JOINT CREDITING MECHANISM

An Emerging Bilateral Crediting Mechanism

50 YEARS
ADB

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An Emerging Bilateral Crediting Mechanism

ADB

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CONTENTS

FIGURES AND BOXES

Figures

Boxes

FOREWORD

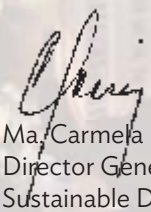
For more than two decades, Asia and the Pacific have witnessed robust economic growth, rapid urbanization, and industrialization. However, at the same time, the region is highly vulnerable to the impacts of climate change, which threatens the economic achievements and development outcomes the region has made. Many countries in the region therefore are committed to a climate-resilient and low-carbon development pathway, decoupling economic growth from greenhouse gas emissions.

While significant investments have been mobilized toward this goal, a wide gap in climate finance must be closed to meet the growing needs of the region for transitioning to a low-carbon path. All possible channels of financing must be used, including a range of policy instruments such as carbon market mechanisms. The Paris Agreement, adopted at COP21 in December last year, suggests that there is significant support for the use of market-based mechanisms, as many countries agree that these are effective means to mobilize resources, especially from the private sector, for cost-effective and ambitious mitigation actions.

ADB's Midterm Review of its Strategy 2020 has identified climate change as one of the strategic priorities for its operations. ADB has announced it will double its annual climate financing to $6 billion by 2020, up from the current $3 billion. Out of the $6 billion, $4 billion will be dedicated to mitigation through scaling up support for renewable energy, energy efficiency, sustainable transport, and building smart cities. Two billion dollars will be for adaptation through more resilient infrastructure, climate-smart agriculture, and better preparation for climate-related disasters.

The Government of Japan launched the Joint Crediting Mechanism (JCM) based on the principles under the framework for various approaches of the United Nations Framework Convention on Climate Change. It may be regarded as one of the cooperative approaches stipulated in Article 6 of the Paris Agreement. The JCM aims to facilitate diffusion of leading low-carbon technologies, products, systems, services, and infrastructure, thus resulting in the reduction of greenhouse gas emissions and contributing to the sustainable development in the developing countries.

This publication provides an overview of the JCM and how it aims to contribute to climate change efforts. It describes the framework and key features of the JCM to assist stakeholders in developing a deeper understanding of this new and, in fact, first ever bilateral carbon market mechanism. It is my sincere hope that potential JCM project developers will be able to utilize this compendium of information to successfully conceptualize and implement their own JCM projects in the region.



Ma. Carmela D. Locsin
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Sustainable Development and Climate Change Department
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PREFACE

The Carbon Market Program (CMP) is one of the flagship climate change initiatives of the Asian Development Bank (ADB) providing carbon finance and technical support to mitigation projects in ADB's developing member countries (DMCs). The CMP includes (i) the Asia Pacific Carbon Fund; (ii) the Future Carbon Fund; and the (iii) Technical Support Facility. The Technical Support Facility has been the main instrument through which ADB provides capacity building support to its DMCs for enhancing mitigation actions through carbon markets.

Under the Regional Technical Assistance (RETA) 8654: ***Supporting the Use of Carbon Financing from New Carbon Market Mechanisms to Promote Green Growth in Asia and the Pacific***, ADB's Technical Support Facility is helping DMCs enhance their institutional capacity and assisting project developers and other stakeholders to effectively participate in and take advantage of bilateral mechanisms such as the JCM.

This publication is the first knowledge product under RETA 8654. It provides detailed information on the JCM, which is the first and only operating bilateral mechanism at present. The publication focuses on the technical aspects of the JCM including its various stakeholders, project cycle, eligible projects, and recent developments related to the JCM. This publication also presents information on the potential financing options that can be availed by potential project developers in developing JCM projects in the region.

ACKNOWLEDGMENTS

This knowledge product has been produced by the Technical Support Facility (TSF), a component of ADB's Carbon Market Program under its Sustainable Development and Climate Change Department (SDCC). The TSF is implementing the regional capacity development technical assistance project R-CDTA 8654: Supporting the Use of Carbon Financing from New Carbon Market Mechanisms to Promote Green Growth in Asia and the Pacific.

Ma. Carmela D. Locsin, director general, SDCC inspired the development of this knowledge product for project developers in ADB's developing member countries. Preety Bhandari, director, Climate Change and Disaster Risk Management Division (SDCD), spearheaded its overall development. Virender K. Duggal, senior climate change specialist (SDCD, SDCC) guided and supervised the development of this knowledge product. Ryuzo Sugimoto, fund manager, JFJCM, Environment and Safeguards Division (SDES, SDCC), provided insightful inputs for this publication.

This publication has been prepared with valuable contributions from Ayato Kurokawa, climate finance specialist (consultant); Raymond Caguioa, carbon market expert (consultant); Muhammad Irfan Pawennei, carbon market expert (consultant); Jose Alfred Cantos, technical assistance coordinator (consultant); Ha Son, carbon market expert (consultant); Shaymal Barman, carbon market expert (consultant); Hanh Le, carbon market expert (consultant); Takeshi Miyata, climate finance specialist (consultant); and Kate Hughes, climate finance specialist (consultant)—all of which are sincerely commended.

ABBREVIATIONS

ADB	–	Asian Development Bank
CDM	–	Clean Development Mechanism
CER	–	Certified Emission Reductions
COP	–	coefficient of performance
COP	–	Conference of the Parties
DMC	–	developing member country
EMS	–	energy management system
ERU	–	emission reduction units
ETS	–	emissions trading system
EU ETS	–	European Union Emissions Trading System
FVA	–	framework for various approaches
GHG	–	greenhouse gas
INDC	–	intended nationally determined contributions
IPCC	–	Intergovernmental Panel on Climate Change
JCM	–	joint crediting mechanism
JFJCM	–	Japan Fund for the Joint Crediting Mechanism
JI	–	Joint Implementation
LED	–	light emitting diode
METI	–	Ministry of Economy, Trade and Industry
MOC	–	modalities of communication
MOEJ	–	Ministry of the Environment, Japan
MRV	–	measuring, reporting and verification
NEDO	–	New Energy and Industrial Technology Development Organization
NMA	–	non-market-based approach
NMM	–	new market-based mechanism
PDD	–	project design document
POISED	–	Preparing Outer Islands for Sustainable Energy Development
REDD+	–	reducing emissions from deforestation and forest degradation
RETA	–	Regional Technical Assistance
SBSTA	–	Subsidiary Body for Scientific and Technological Advice
tCO_2e	–	tons of carbon dioxide equivalent
TPE	–	third party entities
UNFCCC	–	United Nations Framework Convention on Climate Change
USRt	–	US refrigeration ton
WHR	–	waste heat recovery

INTRODUCTION

BACKGROUND

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) reaffirms that warming of the climate system is clear. Anthropogenic greenhouse gas (GHG) emissions are at the highest level in history. Without significant emission reductions, the global temperatures are likely to rise above 4°C from preindustrial levels by 2100, exposing humankind to crippling climate change impacts. According to the same report, it is very likely that heat waves will occur more often and last longer, and that extreme rainfall will become more intense and frequent in many regions. Together with sea level rise, these extreme weather events can lead to human and economic losses.

Asia and the Pacific region is highly exposed to these climate change impacts. With many small island nations, more than half of the Pacific's population lives within 1.5 km from the coastline, making it extremely vulnerable to rising sea levels. Meanwhile, countries in South Asia could face a drop in food production, and water shortages due to warmer weather and changes in precipitation. These negative impacts of climate change will also have severe economic consequences hindering development. According to an Asian Development Bank (ADB) study on the economics of climate change in Southeast Asia, its gross domestic product will reduce by 11% by 2100 under the business-as-usual emissions scenario.[1]

As part of the global response to climate change, the United Nations Framework Convention on Climate Change (UNFCCC) was established in 1992 as an international treaty with the goal of stabilizing "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system." The Convention came into force in March 1994 following the ratification of 50 Parties. To date, the UNFCCC has 197 Parties (196 States and 1 regional economic integration organization).

KYOTO MECHANISMS

At the Third Conference of the Parties (COP) held in Kyoto, Japan in 1997, the Kyoto Protocol was adopted, setting legally binding emission reduction targets for Parties listed in Annex I to the Convention (referred to as Annex I countries).[2] The Annex 1 countries committed to reduce GHG emissions by an average of 5% against 1990 levels during the first commitment period (2008–2012). At COP18 in Doha Qatar in 2012, the "Doha Amendment to the Kyoto Protocol" was adopted, committing to at least 18% emission reductions below 1990 levels in the second commitment period (2013–2020).

Under the Kyoto Protocol, countries must meet their emission reduction targets primarily through national measures. In addition, the Kyoto Protocol establishes three market-based mechanisms

1 ADB. 2016. *Southeast Asia and the Economics of Global Climate Stabilization*. http://www.adb.org/publications/southeast-asia-economics-global-climate-stabilization

2 37 industrialized countries and the European Community.

COUNTRIES WITH KYOTO COMMITMENTS MAY REDUCE EMISSIONS OR REMOVE CARBON FROM THE ATMOSPHERE IN OTHER COUNTRIES IN A COST-EFFECTIVE WAY

designed to to assist Annex I Parties to reduce their GHG emissions as cost-effectively as possible. These "flexible mechanisms" enable Annex I countries to take advantage of relatively lower-cost opportunities to reduce GHG emissions in other countries, rather than relying solely on domestic emission reduction measures which may be more expensive. The three flexible mechanisms set out in the Kyoto Protocol are: Joint Implementation (JI), Clean Development Mechanism (CDM), and international emissions trading.

The flexibility mechanisms also aim to promote sustainable development in non Annex-1 countries by implementing GHG emission reduction activities through technology transfer and investment from Annex I countries.

Joint Implementation. JI is a project based mechanisms which allows Annex I parties to implement GHG reduction projects in the territory of other Annex I Parties, and use the emission reductions from the project, measured in emission reduction units (ERU), to meet their own Kyoto Protocol obligations.

Clean Development Mechanism. The CDM is a project-based mechanism which allows Annex I Parties to implement GHG reduction projects in the territory of non-Annex I (developing country) Parties, and use the emission reductions from the project, measured in certified emission reductions (CER), to meet their own Kyoto Protocol obligations. The purpose of the CDM is to provide a more cost effective way for Annex I countries to meet

their commitments, and promote technology transfer and provide carbon finance for implementing emission reduction projects in developing countries.

The CDM has catalyzed the design and implementation of nearly 8,000 projects and programs in more than 100 countries in just over a decade. Over 1.6 billion tonnes of carbon dioxide equivalent (CO_2e) emission reductions have been issued as of the end of December 2015.

International Emissions Trading. Emissions trading allows Annex I Parties to trade emission permits allocated to them under the Kyoto Protocol, known as assigned amount units (AAU), to other Annex I Parties. Emissions trading also incorporates the trading of ERUs and CERs from JI and CDM projects.

GENESIS OF THE JOINT CREDITING MECHANISM

Based on the experience of the market-based mechanisms under the Kyoto Protocol, many countries agreed that new mechanisms, especially market based mechanisms, should be part of the future international climate change architecture. Market based mechanisms have the potential to mobilise resources, especially from the private sector, for cost-effective and ambitious mitigation actions.

At COP16 in Cancun, Mexico in 2010, Parties decided to consider establishing one or more market-based and nonmarket based approaches, to enhance the cost-effectiveness of and to promote mitigation actions. Subsequently, the COP held in Durban in 2011 decided to consider a Framework for Various Approaches (FVA) under which these would be developed. The Government of Japan made several submissions regarding proposals on FVA, such as criteria and procedures for ensuring environmental integrity, ways to avoid double counting, and arrangements to ensure transparency. These were eventually incorporated into the concept of the JCM.

In April 2013, the Government of Japan made a formal submission to the UNFCCC, proposing the Joint Crediting Mechanism/Bilateral Offset Credit Mechanism (JCM/BOCM) as one of the FVAs.[3] In December 2013, Japan highlighted its intention to use emission reductions achieved through the JCM toward its emission reduction target.[4]

In July 2015, Japan proposed an emission reduction target of 26.0% by 2030 with a base year of 2013.[5] The JCM is not included in the calculation of this target, but it intends to count the emission reduction and removal units acquired under the JCM in its efforts to achieve the target. The accumulated emission reductions or removals through JCM projects supported by the Japanese government are estimated to be between 50 and 100 $MtCO_2e$ by fiscal year (FY) 2030.[6]

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3 The mechanism was first launched as Bilateral Offset Credit Mechanism (BOCM), but it is now more commonly called the Joint Crediting Mechanism. All signatories of bilateral agreements with Japan except Bangladesh use JCM as the name for the mechanism.

4 Government of Japan. 2013. *Japan's First Biennial Report*, p. 45.

5 The emission reduction target was included in Japan's Intended Nationally Determined Contributions (INDCs).

6 Japan INDC submission. 2015. http://www4.unfccc.int/submissions/INDC/Published%20Documents/Japan/1/20150717_Japan's%20INDC.pdf

THE PARIS AGREEMENT ON DECEMBER 2015 PAVED THE WAY FOR THE USE OF MARKET MECHANISMS

PARIS AGREEMENT AND THE JOINT CREDITING MECHANISM

The Paris Agreement, adopted at COP21 in December 2015, is the first binding climate change agreement applicable to all 197 Parties to the UNFCCC. Under the agreement, all Parties are obligated to "*prepare, communicate and maintain successive nationally determined contributions*"[7] and "*pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.*"[8]

While the term market mechanisms are not directly referenced in the Agreement, Article 6 provides for "*cooperative approaches that involve the use of internationally transferred mitigation outcomes towards nationally determined contributions*"[9] pertaining to the possible transfer and acquisition of emission reduction units among Parties. Such cooperative approaches must apply robust accounting, especially the avoidance of double counting. Article 6 also establishes another "mechanism" for mitigation and sustainable development. This will be supervised by a body designated by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) which will set the rules, modalities, and procedures for the mechanism.

