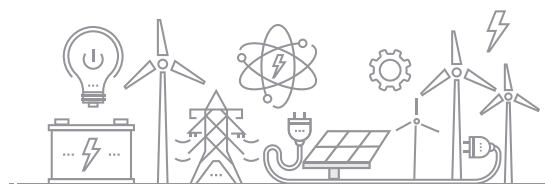


# KEEI Korea Energy Demand Outlook



KOREA ENERGY ECONOMICS INSTITUTE

2019 / Second

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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# Summary

## Energy Trends

- **Total Primary Energy Supply (“TPES”) dropped by 1.7% to 150.0Mtoe in the 1<sup>st</sup> half of 2019 on a year-on-year basis.**
  - The growth of TPES was much slower than the economic growth rate, which was affected by weak industrial and service production amid the economic downturn, increased maintenance at petrochemical facilities and weather conditions.
  - Especially, warmer winter than the previous year and the maintenance work at major petrochemical facilities resulted in much slower energy consumption growth, as compared to the economic growth rate. TPES, except the feedstock energy, fell by 1.3% on a year-on-year basis.
- **The use of all energy sources decreased, except nuclear and renewable energy that are hardly affected by prices or the economic situation.**
  - **Petroleum (-2.5%)** Industrial petroleum use declined, mainly naphtha, as the industrial production slowed down, and some naphtha cracking centers underwent maintenance or ceased operation due to safety issues, although the transport sector consumed more petroleum (1.1%) amid falling global oil prices (-3.7%) and with a temporary fuel tax credit.
  - **Coal (-8.5%)** Industrial coal use fell slightly partly due to the sluggish production, and the consumption fell more sharply in the power generation sector owing to the increased planned preventive maintenance at coal-fired power plants, the temporary shutdown of some power plants following accidents, the government’s limit on the maximum output of thermal power plants as a means of fine dust mitigation.
  - **Nuclear (+33.0%)** The use of nuclear energy surged, as the capacity factors rapidly increased (over 22%p yoy) after several reactors completed maintenance work that took over a year under more stringent safety regulations.
  - **Gas (-6.9%)** Gas consumption rapidly decreased in the power generation sector due to falling power demand, base effect of the surge during the same period last year (32.1%), increased nuclear generation, and the consumption fell in the city gas production sector as well amid the sharply decreased number of heating degree days(Jan-Feb), and as city gas was replaced by other energy sources due to increased price.

- **Electricity (-0.7%)** Industrial and buildings' electricity use declined, as temperatures returned to normal and the service production index grew at slower pace; electricity consumption grew more slowly in the fabricated metals and petrochemical sectors, while it declined more rapidly in the primary metals sector.
- **Total Final Consumption ("TFC") went down by 1.2% to 116.4Mtoe in the 1<sup>st</sup> half of 2019 compared to the corresponding period last year.**
  - **Industry(-1.3%)** Industrial energy use declined as a result of weak production and decreased naphtha use due to the increased maintenance at naphtha cracking centers.
  - **Transport (+1.0%)** Transport energy use increased, which was attributed to the increased number of registered cars, falling oil prices overseas and the fuel tax cut.
  - **Buildings (-2.8%)** Energy use in buildings decreased, which was affected by weather conditions and increased energy rates.

## Energy Outlook

- **TPES is expected to decline by 1.6% to 301.2Mtoe in 2019 but to increase by 2.1% to 307.5Mtoe in 2020( on a year-on-year basis).**
  - TPES and TFC are set to decline in 2019 amid the economic downturn, facility maintenance in large energy consuming industries and a return to the average temperatures. In 2020, however, they are expected to rebound along with a rapid economic growth and base effect.
- **Petroleum and gas demands are projected to recover from the downward trend, and coal demand is to drop more slowly, while nuclear demand is to grow at slower pace.**
  - Petroleum demand is forecast to decrease in 2019 partly because of the maintenance at some petrochemical facilities, but it will recover in 2020 with the completion of the work.
  - Coal demand is projected to fall in 2019 and 2020 as well on a year-on-year basis. The pace of decline, however, is to be slower, as the sharp fall in demand will likely decelerate in the power generations sector.
  - The nuclear generation is expected to grow by 12% in 2019 and 6% in 2020 following the commissioning of a new reactor. However, the growth will be slower, as stronger safety inspections at nuclear power plants continue.

- Gas demand is expected to drop sharply in 2019 in both the power generation and city gas production sectors, while the demand will likely increase in 2020, as electricity demand rebounds and the number of heating degree days increases.
- Electricity demand is forecast to decline in the industrial and buildings sectors in 2019 but expected to bounce back in 2020 along with a faster economic growth.
- **In 2019, the energy consumption growth is forecast to be flat in the industrial sector compared to the previous year, rebound in the transport sector and start to decline in the buildings sector.**
  - Industrial energy demand is set to decline by 0.8% in 2019 from the previous year, owing to the sluggish industrial production amid the economic downturn at home and abroad and massive maintenance in the large energy consuming industries. In 2020, however, the demand is expected to rebound by around 2% backed by increased exports, faster economic growth and base effect.
  - Transport energy demand is projected to be up 0.6% in 2019 than the previous year as a result of the oil price decline and temporary fuel tax cut. In 2020, the demand growth will likely slow down (0.3%), owing to a slower decline in oil prices and the tax cut expiration.
  - Energy demand in buildings is expected to fall by 2.7% year-on-year in 2019 partly due to the sharp drop in the number of cooling & heating degree days. In 2020, around 2% demand growth is expected owing to the base effect and increased production activities in the service sector.

### **Key features and Implications**

- **Energy use fell more sharply in the 1<sup>st</sup> half of 2019 compared to the pace of economic slowdown, which was attributed to the increased maintenance at some petrochemical facilities and weather conditions.**
  - The growth of the economy and energy use showed different trends in the 1<sup>st</sup> half of 2019, as the economy grew by 1.9% year-on-year while TFC fell by 1.2%.
  - Industrial energy use dropped by 1.3% year-on-year as a result of the sharply decreased naphtha use during the maintenance at naphtha cracking centers, leading the downward trend in the nation-wide energy use.
- **Electricity demand is forecast to decrease in 2019 due to the massive maintenance work in large power consuming businesses and weather conditions.**

Industrial electricity consumption is expected to decrease on a year-on-year basis, as the consumption grows much slower in the fabricated metals and petrochemical sectors than the previous year and decrease faster in the primary metals(iron & steel) sector.

