

Social implementation of biomass energy for SDGs in East Asia

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Abstract— After proposing “Biomass Asia Strategy” and arranging “Biomass Asia Workshop”, we have promoted bilateral collaboration of biomass energy between ASEAN countries and Japan under support of NEDO, JICA and JST. We also discussed region wide collaboration on biomass energy at “International Policy Dialogue”. After Paris Agreement, our “Biomass-Asia Project Team” in the Engineering Academy of Japan made the policy proposal to ASEAN countries (International Collaboration on Biomass Energy). Now we are promoting our e-ASIA project among ASEAN countries and Japan (Feasibility Study on Social Implementation of Bioenergy in East Asia) as international industry-academia-government collaboration.

Index Terms— Renewable energy, Biomass energy, Low Carbon Society, SDGs

I. INTRODUCTION

We proposed “Biomass Asia Strategy” as a collaborative subject among East Asia to establish equal partnership, and arranged “Biomass Asia Workshop” among East Asia countries [1, 2]. Figure 1 shows concept of “Biomass Asia Strategy”. Based on discussions at workshops in Japan and ASEAN (Association of South-East Asian Nations), bilateral collaboration such as Thailand-Japan [3] or Vietnam-Japan have been established under support of NEDO (New Energy and Industrial Technology Development Organization), JICA (Japan International Cooperation Agency) and JST (Japan Science and Technology Agency).

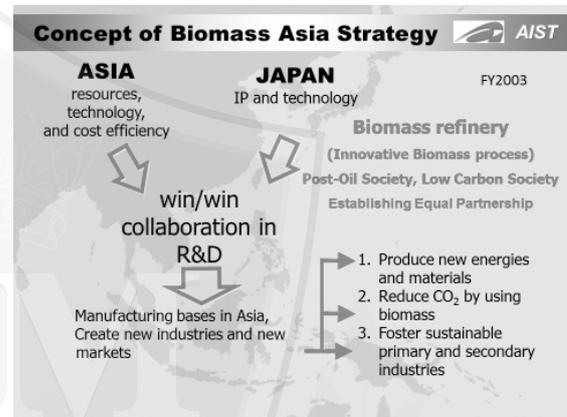


Fig. 1. Concept of Biomass Asia Strategy

II. THAILNAD-JAPAN COLLABORATION ON BIOMASS ENERGY

After laboratory scale research and bench scale research and development, a pilot plant test for high-quality BDF (Bio Diesel Fuel) production was successfully carried out between Thailand and Japan as SATREPS (Science and Technology Research Partnership for Sustainable Development) project.

National Institute of Advanced Industrial Science and Technology (AIST), WASEDA University (WU), National Science and Technology Development Agency (NSTDA), Thailand Institute of Scientific and Technological Research (TISTR), and King Mongkut's University of Technology North Bangkok (KMUTNB) participated in the joint research and development (Innovation on production and automotive utilization of biofuel from non-food biomass) from Japan and Thailand. Figure II shows our Thailand-Japan collaboration on biomass energy (BDF) [3]. This JICA-JST project was also supported by MOST (Ministry of Science and Technology) and MOED (Ministry of Education) in Thailand.

A feasibility study committee was established to take up the practical use of the high-quality BDF. This committee, in addition to researchers of Japan and Thailand, is composed of experts from engineering and trading companies. We discussed with Kasetsart University and Thai industry. An actual vehicle test was successfully conducted in Thailand using B20 (20% BDF with mineral diesel) after engine-bench tests in Japan and Thailand.

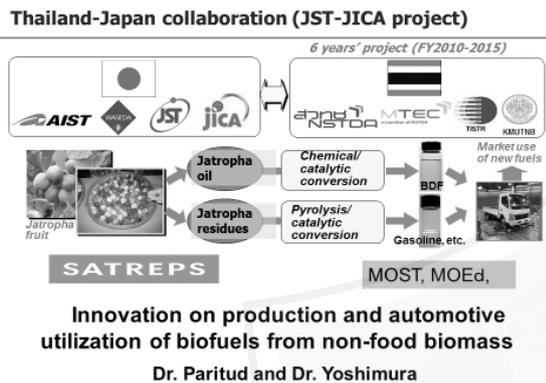


Fig. II. Thailand-Japan Collaboration on BDF

While there still remain many issues for further feasibility study with the objective of future commercial use. For instance, target cost, possible project size, possible area of plantation, possible capacity of BDF supply and a production scenario are our next targets. Optimization of the manufacturing process including co-production with chemical and identification of suitable business partners are also necessary for the next feasibility study of the BDF.

