FY2020 Infrastructure Development Research Project
for Joint Credit Acquisition

Research on International Trends on Market Mechanism Negotiations Report

March 2021

The Institute of Energy Economics, Japan

Introduction

The Paris Agreement came into effect in November 2016, however, the Republican candidate Donald J. Trump, who had publicly stated his commitment to withdraw from the Paris Agreement, got elected in the US presidential election held in the same month of November 2016. After his presidential inauguration, he substantially changed US policy on climate change, including the decision to withdraw from the Paris Agreement in 2017. In this circumstance, negotiations for the Paris Rulebook, the implementing rules of the Paris Agreement, continued, and despite the twists and turns, COP24 held in December 2018 successfully adopted the Paris Rulebook, the implementing rules of the Paris Agreement, except few issues.

Rulebook on article 6 that stipulates market mechanism under the Paris Agreement is one of the issues that failed to agree at COP 24. Parties just decided to continue negotiations for a further one year aiming at the adoption in COP25 to be held in 2019. COP25 had energetic negotiations and some development, however, it did not attain the agreement and decided to continue again the negotiations aiming at the adoption in COP26 to be held in 2020. The COP26 scheduled to be held in 2020 was postponed to 2021, as it became difficult to organize an international conference with the participation of national delegations and NGOs from all over the world due to the COVID-19 pandemic.

Despite such an unforeseeable situation, efforts including successive online meetings have been continuously made in seeking a consensus. The pilot projects assumed to be implemented under Article 6 of the Paris Agreement are being prepared for implementation in the individual countries. At the same time, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), an initiative tackling the global climate change to be implemented from 2021 under the International Civil Aviation Organization (ICAO) has been prepared, despite some impacts of the COVID-19 pandemic. Furthermore, in recent years, a trend to utilize voluntary credit for voluntary action by private corporations against global warming has been observed, which may influence the future market trend.

In this study, we conducted a survey on the trend of market mechanism negotiations under the Paris Agreement together with the related trends (such as CORSIA and voluntary credits), investigated the market mechanism trends of each Party, and analyzed their challenges.

We hope that this report will contribute to discussions on the market mechanism under the Paris Agreement and will be useful as a reference.

March 2021

The Institute of Energy Economics, Japan

Table of Contents

Chapter 1 Survey on Trends of Market Mechanism in UN 1
1. The trend of Negotiations on Issues on Market Mechanism under the Paris Agreement (including the Trend of Article 6) 1
(1). Background and history of negotiations, and each Party's positions 1
(2). Impact of postponement of meetings due to COVID-19 pandemic 4
(3). Issues requiring discussions at COP26 4
2. Trends of CDM and JI under the Kyoto Protocol, and Trends of Pilot Projects 8
(1). Project development trend of CDM, and credit issuance trend 8
(2). Determination of CDM Executive Board on the CDM projects to be implemented from 2021 onward 9
(3). Trends of pilot projects under Article 6 of the Paris Agreement 11
Chapter 2 Survey of Other Trends on the International Market Mechanisms 20
1. Trend of Voluntary Credit Market 20
(1). What is a voluntary credit? 20
(2). Trend of companies that utilizes voluntary credit 22
(3). Trend of projects and credits 25
(4). Private crediting mechanisms 30
2. Initiatives concerning the Use of Voluntary Credits (International Institutions and Corporations) 32
(1). Initiatives toward the development of voluntary credit market 32
(2). Companies that set net-zero/carbon neutral targets 35
(3). Outlook for future market 37
3. Trend of Market Mechanism in ICAO 40
(1). Outline of CORSIA and the impact of COVID-19 pandemic 40
(2). Determination the Eligible Emissions Units in the ICAO Council 41
Chapter 3. Overseas Market Mechanism Trend Investigation 44
1. Market mechanism trend in the United States 44
2. Trends on market mechanisms in the EU 46
3. Trends on market mechanisms in China 48
4. Trends on market mechanisms in Korea 50

Glossary

- Assigned Amount unit

  Initially calculated quota allocated to the countries in Annex I

- AILAC

  The Independent Alliance of Latin America and the Caribbean. UNFCCC negotiating group being participating by Chile, Colombia, Costa Rica, Honduras, Guatemala, Panama and Peru.

- ALBA

  Bolivarian Alliance for the Peoples of our America (ALBA). UNFCCC negotiating group being participated by Bolivia, Venezuela, Cuba, Nicaragua, Ecuador and others.

- Annex I Parties

  Countries listed in the UNFCCC Annex (mainly developed countries).

- AOSIS

  Alliance of Small Island States. UNFCCC negotiating group being participated by St. Lucia, Maldives, Tuvalu, Fiji and others.

- BAU

  When no special measures are taken (Business As Usual).

- CCS

  Carbon Dioxide Capture and Storage. A general term for technology that stores carbon dioxide separated and recovered from sources such as power plants and factories in deep geological formations. Separation methods include chemical absorption method, physical absorption method, membrane separation method, physical adsorption method, cryogenic separation method, and hydrate separation method. Storage methods include underground sequestration, ocean sequestration, and plasma decomposition.

- CDM

  Clean Development Mechanism. Developed countries that have set numerical targets for greenhouse gas emissions under the Kyoto Protocol implement projects such as emission reductions in developing countries where numerical targets have not been set, and receive credits for the resulting reductions in emissions. A general term for schemes relocating to developed countries.

- CER

  Certified Emission Reduction. Credits issued through the CDM.

- CH_4

  Methane. A type of greenhouse gas generated from the final disposal site of organic waste, the bottom of swamps, manure from livestock, and the anaerobic decomposition process of sewage sludge.

- CMA (Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement)

  Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
- CMP

  The Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol. Meeting of the parties to the Kyoto Protocol. It is held once a year together with the COP.
- Cooperative Approach

  A collaborative approach. Market mechanism specified in Article 6.2 of the Paris Agreement.
- CO_2

  Carbon dioxide. A type of greenhouse gas that is generated by the burning of carbon-containing substances such as oil, coal, and wood, the respiration of animals and plants, and the decomposition of organic matter by microorganisms. On the other hand, it is fixed to various organic compounds by photosynthesis of plants.
- COP

  The Conference of the Parties. Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). Currently it is held once a year.
- EIG

  Environmental Integrity Group. A negotiation group under the UNFCCC, participated by Switzerland, South Korea, Mexico, Luxembourg and others.
- ERU

  Emission Reduction Unit. Credits issued through joint implementation.
- ETS

  Emission Allowances Trading Scheme, or Emissions Trading Scheme. This is an economical method used to reduce emissions of environmental pollutants. In order to reduce the total amount of emissions, allowances (caps) are allocated between emission entities such as countries and companies. It is a system in which trading is carried out between an entity that emits pollutants beyond the limit and an entity that falls below the limit. There are various methods for allocating emission allowances, such as a method of allocating free allowances according to past emission results (grandfathering) and a method of procuring necessary emission allowances from the government etc. for a fee (auction).
- EUA

  EU Allowance. Emission allowances traded in EUETS.
- EUETS

  European Emissions Trading Scheme. It was launched in 2005 for the 15 EU member

states in Europe with the aim of achieving the Kyoto Protocol commitments of the EU member states economically and efficiently at the lowest possible cost. The target countries have been gradually expanded, and currently cover 27 EU countries.

- GHGs

  Greenhouse gases. A generic term for gases that produce a greenhouse effect by absorbing some of the infrared radiation emitted from the earth's surface. Under the Kyoto Protocol, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are targeted for control.

- HFC

  Hydrofluorocarbons. A family of target gases of the Kyoto Protocol.

- IPCC

  Intergovernmental Panel on Climate Change. An intergovernmental organization whose purpose is to collect and assess the latest scientific, technical and socio-economic findings on the risks of anthropogenic climate change and to provide the information to decision makers. Due to the extreme weather in the 1970s, the need to provide comprehensive scientific information on climate change has increased. The concept of establishing the IPCC was proposed by the WMO congress and the UNEP governing council in 1987, and was approved in 1988, the same year when the IPCC was established.

- ITMOs

  Internationally Transferred Mitigation Outcomes defined in Article 6.2 of the Paris Agreement. Unit of mitigation outcome transferred under Article 6.2.

- JI

  Joint Implementation. It is a generic name of schemes which implement projects such as emission reductions between developed countries for which the Kyoto Protocol has set numerical targets for greenhouse gas emissions, and are able to transfer the resulting reduction credits to project participants on the side of an investing country.

- Kyoto mechanism

  A generic term for greenhouse gas reduction projects (joint implementation, clean development mechanisms) and emissions trading to achieve the targets set by the Kyoto Protocol.

- Kyoto Protocol

  Kyoto Protocol to the United Nations Framework Convention on Climate Change. It sets legally binding numerical targets for greenhouse gas emissions in developed countries for each country. It has established mechanisms (emissions trading, clean development mechanism, joint implementation, etc.) to achieve the goals in international cooperation.

On the other hand, there are no new obligations such as numerical targets for developing countries.

- LMDC

  Like Minded Developing Country Group. A negotiating group at the UNFCCC composed of emerging and developing countries such as China and Saudi Arabia.

- LULUCF

  Land use, land use change and forestry. So-called sources of absorption.

- MRV

  Measurement, Reporting and Verification

- Modalities and Procedures

  Modalities and Procedures. There are the Modalities and Procedures of CDM and the Modalities and Procedures of mechanism in Article 6.4 of the Paris Agreement.

- NF_3

  Nitrogen trifluoride. A type of target gas of the Kyoto Protocol, added from the second commitment period.

- Non-market Approach

  Non-market approach. Initiative stipulated in Article 6.8 of the Paris Agreement.

- N_2O

  Nitrous oxide. A type of greenhouse gas generated by combustion, use of nitrogenous fertilizers, chemical industry (production of nitric acid, etc.) and microbial decomposition of organic matter.

- PFC

  Perfluorocarbons. A family of target gases of the Kyoto Protocol.

- REDD

  Reducing Emissions from deforestation and forest degradation in developing countries

- RMU

  Removal Unit. Credit issued as net absorption by activities of sources of absorption.

- SB

  Subsidiary Body of COP and CMP. There is a Subsidiary Body for Scientific and Technological Advice (SBSTA), and a Subsidiary Body for Implementation (SBI).

- SBI

  Subsidiary Body for Implementation

- SBSTA

  Subsidiary Body for Scientific and Technological Advice

- SF_6

  Sulfur hexafluoride. A type of target gas of the Kyoto Protocol.

- UNFCCC

  United Nations Framework Convention on Climate Change. A treaty that sets an international framework for global warming.

Chapter 1 Survey on Trends of Market Mechanism in UN

1. The trend of Negotiations on Issues on Market Mechanism under the Paris Agreement (including the Trend of Article 6)

(1). Background and history of negotiations, and each Party's positions

<1> Documents requiring adoption and history to COP25

Article 6 of the Paris Agreement prescribes three approaches for the market mechanism, and the development of the documents as listed below is required for the implementation of each approach. The details of the respective approach and required documents are listed in Table 1.

Table 1. Market Mechanism Prescribed in Article 6 and the Assumed Documents

Provision	Specific approaches	Documents scheduled to be adopted
Article 6.2	**Cooperative approaches** The provision which approves, under the Paris Agreement, market mechanism approaches that are implemented individually by each Party. Specifically, bottom-up or decentralized approaches taken by each Party, such as Japan's JCM and linkage of EU ETS with other emissions trading schemes.	Guidance on accounting for the avoidance of double counting
Article 6.4	**Article 6.4 Mechanism** Centralized implementation of the market mechanism under the control of the Paris Agreement. Top-down or centralized approaches similar to the Kyoto Protocol's CDM.	Rule, Modalities and Procedures (RMP)
Article 6.8	**Non-market approaches** Approaches to support developing countries in ways other than market mechanisms.	Work program

(Source) Created by the Institute of Energy Economics, Japan, based on various data

Since 2016, substantial discussions for the development of three documents as listed in Table 1 have been continuously held in various places including formal meetings hosted by UNFCCC such as COP, and informal consultations. In addition, Parties has submitted their views on market mechanism in response to calls for the submission over three times.

Moreover, there was an additional meeting held in Bangkok, Thailand for facilitating negotiations, in September 2018. Nevertheless, even in COP24/CAM1,divergent views among parties has not converged, therefore, Parties agreed to continue the negotiations until COP25 in 2019.

Table 2. History of Negotiations that have been Held So Far

<table>
<tr><td>May 2016</td><td>SB 44</td><td colspan="2">Start of negotiations: Agreed to provide submissions</td></tr>
<tr><td rowspan="2">November 2016</td><td rowspan="2">COP22</td><td rowspan="2">Agreed to the work program.
(before SB46)</td><td>Held a round table discussion.</td></tr>
<tr><td>Provide submissions.</td></tr>
<tr><td rowspan="2">May 2017</td><td rowspan="2">SB 46</td><td rowspan="2">Agreed to the work program. (before COP23)</td><td>Held a round table discussion.</td></tr>
<tr><td>Provide submissions.</td></tr>
<tr><td rowspan="2">November 2017</td><td rowspan="2">COP23</td><td rowspan="2">Agreed to the work program.
(before SB48)</td><td>Held a round table discussion.</td></tr>
<tr><td>Provide submissions.</td></tr>
<tr><td>May 2018</td><td>SB 48</td><td colspan="2">Discussed the informal notes.</td></tr>
<tr><td>September 2018</td><td>Additional meeting</td><td colspan="2">Discussed the informal notes.</td></tr>
<tr><td>December 2018</td><td>COP24</td><td colspan="2">Adopted the Paris Rule Book.
(The market mechanism could not be adopted.
Only agreed to continue the negotiations.)</td></tr>
<tr><td>June 2019</td><td>SB 50</td><td colspan="2">Adopted the negotiation texts.</td></tr>
<tr><td>December 2019</td><td>COP25</td><td colspan="2">Agree to continue negotiations.</td></tr>
<tr><td>2020</td><td>SB52/COP26</td><td colspan="2">The meeting was postponed due to the COVID-19 pandemic.</td></tr>
</table>

(Source) Created by the Institute of Energy Economics, Japan, based on various data

<2> Results of negotiations at COP25

After the COP24, formal and informal meetings had been held by the 25th Session of the Conference of Parties to the United Nations Framework Convention on Climate Change (COP25) at Madrid, Spain, in December 2019.