The Paris Agreement has therefore paved the way for the use of market mechanisms. The JCM is regarded as one of the cooperative approaches stipulated in Article 6 of the Paris Agreement, and it is assumed that it will be implemented in line with the consultations between the Government of Japan and the governments of JCM host countries, as well as the guidance to be developed by the CMA.

7 Nationally determined contributions, or NDCs, are the national plans or targets pledge by Parties to the Paris Agreement.
8 UNFCCC COP21 Decisions, 2015. Draft decision -/CP.21, Annex, Article 4, paragraph 2.
9 UNFCCC COP21 Decisions, 2015. Draft decision -/CP.21, Annex, Article 6, paragraph 2.

JOINT CREDITING MECHANISM

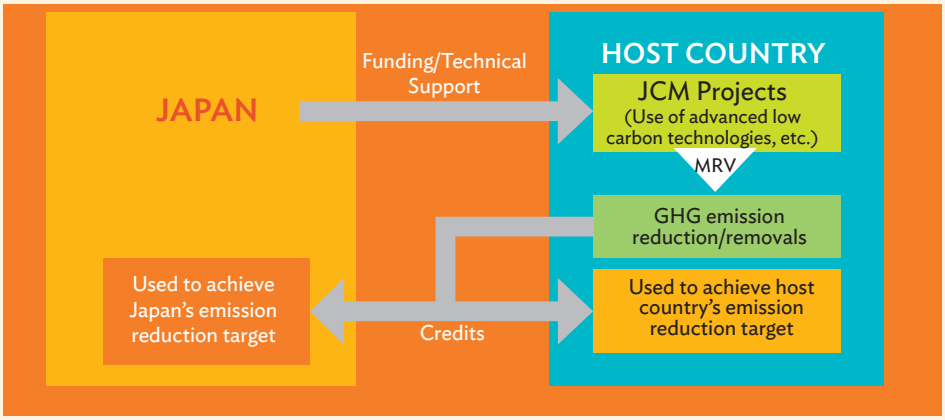
OBJECTIVES, PRINCIPLES, AND CONCEPTS

The Joint Crediting Mechanism (JCM) is a project-based bilateral offset crediting mechanism initiated by the Government of Japan. The JCM aims to facilitate the diffusion of leading low-carbon technologies, products, systems, services, and infrastructure resulting in the mitigation of greenhouse gas (GHG) emissions and contributing to the sustainable development of developing countries. It seeks to contribute to the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) by facilitating global actions for emission reductions or removals, complementing the Clean Development Mechanism (CDM). The GHG emission reductions or removals achieved through the JCM projects can be used by Japan and the host countries to achieve their respective GHG emission reduction targets.

The JCM is typically implemented by Japan and a host country through bilateral agreements between the two countries. A JCM project is implemented in the host country using an advanced low-carbon technology to reduce GHG emissions. The resulting GHG emission reductions, meeting all requirements of the JCM process, may be credited to the project proponents of both participating countries. Figure 1 shows an overview of the scheme between Japan and the host country.

The JCM was designed to take into consideration robust methodologies, transparency, and environmental integrity of its procedures, rules, and guidelines, while maintaining simplicity and practicality. JCM procedures also address double counting of emission reductions by establishing registries, which track relevant information for the issued credits. The registries will also prevent registered JCM projects from being used under any other international climate mitigation mechanisms.

FIGURE 1: OVERVIEW OF THE JOINT CREDITING MECHANISM SCHEME



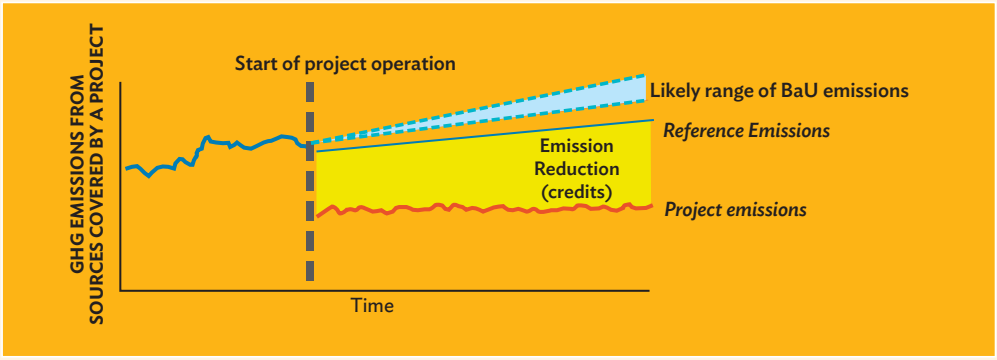
GHG = greenhouse gas, JCM = Joint Crediting Mechanism, MRV = monitoring, reporting, and verification.
Source: adapted from Government of Japan documents.

The JCM has started as a nontradable crediting mechanism. The current bilateral agreements between Japan and different host countries do not authorize international trading of the JCM credits acquired under these agreements. The possibility of extending the JCM to a tradable crediting mechanism may be explored at a future date.

The JCM is expected to be operational until a new international agreement under the UNFCCC comes into effect, expected by 2020. However, both Japan and the host country may consider extending their agreement on the JCM, taking into account the progress made in international climate change negotiations.

Emission reductions are calculated as the difference between "reference emissions" defined as emissions estimated below business-as-usual (BaU), and the "project emissions." The reference emissions and the project emissions can be calculated based on an approved methodology (Figure 2).

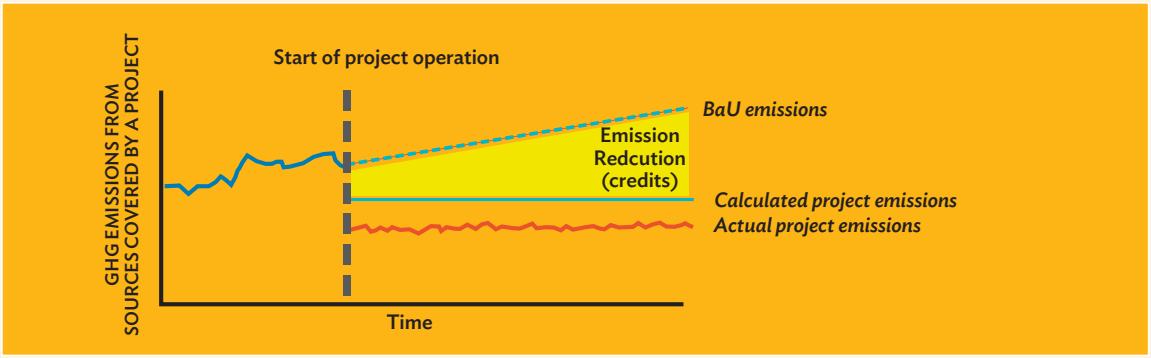
FIGURE 2: CALCULATION OF EMISSION REDUCTIONS USING REFERENCE EMISSIONS



BaU = business-as-usual, GHG = greenhouse gas.
Source: adapted from Government of Japan documents.

Alternatively, project emissions can be calculated using default values. The conservative approach on the default values usually results in calculated emissions being higher than the actual project emissions (Figure 3).

FIGURE 3: CALCULATION OF EMISSION REDUCTIONS USING CONSERVATIVE PROJECT EMISSIONS



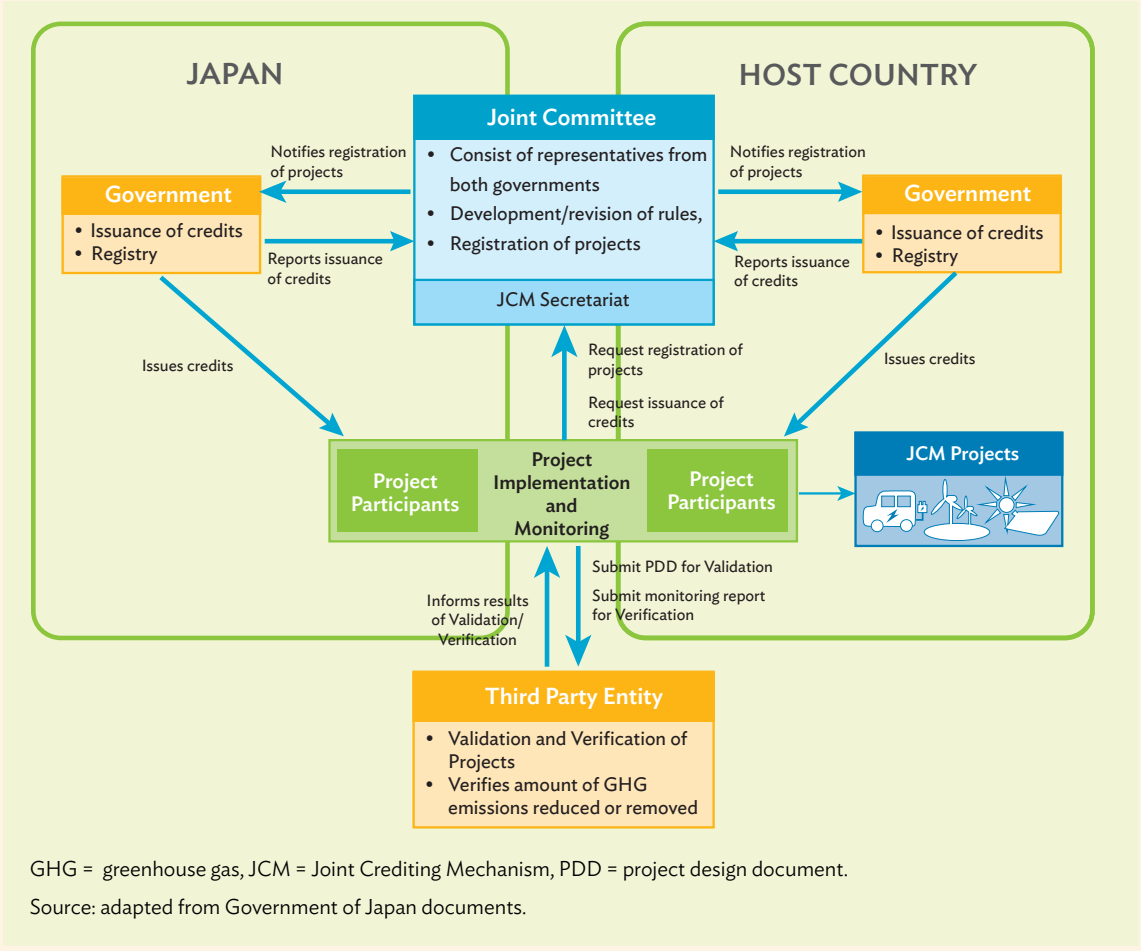
BaU = business-as-usual, GHG = greenhouse gas.
Source: adapted from Government of Japan documents.

Conservative reference emissions or project emissions are used to ensure net emission reductions. In both approaches, default values are widely used reducing monitoring requirements. This allows third party entities (TPE) to more easily validate or verify emission reductions.

JOINT CREDITING MECHANISM STAKEHOLDERS

Figure 4 provides an overview of the various stakeholders involved in the JCM and their interface during the implementation of a JCM project. The role of individual stakeholders is explained in the succeeding paragraphs.

FIGURE 4: JOINT CREDITING MECHANISM STAKEHOLDERS AND ROLES



GHG = greenhouse gas, JCM = Joint Crediting Mechanism, PDD = project design document.

Source: adapted from Government of Japan documents.

Project Participants

A JCM project typically has two project participants—the main proponent of a JCM project—the project owner in the host country; and, a project developer or a technology provider. The project participant prepares and submits methodologies and the project design documents (PDDs), implements the JCM

project, monitors the GHG emission reductions, and gets the project validated and verified by an accredited third party entity (TPE). The project participants are accordingly eligible to receive the issued JCM credits.

Joint Committee

A Joint Committee is established for each JCM host country. The Joint Committee is the governing body for the JCM in that host country and is comprised of representatives from both the governments of Japan and the host country. Each government designates members to the Joint Committee including representatives from the relevant ministries. The total number of members (usually 5–10) of the Joint Committee may not exceed a certain number as agreed upon by the committee. The committee has two appointed co-chairs, one from the host country and the other from the Government of Japan.

The Joint Committee is responsible for the development of rules and guidelines for the implementation of JCM, development of new methodologies, approval (and rejection) of proposed methodologies, registration of JCM projects, registration of designated TPEs, determination of the volume of JCM credits that can be issued to each government, and the development of common specifications for the registries. The committee is, likewise, responsible for formulating rules and guidelines that are essentially common and applicable across participating countries.

The Joint Committee meets at least once in a year. The Joint Committee decisions (taken in person or through electronic means) are adopted by consensus. The full-text of all decisions are made public through the designated JCM website. The link to the official JCM website as well as dedicated JCM host country websites can be found in Appendix 4.

Box 1: Are JCM Rules and Guidelines the same for all countries?

Joint Committees are formed for each JCM host country and each Joint Committee has the authority to set its own rules and guidelines to implement the JCM in their respective host countries. The rules and guidelines that have been formulated so far have been largely identical among all the JCM host countries with a few exceptions on some details. While this knowledge product has been prepared based on JCM rules and guidelines that are common to all countries, it is recommended that rules and procedures for the relevant host countries are checked for accuracy.

Each Side

“Each side” as adopted in a JCM bilateral agreement, refers to the representation of the respective countries implementing the JCM, namely, Japan, and the host country governments.

Each side is tasked to ensure that the implementation of the JCM is transparent, and that neither side uses any of the mitigation projects registered under the JCM for the purpose of any other international climate mitigation mechanisms to avoid double counting. Each side may prepare draft methodologies for submission to the Joint Committee.

Each side is responsible for establishing and maintaining a registry. Such registries have to be in conformance with the relevant domestic laws and regulations as also the rules and guidelines developed by the Joint Committee for the implementation of the JCM. Each side will issue the notified amount of credits to its registry based on the notification on issuance of credits by the committee.

