

### Trends and Implications in Recent Oil and Gas Demand and Supplies Worldwide: Focusing on Major Producers and Consumers

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The World Energy Outlook 2012, released by the International Energy Agency (IEA) in November 2012, projects that the United States would become the largest global oil producer by 2020. As unconventional gas, primarily shale gas, is rapidly emerging as a major alternative to other sources of energy, it is expected that the importance of natural gas in the global energy mix will keep growing.<sup>1</sup> European countries have already begun to voice worries that cheap natural gas supplies available in the United States would enhance the comparative advantages of American companies in terms of energy costs, in turn, weakening the competitive-

ness of European companies.<sup>2</sup> The following report provides a timely review of the recent trends in oil and gas demand and supplies worldwide. It also analyzes the World Energy Outlook 2012 to draw out implications pertinent to Korea's energy policy.

#### 1. Trends in the Oil Demand and Supplies Worldwide

Over the past decade, Russia and Saudi

<sup>1</sup> IEA(2011), World Energy Outlook 2011: Are We Entering a Golden Age of Gas?

<sup>2</sup> Gerrit Wiesmann(2012), "Europe's fears over US energy gap," Financial Times (November 9).

Arabia have dominated the international oil market as the largest oil producers, together producing a quarter of world production. The United States, as the third-place player, has succeeded in increasing its output by approximately 15% from 2008 to 2011. The majority of demand for oil has traditionally come from the advanced economies in North America and Europe. The trend has begun to reverse somewhat, however, starting in 2007, when the demand for oil began to decrease in developed countries, while the demand in Asia and other developing regions began to increase. Figure 1 shows the downward turn in the volumes of oil consumed in the United States, and the contrasting upward movement in China and India. Compared to the United States and Europe, Asian countries have depended on the Middle East for the oil imports to an extensive degree. The share of oil imports from the Middle East in 2010 occupies 42%, 62% and 79% in China, India, and Japan, respectively.

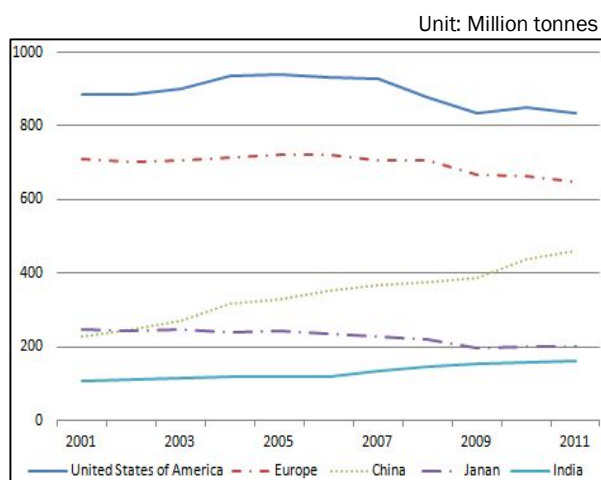
According to the IEA's new policies scenario, the world oil production is going to increase from 84.5 million barrels per day (mb/d) in 2011 to 96.8 mb/d by 2035. The United States,

boasting abundant reservoirs of unconventional energy resources is expected to emerge as the world's largest oil producer by 2020, capable of producing almost 11.1 million barrels per day then. While oil import in the United States decreases, the oil imports in developing countries will continue to grow. This may raise the volume of inter-regional oil trade to increase by 20% from 2011 to 2035, according to the IEA's projections. The projections are based on the increasing output of unconventional energy resources, including light tight oil as well as the steady decline in production at existing oil fields.

## 2. Trends in the Gas Demand and Supplies Worldwide

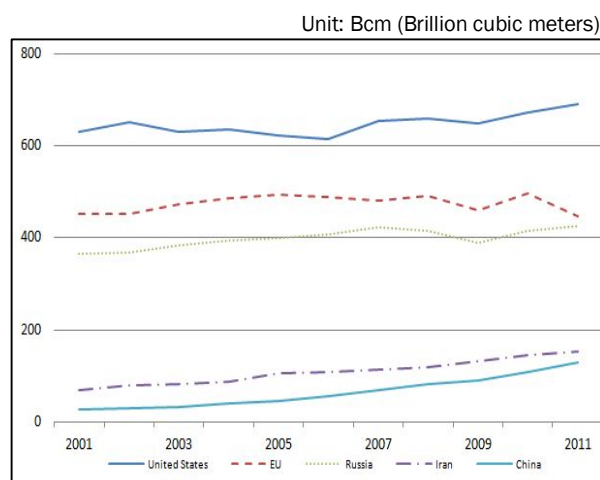
As of 2011, Russia and the United States together produced 38% of gas output worldwide. Since 2008, the United States has become the leading producer of gas. While the gas demand has been decreasing in the European Union due to sovereign debt crisis, other major consumption countries such as Russia and China have been on a steady rise (Figure 2).

