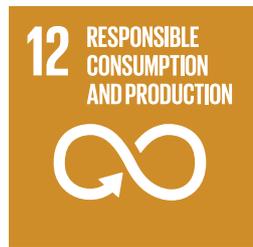
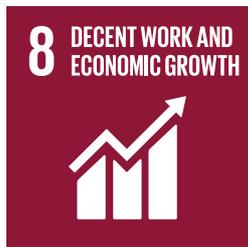




JOINT CREDITING MECHANISM CONTRIBUTIONS TO SUSTAINABLE DEVELOPMENT GOALS



Ministry of the Environment

IGES
Institute for Global
Environmental Strategies

Table of Contents

1. Introduction	2
2. Overview of the analysis	4
3. Target JCM projects for the analysis	5
4. Goals and Targets	6
5. Case Studies	20
6. Summary	24

Authors:

Temuulen Murun, Policy Researcher, Climate and Energy, IGES

Akibi Tsukui, Policy Researcher, Climate and Energy, IGES

Contributors:

Kentaro Takahashi, Programme Manager, Climate and Energy, IGES

Tetsuro Yoshida, Research Manager, Sustainability Governance Centre, IGES

Shinji Onoda, Policy Researcher, Sustainability Governance Centre, IGES

Toru Taguchi, Policy Researcher, Climate and Energy, IGES

Emma Fushimi, Editing Coordinator, Strategic Management office, IGES

Copyright ©2020 Ministry of the Environment, Japan

All copyrights are reserved. The source must be clearly stated if this report is cited, reproduced, translated or transmitted in any form or by any means.

Copyrights for the top left photograph and the bottom left photograph belong to Toyota Tsusho Corporation and Everyday Farm LLC, respectively. Copyrights for the remaining photographs belong to Global Environment Centre Foundation (GEC).

Published in March 2020

This report is printed on eco-friendly paper

1. Introduction

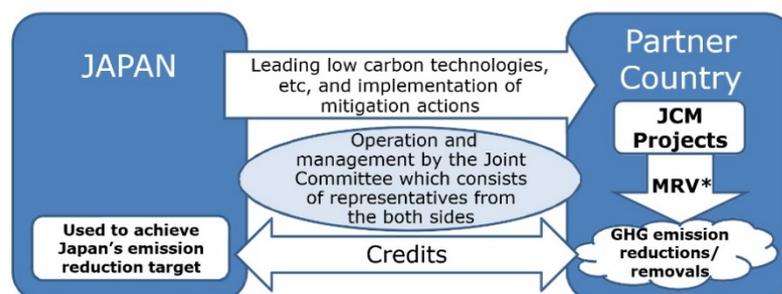
Objective of the Joint Crediting Mechanism (JCM)

The Joint Crediting Mechanism (JCM) facilitates diffusion of leading low-carbon and zero emission technologies, products, systems, services and infrastructure, and contributes to sustainable development in developing countries. Under the JCM, greenhouse gas (GHG) emission reductions or removals are quantitatively evaluated by applying measurement, reporting and verification (MRV) methodologies and used to achieve emission reduction targets in Japan and partner countries. In this way, the GHG emission reductions and removals through the JCM contribute to the ultimate goal of United Nations Framework Convention on Climate Change (UNFCCC).

In 2015, the Paris Agreement (PA) was enacted with the aim of “keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius”. Article 6 of PA regulates the international market mechanisms to contribute to achievement of this long-term goal. Especially under Article 6.2 of PA, the cooperative approach is to utilise mitigation outcomes for the achievement of each country’s emission reduction target in Nationally Determined Contribution (NDC). The JCM has been receiving much attention in recent years as a pioneering scheme based on Article 6.2. To achieve NDCs, both developed and developing countries have to commit to low-carbonisation and de-carbonisation. However, many advanced low-carbon and zero emission technologies have high upfront costs, making it difficult for developing countries to recover their investment. Therefore, the Japanese government covers a part of initial investment to install the low-carbon and zero emission technologies through the JCM.

By March 2020, 17 countries¹ participated in the JCM and 61 projects were registered. Through the JCM, 83,223 tonnes of carbon dioxide (CO₂) emission reductions were issued as credits. By 2030, 50 million – 100 million tonnes of GHG emission reductions or removals are expected to have been achieved through the JCM. So far, disseminated technologies have included various types such as solar PV power generation, energy efficiency technologies, eco-drive technologies, high-efficiency refrigerator system, co-generation, and methane absorption technology.

From 2020, the implementation of the Paris Agreement will begin and Parties are required to take actions toward achievement of NDC. The JCM supports the introduction of advanced technologies that can reduce GHG emissions by responding to the needs of partner countries, meaning that the mechanism contributes to emission reduction achievement both in Japan and partner countries.



2

Under the JCM, representatives from both countries’ governments establish a Joint Committee, which makes important decisions for JCM project-related matters including approving methodologies, registering projects and notification of issuing credits

¹ As of March 2020, Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Laos, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand, Philippines <https://www.jcm.go.jp/>

² JCM website <https://www.jcm.go.jp/>

Linkage between Sustainable Development Goals (SDGs) and the JCM

In 2015 when the Paris Agreement was adopted, the international community agreed on another ambitious framework: “The 2030 Agenda for Sustainable Development” (Agenda 2030), including the Sustainable Development Goals (SDGs). The SDGs depict a universal blueprint for sustainable society and consist of 17 goals and 169 targets. To achieve the goals, all stakeholders, including developing and developed countries, national and local governments, civil society and the private sector, are expected to strengthen and accelerate initiatives as one team.

In November 2019, the United Nations Department of Economic and Social Affairs and the United Nations Framework Convention on Climate Change (UNFCCC) published a report entitled “Maximizing Co-benefits by Linking Implementation of the Sustainable Development Goals and Climate Action³”, which seeks further collaborative approaches to maximise synergies and minimise trade-offs for achieving the objective of the PA and SDGs. For instance, the report summarises that the transition to sustainable energy (Goal 7) can significantly reduce GHG emissions and contribute to achieve the PA’s long-term temperature goal. Development of sustainable industrialisation (Goal 9), sustainable food production systems and resilient agricultural practices (Goal 2), and transition to sustainable consumption and production (Goal 12) can lead to a lower emission pathway, the creation of new kinds of jobs as well as making long-term progress towards eradicating poverty. In addition, the report states that, although many initiatives are implemented following international frameworks such as NDCs, progress towards these goals is slow. There have been requests to take urgent actions beyond borders.

The JCM is a framework for strengthening partnerships at the global level, which enables countries and regions to simultaneously promote actions towards climate change and SDGs. For instance, introducing renewable energy and energy efficiency technologies can reduce GHG emissions directly. Developing these projects can strengthen the relationship with the partner countries, support their shift towards decarbonisation society, and increase resilience to climate change.



4

This report is the first publication to analyse the interlinkage between JCM and SDGs and aims to clarify how the JCM contributes to SDGs targets. The JCM projects are mainly developed between a Japanese company and a local company in the partner country; therefore, we included interviews from those companies participating in the JCM in order to give a private sector perspective. We believe that understanding the interlinkage between JCM and SDGs would be the important step to accelerate further contribution towards SDGs through JCM project implementation.

³ Conference Summary on Global Conference on Strengthening Synergies between the Paris Agreement on Climate Change and The 2030 agenda for Sustainable Development: “Maximizing Co-benefits by Linking Implementation of the Sustainable Development Goals and Climate Action”

https://sustainabledevelopment.un.org/content/documents/22398Summary_document_Copenhagen_FINAL_for_website.pdf

⁴ UN Sustainable Development Goals <https://www.un.org/sustainabledevelopment/news/communications-material/>

2. Overview of the analysis

In this report, we included a quantitative and qualitative assessment of the JCM scheme, registered JCM projects, an assessment of the JCM project design document (PDD), a literature review on UN published reports and JCM related materials, as well as interviews and online surveys from project participants in both Japan and the partner countries.

