Summary of the Feasibility Study on rice based fuel-ethanol production project in Vietnam

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(1) Basic Elements for the implementation of the Project

■ Outline and background of the Project

Vietnam is a crude oil producing country, however it imports almost all refined petroleum products to feed the national energy consumption because it has only one small refinery at this point in time. Therefore, the change in international oil prices affects the national economy of Vietnam. Moreover, the annual average GDP growth rate of Vietnam has been nearly 8%; especially the industry and construction sector has grown by 10%, thus a further increase in demand for energy is expected. Because of the above situation, the emphasis is placed on the development of alternative energy within the country in terms of energy security and climate change in Vietnam, and the government has been formulating “Master Plan of bio-fuel in Vietnam”.

Biomass derived ethanol manufactured in Vietnam is produced mainly from sugar cane molasses. However it is difficult to ensure the stable supply of molasses because of domestic structural reform of the sugar industry. Therefore, the Vietnamese government pursues the stable supply of ethanol to be required for introducing E10 (10% of ethanol) into the national market through research for the possibility of producing alcohol from starch and sugar contained crops, because the country has plentiful agricultural resources. In addition, biomass derived ethanol currently manufactured in Vietnam is not anhydrous ethanol because dehydration technology has not been developed and spread yet in Vietnam, thus fuel ethanol is still under research.

The project is to produce anhydrous ethanol from rice. The main agricultural product in the region is paddy rice and the project produces bio-ethanol from broken rice, which is a by-product of rice milling. The produced ethanol is sold to petroleum companies. The bio-ethanol is blended with gasoline at a rate of 10 percent and used as a transportation fuel in Vietnam.

■ Description of the host country

Lying on the eastern part of the Indochinese peninsula, Vietnam is a strip of land shaped like the letter “S”. China borders it to the north, Laos and Cambodia to the west, the East Sea to the east and the Pacific Ocean to the east and south.

Since 1986, the government launched the "Doi Moi" or all-round renovation process, stepping in the general development trend and the process of gradual globalization and regionalization. With top priority being given to economic reform for creating a multi-sector market economy regulated by the Government, at the same time consolidating legal environment and renovating Party's and State's structure. Since then the Vietnamese economy became opened and transformed from centralized planned economy heavily based on imports to a market-oriented one. With renovation process,

Vietnam has presented its high economic growth. The increase rate in GDP in 2004 was 7.7%.

■ CDM/JI approval criteria of the host country, establishment of DNA, CDM policy and status

Vietnam ratified Kyoto Protocol in September 2002, then the International Cooperation Department of Ministry of Natural Resource and Environment was designated as DNA in March 2003 for CDM in Vietnam.

Vietnam government shows its high interest in climate change issues. Joining CDM activities, Vietnam wants to show its willingness to contribute to global environment protection and look for additional investment and for technology transfer from developed countries.

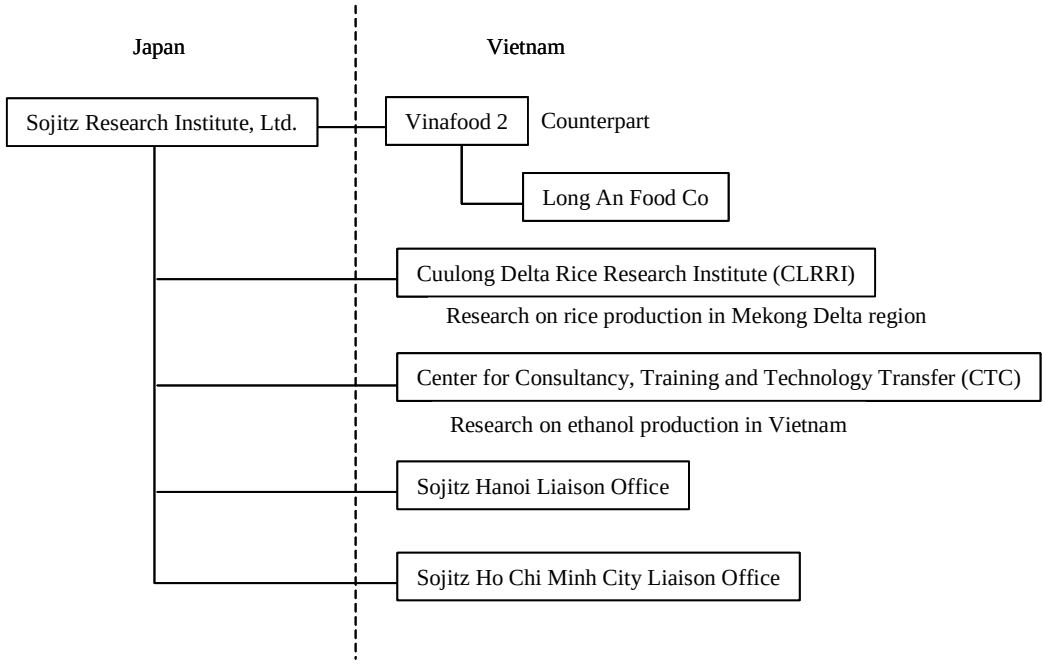
First criteria for screening, selecting possible CDM were developed including sustainability, additionality and feasibility.