At COP25, the Parties had actively engaged consultation for seeking compromise, and they made some progresses. However, the Parties failed to reach a consensus on some issues, despite, the session was extended by two days from the originally scheduled date. The result of negotiation was reflected in the three negotiation texts (President's texts Version 1, Version 2, and Version 3) that include compromise proposal suggested by the president.

The remaining issues that could not reach a consensus were the application of Share of Proceed to Article 6.2, application of the corresponding adjustment to avoid double counting for units from Article 6.4 mechanism, and transition of CDM which was implemented under the Kyoto Protocol to Article 6.4 mechanism under the Paris Agreement (in particular, transfer

to the credit issued for emissions reductions before 2020). The Parties have had much fundamentally different views on these issues by and there was not convergence on these issues by the end of the COP 26.

On the other hand, technical discussions, especially the adjustment method to avoid double counting, made progresses. In the president's texts, the adjustment method to avoid double counting is shown as follows:

Table 3. Outline of Accounting Method Shown in the President's text

(a) Metric of ITMOs	Both CO_2 and non-CO_2 metric. The accounting method of ITMOs of non-CO_2 metric will be further discussed.
(b) Scope of adjustment	Emissions reduction and removal of greenhouse gases.
(c) Method of adjustment	
・In the case of a transfer	Added to the emissions and removals.
・In the case of use	Deducted from the emissions and removals.
(d) Adjustment method between a single year NDC and multiple years NDC	
・In the case of single-year target	(i) Provide a multi-year emissions trajectory or carbon budget to adjust both the amounts transferred and used for both the country transferring country and the acquiring country of ITMOs. (ii) Annual average transferred amount and acquired amount of ITMOs are calculated, indicative adjustment is conducted every year for adjustment at the time of use of NDC.
・In the case of multi-year target	Provide a multi-year emissions trajectory or carbon budget to adjust both the amounts transferred and used for both the transferring country and the acquiring country of ITMOs.
(e) Non-CO_2 metric	Conduct transactions with the same non-CO_2 ITMOs, for annual addition and deduction in a buffer registry.

(Source) Prepared by the Institute of Energy Economics, Japan, based on the COP25 President's text[1]

<3> Summary of each Party's perspective

As seen above, each Party shows different perspectives in the Article 6 negotiations. The positions of major Parties can be largely classified into four groups as shown in Table 2. As the classification was made by considering the difference in the basic directions of each Party in the negotiations.

[1] President's text Version 3 (https://unfccc.int/documents/204687), President's text Version 2 (https://unfccc.int/documents/202115), President's text Version 1 (https://unfccc.int/documents/204639).

Table 4. Each Party's Perspectives on Market Mechanism

Group	Outline
Group giving a high priority to bottom-up/decentralized approaches	The position that cooperative approaches under Article 6.2 should be the new bottom-up/decentralized approaches under the Paris Agreement
Group giving a high priority to top-down/centralized approaches	The position that the cooperative approaches under Article 6.2 should incorporate more centralized elements based on the concept of the Kyoto Protocol
Group giving a high priority to environmental integrity	Position to seek that issues of the market mechanism that has been implemented under the Kyoto Protocol should be improved under the Paris Agreement
Group giving a high priority to non-market approaches	Position to point out limitations of market mechanism including issues of CDM that has been implemented under the Kyoto Protocol and to seek to aid developing countries in ways different from the market mechanism

(Source) Created by the Institute of Energy Economics, Japan, based on various data

(2). Impact of postponement of meetings due to COVID-19 pandemic

The Covid-19 pandemic impacts different areas, including the negotiations on climate change. Usually, there are at least two meetings organized by UNFCCC (Subsidiary Body Meeting in June and COP in December), with the participation of government delegations, NGOs, and experts from all over the world, however, these meetings in 2020 were all postponed to 2021. The Subsidiary Body Meeting scheduled to be held in June was postponed to October(and then postponed to 2021 again), and the COP scheduled to be held in November 2020 was postponed by one year to November 2021.

There remains uncertainty about how the postponement of the series of meetings would affect negotiation on the rules of Article 6 of the Paris Agreement. This delay can make time to have more discussions seeking a consensus, however, it may have possibility that the delay would make negotiation more complicated and difficult to achieve compromise.

As seen above, the negotiations concerning the development of rules on Article 6 of the Paris Agreement has been postponed, however, the collaboration of emission trade system was implemented between EU ETS and Switzerland. Switzerland also started the initiative to purchase offset credits from developing countries under the Paris Agreement. Moreover, as described below, the initiative by the international civil aviation sector has made progress for its implementation. Various initiatives have begun to work without the Rulebook on Article 6 of the Paris Agreement.

(3). Issues requiring discussions at COP26

As mentioned above, at COP25, the Parties were not able to find a compromise and reach

a consensus in terms of the application of the corresponding adjustment to Article 6.4, use of credit before 2020, and application of SOP to Article 6.2, however, there was a development in technological discussions concerning accounting.

For political discussions, it is necessary to seek a compromise through continued negotiations on a political level from now on. Apart from this, and for technological issues, we should clarify which issues will require discussions toward COP26.

<1> Methodology in Mechanism of Article 6.4

Concerning Article 6.4, Parties have different views on the transfer of CDM, which has become a political issue. Also, a large number of options were shown in the text presented at COP 25 on the methodology, in particular, the baseline approach, and which shows that the Parties have not attained a common understanding.

Looking at the President texts from Version 1 to Version 3, almost the same wording is used for the basic concept on the selection of approach to the baseline of the methodology.

President's text Version 3 Article 6.4, paragraph 35

> *Each mechanism methodology shall require the selection of a transparent and conservative approach, assumptions, parameters, data sources and key factors and should take into account, as appropriate: uncertainty; any leakage due to the implementation of the Article 6, paragraph 4, activity; relevant policy; consistency with the NDC of the host Party, any contribution to reducing emission levels in the host Party, any long-term low GHG emission development strategy of the host Party and the long-term goal of the Paris Agreement ; and should encourage an increase in ambition over time.*

(Translated by the Institute of Energy Economics, Japan)

Based on the provision, Versions 1 and 2 suggest several approaches concerning the setting of the baseline. In Version 3, however, no option was suggested, but it is prescribed that the discussion should be continued, aiming at a consensus in a future CMA.

Table 5. Approaches concerning Article 6.4 baselines

Approach	Outline
Performance-based approach	Two methodologies are presented. ✓ An approach where a baseline is based on the emissions of activities providing similar outputs and/or services in similar social, economic, environmental, and technological circumstances (President's text, Version 2 Option A (paragraph 38)) ✓ An approach where the baseline is set "at least at the average emission level of the best performing comparable activities in the past three years and where the host Party may determine a more ambitious level" (President's text Version 2, Option B (paragraph 41))
Best Available Technologies (BAT)	Best available technologies that represent an economically feasible and/or environmentally sound course of action
Benchmark	An ambitious benchmark representing a level of GHG emissions generated in the activities within a defined scope and boundary
Business as Usual (BAU) / Projected emissions / Historical emissions	Where the three approaches above are not deemed to be economically and technologically viable

(Source) Prepared by the Institute of Energy Economics, Japan, based on various data

As shown in **Table 5**, the approaches stated in Versions 1 and 2 are largely classified into four groups. Taking a look at the respective approaches in detail, these approaches have not yet been fully discussed. For example, as for the performance-based approach, its descriptions are different in spite of being under the same name of approach, and it suggests that there are divergent views on the definition of this approach. Furthermore, as for the BAT and benchmark, Version 1 and Version 2 of the President's text did not clarify how to select the BAT and which benchmark is to be used. Version 3, in consideration of such a situation, seems to have stated that further discussions should continue.

<2> Challenges to set a baseline in the Article 6.4 mechanism

Many researchers and experts have given their minds to the methodologies of 6.4 mechanism, and results of analysis have been published concerning the baseline approaches. These research activities have pointed out that a similar approach to that adopted under the Kyoto Protocol would be difficult to apply to the 6.4 mechanism and emphasized the necessity to find a baseline approach in consideration of the new circumstances under the Paris Agreement. On the other hand, there are no convergent views on a possible new baseline approach under the Paris Agreement.

The results of work suggested that there may be many difficulties in the setting of baseline in consideration of NDC, and in the actual introduction of approaches such as performance-based approach, benchmark, and BAT.

For example, the German Emissions Trading Authority (Deutsche Emissionshandelsstell, DEHSt) of the Federal Republic of Germany published a report in 2019, in which they point out that utilization of international benchmark is more appropriate than the BAU approach as a baseline approach in consideration of NDC submitted by each Party under the Paris Agreement, however, they admit that the sectors to which international benchmark can be set are limited[2]. The report analyzes the possibility of setting the international benchmark in the calculation of emissions reductions of energy use in industry, and industrial processes, as well as emissions reductions in the energy production, building and dwelling, transportation, waste management (water discharge), and so on. In the case of homogeneous products, such as a product of petroleum refining, the database that may be the basis of the international benchmark-setting has already existed. As for the products such as iron steel and aluminum, which are frequently traded internationally, the report points out that setting an international benchmark is desirable in order to avoid generating distortion in the trade. For other products, however, the report shows an analysis result that setting the international benchmark is difficult because the energy mix differs among countries.

Besides, a report that experts in International Energy Agency (IEA) analyzed the baseline approach of the Article 6.4 mechanism pointed out the challenges for the baseline approach in the Article 6.4 mechanism, in consideration of the experiment of CDM. Re et al. (2019) pointed out that the baseline approach of CDM is required to be applied to the Paris Agreement only after modification, instead of being applied as it is. They further pointed out the challenges in the application of benchmark, BAT, and other approaches in consideration of the analysis of the CDM methodologies (renewable energy and cement)[3]

For example, the benchmark may be used occasionally in the baseline approach of CDM, however, it is pointed out that sufficient information cannot be obtained when collecting the data for benchmark-setting if the data includes some confidential data. Also, regarding the setting of an international benchmark, it is pointed out that a loose benchmark would invite an excessive credit issuance, while a too strict benchmark would eliminate the opportunities for reduction, therefore, there are various challenges for the setting of a benchmark.

Furthermore, regarding the setting of a baseline with BAT, it is pointed out that the actual operation would require difficult decision-making, such as the way to identify the “Best Available Technologies”, and that the selected technologies would become excessively complicated (possibility to become inapplicable as a matter of practice).

As seen above, a new baseline approach reflecting the circumstance under the Paris

---

[2] DEHSt (2019). Benchmarks to determine baselines for mitigation action under the Article 6.4 mechanism, Discussion Paper.

[3] Re, L. L., Ellis, J., Vaidyula, M., & Prag, A. (2019). Designing the Article 6.4 mechanism: assessing selected baseline approaches and their implications.

Agreement is required, and further deliberation is also required to finding the approach .

2. Trends of CDM and JI under the Kyoto Protocol, and Trends of Pilot Projects

(1). Project development trend of CDM, and credit issuance trend

Since 2013, the development of CDM projects has been downward and the trend remains unchanged in 2020. The number of registered projects was as low as 22, and 154 projects were registered in 2014, however, the number has been lower than 100 thereafter. At present, an activity to develop a new CDM project is hardly observed.

No consensus on the position of CDM under the Paris Agreement and the uncertainty of the future of CDM would be one of the reasons for such faltering project development. Moreover, as described below, in the scheme of CORSIA, which is an initiative to tackle global warming to be implemented under the International Civil Aviation Organization (ICAO), the credits associated with CDM are eligible, has a potential of impacting development of CDM. However, the CORSIA allow to use for its compliance only the credits issued for emissions reductions of 2016-2020 are eligible in 2021-2023 and the demand after 2021 are not foreseeable, which seems to impact the slowdown of CDM development.

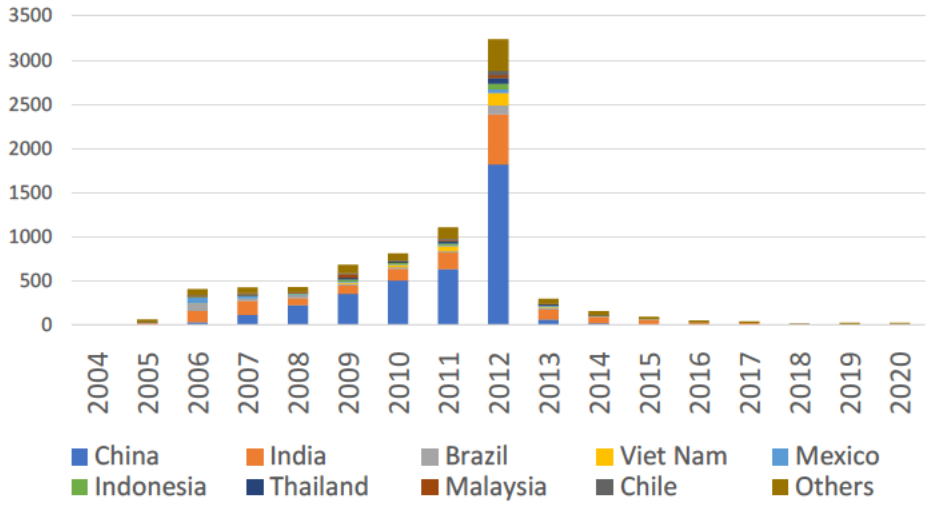

Figure 1. The trend of CDM Project Registration

(Source) Prepared by the Institute of Energy Economics, Japan, based on the data published by the CDM Executive Board

The slowdown continues not only for the trend of project registration but also for credit issuance. In 2020, about 61 million tCO_2e of credits were issued, which is, about 44 million tCO_2e of credits more than those issued in 2019, however, the issued amount was much lower than about 340 million tCO_2e of 2012, as well as the project registration number. The increase in the issuance in 2020 seems to be affected by the above-mentioned approval of

use in CORSIA, however, the demand for CERs from CORSIA will decrease due to the COVID-19 pandemic. Therefore, the increase in the CER issuance will probably remain also limited.

Moreover, a revision of regulations that may significantly impact the future credit supply is undergoing at the CDM Executive Board. In CDM, project participants are allowed to opt for a crediting period to be fixed (ten years) or renew(Basically 7-year crediting period may be renewed twice). Among the projects that set renewing the crediting period, however, a large number of projects have not taken the renewal procedures in recent years. As a result, the CDM Executive Board established a period for renewal procedures of crediting period and determined not to accept any application for renewal procedures for the projects that did not apply the renewal procedures within one year from the renewal date.

