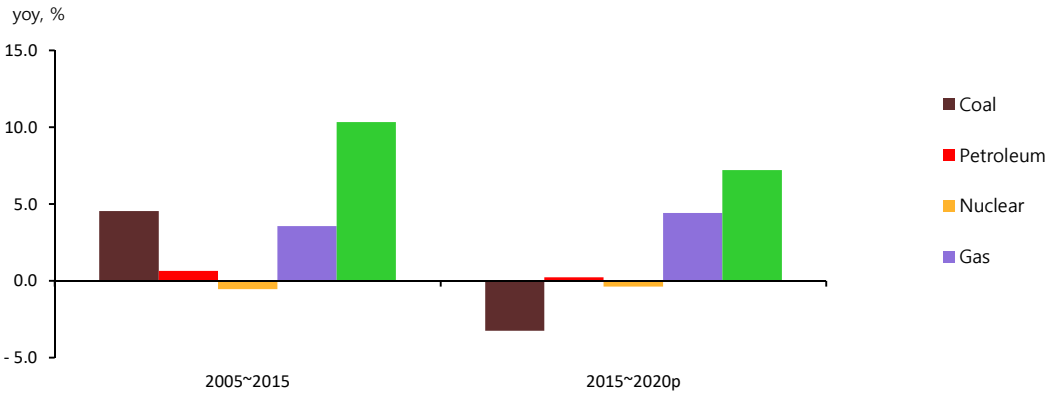
Figure 1.2 Contribution by energy source to fluctuation of total energy consumption



☐ **In the recent five years, gas and renewable energy increased decently, while coal and nuclear energy declined with oil remaining stationary**

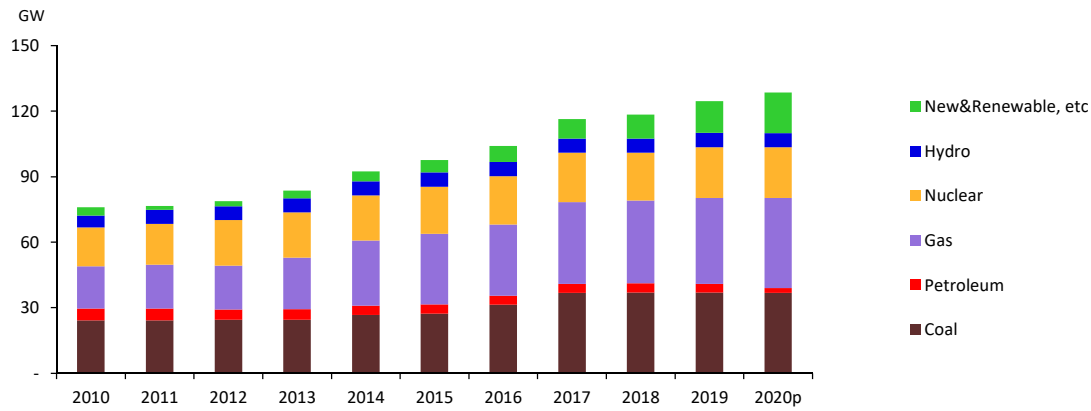
- Coal use grew fast mainly in the power generation and steel sectors until early 2010s. From 2015 to 2020, however, coal consumption posted an annual average decrease of 2.9% as the steel industry suffered a downturn and coal-fired generation was limited by the fine dust measures of the government

Figure 1.3 Comparison of annual growth by energy source



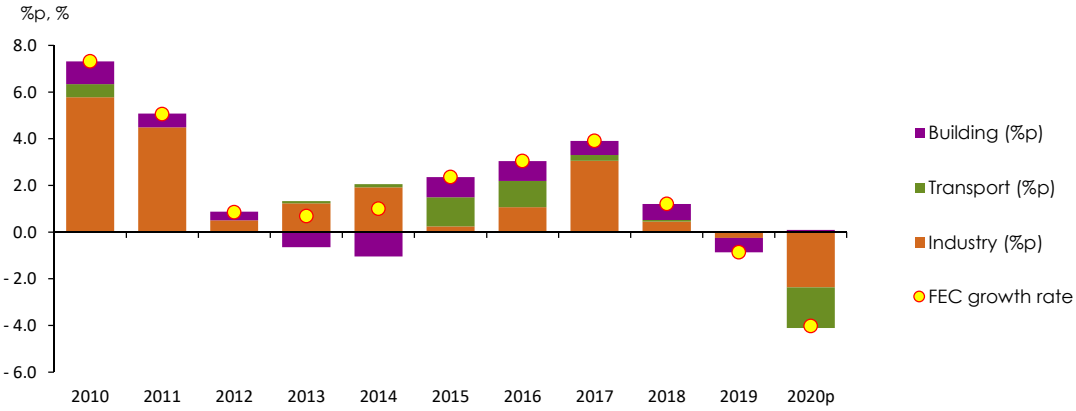
- The growth of oil use slowed down with increased oil price to post a decline from 2015 to 2020. Especially, oil consumption dropped by 5.8% as industrial production slowed down and Social Distancing measures were put in place amidst COVID-19 pandemic
- From 2015 to 2020, natural gas use increased by an annual average of 4.4% as the use for power generation went up rapidly with energy transition policies and the final consumption grew as well driven by a temperature effect and an increase in direct imports by the private sector

Figure 1.4 Generation capacity trends by energy source



- Despite the rapid surge in 2019 and 2020, nuclear generation showed an annual average decline of 0.6% from 2015 to 2020 as two nuclear reactors were shut down and the number of preventive maintenance projects increased due to strengthened safety checks by the government
- Renewable and Other energy use rose by an annual average of 7.2% from 2015 to 2020 thanks to the government's Renewable energy dissemination policies
- Entering into the 2010s, the growth in electricity use significantly slowed down to post an average increase of 1.0% from 2015 to 2020 driven by several factors, including a slowdown of economic growth, the energy demand management policies by the government and electrification becoming stagnant

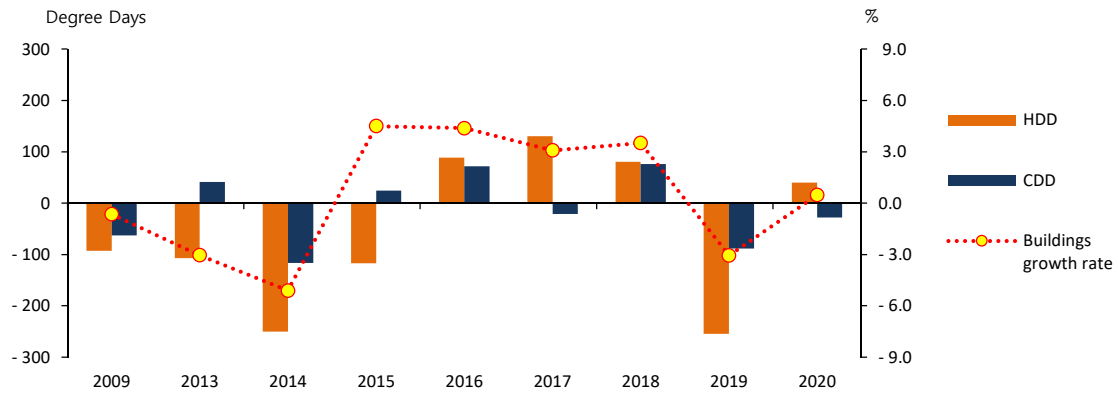
Figure 1.5 Contribution of end-use sectors to fluctuation of TFC consumption



☐ **TFC increased in the industrial and building sectors, while dropping in the transport sector**

- From 2010 to 2015, industrial energy use showed an annual average increase of 2.7% mainly in the steel and petrochemical industries, which have high energy intensity. On the contrary, from 2015 to 2020, the annual average growth experienced a considerable decline to 0.6% as the steel industry started to decrease in energy consumption and the energy use in the petrochemical industry slowed down as well

Figure 1.6 Fluctuation in cooling and heating degree days & buildings' energy use rates



Note: The data for cooling and heating degree days shows year-on-year differences

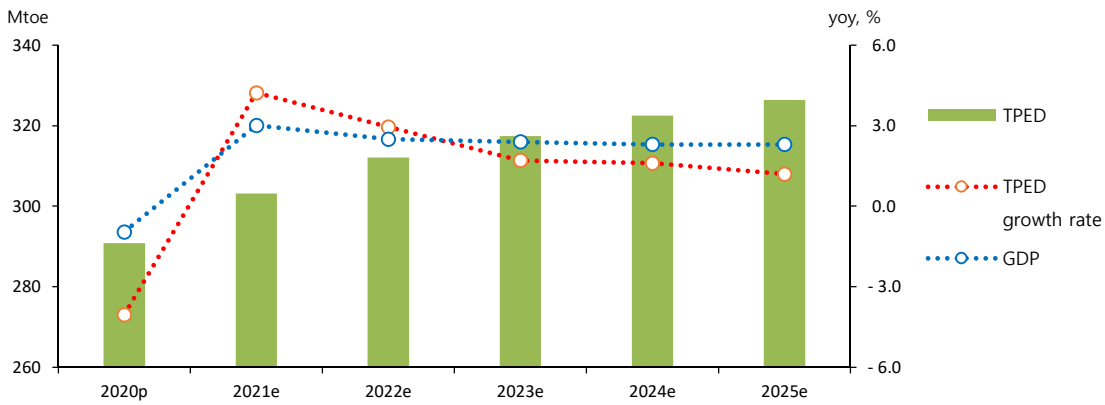
- Energy use in the building sector kept showing a decreasing trend due to stagnant population and increased energy efficiency. From 2015 to 2020, however, the growth added speed to post an annual average of 1.6% driven by abnormal temperature such as heat waves and cold snaps
- In 2020, energy use in the transport sector declined by a whopping 9.4% upon the onset of COVID-19 pandemic, following a static period after 2017 with increased oil prices

2. TPES & TFC Outlook[1]

☐ **From 2020 to 2025, Total Primary Energy Supply ("TPES") is expected to grow by an annual average of 2.3% to reach 326.4 million toe by 2025**

- In the early stage of the forecast horizon, TPES is expected to increase dramatically with the national economy recovering from the impact of COVID-19 pandemic, followed by a stable phase in which TPES is likely to stay at a mid-1% level

Figure 2.1 TPES outlook

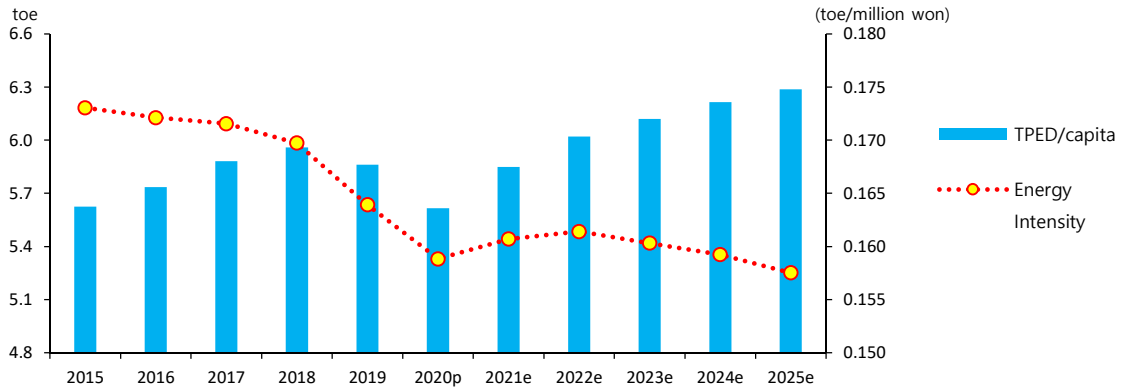


☐ **Energy intensity is expected to continuously improve. However, the improvement is expected to occur much slower compared to the past**

- Energy intensity, which has improved with an annual average fall of 1.7% over the last five years, will continue to improve over time for the forecast horizon. However, the improvement rate is expected to decline significantly to show an annual average of 0.2%
- Energy consumption per capita is expected to go up at a high rate of an annual average increase of 2.3% from 5.6 toe in 2020 to reach 6.3 toe by 2025

[1] The lowercase p and e, which are added to each year, indicates provisional and forecast values, respectively

