

Linking the environment and the economy to create a carbon-neutral society in Japan

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[Short bio]

After graduating from the University of Tokyo with a BA in history of science and from the University of Tsukuba with a MSc in environmental science, Prof. Arimura obtained a Ph.D. in economics from the University of Minnesota. Prior to joining Waseda, he was a professor in the Faculty of Economics at Sophia University; he assumed his current position in 2012. He has served on a number of Japanese government committees on environmental issues, and on the editorial boards of academic journals including *Review of Environmental Economics and Policy* and *Environmental Economics and Policy Studies*.



- How will your research contribute to carbon neutrality?

Working from the perspective of environmental economics, which views environmental issues as an element of the market economy, I am examining the effectiveness of carbon taxes and emissions trading systems. My research will contribute to the design and construction of more reliable policy for achieving carbon neutrality. One of the 2021 Nobel Prize in Physics laureates, Dr. Syukuro Manabe, received his Nobel Prize "for the physical

modelling of Earth's climate, quantifying variability and reliably predicting global warming." Three years earlier, in 2018, Professor William Nordhaus was awarded the Nobel Prize in Economic Sciences for his work on "for integrating climate change into long-run macroeconomic analysis," a major topic among environmental issues. Clearly the goal of carbon neutrality as a measure against climate change is now considered to be of great importance to the world. In that context, I aim to propose policies

that will provide incentives for action toward CO₂ reduction. My research involves the design of new effective policies and the analysis of previous policies implemented in Japan, drawing on examples from other countries.

- What is the motivation behind this research?

I was drawn to this work as a result of my interest in elucidating the relationship between the seemingly unrelated areas of the market (economy) and the environment.

Originally, I wanted to become a scientist, contributing to the solution of environmental problems through the use of technology. However, as I continued taking university courses and studying the history of science, I began to think that it would be difficult to confront environmental problems comprehensively with technology alone, and that an approach drawing on the perspectives of the market and institutions would be another necessary component.

The idea of putting a price on pollution itself has been around since the first half of the 20th century, but now we are seeing it as an international trend: in 1979 Professor Nordhaus announced the notion of "carbon tax," one approach to carbon pricing; in 1988 the UN Intergovernmental Panel on Climate Change (IPCC) was established; and in 1990 Finland introduced the world's first carbon tax. "Emissions trading" is another approach to carbon pricing: the EU Emissions Trading Scheme (EU-ETS) was launched in 2005, following U.S. implementation of an effective sulfur dioxide trading scheme as a countermeasure against acid rain. In Japan, work on such schemes is currently limited to a few trials. However, now, to avoid being left behind by the international shift, we are examining policies that can be adopted in Japan.

- What kind of research are you currently engaged in?

The Tokyo Metropolitan Government and Saitama Prefecture have adopted their own emissions trading programs (Cap-and-Trade Program), and I am currently

verifying the effectiveness of those programs. I am also working to identify the means of efficiently using the carbon tax revenue for significantly reducing CO2 emissions without harming the Japanese economy in the long run. In 2010, the Tokyo Metropolitan Government introduced a trading system under which large business establishments were obliged to reduce their CO2 emissions; currently about 80% of Tokyo establishments have achieved their reduction targets. However, in 2011 the Great East Japan Earthquake struck, prompting calls for electricity conservation and electricity price increases, so I conducted a statistical analysis to identify which factors contributed to the emission reduction in Tokyo. My research revealed that the emissions trading system contributed more than 50% to the reduction, which I see as evidence of the effectiveness of the emission trading scheme. There were also concerns that imposing regulations in one area would lead to "carbon leakage," which would cause CO2 emissions to rise in other areas. However, so far we have seen just the opposite: emissions at business sites outside of Tokyo and Saitama have fallen too. I will continue to carefully examine the progress of the project and hope to apply the results of the project to the design of a system for Japan as a whole.

In contrast to the progress made by the industrial sector and the transportation sector toward reducing CO2 emissions with their own measures, CO2 emissions from the household sector are continuing to increase. Each of us can, or shall we say must, participate in the

reduction of CO2 emissions by making small changes in our behavior. For example, buying energy-efficient home appliances when we replace them; identifying houses with high environmental performance as good ecological purchases; and purchasing electricity generated using renewable sources. Such consumer behaviors would incentivize companies to develop energy-saving devices and systems as well.

Another area of focus is whether companies that are faced with regulations will be able to use their creativity to break through and create innovation. In the EU-ETS, one study has shown that companies that are faced with EU-ETS file more patent applications than those that are not. I am hoping that this kind of thinking will have a positive impact in Japan as well.

- Do you have a message for our readers?

I believe that to build a decarbonized society, there is a need to address many issues from the perspective of economics and other social sciences. Carbon pricing has been introduced and is getting a positive reception. If we create effective incentives for government, companies, and households to engage in carbon pricing, and if we can realize a society where carbon pricing is the norm, I expect that to be a big step toward decarbonization.