ARTICLE 6 OF THE PARIS AGREEMENT

Drawing Lessons from the Joint Crediting Mechanism

NOVEMBER 2019

ASIAN DEVELOPMENT BANK

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Foreword

The fight against climate change has gained new momentum since the signing of the historic Paris Agreement in 2015—a new global framework anchored on bottom-up self-determined commitments outlined in progressively more ambitious nationally determined contributions (NDCs). The agreement has broad support, indicating a willingness of all signatories to do their part in achieving its objective to hold the global temperature rise to well below 2 degrees Celsius (°C) while pursuing a limit of 1.5°C. But, as we enter the 2021–2030 decade, countries face the enormous challenge of translating these commitments into action, and will need a wide range of approaches, instruments, and forms of support, including bilateral, multilateral, and international cooperation.

Article 6 of the Paris Agreement allows for market and nonmarket approaches for voluntary international collaboration, recognizing the potential for such collaboration to support ambition-raising and sustainable development. Specifically, Article 6.2 covers cooperative approaches involving international transfers of mitigation outcomes, and Article 6.4 covers the new mitigation and sustainable development mechanism, both of which provide a framework to use international carbon markets to achieve the objectives of the Paris Agreement.

The bottom-up architecture of the Paris Agreement brings additional complexity to international market-based cooperative approaches. The decentralized approach under Article 6.2 offers countries flexibility and choice around their approach but there are obvious challenges for consistency and ensuring the integrity of mitigation action. These challenges are reflected by the complexity of Article 6 negotiations, which have been, and continue to be multifaceted and slow.

While some countries have experience in international emissions trading and market mechanisms under the Kyoto Protocol, there is much less experience in bilateral cooperation. The Joint Crediting Mechanism (JCM), a project-based bilateral offset crediting mechanism pioneered by the Government of Japan for reducing greenhouse gas emissions through the diffusion of low-carbon technologies, is a notable exception and a pathbreaking initiative.

The Asian Development Bank (ADB) has supported the development of the JCM through the Japan Fund for the Joint Crediting Mechanism (JFJCM), an ADB-managed single-donor trust fund established in 2014 that provides grants and technical assistance to ADB financed projects eligible under the requirements of JCM. The JFJCM is part of ADB's ongoing Carbon Market Program (CMP), which has been providing technical support and carbon finance to mitigation projects in ADB's developing member countries since 2006. The CMP will continue to play a significant role in supporting market-based cooperation under the Paris Agreement, in line with ADB's Strategy 2030, which includes tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability as a key operational priority.

As countries consider how they will use international cooperation under Article 6 as part of their overall climate policy and strategy for achieving ambitions articulated under their respective NDCs, experience from the successful implementation of bilateral cooperation under the JCM will be extremely valuable for the global community. This knowledge product, *Article 6 of the Paris Agreement, Drawing Lessons from the Joint Crediting Mechanism*, presents lessons learned from the JCM. Together with ADB's other knowledge products relating to Article 6, it is our hope that this publication will help developing member countries when designing their approach to Article 6 and formulating their strategies for achieving their NDCs in line with the objectives of the Paris Agreement.

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Preface

The market-based approaches outlined in Article 6 of the Paris Agreement lay the foundation for post-2020 carbon markets by allowing countries to use mitigation outcomes from other countries toward their nationally determined contributions. The bottom-up ethos of the Paris Agreement is reflected in Article 6.2, which provides a decentralized framework for bilaterally or multilaterally defined cooperative approaches. In contrast, Article 6.4 provides for a centrally governed mechanism for climate change mitigation and sustainable development.

The establishment of two different routes—cooperative approaches and a centrally governed mechanism—was formulated deliberately so that countries could design and select carbon market instruments to suit their specific conditions. A number of factors will influence how and when countries use Article 6 and countries need to decide on their strategic use of Article 6.

In December 2018, the Asian Development Bank (ADB) launched the Article 6 Support Facility, which provides technical, capacity building, and policy development support to its developing member countries in Asia and the Pacific to enhance their ability to access new carbon markets envisaged under the framework of Article 6. Building on the experience gained through its Carbon Market Program ongoing since 2006, ADB is able to support countries in Asia and the Pacific to use Article 6 strategically to facilitate and enhance climate action. This includes through knowledge building and sharing of lessons from ADB's experience. This knowledge product *Article 6 of the Paris Agreement, Drawing Lessons from the Joint Crediting Mechanism* is a part of this initiative.

To achieve ambitions set out in their respective nationally determined contributions, and to set more ambitious emission-reduction targets, countries will need access to a selection of effective instruments, some of which will be developed under the framework of Article 6. Although concrete forms of bilateral and multilateral collaboration under Article 6.2 have not yet been established, there are forerunners to such cooperative approaches that countries can learn from when pursuing their Article 6 strategy. The JCM, a path breaking initiative of the Government of Japan, is clearly such a forerunner.

As a leading example of cooperation under Article 6.2, the JCM has demonstrated how a bilateral cooperative approach could be designed and implemented for fostering mitigation actions and generating mitigation outcomes; how the responsibility for defining methodologies can be divided; how verification can be managed jointly / bilaterally; and how the mitigation outcomes can be shared among countries, while addressing environmental integrity, including double counting issue.

It is also important to look at contributions made by the market mechanisms of the Kyoto Protocol, such as the Clean Development Mechanism (CDM) and Joint Implementation (JI). The JCM was built on the experiences from the CDM and JI, including, developing baseline and monitoring methodologies, tracking systems through registries and emission reduction standards. As we prepare for the JCM in the Paris Agreement era, further experience could be drawn from the CDM and JI. For example, JI provides experiences of international carbon

credit transfers and corresponding adjustments between the purchaser of Emission Reduction Units (ERUs), credits under JI, and the host country, as well as of how countries with mitigation targets used ERU transactions for meeting their respective compliance targets under the Kyoto Protocol.

ADB's first publication on Article 6, *Decoding Article 6 of the Paris Agreement* (published in April 2018), helped increase understanding of the ongoing international discussions and the technical options available for establishing the future carbon market guidance, rules, and modalities under Article 6. This was followed by a second knowledge product, *Article 6 of the Paris Agreement: Piloting for Enhanced Readiness*, which elaborated on the pilot activities' role in preparing stakeholders, negotiators, government representatives, and the private sector for the implementation of Article 6 in Asia and the Pacific. We are confident that ADB's latest knowledge product, *Article 6 of the Paris Agreement, Drawing Lessons from the Joint Crediting Mechanism*, will be beneficial for all stakeholders in building insights for developing future market mechanisms and provide a lighthouse for navigating ongoing negotiations on Article 6 of the Paris Agreement.

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Woochong Um, director general, SDCC encouraged the development of this knowledge product. Virender Kumar Duggal, principal climate change specialist and fund manager, Future Carbon Fund, in collaboration with Shintaro Fujii, environment and climate change specialist and fund manager of the Japan Fund for the Joint Crediting Mechanism (JFJCM), SDCC conceptualized and guided its development, under the overall guidance of Preety Bhandari, director, Climate Change and Disaster Risk Management (CCDRM) Division and chief of CCDRM Thematic Group, SDCC.

This knowledge product has been developed with technical inputs from a team of experts engaged under ADB's Carbon Market Program, which included Johan Nylander, Katherine Hughes, Takeshi Miyata, and Takahiro Murayama, all of whom are greatly appreciated.

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Abbreviations

ADB	Asian Development Bank
BAU	business-as-usual
CDM	Clean Development Mechanism
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
COP	Conference of the Parties
DMC	developing member country
ERU	emission reduction unit
GHG	greenhouse gas
FVA	framework for various approaches
ITMO	internationally transferred mitigation outcome
ISO	International Organization for Standardization
JCM	Joint Crediting Mechanism
JFJCM	Japan Fund for the Joint Crediting Mechanism
JI	Joint Implementation
MOEJ	Ministry of the Environment of Japan
MW	megawatt
MRV	monitoring, reporting, and verification
NAMA	Nationally Appropriate Mitigation Action
NDC	nationally determined contribution
NEDO	New Energy and Industrial Technology Development Organization
PDD	project design document
REDD+	reducing emissions from deforestation and forest degradation in developing countries
tCO_2/y	tons of carbon dioxide per year
TPE	third-party entity
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

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 mitigation of greenhouse gas emissions through diffusion of leading low-carbon technologies, products, systems, services, and infrastructure. It was launched in 2013 with a view to being implemented ensuring strong methodologies and environmental integrity, while being a practical mechanism based on rules and guidelines developed by a bilateral Joint Committee.

While the JCM builds on the experiences and lessons from the Clean Development Mechanism (CDM), it was not designed to function under the Kyoto Protocol. It was created in parallel to ongoing discussions for a new international regime and was developed with a future climate regime in mind.

The Paris Agreement, subsequently adopted in 2015, delivered this new climate regime providing an architecture that is different from the Kyoto Protocol. This includes for international cooperation which is covered under Article 6. Article 6 defines cooperative approaches under Article 6.2, establishes a new mechanism for mitigation and sustainable development (Article 6.4), and defines nonmarket approaches (Article 6.8).

Articles 6.2 and 6.4 together define the framework for the future carbon market. Article 6.2 provides a decentralized framework for bilaterally or multilaterally defined cooperative approaches whereas, in contrast, Article 6.4 provides for a centrally governed mechanism for climate change mitigation and sustainable development. Through the two different articles, countries have options to design and select carbon market instruments to suit their specific conditions.

The JCM has been able to develop in a way that fits well under Article 6.2, and as we transition to the Paris Agreement operationalization period the JCM will be subject to guidance under Article 6.2 as the greenhouse gas emission reductions or removals achieved by JCM projects are intended to be used by Japan and the partner countries, to achieve their respective nationally determined contibutions. Key principles of the JCM including environmental integrity, contribution to sustainable development and conservative baselines, reflect principles of cooperation under Article 6.

One of the key differences between carbon markets under the Kyoto period compared to post 2020 will be the variety of forms of cooperation and governance. This is driven by the options inherent to Article 6, as well as the fact that all countries, including those 'hosting' the mitigation action, now have commitments under their nationally determined contributions.

The JCM has been part of a development shifting from the centralized Kyoto Protocol, to a more complex mosaic of evolving carbon markets where domestic and bilateral market-based mechanisms have developed alongside and in parallel to the Kyoto Protocol mechanisms. And while the pre 2020 period has seen several initiatives testing how to approach new types of carbon market collaboration, the JCM is the only existing example of a project-based international cooperative approach and the clearest example of bilateral collaboration.

The significance of the JCM as a forerunner to Article 6.2 may not have been exposed to the extent it deserves, and the JCM can offer several lessons learned from bilateral mitigation cooperation. This report outlines some of the experiences of the JCM and discusses key issues to think about when considering the JCM as a forerunner to bilateral cooperative approaches under Article 6.

The JCM has also offered support for mitigation actions in several of ADB's developing member countries through financing and technical support. DMCs that have signed bilateral agreements with Japan can benefit from support for the development of emission reduction project and as well as from the experience and knowledge they have gained from participating in a bilateral initiative as they now seek to operationalise their NDCs.

Highlights

The Government of Japan has supported a number of potential JCM projects that apply advanced low-carbon technologies by funding over 450 feasibility studies in over 40 countries. So far, more than 140 projects have been selected by the government under its financing schemes since the inception in 2013. As of October 2019, 17 partner countries have joined the JCM with 56 registered projects.

The JCM has supported the use of different advanced low-carbon technologies to meet the requirements of the partner countries and effectively contribute to the reduction of GHG emissions. These include solar technologies, energy saving technologies, high-efficient cooling, high-efficiency centrifugal chillers, energy-efficient air jet looms, energy-efficient transformers, eco-driving, high-efficiency incinerators, and a methane fermentation system.

The availability of upfront finance has been a critical success factor in overcoming barriers due to the initial investment or uncertainty over project viability being too high for project proponents. This is the only stream of finance that developers can receive under the JCM.

The JCM is also expected to deliver, and has delivered, a range of sustainable development co-benefits, showing how cooperative agreements can contribute to "promoting sustainable development" in different ways:

- Renewable energy capacity has been added, enhancing energy security, contributing to energy diversity, and promoting the diffusion of low-carbon technologies.
- New job opportunities have been created in the construction as well as operations and maintenance phases of the projects. An additional indirect effect is created by the service provider involved in the manufacturing, distribution, and servicing of the plant and machinery deployed for the projects.
- JCM projects often build new infrastructure such as transmission lines, local roads, and street lighting, or strengthen and rehabilitate existing infrastructure such as port facilities, water supply and wastewater treatment systems. This has brought about enhanced energy access, greater connectivity with economic activities, and improved safety, health and hygiene for the communities.
- JCM projects are improving people's livelihoods, making a lasting contribution to socioeconomic development through various approaches, such as through vocational training.

The JCM has demonstrated how a bilateral cooperative approach can be flexible to accommodate the varying interests and needs of partnering countries. One way this is achieved is that each partner country is able to establish additional rules or variations in the rules and procedures to make sure the JCM projects are in line with

its national interests. Compared with a global mechanism, it is easier to make adjustments in the design, scope, and setup of a mitigation action if these elements can be decided bilaterally.

At the same time, the JCM where needed has used internationally recognized or agreed protocols or standards and shown that this can be critical to ensure that a bilateral approach meets internationally recognized or agreed protocols or standards to gain market confidence. As an example, the JCM uses operational entities accredited by the Clean Development Mechanism executive board and ISO 14065 certified bodies to conduct validation and verification.

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. Thus, one can argue that the JCM has anticipated the guidance of Article 6.2 in its design. The JCM addresses this by establishing registries at each side (the Government of Japan and each partner country), which track relevant information for the issued credits. The registries also serve to prevent registered JCM projects from being used under any other international climate mitigation mechanisms. In this case, the JCM showcases an element of environmental integrity that is key to the Paris Agreement: to avoid double counting, all countries need to have full control over the mitigation outcomes they produce and if, where, when, and how carbon credits are created.

The JCM has also anticipated another feature of Article 6. It explicitly employs the use of conservative baselines to deal with the requirement of overall mitigation (or net emission reductions as it is termed under the JCM). Overall mitigation of global emissions is an explicit requirement in Article 6.4, whereas requirement under Article 6.2 is still under negotiation.

Activities under Article 6.2 will not be defined top-down and specified beforehand, the development of the framework for Article 6.2 will be largely built on a “case law” basis and national regulatory frameworks will need to be put in place for Article 6.2 to determine eligible protocols for creating mitigation outcomes. The JCM is an example of how countries can determine conditions for carbon markets and potential bilateral or multilateral cooperation, and therefore provides a valuable contribution to the understanding of how Article 6.2 may work in the future. However, this does not mean that it is a simple blueprint for Article 6.2, the JCM also needs to be adapted to the guidance that hopefully will be decided at the 25th Conference of the Parties. The JCM has already anticipated several of the key elements of cooperative approaches so this adapting may proceed smoothly. The JCM will continue to provide lessons learned throughout the coming nationally determined contribution period.

1 Introduction

1.1 Article 6 of the Paris Agreement

The Paris Agreement that was adopted in 2015 at the 21st Conference of the Parties (COP 21) marks a new era for the global community in combatting climate change. The agreement sets an objective for all countries to keep global warming to below 2 degrees Celsius and to pursue efforts towards a 1.5 degree target, and signing countries have agreed to formulate and implement their own contributions to this effect.

At COP 21, the Parties to the Paris Agreement decided on a work program for the operationalization of the agreement, that has come to be called the Paris Agreement Rulebook. This Rulebook was largely adopted at the 24th Conference of the Parties (COP 24) in Katowice in 2018, but an important part, Article 6, was pushed to the 25th Conference of the Parties (COP 25).

Article 6 is the section in the Paris Agreement that deals with international collaboration. It defines cooperative approaches under Article 6.2, establishes a new mechanism for mitigation and sustainable development (Article 6.4), and defines nonmarket approaches (Article 6.8). Articles 6.2 and 6.4 define the framework for the future carbon markets and thus provide options for utilizing market mechanisms under the Paris Agreement.

Article 6.2 is essentially an accounting provision that provides guidance for how international transfers of mitigation outcomes should be made and how they should be accounted for. It is often referred to as a decentralized mechanism, compared to the mechanism defined in Article 6.4, which is subject to more centralized United Nations Framework Convention on Climate Change (UNFCCC) governance.

Articles 6.2 and 6.4 provide two options for creating mitigation outcomes. Article 6.2 reflects the bottom-up ethos of the Paris Agreement in that countries may decide for themselves on how to design frameworks for mitigation actions involving the transfer of mitigation outcomes. Article 6.4 resembles the Clean Development Mechanism (CDM) in that it provides a centralized approach overseen by a UNFCCC body that countries can turn to in using internationally approved methodologies and have mitigation outcomes verified by internationally accredited independent entities.

The framing of international carbon market cooperation under the Paris Agreement reflects the desire of many Parties to give greater responsibility to the participating countries in designing their cooperative schemes. With a diversity of nationally determined contributions (NDCs), countries are searching to create workable solutions for avoiding double counting of mitigation outcomes and for ensuring environmental integrity in the context of heterogeneous mitigation targets.[1]

[1] S. Greiner et al. 2019. *Moving Towards Next Generation of Carbon Markets: Observations from Article 6 Pilots*. https://www.climatefocus.com/sites/default/files/CFI-Moving%20towards%20next%20generation%20carbon%20markets.pdf.

Countries are now looking at different options for engaging in Article 6, and a few pilot activities are already being prepared. Emerging Article 6 activities show a diversity of contractual structures and they reflect the ambition to enhance the NDCs, which means that one of the considerations is how to share mitigation outcomes between acquiring and host countries. The trend is also that pilot activities work with national-level systems for monitoring, reporting, and verification (MRV) in contrast to CDM, which used internationally agreed and developed MRV protocols.[2] This is not surprising since the international guidance and oversight in this area is still to be decided upon.