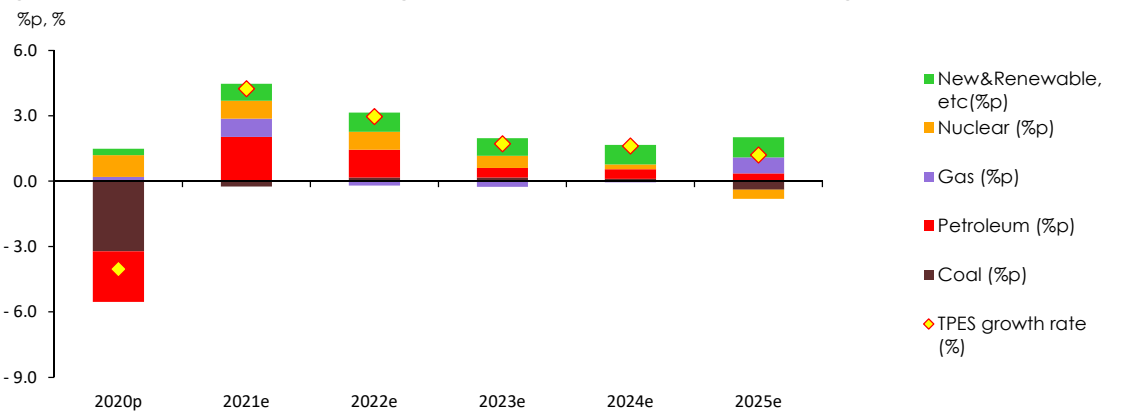
Figure 2.2 Energy consumption per capita and energy intensity outlook



☐ **During the period under consideration, coal demand will stay at the current level while all other energy sources are expected to show a decent increase**

- The coal demand is forecast to post a mere annual average growth of 0.2%, as the consumption for power generation is likely to fall due to the limitations on coal-fired generation, offsetting the anticipated increase in the final use sector driven by the industrial sector
- As the national economy is likely to recover from the impact of COVID-19 pandemic, the oil demand in the transport and industrial sector will rise in 2021. As a result, the demand is expected to continuously go up by an annual average of 2.5% for the forecast period

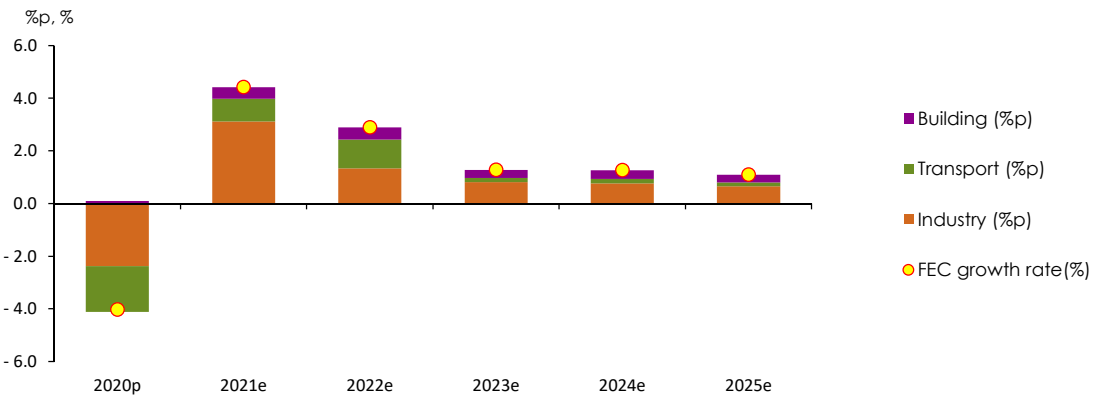
Figure 2.3 Contribution by energy source to fluctuation of total energy consumption



- For the period under consideration, nuclear generation is forecast to grow by an annual average of 3.3% as 1.4 GW large-capacity reactors are planned to come online every year from 2021 to 2024 and the utilization rate for nuclear facilities is likely to be maintained at an early 80% level

- Although the final consumption sector will witness a growth, natural gas demand is expected to show an annual average of a mere 1.1% increase as the gas demand in the power generation sector will drop due to the rise in base-load generation driven by nuclear power
- New&renewable and other energy demand is anticipated to soar by an annual average of 10.7% from 19.9 million toe in 2020 to 33.2 million toe in 2025, thanks to the renewable energy dissemination policy by the government
- Electricity demand in the final consumption sector is likely to rebound fast as the national economy will recover from the impact of COVID-19 pandemic in 2021. Accordingly, the demand growth is anticipated to stay around at a 2% level to bring the electricity demand up by an annual average of 2.2% for the forecast period

Figure 2.4 Contribution of end-use sectors to fluctuation of TFC consumption



☐ **FEC by end-use sector is expected to grow by an annual average of 2.2% for the forecast horizon to reach 247.2 million toe in 2025**

- In the industrial sector, energy demand will rise by 5% with rapid economic recovery in 2021. Since then, however, the trend will slow down considerably to grow by an annual average of 2.1% for the forecast period
- In the transport sector, which was hit the most by COVID-19 pandemic in 2020, energy demand is likely to post an annual growth of 2.7% for the forecast horizon. Specifically, the energy demand is expected to rise by 4.9% mainly in the road transport industry in 2021 and soar by 6.2% in 2022 thanks to a recovery in the air transport industry

- Energy demand in the building sector is anticipated to go up, driven by the industrial sector (sector-wise) as well as electricity and gas (source-wise) to post an annual average growth of nearly 2% for the period under consideration

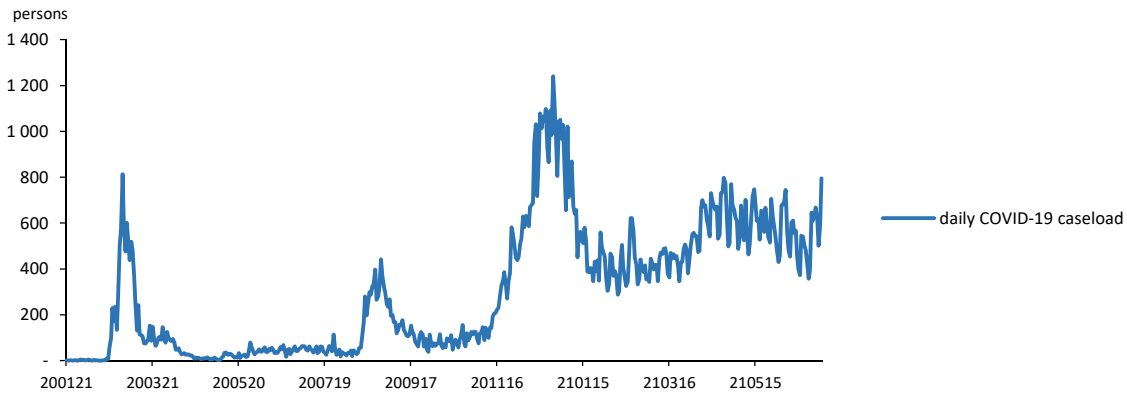
3. Key Features and Implications

Impact of COVID-19 pandemic on electricity consumption in 2020[2]

☐ **Although suffering from three waves of COVID-19 pandemic in 2020, Korea was successful in fighting against the spread with Social Distancing measures**

- Since the first COVID-19 confirmed case took place in Korea on January 21, 2020, a total of 156,961 cases were confirmed as of June 30, 2021 with the death toll reaching 2,018

Figure 3.1 Trend of daily COVID-19 caseload in Korea



Source: https://github.com/jooeungen/coronaboard_kr/blob/master/kr_daily.csv, (2021.06.30)

☐ **Globally, COVID-19 pandemic has brought about massive changes onto energy consuming patterns and energy markets along with an economic downturn and behavioral changes in our life**

- It turns out that the impact of COVID-19 crisis drove down electricity consumption in most countries, with the fall depending on the intensity of the implemented lock down measures (IEA, 2020)
- Spain, Italy, Belgium, the U.K. and other countries implementing a strict lockdown in the face of COVID-19 pandemic witnessed a dramatic fall in electricity consumption while Netherlands and Sweden, the countries resorted to light lockdown measures, experienced a relatively small drop in power use (BahmanyarAlireza, EstebsariAbouzar, ErnstDamien, 2020)

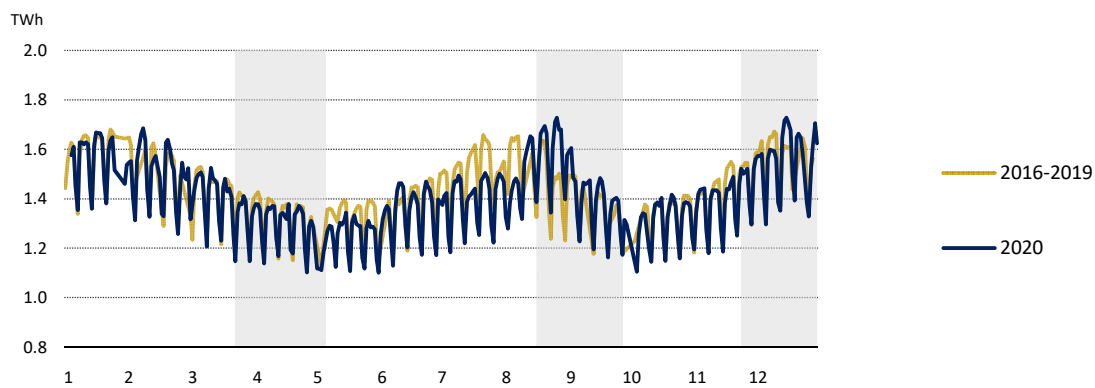
[2] This is a moderated version of an excerpt from "Impact of COVID-19 Pandemic on Electricity Supply and Demand in Korea" by Suil Kim (2021)

- During the strict lockdown, electricity use in Spain plunged by 13.5% compared to the same period from 2015 to 2019 and especially, the power consuming patterns for daytime changed considerably (SantiagoI., et 2021)

☐ **Similarly, Korea experienced a year-on-year drop of 2.2% in electricity consumption due to the impact of COVID-19 with changing consuming patterns**

- Although electricity use in the consumption sector (residential building) decreased due to Social Distancing restrictions, in general, the overall electricity use declined as the production sectors including industrial and service sectors experienced a drop. However, the decline in the national electricity consumption is smaller compared to other major countries enforcing lockdown measures to fight against COVID-19 pandemic
- Overall, electricity use decreased due to the impact of COVID-19 pandemic. However, there is no clear correlation between the increasing number of confirmed cases and the decline in electricity consumption
- Yearly maximum electricity consumption slightly declined by 0.8% from 85.4 GW in 2019 to 84.7 GW in 2020, showing a minor impact of COVID-19 pandemic compared to the minimum power consumption, which plunged by 5.1%
- Analyzing the change in energy consumption patterns for 2020 using Mahalanobis distance shows that the daily power consumption pattern for daytime changed in April, June and December. In terms of time period, a pattern change was observed for 4a.m.-4p.m. as well as 8p.m.-12a.m

Figure 3.2 2016-2019 Average Electricity Consumption vs. 2020 Electricity Consumption



Source: Soo-il Kim (2021) p.16

☐ **In the face of COVID-19 pandemic, each sector displayed different electricity consumption patterns**

- The overall electricity consumption declined in the manufacturing sector. More specifically, the fall in minimum consumption, which has the lowest load, was greater compared to the fall in maximum consumption
- In the past, the residential building sector had a pattern in which electricity use reached the morning peak before the rush hour, and then dropped until lunchtime. As more and more people work from home, the short peak before the morning rush hour disappeared and the electricity demand stays flat until lunchtime
- Some service industries, which were hit the most by the impact of COVID-19 pandemic including Education, Food & Accommodation and Art, Sports & Leisure experienced changes in their electricity use pattern along with a decline in electricity consumption

Changes in GHG emissions in the power generation sector

☐ **Although large-capacity coal-fired generation facilities are planned to come online during the forecast period (2020-2025), GHG emissions in the power generation sector are likely to go down**

- According to the ninth Basic Plan for Electricity Supply and Demand (issued by Ministry of Trade, Industry and Energy in December 2020), a total of seven coal-fired generating units with a capacity of 7.3 GW will be newly installed in the final stage of the government plan for coal generation. Shinseocheon-1 unit will be built in 2021 to be the first of the seven scheduled units while Samcheonpo-2 will be the last, planned to be installed in 2024
- Nevertheless, the facility expansion will be partially offset as 10 out-of-date generation units equivalent to 4.7 GW are scheduled to be shut down from 2021 to 2025. Since the total coal-fired generation management system is going to be put in place along with the operation shutdown and coal-fired generation cap measures aiming at controlling fine dust, the volume of coal-fired generation and resulting GHG emissions are expected to decline slightly for the forecast horizon

Table 3.1 Change in coal-fired and nuclear power generation capacity under the 9th Basic Plan for Electricity Supply and Demand (2021-2025)

