

Global Energy Transition and Its Turning Point

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As major countries in the world have announced ambitious carbon neutrality goals for the middle of the 21st century since 2020, the carbonization trend has dramatically accelerated. In a major development amid the trend, the Glasgow climate agreement was adopted at the 26th Conference of Parties to the United Nations Framework Convention on Climate Change in November 2021, reaffirming efforts to limit global temperature rise to 1.5°C. Under the new situation, the world has increasingly been expected to see a global energy transition in which energy supply and demand will structurally turn around when decarbonization is realized. In this way, the energy transition has become one of the key terms for analyzing the current international energy situation.

Energy supply and demand structurally differ by country or region. Generally, however, fossil fuels account for most of the energy consumption in any country or region. Globally, fossil fuels commanded as much as 83% of primary energy consumption in 2020. Supporting the energy supply and demand structure are international and domestic energy supply chains and infrastructure, as well as final consumption equipment/appliances. These supply chains, infrastructure and final consumption equipment/appliances are mostly legacy assets that continue to be used over a long time after their diffusion. This means that the energy supply and demand structure supported by established supply chains and infrastructure is difficult to change easily, quickly or dramatically due to stock effects.

If energy use changes through choices by energy market consumers and suppliers lead to new investment to continue flow-based changes, however, stock-based changes emerge gradually in a manner to transform the energy supply and demand structure into a new one supported by a new system as time goes by. Such transformation has been observed and represents the essence or true nature of an energy transition.

In this sense, the world has experienced some major energy transitions. In modern history, the first energy transition was a transition from natural energy to coal through the industrial revolution. Humans had long remained dependent on natural energy sources including human labor, livestock labor, water and wind wheels and traditional biomass. As massive energy consumption was required for the industrial revolution, however, coal began to be used as an energy-intensive source, becoming a leading energy source. Coal remained a leading energy source in the early 20th century but was later replaced by oil. Supporting the rapid expansion of oil consumption were increased oil usage symbolized by the rapid diffusion of automobiles and the development of competitive oil supply sources to back up demand growth. Consequently, oil has developed into the largest energy source, leading the 20th century to be called “the century of oil.”

However, the first oil crisis in 1973 triggered a transition from the century of oil. Oil’s share of global primary energy consumption expanded throughout the 20th century, peaking at 49% in 1973. Through oil price spikes and oil market destabilization under the first oil crisis and their great adverse impacts on the global economy, however, the oil share began to decline in 1974. The development of

alternative energy sources to oil and the improvement of energy efficiency mainly in developed countries, as well as the global economic stagnation, led oil demand to decelerate growth and decrease. Since the 1980s, oil consumption volume has expanded due to growing demand in developing countries. However, oil's share of global primary energy consumption has continued to decline, reaching 31% in 2020. While oil has remained the largest energy source, its share has declined substantially and is expected to continue falling. Furthermore, a potential oil demand volume peak or downturn has begun to attract interest globally.

As the world has ushered in the 21st century, the time has come to make a major transition from the century of oil. A trend in which non-fossil energy sources have grown more important through a fall in fossil fuels' share of the energy mix and a rise in renewable energy's share have become clearer in the past decade. Then, the world has faced the acceleration of decarbonization, embarking on a new energy transition. The speed and intensity of the transition will depend on various factors. Attracting attention will be key factors exerting great impacts on the speed and details of the transition.

The past history of energy transitions indicates that political, economic and social factors or their combinations exerted great impacts on energy transitions or became turning points to accelerate such transitions. The history of energy transitions has been influenced by such factors or turning points. As discussed above, the first oil crisis triggered the beginning of the end for the century of oil. The enhanced promotion of alternatives to oil led to a decline in oil's share of the energy mix.

Attracting attention in this respect at present are the Ukraine crisis and its impacts. As a matter of course, decarbonization initiatives have already been exerting impacts on the energy transition. In this sense, the enhancement of carbon neutrality initiatives since 2020 can be considered a turning point for the ongoing energy transition. As the Ukraine crisis and the first oil crisis are similar in some points, however, I pay attention particularly to the future impacts of the Ukraine crisis.

The two crises have some similar background factors. First, energy prices were rising under the tightening international energy supply-demand balance before the two crises. Second, heavy dependence on specific energy supply sources was an issue before the crises. The first oil crisis was accompanied by oil-consuming countries' heavy dependence on the Middle East and the Ukraine crisis by Europe's heavy dependence on Russia. The two crises also featured a combination of a war, embargoes and sanctions and led to concerns on serious physical energy shortage as well as energy price hikes. An important point is that these similarities indicate extremely strong energy security policies coming after the Ukraine crisis, as seen after the first oil crisis. In this sense, Europe and the rest of the world are expected to implement policies to enhance energy security under the Ukraine crisis and its impacts in a manner to accelerate an energy transition.

As a matter of course, future developments in the Ukraine crisis and relevant energy policies are extremely uncertain. Depending on developments, the impacts of the crisis on the global energy transition may widely differ. However, we will have to closely watch the impacts of the Ukraine crisis on future energy policies and international energy markets while considering that the ongoing crisis could be a turning point to exert great impacts on the speed and details of the global energy transition.

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