There may be expectations that Article 6 would facilitate a continuation of a CDM-like system. While this is likely under the new mechanism (Article 6.4), the necessary engagement of the host country to assess mitigation outcomes in light of NDCs, and the fact that the new mechanism will need some time to become operational, have led to an initial focus on cooperative approaches (Article 6.2) or pilots that are "instrument neutral" initiatives.[3]

The idea to work with cooperative approaches bilaterally is not new but was discussed as soon as countries started to look at alternatives to the Kyoto Protocol a decade ago. This discussion resulted in an early initiative leading to some countries now benefitting from international collaboration. While the last piece of the Paris Agreement Rulebook, Article 6, is waiting for its resolution, these countries have taken early action to be ready for cooperative approaches under Article 6.

1.2 Transitioning from the Kyoto Protocol to the Paris Agreement

The Paris Agreement provides a very different setting for carbon markets compared to the Kyoto Protocol. All countries have some type of commitment through their NDC, which means that demand for mitigation outcomes will not be limited to developed countries.

A major difference with the use of market approaches under Article 6 and mechanisms under the Kyoto Protocol is that all parties, including developing countries, must consider how to use Article 6 in relation to their NDCs. This also implies an opportunity since countries can think about how they will be able to use Article 6 strategically to attract additional finance streams to achieve and enhance their NDCs. This means that the political commitment for participation in international cooperative approaches will potentially be stronger. A country that has agreed to sell mitigation outcomes is likely to want to ascertain that the mitigation outcomes are real and that there are tangible benefits to the country, or to the organization that it has authorized to manage the mitigation outcomes.

The greater role of the host country could also mean that there is a greater incentive to tailor mitigation actions specifically to national needs and circumstances. This may impact on the design and type of mitigation actions that are pursued, for example, in terms of sector, country, or size. While the private sector is likely to be the main initiator of mitigation actions, host countries will have a role in directing those initiatives.

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2 Footnote 1, p. 9.

3 Nordic Environment Finance Corporation and Nordic Initiative for Cooperative Approaches. 2019. *Landscape of Article 6 Pilots—A Closer Look At Initial Cooperative Approaches*. https://www.climatefocus.com/sites/default/files/NICA-Article-6-mappping-study-April-2019.pdf.

The Paris Agreement decision specifically requires parties to build on the experiences from the Clean Development Mechanism (CDM), Joint Implementation, and international emissions trading.[4] There is tremendous experience in developing baseline and monitoring methodologies, setting up tracking systems through registries, and preparing activities to meet the requirements of an emission reduction standard that could indeed be very useful.

However, implementing activities under Article 6 also requires examining other types of experiences. Above all, this has to do with forms of cooperation and governance rather than the technical design of mitigation activities. The Kyoto mechanisms did not display a variety of types of collaboration. This is due to the setup of a common structure for targets through assigned amounts, assigned amount units, a centralized tracking system, eligibility rules for trading for developed countries, and a detailed procedure for developing countries to host CDM projects.

The JCM was not designed to function under the Kyoto Protocol, and it could thus be developed with a future climate regime in mind, rather than being based on the principles and rules of the Kyoto Protocol. There have also been several other initiatives establishing new types of collaboration in the years leading up to 2020. However, the JCM is the clearest, if not the only, example of bilateral collaboration.

The JCM has been part of a development shifting from a centralized international framework, the Kyoto Protocol, to a more complex mosaic of evolving carbon markets where domestic and bilateral market-based mechanisms have developed alongside and in parallel to the Kyoto Protocol mechanisms.[5] Most of these market-based mechanisms are emissions trading systems and the JCM stands out with its "outside Kyoto Protocol" baseline-and-crediting approach.

1.3 Article 6: State of Negotiations

Moving into the post-2020 period, initiatives such as the JCM that may involve international transfer of mitigation outcomes, will need to adapt to the guidance and rules of Article 6. As previously mentioned, these provisions are yet to be decided and the framework for the post-2020 carbon market is still lacking decisions on some of the necessary key principles.

Generally, the latest negotiation text relating to Article 6.2 from the Subsidiary Body for Scientific and Technological Advice 50, June 2019 in Bonn, still has many options tabled, concerning both principal concepts and technical solutions. It is still nevertheless safe to state that Article 6.2 will constitute a bottom-up, decentralized approach where governance is expected to be largely left to cooperating parties to agree on.

One of the key elements in Article 6.2 is robust accounting, through corresponding adjustments, and reporting. Corresponding adjustments operationalize the principle that all transfers of mitigation outcomes should be reflected by a subtraction in one country and an addition in another country so that mitigation outcomes cannot

[4] United Nations Framework Convention on Climate Change (UNFCCC). 2011. *Report of the Conference of the Parties on its Seventeenth Session, held in Durban from 28 November to 11 December 2011*. Decisions adopted by the Conference of the Parties. Decision 2/CP. 17. paragraphs 79–82. https://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

[5] Luca Lo Re and Manasvini Vaidyula- 2019. *Analysing key technical issues for markets negotiations under Article 6 of the Paris Agreement* Draft document prepared for the Climate Change Expert Group Global Forum 26–27 March 2019, p. 10

be claimed or used twice, thus avoiding double counting. The parties have still not reached agreement on how these corresponding adjustments should be made, when they should be made, and how they should be reported.

In the absence of an overseeing international body and with a focus on accounting, reporting becomes an important aspect of cooperative approaches under Article 6.2. Reporting will be the instrument for countries to show, in a transparent manner, that the mitigation outcomes are real, verified, and contribute to sustainable development. However, Article 6.2 is not likely to be completely without international oversight. A technical review is proposed as a part of the enhanced transparency framework of the Paris Agreement, and will also include review of elements specific to Article 6.2.

Regardless of the outcomes of the forthcoming negotiations at COP 25, and following negotiation meetings, there are currently no items or issues discussed under Article 6.2 that would limit, prohibit, or make it difficult to pursue the JCM as a cooperative approach under Article 6.2. At the same time, the significance of the JCM as a forerunner to Article 6.2 may not have been exposed to the extent it deserves. This paper will try to remedy this and highlight some of the lessons learned that could be relevant for the coming Article 6 discussions.

1.4 History of the Joint Crediting Mechanism

Early on, the Government of Japan saw the need to establish a framework facilitating a diversity of mechanisms, based on principal guidance from the UNFCCC but allowing countries to individually or bilaterally define the type of cooperation. In discussions following the agreement to work on a new global climate change regime succeeding the Kyoto Protocol, Japan supported the framework for various approaches (FVA) launched at the 17th Conference of the Parties (COP 17) held in Durban in 2011.[6]

Soon after COP 17, Japan proposed that the FVA should aim "to facilitate the development and implementation of, and coordinating interaction among, existing and emerging market-based approaches that result in international transfers of mitigation outcomes, in a transparent manner that provides assurance of environmental integrity."[7] In many ways, the FVA is the basis for Article 6.2, decided at COP 21 in 2015.

The background for advocating the framework for various approaches was that Japan had already decided to develop a bilaterally oriented mechanism that would function with less international oversight than CDM. The Government of Japan made several submissions regarding proposals on FVA, containing elements such as criteria and procedures for ensuring environmental integrity, ways to avoid double counting, and arrangements to ensure transparency. These elements were eventually incorporated into the concept of the JCM.

One can ask what the value of developing parallel mechanisms was. What is important to remember it that while the Government of Japan was working on a mechanism outside the Kyoto Protocol framework, it designed the JCM considering what was likely to be accepted under a future climate regime and fit under the approaches discussed at COP. FVA, as mentioned above, was the obvious arena since it was also promoted by Japan, but JCM could also have been connected to the NAMA concept. At that time, some host-country governments officially mentioned that they were considering using the JCM as part implementation of their Nationally

6 Government of Japan, Ministry of Foreign Affairs. 2014. *Submission by Japan on the Framework for Various Approaches.* https://unfccc.int/sites/default/files/fva_japan.pdf.

7 Footnote 4.

Appropriate Mitigation Actions (NAMAs).[8] However, NAMAs did not generally develop at the scale expected or equivalent to NDCs under the Paris Agreement, meaning the connection between JCM and NAMAs did not become a wide-spread practice for JCM host countries.

Thus, context-wise, the JCM was developed with an FVA-like approach in mind, and could operate in relation to NAMAs. Were there also alternatives for its design that could fall within the scope of a new international climate change regime? Following negotiations related to the Bali Action Plan,[9] there were different options for design. Parallel to the discussions of the FVA there were talks on a New Market-Based Mechanism that explicitly addressed upscaling to sectoral levels.[10] However, this mechanism was never operationalized and there are no indications that Japan considered such approaches for the JCM.

The JCM was launched in 2013 in collaboration with seven partner countries: Bangladesh, Ethiopia, Kenya, the Lao People's Democratic Republic, Mongolia, Maldives, and Viet Nam with a view to be implemented ensuring strong methodologies and environmental integrity, while being a practical mechanism based on rules and guidelines developed by a bilateral Joint Committee. The JCM is a project-based bilateral offset crediting mechanism initiated by the Government of Japan. As of October 2019, 17 partner countries have joined the JCM with 56 registered projects.

8 Xander van Tilburg and Shikha Bhasin. 2014. Annual Status Report on Nationally Appropriate Mitigation Actions (NAMAs), p. 34.
9 Decision 1/CP.13.
10 See, for example, para. 51(e) of Decision 1/CP.18.

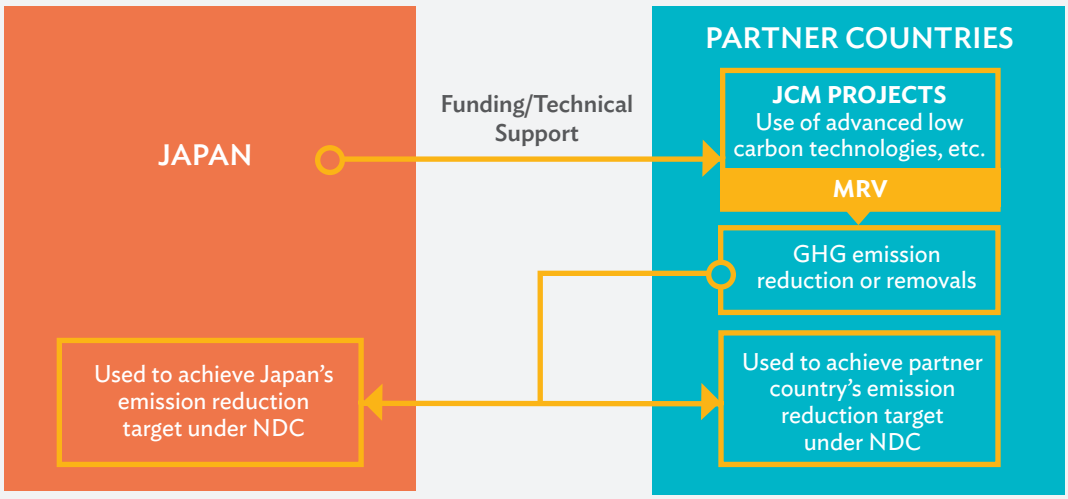
2 Joint Crediting Mechanism

2.1 Objectives

The Joint Crediting Mechanism (JCM) aims to facilitate the mitigation of greenhouse gas (GHG) emissions through diffusion of leading low-carbon technologies, products, systems, services, and infrastructure. JCM projects also contribute to the sustainable development and GHG reduction efforts of the partner countries. The GHG emission reductions or removals achieved through the JCM projects are intended to be used by Japan and the partner countries, to achieve their respective GHG emission reduction targets specified in the respective nationally determined contributions under the Paris Agreement. Figure 1 shows an overview of the scheme between Japan and the partner 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



GHG = greenhouse gas, JCM = Joint Crediting Mechanism, MRV = monitoring, reporting, and verification, NDC = nationally determined contribution.
Source: Adapted from Government of Japan documents.

2.2 Emission Reductions under the Joint Crediting Mechanism

Under the JCM, emission reductions are calculated as the difference between reference emissions and project emissions. According to the Joint Crediting Mechanism Glossary of Terms, reference emissions should be below business-as-usual (BAU) emissions. The reference emissions represent a conservative estimate of what would occur without the JCM project. Project emissions refer to the actual amount of GHGs emitted once the project has been implemented.

To ensure that JCM methodologies are conservative, project participants must use either (i) conservative reference emissions, or (ii) conservative project emissions. In some cases, both (i) and (ii) may be applied.

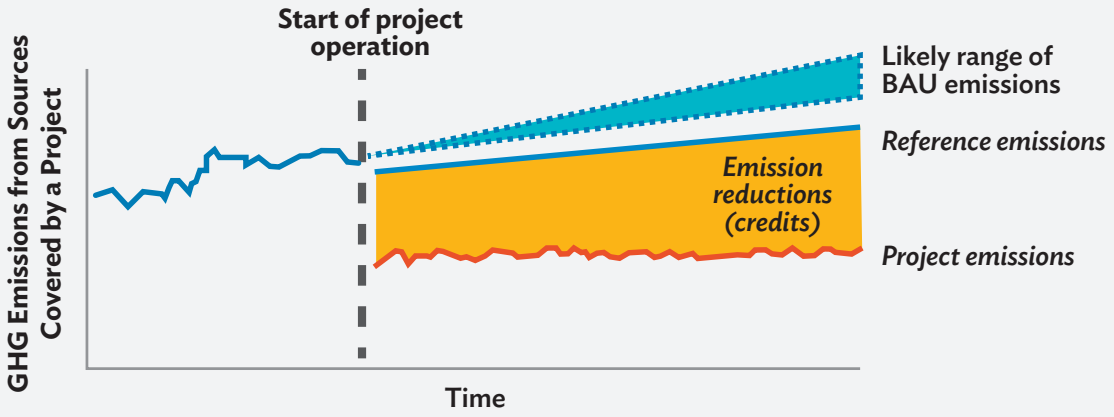
Setting Conservative Reference Emissions

Under the JCM, the reference emissions are set lower than the BAU emissions to ensure that the methodology is conservative. The reference scenario and reference emissions are set considering the following types of factors:

(i) the current situation and performance,
(ii) the average historical performance,
(iii) performance of similar products and technologies that compete with the project technology,
(iv) legal requirements, and
(v) the best available technology.

For example, in introducing a new advanced low-carbon technology from overseas, the BAU may be based on historical data, and the reference emissions may be set based on the best available technology in the partner country that is still less efficient than the proposed project. The process described here is conceptual, and how to set the reference emissions varies depending on the project. Figure 2 shows a graphical representation of how setting the reference emissions lower than BAU emissions results in a conservative calculation of emission reductions.

Figure 2: Calculation of Emission Reductions Using Reference Emissions

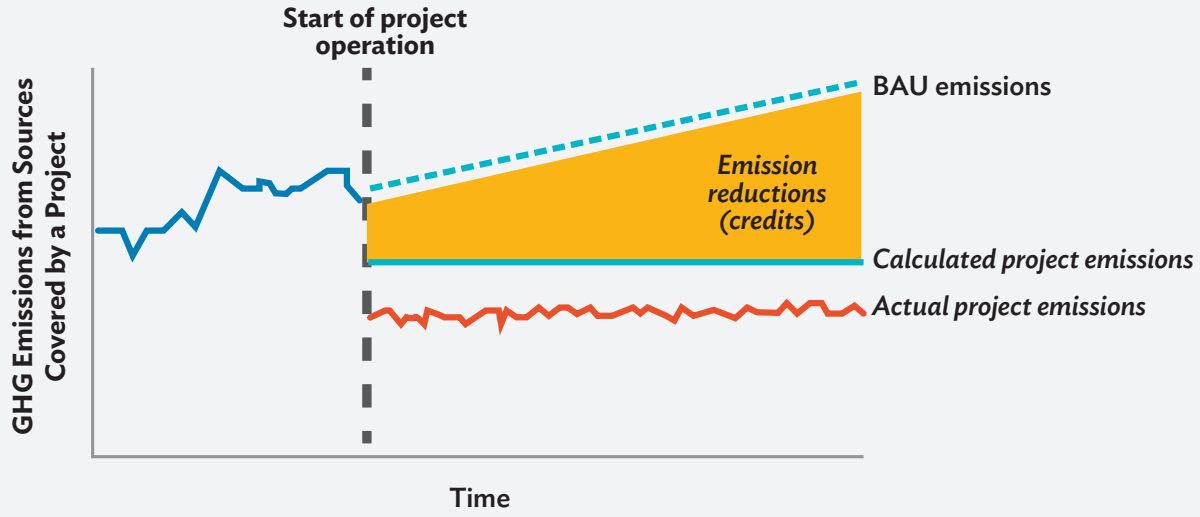


BAU = business-as-usual, GHG = greenhouse gas.
Source: Adapted from Government of Japan documents.

Setting Conservative Project Emissions

Project emissions refer to emissions resulting from the implementation of the JCM project and are normally calculated using monitored data (post-implementation) or conservatively set default values. The proponent of the methodology to calculate the emission reductions may choose to use conservative default values that will result in calculated project emissions that are larger than the actual project emissions. Using default values reduces the burden of monitoring and simplifies verification at a later stage. Figure 3 shows a graphical representation of how using default values for the calculation of project emissions results in a conservative calculation of emission reductions.

