Falling Oil Prices: Impacts on the Korean Power Sector and the Role of KEPCO

By Jikhan Jeong*

In general, the power market consists of energy, capacity, and an ancillary service market. Fuel costs take up the biggest part of the energy market. Korea's wholesale energy market is a cost-based mandatory pool system. Korea's wholesale electricity price is made up of the variable price and the capacity price. The variable price compensates for the cost of fuel, which results from generating companies' production of electricity. The System Marginal Price (SMP) is a variable and market-clearing price applied to all power systems in Korea except for that of Jeju island (Suduk Kim et al., 2013). The SMP depends on the bidding price of a marginal plant. The bidding price of the plant is predetermined based on fuel cost and plant performance. Recently, oil prices have crashed over the past few months. The oil price is an indicator of the Liquefied Natural Gas (LNG) price for power generation, since the LNG price for power generation is strongly correlated with the oil price in Korea. As Figure 1 shows, the LNG price for power generation in Korea has followed the recent oil price trend. Therefore, as the oil price has dropped over the past few months, the fuel cost of power generation from oil and LNG has decreased.

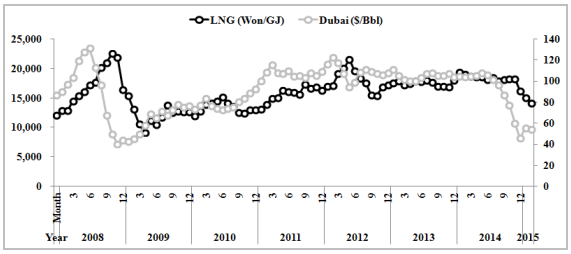

Figure 1. LNG price for power generation in Korea and oil price in spot market.

*Source: Oil price obtained from Petronet, LNG price for power generation obtained from Korea Gas Corporation.

Furthermore, the marginal plant is usually an LNG power plant; therefore the SMP is mostly determined by the LNG plant. As of 2014, the marginal price ratio set by LNG power plants is 94.9%. Therefore, even though the share of electricity generated from oil resources was 4.1% and that from gas resources was 22.95% in 2010, the impact of the falling oil price has dramatically influenced the wholesale price in the Korean power market. As Figure 3 shows, fuel costs for oil and gas power generation have decreased due to the falling oil price. As a result, the bidding price for LNG power plants has also decreased, and the SMP has dropped. So what will happen in Korea's power sector in the short term?

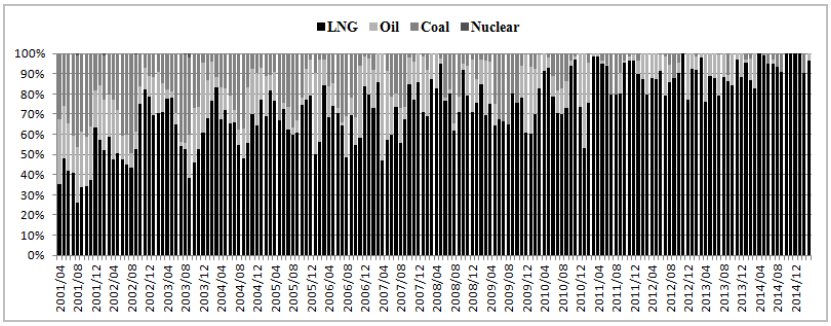

Figure 2. The marginal price ratio set by fuel types.

*Source: Electric Power Statistics Information System.

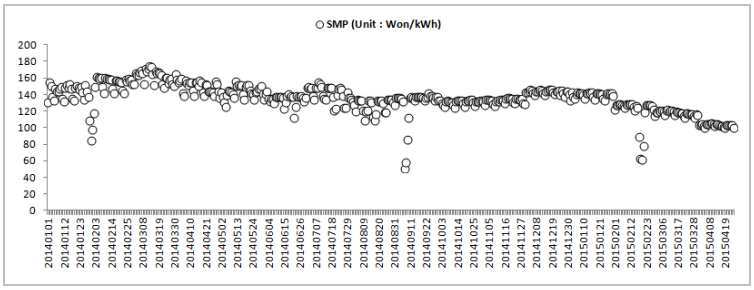

Figure 3. Price trend in SMP.

*Source: Electric Power Statistics Information System.

