Energy Policy 116 (2018) 137–144

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Public perception of energy transition in Korea: Nuclear power, climate change, and party preference

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ARTICLE INFO

Keywords:
Public perception
Climate change
Nuclear power
Political preference

ABSTRACT

Since President Moon Jae-in took office in May 2017, South Korea has been embroiled in a major social controversy about energy transition. The president's pledge to transition toward renewable energy represented a dramatic change in Korean energy policy, which has been focused on nuclear and coal-fired plant expansion policies since the 1970s. This study examines public perception of energy, with focus on the relationship between nuclear power and climate change as well as party preferences, based on a nationally representative survey of Korea. The survey data shows that the risk-risk tradeoff strategy, reframing nuclear power generation as a way to mitigate the risks of climate change, seems to be ineffective in Korea. Furthermore, nuclear power represents the values of the elderly, materialists, developmentalists, and conservative political parties. These results suggest that Korean energy policy is a very political issue rather than a strictly scientific or economic one. Therefore, this issue should be deliberated through a democratic process.

1. Introduction

Since the 1960s, South Korea has achieved rapid economic development called “compressed development.” The Korean government has sought to secure energy resources that can be supplied inexpensively and consistently to maintain rapid economic growth. As a result, electric power production, primarily in the form of coal and nuclear power, soared from about 1.8 TWh in 1961 to 433 TWh in 2015 (Korea Electric Power Corporation, 2016). Currently, coal accounts for the largest portion of electricity generation in Korea (39.1%), followed by nuclear power (30%) and Liquefied Natural Gas (LNG) (21.4%) (Korea Electric Power Corporation, 2016). South Korea, located in the Korean Peninsula, cannot connect to the Eurasian continent because of military confrontation with North Korea. Therefore, after the Korean War in 1950, all power has been produced domestically, and a stable supply of electric power has been the most important policy priority above any other concerns. All energy resources needed in Korea are imported from overseas, and nuclear power has played a critical role in Korean energy security. Although nuclear fuel has also been imported from overseas, its long fuel cycle and long-term contract of import (more than 20 years) contribute significantly to energy security in Korea. As of December 2016, 25 nuclear power plants are operating in Korea, ranking sixth in the world by number and is the greatest in terms of number of nuclear power plants per unit land area (IAEA, 2017). The share of nuclear electricity production was 30.3%, at number 13 in global rankings (IAEA, 2017).

As the risk of climate change has deepened, shifting to a low-carbon economy has been emphasized internationally. Transitioning to a low-carbon economy implies entry into the new climate regime. The global community recognizes the seriousness of climate change and strives to mitigate risks through the Kyoto Protocol established in 1997 and the Paris Agreement of 2015. Korea also aims to reduce greenhouse gas (GHG) emissions by 37% by business as usual standards by 2030 (UNFCC, 2016). The Korean public also wants low-carbon development. The expansion of coal-fired power plants and rapid increase in automobiles have worsened the problem of fine dust in Korea. After the impeachment of President Park Geun-Hye in 2017, resolution of the problem of fine dust became one of the most important issues in the Korean presidential election. However, nuclear power has caused serious social conflict surrounding the issue of spent fuel and radioactive waste disposal. In Anmyeon Island (1990), Gulup Island (1994), and Buan City (2003), opposition to the radioactive waste repository has developed into violent demonstrations. Thus, since the 1990s, the Korean government's energy management policy has not successfully satisfied the changing needs of the people. Public acceptance has increasingly become an important factor in the choice of energy source.

The purpose of this study is to examine the following research issues. First, we identified which future energy sources Koreans think are

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https://doi.org/10.1016/j.enpol.2018.02.007
Received 30 October 2017; Received in revised form 25 January 2018; Accepted 4 February 2018

preferable. Secondly, we analyzed the relationship between the perception of favorable energy sources and the perception of climate change. Thirdly, we analyzed factors affecting Korean preferences for various energy sources. Among them, demographic factors, values, political tendencies, and awareness of climate change were examined. In this process, public acceptance of recent controversial "risk-risk tradeoffs" of climate change and nuclear power has been identified (Bickerstaff et al., 2008). The fact that nuclear power plants produce very little GHG emissions has been useful rhetoric to pro-nuclear energy groups for increasing the number of nuclear power plants in Korea.

This paper is presented in the following order. First, we examine the research that has dealt with public perception of energy sources. This literature review reveals which factors influence energy preferences. We also examine risk-risk tradeoff debates concerning climate change and nuclear power. Secondly, we present the survey method used in this study to investigate the public perception of energy sources. Thirdly, the results of the survey analysis are presented. Finally, the implications of the study are discussed.

2. Background and literature review

2.1. Public perceptions on future energy

In the determining the energy mix of a country, various points of view must be considered. Globally, important issues in energy system transformation include energy security, affordability (low costs), climate change mitigation, and environmental protection (European Commission, 2002, 2007; Parkhill et al., 2013). According to a UK survey in 2012 (Parkhill et al., 2013) for the UK public, affordability (keeping energy bills affordable) was viewed as the most important policy priority (40%), followed by energy security (making sure the UK has enough energy) (32%). Climate change was also rated important (27%); however, this issue was viewed as less significant than affordability and security. A Eurobarometer survey (European Commission, 2002, 2007) showed similar results.