In Section 4, the JCM scheme and its projects were assessed based on the quantitative and qualitative indicators to measure the projects' contribution to SDGs and their Targets. We have developed unique quantitative indicators to evaluate the JCM project progress towards SDGs in quantitative data. We utilised the "Business Reporting on the SDGs: An Analysis of Goals and Targets"⁵ report published by the Global Reporting Initiative (GRI) and United Nations Global Compact (UNGC) as a reference to develop these indicators. The 232 Indicators of the SDGs are used to measure the progress worldwide, not for business activities. Therefore, the report by GRI and UNGC is for the private sector to evaluate the companies' business contribution to the SDGs and their Targets by using different types of indicators. Since the JCM projects are mainly developed between a Japanese company and a local company, we used the report to develop indicators for the JCM because it is suitable to assess project activities. The quantitative data for assessing progress was collected from the IGES database⁶ and other available sources. For the JCM data, we utilised the IGES JCM database, which describes project technologies, product types, and country basis. We also assessed the PDD for each JCM project, including methodology, emission reductions, and monitoring report.

The qualitative indicators of the JCM are used to qualitatively assess the JCM scheme and individual project contributions to SDGs and their Targets. We developed these indicators because some of the SDGs targets and contributions are difficult to quantify. The unique qualitative indicators have been developed based on the above mentioned report.

In Section 5, we introduced the JCM case studies that include interviews and online surveys with the Japanese companies and local companies in the partner countries in order to examine how each project can contribute to the SDGs in practice. We selected four projects in Viet Nam, Mongolia, Bangladesh and Indonesia, and conducted interviews with four Japanese companies and one local company, and online surveys for two local companies in the case studies.

⁵ GRI and UN Global Compact, Business Reporting on the SDGs: An Analysis of Goals and Targets <https://www.unglobalcompact.org/library/5361>

⁶ IGES JCM Database <https://www.iges.or.jp/en/pub/iges-joint-crediting-mechanism-jcm-database/en>

3. Target JCM projects for the analysis

We selected 57 registered projects with 15 renewable energy (RE) projects and 42 energy efficiency (EE) projects. For the analysis, we categorised these projects into nine groups (Table 1). This classification is based on our qualitative and quantitative assessment of the registered projects toward SDGs and their Targets. Therefore, some projects overlap across different categories.

The JCM scheme in Section 4, Goals and Targets, refers to the JCM project development, technical training and seminars, the JCM financial support, the issued JCM credits, which are all actions and progress implemented under the JCM.

Table 1. Types of JCM project and explanations

Types of Project	Explanation
RE projects	Renewable energy (RE) projects include solar photovoltaic (PV) power generation in factories and farms, and rooftop solar PV power generation in school buildings, commercial facilities and shopping malls. Example: 10MW Solar Power Project in Darkhan City, https://www.jcm.go.jp/projects/22
EE projects	Energy efficiency (EE) projects aim to introduce advanced low-carbon and zero emission technologies and equipment such as high-efficiency refrigerator systems, gas co-generation, and chillers and compressors in factories. This category also includes energy efficiency technologies in public and energy infrastructure. Example: Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor, https://www.jcm.go.jp/projects/45
Agriculture related projects	These projects are mainly solar PV power generation in the agriculture sector. Example: Installation of 12.7 MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb, https://www.jcm.go.jp/projects/21
EE projects in factories	Energy efficiency (EE) projects include advanced low-carbon technologies and equipment installed in the manufacturing sector. This category also includes energy efficiency technologies in water infrastructure. Example: Installation of High Efficiency Loom at Weaving Factory, https://www.jcm.go.jp/projects/38
Waste recycling related projects	Waste recycling related projects are energy efficiency technologies introduced in recycling waste treatment factories. Example: Reduction of Energy Consumption by Introducing an Energy-Efficient Waste Paper Processing System into a Packaging Paper Factory, https://www.jcm.go.jp/projects/29
Transportation related projects	These projects are to improve fuel efficiency in the transportation sector. Example: Eco-Driving by Utilizing Digital Tachograph System, https://www.jcm.go.jp/projects/7
Energy transmission projects	Energy transmission projects cover high efficiency transmission and distribution system introduction in energy infrastructure sector. Example: Introduction of Amorphous High Efficiency Transformers in Southern and Central Power Grids, https://www.jcm.go.jp/projects/35
Water utility related projects	Water utility related projects are advanced low-carbon technology and equipment installed in water infrastructure sector. Example: Introduction of High Efficiency Water Pumps in Da Nang City, https://www.jcm.go.jp/projects/55

4. Goals and Targets



Goal 2. Zero Hunger

“Ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture will lead to a stable supply of food for all worldwide”⁷. Despite a great deal of effort over many years, as of 2017, the number of people facing starvation in the world was on the rise with approximately 821 million people malnourished. The primary causes of severe food crises are extreme weather due to climate change, and conflicts⁸. Eliminating hunger requires simultaneous measures in the agriculture sector as well as mitigation actions towards climate change. By supporting the introduction of renewable energy and energy efficiency technologies in the agricultural sector, the JCM is contributing to building sustainable food production systems and reducing GHG emissions.

According to the qualitative indicators for JCM contributions to Goal 2 (Table 2), the projects for the installation of solar photovoltaic (PV) power generation on farmland have contributed to Targets 2.4 and 2.a. Introducing RE projects and low-carbon technologies in the agriculture sector reduces GHG emissions, thereby contributing to climate change mitigation. The amount of sustainable food production is increasing due to implementation of projects because revenue from selling electricity generated from solar PV power stations can secure a stable income. The projects also aim to establish a production system, which is suited to the local environment, by utilising revenue to introduce advanced agricultural technologies from Japan. These initiatives are raising the awareness of employees toward sustainable food consumption. Achieving Target 2.4 requires investment in infrastructure and technology through international cooperation. Developing low-carbon technologies and RE projects in agriculture in different parts of the world would expand sustainable agriculture practices.

Table 2. Qualitative indicators for the JCM to measure its contribution to Goal 2

Goal and Target		Qualitative indicator	JCM Project
2.4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Taking actions to mitigate climate change impacts and to reduce greenhouse gasses	Agriculture related projects
		Increasing the proportion of sustainably produced goods and services	Agriculture related projects
		Raising the awareness of employees on sustainable food consumption	Agriculture related projects
2.a	Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries	Investing in sustainable agriculture by low-carbon technologies and RE	Agriculture related projects

⁷ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-02/>

⁸ UNICEF, The State of Food Security and Nutrition in the World 2019 <https://data.unicef.org/resources/sofi-2019/#:~:text=This%20Year's%20The%20State%20of,%20economic%20slowdowns%20and%20downturns.>



Goal 3. Good Health and Well-Being

“Ensuring healthy lives and promoting well-being for all at all ages is an important basic human right”⁹. One consequence of the rapid economic development of recent years has been worsening air pollution, especially in developing countries. Air pollution is a major environmental risk to health. In 2016, approximately 4.2 million people died as a result of ambient air pollution from traffic, industry, power generation, waste-burning and residential fuel combustion⁹. Air pollution can be reduced by lowering the concentration of particulate matter (PM_{2.5}), ozone (O₃), nitrogen dioxide (NO₂) and sulfur dioxide (SO₂) in the atmosphere. This requires introducing cleaner transportation systems and renewable energy, energy-efficiency in housing and industry, as well as policies and investment for properly managing urban waste. The JCM supports the reduction of air pollutants by disseminating renewable energy projects and digital tachograph technologies in the partner countries.

Based on the quantitative indicator of JCM contributions to Goal 3 (Table 3), the JCM has contributed to Target 3.9 by implementing RE projects and digital tachograph projects. A digital tachograph is an operation recorder that records information such as speed, running time and driving distance on a memory card. Recorded driving data collected by a digital tachograph is used to improve driving skills so that drivers are more efficient, which improves fuel efficiency and reduces exhaust gas emissions from vehicles. Such projects can reduce air pollutant concentration and health risks which meets Target 3.9 of the SDGs. Based on the quantitative indicator, the amount of CO₂ was reduced by 76,786 tonnes through this project implementation by 2019.