■ Contribution to sustainable development of host country

The Project contributes to the sustainable development in Vietnam in the following ways:

- reducing the dependence on the import of refined petroleum products
- reducing GHG emissions and air pollution
- providing the stable supply of fuel ethanol
- technology transfer
- creating added value in rice
- creating employment opportunities and help farmers to increase their income

■ Implementation framework of the study



(2) Project planning

■ Description of the Project

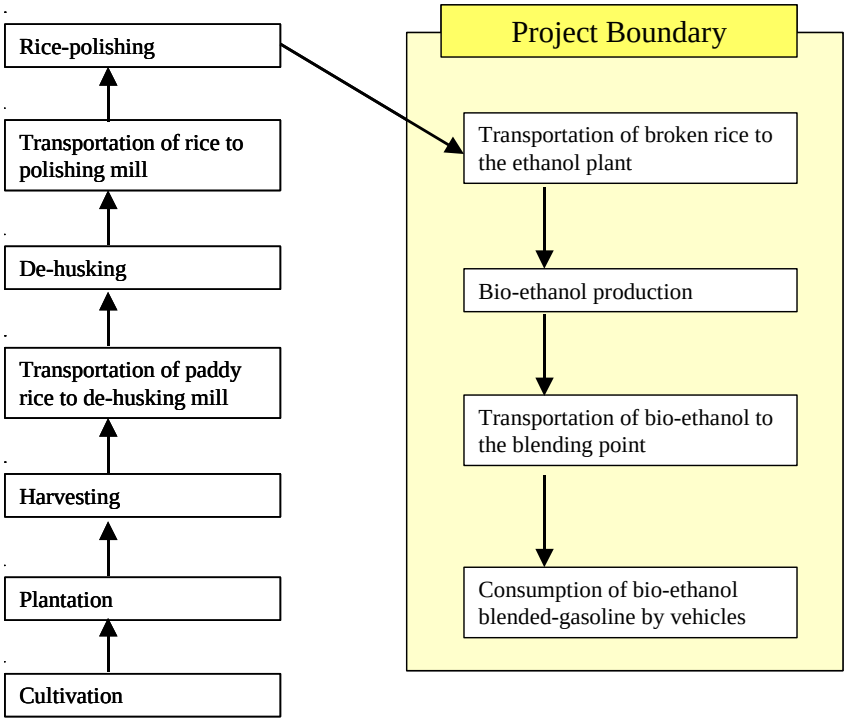
The project is to produce anhydrous ethanol from rice. The project plant will be built in an industrial zone of Long An province, in the Mekong Delta region of South Vietnam. The main agricultural product in the region is paddy rice and the project produces bio-ethanol from broken rice, which is a by-product of rice milling. The project plant has a capacity of 100,000 liters of anhydrous ethanol per day, and rice-husk power generation facility is installed within the project site to supply electricity to the plant. The produced ethanol is sold to petroleum companies. The bio-ethanol is blended with gasoline at a rate of 10 percent and used as a transportation fuel in Vietnam. The project promotes mitigation of greenhouse gas emissions through partially substituting gasoline with bio-ethanol.

■ Project boundary, baseline setting, demonstration of additionality

To date, no baseline methodology can be applied to the project activity has been approved by EB, therefore a new baseline methodology is developed.

1) Project boundary

The project produces bio-ethanol from broken rice. The produced ethanol is sold to petroleum companies, and then it is blended with gasoline at a rate of 10 percent and used as a transportation fuel in Vietnam. The project boundary is shown in the figure below.



2) Baseline

To identify the baseline scenario, the alternative scenario options are listed up, and then they are to be examined one by one and winnowed down to the most likely one.

The following three alternative scenarios are given in the proposed baseline methodology.

- Substituting gasoline with bio-ethanol, not produced by a CDM project activity
- Other alternative fuels are used as a substitute for gasoline
- The continuation of a current activity – the use of gasoline

There are not effective policies or regulations in Vietnam on the use of bio-ethanol in the transport sector up to now. One of the significant requirements for the spread of bio-ethanol blended gasoline is that the price of gasohol is lower than that of gasoline. The production cost of bio-ethanol is still expensive, and therefore similar bio-fuel production projects would not be promoted without CDM revenue. In addition, dehydration technology in Vietnam has not been developed to produce enough anhydrous ethanol for E10 use, thus it would not be expected that bio-ethanol is used in Vietnam as a baseline fuel.