Figure 1. Oil Consumption



Source: BP Statistical Review of World Energy, June 2012 ([www.bp.com/statisticalreview](http://www.bp.com/statisticalreview))

Figure 2. Natural Gas Consumption



Source: BP Statistical Review of World Energy, June 2012 ([www.bp.com/statisticalreview](http://www.bp.com/statisticalreview))

European countries and the U.S. rely on pipelines for gas imports. States in the Asia-Pacific Region, on the other hand, mostly import liquefied natural gas (LNG). The United States, the world's largest producer of gas, still need to import gas from Canada through pipelines to meet all its demand. China imports LNG from Australia, Qatar, and Indonesia, in addition to receiving gas from Turkmenistan through a pipeline. Korea exclusively relies on imports of LNG from such states as Qatar, Indonesia, Malaysia, and Russia.

The IEA forecasts that the production of unconventional gas will significantly increase between 2011 and 2035 to make up 26% of all gases produced worldwide. The United States is expected to increase the volume of its gas output from 650 billion cubic meters (bcm) in 2011 to 800 bcm in 2035, with much of the increase in the output to come from the increased production of shale gas. The IEA also projects that the gas demand in non-OECD countries is likely to grow at a rate of 2.3% per year on average between 2010 and 2035, triple the rate of the OECD average at 0.8%. This will make non-OECD countries account for 80% of the increased volume of gas output produced by then.

### 3. Implications for Korea

#### A. Securing Stable Energy Supply from Diverse Sources

Korea is a heavy importer of fuels, with more than 80% of oil import coming from the Middle East. This leaves Korea quite vulnerable to the risks associated with geopolitical tensions. The geopolitical dangers involving Iraq, Iran, and other Middle Eastern states, and the territorial disputes between China and other states in the South China Sea through which Korea imports oil, present a series of constant and uncontrollable risks to the country.

As the United States lessens its dependence on oil from the Middle East by increasing the domestic production of unconventional oil and gas, the United States may also decrease its involvement in Middle East region. This might increase the geopolitical risks in Middle East. When one anticipating that China, Japan, India, and other such Asian states will gradually replace the United States as major importers of Middle Eastern oil, it is crucial for Korea to take strategic actions to ensure the security of its fuel imports and the navigational routes through which it imports fuels.

Korea needs to prepare those potential risks and secure the reliable energy imports by strengthening relations with conventional fuel producers that may feel threatened by the increase in the strength of unconventional fuel producers. For instance, Russia, possessing the world's largest depository of natural gas, has traditionally exported its natural gas to Europe.<sup>3</sup> In light of the increasing production of shale gas and other such unconventional fuels worldwide, Russia is expected to diversify the clientele of its energy exports including East Asian states.

#### B. Implementing Energy-Efficient Policies and Enhancing Support for R&D

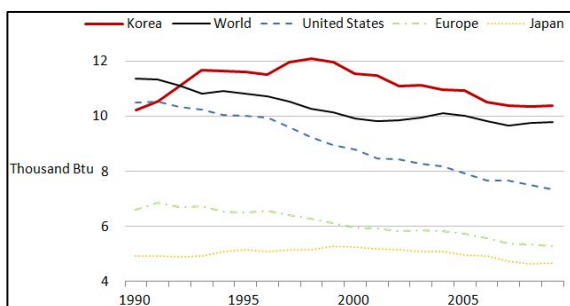
Korea needs to develop and implement policies toward increasing energy efficiency. Promoting greater efficiency of energy consumption may be the easier and more feasible alternative considering the country's vulnerable and heavily import-dependent energy structure. The Energy Architecture Performance Index (EAPI), released at the World Economic Forum on December 11, 2012, ranked Korea in the 38th position, far behind

<sup>3</sup> Ninety-three percent of all natural gas exports from Russia go to Europe and the Commonwealth of Independent States (CIS) through pipelines. See the BP Statistical Review of World Energy(2012).

other advanced economies, in terms of efficiency of by-country energy consumption.<sup>4</sup> The EAPI evaluates whether a country's energy structure is capable of supporting economic growth and development, environmental sustainability and energy access and security. Major European states have topped the list with Norway, France, and the United Kingdom in the first, third, and tenth rank positions, respectively.