We visited other ASEAN countries (Vietnam, Indonesia, Malaysia, Laos and Myanmar) and discussed practical use of the high-quality BDF. We also discussed “local production and local consumption” of biomass energy for power generation and transportation. “Entrance strategy” (Production of promising non-food biomass), “Exit strategy” (LCA and Economic efficiency), “Technology strategy” (Advanced technology) and human development were main issues of our discussions. Because Pongamia was chosen as the most promising non-food biomass, we visited India and Australia where research and development is most advanced.

III. INTERNATIONAL POLICY DIALOGUE

Then region wide collaboration on biomass energy in East Asia was discussed as a major wide area research project at “International Policy Dialogue” (Regional collaboration in Science and Technology in East Asia). This International Policy Dialogue was held for 3 years by Takeda Foundation, the National Graduate Institute for Policy Studies (GRIPS), the Engineering Academy of Japan (EAJ), JICA and JST [4]. After policy recommendation related to the

utilization of biomass energy in East Asia has been publicized, EAJ set up the study group for accelerating social implementation of biomass energy in East Asia (“Biomass-Asia Project”) (2015).

A. Biomass-Asia Project at EAJ

Basic concept of “Biomass-Asia Project” is shown in Table 1. The study group has focused on ASEAN countries among East Asian countries. ASEAN is now integrating economically and trying to strengthen its S&T capacities to achieve sustainable growth. Since ASEAN countries have a lot of biomass resources, they have great interest in biomass energy.

ASEAN started its economic integration in 2015. Japan should participate in the development of biomass energy in ASEAN countries as an equal partner by promoting regional innovation based on region wide collaboration and accelerating the cross-border movement of human resources between ASEAN and Japan.

After Paris Agreement we made policy proposal to ASEAN countries (A Policy Proposal for International Collaboration on Biomass Energy between ASEAN and Japan) (Jan. 2016).

TABLE I
CONCEPT OF BIOMASS-ASIA PROJECT TEAM

Basic Concept of Biomass Asia Project at EAJ

Multilateral Collaboration on Biomass Utilization in East Asia towards Low Carbon Society

1. East Asia is an Engine of global economy.
2. East Asian countries share many common issues such as shortage of energy and environmental problems.
3. East Asia region is rich in biomass resources.
4. Biomass utilization is one of the most feasible approach toward sustainable development of the region.
5. While no single country can address these common issue alone.
6. So, bilateral and region wide collaboration on biomass utilization is essential for our sustainable development.

Akio Nishijima, EAJ, Biomass-Asia Project Team

IV. e-ASIA JOINT RESEARCH PROJECT

A. Feasibility Study on Social Implementation of Bioenergy in ASEAN

Last year we started our e-ASIA joint research project (Feasibility Study on Social Implementation of Bioenergy in East Asia) among ASEAN countries (Thailand, Vietnam, Indonesia, Myanmar and Lao PDR) and Japan. Our goals of the project are as follows.

1. Data base and priority setting for social implementation of bioenergy in East Asia
2. Feasibility study (economic evaluation, LCA and Social acceptability) on bioenergy
3. Region wide networking for the utilization of biomass in East Asia

4. Understanding of local needs and sustainable supply of feedstocks
5. Optimization of local production for local consumption and international market
6. Training young human resources of ASEAN and Japan
7. Attain Sustainable Development Goals (SDGs)

Table II. shows participating countries and research representatives of our e-ASIA project.

