

## **Key Points of IEEJ Asia/World Energy Outlook 2016**

Ken Koyama, PhD  
Chief Economist, Managing Director  
The Institute of Energy Economics, Japan

On October 21, the Institute of Energy Economics, Japan, published the “Asia/World Energy Outlook 2016” (hereinafter referred to as the “outlook”). The outlook provides reference and other scenarios for the world energy supply and demand outlook through 2040 to predict the world’s energy supply and demand structure for the future and analyze energy security and climate change problems emerging from the structure and their economic impacts multilaterally and comprehensively.

The IEEJ outlook has provided major case studies based on important challenges and hot problems for each year. While giving priority to analyses related to climate change every year, the annual outlook focused on a scenario for the substantial promotion of unconventional oil and gas resources development in 2013, that for economic deceleration in China and India in 2014 and that for lower crude oil prices in 2015. The 2016 outlook features analyses on three major topics – the impacts of energy supply disruptions, climate change and the role of nuclear energy. The following overviews the reference scenario for the 2016 outlook and summarizes key points of the three topics.

The reference scenario depicts the so-called “business as usual” world. In the scenario, the current energy supply and demand trend is assumed to remain unchanged with no major change seen in energy and environment policies and in energy-related technologies. In the reference scenario, global primary energy demand will increase at an average annual rate of 1.2% from 2014 to 18.9 billion tons of oil equivalent in 2040 (a 38% increase from 2014) under an annual average economic growth rate of a little less than 3%.

The demand growth will center on Asia. Particularly, China, India and the Association of Southeast Asian Nations (ASEAN) will account for 55% of global energy demand growth, serving as the driver of the global growth. While demand for all energy sources will increase, growth will be remarkable for renewable energy, nuclear and other non-fossil energy sources. Even in 2040, however, the world will still depend on fossil energy sources (oil, gas and coal) for 78% of total energy supply.

As the gravity center of the global energy market is shifting to Asia, the 2016 outlook focuses on ASEAN in Asia. While China and India are important, ASEAN is also one of the important growth centers. As coal power generation is expected to substantially increase in response to the

robust electricity demand growth (a three-fold increase by 2040) in ASEAN, future environment measures will be important for the region. Growing natural gas demand will prompt ASEAN to become a net gas importer by 2030. ASEAN will also increase its dependence on imported oil. For ASEAN as well as the whole of Asia, energy security will grow even more important in the future.

In this respect, the 2016 outlook analyzes the impact of large-scale energy supply disruptions (physical energy shortages) as a key topic. As the current international energy market is plagued with oversupply, crude oil prices have halved from \$100/bbl a few years ago. At the same time, however, geopolitical risks and uncertainties have grown to unprecedented levels in the Middle East and other major oil producing regions.

From the viewpoint of “preparing for war in peace,” we conducted a quantitative analysis on the impacts on the world economy of physical energy shortages amid large-scale energy supply disruptions (e.g., 10 million bpd), using a comparative static approach. The analysis indicates that such energy supply disruptions would lead the world economy to contract by 9%. Adverse effects on Asia including Japan would be particularly great. It has also made clear that energy security is a very important challenge for Asia.

An analysis on climate change concludes that greenhouse gas emissions, if based on intended nationally determined contributions (INDC) for the Paris Agreement, would increase from the present level to 4.6 billion tons of carbon dioxide equivalent. Although the present INDC deviates far from the target of halving GHG emissions by 2050, the 2016 outlook positions the Paris Agreement as a key global initiative as a first step.

As for long-term climate change initiatives, the 2016 outlook analyzes the importance of an initiative to minimize comprehensive costs covering not only attention-attracting GHG emission reduction measures and costs (mitigation costs) but also adaptation costs to reduce and respond to damage. Projected costs, though being accompanied by great uncertainties, indicate that an option to give priority to substantial GHG emission cuts alone would not necessarily minimize the comprehensive costs. While the development and spread of innovative technologies are seen as indispensable for long-term initiatives, the 2016 outlook provides an analysis of hydrogen’s potential contribution to reducing CO<sub>2</sub> emission substantially.

Regarding nuclear energy, the 2016 outlook sets not only the reference scenario through 2040 but also lower and higher nuclear capacity scenarios and quantitatively analyzes the impacts of the three scenarios on the so-called three Es – economic growth, energy security and environmental protection – at global and Asian levels. In the higher nuclear capacity scenario, Asian nuclear power generation capacity in 2040 is assumed to post a substantial increase of about seven-fold from 2014.

A sensitivity analysis of these scenarios indicates anew that nuclear energy could greatly contribute to reducing CO<sub>2</sub> emissions, improving the energy self-sufficiency rate and saving electricity costs. Regarding nuclear energy, however, safety must be given top priority naturally. As

far as safety is secured, nuclear energy can contribute to the three Es. The outlook emphasizes that more serious efforts to secure safety are required to allow nuclear energy to play its expected important role.

Contact: [report@tky.iej.or.jp](mailto:report@tky.iej.or.jp)

The back issues are available at the following URL

[http://eneken.iej.or.jp/en/special\\_bulletin.html](http://eneken.iej.or.jp/en/special_bulletin.html)