- Buildings' electricity demand is forecast to decrease in 2019 on a year-on-year basis, as temperatures return to seasonal norms, leading to a sharp drop in the number of cooling & heating degree days which surged last year due to extreme heatwave and cold spell. If the temperature effect remains at the average level, the electricity demand in buildings will likely increase.

☐ **Energy demand is set to rebound in 2020, as several factors that are driving down the demand in 2019 will have no more or less impact.**

- As for TPES by energy sources, petroleum and gas demand that is set to decline in 2019 is expected to rebound in 2020, and the rapid decline in coal demand is forecast to much slow down.
- In terms of TFC by end-use sectors, the industrial and buildings' energy demand will likely rebound in 2020 after a decline in 2019 as a result of a faster economic growth, the completion of facility maintenance and base effect.

# The Main Indicator and Energy Outlook Result

## Main Economic and Energy Indicators

|  | 2016    | 2017    |       |         | 2018    |       |         | 2019p   |       |         | 2020e   |
|--|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|
|  |         | 1H      | 2H    |         | 1H      | 2H    |         | 1H      | 2H    |         |         |
| <b>Economy and Population</b>              |         |         |       |         |         |       |         |         |       |         |         |
| GDP (2010 trillion won)                    | 1 706.9 | 855.2   | 905.6 | 1 760.8 | 879.5   | 928.2 | 1 807.7 | 895.9   | 948.0 | 1 843.8 | 1 885.5 |
| Industrial Production(2010=100)            | 102.2   | 104.1   | 105.3 | 104.7   | 104.6   | 107.6 | 106.1   | 103.2   | 108.5 | 105.9   | 106.6   |
| Crude Oil Price (Dubai, USD/bbl)           | 41.2    | 51.5    | 54.9  | 53.2    | 68.0    | 70.9  | 69.4    | 65.5    | 62.1  | 63.8    | 61.7    |
| Working Days                               | 273.0   | 134.0   | 135.5 | 269.5   | 133.0   | 137.0 | 270.0   | 134.0   | 138.5 | 272.5   | 275.0   |
| Population (million)                       | 51.2    | 51.4    | 51.4  | 51.4    | 51.6    | 51.6  | 51.6    | 51.7    | 51.7  | 51.7    | 51.8    |
| Average Temperature (°C)                   | 13.6    | 10.4    | 15.7  | 13.1    | 9.9     | 16.1  | 13.0    | 10.4    | 16.5  | 13.5    | 13.0    |
| Cooling Degree days                        | 154.1   | 2.4     | 130.3 | 132.7   | 3.5     | 205.5 | 209.0   | -       | 120.4 | 120.4   | 112.1   |
| Heating Degree days                        | 2 386.8 | 1 520.3 | 996.8 | 2 517.1 | 1 616.9 | 980.9 | 2 597.8 | 1 511.5 | 862.4 | 2 373.9 | 2 537.6 |
| <b>Energy Indicators</b>                   |         |         |       |         |         |       |         |         |       |         |         |
| Total Primary Energy Demand (Mtoe)         | 293.3   | 148.4   | 152.9 | 301.3   | 152.5   | 153.5 | 306.0   | 150.0   | 151.2 | 301.2   | 307.5   |
| Energy Intensity (toe/million won)         | 0.172   | 0.174   | 0.169 | 0.171   | 0.174   | 0.165 | 0.170   | 0.168   | 0.160 | 0.164   | 0.163   |
| TPED/capita (toe/capita)                   | 5.726   | 2.889   | 2.977 | 5.866   | 2.956   | 2.975 | 5.930   | 2.901   | 2.923 | 5.824   | 5.938   |
| Electricity Generation (TWh)               | 540.4   | 270.4   | 283.2 | 553.5   | 279.1   | 291.6 | 570.6   | 277.1   | 290.5 | 567.6   | 581.3   |
| Electricity Generation/capita (MWh/capita) | 10.6    | 5.3     | 5.5   | 10.8    | 5.4     | 5.7   | 11.1    | 5.4     | 5.6   | 11.0    | 11.2    |
| Electricity Demand/capita (MWh/capita)     | 9.7     | 4.9     | 5.0   | 9.9     | 5.1     | 5.1   | 10.2    | 5.0     | 5.1   | 10.1    | 10.4    |