Table 3. Quantitative indicators for the JCM to measure its contribution to Goal 3

Goal and Target		Quantitative indicator	Unit	JCM Project
3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	CO ₂ emission reductions	tCO ₂	RE projects, Transportation related projects

By using the qualitative indicator (Table 4) to evaluate JCM project contributions to SDGs, RE projects in countries with severe air pollution can contribute to Target 3.9 of the SDGs. Environmentally sound technologies (EST) refer to technologies that protect the environment, use all resources in a sustainable manner with less pollution, reuse more waste and products, and handle residual waste using methods that are preferable to alternative technologies¹⁰. Using these technologies can reduce environmental pollutants and health damages of employees from hazardous substances.

Table 4. Qualitative indicators for the JCM to measure its contribution to Goal 3

Goal and Target		Qualitative indicator	JCM Project
3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Using environmentally sound technologies (EST)	RE projects, Transportation related projects

⁹ UN Statistics <https://unstats.un.org/sdgs/report/2019/Goal-03/>

¹⁰ UN Sustainable Development, Agenda 21 <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>



Goal 4. Quality Education

“Inclusive and equitable quality education and promotion of lifelong learning opportunities for all is key to levelling up socioeconomic status and escaping from poverty”¹¹. Worldwide, 58% of children and adolescents in primary and lower secondary school are not achieving the minimum proficiency in reading and mathematics¹¹. Learning opportunities for all ages should be increased and diversified, using different type of training modalities, so that all adults can acquire work-relevant knowledge and technical skills for decent work. The JCM has been conducting training for local project participants and relevant stakeholders in the partner countries in order to improve their technical knowledge, which is also important for the operation of the JCM scheme itself and for each project.

According to the quantitative indicator of JCM contributions to Goal 4 (Table 5) it can be said the JCM has contributed to achieving Target 4.4 in the partner countries. Since 2013 the JCM in general has conducted a total of 1,125 hours of technical training and seminars covering climate change mitigation, carbon market, and GHG emission reduction methodology for relevant stakeholders, and for third party entities on how to validate projects and verify issued credits (Figure 1).

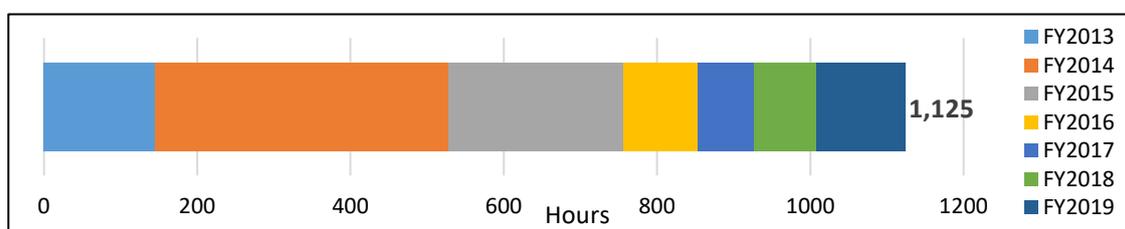


Figure 1. The hours of training conducted in the partner countries by the JCM related organisations¹²

Table 5. Quantitative indicators for the JCM to measure its contribution to Goal 4

Goal and Target		Quantitative indicator	Unit	JCM Project
4.4	By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	Hours of training that relevant stakeholders have undertaken	Hours	JCM scheme

Based on the qualitative indicator (Table 6), the JCM has provided support to increase the number of adults who have technical and vocational skills by offering different training sessions on operation and monitoring of RE and EE projects. In particular, RE projects and advanced high-efficiency equipment require technical knowledge to operate power stations and conduct regular maintenance of machines in factories. To build this type of capacity, project partners from Japan frequently organise training seminars for the local partners. Monitoring of GHG emissions reduction from the JCM projects is a requirement for the local project participants. To meet this requirement, during the monitoring period they receive online guidance as well as onsite training on how to carry out monitoring.

Table 6. Qualitative indicators for the JCM to measure its contribution to Goal 4

Goal and Target		Qualitative indicator	JCM Project
4.4	By 2030, substantially increase the number of youth and adults who have relevant skills,	Offering technical and vocational guidance and	RE and EE projects

¹¹ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-06/>

¹² The data from IGES, Global Environment Centre (GEC) and Overseas Environmental Cooperation Center (OECC)

	including technical and vocational skills, for employment, decent jobs and entrepreneurship	training programmes to employees	
--	---	----------------------------------	--



Goal 6. Clean Water and Sanitation

“Ensuring the availability and sustainable management of water and sanitation for all will save millions of people”¹³, which makes Goal 6 one of the most important priorities in a country’s public infrastructure development. In 2017, approximately 90% of the world’s population had access to a basic drinking water service, while only 45% had access to safely managed sanitation, and 60% could access basic hand washing facilities¹³. While donor countries have increased their aid and support to the water sector, there are billions of people who lack access to clean drinking water and sanitation. The JCM is supporting safe drinking water and sanitation by upgrading water treatment in the partner countries and improving water efficiency in public infrastructure.

Based on our quantitative indicators (Table 7), the JCM water utility projects have contributed to Targets 6.1, 6.3 and 6.4 by introducing high-efficiency water pumps in drinking water treatment facilities. Increasing the water services in a city through the JCM project implementation has positive impacts for Target 6.1, which is achieving equitable access to safe drinking water for all. Since the water pumps are advanced technology, the projects can contribute to reducing pollution, which is linked to Target 6.3. This can be achieved by minimising the negative impacts on water quality and increasing the amount of treated water, so that less waste is generated and hazardous chemicals are not released into the environment. In addition, these energy efficient JCM projects improve water performance in water treatment, which has a direct link to increased water-use efficiency across all sectors, as stated in Target 6.4.

Table 7. Quantitative indicators for the JCM to measure its contribution to Goal 6

Goal and Target		Qualitative indicator	JCM Project
6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all	Increasing water service coverage in the area	Water utility related projects
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	Increasing volume of water that is treated by project	Water utility related projects
		Minimising negative impact on water quality through the project	Water utility related projects
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	Improving water performance and efficiency	Water utility related projects

¹³ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-06/>



Goal 7. Affordable and Clean Energy

“Ensuring access to affordable, reliable, sustainable and modern energy for all by 2030 will open a new world of opportunities for billions of people”¹⁴. The proportion of the global population with access to electricity is steadily increasing. However, about 1.1 billion people are still without access to electricity. Renewable energy (RE) in the electricity sector has advanced rapidly and in 2018, electricity generated using renewable sources increased by 450 terawatt-hours (TWh) compared to the previous year¹⁵. In addition, energy efficiency continues to improve, which is offsetting carbon dioxide emissions, and reducing energy demand. However, energy intensity needs to improve at an annual rate of 2.7% over the period 2016-2030¹⁶. According to the International Energy Agency, in order to provide electricity for all people by 2030, USD 40 billion is necessary to invest in small solar photovoltaics (PV) stations and decentralised solutions¹⁷. The JCM aims to increase RE-sourced electricity in the partner countries and improve EE in different industries, which are committed to meeting Goal 7 and its Targets.

The JCM has generated 75,300 MW electricity by implementing solar PV projects and rooftop solar PV power generations in the partner countries since 2013¹⁸ (Figure 2). Based on the quantitative indicator of JCM contributions to Goal 7 (Table 8), these projects are contributing to increase the share of renewable energy in the global energy mix, which is achieving Target 7.1. In order to achieve energy efficiency target in Target 7.3 (to double the global rate of improvement in energy efficiency by 2030) the JCM has been introducing advanced low-carbon and zero emission technologies in the partner countries across different sectors, such as the textile industry, cement industry, energy sector and manufacturing industry. Since 2013, a total of 81 energy-efficiency projects have been adopted under the JCM scheme.