Figure 3: Calculation of Emission Reductions Using Conservative Project Emissions

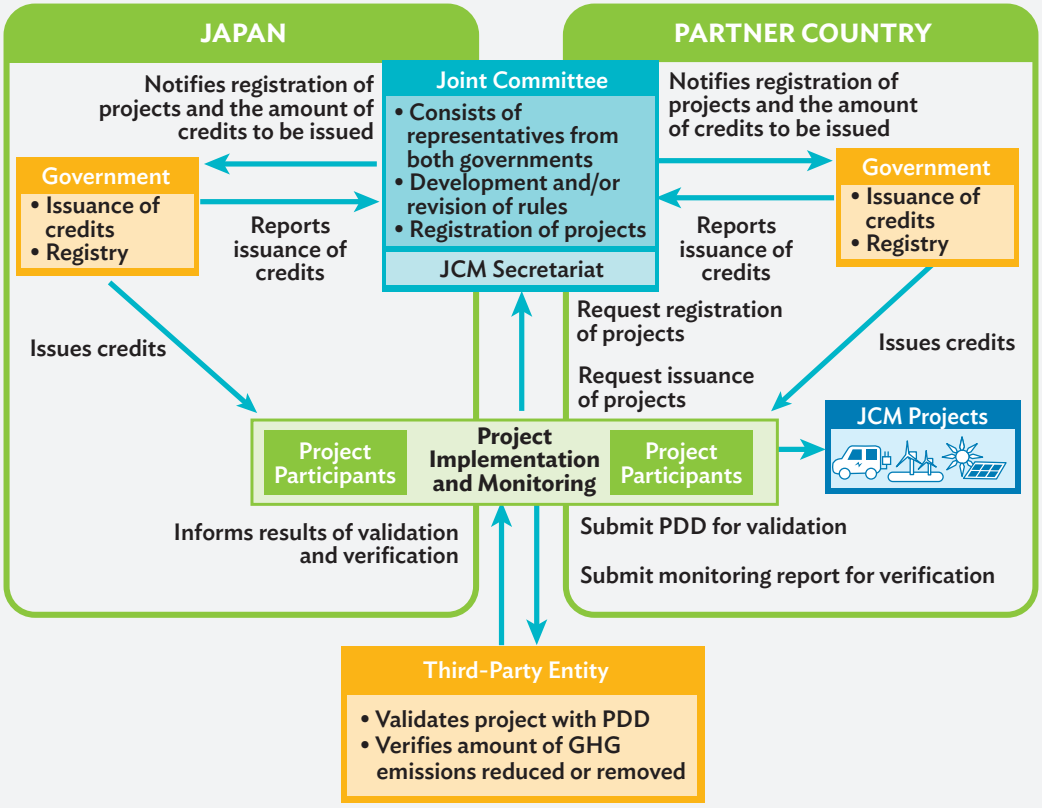


BAU = business-as-usual, GHG = greenhouse gas.
Source: Adapted from Government of Japan documents.

2.3 Stakeholders and Governance Structure

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 summarized in the succeeding paragraphs.

Figure 4: Roles of the Stakeholders of the Joint Crediting Mechanism



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 partner country and a project developer or a technology provider. The project participant prepares and submits methodologies (if required) 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.

Joint Committee

A Joint Committee is established for each JCM partner country. The Joint Committee is the governing body for the JCM in that partner country and is comprised of representatives from both the governments of Japan and the partner country. Each government designates members to the Joint Committee including representatives from the relevant ministries. The committee has two appointed co-chairs, one from the partner 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 the JCM, development of new methodologies, approval (and rejection) of proposed methodologies, registration of JCM projects, registration of designated third-party entities (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 also responsible for formulating rules and guidelines that are essentially common and applicable across participating countries.

The Joint Committee meets at least once 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.[11]

Each Side

"Each side," as adopted in a JCM bilateral agreement, refers to the representation of the respective countries implementing the JCM—Japan, and the partner country governments. 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 comply with the relevant domestic laws and regulations as well as 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.

Joint Crediting Mechanism Secretariat

The JCM secretariat for each partner country is established by the Joint Committee to support the implementation of JCM activities between Japan and the partner country. The JCM secretariat services the Joint Committee and relevant stakeholders and acts as the focal point alongside the JCM project development cycle (including methodology development, project registration, and credit issuance), and disseminates information for the smooth implementation of the JCM.

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 the International Organization for Standardization (ISO) 14065 certification bodies. The TPE conducts validation to assess a PDD on whether or not 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

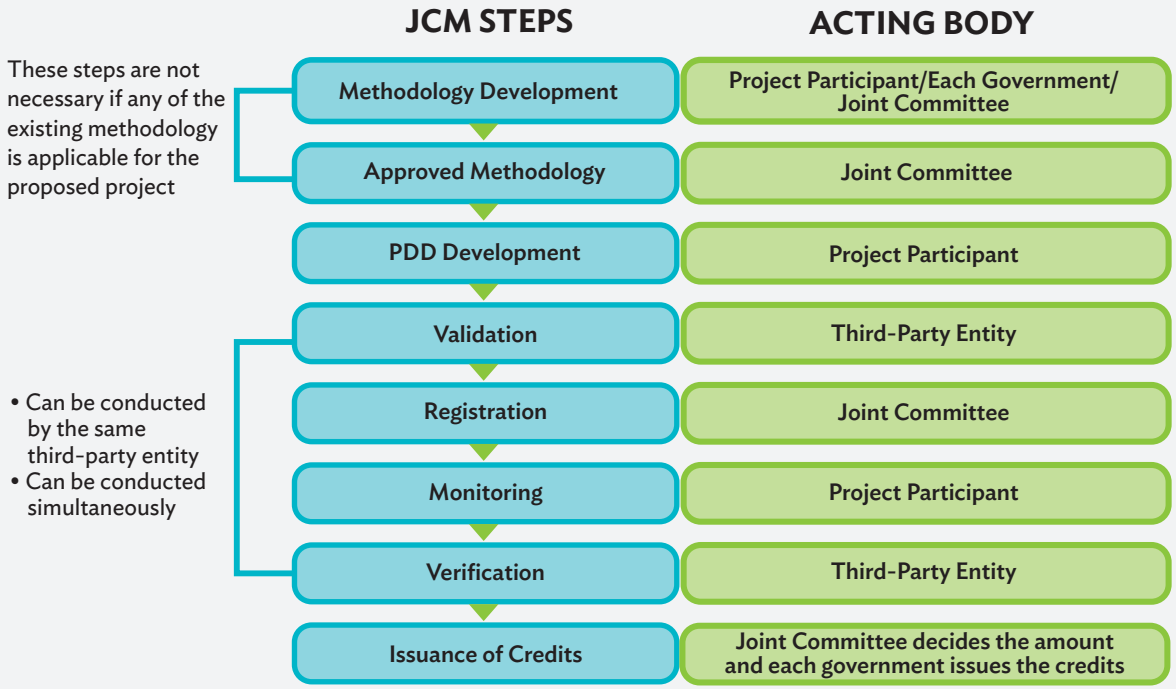
[11] The Joint Crediting Mechanism (JCM). https://www.jcm.go.jp/.

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's decision on the amount of credits to be issued. The same TPE can conduct both the validation and verification of a JCM project, and both activities can be conducted simultaneously.

2.4 JCM Project Development Cycle

Figure 5 provides an overview of the JCM project development cycle from methodology development to credit issuance.

Figure 5: Joint Crediting Mechanism Project Development Cycle



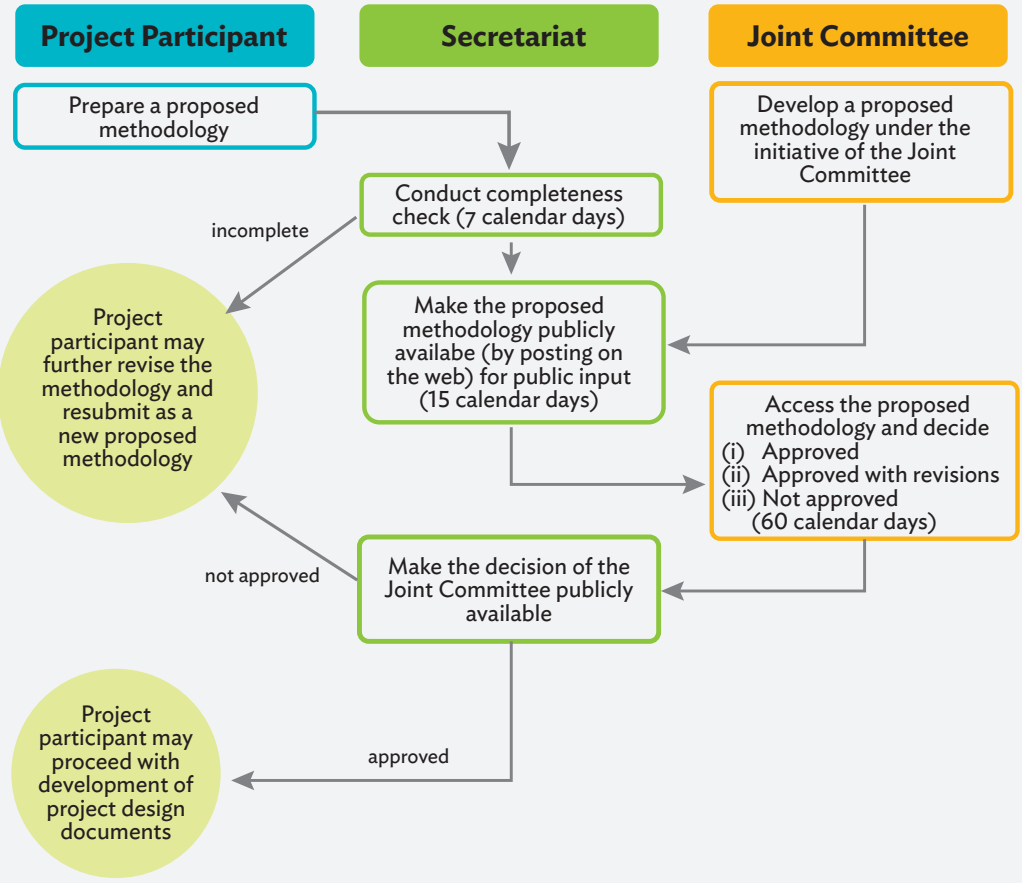
JCM = Joint Crediting Mechanism, PDD = project design document.

Source: Adapted from the Government of Japan documents.

Methodology Development and Approval

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."[12] A JCM project must use an approved methodology or a combination of approved methodologies in order to be registered as a JCM project. Each approved methodology has specific eligibility criteria. If there is no approved methodology applicable to a proposed JCM project in the particular partner country, the project participants will have to develop a new methodology, or propose an amendment to an existing methodology, to proceed with the JCM. If an applicable methodology is available for the proposed JCM project, project participants can proceed to the project design document (PDD) development. The steps for approving methodology are summarized in Figure 6.

Figure 6: Joint Crediting Mechanism Methodology and Approval Process



Source: Authors.

[12] The Joint Crediting Mechanism. *Joint Crediting Mechanism Glossary of Terms, Rules and Guidelines of the JCM between Mongolia and Japan*. p. 3. https://www.jcm.go.jp/rules_and_guidelines/mn/file_08/JCM_MN_Glossary_ver01.0.pdf.

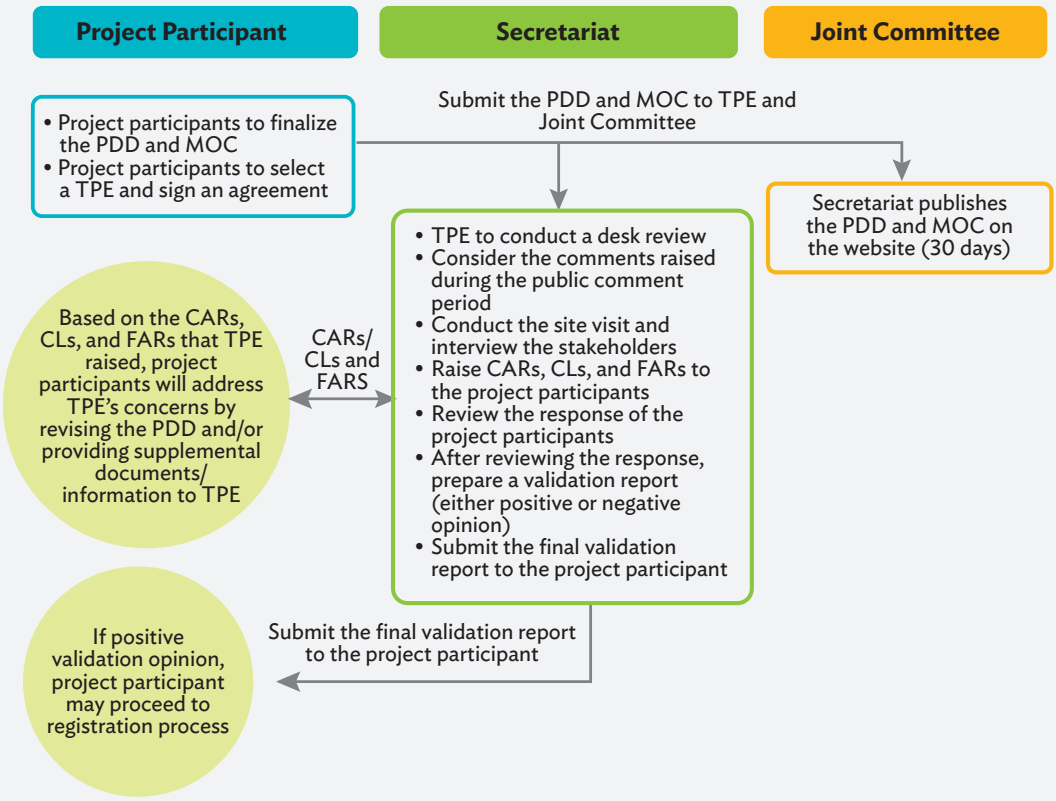
Project Design Document Development and Validation

The project participants prepare the PDD using the latest PDD form available on the JCM website and the monitoring spreadsheet from the approved methodology(ies), following the JCM Guidelines for Developing Project Design Document and Monitoring Report, and the applied methodology(ies).

The PDD is the key document in the JCM development procedure, and the main source of information for the validation, registration, and verification processes as well as for the issuance of JCM credits.

Validation is the independent evaluation of a proposed JCM project by a third-party entity (TPE). Validation assesses the projects' compliance with the JCM requirements in accordance with the Guidelines for Validation and Verification. For each JCM project, a TPE accredited by the partner country must be appointed by the project participants. The project participants submit the PDD and the modalities of communication statement (MOC) to the TPE and the secretariat simultaneously, to initiate validation. The steps for validation are summarized in Figure 7.

Figure 7: Joint Crediting Mechanism Validation Process



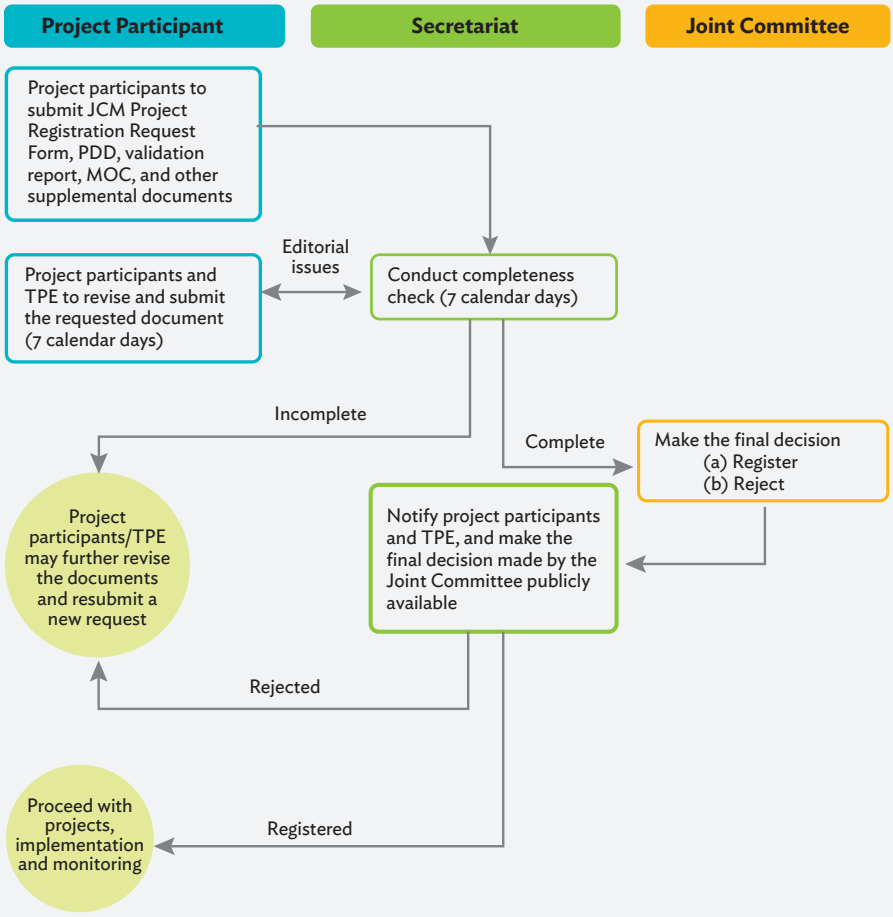
CAR = corrective action request, CL = clarification request, FAR = forward action request, PDD = project design document, MOC = modalities of communication statement, TPE = third-party entity.

Source: Authors.

Registration

Registration is the formal acceptance of a JCM project. Once the project participants receive a positive validation opinion from the TPE, the project participants may submit their PDD, validation report, MOC, and a completed JCM Project Registration Request Form to the secretariat to officially request registration. The steps for registration are summarized in Figure 8.

Figure 8: Joint Crediting Mechanism Registration Process



JCM = Joint Crediting Mechanism, MOC = modalities of communication statement, PDD = project design document, TPE = third-party entity.

Source: Authors.

Monitoring, Reporting, and Verification

Monitoring is the collection of data and information from the JCM project under implementation, which is necessary for the calculation of GHG emission reductions in line with the monitoring plan included in the registered PDD. Once a project is implemented, monitoring of the required parameters should be carried out in accordance with the registered PDD.

