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Analyzing Energy Security in East Asia

Evaluating Energy Security Performance in the cases of Japan, South Korea, and Taiwan

Topic and Research Question

Energy is omnipresent in news, media, and political discourse. Climate change sits firmly at the center of these discussions and renewable energies have been touted as the way forward to delay global warming.

As renewable energies do not depend on the import of carbon-based fuels, they have the additional benefit of enabling countries to reduce their reliance on foreign fossil fuels. This can further mitigate risks from conflicts or other disruption to the energy supply, a core tenant of energy security discussion (Ölz, Sims, & Kirchner, 2007, p. 5).

In Japan, the first oil crises forced policymakers to integrate energy security under the umbrella of national security (Mihut & Daniel, 2013, p. 1046). South Korea was equally affected by the oil shocks (Azad, 2015, pp. 63–64; Halloran, 1974). In Taiwan, just recently a massive power outage in the northern half of the island in 2017 caused a five-hour blackout and was thought to be caused by structural problems within the electricity supply (Horwitz, 2017; J. M. Yu, 2017).

Disruptions to energy supplies are so impactful, they are considered risks to national security. Minimizing risks is paramount to the continuation of economic activity and everyday life.

This thesis focuses on energy security in Japan, South Korea, and Taiwan. These countries have been chosen, because they are highly reliant on imports of fossil fuels. The question the author tries to answer is, in what way the energy security situation in Japan, South Korea, and Taiwan currently differs. All data used in reference to the framework was taken from 2016.

State of the Art

The OECD and International Energy Agency (2014) define the term energy security as ‘‘the uninterrupted availability of energy sources at an affordable price” (ibid., p. 13). The three major aspects when discussing energy security are affordability, availability, and accessibility.

Expanding upon this definition, the Asia Pacific Energy Research Centre has included environmental protection in the umbrella term of energy security. A fourth aspect, acceptability, was proposed to be added in 2007.

According Cherp and Jewell (2014, pp. 416–418), the concept of energy security has not been adequately defined in the past, which has led to various definitions now being circulated. Other researches (Ang et al. 2015b, pp. 1081-1082) have followed up upon these definitions and attempted to uniformize their approaches.

Methodology and Approach

The methodology used focuses on Martchamadol and Kumar’s (2013) framework, titled the “Aggregated Energy Security Performance Indicator (AESPI)” and includes elements from Sovacool’s (2013) “Assessing energy security performance in the Asia Pacific, 1990-2010”. AESPI was intended to be comparable in application to the Human Development Index or the Gross Domestic Product as a status overview of any given country’s energy security situation. AESPI consists of 25 indicators based on the Energy Indicators for Sustainable Development (EISD) and chosen by their most common usage rate in other energy security analysis works and the availability of historical data

Sovacool’s work adds pollution data, water and land use as well as fuel prices and price stability among others. It was also created with a focus on the Asia-Pacific, which was an added benefit.

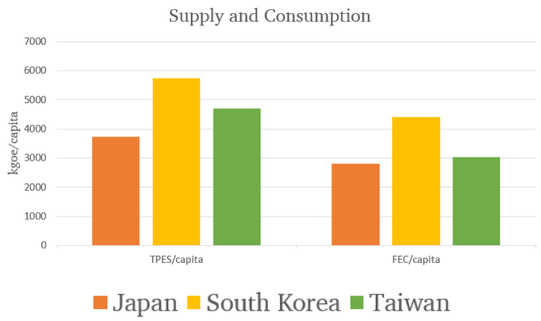
All indicators and components, which were equal in their purpose were combined into single indicators. The final framework features 35 indicators in total.

The three chosen nations were then analyzed on a per country basis, using this combined framework. Each indicator is assessed individually and calculated according to the framework’s definitions.

Main Facts

On the supply side, significant differences were observed between the three chosen countries for the year 2016. While South Korea’s total primary energy supply (TPES) was around 60% of Japan’s total, the per capita energy supply is 53,8% higher than Japan’s and 21,9% higher than Taiwan’s. Japan’s total TPES was 474.233.623,7 tons of oil equivalent (toe), South Korea’s measured 294.654.000 toe, and Taiwan showed a value of 110.962.800 toe. The per capita values calculated measured 3.736,09 kilograms of oil equivalent (kgoe) per capita in the case of Japan, 5.747,15 kgoe in South Korea, and 4.713,86 kgoe in Taiwan.

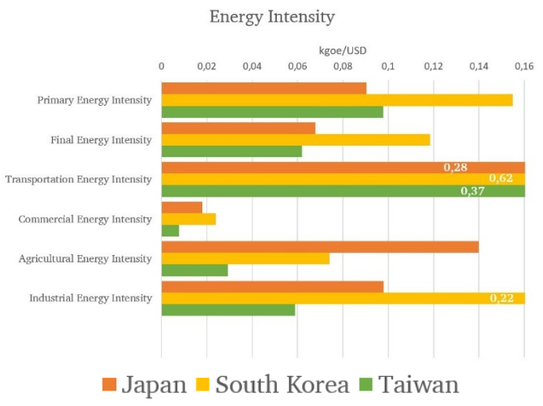
The primary energy intensity for Japan was 42,7% lower compared to South Korea and 7,5% lower compared to Taiwan, which makes Japan the overall most energy efficient country. When looking at the final energy



intensity, the lowest value is calculated for Taiwan at 0,062 kgoe per USD. This value is 9% lower than Japan 47,6% lower than South Korea. Taiwan uses the energy more efficiently after transformation and after accounting for losses.

Considering the storage of fuels, Japanese storage in 2016 amounted to 7,75 years of reserves, in comparison to South Korea’s 5,9 years and Taiwan’s 1,19 years.

Japan leads in diversification, as renewable energies, including waste energy, provide more than 10% of TPES. South Korea features a level of 5%. Hydropower in Korea only accounted for around 9% of all renewable energies, while solar, wind, and other new renewable energies accounted for 13,7%. The rest is made up of waste and biomass energies. Taiwan features the lowest level of diversification at 2,21%. It is hindered by a low hydropower generation with little possibilities to improve it. Off-shore wind power generation is preferred over on-shore generation. The largest share of renewable energy in Taiwan was also produced by waste energy and biomass.



Measured against GDP, South Korea produces 72% more emissions per USD than Japan and Taiwan. Japan and Taiwan both have the same calculated value of 0,25 kg of CO2 per USD. The value for South Korea was 0,43 kg of CO2 per USD.

Results

The results of applying this framework show that overall, Japan has the smallest energy supply and the lowest consumption of all three countries on a per capita basis, while South Korea sits at opposite end.

Looking at the economic sectors individually, the most substantial difference is evident in the agricultural sector, where Taiwan’s energy intensity is 60% lower than South Korea’s and 80% lower than Japan’s. Taiwan also shows the lowest energy intensity in the other sectors, with the exception of the transportation sector.

Strong variations between energy intensity within the economic sectors, while overall sectorial GDP output is similar, offer opportunities for future research. If South Korea and Japan can successfully reduce their energy intensity to the levels of Taiwan, the energy savings could be considerable.

A steady and well-maintained stockpile of fossil fuels is an obvious choice for emergencies, but diversification remains the necessary choice to increase domestic energy supplies. Investing in new energies needs to be part of this diversification.

References

All references can be found in the full version of the MA thesis available at http://othes.univie.ac.at/.

About the Author

Daniel Yasin was an MA student and student assistant at the Chair of East Asian Economy and Society. He holds a BA in Japanese Studies.and studied Japanese as an exchange student at the Tokyo Metropolitan University in Tokyo, where he was also a lecture assistant.

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