## Energy Demand

|                                    | 2016         | 2017         |              |              | 2018         |              |              | 2019p        |              |              | 2020e        |
|------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                                    |              | 1H           | 2H           |              | 1H           | 2H           |              | 1H           | 2H           |              |              |
| <b>Total Primary Energy Supply</b> |              |              |              |              |              |              |              |              |              |              |              |
| Coal (Mton)                        | 129.3        | 66.5         | 73.3         | 139.8        | 68.9         | 72.1         | 141.0        | 63.0         | 71.4         | 134.4        | 134.0        |
| Oil (Mbbbl)                        | 921.1        | 457.9        | 479.2        | 937.1        | 466.6        | 465.2        | 931.8        | 454.8        | 467.7        | 922.4        | 939.8        |
| Gas (Bm <sup>3</sup> )             | 34.5         | 18.3         | 17.5         | 35.8         | 22.2         | 19.0         | 41.2         | 20.6         | 18.1         | 38.7         | 39.8         |
| Hydro (TWh)                        | 6.6          | 3.2          | 3.8          | 7.0          | 3.4          | 3.9          | 7.3          | 3.0          | 3.2          | 6.2          | 7.1          |
| Nuclear (TWh)                      | 162.0        | 78.1         | 70.3         | 148.4        | 60.0         | 73.6         | 133.5        | 79.7         | 70.7         | 150.4        | 160.0        |
| Other Renewables (Mtoe)            | 13.6         | 7.8          | 8.1          | 15.8         | 8.4          | 8.7          | 17.1         | 8.7          | 9.2          | 17.9         | 19.6         |
| <b>Total (Mtoe)</b>                | <b>293.3</b> | <b>148.4</b> | <b>152.9</b> | <b>301.3</b> | <b>152.5</b> | <b>153.5</b> | <b>306.0</b> | <b>150.0</b> | <b>151.2</b> | <b>301.2</b> | <b>307.5</b> |
| Coal                               | 81.5         | 41.0         | 45.2         | 86.2         | 42.4         | 44.3         | 86.7         | 38.9         | 43.6         | 82.6         | 81.8         |
| Oil                                | 117.6        | 58.3         | 61.1         | 119.4        | 59.3         | 59.2         | 118.5        | 57.7         | 59.0         | 116.7        | 118.6        |
| Gas                                | 45.0         | 23.9         | 22.8         | 46.7         | 29.0         | 24.8         | 53.8         | 27.0         | 23.6         | 50.6         | 51.9         |
| Nuclear                            | 1.4          | 0.7          | 0.8          | 1.5          | 0.7          | 0.8          | 1.5          | 0.6          | 0.7          | 1.3          | 1.5          |
| Hydro                              | 34.2         | 16.6         | 15.0         | 31.6         | 12.8         | 15.7         | 28.4         | 17.0         | 15.0         | 32.0         | 34.1         |
| Other Renewables                   | 13.6         | 7.8          | 8.1          | 15.8         | 8.4          | 8.7          | 17.1         | 8.7          | 9.2          | 17.9         | 19.6         |
| <b>Total Final Consumption</b>     |              |              |              |              |              |              |              |              |              |              |              |
| Coal (Mton)                        | 49.0         | 24.8         | 25.5         | 50.4         | 24.3         | 24.9         | 49.2         | 24.1         | 24.6         | 48.8         | 49.2         |
| Oil (Mbbbl)                        | 899.3        | 451.9        | 474.7        | 926.6        | 459.4        | 460.6        | 920.0        | 450.0        | 464.9        | 914.9        | 932.3        |
| Gas (Bm <sup>3</sup> )             | 21.8         | 13.1         | 10.2         | 23.4         | 14.5         | 11.2         | 25.7         | 14.6         | 10.9         | 25.5         | 26.2         |
| Electricity (TWh)                  | 497.0        | 251.4        | 256.3        | 507.7        | 261.7        | 264.5        | 526.1        | 259.9        | 263.4        | 523.3        | 536.4        |
| Heat (Mtoe)                        | 2.2          | 1.4          | 1.0          | 2.4          | 1.6          | 1.1          | 2.7          | 1.5          | 1.0          | 2.5          | 2.6          |
| Other Renewables (Mtoe)            | 7.2          | 4.3          | 4.4          | 8.6          | 4.5          | 4.6          | 9.1          | 4.5          | 4.7          | 9.2          | 9.5          |
| <b>Total (Mtoe)</b>                | <b>221.4</b> | <b>114.7</b> | <b>115.3</b> | <b>230.0</b> | <b>117.9</b> | <b>114.9</b> | <b>232.7</b> | <b>116.4</b> | <b>114.2</b> | <b>230.6</b> | <b>234.5</b> |
| Coal                               | 32.3         | 16.4         | 16.9         | 33.4         | 16.0         | 16.4         | 32.4         | 16.0         | 16.0         | 32.0         | 31.7         |
| Oil                                | 114.3        | 57.4         | 60.4         | 117.9        | 58.3         | 58.6         | 116.8        | 57.1         | 58.6         | 115.7        | 117.5        |
| Gas                                | 22.7         | 13.5         | 10.5         | 24.1         | 15.0         | 11.5         | 26.4         | 15.0         | 11.2         | 26.2         | 27.0         |
| Electricity                        | 42.7         | 21.6         | 22.0         | 43.7         | 22.5         | 22.7         | 45.2         | 22.3         | 22.7         | 45.0         | 46.1         |
| Heat                               | 2.2          | 1.4          | 1.0          | 2.4          | 1.6          | 1.1          | 2.7          | 1.5          | 1.0          | 2.5          | 2.6          |
| Other Renewables                   | 7.2          | 4.3          | 4.4          | 8.6          | 4.5          | 4.6          | 9.1          | 4.5          | 4.7          | 9.2          | 9.5          |
| Industry                           | 135.2        | 69.6         | 72.3         | 141.9        | 71.0         | 71.8         | 142.9        | 70.1         | 71.7         | 141.8        | 144.4        |
| Transport                          | 42.3         | 20.9         | 21.9         | 42.8         | 21.1         | 21.9         | 43.0         | 21.3         | 21.9         | 43.2         | 43.3         |
| Buildings                          | 44.0         | 24.2         | 21.1         | 45.3         | 25.7         | 21.2         | 46.9         | 25.0         | 20.6         | 45.7         | 46.7         |