TABLE II
E-ASIA JOINT RESEARCH PROJECT

Feasibility Study on Social Implementation of Bioenergy in East Asia (e-ASIA JRP)	
Akio Nishijima (Waseda Univ.)	
<Participating countries and research representatives>	
Japan	Prof. Masafumi Katsuta, WASEDA University
Thailand	Prof. Paritud Bhandhubanyong, Panyapiwat Institute of Management
Vietnam	Prof. Tuan Le Anh, Hanoi University of Science and Technology
Indonesia	Dr. Anugerah Widiyanto, Agency of the Assessment and Application of Technology (BPPT)
Myanmar	Prof. Ei Ei Htwe, Mandalay Technological University
LAO P. D. R.	Prof. Bounmy Keohavong, Souphanouvong University

This e-ASIA joint research project is now being carried out by international industry-academia-government collaboration. In Japan main participating organizations are WU, EAJ, AIST, the Takeda Foundation and industry (power generation, engineering, chemical and etc.).

Last fiscal year we discussed and exchanged information regarding research potential of each country in the field of biomass utilization. We also received many proposals from each country such as biomass power generation or transportation biofuel related to cooperation between the two countries. Local production and local consumption was the core of our discussions.

Based on bilateral meetings with ASEAN countries, 6 countries workshop was held in Bangkok (Oct. 2017) for promoting multilateral collaboration and region wide network. Several major discussion topics of the workshop are biomass power generation and transportation biofuel (ethanol, BDF, Jet fuel). We discussed "Entrance strategy" (Sustainable plantation, Sustainable supply of inexpensive starting materials), "Exit strategy" (LCA, Economic efficiency and Social acceptability) and "Technology strategy" (Integrated

process from the inlet to the outlet, Torrefaction of biomass residue, Co-production of material and fuel, Cascade utilization of biomass).

This fiscal year we will identify significant specific research and development areas to be jointly examined in light of future utilization of biomass in the ASEAN region followed by formation of international research groups among six countries. We are also arranging to foster young researchers' activities through the participation of this program.

Figure III shows Asia Biomass Community for SDGs. International industry-academia-government collaboration and creation of "Asian Biomass Community" (Biomass refinery and Sustainable industry) are now required for our sustainable development in East Asia.

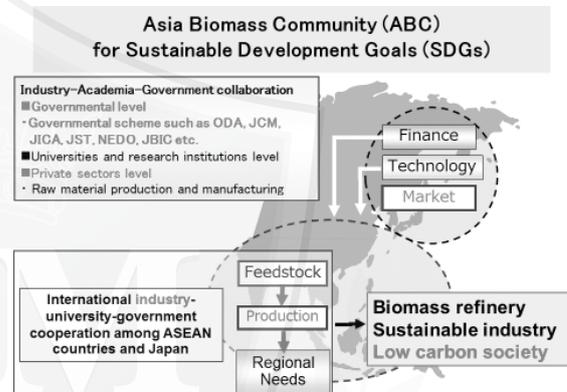


Fig. III. Asia Biomass Community for SDGs

ACKNOWLEDGEMENT

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Akio Nishijima is now a member of the Engineering Academy of Japan (EAJ). He is a chair of Biomass Project team in EAJ. He is also working for WASEDA University and National Institute of Advanced Industrial Science and Technology (AIST). More

than 200 papers have been published and 14 patents have been filed by him. He has contributed to various academic and governmental committees.

He obtained academic B.S., M.S. and Ph.D. degrees in applied chemistry from the University of Tokyo. He joined National Chemical Laboratory in MITI in 1975. He has been engaged in various research projects such as clean air, clean fuel, renewable energy and nanotechnology. Another his research field is advanced characterization using SR and material design. During his stay in AIST, he arranged and promoted international collaboration such as US-Japan and EU-Japan in the field of energy and environment. He moved to WASEDA University in 2006 and has been engaged in young researcher's fostering. He is promoting collaboration with China, Korea and ASEAN countries concerning human development of young researchers. Recently he is promoting collaboration in the field of biomass utilization among East Asia countries towards Low Carbon Society and SDGS.