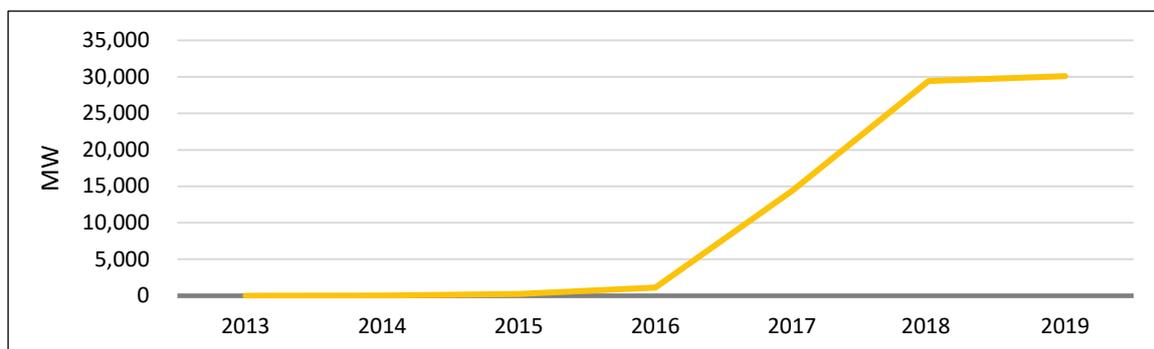


Figure 2. Annual electricity generated by the JCM RE projects

Table 8. Quantitative indicators for the JCM to measure its contribution to Goal 7

Goal and Target		Quantitative indicator	Unit	JCM Project
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix	Amount of renewable energy generated electricity	MW	RE projects
7.3	By 2030, double the global rate of improvement in energy efficiency	Number of adopted EE projects	Numbers	EE projects

In a qualitative assessment of JCM contributions to Goal 7 (Table 9), the JCM projects have contributed to all five targets, which shows a significant impact on Goal 7 achievement. To invest and develop renewable

¹⁴ UN Statistics <https://unstats.un.org/sdgs/report/2018/Goal-07/>

¹⁵ World Energy Outlook book 2019 <https://www.iea.org/reports/world-energy-outlook-2019/renewables#abstract>

¹⁶ 2018 HLPF Review of SDGs implementation: SDG 7 https://sustainabledevelopment.un.org/content/documents/195532018_background_notes_SDG_7Final1.pdf

¹⁷ International Energy Agency <https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity>

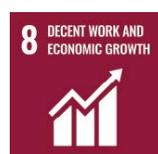
¹⁸ Calculated by the JCM project monitoring plan on the JCM website <https://www.jcm.go.jp/>

energy projects and introduce energy efficiency technologies, the JCM RE, EE and energy transmission projects are directly linked to Targets 7.1, 7.2, 7.3, 7.a and 7.b (Table 9).

Upgrading technologies through the JCM in the partner countries would improve energy efficiency and reduce energy consumption, which is directly linked to doubling the global rate of improvement in energy efficiency, Target 7.3 of the SDGs. Disseminating clean technology in energy infrastructure sector by introducing high efficiency transmission and developing solar PV projects is an important area of public infrastructure development in the partner countries.

Table 9. Qualitative indicators for the JCM to measure its contribution to Goal 7

Goal and Target		Qualitative indicator	JCM Project
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services	Investing in clean energy technologies	RE projects, Energy transmission projects
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix	Investing in and promoting initiatives on renewable energy	RE projects
7.3	By 2030, double the global rate of improvement in energy efficiency	Improvement of energy efficiency	EE projects
		Energy reduction	EE projects
7.a	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	Participating international cooperation to introduce renewable energy and low-carbon technology	RE and EE projects
7.b	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support	Expanding business in energy infrastructure sector in developing countries	RE projects, Energy transmission projects



Goal 8. Decent Work and Economic Growth

“Inclusive and sustainable economic growth brings full and productive employment and decent work for all”¹⁹. Since the global recession of 2009, labour productivity has been improving, and in 2018, it increased by 2.1% globally. However, there are wide disparities between different regions. Whereas there was a 4.8% increase in Central and Southern Asia, the increase in Sub-Saharan Africa was just 0.3%¹⁹. The percentage of informal employment, the gender pay gap, and youth unemployment remain high. To achieve economic growth targets in developing countries, safe and decent work environments need to be provided for all workers. By introducing energy-saving equipment to factories, the JCM supports establishing a sustainable production system, which creates a better working environment and provides workers with more decent jobs.

According to the qualitative indicator (Table 10) to evaluate JCM contributions to Goal 8, it can be seen that the JCM projects meet Target 8.2. Out of the 42 registered EE projects, a total of 33 projects were to install energy efficiency equipment into industry sector. The development of high efficiency equipment and machines

¹⁹ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-08/>

in manufacturing not only reduces energy consumption, but also contributes to industry innovation in the partner countries. There are also positive impacts on improving the working environment, with many projects reporting that newly installed equipment reduced noise in factories.

Table 10. Qualitative indicators for the JCM to measure its contribution to Goal 8

Goal and Target		Qualitative indicator	JCM Project
8.2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	Helping to upgrade technology in factories in developing countries	EE projects in factories



Goal 9. Industry, Innovation and Infrastructure

“Building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation”²⁰ can ensure a dynamic and competitive economy that results in increased employment and income. Introducing and promoting new technologies and enabling the efficient use of natural resources are key components for sustainable industrialisation. However, some countries, in particular the least developed countries, need to accelerate the development of their manufacturing sector in order to achieve Agenda 2030 targets. The JCM has been implementing energy efficiency technologies and equipment in factories as well as improving partner countries’ energy distribution system in order to reduce energy loss.

According to the quantitative indicators of JCM contributions to Goal 9 (Table 11), the JCM scheme has contributed to achieving Target 9.4 by issuing 81,887 tCO₂ of credits through the JCM projects (Figure 3). These include environmentally sound technologies (EST) installed in the industry sector to improve energy efficiency and reduce power consumption in the partner countries. The issued JCM credits were measured and verified based on GHG emission reductions from the projects. This is directly linked to the reduction of carbon intensity in the manufacturing sector, which is critical for developing sustainable industrialisation. By developing RE projects in energy infrastructure, the JCM has scaled up clean energy in the partner countries, where fossil fuels, especially coal, are predominantly utilised.

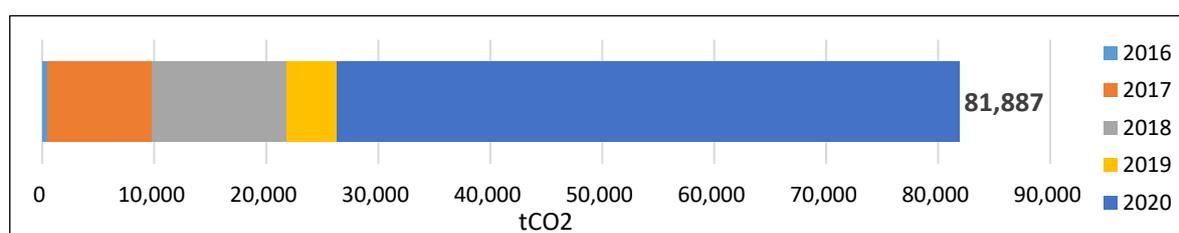


Figure 3. The issued credits from the JCM RE and EE projects

Table 11. Quantitative indicators for the JCM to measure its contribution to Goal 9

Goal and Target		Quantitative indicator	Unit	JCM Project
9.4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	CO ₂ emission reductions	tCO ₂	RE and EE projects
		Issued credits based on tracking and reporting the amount of GHG emission reductions	tonnes	RE and EE projects

²⁰ UN Statistics <https://unstats.un.org/sdgs/report/2019/Goal-03/>

Based on the qualitative indicators of JCM contributions to Goal 9 (Table 12), the JCM energy transmission projects and water utility projects have taken measures to reduce environmental impacts while these projects were being developed. These JCM projects have a positive impact on the development of reliable and sustainable infrastructure in the partner countries.