Registries established by each side need to conform to the common specifications as developed by the Joint Committee. Common specifications include functions (e.g., issuance, retirement, holding, cancelation of credits); account type (e.g., holding account, government holding account, cancellation account, and retirement account); rules on the serial number of the credits; and information sharing. Japan has established its registry and started its operation in November 2015.[10]

Joint Crediting Mechanism Secretariat

The JCM secretariat for each host country is established by the Joint Committee to support the implementation of JCM activities between Japan and the host country. The JCM secretariat services the Joint Committee and relevant stakeholders and acts as the focal point for information dissemination for the smooth implementation of the JCM.

Methodology. In order to develop a methodology, the project participant(s) and/or any of the governments are required to submit a proposal or methodology to the JCM secretariat. The JCM secretariat notifies the methodology proponent on the receipt of the submission, communicates the results of a completeness check, and communicates the outcome of the approval process by the Joint Committee.

Registration. For the registration of the JCM project, the project participants submit their request for registration along with the PDD of the JCM project, completed modalities of communication form, and a validation report by a TPE to the JCM secretariat. The JCM secretariat notifies the project participant(s) on the receipt of such submission and communicates the conclusion of the completeness check and result of the registration process.

Credits Issuance. For the issuance of credits, the project participant submits the JCM credits issuance request along with the monitoring report and verification report issued by a TPE to the JCM secretariat. The JCM secretariat notifies the project participant(s) on the receipt of the submission and the Joint Committee's decision on the amount of credits to be issued.

Third Party Entities

The TPEs are independent auditors designated by the Joint Committee to conduct validation and verification activities under the JCM. TPEs can be existing designated operational entities accredited by the CDM Executive Board, as well as International Organization for Standardization (ISO) 14065 certification bodies. The TPE conducts validation to assess whether a proposed JCM project complies with the eligibility criteria set forth under the applied approved methodology(ies). The resulting validation report will be the basis for the approval or rejection of the proposed project for JCM Registration. Verification aims to assess actual project implementation against the registered PDD and to ensure correctness of the monitored data used for the calculation of GHG emission reductions. The resulting verification report will be the basis for the Joint Committee to decide the amount of credits to be issued. The same TPE can conduct both the validation and verification of a JCM project.

THE JCM SECRETARIAT SERVICES THE JOINT COMMITTEE AND RELEVANT STAKEHOLDERS AND ACTS AS THE FOCAL POINT FOR INFORMATION DISSEMINATION FOR THE SMOOTH IMPLEMENTATION OF THE JCM.

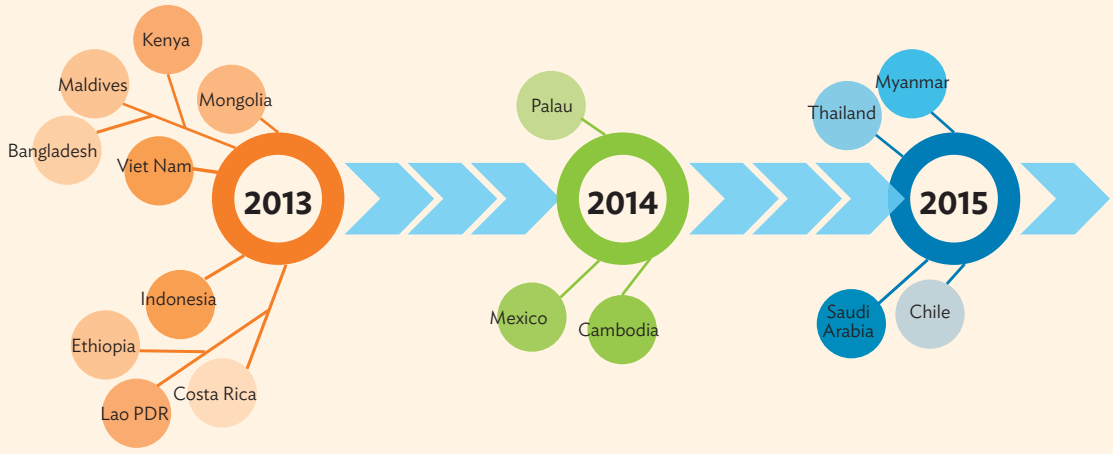
[10] The Joint Crediting Mechanism. 2016. Registry System. https://www.jcmregistry.go.jp/

RECENT DEVELOPMENTS ON THE JOINT CREDITING MECHANISM

Host Countries

As of July 2016, 16 host countries have signed bilateral agreements with Japan on the JCM. Mongolia was the first host country to sign a JCM bilateral agreement, kickstarting the JCM in 2013. Since then, other countries in Asia and the Pacific as well as other regions have signed, including Bangladesh, Cambodia, Chile, Costa Rica, Ethiopia, Indonesia, Kenya, the Lao PDR, the Maldives, Mexico, Myanmar, Palau, Saudi Arabia, Thailand, Viet Nam. The Philippines and Japan exchanged a memorandum (aide memoire) aiming to establish and operationalize the JCM on 7 December 2015, on the sidelines of the Conference of the Parties (COP21) meetings. It will become the 17th country to host the JCM upon signing of a formal bilateral agreement. The full list of host countries participating in the JCM can be found in Appendix 1.

FIGURE 5: TIMELINE OF COUNTRIES HOSTING THE JOINT CREDITING MECHANISM



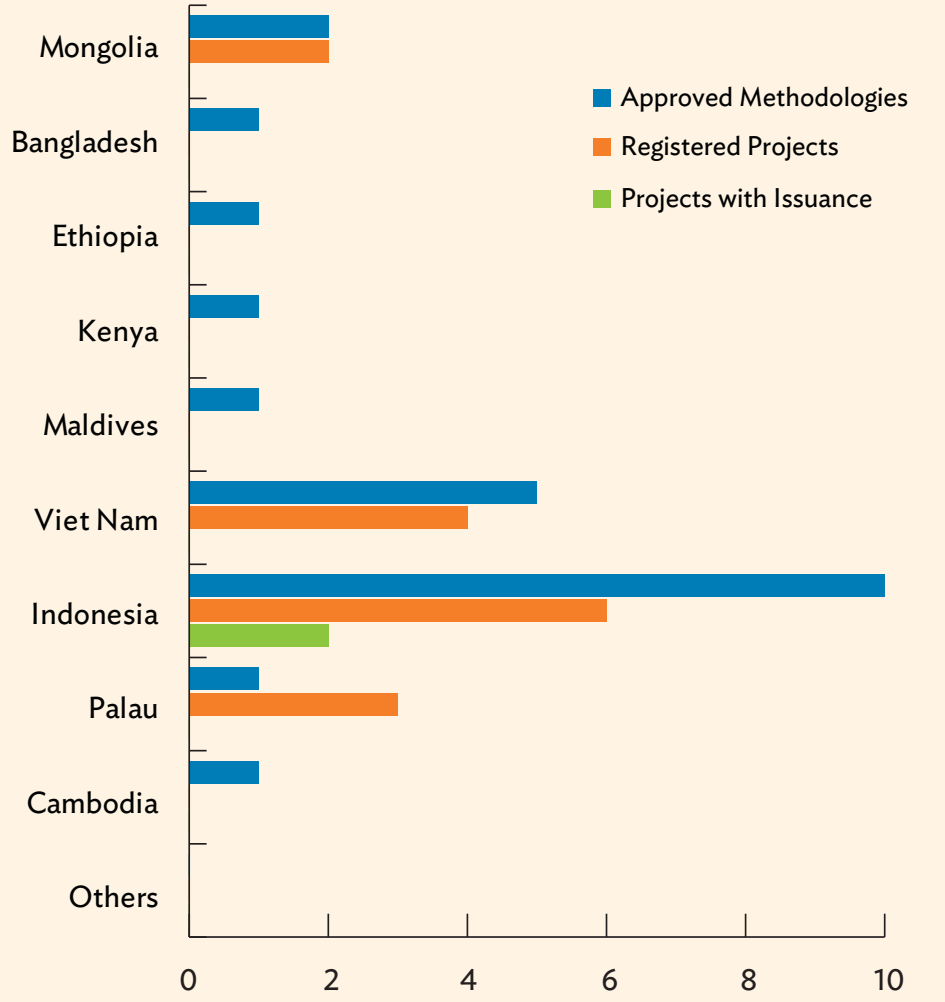
Registered Joint Crediting Mechanism Projects

There are 15 registered JCM projects as of July 2016. Six projects are hosted in Indonesia and are energy efficiency projects involving air-conditioning, process cooling systems, and refrigeration systems. Three renewable energy projects are hosted in Palau involving small-scale solar power generation. Two are hosted in Mongolia involving the use of high-efficiency heat-only boilers for heat supply systems. Four projects are hosted in Viet Nam. These include energy efficiency projects in the transport, energy distribution, and green building sectors. The full list of projects that have been registered can be found in Appendix 2.

Methodologies

JCM methodologies are approved individually for each country by the Joint Committee comprising representatives from the Japanese government and the host country. There are currently 23 approved methodologies in nine countries, as listed in Appendix 3.

FIGURE 6: ACTIVITIES IN JOINT CREDITING MECHANISM HOST COUNTRIES



Issuance of Credits

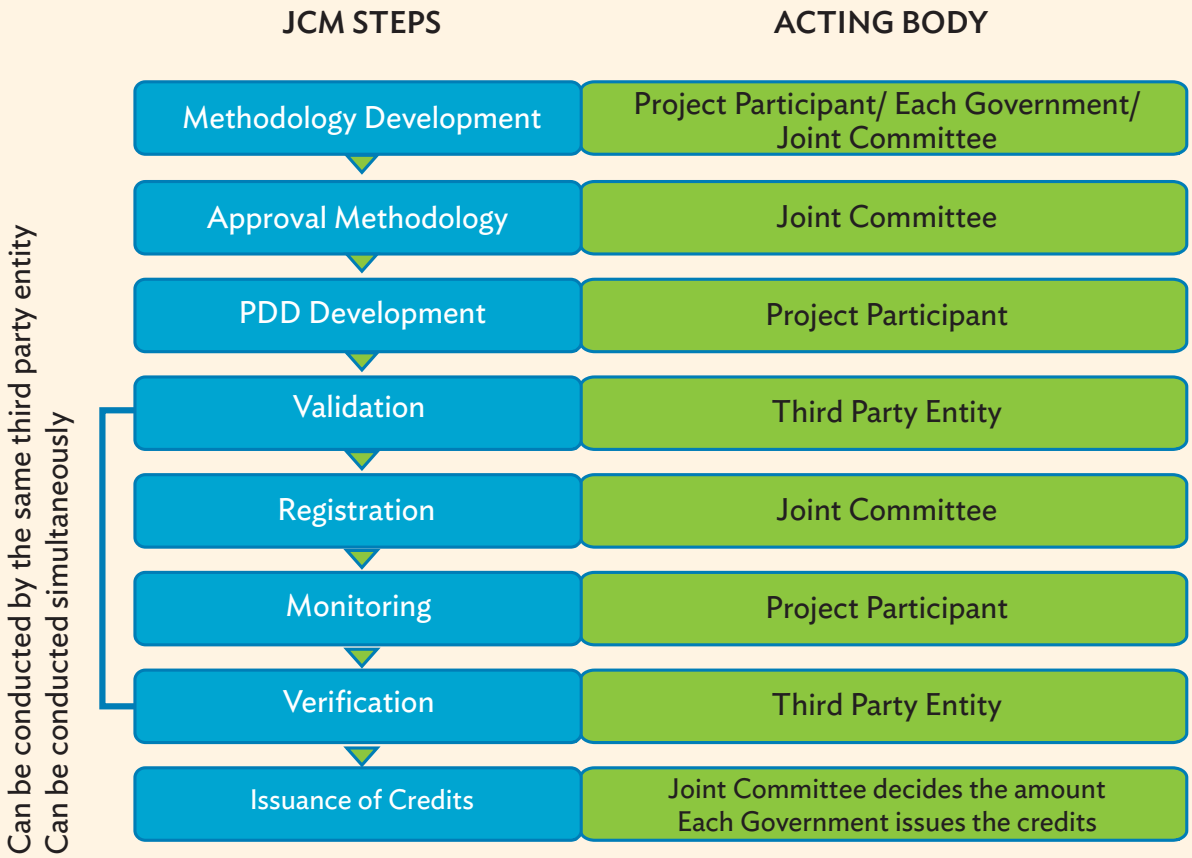
The first JCM credits were issued in May 2016 for two registered JCM projects in Indonesia namely, ID_002 "Project of Introducing High Efficiency Refrigerator to a Food Industry Cold Storage in Indonesia", and ID_003 "Project of Introducing High Efficiency Refrigerator to a Frozen Food Processing Plant in Indonesia." The projects were issued 29 and 11 credits (in tCO_2e units) respectively for the monitoring period 2 February 2015 to 31 July 2015.

JOINT CREDITING MECHANISM PROJECT DEVELOPMENT

JOINT CREDITING MECHANISM PROJECT CYCLE

Figure 7 provides an overview of the Joint Crediting Mechanism (JCM) project development cycle.

FIGURE 7: JOINT CREDITING MECHANISM PROJECT DEVELOPMENT CYCLE



JCM = Joint Crediting Mechanism, PDD = project design document.

Source: adapted from Government of Japan documents.

Methodology Development

Methodology is defined in the JCM bilateral agreement as *"a methodology applied to JCM projects for calculating emission reductions achieved by each project and monitoring the JCM project."* A JCM project can refer to an approved methodology or a combination of multiple approved methodologies applicable to the proposed project. Approved methodologies specify eligibility criteria for a proposed project to be registered as a JCM project and serve as basis for the calculation of emission reductions achieved by the project, including specifying the required parameters to be monitored.

JCM methodologies are designed with the ease of use by project participants and ease of verification in mind. Default values can be used to reduce monitoring burden. Eligibility criteria are clearly defined in the methodology, reducing the risk of rejection of proposed projects.