## Energy Demand

|                                    | (yoy, %)   |            |            |            |            |              |            |              |              |              |            |
|------------------------------------|------------|------------|------------|------------|------------|--------------|------------|--------------|--------------|--------------|------------|
|                                    | 2016       | 2017       |            |            | 2018       |              |            | 2019p        |              |              | 2020e      |
|                                    |            | 1H         | 2H         |            | 1H         | 2H           |            | 1H           | 2H           |              |            |
| <b>Total Primary Energy Supply</b> |            |            |            |            |            |              |            |              |              |              |            |
| Coal (Mton)                        | - 4.3      | 7.2        | 8.9        | 8.1        | 3.7        | - 1.7        | 0.9        | - 8.5        | - 1.0        | - 4.7        | - 0.3      |
| Oil (Mbbbl)                        | 8.0        | 1.8        | 1.7        | 1.7        | 1.9        | - 2.9        | - 0.6      | - 2.5        | 0.5          | - 1.0        | 1.9        |
| Gas (Bm <sup>3</sup> )             | 4.3        | 3.7        | 3.6        | 3.7        | 21.0       | 8.7          | 15.0       | - 6.9        | - 4.6        | - 5.9        | 2.6        |
| Hydro (TWh)                        | 14.5       | 7.0        | 4.2        | 5.5        | 5.6        | 2.5          | 3.9        | - 11.6       | - 16.4       | - 14.2       | 14.0       |
| Nuclear (TWh)                      | - 1.7      | - 9.7      | - 6.9      | - 8.4      | - 23.3     | 4.6          | - 10.1     | 33.0         | - 3.9        | 12.6         | 6.4        |
| Other Renewables (Mtoe)            | 5.7        | 16.3       | 17.2       | 16.7       | 7.7        | 8.3          | 8.0        | 4.1          | 5.1          | 4.6          | 9.4        |
| <b>Total (Mtoe)</b>                | <b>2.4</b> | <b>2.1</b> | <b>3.4</b> | <b>2.7</b> | <b>2.8</b> | <b>0.4</b>   | <b>1.6</b> | <b>- 1.7</b> | <b>- 1.5</b> | <b>- 1.6</b> | <b>2.1</b> |
| Coal                               | - 4.6      | 4.7        | 6.7        | 5.7        | 3.3        | - 1.9        | 0.6        | - 8.1        | - 1.5        | - 4.7        | - 0.9      |
| Oil                                | 7.8        | 1.3        | 1.8        | 1.5        | 1.7        | - 3.0        | - 0.7      | - 2.6        | - 0.4        | - 1.5        | 1.6        |
| Gas                                | 4.3        | 3.9        | 3.8        | 3.8        | 21.0       | 8.7          | 15.0       | - 6.9        | - 4.6        | - 5.9        | 2.6        |
| Nuclear                            | 14.5       | 8.0        | 5.2        | 6.5        | 5.6        | 2.5          | 3.9        | - 11.6       | - 16.4       | - 14.2       | 14.0       |
| Hydro                              | - 1.7      | - 8.8      | - 6.0      | - 7.5      | - 23.3     | 4.6          | - 10.1     | 33.0         | - 3.9        | 12.6         | 6.4        |
| Other Renewables                   | 5.7        | 16.3       | 17.2       | 16.7       | 7.7        | 8.3          | 8.0        | 4.1          | 5.1          | 4.6          | 9.4        |
| <b>Total Final Consumption</b>     |            |            |            |            |            |              |            |              |              |              |            |
| Coal (Mton)                        | - 6.8      | 7.3        | - 1.3      | 2.7        | - 2.0      | - 2.5        | - 2.3      | - 0.8        | - 1.1        | - 0.9        | 1.0        |
| Oil (Mbbbl)                        | 7.3        | 3.4        | 2.7        | 3.0        | 1.7        | - 3.0        | - 0.7      | - 2.1        | 0.9          | - 0.6        | 1.9        |
| Gas (Bm <sup>3</sup> )             | 2.6        | 4.7        | 11.1       | 7.4        | 10.6       | 9.0          | 9.9        | 0.5          | - 2.4        | - 0.7        | 2.7        |
| Electricity (TWh)                  | 2.8        | 1.2        | 3.1        | 2.2        | 4.1        | 3.2          | 3.6        | - 0.7        | - 0.4        | - 0.6        | 2.5        |
| Heat (Mtoe)                        | 11.0       | 5.0        | 22.5       | 11.8       | 15.6       | 2.2          | 9.9        | - 5.9        | - 4.6        | - 5.4        | 4.0        |
| Other Renewables (Mtoe)            | - 5.6      | 18.8       | 22.1       | 20.4       | 5.8        | 5.1          | 5.5        | - 1.2        | 2.7          | 0.8          | 3.7        |
| <b>Total (Mtoe)</b>                | <b>3.0</b> | <b>3.9</b> | <b>3.9</b> | <b>3.9</b> | <b>2.8</b> | <b>- 0.4</b> | <b>1.2</b> | <b>- 1.2</b> | <b>- 0.6</b> | <b>- 0.9</b> | <b>1.7</b> |
| Coal                               | - 7.2      | 6.9        | - 0.2      | 3.1        | - 2.7      | - 2.9        | - 2.8      | - 0.1        | - 2.6        | - 1.3        | - 0.9      |
| Oil                                | 6.9        | 3.2        | 3.1        | 3.1        | 1.4        | - 3.1        | - 0.9      | - 2.1        | 0.1          | - 1.0        | 1.6        |
| Gas                                | 2.6        | 3.3        | 9.7        | 6.0        | 10.6       | 9.0          | 9.9        | 0.5          | - 2.4        | - 0.7        | 2.7        |
| Electricity                        | 2.8        | 1.2        | 3.1        | 2.2        | 4.1        | 3.2          | 3.6        | - 0.7        | - 0.4        | - 0.6        | 2.5        |
| Heat                               | 11.0       | 5.0        | 22.5       | 11.8       | 15.6       | 2.2          | 9.9        | - 5.9        | - 4.6        | - 5.4        | 4.0        |
| Other Renewables                   | - 5.6      | 18.8       | 22.1       | 20.4       | 5.8        | 5.1          | 5.5        | - 1.2        | 2.7          | 0.8          | 3.7        |
| Industry                           | 1.6        | 5.9        | 4.2        | 5.0        | 2.0        | - 0.6        | 0.7        | - 1.3        | - 0.2        | - 0.8        | 1.9        |
| Transport                          | 6.1        | 1.4        | 1.1        | 1.2        | 1.0        | - 0.2        | 0.4        | 1.0          | 0.1          | 0.6          | 0.3        |
| Buildings                          | 4.4        | 0.7        | 6.0        | 3.1        | 6.4        | 0.2          | 3.5        | - 2.8        | - 2.5        | - 2.7        | 2.3        |