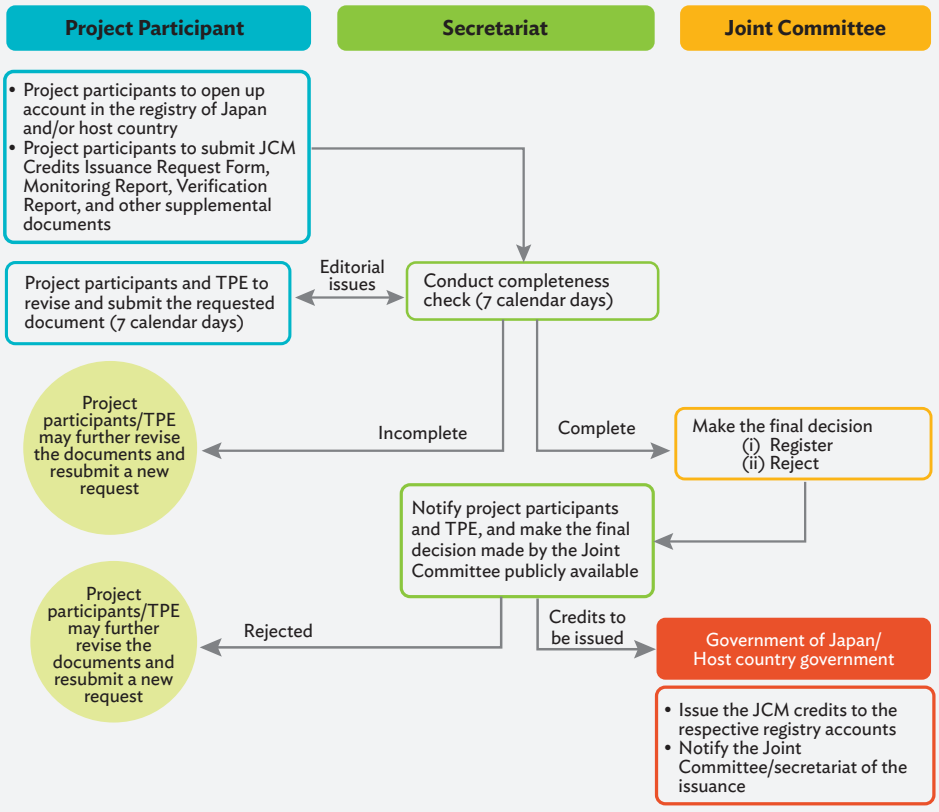
Once monitoring is completed for a certain monitoring period, the collected data, information, and corresponding calculations for emission reductions are reported through the monitoring report using relevant sections of the registered PDD. The monitoring report is then used as the basis for the verification process and issuance of credits.

Verification is the independent evaluation of the monitoring report (including data and emission reductions calculation) for a JCM project. It is carried out in line with the Guidelines for Validation and Verification. The implemented project is also assessed against the description in the registered PDD and methodology to ensure it complies. A verification report is prepared by the TPE containing the results and findings of the assessment and will be used as a basis for the amount of credits to be issued for the JCM project. During verification, the TPE may also conduct a site visit and interview relevant stakeholders. Verification can be conducted simultaneously with validation.

Issuance of Credits

JCM credits will be issued based on the results and findings of the verification report. Upon receiving the verification report from the TPE, the project participants request the issuance of credits by submitting a Credits Issuance Request Form, information on the allocation of credits among the project participants, the verified monitoring report, and the verification report to the Joint Committee through the secretariat. The steps for credit issuance are summarized in Figure 9.

Figure 9: Joint Crediting Mechanism Credit Issuance Process



JCM = Joint Crediting Mechanism, TPE = third-party entity.
Source: Authors.

Currently the JCM stipulates that the allocation of credits is determined by the project participants from Japan and the partner country among themselves, based on their contributions to GHG emission reductions or removals through the JCM project.

Different financing mechanisms for the JCM may also have their own rules for credit allocation. For example, under the Financing Programme for JCM Model Projects, the project participants are required "to deliver to the account of Japanese government at least fifty percent of the JCM credits of GHG issued corresponding to emission reductions achieved by the project for the abovementioned legal durable years."[13] The rest of the issued JCM credits are shared among the partner country and the project participants.[14]

Variations in Details by Partner Countries

While steps of the JCM project development cycle are common for each partner country, the JCM scheme is flexible enough to accommodate requirements from each partner to meet the country's needs in each step. For example, in the case of Mongolia, project participants are required to develop a sustainable development contribution plan at the time of the submission of the draft PDD. The project participants are also required to develop a sustainable development contribution report at the time of the submission of the draft monitoring report for verification. These steps are requested by the Government of Mongolia to ensure that the JCM projects contribute to the sustainable development of the country. Indonesia also has similar steps requiring sustainable development implementation plan and report.

2.5 Eligible Activities

There are 15 sectors under the JCM that are based on the CDM sectoral scopes. A JCM project may fall within more than one of the following scopes:

(i) energy industry (renewable and non-renewable sources),
(ii) energy distribution,
(iii) energy demand,
(iv) manufacturing industries,
(v) chemical industry,
(vi) construction,
(vii) transport,
(viii) mining and mineral production,
(ix) metal production,
(x) fugitive emissions from fuel (solid, oil, and gas),
(xi) fugitive emissions from production and consumption of halocarbons and sulfur hexafluoride,
(xii) solvent use,

[13] Global Environmental Centre Foundation. 2019. *Guidelines for Submitting Proposals*. http://gec.jp/jcm/jp/kobo/h31/mp/(tentative)2019_Guidelines_for_Submitting_Proposals.pdf.

[14] In the case of Indonesia, at least 10% of the JCM credit issued should be allocated to the government of Indonesia according to the Rules of Implementation for the JCM in Indonesia. In the case of Palau, the Government of Palau decided not to allocate the JCM credits issued to private project participants from the Palau side.

(xiii) waste handling and disposal,
(xiv) afforestation and reforestation,[15] and
(xv) agriculture.

In addition, there are seven eligible GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). Projects must result in a reduction (or removal) of one of these types of GHGs to be eligible.

[15] In the case of Cambodia, Indonesia, the Lao People's Democratic Republic, and Myanmar, this sectoral scope includes 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 (REDD+).

3 Achievements of the Joint Crediting Mechanism

3.1 Enhanced Mitigation Actions through the Joint Crediting Mechanism

The Joint Crediting Mechanism (JCM) aims to achieve significant reductions in the GHG emissions. In its nationally determined contribution (NDC), the Government of Japan states that government JCM programs are expected to result in 50 million to 100 million tons of carbon dioxide equivalent (tCO_2e) in accumulated emission reductions and removals by 2030. The trend of recently approved projects shows that the amount of GHG emission reductions per year for each project is increasing. There are currently 31 projects with annual emission reductions of more than 10,000 tCO_2e from 2013 to date, among which seven of them have been approved in 2019. An observable trend is that the Government of Japan increasingly is prioritising projects with larger GHG emission reductions, and it is estimated that the amount of GHG emission reductions by JCM projects will become larger and larger in coming years.

The JCM involves financing, technology development and transfer and capacity building through its various support schemes as introduced in the sections below. It therefore has significant potential to support countries, including ADB's developing member countries (DMCs) to accelerate their mitigation actions under the scope of their conditional NDC targets which are contingent on these forms of international support. For example, in the first NDC of Indonesia, the government "has set unconditional reduction target of 29% and conditional reduction target up to 41% of the business as usual scenario by 2030," with the conditional target subject to availability of international support.

Also, the JCM has supported the concept of a baseline-and-crediting mechanism during a time when the CDM has lost traction. In this sense, the JCM injected some confidence during the pre-2020 period that such carbon market mechanism would still work, although in a decentralized way, in a future climate regime. With such confidence among the private sector, JCM projects have been increasingly developed, which has been boosting mitigation actions in the partner countries.

3.2 Financing Options for the Joint Crediting Mechanism

Financial support for Joint Crediting Mechanism (JCM) projects is currently available during the initial phase of project implementation and is the only stream of finance that developers can receive under the JCM. This availability of upfront finance 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's JCM schemes and the Asian Development Bank (ADB) Japan Fund for the JCM. Support is offered to supplement the initial investment cost or to mitigate the financing cost to implement the JCM project.

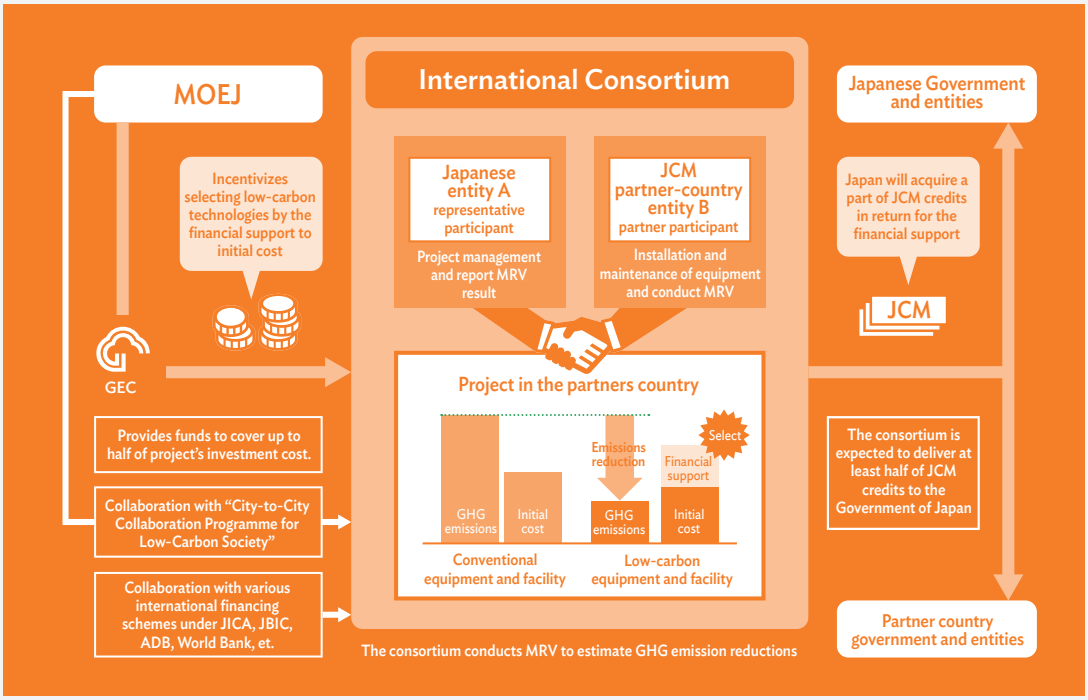
Initially, the government supported a number of potential JCM projects by funding over 450 feasibility studies in over 40 countries. Since the fiscal year 2013, the government began supporting actual projects through some financing schemes. So far, more than 140 projects have been selected by the government under the schemes.

Financing Program for Joint Crediting Mechanism Model Projects

One of the main financing support schemes by the Government of Japan is the Financing Program for JCM Model Projects. Initiated by the Ministry of the Environment of Japan (MOEJ), it can provide grant financing to cover up to 50% of the project's initial investment costs. The scope of financing includes facilities and equipment that reduce energy-related carbon dioxide (CO_2) 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 partner 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 Government of Japan, when JCM credits are issued. The Japanese entity within the international consortium is eligible to submit the application, receive the financial support, and is responsible to MOEJ for implementing the project.

Figure 10: Joint Crediting Mechanism Model Project Scheme



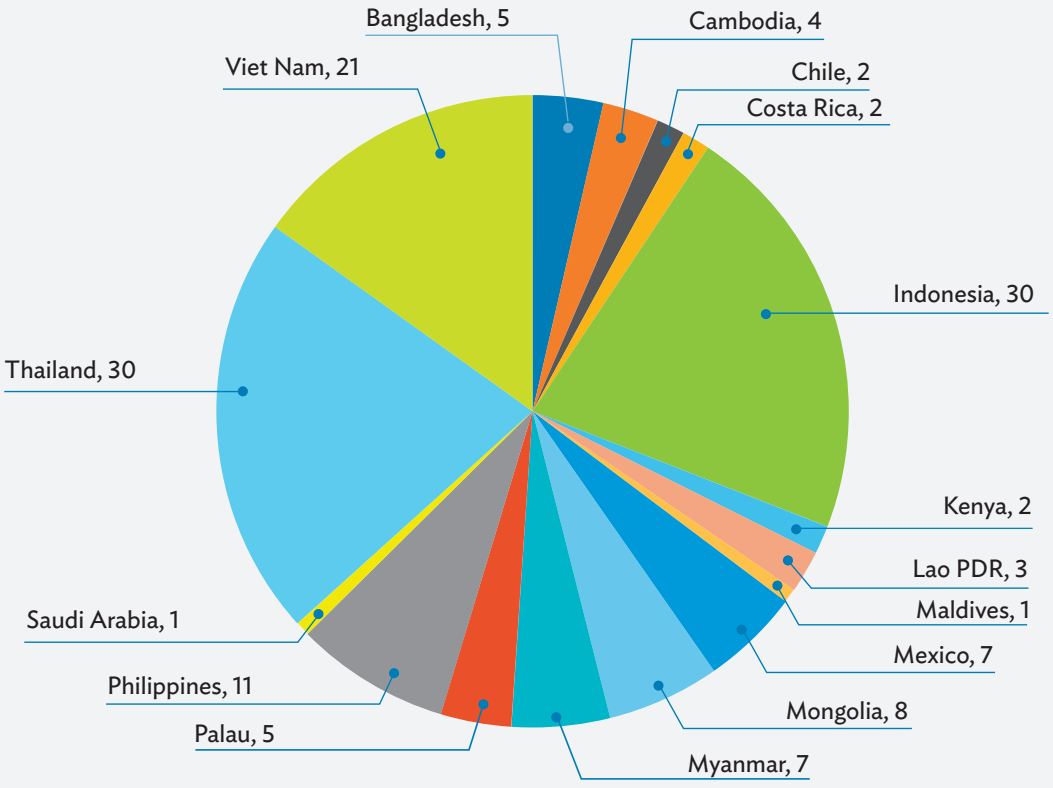
ADB = Asian Development Bank, GEC = Global Environment Centre Foundation, GHG = greenhouse gas, JBIC = Japan Bank for International Cooperation, JCM = Joint Crediting Mechanism, JICA = Japan International Cooperation Agency, MOEJ = Ministry of the Environment of Japan.

Source: Global Environment Centre Foundation. 2019. *The Joint Crediting Mechanism*. http://gec.jp/jcm/jp/publication/JCM2019Aug_En_Web.pdf.

Applications for financial support are received throughout the year, subject to availability of the funding. 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, and contribution to sustainable development, among others.

The Government of Japan has been increasing the budget for JCM Model Projects since its inception in fiscal year (FY) 2013 from ¥1.2 billion ($11.2 million equivalent) to ¥9.9 billion ($84.1 million equivalent) in FY 2019.[16] To date, 139 JCM Model Projects in Bangladesh, Cambodia, Chile, Costa Rica, Indonesia, Kenya, the Lao People's Democratic Republic (Lao PDR), Malaysia, Maldives, Mexico, Mongolia, Myanmar, Palau, the Philippines, Saudi Arabia, Thailand, and Viet Nam have been selected.[17]

Figure 11: Joint Crediting Mechanism Model Projects by Country



Lao PDR = Lao People's Democratic Republic.

Source: The Joint Crediting Mechanism. https://gec.jp/jcm/.

[16] Calculated at $1 = ¥107, 10 October 2019.

[17] The Joint Crediting Mechanism. https://gec.jp/jcm/jp/.

Joint Crediting Mechanism Demonstration Projects

Another scheme initiated by the Government of Japan is JCM Demonstration Projects. Managed by the New Energy and Industrial Technology Development Organization (NEDO), an affiliate agency of the Ministry of Economy, Trade and Industry of Japan, the scheme provides technical assistance to demonstrate and verify the effectiveness of advanced low-carbon technology and its GHG emission reduction potential in line with JCM rules and guidelines.

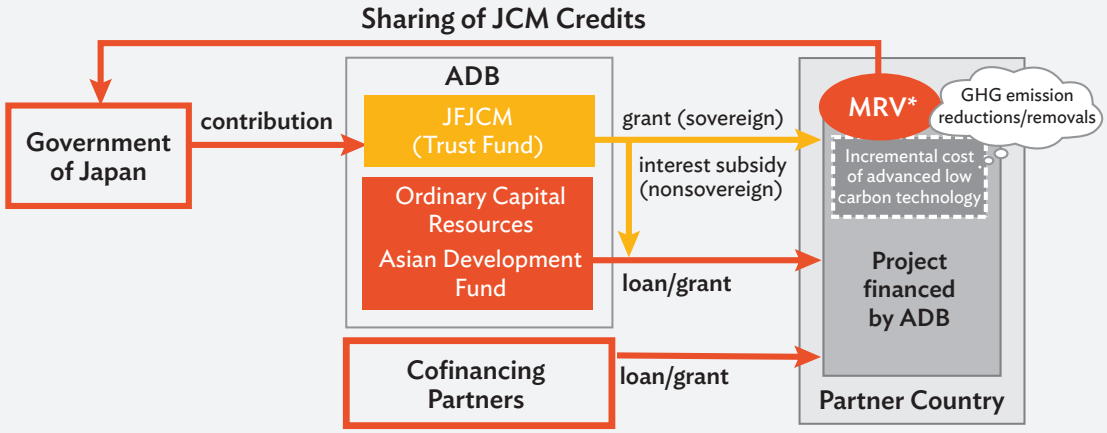
The cost of the demonstration and verification of the projects, including cost of design, production, transfer, installation, technical advice, and JCM-related procedures, are covered by the scheme.

