Comparative analysis of public's perception of economic feasibility and reality for selected energy sources in Korea

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1. Introduction

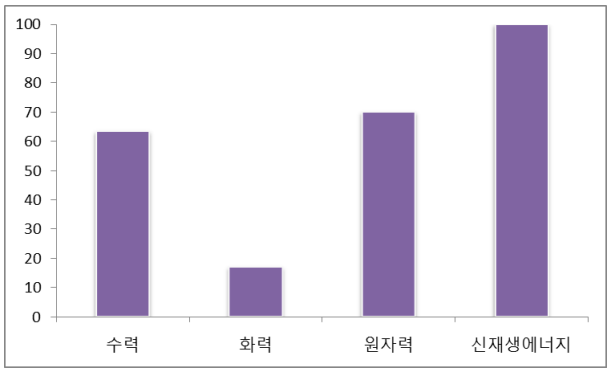
Controversy on nuclear energy has persisted ever since, but nuclear energy has maintained around 30% of electricity generation in Korea. This is because Korean wants to secure energy security and diversity of energy sources, but the most rational driver behind nuclear energy is the economic feasibility.[1]
Looking at the actual prices of electricity traded in the Korean Power Exchange, the price of electricity generated by nuclear energy is 39.1 Korean won per kWh, which is lower than that of other sources: 58.9 (bituminous coal), 221.8 (oil), 158.6 (gas), 170.9 (hydropower), 162.8 (wind) and 463.1 (photovoltaic). However only experts, regulators and people from electricity generation industry are aware of this fact and the public does not seem to be perceiving this correctly. This research, therefore, will compare the economic feasibility of energy sources and how it is perceived by the public in general.

2. Method and Data

To identify how the general public perceives economic feasibility of different energy sources, we conducted a survey in March 2015 on 1,009 Koreans living in Korea then. The survey asked the respondents to select the energy source with the best economic feasibility among four choices (hydropower, fossil fuel, nuclear and new and renewable energy). Out of the 1,009 respondents, only 458 valid responses were selected after excluding invalid and null responses. The responses were normalized such that the energy source with the most number of responses are set to value of 100. This index was then compared to the actual prices of electricity traded in the electricity market for each energy sources. The prices were also normalized such that the most economic feasible energy source would possess a value of 100.

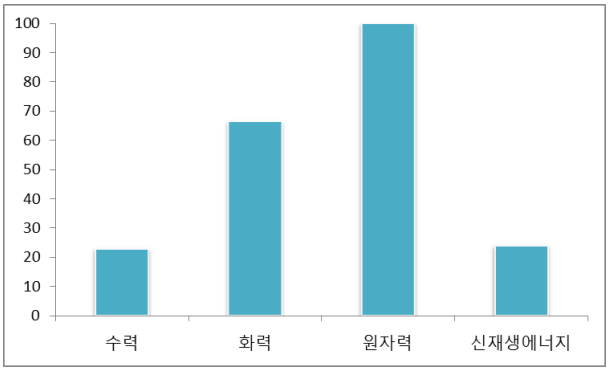
3. Results

The results indicate that the public perceives new and renewable energy as the most economic-feasible energy source, as 183 out of 458 respondents selected new and renewable energy to be the energy source with the best economic feasibility. Nuclear energy followed with 128 respondents followed by hydropower and fossil fuel with values of 116 and 31 respectively. Normalization of the result using reference value of 100 for new and renewable energy leads to figure 1.



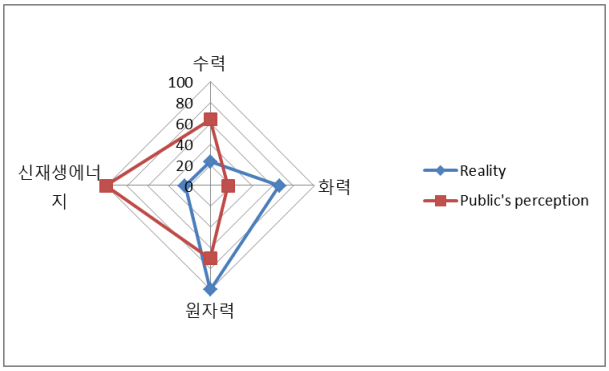
[Figure 1. Public's perception of economic feasibility of four energy sources (normalized)]

The prices of electricity traded for each energy sources were normalized as described in section 2. The results are depicted in figure 2. Since there were two or more energy sources that corresponded to "fossil fuel" and "new and renewable energy", the cheapest energy source was selected: bituminous coal for fossil fuel and wind for new and renewable energy. The results suggest that nuclear energy was most competitive with value of 100, followed by fossil fuel (bituminous coal), new and renewable energy (wind) and hydropower with values of 66.38, 24.01 and 22.87 respectively.



[Figure 2. Economic feasibility of four energy sources measured by price of electricity traded in electricity market (normalized)]

Comparison of figure 1 and figure 2 yields figure 3.



[Figure 3. Gap between the reality and public's perception of economic feasibility]

Figure 3 clearly demonstrates that there is a large gap between public's perception and the reality in terms of economic feasibility.

4. Conclusion

This research was able to identify the large gap between public's perception on and reality of economic feasibility of energy sources. There are two possible reasons for the gap.

Firstly, the electricity price paid by the public is agnostic of energy sources. Therefore, it is difficult for the public to be aware that the electricity from nuclear energy is benefiting them and hence the public would be indifferent to the real economic feasibility.[8,10,12]

Secondly, public's awareness of nuclear reactor decommissioning and spent fuel processing along with easier access to relevant information the media would have played a role. In fact, number of press and media has questioned the economic feasibility of nuclear energy. However, the price of electricity generated by nuclear energy includes costs for future activities such as decommissioning, radioactive waste disposal and spent fuel disposal. The public seems to be not aware of such fact and therefore favoring the media.

Such analysis leads to two major policy implications. Most importantly, the government should emphasize the specific economic benefits of nuclear energy to the public. Recent heat wave in Korea has induced public's interest on electricity prices. The government should emphasize the role of nuclear energy in enabling relatively low electricity prices compared to other nations.

In addition, the government and the nuclear industry should proactively respond to the wrong information provided by the media and/or NGOs.[5,6,7,15] It is easy for the general public, without expertise in science and/or economics, to accept biased claims without verifying the facts behind them. The government and the nuclear industry should ensure that the public is aware of the facts and do not adopt biased claims.[2,3,4]

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