A new methodology has to be developed and submitted to the Joint Committee through the JCM secretariat for approval if no previously approved methodologies are applicable to a proposed JCM project in the particular host country. The methodology proponent (project participants or each government) prepares the proposed new methodology using the proposed methodology form available from the official JCM website of each host country.[11]

Methodology form. The methodology form consists of nine sections: (i) title of the methodology, (ii) terms and definitions, (iii) summary of the methodology, (iv) eligibility criteria, (v) emission sources and greenhouse gas types, (vi) establishment and calculation of reference emissions, (vii) calculation of project emissions, (viii) calculation of emission reductions, and (ix) data and parameters fixed ex-ante.

Monitoring spreadsheet. The monitoring spreadsheet is part of an approved methodology. It defines the monitoring plan and enables automatic calculation of emission reductions by simply providing the necessary input parameters. The monitoring spreadsheet consists of a monitoring plan sheet where monitored parameters are encoded in appropriate input fields and ex-ante calculation is done automatically; a monitoring structure sheet where the organizational structure and responsibilities of personnel for monitoring are defined; and a monitoring report sheet which is used for preparing a monitoring report and calculating emission reductions ex post.

Guidelines for developing methodology. To further facilitate the methodology development process, the official JCM websites of each of the host countries provide guidelines on how to develop and propose a new methodology.[12] The guidelines contain instructions on how to complete the proposed methodology form and the monitoring spreadsheet (proposed methodology spreadsheet).

Approval of methodology. The methodology proponent submits the proposed methodology to the Joint Committee through the JCM secretariat for approval. The proposed methodology will undergo a completeness check which takes around 7 days, followed by a 15-day period for public inputs. After the public inputs period the proposed methodology will undergo assessment by the Joint Committee which takes between 60 and 90 days. After this, the approval or nonapproval of the proposed methodology will be decided and the methodology proponent notified of the outcome. Figure 8 shows the methodology approval process.

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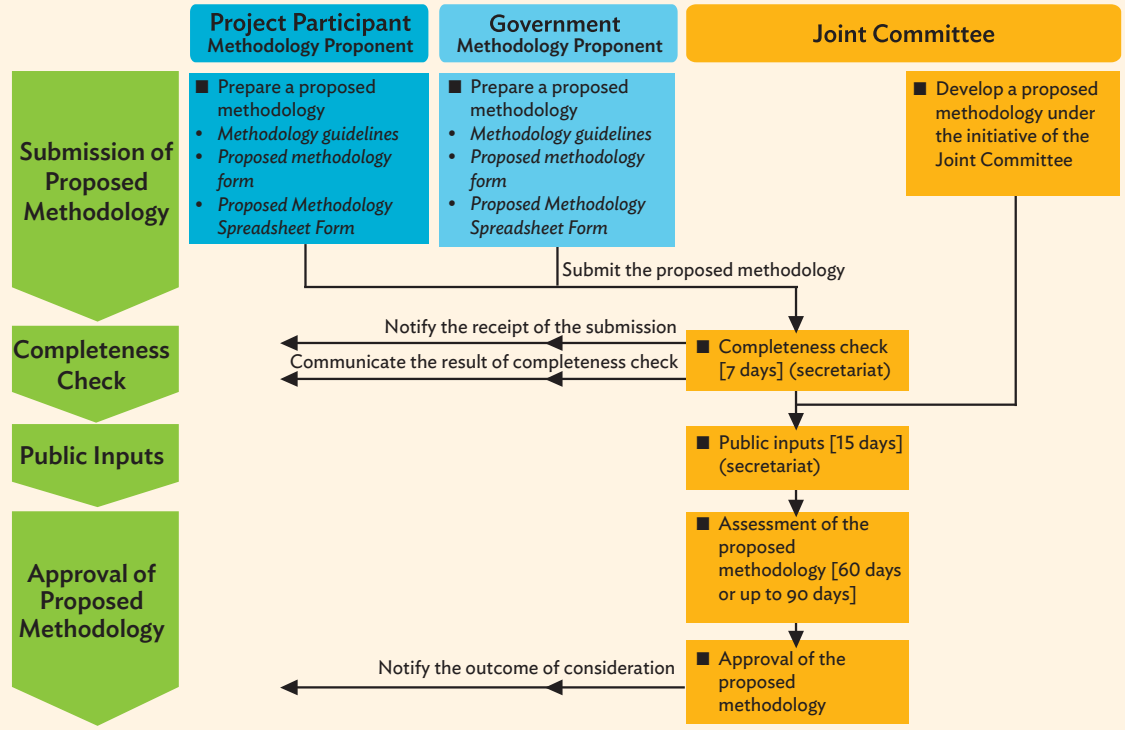
11 Each host country has their corresponding official JCM website, containing the proposed methodology form. Example, for Indonesia: https://www.jcm.go.jp/id-jp/rules_and_guidelines/forms/download/proposed_methodology_form

12 Each host country has their corresponding official JCM website, containing the guidelines for developing the proposed methodology. Example, for Indonesia: https://www.jcm.go.jp/id-jp/rules_and_guidelines/download/file_05

FIGURE 8: METHODOLOGY APPROVAL PROCESS



Source: Government of Japan.

Project Design Document Development

The project design document (PDD) provides detailed information about the proposed JCM project. The PDD is the key document for the JCM project, and the main source of information for the validation, registration, and verification. The PDD form is available at the official JCM website of each host country.[13]

Project Design Document. The PDD consists of six sections, namely:

(i) Project description. Contains information on the general description of the project and the applied advance low-carbon technology, and other specific details regarding the project;

(ii) Application of approved methodology(ies). Identifies the specific approved methodology used for the project and explains how the project meets the eligibility criteria of the methodology;

(iii) Calculation of emission reductions. Defines all emission sources and calculates emission reductions;

[13] Each host country has their corresponding official JCM website, containing the PDD form. Example, for Indonesia: https://www.jcm.go.jp/id-jp/rules_and_guidelines/forms/download/pdd

(iv) Environmental impact assessment. Discusses how the impacts of the project to the community and environment are addressed;

(v) Local stakeholders consultation. Provides summaries of proceedings from consultation with relevant stakeholders and how their concerns are addressed; and

(vi) References. Provides relevant supporting documents.

In addition to the PDD form, the approved methodology spreadsheet contained in the corresponding approved methodology should be properly completed and attached as an Annex to the PDD.

Guidelines for developing project design document and monitoring report. To facilitate the PDD development process, as well as the preparation of the monitoring report, the official JCM website of each host country provides guidelines on how to prepare the PDD and monitoring report.[14] The guidelines provide instructions on how to complete the PDD form, as well as some examples on how the form is completed using a sample project.

Validation

Validation is the independent evaluation of a proposed JCM project by a third party entity (TPE). It asseses its compliance with the JCM requirements in accordance with the validation guidelines developed by the Joint Committee. The project participant submits the PDD to the TPE for validation, and the TPE prepares a validation report containing the results of its assessment of the proposed project, which is submitted to the project participant. Unlike CDM, the TPE has no direct interaction with the JCM governing body, the Joint Committee, aside from confirming the authenticity and relevance of the public inputs received. Instead, the project participants coordinate directly with the Joint Committee through the JCM secretariat.

A 30-day public inputs period is conducted simultaneously with the validation process by the Joint Committee. The proceedings of the public inputs period are noted by the TPE, which will be considered in preparing the validation report.

Modalities of communication. Project participants should designate one focal point entity to communicate on their behalf with the Joint Committee and the secretariat. The project participants submit the modalities of communication (MOC) to the Joint Committee and the TPE, at the time of submitting the draft PDD to the TPE for validation and the committee for public inputs. Through the MOC, the project participants grant the focal point entity the authority to communicate in relation to requests for issuance of credits to respective accounts; communicate in relation to requests for addition and/or voluntary withdrawal of project participants and changes to the focal point, as well as changes to company names, legal status, contact details, and specimen signatures; and communicate on all other project-related matters. After the submission of an MOC for a proposed JCM project, all official communication between the project participants and the Joint Committee, the secretariat, or each side for the specific project is conducted through the focal point entity.

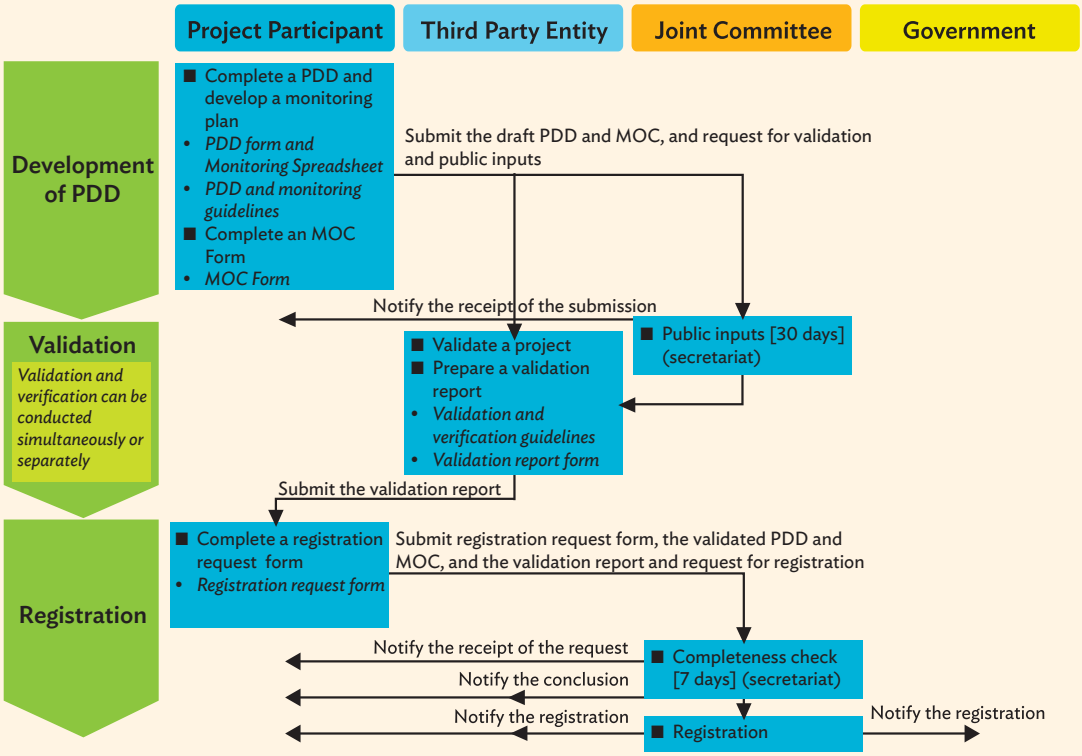
[14] Each host country has its corresponding official JCM website, containing the Guidelines for Developing Project Design Document and Monitoring Report. Example, for Indonesia: https://www.jcm.go.jp/id-jp/rules_and_guidelines/download/file_04

Registration

Registration is the formal acceptance of a JCM project. Once the project participant receives the validation report from the TPE, the project participant may proceed to submit their PDD, validation report, and MOC to the Joint Committee to officially request registration. The proposed project will undergo a completeness check to be done by the JCM secretariat within 7 days, and the project participants will be notified of the conclusion regarding registration or nonregistration of the project.

When the Joint Committee decides to register the proposed JCM project, the secretariat notifies each side, the project participants and the TPE, of the registration and publishes the relevant information on the JCM project through the JCM website. Figure 9 shows the procedural flow of the JCM registration process.

FIGURE 9: JOINT CREDITING MECHANISM REGISTRATION PROCESS



MOC = modalities of communication, PDD = project design document.
Source: Government of Japan.

Monitoring

Monitoring is the collection of data from the implemented JCM project, necessary for the calculation of GHG emission reductions in accordance with the monitoring plan in the registered PDD.

A monitoring period defines the period of time that monitoring takes place under the monitoring report. There are no specific requirements regarding the length of a monitoring period. Project participants can choose the monitoring period based on their own assessment. Once monitoring is completed for a certain monitoring period, the collected data and corresponding calculations for emission reductions are reported through the monitoring report. The monitoring report will be the basis document for the verification process and issuance of credits.

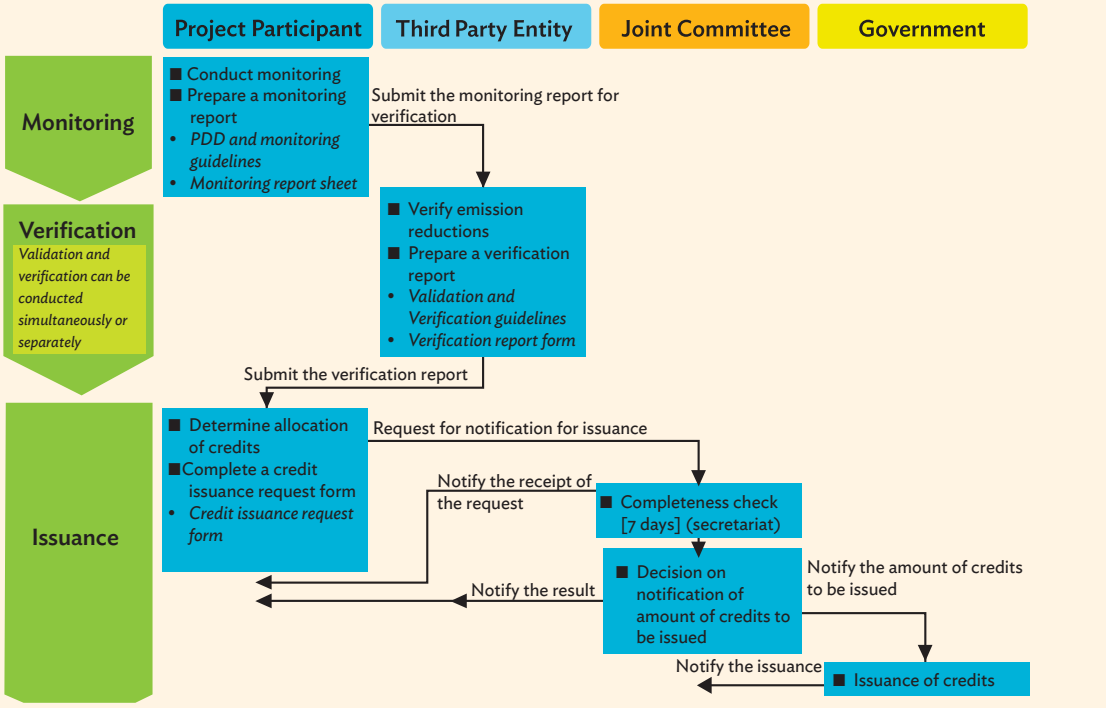
Verification

Verification is the independent evaluation of a registered JCM project by a TPE to assess the monitored data and emission reductions achieved by the project as described in the monitoring report. It is conducted in line with the verification guidelines developed by the Joint Committee. The project is also assessed to determine whether it has been implemented as described in the registered PDD. A verification report is prepared by the TPE containing the results of its assessment and will be used as the basis for the amount of credits to be issued for the JCM project. Verification can be conducted simultaneously with validation.