## Energy Demand by Sector

(Mtoe)

|                   | 2016         | 2017        |             |              | 2018        |             |              | 2019p       |             |              | 2020e        |
|-------------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|--------------|
|                   |              | 1H          | 2H          |              | 1H          | 2H          |              | 1H          | 2H          |              |              |
| <b>Industry</b>   | <b>135.2</b> | <b>69.6</b> | <b>72.3</b> | <b>141.9</b> | <b>71.0</b> | <b>71.8</b> | <b>142.9</b> | <b>70.1</b> | <b>71.7</b> | <b>141.8</b> | <b>144.4</b> |
| Coal              | 31.8         | 16.2        | 16.6        | 32.8         | 15.8        | 16.2        | 32.0         | 15.9        | 15.8        | 31.6         | 31.4         |
| Oil               | 66.8         | 33.9        | 36.0        | 69.8         | 34.6        | 34.7        | 69.3         | 33.4        | 34.9        | 68.3         | 70.2         |
| Gas               | 8.0          | 4.5         | 4.3         | 8.8          | 5.2         | 5.3         | 10.5         | 5.6         | 5.3         | 10.9         | 11.1         |
| Electricity       | 23.2         | 11.8        | 12.0        | 23.8         | 12.1        | 12.3        | 24.4         | 12.1        | 12.2        | 24.3         | 24.8         |
| Heat              | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| Other Renewables  | 5.3          | 3.3         | 3.3         | 6.6          | 3.3         | 3.4         | 6.7          | 3.2         | 3.5         | 6.7          | 7.0          |
| <b>Transport</b>  | <b>42.3</b>  | <b>20.9</b> | <b>21.9</b> | <b>42.8</b>  | <b>21.1</b> | <b>21.9</b> | <b>43.0</b>  | <b>21.3</b> | <b>21.9</b> | <b>43.2</b>  | <b>43.3</b>  |
| Coal              | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| Oil               | 40.3         | 19.9        | 20.9        | 40.9         | 20.0        | 20.8        | 40.8         | 20.2        | 20.8        | 41.0         | 41.2         |
| Gas               | 1.3          | 0.6         | 0.6         | 1.3          | 0.6         | 0.6         | 1.2          | 0.6         | 0.6         | 1.2          | 1.2          |
| Electricity       | 0.2          | 0.1         | 0.1         | 0.2          | 0.1         | 0.1         | 0.3          | 0.1         | 0.1         | 0.3          | 0.3          |
| Heat              | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| Other Renewables  | 0.4          | 0.2         | 0.2         | 0.4          | 0.3         | 0.3         | 0.7          | 0.3         | 0.3         | 0.7          | 0.7          |
| <b>Buildings*</b> | <b>44.0</b>  | <b>24.2</b> | <b>21.1</b> | <b>45.3</b>  | <b>25.7</b> | <b>21.2</b> | <b>46.9</b>  | <b>25.0</b> | <b>20.6</b> | <b>45.7</b>  | <b>46.7</b>  |
| Coal              | 0.6          | 0.2         | 0.3         | 0.5          | 0.2         | 0.3         | 0.4          | 0.1         | 0.2         | 0.3          | 0.4          |
| Oil               | 7.1          | 3.6         | 3.5         | 7.2          | 3.6         | 3.1         | 6.8          | 3.4         | 2.9         | 6.3          | 6.1          |
| Gas               | 13.4         | 8.5         | 5.5         | 14.0         | 9.2         | 5.5         | 14.7         | 8.9         | 5.3         | 14.2         | 14.6         |
| Electricity       | 19.3         | 9.7         | 9.9         | 19.6         | 10.3        | 10.3        | 20.6         | 10.2        | 10.3        | 20.5         | 21.1         |
| Heat              | 2.2          | 1.4         | 1.0         | 2.4          | 1.6         | 1.1         | 2.7          | 1.5         | 1.0         | 2.5          | 2.6          |
| Other Renewables  | 1.4          | 0.8         | 0.8         | 1.6          | 0.9         | 0.9         | 1.7          | 0.9         | 0.9         | 1.8          | 1.8          |
| <b>Transform</b>  | <b>139.5</b> | <b>70.2</b> | <b>71.2</b> | <b>141.4</b> | <b>73.7</b> | <b>73.9</b> | <b>147.7</b> | <b>72.5</b> | <b>71.8</b> | <b>144.3</b> | <b>148.7</b> |
| Coal              | 49.2         | 24.6        | 28.2        | 52.8         | 26.4        | 27.9        | 54.2         | 23.0        | 27.6        | 50.6         | 50.1         |
| Oil               | 3.3          | 0.9         | 0.7         | 1.5          | 1.0         | 0.7         | 1.7          | 0.7         | 0.4         | 1.1          | 1.0          |
| Gas               | 45.0         | 23.9        | 22.8        | 46.7         | 29.0        | 24.8        | 53.8         | 27.0        | 23.6        | 50.6         | 51.9         |
| Nuclear           | 34.2         | 16.6        | 15.0        | 31.6         | 12.8        | 15.7        | 28.4         | 17.0        | 15.0        | 32.0         | 34.1         |
| Hydro             | 1.4          | 0.7         | 0.8         | 1.5          | 0.7         | 0.8         | 1.5          | 0.6         | 0.7         | 1.3          | 1.5          |
| Renewables        | 6.4          | 3.5         | 3.7         | 7.2          | 3.9         | 4.1         | 8.0          | 4.3         | 4.5         | 8.7          | 10.1         |