Due to the revision of regulations, many projects seem to have not applied the renewal procedures by passing the deadline for renewal procedures. Although accurate data are not obtained at present, CERs will not be supplied anymore from the projects of which the crediting period was not renewed, which may exert an influence on the future credit supply amount.

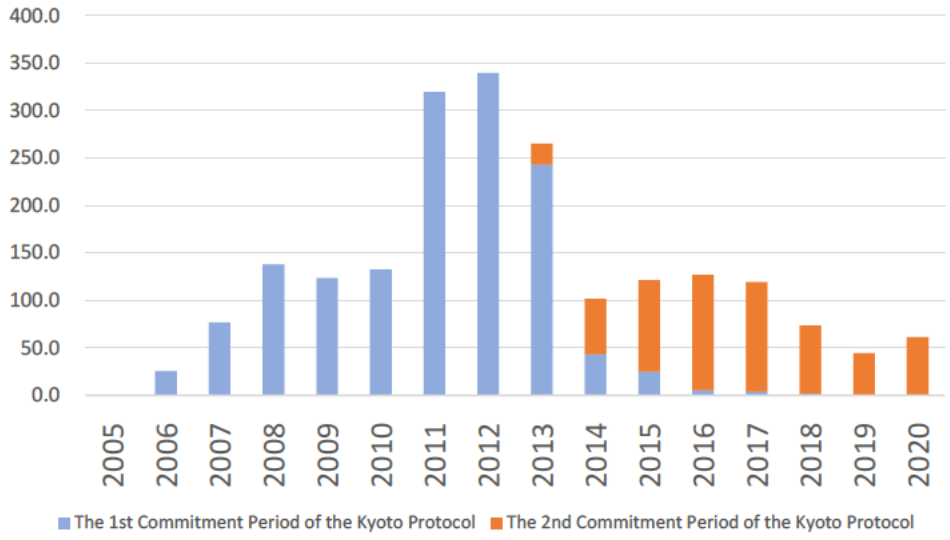

Figure 2. CER Issue Trend

(Source) Prepared by the Institute of Energy Economics, Japan, based on the data published by the CDM Executive Board

(2). Determination of CDM Executive Board on the CDM projects to be implemented from 2021 onward

Concerning the CDM projects to be implemented from 2021 onward, the CDM Executive Board made a decision that would significantly impact the project development, credit period renewal procedures, and crediting procedures at least until the 16th Conference of Parties serving as the Meeting of the Parties to the Kyoto Protocol, the CMP16, that is to be held

simultaneously with COP26.

In the 107th Executive Board held in October 2020, board members elected from the EU and the Alliance of Small Island States (AOSIS) pointed out problems concerning the CDM projects to be implemented from 2021 onward.

These board members expressed that the role of CDM is over, because the Kyoto Protocol does not set the 3rd Commitment Period, and the emissions reduction target is not set under the Kyoto Protocol. Based on this views, they argued that the CDM Executive Board cannot register projects before a political decision made by CMP on the position of CDM in and after 2021. This means the registration of new projects, renewal procedures of credit periods, and crediting procedures should be stopped. In response to this, other board members argued that the CDM should continue because no provision stipulates the termination of CDM. The discussions went complicated, and the 107th Executive Board did not form a conclusion on this issue[4].

Even among the experts, some have a view that the CDM cannot continue from 2021 onward without a political decision, while others have an opposite view that the CDM activities cannot be suspended without political decision. There is no unified view on this issue[5]. The private companies which have engaged in the CDM project development express their concern that the uncertainty over the continuation of the CDM would erode confidence in the project investment[6].

The 108th Executive Board held in December continued the discussions and finally achieved a compromise. The 108th Executive Board agreed to process requests on an exceptional basis, pending new guidance at CMP16.

Firstly, the Board agreed to process requests for registration of project activities and renewal of crediting periods starting on or after January 1, 2021, as tentative measures, as follows:

i. Registration fees are not charged, pending CMP guidance at CMP16.

ii. At the point of receiving the request, the secretariat should request the project participant to acknowledge and accept the risk that it may not be possible for credit to be issued.

iii. If the analysis of such submissions is completed, it shall be recorded as provisional and only be finalized by the CDM Executive Board after guidance from the CMP.

[4] Carbon Pulse “UN board dodges decision on ‘back door’ CDM extension into Paris era”, October 5, 2020
[5] Climate Home “Fate of UN-led carbon market to be decided behind closed doors”, October 1, 2020
[6] Carbon Pules(Oct 5,2020) op.cit.,

Similarly, the Board agreed to process requests for issuance of credits for emission reductions achieved on or after January 1, 2021, as follows:

i. Share of Proceeds for administrative expenses of the CDM Executive Board is not to be charged, pending the guidance at CMP16.

ii. At the point of receiving the request, the secretariat should request the project participant to acknowledge and accept the risk that it may not be possible for credits to be issued.

iii. If the analysis of such submissions is completed, it shall be recorded as provisional and only be finalized by the CDM Executive Board after guidance from the CMP.

The Board informed project participants of a temporary method for calculation of emission reductions as follows:

- In calculating emission reductions achieved on or after January 1, 2021 in Project/Program Design Documents (PDD), they shall apply, as the value of global warming potential, the lowest value from the Intergovernmental Panel on Climate Change (IPCC) assessment reports for a 100-year time horizon.

As seen above, the discussions on the implementation rules of market mechanism under Article 6 of the Paris Agreement are stagnant, and it is not clarified whether the transfer of CDM to the Paris Agreement will be approved or not. The situation exerts an impact on the administration of the CDM Executive Board and the necessity to achieve a consensus on Article 6 of the Paris Agreement has further increased.

(3). Trends of pilot projects under Article 6 of the Paris Agreement

Although discussions on the Paris Rulebook on Article 6 of the Paris Agreement have not reached a consensus, works for preparation and implementation of pilot project, emissions reduction project that is assumed to be implemented under Article 6 of the Paris Agreement, have started in various countries[7].

There is no official definition of the pilot project under Article 6 of the Paris Agreement. In a broader sense, it may include ETS linkage (e.g. EU-Switzerland) and environment improvement such as a capacity building. In a narrower sense, however, it covers the project that conducts international cooperation under Article 6.2 and ultimately aims at generating Internationally Transferred Mitigation Outcomes (ITMOs). Besides, some projects are

[7] The report in this section is mainly based on the following documents: Climate Focus (2020): Article 6 Piloting: State of Play and Stakeholder Experiences

assumed to be implemented under Article 6.8.

If classifying piloting activities according to three different phases of the preparatory phase, the pilot phase, and the full implementation phase, most of the piloting activities are currently in the preparatory phase. Only a few of them have progressed into the pilot phase, signing a bilateral agreement (Switzerland and Peru having signed the first Article 6 specific bilateral agreement) and are advancing on establishing mitigation outcome purchase agreements (MOPAs). The only activity in the full implementation phase is the Joint Crediting Mechanism (JCM) of Japan. (The corresponding adjustment in the host country has not yet been implemented.)

An annual number of new initiatives has decreased since 2019, and the delay in agreement on the Paris Rulebook on Article 6 can be pointed out as a reason. A successful conclusion of negotiations is not regarded as a necessary condition for the continuation of pilot projects, however, it is pointed out that failure to establish clear rules for Article 6 would be a severe setback for multilaterally-governed carbon markets[8]. The impacts of the COVID-19 pandemic have resulted in activity-specific delays, but not terminated any initiatives.

While buying countries are eager to develop cooperative approaches, host countries take a more cautious stance. This is due to host countries possibly having more risk for the achievement of their own NDC by signing an agreement in the context of Article 6 of the Paris Agreement, as compared with the Kyoto Mechanism, where they did not have emission targets. For example, Chile has so far sought the possibility of pilot projects with Canada, Sweden, and Switzerland, however, it is reported that Chile temporarily ceased all the dialogues with the projects after the significant strengthening of NDC in April 2020[9]. As measures to mitigate such a risk, exploration is ongoing for the setting of conservative baseline and performance-based finance (the trade is done only where the reductions exceeded the NDC of the host country).

Table 6 shows the outline of pilot projects aiming at issuance of ITMOs, Figure 3 shows their geographic distribution, and Figure 4 shows the size of financial resources. Compared with the CDM of which the host countries were mainly China and India, the pilot projects are globally distributed. In terms of the relationship with Article 6, some projects have declared to apply the cooperative approach under Article 6.2, however, many others have not made any special declaration. Currently, it seems that they have not determined whether they will use Article 6.2 or Article 6.4 (approach-neutral). Only the Adaptation Benefits Mechanism

[8] ibid., p3

[9] Carbon Pulse “BRIEFING: International emissions trading pilots see fourfold funding gain ahead of Paris rulebook” ,December 22, 2020, https://carbon-pulse.com/117895/

(ABM) of African Development Bank has declared to apply the non-market approach of Article 6.8.

The fund size is estimated to be at least 1.37 billion US dollars for the entire pilot projects and tends to increase, however, the fund size is still smaller than that of CDM or JI. The KliK Foundation of Switzerland (550 million - 1.1 billion US dollars) and the JCM of Japan (580 million US dollars) have a large size of funds. Some projects have not yet been allocated the fund because they are still in the preparatory phase.

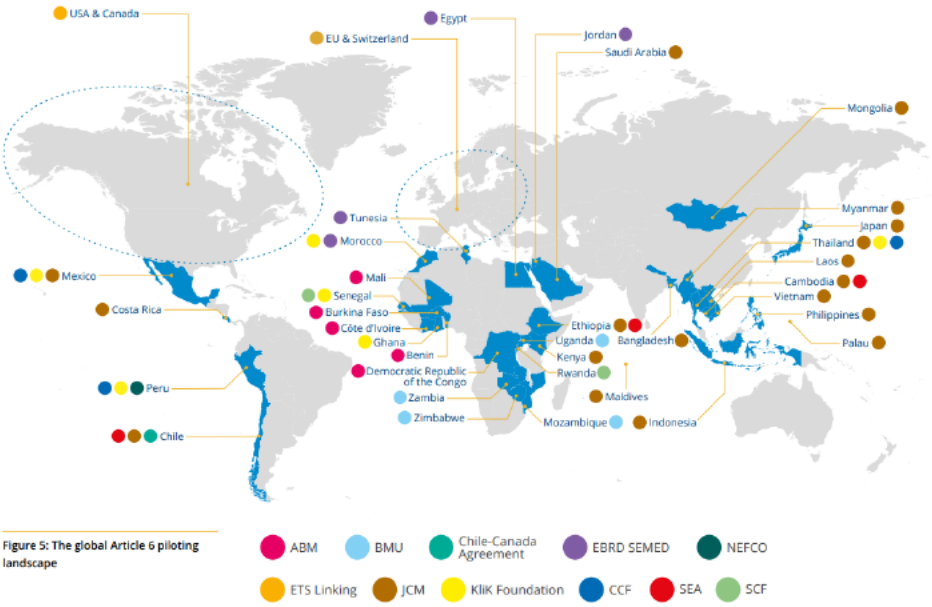

Figure 3. Global landscape the article 6 pilot project

(Source) Climate Focus (2020)

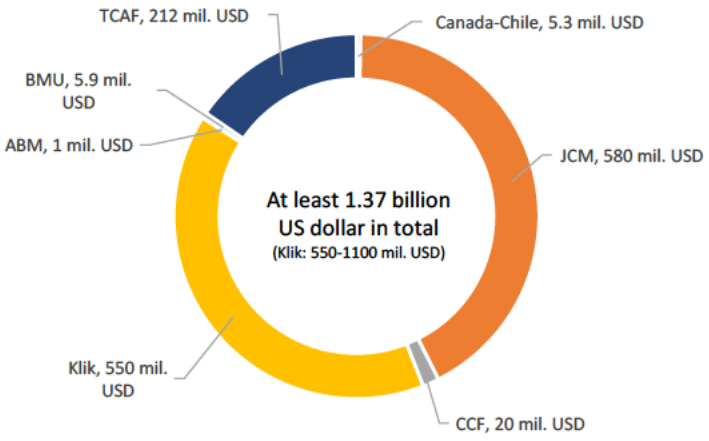

Figure 4. The Volume of Funds of Article 6 Pilot Projects

(Source) Prepared by the Institute of Energy Economics, Japan, based on Climate Focus (2020)

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (1)

#	Title	Financed by	Host Country	Fund size	Relationship with Article 6	Summary
1	Adaptation Benefits Mechanism (ABM)	African Development Bank (AfDB), (Green Climate Fund, African Climate Change Fund, Donor countries, others)	Benin, Ethiopia, Cote d'Ivoire, Nigeria, Mozambique, Rwanda, Senegal, Uganda	US$1 million (in the expansion)	Article 6.8 (Non-market approach)	ABM is the first attempt to operationalize a mechanism to support adaptation activities, aiming at quantifying, validating, and verifying the advantages of sustainable development by a results-based finance instrument. As a candidate of a non-market approach based on Article 6.8, the ABM will start 10 -12 pilot phases in 2019-2023.
2	Program to reduce emission in the waste sector	Canadian Ministry of Environment and Climate Change	Chile	US$5.3 million (C$7 million) (2017- 2021)	Approach-neutral. Article 6 is considered as an option.	The Canada-Chile Agreement on Environment Cooperation entered into force in July 1997 in parallel to the bilateral Canada-Chile Free Trade Agreement and has provided a framework for bilateral cooperation on environmental issues. Within the context of this cooperation, Canada has offered financial and technical support to Chile, in light of the approval of the Paris Agreement in 2016, to deploy technologies and to pilot innovative approaches supporting the reduction of methane emissions in the waste sector.