Issuance of Credits

JCM credits will be issued based on the GHG emission reductions achieved by the project as verified through the verification report. Upon receiving the verification report from the TPE, the project participants may proceed to request issuance of credits by submitting a credit issuance request form to the Joint Committee through the JCM secretariat. After conducting the completeness test for 7 days, the committee decides the amount of credits to be issued based on the verification report, and each government issues the credits to their respective accounts in the registry. Figure 10 shows the procedural flow of the issuance process.

FIGURE 10: JOINT CREDITING MECHANISM ISSUANCE PROCESS



PDD = project design document.

Source: Government of Japan.

TYPES OF ELIGIBLE PROJECTS UNDER THE JOINT CREDITING MECHANISM

The objective of the JCM is to facilitate leading low-carbon technologies, products, systems, services, and infrastructure which contribute to sustainable development. Types of eligible JCM projects are defined based on sectors which are then narrowed into type of technologies categorized as a JCM project.

Sectors

There are 15 sectors under the JCM which are based on the CDM sectoral scopes. A JCM project may fall within more than one sectoral scope.

(i) Energy industry (renewable and nonrenewable sources)
(ii) Energy distribution
(iii) Energy demand
(iv) Manufacturing industries
(v) Chemical industry
(vi) Construction
(vii) Transport
(viii) Mining/mineral production
(ix) Metal production
(x) Fugitive emissions from fuel (solid, oil, and gas)
(xi) Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
(xii) Solvent use
(xiii) Waste handling and disposal
(xiv) Afforestation and reforestation[15]
(xv) Agriculture

[15] For Indonesia, this sectoral scope is referred to as, "Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD-plus)."

Technologies

The Joint Committee determines which technologies, products, and system should be registered as a JCM through the approval of JCM methodologies. The following list presents examples of different types of JCM eligible technologies in each sector based on registered JCM projects, approved methodologies, and JCM model and demonstration projects. It should be noted that project developers are not limited to these technology types and can propose other low-carbon technologies.

Energy Industry (Renewable and Nonrenewable Sources)

This sector is dominated by renewable energy technologies that have been enhanced to increase the effectiveness of the technology. For example, by implementing a hybrid system or adding features to enhance efficiency of the overall system. Non renewable low carbon energy generation technologies can also be used.

Solar technology is a renewable energy technology that can be implemented as a JCM project. Improved solar cell modules such as thin-film solar panels can also be developed as JCM projects with high conversion efficiency, and can be complemented with a remote automonitoring system providing appropriate operation and management. In addition, a solar photovoltaic system with an advanced battery integrated with an energy management system (EMS) will enable a stable power supply with a high level of renewable energy—a highly efficient solution. A hybrid solution of solar photovoltaics with an integrated wind energy system provides stable and efficient off-grid power generation, especially in rural or remote areas.

Box 2: Case Study—Registered JCM Project Using Solar Technology

Project: PW001 Small-Scale Solar Power Plants for Commercial Facilities in Island States

Host Country: Republic of Palau
Registration date: 21 April 2015

Project Participants (Palau): Western Caroline Trading Company, Surangel and Sons Company
Project Participants (Japan): Pacific Consultants Co., Ltd. (PCKK), InterAct Inc.
Palau is one of the small island developing states that has low lying coastal areas and is significantly affected by global warming. The Asian Development Bank has been working closely with the Government of the Republic of Palau in supporting sustainable development and alleviating the impacts of climate change, by providing lending to build essential public infrastructures.

To mitigate the impact of global warming, the government adopted the Palau National Energy Policy in 2010 and set an ambitious target to increase share of renewable energy to 20% by 2020. Among all renewable energy sources, solar power is found to be the most suitable for Palau. However, as of 2014, solar power contributes only 5% to the overall power generation capacity in the country, while the remaining is generated by diesel power generators.

The project involves installation of a new grid connected 370.5 kW photovoltaic system on top of two buildings. Electricity generated from the project is first consumed by these buildings and any surplus is exported. As a result, the project displaces electricity generated by the grid connected diesel power generators, and reduces greenhouse gas emission from the consumption of diesel.

continued on next page

Box 2 *continued*

The project uses high quality photovoltaic modules from Kyocera, a Japanese manufacturer, and general-purpose inverters with easy maintenance suitable for small-scale applications. The project was commissioned in 2014 and started reducing greenhouse gas. From 2014 to 2020, the project is expected to reduce 1,594 tCO_2e (or 228 tCO_2e average annually).

Reference Scenario: The solar photovoltaic systems will replace grid electricity and/or captive electricity generated by existing diesel generators with estimated power generation efficiency of around 33%–41%. Reference emissions were calculated using a power generation efficiency of 49%, which has not been achieved yet by the world's leading diesel generators, ensuring conservativeness in net emission reductions.

Estimated Emission Reduction: 36 tCO_2e in 2014 and 259 tCO_2e annually from 2015 onward.

Methodology: PW_AM001 Displacement of Grid and Captive Genset Electricity by a Small-Scale Solar PV System

kW = kilowatt hour, PV = photovoltaic, tCO_2e = tons of carbon dioxide equivalent.

Waste heat recovery (WHR) is an example of a nonrenewable project to generate power for industry. A WHR system generates electricity through the recovery of exhaust heat from production facilities such as textile, cement, and other type of industries. Electricity generated from WHR systems normally displaces the use of grid generated electricity thereby reducing GHG emissions.

Energy Demand

This sector mainly covers energy efficiency projects, such as, energy saving lighting, high-efficient cooling systems, pump systems, and other high-efficiency equipment. Electricity savings and/or reductions in fossil fuel use at existing facilities are achieved by replacing or substituting existing equipment with high-efficiency equipment.

Energy saving technology in buildings or grocery stores or other commercial places can be implemented by replacing existing lighting with energy-saving lighting, such as light emitting diode (LED) lighting. The same buildings can also utilize high-efficient pumping systems wherein energy for both heating and cooling is simultaneously generated. Installation of an inverter air conditioning system as a cooling system will also save energy.

Highly efficient cooling systems can be used by the food industry, which requires a cooling system for its cold food storage. The industry could also adopt a separate refrigerator-freezer energy efficient cooling system for buildings and grocery stores resulting in reduced electricity load as well as avoiding the release of waste heat indoors.

High efficiency centrifugal chiller is a more advanced cooling solution for big industry. It improves efficiencies for air-conditioning and process cooling which usually consume significant amount of energy. The highly efficient centrifugal chiller would therefore result in major energy savings.

Box 3: Case Study—Registered JCM Project Using Highly Efficient Cooling System

Project: ID002 Project of Introducing High Efficiency Refrigerator to a Food Industry Cold Storage in Indonesia

Host Country: Indonesia
Registration date: 29 March 2015
Project Participants (Indonesia): PT. Adib Global Food Supplies, PT. Mayekawa Indonesia
Project Participants (Japan): Mayekawa Mfg. Co., Ltd.

Indonesia is an archipelago nation with vast low-lying areas making it vulnerable to the adverse effect of climate change. The Government of Indonesia is committed to a climate resilient development pathway, aiming to reduce GHG emissions by 26% through its own efforts by 2020, which could be increased to 41% with international support. As a country with high dependency on fossil fuels, Indonesia's energy sector is a potential sector for GHG emission reductions.

The project contributes to this goal through the use of a leading energy efficient cooling system. The project is implemented by PT. Adib Global Food Supplies in Bekasi, West Java Province, Indonesia, and involves the installation of a state-of-the-art cooling system for its cold storage facility. The facility is built to meet international standards in terms of construction specifications, flooring, racking systems, and designed to meet strict quality and hygiene standards of the food industry. Moreover, its cooling system is an environmentally friendly system utilizing natural refrigerants, compared with conventional technologies, which use ammonia or other common refrigerants that are toxic and consume more energy.

The project started operating in December 2014 with an expected operational lifetime of 12 years. The project is partially supported by the Ministry of the Environment of Japan, through its financing program for JCM model projects. It is expected to reduce emissions of about 140 tCO_2e of GHG annually from the decrease in electricity consumption while resulting in 22% of energy savings. Implementation of this JCM project brought significant benefits to the project developer such as access to additional financial support, adoption of leading highly efficient technology, contribution to the global GHG reduction, and added publicity with the project serving as a marketing tool.

Reference Scenario: Reference emissions are calculated based on the project's power consumption, ratio of coefficient of performance (COP), and carbon dioxide emission factor of electricity consumed. Reference emissions were established using the maximum COP values of other possible cooling systems. The most common COP values are 1.60–1.65 for cold storage and 1.20–1.25 for individual quick freezers. The project uses the COP value of 2.20 for reference emissions calculation.

Estimated Emission Reduction: 140 tCO_2e annually from 2015 onward.

Methodology: ID_AM003 Installation of Energy-efficient Refrigerators Using Natural Refrigerant at Food Industry Cold Storage and Frozen Food Processing Plant

CO_2 = carbon dioxide, GHG = greenhouse gas, JCM = Joint Crediting Mechanism, tCO_2e = tons of carbon dioxide equivalent.

Box 4: Case Study—Registered JCM Project Using Highly Efficient Centrifugal Chiller

Project: ID001 Energy Saving for Air-Conditioning and Process Cooling by Introducing A High-efficiency Centrifugal Chiller

Host Country: Indonesia
Registration date: 31 Oct 2014
Project Participants (Indonesia): PT. Primatexco Indonesia
Project Participants (Japan): Nippon Koei Co., Ltd., Ebara Refrigeration Equipment & Systems Co., Ltd.

Since the signing of the JCM bilateral agreement in August 2013, Indonesia has become one of the most active countries in developing JCM projects, including those introducing energy efficiency technologies in industrial application. A number of JCM feasibility studies have been conducted in Indonesia and as of November 2015, three JCM projects have been registered. This project is the first JCM project registered globally.

The project aims to improve energy saving for air-conditioning and process cooling of a textile factory by introducing a high-efficiency centrifugal chiller. In the textile industry, humidity control is critical to maintain high quality production, which requires significant energy. Prior to the project, the factory used two chillers with plate capacities of 230 USRt (centrifugal chiller) and 400 USRt (absorption chiller using steam from fossil fuels). Under the project, these chillers were replaced with a high-efficiency centrifugal chiller manufactured by Ebara Refrigeration Equipment & Systems with a cooling capacity of 500 USRt.

The new chiller has a coefficient of performance (COP) of over 6.0, which reaches the highest level of COP among comparable chillers. It also uses low-pressure refrigerant (HFC-245fa) with zero ODP (Ozone Depletion Potential). The project is estimated to reduce power consumption, and therefore, GHG emissions by approximately 7% compared with the reference scenario.

The project was commissioned in March 2014 and started reducing GHG emissions. The project is expected to reduce 799 tCO_2e (or 114 tCO_2e average annually) from 2014 to 2020.

Reference Scenario: Reference emissions are calculated based on the project's power consumption, ratio of COP, and CO_2 emission factor of electricity consumed. Reference emissions were established using the COP values of the cooling systems which have highest market occupancy for new installation. The project uses the COP value of 5.59 for reference emissions calculation, which is applied when cooling capacity of the chiller is equal or more than 450 USRt and less than 500 USRt.

Estimated Emission Reduction: 97 tCO_2e in 2014 and 117 tCO_2e annually from 2015 onward.

Methodology: ID_AM002 Energy Saving by Introduction of High Efficiency Centrifugal Chiller

CO_2 = carbon dioxide, GHG = greenhouse gas, JCM = Joint Crediting Mechanism, tCO_2e = tons of carbon dioxide equivalent, USRt = US refrigeration ton.

Energy Distribution

In most developing countries, a national electricity company manages transmission and distribution of electricity. Transmission and distribution losses in each country vary depending on the efficiency of the overall system.

Energy efficient transformers such as amorphous metal transformers will result in the significant reduction of transmission loss from the distribution of grid electricity.

Low loss type aluminium conductors using aluminium-clad steel reinforced cables for transmission lines is another solution to significantly reduce transmission losses.

Manufacturing

Various industries have been continuously improving their manufacturing processes through the use of technology to ensure more effective and efficient processes.

Regenerative burners can replace conventional burners for aluminium holding furnaces to reduce energy consumption. The consumption of natural gas can also be reduced and leads to reduction of GHG emissions.

Agricultural biomass can be an alternative fuel in cement manufacturing. Using this alternative fuel significantly reduces carbon dioxide (CO_2) emissions from replacing the use of coal.

Transportation

Another application of low-carbon technology is in the transportation sector, with electric vehicles being one of the most popular.

Electric vehicles can reduce significant GHG emissions in the transportation sector, one of the main emission sources in major cities. Projects can be initiated with public transportation or city taxis by not only introducing the electric vehicle but also developing a charging infrastructure to support the use of electric vehicles.

Ecodriving is another technology application, utilizing the digital tachograph system. Fuel savings is enabled through the analysis and feedback provided by the system to drivers in order to change their driving behaviors toward more fuel-efficient practices.