Regarding other alternative fuels, Vietnam has plentiful agricultural resources thus there are a lot of raw materials of bio-ethanol, on the other hand, cultivation of oil crops (such as oil palm or soybean), which are raw materials of bio diesel, is not flourishing. Therefore, the development of bio-ethanol will be put before that of bio diesel in Vietnam.

The baseline scenario for the project activity is the continuation of a current activity, which is the use of gasoline.

3) Additionality

"Tool for the demonstration and assessment of additionality" is applied to demonstrate additionality.

Ethanol-blended fuels can hold water but once the fuel is saturated with water, excess water will separate and cause two distinct layers of product. For the use as a transportation fuel, producers must use dehydration methods after fermentation and distillation processes to purify the ethanol. In Vietnam, dehydration technology is still under research and is not in the practical stage. The project includes technology transfer of dehydration technology, which is still under development in Vietnam. Technological barrier exists to implement type of the proposed project activity, and therefore the project is considered to be additional.

■ GHG emissions reductions by the Project and leakage

The GHG emission reductions of the project activity are the differences between the baseline emissions and the total project activity emissions, which are the sum of project emissions and

leakage.

Project emissions

The project emissions are the sum of emissions from raw material transportation to the bio-ethanol plant and emissions from bio fuel production. Since a rice-husk power generation facility is installed within the project site to supply electricity to the plant, emissions from bio fuel production are zero. Annual emissions from raw material transportation are calculated as 105 tCO2e/y.

Leakage

The boundary for the project does not include rice cultivation in order to procure the raw material of bio-ethanol, thus there is a possibility of the diversion of broken rice from other uses to the project activity. In that case, other agricultural crops may replace broken rice. However, total amount of raw material required for the project activity accounts for only 1.74% of total broken rice produced at Mekong Delta region. Hence, this project activity will not affect the cultivation of other agricultural crops. Therefore, leakage is considered as zero.

Baseline emissions

In the proposed project activity, the reduction of anthropogenic emissions of greenhouse gases will occur through the substitution of gasoline with bio-ethanol, which is biomass derived fuel. The baseline scenario for the project is the use of gasoline and baseline emissions are emissions from gasoline consumption by vehicles within the host country. Annual baseline emissions are calculated as 53,431 tCO2e/y.

Years	Estimation of project emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
Year 1	53,431	0	105	53,326
Year 2	53,431	0	105	53,326
Year 3	53,431	0	105	53,326
Year 4	53,431	0	105	53,326
Year 5	53,431	0	105	53,326
Year 6	53,431	0	105	53,326
Year 7	53,431	0	105	53,326
Total estimated reductions	374,017	0	735	373,282

■ Monitoring plan

Monitoring will be implemented based on the new monitoring methodology. Major parameters are as follows;

- Volume of bio ethanol sold in a certain year
- Diesel oil consumption for raw material transportation
- Captive power generation at the bio-ethanol plant

■ Environmental Impacts and other Indirect Impacts

However the project plant will be built in an industrial zone and it is not needed to perform an EIA procedure, because EIA will be done when the industrial zone is developed. The project plant will be designed following all the environmental regulations and standards in Vietnam, thus it can minimize the impact of the project activity on the ambient environment. In regard to the effluent from fermentation process, it contains high percentage of protein and suitable for animal feed. The effluent is to be separated with moisture and solid portion will be sold to domestic market. Only separated water, value under emission standard in Vietnam, will be emitted to river.

■ Stakeholder comments

Comments were received through the meetings with stakeholders. The following stakeholders were identified for the project activity.

- Ministry of Natural Resource and Environment – DNA of Vietnam
- Department of Industry of Long An province
- Petroleum companies (PetroVietnam and Petrolimex)

Comments received from stakeholders have been supportive. The project is welcomed because it is the first bio-ethanol project in Vietnam. Also, the local government of Long An province expects the project to revitalize local communities.

In regard to the local residents, People's Committee of Long An province has explained to local residents about the construction of the industrial zone and local residents welcome the construction of the industrial zone. The People's Committee will assist and support to obtain a suitable policy to minimize affection to local citizen in case any negative impact for instance resettlement occurs.

(3) Toward the project implementation

■ Project implementation framework

The project to be implemented by Sojitz Corporation and VinaFood II.

■ Project financing

Financing to be negotiated with JBIC first to structure project finance. Syndicated loan from local banks is to be also discussed.

■ Cost effectiveness

Thanks to recent rise of international oil price, price of ethanol is also risen. Cost of broken rice is fluctuated independently to oil price, so that we still need to study economic potential of the project.

■ Plans and issues toward implementation

The Biggest problem in Vietnam to implement the project is infrastructure, especially logistics aspect on anhydrous ethanol. We feel it will be taking another years to clear this point.

On the other hand, we see high possibility to export ethanol to countries near round so that now we are studying to export potential of hydrous ethanol. The study will be completed within this fiscal year.