(Source) Prepared by the Institute of Energy Economics, Japan, based on Climate Focus (2020): Article 6 Piloting: State of Play and Stakeholder Experiences and UNEP DTU Partnership: Article 6 Pipeline overview

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (2)

#	Title	Financed by	Host country	Fund size	Relationship with Article 6	Summary
3	Integrated Carbon Program (ICP) for the Southern and Eastern Mediterranean (SEMED)	European Bank for Reconstruction and Development (EBRD), Spanish Government	Egypt, Jordan, Morocco, Tunisia	N/A	Technical assistance, technological transfer, policy dialog, results-based finance	European Bank for Reconstruction and Development (EBRD) is supporting the transition to low carbon economies of Southern and Eastern Mediterranean (SEMED) through the Integrated Carbon Program (ICP), together with the Spanish Office of Climate Change (OECC). This program includes technical assistance, policy dialog and capacity building in carbon markets, and financing certificates for emission reduction activities.
4	Pilot Activities by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)	Ministry for the Environment, Nature Conservation and Nuclear Safety of Federal Republic of Germany (BMU)	Zambia, Uganda, Mozambique, Zimbabwe	US$5.9 million (€ 5 million) (carbon payment) and low-interest loan (interest payment reduction amount is a combination of approx. US$41.23 million (€34.71 million))	Article 6.2	BMU's support for the development of Article 6 pilot activities. BAU aims, first and foremost, to build capacity in partner countries through assistance under Article 6, and as a second step, to generate emission reduction. BAU-funded Article 6 pilot projects currently underway include a program for reducing technical losses (TD-losses) in the power grids.

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (3)

#	Title	Financed by	Host country	Fund size	Relationship with Article 6	Summary
5	Joint Crediting Mechanism (JCM)	Japanese Government	Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Laos, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Philippines, and Thailand (17 countries)	The project budget 2013 - 2020 is approx. US$580 million (61 billion yen)	Possibility to transfer to cooperative approach under Article 6.2	Joint Crediting Mechanism (JCM) is a crediting mechanism to promote the implementation of mitigation activities in developing countries. Japan established the JCM in 2010 and has already signed agreements with 17 countries. As of July 2020, 64 projects have been registered with 95 methodologies to quantify the emission reduction, and approx. 88,500 tCO2e of credits have been issued.

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (4)

#	Title	Financed by	Host country	Fund size	Relationship with Article 6	Summary
6	Pilot Projects by the Nordic Environment Finance Corporation (NEFCO)	Sweden, Norway, Finland, Nordic Environment Finance Corporation (NEFCO)	Peru, Viet Nam	N/A	Approach-neutral	Nordic Initiative for Cooperation Approaches (NICA) is an initiative managed by NEFCO. NICA was launched in 2018 in collaboration with Finland, Norway, Sweden, and NEFCO. The cooperation funded through NICA is based on the activity developed under the Nordic Partnership Initiative (NPI) on Upscaling Mitigation Action. Between 2011 and 2018, NPI supported the development of the preparatory program of Nationally Appropriate Mitigation Actions (NAMA) in developing countries, for the solid waste sector of Peru and the cement sector of Viet Nam.
7	Pilot Projects by Swedish Energy Agency (SEA)	Swedish Energy Agency (SEA)	Nigeria, Kenya, Chile, Mongolia, Philippines, Indonesia, Columbia	N/A	Currently implementing the activities of Article 6.2 and approach-neutral. Article 6.4 will be within the view after the operation starts.	Swedish Energy Agency (SEA) has engaged in Article 6 test operations by exploring ways to support the development of mitigation activities that could potentially generate ITMOs. The activity of SEA is still in the conceptual or initial development phase and has not yet committed the Article 6 transactions. SEA has engaged in different initiatives to start the Article 6 project pipeline.

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (5)

#	Title	Financed by	Host country	Fund size	Relationship with Article 6	Summary
8	Pilots Projects by Climate Cent Foundation (CCF)	CCF (Swiss Government)	Mexico, Peru, Thailand	Approx. US$20 million (CHF20 million)	Article 6.2 Based on the approvals of the host country and the buyer country, and the inter-government approach with the corresponding adjustment to the GHG inventory.	In 2013, the Swiss government mandated the Climate Cent Foundation (CCF) to use its assets of CHF100 million (at least CHF 20 million) to finance Article 6 pilot activities with interested countries and private sectors until 2032. The Swiss government and CCF jointly agree and determine the pilot activities. All the certificates obtained as a result are delivered to the Swiss government without additional expenses.
9	ITMOs Purchase Program of the KliK Foundation	CCF, Foundation for Climate Protection and Carbon Offset (Stiftung Klimaschutz und CO_2-Kompensation) KliK Foundation (Swiss government)	Ghana, Peru, Morocco, Senegal	US$550 million - 1.1 billion (CHF500 million - 1 billion) is estimated as costs in 10 years.	Article 6.2, Based on the inter-government approach with approvals of the host country and the buyer country, and the corresponding adjustment to the GHG inventory	KliK Foundation is supporting domestic projects that generate carbon credits based on the carbon standards under the current CO_2 Law. The CO_2 Law approved by the Parliament in September 2020 permits to use of international carbon credits for 25% of the NDC target of Switzerland. The Foundation is developing ITMOs purchase procedures from 2021 onward in anticipation of future regulations.

Table 6. Summary of Pilot Projects Aiming at Generating ITMOs (6)

#	Title	Financed by	Host country	Fund size	Relationship with Article 6	Summary
10	Standardized Crediting Framework (SCF)	World Bank Carbon Initiative for Development (Ci-Dev)	Rwanda, Senegal, Kenya, Laos, Madagascar, Ethiopia, Mali, Burkina Faso, Uganda	A private fund of US$267 million is to be motivated by 2025.	Approach-neutral	The Standardized Crediting Framework for Energy Access (SCF) was developed in anticipation of the future transition of CDM projects and Programs of Activities (PoAs) to Article 6. SCF pilots have been determined to be implemented in Senegal and Rwanda, and have realized a significant time and cost-saving compared with the conventional CDM process. Ci-Dev is currently engaged in full deployment of SCF in all the Ci-Dev countries.
11	Transformative Carbon Asset Facility (TCAF)	World Bank TCAF (Canada, Germany, Norway, Sweden, Switzerland, UK)	India, Morocco	US$212 million. Targeting to increase the financial procurement to US$500 million.	Approach-neutral	TCAF is a trust fund of the World Bank piloting innovative CO_2 crediting and quantification mechanisms. To ensure environmental integrity, the fund promotes strict monitoring and accounting on the use of conservative baseline and performance of selected sectors and policy intervention.

Chapter 2 Survey of Other Trends on the International Market Mechanisms

1. Trend of Voluntary Credit Market

In recent years, while an increasing number of countries are setting their net-zero/carbon neutral targets, private companies have been also strengthening their efforts to reduce GHG emissions including setting their net-zero/carbon neutral target as voluntary initiatives.

Given that some private companies are assumed to use offset credits for the achievement of their voluntary net-zero/carbon neutral targets, this assumption is also raising the expectation for future growth voluntary offset credits market of meeting such demand from private companies' voluntary initiatives.

This section will summarize the trends of voluntary credit market and clarify its entire picture. The entire picture will gives us a view of current situations on the voluntary offset credits market and the trends of of voluntary initiatives taken by private companies including net-zero/carbon neutral target and use of offset credits for it.

(1). What is a voluntary credit?

<1> Baseline-and-credit emissions trading scheme, and voluntary credit

Various emissions trading schemes are implemented globally, and the baseline-and-credit scheme is one of them. This is a system that implements a project leading to emission reduction, such as wind-power generation, and the difference of the actual emissions and the estimated emissions otherwise to emitted by the project is deemed as the emissions reduction, for which the offset credit is issued[10].

Joint Crediting Mechanism that Japan implements with partner countries, and J-Credit that is implemented in Japan, precisely fall under the baseline-and-credit emissions trading system. In addition, there are baseline-and-credit systems operated by national and local governments in the US, Canada, South Korea, etc. Internationally, there is Clean Development Mechanism (CDM), which is implemented under the Kyoto Protocol. As described below, there are private organizations that operate their original baseline-and-credit systems.

The baseline-and-credit system of emissions trading are applicable mainly to two types of demands. One is a demand to use the credits to comply with the governmental regulations, in particular, the target under the Kyoto Protocol or the Paris Agreement. The other is a demand to use the credits for voluntary actions against global warming of private companies, local governments and individuals. Voluntary credit market is a market where trade to meet the latter demand.

The credits traded as voluntary credits are diverse. At the present, Certified Emission Reductions (CERs), credits generated in the CDM implemented under the Kyoto Protocol are occasionally used for

[10] Another emissions trading scheme is the cap and trade scheme, in which the regulatory body allocates permits which allow companies to emit a certain amount of carbon emissions. The companies, if succeeding in controlling their emissions lower than their permits, may sell unused permits to other companies that exceeded their permits. Specifically, EU ETS implemented in Europe falls under this system.

voluntary initiatives of private companies for purposes other than the achievement of the target under the Kyoto Protocol. The credits used as voluntary credits are often issued by private crediting body (generally called Verified Emission Reductions or VERs).

<2> Difficulty in setting the border – Compliance credit and voluntary credit

Efforts to use the credits for voluntary initiatives of companies started in the latter half of 1990s in the United States, and the credits used for these initiatives have been all issued by private crediting bodies. Thereafter, the Kyoto Protocol was adopted, and the CDM was established in under the Kyoto Protocol. Use of credits to achieve the target under the Kyoto Protocol produced a large demand, and such credits were supplied from CDM (or JI). Therefore, from 2005 to the early 2010s, in the compliance credit market, so-called Kyoto credits, such as CERs, were traded. In the market of voluntary credits which continued after the adoption of the Kyoto Protocol, credits issued by private crediting bodies, VERs, were traded. The border between the market of compliance credits and that of voluntary credits was clearly distinguished.

Since 2013, however, under the emission trading scheme of the State of California in the US, use of a part of VERs traded as voluntary credits, has been permitted. Like this, VERs have come to be used for regulations of the government. At the same time, the online platform for voluntary cancellation of CERs was established in September 2015, that makes companies and individuals possible to cancel CERs for voluntary offsetting their carbon footprint. Since then, some CERs have come to be traded as voluntary credits. The border between the voluntary credit and compliance credit has become unclear, and at last, in 2019, in the scheme against global warming implemented under International Civil Aviation Organization (ICAO), Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), VERs of private offset credit issuing bodies, which are traded as voluntary credits, have become eligible.

<3> Meaning of voluntary credit in this report

Defining the voluntary credit is somehow difficult. This report covers the trends of voluntary credit market, focusing on the trading of VERs other than CERs, how to use VER to voluntary actions in private company, which body issues voluntary credits, and what kind credits are traded , and so on. It is because, VERs have been mainly used in the implementation of companies' voluntary actions against global warming, although, the use of VERs for regulations of government has expanded.

One thing to be noted is that transactions in voluntary credit market include preliminary purchase of credits in anticipation of future governmental regulations, although the regulations are not currently established. As stated above, in the emissions trading scheme of the State of California and in CORSIA, credits which have been initially traded as voluntary credits are permitted to be used, and there are transactions in anticipation of such use. For that reason, the volume and value of transactions shown in this report contain the transactions conducted in consideration of the current and future regulations.

(2). Trend of companies that utilizes voluntary credit

<1> Companies that use voluntary credits

Companies in many sectors are voluntarily offsetting their emissions. Buyers in the energy sector purchase the highest volumes. They are followed by buyers in the finance, consumer goods, and entertainment sectors, which are not the sectors covered by regulation of government, but account for a large part of demand of voluntary credits[11].

The purposes of purchased offsets are diverse. Voluntary credits are purchased for diverse initiatives, for example, they want to demonstrate their commitment to engage the climate change; they have to meet their defined goal, or they intend to offset the emissions due to the use of their products. (See Table 7)

Moreover, in recent years, new usage of voluntary credit has been observed. According to a report of Google, they had achieved the carbon neutrality for the emissions generated from their activities as early as in 2007. In a decade thereafter, they increased their purchase of renewable energy, and purchased electricity derived from renewable energy, covering all corporate-wide electricity consumption. Furthermore, Google has established a goal to compensate all the emissions ever emitted by them since their foundation in 1998 through the initiatives against global warming published in September 2020, by 2030[12]. This is an initiative that aims not only to use voluntary credits to achieve their emission reduction goal, but also to retroactively compensate their entire carbon legacy, which may be a new usage of voluntary credit.

New initiative is emerging among the energy companies, for example, a company provides carbon-free LNG that offsets the emissions produced in the use of the products (gas and petroleum). The companies which sell the carbon free LNG purchased voluntary credits before selling the carbon free LNG. The initiative draws attention as a new use of voluntary carbon credits[13].

[11] The survey introduced herein are the survey result of Forest Trends' Ecosystem Marketplace published in 2017. It describes the circumstances before companies start to actively tackle the setting of net-zero / carbon neutral goal in and after 2019. Forest Trends' Ecosystem Marketplace "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017,See pp.7-13.

[12] Google "Realizing a carbon-free future Google's Third Decade of Climate Action" 2020 See pp.2-11.

