Decarbonization and Energy Geopolitics

Nobuo Tanaka*

Prime Minister Suga declared that Japan, too, will aim to reach net-zero carbon emissions, or carbon neutrality, by 2050. The declaration came soon after Chinese President Xi Jinping surprised the world by declaring in September last year that China will aim to reach carbon neutrality by 2060, after the EU released an ambitious green deal in 2019 aiming to achieve carbon neutrality. Furthermore, the United States, too, is likely to fully engage in decarbonization efforts once the Biden administration is inaugurated. Meanwhile, the International Energy Agency (IEA) has unveiled a 2050 Net-Zero Emission Case (NZE2050) in its latest World Energy Outlook (WEO2020) in addition to its Sustainable Development Scenario.

There are several reasons why a previously unthinkable scenario is now being widely discussed. First, many governments, particularly in the Europe, have pledged to go carbon neutral by 2050. Japan, the US, and China later decided to take the same direction. Second is the significant drop in the cost of renewable energies, including solar PV and wind power. The IEA has said that solar PV will be the new king of electricity. Third, many mega tech firms, the leaders of the digital transformation that has accelerated with the coronavirus pandemic, are now committing themselves to decarbonization one after another. A typical example is Apple, which has declared that the company, together with their component supply chain, will go carbon-neutral by 2030. This will require any company worldwide to aim for carbon neutrality if they want to do business with Apple. I call this phenomenon a “demand-side driven energy transformation.” Fourth, investment in renewable energy is robust, underpinned by the green recovery plans established by governments to emerge from the coronavirus crisis, in contrast to the slump in demand for fossil fuels due to the crisis. I was personally astonished to hear IEA Executive Director Dr Fatih Birol say, “Today, I’m more optimistic than ever about the world’s ability to reach the goals of the Paris agreement,,,”. The speed of change is accelerating.

However, to achieve net carbon neutrality, extreme levels of technological innovation and infrastructure investment are required. The IEA has set its sights on four new technologies that will accelerate the use of renewable energy: hydrogen; batteries; carbon capture, utilization, and storage (CCUS); and small modular reactors (SMRs). Infrastructure investment will also be enormous. For instance, the amount of investment needed is roughly the equivalent of building the world’s largest solar park every two days for solar PV, the world’s largest electrolysis plant every hour for hydrogen energy, and a mega CCS site every week. Furthermore, at least half of all new cars will need to be EVs within 10 years. Consumer behavior will also need to change. The necessary changes will

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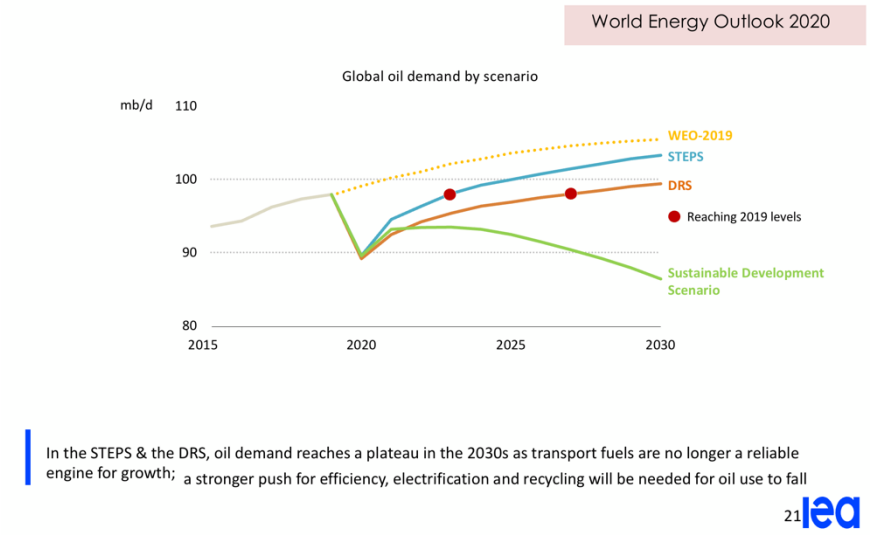
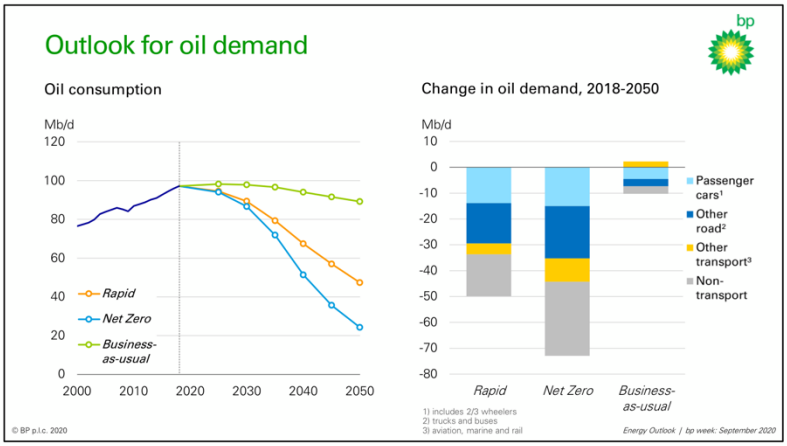
encompass all aspects of daily life; flights shorter than one hour will need to be banned in air transport; car rides shorter than 3 km will need to be replaced by cycling or walking; 20% of all workers in the world will need to work at home three days a week; and household air-conditioners will need to be turned up (or down) 3 degrees Celsius when cooling (or heating). A transformation on this scale will not happen without more rigorous government regulation, in addition to imposing major carbon taxes or creating a carbon credit trading market. Many countries in Europe, China, and the state of California have decided to ban the sale of gasoline vehicles by 2035.

