MINUTES OF MEETING
BETWEEN
THE JAPAN INTERNATINAL COOPERATION AGENCY
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF SOCIALIST REPUBLIC OF VIET NAM FOR

THE JAPANESE TECHNICAL COOPERATION PROJETCT ON ESTABLISHMENT OF CARBON-CYCLE-SYSTEM WITH NATURAL RUBBER

Japanese Mid-Term Review team (hereinafter referred to as "the Japanese side"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA"), visited the Socialist Republic of Viet Nam from November 25 to December 12, 2013 for the purpose of conducting the Joint Mid-Term Review on Japanese technical cooperation project on Establishment of Carbon-Cycle-System with Natural Rubber (hereinafter referred to as "the Project") on the basis of the Record of Discussion (hereinafter referred to as "R/D") signed on February 18th, 2011.

During its stay in Viet Nam, the Japanese side had a series of discussions and exchanged views with the Vietnamese Mid-Term Review Team (hereinafter referred to as "the Vietnamese side").

As a result of discussions, the Vietnamese side and the Japanese side mutually agreed upon the matters referred to in the Joint Mid-Term Review Report attached as appendixes.

Hanoi, December 12th, 2013

Dr. Tran Van Top
Vice President
Hanoi University of Science and Technology
(HUST)
Vietnam

Mr. Ichiro Adachi
Leader
Japanese Mid-Term Review Team
Japan International Cooperation Agency
(JICA)
Japan

Mr. Phan Thanh Dung
Director
Rubber Research Institute Vietnam
(RRIV)
Vietnam

Mr. Nguyen Xuan Tien
Deputy General Director
Foreign Economic Relations Department,
Ministry of Planning and Investment
(MPI)
Vietnam

Dr. Masao Fukuda (witness)
Project Leader
Department of Bioengineering
Nagaoka University of Technology
(NUT)
Japan

Dr. Bui Hong Quang
Deputy Director General
Department of Planning and Finance
Ministry of Education and Training
(MOET)
Vietnam

2

I. Mid-Term Review Report

The Joint Mid-Term Review Team consisting of Vietnamese and Japanese members presented (or reported) the results of the Joint Mid-Term Review Report (attached as Appendix I) to the Joint Coordinating Committee (hereinafter referred to as "JCC"). Both Japanese and Vietnamese side confirmed that the members of the JCC reviewed and approved its contents of this Mid-Term Review report.

II. Main Pointes Discussed

1. Strengthening the relationship with RRIV

Given RRIV's important position in the natural rubber industry, both sides agreed that RRIV will participate more extensively in the Project. On the planning, RRIV's participation is limited to Group 5 activity, from now on, activity of the rest of the Groups also need RRIV's cooperation.

2. Time-Bound Action Plan

Both sides developed Time-Bound Action Plan (hereinafter referred to as "the Action Plan") as shown in Appendix II. Each group-leader will monitor a progress of the Action Plan at least semiannually or in case of any major changes arise, and report the updates to the Project leader with brief descriptions of the progress. The Action Plan will be periodically shared among all related persons of the Project at JCC or other opportunities when appropriate.

3. Revised Plan of Operation

Both sides agreed on Plan of Operation version 2 (hereinafter referred to as "PO") as shown in Appendix II.

4. Dissemination

Both sides agreed the importance of dissemination the Project's activities and achievement. Both sides confirmed to disseminate information through whatever appropriate means such as open seminars/workshops in order to gain recognition of the Project, thus leading to increase a person who is interested in the Project.

5. Efforts for enhancing a structure of the Project

a) Both sides agreed to enhance a structure of the Project. Japanese researches will

attempt to prolong the duration of each stay in Vietnam to promote research and technical transfer. HUST will also mobilize additional human resources dedicated to the Project.

b) Both sides agreed that the Project continues to approach Vietnamese enterprises through various means including Public Relation workshops or consultation with individual firms in order to develop a road map for specific industrial application.

c) Both sides will enhance sharing information to the Project Director, thus strengthening an implementation structure of the Project.

6. Sustainable and systematic management of the equipment

a) Both sides confirmed that HUST bears primary responsibility for management of the equipment provided by the Project. HUST will elaborate a plan for sustainable and systematic operation and maintenance of the equipment, in consultation with Japanese researchers. Both sides confirmed that MPI and MOET will give a continuous support for this matter during the course of the Project as well as after the completion of the Project.

b) This matter will continuously be considered in HUST in consultation with other related parties and to be discussed in the next JCC in 2014. Mid-term review team requested the Vietnamese side to clarify a plan on "Rubber Center" in HUST. Vietnamese side will develop a plan in coordination with NUT.

7. Discussion with MOET

a) Through the discussion between MOET, HUST, and JICA Vietnam on 11th December, 2013, MOET committed to provide a counterpart fund from the year 2014 until the end of the Project, which includes costs for consumable chemicals, glass wares, etc. to use equipment, and also TCVN application fee.

b) MOET mentioned that MOET will seek possibility to construct a building for rubber center.

Appendix I	Joint Mid-Term Review Report
Appendix II	Time-bound Action Plan
Appendix III	Plan of Operation (PO) Version 2
Appendix IV	Agenda of 4th JCC

Appendix I

Joint Mid-Term Review Report
for
Project on Establishment of Carbon-Cycle-System with Natural Rubber in Socialist Republic of Viet Nam

Joint Mid-Term Review Team

2013/12/12

Dr. Tran Van Top
Vice President
Hanoi University of Science and Technology
(HUST)
Vietnam

Mr. Ichiro Adachi
Leader
Japanese Mid-Term Review Team
Japan International Cooperation Agency
(JICA)
Japan

Mr. Phan Thanh Dung
Director
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Ministry of Education and Training
(MOET)
Vietnam

CONTENTS

Annex 1:	Schedule of the Japanese Evaluation Team
Annex 2-1:	Japanese Side Project Members
Annex 2-1:	Vietnamese Side Project Members
Annex 3:	Record of the Japanese Side Members' Dispatch to Vietnam
Annex 4:	Record of Invitation of Vietnamese Side Members to Japan
Annex 5:	List of Provided Equipment by JICA
Annex 6:	Local Operation Cost spent by the Japanese side
Annex 7:	Expense Spent by the Vietnamese Side
Annex 8:	List of Seminar and Workshop Organized by the Project
Annex 9:	Record of Participation to International Conference by the Vietnamese side Members
Annex 10:	Record of JCC organized
Annex 11:	Plan of Operation (PO) Version 1

List of Abbreviation

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CP	Counterpart
ESCANBER	Project Establishment of Carbon-Cycle-Syetem with Natural Rubber
GHG	Greenhouse Gas
HUST	Hanoi Univerity of Science and Technogy
ISO	International Organization for Standardization
JCC	Joint Coordination Committe
JFY	Japanese Fiscal Year
JICA	Japan International Cooperation Agency
JST	Japan Science and Technlogy Agency
KNCT	Kure National College of Technology, Japan
M/M	Minutes of Meetings
MOET	Ministry of Education and Training, Vietnam
MOU	Memorandum of Understanding
MPI	Ministry of Planning of Investment, Vietnam
NIES	National Institute for Environmental Studies, Japan
NMR	Nuclear Magnetic Resonance
NUT	Nagaoka University of Technology, Japan
PDM	Project Design Matrix
PMU	Project Management Unit (at HUST)
PO	Plan of Operation
R/D	Record of Discussions
RRIV	Rubber Research Institute of Vietnam
SATREPS	Science and Technology Research Partnership for Sustainable Development
TCVN	Vietnam Standards and Quality Institute, Directorate for Standards, Metrology and Quality,
TNCT	Tokyo National College of Technology, Japan
Vietnam STAMEQ	Directorate for Standards, Methodology and Quality, Ministry of Science and Technology, Vietnam
VNFY	Vietnamese Fiscal Year

Chapter 1 OUTLINE OF THE EVALUATION STUDY

1.1 Introduction

Project on Establishment of Carbon-Cycle-System with Natural Rubber has been implemented since April 2011 for 5 years based on the RD signed on February 18, 2011 between JICA and the Government of Socialist Republic of Viet Nam (hereinafter Viet Nam).

This time, two year and eight months after the commencement of the Project, Mid-Term Review is conducted to review whether the Project has been achieving the expected outputs and the project purpose. The specific objectives of the evaluation study in the Mid-Term Review are summarized in the next section.

1.2 Objectives of the Evaluation Study in the Mid-Term Review

The specific objectives of the evaluation study are outlined as follows.

1) To review the progress of the Project and evaluate the achievement in accordance with the five evaluation criteria (relevance, effectiveness, efficiency, impact and sustainability)
2) To draw the factors to promote/impede the effects
3) To consider the necessary actions to be taken and make recommendations for the Project
4) To revise the project plans, if necessary
5) To summarize the result of the evaluation study in a joint evaluation report

1.3 Members of the Joint Mid-Term Review Team

The Joint Mid-Term Review Team (hereinafter referred to as "the Team") consists of the following members.

1.3.1 Vietnamese Team

(1) Dr. Tran Van Top
Vice President,
Hanoi University of Science and Technology

(2) Dr. Phan Trung Nghia
Deputy of Department of General and Inorganic Chemistry,
School of Chemical Engineering,
Hanoi University of Science and Technology

1.3.2 Japanese Team

JICA

(1) Mr. Ichiro Adachi (Leader)

Director, Environmental Management Division 2
Environmental Management Group
Global Environment Department, JICA

(2) Ms. Rie Kawahara (Consultant)
R-Quest Corporation

(3) Mr. Ken Okumura
Deputy Assistant Director
Environmental Management Division 2
Environmental Management Group
Global Environment Department, JICA

1.3.3 Observer

JST

(1) Mr. Masayuki Sato
Principal Researcher
Research Partnership for Sustainable Development Division, JST

(2) Ms. Miho Takahashi
Assistant Program Officer
Research Partnership for Sustainable Development Division, JST

1.4 Schedule of the Evaluation Study

The evaluation study was implemented from 25th November 2013 to 12th December 2013 in Vietnam. The schedule is attached as Annex 1.

1.5 Methodology of Evaluation

1.5.1 Evaluation Procedure

First, the Team formulated the evaluation grid, which identified the specific evaluation points and the data collection methods. For the data and information collection, the Team conducted interviews to main Japanese Experts and Vietnamese Counterparts as well as the Project related persons. The Team analyzed and evaluated the Project in terms of the achievement level of the Project, implementation process, and five evaluation criteria, i.e. Relevance, Effectiveness, Efficiency, Impact and Sustainability. Finally, the Team made the recommendations based on the result of review for improving activities during the remaining period of the Project.

1.5.2 Points for the Evaluation

The achievement levels in terms of Inputs, Activities, Output, and Project purpose were assessed

in comparison with the actual progress of the Project. The implementation process of the Project was also confirmed from the various viewpoints, such as Project progress monitoring and communications.

<Evaluation Criteria>

In addition to verification of the achievement level and implementation process of the Project, the Mid-Term Review assesses the Project from the following five evaluation criteria.

(1) Relevance: An overall assessment of whether the project purpose and overall goal are in line with policy of both sides, and with needs of the partner country and the sectors.
(2) Effectiveness: A measure of whether the Project purpose will be achieved by the end of the Project period. This is then a question to the degree to which the Outputs contribute towards achieving the intended Project purpose.
(3) Efficiency: A measure of the production of Outputs (results) of the Project in relation to the total resource Inputs.
(4) Impact: The positive and negative changes and consequences, produced directly and indirectly as the result of the Project.
(5) Sustainability: An overall assessment of the extent to which the positive changes achieved by the Project can be expected to last after the completion of the Project.

Chapter 2 OUTLINE OF THE PROJECT

The Projects has been carried out since April 2011 under the scheme of SATREPS[1]. The designed Project Purpose and Outputs are as follows:

Project Purpose:

The capacity of HUST and RRIV will be enhanced on the technologies to realize sophistication and expansion in application of natural rubber and environment-friendly natural rubber production.

Outputs

Output 1: A novel evaluation method of natural rubber is developed.

Activity 1-1: Small NMR signals of Vietnamese fresh natural rubber are assigned to terminal units through solid state NMR spectroscopy with field gradient-high speed magic angle spinning probe.

Activity 1-2: Small NMR signals of Vietnamese commercial natural rubber are assigned through solid state NMR spectroscopy with field gradient-high speed magic angle spinning probe.

Activity 1-3: A novel standard for natural rubber is prepared based on the relationship between the terminal units and mechanical properties.

Activity 1-4: Round-Lobin-test for fresh natural rubber and commercial natural rubber is performed with private firms in terms of the novel standard.

Activity 1-5: The novel standard is submitted to the Directorate for Standards, Metrology and Quality (STAMEQ) and a draft of corresponding ISO is prepared.

Output 2: High performance rubber is developed.

Activity 2-1: Lab-scale highly purified natural rubber is prepared in Vietnam.

Activity 2-2: A test-plant for the purification of natural rubber is produced in Vietnam.

Activity 2-3: Preliminary test of preparation of prototype of the highly purified natural rubber is performed by the test-plant.

Activity 2-4: A prototype of the highly purified natural rubber is prepared by the test-plant

Activity 2-5: Mechanical properties of the prototype of the highly purified natural rubber are measured.

Output 3: Highly functional polymer is developed from natural rubber.

Activity 3-1: Nanomatrix structure as a 3D-nano-network is formed.

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[1] SATREPS stands for Science and Technology Research Partnership for Sustainable Development established in collaboration between JICA and Japan Science and Technology Agency (JST).

Activity 3-2: Nanomatrix structure as a 3D-nano-network is observed by 3D transmission electron micro-tomography.

Activity 3-3: Proton-conductivity of the Nanomatrix structure as a 3D-nano-network is enhanced.

Activity 3-4: Scale-up of formation of nanomatrix structure as a 3D-nano-network is performed.

Output 4: Technology to produce bio-fuel from rubber waste woods is developed.

Activity 4-1: Evaluation method for pretreatment is established.

Activity 4-2: A suitable pretreatment method of rubber waste wood is established.

Activity 4-3: Screening methods of most efficient microorganisms is established.

Activity 4-4: The decomposing microorganisms are isolated and preserved.

Activity 4-5: Saccharification ability of the microorganisms for the pretreated samples is evaluated.

Activity 4-6: The enzymes are characterized.

Activity 4-7: The decomposing microorganisms collection is established.

Activity 4-8: The decomposition of microorganisms is improved by mutagenesis.

Activity 4-9: The excellent decomposition process is developed.

Output 5: Advanced treatment technology of rubber industrial wastewater is developed.

Activity 5-1: The present treatment system (water quality) and characterization of rubber wastewater are surveyed.