\* include residential, commercial, public-etc usage

## Coal

| (Mton)                         |              |             |             |              |             |             |              |             |             |              |              |
|--------------------------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|--------------|
|                                | 2016         | 2017        |             |              | 2018        |             |              | 2019p       |             |              | 2020e        |
|                                |              | 1H          | 2H          |              | 1H          | 2H          |              | 1H          | 2H          |              |              |
| <b>Total Coal Demand</b>       | <b>129.3</b> | <b>66.5</b> | <b>73.3</b> | <b>139.8</b> | <b>68.9</b> | <b>72.1</b> | <b>141.0</b> | <b>63.0</b> | <b>71.4</b> | <b>134.4</b> | <b>134.0</b> |
| Transform                      | 80.3         | 41.6        | 47.8        | 89.4         | 44.6        | 47.2        | 91.8         | 38.9        | 46.8        | 85.6         | 84.8         |
| Power Generation               | 80.3         | 41.6        | 47.8        | 89.4         | 44.6        | 47.2        | 91.8         | 38.9        | 46.8        | 85.6         | 84.8         |
| Heat                           | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| Gas Manufacture                | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| <b>Total Final Consumption</b> | <b>49.0</b>  | <b>24.8</b> | <b>25.5</b> | <b>50.4</b>  | <b>24.3</b> | <b>24.9</b> | <b>49.2</b>  | <b>24.1</b> | <b>24.6</b> | <b>48.8</b>  | <b>49.2</b>  |
| Industry                       | 47.8         | 24.4        | 24.8        | 49.3         | 24.0        | 24.3        | 48.3         | 23.9        | 24.2        | 48.1         | 48.7         |
| Transport                      | -            | -           | -           | -            | -           | -           | -            | -           | -           | -            | -            |
| Buildings                      | 1.3          | 0.4         | 0.7         | 1.1          | 0.3         | 0.6         | 0.9          | 0.2         | 0.4         | 0.7          | 0.6          |
| <b>Consumption by products</b> |              |             |             |              |             |             |              |             |             |              |              |
| Anthracite                     | 10.8         | 4.3         | 3.9         | 8.3          | 4.5         | 4.7         | 9.2          | 4.2         | 4.1         | 8.2          | 8.2          |
| Bituminous                     | 118.5        | 62.1        | 69.4        | 131.5        | 64.4        | 67.4        | 131.8        | 58.8        | 67.3        | 126.1        | 125.8        |
| Iron making                    | 33.5         | 17.7        | 18.6        | 36.3         | 16.9        | 17.7        | 34.6         | 17.3        | 17.8        | 35.1         | 35.6         |
| Cement                         | 4.6          | 2.2         | 2.0         | 4.2          | 1.8         | 1.9         | 3.7          | 2.0         | 2.0         | 3.9          | 3.8          |
| Power Generation               | 77.8         | 40.9        | 47.4        | 88.3         | 44.3        | 46.5        | 90.8         | 38.3        | 46.2        | 84.5         | 83.8         |

## Oil

(Mbbbl)

|                                     | 2016         | 2017         |              |              | 2018         |              |              | 2019p        |              |              | 2020e        |
|-------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                                     |              | 1H           | 2H           |              | 1H           | 2H           |              | 1H           | 2H           |              |              |
| <b>Total Oil Demand</b>             | <b>921.1</b> | <b>457.9</b> | <b>479.2</b> | <b>937.1</b> | <b>466.6</b> | <b>465.2</b> | <b>931.8</b> | <b>454.8</b> | <b>467.7</b> | <b>922.4</b> | <b>939.8</b> |
| Transform                           | 21.8         | 5.9          | 4.5          | 10.5         | 7.2          | 4.5          | 11.7         | 4.8          | 2.8          | 7.6          | 7.5          |
| Power Generation                    | 19.3         | 4.5          | 3.5          | 8.1          | 5.0          | 3.6          | 8.6          | 3.2          | 1.8          | 5.0          | 4.7          |
| Heat                                | 1.3          | 0.8          | 0.4          | 1.2          | 0.7          | 0.4          | 1.1          | 1.1          | 0.4          | 1.4          | 1.6          |
| Gas Manufacture                     | 1.2          | 0.6          | 0.6          | 1.2          | 1.5          | 0.6          | 2.0          | 0.6          | 0.5          | 1.1          | 1.2          |
| <b>Total Final Consumption</b>      | <b>899.3</b> | <b>451.9</b> | <b>474.7</b> | <b>926.6</b> | <b>459.4</b> | <b>460.6</b> | <b>920.0</b> | <b>450.0</b> | <b>464.9</b> | <b>914.9</b> | <b>932.3</b> |
| Industry                            | 542.6        | 275.3        | 291.6        | 567.0        | 282.2        | 281.9        | 564.1        | 272.3        | 286.3        | 558.6        | 576.0        |
| Transport                           | 300.5        | 147.9        | 155.3        | 303.2        | 148.4        | 153.8        | 302.3        | 150.2        | 154.3        | 304.5        | 305.2        |
| Buildings                           | 56.3         | 28.7         | 27.8         | 56.4         | 28.8         | 24.9         | 53.7         | 27.5         | 24.3         | 51.8         | 51.2         |
| <b>Consumption by products</b>      |              |              |              |              |              |              |              |              |              |              |              |
| Gasoline                            | 78.9         | 38.5         | 41.2         | 79.6         | 39.0         | 40.7         | 79.7         | 40.6         | 42.0         | 82.6         | 82.0         |
| Diesel (including Transformation)   | 163.5        | 80.7         | 85.2         | 165.9        | 79.9         | 84.2         | 164.1        | 83.2         | 85.5         | 168.7        | 166.7        |
| Kerosene (including Transformation) | 19.1         | 9.3          | 9.7          | 19.0         | 10.2         | 8.7          | 18.9         | 9.2          | 7.6          | 16.8         | 16.4         |
| B-C (including Transformation)      | 47.5         | 18.5         | 17.3         | 35.8         | 18.3         | 15.4         | 33.7         | 13.9         | 12.2         | 26.1         | 26.0         |
| Jet Oil                             | 37.0         | 18.5         | 19.7         | 38.2         | 19.8         | 20.0         | 39.9         | 19.5         | 18.6         | 38.1         | 39.6         |
| LPG (including Transformation)      | 109.0        | 52.7         | 52.5         | 105.1        | 56.6         | 52.8         | 109.4        | 55.8         | 62.0         | 117.8        | 124.8        |
| Naphtha                             | 430.1        | 222.9        | 235.5        | 458.4        | 226.5        | 224.7        | 451.2        | 215.3        | 222.4        | 437.8        | 449.7        |
| Other Non-Energy                    | 36.1         | 16.8         | 18.2         | 35.1         | 16.4         | 18.7         | 35.1         | 17.3         | 17.3         | 34.6         | 34.6         |