[13] As an example of LNG, initiative of Shell can be mentioned. Shell press release "Shell accelerates drive for net-zero emissions with customer-first strategy", dated Feb 11, 2021.
For petroleum, there is an example of Carbon neutral crude provided by Occidental. https://www.offshore-energy.biz/occidental-delivers-world-first-carbon-neutral-crude-shipment/

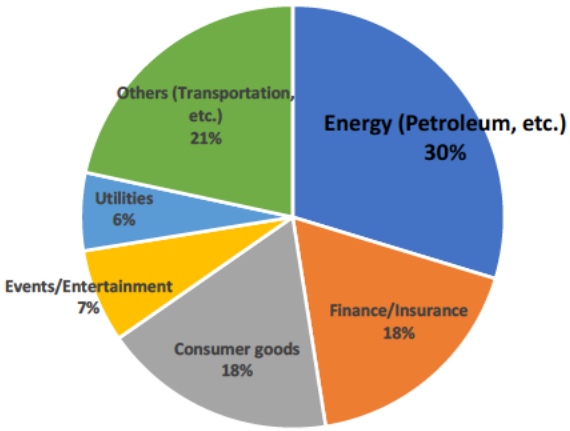

Figure 5. Types of Companies Purchasing Voluntary Offsets

(Source) Prepared by the Institute of Energy economics, Japan, based on Forest Trends' Ecosystem Marketplace "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017

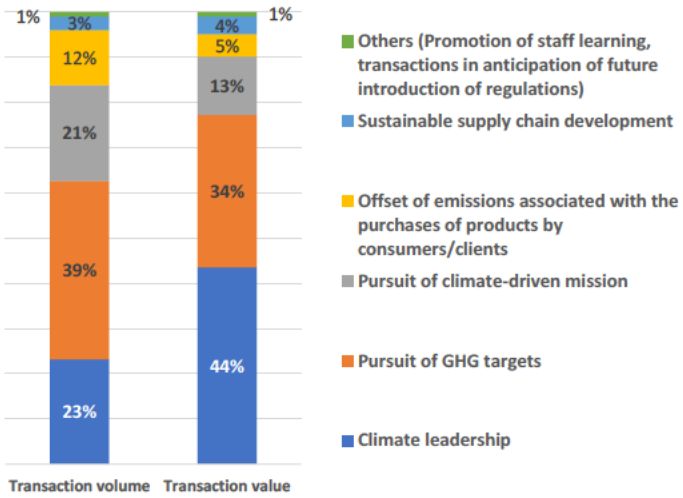

Figure 6. Use of Voluntary Credits

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017

Table 7. Description of Use of Offset Credits

Category of initiative	Explanation	Example
Climate Leadership	The companies aim to demonstrate their intention to be the first in the sector to tackle the global warming. They purchase offset credits as a part of their innovative initiatives against global warming. They purchase the offset credits at a higher price (US$8.2/tCO2e at the average), however, their purchases only make up only a lower percentage of the total volume.	Interface, a carpet maker, launched its Cool Carpet Program to offset emissions from all stages of its carpets' life-cycle, i.e. from production to end use. This program purchases offset credits to compensate their emissions.
Achievement of their GHG targets	The companies that set voluntary emission reduction target to appeal their products and services to consumers who are conscious of global warming purchase the offset credits to achieve the goal. While they account for the largest share in the transaction volume (39%), their average transaction price is US$3.9/tCO2e.	National Australian Bank (NAB), when being certified as the first carbon neutral bank in Australia, purchased offset credits to compensate their emissions. They did so as they believe that their initiative against global warming is necessary for attracting new talent and retaining employees.
Pursuit of initiatives against global warming	The companies set their social role beyond simply making profit in their corporate activities. They do not set their emission reduction targets, but may purchase voluntary offset credits as their contribution to the actions against global warming. They account for 21% of trading volume and 13% of trading value. (The average price is US$2.7/tCO2e.)	Max, a Swedish burger chain, started to sell veggie burgers to reduce the GHG emissions from cattle. They offset the rest of its emissions they cannot reduce.
Offset of emissions associated with their products	The companies use carbon-neutral brand to differentiate themselves from rival companies and products. To appeal their contribution to mitigation of global warming, they may offer customers the option to make their product or service carbon neutral. Such a demand accounts for 12% of the trading volume and 5% of trading value. (The average price is US$1.8/yCO2e.)	Center Point Energy Service, an energy provider, offers customers the opportunity to offset emissions from their natural gas purchases through a program called Green Balance. The use of this service is increasing, as observed in the supply for entire apartments or condominiums.
Sustainable supply chain development	The companies purchase offset credits from projects that directly impact their supply chain. They account for 3% of trading volume and 4% of trading value. (The average price is unknown.)	Coop, a Swiss grocer, implements a project that leads to the CO_2 emission reduction in the areas in Kenya where the employees of Kenyan companies to which they provide their products live.
Others	The companies purchase voluntary offset credits as a way to promote internal engagement with the environment, or in anticipation of future introduction of regulations, even though they are not subject to the regulations at the time of purchase.	Some airline companies are purchasing voluntary offset credits in anticipation of regulations (to be started from 2021) to CORSIA, the carbon offsetting and reduction scheme under ICAO

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017

<2> Trend of buyer countries

A view of voluntary credit buyer countries represents that industrial countries from North America and Europe hold the top five positions. Japan is not included in the table below. This seems to be because Japanese companies were not included in the survey which was the basis of the Table[14]. Nevertheless, Japanese companies use voluntary credits in different forms. They use mainly J-Credit system to offset the emissions associated with their products and events[15].

In recent years, there are initiatives to sell carbon-free LNG by utilizing VCS credits other than J-Credits[16]. Furthermore, an increasing number of companies set net-zero/carbon neutral targets. The use of voluntary credit may further increase to achieve the target.

Table 8. Buyer Countries of Offset Credits (2019)

Buyer country	Traded volume (million tCO2e)
United States	12.06
France	10.22
United Kingdom	5.87
Germany	1.91
Switzerland	0.89

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace. "The Only Constant is Chang. State of the Voluntary Carbon Markets 2020, Second Installment Featuring Core Carbon & Additional Attributes Offset Prices, Volumes and Insights", 2020

(3). Trend of projects and credits

<1> Categories of transacted projects (project types)

What types of credits are transacted as voluntary credits? Table 9 summarizes the voluntary credits transacted in 2019 by project type. When looking at the project types shown in this table, it is understood that projects mainly associated with renewable energy and forestry and land use are transacted.

What makes this survey interesting is that the renewable-energy-related projects,

[14] Forest Trends' Ecosystem Marketplace annually surveys and publishes the trend of voluntary credit market. In the survey, interviews with private companies involved in voluntary credits are conducted, however, Japanese companies are not included in the interview survey. This seems to be the reason the trend of Japanese companies is not reflected on the table.

[15] Deloitte Tohmatsu Consulting LLC, "FY2018 Commissioned Project for Assisting Utilization and Promotion of the J Credit – Working Paper" pp. 156-161.

[16] An example is the Initiative of Tokyo Gas to offer carbon-free LNG provided by Shell to Japanese customers. https://www.tokyo-gas.co.jp/Press/20190618-01.html

producing the largest transacted volume of approx. 42 million tCO2e, have approx. US$60 million of trade volume, and are ranked as the second, subsequent to the projects related to forestry and land use. This is because the credits associated with the projects related to forestry and land use at the 2nd rank in the trade value are traded at an average unit price of US$4.3/tCO2e, therefore equated to the highest traded volume of approx. US$160 million. As seen above, the reason the credits associated with forestry and land use are traded at higher prices is that the buyer companies choose the credits in consideration of not only the emission reduction, but also other factors.

The survey on the selection criteria of buyers that purchase the credits has clarified that many companies' main concern was the co-benefits of the implementation of the project[17]. Among the respondent companies to the survey, 35% placed priority on the co-benefits, followed by costs, consistency with the company/organization's mission. A project's consistency with the organization's mission could be a combination of factors, including co-benefits, biodiversity, and adaptation. Projects deemed to be associated with co-benefits, like community development or biodiversity preservation, are implemented in Latin America and Africa as project related to forestry and land use.

Table 9. Traded Offset Credits by Project Type (2019)

	Volume (million tCO2e)	Value (million USD)	Average price (US$/tCO2e)
Renewable energy	42.5	60.1	1.4
Forestry and land use	36.7	159.1	4.3
Waste management	7.3	18	2.5
Household devise (cook-stove, etc.)	6.4	24.8	3.8
Industrial processes	4.1	7.7	1.9
Energy efficiency/Fuel switching	3.1	11.9	3.9
Transportation	0.4	0.7	1.7

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace "Voluntary Carbon and the Post-Pandemic Recovery" 2020

[17] Forest Trends' Ecosystem Marketplace "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017, See p.14.

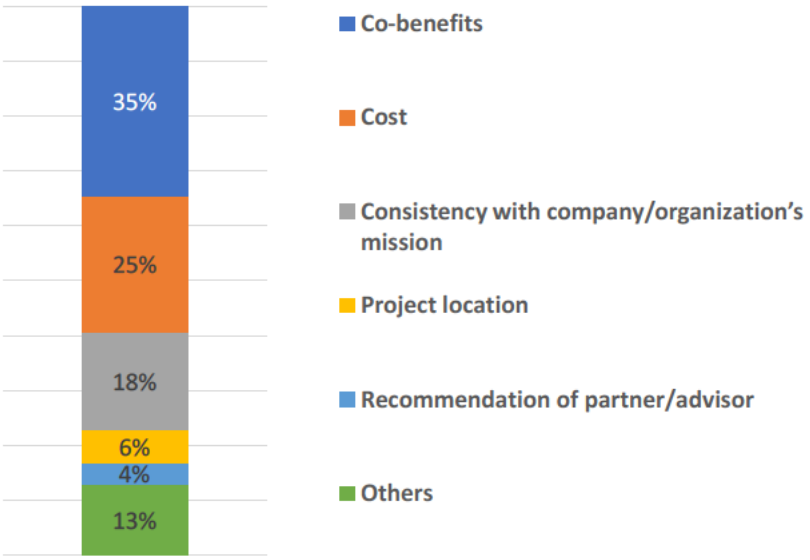

Figure 7. Buyer's Selection Criteria when Purchasing Credits

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends Ecosystem Marketplace publication "Unlocking Potential State of the Voluntary Carbon Markets 2017 Buyers Analysis" 2017

Such a trend is growing in recent years, and attracts more buyer companies to the projects concerning REDD+ that prevent deforestation. This is because REDD+ involves the projects that deliver support for indigenous people, and other contribution to SDGs[18].

Given that an IPPC report on land use published in 2018 pointed out that the carbon absorption in the natural ecosystem was essential for achievement of the Paris Agreement target (2 degrees Celsius target), importance has been more fiercely pointed out for the actions against global warming through conservation of natural ecosystem, which is called Natural Climate Solution (NCS). Accordingly, the attention to the projects related to forestry and land use has been increasingly garnered. Some energy companies express their intention to actively engage NCS[19].

Cost-conscious companies tend to prefer credits associated with renewable energy projects. They conduct relatively a large volume of transactions, and the credits are mainly supplied from North America and Asia. Such a cost-oriented tendency is dominantly seen among multi-national corporations, while companies that operate domestic business tend to

[18] Forest Trends' Ecosystem Marketplace "Voluntary Carbon and the Post-Pandemic Recovery" 2020, See p. 6.
[19] Forest Trends' Ecosystem Marketplace" Financing Emissions Reductions for the Future State of the Voluntary Market 2019" 2019, See p. 6.

place emphasis on co-benefits[20].

<2> Traded Projects by Type (Host Country)

Table 10 summarizes the trend of host countries. Many countries host the projects. While developing countries such as China, India, and African countries host the projects, and interestingly, the US also plays an important role as a host country.

In this Table, US is ranked as the second in terms of transaction volume, subsequent to India, which shows that not only demand but also supply comes from the US. This suggests that the demand for voluntary credits in the US may be covered by the projects in the US.

Table 10. Host Countries of Projects (2019)

Country	Volume (million tCO2e)
India	23.13
US	14.36
China	10.16
Indonesia	7.01
Peru	5.76
Kenya	5.48
Brazil	4.56
Guatemala	2.92
Uganda	2.16
Zimbabwe	2.12

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace. T"The Only Constant is Chang. State of the Voluntary Carbon Markets 2020, Second Installment Featuring Core Carbon & Additional Attributes Offset Prices, Volumes and Insights", 2020

<3> Market trend (volume and value)

While the transactions in the voluntary credit market started in the beginning of 2000s, the trend has been surveyed and reports have been issued since 2007[21]. Figure 8 summarizes the market-wide trend of voluntary credit transactions (volume and value). As shown in the Figure, both volume and value continued to increase from 2005 to 2008, then once a declining trend continued, and the trend turned upward from 2018.

[20] Forest Trends' Ecosystem Marketplace(2017) op.cit., p.7.
[21] Ibid., pp. 2-3.

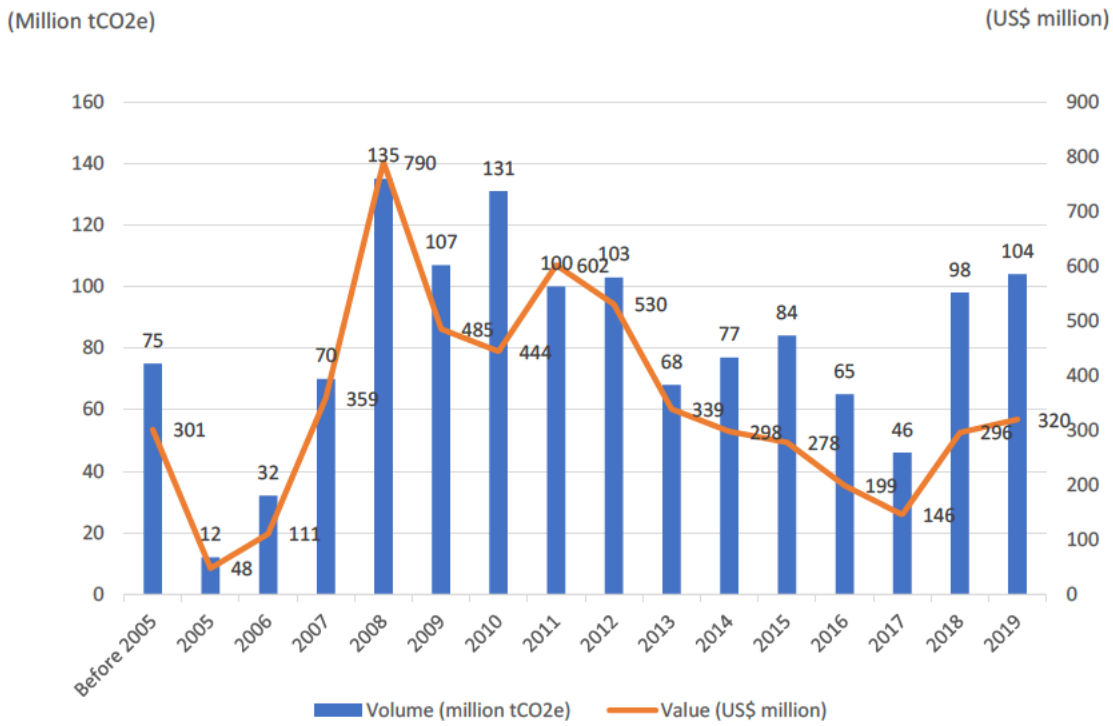

Figure 8. Trend of Voluntary Credit Transactions

(Source) Prepared by the Institute of Energy Economics, Japan, based on Forest Trends' Ecosystem Marketplace "Voluntary Carbon and the Post-Pandemic Recovery" 2020

The tendency of regulations has also impacted this upturn. Since 2016, broader demand for voluntary carbon offsets has been increasing from airline companies in order to meet the ICAO regulations of climate change. According to the report, the increase in demand for compliance with the regulations has contributed to the increase in the transaction volume since 2018, however, corporate demand for credits as voluntary action against global warming has also contributed to the expansion of the market[22]. In particular, after the adoption of the Paris Agreement in 2015, interests of private companies to take actions to climate change has been widened and that involves the increase of interest to the voluntary credits. This trend remains unchanged in the sluggish economy due to the COVID-19 pandemic. It is pointed out that, while some companies refrain from newly purchasing credits, interest in voluntary credits is kept as the increase of launching initiatives by private companies to set their net-zero/carbon neutral targets, a broad range of companies are showing their interest[23].