In addition, by upgrading the technology for public and energy infrastructure, the JCM projects have increased investment in infrastructure development and technical support for the partner countries, thereby eventually contributing to Targets 9.4 and 9.a (Table 12). Through project development in public infrastructure, resource efficiency can be increased due to EST. Furthermore, financial and technical support can be expanded especially in African countries, Least Developed Countries (LDCs), and Landlocked Developing Countries (LLDCs).

Table 12. Qualitative indicators for the JCM to measure its contribution to Goal 9

Goal and Target		Qualitative indicator	JCM Project
9.1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	Taking precautionary measures to reduce environmental impacts when developing and retrofitting infrastructure	Energy transmission projects, Water utility related projects
9.4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Upgrading infrastructure and retrofitting industries through investment in infrastructure development	RE projects, Energy transmission projects, Water utility related projects
9.a	Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States	Supporting sustainable infrastructure development in developing countries (with financial and technical support)	RE projects, Energy transmission projects, Water utility related projects



Goal 12. Responsible Consumption and Production

“Ensuring sustainable consumption and production patterns is necessary for economic growth and sustainable development”²¹. Wasting resources is a significant barrier to sustainable development. Material footprint—which refers to the total amount of raw materials used to meet final consumption demand—increased by no less than 113% between 1990 and 2017, from 43 billion tonnes to 92 billion tonnes. In addition, the process from resource extraction to product manufacture accounts for approximately 50% of global GHG emissions²². Given the economic growth of emerging countries and the rise of the middle class, it is clear that resource demand will continue to rise in the future, which leads to environmental impacts such as climate change. Sustainable consumption and production means that better quality goods are made with fewer resources. It requires improvements in resource efficiency, reductions in waste, and mainstreaming of sustainability in all sectors involved in economic activity. The JCM aims to achieve responsible industrial

²¹ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-12/>

²² UNEP IRP (2019) “Global Resources Outlook 2019” <https://www.resourcepanel.org/reports/global-resources-outlook>

development, by reducing the use of fossil fuel combustion and disseminating advanced low-carbon technologies and equipment to use natural resources more effectively.

Based on the quantitative indicators (Table 13) to evaluate JCM contributions to Goal 12, the JCM projects in the renewable energy, transportation, recycling waste, and water utility sectors have contributed to Target 12.4. Monitoring and reporting on GHG emissions from project activities encourages responsible management and consumption of natural resources. By 2019, as a result of these projects, 118,446 tCO₂ of emissions were reduced and 35,641 tonnes of credits were issued.

Table 13. Quantitative indicators for the JCM to measure its contribution to Goal 12

Goal and Target		Quantitative indicator	Unit	JCM Project
12.4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	CO ₂ emission reductions	tCO ₂	RE projects, Transportation related projects, Waste recycling related projects, Water utility related projects
		Issued credits based on tracking and reporting the amount of GHG emission reductions	tonnes	RE projects, Transportation related projects, Waste recycling related projects, Water utility related projects

Based on the qualitative indicators, the JCM projects have contributed to Targets 12.2, 12.5, 12.7 and 12.a (Table 14). The use of environmentally sound technologies (EST) is essential for the effective use of natural resources. Using and supplying electricity generated from renewable energy reduces fossil fuel consumption. Energy efficiency projects contribute to the effective use of natural resources by improving energy efficiency and reducing energy consumption. For example, installing a high-efficiency pump in a water treatment plant reduces CO₂ emissions and energy consumption which contributes to the effective use of water resources. Installing an energy-efficient waste paper processing system into a packaging factory to prepare raw materials from used corrugated cardboard has also led to a reduction of solid waste through the use of renewable raw materials.

The JCM has supported four projects in Viet Nam to introduce amorphous high-efficiency transformers. These projects successfully demonstrated the energy efficiency effects of high efficiency transformers, which resulted in the local energy company changing its regulations on equipment procurement standards. In cooperation with the local government, the JCM contributed to making Viet Nam's procurement standards more sustainable. The JCM currently aims to expand similar projects into other partner countries.

Finally, achieving Goal 12 requires a shift to sustainable production and consumption in all countries. Through its project development and implementation, the JCM is helping to build the necessary capacity of the partner countries for such a transition.

Table 14. Qualitative indicators for the JCM to measure its contribution to Goal 12

Goal and Target		Qualitative indicator	JCM Project
12.2	By 2030, achieve the sustainable management and efficient use of natural resources	Using or supplying RE generated electricity	RE projects
		Using environmentally sound technologies (EST)	RE projects and EE projects
		Improving energy efficiency	EE projects
		Energy Reduction	EE projects
		Using renewable materials	Waste recycling related projects

12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	Recycling material or increasing recycling material	Waste recycling related projects
12.7	Promote public procurement practices that are sustainable, in accordance with national policies and priorities	Working with governments to improve sustainable principles in the public procurement directives	Energy transmission projects (only in Viet Nam)
12.a	Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	Supporting developing countries to increase their capacity to transfer into sustainable production and consumption	RE projects and EE projects



Goal 13. Climate Action

“Taking urgent action to combat climate change and its impacts is the defining issue of our time and the greatest challenge to sustainable development”²³. The concentrations of CO₂ in the atmosphere hit a record level of 407.8 parts per million in 2018 and continued to rise in 2019 due to human activities. The World Meteorological Organization report says that “the global average temperature in 2019 (January to October) was about 1.1 degrees Celsius above the pre-industrial period”²⁴. The negative impacts of climate change, extreme weather events such as floods, hurricanes, droughts, wild fires, and heat waves are evident all over the world. To avoid catastrophic consequences, 189 Parties ratified the Paris Agreement and 186 Parties (including the European Union as one Party) communicated their first NDCs to the UNFCCC²⁵. Currently many countries are working on updating their NDCs and developing targets that are more ambitious for limiting global warming to 1.5°C. The JCM is committed to contribute to climate action, Goal 13 of the SDGs, and aims to reduce CO₂ emissions by introducing low-carbon and zero emission technologies.

As in the quantitative indicators of JCM contributions to Goal 13 (Table 15), the JCM renewable energy projects are directly linked to Target 13.1 by reducing emissions by 75,356 tCO₂ emissions. Reducing GHG emissions through developing RE projects, the JCM increases partner countries’ resilience to climate change and their capacity to adapt to climate disasters. Combining the RE and EE projects, under the JCM a total of 387,855 tCO₂ was reduced. The number of JCM partner countries has increased over the years and now it has reached 17 countries. The JCM is supporting improvements to public awareness of climate change in these countries by developing and implementing the RE and EE projects.

Access to finance in order to develop mitigation actions is important for developing countries to fight against climate change and Target 13.a mentions that developed country parties should address the needs of developing countries’ mitigation actions. The JCM has supported partner countries by investing a part of the initial cost to install advanced low-carbon and zero emission technologies, as well as implementing RE projects, which the amount of financial support reached a record high approximately USD 10 million in 2019 ²⁶ (Figure 4). The JCM has been supporting Least Developed Countries (LDCs) as well as Land-Locked Developing Countries (LLDCs) financially to increase their resilience and adaptive capacity to climate change.