According to the eligibility criteria for the JCM Demonstration Projects, the project is required (i) to maximize the utilization and wide deployment of advanced Japanese technologies; (ii) to aim for large GHG emission reduction effects through the diffusion of the technology introduced and demonstrated through the projects; (iii) to have project participants from both countries, with only the Japanese entities eligible to apply for the projects; and (iv) to be completed within 3 years.

The Japan Fund for the Joint Crediting Mechanism

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

Figure 12: Japan Fund for the Joint Crediting Mechanism



ADB = Asian Development Bank, GHG = greenhouse gas, JCM = Joint Crediting Mechanism, JFJCM = Japan Fund for the Joint Crediting Mechanism, MRV = monitoring, reporting, and verification.

Source: ADB, 2019.

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 Government of Japan has been making annual contributions to the JFJCM and its cumulative support amounts to ¥7.8 billion ($69.96 million equivalent) to date, with further contributions expected in subsequent years. There are five projects approved for the JFJCM support as below:

(i) Preparing Outer Islands for Sustainable Energy Development Project in Maldives
(ii) Provincial Water Supply and Sanitation Project in Cambodia
(iii) Southwest Transmission Grid Expansion Project in Bangladesh
(iv) Upscaling Renewable Energy Sector Project in Mongolia
(v) Improving Access to Health Services for Disadvantaged Groups Investment Program in Mongolia

3.3 Technology Transfer

The JCM aims to achieve GHG mitigation through the diffusion of advanced low-carbon technologies to the partner countries. The partner countries may utilize the JCM to introduce, test, and demonstrate such technologies in the country. This supports the transition of the partner country to a low-carbon economy and the achievement of its commitments made under respective NDCs.

In the JCM, different advanced low-carbon technologies are being used to meet the requirements of the partner countries and effectively contribute to the reduction of GHG emissions. The following are some examples of innovative low-carbon technologies that have been supported in the partner countries through the JCM.

Solar technology. This is a renewable energy technology that can be implemented as a JCM project. Although the partner countries with a relatively large economy have successfully adapted renewable energy in their energy mix, many of the partner countries have faced various constraints, such as grid stability issues and scarcity of suitable land. A solar photovoltaic system including an advanced battery integrated with an energy management system in remote islands 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. Conventional solar projects require large flat land, which are not always available. To meet the land requirements, innovative approaches have been taken under the JCM, including installing floating solar panels on reservoirs and establishing agrivoltaic solar projects on farming land.

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

Highly efficient cooling systems. These systems have natural refrigerants and are 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 that can result in reduced electricity load as well as avoid the release of waste heat indoors.

High-efficiency centrifugal chiller. This is a more advanced cooling solution for large industries. It improves efficiencies for airconditioning and process cooling that usually consume significant amounts of energy. The highly efficient centrifugal chiller would therefore result in major energy savings.

Energy-efficient air jet looms. These have energy-saving technologies such as the optimized shape of the reed's tunnel of nozzles and a pressure sensor to measure air pressure of nozzles for optimization of compressed air consumption of weft insertion installed in textile factories. Through the new jet looms, factories have successfully saved their electricity consumption.

Energy-efficient transformers. These transformers, such as amorphous metal transformers, achieve significant reduction of transmission loss from the distribution of grid electricity. In addition, low-loss type aluminium conductors using aluminium-clad steel reinforced cables for transmission lines is another solution to significantly reduce transmission losses. Box 1 provides a case study for the introduction of this technology.

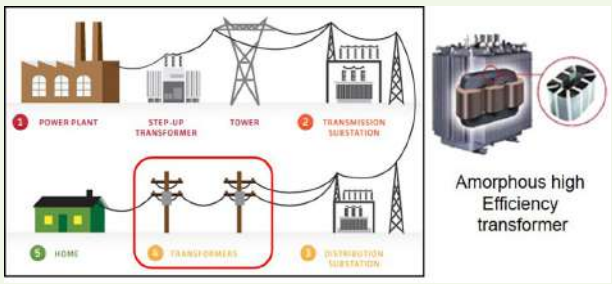
Ecodriving. This is another technology application, utilizing the digital tachograph system. Fuel savings is enabled through the analysis and feedback provided by the system to drivers to change their driving behavior toward more fuel-efficient practices.

High-efficiency incinerator. This type of incinerator combusts municipal solid waste and generates electricity efficiently from the heat generated from the combustion process. Waste–to–energy technology projects leads to significant emission reductions and also reduce issues arising from the management of municipal waste. Furthermore, high-efficiency incinerators reduce the amount of waste that will go to landfills and thus significantly reduce GHG emissions by avoiding methane emissions.

Methane fermentation system. This is another example of waste–to–energy technology. The system treats industrial food waste such as vegetable and fruit processing factories, using microbes. Generated biogas from the system is collected and used to meet in-house energy requirements.

Box 1: Introduction of Amorphous High Efficiency Transformers throughout the Lao People's Democratic Republic and Viet Nam

Amorphous high efficiency transformers have been introduced in the Lao People's Democratic Republic (Lao PDR) and Viet Nam with the support of the Joint Crediting Mechanism (JCM). The amorphous transformer is an advanced energy-efficient technology that significantly reduces transmission loss from the distribution of grid electricity in transformers compared to the conventional silicon steel transformers.



The technology was demonstrated in southern Viet Nam with the support of the Financing Programme for JCM Model Project in 2014. The project was expanded to other regions within Viet Nam in the succeeding years, and installed a total of more than 10,000 transformers. Upon successful demonstration of the energy efficiency impacts, the distribution company now sets the amorphous transformer as the standard for its procurement. More than 1,300 of the amorphous transformer was subsequently introduced to the Lao PDR with the support of the JCM.

The projects are expected to reduce over 9,000 tons of carbon dioxide (tCO_2) in Viet Nam and 2,000 tCO_2 in the Lao PDR.

Source: The Joint Crediting Mechanism. *Introduction of Amorphous High Efficiency Transformers in Power Grid*. http://gec.jp/jcm/projects/17pro_lao_02/.

3.4 Contribution to Sustainable Development through the Delivery of Co-Benefits

Each JCM project contributes to the sustainable development of the partner countries by delivering a wide variety of co-benefits. In the context of GHG emission reduction projects and climate change, co-benefits are the additional positive social, environmental, and economic benefits attributed to climate mitigation projects above and beyond the main benefit of expected GHG emission reductions. Co-benefits are commonly identified under the three pillars of sustainability—social, environmental, and economic. The following are expected and observed co-benefits of JCM projects

- **Energy Security.** Renewable energy capacity has been added through the JCM, generating and delivering clean renewable energy to the grid and to the community. Asia and the Pacific is experiencing economic growth that is essential for sustainable development and poverty reduction. However, this economic growth is coupled with growth in energy consumption and energy demand in the region is projected to almost double by 2030. Compounding the problem is the widespread energy poverty across Asia, with almost a billion people still without access to electricity. The JCM projects are addressing this problem by enhancing generation and access to clean energy using renewable energy technologies, including solar, wind, biomass and mini/micro hydro power plants. JCM projects are improving energy security, contributing to the diversity of energy sources, and demonstrating the economic viability of advanced renewable energy technologies. This clean energy is contributing to fill the gap and contributing to energy diversity.

- **Diffusion of Low-carbon Technologies.** There are numerous barriers to the implementation of low-carbon technologies, especially technologies that are new or not widely used in a host country. Diffusion of low-carbon technologies plays an important role in achieving the national climate change goals of the host countries and directly contributes to broader sustainable development goals. Technologies used in JCM projects were not widely available or had limited penetration at the time of project implementation. Many of these projects have also contributed to strengthening national institutional capacity and enhancing environmental planning by having more technology options available in the country.

- **New Employment Opportunity:** JCM projects have created new job opportunities in the host country in the construction as well as operation and maintenance phases. While the jobs required during the construction phase of the projects are often labor-intensive and tend to employ men, the operation and maintenance phase tends to provide managerial and more complex positions with wider opportunities for both men and women. JCM projects' contributions on creating new jobs go beyond the project boundary. Many quality jobs have been created by the service providers involved in the manufacturing, distribution, and servicing of the plant and machinery deployed for these projects. JCM projects are enhancing the professional skills and corresponding income levels of the people associated with these projects too. This is supplemented by the fact that some of the JCM projects are located in rural area where quality jobs are difficult to find. These benefits not only improve working conditions but also facilitate long-term and tangible benefits for the individuals as well as the respective communities. Such benefits enable people to upgrade their skills, enhance professional opportunities, and create a greater sense of professional security. Many JCM projects are also enabling their employees to enhance their skills through various training programs including on-the-job training.

- **Access to New Infrastructure.** JCM projects have built new infrastructure such as transmission lines, local roads and street lighting, or strengthen and rehabilitate existing infrastructure such as port facilities, water supply and wastewater treatment systems. Investments in infrastructure are crucial for achieving sustainable development and empowering communities. Deficiencies in basic infrastructure, such as poorly developed roads or scarce health facilities, can deprive people of access to markets and employment opportunities, or much needed medical care and pose a major impediment to development. This has brought about enhanced energy access, greater connectivity with economic activities, and improved safety, health and hygiene for the local communities.

- **Improved Livelihoods.** JCM projects are improving people's livelihoods, making a lasting contribution to socioeconomic development through various approaches. One such approach is providing vocational training to the communities, most of whom are women, acquiring skills to pursue income-generating opportunities. This is empowering women to participate in social and economic activities and has resulted in sustainable sources of their income.

Co-benefits can be delivered at multiple levels. As GHG emission reductions yield positive impacts for the global environment, co-benefits are delivered for the local, regional, and even trans-boundary beneficiaries. Reduced odor and well-being from improvements at a wastewater treatment plant are examples of a local co-benefit. The supply of clean energy to an electricity grid from a renewable power project or the reduction of dependency on imported fossil fuels are examples of regional co-benefits.

Box 2 presents an example of JCM project delivering local (air pollution) and regional (introducing new technology to the country) co-benefits in Mongolia.

These co-benefits are important elements of the JCM that impact the community and region and partner countries and they may play an important role in further encouraging higher level of co-benefits from proposed JCM projects. For example, Mongolia ensures the level of sustainable development contribution of their projects by requiring an ex-ante evaluation (JCM Sustainable Development Contribution Plan) of (i) any negative impact of the projects and how to minimize the effect and (ii) identifying potential contributions to Sustainable Development Goals of the projects which is supplemented with ex-post reporting (JCM Sustainable Development Contribution Report).

Box 2: Improving Access to Health Services for Disadvantaged Groups Investment Program in Mongolia

In October 2019, the Asian Development Bank approved $158.34 million for providing high-quality health care services in selected disadvantaged *ger*[a] areas of Ulaanbaatar, provinces, and subdistricts to support the Government of Mongolia's commitment to universal health coverage. It is the fifth project supported by the Japan Fund for the Joint Crediting Mechanism (JFJCM) as of October 2019.

With support from the JFJCM, innovative low-carbon technologies such as energy-efficient heating, ventilation, and air conditioning systems, ground source heat pumps, solar photovoltaics, and smart green design including high insulation windows will be introduced to the upgraded Khan Uul district hospital and selected family health centers. The project is expected to reduce approximately 3,000 tons of carbon dioxide per year (tCO_2/y). The low-carbon technologies supported by JFJCM can serve as a model or demonstration for other projects in Mongolia.

Future site for one of family health centers. One of the project sites where ground source heat pumps will be introduced to new family health centers. Test drilling and thermal response tests were conducted in August 2019 at the location. (Photo credit: ADB)

In addition to the reduction of CO_2 emissions, the project's co-benefits include the improvement of air quality, which results in the health benefits to the local population.

As the heat and electricity system is heavily reliant on coal from heat-only boilers and combined heat and power plants, savings in heat energy and power would entail reductions in nitrogen oxides, sulfur oxides, and particulate matter, which are the source of severe air pollution. Another co-benefit of this project is the exposure of engineers and the building industry in Mongolia to this new technology. As this is a relatively new technology that is not widely disseminated in the country, it will enhance the institutional knowledge and experience of energy-efficient buildings in Mongolia. It will also create new job opportunities and lead to further research and development in other energy-efficient technologies for building.

[a] Traditional felt tent originally used by nomadic herders.

Source: ADB. https://www.adb.org/projects/49173-003/main#project-pds.

4 Joint Crediting Mechanism as a Forerunner for Article 6.2

4.1 The Joint Crediting Mechanism as a Cooperative Approach

The current (pre-2020) bilateral agreements between Japan and partner countries have not involved internationally tradable carbon credits. Carbon credits are issued and shared among participants, the Government of Japan, and partner country governments. Such allocation after issuance is recorded in the registries of both countries and no subsequent international trading has taken place.

As the Paris Agreement enters the implementation phase, the JCM will undergo a transformation such that it complies with the international guidance under the Paris Agreement. As presented in the first chapter, Article 6.1 of the Paris Agreement recognizes that countries may pursue higher ambition in the implementation of their nationally determined contributions (NDCs) through international collaboration. Article 6.2 states that if countries want to use internationally transferred mitigation outcomes (ITMOs), they must show that sustainable development has been promoted and environmental integrity and transparency have been ensured. Article 6.2 continues to state that "(Parties)...shall apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement". This guidance is not yet adopted but several elements that will be subject to guidance were identified in the work program for Article 6 and additional items have been added during the course of negotiations.[18] One important part of the work program for Article 6.2 is "guidance to ensure that double counting is avoided on the basis of a corresponding adjustment by Parties for both anthropogenic emissions by sources and removals by sinks covered by their nationally determined contributions under the Agreement."[19]

The JCM is about to become the first cooperative approach under Article 6.2 in operation. As such, the JCM will be one of the first examples of how ITMOs will be managed in bilateral contracts reflecting requirements for robust accounting including performing corresponding adjustments and avoiding double counting. This means that the JCM operating under Article 6.2 needs to observe the guidance, given that there is a transfer of ITMOs between participating countries. Key elements of the guidance currently being negotiated will be addressed in Chapter 4.3 and it will be shown how the JCM has anticipated operationalization of some of these key elements. But first a brief introduction to how the JCM differs compared to other Article 6 pilots.

[18] 1/CP.21. Adoption of the Paris Agreement. Paras 36–38 https://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf.
[19] Footnote 14, para. 36.

4.2 The Joint Crediting Mechanism and other Article 6 Pilots

The most striking feature of the JCM is perhaps not to be found in the cooperative approach itself, but rather in the fact that Japan has started such type of collaboration for the post-2020 Paris Agreement period much earlier than other countries. The JCM is the only existing example of a project-based international cooperative approach. There are other initiatives that have been implemented with a new framework for carbon market mechanisms in mind and it is useful to consider these in comparison to the JCM. Most of these initiatives have been established much more recently than the JCM are not a formal mechanism. Rather, they are an emerging set of pilots for Article 6 activities, that are working through different modes of collaboration.[20]

Linking of emissions trading systems is one type of activity that would fall under Article 6.2. Trading of units takes place between compliance buyers in the system and all transactions are tracked by a registry. There are several ways of accounting for the shift of units or allowances between the participating countries; one is to estimate the net transfer of allowances at the end of the trading period.[21] The linking between the EU ETS and the Swiss ETS is one of the first cooperative approaches that will address how to account for the transfer of ITMOs between the systems. The ITMO in this case is likely to be some type of net volume as a result of trade. Emissions trading systems are not an innovative cooperative approach to be tested under Article 6 for the first time, but the accounting of international transfers will have to be done differently to how it was done under the Kyoto Protocol.

There are a few countries that have initiated pilot activities with an explicit reference to Article 6: Switzerland, Canada, and Sweden. The Swiss Klik Foundation has worked with call for proposals, leading initially to three "ITMO activities," in Peru, Senegal, and Ghana.[22]

Canada is supporting Chile in a program to reduce emissions in the waste sector that potentially can be developed under Article 6.2.[23] This is an example of a bilateral approach where the countries are working together to enhance MRV capacity and develop new tools and protocols for the waste sector as part of a sector mitigation activity. A key difference between initiatives like this and the JCM is though the level of institutionalization (see 4.3) is much lower in single bilateral pilots compared to the structures set up under the JCM, continuation of the mechanisms after the pilots is unclear.[24]

The Swedish Energy Agency (SEA) has commissioned several virtual pilots, providing examples of pilots that could be implemented but where the set-up is tentatively described. Unlike the JCM and the Canada–Chile approach, the virtual pilots have been developed by project developers and discussions with host country governments have only taken place in varying degrees. Both the Klik Foundation and the virtual pilots by SEA are taking project-specific approaches, rather than entering into bilateral agreement with the host governments.

Through the JCM, the Government of Japan entered into bilateral agreements at an early stage, and this is likely to prove a successful strategy. Currently, due to the collapse of the CDM market and uncertainty regarding the guidance and rules for carbon markets under the Paris Agreement, developing country governments may be

[20] Pilots here refer to activities that are explicitly named Article 6 pilots and activities that are likely to become subject to Article 6 rules and guidance.

[21] L. Schneider et al. 2018. *Accounting for the Linking of Emissions Trading Systems under Article 6.2 of the Paris Agreement*. Berlin: International Carbon Action Partnership (ICAP). https://icapcarbonaction.com/en/?option=com_attach&task=download&id=598.

[22] https://www.international.klik.ch/en/News/Newsletter.277.html?nid=2041.

[23] Baker & McKenzie. 2019. *Papua New Guinea's Financing Emissions Reduction Roundtable*. Background Paper. The Climate Change and Development Authority. Papua New Guinea. p. 41.

[24] S. Greiner et al. 2019. *Moving Towards Next Generation of Carbon Markets: Observations from Article 6 Pilots*. p. 40. https://www.climatefocus.com/sites/default/files/CFI-Moving%20towards%20next%20generation%20carbon%20markets.pdf.

hesitant to enter into agreements that imply export of mitigation outcomes, regardless of whether it is a large-scale sectoral approach or if it is in the form of a single mitigation project.[25] Bilateral agreements involving the transfer of ITMOs under Article 6 are not very likely without showing potential tangible benefits, reflecting that host countries now have NDC targets and emission reductions become an asset under the Paris Agreement.