Activity 5-2: A lab-scale reactor is installed in HUST.

Activity 5-3: An analysis method for wastewater and sludge is established.

Activity 5-4: The present treatment system (GHG, bacterial activity) is surveyed.

Activity 5-5: An operational method for the lab-scale reactor is established.

Activity 5-6: The process performance (COD removal, rubber recovery) of the lab-scale reactor is evaluated.

Activity 5-7: The pilot-scale reactor is designed.

Activity 5-8: The pilot-scale reactor is installed in RRIV.

Activity 5-9: The process performance (COD removal, rubber recovery) of the pilot-scale reactor is evaluated.

Activity 5-10: The wastewater treatment system of the pilot-scale reactors is optimized.

Activity 5-11: A design guideline for rubber wastewater treatment system is prepared.

Activity 5-12: Potential for GHG reduction is evaluated with respect to the developed wastewater treatment system.

Chapter3 ACHIVEMENT AND IMPLEMENTATION PROESS

3.1 Inputs

3.1.1 The Japanese side

(1) Inputs of Personnel

- 2 Project Coordinators dispatched by JICA by the end of 2013 are:
  - G4 Researcher/Coordinators: From May 2013 to May 2013
  - Coordinator: From May 2013 to May 2015 (Plan)

- There are 13 Japanese side of member into 5 research groups is as follows. (Annex 2-1)

Total Number of Researchers		Leader of each Group
Project Leaders	Dr Fukuda (Member of Group 4)	
G1	2 persons	Dr Kawahara
G2	3 persons	Dr Kawahara
G3	2 persons	Dr Yamamoto
G4	5 persons	Dr. Ogasawara
G5	5 persons	Dr. Yamaguchi
Total 14 persons (From 1-3, in total 3 persons, and Dr Fukuda is a member in Group 4)		

- Dispatch of the Japanese side researchers to Vietnam from 2011 to December 2013 :
  In total 79 times (Annex 3)

1st Year (JFY2011)	25 times
2nd Year (JFY 2012)	17 time
3rd Year (JFY2013) including plans up to the end of December	37 time
Total (up to the end of Dec 2013)	79 times

(2) Invitation of Vietnamese side members to Japan (Annex 4)

- Visit of the Vietnamese side members to Japan: in total 22 times

1st Year (JFY2011)	12 times
2nd Year (JFY 2012)	5 times
3rd Year (JFY2013) *including plans up to the end of December*	5 time
Total *up to the end of 2013*	22 times

(4) List of Equipment supplied by JICA (Annex 5)

- Details of experimental equipment, installed and to be installed at HUST and RRIV by March 2014 (within JFY 2013), are shown in Annex 5. Delay in equipment delivery about a half to 1 year in 2012 and 2013 was caused, mainly due to complexities of handling procedures in customs.

(5) Local operation costs by Japanese side (Annex 6)

- Summary of expense on local operation cost of the Japanese (JICA only, not including fund from JST) side by the end of September 2013 is USD 289,484.71 as shown below (= equivalent to JPY29,797 thousand in an exchange rate as of Dec 3 2013, USD= 102.93JPY).
- They are mainly for general operating cost such as transportation and consumables, travel expenses, allowance, seminar/workshop cost etc.(this amount not including costs for equipment provided by JICA). Details are shown in Annex 6.

JFY	Amount in USD
1st Year (JFY2011)	100,640.57
2nd Year (JFY 2012)	136,594.84
3rd Year (JFY2013) *Up to September 2013*	52,801.47
Total *up to September 2013*	289,484.71

(6) Workshop and Semin

CPs (Annexes 8 & 9)

- **6 times of Workshop**s were organized as below:
  - JFY 2011:1 time: Kick-off meeting
  - JFY 2012: 2 times: Annual review and information collection related to TCVN (application procedures for TCVN)
  - JFY 2013: 3 times: Annual review and information collection related to TCVN (Preparation toward new standard for natural rubber evaluation method)

- **6 times of dispatching** Vietnamese CPs to **International Conference** as below. The cost was mainly covered by the Project.
  - JFY 2012: 2 times (2 persons)
  - JFY 2013: 4 times (2 persons)

3.1.2 The Vietnamese Side

(1) Personnel (Annex 2-12: Vietnamese Side Members)

- Major personnel assigned for the Project:
- Project Director: Vice Present of HUST (Dr Top)
- Project Manager: Lecturer of HUST (Dr Nghia)
- Besides 2 personnel of Project Director and Manager, totally 35 Vietnamese side researchers have been designated into the 5 Research Groups and as advisors as follows.

Total Number of Researchers/technical		Leader of each Group
G1	5 persons	Dr Trinh Xuan Anh
G2	9 persons	Dr Nghia
G3	5 persons	Dr Chuong
G4	7 persons	Dr To Kim Anh
G5	10 persons from HUST + RRIV	Dr Hai
Project Advisor	4 persons	
Total: 35 persons (there are some members overlapping members into the different groups)		

(2) Provision of Project office and Research Facilities

1) A Project Coordination office at HUST
2) 6 laboratories/facilities at HUST. Costs for renovating labs for groups research/experiment were covered by the Vietnamese side

(3) Expense Spent by the Vietnamese side (Annex 7)

- According to PMU at HUST, 8.7 billion VN Don was planned and allocated by MOET as a Project counterpart fund for the whole period of the Project. By the end of 2013, about 5.9 billion VN Don were already spent.
- As Annex 7, made by HUST PMU, shows below, accumulated amount spent by the Vietnamese side at the end of 2013 are 6,039,840 Thousand Don (JPY 29,287,738 in an Exchange Rate as of Dec 3 2013, VND = 0.004849 JPY).
- Most of expense was used for renovating laboratories, and procurement of equipment within HUST, and some management costs such as utilities and consultant fees.

VN FY*	Amount in VND (Thousand)
1st Year (JFY2011)	-

2nd Year (JFY 2012)	3,016,405
3rd Year (JFY2013)	3,023,436
Total *up to the end of 2013*	6,039,840
Planned Budget in VN FY2014**	2,940,000

Note: * VN FY starts January.

** Budget for FY2014 is already endorsed by MOET as of Dec 2014.

3.2 Achievement of the Project

3.2.1 Output

Output 1

Output 1 is "A novel evaluation method of natural rubber is developed."

<Scientific Achievement>

- Terminal units of natural rubber were analyzed through Nuclear Magnetic Resonance (NMR) spectroscopy. Signals appearing at 1.5-1.7 ppm in the ^{1}H-NMR spectrum were assigned.
- It was found that the specific signals of the terminal units appeared after purification.
- The number of signals shown in the ^{1}H-NMR spectrum was found to be dependent upon the structure of natural rubber. Based on these findings.
- Ms. Nguyen Thu Ha of HUST received ""the Young Poster Award" in 13-1 meeting (2013) of the Research Group on Nuclear Magnetic Resonance of the Society of Polymer Science, Japan.
- Dr. Trinh Xuan Anh received Poster award at the Gigaku Conference in Nagaoka in June, 2013

<Progress on Activity Basis>

- By the Mid-Term Review in November and December 2013, experiments on Activities 1-1 to 1-3 have been carried out in Japan (by NMR available in NUT). This is because delivery of NMR, which is critically required for carrying out the researches of Output 1, was delayed about a year, and preparation of the installation site in HUST was also recently finished.
- Installation of NMR at HUST was just completed at the end of October 2013, and 1 month technical guidance after installation by the manufacturers completed at the end of November, 2013. Placement of NMR at HUST was originally planned in October 2012.
- Activities 1-1 and 1-4 at HUST will be thereby started after the Mid-Term Review.

- According to the current plan, Activity 1-5, a submission of a proposal on a new standard of natural rubber to TCVN by HUST, will be carried out by the end of the Project, as well as a draft formulation for ISO standards of high-performance rubber to the TCVN.
- Before the proposal submission of a new standard to TCVN, it is necessary undergo authorization process within HUST.

Progress and prospect as compared with planned indicator is as follow:

Indicators	Progress and Prospect
A. A draft of a new standard for natural rubber is submitted to the Directorate for Standards, Metrology and Quality (STAMEQ) of the Ministry of Science and Technology (in Vietnam).	· Drafts of a new standard for natural rubber and for ISO have not been formulated yet. · It is expected that a proposal for standard will be formulated by the CP of HUST side in charge of Group 2, and to be submitted to Vietnam's STAMEQ after undergoing an approval processes by HUST's technical committee.
B. A draft of corresponding ISO is prepared.	· Draft of corresponding ISO will be formulated in the same way by HUST CP in charge of Group 2.

Output 2

Output 2 is "High performance rubber is developed." With this Output, bench-scale preparation of protein-free natural rubber has been performed in Vietnam. And new purification technology has developed to achieve less than 0.01 w/w% of nitrogen content in protein free natural rubber.

<Scientific Achievement>

- Protein-free natural rubber has been prepared in the laboratory of Hanoi University of Science and Technology.
- A total nitrogen content of the resulting protein-free natural rubber was less than 0.001 wt%, which was determined by Kjeldahl analysis.

<Progress on Activity Basis>

- 5 activities were planned towards achieving this Output, and progress of them at the time of mid-time review is as follows:
  - Activity 2-1 was completed in Vietnam.
  - Regarding Activities 2-2 to 2-5, it was not started yet in Vietnam. A laboratory and associated facilities for a de-protein test plant has been under construction at the premise of HUST, and it will be expected to complete in January or February 2014.
  - It would be highly possible to complete the planned activities and purposes while details towards "industrial" application" of purified natural rubber has not identified at the time of the mid-term review.

Progress and prospect based on the planned indicator is summarized below.

Indicators	Progress and prospect
Technology for process of industrial application for highly purified natural rubber with less than 0.01 w/w% of nitrogen is developed.	· In Japan, the target level of purification of rubber was achieved in a laboratory scale. · A pilot scale experiment in Vietnam has not started. After construction of lab and related facilities are completed after January or February 2014, necessary equipment will be installed at the premise. · Development of purified natural rubber with less than 0.01 w/w% of nitrogen in Vietnam is feasible following knowledge and experience established in Japan. · It is foreseen that technology for "industrial" application of purified natural rubber below 0.01 w/w% is feasible within the Project period as long as remaining activities are practiced as it is planned.

Output 3

The Output 3 is "Highly functional polymer is developed from natural rubber."

<Scientific Achievement>

- Polymer electrolyte membrane with nanomatrix channel was prepared by graft-copolymerization of styrene onto deproteinized natural rubber followed by sulfonation with chlorosulfonic acid.
- A three-dimensional morphology of the nanomatrix channel was observed by transmission electron microtomography technique with a transmission electron microscope.
- The proton conductivity, ion exchange capacity, sulfur content, and water uptake were 9.8x10–2 S/cm, 1.41 meq/g, 10.2 w/w%, and 66.5 w/w%, respectively.

<Progress on Activity Basis>

- Research and development activities for Output 3 are carried out in Japan by the Japanese side. This is because researches on Output 3 required very high-technology and equipment, which are not available at HUST.
- Knowledge transfer and capacity building of the Vietnamese side researchers will be main issues towards the Vietnam side.

Indicators	Progress and Prospect
Polymer of more than 0.1 S/cm in proton conductivity is developed.	· It was completed in Japan. (Research and development in Japan only).

Output 4

The Output 4 is "Technology to produce bio-fuel from waste rubber woods is developed."

<Scientific Achievement>

- Pretreatment method for waste rubber woods was established employing hydrothermal and alkaline treatment. Because plant biomass saccharification was enhanced by the addition of ligninolytic enzymes, a laccase producing fungus, *Phomopsis* sp. was isolated. Hemicellulase (xylanase) production in *Trichoderma reesei* was enhanced by pretreated rubber tree.
- A rubber degrading microorganism, H2DA3 was obtained after the selection from the enrichment culture originated from waste rubber plants.
- It was identified as *Nocardia farcinica*, and its genome DNA sequence indicated the presence of rubber degradation enzyme genes.

<Progress on Activity Basis>

- Activities 4-1 and 4-2 were completed using waste rubber woods from Vietnam. Most suitable pretreatment technology for production of bio-ethanol from waste woods was established employing hydrothermal and alkaline treatments.
- Activities from 4-3 and 4-6 were also completed following a protocol agreed between the Japanese side and the Vietnamese side. Technology on screening for cellulose-and rubber-degrading microorganisms has been transferred, and being used in screening in Vietnam also. Some promising strains were isolated and characterized in Vietnam. Activity 4-6, characterization of enzymes is ongoing.
- Activities 4-7 to 4-9 will be conducted after the Mid-Term Review.

The progress and prospect with comparison of the indicators are summarized below:

Indicators	Progress and Prospect
A decomposition process using microorganisms achieves more than 50% of saccharification rate.	· On progress. · Planned research activities have been implemented faster than a planned timeframe. · It will be possible to achieve Output 4, far prior to the end of the Project.

Output 5

The Output 5 is "Advanced treatment technology of rubber industrial wastewater is developed."

<Scientific Achievement>

- Lab-scale reactors for treatment of natural rubber-processing wastewater, BR-UASB-DHS system and AO-UASB-AFR system, were developed and operated.
- The method for estimation of GHGs emission rate was developed, and it revealed that GHGs were containing of not only methane but also nitrous oxide as dominant gas in an actual

opened anaerobic tank treating rubber wastewater.

- Human resources progress by making opportunities as the survey of conventional rubber factories, internship, staff training, and sharing methods.

<Progress on Activity Basis>

- Activity 5-1 is conducted for four rubber-manufacturing factories..
- Regarding Activity 5-2, installation of lab-scale reactor at HUST, which was originally scheduled in FY2011, was a little delayed, and it was installed by the budget of JFY 2012 at HUST. It was decided to conduct two wastewater treatment technology systems named BR-UASB-DHS system and AO-UASB-AFR system. Research of the BR-UASB-DHS system was started already at HUST, and the AO-UASB-AFR system will be started soon.
- Activity 5-3, establishment of analysis method for wastewater was completed.
- Activity 5-4, GHG emission was determined.
- Regarding Activities 5-5 and 5-6, they are setting-up of the lab-scale reactor at HUST, and evaluation of process performance of the reactor, have been continuously carried out by the collaboration of Vietnam and Japanese side (Students from NUT).
- In the Activity 5-7, design, agreements on operation and maintenance and utilization of the pilot scale reactor, to be placed in RRIV, are completed.
- Activity 5-8, installation of the reactor to RRIV is in progress. Activities 5-9 to 5-10 will be started after completion of installation of the reactor to RRIV around April 2014. In the site of RRIV, a base of the reactor has been under preparation.
- Activity 5-11, designing guideline for rubber wastewater treatment system, and Activity 5-12, evaluation of potential of GHG reduction based on the developed system will be mainly carried out applying experiences in other developing countries by the Japanese side. Volumes of wastewater have been recorded at 2 factories by RRIV since 2012.