²³ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-13/>

²⁴ WMO Provisional Statement on the State of the Global Climate in 2019 https://library.wmo.int/index.php?lvl=notice_display&id=21626#_XmCcjagzY2w

²⁵ UNFCCC NDC official website <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>

²⁶ Ministry of Environment Japan <https://www.env.go.jp/guide/budget/index.html>

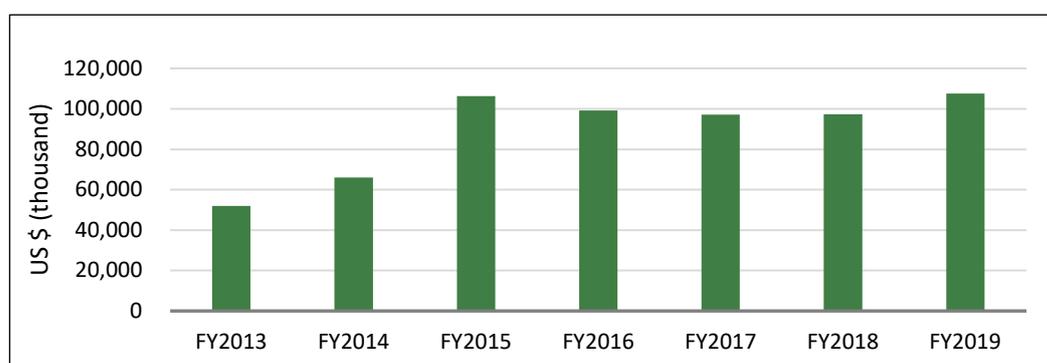


Figure 4. The amount of financial support through the JCM

Table 15. Quantitative indicators for the JCM to measure its contribution to Goal 13

Goal and Target		Quantitative indicator	Unit	JCM Project
13.1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	CO ₂ emission reductions	tCO ₂	RE projects
13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Number of JCM partner countries	Number of countries	JCM scheme
13.a	Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	The amount of financial support on environmentally sound technology (EST)	USD	JCM scheme

According to the qualitative indicators (Table 16), it can be said that the JCM projects have contributed to Targets 13.1, 13.2, and 13.3. The agriculture projects under the JCM has supported the partner country not only to mitigate climate change but also to adapt to climate-related hazards and natural disasters. In addition, through the JCM project implementation, the partner countries can scale up climate actions and policies to achieve their NDC targets. For instance, Mongolia's first NDC²⁷ mentions increasing the share of renewable electricity capacity up to 30% by 2030, with the aim to install 145MW solar PV power facilities. More than 50% of current solar PV power generation has been introduced by the JCM. The project participants have increased awareness of employees with regards to climate change and global warming, and they have actively attended knowledge-sharing network events and seminars that were organised by the JCM-relevant stakeholders. This shows a direct linkage between JCM project implementation and achievement of Target 13.3.

Table 16. Qualitative indicators for the JCM to measure its contribution to Goal 13

Goal and Target		Qualitative indicator	JCM Project
13.1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Helping developing countries to introduce climate mitigation and adaptation technologies	Agriculture projects
13.2	Integrate climate change measures into national policies, strategies and planning	Collaborating with governments on ambitious policy solutions for climate change and scaling up climate actions	JCM scheme

²⁷ Mongolia's first NDC, UNFCCC NDC Registry website <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>

13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Raising the awareness of employees on climate change	RE and EE projects
		Collaborating with public and/or private actors to promote knowledge networks in climate change	JCM scheme



Goal 17. Partnerships for the Goals

“Strengthening the means of implementation and revitalising the Global Partnership for sustainable development are essential for achieving the SDGs”²⁸. Goal 17 is categorised into seven sub-themes: “Finance”, “Technology”, “Capacity-Building”, “Trade”, “Policy and Institutional coherence”, “Multi-stakeholder partnerships” and “Data, monitoring and accountability”²⁸. Global partnership is a key concept of the JCM. Five out of seven sub-themes are particularly relevant to the JCM: “Finance”, “Technology”, “Capacity-Building”, “Trade”, “Policy and Institutional coherence” and “Multi-stakeholder partnerships”. The following section describes how the JCM is addressing these five sub-themes.

Based on the quantitative indicator of JCM contributions to Goal 17 (Table 17), the JCM has positive impacts on Targets 17.6 and 17.7, which are related to the sub-theme: “Technology”. Under the JCM, 63 RE projects and 84 EE projects were adopted between fiscal year 2013 and 2019 (Figure 5). The JCM is a framework aligned with a bilateral agreement between Japan and the partner country. Adopted projects under the JCM are required to be implemented and managed based on this agreement. Technology transfer through the JCM projects development can strengthen cross-border regional and international cooperative relations. Based on mutual understanding to transfer technologies can contribute to Goal 17.

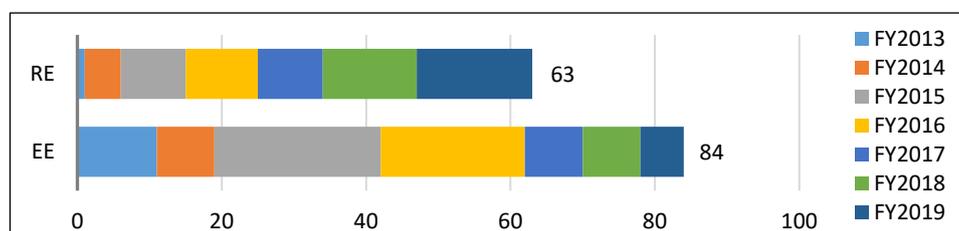


Figure 5. Number of RE and EE projects under the JCM since 2013

Table 17. Quantitative indicators for the JCM to measure its contribution to Goal 17

Goal and Target		Quantitative indicator	Unit	JCM Project
17.6	[Technology] Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism	Number of financing RE and EE projects	Numbers	RE and EE projects

²⁸ UN Statistics <https://unstats.un.org/sdgs/report/2019/goal-17/>

17.7	[Technology] Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed	Number of financing RE and EE projects	Numbers	RE and EE projects
------	--	--	---------	--------------------

In qualitative assessment to measure JCM contributions to Goal 17 by using the indicators (Table 18) the JCM scheme itself has contributed to four sub-themes with six Targets of Goal 17. Target 17.3 is about finance. The JCM supports a part of the initial investment cost of introducing advanced low-emission and zero emission technologies. This stimulates expanding private-sector business beyond borders and leads to the mobilisation of private capital.

Target 17.9 is related to support for capacity building. The Japanese side organises conferences, seminars and workshops related to the JCM both in Japan and overseas. Different stakeholders such as government officials and private sectors join these events, which enhances public-private dialogue. Moreover, the JCM scheme strengthens local businesses in the partner countries through direct investment and training done by technical expertise. Providing these opportunities through the JCM can support the capacity building necessary to achieve the SDGs.

Targets 17.14 and 17.15 are related to policy and institutional coherence. The JCM is supported by many different stakeholders including both Japanese and partner governments, consultants, and third-party entities. Having sufficient communication among the stakeholders is essential for coherence of the JCM. To keep this coherence, the JCM scheme needs to fit each country's unique situation. Rules and guidelines of the JCM have been designed to respect and consider the partner countries' will and perspective. For example, Indonesia and Mongolia have integrated the SDGs into their national policies; therefore, they have included this SDGs aspect in the JCM guidelines. The project participants are required to follow these guidelines and explain whether the project has negative impacts on the environment and how it contributes to the SDGs and its targets. These efforts ensure consistency of the JCM in their national policies by respecting policy space and leadership of partner countries.

Targets 17.16 and 17.17 are about goals for multi-stakeholder partnerships. Under the JCM technologies, finance, and capacity building consist of different stakeholders, and this can strengthen partnership among stakeholders beyond borders and achieve the SDGs and their Targets.

Table 18. Qualitative indicators for the JCM to measure its contribution to Goal 17

Goal and Target		Qualitative indicator	JCM Project
17.3	[Finance] Mobilize additional financial resources for developing countries from multiple sources	Mobilising private capital towards supporting sustainable development in developing countries	JCM scheme
17.9	[Capacity-building] Enhance international support for implementing effective and targeted capacity- building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North- South, South-South and triangular cooperation	Engaging in the dialogue between governments and other private sector actors to share technology and expertise	JCM scheme
		Strengthening local business in partner countries through direct investment and providing in-house capacity	JCM scheme
17.14	[Policy and Institutional coherence] Enhance policy coherence for sustainable development	Supporting sustainable development policies through working together with other stakeholders	JCM scheme

17.15	[Policy and Institutional coherence] Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development	Working together with host country government and following the guideline made by JC meetings	JCM scheme
17.16	[Multi-stakeholder partnerships] Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries	Supporting joint development projects with governments, civil society and international organisation	JCM scheme
		Participating in international cooperative mechanisms with different stakeholders to diffuse environmentally sound technologies (EST)	JCM scheme
17.17	[Multi-stakeholder partnerships] Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	Providing the full depth of resources, expertise and technological innovation to different stakeholders	JCM scheme

5. Case Studies

Viet Nam: Introduction of High Efficiency Water Pumps in Da Nang City

Yokohama City and Da Nang City have been promoting technical cooperation on infrastructure development and environmental measures through "City-to-City Cooperation". The two cities have a long-standing partnership and this kick-started the project. Yokohama Water Co., Ltd. replaced existing conventional water pumps with Japanese higher efficiency ones in two water pump stations of the water treatment plant owned by Da Nang Water Supply One-member Limited Company (DAWACO). The newly-introduced pumps reduced CO₂ emissions by reducing power consumption, and have contributed to solving environmental problems through water utility service.