Box 5: Case Study—Registered JCM Project Using Ecodriving

Project: VN001 Ecodriving by Utilizing Digital Tachograph System
Host Country: The Socialist Republic of Viet Nam
Registration date: 04 August 15
Project Participants (Viet Nam): Nippon Express (Viet Nam) Co., Ltd.
Project Participants (Japan): Nippon Express Co., Ltd.

Viet Nam is a fast growing economy in Southeast Asia, achieving an annual growth rate of 7% on average over the past 10 years. With an urbanization rate of 17–18% in recent years, Viet Nam has witnessed vibrant trade and commercial activities. However, coupled with the impressive growth rates, the country is also faced with the challenges of increasing domestic GHG emissions.

continued on next page

Box 5 *continued*

According to its Biennial Update Report in 2014, Viet Nam's GHG emission profile based on 2010 data features over 50% of emissions coming from the energy sector. Out of this, 23% or 31 million tCO_2e was from the transport sector, representing an important sector in the country's mitigation efforts. Further, in GIZ's recent report road transport in Viet Nam accounts for the largest share of emissions within the sector (68.5% in 2010) with diesel being the dominant fuel type.[a]

In this context, the project is a pioneering example in the area of transport and assists the transfer of environmentally sound and state-of-the-art technology and know-how from Japan. The project aims to improve fuel efficiency of 124 diesel vehicles, trucks and trailers in the host company's freight transportation fleet through the use of the digital tachograph system, while providing the same level of freight transportation services.

The project includes installations of digital tachograph systems on-board in these vehicles which provide data analysis and feedback, combined with regular trainings, to change drivers' behavior and promote more efficient fuel use which reduces CO_2 and other emissions associated with fuel combustion. The system also has significant social effects, as ecodriving also leads to safer driving and less traffic accidents.

The project was commissioned in 2015. The project is estimated to reduce 1,776 tCO_2e (or 296 tCO_2e average annually) from 2015 to 2020.

Reference Scenario: The digital tachograph system will provide data analysis and feedback which help drivers change behaviors toward more fuel-efficient practices, leading to emission reduction. The reference emission was calculated based on business as usual without the installations of the digital tachograph system on these vehicles, estimated to be 4,696 tCO_2e annually.

Estimated Emission Reduction: 136 tCO_2e in 2015, 328 tCO_2e annually from 2016 onward.

Methodology: VN_AM001 Transportation Energy Efficiency Activities by Installing Digital Tachograph Systems

CO_2 = carbon dioxide, GHG = greenhouse gas, JCM = Joint Crediting Mechanism, tCO_2e = tons of carbon dioxide equivalent.

[a] GIZ. 2015. *Tracking Sustainable Transport in Vietnam: Data and Policy Review for Energy Efficiency and Climate Change 2015*.

Waste Handling

The introduction of waste-to-energy technology projects can lead to significant emission reductions and also reduce issues arising from the management of municipal waste.

Highly efficient incinerator is a key technology to combust municipal solid waste and produce electricity from the heat generated from the incinerator. The proposed solution will reduce the amount of landfilled waste and thus significantly reduce greenhouse gases by avoiding methane emissions.

Anaerobic digestion of organic waste to produce biogas can be a solution within the wholesale markets. This technology avoids the emissions of methane to the atmosphere from the decomposition of organic waste at a solid waste disposal site as well as generate biogas which can displace fossil fuel use. The same technology solution can be implemented for treating agricultural waste in the palm oil industry, cassava, and manure treatment.

FINANCING OPTIONS FOR THE JOINT CREDITING MECHANISM

Introduction

Financial support for Joint Crediting Mechanism (JCM) projects is currently available during the initial phase of project implementation. This availability of finance upfront is a critical success factor, to overcome barriers due to the initial investment or uncertainty over project viability being too high for project proponents.

Financial support under the JCM is provided through the Government of Japan, its affiliated organizations, and the Asian Development Bank (ADB). Support is offered at an early stage of the project either to supplement the initial investment cost or to mitigate the financing cost to implement the JCM project. This section describes the Japanese government's channels of funding and ADB's JCM trust fund.

Feasibility studies funded by the Japanese government have been conducted since 2010 to identify applicable advanced low-carbon technologies, source potential projects, and develop JCM methodologies. Over 400 feasibility studies have been conducted in over 40 countries so far, including 22 from the Asia and the Pacific region. The emphasis on supporting energy efficient technologies and systems, such as green buildings and energy efficient manufacturing processes, has led to the high proportion of energy efficiency-related approved methodologies and registered projects. In FY2013, the Japanese government began supporting actual projects selected from the pool of successful feasibility studies. So far, nearly 100 such projects have been selected by the Japanese government, and have received funds to cover part of the project's initial investment costs.

Japanese Government

Joint Crediting Mechanism Model Project

One of the main financing support schemes by the Government of Japan is the JCM Model Project. Initiated by the Ministry of the Environment of Japan (MOEJ), it can provide a subsidy to cover up to 50% of the project's initial investment costs. The scope of financing includes facilities and equipment which reduce carbon dioxide (CO_2) from fossil fuel combustion as well as construction costs for installing such facilities.

The scheme requires an international consortium to be formed between project participants of Japan and the host country. The international consortium is required to apply for JCM project registration; conduct monitoring, reporting, and verification (MRV); and deliver at least half of the credits to the

Japanese government, when JCM credits are issued. The Japanese entity within the international consortium is eligible to submit the application, receive the subsidy, and is responsible to MOEJ for implementing the project.

Applications for subsidy are received multiple times a year on an irregular basis. The feasibility of the application is evaluated as well as the amount of greenhouse gas (GHG) emission reductions, cost effectiveness, possibility of technology diffusion, maturity of JCM methodology, among others. The process is competitive, for example, 28 out of 52 projects were chosen in the latest round of selection whose results were announced in June and July 2016.

The Japanese government has been increasing the budget for the JCM Model Project since its inception in fiscal year (FY) 2013 from ¥1.2 billion ($12.7 million equivalent) to ¥3.6 billion ($34.8 million equivalent) in FY2014 and ¥7.2 billion ($59.9 million equivalent) in FY2015. The budget for FY2016 which begins in April 2016 is ¥6.7 billion ($59.5 million equivalent). For FY2014, FY2015 and FY2016, the budgeted amount is to be disbursed in 3 years from the year of selection (for example, ¥1.2 billion is to be disbursed every year between FY2014 and FY2016 for projects selected in FY2014). To date, around 90 JCM Model Projects in Bangladesh, Cambodia, Costa Rica, Ethiopia, Indonesia, Kenya, the Lao PDR, Malaysia, the Maldives, Mexico, Mongolia, Myanmar, Palau, Saudi Arabia, Thailand, and Viet Nam have been selected. A list of all JCM Model Projects can be found in Appendix 5.

Japan International Cooperation Agency Collaborative Financing Program

In addition to the JCM Model Project, MOEJ provides funds to projects that receive investment or loans from the Japan International Cooperation Agency or other Japanese government financial institutions such as Japan Bank for International Cooperation. Similar to the JCM Model Project, it can cover up to 50% of the initial investment cost for the GHG emission reduction component of the project.

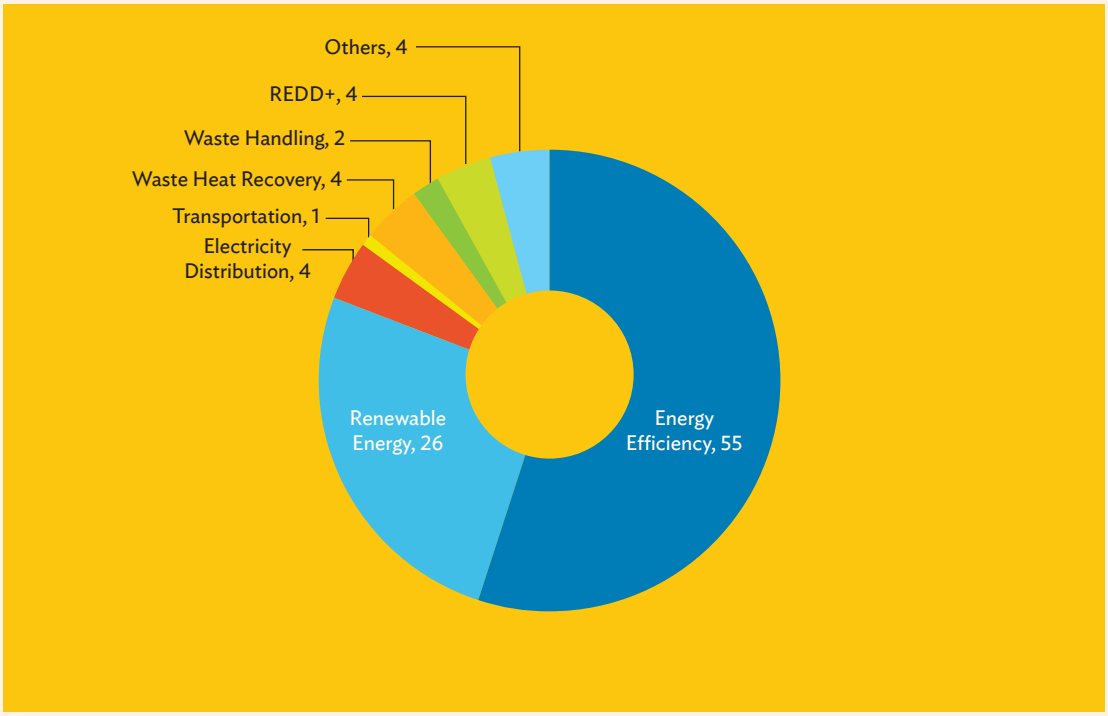
This scheme also requires an international consortium to be formed between project participants of Japan and the host country, and at least half of JCM credits are required to be delivered to the Japanese government. The selection process and criteria are similar to the JCM Model Project, however relatively larger projects with GHG emission reduction of more than 100,000 ton of carbon dioxide equivalent (tCO_2e) per year from fuel combustion are given priority. The scheme was launched in 2014 and the budget for project(s) selected in FY2015 is ¥7.2 billion ($59.9 million equivalent), which would be disbursed by FY2018.

Joint Crediting Mechanism Demonstration Project

The New Energy and Industrial Technology Development Organization (NEDO), an affiliate agency of the Ministry of Economy, Trade and Industry of Japan, provides part of the initial investment costs to implement advanced low-carbon technologies and the cost for MRV. The scope of financial support includes basic design cost, manufacturing cost of equipment, cost of international transport, and cost for MRV, and the third party entity (TPE). Project participants will be required to return part of the equipment cost back to NEDO after a designated period of time. The host country participants are required to bear the cost for activities within the host country, such as domestic transport, civil works, installation, and operation of the facility or equipment.

Under this scheme, a memorandum of understanding between NEDO and the host country ministry, and an implementation document between the project participants from Japan and the host country project participants are to be established to formally start the project. Launched in FY2013, 10 JCM Demonstration Projects in Indonesia, the Lao PDR, Mongolia, and Viet Nam have been selected and contracted. A list of all JCM Demonstration Projects can be found in Appendix 5. The FY2016 budget is approximately ¥2.4 billion ($21.3 million equivalent).

FIGURE 11: SUPPORTED MODEL AND DEMONSTRATION PROJECTS BY PROJECT TYPE



Asian Development Bank

Overview of Japan Fund for the Joint Crediting Mechanism

The Japan Fund for the Joint Crediting Mechanism (JFJCM) is one of ADB's trust funds that provide financial incentives for the adoption of advanced low-carbon technology to projects that are financed by the ADB. The JFJCM provides support in the form of grant and technical assistance to projects in ADB's developing member countries (DMCs) which have signed bilateral agreements for the JCM with Japan. Both sovereign and nonsovereign projects are eligible for support under the JFJCM.

Established in June 2014 by ADB, the JFJCM aims to facilitate the diffusion of advanced low-carbon technologies, products, systems, services, and infrastructure as well as to encourage the implementation of mitigation actions. The Japanese government has been making annual contributions, and its cumulative support amounts to ¥4.8 billion ($42.6 million equivalent) to date, with further contributions expected in subsequent years. The first project to receive support under the JFJCM is a smart microgrid system in the Maldives (details in Box 7).

General Requirements for the Japan Fund for the Joint Crediting Mechanism

Eligible Countries. ADB DMCs that have signed bilateral agreements with Japan are all eligible for support. These DMCs currently include Bangladesh, Cambodia, Indonesia, the Lao PDR, the Maldives, Myanmar, Mongolia, Palau, Thailand, and Viet Nam. Other DMCs will be eligible upon signing the bilateral agreement on the JCM with the Government of Japan.

ADB financed projects. To receive support from the JFJCM, the projects also have to be financed by ADB or ADB administered funds. Projects that are cofinanced by other banks or donors as well as ADB are also eligible, but only the ADB financed portion is eligible for a grant from the JFJCM, as explained in more detail below.

Advanced low-carbon technologies. Since one of the important objectives of the JFJCM is to promote the use of advanced low-carbon technologies, the project must include the adoption of technology that reduces GHG emissions. In particular, it is a requirement that the project supported by the JFJCM contributes to the reduction of CO_2 from fuel combustion. Technologies in any sector are eligible on the condition that they have a proven implementation and operation record of technical effectiveness and GHG emission reduction capacity. The technology's track record does not have to be that of the host country and can be of a developed country or another developing country.

Application of the JCM. Recipients of the JFJCM grant will need to apply the project for the JCM, including:

(i) preparation of a new methodology for MRV under the JCM, if applicable;
(ii) preparation of the Project Design Document (PDD);
(iii) validation of the project by a TPE;
(iv) submission of the project to the JCM Joint Committee for project registration;
(v) monitoring of data, and verification of GHG emission reduction by a TPE; and
(vi) application for the JCM credits to the JCM Joint Committee.

The Joint Committee will notify the amount of credits to be distributed between Japan and the participating country depending on different factors such as each party's contribution to the project.