The progress and prospect in comparison with the indicators are below.

Indicators	Progress and Prospect
A. 90% of rubber recovery rate (based on COD) from latex-rich wastewater produced in high purification of natural rubber is achieved.	· Most of researches are on progress. · It is expected to achieve the end of the Project.
B. 80% of methane recovery rate (based on BOD) from the residual wastewater after rubber recovery is achieved.	

3.2.2 Prospect to achieve Project Purpose

The Project Purpose is "the capacity of HUST and RRIV will be enhanced on the technologies to realize sophistication and expansion in application of natural rubber and environment-friendly natural rubber production."

There are 2 indicators to be evaluated towards fulfillment of Project Purposes:

1) Publicizing research results in science journals and presentations at other opportunities has been very successfully carried out as summarized in a table below.
2) Setting-up of natural rubber study group or researcher group in Vietnam is on the way, and this indicator cannot be evaluated at the time of Mid-Term Review.

Achievement and prospect toward the Project Purpose by the end of the Project period are summarized below.

Indicators	Progress and Prospect <at November 2013>
1. Papers are publicized in science journals.	· Publications of the academic papers and presentations has been far active more than planned as below: Publication · 46 in international journals · 7 in Japanese Scientific conference: · 18 in International journals · 15 in Japanese Oral Presentation: · 20 in International journals · 88 in Japanese Poster Presentation · 38 in international journals · 54 in Japanese
2. A natural rubber study division is established in an existing academic society in Vietnam.	· On progress. · A natural rubber study group in the existing academic society is not established yet (In Vietnam, there is Chemical Society or Vietnam Rubber Association). · Instead of above, preparation for setting-up group of researchers and enterprises on natural rubber, such as through organizing a meeting with TCVN, was carried out by the Project. · It is planned that the group of researchers and enterprises will be more firm by the end of the Project period for development a standard of new evaluation methods of natural rubber in Vietnam.

3.3 Implementation Process

(1) Structure of Implementing Activities and Technical Transfer

<Modality of Technical Transfer>

- Most of activities and technical transfer have been carried out by a Group-basis.
- Japanese side researchers visited Vietnam in relatively short periods (from 3 days to 49 days) from time to time, and visits of some Vietnamese side researchers to NUT has been practiced in order to transfer knowledge from the Japanese side, and to exchange opinions for carrying out joint researches. (See Annexes 3 and 4: Records of the Japanese Side Members' Dispatch to Vietnam, and Invitation of Vietnamese Researchers).
- Besides, there have been frequent communications via internets between the Japanese and Vietnamese researchers.
- According interview results of Vietnamese counterparts at the time of Mid-Term Review, Vietnamese researchers were basically satisfied with modes of technical transfer and communications while it was ideal that Japanese researchers stay in Vietnam will stay enough time to fulfill purposes.

<Issues on Carrying Out Researches and tasks of SATREPS by Vietnamese Side>

- For the Vietnamese researchers, participating in the SATREPS Project is additional tasks besides their routine duties at HUST. Therefore, some of Vietnamese researchers appear to be passive as long as observed in the Mid-Term Review.
- It is desirable that the Vietnamese researchers and assistants should be motivated to get actively involved in research as duties of HUST.

(2) Monitoring

<Modality of Project Monitoring>

1) JCC:
   - It is organized annually mainly to report the progress of the Project activities and to discuss issues and problems to be solved
   - So far 3 times of JCC were held (August 2011, February 2012, August 2012, See Annex 10).
2) Annual report in a Japanese language has been made, and submitted to both JST and JICA.
3) Monthly meeting with Project Director (by the Project Manager and the Coordinator)
   For sharing information on progress of the Project activities and problem are shared.

- Above 3 major means for communication and monitoring among the stake holders of the Project are set up. On the other hand, it is observed that linkages between PMU (management of finance etc.) and each Group activities (technical groups) within HUST is

not enough. It also found that communication with extended stakeholders in Vietnam, such as MOET, by the Project seems to be not much carried out during the Mid-Term Review. (i.e., for problem solving of transferring equipment to RRIV, and other budget issues) Frequency of communication (i.e., reporting Progress etc.) and information sharing inter-HUST stakeholders, and intra-organizations within Vietnam shall be more strengthening after the Mid-Term Review.

For example, there is no English written document on progress of the Project. It is necessary to regularize issuing quarterly or semi-annual English written progress report mainly by the Vietnamese Counterparts, possibly in a Group basis, in order to record and to share information within HUST and extended stakeholders. In the English written report, results of research and activities, and the time-frame need to be recorded, referring PO, research progress.

< Involvement from Vietnamese side researcher>

- Until the point of Mid-Term Review, the Vietnamese side researchers have done the activities in Japan as originally planned.
- After the Mid-Term Review, installation of equipment will be completed and substantial laboratory and pilot scale experiment in Vietnam will be further promoted. It is expected that chances of participation by the Vietnamese side researchers will be increased to produce target Outputs.

Chapter 4 EVALUATION BY FIVE CRITERIA

Results of five criteria evaluation are summarized in five ratings. The highest rate is "very high", and followed by "high", "fair", "low" and "very low".

4.1 Relevance: High

Relevance of implementing the Project is evaluated high in the following reasons.

＜Necessity＞

- It is consistent with the Vietnam's policy promoting establishment and advancement of technology on the natural rubber and its industry (Vietnam's National Plan of the Natural Rubber 2015-2020). In line with the policy, production of the natural rubber in Vietnam has been rapidly growing in recent years, and this Project will contribute value added processing and waste wood and water treatment of natural rubber.
- It also consistent with Japan's "Country assistance policy for the Socialist Republic of Viet Nam" (2012), Ministry of Foreign Affairs (MOFA) in Japan, One is the priority areas of the policy is "promotion of economic growth and international competitiveness" and addressing threats on climate changes relating "environmental issues."

<Appropriateness of Means＞

- **Selection of Target groups**
  - Selecting CPs of HUST and RRIV is judged relevant because HUST is a university specializing science and technology in Vietnam, and there was experience of international academic joint research and exchange with NUT before starting the Project.
  - RRIV, another CP institution carrying out research activities is RRIV, is a research organization specifying natural rubber, and RRIV is also an agency certifies quality of natural rubber in Vietnam. RRIV has production and water treatment facilities within the premise.
- **Technical Advantages of Japan**
  - NUT has worldwide reputation on researches on purified natural rubber and its industrial use. Besides, NUT has accumulated advanced knowledge and information on selecting screening of microorganism, and improving strain of microorganism. Other research organizations joining this Project are also endowed knowledge on environmental global warming countermeasures on rubber processing waste water treatment.

4.2 Effectiveness (Prediction): Fair to High

＜Prospect to achieve Project Purpose＞

From the viewpoint to foresee achievement on the 2 planned indicators of Project Purpose, "publishing academic papers" has been successfully fulfilled far more than expectation. Regarding "setting-up group of researchers and enterprises on natural rubber," as a basis of developing a standardized evaluation method of natural rubber in Vietnam, it will be mostly achieved by the end of the Project period.

＜Logical Relations between Outputs and Project Purpose＞

- In general it was observed that planned activities have been progressed in most experiments, excepting for some of them influenced a delay of equipment delivery. For recovering this delay, it is necessary to accelerate some activities.

＜Situation on External Conditions from Outputs to Project Purpose＞

- There have not been many changes of researchers of Vietnamese side.
- From the view point of more effectiveness, until the end of the project, it shall be strengthen that the Vietnamese side allocate more budget and resources, such as consumables for research operation and human resources for carrying out experiments.

4.3 Efficiency: Fair

Efficiency of the Project is assessed fair at the time of Mid-Term Review in the following reason.

<Status towards achieving Outputs・Logical Relation between Activities and Outputs＞

- In general it is found that most of tasks toward Outputs are on progress as planned. After the Mid-Term Review, research activities in Vietnam will be in full-swing.

<Status of Inputs: Timing, Quality and Volume＞

- While expertize and number sending Japanese side of researchers to Vietnam were good enough in general. But there were some groups which did not have enough full capacity for research activities. Therefore, suitable number of research personnel should be allocated to the Project.
- JICA Coordinator will play a role to facilitate an overall project management more efficiently. It is noted that coordination function is important to implement this type of Project more smoothly.

4.4 Impact (Prospect): some matters can be pointed out, but for determining impact, it needs more time.

- When Project Purpose is achieved, it will contribute to advancement of science, technical

transfer and industrial use etc. Especially, 53 research papers have been already published through the Project, and some patents are taken. It is expected that these outputs have some impact.

- Some private companies are interested in this research.
- For development of new standard for natural rubber in Vietnam, there are still some tasks and processes to be carried out after the Mid-Term Review. It is necessary to ensure the process and steps have to be undergone as planned tasks.

<Ripple Effect/Multiple Effect to be Expected and Sustainability of Effects >

- The Project has been also providing good opportunities to younger researchers, in particular for the Japanese side, to carry out their research and practice at the natural rubber produced country, and to interact with rubber related enterprises as well as exchanging knowledge.

4.5 Sustainability (Prospect): Fair

As for sustainability, it is foreseen fair at the Mid-Term Review. There are some points which show prospect for ensuring continuity of the effects, to be produced as a result of the Project. At the same time, there are some points that the Project has to improve ways of carrying out activities and its structure on communication and monitoring.

＜Policy Aspect＞

- According to "National Plan of the Natural Rubber 2015-2020," the Vietnamese Government aims an increase in volume and productivity of natural rubber production. It is assumed that the Government of Vietnam continues this policy of expanding the natural rubber production volume, grading up of quality and promoting value added processing.

＜Technical Aspect＞

- Acceptance of technical transfer:
  It was observed that technical transfer from the Japanese side to the Vietnamese side has been carried out in successful manners.
  For strengthening the sustainability, it would be suggested that the coverage of technical transfer need to be also taken into account, including guiding on operation and maintenance of equipment.

＜Organizational and Budgetary Aspects＞

- As seen in renovation of laboratories for installing provided equipment, HUST certainly showed senses of the Project ownership. Since the Project aims environmental loading

reduction in future, it is expected that HUST will continue the ownership in future too.

- About maintenance and equipment supplied by JICA, a detailed plan formulation on operation and maintenance, in particular for the expensive equipment like NMR, and in what way necessary costs for O & M will be secured shall be identified in the plan by HUST as early possible.

4.6 Conclusion

Through a series of studies and analysis during the Mid-Term Review, the Team concludes that the Project has been, in most of parts, on progress towards achieving planned Outputs and Project Purpose. On the other hand, as depicted prior and recommendations in the following, there are some points to improve, and to be planned more firmly, in light of project management to ensure producing planned Outputs of the Project, by both Japanese and Vietnamese sides during the remaining period.

Chapter 5 RECOMMENDATION

1. Progress Monitoring of the Project
   It is recommended that the Project will design an action plan, in which a series of tasks to be done within a timeframe listed in consideration of termination time of the Project. Each group-leader should monitor a progress of the action plan at least semiannually (or in case of any major changes arise) and report the update to the Project leader with brief descriptions of the progress. The action plan should be periodically shared among all related persons of the Project at JCC or other opportunities when appropriate.

2. Dissemination
   It is recommended that the Project team will disseminate the activities and achievement of the Project through appropriate means such as open seminar/workshops etc., in order to gain recognition, thus promote further fostering research personnel and capacity development in Japan and Viet Nam.

3. Efforts for enhancing a structure of the Project
   a) Since most of the equipment has been installed and the Project is shifting into full-swing, Japanese researches should attempt to prolong the duration of each stay in Viet Nam to promote research and technical transfer. HUST will also mobilize additional human resources dedicated to the Project.
   b) Besides increasing the research personnel from Vietnamese side, the Project should continue to approach Vietnamese enterprises, through for example Public Relation workshop or consultation with individual firms. In this Mid-Term Review, it is highly important to develop a roadmap for specific industrial application to produce impact from the Project. Also, Project's members should enhance sharing information to the Project Director, thus strengthening an implementation structure of the Project.

4. Sustainable and systematic management of the equipment
   The primary responsibility for managing the equipment lies in HUST, and it is necessary for HUST to consider measures for sustainable and systematic operation and maintenance, in consultation with Japanese researchers. This matter should be continuously discussed and shall be confirmed in the next JCC in 2014. The Team also requested that the Vietnamese side should develop a clearer idea on "Rubber Center". Vietnamese side will develop a plan in coordination with NUT.

Annex 1 Schedule of the Japanese Evaluation Team

Date		Activities
Nov 25	Mon	Ms. Kawahara arrives at Hanoi, Vitenam, meeting at JICA Vietnam office
Nov 26	Tue	Interview at HUST and observation of supplied equipment
Nov 27	Wed	Interview at HUST
Nov 28	Thu	Interview at HUST, Information compilation and documentation
Nov 29	Fri	Interview at HUST and TCVN, Information compilation and documentation
Nov 30	Sat	Information compilation and documentation
Dec 1	Sun	Information compilation and documentation
Dec 2	Mon	Interview at HUST, Information compilation and documentation
Dec 3	Tue	Interview at HUST, Information compilation and documentation Mr Okumura and Ms Takahashi arrive Hanoi
Dec 4	Wed	Interviews at MPI, MOET, HUST and observation of equipment
Dec 5	Thu	Move from Hanoi to HCM, Mr Sato arrives HCM
Dec 6	Fri	Visit to natural rubber processing farms/factories
Dec 7	Sat	Study Tem internal meeting and documentation
Dec 8	Sun	Documentation
Dec 9	Mon	Visit to RRIV, Move from HCM to Hanoi, Mr. Adachi arrives Hanoi
Dec 10	Tue	Formulation of time-bounded action plan with HUST and Project Team
Dec 11	Wed	Discussions on Mid-Term Review Report with HUST, Project team, Interview at MOET
Dec 12	Thu	Report to JICA Vietnam Office, Documentation for M/M, JCC, Departure from Hanoi, Vietnam
Dec 13	Fri	Arriving at Narita, Japan

Annex 2-1 Japanese Side Project Members (as of December, 2013)

	Title	Name	Organization
1	Project Leader (+ Member of Group 4)	Prof. Masao Fukuda	Department of Bioengineering, NUT
2	Group 1 & 2	Assoc. Prof. Seiichi Kawahara (Leader of Group 1 & 2, member of Group 3)	Department of Materials Science and Technology, NUT
	Group 2	Prof. Hiroyuki Ishii	Department of Chemical Science and Engineering, TNCT
3	Group 3	Assoc. Prof. Yoshimasa Yamamoto (Leader, member of Group 1, 2)	Department of Chemical Science and Engineering, TNCT
5	Group 4	Assoc. Prof. Wataru Ogasawara (Leader)	Department of Bioengineering, NUT
6		Assis. Prof. Daisuke Kasai	Department of Bioengineering, NUT
7		Dr. Shunsuke Imai	Department of Bioengineering, NUT
8		Dr. So Iijima	NUT
9	Group 5	Prof. Takashi Yamaguchi (Leader)	Department of Civil and Environmental Engineering, NUT
10		Dr. Kazuaki Shutsubo	Head of Research Section, Center for Regional Environmental Research, NIES
11		Assis.Prof. Masashi Hatamoto	Department of Civil and Environmental Engineering, NUT
12		Dr. Takashi Onodera	NIES
13		Mr. Daisuke Tanikawa	Kure NCT

Annex 2-2 Vietnamese Side Project Members (as of December 2013) * are newly added CP members.