[22] Ibid., p.4.
[23] Ibid., pp.4-5.

(4). Private crediting mechanisms

In the voluntary credit market, part of CDM-associated credits, CERs, are transacted, however, the most transacted are the credits issued by private crediting bodies. There are several crediting bodies, as shown in Figure 9 below, and most of the transactions, or almost 90%, are those of credits issued by the crediting bodies, Verified Carbon Standard (VCS) and Gold Standard (GS).

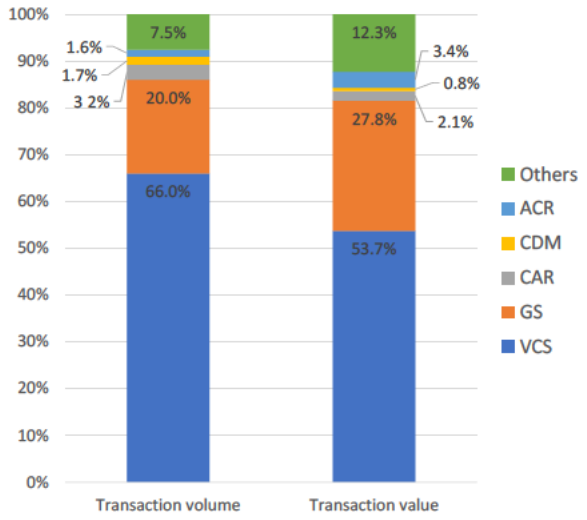

Figure 9. Transaction Volume and Value by Crediting Body of Voluntary Credits

(Source) Ecosystem Marketplace "Voluntary Carbon Markets Insights" 2018

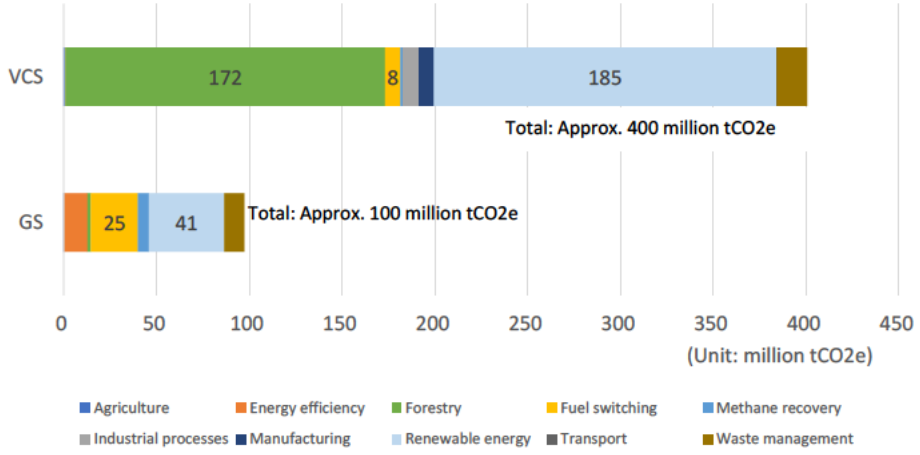

Figure 10. Credits Issued by VCS and Gold Standard by Type

(Data of 2013-2018)

(Source) Prepared by the Institute of Energy Economics, Japan, based on World Bank, "State and Trends of Carbon Pricing 2020"

Both were established in the early 2000s, and have provided credits to the voluntary credit market since their earliest stage.

VCS, that currently issues the largest volume of voluntary credits, was founded in 2005 by several organizations including the World Business Council for Sustainable Development (WBCSD) and the International Emissions Trading Associations (IATA), in which private companies participate, aiming at the certification of voluntary credits. The large number of projects related to forestry and land use are implemented. Among these projects, not only simple tree-planting projects, but also Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects, conservation of wetlands and other diverse projects are implemented.

Recently, initiatives to certify the projects with co-benefits as Climate Community & Biodiversity (CCB) projects were launched and have been popular in the market[24]. Moreover, credits issued by VCS are permitted to be used under the emission trading system of the State of California and more recently, permitted to be used under CORSIA, initiative against global warming in the international civil aviation sector. Like this, such credits have come to be used to comply with governmental regulations, apart from the voluntary credits.

On the other hand, Gold Standard (GS) was established by the World Wildlife Fund (WWF) and several international environment NGOs in 2003. Differently from VCS, GS not only has issued credits by itself, but also certified the projects, from among the CDM projects, which are deemed to have co-benefits such as contribution to the local community. By 2018, GS had issued approximately 100 million tCO2e of credits, in addition, 19 million tCO2e of CER were issued in association with the CDM projects certified by GS. It thereby has not only helped to achieve the emission reduction in the CDM projects, but also met the demand of the companies that are interested in other contributions to the society. GS as well as VCS, is permitted to be used in CORSIA, therefore, an increased demand for compliance with future regulations is anticipated.

These two crediting bodies issue credits globally, mainly to the projects implemented in developing countries. Crediting bodies such as Carbon Action Registry (CAR) and American Carbon Registry (ACR) issue credits to the projects in North America or in the US. ACR was founded in 1996 and CAR was founded in 2001 in the US, although the numbers of projects and the counts of issued credits are both smaller than those of VCS and GS, and they have impacted other systems as the precursors of baseline credit system.

As seen above, although credits issued from VCS and GS currently share a majority of transactions in the market, there are diverse crediting bodies and each supplies credits.

[24] Forest Trends' Ecosystem Marketplace(2019) op.cit.,p.8.

Furthermore, efforts are made to establish a common standard to ensure credit additionality, to ensure environmental integrity, and assessment criteria of co-benefits.

2. Initiatives concerning the Use of Voluntary Credits (International Institutions and Corporations)

(1). Initiatives toward the development of voluntary credit market

<1> Recommendations to the development of voluntary credit market

In recent years, an increasing number of companies have set net-zero/carbon neutral targets, and a part of them have shown their intention to use voluntary credit[25]. Therefore, it has become necessary to suggest the companies how they should use voluntary credits.

In such a context, some organizations intend to develop standards in different forms concerning the use of voluntary credits. For example, ICROA developed and published a standard to ensure a certain quality for voluntary credits. In addition, there are diverse initiatives, including an organization that explores the use of voluntary credits in companies' actions against global warming to achieve the target.

Among them, initiatives of Taskforce on Scaling Voluntary Carbon Market (TSVCM) has been paied the attention. TSVCM is a working group represented by Mark Carney, former Governor of Bank of England, and initiated under the Institute of International Finance (IIF) to develop recommendation required for future development of voluntary credit market[26].

TSVCM started its activities in September 2020, published draft report including draft recommendations for the public consultation in November, providing an opportunity to submit input on the recommended blueprint for stakeholders. Then, TSVCM revised the report based on the feedback and published the final version of recommendations at the end of January 2021. In the published recommendations, TSVCM stated that voluntary actions against climate change is essential for achievement of the 2 degrees Celsius target of the Paris Agreement, and expressed a recognition that the voluntary credits would play an important role in the voluntary initiatives of private companies. On the other hand, TSVCM pointed out that the market is not fully developed in the voluntary credit market, and the market is dependent on negotiation-based transactions, the liquidity of the market is low, and the fund provided to the market remains limited. In particular, there is no supervisory body to ensure

[25] Targets of measures against global warming by companies are set in different forms, including net-zero target and carbon neutral target. Companies have different definitions and understanding for these targets. Since this report does not aim to examine the ways of setting the targets of the companies, we do not examine the definitions of individual target setting, and state the net-zero target and carbon neutral target collectively as net-zero / carbon neutral target.

[26] The Institute of International Finance was founded in 1983, led by banks of developed countries, at the occasion of the world debt problem of developing countries, with the mission to develop standards of financial risks including sovereign risk to ensure the stabilization of international financial system. At present, approximately 500 global financial institutions participate in the association.

the quality of voluntary credits, although the demands for voluntary credits could be grown in the future, TSVCM sees it as a problem for the development of voluntary carbon market.

Table 11 summarizes the recommendations by TSVCM. It is required to ensure the reliability of voluntary credit market by trading the credits in accordance with the principle to ensure the quality of voluntary credits (Core Carbon Credits Principles (CCP)), and it is also suggested that the demand should be expanded in maintaining the quality, by developing the core carbon reference contracts that meet the various needs of buyers. Moreover, TSVCM recommends establishing the infrastructure for transactions, and the market supervisory organization to facilitate the transactions and develop the market.

The detailed overview of CCP is shown in Table 12. As shown here, efforts and consideration for a wide-range of matters are required, by ensuring the emission reduction to ensure the quality of voluntary credits, and by taking actions to mitigate the harm to local communities and biodiversity associated with the implementation of the projects.

Table 11. Recommendation Provided by TSVCM

Recommendation on CCP	Recommendation 1: Establish Core Carbon Principles (Clarification on CCP principles and additional contributions (characteristic of the project (whether to implement emission reductions and/or removals))) Recommendation 2: Assess adherence to CCP Recommendation 3: Scale up environmentally high-integrity supply
Recommendation on core carbon reference contracts	Recommendation 4: Introduce core carbon spot and futures reference contracts Recommendation 5: Establish an active secondary market Recommendation 6: Increase transparency and standardization in over-the-counter (OTC) market
Recommendation on Infrastructure: Trade, post-trade, financing and data	Recommendation 7: Utilize existing high-volume trade infrastructure or build new infrastructure Recommendation 8: Utilize existing post-trade infrastructure or build new infrastructure Recommendation 9: Implement data infrastructure Recommendation 10: Promote structured finance
Recommendation on consensus on legitimacy of offsetting	Recommendation 11: Establish principles on the use of offsets Recommendation 12: Guidance on offsetting in corporation

Recommendation on market integrity assurance	Recommendation 13: Implement efficient and accelerated verification procedures Recommendation 14: Develop anti-money-laundering guidelines Recommendation 15: Establish legal and accounting framework Recommendation 16: Institute governance for market participants and market supervision
Recommendation on demand signal	Recommendation 17: Offer consistent investor guidance on offsetting Recommendation 18: Enhance offering method for consumers at point-of-sale of products Recommendation 19: Increase industry collaboration and commitments Recommendation 20: Create mechanisms for demand signaling

(Source) Prepared by the Institute of Energy Economics, Japan, based on the material of Taskforce on Scaling Voluntary Carbon Markets

Table 12. Core Carbon Credits Principles (CCP) Provided by TSVCM

Minimum quality standards for the offset product	
	Clear and transparent accounting standards and methodologies
	The GHG offset credit program must publish that accounting standards and methodologies should ensure that emission reductions and/ or removal are: ● **Real:** Measured, monitored and verified ex-post to have actually occurred. ● **Additional:** Beyond GHG reductions or removals that would otherwise occur. Projects demonstrate a conservative business-as-usual (BAU) scenario and must be additional to regulatory requirements by government. Jurisdictional programs should demonstrate additional reductions below the historical reference level. ● **Based on realistic and credible baselines:** Credited only beyond performance against a conservative and legitimate baseline estimate of emissions (that assumes the business-as-usual trajectory in the absence of the activity). Baseline should be recalculated regularly on a conservative timeframe. ● **Monitored, reported, and verified:** Calculated in a conservative and transparent manner, based on accurate measurements and quantification methods. Must be verified by an accredited third-party entity. MRV should be conducted at specified intervals. ● **Permanent:** Only issued for GHG reductions or removals that are permanent, or if they have a reversal risk, must have requirement for decades and a comprehensive risk mitigation and compensation mechanism in place with a means to replace any units lost. ● **Leakage eliminated:** Assessed, mitigated, and calculated considering any potential increase in emissions outside of the boundary of the projects. ● **Only counted once:** Not double-issued or sold.
	DO-NOT-HARM Principle
	GHG credit programs must have requirements to ensure that projects and programs to be implemented consider all potential, comprehensive, environmental and social risks and take actions to mitigate associated harm.

Minimum quality standards for supporting GHG program	
	Program governance
	GHG credit program must be managed by a government or non-profit organization that sets out in a transparent manner the governance of the program. The transparency requires: ● Roles and responsibilities of the organization, management and staff that are responsible for the program, as well as the board that oversees the organization ● Enforcement of rules to guard conflict of interest by the board, management, and staff ● Published grievance and redress mechanisms
	Program transparency and public participation provisions
	GHG credit program must have in place provisions for public stakeholder consultation on: ● Development of program rules and procedures ● Accounting methodologies ● Projects and programs to be registered Stakeholder comments should be transparently addressed.
	Clear and transparent requirements for independent third-party verification
	GHG credit mechanism must publish requirements for independent third-party verification body, including provisions to avoid and assess conflicts of interest, and for accreditation and oversight of validation and verification bodies. (Validation and verification bodies should be accredited to ISO 14065 by a member of the International Accreditation Forum (IAF)).
	Legal underpinning
	GHG credit program must have requirements to ensure that there is a robust legal framework underpinning the creation and ownership of all units issued, including: ● Requirements that project developers submit legal representations to accept legal responsibility for the documentation being submitted. ● A clear definition of the legal nature of the units issued by appropriate legal opinions ● Registry Terms of Use that set out further requirements in respect of interactions with the program's registry
	Publicly accessible registry
	GHG credit program must have a registry publicly available for companies and citizens that track the units issued and with the basic functionalit to: ● Provide access to all underlying project information (including project-related documentation, verification statements and legal representations) ● Transparently issue, retire, ad cancel credit units ● Individually identify units through unique serial numbers that contain sufficient information to avoid double counting (project type, geography, vintage) ● Identify unit status (issued, retired, canceled) ● Track chain of custody, from creation to retirement
	Registry operation
	GHG credit program must have rules and procedures in place to ensure that: ● All account holders: ✓ Pass "know you customer" checks ✓ Agree to the legal requirements regarding the use of the registry, as set out in Terms of Use of the Registry ● The Registry: ✓ Guards against Registry Service Provider conflicts of interest ✓ Has robust registry security system and provisions for regular security system audits

(Source) Prepared by the Institute of Energy Economics, Japan, based on the materials of Taskforce on Scaling Voluntary Carbon Markets

(2). Companies that set net-zero/carbon neutral targets

A large number of companies voluntarily set their net-zero/carbon neutral targets, expressing their policy to use credits. It is difficult to know how many companies have set

their net-zero/carbon neutral targets, however, according to a survey of a research institute, over 1,500 companies in the world have set net-zero targets by September 2020[27].

