

SPONSORED BY THE



Federal Ministry
of Education
and Research

BioRist



Development and integration of an innovative process technology for biogas production from rice straw in regional value chains in rural areas in South East Asia under consideration of sustainable development and climate protection – case Vietnam (02/2016-01/2019)

INTRODUCTION

In Vietnam, the traditional use of rice straw as construction material or cattle feeding has largely decreased and thus most of the rice straw is either combusted close to the harvested areas, emitting high amounts of particulate matter or remains in the paddies, where it is mainly converted to carbon dioxide and methane. Since 1991, the production of paddy rice has been doubled and depending on the rice species the amount of rice straw amounts to 58 million tons/year, which would equivalent to 15 million tons methane if it would be fully processed to biogas.

In accordance with the Vietnamese masterplan for power development, the production of biogas will increase over the next two decades by 500 MW until 2020 and another 200 MW until 2030 (Government of Vietnam, Decision 1208/QĐ-TTg). By today, the energy use of rice straw remains difficult in practice because of the challenges of the decomposition of lignin and the high concentrations of silicates and none of the previous approaches led to the development of a marketable biogas plant. The objective of the joint project BioRist is to develop a method for biogas processing from rice straw and to implement it in a rural community in the Mekong Delta.

METHODS

Subjected site of research

The village of Hậu Mỹ Bắc B is located in the province of Tiền Giang in the Mekong Delta, about 70 km in the Southwest of Ho Chi Minh City. According to the General statistics office of Vietnam (GSO, 2016), over 90% of the total agricultural area of Tiền Giang is managed as paddies. Several cooperatives in the province take part in the global program of Good Agricultural Practices (GAP). This program includes the training and implementation of modern methods and technologies in order to increase the quality and competitiveness of the local rice products.

Development and operation of a biogas pilot plant

The hub of the research project is the development of an innovative biogas process. The process is being developed and tested in Germany and will be implemented as a pilot plant in the study area in March 2017. The operation time of the pilot plant will last two years, in which the conditions (e.g. retention time, co-fermentation, pre-treatment of the substrates) will be adapted and optimized in order to obtain the maximum yield of biogas, which ranges between 210-320 m³ CH₄/t ODM.

Potential and mass flow analysis

The agricultural areas of the commune and their current use will be studied by a detailed survey of the land use patterns.

A structured household survey and a waste stream analyze will lead to reliable data on quality and quantity of available bio wastes from the kitchen, gardening and animal breeding, which could be co-fermented in the biogas plant. These data will feed a database, which will be the base of a material flow analysis.

Emissions

The quantification of the benefits of the biogas plant towards climate change is part of this project. Therefore the determination of methane and nitrous oxide fluxes from storage and processing and treatment of the residues and digestate is one of the key issues of the project. Main part will be a GHG balance considering emissions from managed soil and possible emission reductions from the substitution of mineral fertilizer due to compost from fermentation residues.

Capacity building

The sustainable operation of requires trained technicians and engineers, which is considered as a problematic issue in Vietnam. To cope with this situation, it is planned, to cooperate closely with the leaders of the village and to carry out regular information assemblies and training courses in the village and to involve and train the future technicians from the beginning. The close contact to the Vietnamese cooperation partner Lotus Environment Technologies enables the local production of the marketable plant after the project runtime.

Climate protection project

In parallel with the technology development, project implementation and operation, the research on the climate change mitigation and the study of carbon business model and NAMA's (Nationally Appropriate Mitigation Actions) will be embedded into the entire project cycle.

Contact: Celia.Hahn@tu-berlin.de

Coordination, analysis of emissions, mass flow analysis, development of climate protection:



Technische Universität Berlin
Institute of Environmental
Technology
Chair of Circular Economy and
Recycling Technology

www.biorist.tu-berlin.de

Development, construction, operation of a biogas pilot plant using biogas as material source:



Herbst Umwelttechnik
GmbH
Dr. Leonhard Fechter
Goerzallee 305 a
14167 Berlin

Partner in Vietnam:

Industrial University of Ho Chi Minh City
Department of Environmental Technology
Dr. Le Hung Anh

Lotus Environment Technology Application and
Development Joint Stock Company
Ho Chi Minh City



Funding number: 01LY1508A / 01LY1508B