It is thus especially important for Korea to implement energy-efficient policies and provide enhanced support for research and development of related technologies. The European Parliament enacted the Energy Efficiency Directive in September 2012 to decrease the volume of primary energy consumption across the European Union by 20% by 2020. The new directive was published in the EU Official Journal on November 14. Energy costs claim a significant portion of Korea's gross domestic product (Figure 3) with much of the energy demand from industrial sector. It is therefore necessary to motivate industrial sector to reduce their energy consumption and develop more energy-efficient technologies.

Figure 3. Energy Intensity\*



Note: \* Total Primary Energy Consumption per Dollar of GDP (Btu per Year 2005 U.S. Dollars (Market Exchange Rates))

Source: U.S. EIA, International Energy Statistics ([www.eia.gov/countries](http://www.eia.gov/countries))

<sup>4</sup> World Economic Forum(2012), The Global Energy Architecture Performance Index Report 2013.

### C. Ensuring the Consistency of Energy Policies

The economic ripple effects ensuing Japan's radical attempt to do away with its nuclear plants in the wake of the major earthquake that shook the country's eastern coast and destroyed the nuclear reactor in Fukushima in 2011 bear important lessons for Korea. In the immediate aftermath of the nuclear reactor crisis, Japan dramatically increased the volumes of LNG and oil imports from overseas, which began to exert negative influence on the yen and the country's balance of trade. The Japanese Minister of Finance announced in October 2012 that the country's trade deficit in the first half of the year amounted to 3.219 trillion yen, the greatest by far in 25 years since 1979. While the trade deficit stems from multiple causes, including the economic recession worldwide and the drastic drop in the volume of exports to China amid the territorial disputes over the Senkaku Islands, the increase in fuel imports has also played a major role.<sup>5</sup> The deterioration in Japan's balance of trade since mid-2011 has stalled the appreciation of the yen against the U.S. dollar, while recent qualitative easing policy in developed countries weakened the yen's value.

The confusion over Japan's nuclear energy policy in the recent months should remind us of the importance of ensuring consistency in energy policies. The Liberal Democratic Party of Japan, which claimed victory in the general election in December 2012, has overturned the Democratic Party's policy commitment to closing down all nuclear reactors in Japan by 2030. The LDP calls for a decision on whether to restart all reactors within the next three years.<sup>6</sup> As Japan's case shows, sudden chang-

<sup>5</sup> Anthony Rowley(2012), "Japan's H1 trade deficit soars 90% to highest ever," The Business Times. (October 23)

<sup>6</sup> Reynolds, I. and Hirokawa, T.(2012), "Japan Op-

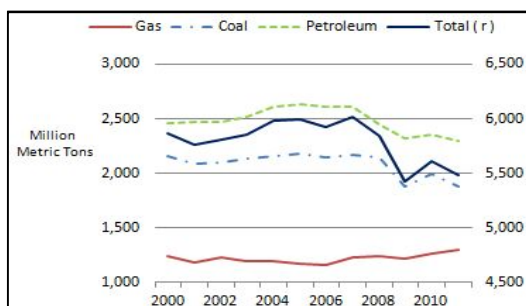
es in energy policy may seriously endanger a country's economy. Korea needs to establish its energy policy with a view to long-term consequences.

#### D. Cutting down Greenhouse Gas Emissions by Increasing Gas Consumption

Korea has important lessons to learn from the United States setting for reducing the energy cost and fighting greenhouse gas emissions by increasing shale gas consumption. The production of shale gas has led to a drastic fall in the price of natural gas in the United States, thereby inducing a decrease in the consumption of oil and coal, and, in turn, noticeable increase in the gas demand. The gas demand in the electric power sector, in particular, grew 13% from 2008 to 2011. The fuel cost makes up 40% of the total electricity cost in the United States. Replacing coals with natural gas has thus enabled utility companies to lower electricity price. The subsequent drop in the volume of carbon dioxide emissions, thanks to the decrease in the consumption of fossil fuels, has allowed the United States to decrease its overall carbon dioxide emissions by 8.9% since 2007 (Figure 4). Shale gas thus exerts significant and positive influence across the whole U.S. economy.

Korea will need to convert its energy consumption structure in the long run to cope with the changing dynamics of the international energy market and climate change. Gas occupied only 16.4% of all energy generated in Korea as of 2010. The Korean government needs to consider establishing closer ties with producers of shale gas and conventional gases and increase reliance on natural gas to cut down the country's greenhouse gas emissions in the future. **KIEP**

**Figure 4. U.S. Carbon Dioxide Emissions from Energy Consumption by Source**



Source: U.S. EIA(2012), *Annual Energy Review 2011*.

position's Hosoda Calls for Restarting Nuclear Reactors," Bloomberg. (November 26)