No.	Title	Name	Organizations
1	Group 1	Dr. Trinh Xuan Anh (Leader)	School of Chemical Engineering, HUST
2		Dr. Phan Trung Nghia	School of Chemical Engineering, HUST
3		MSc. Bui Dinh Long	School of Chemical Engineering, HUST
4		Dr. Chu Nhat Huy*	School of Chemical Engineering, HUST
5		Dr. Vu Ngoc Phan*	Advanced Institute of Science and Technology, HUST
6	Group 2	Dr. Phan Trung Nghia (Leader)	School of Chemical Engineering, HUST
7		PhD. Le Dieu Thu	School of Chemical Engineering, HUST
8		MSc. Nguyen Le Huy	School of Chemical Engineering, HUST
9		Dr. Trinh Xuan Anh*	School of Chemical Engineering, HUST
10		PhD. Nguyen Thi Thuong	School of Chemical Engineering, HUST
11		PhD. Nguyen Thi Ha	School of Chemical Engineering, HUST
12		Ms. Tran Thi Luyen*	School of Chemical Engineering, HUST
13		Ms. Tran Thi Mai	ESCANBER Project
14		Ms. Dang Thi Minh Hue*	School of Chemical Engineering, HUST
15	Group 3	Bui Chuong (Leader)	Polymer Centre, HUST
16		Dr. Phan Trung Nghia	School of Chemical Engineering, HUST
17		Dr. Tran Hai Ninh*	Polymer Centre, HUST
18		Dr. Dang Viet Hung*	Polymer Centre, HUST
19		Dr. Tran Thi Thuy	School of Chemical Engineering, HUST
20	Group 4	Prof. To Kim Anh (Leader)	School of Biotechnology and Food Technology, HUST
21		Prof. Nguyen Lan Huong	School of Biotechnology and Food Technology, HUST
22		Dr. Nguyen Thi Xuan Sam	School of Biotechnology and Food Technology, HUST
23		Dr. Le Thanh Ha	School of Biotechnology and Food Technology, HUST
24		Dr. Quan Le Ha	School of Biotechnology and Food Technology, HUST
25		Dr. Pham Tuan Anh	School of Biotechnology and Food Technology, HUST
26		MSc. Dao Viet Linh*	School of Biotechnology and Food Technology, HUST
27	Group 5	Prof. Huynh Trung Hai (Leader)	School of Environmental Science and Technology, HUST
28		Dr. Hoang Thi Thu Huong	School of Environmental Science and Technology, HUST
29		Dr. Tran Le Minh	School of Environmental Science and Technology, HUST
30		Dr. Nguyen Minh Tan	School of Chemical Engineering, HUST Institute for Research and Development of Natural Products
31		MSc. Duong Thi Thuy Linh	Institute for Research and Development of Natural Products
32		Dr. Cung Thi To Quynh*	Institute for Research and Development of Natural Products
33		MSc. Vu Ngoc Ha*	Institute for Research and Development of Natural Products
34		Mr. Phan Thanh Dung	Representative of RRIV
35		Dr. Nguyen Ngoc Bich	Rubber Technology Center
36		Dr. Lai Van Lam	Vietnam Rubber Group
37	Project advisor	Prof. Nguyen Van Xa	School of Chemical Engineering, HUST
38		Prof. Bui Chuong	Polymer Centre, HUST
39		Prof. Huynh Dang Chinh	School of Chemical Engineering, HUST
40		Dr. Nguyen Thanh Liem	Polymer Centre, HUST

Annex 3 Record of Japanese Side Members' Dispatch to Vietnam

1. Long Term Researchers and Coordinators : 2 persons

No.	Name	Designation	Organization	From	Until
1	Iijima So	G-4/Coordinator	NUT	17 May 2011	16 May 2013
2	Masuda Ryoichiro	Coordinator	JICA	23 May 2013	22 May 2015

2. Short Term Researchers

(1) JFY 2011 (1st April,2011-31st March,2012 : 1st Year)

No.	Name	Research Group	Designation	Organization	From	Until	Days
1	Fukuda Masao	Project Leader	Professor	NUT	14 June 2011	18 June 2011	8
2	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	14 June 2011	16 June 2011	8
3	Ogasawara Wataru	G-4	Associate Professor	NUT	14 June 2011	18 June 2011	4
4	Yamaguchi Takashi	G-5	Associate Professor	NUT	13 June 2011	15 June 2011	4
5	Shutsubo Kazuaki	G-5	Chief Researcher	NIER	13 June 2011	16 June 2011	5
6	Tanikawa Daisuke	G-5	Researcher	NUT	13 June 2011	16 June 2011	5
7	Fukuda Masao	Project Leader	Professor	NUT	3 August 2011	7 August 2011	6
8	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	1 August 2011	6 August 2011	7
9	Ogasawara Wataru	G-4	Associate Professor	NUT	3 August 2011	7 August 2011	6
10	Yamaguchi Takashi	G-5	Associate Professor	NUT	3 August 2011	6 August 2011	5
11	Yamamoto Yoshimasa	G-2	Lecturer	TNCT	2 August 2011	6 August 2011	6
12	Tanikawa Daisuke	G-2	Researcher	NUT	3 August 2011	6 August 2011	5
13	Yamamoto Yoshimasa	G-2	Lecturer	NUT	9 October 2011	15 October 2011	8
14	Fukuda Masao	G-2	Professor	NUT	10 November 2011	13 November 2011	5
15	Ogasawara Wataru	G-4	Associate Professor	NUT	10 November 2011	13 November 2011	5
16	Yamaguchi Takashi	G-5	Associate Professor	NUT	18 December 2011	21 December 2011	5
17	Shutsubo Kazuaki	G-5	Chief Researcher	NIES	18 December 2011	22 December 2011	6
18	Tanikawa Daisuke	G-5	Researcher	NUT	18 December 2011	22 December 2011	6
19	Fukuda Masao	Project Leader	Professor	NUT	5 January 2012	10 January 2012	7
20	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	5 January 2012	10 January 2012	7
21	Ogasawara Wataru	G-4	Associate Professor	NUT	5 January 2012	10 January 2012	7
22	Yamaguchi Takashi	G-5	Associate Professor	NUT	5 January 2012	8 January 2012	5
23	Yamamoto Yoshimasa	G-2	Lecturer	TNCT	5 January 2012	10 January 2012	7
24	Tanikawa Daisuke	G-5	Researcher	NUT	4 March 2012	9 March 2012	7

25	Ogasawara Wataru	G-4	Associate Professor	NUT	18 March 2012	21 March 2012	5

(2) JFY 2012 (1st April,2012-31st March,2013 : 2nd Year)

No.	Name	Research Group	Designation	Organization	From	Until	Days
1	Fukuda Masao	Project Leader	Professor	NUT	13 June 2012	16 June 2012	5
2	Ogasawara Wataru	G-4	Associate Professor	NUT	13 June 2012	17 June 2012	6
3	Tanikawa Daisuke	G-5	Researcher	NUT	15 July 2012	20 July 2012	7
4	Fukuda Masao	Project Leader	Professor	NUT	4 August 2012	7 August 2012	5
5	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	5 August 2012	8 August 2012	5
6	Yamaguchi Takashi	G-5	Professor	NUT	5 August 2012	7 August 2012	4
7	Oraphin chaikumpoll ert	G-1 & 3	Researcher	NUT	5 August 2012	10 August 2012	7
8	Yamamoto Yoshimasa	G-2	Lecturer	TNCT	5 August 2012	10 August 2012	7
9	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	12 September 2012	18 September 2012	8
10	Yamamoto Yoshimasa	G-2	Lecturer	TNCT	12 September 2012	19 September 2012	9
11	Tanikawa Daisuke	G-5	Researcher	NUT	29 September 2012	16 November 2012	49
12	Fukuda Masao	Project Leader	Professor	NUT	31 October 2012	3 November 2012	4
13	Shutsubo Kazuaki	G-5	Director	NIES	28 October 2012	31 October 2012	5
14	Yamaguchi Takashi	G-5	Professor	NUT	19 October 2012	20 October 2012	3
15	Fukuda Masao	Project Leader	Professor	NUT	6 January 2013	8 January 2013	4
16	Tanikawa Daisuke	G-5	Researcher	NUT	23 February 2013	5 March 2013	14
17	Yamamoto Yoshimasa	G-2	Lecturer	TNCT	24 March 2013	30 March 2013	8

(3) JFY 2013 (1st April,2013-31st March,2014 : 3rd Year)

No.	Name	Research Group	Designation	Organization	From	Until	Days
1	Yamamoto Yoshimasa	G-2	Associate Professor	TNCT	5 May 2013	7 May 2013	4
2	Ishii Hiroyuki	G-2	Professor	TNCT	5 May 2013	7 May 2013	4
3	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	5 May 2013	7 May 2013	4
4	Iijima So	G-4	Researcher	NUT	31 May 2013	21 June 2013	22
5	Ishii Hiroyuki	G-2	Professor	TNCT	14 July 2013	16 July 2013	4
6	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	10 July 2013	15 July 2013	7
7	Fukuda Masao	Project Leader	Professor	NUT	10 July 2013	12 July 2013	4
8	Imai Shunsuke	G-4	Researcher	NUT	4 August 2013	8 August 2013	6
9	Iijima So	G-4	Researcher	NUT	4 August 2013	21 September 2013	49
10	Hatamoto Masashi	G-5	Assistant Professor	NUT	4 August 2013	7 August 2013	5

11	Kasai Daisuke	G-4	Assistant Professor	NUT	4 August 2013	8 August 2013	6	
12	Yamamoto Yoshimasa	G-2	Associate Professor	TNCT	4 August 2013	6 August 2013	4	
13	Ishii Hiroyuki	G-2	Professor	TNCT	4 August 2013	6 August 2013	4	
14	Ogasawara Wataru	G-4	Associate Professor	NUT	4 August 2013	6 August 2013	4	
15	Yamaguchi Takashi	G-5	Professor	NUT	4 August 2013	5 August 2013	3	
16	Fukuda Masao	Project Leader	Professor	NUT	4 August 2013	6 August 2013	4	
17	Yamamoto Yoshimasa	G-2	Associate Professor	TNCT	20 August 2013	22 August 2013	4	
18	Ishii Hiroyuki	G-2	Professor	TNCT	20 August 2013	22 August 2013	4	
19	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	20 August 2013	23 August 2013	5	
20	Fukuda Masao	Project Leader	Professor	NUT	19 August 2013	21 August 2013	4	
21	Imai Shunsuke	G-4	Researcher	NUT	8 September 2013	21 September 2013	15	
22	Tanikawa Daisuke	G-5	Assistant Professor	KNCT	8 September 2013	17 September 2013	11	
23	Hatamoto Masashi	G-5	Assistant Professor	NUT	11 September 2013	14 September 2013	5	
24	Tanikawa Daisuke	G-5	Assistant Professor	KNCT	16 October 2013	19 October 2013	4	
25	Iijima So	G-4	Researcher	NUT	20 October 2013	3 November 2013	15	
26	Iijima So	G-4	Researcher	NUT	9 November 2013	22 December 2013	15	(plan)
27	Fukuda Masao	Project Leader	Professor	NUT	13 November 2013	15 November 2013	3	
28	Yamaguchi Takashi	G-5	Professor	NUT	17 November 2013	19 November 2013	3	
29	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	19 November 2013	21 November 2013	3	
30	Kasai Daisuke	G-4	Assistant Professor	NUT	23 November 2013	26 November 2013	4	
31	Fukuda Masao	Project Leader	Professor	NUT	3 December 2013	13 December 2013	3	(plan)
32	Yamaguchi Takashi	G-5	Professor	NUT	8 December 2013	11 December 2013	4	(plan)
33	Kawahara Seiichi	G-1 & 3	Associate Professor	NUT	9 December 2013	13 December 2013	5	(plan)
34	Shutsubo Kazuaki	G-5	Director	NIES	9 December 2013	13 December 2013	5	(plan)
35	Hatamoto Masashi	G-5	Assistant Professor	NUT	9 December 2013	13 December 2013	5	(plan)
37	Ogasawara Wataru	G-4	Associate Professor	NUT	10 December 2013	13 December 2013	4	(plan)

Annex 4 Record of Invitation of Vietnamese Side Members to Japan

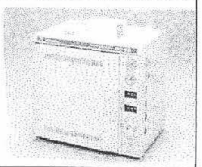
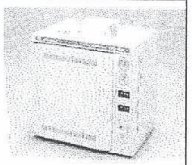
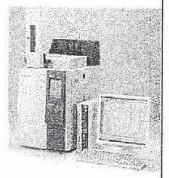
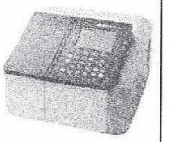
	Name	Organizations		Terms	
				Starting	end
1	Phan Trung Nghia	Project Manager	HUST	2011/10/23	2011/10/27
2	Trinh Xuan Anh	G1 Leader	HUST	2012/2/2	2012/2/6
3	Phan Trung Nghia	Project Manager	HUST	2012/2/2	2012/2/6
4	Bui Chuong	G3 Leader	HUST	2012/2/2	2012/2/6
5	To Kim Anh	G4 Leader	HUST	2012/2/2	2012/2/6
6	Huynh Trung Hai	G5 Leader	HUST	2012/2/2	2012/2/6
7	Lai Van Lam	RRIV Director	RRIV	2012/2/2	2012/2/6
8	Nguyen Ngoc Bich	RRIV senior researcher	RRIV	2012/2/2	2012/2/6
9	Phan Trung Nghia	Project Manager	HUST	2012/3/13	2012/3/21
10	Nguyen Minh Tan	G5	HUST	2012/3/13	2012/3/21
11	Nguyen Lan Huong	G4	HUST	2012/3/13	2012/3/26
12	Pham Tuan Anh	G4	HUST	2012/3/21	2012/3/31
13	Pham Tuan Anh	G4	HUST	2012/4/1	2012/4/6
14	Phan Trung Nghia	Project Manager	HUST	2012/6/7	2012/6/9
15	Tran Thi Thuy	G3	HUST	2012/6/7	2012/6/16
16	TRAN LE MINH	G5	HUST	2012/12/2	2012/12/22
17	Phan T. Nghia	Project Manager	HUST	2012/12/19	2012/12/21
18	Trinh X. Anh	G1 Leader	HUST	2012/12/19	2012/12/21
19	To K. Anh	G4 Leader	HUST	2013/5/29	2013/6/1
20	Phan T. Nghia	Project Manager	HUST	2013/6/21	2013/6/24
21	Trinh X. Anh	G1 Leader	HUST	2013/6/21	2013/6/24
22	Phan T. Nghia	Project Manager	HUST	2013/9/10	2013/9/11
23	Trinh X. Anh	G1 Leader	HUST	2013/11/15	2013/11/18

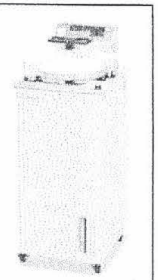
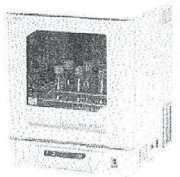
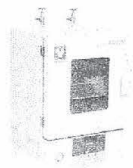
Record of invitation below is shown as a reference purpose (The cost was not covered by JICA).