The IEA considers that the global demand for oil will not peak for another ten years, but according to NZE2050, the demand has already peaked, in 2019 (Fig. 1). In its recent energy outlook, oil major BP shocked the world by stating that 2019 could have marked the peak of oil demand if governments implement active measures toward decarbonization, and even if not, the demand would level off without rising significantly above 2019 levels (Fig. 2). This outlook explains why BP decided on a massive write-off of its oil resources in spring 2020. The conventional model in the oil business has been to drill and extract underground resources in limited amounts and sell them at high prices, assuming that demand will keep growing. High prices were made possible by the oligopoly of a handful of oil majors and the cartel of OPEC oil producers. This business model will no longer be feasible if oil demand declines. Even if oil demand declines and international wholesale prices fall, the price of carbon dioxide will rise to some $140 per tonne in developed countries (as per the IEA's Sustainable Development Scenario), pushing up the consumer price of oil, including the price of carbon, thus passing the rents costs from producers to consumers. With the governments of European countries and the EU switching their policies to decarbonization, the European oil majors including BP, Total and Shell have suddenly switched gear to decarbonization. They have abandoned coal, shifted from oil to natural gas, and are ramping up their hydrogen and renewable energy businesses. US majors have been slower to react, but such a transformation will be the global norm in the energy business in the future.

Oil demand will not fall quickly unless there is a major change in policy.



Oil major BP shocked the world by predicting that demand will peak earlier than expected.



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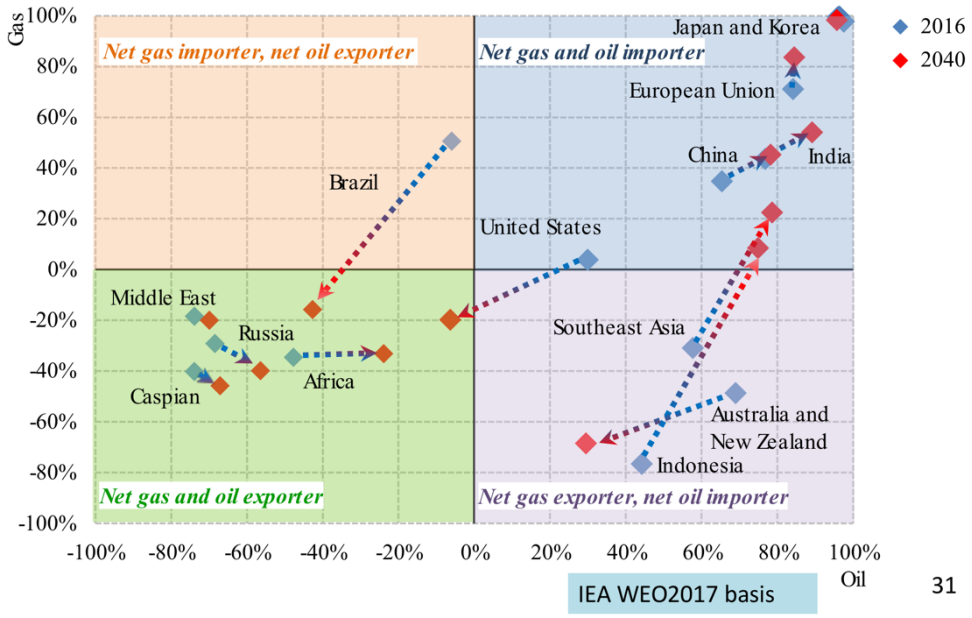
This is a catastrophe for countries that depend on oil and natural gas production. As symbolized by the efforts of US President Trump who went as far as to broker a deal between Saudi Arabia and Russia to cut oil production as oil demand evaporated due to lockdowns amid the coronavirus, oil and gas producing countries will do whatever is in their power to maintain their conventional energy dominance. Meanwhile, Europe and China will endeavor to attain energy self-sufficiency by making maximum use of renewable energy. Just as Covid-19 has caused societies to polarize into the rich and the poor in domestic politics, the world of energy is likely to polarize further into fossil fuel-dependent and renewable energy-based countries (Fig. 3). Will opposite sides start crashing with one another, just as in domestic politics? Or is there a different path?

