

## **What Should the World Learn from the Oil Crisis 50 Years Ago (4): Impacts on Energy Transition**

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The last serial report on what the world should learn from the oil crisis 50 years ago takes up the impacts on energy transition.

As described earlier, the first oil crisis came as a great shock to the international energy market, leading the world to turn around. The turnaround represented the beginning of the end to the century of oil. Before the first oil crisis, oil's share of the international energy market was rising persistently. Historically, the age of coal lasted long after coal became a central modern energy source on massive energy consumption under the industrial revolution launched in the 19th century. The international oil industry entered a development stage in the second half of the 19th century, when oil production mainly in the United States expanded to meet growing oil consumption. Until around the 1940s, however, coal accounted for some 70% of global energy consumption, remaining a central energy source.

However, economic reconstruction and rapid economic expansion mainly in developed countries after World War II required even more energy consumption than earlier. Then, Middle Eastern oil in a full-fledged production expansion stage played a central role in fulfilling the rapidly growing global energy demand. Taking advantage of the ease in handling of oil as liquid, oil's transportation competitiveness increased through the development of large tankers and oil's excellent price competitiveness, massively supplied Middle Eastern oil rapidly replaced coal, raising its position to the center of global energy supply. In Japan, the rapid oil consumption growth was called the liquid energy revolution, meaning that liquid oil rapidly replaced solid coal as a central energy source. Oil's share of global energy consumption continued increasing, reaching 49% in 1973.

However, the oil crisis forced the trend to change dramatically. Learning lessons from the oil crisis, developed countries took leadership in enhancing energy security policies to overcome their vulnerability attributed to their excessive and short-sighted dependence on economical oil and on the Middle East as an oil supply source. As noted in my earlier reports, they promoted energy efficiency and conservation policies, oil substitutes such as nuclear energy and natural gas/LNG and coal utilization. New energy development promotion started then.

Nuclear energy became a symbolic substitute for oil. Global nuclear power generation began to increase in the early 1970s and its growth accelerated after the oil crisis. From 204 terawatt-hours in 1973, global nuclear power generation increased more than three-fold to 712 TWh in 1980 and seven-fold to 1,489 TWh in 1985. Given the lead time required for building nuclear power plants, nuclear power generation expansion triggered by the oil crisis might have started in the

1980s. Nuclear power generation continued increasing later, reaching 2,001 TWh in 1990, about 10 times as much as at the time of the oil crisis. Then, developed countries, or the members of the Organization for Economic Cooperation and Development, accounted for 1,734 TWh or nearly 90% of global nuclear power generation, indicating that developed countries in the face of the oil crisis expanded nuclear power generation.

The promotion of substitutes for oil was combined with energy efficiency and conservation measures to cause a major change in oil's share of global primary energy consumption. The share peaked at 49% in 1973 and followed a downtrend. Global oil consumption seesawed or stagnated amid global recession after the oil crisis until the first half of the 1980s. Supported by robust oil demand expansion in developing countries later, however, oil consumption continued increasing. In fact, global oil consumption soared by 69%, from 55.69 million barrels per day in 1973 to 94.09 million bpd in 2021. However, oil's share of global energy consumption slipped below 40% in 1985 and followed a downtrend, sinking to 31% in 2021. The share was higher than 26% for coal and 24% for natural gas, showing that oil remained the largest energy source. Historically, however, it is clear that oil's share suddenly stopped its expansion and followed a long downtrend in energy transition triggered by the first oil crisis.

The Ukraine crisis has greatly shaken the world again. The international energy market has become turbulent, leading energy security to become a top priority again. Even before the Ukraine crisis, however, the world enhanced decarbonization efforts, leading the structural shift from fossil fuels to non-fossil fuels, the promotion of electrification, and the development and diffusion of innovative energy technologies to become priorities. These priorities were expected to drive a new energy transition.

How would the Ukraine crisis and the new emphasis on energy security influence the future energy transition? Over the short term, many countries have chosen to utilize all energy options including coal to achieve stable energy supply as a top priority, resulting in some phenomena that run counter to decarbonization in some sense. At the same time, however, initiatives have been enhanced to reduce dependence on fossil fuels (particularly Russian ones) to promote both energy security and decarbonization over the medium to long term. Symbolizing such moves is the European Union's REPowerEU plan. Developed countries have generally indicated an attitude of going in this direction. In this sense, the Ukraine crisis has the potential to accelerate the energy transition that began earlier to make progress.

However, I view the future energy transition as being complicated by the Ukraine crisis. First, energy price or cost hikes' social, political and economic impacts are too great to be ignored. Even developed countries may have to prudently watch whether society would accept an energy transition accompanied by energy price hikes. This point is even more important for low-income developing countries. Even if decarbonization is pursued finally, more pragmatic approaches may be favored. Second, the viewpoint of comprehensive economic security considering not only energy but also relevant materials and infrastructure may play an important role in the future energy transition. Important in this respect may be a rare earth/minerals or critical minerals issue. Not only decarbonization but also the tightening supply-demand balance for critical minerals for the energy transition and the world's dependence on certain countries for their supply will become even more significant as the division of the world develops into a real structural problem. The future energy transition may undergo the complicated impacts of the Ukraine crisis and geopolitical realities.