First, cheaper electricity prices have threatened the investment on renewable and distributed energy from the private sector in Korea. As the price of electricity gets cheaper, the end users will lose their motivation to install small-scale renewable and distributed energy such as roof-top solar cells due to its lower profitability and higher uncertainty. Furthermore, the oil price influences the financial performance of renewable energies based on economic feasibility among renewable energy sources and others (Juan C. Reboredo, 2015). In addition, investments in utility-scale renewable energy will likely decrease due to the increasing cost competitiveness of other types of fossil fuel power plants. Furthermore, electric vehicles are not yet a feasible substitute for oil-based vehicles. Therefore, in the short-term view, as the oil price drops, the renewable and distributed energy industry may be sluggish.

Second, it's possible that carbon emissions from the power sector may increase. As the price of electricity becomes cheaper, electricity consumption will increase. Furthermore, people may be less likely to understand the importance of saving electricity due to its cheap price. Therefore, the carbon emissions from fossil fuel generation will go up due to increasing electricity consumption and its lower fuel cost. In addition, as the share of electricity generated from renewable energy grows slowly, its impact on reducing carbon emissions will not be as

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significant as expected. In this regard, if there are no suitable technologies for reducing carbon emissions from fossil fuel generation, it is possible that carbon emissions from the power sector will be larger than in the case of a high oil price level.

Third, the Korea Electric Power Corporation (KEPCO)'s profit will increase, since KEPCO can buy electricity at a cheaper price in the wholesale market. As Figure 4 shows, the KEPCO stock price has increased as the oil price has dropped, by enabling KEPCO to buy electricity more cheaply than before. Also, large incumbent companies such as KEPCO can take advantage of their economic scale, internal R&D capacity and cumulative learning effects when they drive an innovation forward (Christophe Defeuilley, 2009). On the other hand, the profitability of generation companies operating peak load power plants will be hampered by the decreasing wholesale price. In addition, it will be unlikely for private companies to invest in a long-term, risky, uncertain new energy business. In this case, private companies will be likely to focus on short-term investment and proven new energy technologies.

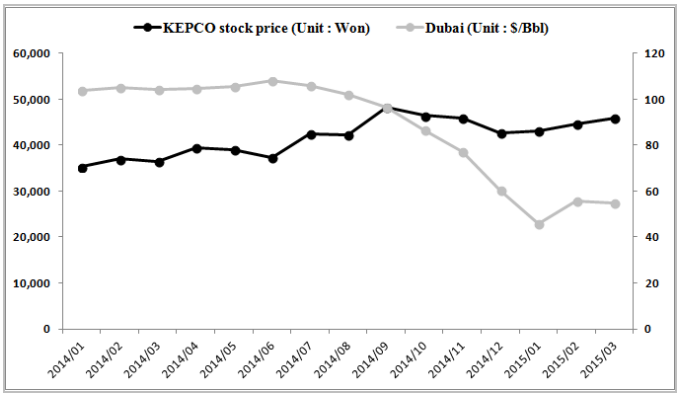

Figure 4. KEPCO's closing stock price.

In conclusion, the recent drop in oil prices may be a threat to a new energy industry including renewable and distributed energy; therefore, the role of KEPCO as a leading public enterprise will be more crucial in supporting stable growth in the new energy industry and improving social welfare. In particular, as of 2014, the Korea Ministry of Trade, Industry and Energy (MOTIE) announced its plan to stimulate a 'new energy industry,' including an energy storage system (ESS), electric vehicle (EV) services, a micro-grid, a solar energy rental service, and others. KEPCO is a single seller in Korea's retail market, and owns both distribution and transmission. Therefore, with its growing profitability, it will be affordable for KEPCO to invest in a new energy industry and stimulate knowledge spillover through a power sector value chain. In fact, KEPCO will increase investments by 54 percent in 2015 compared to the previous year. To be specific, up to 1 trillion won will be invested in new energy businesses such as smart grid, ESS and renewable energy to support green and smart innovation. Above all, it's clear that the role of KEPCO will be crucial in leading the long-term investment and stimulating knowledge spillover in the new energy industry.

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Electric Power Statistics Information System: < http://epsis.kpx.or.kr>

Korea Gas Corporation: <www.kogas.or.kr>

Petronet: <www.petronet.co.kr>