Among those companies that have set their net-zero/carbon neutral targets, the number of companies that expressly showed their intention to use credits is limited, while some such as Google expressed their intention to use credits. So far, use of credit as companies' action against global warming has not been evaluated negatively, however, it is pointed out that the importance of use of credits as companies' action against global warming has become ambiguous in 2021. Such a change of importance of the use of credits may exert an impact on the attitude of companies[28].

Table 13. Companies that Expressly Stated their Use of Credits as Net-Zero/Carbon Neutral Targets

Company name	Industry	Target year	Usage of the credits
MACE	**Construction**	2020	Makes efforts to reduce emissions, and achieves net-zero target by purchase of credits issued by Gold Standard to cover the shortfall.
EY	**Accounting**	2020	Changes the electricity of the office to renewable energy, such as wind power and solar power. The shortfall will be covered by purchase of carbon credits and participation to forest regeneration projects.
Jacob's Engineering	**Engineering**	2020	Achieves the net-zero emissions from business travels of the Scope 1/2 and Scope 3 in 2020. Purchases renewable energy and carbon offsets to achieve the target.
Bolt	**Scooter manufacturing and sales**	2020	Achieves the net-zero target by tree planting, introduction of renewable energy and participation to carbon credit programs.
Nespresso	**Coffee production and sales**	2022	Achieves the target by reduction of their own emissions, tree planting projects around the farms from which they purchase coffee, participation in the investments in the forest conservation and forest regeneration projects.
CMS	**Law firm**	2025	Changes the power at seven of eight offices in UK to renewable energy. Achieves the net-zero target by offsetting the shortfall.
Arup	**Engineering**	2030	Continues the efforts to reduce CO_2 emissions, and achieves the net-zero target by purchasing credits issued by Gold Standard (from 2030) to cover the shortfall.

(Source) Prepared by the Institute of Energy Economics, Japan

[27] New Climate "Accelerating Net Zero" September 2020, See p.13.
[28] Ibid., p.17.

Table 13 summarizes the industry, target year, and specific usage of credits of the selected companies that have shown their policy to use credits. As seen above, diverse companies have expressed their policy to use credits in different forms. The above listed companies are mainly in the service industry, however, recently there has been companies in energy industry that set the net-zero targets and expressed the policy to use credits to achieve the target.

For example, on February 11, 2021, Shell issued a release on their new strategy that they would further accelerate actions toward achievement of net-zero emission target[29]. In the strategy, they are to set a target to gradually reduce the specific emissions aiming at 100% of reduction by 2050, and take different actions to achieve the target. According to media, Shell will implement CCS projects, and also use 12 million tCO2e of credits that are obtained from Natural Climate Solution (NCS) by 2030[30]. Additionally, an Italian oil and gas company, ENI, has published that they will use credit generated by NCS, in particular, credits associated with REDD+, to achieve their net-zero emission target[31]. In addition to these companies, in the oil and gas industry, companies including BP, Total, Respol, Woodside, Equinor, and Enbrige have set their net-zero targets, and shown their policy to use NCS.

(3). Outlook for future market

<1> Comparison with the existing market and the outlook

As mentioned above, both the transaction volume and value of voluntary credits have tended to increase in recent years, however, the current market size is much smaller when compared with the market of compliance units.

The demand for compliance credits under the Kyoto Protocol is currently almost zero, however, the market to comply with governmental regulations, including the units traded under EU ETS and in the State of California in the US had the size of approx. 8.7 billion tCO2e in the traded volume and approx. €1.9 billion (approx. 24 trillion Japanese yen) in the traded value in 2019. Comparatively, the voluntary credit market has the size of approx. 100 million tCO2e in the traded volume and approx. US$320 million (approx. 33 billion Japanese yen) in the traded value, which shows they have literally a different order of magnitude from the compliance credits market at the present[32].

---

[29] Shell press release “Shell accelerates drive for net-zero emissions with customer-first strategy” February 11, 2021.
https://www.shell.com/media/news-and-media-releases/2021/shell-accelerates-drive-for-net-zero-emissions-with-customer-first-strategy.html

[30] Carbon Pulse “Shell outlines net-zero emissions plans involving ramped up offset, CCS use” February 11, 2021
https://carbon-pulse.com/121353/

[31] ENI website “ENI's commitment to protecting and conserving forests” December 1, 2020
https://www.eni.com/en-IT/low-carbon/forest-protection-conservation.html

[32] Based on data in Refinitive "Carbon Market Year in Review" 2020, "Carbon Market Monitor" 2016, Forest Trends’ Ecosystem Marketplace "Voluntary Carbon and the Post-Pandemic Recovery" 2020

It is difficult to simply compare the transactions in the cap-and-trade type emission market and those in the baseline-credit type emission market as the transaction forms are different, however, its market size still remains small.

While the voluntary credit market is relatively small in size when compared with the compliance credit market, the voluntary credit market has potential to significantly grow in future. We have already seen the sign. Recently, there are companies that newly participate in the voluntary credit market emerged, and that these new demand coming from companies of various size and from the countries which have been so far deemed not to have a large demand for voluntary credits[33].

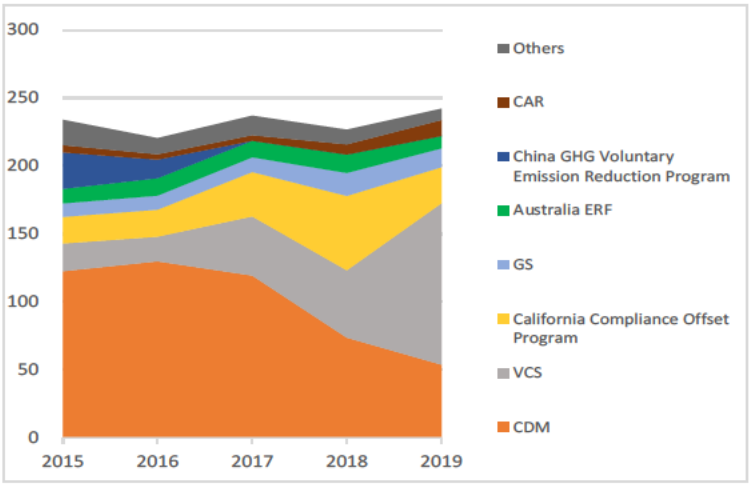

Figure 11. Annual Volume of Issuances of Offset Credits 2015 - 2019

(Unit: million tCO2e)

(Source) Prepared by the Institute of Energy Economics, Japan, based on the data of World Bank Carbon Pricing Dashboard

A publication of World Bank also shows the sign. Th report shows that the voluntary credit market has continuously grown since 2015, and the credit issuance volume of VCS that issues voluntary credits exceeded that of the CDM for the first time since 2006[34]. Moreover, there is an estimate that the demand for achievement of net-zero/carbon neutral target will grow significantly, and the voluntary credit market may possibly become totally different from the current situation[35]. Projects for which demand has grown are those related to forestry and land use. According to a report, the demand for such projects grew rapidly in

[33] Forest Trends' Ecosystem Marketplace "State of the Voluntary Carbon Markets 2019 Market Dynamics: What Participants Describe in 2019," See p.11.
[34] World Bank annually publishes a report, "State and Trends of Carbon Pricing", which summarizes the results of survey on the situation of introduction and implementation of carbon pricing in the world. The latest version 2020 reports the rapid growth of voluntary credit market, (See pp.53 – 57).
[35] Taskforce on Scaling Voluntary Carbon Markets "Consultation document". Nov 2020. p.46

the recent two years[36].

In such a rapid increase in demand, however, there are concerns about sufficient supply of credits to the demand, in particular, for credits generated from projects related to forestry and land use. Some market participants concern about future supply of credits generated from the project types that absorb and remove CO_2 from the atmosphere, instead of mere emissions reductions[37].

The demands for voluntary credits are increasing, although they are disproportionately concentrated on certain projects. The increase in demand may raise the transaction price in the future, and as a result, may potentially exert impacts on the trend of project development, and credit supply volume to the market as a whole.

<2> Uncertainty concerning the future growth of voluntary credit market

Behind the current expansion of the voluntary credit market, there are an increasing number of companies that set their net-zero/carbon neutral targets, and the interest in use of offset credits is increasing among them. In particular, projects to remove carbon dioxide from the atmosphere by projects of forestry and land use related to NCS accompanying co-benefits to local communities are attracting more attention.

The projects related to forestry and land use, however, have challenges concerning leakage and permanence. For example, the challenge is, while forest conservation, tree-planting and halt of logging are seen at some places, there remains uncertainty of leakage, or tree-cutting at other places, or in some case, forest is lost due to fire or other reasons. TSVCM recognizes this challenge, and CCP is required to provide the countermeasures.

In addition, it remains unclear in what form the use of credit is eligible to achieve the net-zero/carbon neutral target. TSVCM shows their views of allowing companies to use the credits as “to compensate a share of unabated emissions annually during the transition to net-zero” [38]. However, there is uncertainty whether the concept of TSVCM will be accepted by the society as a general initiative in the future.

In addition to the above, at present, there is no clear vision to what extent the demand for voluntary credit will increase. In addition to the achievement of net-zero/carbon neutral target, the use of voluntary credits has become extensive, for example, some gas companies provide carbon-free LNG that offsets the emission by the use of LNG.

The demands to credits among those that laid out their net-zero/carbon neutral targets are still unpredictable. Among from the energy companies from which a large demand can be expected, however, there still remains much uncertainty. Therefore, it is possible that

[36] Fitch “Tightening Climate Policy to Drive Carbon Offsetting and Emissions Trading” 2020, See p.7.
[37] Forest Trends’ Ecosystem Marketplace(2020) op.cit., p.10.
[38] Taskforce on Scaling Voluntary Carbon Markets “Final Report” Jan,2021 See p.93.

the interest in the voluntary credit market, currently showing an upsurge, will gradually lose if the demand for credits to achieve the net-zero/carbon neutral target does not increase. On the contrary, if the use of credit increases, it cannot be denied that a large demand will be generated, and the structure of international credit market itself will be drastically changed.

3. Trend of Market Mechanism in ICAO

(1). Outline of CORSIA and the impact of COVID-19 pandemic

<1> Action against global warming in the international civil aviation sector

In October 2016, International Civil Aviation Organization (ICAO) agreed to implement an action using the market mechanism, Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), as the initiative against global warming of the international civil aviation sector from 2021.

International civil aviation sector is not subject to the regulations of UNFCCC, and their own initiatives have been conducted under the ICAO, the CORSIA has been garnered attention as a main GHG emission reduction initiative after 2021 in the sector.

Table 14. Outline of CORSIA

Summary of regulation	Airline companies that operate international flights will control the emissions to the reference emission level (average of emissions of 2019 and 2020) from 2021 onward. If emissions increase, they may use credits to offset.
Regulation schedule	
2021 - 2023	Pilot phase (voluntary participation)
2024- 2026	The First Phase (Voluntary participation)
2027- 2035	The Second Phase (Mandatory participation)
Compliance period	3 years
Compliance method	・Use of aircrafts with high fuel efficiency ・Use of bio-fuel ・Offset credits
Eligible credits	Credits issued by offset credit issuing programs that meet the certain criteria determined by ICAO[39].

(Source) Prepared by the Institute of Energy Economics, Japan, based on ICAO publication

Under the CORSIA, the companies that operate international flights from different countries are required to control the increase of emissions from the reference emission level (average emission of 2019 and 2020). To achieve the reference emissions, they are

[39] For specific standards, refer to the following document.
The Institute of Energy Economics, Japan, “FY2019 Infrastructure Development Research Project for Joint Credit Acquisition: Research on International Trends on Market Mechanism Negotiations, Report” p.30

permitted to use the credits that satisfy a certain condition to comply with the regulations when their emissions are over the reference emission level.

The eligible credits are examined by the expert group established under the ICAO (Technical Advisory Board, TAB) and the credits generated by seven programs are eligible for CORSIA.

<2> Impact of the calculation of reference emissions due to COVID-19 pandemic

The COVID-19 pandemic impacted also the implementation of CORSIA. Initially, the reference emission was determined to be the average of emissions of 2019 and 2020, and the airline companies that are subject to the regulations as from 2019 measured their emissions. Due to the COVID-19 pandemic, however, many civil aviation companies were forced to cease the international flight operations, and the emissions in 2020 was expected to significantly decrease. This means that the reference emission level will be significantly lower than the initially assumed level, and furthermore, the airline companies will be required to purchase more credits if the international airlines' operation recovers to the pre-pandemic level, resulting in an increase of compliance cost of the airline companies.

In such a context, the industrial association of international airline companies, IATA, published a statement on March 30 that it will deem the emissions of 2019 as the reference emissions. Environmental NGO criticized that the statement would water down the CORSIA regulations, however, the US government supported the request from IATA, and other countries also took same position with the US. As a result, ICAO Council held in June 2020 officially agreed to use only the 2019 emissions to design the 2021 reference emissions[40].

It was agreed that the reference emission will be designed in the policy not to excessively increase the airline companies' burden in consideration of the COVID-19 pandemic. A slowdown of air traffic, if continues for a long term in future, will further impact the demand for the credits, and may possibly impact the future trend of international market mechanism.

(2). Determination the Eligible Emissions Units in the ICAO Council

<1> Eligible offset programs

As seen above, while the COVID-19 pandemic impacts the implementation of CORSIA, the examination work of offset programs that generate credits eligible under CORSIA (CORSIA Eligible Emissions Units) has constantly continued, and in the ICAO Council held in March 2020, six offset programs were approved based on the assessment of TAB. Furthermore, ICAO started the second invitation for applications at the end of March 2020, and one program was approved in the ICAO Council held in November 2020, making seven

[40] Carbon pulse "ICAO Council drops 2020 from emissions baseline for CORSIA's pilot phase" June 30,2020 https://carbon-pulse.com/102766/

programs in total. The third invitation for applications is scheduled in 2021.