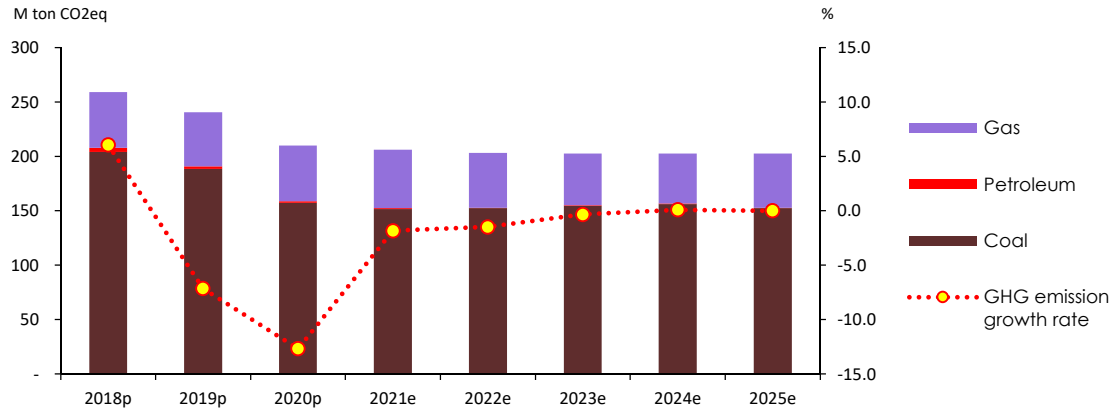
Year	Coal	Nuclear
2021	Shinseocheon#1(1,000 MW) Goseonghai#1(1,040 MW) Goseonghai#2(1,040 MW) Samcheonpo#1(-560 MW) Samcheonpo#2(-560 MW) Honam#1(-250 MW) Honam#2(-250 MW)	Shinhanul #1(1,400 MW)
2022	Gangreunganin#1(1,040 MW)	Shinhanul #2(1,400 MW)
2023	Gangreunganin#2(1,040 MW) Samcheok#1(1,050 MW)	Shinkori#5(1,400 MW) kori#2(-650 MW)
2024	Samcheok#2(1,050 MW) Samcheonpo#3(-560 MW) Samcheonpo#4(-560 MW)	Shinkori#6(1,400 MW) kori#3(-950 MW)
2025	태안#1(-500 MW) 태안#2(-500 MW) Boryeong#5(-500 MW) Boryeong#6(-500 MW)	kori#4(-950 MW) Hanbit #1(-950 MW)

Source: The 9th Basic Plan for Electricity Supply and Demand, The generators highlighted in blue are scheduled to be shutdown

Note: After a prolonged approval process, Shinhanul-1 was finally given the green light in July. It will commence commercial operation on March 2022

- Although electricity demand is likely to increase continuously for the forecast period, gas power generation will fall slightly with nuclear and renewable growing fast in power generation. Accordingly, GHG emissions caused by gas generation is expected to tick down

Figure 3.3 Changes in GHG emissions in the power generation sector for the forecast period

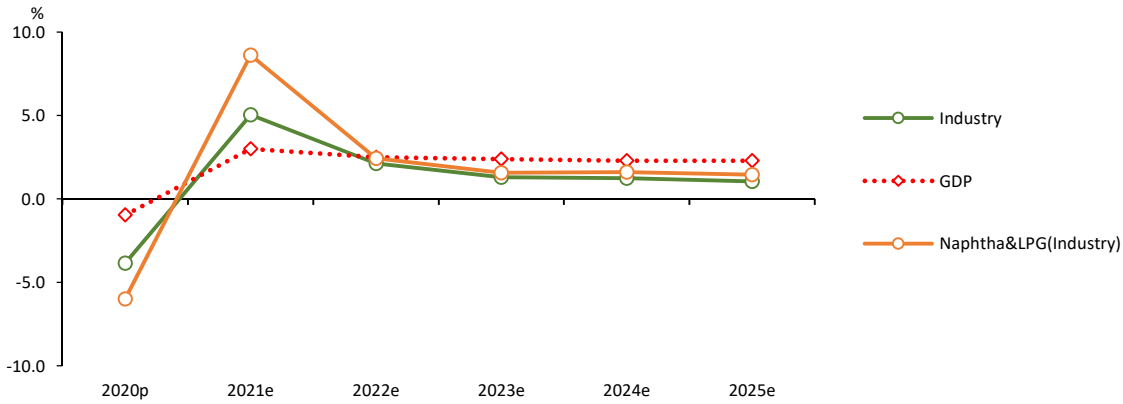


Petrochemical facility expansion

☐ **Thanks to the new installation and expansion of petrochemical facilities, the demand for naphtha and LPG is forecast to increase, driving a growth in energy demand in the industrial sector**

- Since 2014, many firms in the domestic and overseas petrochemical sectors continued to invest in plant and equipment to realize the economy of scale on the back of low oil prices, regardless of the demand for petrochemical products in the global market (Dongwon Sung, 2019.4.25)

Figure 3.4 The growth rates of industrial use and Naphtha & LPG(industry) & economic growth rates



Note: Industrial energy includes the demand for raw materials such as naphtha

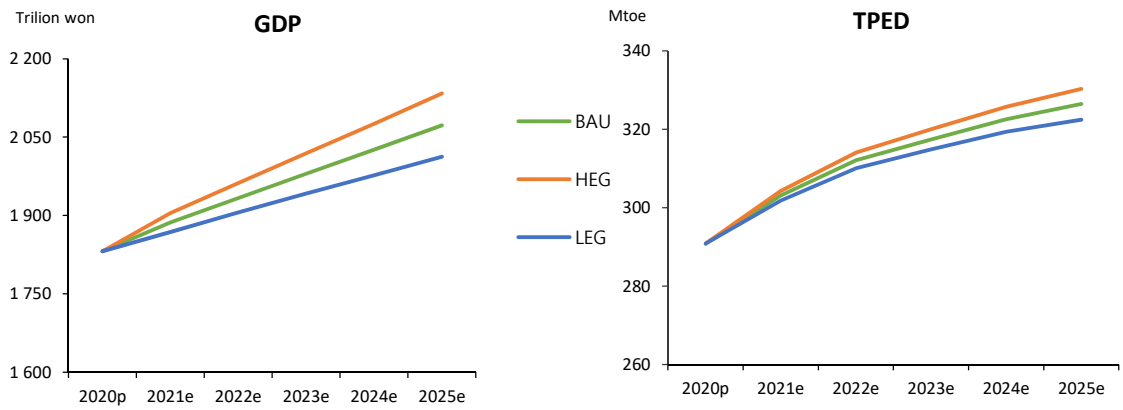
- Thanks to the new installation and expansion of petrochemical facilities, the demand for naphtha and LPG used as base materials is forecast to significantly grow, in turn, to drive an increase in demand for industrial energy

Economic growth scenarios

☐ **Total energy demand is predicted to go up by an annual average of 2.6% under the high-growth scenario and an annual average of 2.1% under the low-growth scenario**

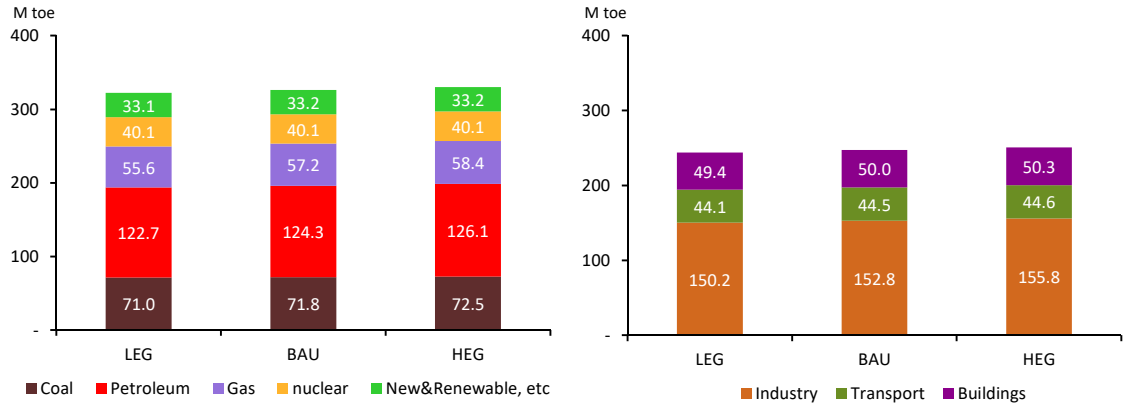
- When establishing the two scenarios, economic uncertainties for the forecast horizon were factored in

Figure 3.5 GDP assumptions and TPES outlook across three scenarios



- By 2025, TPES is anticipated to reach 330 Mtoe under the high-growth scenario and 323 Mtoe under the low-growth scenario
- Under the high-growth scenario, final energy consumption is forecast to grow by an annual average of 2.5% for the period under consideration to reach 250 Mtoe. However, final energy consumption is likely to post an annual average increase of 1.9% to stay around 244 Mtoe under the low-growth scenario

Figure 3.6 TPES & TFC outlook in 2025 across three scenarios



- If the high-growth scenario is the case, energy intensity is likely to improve by an annual average of 0.5% to reach 0.158 toe/million KRW while it is anticipated that the index will reach 0.160 toe/million KRW with an annual average increase of 0.2% under the low-growth scenario

The Main Indicator and Energy Outlook Result

Main Economic and Energy Indicators - *BAU Scenario*

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Economy and Population											
GDP (2010 trillion won)	1 760.8	1 812.0	1 849.0	1 831.2	1 886.4	1 933.5	1 979.9	2 025.5	2 072.1	2.0	2.5
Industrial Production(2010=100)	104.8	106.4	106.7	106.3	108.3	110.1	112.4	114.3	116.3	1.2	1.8
Crude Oil Price (Dubai, USD/bbl)	53.2	69.4	63.5	42.2	60.4	57.9	58.2	62.9	67.4	- 3.6	9.8
Working Days	269.5	270.0	272.5	275.0	276.0	275.5	274.5	272.5	274.5	0.1	- 0.0
Population (million)	51.4	51.6	51.7	51.8	51.8	51.8	51.9	51.9	51.9	0.3	0.0
Average Temperature (℃)	13.1	13.0	13.5	13.3	13.4	13.2	13.2	13.2	13.2	- 0.3	- 0.2
Cooling Degree days	132.7	209.0	120.4	92.5	104.1	104.1	104.1	104.1	104.1	2.4	2.4
Heating Degree days	2 517.1	2 597.8	2 342.9	2 382.7	2 358.6	2 452.7	2 452.7	2 467.6	2 452.7	0.7	0.6
Energy Indicators											
Total Primary Energy Demand (Mtoe)	302.1	307.6	303.1	290.8	303.1	312.1	317.4	322.5	326.4	0.3	2.3
Energy Intensity (toe/million won)	0.172	0.170	0.164	0.159	0.161	0.162	0.160	0.159	0.158	- 1.7	- 0.2
TPED/capita (toe/capita)	5.881	5.960	5.862	5.617	5.850	6.020	6.120	6.216	6.289	- 0.0	2.3
Electricity Generation (TWh)	553.5	570.6	563.0	552.1	577.4	590.3	602.0	613.4	624.0	0.9	2.5
Electricity Generation/capita (MWh/capita)	10.8	11.1	10.9	10.7	11.1	11.4	11.6	11.8	12.0	0.6	2.4
Electricity Demand/capita (MWh/capita)	9.9	10.2	10.1	9.8	10.2	10.4	10.6	10.8	11.0	0.7	2.2