Various surveys have been conducted asking about the energy preferences of the public or suitable future energy sources. Taken together, we can easily identify that renewable energy has been selected as the most preferred energy source in many cases. Many survey results (European Commission, 2002, 2007; Karlstrøm and Ryghaug, 2014; Parkhill et al., 2013; Pidgeon et al., 2008; Poortinga et al., 2013; KNEA, 2015) showed that the public is most likely to prefer renewable energy sources such as solar, wind, and hydroelectricity to fossil fuel energy and nuclear power. Furthermore, in response to a question asking about future energy sources in 30 years (European Commission, 2007), the greatest expectations were for renewable energy. In Korea, the result of the national survey question "what is the energy to be used most in the future" asked by the Korea Nuclear Energy Agency (KNEA, 2015) was also renewable energy (58.1%). However, in some cases, nuclear power was recognized as an important future energy source based on recognition of it as 'a necessary evil' (European Commission, 2007, p. 52).

Nevertheless, concerns about energy security persist for renewable energy, including ensuring a stable supply and affordability. Nuclear power may be sufficiently competitive in terms of security and affordability, but safety problems exist, including the risk of accidents that can develop into catastrophes. In particular, after the Fukushima nuclear power plant accident in Japan in 2011, the issue of safety became more prominent among members of the public. In terms of climate change and environmental protection, nuclear power has two sides. It generates very little GHG emissions but produces spent fuel that is environmentally harmful for very long periods of time.

2.2. Socio-demographic variables and energy support

There are several important socio-demographic variables that may influence support of or opposition to energy sources. Some of these factors include gender, age, education (scientific knowledge), and marital status (Chung and Kim, 2009; Chung et al., 2008; Karlstrøm and Ryghaug, 2014). Studies have mainly focused on energy-related NIMBY (Not In My Back Yard) or LULU (Locally Unwanted Land Use) issues. In particular, nuclear power has been a major research topic.

In terms of the influence of gender and energy preferences, women are more environmentally oriented than men (Karlstrøm and Ryghaug, 2014) and have higher levels of risk perception regarding potentially dangerous energy technologies such as nuclear power (Chung and Kim, 2009; Chung et al., 2008). As indicated by the results of a recent survey in the United States (Pew Research Center, 2015), a majority of men (54%) favor building more nuclear power plants, whereas only 36% of women favor doing so. This trend is fairly consistent in other studies as well. Education or the level of knowledge about specific energy sources may generally increase public acceptance. In a questionnaire about building more nuclear power plants in the United States, half of those with a college degree or higher favored building more plants. In comparison, only 42% of those with a high school degree or less favored building more nuclear power plants (Pew Research Center, 2015). One survey conducted in China also demonstrated that people with university degrees or above have more positive attitudes regarding nuclear energy than people with less education (Yu et al., 2012).

Although age may be a very important factor for determining support for different types of energy, several studies have given an unclear picture of these relationships. A survey of German- and French-speaking regions of Switzerland demonstrated that age was negatively correlated with nuclear power plant acceptance (Siegrist et al., 2014). This finding indicates that older people were less likely to accept nuclear power compared with younger people. However, a recent survey in the United States showed different results. The result reported by the Pew Research Center (2015) demonstrated that older adults (ages 65 and older) were more inclined to favor building more nuclear power plants than were younger age cohorts. For the alternative energy sources such as wind and solar power, adults under 30 prioritized alternative energy development over fossil fuels by a 74% (alternative energy) to 20% (fossil fuels) margin. In contrast, for those aged 65 and older, the difference was only 7% (Pew Research Center, 2015). A study of the Australian public showed that support for renewable energy is stronger among younger Australians (Tranter, 2011). Likewise, a survey of the Norwegian public demonstrated that older people were generally more skeptical of renewable energy sources, such as onshore and offshore wind, than were younger people, and more favorable toward gas (Karlstrøm and Ryghaug, 2014).

2.3. Risk-risk tradeoffs between climate change and nuclear power

Under the new climate change regime, the energy sources we choose in the future should be environmentally friendly without generating GHGs. Possible alternatives to fossil fuels are renewables and nuclear power. Nuclear power generation was once a dream technology thought to be able to solve human energy problems. However, the Three Mile Island accident in 1979 and the Chernobyl disaster in 1986 showed that nuclear power could pose a major threat to humanity. Since then, most Western countries, such as the United States and the United Kingdom, have not been able to build new nuclear power plants. However, as the price of energy surged and as the risk of climate change increased in the 2000s, the perception of nuclear power has begun to change. In fact, as international climate change negotiations progressed, the role of nuclear power was continuously discussed as a solution for the reduction of GHG emissions (Marshall, 2005). The use of nuclear power has been emphasized as a reliable alternative to solve the energy demand issues arising from the restriction of fossil fuels in response to climate change risks.

However, prominent environmental activists have claimed that this trend is the result of a clever public relations campaign by the nuclear industry (Marshall, 2005). Bickerstaff et al. (2008) argued that the use