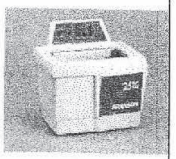
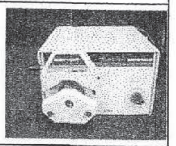
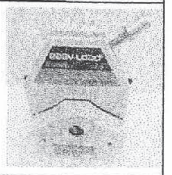
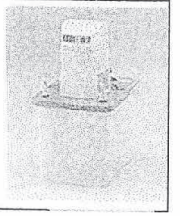
Other Costs

1	Dr. Bach Trong Phuc	Group Leader 3 (substitute)	HUST	2013/6/21	2013/6/24
2	Dr. Nguyen Van Xa	Project Advisor	HUST	2013/6/21	2013/6/24

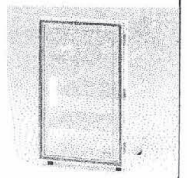
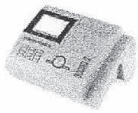
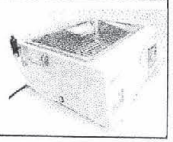
Annex 5 List of Machinery and Equipment Provided Equipment by JICA

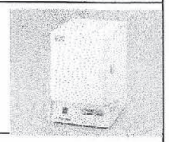
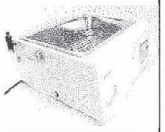
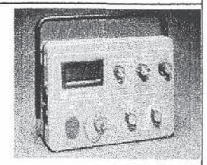
No.	Group	Name in List	Name of equipment	Name of equipment	Model	Manufacturer	Original Quantity	Location	Photo
1	5	Analytical equipment for Lab-scale reactor	GC-TCD	Gas chromatograph	GC-8AIT	Shimadzu	1	C5-308	
2	5	Analytical equipment for Pilot-scale reactor	GC-TCD	Gas chromatograph	GC-8AIT	Shimadzu	1	RRIV	
3	5	Analytical equipment for Lab-scale reactor	GC-FID	Gas chromatograph	GC- 2014AF	Shimadzu	1	C5-308	
4	4	Spectrophotometer	Spectrophotometer	UV-VIS spectrophotometer	UV-1800	Shimadzu	1	C5-308	
5	4	Centrifuge	Centrifuge	High Speed Refrigerated Micro Centrifuge	MX-305	TOMY	2	C10-103, C5-309	

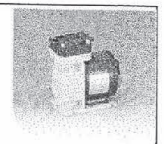
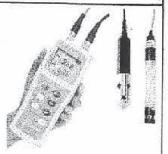
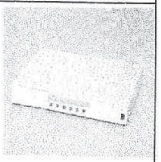
6	4	Autoclave	Autoclave	High Pressure Steam Sterilizer	ES-315	TOMY	2	C10-103, C5-308	
7	4	Bioshaker	Bioshaker	Bioshaker	BR-43FL	TAITEC	2	C10-103, C5-308	
8	4	Low Temp. Incubator	Low Temp. Incubator	Low Temp. Incubator	LTI-601 SD	Toukyourikakikai	2	C10-103, C5-308	
9	4	Beads Cell Disrupter	Beads Cell Disrupter	Beads Cell Disrupter	MS 100	TOMY	1	C5- 308	
10	123	Vacume Drying Oven	Vacume Drying Oven	Vacuum Drying Ovens	ADP300	YAMATO	1	C5-309	

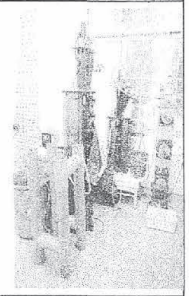
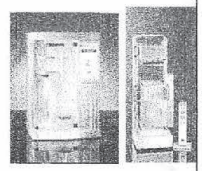
11	123	Rotary Evaporator	Rotary Evaporator	Rotary Evaporator	N-1110V-W	Toukyourika	1	C5 - 309	
12	123	Ultrasonic Cleaner	Ultrasonic Cleaner	Bench-top Ultrasonic Cleaners	2510E-MTH	BRANSON	1	C5 - 309	
13	5	Lab-scale reactor system	Pump	Variable pump	7554-85	COLE PAMER	7	C10B, C1-415	
14	5	Lab-scale reactor system	pump	Easy Load Pump Head	7518-00	COLE PAMPER	8	C10B, C10-415	
15	5	Lab-scale reactor system	Pump	Digital Variavle Pump	Oct-28	COLE PAMER	1	C10B, C1-415	
16	5	Analytical equipment for Lab-scale reactor	Aspirator	Aspirator	A-1000S	TOUKYOURIKAKIKAI	1	C5-308	

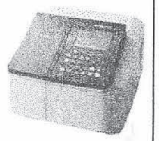
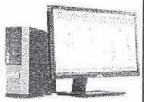
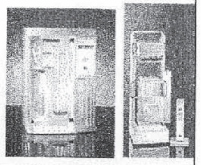
17	5	Analytical equipment for Lab-scale reactor	Desiccator	Auto Desiccator	ND-4S	AS ONE	1	C5-308	
18	5	Analytical equipment for Lab-scale reactor	Desiccator	Desiccator	LH	AS ONE	1	C5-308	
19	5	Analytical equipment for Lab-scale reactor	Annalytical balance	Balancer	AUX120	SHIMADZU	1	C5-308	
20	5	Analytical equipment for Pilot-scale reactor	Aspirator	Aspirator	A-1000S	TOUKYOURIKAKIKAI	1	RRIV	
21	5	Analytical equipment for Pilot-scale reactor	Desiccator	Auto Desiccator	ND-4S	AS ONE	1	RRIV	

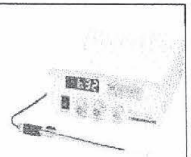
22	5	Analytical equipment for Pilot-scale reactor	Desiccator	Desiccator	LH	AS ONE	1	RRIV	
23	5	Analytical equipment for Lab-scale reactor	Annalytical balance	Balancer	AUX120	SHIMADZU	1	RRIV	
24	5	Analytical equipment for Lab-scale reactor	Multiple Water Checker	Multiple Water Checker	DR2800	HACH	1	C5-308	
25	5	Analytical equipment for Lab-scale reactor	COD rector	Reactor	DBR200	HACH	1	C5-308	
26	5	Analytical equipment for Lab-scale reactor	Multiple Water Checker	Multiple water checker	PhotoLab 6100 V	WTW	1	C5-308	
27	5	Analytical equipment for Lab-scale reactor	Water Bath	Water Bath	BS660	YAMATO	1	C5-308	

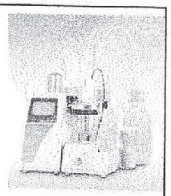
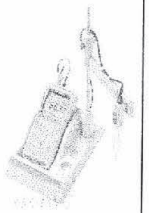
28	5	Analytical equipment for Lab-scale reactor	Oven	Oven	ON-450S	AS ONE	1	C5-309	
29	5	Analytical equipment for Lab-scale reactor	Muffle Kiln	Muffle Kiln	HPM-1N	AS ONE	1	C5-308	
30	5	Analytical equipment for Pilot-scale reactor	Water Bath	Water Bath	BS660	YAMATO	1	RRIV	
31	5	Analytical equipment for Pilot-scale reactor	Oven	Oven	ON-450S	AS ONE	1	RRIV	
32	5	Analytical equipment for Pilot-scale reactor	Muffle Kiln	Muffle Kiln	HPM-1N	AS ONE	1	RRIV	
33	5	Analytical equipment for Lab & Pilot-scale reactor	DO meter	Laboratory DO Meter	YSI 58	Nanotech	2	C5-308, RRIV	
34	5	Analytical equipment for Lab & Pilot-scale reactor	Cool incubator	Cool Incubator	A4201	ASONE	2	C5-308, RRIV	

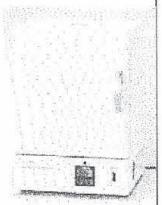
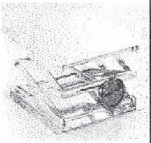
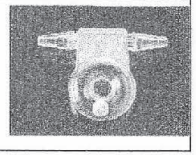
35	5	Analytical equipment for Lab & Pilot-scale reactor	Air pump	Air Pump	APN-110KV-1	IWAKI	4	C5-308, RRIV	
36	5	Analytical equipment for Lab & Pilot-scale reactor	Twin DO/pH meter	Twin DO/pH Meter	DOP-5F	KASAHARA	2	C5-308, RRIV	
37	5	Analytical equipment for Lab & Pilot-scale reactor	Homogenizer	Homogenizer	T18 Basic	IKA	2	C5-308, RRIV	
38	5	Analytical equipment for Lab & Pilot-scale reactor	Magnetic stirrer	Magnetic Stirrer	HS-6A	ASONE	2	C5-309, RRIV	
39	5	Analytical equipment for Lab & Pilot-scale reactor	Magnetic stirrer	Hot Plate Stirrer	CHPS-170AN	ASONE	2	C1-415, RRIV	
40	5	Analytical equipment for Lab & Pilot-scale reactor	Water bath with shaking	Shaking Bath	SB-20	ASONE	2	C5-309, RRIV	

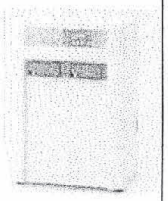
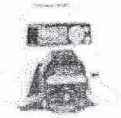
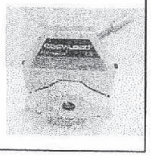
41	5	Analytical equipment for Lab & Pilot-scale reactor	Water bath with shaking	Thermal Robo	TR-1AR	ASONE	2	C5-309, RRIV	
42	5	Analytical equipment for Pilot-scale reactor	Pure water apparatus	Pure Water Apparatus	WG250B	YAMATO	1	RRIV	
43	5	Analytical equipment for Lab & Pilot-scale reactor	Thermo recorder	Thermo Recorder Ondotori	TR-51i	T&D	3	C5-308, RRIV	
44	5	Analytical equipment for Lab & Pilot-	Thermo recorder	Underwater Sensor for Thermo Recorder	TR-5530	T&D	3	C5-308, RRIV	
45	5	Analytical equipment for Pilot-scale reactor	Deionizer	Deionizer	G-1HB	ORGANO	1	RRIV	
46	5	Lab-scale reactor system	Reactor	UASB reactor	GSS(PVC)	NOT AVAILABLE	3	D7, C10	
47	5	Lab-scale reactor system	Reactor	Desulfurization column	500cc(PVC)	NOT AVAILABLE	3	D7, C10	
48	5	Lab-scale reactor system	Reactor	Pre-treatment tank	PVC	NOT AVAILABLE	1	D7	
49	5	Lab-scale reactor system	Reactor	DHSreactor	PVC	NOT AVAILABLE	2	D7, C10	
50	5	Analytical equipment for Lab-scale reactor	Kjeldahl	Kjeldahl distillation unit	VAP30s	Gerhardt	1	C5-308	

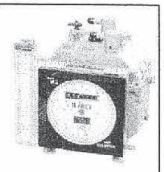
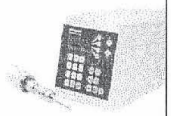
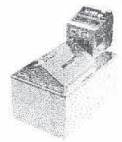
51	5	Analytical equipment for Lab-scale reactor	Spectrophotometer	UV/VIS Spectrophtometer	UV-1800	Shimadzu	1	C5-308	
52	4	Viscometer	Viscometer	Rotational Viscometer	2300 RV2-R	Elcometer	2	C5-308, C1-415	
53	5	Analytical equipment for Lab-scale reactor	Spectrophotometer	Personal computer	OptiPlex390 HRD-1T	Dell	1	C5-308	
54	5	Analytical equipment for Lab-scale reactor	Spectrophotometer	Printer	Officejet6100	Hewlett Packard Development	1	C5-308	
55	5	Analytical equipment for Pilot-scale reactor	Kjeldahl	Kjeldahl distillation unit	VAP30s	Gerhardt	1	RRIV	
56	5	Lab-scale reactor system	Reactor	Circulator High Temp	LCH-1K	AS ONE	1	C10B	

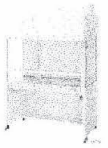
57	5	Lab-scale reactor system	pH controller	pH Controller	FD-02	Tokyogarasukikai	1	C1-415	
58	5	Analytical equipment for Lab & Pilot-scale reactor	pH meter	Benchtop pH meter	InoLab pH7310	WTW	2	C5-308, RRIV	
59	5	Analytical equipment for Lab-scale reactor	BOD reactor	BOD sensor	OxiTop IS 12	WTW	1	C5-308	
60	5	Analytical equipment for Lab-scale reactor	BOD reactor	Incubator	TS606-G/2-i	WTW	1	C5-308	
61	5	Analytical equipment for Lab-scale reactor	COD rector	Reactor	CR3200	WTW	1	C5-308	

62	5	Analytical equipment for Lab-scale reactor	Automatic volumetric titrator	Automatic Volumetric Titrator	P/N 24906-25	Schott	1	C5-308	
63	123	Heater mantle	Heater mantle	Heater Mantle	MS-ES3	Nonakarikaseisakusyo	2	C1-415	
64	123	Heater	Heater	Heater	SK-65	Ishizaki Electric	2	C1-415	
65	123	pH meter	pH meter	pH Metter	D51AC	HORIBA	2	C1-415 +D7	
66	123	Cooling stirrer	Cooling stirrer	Stirrer/Water Math Cool	SAC-900	Sansyo	2	C5-309	