Energy Demand - *BAU Scenario*

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	139.8	141.1	133.0	116.6	116.0	117.3	118.6	119.5	117.8	- 2.9	0.2
Oil (Mbbl)	937.1	931.8	927.1	873.3	925.7	956.0	967.4	979.1	989.9	0.5	2.5
Gas (Bm^3)	36.4	42.3	41.0	41.4	43.3	42.8	42.2	42.0	43.8	4.4	1.1
Hydro (TWh)	7.0	7.3	6.2	7.1	7.2	8.1	8.1	8.1	8.1	4.3	2.5
Nuclear (TWh)	148.4	133.5	145.9	160.2	171.4	183.2	191.3	194.7	188.1	- 0.6	3.3
Other Renewables (Mtoe)	15.8	17.1	17.7	18.4	20.6	23.1	25.6	28.5	31.4	7.4	11.3
Total (Mtoe)	**302.1**	**307.6**	**303.1**	**290.8**	**303.1**	**312.1**	**317.4**	**322.5**	**326.4**	**0.3**	**2.3**
Coal	86.2	86.7	82.1	72.4	71.7	72.2	72.7	73.0	71.8	- 3.3	- 0.2
Oil	119.4	118.5	117.3	110.3	116.3	120.1	121.5	122.9	124.3	0.2	2.4
Gas	47.5	55.2	53.5	54.1	56.5	55.9	55.1	54.9	57.2	4.4	1.1
Nuclear	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Hydro	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Other Renewables	15.8	17.1	17.7	18.4	20.6	23.1	25.6	28.5	31.4	7.4	11.3
Total Final Consumption											
Coal (Mton)	50.4	49.3	48.2	45.8	47.9	48.8	49.2	49.3	49.4	- 2.7	1.5
Oil (Mbbl)	926.6	920.0	918.5	867.1	919.8	951.2	962.4	974.1	984.8	0.7	2.6
Gas (Bm^3)	22.6	24.3	23.3	22.5	23.1	23.4	23.5	23.7	23.8	1.6	1.2
Electricity (TWh)	507.7	526.1	520.5	509.3	526.2	537.9	548.4	558.8	568.5	1.0	2.2
Heat (Mtoe)	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.8
Other Renewables (Mtoe)	8.6	9.1	8.9	8.8	8.9	9.4	9.7	10.1	10.4	3.0	3.4
Total (Mtoe)	**230.6**	**233.4**	**231.4**	**222.0**	**231.8**	**238.5**	**241.6**	**244.6**	**247.3**	**0.6**	**2.2**
Coal	33.4	32.5	32.1	30.6	31.4	31.7	31.6	31.5	31.3	- 2.6	0.5
Oil	117.9	116.8	116.1	109.5	115.5	119.5	120.9	122.3	123.6	0.5	2.5
Gas	24.6	27.0	26.9	26.7	28.1	28.9	29.3	29.7	30.1	3.5	2.4
Electricity	43.7	45.2	44.8	43.8	45.3	46.3	47.2	48.1	48.9	1.0	2.2
Heat	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.8
Other Renewables	8.6	9.1	8.9	8.8	8.9	9.4	9.7	10.1	10.4	3.0	3.4
Industry	142.5	143.5	142.9	137.4	144.3	147.4	149.3	151.2	152.8	0.6	2.1
Transport	42.8	43.0	43.0	38.9	40.8	43.4	43.8	44.2	44.5	- 0.5	2.7
Buildings	45.3	46.9	45.5	45.7	46.7	47.7	48.5	49.3	50.0	1.6	1.8

Energy Demand - *BAU Scenario*

(yoy, %)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	8.1	0.9	- 5.7	- 12.4	- 0.5	1.1	1.2	0.7	- 1.4	- 2.9	0.2
Oil (Mbbl)	1.7	- 0.6	- 0.5	- 5.8	6.0	3.3	1.2	1.2	1.1	0.5	2.5
Gas (Bm^3)	4.3	16.2	- 3.1	1.1	4.5	- 1.1	- 1.5	- 0.4	4.1	4.4	1.1
Hydro (TWh)	5.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.3	2.5
Nuclear (TWh)	- 8.4	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.6	3.3
Other Renewables (Mtoe)	16.7	8.0	3.3	4.0	12.1	12.2	10.9	11.0	10.5	7.4	11.3
Total (Mtoe)	**2.8**	**1.8**	**- 1.5**	**- 4.0**	**4.2**	**3.0**	**1.7**	**1.6**	**1.2**	**0.3**	**2.3**
Coal	5.7	0.6	- 5.3	- 11.9	- 1.0	0.7	0.7	0.5	- 1.7	- 3.3	- 0.2
Oil	1.5	- 0.7	- 1.0	- 6.0	5.4	3.3	1.2	1.2	1.1	0.2	2.4
Gas	4.4	16.2	- 3.1	1.1	4.5	- 1.1	- 1.5	- 0.4	4.1	4.4	1.1
Nuclear	6.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.5	2.5
Hydro	- 7.5	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.4	3.3
Other Renewables	16.7	8.0	3.3	4.0	12.1	12.2	10.9	11.0	10.5	7.4	11.3
Total Final Consumption											
Coal (Mton)	2.7	- 2.1	- 2.2	- 4.9	4.5	1.9	0.8	0.2	0.2	- 2.7	1.5
Oil (Mbbl)	3.0	- 0.7	- 0.2	- 5.6	6.1	3.4	1.2	1.2	1.1	0.7	2.6
Gas (Bm^3)	6.3	7.4	- 4.1	- 3.4	2.9	1.3	0.4	0.7	0.5	1.6	1.2
Electricity (TWh)	2.2	3.6	- 1.1	- 2.2	3.3	2.2	2.0	1.9	1.7	1.0	2.2
Heat (Mtoe)	11.8	9.9	- 1.3	0.4	1.5	3.4	3.6	3.9	1.6	6.2	2.8
Other Renewables (Mtoe)	20.4	5.5	- 2.2	- 1.4	1.4	5.1	3.4	3.8	3.2	3.0	3.4
Total (Mtoe)	**3.9**	**1.2**	**- 0.9**	**- 4.0**	**4.4**	**2.9**	**1.3**	**1.3**	**1.1**	**0.6**	**2.2**
Coal	3.1	- 2.6	- 1.3	- 4.6	2.8	0.9	- 0.3	- 0.4	- 0.6	- 2.6	0.5
Oil	3.1	- 0.9	- 0.6	- 5.7	5.5	3.5	1.1	1.2	1.1	0.5	2.5
Gas	6.0	9.7	- 0.6	- 0.5	5.0	3.0	1.5	1.3	1.1	3.5	2.4
Electricity	2.2	3.6	- 1.1	- 2.2	3.3	2.2	2.0	1.9	1.7	1.0	2.2
Heat	11.8	9.9	- 1.3	0.4	1.5	3.4	3.6	3.9	1.6	6.2	2.8
Other Renewables	20.4	5.5	- 2.2	- 1.4	1.4	5.1	3.4	3.8	3.2	3.0	3.4
Industry	5.0	0.7	- 0.4	- 3.8	5.0	2.1	1.3	1.2	1.1	0.6	2.1
Transport	1.2	0.4	0.0	- 9.4	4.9	6.2	0.9	0.9	0.8	- 0.5	2.7
Buildings	3.1	3.5	- 3.1	0.5	2.1	2.3	1.6	1.6	1.4	1.6	1.8

Energy Demand by Sector - *BAU Scenario*

(Mtoe)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Industry	**142.5**	**143.5**	**142.9**	**137.4**	**144.3**	**147.4**	**149.3**	**151.2**	**152.8**	**0.6**	**2.1**
Coal	32.8	32.0	31.8	30.3	31.1	31.4	31.3	31.2	31.0	- 2.4	0.4
Oil	69.8	69.3	69.2	66.3	70.7	72.3	73.3	74.4	75.4	1.3	2.6
Gas	9.4	11.1	11.4	11.4	12.1	12.5	12.8	13.0	13.2	6.1	2.9
Electricity	23.8	24.4	24.1	23.1	24.1	24.7	25.2	25.7	26.2	0.2	2.5
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	6.6	6.7	6.4	6.2	6.3	6.5	6.7	6.9	7.0	1.6	2.5
Transport	**42.8**	**43.0**	**43.0**	**38.9**	**40.8**	**43.4**	**43.8**	**44.2**	**44.5**	**- 0.5**	**2.7**
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	40.9	40.8	40.8	36.9	38.7	41.2	41.5	41.9	42.2	- 0.5	2.7
Gas	1.3	1.2	1.2	1.1	1.2	1.2	1.2	1.1	1.1	- 2.9	0.6
Electricity	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	4.3	7.0
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.5
Buildings*	**45.3**	**46.9**	**45.5**	**45.7**	**46.7**	**47.7**	**48.5**	**49.3**	**50.0**	**1.6**	**1.8**
Coal	0.5	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	- 18.5	4.5
Oil	7.2	6.8	6.1	6.3	6.0	6.0	6.0	6.0	6.0	- 1.5	- 0.9
Gas	14.0	14.7	14.2	14.2	14.8	15.2	15.4	15.6	15.8	2.2	2.1
Electricity	19.6	20.6	20.5	20.5	20.9	21.3	21.7	22.0	22.4	2.0	1.8
Heat	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.8
Other Renewables	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.4	2.5	5.9	5.7
Transform	**140.8**	**147.1**	**143.1**	**138.4**	**143.0**	**146.7**	**150.1**	**153.3**	**155.6**	**0.2**	**2.4**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.5	1.7	1.2	0.8	0.8	0.6	0.6	0.6	0.7	- 17.8	- 4.9
Gas	46.2	53.2	50.6	50.5	52.3	51.1	50.0	49.5	51.6	3.4	0.4
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* include residential, commercial, public·etc usage

Coal - *BAU Scenario*

(Mton)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Coal Demand	**139.8**	**141.1**	**133.0**	**116.6**	**116.0**	**117.3**	**118.6**	**119.5**	**117.8**	**- 2.9**	**0.2**
Transform	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Power Generation	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Heat	-	-	-	-	-	-	-	-	-	-	-
Gas Manufacture	-	-	-	-	-	-	-	-	-	-	-
Total Final Consumption	**50.4**	**49.3**	**48.2**	**45.8**	**47.9**	**48.8**	**49.2**	**49.3**	**49.4**	**- 2.7**	**1.5**
Industry	49.3	48.4	47.6	45.3	47.4	48.4	48.8	49.0	49.1	- 2.4	1.6
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	1.1	0.9	0.6	0.5	0.5	0.4	0.4	0.3	0.3	- 19.1	- 9.6
Consumption by products											
Anthracite	8.3	9.3	7.9	7.2	7.7	7.8	7.8	7.7	7.7	- 7.4	1.4
Bituminous	131.5	131.8	125.1	109.4	108.3	109.5	110.8	111.8	110.1	- 2.6	0.1
Iron making	36.3	34.6	35.0	33.8	35.4	36.3	36.6	36.9	37.0	- 1.7	1.8
Cement	4.2	3.7	4.0	3.4	3.2	3.1	3.0	3.0	3.0	- 6.0	- 2.6
Power Generation	88.3	90.8	83.6	69.8	67.4	67.8	68.8	69.6	67.9	- 2.8	- 0.5

Oil - *BAU Scenario*

(Mbbl)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Oil Demand	**937.1**	**931.8**	**927.1**	**873.3**	**925.7**	**956.0**	**967.4**	**979.1**	**989.9**	**0.5**	**2.5**
Transform	10.5	11.7	8.6	6.2	5.9	4.9	5.0	5.1	5.1	- 15.8	- 3.8
Power Generation	8.1	8.6	5.7	3.4	2.3	1.1	1.1	1.1	1.1	- 23.4	- 20.3
Heat	1.2	1.1	1.7	1.7	2.4	2.6	2.7	2.8	2.8	17.1	11.0
Gas Manufacture	1.2	2.0	1.2	1.1	1.2	1.2	1.2	1.2	1.2	2.0	0.9
Total Final Consumption	**926.6**	**920.0**	**918.5**	**867.1**	**919.8**	**951.2**	**962.4**	**974.1**	**984.8**	**0.7**	**2.6**
Industry	567.0	564.1	566.2	543.0	580.9	594.3	603.2	612.4	621.0	1.6	2.7
Transport	303.2	302.3	303.2	273.9	287.8	305.9	308.4	311.0	313.2	- 0.7	2.7
Buildings	56.4	53.7	49.1	50.1	51.1	50.9	50.8	50.7	50.6	- 1.3	0.2
Consumption by products											
Gasoline	79.6	79.7	82.7	81.0	84.2	86.0	86.8	87.6	88.2	1.1	1.7
Diesel(includingTransformation)	165.9	164.1	166.9	159.0	165.9	169.1	170.9	172.9	174.4	0.7	1.9
Kerosene(includingTransformation)	19.0	18.9	17.1	17.0	17.2	16.9	16.9	16.8	16.8	0.9	- 0.2
B-C (including Transformation)	35.8	33.7	24.0	23.7	21.7	20.9	20.4	20.0	19.9	- 9.1	- 3.5
Jet Oil	38.2	39.9	38.8	21.7	25.6	39.0	39.5	39.9	40.4	- 8.8	13.2
LPG (including Transformation)	105.1	109.4	122.1	122.4	133.8	138.4	140.1	141.7	142.8	6.4	3.1
Naphtha	458.4	451.2	438.6	405.3	439.2	447.4	454.0	461.0	467.6	- 0.3	2.9
Other Non-Energy	35.1	35.1	36.7	43.3	38.1	38.3	38.8	39.2	39.8	5.1	- 1.6

Gas - *BAU Scenario*

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Gas Demand (Mton)	**36.4**	**42.3**	**41.0**	**41.4**	**43.3**	**42.8**	**42.2**	**42.0**	**43.8**	**4.4**	**1.1**
Transform	35.3	40.7	38.8	38.7	40.0	39.1	38.2	37.9	39.5	3.4	0.4
Power Generation	15.2	18.5	17.9	18.6	19.5	18.3	17.2	16.7	18.1	5.5	- 0.5
Heat	1.7	2.3	1.9	1.8	1.8	1.8	1.9	2.0	2.0	2.9	2.4
Gas Manufacture	18.5	20.0	18.9	18.3	18.8	19.0	19.1	19.3	19.4	1.5	1.2
Industry	1.0	1.6	2.2	2.8	3.3	3.7	4.0	4.1	4.3	33.4	9.1
City Gas (Bm^3)	**22.6**	**24.3**	**23.3**	**22.5**	**23.1**	**23.4**	**23.5**	**23.7**	**23.8**	**1.6**	**1.2**
Industry*	7.8	8.8	8.3	7.6	7.6	7.5	7.4	7.4	7.4	0.7	- 0.6
Transport	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	- 2.7	0.6
Buildings	13.6	14.3	13.8	13.8	14.4	14.8	15.0	15.1	15.3	2.4	2.1