## Gas

|                                  | 2016        | 2017        |             |             | 2018        |             |             | 2019p       |             |             | 2020e       |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                  |             | 1H          | 2H          |             | 1H          | 2H          |             | 1H          | 2H          |             |             |
| <b>Total Gas Demand (Mton)</b>   | <b>34.5</b> | <b>18.3</b> | <b>17.5</b> | <b>35.8</b> | <b>22.2</b> | <b>19.0</b> | <b>41.2</b> | <b>20.6</b> | <b>18.1</b> | <b>38.7</b> | <b>39.8</b> |
| Transform                        | 34.5        | 18.3        | 17.5        | 35.8        | 22.2        | 19.0        | 41.2        | 20.6        | 18.1        | 38.7        | 39.8        |
| Power Generation                 | 15.5        | 7.4         | 8.2         | 15.6        | 9.8         | 9.1         | 18.9        | 8.9         | 8.9         | 17.8        | 17.9        |
| Heat                             | 1.6         | 0.8         | 0.8         | 1.7         | 1.2         | 1.0         | 2.3         | 1.0         | 1.0         | 2.0         | 2.0         |
| Gas Manufacture                  | 17.5        | 10.1        | 8.4         | 18.5        | 11.1        | 8.8         | 20.0        | 10.7        | 8.2         | 19.0        | 19.9        |
| Industry                         | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>City Gas (Bm<sup>3</sup>)</b> | <b>21.8</b> | <b>13.1</b> | <b>10.2</b> | <b>23.4</b> | <b>14.5</b> | <b>11.2</b> | <b>25.7</b> | <b>14.6</b> | <b>10.9</b> | <b>25.5</b> | <b>26.2</b> |
| Industry*                        | 7.7         | 4.3         | 4.2         | 8.6         | 5.0         | 5.2         | 10.2        | 5.4         | 5.1         | 10.5        | 10.8        |
| Transport                        | 1.2         | 0.6         | 0.6         | 1.2         | 0.6         | 0.6         | 1.2         | 0.6         | 0.6         | 1.2         | 1.2         |
| Buildings                        | 12.8        | 8.2         | 5.4         | 13.6        | 8.9         | 5.3         | 14.3        | 8.6         | 5.1         | 13.8        | 14.2        |

\* exclude industrial LNG usage

## Electricity

(TWh)

|   | 2016         | 2017         |              |              | 2018         |              |              | 2019p        |              |              | 2020e        |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|   |              | 1H           | 2H           |              | 1H           | 2H           |              | 1H           | 2H           |              |              |
| <b>Net Electricity Demand</b>                   | <b>540.4</b> | <b>270.4</b> | <b>283.2</b> | <b>553.5</b> | <b>279.1</b> | <b>291.6</b> | <b>570.6</b> | <b>277.1</b> | <b>290.5</b> | <b>567.6</b> | <b>581.3</b> |
| Own use and Losses                              | 43.4         | 19.0         | 26.8         | 45.8         | 17.4         | 27.1         | 44.5         | 17.3         | 27.1         | 44.3         | 44.9         |
| <b>Total Final Consumption</b>                  | <b>497.0</b> | <b>251.4</b> | <b>256.3</b> | <b>507.7</b> | <b>261.7</b> | <b>264.5</b> | <b>526.1</b> | <b>259.9</b> | <b>263.4</b> | <b>523.3</b> | <b>536.4</b> |
| Industry  | 270.0        | 136.9        | 139.8        | 276.7        | 140.8        | 142.9        | 283.7        | 140.2        | 141.8        | 282.0        | 287.9        |
| Transport                                       | 2.7          | 1.3          | 1.5          | 2.8          | 1.4          | 1.5          | 3.0          | 1.4          | 1.5          | 2.9          | 3.1          |
| Buildings                                       | 224.4        | 113.2        | 115.1        | 228.3        | 119.4        | 120.0        | 239.5        | 118.2        | 120.1        | 238.3        | 245.4        |
| <b>Installed Electrical Capacity (GW)*</b>      | <b>402.7</b> | <b>219.5</b> | <b>230.6</b> | <b>450.1</b> | <b>233.8</b> | <b>236.3</b> | <b>470.1</b> | <b>239.8</b> | <b>246.1</b> | <b>485.9</b> | <b>509.8</b> |
| Coal  | 115.5        | 66.0         | 72.8         | 138.8        | 73.5         | 73.9         | 147.5        | 74.1         | 73.6         | 147.8        | 147.1        |
| Oil   | 16.5         | 8.3          | 8.3          | 16.6         | 8.3          | 8.6          | 16.9         | 8.4          | 7.9          | 16.2         | 15.1         |
| Gas   | 130.3        | 70.3         | 74.1         | 144.4        | 75.1         | 75.7         | 150.8        | 75.8         | 78.4         | 154.2        | 165.6        |
| Nuclear   | 87.3         | 46.0         | 45.1         | 91.1         | 44.8         | 43.7         | 88.5         | 43.7         | 46.0         | 89.7         | 94.4         |
| Hydro   | 25.9         | 13.0         | 13.0         | 25.9         | 13.0         | 13.0         | 26.0         | 13.0         | 13.0         | 26.0         | 26.0         |
| Other Renewables                                | 27.1         | 16.0         | 17.4         | 33.3         | 19.1         | 21.4         | 40.4         | 24.8         | 27.2         | 52.0         | 61.7         |
| <b>Electricity Generation of Power Plants*</b>  | <b>540.4</b> | <b>270.4</b> | <b>283.2</b> | <b>553.5</b> | <b>279.1</b> | <b>291.6</b> | <b>570.6</b> | <b>277.1</b> | <b>290.5</b> | <b>567.6</b> | <b>581.3</b> |
| Coal  | 213.8        | 113.3        | 125.5        | 238.8        | 116.1        | 122.3        | 238.4        | 104.2        | 124.4        | 228.7        | 226.4        |
| Oil   | 14.0         | 3.0          | 2.3          | 5.3          | 3.4          | 2.4          | 5.7          | 2.4          | 1.3          | 3.8          | 3.6          |
| Gas   | 121.0        | 59.2         | 66.9         | 126.0        | 80.9         | 72.6         | 153.5        | 70.3         | 72.7         | 142.9        | 143.3        |
| Nuclear   | 162.0        | 78.1         | 70.3         | 148.4        | 60.0         | 73.6         | 133.5        | 79.8         | 70.7         | 150.5        | 160.0        |
| Hydro   | 6.6          | 3.2          | 3.8          | 7.0          | 3.4          | 3.9          | 7.3          | 3.0          | 3.2          | 6.2          | 7.1          |
| Other Renewables                                | 23.0         | 13.5         | 14.5         | 28.0         | 15.4         | 16.9         | 32.2         | 17.3         | 18.2         | 35.5         | 40.9         |
| <b>Fuel Consumption of Power Plants (Mtoe)*</b> | <b>114.4</b> | <b>55.8</b>  | <b>58.9</b>  | <b>114.7</b> | <b>57.3</b>  | <b>61.0</b>  | <b>118.3</b> | <b>57.0</b>  | <b>59.7</b>  | <b>116.7</b> | <b>119.8</b> |
| Coal  | 49.2         | 24.6         | 28.2         | 52.8         | 26.4         | 27.9         | 54.2         | 23.0         | 27.6         | 50.6         | 50.1         |
| Oil   | 3.0          | 0.7          | 0.5          | 1.2          | 0.8          | 0.5          | 1.3          | 0.5          | 0.3          | 0.8          | 0.7          |
| Gas   | 20.2         | 9.7          | 10.7         | 20.4         | 12.8         | 11.9         | 24.7         | 11.6         | 11.6         | 23.3         | 23.3         |
| Nuclear   | 34.2         | 16.6         | 15.0         | 31.6         | 12.8         | 15.7         | 28.4         | 17.0         | 15.0         | 32.0         | 34.1         |
| Hydro   | 1.4          | 0.7          | 0.8          | 1.5          | 0.7          | 0.8          | 1.5          | 0.6          | 0.7          | 1.3          | 1.5          |
| Other Renewables                                | 6.4          | 3.5          | 3.7          | 7.2          | 3.9          | 4.1          | 8.0          | 4.3          | 4.5          | 8.7          | 10.1         |