67	123	Stirrer	Stirrer	Stirrer/Hot Plate	PC-220	CORNING	2	C1-415	
68	123	analytical balance	analytical balance	Analytical Balance	MS204S/02	Mettler Toledo	1	C5-308	
69	123	Drying Chamber	Drying Chamber	Drying Chamber	SDN70P	Sansyo	1	C1-415	
70	123	Jack	Jack	Jack	SUS18-2	Sansyo	2	C1-415, C5-309	
71	123	Flow indicater	Flow indicater	Flow Monitor	BA19935	Sansyo	2	C1-415	

72	all	Pure water apparatus	Pure water apparatus	Automatic Water Distillation Apparetus	SA-2100E1	TOKYO RIKAKIKAI	2	C1-415, C5-309	
73	4	Electric balance	Electric balance	Electronic Balance	UX620H	Shimadzu	3	-308, C1-415, C10-103	
74	4	pH meter	pH meter	pH Metter	Docu pH.5	Sartorius	2	C5-308, C10-103	
75	5	Lab-scale reactor system	Pump	Digital Variabie Pump	7528-10	COLE PAMER	3	C10B, C1-415	
76	5	Lab-scale reactor system	Pump	Easy Load Pump Head	7518-00	COLE PAMER	2	C10B, C1-415	

77	5	Lab-scale reactor system	Wet gas meter	Wet Gas Meter	WS-1A	Shinagawa	4	C1-415, C10B	
78	5	Analytical equipment for Lab-scale reactor	Ultrasonic system	Ultrasonic	S-450D	Branson	1	C1-415	
79	4	Analytical balance	Analytical balance	Analytical Balance	AUW220	Shimadzu	3	C1-415, C10-103	
80	4	Water bath	Water bath	Water Bath	SH-10N	TAITEC	2	C5-308	
81	5	Analytical equipment for Lab & Pilot-scale reactor	Refrigerated cetnrifuge	Refrigerated Centrifuge	CAX-371	TOMY SEIKO	2	C5-308, RRIV	
82	4	Ultra low freezer	Ultra low freezer	Ultra low freezer (Upright) ULF 650	ULF 650	Arctico	1	C5 - 308	

83	4	Clean bench	Clean bench	Panasonic Clean Bench MCV-B131F- PK	MCV - B131F - PK	Panasonic	1	C5 - 308	
84	4	Clean bench	Clean bench	Panasonic Clean Bench MCV - B91F- PK	MCV - B91F - PK	Panasonic	1	C10 - 103	
85	all	Car	Car	Car	Toyota Highlander	Toyota	1		
86	123	NMR	NMR	NNR	ECA-400	JEOL	1	D7 - 104	

Annex 6 Local Operation Cost Spent by the Japanese Side

Categories	Details	JFY 2011	JFY 2012	JFY 2013
General operating expenses	Stationary, Communication, Rental car, Consumable Items, Chemical, Transportation of Equipment etc.	56,524.43	89,858.59	21,258.18
Travel expense (Air fare)	Purchase of Airtickets for Experts, CPs, Project Staff	18,920.30	18,431.78	10,794.20
Travel expense (Others)	Trave expenses Experts, CPs, Proejct Staff excepting airtickets	15,472.56	9,143.16	7,348.86
Fee and honorarium	Hiring of Translator (Japanese-English-Vietnamese), Salary, Social Insurance and Health Insurance for [illegible]	9,704.70	18,618.31	8,180.86
Meeting expenses	Organising fee of Seminars and Workshops etc.	9.41	0.00	5,219.37
Contract with local based consultant	Hiring of Consultants in Vietnam	0.00	0.00	0.00
Construction expenses	Fee for small scale construction works	9.17	542.99	0.00
	Annual Total (USD)	**100,640.57**	**136,594.83**	**52,801.47**
	Accumulated Total (USD)		**237,235.4**	**290,036.9**

Note: JFY: April 01-March

Annex 7 Expense Spent by the Vietnamese Side

No	Categories	Year			Planning
		2012 (VND)	2013 (VND)	Total (VND)	2014 (VND)
1	Renovated laboratories	1,315,274,000	1,820,189,000	3,135,463,000	200,000,000
2	Equipment procurement	374,613,000	700,000,000	1,074,613,000	500,000,000
3	Conferences, workshop	69,350,000	18,490,000	87,840,000	100,000,000
4	working trip allowances	9,610,000	95,491,000	105,101,000	120,000,000
5	Electricity	380,369,818	105,533,923	485,903,741	700,000,000
6	Water bills	99,376,100		99,376,100	50,000,000
7	Telephone bills	38,432,929		38,432,929	50,000,000
8	Project management cost	98,870,000	164,029,600	262,899,600	130,000,000
	1)Part - time officers allowances	*82,483,000*	*150,000,000*	*232,483,000*	*120,000,000*
	2)Office supplies	*16,387,000*	*14,029,600*	*30,416,600*	*10,000,000*
9	Project consultant cost	630,509,000	2,138,000	632,647,000	30,000,000
10	Boat registration and registration fees for car	-	51,843,000	51,843,000	-
11	Fuel bills		56,089,000	56,089,000	60,000,000
12	Power supplies repairation		9,632,150	9,632,150	-
13	Chemicals for equipments			-	1,000,000,000
Total (VND)		**3,016,404,847**	**3,023,435,673**	**6,039,840,520**	**2,940,000,000**

Source: Data provided by HUST PMU

Annex 8 List of Seminars and Workshops Organized in Vietnam

(1) JFY2011 (1st April,2011-31st March,2012 : 1st Year)

	Title	Venue	Date	Contents
1	Kick-off symposium	HUST	2-6 August, 2011	Introduction of the Project

(2) JFY2012 (1st April,2012-31st March,2013 : 2nd Year)

	Title	Place	Date	Contents
1	1st ESCANBER Workshop	HUST	6 August 2012	Progress reporting
2	1st TCVN Workshop	RRIV	7 August 2012	G1-3: Explanation on ISO prcedures & explanation on new technology

(3) JFY2013 (1st April,2013-31st March,2014 : 3rd Year)

	Title	Place	Date	Contents
1	2nd ESCANBER Workshop	HUST	5 August 2013	Progress reporting
2	2nd TCVN Workshop	HCM City	21 August 2013	G1-3: Problem of protein in natural rubber, and application of deprotenization

Annex 9 Record of Attendance to International Conferences by the Vietnamese Side Members

(1) JFY 2011 (1st April,2011-31st March,2012 : 1st Year): None

(2) JFY 2012 (1st April,2012-31st March,2013 : 2nd Year)

	Name	Designation	Organization	Place	Conference	Date	Days
1	Phan Trung Nghia	Lecturer	HUST	Rio de Janeiro ,Brazil	13th International Seminar on Elastomers	2012/06/15-22	8
2	Phan Trung Nghia	Lecturer	HUST	Pattaya, Thailand	28th International Conference on Polymer Processing Society	2012/12/11-15	5

(3) JFY 2013 (1st April,2013-31st March,2014 : 3rd Year)

	Name	Designation	Organization	Place	Conference	From	Days
1	Phan Trung Nghia	Lecturer	HUST	Nuremberg, Germany	29th International Conference on Polymer Processing Society	2013/07/14-21	8
2	Trinh Xuan Anh	Lecturer	HUST	Nuremberg, Germany	29th International Conference on Polymer Processing Society	2013/07/14-21	8
3	Phan Trung Nghia	Lecturer	HUST	Goa, India	Asian Workshop on Polymer Processing	2013/12/7-10	4
4	Trinh Xuan Anh	Lecturer	HUST	Goa, India	Asian Workshop on Polymer Processing	2013/12/7-10	4

Annex 10 Record of Joint Coordinating Committee (JCC) Organized

(1) JFY 2011 (1st April,2011-31st March,2012 : 1st Year)

No.		Venue	Date	Issues Discussed/Agreed
1	1st JCC	HUST	5 August 2011	Kick-off (Plans of Project)

(2) JFY 2012 (1st April,2012-31st March,2013 : 2nd Year)

No		Venue	Date	Issues Discussed/Agreed
1	2nd JCC	NUT	3 February 2012	Progress reporting, Confirmation of PO, Discussions on problems and solutions
2	3rd JCC	HUST	6 August 2012	Progress reporting, Plan for JFY 2012, Discussions on problems and solutions

(3) JFY 2013 (1st April,2013-31st March,2014 : 3rd Year)

No		Venue	Date	Issues Discussed/Agreed
1	4th JCC	HUST	12 December 2013	Progress reporting, Mid-term review and Agreement on recommendation by the review team

Annex11. PLAN OF OPERATION (PO) version 1 (as of October 2010)

(TENTATIVE)

October 26, 2010

	1st Year	2nd Year	3rd Year	4th Year	5th Year
Project Period					
Total Years	1st Year	2nd Year	3rd Year	4th Year	5th Year
Total Months	1 2 3 4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32 33 34 35 36	37 38 39 40 41 42 43 44 45 46 47 48	49 50 51 52 53 54 55 56 57 58 59 60
Year (Japanese Fiscal Year: JFY)	JFY2011	JFY2012	JFY2013	JFY2014	JFY2015
Month	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3
Joint Coordinating Committee (JCC)	▲ ▲	▲	▲ ▲	▲	▲ ▲
Evaluation Activities			▲		▲

	Inputs from Japan (Experts)	Output 1	2	3	4	5
1	Short-term 1 (Dr. Fukuda)	○	○	○	○	○
2	Short-term 2 (Dr. Kawahara)	●	●	○		
3	Short-term 3 (Dr. Yamaguchi)					○
4	Short-term 4 (Dr. Shutsubo)					●
5	Short-term 5 (Dr. Ogasawara)				●	
6	Short-term 6 (Dr. Yamamoto)	○	○	●		
7	Short-term 7 (Dr. Iijima)				○	○
8	Short-term 8 (Researcher A)	○	○	○		
9	Short-term 9 (Researcher B)				○	○
10	Long-term (Coordinator)					

Outputs, Indicators and Activities

Output 1. A novel evaluation method of natural rubber is developed.

Indicator 1-A. A draft of a new standard for natural rubber is submitted to the Directorate for Standards, Metrology and Quality (STAMEQ) of the Ministry of Science and Technology.

Indicator 1-B. A draft of corresponding ISO is prepared.

- 1-1. Small NMR signals of Vietnamese fresh natural rubber are assigned to terminal units through solid state NMR spectroscopy with field gradient-high speed magic angle spinning probe.
- 1-2. Small NMR signals of Vietnamese commercial natural rubber are assigned through solid state NMR spectroscopy with field gradient-high speed magic angle spinning probe.
- 1-3. A novel standard for natural rubber is prepared based on the relationship between the terminal units and mechanical properties.
- 1-4. Round-Lobin-test for fresh natural rubber and commercial natural rubber is performed with private firms in terms of the novel
- 1-5. The novel standard is submitted to the Directorate for Standards, Metrology and Quality (STAMEQ) and a draft of corresponding ISO is prepared.

Output 2. High performance rubber is developed.

Indicator: Technology for process of industrial application for highly purified natural rubber with less than 0.01 w/w% of nitrogen is developed.

- 2-1. Lab-scale highly purified natural rubber is prepared in Vietnam.
- 2-2. A test-plant for the purification of natural rubber is produced in Vietnam.
- 2-3. Preliminary test of preparation of prototype of the highly purified natural rubber is performed by the test-plant.
- 2-4. A prototype of the highly purified natural rubber is prepared by the test-plant.
- 2-5. Mechanical properties of the prototype of the highly purified natural rubber are measured.

Output 3. Highly functional polymer is developed from natural rubber.

Indicator: Polymer of more than 0.1 S/cm in proton conductivity is developed.

- 3-1. Nanomatrix structure as a 3D-nano-network is formed.
- 3-2. Nanomatrix structure as a 3D-nano-network is observed by 3D transmission electron micro-tomography.
- 3-3. Proton-conductivity of the Nanomatrix structure as a 3D-nano-network is enhanced.
- 3-4. Scale-up of formation of nanomatrix structure as a 3D-nano-network is performed.

Output 4. Technology to produce bio-fuel from rubber waste woods is developed.

Indicator: A decomposition process using microorganisms achieves more than 50% of saccharification rate.

- 4-1. Evaluation method for pretreatment is established.
- 4-2. A suitable pretreatment method of rubber waste wood is established.
- 4-3. Screening methods of most efficient microorganisms is established.
- 4-4. The decomposing microorganisms are isolated and preserved.
- 4-5. Saccharification ability of the microorganisms for the pretreated samples is evaluated.
- 4-6. The enzymes are characterized.
- 4-7. The decomposing microorganisms collection is established.
- 4-8. The decomposition of microorganisms is improved by mutagenesis.
- 4-9. The excellent decomposition process is developed.

Output 5. Advanced treatment technology of rubber industrial wastewater is developed.

Indicator 5-A. 90% of rubber recovery rate (based on COD) from latex-rich wastewater produced in high purification of natural rubber is achieved.

Indicator 5-B. 80% of methane recovery rate (based on BOD) from the residual wastewater after rubber recovery is achieved.

- 5-1. The present treatment system (water quality) and characterization of rubber wastewater are surveyed.
- 5-2. A lab-scale reactor is installed in HUST.
- 5-3. An analysis method for wastewater and sludge is established.
- 5-4. The present treatment system (GHG, bacterial activity) is surveyed.
- 5-5. An operational method for the lab-scale reactor is established.
- 5-6. The process performance (COD removal, rubber recovery) of the lab-scale reactor is evaluated.
- 5-7. The pilot-scale reactor is designed.
- 5-8. The pilot-scale reactor is installed in RRIV.
- 5-9. The process performance (COD removal, rubber recovery) of the pilot-scale reactor is evaluated.
- 5-10. The wastewater treatment system of the pilot-scale reactors is optimized.
- 5-11. A design guideline for rubber wastewater treatment system is prepared.
- 5-12. Potential for GHG reduction is evaluated with respect to the developed wastewater treatment system.