* exclude industrial LNG usage

Electricity - *BAU Scenario*

(TWh)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Electricity Demand	**553.5**	**570.6**	**563.0**	**552.1**	**577.4**	**590.3**	**602.0**	**613.4**	**624.0**	**0.9**	**2.5**
Own use and Losses	45.8	44.5	42.5	42.8	51.2	52.4	53.5	54.6	55.5	- 0.7	5.3
Total Final Consumption	**507.7**	**526.1**	**520.5**	**509.3**	**526.2**	**537.9**	**548.4**	**558.8**	**568.5**	**1.0**	**2.2**
Industry	276.7	283.7	279.8	268.7	279.8	287.3	293.2	299.0	304.3	0.2	2.5
Transport	2.8	3.0	2.9	2.7	2.9	3.1	3.3	3.6	3.8	4.3	7.0
Buildings	228.3	239.5	237.8	237.8	243.5	247.5	251.9	256.2	260.3	2.0	1.8
Installed Electrical Capacity (GW)*	**116.4**	**118.5**	**124.6**	**128.5**	**135.7**	**140.6**	**148.2**	**154.9**	**159.7**	**5.7**	**4.4**
Coal	36.8	37.0	37.0	36.9	38.6	39.4	41.4	42.1	40.7	6.2	2.0
Oil	4.1	4.3	3.9	2.2	2.2	1.0	1.0	1.0	1.0	- 12.3	- 13.8
Gas	37.5	37.9	39.4	41.2	41.2	41.5	42.2	43.1	45.7	5.0	2.1
Nuclear	22.5	21.9	23.3	23.3	24.7	26.1	26.8	27.3	26.0	1.4	2.2
Hydro	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	0.1	0.0
Other Renewables	8.9	11.0	14.6	18.5	22.5	26.2	30.3	34.9	39.7	26.9	16.5
Electricity Generation of Power Plants*	**553.5**	**570.6**	**563.0**	**552.1**	**577.4**	**590.3**	**602.0**	**613.4**	**624.0**	**0.9**	**2.5**
Coal	238.8	238.4	227.4	196.3	192.7	194.7	197.5	199.8	194.8	- 0.8	- 0.2
Oil	5.3	5.7	3.3	2.3	1.6	0.7	0.7	0.7	0.7	- 41.1	- 20.1
Gas	126.0	153.5	144.4	146.1	155.6	146.2	137.7	133.2	144.4	7.7	- 0.2
Nuclear	148.4	133.5	145.9	160.2	171.4	183.2	191.3	194.7	188.1	- 0.6	3.3
Hydro	7.0	7.3	6.2	7.3	7.2	8.1	8.1	8.1	8.1	4.6	2.2
Other Renewables	28.0	32.2	35.9	40.1	48.8	57.4	66.6	76.8	87.9	14.5	17.0
Fuel Consumption of Power Plants (Mtoe)*	**114.1**	**117.7**	**115.6**	**111.8**	**115.8**	**119.0**	**122.1**	**125.0**	**127.1**	**- 0.1**	**2.6**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.2	1.3	0.8	0.5	0.3	0.2	0.2	0.2	0.2	- 24.4	- 20.2
Gas	19.8	24.2	23.4	24.3	25.4	23.9	22.5	21.8	23.6	5.5	- 0.5
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Other Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* District Heat is classified by fuel type since 2014

Heat and Other Renewables - *BAU Scenario*

(Mtoe)

										CAGR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Heat Demand	**2.4**	**2.6**	**2.6**	**2.6**	**2.6**	**2.7**	**2.8**	**2.9**	**3.0**	**5.1**	**2.7**
Own use and Losses	0.0	- 0.0	0.0	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 196.8	4.6
Total Final Consumption	**2.4**	**2.7**	**2.6**	**2.7**	**2.7**	**2.8**	**2.9**	**3.0**	**3.0**	**6.2**	**2.8**
Industry	-	-	-	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.8
Heat Production by fuel											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	1.5	1.7	1.7	1.7	1.8	1.8	1.9	2.0	2.0	5.3	2.8
Gas	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	4.8	2.6
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Fuel Consumption of District Heat											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	13.6	10.3
Gas	2.2	2.9	2.5	2.3	2.3	2.4	2.5	2.6	2.6	3.0	2.4
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	**17.3**	**18.7**	**19.0**	**19.9**	**22.2**	**24.9**	**27.4**	**30.2**	**33.2**	**7.2**	**10.7**
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Transform	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0
Total Final Consumption	**8.6**	**9.1**	**8.9**	**8.8**	**8.9**	**9.4**	**9.7**	**10.1**	**10.4**	**3.0**	**3.4**
Industry	6.6	6.7	6.4	6.2	6.3	6.5	6.7	6.9	7.0	1.6	2.5
Transport	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.5
Buildings	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.4	2.5	5.9	5.7

Main Economic and Energy Indicators - *HEG Scenario*

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Economy and Population											
GDP (2010 trillion won)	1 760.8	1 812.0	1 849.0	1 831.2	1 904.7	1 961.8	2 018.7	2 075.2	2 133.4	2.0	3.1
Industrial Production(2010=100)	104.8	106.4	106.7	106.3	108.9	111.1	113.9	116.3	118.8	1.2	2.2
Crude Oil Price (Dubai, USD/bbl)	53.2	69.4	63.5	42.2	60.4	57.9	58.2	62.9	67.4	- 3.6	9.8
Working Days	269.5	270.0	272.5	275.0	276.0	275.5	274.5	272.5	274.5	0.1	- 0.0
Population (million)	51.4	51.6	51.7	51.8	51.8	51.8	51.9	51.9	51.9	0.3	0.0
Average Temperature (ºC)	13.1	13.0	13.5	13.3	13.4	13.2	13.2	13.2	13.2	- 0.3	- 0.2
Cooling Degree days	132.7	209.0	120.4	92.5	104.1	104.1	104.1	104.1	104.1	2.4	2.4
Heating Degree days	2 517.1	2 597.8	2 342.9	2 382.7	2 358.6	2 452.7	2 452.7	2 467.6	2 452.7	0.7	0.6
Energy Indicators											
Total Primary Energy Demand (Mtoe)	302.1	307.6	303.1	290.8	304.3	314.1	320.1	325.7	330.3	0.3	2.6
Energy Intensity (toe/million won)	0.172	0.170	0.164	0.159	0.160	0.160	0.159	0.157	0.155	- 1.7	- 0.5
TPED/capita (toe/capita)	5.881	5.960	5.862	5.617	5.872	6.058	6.171	6.278	6.363	- 0.0	2.5
Electricity Generation (TWh)	553.5	570.6	563.0	552.1	578.8	592.7	605.2	617.6	629.2	0.9	2.6
Electricity Generation/capita (MWh/capita)	10.8	11.1	10.9	10.7	11.2	11.4	11.7	11.9	12.1	0.6	2.6
Electricity Demand/capita (MWh/capita)	9.9	10.2	10.1	9.8	10.2	10.4	10.6	10.8	11.0	0.7	2.3

Energy Demand - *HEG Scenario*

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	139.8	141.1	133.0	116.6	116.4	118.0	119.6	120.6	119.1	- 2.9	0.4
Oil (Mbbl)	937.1	931.8	927.1	873.3	930.1	963.6	977.7	991.6	1 004.9	0.5	2.8
Gas (Bm3)	36.4	42.3	41.0	41.4	43.5	43.2	42.8	42.8	44.7	4.4	1.5
Hydro (TWh)	7.0	7.3	6.2	7.1	7.2	8.1	8.1	8.1	8.1	4.3	2.5
Nuclear (TWh)	148.4	133.5	145.9	160.2	171.4	183.2	191.3	194.7	188.1	- 0.6	3.3
Other Renewables (Mtoe)	15.8	17.1	17.7	18.4	20.6	23.2	25.7	28.5	31.5	7.4	11.4
Total (Mtoe)	**302.1**	**307.6**	**303.1**	**290.8**	**304.3**	**314.1**	**320.1**	**325.7**	**330.3**	**0.3**	**2.6**
Coal	86.2	86.7	82.1	72.4	71.9	72.6	73.2	73.7	72.5	- 3.3	0.0
Oil	119.4	118.5	117.3	110.3	116.8	121.1	122.8	124.5	126.1	0.2	2.7
Gas	47.5	55.2	53.5	54.1	56.9	56.5	55.9	55.9	58.4	4.4	1.5
Nuclear	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Hydro	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Other Renewables	15.8	17.1	17.7	18.4	20.6	23.2	25.7	28.5	31.5	7.4	11.4
Total Final Consumption											
Coal (Mton)	50.4	49.3	48.2	45.8	48.3	49.5	50.1	50.4	50.7	- 2.7	2.0
Oil (Mbbl)	926.6	920.0	918.5	867.1	924.3	958.8	972.8	986.6	999.8	0.7	2.9
Gas (Bm3)	22.6	24.3	23.3	22.5	23.2	23.5	23.6	23.8	24.0	1.6	1.3
Electricity (TWh)	507.7	526.1	520.5	509.3	527.5	540.0	551.4	562.6	573.2	1.0	2.4
Heat (Mtoe)	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.1	6.2	2.8
Other Renewables (Mtoe)	8.6	9.1	8.9	8.8	8.9	9.4	9.7	10.1	10.5	3.0	3.5
Total (Mtoe)	**230.6**	**233.4**	**231.4**	**222.0**	**232.9**	**240.3**	**244.0**	**247.5**	**250.7**	**0.6**	**2.5**
Coal	33.4	32.5	32.1	30.6	31.6	32.1	32.2	32.1	32.1	- 2.6	1.0
Oil	117.9	116.8	116.1	109.5	116.0	120.5	122.2	123.8	125.4	0.5	2.8
Gas	24.6	27.0	26.9	26.7	28.2	29.1	29.6	30.0	30.4	3.5	2.6
Electricity	43.7	45.2	44.8	43.8	45.4	46.4	47.4	48.4	49.3	1.0	2.4
Heat	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.1	6.2	2.8
Other Renewables	8.6	9.1	8.9	8.8	8.9	9.4	9.7	10.1	10.5	3.0	3.5
Industry	142.5	143.5	142.9	137.4	145.1	148.7	151.3	153.6	155.8	0.6	2.5
Transport	42.8	43.0	43.0	38.9	41.0	43.7	44.0	44.3	44.6	- 0.5	2.8
Buildings	45.3	46.9	45.5	45.7	46.8	47.9	48.7	49.5	50.3	1.6	1.9