Da Nang Water Supply One-member Limited Company (DAWACO)

Installing high efficiency water pumps in our water treatment facilities contributes to the achievement of Da Nang City's "Environmental City by 2020" goal. According to a feasibility study carried out in 2015, upgrading the water pumps would be the most suitable action for the further development of JCM projects in Da Nang City.

The population of Da Nang is estimated to increase to over 2 million by 2025; therefore, for us, a more stable water supply has become a high priority. Improving the efficiency of water pumps has led to increasing water supply capacity to meet the city's growing water demand.

We supply about 80% of the total water consumption in Da Nang City. In 2018, we treated and supplied 72 million tonnes of water to the city. The installed high efficiency water pumps contributed to increasing the amount of water by 50 thousand tonnes per day, and the energy efficiency was improved by around 20%, which led to reducing electricity consumption in the treatment facility. Moreover, the new equipment is much quieter, so our working environment has improved. Technical training was conducted for local employees and engineers, providing instructions for operation and maintenance of energy-saving pumps.

We expect that the success of this project will increase the introduction of energy efficiency and high performance equipment in water utility business in Viet Nam.



©Yokohama Water Co., Ltd

Yokohama Water Co., Ltd.

The project was implemented under technical cooperation in water infrastructure. We applied for the JCM with DAWACO because we have a long business relationship with DAWACO and think that they are a reliable business partner for this project.

Since the initial investment cost is expensive for improving energy efficiency of water supply system, the projects could not be implemented without the JCM. The monitoring period is long for the JCM but we think of this as "an opportunity to maintain a relationship with the local company" and hope that it will lead to new business.

Horizontal business networks in Viet Nam have been progressing thanks to this project. Currently we are working with Build Own Operate company to install inverters for its drinking water treatment facility in Ho Chi Minh City through the JCM. We did not have any prior connections with the business partner for the Ho Chi Minh City project but this Da Nang project has led to the development of new customers.



Participation in the JCM has given us a new viewpoint: "contribution from an environmental perspective to our water utility business." Taking advantage of this experience, we would like to implement similar projects in other JCM partner countries to supply safe and secure water to more people.

Mongolia: Installation of 12.7 MW Solar Power Plant for Power Supply In Ulaanbaatar Suburbs

Farmdo Co., Ltd and Everyday Farm LLC introduced a large-scale Solar Farm® in the suburbs of Ulaanbaatar to contribute to solving air pollution and improve the quality of vegetables in the city. The Solar PV at the farm can reduce fossil fuel consumption in Mongolia, thereby decreasing CO₂ emissions. In addition, the generated electricity is sold to the national grid. In November 2018, the 6th Joint Committee between Mongolia and Japan decided to issue JCM credits equivalent to 8,880 tCO₂ under this project.



Everyday Farm LLC

Under the JCM, the Japanese government covers a part of its initial investment, which allowed us to introduce solar PV in Mongolia requiring high investment. In addition, through the JCM, we have built a good partnership with Farmdo Co., Ltd, which enables further business cooperation.

Total electricity production since operations started comes to 40,139,379 kWh and the amount of electricity sold is 38,163,056 kWh (as of 31 December 2019). In 2019, we produced 27 tonnes of vegetables, and the revenue from the solar PV project provided us with support to increase investment in introducing Japanese agricultural technologies, as well as enabling stable employment at the farm site.

Through the JCM, not only did we transfer technology but we also organised technical training programmes for the local engineers on solar PV power plant operations. Currently they are working onsite under online guidance from the manufacturer's engineers. We have conducted study tours in Japan in order to build local farmers' capacity on farming techniques that are necessary at Solar Farm®.

In addition, we attended national and international seminars related to the JCM in Mongolia. Our commitment to solve air pollution and food insecurity by introducing solar PV in the agricultural sector was greatly appreciated as an innovative solution by the Government of Mongolia, and we have received several awards such as the "Green Certificate" and the "Silk Road Award".



©Everyday Farm LLC

Farmdo Co., Ltd

We first started operating the farming photovoltaic system, a combination of solar PV power generation with agriculture, in Japan. The Great East Japan Earthquake made us realise the importance of renewable energy. And then, when we thought about the severe labour shortage facing the agricultural industry in Japan, we came up with the idea of supporting this unstable sector by utilising the revenue from sales of electricity generated from solar PV power plants. This is how the Solar Farm was born. We have always been devoted to improving Mongolian agriculture, so our company introduced the Solar Farm through the JCM.

The JCM provided us with support to invest in agriculture, a highly volatile sector. Of course, expanding a business overseas comes with some potential risks. However, the JCM is a bilateral agreement between two countries' government so it is very reassuring to have this support from the Ministry of the Environment Japan.

By participating in the JCM, we have received many opportunities to attend and give presentations at both national and international events related to agriculture, environment and climate change. Due to these activities, we have seen a large increase in the number of people who visit the Solar Farm resulting in new business chances. We plan to expand Solar Farms to 10 countries including JCM partner countries by using our business experience and knowledge in Mongolia.



©Farmdo Co., Ltd

Bangladesh: Installation of High Efficiency Loom at Weaving Factory

Toyota Tsusho Corporation introduced a Japanese high-efficiency air-jet loom into a weaving factory in Dhaka, Bangladesh. The newly-installed technology has improved energy efficiency, speed, and productivity compared with existing weaving technology. This project was started based on a proposal carried out by Japanese companies who were exploring potential JCM projects in Bangladesh. A feasibility study was conducted for this project before it was actually financed as a JCM project.



Toyota Tsusho Corporation

Toyota Tsusho was established in 1948, and four years later in 1952, we opened our office in Dhaka. Since then, we have been strengthening business in Bangladesh especially introducing Japanese high efficiency-weaving machines into the textile industry.

In general, high-efficiency air-jet looms are difficult to introduce because the initial cost, including incidental equipment and technical training for employees, is a high hurdle for companies. In addition, the textile industry is easily influenced by fashion trends and demand is unstable; therefore, it is necessary to be cautious on which technology to introduce.

We have a longstanding, trustworthy business relationship with the local manufacturer who is developing this project with us. The factory was using outdated weaving machines and the owner was considering replacing the machines. They also were putting focus on low-carbon technologies and environmental issues, and were in support of the JCM concept, so decided to apply for the scheme.

The Japanese air-jet loom is much faster and saves more energy compared to the old machine, thereby boosting productivity for textile weaving. Regular maintenance is required in order to maintain capacity and performance so that the machine can be used over the long-term. The local factory conducts inspections on a daily, weekly, and monthly basis and ensures a working environment for the employees to be able to work efficiently following the outlined plan. This would eventually link to development of the labour force.



©Toyota Tsusho Corporation

Since the project began, we have received a lot of support from the Japanese side as well as Bangladesh side. In 2016, just after the project was launched, there was a terrorist attack in Bangladesh and visiting the local factory was impossible at that time. We were concerned about the lack of communication with the local authorities and our business partner. However, with support from MOEJ, officials from Bangladesh government were able to visit Japan, giving us an opportunity to discuss the project's background and the progress being made by the factory.