4.3 Benefits of a Bilateral Cooperative Approach

The countries involved in the JCM have seen substantial benefits from the JCM. Since it is possible for partner countries to retain ownership of the design of the JCM process, each country can have its own variations in rules and procedures. Another benefit of the JCM has been that experiences and lessons from the Clean Development Mechanism (CDM) have been well integrated to make the mechanism solid while reducing transaction costs, and the concept has been tested and improved through "learning by doing" to make the mechanism workable. Countries can now look to the JCM for lessons learned regarding a bilateral cooperative approach. The JCM can offer several lessons learned from bilateral mitigation cooperation.

The JCM showcases a mechanism that can be tailored to national circumstances, in the interest of both the investing and the receiving country. The JCM ensures the host countries' requirement on technology needs are reflected in the process when selecting the projects supported by some of the funding programs, which was not available under the CDM. A mutual interest between two countries and a bilateral mechanism that can explicitly address that interest have a great chance to deliver.

History shows that a unitary, one-size-fits-all approach faces challenges when addressing multiple objectives simultaneously, which was the case for CDM. With CDM, there were expectations for delivery on technology transfer, regional distribution, promotion of specific project types and sustainable development co-benefits. However, such preferences are difficult to accommodate in one global mechanism. A bilateral cooperative approach is not a one-size-fits-all approach but can be flexible to accommodate varying interests and needs of partnering countries. One such flexibility is that each partner country can have additional rules to make sure the JCM projects are in line with its national interests. In Indonesia for example, at least 10% of the credits issued from the JCM project are allocated to Indonesia, to consider their contribution in greenhouse gas reduction.[26]

Related to this is that the JCM illustrates how a bilateral cooperative approach can contain different types of support for which the contractual arrangement for various activities may differ. The Government of Japan extends support to partner countries for establishing the JCM system. The support includes assisting the joint committee for setting up the rulebook, guidelines, and methodologies, organizing a number of workshops and capacity building initiatives, and funding various types of pilot projects to kick-start the JCM activities in the country. The sharing of carbon credits in the case of the JCM model projects funded by the Ministry of the Environment of Japan—where at least 50% of the credits should be allocated to the government—illustrates that depending on the stakes, the efforts, and the relative contribution of the countries to make the mitigation action happen, the sharing of mitigation outcomes can vary. Again, compared with a global mechanism, it is easier to make adjustments in terms of the design, scope, and setup of a mitigation action if these elements can be decided bilaterally.

This may be seen by some as marketing the flexibility of implementing mitigation action bilaterally and avoiding cumbersome processes that require international consensus. While this could be part of the rationale for

[25] Footnote 26.

[26] JCM. Rules of Implementation for the Joint Crediting Mechanism with Indonesia. https://www.jcm.go.jp/rules_and_guidelines/id/file_01/JCM_ID_RoI_ver02.2.pdf.

using a bilateral approach, there is nothing that excludes a bilateral cooperative approach to apply or use internationally recognized or agreed protocols or standards. It is critical to ensure that such a bilateral approach meets internationally high levels of quality assurance to gain market confidence. To create a credible bilateral mechanism, there needs to be transparent procedures and a governance structure that can ensure environmental integrity. Article 6.2 is explicit on this point: "Parties shall.....ensure environmental integrity and transparency, including in governance."[27]

Another issue relates to governance, i.e., how the different elements that may impact environmental integrity is managed and overseen. The JCM provides an example of how bilateral arrangements can be set up under Article 6.2, agreeing on elements such as accreditation, validation, registration, and project eligibility. When creating a cooperative approach under the decentralized nature of Article 6.2, one of the key elements that needs attention is governance. This is because the mechanism will not rely on international bodies and processes to perform approval, validation, verification, and registration.

In the JCM, the arrangement has a high level of institutionalization, i.e., there is a joint committee that is overseeing the projects in the host country over a specified period supported by a JCM secretariat in each partner country. Cooperative approaches may not need to have this level of institutionalization, but countries would need to agree bilaterally on elements in several steps of the activity cycle.

Under the CDM, validation and verification are required and these must be performed only by entities accredited by the CDM executive board. Under cooperative approaches, there is no specific requirement for a third-party audit while requirements is something that can be agreed upon bilaterally or multilaterally, including accreditation and the regulatory framework for validation, monitoring, reporting, verification, and certification. In the JCM case, the approach has been to use operational entities accredited by the CDM Executive Board and ISO 14065 certified bodies. This is likely to be the most realistic option under other cooperative approaches although it may be possible for countries that have or planned national carbon pricing schemes to use national accreditation and verification systems.

This leads to an important point relating to the Article 6.4, mechanism. In addition to those countries that will use the framework of the new mechanism fully, the advantages of having a centralized UNFCCC mechanism is that there are services and facilities that countries can use also under cooperative approaches of Article 6.2. Examples of these services include allowing access to internationally accredited verifiers, providing registry accounts, and making internationally reviewed methodologies available to the public.

Other countries in the region are looking at the offers and mechanisms that are similar to the JCM. This includes a set of countries interested in hosting such projects, as well as countries that are interested in providing financing and collaborating with developing countries.

4.4 Article 6.2: Anticipating and Adapting

Addressing Requirements under Article 6.2

Assuming the JCM arrangements in some countries will be developed into cooperative approaches, some elements need to change for the JCM to be eligible under Article 6.2 and create ITMOs that can be used toward the NDC of Japan.

[27] Article 6 of the Paris Agreement, para 6.2. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.

The JCM would need to show how environmental integrity has been ensured, which is a specific requirement in Article 6.2. 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. Thus, one can argue that the JCM has anticipated the guidance of Article 6.2 in its design.

Regarding transparency, the JCM activities have, in the pre-2020 period, been reported in national communications to the UNFCCC by Japan and the host countries.[28] Under the Paris Agreement, if the JCM activities have been implemented involving ITMOs, then it is very likely that this has to be reported in the biennial transparency reports. The Article 6.2 guidance is not yet set for this specific reporting for cooperative approaches, but the transparency decision from Katowice indicates that it will require more detailed reporting than what has been provided in the national communications to the UNFCCC.[29] The JCM is a model approach in the sense that it has worked with transparency since the outset. The type of information available regarding JCM projects were not to be found for many of the pilots initiated recently.

The rules and guidance for Article 6.2 have yet to be determined as initially described. Without prejudging the outcome of COP 25 and later sessions, it could be the case that a requirement for participating in Article 6.2 is to have a national registry and to be able to perform corresponding adjustments.[30]

The negotiation text signals that countries will need national registries for keeping records of mitigation outcomes. In cases of lack of resources and capacity, international registry solutions may be provided. Given the "sharing" element of the JCM, the need for registries has been anticipated, and in line with the requirement of Article 6 to avoid double counting, the JCM addresses this by establishing registries at each side (the Government of Japan and each partner country), which track relevant information for the issued credits. The registries also serve to prevent registered JCM projects from being used under any other international climate mitigation mechanisms. In this case, the JCM showcases an element of environmental integrity that is key to the Paris Agreement: to avoid double counting, all countries need to have full control over the mitigation outcomes they produce and if, where, when, and how carbon credits are created.

The requirements for participation in Article 6.2 may cause problems for some partner countries involved in the JCM. The issue is simply a question of whether the host countries will be able to comply with the regulatory framework (to be determined) for making corresponding adjustments. This framework is likely to require the development of annual inventories and, in case the country has a single-year target, measures to make it possible to transfer ITMOs on an annual basis (and not only at the end of the NDC period).

This issue has been pointed out by one study, emphasizing that countries need to prevent a "disconnection between multiple years contribution and single-year target."[31] The risk is that mitigation outcomes from the JCM cannot be transferred and used outside the single target year. There are likely to be provisions in the guidance for Article 6.2 that deals with this, but there are still several options tabled. If guidance turns out to be thin, the

[28] For example, in the Third National Communication to the UNFCCC from Mongolia, May 2018, and the 7th National Communication to the UNFCCC from Japan, 2019.

[29] UNFCCC. 2018. *Modalities, Procedures and Guidelines for the Transparency Framework for Action and Support Referred to in Article 13 of the Paris Agreement*. Draft Decision/CMA.1. https://unfccc.int/fr/node/184700.

[30] UNFCCC. 2019. *Guidance on Cooperative Approaches Referred to in Article 6, Paragraph 2 of the Paris Agreement*. Paper prepared for the 50th Meeting of the Subsidiary Body for Scientific and Technological Advice. Bonn, Germany. 17–27 June. https://unfccc.int/sites/default/files/resource/sbsta2019_L.09E.pdf.

[31] K. Koatkutsu et al. 2016. *Operationalizing the Paris Agreement Article 6 through the Joint Crediting Mechanism (JCM): Key Issues for Linking Market Mechanisms and the Nationally Determined Contributions (NDCs).* Institute for Global Environmental Strategies (IGES) Discussion Paper. https://iges.or.jp/en/pub/operationalizing-paris-agreement-article-6.

collaborating countries may need to agree on a method for ensuring that corresponding adjustments can be made for all relevant years.

The JCM has also anticipated another feature of Article 6. It explicitly employs the use of conservative baselines to deal with the requirement of overall mitigation (or net emission reductions as it is termed under the JCM). As stated in one recent study on pilots under Article 6: "all the while, the JCM has been developed as a cooperative approach under Article 6.2 for which an overall mitigation is yet to be required."[32] This refers to how overall mitigation of global emissions is an explicit requirement in Article 6.4, whereas requirement under Article 6.2 is still under negotiation. This is one of the issues that Parties to the Paris Agreement will continue to discuss at COP 25.

Another point relates to how the JCM has made use of methodologies developed under CDM and adapted these to the bilateral situation. The JCM modifies existing CDM methodologies to simplify their use, applying conservative default factors, simplified monitoring approaches based on agreed spreadsheet formats, and crediting thresholds that are deemed more ambitious than business-as-usual scenarios.[33]

The JCM also shows how "promoting sustainable development" can differ between cooperative agreements. As the Mongolia case shows, project participants under one agreement were required to develop a sustainable development contribution plan at the time of the submission of the draft PDD. The project participants were also required to develop a sustainable development contribution report at the time of the submission of the draft monitoring report for verification. However, the same practice has not been adapted by all partner countries and the JCM may require further adjustment to meet the requirements of Article 6.2. However, partner countries are likely able to demonstrate how sustainable development has been promoted in the biennial transparency reports.

Article 6.2 may have implications for the sharing of mitigation outcomes. A JCM project typically has two project participants, from both Japan and a partner country. The project participants are accordingly eligible to receive the issued JCM credits. As shown in Chapter 2, the allocation of carbon credits is based on a consultation between the project participants from Japan and the host country, and it is also shown how this allocation can be altered depending on the type and financing of the project.

This will not necessarily change if the JCM is to be implemented under Article 6.2. The impact of host countries having NDCs is likely that host country governments will increase their involvement in decisions over transactions. Typical transactions under CDM involved a private or government buyer and a seller of carbon credits, where the seller needed a letter of approval to claim the credits for sale, and the type of contract typically an off-take agreement. In the post-2020 situation, cooperative approaches may include this model, but the need of the host country to be able to achieve the NDC may have to be considered in the bilateral cooperative agreement or approving any transactions by the partner country governments. Since mitigation outcomes are shared, one issue that may arise is the portion allocated to the host country project proponent may be claimed by the government. This is of course to be regulated in the agreement between Japan and the host country, but it could be interesting to see if, over time, there will be a shift from a transaction agreement between project participants, to transaction agreements involving governments only.

[32] Footnote 1, p. 38.
[33] Footnote 1, p. 34.

4.5 Conclusion

Groundbreaking pilot initiatives have great value in this period during in which Article 6 negotiations will be intense. Negotiators, as well as policy-makers and activity developers, will be looking for hands-on experience to enhance their knowledge and understanding of how Article 6.2 can be implemented. Pilot activities for Article 6 are emerging in several regions but some time needs to pass before these can provide lessons learned. The JCM is in this regard unique in that it provides lessons learned from years of experience.

One of the most important elements that the JCM can showcase is the establishment of a decentralized governance system, i.e. decentralized in the sense that it operates independently of any supranational overseeing body. When considering bilateral or multilateral cooperative approaches, this could be one of the least explored territories. How to set the bilateral or multilateral governance system up will be of great importance since Article 6.2 specifically requires to "ensure environmental integrity and transparency, including in governance." The JCM provides a concrete example of how this provision can be operationalized.

Given that activities under Article 6.2 are not defined top-down and specified beforehand, the development of the framework for Article 6.2 will be largely built on a "case law" basis. This means that how ITMOs are generated and issued may look different from case to case, that the institutional setup for managing the lifecycle of an ITMO may look different from case to case, and that national regulatory frameworks will need to be put in place for Article 6.2 to determine eligible protocols for creating mitigation outcomes.[34]

The JCM is an example of exactly this, and therefore provides a valuable contribution to the understanding of how Article 6.2 may work in the future. However, this does not mean that it is a simple blueprint for Article 6.2; the JCM also needs to be adapted to the guidance that hopefully will be decided at COP 25. The JCM already has anticipated several of the key elements of cooperative approaches so this adapting may proceed smoothly. We are convinced that the JCM will continue to provide lessons learned throughout the coming NDC period.

[34] Footnote 15.

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APPENDIX 1
Approved Methodologies, as of 31 Oct 2019

Partner Country	Methodology	Methodology Type	Number of Successfully Approved Projects
Bangladesh	Energy Efficiency Improvement through the Introduction of Energy-Efficient Air Jet Looms in Textile Industry	Energy Demand	1
Bangladesh	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	1
Bangladesh	Energy Saving by Introduction of High Efficiency Centrifugal Chiller	Energy Demand	1
Cambodia	Installation of LED street lighting system with wireless network control	Energy Demand	0
Cambodia	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	1
Chile	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	1
Costa Rica	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	0
Costa Rica	Energy Saving by Introduction of High Efficiency Centrifugal Chiller	Energy Demand	0
Costa Rica	Installation of Electric Heat Pump Type Water Heater for Hot Water Supply Systems	Energy Demand	0
Ethiopia	Electrification of Communities Using Micro Hydropower Generation	Energy Industries (renewable sources)	0
Ethiopia	Electrification by Photovoltaic Power Generation in Ethiopia	Energy Industries	0
Ethiopia	Introduction of Biomass Combined Heat and Power Plant	Energy Industries (renewable-/non-renewable sources)	0
Indonesia	Power Generation by Waste Heat Recovery in Cement Industry	Energy Industries	1
Indonesia	Energy Saving by Introduction of High Efficiency Centrifugal Chiller	Energy Demand	4

continued on next page

Table continued

Partner Country	Methodology	Methodology Type	Number of Successfully Approved Projects
Indonesia	Installation of Energy-Efficient Refrigerators Using Natural Refrigerant at Food Industry Cold Storage and Frozen Food Processing Plant	Energy Demand	2
Indonesia	Installation of Inverter-Type Air Conditioning System for Cooling for Grocery Store	Energy Demand	1
Indonesia	Installation of LED Lighting for Grocery Store	Energy Demand	1
Indonesia	GHG Emission Reductions through Optimization of Refinery Plant Operation in Indonesia	Energy Demand	1
Indonesia	GHG Emission Reductions through Optimization of Boiler Operation in Indonesia	Energy Demand	1
Indonesia	Installation of a Separate Type Fridge-Freezer Showcase by Using Natural Refrigerant for Grocery Store to Reduce Air Conditioning Load Inside the Store	Energy Demand	1
Indonesia	Replacement of Conventional Burners with Regenerative Burners for Aluminum Holding Furnaces	Energy Demand	0
Indonesia	Introducing Double-Bundle Modular Electric Heat Pumps to a New Building	Energy Demand	1
Indonesia	Installation of Energy Saving Air Jet Loom at Textile Factory	Energy Demand	2
Indonesia	Reduction of Energy Consumption by Introducing an Energy-Efficient Old Corrugated Carton Processing System into a Cardboard Factory	Energy Demand, Manufacturing Industries	1
Indonesia	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	2
Indonesia	Installation of Tribrid Systems to Mobile Communication's Base Transceiver Stations	Energy Industries (renewable-/non-renewable sources)	1
Indonesia	Energy Saving by Introduction of High Efficiency Once-through Boiler	Energy Demand	1
Indonesia	Installation of Gas Engine Cogeneration System to Supply Electricity and Heat to Facility	Energy Industries (renewable-/non-renewable sources)	1
Indonesia	Installation of Solar PV System and Storage Battery System	Energy Industries (renewable-/non-renewable sources)	0
Indonesia	Installation of LED Street Lighting with Lighting Control System	Energy Demand	0

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Table continued

Partner Country	Methodology	Methodology Type	Number of Successfully Approved Projects
Indonesia	Electricity Generation by Installation of Run-of-River Hydro Power Generation System(s) in Indonesia	Energy Industries (renewable-/non-renewable sources)	0
Indonesia	Introduction of Energy-Efficient and High Color Rendering LED Downlight/ Spotlight	Energy Demand	0
Indonesia	Electricity Generation by Rehabilitation of Run-of-River Hydro Power Generation System(s) in Indonesia	Energy Industry (renewable-/non-renewable sources)	0
Indonesia	Introduction of Absorption Chiller	Energy Demand	0
Kenya	Electrification of Communities Using Micro hydropower generation	Energy Industries (renewable sources)	0
Kenya	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	0
Kenya	Installation of Run-of-river Small Hydropower Generation Plant	Energy Industries (renewable-/non-renewable sources)	0
Lao PDR	Installation and Operation of Energy-Efficient Data Center in the Lao PDR	Energy Demand	1
Lao PDR	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	0
Lao PDR	Installation of Energy-Efficient Transformers in a Power Distribution Grid	Energy distribution	0
Myanmar	PowerGeneration and Avoidance of Landfill Gas Emissions through Combustion of Municipal Solid Waste	Energy Industries (renewable-/non-renewable sources), Waste handling and disposal	0
Mongolia	Installation of Energy-Saving Transmission Lines in the Mongolian Grid	Energy distribution	1
Mongolia	Replacement and Installation of High Efficiency Heat-Only Boiler for Hot Water Supply Systems	Energy Industries	2
Mongolia	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	2
Maldives	Displacement of Grid and Captive Genset Electricity by Solar PV System	Energy Industries (renewable-/non-renewable sources)	1
Mexico	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	0
Palau	Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System	Energy Industries (renewable-/non-renewable sources)	3