Environmental and social impact. Other than GHG emission reduction and JCM application, the project should have additional environmental and social benefits such as reduction of pollution and waste, natural resources conservation, increased job opportunities, and better access to infrastructure.

Use of Funds

Sovereign projects. For projects where the government of one of ADB's DMCs is the borrower, JFJCM resources will mainly be used to finance the incremental cost of deploying advanced low-carbon technologies with a "business as usual" technology cost and the cost related to meeting the requirements for JCM application. The eligible expenditures of the grant component of the JFJCM are:

(i) goods and services (including the technical operation of the introduced technology);
(ii) consulting services (including the preparation and validation of the PDD, the registration of the project with the JCM Joint Committee, and the MRV of the project JCM);

(iii) training for capacity building; and
(iv) civil works.

JFJCM grants may not be used for salaries for civil servants, scholarships or internships, and academic research.

For sovereign projects, the JFJCM will provide a grant of:

(i) up to $5 million for a project cost of less than $50 million; or
(ii) 10% of the project cost or $10 million (whichever is smaller), for projects exceeding $50 million.

Nonsovereign projects. For projects in which the borrower is in the private sector or the project is not guaranteed by the DMC government, the JFJCM grant is used as an interest subsidy to soften the relevant ADB loan of the project. The grant can reach up to 10% of the project cost and $10 million (whichever is smaller).

For nonsovereign projects, ADB will consider whether the interest subsidy by using the JFJCM is "additional" in that some concessional financing is necessary for the project to be viable or acceptable from a risk-reward perspective. Investment analysis will assess whether a reasonable investor would decide to proceed with a proposed project activity without the benefits of the concessional financing created by the JFJCM.

Technical assistance. With a maximum eligible amount of $2 million per technical assistance project, the JFJCM can be used for technical assistance projects that intend to provide technical support to operate and manage the eligible JFJCM project efficiently and effectively. Eligible expenditures for technical assistance projects include goods, equipment, consulting services, and other expenses for:

(i) capacity building and support for development of the JCM methodology, preparation and validation of the PDD, registration of the project with the relevant JCM Joint Committee, monitoring and verification of GHG emission reduction of JFJCM projects under the JCM;
(ii) capacity building and analytical work to prepare the technical specifications and evaluation and qualification criteria regarding advanced low-carbon technologies in eligible DMCs;
(iii) project preparation for JFJCM financing; and
(iv) activities for the promotion of the JFJCM, knowledge sharing, and the publication of the results and outcomes of projects supported by the JFJCM.

Application Process for Loans

The JFJCM application process takes place in parallel with ADB's financing approval process. A grant under the JFJCM will be proposed by the operations department of ADB, in cooperation with eligible DMC governments, public institutions, private sector entities, and/or other organizations.

The process commences with an internal review within ADB, followed by the submission of a preliminary project proposal to the Japanese government (the donor) for screening. Upon a favorable result thereof, ADB's operations department will prepare a project proposal for further

in-depth review within ADB. The project proposal will include details of the procurement arrangement to ensure the use of advanced low-carbon technology, by considering the life cycle cost of the technology in addition to its detailed technical specification.

Once the project proposal is cleared within ADB, it would be submitted to the Japanese government for approval. Following the fund approval by the Japanese government, the projects will be processed following ADB's standard policies, procedures, and guidelines for loan approval.

Box 6: First Project Supported by the JFJCM – Preparing Outer Islands for Sustainable Energy Development Project in the Maldives

The first project supported by the JFJCM is the Preparing Outer Islands for Sustainable Energy Development (POISED) Project in the Maldives. The island nation has 141 MW of installed diesel generation capacity on the inhabited islands and another 105 MW on the tourism islands. While achieving 100% access to electricity, each island of the Maldives is electrified with its own diesel powered grid system, costing 30 to 70 cents per kilowatt-hour for diesel power and requiring government subsidies in excess of $50 million annually. In 2012, the Maldives spent over $470 million on oil imports, a large share of it being fuel for electricity generation. The POISED project is expected to alleviate the Maldives' fiscal pressure and reduce the carbon emissions per unit of electricity, which is one of the highest in the region.

The $110-million sovereign project is financed by the European Investment Bank, Islamic Development Bank, Asian Development Bank (ADB) administered Strategic Climate Fund, as well as an ADB Grant. Phase 1 of the POISED project will support 2.5 MW of solar photovoltaics capacity with smart grid systems in five islands. Based on the project's roadmap, about 21 MW of solar photovoltaics will be installed by the end of the project.

In addition to the main financial support above, a grant of $5 million from the JFJCM will be provided toward the installation of 1 MW of lithium-ion battery system with advanced energy management system in Addu, an island with the second largest population in the Maldives. 1.6 MW of solar photovoltaics will be installed on the island by the main project. The smart microgrid system including battery and energy management system to be realized by the additional funding is expected to increase the solar photovoltaics penetration capacity of the maximum system demand in the island from 33% to 54%.

JFJCM = Japan Fund for the Joint Crediting Mechanism, MW = megawatt.

The Equatorial Convention Centre located in Hithadhoo, Addu City of the Maldives is one of the project sites where solar panels will be installed on its rooftop.

An existing powerhouse in Addu Atoll with multiple stand-alone diesel generators. Electricity produced from these generators is expected to be displaced, and efficiency improved, by the project.

APPENDIXES

APPENDIX 1: COUNTRIES WITH SIGNED AGREEMENT WITH JAPAN FOR JOINT CREDITING MECHANISM

No.	Country	Date Signed
1	Mongolia	8 January 2013
2	Bangladesh	19 March 2013
3	Ethiopia	27 May 2013
4	Kenya	12 June 2013
5	Maldives	29 June 2013
6	Viet Nam	2 July 2013
7	Lao PDR	7 August 2013
8	Indonesia	26 August 2013
9	Costa Rica	9 December 2013
10	Palau	13 January 2014
11	Cambodia	11 April 2014
12	Mexico	25 July 2014
13	Saudi Arabia	13 May 2015*
14	Chile	26 May 2015
15	Myanmar	16 September 2015
16	Thailand	19 November 2015

*The Kingdom of Saudi Arabia and Japan consented to establishing the Joint Crediting Mechanism.

APPENDIX 2: REGISTERED JOINT CREDITING MECHANISM PROJECTS

Registration Date	Host Country	Project Title	Emission Reduction*
3 Jun 2016	Indonesia	Installation of Inverter-Type Air Conditioning System, LED Lighting and Separate Type Fridge Freezer Showcase to Grocery Stores in Republic of Indonesia	115 tCO_2e
24 Mar 2016	Indonesia	Energy Saving for Air-Conditioning at Textile Factory by Introducing High-efficiency Centrifugal Chiller in Batang, Central Java (Phase 2)	145 tCO_2e
24 Mar 2016	Indonesia	Energy Saving for Air-Conditioning at Textile Factory by Introducing High-efficiency Centrifugal Chiller in Karawang West Java	176 tCO_2e
29 Mar 2015	Indonesia	Project of Introducing High-Efficiency Refrigerator to a Food Industry Cold Storage in Indonesia	120 tCO_2e
29 Mar 2015	Indonesia	Project of Introducing High-Efficiency Refrigerator to a Frozen Food Processing Plant in Indonesia	21 tCO_2e
31 Oct 2014	Indonesia	Energy Saving for Air-Conditioning and Process Cooling by Introducing High-Efficiency Centrifugal Chiller	114 tCO_2e
12 Jul 2016	Palau	Small Scale Solar Power Plants for Commercial Facilities in Island States II	315 tCO_2e
12 Jul 2016	Palau	Small Scale Solar Power Plants for Schools in Island States	108 tCO_2e
21 Apr 2015	Palau	Small-Scale Solar Power Plants for Commercial Facilities in Island States	227 tCO_2e
30 Jun 2015	Mongolia	Installation of High-Efficiency Heat Only Boilers in 118th School of Ulaanbaatar City Project	92 tCO_2e
30 Jun 2015	Mongolia	Centralization of Heat Supply System by Installation of High-Efficiency Heat Only Boilers in Bornuursoum Project	206 tCO_2e
15 May 2016	Viet Nam	Introduction of Amorphous High Efficiency Transformers in Power Distribution Systems in the Southern Part of Viet Nam	610 tCO_2e
15 May 2016	Viet Nam	Low Carbon Hotel Project in Vietnam: Improving the Energy Efficiency of Commercial Buildings by Utilization of High Efficiency Equipment	272 tCO_2e
30 Nov 2015	Viet Nam	Promotion of Green Hospitals by Improving Efficiency/ Environment in National Hospitals in Viet Nam	515 tCO_2e
4 Aug 2015	Viet Nam	Ecodriving by Utilizing Digital Tachograph System	296 tCO_2e

tCO_2e = tons of carbon dioxide equivalent.

* Estimated average emission reductions per annum.

APPENDIX 3: APPROVED METHODOLOGIES

Host Country	Methodology Title
Mongolia	Installation of Energy-Saving Transmission Lines in the Mongolian Grid
	Replacement and Installation of High-Efficiency Heat Only Boiler (HOB) for Hot Water Supply Systems
Bangladesh	Energy Saving by Introduction of High Efficiency Centrifugal Chiller
Ethiopia	Electrification of Communities Using Micro Hydropower Generation
Kenya	Electrification of Communities Using Micro Hydropower Generation
Maldives	Displacement of Grid and Captive Genset Electricity by Solar PV System
Viet Nam	Transportation energy Efficiency Activities by Installing Digital Tachograph Systems
	Introduction of Room Air Conditioners Equipped with Inverters
	Improving the Energy Efficiency of Commercial Buildings by Utilization of High Efficiency Equipment
	Anaerobic Digestion of Organic Waste for Biogas Utilization within Wholesale Markets
	Installation of Energy Efficient Transformers in a Power Distribution Grid
Indonesia	Power Generation by Waste Heat Recovery in Cement Industry
	Energy Saving by Introduction of High Efficiency Centrifugal Chiller
	Installation of Energy-Efficient Refrigerators Using Natural Refrigerant at Food Industry Cold Storage and Frozen Food Processing Plant
	Installation of Inverter-Type Air Conditioning System for Cooling for Grocery Store
	Installation of LED Lighting for Grocery Store
	Greenhouse Gas Emission Reductions Through Optimization of Refinery Plant Operation in Indonesia
	Greenhouse Gas Emission Reductions Through Optimization of Boiler Operation in Indonesia
	Installation of a Separate Type Fridge-Freezer Showcase by Using Natural Refrigerant for Grocery Store to Reduce Air Conditioning Load inside the Store
	Replacement of Conventional Burners with Regenerative Burners for Aluminium Holding Furnaces
	Introducing Double-Bundle Modular Electric Heat Pumps to a New Building
Palau	Displacement of Grid and Captive Genset Electricity by a Small-Scale Solar PV System
Cambodia	Installation of LED Street Lighting System with Wireless Network Control

APPENDIX 4: SELECTED INFORMATION SOURCES

No.	Information Area	Source
1	Official JCM website	www.jcm.go.jp
2	Host Country – Mongolia	www.jcm.go.jp/mn-jp
3	Host Country – Bangladesh	www.jcm.go.jp/bd-jp
4	Host Country – Ethiopia	www.jcm.go.jp/et-jp
5	Host Country – Kenya	www.jcm.go.jp/ke-jp
6	Host Country – Maldives	www.jcm.go.jp/mv-jp
7	Host Country – Viet Nam	www.jcm.go.jp/vn-jp
8	Host Country – Lao PDR	www.jcm.go.jp/la-jp
9	Host Country – Indonesia	www.jcm.go.jp/id-jp
10	Host Country – Costa Rica	www.jcm.go.jp/cr-jp
11	Host Country – Palau	www.jcm.go.jp/pw-jp
12	Host Country – Cambodia	www.jcm.go.jp/kh-jp
13	Host Country – Mexico	www.jcm.go.jp/mx-jp
14	Host Country – Saudi Arabia	www.jcm.go.jp/sa-jp
15	Host Country – Thailand	www.jcm.go.jp/th-jp
16	New Mechanisms Information Platform*	www.mmechanisms.org/e/index.html
17	JCM Registry System for Japan	www.jcmregistry.go.jp

JCM = Joint Crediting Mechanism.

* The website includes information on the JCM including recent developments, list of selected projects, and studies under the Government of Japan's support programs.