Energy Demand - *HEG Scenario*

(yoy, %)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	8.1	0.9	- 5.7	- 12.4	- 0.2	1.4	1.3	0.9	- 1.3	- 2.9	0.4
Oil (Mbbl)	1.7	- 0.6	- 0.5	- 5.8	6.5	3.6	1.5	1.4	1.3	0.5	2.8
Gas (Bm3)	4.3	16.2	- 3.1	1.1	5.1	- 0.7	- 1.1	0.0	4.4	4.4	1.5
Hydro (TWh)	5.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.3	2.5
Nuclear (TWh)	- 8.4	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.6	3.3
Other Renewables (Mtoe)	16.7	8.0	3.3	4.0	12.3	12.3	10.9	11.0	10.5	7.4	11.4
Total (Mtoe)	**2.8**	**1.8**	**- 1.5**	**- 4.0**	**4.6**	**3.2**	**1.9**	**1.8**	**1.4**	**0.3**	**2.6**
Coal	5.7	0.6	- 5.3	- 11.9	- 0.6	1.0	0.9	0.6	- 1.5	- 3.3	0.0
Oil	1.5	- 0.7	- 1.0	- 6.0	5.9	3.7	1.4	1.4	1.3	0.2	2.7
Gas	4.4	16.2	- 3.1	1.1	5.1	- 0.7	- 1.1	0.0	4.4	4.4	1.5
Nuclear	6.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.5	2.5
Hydro	- 7.5	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.4	3.3
Other Renewables	16.7	8.0	3.3	4.0	12.3	12.3	10.9	11.0	10.5	7.4	11.4
Total Final Consumption											
Coal (Mton)	2.7	- 2.1	- 2.2	- 4.9	5.3	2.6	1.2	0.6	0.5	- 2.7	2.0
Oil (Mbbl)	3.0	- 0.7	- 0.2	- 5.6	6.6	3.7	1.5	1.4	1.3	0.7	2.9
Gas (Bm3)	6.3	7.4	- 4.1	- 3.4	3.3	1.4	0.5	0.9	0.7	1.6	1.3
Electricity (TWh)	2.2	3.6	- 1.1	- 2.2	3.6	2.4	2.1	2.0	1.9	1.0	2.4
Heat (Mtoe)	11.8	9.9	- 1.3	0.4	1.1	3.6	3.7	4.0	1.7	6.2	2.8
Other Renewables (Mtoe)	20.4	5.5	- 2.2	- 1.4	1.8	5.3	3.5	3.9	3.3	3.0	3.5
Total (Mtoe)	**3.9**	**1.2**	**- 0.9**	**- 4.0**	**4.9**	**3.2**	**1.5**	**1.4**	**1.3**	**0.6**	**2.5**
Coal	3.1	- 2.6	- 1.3	- 4.6	3.5	1.5	0.2	- 0.1	- 0.3	- 2.6	1.0
Oil	3.1	- 0.9	- 0.6	- 5.7	6.0	3.8	1.4	1.4	1.3	0.5	2.8
Gas	6.0	9.7	- 0.6	- 0.5	5.5	3.1	1.7	1.5	1.3	3.5	2.6
Electricity	2.2	3.6	- 1.1	- 2.2	3.6	2.4	2.1	2.0	1.9	1.0	2.4
Heat	11.8	9.9	- 1.3	0.4	1.1	3.6	3.7	4.0	1.7	6.2	2.8
Other Renewables	20.4	5.5	- 2.2	- 1.4	1.8	5.3	3.5	3.9	3.3	3.0	3.5
Industry	5.0	0.7	- 0.4	- 3.8	5.6	2.5	1.7	1.6	1.4	0.6	2.5
Transport	1.2	0.4	0.0	- 9.4	5.4	6.6	0.7	0.7	0.6	- 0.5	2.8
Buildings	3.1	3.5	- 3.1	0.5	2.4	2.4	1.7	1.8	1.5	1.6	1.9

Energy Demand by Sector - *HEG Scenario*

(Mtoe)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Industry	**142.5**	**143.5**	**142.9**	**137.4**	**145.1**	**148.7**	**151.3**	**153.6**	**155.8**	**0.6**	**2.5**
Coal	32.8	32.0	31.8	30.3	31.4	31.8	31.9	31.8	31.8	- 2.4	0.9
Oil	69.8	69.3	69.2	66.3	71.1	72.9	74.4	75.8	77.2	1.3	3.1
Gas	9.4	11.1	11.4	11.4	12.2	12.7	13.0	13.2	13.4	6.1	3.3
Electricity	23.8	24.4	24.1	23.1	24.1	24.8	25.3	25.9	26.3	0.2	2.7
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	6.6	6.7	6.4	6.2	6.3	6.5	6.7	6.9	7.1	1.6	2.7
Transport	**42.8**	**43.0**	**43.0**	**38.9**	**41.0**	**43.7**	**44.0**	**44.3**	**44.6**	**- 0.5**	**2.8**
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	40.9	40.8	40.8	36.9	38.9	41.5	41.8	42.1	42.3	- 0.5	2.8
Gas	1.3	1.2	1.2	1.1	1.2	1.2	1.2	1.1	1.1	- 2.9	0.6
Electricity	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	4.3	7.0
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.4
Buildings*	**45.3**	**46.9**	**45.5**	**45.7**	**46.8**	**47.9**	**48.7**	**49.5**	**50.3**	**1.6**	**1.9**
Coal	0.5	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	- 18.5	4.8
Oil	7.2	6.8	6.1	6.3	6.1	6.0	6.0	6.0	6.0	- 1.5	- 1.0
Gas	14.0	14.7	14.2	14.2	14.9	15.3	15.4	15.6	15.8	2.2	2.2
Electricity	19.6	20.6	20.5	20.5	21.0	21.4	21.8	22.2	22.6	2.0	2.0
Heat	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.1	6.2	2.8
Other Renewables	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.4	2.5	5.9	5.9
Transform	**140.8**	**147.1**	**143.1**	**138.4**	**143.3**	**147.2**	**150.7**	**154.2**	**156.6**	**0.2**	**2.5**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.5	1.7	1.2	0.8	0.8	0.6	0.6	0.6	0.7	- 17.8	- 4.9
Gas	46.2	53.2	50.6	50.5	52.6	51.6	50.6	50.4	52.7	3.4	0.8
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* include residential, commercial, public·etc usage

Coal - *HEG Scenario*

(Mton)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Coal Demand	**139.8**	**141.1**	**133.0**	**116.6**	**116.4**	**118.0**	**119.6**	**120.6**	**119.1**	**- 2.9**	**0.4**
Transform	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Power Generation	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Heat	-	-	-	-	-	-	-	-	-	-	-
Gas Manufacture	-	-	-	-	-	-	-	-	-	-	-
Total Final Consumption	**50.4**	**49.3**	**48.2**	**45.8**	**48.3**	**49.5**	**50.1**	**50.4**	**50.7**	**- 2.7**	**2.0**
Industry	49.3	48.4	47.6	45.3	47.8	49.1	49.8	50.1	50.4	- 2.4	2.1
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	1.1	0.9	0.6	0.5	0.5	0.4	0.4	0.3	0.3	- 19.1	- 9.6
Consumption by products											
Anthracite	8.3	9.3	7.9	7.2	7.7	7.9	7.9	7.9	7.9	- 7.4	1.9
Bituminous	131.5	131.8	125.1	109.4	108.7	110.1	111.6	112.7	111.2	- 2.6	0.3
Iron making	36.3	34.6	35.0	33.8	35.7	36.9	37.5	37.8	38.0	- 1.7	2.4
Cement	4.2	3.7	4.0	3.4	3.2	3.1	3.0	3.0	3.0	- 6.0	- 2.6
Power Generation	88.3	90.8	83.6	69.8	67.4	67.8	68.8	69.6	67.9	- 2.8	- 0.5

Oil - *HEG Scenario*

(Mbbl)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Oil Demand	**937.1**	**931.8**	**927.1**	**873.3**	**930.1**	**963.6**	**977.7**	**991.6**	**1 004.9**	**0.5**	**2.8**
Transform	10.5	11.7	8.6	6.2	5.9	4.9	5.0	5.1	5.1	- 15.8	- 3.7
Power Generation	8.1	8.6	5.7	3.4	2.3	1.1	1.1	1.1	1.1	- 23.4	- 20.3
Heat	1.2	1.1	1.7	1.7	2.4	2.6	2.7	2.8	2.8	17.1	11.0
Gas Manufacture	1.2	2.0	1.2	1.1	1.2	1.2	1.2	1.2	1.2	2.0	1.1
Total Final Consumption	**926.6**	**920.0**	**918.5**	**867.1**	**924.3**	**958.8**	**972.8**	**986.6**	**999.8**	**0.7**	**2.9**
Industry	567.0	564.1	566.2	543.0	584.0	599.6	611.9	623.9	635.7	1.6	3.2
Transport	303.2	302.3	303.2	273.9	289.1	308.3	310.2	312.2	313.7	- 0.7	2.7
Buildings	56.4	53.7	49.1	50.1	51.2	50.8	50.7	50.5	50.4	- 1.3	0.1
Consumption by products											
Gasoline	79.6	79.7	82.7	81.0	84.2	86.4	87.1	87.8	88.2	1.1	1.7
Diesel(including Transformation)	165.9	164.1	166.9	159.0	167.0	170.7	171.9	173.1	174.0	0.7	1.8
Kerosene(includingTransformation)	19.0	18.9	17.1	17.0	17.2	16.9	16.9	16.8	16.8	0.9	- 0.2
B-C (including Transformation)	35.8	33.7	24.0	23.7	21.7	20.9	20.4	20.0	19.9	- 9.1	- 3.5
Jet Oil	38.2	39.9	38.8	21.7	25.8	39.5	40.1	40.8	41.4	- 8.8	13.8
LPG (including Transformation)	105.1	109.4	122.1	122.4	134.3	139.1	141.2	143.2	144.8	6.4	3.4
Naphtha	458.4	451.2	438.6	405.3	441.6	451.6	460.9	470.1	479.3	- 0.3	3.4
Other Non-Energy	35.1	35.1	36.7	43.3	38.3	38.6	39.3	39.8	40.6	5.1	- 1.3

Gas - *HEG Scenario*

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Gas Demand (Mton)	**36.4**	**42.3**	**41.0**	**41.4**	**43.5**	**43.2**	**42.8**	**42.8**	**44.7**	**4.4**	**1.5**
Transform	35.3	40.7	38.8	38.7	40.2	39.5	38.8	38.6	40.3	3.4	0.8
Power Generation	15.2	18.5	17.9	18.6	19.6	18.6	17.6	17.2	18.8	5.5	0.2
Heat	1.7	2.3	1.9	1.8	1.8	1.8	1.9	2.0	2.0	2.9	2.4
Gas Manufacture	18.5	20.0	18.9	18.3	18.9	19.1	19.2	19.4	19.6	1.5	1.4
Industry	1.0	1.6	2.2	2.8	3.3	3.7	4.0	4.2	4.4	33.4	9.5
City Gas (Bm^3)	**22.6**	**24.3**	**23.3**	**22.5**	**23.2**	**23.5**	**23.6**	**23.8**	**24.0**	**1.6**	**1.3**
Industry*	7.8	8.8	8.3	7.6	7.6	7.6	7.5	7.5	7.5	0.7	- 0.2
Transport	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	- 2.7	0.6
Buildings	13.6	14.3	13.8	13.8	14.4	14.8	15.0	15.2	15.4	2.4	2.2

* exclude industrial LNG usage

Electricity - *HEG Scenario*

(TWh)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Electricity Demand	**553.5**	**570.6**	**563.0**	**552.1**	**578.8**	**592.7**	**605.2**	**617.6**	**629.2**	**0.9**	**2.6**
Own use and Losses	45.8	44.5	42.5	42.8	51.3	52.6	53.8	55.0	56.0	- 0.7	5.5
Total Final Consumption	**507.7**	**526.1**	**520.5**	**509.3**	**527.5**	**540.0**	**551.4**	**562.6**	**573.2**	**1.0**	**2.4**
Industry	276.7	283.7	279.8	268.7	280.3	288.2	294.4	300.6	306.3	0.2	2.7
Transport	2.8	3.0	2.9	2.7	2.9	3.1	3.3	3.6	3.8	4.3	7.0
Buildings	228.3	239.5	237.8	237.8	244.2	248.7	253.6	258.5	263.1	2.0	2.0
Installed Electrical Capacity (GW)*	**116.4**	**118.5**	**124.6**	**128.5**	**135.7**	**140.6**	**148.2**	**154.9**	**159.7**	**5.7**	**4.4**
Coal	36.8	37.0	37.0	36.9	38.6	39.4	41.4	42.1	40.7	6.2	2.0
Oil	4.1	4.3	3.9	2.2	2.2	1.0	1.0	1.0	1.0	- 12.3	- 13.8
Gas	37.5	37.9	39.4	41.2	41.2	41.5	42.2	43.1	45.7	5.0	2.1
Nuclear	22.5	21.9	23.3	23.3	24.7	26.1	26.8	27.3	26.0	1.4	2.2
Hydro	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	0.1	0.0
Other Renewables	8.9	11.0	14.6	18.5	22.5	26.2	30.3	34.9	39.7	26.9	16.5
Electricity Generation of Power Plants*	**553.5**	**570.6**	**563.0**	**552.1**	**578.8**	**592.7**	**605.2**	**617.6**	**629.2**	0.9	2.6
Coal	238.8	238.4	227.4	196.3	192.7	194.7	197.5	199.8	194.8	- 0.8	- 0.2
Oil	5.3	5.7	3.3	2.3	1.6	0.7	0.7	0.7	0.7	- 41.1	- 20.1
Gas	126.0	153.5	144.4	146.1	157.0	148.6	141.0	137.4	149.6	7.7	0.5
Nuclear	148.4	133.5	145.9	160.2	171.4	183.2	191.3	194.7	188.1	- 0.6	3.3
Hydro	7.0	7.3	6.2	7.3	7.2	8.1	8.1	8.1	8.1	4.6	2.2
Other Renewables	28.0	32.2	35.9	40.1	48.8	57.4	66.6	76.8	87.9	14.5	17.0
Fuel Consumption of Power Plants (Mtoe)*	**114.1**	**117.7**	**115.6**	**111.8**	**116.0**	**119.4**	**122.7**	**125.7**	**128.0**	**- 0.1**	**2.7**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.2	1.3	0.8	0.5	0.3	0.2	0.2	0.2	0.2	- 24.4	- 20.2
Gas	19.8	24.2	23.4	24.3	25.6	24.2	23.0	22.5	24.5	5.5	0.2
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Other Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* District Heat is classified by fuel type since 2014