Hideo Samura is now a member of the Engineering Academy of Japan (EAJ) and a coordinator of Biomass Project team in EAJ. He is a president and CEO of FS Corporation Inc., that is promoting a large scale of Pongamia plantation in ASEAN,

Director, Nosaer Co. Ltd., Director, Nobel Crystal Technology Co. Ltd., Director, Japan-Israel Commerce of Chamber Kansai and Executive Managing Director, Connected Society Business Consortium. He has been holding titles including Executive Managing Director, Japan Industrial and Technology Association (2005 to 2011), President, AIST Innovations (2005 to 2011), Executive Managing Director, Kansai Research Institute Inc., (1991 to 2001), Director, New Business Development Department, Sanyo Chemical Industry Co. Ltd., (1985 to 1991), Senior Research Scientist, Research Center, Sanyo Chemical Industry Co. Ltd., (1980 to 1984), Research Scientist, Research Center, Sanyo Chemical Industries Co. Ltd., (1973 to 1979). He graduated from the school of Engineering, the University of Kyusyu in 1969, and obtained academic M.S. and Ph.D. degrees in synthetic chemistry from the University of Kyusyu in 1973.



Tomoko Saiki is currently Professor emeritus, Tokyo Institute of Technology (TITEC). She is a member of the Engineering Academy of Japan (EAJ) and a coordinator of Biomass Project team in EAJ.

She obtained B.S. and M.S. degrees in Pharmacology from Osaka University. Then she joined the Japan Patent Office (JPO) in 1972 and is a former Director of Medical and Science Division. She had been engaged in examination of patent applications and management thereof until 1996. After she worked as a patent attorney, she joined Fancl cooperation in 2000 and is a former general manager of Intellectual Property Department. And then she joined TITEC as a professor in 2002. She had been engaged in education and research in Intellectual Property Management until 2013. Papers and books in the fields of Intellectual Property Strategy, Management of Intellectual Property and Information of Intellectual Property in Mergers and Acquisitions and Intellectual Property management for Life Science technology have been published by her.



Norio Ohto is Senior Managing Director, the Takeda Foundation. He has been holding titles including Director, the Takeda Foundation (2009 to 2012), Director, the Sasakawa Peace Foundation (2005 to 2009), Program Officer, the Takeda

Foundation (2001 to 2003), Director, Pharmaceuticals and Bio Business Division, Mitsui Chemicals, Inc. (1998 to 2001), Director, Department of Pharmaceutical Research, Institute of Biological Sciences, Mitsui Pharmaceuticals, Inc., (1995 to 1998), Senior Research Scientist, Life Science Laboratory, Mitsui Toatsu Chemicals, Inc., (1984 to 1995), Research Scientist, Research Center, Mitsui Toatsu Chemicals, Inc., (1977 to 1984), and Postdoctoral Research Scientist, Louisiana State University, Department of Chemistry (1980 to 1982).

He graduated from the School of Engineering, the University of Tokyo in 1972, and obtained academic M.S. and Ph.D. degrees in applied chemistry from the University of Tokyo in 1977. He promoted planning and management of drug discovery research and pharmaceutical business during his stay in chemical industry

He is now promoting planning and management of the international awarding and funding programs. Evaluation of technological innovations including the Internet, DNA Chips and DNA microarrays, and large-scale genome sequencing systems. He is also promoting planning and management of international symposiums and receptions.



Paritud Bhandhubanyong holds a B. Eng. (1972) and M. Eng. (1976) (Industrial Engineering) from Chulalongkorn University, MBA (1976) from Thammasart University and D.Eng. (Metallurgy) in 1983 from the University of Tokyo. He joined the State Railway of Thailand as a junior engineer then moved to work as an instructor in the Faculty of Engineering, Chulalongkorn University. He was Head of Department of Metallurgical Engineering, Vice Dean of Planning and Development before joining the National Metal and Materials Technology Center as Executive Director. He then moved to be the Executive Director of the Technological Promotion Association Thai-Japan (TPA) before joining the Panyapiwat Institute of

Management as Executive Director in the office of the President and acting Head of Department of Automotive Manufacturing Engineering. His research interest included Casting Technology, TQM, TPM, TPS. and work-based education (WBE) practices. His recent papers and publication included a chapter in the Report on ASEAN Automotive Industry 2016 (in Japanese), Business Continuity Management (TPA, 2015) and a paper on WBE presented at ISATE 2016.

Dr. Paritud is a member of the Japan Foundry Engineering Society, The Iron and Steel Institute of Japan, former Chairman of the Foundation of TQM Promotion of Thailand, committee member of the Standard and Quality Association of Thailand, advisor to the Thai Foundry Association of Thailand and the Materials and Corrosion Society

