

Decoupling Emission Growth from Economic Growth Globally

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The world is now stepping up its efforts to promote a new energy transition. Not only developed economies but also many other economies around the world have declared that they aim to achieve carbon neutrality by 2050, 2060, or 2070. In addition, they have voluntarily set out greenhouse gas emission reduction targets for 2030 to achieve these long-term targets under the Paris Agreement and are making efforts to attain them. Based on the outcome of last year's 28th Conference of the Parties to the United Nations Framework Convention on Climate Change, known as COP28, countries are trying to review and enhance emission reduction targets towards 2035.

Russia's aggression into Ukraine in 2022 has reminded the world of the importance of energy security. The importance of energy as a commodity that supports daily life and serves as the foundation of the economy and industry has been strongly understood. It has been recognized that our society cannot exist without a stable supply of energy. In this way, the world is required to promote the energy transition to achieve both energy security and decarbonization. The basic prescription given for achieving this goal calls for thoroughly improving the efficiency of energy use, for increasing energy self-sufficiency, for maximizing the use of clean energy, and for enhancing flexibility and resilience to respond to unforeseen circumstances and emergencies. Countries around the world are trying to implement the prescription.

On the other hand, we must look at the reality of global energy consumption and recognize that global energy supply and demand are still heavily and structurally dependent on fossil fuels before the energy transition to be pursued in the future. As of 2022, global primary energy consumption totaled 604 exajoules (quintillion joules), up 52% from 397 EJ in 2000. In 2022, oil accounted for the largest share of energy consumption at 32%, followed by 27% for coal, and 23% for natural gas. Fossil fuels' share thus stood at 82%. Among non-fossil energy sources, renewable energy, known for its remarkable expansion in recent years, accounted for 7% of energy consumption, hydropower for 7%, and nuclear power for 4%. It is clear that the importance of fossil fuels is overwhelmingly high in the world as a whole. Another important point is that the abovementioned energy consumption in 2022 was supported by the existing stock of huge supply chains that stretch across the world and each country, as well as infrastructure and energy use equipment. This means that the flow of energy consumption at a certain point in time is realized by the energy-related stock in the background. In order to promote a fundamental energy transition, the whole of the stock must be transformed dramatically over the long term.

With regard to decarbonization, which is one of the key objectives of the energy transition, we are confronted with the reality that global CO₂ emissions have continued to increase for a long time. Global energy-related CO₂ emissions increased by 45% from 23.7 billion tons in 2000 to 34.4 billion tons in 2022. Although the increase in CO₂ emissions is slightly lower than the growth in primary energy consumption, the increase in CO₂ emissions almost coincided with the growth in

energy consumption. Over the past 22 (or more) years, global CO₂ emissions were basically on an upward trend. Exceptionally, emissions remarkably declined in 2009 and 2020. In 2009, the global economy contracted amid the global financial crisis. In 2020, CO₂ emissions posted an unprecedentedly large decrease of more than 5% from the previous year to 32.3 billion tons due to an unprecedentedly fast global economic decline under the COVID-19 pandemic. It is perceived that the economic slump was combined with strong regulatory measures such as city lockdowns to bring about this significant decrease in CO₂ emissions.

What does this mean? There has been a strong link between economic growth and the increase in CO₂ emissions in the world as a whole, indicating that economic growth has been coupled with the CO₂ emission increase. Of course, this is closely related to factors such as global energy consumption trends and the presence and influence of the vast stock that supports energy consumption. In the context of this reality, it can be said that what the world is trying to do now is to fundamentally decouple CO₂ emission growth from economic growth while promoting the energy transition. This means that the world as a whole is required to dramatically reduce CO₂ emissions while maintaining economic growth in the future.

Needless to say, however, the decoupling is indeed a momentous challenge. One of the factors contributing to the difficulty and complexity of the challenge is the huge existing stock of energy supply chains, infrastructure, and consumer equipment as mentioned above. On the other hand, it may be pointed out or argued that, although this challenge may be difficult, there are many cases in which CO₂ emission growth has been decoupled from economic growth. Developed economies such as Japan, the United States, and Europe have reduced CO₂ emissions over the past 10 to 20 years, although reduction degrees have varied, with progress having failed to be linear or continuous. At the same time, however, they have continued to achieve certain levels of economic growth, although their growth has been slower than in emerging economies. In this sense, developed economies can be viewed as having decoupled CO₂ emission growth from economic growth successfully.

However, it cannot be overlooked that global CO₂ emissions continued to expand. While global emissions increased, the developed economies covered by the Organization for Economic Cooperation and Development reduced their share of global emissions from 13.1 billion tons or 56% in 2000 to 11.6 billion tons or 34%, with non-OECD countries expanding their share from 10.6 billion tons or 44% to 22.8 billion tons or 66%. There is no doubt that there are many areas in which developed economies have taken the lead in enhancing efforts to cut emissions and achieving progress in emission reductions. However, we cannot overlook the fact that industrial sectors with high CO₂ emissions in developed economies have relocated their bases to developing economies while enhancing efforts to cut emissions. A type of carbon leakage has actually occurred. Given this, it seems that the successful global decoupling of CO₂ emission growth from economic growth will be an even more difficult challenge.

Developing and emerging economies will hold the key to the successful global CO₂ emission reduction in the future. However, there is no sign at this point that their CO₂ emission growth will be decoupled from their economic growth. Their position is that economic growth and development are important and should not be constrained by the energy transition. After the relocation of CO₂ emission bases has contributed to developed economies' successful decoupling of CO₂ emission growth from economic growth, developing and emerging economies may be confronted with the question of whether they can secure relocation destinations. If they can secure relocation destinations, it may be a problem for global decoupling. The question is how to break the link between economic growth and CO₂ emission growth through historic changes on a global scale. Emission reduction measures in

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developing and emerging economies, which are at the center of the challenge, are an issue not only for them, but also for the entire world. They must cooperate with developed economies in cutting emissions.

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