Heat and Other Renewables - *HEG Scenario*

(Mtoe)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Heat Demand	**2.4**	**2.6**	**2.6**	**2.6**	**2.6**	**2.7**	**2.8**	**2.9**	**3.0**	**5.1**	**2.8**
Own use and Losses	0.0	- 0.0	0.0	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 196.8	4.5
Total Final Consumption	**2.4**	**2.7**	**2.6**	**2.7**	**2.7**	**2.8**	**2.9**	**3.0**	**3.1**	**6.2**	**2.8**
Industry	-	-	-	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.1	6.2	2.8
Heat Production by fuel											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	1.5	1.7	1.7	1.7	1.8	1.8	1.9	2.0	2.0	5.3	2.8
Gas	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	4.8	2.6
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Fuel Consumption of District Heat											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	13.6	10.3
Gas	2.2	2.9	2.5	2.3	2.3	2.4	2.5	2.6	2.6	3.0	2.4
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	**17.3**	**18.7**	**19.0**	**19.9**	**22.2**	**24.9**	**27.4**	**30.3**	**33.2**	**7.2**	**10.8**
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Transform	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0
Total Final Consumption	**8.6**	**9.1**	**8.9**	**8.8**	**8.9**	**9.4**	**9.7**	**10.1**	**10.5**	**3.0**	**3.5**
Industry	6.6	6.7	6.4	6.2	6.3	6.5	6.7	6.9	7.1	1.6	2.7
Transport	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.4
Buildings	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.4	2.5	5.9	5.9

Main Economic and Energy Indicators - *LEG Scenario*

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Economy and Population											
GDP (2010 trillion won)	1 760.8	1 812.0	1 849.0	1 831.2	1 868.1	1 905.4	1 941.6	1 976.6	2 012.2	2.0	1.9
Industrial Production(2010=100)	104.8	106.4	106.7	106.3	107.6	109.0	110.8	112.3	113.8	1.2	1.4
Crude Oil Price (Dubai, USD/bbl)	53.2	69.4	63.5	42.2	60.4	57.9	58.2	62.9	67.4	- 3.6	9.8
Working Days	269.5	270.0	272.5	275.0	276.0	275.5	274.5	272.5	274.5	0.1	- 0.0
Population (million)	51.4	51.6	51.7	51.8	51.8	51.8	51.9	51.9	51.9	0.3	0.0
Average Temperature (ºC)	13.1	13.0	13.5	13.3	13.4	13.2	13.2	13.2	13.2	- 0.3	- 0.2
Cooling Degree days	132.7	209.0	120.4	92.5	104.1	104.1	104.1	104.1	104.1	2.4	2.4
Heating Degree days	2 517.1	2 597.8	2 342.9	2 382.7	2 358.6	2 452.7	2 452.7	2 467.6	2 452.7	0.7	0.6
Energy Indicators											
Total Primary Energy Demand (Mtoe)	302.1	307.6	303.1	290.8	301.8	310.0	314.9	319.3	322.5	0.3	2.1
Energy Intensity (toe/million won)	0.172	0.170	0.164	0.159	0.162	0.163	0.162	0.162	0.160	- 1.7	0.2
TPED/capita (toe/capita)	5.881	5.960	5.862	5.617	5.824	5.979	6.071	6.154	6.213	- 0.0	2.0
Electricity Generation (TWh)	553.5	570.6	563.0	552.1	576.0	588.0	598.8	609.2	618.9	0.9	2.3
Electricity Generation/capita (MWh/capita)	10.8	11.1	10.9	10.7	11.1	11.3	11.5	11.7	11.9	0.6	2.3
Electricity Demand/capita (MWh/capita)	9.9	10.2	10.1	9.8	10.1	10.3	10.5	10.7	10.9	0.7	2.0

Energy Demand - *LEG Scenario*

(yoy, %)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	8.1	0.9	- 5.7	- 12.4	- 1.4	0.9	1.0	0.7	- 1.6	- 2.9	- 0.1
Oil (Mbbl)	1.7	- 0.6	- 0.5	- 5.8	5.6	3.1	1.1	0.9	0.8	0.5	2.3
Gas (Bm^3)	4.3	16.2	- 3.1	1.1	3.6	- 1.7	- 2.0	- 0.8	3.8	4.4	0.6
Hydro (TWh)	5.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.3	2.5
Nuclear (TWh)	- 8.4	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.6	3.3
Other Renewables (Mtoe)	16.7	8.0	3.3	4.0	11.9	12.2	10.8	11.0	10.4	7.4	11.3
Total (Mtoe)	**2.8**	**1.8**	**- 1.5**	**- 4.0**	**3.8**	**2.7**	**1.6**	**1.4**	**1.0**	**0.3**	**2.1**
Coal	5.7	0.6	- 5.3	- 11.9	- 1.5	0.5	0.6	0.4	- 1.8	- 3.3	- 0.4
Oil	1.5	- 0.7	- 1.0	- 6.0	5.0	3.1	1.1	0.9	0.8	0.2	2.1
Gas	4.4	16.2	- 3.1	1.1	3.6	- 1.7	- 2.0	- 0.8	3.8	4.4	0.6
Nuclear	6.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.5	2.5
Hydro	- 7.5	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.4	3.3
Other Renewables	16.7	8.0	3.3	4.0	11.9	12.2	10.8	11.0	10.4	7.4	11.3
Total Final Consumption											
Coal (Mton)	2.7	- 2.1	- 2.2	- 4.9	2.3	1.4	0.4	0.1	- 0.1	- 2.7	0.8
Oil (Mbbl)	3.0	- 0.7	- 0.2	- 5.6	5.7	3.2	1.1	0.9	0.8	0.7	2.3
Gas (Bm^3)	6.3	7.4	- 4.1	- 3.4	2.1	0.8	0.1	0.5	0.3	1.6	0.8
Electricity (TWh)	2.2	3.6	- 1.1	- 2.2	3.1	2.1	1.8	1.7	1.6	1.0	2.1
Heat (Mtoe)	11.8	9.9	- 1.3	0.4	1.9	2.9	3.4	3.9	1.4	6.2	2.7
Other Renewables (Mtoe)	20.4	5.5	- 2.2	- 1.4	1.0	5.0	3.3	3.7	3.0	3.0	3.2
Total (Mtoe)	**3.9**	**1.2**	**- 0.9**	**- 4.0**	**3.9**	**2.6**	**1.1**	**1.0**	**0.8**	**0.6**	**1.9**
Coal	3.1	- 2.6	- 1.3	- 4.6	1.6	0.4	- 0.5	- 0.6	- 0.9	- 2.6	0.0
Oil	3.1	- 0.9	- 0.6	- 5.7	5.1	3.3	1.1	0.9	0.8	0.5	2.2
Gas	6.0	9.7	- 0.6	- 0.5	4.1	2.4	1.2	1.1	0.9	3.5	1.9
Electricity	2.2	3.6	- 1.1	- 2.2	3.1	2.1	1.8	1.7	1.6	1.0	2.1
Heat	11.8	9.9	- 1.3	0.4	1.9	2.9	3.4	3.9	1.4	6.2	2.7
Other Renewables	20.4	5.5	- 2.2	- 1.4	1.0	5.0	3.3	3.7	3.0	3.0	3.2
Industry	5.0	0.7	- 0.4	- 3.8	4.4	1.9	1.1	0.9	0.7	0.6	1.8
Transport	1.2	0.4	0.0	- 9.4	4.6	5.8	0.9	0.8	0.7	- 0.5	2.5
Buildings	3.1	3.5	- 3.1	0.5	1.8	2.0	1.4	1.5	1.2	1.6	1.6

Energy Demand - *LEG Scenario*

(yoy, %)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Primary Energy Supply											
Coal (Mton)	8.1	0.9	- 5.7	- 12.4	- 1.4	0.9	1.0	0.7	- 1.6	- 2.9	- 0.1
Oil (Mbbl)	1.7	- 0.6	- 0.5	- 5.8	5.6	3.1	1.1	0.9	0.8	0.5	2.3
Gas (Bm^3)	4.3	16.2	- 3.1	1.1	3.6	- 1.7	- 2.0	- 0.8	3.8	4.4	0.6
Hydro (TWh)	5.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.3	2.5
Nuclear (TWh)	- 8.4	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.6	3.3
Other Renewables (Mtoe)	16.7	8.0	3.3	4.0	11.9	12.2	10.8	11.0	10.4	7.4	11.3
Total (Mtoe)	**2.8**	**1.8**	**- 1.5**	**- 4.0**	**3.8**	**2.7**	**1.6**	**1.4**	**1.0**	**0.3**	**2.1**
Coal	5.7	0.6	- 5.3	- 11.9	- 1.5	0.5	0.6	0.4	- 1.8	- 3.3	- 0.4
Oil	1.5	- 0.7	- 1.0	- 6.0	5.0	3.1	1.1	0.9	0.8	0.2	2.1
Gas	4.4	16.2	- 3.1	1.1	3.6	- 1.7	- 2.0	- 0.8	3.8	4.4	0.6
Nuclear	6.5	3.9	- 14.1	14.4	1.4	11.8	0.0	0.2	- 0.2	4.5	2.5
Hydro	- 7.5	- 10.1	9.3	9.8	7.0	6.9	4.5	1.8	- 3.4	- 0.4	3.3
Other Renewables	16.7	8.0	3.3	4.0	11.9	12.2	10.8	11.0	10.4	7.4	11.3
Total Final Consumption											
Coal (Mton)	2.7	- 2.1	- 2.2	- 4.9	2.3	1.4	0.4	0.1	- 0.1	- 2.7	0.8
Oil (Mbbl)	3.0	- 0.7	- 0.2	- 5.6	5.7	3.2	1.1	0.9	0.8	0.7	2.3
Gas (Bm^3)	6.3	7.4	- 4.1	- 3.4	2.1	0.8	0.1	0.5	0.3	1.6	0.8
Electricity (TWh)	2.2	3.6	- 1.1	- 2.2	3.1	2.1	1.8	1.7	1.6	1.0	2.1
Heat (Mtoe)	11.8	9.9	- 1.3	0.4	1.9	2.9	3.4	3.9	1.4	6.2	2.7
Other Renewables (Mtoe)	20.4	5.5	- 2.2	- 1.4	1.0	5.0	3.3	3.7	3.0	3.0	3.2
Total (Mtoe)	**3.9**	**1.2**	**- 0.9**	**- 4.0**	**3.9**	**2.6**	**1.1**	**1.0**	**0.8**	**0.6**	**1.9**
Coal	3.1	- 2.6	- 1.3	- 4.6	1.6	0.4	- 0.5	- 0.6	- 0.9	- 2.6	0.0
Oil	3.1	- 0.9	- 0.6	- 5.7	5.1	3.3	1.1	0.9	0.8	0.5	2.2
Gas	6.0	9.7	- 0.6	- 0.5	4.1	2.4	1.2	1.1	0.9	3.5	1.9
Electricity	2.2	3.6	- 1.1	- 2.2	3.1	2.1	1.8	1.7	1.6	1.0	2.1
Heat	11.8	9.9	- 1.3	0.4	1.9	2.9	3.4	3.9	1.4	6.2	2.7
Other Renewables	20.4	5.5	- 2.2	- 1.4	1.0	5.0	3.3	3.7	3.0	3.0	3.2
Industry	5.0	0.7	- 0.4	- 3.8	4.4	1.9	1.1	0.9	0.7	0.6	1.8
Transport	1.2	0.4	0.0	- 9.4	4.6	5.8	0.9	0.8	0.7	- 0.5	2.5
Buildings	3.1	3.5	- 3.1	0.5	1.8	2.0	1.4	1.5	1.2	1.6	1.6