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Table continued

Partner Country	Methodology	Methodology Type	Number of Successfully Approved Projects
Saudi Arabia	Introduction of High Efficiency Electrolyzer in Chlor-Alkali Processing Plant	Energy Demand	1
Thailand	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	2
Thailand	Energy Saving by Introduction of Multi-stage Oil-Free Air Compressor	Energy Demand	1
Thailand	Energy Saving by Introduction of High Efficiency Inverter Type Centrifugal Chiller	Energy Demand	2
Thailand	Installation of Energy Saving Air Jet Loom at Textile Factory	Energy Demand	1
Thailand	Energy Saving by Introduction of High Efficiency Non-Inverter Type Centrifugal Chiller	Energy Demand	0
Thailand	Installation of Displacement Ventilation Air Conditioning Unit in the Cleanroom of Semiconductor Manufacturing Factory	Energy Demand, Manufacturing Industries	1
Thailand	Power Generation by Waste Heat Recovery in Cement Industry	Energy Industries	1
Thailand	Introducing Heat Recovery Heat Pumps with Natural Refrigerants for the Food Manufacturing Industries	Energy Demand	0
Thailand	Installation of Gas Engine Cogeneration System to Supply Electricity and Heat	Energy Industries (renewable-/non-renewable sources)	0
Viet Nam	Transportation Energy Efficiency Activities by Installing Digital Tachograph Systems	Transport	1
Viet Nam	Introduction of Room Air Conditioners Equipped with Inverters	Energy Demand	1
Viet Nam	Improving the Energy Efficiency of Commercial Buildings by Utilization of High Efficiency Equipment	Energy Demand	1
Viet Nam	Anaerobic Digestion of Organic Waste for Biogas Utilization Within Wholesale Markets	Waste Handling and Disposal	0
Viet Nam	Installation of Energy-Efficient Transformers in a Power Distribution Grid	Energy Distribution	3
Viet Nam	Introduction of Air Conditioning System Equipped with Inverters	Energy Demand	2
Viet Nam	Installation of Solar PV System	Energy Industries (renewable-/non-renewable sources)	1

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Table continued

Partner Country	Methodology	Methodology Type	Number of Successfully Approved Projects
Viet Nam	Installation of LED Lighting Equipment to Fishing Boats	Energy Demand	1
Viet Nam	Installation of Container Formation Facility at Lead Acid Battery Factory	Energy Demand	1
Viet Nam	Introduction of Tunnel and/or Shuttle Kiln with Waste Heat Recovery System	Energy Demand	0
Viet Nam	Energy Saving by Introduction of High Efficiency Inverter Type Centrifugal Chille	Energy Demand	1
Viet Nam	Energy Saving by Introduction of Heat Recovery Electric Heat Pump	Energy Demand	1
Viet Nam	Energy Saving by Introduction of High-Efficiency Double Suction Volute Pumps in Water Supply System	Energy Demand	1
Viet Nam	Introduction of Energy-Efficient Wire Stranding Machines to Automotive Wire Production Factory	Energy Demand	1
Viet Nam	Installation of Compressor Control System(s) for Split Type Air Conditioner(s)	Energy Demand	0

GHG = greenhouse gas, Lao PDR = Lao People's Democratic Republic, LED = light-emitting diode, PV = photovoltaic.
Source: The Joint Crediting Mechanism. https://www.jcm.go.jp (accessed 25 October 2019).

APPENDIX 2
Joint Crediting Mechanism Projects

List of Projects under the Joint Crediting Mechanism Financing Program as of October 2019

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
1	2013	Indonesia	JCM Model Project	Ebara Refrigeration Equipment & Systems Co., Ltd.	Energy Saving for Air-conditioning and Process Cooling at Textile Factory 1	Energy Efficiency Improvement	117
2	2013	Indonesia	JCM Model Project	Lawson, Inc.	Installation of Inverter-type Air Conditioning System LED Lighting and Separate Type Fridge Freezer Showcase to Grocery Stores in Republic of Indonesia	Energy Efficiency Improvement	141
3	2013	Indonesia	JCM Model Project	Mayekawa Manufacturing Co., Ltd.	Energy-Efficient Refrigerants to Cold Chain Industry	Energy Efficiency Improvement	165
4	2013	Indonesia	JCM Model Project	Toyota Tsusho Corporation	Energy Saving by Installation of Double Bundle-type Heat Pump	Energy Efficiency Improvement	175
5	2013	Indonesia	JCM Model Project	Ebara Refrigeration Equipment & Systems Co., Ltd.	Energy Saving for Air-conditioning and Process Cooling at Textile Factory 2	Energy Efficiency Improvement	152

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
6	2013	Mongolia	JCM Model Project	Suuri-Keikaku Co., Ltd.	Upgrading and Installation of Centralized Control System of High-efficiency Heat-Only Boiler	Energy Efficiency Improvement	298
7	2013	Mongolia	JCM Demonstration Project	Hitachi, Ltd.	A High Efficiency and Low Loss Power Transmission and Distribution System in Mongolia	Energy Efficiency Improvement	467
8	2013	Indonesia	JCM Demonstration Project	Azbil Corporation	GHG emission reductions through utility facility operation optimization system for refineries in the Republic of Indonesia	Energy Efficiency Improvement	20,000
9	2013	Indonesia	JCM Demonstration Project	Yokogawa Electric Corporation	Energy saving by optimum operation at an oil refinery	Energy Efficiency Improvement	1,275
10	2013	Palau	JCM Model Project	Pacific Consultants Co., Ltd.	Small-Scale Solar Power Plant for Commercial Facilities in Island States	Renewable Energy	259
11	2014	Indonesia	JCM Model Project	JFE Engineering Corporation	Power Generation by Waste-heat Recovery in Cement Industry	Effective Use of Energy	149,063
12	2014	Indonesia	JCM Model Project	Itochu Corporation	Installation of Solar Power System and Storage Battery to Commercial Facility	Renewable Energy	385

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
13	2014	Indonesia	JCM Model Project	Toyotsu Machinary Corporation	Energy Saving through Introduction of Regenerative Burners to the Aluminum Holding Furnace of the Automotive Components	Energy Efficiency Improvement	91
14	2014	Indonesia	JCM Model Project	Ebara Refrigeration Equipment & Systems Co., Ltd.	Energy Saving for Textile Factory Facility Cooling by High Efficiency Centrifugal Chiller	Energy Efficiency Improvement	205
15	2014	Viet Nam	JCM Model Project	Nippon Express Co., Ltd.	Eco-Driving by Utilizing Digital Tachograph System	Transport	324
16	2014	Viet Nam	JCM Demonstration Project	Mitsubishi Electric Corporation	Promotion of green hospitals by improving efficiency/ environment in national hospitals in Viet Nam	Energy Efficiency Improvement	515
17	2014	Viet Nam	JCM Demonstration Project	Hibiya Engineering, Ltd.	Low carbon hotel project in Viet Nam: Improving the energy efficiency of commercial buildings by utilization of high efficiency equipment	Energy Efficiency Improvement	272
18	2014	Lao PDR	JCM Demonstration Project	Toyota Tsusho Corporation; Internet Initiative Japan Inc.	Lao PDR Energy-Efficient date center (LEED)	Energy Efficiency Improvement	567
19	2014	Maldives	JCM Model Project	Pacific Consultants Co., Ltd.	Solar Power on Rooftop of School Building Project	Renewable Energy	156

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
20	2014	Bangladesh	JCM Model Project	Ebara Refrigeration Equipment & Systems Co., Ltd.	Energy saving for air conditioning & facility cooling by high-efficiency centrifugal chiller (Suburbs of Dhaka)	Energy Efficiency Improvement	107
21	2014	Indonesia	JCM Model Project	Kanematsu Corporation	Introduction of high efficient Old Corrugated Cartons Process at Paper Factory	Energy Efficiency Improvement	19,011
22	2014	Indonesia	JCM Model Project	Toray Industries, Inc.	Reducing GHG emission at textile factories by upgrading to air-saving loom	Energy Efficiency Improvement	742
23	2014	Palau	JCM Model Project	Pacific Consultants Co., Ltd.	Small-Scale Solar Power Plants for Commercial Facilities Project II	Renewable Energy	320
24	2014	Palau	JCM Model Project	Pacific Consultants Co., Ltd.	Solar PV System for Schools Project	Renewable Energy	111
25	2014	Viet Nam	JCM Model Project	Yuko Keiso Co., Ltd.	Introduction of Amorphous high efficiency transformers in power distribution systems	Energy Efficiency Improvement	610
26	2014	Maldives	ADB	Addu Atoll Electric Power Corporation	Smart Micro Grid System at Addu Atoll	Renewable Energy	3,958
27	2015	Indonesia	JCM Model Project	NTT Facilities, Inc.	Energy Saving for Air-Conditioning at Shopping Mall with High Efficiency Centrifugal Chiller	Energy Efficiency Improvement	398

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
28	2015	Indonesia	JCM Model Project	NTT Facilities, Inc.	Energy Saving for Industrial Park with Smart LED Street Lighting System	Energy Efficiency Improvement	543
29	2015	Indonesia	JCM Demonstration Project	KDDI Corporation	Installation of Tribrid System to mobile communication's Base Transceiver Stations in Republic of Indonesia	Energy Efficiency Improvement	359
30	2015	Indonesia	JCM Model Project	Mitsubishi Chemical Corporation	Introduction of High Efficiency Once-through Boiler System in Film Factory	Energy Efficiency Improvement	363
31	2015	Cambodia	JCM Model Project	MinebeaMitsumi Inc.	Introduction of High Efficiency LED Lighting Utilizing Wireless Network	Energy Efficiency Improvement	559
32	2015	Bangladesh	JCM Model Project	Toyota Tsusho Corporation	Installation of High Efficiency Loom at Weaving Factory	Energy Efficiency Improvement	437
33	2015	Bangladesh	JCM Model Project	YKK Corporation	Introduction of PV-diesel Hybrid System at Fastening Manufacturing Plant	Renewable Energy	226
34	2015	Indonesia	JCM Demonstration Project	KDDI Corporation	Installation of Tribrid System to mobile communication's Base Transceiver Stations in Republic of Indonesia	Energy Efficiency Improvement	359
35	2015	Viet Nam	JCM Model Project	NTT Data Institute of Management Consulting, Inc.	Introduction of High Efficiency Air-conditioning in Hotel	Energy Efficiency Improvement	935

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
36	2015	Viet Nam	JCM Demonstration Project	Stanley Electric Co., Ltd.	Energy saving and work efficiency improvement by introducing a new chip-on-board LED system in Viet Nam	Energy Efficiency Improvement	823
37	2015	Viet Nam	JCM Model Project	Ricoh Company, Ltd.	Introduction of Energy-Efficient Air Conditioners in a Lens Factory	Energy Efficiency Improvement	147
38	2015	Thailand	JCM Model Project	FamilyMart Co., Ltd.	Energy Saving at Convenience Stores with High Efficiency Air-Conditioning and Refrigerated Showcase	Energy Efficiency Improvement	223
39	2015	Thailand	JCM Model Project	Pacific Consultants Co., Ltd.	Introduction of Solar PV System on Factory Rooftop	Renewable Energy	491
40	2015	Thailand	JCM Model Project	Toray Industries, Inc.	Reducing GHG Emission at Textile Factory by Upgrading to Airsaving Loom (Samutprakarn)	Energy Efficiency Improvement	390
41	2015	Thailand	JCM Model Project	Sony Semiconductor Manufacturing Corporation	Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor	Energy Efficiency Improvement	365
42	2015	Myanmar	JCM Model Project	JFE Engineering Corporation	Introduction of Waste to Energy Plant in Yangon City	Waste handling and disposal	4,125
43	2015	Viet Nam	JCM Model Project	Hitachi Chemical Company, Ltd.	Energy Saving in Acid Lead Battery Factory with Container Formation Facility	Energy Efficiency Improvement	3,825

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
44	2015	Indonesia	JCM Model Project	Toyota Tsusho Corporation	Installation of Gas Co-generation System for Automobile Manufacturing Plant	Effective Use of Energy	21,793
45	2015	Thailand	JCM Model Project	Nippon Steel & Sumikin Engineering Co., Ltd.	Installation of Co-Generation Plant for On-Site Energy Supply in Motorcycle Factory	Energy Efficiency Improvement/ Effective Use of Energy	7,414
46	2015	Indonesia	JCM Model Project	Sharp Corporation	1.6MW Solar PV Power Plant Project in Jakabaring Sport City	Renewable Energy	917
47	2015	Indonesia	JCM Model Project	Sumitomo Rubber Industries, Ltd.	Introduction of High Efficiency Once-through Boiler in Golf Ball Factory	Energy Efficiency Improvement	363
48	2015	Cambodia	JCM Model Project	Asian Gateway Corporation	Introduction of Ultra-lightweight Solar Panels for Power Generation at International School	Renewable Energy	104
49	2015	Kenya	JCM Model Project	Pacific Consultants Co., Ltd.	Introduction of Solar PV System at Salt Factory	Renewable Energy	888
50	2015	Saudi Arabia	JCM Model Project	Kanematsu Corporation	Introduction of High Efficiency Electrolyzer in Chlorine Production Plant	Energy Efficiency Improvement	3,289
51	2015	Thailand	JCM Model Project	Sony Semiconductor Manufacturing Corporation	Installation of High Efficiency Air Conditioning System and Chillers in Semiconductor Factory	Energy Efficiency Improvement	3,744

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
52	2015	Thailand	JCM Model Project	Inabata & Co., Ltd.	Energy Saving for Air-Conditioning in Tire Manufacturing Factory with High Efficiency Centrifugal Chiller	Energy Efficiency Improvement	305
53	2015	Bangladesh	JCM Model Project	Pacific Consultants Co., Ltd.	50MW Solar PV Power Plant Project	Renewable Energy	40,527
54	2015	Bangladesh	JCM Model Project	Ebara Refrigeration Equipment & Systems Co., Ltd.	Installation of High Efficiency Centrifugal Chiller for Air Conditioning System in Clothing Tag Factory	Energy Efficiency Improvement	578
55	2015	Viet Nam	JCM Model Project	Yuko Keiso Co., Ltd.	Energy Saving in Factories with Air-Conditioning Control System	Energy Efficiency Improvement	3,297
56	2015	Viet Nam	JCM Model Project	Yuko Keiso Co., Ltd.	Introduction of Amorphous High Efficiency Transformers in Southern and Central Power Grids	Energy Efficiency Improvement	3,885
57	2015	Viet Nam	JCM Model Project	Toto Ltd.	Installation of High Efficiency Kiln in Sanitary Ware Manufacturing Factory	Energy Efficiency Improvement	311
58	2015	Viet Nam	JCM Model Project	Aeon Retail Co., Ltd.	Introduction of Solar PV System at Shopping Mall in Ho Chi Minh City	Renewable Energy	125
59	2015	Mongolia	JCM Model Project	Sharp Corporation	10MW Solar Power Project in Darkhan City	Renewable Energy	11,221

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
60	2015	Mongolia	JCM Model Project	Farmdo Co., Ltd.	Installation of 2.1MW Solar Power Plant for Power Supply in Ulaanbaatar Suburb	Renewable Energy	2,424
61	2015~2016	Indonesia	REDD+	Kanematsu Corporation	REDD+ project in Boalemo District	REDD+	86,520
62	2015~2017	Lao PDR	REDD+	Waseda University	REDD+ project in Luang Prabang Province through controlling slash-and-burn	REDD+	140,000
63	2016	Mongolia	JCM Model Project	Farmdo Co., Ltd.	Installation of 8.3MW Solar Power Plant in Ulaanbaatar suburb Farm	Renewable Energy	9,585
64	2016	Viet Nam	JCM Model Project	Yokohama Water Co., Ltd.	Introduction of High Efficiency Water Pumps in Da Nang City	Energy Efficiency Improvement	738
65	2016	Viet Nam	JCM Model Project	Hoya Corporation	Installation of Energy Saving Equipment in Lens Factory	Energy Efficiency Improvement	1,220
66	2016	Indonesia	JCM Model Project	Toyo Energy Farm Co., Ltd.	10MW Mini Hydro Power Plant Project in North Sumatra	Renewable Energy	47,182
67	2016	Indonesia	JCM Model Project	Fast Retailing Co., Ltd.	Introduction of LED Lighting to Sales Stores	Energy Efficiency Improvement	2,583
68	2016	Indonesia	JCM Model Project	Nisshinbo Textile Inc.	Introduction High Efficiency Looms in Weaving Mill	Energy Efficiency Improvement	354
69	2016	Indonesia	JCM Model Project	EMATEC: Environmental Management and Technology	Energy Saving in Industrial Wastewater Treatment System for Rubber Industry	Energy Efficiency Improvement	403
70	2016	Costa Rica	JCM Model Project	NTT Data Institute of Management Consulting, Inc.	5MW Solar Power Project in Belen	Renewable Energy	2,245