Possible polarization of post-Covid energy self-sufficiency strategies: The US will form an oil and gas producer coalition with Russia and Saudi Arabia, while China and the EU will opt for renewable energy. What should Japan do?



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About five years ago, I was invited to a board meeting of Saudi Aramco with Daniel Yergin and was asked, “When will oil demand peak?” This question would be absolutely normal today, but back then, I was shocked and was not sure if it was a serious question. However, I soon realized that they had good reason to be worried, with electric vehicles (EVs) and hydrogen fuel cell vehicles (FCVs) starting to be seen on the streets and with countries ramping up their emission reduction commitments ahead of COP21. For Saudi Arabia and other oil producers, peak oil demand is a nightmare. The curve for peak oil was first discoveredby Hubbert in 1956, but it was based on production. In reality, oil fields were developed one after another and although costs increased, the peak never came. Thanks to high oil prices, the United States could boost production through technological innovation and return to the helm of global oil production after the shale oil revolution. However, producers can do nothing about peak demand. I recall the words of Saudi Arabia’s former petroleum minister, Zaki Yamani: “The Stone Age did not end, because we ran out of stones.” In response to that question from Aramco five years ago, I answered “2030 or earlier,” which was earlier than 2035 widely accepted in the oil industry back then, because at COP21 in Paris both the US and China were keen to reach peak CO_2 emissions by 2030. Thereafter, China continued to build large numbers of solar PV and wind power plants, shift to EVs and FCVs, and has begun to suggest that oil demand will peak in 2025. And now the coronavirus pandemic is likely to cause the oil era to end even earlier.

One of the possible solutions is hydrogen. Aramco had high hopes for hydrogen even back in 2015 when I received the question. It is possible to produce clean hydrogen by extracting hydrogen from oil and re-injecting the carbon dioxide into geological formations for enhanced oil recovery (EOR). Such hydrogen is currently called “blue hydrogen” and is distinguished from green hydrogen, which is sourced from renewable energy. Saudi Arabia has begun to work on trials of both types of hydrogen. For example, it plans to build a plant near the futuristic city of Neom, which will generate green hydrogen through electrolysis using solar power and convert it into ammonia. Furthermore, a plan is under way with Japan to convert blue hydrogen into ammonia and export the product.

Japan has long relied on imports for fossil fuels. However, the country diversified its sources of energy after the oil crises to promote coal- and gas-fired thermal power, nuclear, and energy conservation. Fifty years ago, Japan developed a business model to liquefy natural gas, a cleaner fossil fuel, to transport the gas in liquid form, and LNG has now become Japan’s specialty. However, natural gas does emit CO_2, though in relatively smaller amounts. If Japan were to decarbonize, the key would be hydrogen, as in Saudi Arabia, rather than LNG. Energy will be traded by transporting decarbonized oil, coal, natural gas as blue hydrogen, converting and transporting renewables-sourced electricity as green hydrogen, or importing electricity directly by connecting power grids; this can be the fresh vision of energy trading. Hydrogen can be transported, in addition to ammonia, as an organic hydrate (methylcyclohexane, MCH) or as liquid hydrogen, and Japan is the world’s frontrunner in both these technologies. The IEA considers that decarbonizing existing hard-to-abate sectors and facilities is the most difficult challenge, and the challenge is particularly relevant in Asia where many plants are still young. One solution might be for Japan to

promote clean ammonia co-firing in coal-fired thermal power plants, a technology Japan is currently considering, to consumer countries in Asia and Middle East oil-producing countries. Singapore intends to use MCH as the Asian hub of the hydrogen trade. Australia plans to export blue hydrogen generated from brown coal and green hydrogen from solar PV. It also plans to connect its power lines to Singapore. If society actually achieves carbon neutrality, the marginal cost of fossil fuel for the power sectors should become zero, to match those of wind power and solar PV. Gas resources underground acquired value by being converted into LNG, but in future, value will be created by converting gas into hydrogen. Oil demand slumped due to the coronavirus pandemic, and oil prices became negative at one point. Covid-19 will usher in an era where demand determines the form of supply. This could be a tremendous opportunity for Japanese companies depending on the way they choose.

Writer's Profile

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Mr. Tanaka is the Distinguished Fellow at the IEEJ. He is the chairman of the Steering Committee of Innovation for Cool Earth Forum (ICEF). As Executive Director of the International Energy Agency (IEA) from 2007 to 2011, he initiated a collective release of oil stocks in June 2011. He also played a crucial and personal role in the strengthening of ties with major non-Member energy players, including China and India. He began his career in 1973 in the Ministry of Economy, Trade and Industry (METI), and has served in a number of high-ranking positions, including Director-General of the Multilateral Trade System Department. He was deeply engaged in bilateral trade issues with the US as Minister for Industry, Trade and Energy at the Embassy of Japan, Washington DC. He has also served twice as Director for Science, Technology and Industry (DSTI) of the Paris- based international organization, OECD. He is currently CEO of Tanaka Global, Inc. He is also former Chairman of the Sasakawa Peace Foundation and serves as a Board member or an auditor at some corporations.