Appendix II

Time-Bound Action Plan

Group 1

Item	Person In Charge in task implementation level	Timeframe for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Carrying out round robin experiment in VN	Dr. Huy	2014 Jan. – 2014 April	Dr. Anh	2014 Mar.
Applying the round robin experiment result to enterprises/industries as a pilot in VN	Dr. Nghia Ms. Thuong	2014 April – 2015 Mar.	Dr. Anh Dr. Nghai Dr. Kawahara	2015 Mar
Confirming/secure a budget for application fee (TCVN)	Dr. Nghia	2013 Dec- 2014 Jan.	Prof. Top / MOET (PMU)	2014 Jan
Approval within HUST Technical committee (TCVN)	Dr. Anh	2015 Jan – 2015 Dec	Dr. Nghia	2015 Dec
Submission of official request for national standard TCVN	Ms. Mai	2014 Feb. -2014 Feb	Dr. Nghia, Dr. Anh Prof. Top/ TCVN	2014 Feb
Holding a 3rd TCVN Meeting	Dr. Nghia.	2014 Mar	Dr. Top	2014 Mar.
Submitting a sustainable operation plan for NMR	Anh	2015 Mar.	Prof. Top	2014 May
First draft formulation of ISO	Dr Nghia	2015 Dec.	University Committee, Dr Top, Dr. Bich	2014 Sep
Finalization of Draft on ISO	Ms. Mai	2016 Mar.	Dr. Nghia	2016 Mar
Establishment of Rubber Research Center	Dr. Nghia	2014 Jan. – 2014 Dec.	Dr. Top	2014 Dec

Group 2

Items	Person In Charge at task implementation level	Time- frame for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Preliminary preparation of proto type of protein free (low-protein) natural rubber	Dr. Anh	2014 Jan – 2014 Mar	Dr. Nghia	2014 Mar
Preparation of proto type of protein free (low-protein) natural rubber	Dr. Nghia	2014 April – 2015 Mar	Dr. Kawahara	2016 Mar
Characterization of protein free (low-protein) natural rubber	Ms. Thuong	2014 April – 2015 Sep	Dr. Kawahara	2015 Sep
Measurement of mechanical properties of protein free (low-protein) natural rubber	Dr. Huy	2014 April – 2015 Sep	Dr. Kawahara	2016 Mar
Commercialization of protein free (low-protein) natural rubber	Dr. Nghia	2014 April – 2015 Sep	Dr. Kawahara	2015 Dec
Preparation of a draft of TCVN	Ms. Mai	2015 April – 2015 Dec	Dr. Nigh	2015 Dec
Application to Glove	Dr. Nghia	2015 Jan – 2015 Dec.	Dr. Kawahara	2016 Mar
Application to Puff	Ms. Thuong	2015 Jan – 2015 Dec.	Dr. Kawahara	2016 Mar
NR research center	Dr. Nghia	2014 Jan 2014 Dec	Dr. Top	2014 Dec

Group 3

Items	Person In Charge at task implementation level	Time- frame for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Formation of nanomatrix channel	Dr. Thuy Ms. Ha	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Morphology-observation of nanomatrix channel	Dr. Thuy	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Proton conductivity of more than 0.1 S/cm	Dr. Thuy Ms. Ha	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Scale up	Ms. Ha	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Paper	Ms. Ha	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Patent Application	Dr. Nghia	2013 Dec – 2015 Dec	Dr. Yamamoto	2016 Mar
Preparation of Composite of natural rubber and silica-nano-particles	Dr. Hung	2014 Jan – 2015 Dec	Dr. Chuong	2015 Dec
Enhancement of dispersion of silica-nano-particles into natural rubber	Dr. Hung	2014 Jan – 2015 Dec	Dr. Chuong	2015 Dec
Morphology-observation of Composite of natural rubber and silica- nano-particles	Dr. Ninh	2014 Mar – 2016 Mar	Dr. Chuong	2016 Mar

Group 4: Technology to produce bio-fuel from rubber waste wood is developed

Items	Person In Charge at task implementation level	Time- frame for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Evaluation method for pretreatment is established	finished	2011 April -2012 September	finished	2012 September
A suitable pretreatment method of rubber waste wood is established	finished	2012 October -2013 March	finished	2013 March
Screening methods of most efficient microorganisms is established	Drs. Huong, Tuan Anh, Linh, Imai, Iijima, Kasai	2011 April -2012 July	Profs. Kim Anh, Ogasawara	2012 July
The decomposing microorganisms are isolated and preserved	Drs. Huong, Tuan Anh, Imai, Iijima, Kasai, Ogasawara	2012 April -2014 March	Profs. Kim Anh, Ogasawara	2014 March
Degradation ability of the microorganisms for the pretreated samples is evaluated	Drs. Huong, Tuan Anh, Imai, Iijima, Kasai, Ogasawara	2012 April -2014 March	Profs. Kim Anh, Ogasawara	2014 March
The enzymes are characterized	Drs. Huong, Tuan Anh, Linh, Imai, Iijima, Kasai, Ogasawara	2012 January -2015 September	Profs. Kim Anh, Ogasawara	2015 September
The decomposing microorganisms collection is established	Drs. Huong, Tuan Anh, Linh, Imai, Iijima, Kasai, Ogasawara	2014 October -2015 January	Profs. Kim Anh, Ogasawara	2015 January
The decomposition of microorganisms is improved by mutagenesis and recombinant technology	Drs. Tuan Anh, Linh, Kasai, Ogasawara	2014 May -2015 September	Profs. Kim Anh, Ogasawara	2015 September
The excellent decomposition process is developed	Drs. Tuan Anh, Linh, Kasai, Ogasawara	2014 January -2015 March	Profs. Kim Anh, Ogasawara	2015 March

Action plan onwards with details

Group 4: Technology to produce bio-fuel from rubber waste wood is developed

Items: Details	Person In Charge at task implementation level	Time- frame for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Evaluation method for pretreatment is established: Enzymes and procedures suitable for evaluation of pretreatment are determined	finished	2011 April -2012 September	finished	2012 September
A suitable pretreatment method of rubber waste wood is established: Based on the evaluation of several methods, pretreatment procedure is determined	finished	2012 October -2013 March	finished	2013 March
Screening methods of most efficient microorganisms is established: Screening methods to select degradation micoroorganisms of cellulose, lignin, and rubber are determined	Dr Huong, Tuan Anh, Linh, Imai, Iijima, Kasai	2011 April -2012 July	Profs. Kim Anh, Ogasawara	2012 July
The decomposing microorganisms are isolated and preserved: Good microorganisms for degradation are isolated by pure-culture technique and preserved by freezing	Drs. Huong, Tuan Anh, Imai, Iijima, Kasai, Ogasawara	2012 April -2014 March	Profs. Kim Anh, Ogasawara	2014 March
Degradation ability of the microorganisms for the pretreated samples is evaluated: Degradation activities of selected microorganisms are determined	Drs. Huong, Tuan Anh, Imai, Iijima, Kasai, Ogasawara	2012 April -2014 March	Profs. Kim Anh, Ogasawara	2014 March
The enzymes are characterized: Structures and activities of degradation enzymes from good microorganisms are characterized	Drs. Huong, Tuan Anh, Linh, Imai, Iijima, Kasai, Ogasawara	2012 January -2015 September	Profs. Kim Anh, Ogasawara	2015 September

The decomposing microorganisms collection is established: Degradation microorganisms are preserved by freezing and their informations are saved in the database	Drs. Huong, Tuan Anh, Linh, Imai, Iijima, Kasai, Ogasawara	2014 October -2015 January	Profs. Kim Anh, Ogasawara	2015 January
The decomposition of microorganisms is improved by mutagenesis and recombinant technology: Activities of major enzymes are elevated by more than 20% by mutagenesis and recombinant technology	Drs. Tuan Anh, Linh, Kasai, Ogasawara	2014 May -2015 September	Profs. Kim Anh, Ogasawara	2015 September
The excellent decomposition process is developed: Combining the pretreatment method and selected enzymes, saccharification process most suitable for rubber tree is established	Drs. Tuan Anh, Linh, Kasai, Ogasawara	2014 January -2015 March	Profs. Kim Anh, Ogasawara	2015 March

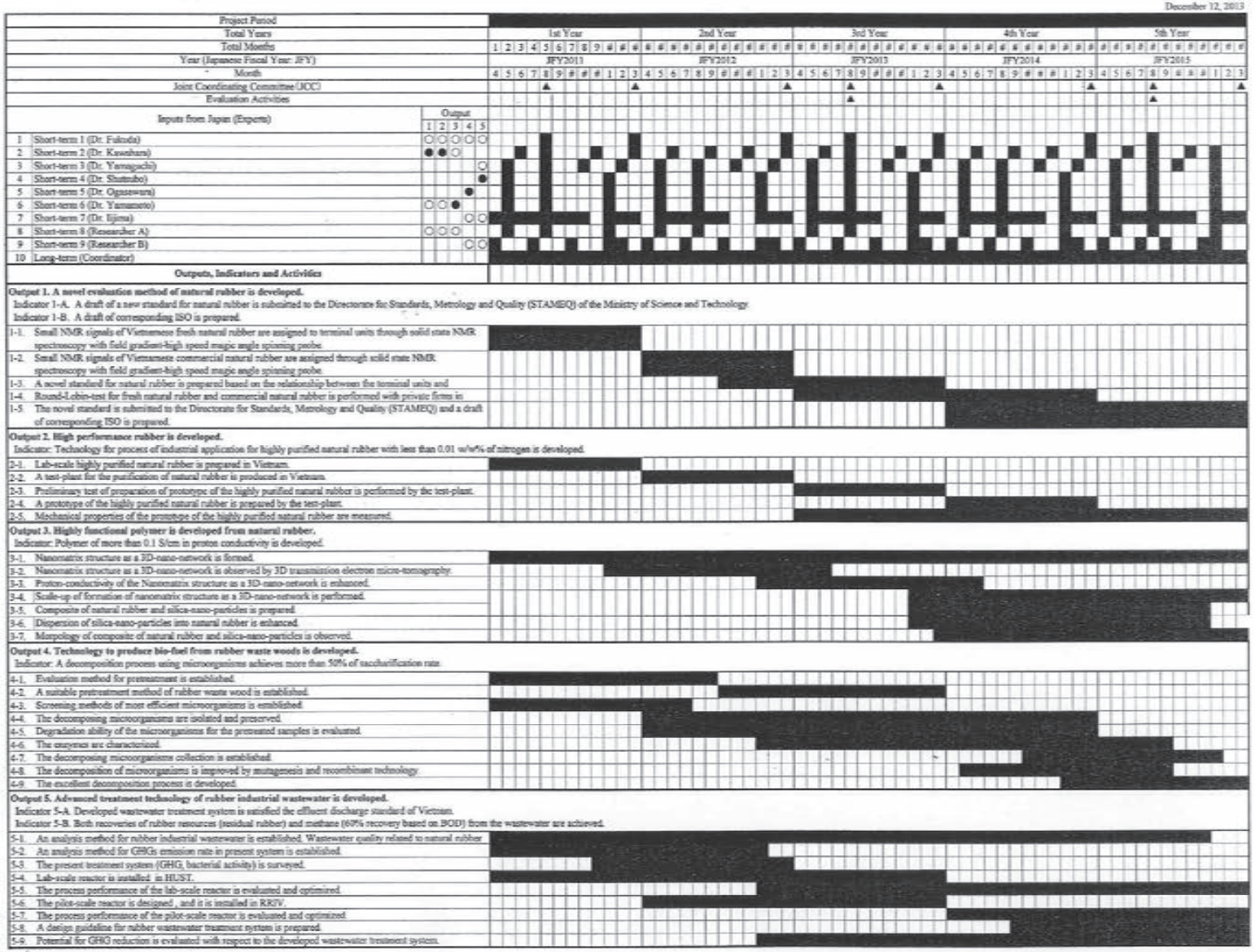
Group 5

Items	Person In Charge at task implementation level	Time-frame for the task (start - end)	Quality of Outputs/Status to be Authorized by whom	Target complete Date
Installation of lab-scale reactor system designed by HUST	Ms. Minh	2014 Jan.	Prof. Hai	2014 Jan.
Evaluation of process performance of lab-scale reactor for rubber industrial wastewater treatment by BR–UASB–DHS system (NUT system)	Mr. Watari	- 2016 Mar.	Prof. Yamaguchi	2016 Mar.
Evaluation of process performance of lab-scale reactor for rubber industrial wastewater treatment by AO–UASB–AFR system (HUST system)	Ms. Minh	2014 Feb. – 2016 Mar.	Prof. Hai	2016 Mar.
Development of method for rubber resource recovery from DPNR wastewater	Mr. Watari	2014 Apr. – 2014 Aug.	Prof. Yamaguchi /Prof. Hai	2014 Aug.
Reduction of additive amount of ammonia for storage of natural rubber latex	Dr. Nghia	2014 Apr. – 2014 Aug.	Prof. Yamaguchi /Prof. Kawahara	2014 Aug.
Membrane treatment of final effluent of lab-scale reactor system	Dr. Tan	2014 Aug. – 2016 Mar.	Prof. Yamaguchi	2016 Mar.
Comparison of 2 lab-scale reactor system and proposal of appropriate system for rubber industrial wastewater treatment	Mr. Watari	2014 Aug. – 2016 Mar.	Prof. Yamaguchi /Prof. Hai	2016 Mar.
Installation of pilot-scale reactor system in RRIV	Mr. Tanikawa	2013 Dec. – 2014 Mar.	Prof. Yamaguchi /Dr. Bich	2014 Mar.
Evaluation of process performance of pilot-scale reactor system for rubber industrial wastewater treatment by UASB – DHS system	Project researcher of RRIV	2014 Apr. – 2016 Mar.	Dr. Bich/Prof. Yamaguchi	2016 Mar.

Identification of the degradation bacteria of rubber industrial wastewater by microbial community analysis of retained sludge of lab-scale, pilot-scale reactor and conventional wastewater treatment system.	Dr. Syutsubo /Mr. Watari	- 2016 Mar.	Prof. Yamaguchi	2016 Mar.
Collection of the information about greenhouse gases (GHGs) emission in natural rubber industries	Mr. Tanikawa /Dr. Bich	- 2016 Mar.	Prof. Yamaguchi /Dr. Syutsubo	2016 Mar.
Evaluation of the potential for GHGs reduction	Mr. Tanikawa /Dr. Syutsubo	2014 Aug. – 2016. Mar.	Prof. Yamaguchi /Dr. Bich	2016 Mar.
Establishment of a designed guide line for rubber industrial wastewater treatment	Mr. Tanikawa	2015 Apr. – 2016 Mar.	Prof. Yamaguchi /Prof. Hai/ Dr. Bich/TCVN	2016 Mar.

