Clarifying and measuring energy security

A new study has clarified the concept of the popular phrase ‘energy security’. It suggests that measurements of energy security for a country or area should be multi-dimensional and include figures that represent fuel prices, the diversity of the energy market and political stability.

Ensuring the security of energy supply through sustainable energy initiatives is a key concern in the EU and has been integrated into environmental policy. However, although the term ‘energy security’ is frequently used in both scientific and political arenas, the measurement of the concept is rather vague.

Energy security is generally considered to be present if energy is available at all times in sufficient quantities and at reasonable prices. The study adopted a definition which further clarified the economic aspect of energy security: “energy security exists if the energy sector does not cause major welfare-reducing frictions in the economy at national and global levels.”

The study reviewed existing attempts to define or measure energy security. It highlighted the need to consider external influences, such as political stability, potential market failures and energy price fluctuations in these measurements. Some indicators are based on the diversity of the energy sources, fuels and suppliers. This is because it is widely believed that diversity can mitigate energy insecurity. Other approaches use dependence on fuel imports as an indicator, as this highlights the availability of domestic energy sources. The International Energy Agency (IEA) developed two indicators of energy security: the first based on the price of energy and the second based on the availability of energy.

The researchers introduce the concepts of ex-post and ex-ante indicators. Ex-post indicators attempt to measure whether the energy system caused any major frictions to the economy in the past and ex-ante indicators try to ascertain whether there will be any major frictions in the future. The former tend to use the price developments in fuel, whereas the latter is broader and considers potential problems in the market structure for energy goods and global political and technological issues. The research suggests that these indicators should be used in combination.

The study created an ex-post indicator based on price and an ex-ante indicator based on market structure and fuel diversity to measure the energy security of four countries: Germany, the Netherlands, Spain and the USA. The ex-post measure indicated that energy security has generally been decreasing over the last decade and is the same for all four countries.

Since 2002 in particular, these countries have faced increasing oil prices which implies that energy security has declined. The ex-ante measure predicted that if political risk is ignored, energy security will decrease for all four countries until 2030. Germany has the lowest predicted security and Spain’s predicted security improved relative to the other countries. However, if political risk is included the situation changes and Germany is predicted to become the most energy secure of the four in 2030. This is probably due to the phase-out of nuclear energy in Germany with increased gas and renewable energy in the mix.

The results suggest that accounting for multiple dimensions of energy security is a promising area of research that could inform energy policy and clarify the meaning of energy security across nations.


Contact: dirk.ruebbelke@cicero.uio.no

Theme(s): Climate change and energy, Sustainable development and policy analysis