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
71	2016	Costa Rica	JCM Model Project	NTT Data Institute of Management Consulting, Inc.	Introduction of the High Efficiency Chiller and the Exhaust Heat Recovery System	Energy Efficiency Improvement	585
72	2016	Cambodia	JCM Model Project	AEON Mall Co., Ltd.	Introduction of 1MW Solar Power System and High Efficiency Centrifugal Chiller in Large Shopping Mall	Energy Efficiency Improvement/ Renewable Energy	881
73	2016	Mexico	JCM Model Project	NTT Data Institute of Management Consulting, Inc.	Introduction of 2.4MW Power Generation with Methane Gas Recovery System	Waste handling and disposal	122,314
74	2016	Myanmar	JCM Model Project	Kirin Holdings Company, Limited	Introduction of Energy Saving Brewing Systems to Beer Factory	Energy Efficiency Improvement	2,841
75	2016	Myanmar	JCM Model Project	Acecook Co., Ltd.	Introduction of High-efficiency Once-through Boiler in Instant Noodle Factory	Energy Efficiency Improvement	674
76	2016	Thailand	JCM Model Project	AGC Inc.	Introduction of High Efficiency Ion Exchange Membrane Electrolyzer in Caustic Soda Production Plant	Energy Efficiency Improvement	2,591
77	2016	Thailand	JCM Model Project	Fast Retailing Co., Ltd.	Introduction of LED Lighting to Sales Stores	Energy Efficiency Improvement	1,649
78	2016	Thailand	JCM Model Project	Tepia Corporation Japan Co., Ltd.	Introduction of High Efficiency Chilled Water Supply System in Milk Factory	Energy Efficiency Improvement	941

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
79	2016	Viet Nam	JCM Model Project	Yuko Keiso Co., Ltd.	Introduction of Amorphous High Efficiency Transformers in Northern, Central and Southern Power Grids	Energy Efficiency Improvement	3,477
80	2016	Viet Nam	JCM Model Project	Yazaki Parts Co., Ltd.	Introduction of Energy Saving Equipment to Automotive Wire Production Factory	Energy Efficiency Improvement	591
81	2016	Thailand	JCM Model Project	NTT Data Institute of Management Consulting, Inc.	Introduction of 12MW Power Generation System by Waste Heat Recovery for Cement Plant	Effective Use of Energy	29,746
82	2016	Thailand	JCM Model Project	Denso Corporation	Introduction of Co-generation System to Motor Parts Factory	Energy Efficiency Improvement/ Effective Use of Energy	5,904
83	2016	Thailand	JCM Model Project	Kyowa Hakko Bio Co., Ltd.	Introduction of Energy Saving Refrigerator and Evaporator with Mechanical Vapor Recompression in Amino Acid Producing Plant	Energy Efficiency Improvement	1,527
84	2016	Thailand	JCM Model Project	Sharp Corporation	Introduction of 3.4MW Rooftop Solar Power System to Air-conditioning Parts Factories	Renewable Energy	1,179
85	2016	Thailand	JCM Model Project	Finetech Co., Ltd.	Introduction of 2MW Rooftop Solar Power System for Power Supply in Factory	Renewable Energy	844

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
86	2016	Thailand	JCM Model Project	Kanematsu Corporation	Introduction of Energy-Efficient Refrigeration System in Industrial Cold Storage	Energy Efficiency Improvement	293
87	2016	Myanmar	JCM Model Project	Fujita Corporation	Rice Husk Power Generation in Rice Mill Factory in Ayeyarwady	Renewable Energy	4,080
88	2016	Mexico	JCM Model Project	Suntory Spirits Limited	Introduction of Once-through Boiler and Fuel Switching to Tequila Plant	Energy Efficiency Improvement	3,435
89	2016	Thailand	JCM Model Project	CPF Japan Co., Ltd.	Introduction of Heat Recovery Heat Pumps to Food Processing Factory	Energy Efficiency Improvement	985
90	2016	Indonesia	JCM Model Project	Next Energy & Resources Co., Ltd.	Introduction of 0.5MW Solar Power System to Aroma and Food Ingredients Factory	Renewable Energy	369
91	2016	Thailand	JCM Model Project	TSB Co., Ltd.	Introduction of 5MW Floating Solar Power System on Industrial Water Reservoir	Renewable Energy	2,706
92	2016	Cambodia	JCM Model Project	METAWATER Co., Ltd.	Energy Saving by Inverters for Distribution Pumps in Water Treatment Plant	Energy Efficiency Improvement	406
93	2016	Chile	JCM Model Project	Waseda Environmental Institute Co., Ltd.	Introduction of 1MW Rooftop Solar Power System to University	Renewable Energy	511

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
94	2016	Myanmar	JCM Model Project	Ryobi Holdings Co., Ltd.	Introduction of Energy-Efficient Refrigeration System in Logistics Center	Energy Efficiency Improvement	125
95	2016	Thailand	JCM Model Project	Sharp Corporation	Introduction of 30MW Rooftop Solar Power System to Large Supermarkets	Renewable Energy	13,293
96	2016	Thailand	JCM Model Project	Bando Chemical Industries, Ltd.	Introduction of High-efficiency Boiler System to Rubber Belt Plant	Energy Efficiency Improvement	3,060
97	2016	Thailand	JCM Model Project	Yuasa Tradng Co., Ltd.	Energy Saving by Air-Conditioning Control System in Precision Parts Factories	Energy Efficiency Improvement	2,493
98	2017	Mongolia	JCM Model Project	Sharp Corporation	Introduction of 15MW Solar Power System near New Airport	Renewable Energy	18,438
99	2017	Viet Nam	JCM Model Project	Yuko Keiso Co., Ltd.	Introduction of Amorphous High Efficiency Transformers in Southern and Central Power Grids	Energy Efficiency Improvement	1,469
100	2017	Viet Nam	JCM Model Project	Yuasa Tradng Co., Ltd.	Introduction of High Efficiency Centrifugal Chiller to Rubber Products Factory	Energy Efficiency Improvement	289
101	2017	Viet Nam	JCM Model Project	Sapporo International Inc.	Introduction of Energy Saving Equipment to Brewery	Energy Efficiency Improvement	111
102	2017	Lao PDR	JCM Model Project	TSB Co., Ltd.	Introduction of 14MW floating solar power system in Vientiane	Renewable Energy	11,450

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
103	2017	Lao PDR	JCM Model Project	Yuko Keiso Co., Ltd.	Introduction of Amorphous High Efficiency Transformers in Power Grid	Energy Efficiency Improvement	2,099
104	2017	Mexico	JCM Model Project	Kyuden International Corporation	Los Altos II Wind Farm Project	Renewable Energy	66,351
105	2017	Mexico	JCM Model Project	Sharp Corporation	20MW Solar Power Project in Guanajuato	Renewable Energy	14,682
106	2017	Thailand	JCM Model Project	Fuji-Foods Corporation	Introduction of Biomass Co-Generation System to Food Factory	Renewable Energy	7,111
107	2017	Thailand	JCM Model Project	Yokohama Port Corporation	Introduction of Energy-Efficient Equipment to Bangkok Port	Energy Efficiency Improvement/ Renewable Energy	5,491
108	2017	Philippines	JCM Model Project	Toyota Tsusho Corporation	15MW Mini Hydro Power Plant Project in Siguil River in Mindanao	Renewable Energy	49,073
109	2017	Philippines	JCM Model Project	Chodai Co., Ltd.	4MW Mini Hydro Power Plant Project in Taguibo River in Mindanao	Renewable Energy	5,675
110	2017	Philippines	JCM Model Project	Tokyo Century Corporation	Introduction of 1.53MW Rooftop Solar Power System in Auto Parts Factories	Renewable Energy	1,124
111	2017	Philippines	JCM Model Project	Toyota Motor Corporation	Introduction of 1MW Rooftop Solar Power System in Vehicle Assembly Factory	Renewable Energy	731

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
112	2017	Indonesia	JCM Model Project	DENSO Corporation	Introduction of Gas Co-generation System and Absorption Chiller to Motor Parts Factory	Energy Efficiency Improvement/ Effective Use of Energy	4,629
113	2017	Indonesia	JCM Model Project	Tokyo Century Corporation	Introduction of Absorption Chiller to Chemical Factory	Energy Efficiency Improvement	917
114	2017	Mongolia	JCM Model Project	Sharp Corporation	Introduction of 20MW Solar Power System in Darkhan City	Renewable Energy	22,927
115	2017	Indonesia	JCM Model Project	Chodai Co., Ltd.	10MW Mini Hydro Power Plant Project in Lae Ordi River in North Sumatra	Renewable Energy	37,699
116	2017	Philippines	JCM Model Project	Tokyo Century Corporation	Installation of 1.2MW Rooftop Solar Power System in Refrigerating Warehouse	Renewable Energy	838
117	2017	Cambodia	ADB	Ministry of Public Works and Transport	Battambang Wastewater Treatment Project	Energy Efficiency Improvement	6,371
118	2018	Mongolia	JCM Model Project	Sharp Energy Solutions Corporation	21MW Solar Power Project in Bayanchandmani	Renewable Energy	27,008
119	2018	Viet Nam	JCM Model Project	Nihon Crant Co. Ltd.	Modal Shift from Truck to Cargo Ship with Freshness Preservation Reefer Container	Transport	10,061
120	2018	Viet Nam	JCM Model Project	Yokohama Water Co., Ltd.	Energy Saving by Introduction of Inverters for Raw Water Intake Pumps	Energy Efficiency Improvement	1,043

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Table continued

No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
121	2018	Indonesia	JCM Model Project	Otsuka Pharmaceutical Factory, Inc.	Energy Saving by Introducing High Efficiency Autoclave to Infusion Manufacturing Factory	Energy Efficiency Improvement	1,949
122	2018	Indonesia	JCM Model Project	Hokusan Co., Ltd.	Introduction of CNG-Diesel Hybrid Equipment to Public Bus in Semarang	Transport	2,667
123	2018	Palau	JCM Model Project	Sharp Energy Solutions Corporation	Introduction of 0.4MW Rooftop Solar Power System in Supermarket	Renewable Energy	296
124	2018	Mexico	JCM Model Project	Sharp Energy Solutions Corporation	30MW Solar Park Project in Guanajuato	Renewable Energy	36,416
125	2018	Myanmar	JCM Model Project	Global Engineering Co., Ltd.	Introduction of 8.8MW Power Generation System by Waste Heat Recovery for Cement Plant	Effective Use of Energy	19,241
126	2018	Thailand	JCM Model Project	The Kansai Electric Power Company, Incorporated	Introduction of Gas Co-generation System and Absorption Chiller to Fiber Factory	Energy Efficiency Improvement/ Effective Use of Energy	17,851
127	2018	Thailand	JCM Model Project	Tokyo Century Corporation	25MW Rooftop and Floating Solar Power Project in Industrial Park	Renewable Energy	10,678
128	2018	Thailand	JCM Model Project	Toyota Motor Corporation	Introduction of 3.4 MW Rooftop Solar Power System in Technical Center and Office Buildings	Renewable Energy	1,617

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No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
129	2018	Philippines	JCM Model Project	Chodai Co., Ltd.	2.5MW Rice Husk Power Generation Project in Butuan City, Mindanao	Renewable Energy	10,577
130	2018	Philippines	JCM Model Project	Sharp Energy Solutions Corporation	Introduction of 4MW Rooftop Solar Power System in Tire Factory	Renewable Energy	2,858
131	2018	Philippines	JCM Model Project	Chodai Co., Ltd.	0.16MW Micro Hydro Power System in Taguibo Water Supply Facility, Mindanao	Renewable Energy	488
132	2018	Indonesia	JCM Model Project	Voith Fuji Hydro K. K.	Rehabilitation Project of Power Generation System at karai 7 Mini Hydro Power Plant	Renewable Energy	1,133
133	2018	Mexico	JCM Model Project	Suntory Spirits Limited	Introduction of Energy-Efficient Distillation System to Tequila Plant	Energy Efficiency Improvement	1,493
134	2018	Chile	JCM Model Project	Liberal Solution Co., Ltd.	2MW Solar Power and 4MWh Strage Battery Project in San Pedro de Atacama city	Renewable Energy	2,352
135	2018	Myanmar	JCM Model Project	Kirin Holdings Company, Limited	Introduction of Biogas Boiler and Waste Heat Recovery System to Beer Factory	Energy Efficiency Improvement/ Renewable Energy	3,508
136	2018	Kenya	JCM Model Project	Sharp Energy Solutions Corporation	38MW Solar Power Project in Makueni county	Renewable Energy	35,034
137	2018	Lao PDR	JCM Model Project	Sharp Energy Solutions Corporation	11MW Solar Power Project in Savannakhet Province	Renewable Energy	4,784

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No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
138	2018	Indonesia	JCM Model Project	Aura Green Energy Co., Ltd.	12MW Biomass Power Plant Project in Aceh Province, Sumatra	Renewable Energy	31,322
139	2018	Indonesia	JCM Model Project	Tokyo Century Corporation	Introduction of High Efficiency Injection Molding Machine to Plastic Parts Factory	Energy Efficiency Improvement	4,380
140	2018	Thailand	JCM Model Project	TEPIA Corporation Japan Co.,Ltd.	Introduction of Biomass Boiler to Cooking Oil Factory	Renewable Energy	29,759
141	2018	Thailand	JCM Model Project	Kanematsu KGK Corp.	Introduction of 0.8MW Solar Power System and High Efficiency Refrigerator to Food Factory	Energy Efficiency Improvement/ Renewable Energy	481
142	2018	Bangladesh	ADB	Power Grid Company of Bangladesh, Ltd.	Introduction of High Efficiency Transmission Line in South-West area (between Barisal and Gopalganj) of Bangladesh	Energy Efficiency Improvement	23,000
143	2018	Mongolia	ADB	Ministry of Energy	Upscaling Renewable Energy Sector Project	Renewable Energy	6,423
144	2018	Thailand	JCM F-gas Project	Dowa Eco-System Co., Ltd.	Project on Introduction of Scheme for Fluorocarbons Recovery and Destruction with Utilization of Existing Waste Incineration Plant	F-gas Recovery and Destruction	12,512

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No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
145	2018	Viet Nam	JCM F-gas Project	Marubeni Corporation	Development of Collection Scheme and Introduction of Dedicated System for Destruction of Used Fluorocarbons	F-gas Recovery and Destruction	6,294
146	2019	Mongolia	JCM Model Project	Saisan Co.,Ltd.	Fuel Conversion by Introduction of LPG Boilers to Beverage Factory	Energy Efficiency Improvement	5,781
147	2019	Viet Nam	JCM Model Project	Hitachi Zosen Corporation	Waste to Energy Project in Hanoi City	Waste handling and disposal	119,870
148	2019	Viet Nam	JCM Model Project	Yokohama Water Co., Ltd.	Energy Saving by Introduction of High Efficiency Water Pumps in Hue City	Energy Efficiency Improvement	4,060
149	2019	Palau	JCM Model Project	Sharp Energy Solutions Corporation	Introduction of 1MW Solar Power System on Supermarket Rooftop	Renewable Energy	842
150	2019	Mexico	JCM Model Project	Sharp Energy Solutions Corporation	30MW Solar Power Project in La Paz city	Renewable Energy	36,724
151	2019	Philippines	JCM Model Project	Voith Fuji Hydro K.K.	19 MW Mini Hydro Power Plant Project in Isabela Province	Renewable Energy	46,836
152	2019	Philippines	JCM Model Project	Tokyo Century Corporation	18MW Solar Power Project in Collaboration with Power Supply Company	Renewable Energy	11,743
153	2019	Viet Nam	JCM Model Project	Daiichi Jitsugyo Co., Ltd.	Introduction of Biomass Boiler to Chemical Factory	Renewable Energy	16,882

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No	Year	Partner Country	Type	Participants	Project Title	Sector	Expected GHG Emission Reductions (tCO_2/y)
154	2019	Thailand	JCM Model Project	Toyota Motor Corporation	Introduction of 37MW Solar Power System and High Efficiency Melting Furnace in Vehicle & Engine Factory	Energy Efficiency Improvement/ Renewable Energy	19,483
156	2019	Thailand	JCM Model Project	Nippon Steel Engineering Co., Ltd.	Efficiency Improvement of Co-generation System by Installation of Heat Exchanger in Fiber Factory	Energy Efficiency Improvement	359
157	2019	Philippines	JCM Model Project	Itochu Corporation	Biogas Power Generation and Fuel Conversion Project in Pineapple Canneries	Renewable Energy	52,156
158	2019	Mongolia	JCM Model Project	Ulanbataar City Health Department	Improving Access to Health Services for Disadvantaged Groups Investment Program	Energy Efficiency Improvement/ Renewable Energy	2,993

ADB = Asian Development Bank, CNG = compressed natural gas, GHG = greenhouse gas, JCM = Joint Crediting Mechanism, LED = light-emitting diode, LPG = liquefied petroleum gas, MW = megawatt, MWh = tCO_2/y, PV = photovoltaic, REDD+ = reducing emissions from deforestation and forest degradation in developing countries, tCO_2/y = tons of carbon dioxide per year.

Sources: Asian Development Bank (ADB), Global Environment Center Foundation (GEC), New Energy and Industrial Technology Development Organization (NEDO), 2019.

Article 6 of the Paris Agreement

Drawing Lessons from the Joint Crediting Mechanism

The Article 6 of the Paris Agreement lays the foundation for countries to use cooperative approaches in achieving and raising climate ambitions articulated in their respective nationally determined contributions. As the rulebook for Article 6 is expected to be adopted at COP25 in Madrid, it is pertinent to learn from the wealth of knowledge and experience of the existing mechanisms. The Joint Crediting Mechanism initiated by the Government of Japan in 2013 demonstrates how bilateral cooperative approaches could be designed and implemented for fostering mitigation actions to the benefit of partnering countries. This publication is an effort to provide insights into the Joint Crediting Mechanism and the lighthouse it could provide for navigating ongoing negotiations on Article 6 of the Paris Agreement and guiding future development of new market mechanisms.

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