\* District Heat is classified by fuel type since 2014

## Heat and Other Renewables

| (Mtoe)                                   |             |            |            |             |            |            |             |            |            |             |             |
|--|-------------|------------|------------|-------------|------------|------------|-------------|------------|------------|-------------|-------------|
|  | 2016        | 2017       |            |             | 2018       |            |             | 2019p      |            |             | 2020e       |
|  |             | 1H         | 2H         |             | 1H         | 2H         |             | 1H         | 2H         |             |             |
| <b>Net Heat Demand</b>                   | <b>2.2</b>  | <b>1.4</b> | <b>1.1</b> | <b>2.4</b>  | <b>1.6</b> | <b>1.1</b> | <b>2.6</b>  | <b>1.5</b> | <b>1.0</b> | <b>2.5</b>  | <b>2.6</b>  |
| Own use and Losses                       | 0.0         | -0.0       | 0.0        | 0.0         | -0.0       | 0.0        | -0.0        | -0.0       | 0.0        | -0.0        | -0.0        |
| <b>Total Final Consumption</b>           | <b>2.2</b>  | <b>1.4</b> | <b>1.0</b> | <b>2.4</b>  | <b>1.6</b> | <b>1.1</b> | <b>2.7</b>  | <b>1.5</b> | <b>1.0</b> | <b>2.5</b>  | <b>2.6</b>  |
| Industry                                 | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Transport                                | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Buildings                                | 2.2         | 1.4        | 1.0        | 2.4         | 1.6        | 1.1        | 2.7         | 1.5        | 1.0        | 2.5         | 2.6         |
| <b>Heat Production by fuel</b>           |             |            |            |             |            |            |             |            |            |             |             |
| Coal                                     | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Oil                                      | 1.4         | 0.9        | 0.6        | 1.5         | 1.0        | 0.7        | 1.7         | 1.0        | 0.7        | 1.7         | 1.7         |
| Gas                                      | 0.8         | 0.5        | 0.4        | 1.0         | 0.6        | 0.4        | 0.9         | 0.5        | 0.4        | 0.9         | 0.9         |
| Nuclear                                  | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Hydro                                    | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Other Renewables                         | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| <b>Fuel Consumption of District Heat</b> |             |            |            |             |            |            |             |            |            |             |             |
| Coal                                     | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Oil                                      | 0.2         | 0.1        | 0.1        | 0.2         | 0.1        | 0.1        | 0.2         | 0.1        | 0.1        | 0.2         | 0.2         |
| Gas                                      | 2.0         | 1.1        | 1.1        | 2.2         | 1.6        | 1.3        | 2.9         | 1.3        | 1.3        | 2.6         | 2.7         |
| Nuclear                                  | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Hydro                                    | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| Other Renewables                         | -           | -          | -          | -           | -          | -          | -           | -          | -          | -           | -           |
| <b>Other Renewables</b>                  | <b>15.0</b> | <b>8.5</b> | <b>8.9</b> | <b>17.3</b> | <b>9.1</b> | <b>9.5</b> | <b>18.7</b> | <b>9.4</b> | <b>9.9</b> | <b>19.2</b> | <b>21.1</b> |
| Hydro                                    | 1.4         | 0.7        | 0.8        | 1.5         | 0.7        | 0.8        | 1.5         | 0.6        | 0.7        | 1.3         | 1.5         |
| Transform                                | 6.4         | 3.5        | 3.7        | 7.2         | 3.9        | 4.1        | 8.0         | 4.3        | 4.5        | 8.7         | 10.1        |
| <b>Total Final Consumption</b>           | <b>7.2</b>  | <b>4.3</b> | <b>4.4</b> | <b>8.6</b>  | <b>4.5</b> | <b>4.6</b> | <b>9.1</b>  | <b>4.5</b> | <b>4.7</b> | <b>9.2</b>  | <b>9.5</b>  |
| Industry                                 | 5.3         | 3.3        | 3.3        | 6.6         | 3.3        | 3.4        | 6.7         | 3.2        | 3.5        | 6.7         | 7.0         |
| Transport                                | 0.4         | 0.2        | 0.2        | 0.4         | 0.3        | 0.3        | 0.7         | 0.3        | 0.3        | 0.7         | 0.7         |
| Buildings                                | 1.4         | 0.8        | 0.8        | 1.6         | 0.9        | 0.9        | 1.7         | 0.9        | 0.9        | 1.8         | 1.8         |

# KEEI

## Korea Energy Demand Outlook