Appendix 3. PLAN OF OPERATION (PO)

Version 2
December 12, 2013



Appendix IV

The Project for
ESTABLISHMENT OF CARBON-CYCLE-SYSTEM WITH NATURAL RUBBER

4th Joint Coordinating Committee Meeting

Thursday, December 12th, 2013
14:00 pm - 16:25 pm
Meeting Room (Room 222) at 2nd Floor of C1 Building
Hanoi University of Science and Technology
No.1 Dai Co Viet, Hanoi, Vietnam

AGENDA

14:00 - 14:10	**Opening Speeches by JCC Chair (Prof.Top with introduction of Guests of honour-MPI, MOET and RRIV), JICA (Mr.Adachi) and JST (Mr.Sato)**
14:10 - 14:30	**Presentation by HUST (Progress Report and Planning until Mar.2016 and after)**
14:30 - 14:50	**Presentation by NUT (Progress Report and Planning until Mar.2016 and after)**
14:50 - 15:20	**Results of Mid-term Evaluation by Evaluation Team (JICA Mr.Okumura, Ms.Kawahara) and JST (Mr.Sato and Ms.Takahashi)**
15:20 - 16:00	**Comments from Vietnamese side (MPI, MOET, RRIV), Discussion on Progress and Future planning**
16:00 - 16:05	**Comments from the leader of Evaluation team (Mr.Adachi)**
16:05 - 16:10	**Tea break**
16:10 - 16:20	**Signing of Minutes of Meeting**
16:20 - 16:25	**Closing Remarks (JCC Chair, Prof. Top)**

４．評価グリッド（和文）

1. 実績の検証　　013/11/15 作成

評価設問		必要な情報・データ（指標）	情報源・指標の入手手段	データ収集方法
大項目	小項目			
上位目標達成の見込み	ベトナムでのゴム生産量増加・環境負荷低減対策技術開発⇒気候変動への貢献	1. ゴム生産量増加･環境負荷低減対策技術開発の推移 2. 気候変動への貢献の状況	・ モニタリング・年間報告書の確認 ・ ベ国側・日本側研究・研究成果の実用にかかる各機関からの情報 ・ 当初計画と今回調査結果の比較	文献・聞取り・質問票・質問票調査
プロジェクト目標の達成見込み	① 天然ゴムの高性能化、高機能化、用途の拡大をもたらすナノテクノロジー技術および生産排水・廃木の効率的処理と利用による炭素循環の基盤技術が開発される。 ② 天然ゴムに関する先進産業を支える人材および生物資源の持続可能な高度利用に資する人材が育成される。	1. ナノテクノロジー技術および生産排水･廃木の効率的処理と利用による炭素循環の基盤技術が開発の推移、実用数、研究開発達成事項 2. 天然ゴムに関する先進産業を支える人材および生物資源の持続可能な高度利用に資する人材の育成状況（大学、研究機関）	・ 関連組織の活動年次報告書・モニタリング報告書 ・ ベ国側・日本側研究・研究成果の実用にかかる各機関からの情報 ・ 当帆計画と今回調査結果の比較	聞取り・質問票・質問票調査
アウトプットの達成状況	アウトプット 1：新規天然ゴム評価法の開発	現在までの進捗、達成事項、今後の活動計画、活動実施上の課題	・ ベ国側・日本側研究・研究成果の実用にかかる各機関からの情報 ・ 各活動計画書および報告書・モニタリング報告書 ・ 当初計画と今回調査結果の比較	文献・聞取り・質問票調査
	アウトプット 2：高性能ゴムの開発			
	アウトプット 3：新規高機能ポリマーの開発			
	アウトプット４：ゴム廃木からの次世代バイオ燃料生産技術の開発			
	アウトプット 5：資源回収型廃水処理技術の開発			
ベトナム側の投入実績	人材	・ カウンターパートの配置（人数、専門性、配置の変遷等）	・ R/D、（年次）活動報告書 専門家、C/P	文献・聞取り・質問票調査
	施設・建物	・ 専門家の活動に必要な事務所スペース及び施設		
	実施・管理等の費用：ローカルコスト負担	・ C/P 活動費用や事務所維持管理にかかる光熱費、通信費等の拠出		
日本側の投入実績	専門家の派遣・配置	・ 長期専門家：派遣分野、人数・回数・期間等	・ R/D､詳細計画策定調査報告書､（年次）活動報告書、専門家、C/P	文献・聞取り・質問票調査
		・ 短期専門家：派遣分野、人数・回数・期間等		
	経費：ローカルコスト負担	・ 金額、内容、タイミング		
	機材供与	・ 内容、数量、時期、		
	本邦研修	・ 内容、人数、時期		
	第三国・国内等の研修・ワークショップ	・ 研修内容・開催時期、参加者、成果の評価等		

2. 実施プロセス

評価設問		必要な情報・データ	情報源	データ収集方法
大項目	小項目			
活動実施状況	活動は計画通りに実施されたか	・ 実施時期 ・ 達成度・進捗状況 ・ 進捗に影響を与えた問題・制約要因等	・ （年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
プロジェクトの実施体制	マネジメント体制は適切に機能しているか	・ 意思決定の方法（必要な関係者が含まれているか、適切なタイミングで行われているか等） ・ 指示系統とそれが機能しているか	・ （年次）活動報告書、専門家、C/P、JICA ベトナム事務所	文献・聞取り・質問票調査
	関係者間のコミュニケーションは適切にとられているか	・ 情報交換/コミュニケーションの方法・頻度（JCC、進捗報告、定例会議等各種会合の開催実績） ・ 共有された情報の内容等	・ 詳細設計報告書、（年次）活動報告書、JCC 議事録、専門家、C/P	文献・聞取り・質問票・質問票調査
	実施機関や C/P のオーナーシップは十分か	・ C/P や活動参加者の参加度 ・ 投入実績 ・ ベ国側担当事項の実施状況、活動主体性への意思 ・ 課題や制約要因	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票調査
	プロジェクトの進捗モニタリングは適切に行われているか	・ モニタリングの方法・頻度 ・ モニタリング結果が関係者間で共有され次の活動に活かされてきているか	・ （年次）活動報告書、専門家、C/P、JICA ベトナム事務所	文献・聞取り・質問票調査
技術移転の方法	技術移転の達成目標・手法が明確か、方法に問題はないか	・ C/P に対する技術移転の達成目標、手法、達成状況、満足度、課題	・ 詳細設計報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
人材の配置状況	配置されている専門家は適切な人材か、十分に活動に従事しているか	・ 専門家人材の専門性等の適切性 ・ プロジェクト活動の方法・派遣の頻度、現地活動での内容・課題等 ・ 専門家間での役割分担 ・ 制約要因	・ 詳細設計報告書（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
	配置されている C/P は適切な人材か、十分に活動に従事しているか	・ C/P 人材の人数、専門性等の適切性 ・ プロジェクト活動への参加方法・頻度 ・ 制約要因	・ 詳細設計報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
ターゲットグループや関係組織の参加度・認識	ベ国側関係者はプロジェクトの活動に十分に参加しているか	・ 住民グループ、各関係者の活動への参加方法・頻度 ・ 参加実績 ・ 活動上の課題等	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P、研究成果の応用にかかる機関	文献・聞取り・質問票・質問票調査
PDM の改訂	PDM/計画の改訂は適切なプロセスで行われたか	・ PDM 作成・計画策定のプロセス ・ 改訂内容 ・ 関係者の理解度	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P、JICA ベトナム事務所、JCC の協議議事録	文献・聞取り・質問票調査
	当初の目的や現状に鑑みた適切な活動・目標等の修正がなされたか	・ 現行の PDM のプロ目の指標・成果の指標(目標値を含む）の適切さ ・ 計画された活動、投入など内容は適切か	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P、JICA ベトナム事務所、JCC の協議議事録	文献・聞取り・質問票調査
その他、実施過程で生じている問題、効果発現に影響を与えた要因等	・ 終了時評価調査以降、現時点までに何らかの課題が生じているか ・ 生じた課題に対してどのように対処しているか	・ 計画された活動の実施状況・インパクト等 ・ 課題の現状・課題への対処状況 ・ 今後の活動への影響や見通し	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査

3. 評価 5 項目

評価項目	評価設問		必要な情報・データ	情報源	データ収集方法
	大項目	小項目			
妥当性	必要性・	プロジェクトはベ国の対象分野のニーズに合致しているか、詳細設計調査で確認された必要性の状況に変更はないか ベ国の開発政策との整合性はあるか	・ ベ国の国家計画・政策、分野政策、分野のニーズや最新の動向・課題 ・ ベ国の社会経済開発計画や政策との整合性に変化がないか ・ 同国の農村・農業開発、コミュニティ開発の最新の政策・計画と整合しているか	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
		日本の ODA 政策、外務省の国別援助方針、JICA の同国国支援実施計画との整合性はあるか	・ 日本の援助政策/国別援助計画との整合性 ・ JICA の同国国支援実施計画との整合性	・ 対ベトナム国別援助計画	
	手段としての適切性	プロジェクトの内容・デザイン・アプローチは開発課題に効果を生む手段として適切か	・ プロジェクトの内容・デザイン・アプローチの適切性 ・ 当初計画からの変更 (変更の適切性）と変更後の達成の検証	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
		ターゲットグループの選定は適切かつ十分であったか	・ 対象ターゲットの選定にかかる当初計画からの変更と変更後の達成の検証		
		日本の技術の優位性	・ 日本の経験・蓄積・技術の活用・移転状況		
	その他	政府による関連事業、他ドナー・NGO によるプロジェクト、他の JICA 事業等との連携・デマケは明確に示されているか、相乗効果が生じているか	・ 政府のその他の取り組み ・ 他ドナー・NGO による事業 ・ JICA の他案件と本件との関連性 ・ 他ドナーや他案件との連携による活動の実施状況	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P、該当する他ドナー・NGO・JICA 事業の関連文書・活動内容	文献・聞取り・質問票調査
		プロジェクト開始後、プロジェクトを取り巻く環境（制度・政策面、社会・経済動向等）の変化はないか	・ 実施機関の組織変革 ・ プロジェクトの位置付けの変化 ・ 他ドナー・NGO による類似プロジェクトの開始の有無 ・ 社会・経済状況の変化等		
有効性（予測）	プロジェクト目標の達成見込み	プロジェクト目標は達成が見込まれるか、その貢献要因は何か	・ 実績の検証結果 ・ 専門家、C/P 等の関係者の意見	・ 詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P ・ 実績の検証結果	文献・聞取り・質問票調査
		プロジェクト目標達成を阻害する要因・リスクは何か			
	アウトプットとプロジェクト目標達成の因果関係	アウトプットはプロジェクト目標を達成するために十分か			
		アウトプットからプロジェクト目標に至るまでの外部条件は現時点でも正しいか、外部条件の影響がみられるか	・ ベ国側のプロジェクト実施方針に転換がないかどうか ・ 転換があればその背景・課題等		
		プロジェクト目標達成のための新たな外部条件があるか	・ 新たな外部条件の有無		

効率性	アウトプットの産出	アウトプットの産出状況は適切か。その貢献要因はなにか。 アウトプットを産出するために十分な活動であったか	・実績の検証結果 ・専門家、C/P 等の関係者の意見	・詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P ・実績の検証結果実績の検証結果 ・実施プロセスの分析結果	文献・聞取り・質問票調査
	活動とアウトプット産出の因果関係	活動からアウトプットに至るまでの外部条件は現時点においても正しいか、外部条件の影響はあったか 活動からアウトプットに至るまでの外部条件は現時点においても正しいか、外部条件の影響はあったか アウトプット達成のための新たな外部条件があるか	・外部条件の有無、妥当性 ・新たな外部条件の有無	・詳細設計報告書、詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P ・実績の検証結果	文献・聞取り・質問票調査
	投入のタイミング・質・量	活動を行うために過不足ない量・質の投入が、適切なタイミングで供給されたか	・主な投入がアウトプットの産出に直接結びついているか ・上記に問題がある場合の要因・リスク		
	費用対効果	コストに見合うアウトプットが産出されているか	・類似プロジェクトと比較してアウトプットや目標の達成が見込めるか		
インパクト（見込み）	上位目標達成の見込み	プロジェクトの効果として上位目標の発現が見込まれるか。上位目標の達成を阻害する要因があるか	・事後の評価でプロジェクトの効果として上位目標達成が見込めるか ・上位目標の達成を阻害する要因の有無	・詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P	文献・聞取り・質問票・質問票調査
		上位目標とプロジェクト目標は乖離していないか	・対象分野での経験・成果が今後に普及・発展するために必要な体制（人材・技術・制度・予算等）の見込み		
	上位目標とプロジェクト目標の因果関係	プロジェクト目標から上位目標に至るまでの外部条件は現時点においても正しいか、外部条件の影響はあったか プロジェクト目標から上位目標に至るまでの新たな外部条件があるか	・外部条件の有無、妥当性 ・新たな外部条件の有無		
		上位目標以外の正負のインパクトが見込まれるか	・政策の策定、法律・制度・基準や実用への影響の有無		
	波及効果・効果の持続性の有無	上位目標以外の正負のインパクトが見込まれるか プロジェクトが目指している効果はプロジェクト終了後も持続することが見込めるか	・対象ターゲット、分野動向、実用への影響の有無 ・自然環境、ジェンダー、人権、貧富等の社会階層間格差の軽減等の社会・文化的側面への影響の有無 ・総合的な要因分析の結果		
自立発展性（見込）	政策・制度面	政策支援・関連規制・法制度の整備	・今後、政策支援、関連規制、法制度は整備される予定はあるか ・研究開発成果の広がり、実用化を支援する取組はあるか	・詳細計画策定調査報告書、（年次）活動報告書、専門家、C/P、実用化にかか	文献・聞取り・質問票質問票調査

	技術面	技術移転の受容性	・技術レベル、社会・組織慣習面で受容されつつあるか	る機関・企業からの情報	
		資機材の維持管理は適正にお粉われているか	・資機材の活用度 ・維持管理の頻度や状況 ・管理要員の配置		
		実施機関により成果の普及･実用化へのメカニズムはプロジェクトに取り込まれているか､その持続は可能か	・成果の普及、波及、実用化のメカニズムの有無 ・成果普及・波及、実用化への持続の可能性の検証		
	組織・財政麺	協力終了後も効果を継続するための組織能力はあるか	・組織体制・人員配置、意思決定プロセス等		
		研究開発､実用化に必要な予算が確保されているか､予算措置は十分か	・研究開発、実用化に必要な予算が確保されているか、予算措置は十分か		
		実施機関のオーナーシップは確保されつつあるか	・ベ国側のプロジェクト実施、また今後の行政支援や技術開発・発展にかかるオーナーシップは十分に確保されているか		
	環境社会配慮からみた持続性	環境面	・環境への負の影響は活動を継続するうえで支障とならないか		
		社会的弱者への配慮	・女性、貧困層、社会的弱者への配慮不足が持続的効果を妨げていないか		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