Energy Demand by Sector - *LEG Scenario*

(Mtoe)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Industry	**142.5**	**143.5**	**142.9**	**137.4**	**143.4**	**146.1**	**147.8**	**149.1**	**150.2**	**0.6**	**1.8**
Coal	32.8	32.0	31.8	30.3	30.8	30.9	30.8	30.6	30.3	- 2.4	- 0.0
Oil	69.8	69.3	69.2	66.3	70.5	71.9	72.9	73.6	74.3	1.3	2.3
Gas	9.4	11.1	11.4	11.4	11.9	12.2	12.4	12.5	12.6	6.1	2.0
Electricity	23.8	24.4	24.1	23.1	24.0	24.6	25.1	25.6	26.0	0.2	2.4
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	6.6	6.7	6.4	6.2	6.3	6.5	6.6	6.8	7.0	1.6	2.3
Transport	**42.8**	**43.0**	**43.0**	**38.9**	**40.7**	**43.1**	**43.5**	**43.8**	**44.1**	**- 0.5**	**2.5**
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	40.9	40.8	40.8	36.9	38.6	40.9	41.2	41.6	41.8	- 0.5	2.5
Gas	1.3	1.2	1.2	1.1	1.2	1.2	1.2	1.1	1.1	- 2.9	0.6
Electricity	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	4.3	7.0
Heat	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.3
Buildings*	**45.3**	**46.9**	**45.5**	**45.7**	**46.5**	**47.4**	**48.1**	**48.8**	**49.4**	**1.6**	**1.6**
Coal	0.5	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	- 18.5	1.8
Oil	7.2	6.8	6.1	6.3	6.0	6.0	6.0	5.9	5.9	- 1.5	- 1.1
Gas	14.0	14.7	14.2	14.2	14.8	15.1	15.3	15.5	15.6	2.2	1.9
Electricity	19.6	20.6	20.5	20.5	20.9	21.2	21.5	21.8	22.1	2.0	1.6
Heat	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.7
Other Renewables	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.3	2.5	5.9	5.5
Transform	**140.8**	**147.1**	**143.1**	**138.4**	**142.6**	**146.0**	**149.2**	**152.2**	**154.2**	**0.2**	**2.2**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.5	1.7	1.2	0.8	0.8	0.6	0.6	0.6	0.6	- 17.8	- 5.0
Gas	46.2	53.2	50.6	50.5	51.9	50.4	49.1	48.4	50.3	3.4	- 0.1
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* include residential, commercial, public·etc usage

Coal - *LEG Scenario*

(Mton)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Coal Demand	**139.8**	**141.1**	**133.0**	**116.6**	**115.0**	**116.0**	**117.1**	**117.9**	**116.1**	**- 2.9**	**- 0.1**
Transform	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Power Generation	89.4	91.8	84.8	70.7	68.1	68.4	69.4	70.2	68.4	- 3.0	- 0.7
Heat	-	-	-	-	-	-	-	-	-	-	-
Gas Manufacture	-	-	-	-	-	-	-	-	-	-	-
Total Final Consumption	**50.4**	**49.3**	**48.2**	**45.8**	**46.9**	**47.5**	**47.7**	**47.7**	**47.7**	**- 2.7**	**0.8**
Industry	49.3	48.4	47.6	45.3	46.4	47.1	47.3	47.4	47.4	- 2.4	0.9
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	1.1	0.9	0.6	0.5	0.5	0.4	0.4	0.3	0.3	- 19.1	- 9.6
Consumption by products											
Anthracite	8.3	9.3	7.9	7.2	7.1	7.2	7.1	7.0	7.0	- 7.4	- 0.6
Bituminous	131.5	131.8	125.1	109.4	107.9	108.8	110.0	110.9	109.1	- 2.6	- 0.0
Iron making	36.3	34.6	35.0	33.8	34.9	35.6	35.8	36.0	36.0	- 1.7	1.3
Cement	4.2	3.7	4.0	3.4	3.2	3.1	3.0	3.0	3.0	- 6.0	- 2.6
Power Generation	88.3	90.8	83.6	69.8	67.4	67.8	68.8	69.6	67.9	- 2.8	- 0.5

Oil - *LEG Scenario*

(Mbbl)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Oil Demand	**937.1**	**931.8**	**927.1**	**873.3**	**922.0**	**950.4**	**961.1**	**969.7**	**977.3**	**0.5**	**2.3**
Transform	10.5	11.7	8.6	6.2	5.9	4.8	4.9	5.0	5.1	- 15.8	- 3.9
Power Generation	8.1	8.6	5.7	3.4	2.3	1.1	1.1	1.1	1.1	- 23.4	- 20.3
Heat	1.2	1.1	1.7	1.7	2.4	2.6	2.7	2.8	2.8	17.1	10.9
Gas Manufacture	1.2	2.0	1.2	1.1	1.1	1.2	1.2	1.2	1.2	2.0	0.6
Total Final Consumption	**926.6**	**920.0**	**918.5**	**867.1**	**916.1**	**945.6**	**956.1**	**964.7**	**972.2**	**0.7**	**2.3**
Industry	567.0	564.1	566.2	543.0	578.4	591.3	599.4	605.8	611.6	1.6	2.4
Transport	303.2	302.3	303.2	273.9	286.9	303.7	306.2	308.5	310.3	- 0.7	2.5
Buildings	56.4	53.7	49.1	50.1	50.8	50.6	50.5	50.4	50.3	- 1.3	0.1
Consumption by products											
Gasoline	79.6	79.7	82.7	81.0	83.6	85.1	85.8	86.5	87.1	1.1	1.5
Diesel (including Transformation)	165.9	164.1	166.9	159.0	164.8	167.8	169.4	171.3	172.6	0.7	1.7
Kerosene(includingTransformation)	19.0	18.9	17.1	17.0	17.1	16.7	16.6	16.5	16.5	0.9	- 0.6
B-C (including Transformation)	35.8	33.7	24.0	23.7	22.2	20.8	20.6	20.2	19.9	- 9.1	- 3.4
Jet Oil	38.2	39.9	38.8	21.7	25.6	38.9	39.2	39.5	39.8	- 8.8	12.9
LPG (including Transformation)	105.1	109.4	122.1	122.4	133.6	137.8	139.9	141.1	141.8	6.4	3.0
Naphtha	458.4	451.2	438.6	405.3	437.2	445.2	451.1	455.9	460.3	- 0.3	2.6
Other Non-Energy	35.1	35.1	36.7	43.3	37.9	38.0	38.4	38.7	39.1	5.1	- 2.0

Gas - *LEG Scenario*

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Total Gas Demand (Mton)	**36.4**	**42.3**	**41.0**	**41.4**	**42.9**	**42.2**	**41.4**	**41.1**	**42.6**	**4.4**	**0.6**
Transform	35.3	40.7	38.8	38.7	39.7	38.6	37.6	37.1	38.5	3.4	- 0.1
Power Generation	15.2	18.5	17.9	18.6	19.3	18.0	16.8	16.1	17.5	5.5	- 1.3
Heat	1.7	2.3	1.9	1.8	1.8	1.8	1.9	2.0	2.0	2.9	2.3
Gas Manufacture	18.5	20.0	18.9	18.3	18.7	18.8	18.9	19.0	19.1	1.5	0.8
Industry	1.0	1.6	2.2	2.8	3.2	3.6	3.8	4.0	4.1	33.4	8.3
City Gas (Bm^3)	**22.6**	**24.3**	**23.3**	**22.5**	**22.9**	**23.1**	**23.2**	**23.3**	**23.4**	**1.6**	**0.8**
Industry*	7.8	8.8	8.3	7.6	7.4	7.3	7.2	7.1	7.1	0.7	- 1.4
Transport	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	- 2.7	0.6
Buildings	13.6	14.3	13.8	13.8	14.4	14.7	14.9	15.0	15.2	2.4	1.9

* exclude industrial LNG usage

Electricity - *LEG Scenario*

(TWh)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Electricity Demand	**553.5**	**570.6**	**563.0**	**552.1**	**576.0**	**588.0**	**598.8**	**609.2**	**618.9**	**0.9**	**2.3**
Own use and Losses	45.8	44.5	42.5	42.8	51.1	52.2	53.3	54.2	55.1	- 0.7	5.2
Total Final Consumption	**507.7**	**526.1**	**520.5**	**509.3**	**525.0**	**535.8**	**545.5**	**555.0**	**563.8**	**1.0**	**2.1**
Industry	276.7	283.7	279.8	268.7	279.2	286.5	292.0	297.5	302.5	0.2	2.4
Transport	2.8	3.0	2.9	2.7	2.9	3.1	3.3	3.6	3.8	4.3	7.0
Buildings	228.3	239.5	237.8	237.8	242.9	246.3	250.2	253.9	257.5	2.0	1.6
Installed Electrical Capacity (GW)*	**116.4**	**118.5**	**124.6**	**128.5**	**135.7**	**140.6**	**148.2**	**154.9**	**159.7**	**5.7**	**4.4**
Coal	36.8	37.0	37.0	36.9	38.6	39.4	41.4	42.1	40.7	6.2	2.0
Oil	4.1	4.3	3.9	2.2	2.2	1.0	1.0	1.0	1.0	- 12.3	- 13.8
Gas	37.5	37.9	39.4	41.2	41.2	41.5	42.2	43.1	45.7	5.0	2.1
Nuclear	22.5	21.9	23.3	23.3	24.7	26.1	26.8	27.3	26.0	1.4	2.2
Hydro	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	0.1	0.0
Other Renewables	8.9	11.0	14.6	18.5	22.5	26.2	30.3	34.9	39.7	26.9	16.5
Electricity Generation of Power Plants*	**553.5**	**570.6**	**563.0**	**552.1**	**576.0**	**588.0**	**598.8**	**609.2**	**618.9**	0.9	2.3
Coal	238.8	238.4	227.4	196.3	192.7	194.7	197.5	199.8	194.8	- 0.8	- 0.2
Oil	5.3	5.7	3.3	2.3	1.6	0.7	0.7	0.7	0.7	- 41.1	- 20.1
Gas	126.0	153.5	144.4	146.1	154.3	144.0	134.5	129.0	139.2	7.7	- 1.0
Nuclear	148.4	133.5	145.9	160.2	171.4	183.2	191.3	194.7	188.1	- 0.6	3.3
Hydro	7.0	7.3	6.2	7.3	7.2	8.1	8.1	8.1	8.1	4.6	2.2
Other Renewables	28.0	32.2	35.9	40.1	48.8	57.4	66.6	76.8	87.9	14.5	17.0
Fuel Consumption of Power Plants (Mtoe)*	**114.1**	**117.7**	**115.6**	**111.8**	**115.5**	**118.6**	**121.6**	**124.3**	**126.3**	**- 0.1**	**2.5**
Coal	52.8	54.2	50.1	41.8	40.2	40.5	41.0	41.5	40.5	- 3.7	- 0.6
Oil	1.2	1.3	0.8	0.5	0.3	0.2	0.2	0.2	0.2	- 24.4	- 20.2
Gas	19.8	24.2	23.4	24.3	25.2	23.5	22.0	21.1	22.8	5.5	- 1.3
Nuclear	31.6	28.4	31.1	34.1	36.5	39.0	40.7	41.5	40.1	- 0.4	3.3
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Other Renewables	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0

* District Heat is classified by fuel type since 2014

Heat and Other Renewables - *LEG Scenario*

(Mtoe)

										GACR (%)	
	2017	2018	2019	2020p	2021e	2022e	2023e	2024e	2025e	15-20	20-25
Net Heat Demand	**2.4**	**2.6**	**2.6**	**2.6**	**2.7**	**2.7**	**2.8**	**2.9**	**3.0**	**5.1**	**2.7**
Own use and Losses	0.0	-0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-196.8	4.5
Total Final Consumption	**2.4**	**2.7**	**2.6**	**2.7**	**2.7**	**2.8**	**2.9**	**3.0**	**3.0**	**6.2**	**2.7**
Industry	-	-	-	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-	-	-	-
Buildings	2.4	2.7	2.6	2.7	2.7	2.8	2.9	3.0	3.0	6.2	2.7
Heat Production by fuel											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	1.5	1.7	1.7	1.7	1.8	1.8	1.9	2.0	2.0	5.3	2.7
Gas	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	4.8	2.5
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Fuel Consumption of District Heat											
Coal	-	-	-	-	-	-	-	-	-	-	-
Oil	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	13.6	10.2
Gas	2.2	2.9	2.5	2.3	2.3	2.4	2.5	2.6	2.6	3.0	2.3
Nuclear	-	-	-	-	-	-	-	-	-	-	-
Hydro	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	-	-	-	-	-	-	-
Other Renewables	**17.3**	**18.7**	**19.0**	**19.9**	**22.1**	**24.8**	**27.3**	**30.1**	**33.1**	**7.2**	**10.7**
Hydro	1.5	1.5	1.3	1.5	1.5	1.7	1.7	1.7	1.7	4.5	2.5
Transform	7.2	8.0	8.8	9.6	11.7	13.8	16.0	18.4	21.1	12.9	17.0
Total Final Consumption	**8.6**	**9.1**	**8.9**	**8.8**	**8.9**	**9.3**	**9.6**	**10.0**	**10.3**	**3.0**	**3.2**
Industry	6.6	6.7	6.4	6.2	6.3	6.5	6.6	6.8	7.0	1.6	2.3
Transport	0.4	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	9.3	4.3
Buildings	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.3	2.5	5.9	5.5

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