Biofuel-Use Strategies for Sustainable Development

Principal Investigator: Kazuhiko TAKEUCHI
Institution: Deputy Executive Director, Integrated Research System for Sustainability
Science (IR3S), The University of Tokyo

Cooperated by: The Institute of Scientific and Industrial Research (ISIR) at Osaka University,
Graduate School of Public Policy (GraSPP) at The University of Tokyo, Graduate
School of Agricultural and Life Sciences at The University of Tokyo, National
Agriculture and Food Research Organisation (NARO), Faculty of Engineering at The
University of Tokyo, United Nations University Institute of Advanced Studies
(UNU-IAS) and Institute for Global Environmental Strategies (IGES)

[Abstract]

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There are many researchers that voice scientific skepticism about the expected contribution, although biofuels are getting noticed since those are not only candidate substitution fuel of fossil fuels but also are expected to contribute to reducing emissions of green house gases (GHGs) , to activating agriculture and rural areas and to alleviating poverty.

The aim of this research is to establish a comprehensive analysis of biofuel use at the national, regional, and global levels using Sustainability Science with the focus on the Asia-Pacific Region. The conflicts between the use of crops as food or energy, concerns regarding deforestation, water pollution and water shortage and finding an energy balance are addressed by identifying relationships among nations and regions, or stakeholders, from the perspectives of both natural and social science. Targeted countries are four countries in the Asia-Pacific Region (Japan, China, India and Indonesia) as well as the US, the European Union (EU), and Brazil, and are key players in the global production and use of biofuel. Considering the current biofuel trend, the present research will not only cover the first-generation biofuels (mainly from sugarcane, grains and palm oil), but also the second-generation biofuels (cellulose from woods and grasses). The projection period will be set as 2020, taking into consideration the uncertainties associated with technical developments and other factors.

We find there are many diversified stake folders and many issues which should be considered in countries such as Brazil in Sub-theme 2. The biofuels ontology model by Sub-theme1 is helpful to understand the linkages of stake holders and issues to build the strategies for sustainable biofuel use in Sub-theme 2. The results of an economic simulation model in Sub-theme 3 imply that the promotion of first generation biofuels made from maize in the U.S let the world maize price get higher and have negative impacts on developing countries.

Sub-theme 5 shows the GHG emissions can be decreased when waste biomass from processing biofuel crops is used and the other sectors are connected with biofuel production/utilize sectors. Finally, the Sub-theme 7's case study and well being analysis by Sub-theme 6 in Asia-Pacific region established a frame work for evaluating the effects of biofuel use strategies in an importing country, Japan, to exporting countries such as China, India and Indonesia. It is cocluded from their analysis that small scale ptoduction/utilization of biofule in small village is rather effective and efficient than large scale.