APPENDIX 5: JOINT CREDITING MECHANISM MODEL AND DEMONSTRATION PROJECTS SELECTED FOR SUPPORT BY THE GOVERNMENT OF JAPAN (SORTED BY COUNTRY)*

Country	Title	Fiscal Year	Agency	Entity
Bangladesh	Energy Saving of Air Conditioning System by Recovering Waste Heat from Engine in Textile Factory	FY2016	MOE	Ebara Refrigeration Equipment & Systems
Bangladesh	50MW Solar PV Power Plant Project	FY2015	MOE	Pacific Consultants
Bangladesh	Installation of High Efficiency Centrifugal Chiller for Air Conditioning System in Clothing Tag Factory	FY2015	MOE	Ebara Refrigeration Equipment & Systems
Bangladesh	Installation of High Efficiency Loom at Weaving Factory	FY2015	MOE	Toyota Tsusho
Bangladesh	Introduction of PV-Diesel Hybrid System at Fastening Manufacturing Plant	FY2015	MOE	YKK
Bangladesh	Energy Saving for Air Conditioning & Facility Cooling by High Efficiency Centrifugal Chiller (Suburbs of Dhaka)	FY2014	MOE	Ebara Refrigeration Equipment & Systems
Cambodia	Introduction of 0.8MW Solar Power Generation in International School	FY2016	MOE	Asian Gateway
Cambodia	Introduction of 1MW Solar Power System and High Efficiency Centrifugal Chiller in Large Shopping Mall	FY2016	MOE	Aeon Mall
Cambodia	Introduction of High Efficiency LED Lighting Utilizing Wireless Network	FY2015	MOE	Minebea
Cambodia	Small-Scale Biomass Power Generation by Using Stirling Engines	FY2013	MOE	Promaterials
Costa Rica	Introduction of the High Efficiency Chiller and the Exhaust Heat Recovery System	FY2016	MOE	NTT DATA Institute of Management Consulting
Costa Rica	5MW Solar Power Project in Belen	FY2016	MOE	NTT DATA Institute of Management Consulting
Ethiopia	Introduction of Biomass CHP Plant in Flooring Factory	FY2015	MOE	Pacific Consultants
Indonesia	Energy Saving in Industrial Wastewater Treatment System for Rubber Industry	FY2016	MOE	Environmental Management & Technology Center
Indonesia	Energy Saving for Air Conditioning Utility System in the Airport Terminal by High Efficiency Operating System	FY2016	MOE	iFORCOM Tokyo
Indonesia	Introduction of High Efficiency Looms in Weaving Mill	FY2016	MOE	Nisshinbo Textile
Indonesia	Introduction of LED Lighting to Sales Stores	FY2016	MOE	Fast Retailing
Indonesia	10MW Mini Hydro Power Plant Project in North Sumatra	FY2016	MOE	Toyo Energy Farm
Indonesia	REDD+ Project in Boalemo District	FY2016	MOE	Kanematsu
Indonesia	Energy Saving by Utilizing Waste Heat at Hotel	FY2015	MOE	Takasago Thermal Engineering

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Table continued

Country	Title	Fiscal Year	Agency	Entity
Indonesia	Energy Saving for Air-Conditioning at Shopping Mall with High Efficiency Centrifugal Chiller	FY2015	MOE	NTT Facilities
Indonesia	Energy Saving for Industrial Park with Smart LED Street Lighting System	FY2015	MOE	NTT Facilities
Indonesia	Energy Saving for Office Building with High Efficiency Water Cooled Air-Conditioning Unit	FY2015	MOE	NTT Facilities
Indonesia	Installation of Cogeneration System in Hotel	FY2015	MOE	NTT DATA Institute of Management Consulting
Indonesia	Installation of Gas Co-generation System for Automobile Manufacturing Plant	FY2015	MOE	Toyota Tsusho
Indonesia	Introduction of High Efficiency Once-Through Boiler System in Film Factory	FY2015	MOE	Mitsubishi Plastics
Indonesia	REDD+ Project in Boalemo District	FY2015	MOE	Kanematsu
Indonesia	Energy Saving for Textile Factory Facility Cooling by High-efficiency Centrifugal Chiller	FY2014	MOE	Ebara Refrigeration Equipment & Systems
Indonesia	Energy Saving through Introduction of Regenerative Burners to the Aluminum Holding Furnace of the Automotive Components Manufacturer	FY2014	MOE	Toyotsu Machinery/ Hokuriku Techno
Indonesia	Introduction of High Efficient Old Corrugated Cartons Process at Paper Factory	FY2014	MOE	Kanematsu
Indonesia	Power Generation by Waste-heat Recovery in Cement Industry	FY2014	MOE	JFE Engineering
Indonesia	Reducing Greenhouse Gas Emission at Textile Factories by Upgrading to Air-Saving Loom	FY2014	MOE	Toray Industries
Indonesia	Solar Power Hybrid System Installation to Existing Base Transceiver Stations in Off-Grid Area	FY2014	MOE	Telekomunikasi Selular
Indonesia	Energy Saving by Optimum Operation at Oil factory	FY2013	METI/ NEDO	Yokogawa Solution Service
Indonesia	Thin-Film Solar Power Plant	FY2013	METI/ NEDO	Sharp
Indonesia	Utility Facility Operation Optimization Technology into Oil Factory	FY2013	METI/ NEDO	Azbil
Indonesia	Energy Efficient Refrigerants to Cold Chain Industry	FY2013	MOE	Mayekawa Mfg.
Indonesia	Energy Saving by Installation of Double Bundle-Type Heat Pump	FY2013	MOE	Toyota Tsusho
Indonesia	Energy Saving for Air-Conditioning at Textile Factory	FY2013	MOE	Ebara Refrigeration Equipment & Systems
Indonesia	Energy Saving for Air-Conditioning and Process Cooling at Factory	FY2013	MOE	Ebara Refrigeration Equipment & Systems
Indonesia	Energy Savings at Convenience Stores	FY2013	MOE	Lawson
Kenya	6MW Small Hydropower Generation Project in Rupingazi	FY2015	MOE	Pacific Consultants
Kenya	Introduction of Solar PV System at Salt Factory	FY2015	MOE	Pacific Consultants
Kenya	Solar Diesel Abatement Project	FY2014	MOE	Ingerosec

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Table continued

Country	Title	Fiscal Year	Agency	Entity
Lao PDR	REDD+ Project in Luang Prabang Province through Controlling Slash-and-Burn	FY2016	MOE	Waseda University
Lao PDR	REDD+ Project in Luang Prabang Province through Controlling Slash-and-Burn	FY2015	MOE	Waseda University
Lao PDR	Energy Efficiency Container Data Center	FY2014	METI/ NEDO	Toyota Tsusho, Internet Initiative Japan/Mitsubishi UFJ Morgan Stanley Securities
Malaysia	PV Power Generation System for the Office Building	FY2014	MOE	NTT DATA Institute of Management Consulting
Maldives	School Building Rooftop Solar Power Plant Project	FY2014	MOE	Pacific Consultants/InterAct
Mexico	Introduction of 4.8MW Power Generation with Methane Gas Recovery System	FY2016	MOE	NTT DATA Institute of Management Consulting
Mexico	Domo de San Pedro II Geothermal Power Generation	FY2015	MOE	Mitsubishi Hitachi Power Systems
Mexico	Energy Saving by Converting from Hg-Cell Process to Ion-Exchange Membrane Process at Chlorine Production Plant	FY2015	MOE	ThyssenKrupp Uhde Chlorine Engineers (Japan)
Mongolia	Installation of 8.3MW Solar Power Plant in Ulaanbaatar Suburb Farm	FY2016	MOE	Farmdo
Mongolia	10MW Solar Power Project in Darkhan City	FY2015	MOE	Sharp
Mongolia	Installation of 2.1MW Solar Power Plant for Power Supply in Ulaanbaatar Suburb	FY2015	MOE	Farmdo
Mongolia	High Efficiency and Low Loss Power Transmission and Distribution System	FY2013	METI/ NEDO	Hitachi
Mongolia	Upgrading and Installation of Centralized Control System of High-Efficiency Heat Only Boiler (HOW)	FY2013	MOE	Suuri-Keikaku
Myanmar	Introduction of High-efficiency Once-through Boiler in Instant Noodle Factory	FY2016	MOE	Acecook
Myanmar	Introduction of Energy Saving Brewing Systems to Beer Factory	FY2016	MOE	Kirin Holdings
Myanmar	Introduction of Waste to Energy Plant in Yangon City	FY2015	MOE	JFE Engineering
Palau	Small-Scale Solar Power Plants for Commercial Facilities Project II	FY2014	MOE	Pacific Consultants
Palau	Solar PV System for Schools Project	FY2014	MOE	Pacific Consultants
Palau	Small-Scale Solar Power Plant for Commercial Facilities in Island States	FY2013	MOE	Pacific Consultants
Saudi Arabia	Introduction of High Efficiency Electrolyzer in Chlorine Production Plant	FY2015	MOE	Kanematsu
Thailand	Introduction of Energy Efficient Refrigeration System in Industrial Cold Storage	FY2016	MOE	Kanematsu
Thailand	Introduction of 1.5MW Rooftop Solar Power System and Advanced EMS for Power Supply in Paint Factory	FY2016	MOE	Finetech
Thailand	Introduction of 3.4MW Rooftop Solar Power System to Air Conditioning Parts Factories	FY2016	MOE	Sharp

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Table continued

Country	Title	Fiscal Year	Agency	Entity
Thailand	Introduction of Energy Saving Refrigerator and Evaporator with Mechanical Vapor Recompression in Amino Acid Producing Plant	FY2016	MOE	Kyowa Hakko Bio
Thailand	Introduction of Cogeneration System to Motor Parts Factory	FY2016	MOE	Denso
Thailand	Introduction of 12MW Power Generation System by Waste Heat Recovery for Cement Plant	FY2016	MOE	NTT DATA Institute of Management Consulting
Thailand	Introduction of High Efficiency Chilled Water Supply System in Milk Factory	FY2016	MOE	Tepia Corporation Japan
Thailand	Introduction of LED Lighting to Sales Stores	FY2016	MOE	Fast Retailing
Thailand	Introduction of High Efficiency Ion Exchange Membrane Electrolyzer in Caustic Soda Production Plant	FY2016	MOE	Asahi Glass
Thailand	Energy Saving at Convenience Stores with High Efficiency Air-Conditioning and Refrigerated Showcase	FY2015	MOE	FamilyMart
Thailand	Energy Saving for Air-Conditioning in Tire Manufacturing Factory with High Efficiency Centrifugal Chiller	FY2015	MOE	Inabata & Co
Thailand	Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor	FY2015	MOE	Sony Semiconductor
Thailand	Installation of Co-Generation Plant for On-Site Energy Supply in Motorcycle Factory	FY2015	MOE	Nippon Steel & Sumikin Engineering
Thailand	Installation of High Efficiency Air Conditioning System and Chillers in Semiconductor Factory	FY2015	MOE	Sony Semiconductor
Thailand	Introduction of Solar PV System on Factory Rooftop	FY2015	MOE	Pacific Consultants
Thailand	Reducing Greenhouse Gas Emission at Textile Factory by Upgrading to Air-Saving Loom (Samutprakarn)	FY2015	MOE	Toray Industries
Viet Nam	Introduction of Energy Saving Equipment to Automotive Wire Production Factory	FY2016	MOE	Yazaki Parts
Viet Nam	Introduction of Amorphous High Efficiency Transformer in Northern, Central, and Southern Power Grids	FY2016	MOE	Yuko Keiso
Viet Nam	Installation of Energy Saving Equipment in Lens Factory	FY2016	MOE	Hoya
Viet Nam	Introduction of High Efficiency Water Pumps in Da Nang City	FY2016	MOE	Yokohama Water
Viet Nam	Introduction of 4.75MW Power Generation System by Waste Heat Recovery for Cement Plant	FY2016	MOE	NTT DATA Institute of Management Consulting
Viet Nam	Energy Saving and Work Efficiency Improvement Project by special LED Equipment with new technology, COB	FY2015	METI/ NEDO	Stanley Electric
Viet Nam	Energy Saving in Acid Lead Battery Factory with Container Formation Facility	FY2015	MOE	Hitachi Chemical Company
Viet Nam	Energy Saving in Factories with Air-Conditioning Control System	FY2015	MOE	Yuko Keiso
Viet Nam	Energy Saving in Lens Factory with Energy Efficient Air-Conditioners	FY2015	MOE	Ricoh
Viet Nam	Installation of High Efficiency Kiln in Sanitary Ware Manufacturing Factory	FY2015	MOE	TOTO

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Table continued

Country	Title	Fiscal Year	Agency	Entity
Viet Nam	Introduction of Amorphous High Efficiency Transformers in Southern and Central Power Grids	FY2015	MOE	Yuko Keiso
Viet Nam	Energy Saving in Acid Lead Battery Factory with Container Formation Facility	FY2015	MOE	Hitachi Chemical
Viet Nam	Energy Saving in Lens Factory with Energy Efficient Air-Conditioners	FY2015	MOE	Ricoh
Viet Nam	Introduction of High Efficiency Air-Conditioning in Hotel	FY2015	MOE	NTT DATA Institute of Management Consulting
Viet Nam	Energy Efficient Paper Making Process	FY2014	METI/ NEDO	Marubeni/Nomura Research Institute
Viet Nam	Anaerobic Digestion of Organic Waste for Biogas Utilization at Market	FY2014	MOE	Hitachi Zosen/Satisfactory International
Viet Nam	Ecodriving by Utilizing Digital Tachograph System	FY2014	MOE	Nippon Express
Viet Nam	Introduction of Amorphous High Efficiency Transformers in Power Distribution Systems	FY2014	MOE	Yuko Keiso
Viet Nam	Energy Saving by BEMS Optimum Operation at Hotel	FY2013	METI/ NEDO	Hibiya Engineering/ Mitsubishi UFJ Morgan Stanley Securities
Viet Nam	Energy Saving by Inverter Air Conditioner Optimum Operation at National Hospital	FY2013	METI/ NEDO	Mitsubishi Electric/ Mitsubishi Corporation/ Mitsubishi UFJ Morgan Stanley Securities

BEMS = building energy management system, COB = chip on board, FY = fiscal year, LED = light emitting diode, METI = Ministry of Economy, Trade and Industry of Japan, MOE = Ministry of the Environment of Japan, MW = megawatt, NEDO = New Energy and Industrial Technology Development Organization, PV = photovoltaic, REDD+ = Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

* List of Selected Projects and Studies under the Joint Crediting Mechanism Support Programme of the New Mechanisms Information Platform (source: http://www.mmechanisms.org/e/support/adoption.html).

Joint Crediting Mechanism

An Emerging Bilateral Crediting Mechanism

The Joint Crediting Mechanism (JCM) is a relatively new project-based bilateral offset crediting mechanism initiated by the Government of Japan. It aims to facilitate the diffusion of leading low-carbon technologies resulting in the mitigation of greenhouse gas emissions and contributing to the sustainable development of developing countries. So far, 16 countries including 10 in Asia and the Pacific region have launched the JCM, with 15 registered projects. This publication describes the framework and key features of the JCM to assist stakeholders in developing a deeper understanding of this new bilateral mechanism. It provides background information on how bilateral mechanisms evolved in relation to the international climate change negotiations, and it lays emphasis on apprising its readers on technical aspects of the JCM including its various stakeholders, project cycle, eligible projects, and recent developments related to the JCM. This publication also presents information on the possible financing options that can be availed by potential project developers in developing JCM projects in the region.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to half of the world's extreme poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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