In 2018, looking to solve social issues centered on the SDGs, we formulated "CSR Materiality (Material Issues)" and decided to make it a main pillar of our management strategy. We are now engaged in business activities with awareness of materiality. Through the JCM we have learned what the impact is of our business - introducing advanced technology - in the context of Environmental, Social, and Governance (ESG) and SDGs.

High efficiency machinery in a factory aims to support and encourage automation in labour-intensive sectors such as the textile industry. Currently we are operating several other JCM projects. In the JCM partner countries, we not only support energy efficiency in factories but also consider contributing to industry revolution and development in terms of "jobs that only people can do."

Indonesia: Reduction of Energy Consumption by Introducing an Energy-Efficient Waste Paper Processing System into a Packaging Paper Factory

Kanematsu Corporation and PT Fajar Surya Wisesa Tbk. introduced a highly efficient, Japanese system into a packaging paper factory for its Old Corrugated Cartons (OCC) process. This project began with a feasibility study conducted by Nomura Research Institute and Aikawa Iron Works Co., Ltd. Following this, Kanematsu Corporation became the representative company to implement the project with Aikawa Iron Works and PT Fajar Surya Wisesa Tbk., with their long business connection. In January 2020, the Joint Committee between Mongolia and Japan decided to issue JCM credits equivalent to 16,177 tonnes of CO₂ under this project.



PT Fajar Surya Wisesa Tbk.

We were in the process of expanding our factory to increase its capacity, so it was perfect timing for us to apply for the JCM because we had previously participated in the Clean Development Mechanism (CDM), administered by UNFCCC, and we are constantly adopting new energy saving technology to support our sustainable manufacturing business. We are also interested in JCM credits, which are issued based on emission reductions under the JCM project. In addition, we had support from the Japanese side on methodology development to calculate GHG emission reductions.



Through the JCM, energy efficiency was improved by 10% and the amount of processed waste paper in a day increased from 3,200 tonnes to 4,200 tonnes compared to the old technology. In our factory, we now recycle 1 tonne of waste carton boxes and produce 860-880 kg of new paper per day, which is made from 100% recycled paper, primarily used cartons. We received technical training from the manufacturer of the installed technology and also got guidance on how to maintain the low-carbon technology after its installation.

By participating in the JCM, we have attended several JCM related seminars and events in Indonesia. We gave a presentation about the JCM programme and energy efficiency technology at the seminar of Paper Industry Association in 2018. We also closely work with the JCM Secretariat of Indonesia, including participation at relevant JCM seminars. We would welcome the chance to make use of the experience gained on JCM and participate in international cooperation in the future.

Kanematsu Corporation

This project was successfully developed through the cooperation of different business players, including consulting company, manufacturers and a trading company. The most important aspect of the JCM is transferring Japanese advanced technology overseas and contributing to the environment. The old style of trading company, which is buying and selling, is outdated. We now need to look at how we can provide added-value to business. Most international and domestic companies are making "environment" as one of important strategies into their business operations. Therefore, we are also shifting our business to be more environmentally friendly.

The JCM focuses on private sector business cooperation, making it different from the existing Official Development Assistance (ODA) which is currently dominant in development aid. Some developing countries are no longer eligible for the Japanese ODA, but they still find it difficult to transfer Japanese advanced technology. Therefore, we think more private companies will enter and participate in the JCM. We have been receiving business proposals from different companies regarding JCM project development in developing countries and we can say that interest in the JCM has increased in recent years.

For this project, we participated as a representative company in the JCM. This gave us opportunities to attend JCM related seminars and to share the business experiences on several occasions which led to increasing our network with JCM participant companies as well as the companies that are interested in the mechanism.



6. Summary

Indicators for the JCM have assessed its contributions to the SDGs both qualitatively and quantitatively. We analysed 57 registered JCM projects (15 RE and 42 EE projects) including the JCM scheme. The results of the assessment showed that the JCM can contribute to 10 Goals of the SDGs: Zero Hunger (Goal 2), Good Health and Well-Being (Goal 3), Quality Education (Goal 4), Clean Water and Sanitation (Goal 6), Affordable and Clean Energy (Goal 7), Decent Work and Economic Growth (Goal 8), Industry, Innovation and Infrastructure (Goal 9), Responsible Consumption and Production (Goal 12), Climate Actions (Goal 13), and Partnerships for the Goals (Goal 17). This proves that the JCM has significant impact on Agenda 2030 and huge potential to contribute to the SDGs achievement in the partner countries.

Based on the assessment, it can be seen that the JCM is linked to not only environment and energy-related Goals but also the social dimensions of the SDGs, namely Goals 2, 3, 4, and 8. This is because under the JCM, many different types of projects are being developed and implemented. In this way, the projects bring benefits to reduce air pollution, increase sustainable food production, build technical and vocational skills for local project participants, and improve the work environment in factories. The most significant contributions to the SDGs through the JCM project implementation are for Goals 7, 9, 12, 13, and 17. The JCM introduces many renewable energy projects and various energy efficiency equipment in the manufacturing sector. It largely has positive effects on increasing electricity generated from renewable sources, development of sustainable industry and infrastructure, responsible production, combating against climate change and strengthening partnerships to achieve the SDGs.

Section 5 outlined the case studies based on the interviews and online surveys from the JCM project participants. This proves that development and implementation of one JCM project can contribute to several Goals of the SDGs at the same time. For instance, RE projects in the agriculture sector in Mongolia contributes to both GHG emission reductions (Goal 13) and development of sustainable agriculture systems (Goal 2). In developing countries including the partner countries, water infrastructure is becoming an important priority due to rapid urbanisation and a growing population. The JCM project which introduced high-efficiency water pumps in a water treatment facility in Da Nang City, Viet Nam, contributed to efficient water distribution (Goal 6) and sustainable water infrastructure (Goal 9). The introduction of high-efficiency equipment in a paper processing factory in Indonesia can contribute to reducing waste and recycling materials (Goal 12) and improving energy efficiency (Goal 7). The textile sector is one of the most labour intensive sectors. A project introducing energy efficiency air-jet looms in a fabric factory in Bangladesh can provide a decent work environment to employees (Goal 8) while at the same time, reducing energy consumption (Goal 7).

After 2020, when the Parties move towards implementation of the Paris Agreement, we think that development of the JCM projects and mitigation action needs from the partner countries will increase. Therefore, we believe that there will be many potential JCM projects from the SDGs perspective, which can contribute to solving environmental and social problems. For instance, developing renewable energy generation in an irrigation system would link to Zero Hunger (Goal 2), Affordable and Clean Energy (Goal 7) and Clean Water and Sanitation (Goal 6). From the viewpoint of public health and environment, projects related to wastewater treatment will contribute to Sustainable and Resilient Cities (Goal 11), Industry, Innovation and Infrastructure (Goal 9) and Clean Water and Sanitation (Goal 6). In addition, solid waste and plastic recycling treatment projects can have huge impacts on Life below Water (Goal 14), Responsible Consumption and Production (Goal 12), leading to a solution to the issue of plastic pollution in the oceans.

The SDGs are universal goals, and provide guidance on how we should live and how business should be developed from now on. The SDGs are closely and deeply connected to the government, private sector, and people's everyday lives, so this connection will continue to deepen in every sector. Since many private companies integrate the SDGs into their business strategy, we think that the importance of SDGs in the private sector will further increase going forward. Countries are also including a component of the SDGs in their national policies and climate mitigation actions. The JCM partner countries are developing national sustainable development plans in order to achieve Agenda 2030. We believe that the JCM can be a potential option for both private and public sectors to contribute to the SDGs.

**Ministry of the Environment, Government of Japan
Office of Market Mechanisms, Climate Change
Policy Division, Global Environment Bureau**

1-2-2 Kasumigaseki Chiyoda-ku, Tokyo, 100-8975, Japan
URL: Carbon Market Express <https://www.carbon-markets.go.jp/>

Institute for Global Environmental Strategies

2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115, Japan
Tel: +81-46-855-3700
Fax: +81-46-855-3709
E-mail: iges@iges.or.jp
URL: <https://www.iges.or.jp/en>