Table 15. Restrictions and Conditions Applicable to all the Programs

(1) Eligibility of term	From 2021 to 2023 (CORSIA pilot period)
(2) Eligibility of credits	✓ Credits issued to the projects of which the first credit period starts on or after January 1, 2016 ✓ Credits issued to the emissions reductions that were generated on or before December 31, 2020

(Source) Prepared by the Institute of Energy Economics, Japan, based on the ICAO publication

Table 16. Eligible Offset Programs (Scheme, Organization) and Restriction for Use

Program	Restrictions
American Carbon Registry (ACR)	Offset credits used in emission reduction trading system in the State of California[41], and credits from emission reduction by REDD+[42] from projects estimated to generate greater than 7,000 emission reduction tonnes (ERTs) annually are not eligible.
China GHG Voluntary Emission Reduction Program	Offset credits associated with the projects of afforestation and reforestation, carbon capture utilization and storage (CCUS), N2O, agricultural operations (including fertilizers application), fluorinated gases emissions, HFC emissions, SF6 emissions and HCFC 22 are not eligible.
Clean Development Mechanism (CDM)	Credits issued to the projects of afforestation and reforestation are not eligible.
Climate Action Reserve (CAR)	Credits issued associated with activities that have not reported their sustainable development contributions according to the manual prepared by CAR, credits used in the emission reduction system of the State of California, and credits of Forecast Mitigation Units (FMUs) are not eligible[43].
The Gold Standard (GS)	Planned Emission Reductions[44] (PERs), units issued from micro scale activities where an accredited entity has not carried out validation and verification, credits issued associated with the emission reduction activities that are developed in REDD+ and are estimated to generate greater than 7,000 VERs (Verified Emissions Reductions) per annum are not eligible.
Verified Carbon Standard (VCS)	Offset credits used in emission reduction trading system in the State of California, and credits issued to activities that have not reported their sustainable development contributions are not eligible. The credit associated with REDD+ activities are eligible for credits in the JNR framework[45].
Architecture for REDD+ Transactions (ART)	No exclusion

(Source) Prepared by the Institute of Energy Economics, Japan, based on the ICAO, "ICAO Document CORSIA Eligible Emissions Units".

[41] Two credits, which are California Registry Offset Credits (ROCs), and California Early Action Offset Credits (EAOCs).
[42] Abbreviation of "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". It involves control and reduction of emissions generated from the decrease and degradation of forest, forest conservation, sustainable forest management, and increased accumulation of forest carbon.
[43] In the framework of CAR, credits are issued not only for so far implemented emission reductions (Post-Trade Credits) but also before the actual implementation of reduction project (Forecast Mitigation Units).
[44] Credits issued to the absorption anticipated in the future.
[45] Credit in the framework of Jurisdictional Nested REDD+ (JNR) issued by VCS.

These programs are not used unconditionally, but are eligible under several restrictions and conditions. Together with the restrictions and conditions that are applied to all the programs, there are restrictions applicable to each offset programs[46].

Eligibility program after 2024 will be evaluated in the TAB, and then, the TAB will recommend to the ICAO Council, and the ICAO Council will determine these matters.

Credits that are not deemed to be eligible are largely classified into groups, which are the credits generated from projects that have not reported their sustainable development contributions, the credits that are issued in anticipation of the future reduction, and the credits that are used under the emission reduction system of the State of California. On the other hand, in the first assessment for approval, the credits related to forest carbon sink were not approved, however, the ART that was approved in the second assessment for approval is a program that creates credits generated from forest sink and protection such as REDD+.

<2> Other offset programs that were not approved

In addition to seven offset programs that have been already approved, there are programs that are accessed by TAB to be conditionally eligible like the Forest Carbon Partnership Facility (FCPF). Moreover, the following three programs are recommended by TAB to submit re-applications upon correction based on the TAB assessment.

・BioCarbon Fund Initiative for Sustainable Forest Landscapes
・Joint Crediting Mechanism between Japan and Mongolia
・CERCARBONO

These three mechanisms may possibly become eligible subject to the future assessment.

[46] Only Architecture for REDD+ Transactions (ART) program does not have restriction.

Chapter 3. Overseas Market Mechanism Trend Investigation

With regard to market mechanism, not only developed countries such as the United States and Europe, but also emerging countries such as China and South Korea have been moving toward its adoption in recent years. EUETS in Europe has had a major influence on the international credit market as the largest source of credit demand until 2012, but the emission trading schemes has also been introduced in China, South Korea, and other countries in recent years. As an example, South Korea has allowed the use of CDM credits, which has started to affect international market mechanisms. Result of research on major trends of market mechanisms abroad are reported below (such as the U.S., EU, China, South Korea).

1. Market mechanism trend in the United States

There was a presidential election in 2020 in the United States in which Mr. Trump from the Republican Party and Mr. Biden from the Democratic Party battled each other, and Democrat candidate Mr. Biden won the presidency. Under the Trump administration, foreign policy related to the field of climate change has changed drastically from the Obama administration, the President Trump decided that the United States withdrew from the Paris Agreement, and eased many climate change regulations which were formulated under the Obama administration as well. The new President Biden who criticizes these policies of the Trump administration has expressed that he would place emphasis on the climate change policy since the campaign. Soon after taking office in January, President Biden announced polices to make major shift in the U.S. climate change policies both domestically and internationally. As noteworthy trends related to international policy in the field of climate change, the following three points should be listed: a. Returning to the Paris Agreement, b. Holding a climate summit and reduction targets, and c. International financial support in the future.

a. Return to the Paris Agreement

During his election campaign, President Biden pledged to return to the Paris Agreement from which the Trump administration withdrew. On the day he took office, President Biden fulfilled his pledge and directed the return to the Paris Agreement. The United States formally rejoined the Paris Agreement on February 19, 2021. After its return to the Paris Agreement, the United States seems to show the willingness to activity engage climate change issue, and at the same time to urge other countries to work harder on the issue of climate change.

b. Holding a climate summit and reduction targets

Holding a climate summit is another President Biden’s new activity on climate policy. The United States will organize the climate summit where world’s leaders gather under the

leadership of the United States. In the climate summit, the U.S will demonstrate its stance to the world and to pressure the world to strengthen efforts toward climate change. President Biden instructed relevant ministries and agencies to hold an international climate summit on April 22 under the “Executive Order on Tackling the Climate Crisis at Home and Abroad” which was signed on January 27. In this Executive Order, the development of NDC was also instructed. The United States already submitted its NDC under the Obama administration. However, since the target year was set to 2025, the Biden administration seems to develop a new NDC in which the target year is newly set to 2030. Although President Biden stated in this Executive Order that the United States will aim to submit the new reduction targets in advance of the climate summit, reduction targets of the United States to be announced at the climate summit is likely to be overall framework without detailed targets because of short period until the day of the summit.

c. International financial support in the future

There is expectation on remarks of international financial support for climate change by the United States at the climate summit. Since U.S. climate change envoy John Kerry has expressed the restart of U.S. contributions to the Green Climate Fund (GCF) which was stopped by the Trump administration, the U.S. contributions is highly likely to be mentioned at the Summit.

In addition, the United States is likely to require that future international financial support gives more consideration on environment at the time of the climate summit or on other occasions. Taking a look at the Executive Order mentioned above, the United States will adjust the flow of the fund according to the aim of the Paris Agreement under the cooperation with other countries, and financing coal is stated as an example of this adjustment. Moreover, as an order to the Secretary of the Treasury, Executive Order stipulates the development of strategies to implement financial support that promote the achievement of the goal set under the Paris Agreement within international financial institutions including the IMF and the World Bank. At the same time, this Executive Order instructs Secretaries of the relevant departments and agencies including Department of the Treasure and the Export-Import Bank of the United States and the United States International Development Finance Corporation to clarify the pathway to end international funding for carbon intensive fossil fuel energy.

These instructions included in the Executive Order indicate that the Biden administration has negative attitude toward financial support for the use of coal and other fossil fuel and is likely to strongly seek to consider environment regarding to future international financial support.

2. Trends on market mechanisms in the EU

The European Commission published the annual report on the EU ETS (Carbon Market Report) on November 18, 2020 through which the EU reported that emissions from facilities subject to ETS decreased by 9.1% in 2019 compared to the previous year. In particular, emissions in the power generation sector decreased by 15% from the previous year. The European Commission said that there was the progress about the conversion from coal-fired power to gas-fired power and renewable energy.

○Steep rise of EUA price

The price of EU Allowance (EUA) which is used in the EU ETS is rising. EUA trading is at high level as shown in the facts that EUA future price which is traded on ICE in February 2021 exceeded the level of 40 euros/t-CO_2 and that the bidding at 50 euros/t-CO_2 was submitted at the EUA auction of EEX. The factor of this trend is increasing demand for electric power and heat for severe winter months in short term, and the rise of EUA price promote the shift from coal-fired power to gas-fired power. In addition, in medium- to long-term, 2030 targets were raised from 40% reduction to 55% reduction compared to 1990, and the demand-supply situation for EUA will become tight because the influence evaluation expected further reduction in emission along with the expansion of the ETS sector.

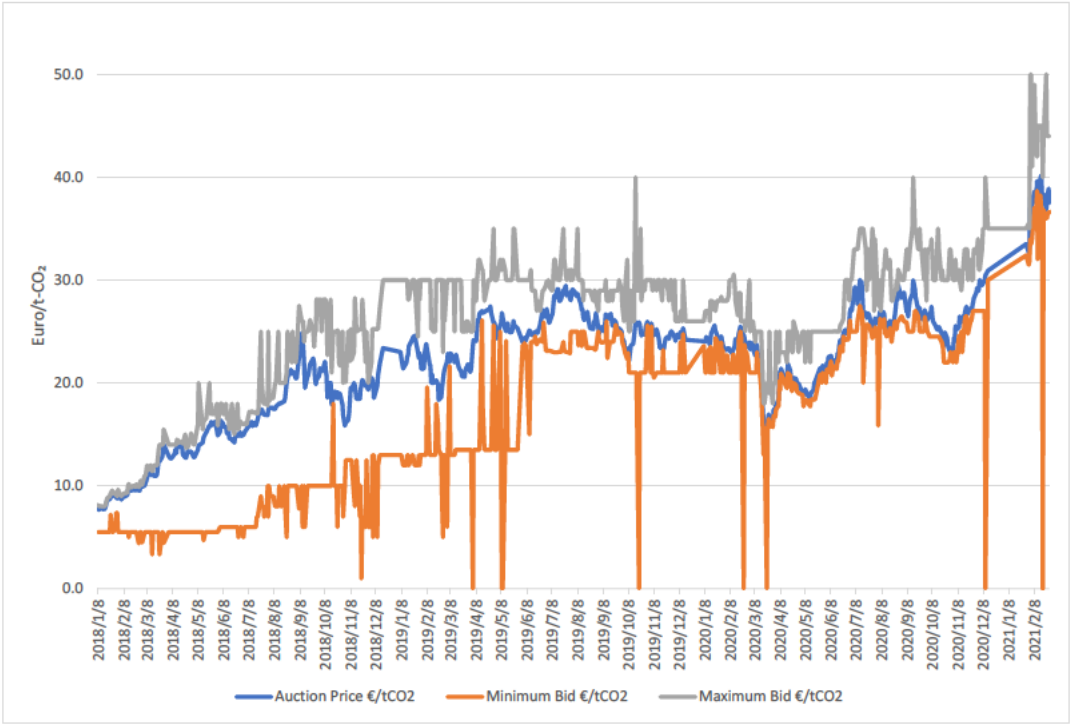

Fig. 12. Change in Price at EUA auction conducted by EEX

(Source) Prepared by the Institute of Energy Economics, Japan based on the data published by EEX

○Start of phase 4 from 2021

EUETS Phase 3 ended at the end of 2020 and the end of May is the deadline for compliance procedures of emissions during FY2020. The amended ETS directive passed in 2018 has been applies to Phase 4 emissions in January 2021 and onward.

Most of the system of Phase 4 has been already revised, and deciding the benchmark values for deciding allocation of free quotas to the industrial sector is the only remaining part to be completed. The proposed benchmark was scheduled to be announced in July 2020 and through consultation, quotas for each facility was scheduled to be decided by the end of 2020 according to the road map of the European Commission. However, the announcement of the proposed benchmark was delayed up to December 2020, and the schedule was changed to implement consultation by January 2021 and to decide free quotas at the end of February 2021. Other revision of the system has been completed and Phase 4 auction that was delayed due to technical trouble has started since February 2021.

However, the transitional period for EU and the UK ended at the end of December 2020, and the UK government announced its introduction of the UK ETS and the withdrawal from the EU ETS.

○Reintroduction of UK ETS

Before the end of the transitional period from EU which expired at the end of 2020, the UK government published its energy white paper stating future energy policies in December 2020. In this white paper, the UK expressed its intention to launch the UK ETS in January 2021 and withdrawal from the EU ETS. In the past, with regard to carbon pricing after the transitional period, re-application of climate change tax and transition to UK ETS have been considered, and the system design[47] and impact evaluation[48] have been implemented. The UK ETS law[49] submitted to the British Parliament in July and passed in November is following the EU ETS on the whole except the newly specified upper limit of emissions (Cap) different from that of EU ETS to achieve net zero in 2050.

In the negotiation previously conducted between the EU and the UK, both showed positive stance that the UK would remain in the EU ETS or they would enter into agreement to establish linking between the two systems. However, in the situation where the conclusion of trade negotiation cannot be expected, the UK government announced its intention. In the

[47] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/889037/Government_Response_to_Consultation_on_Future_of_UK_Carbon_Pricing.pdf

[48] https://www.legislation.gov.uk/ukia/2020/78/pdfs/ukia_20200078_en.pdf

[49] https://www.legislation.gov.uk/uksi/2020/1265/contents/made

meantime, the agreement includes the wording described below, leaving the possibility of intersystem linking in the future.

> *Article 7.3: Carbon pricing*[50]
>
> *6. The Parties shall cooperate on carbon pricing. They shall give serious consideration to linking their respective carbon pricing systems in a way that preserves the integrity of these systems and provides for the possibility to increase their effectiveness.*

3. Trends on market mechanisms in China

In 2020, policies and systems related to the market mechanism in China showed great change.

First, on September 22, 2020, at the UN General Assembly, Chinese President Xi Jinping expressed a significant increase of climate ambition as the nation with the world's largest emissions and declared its goal toward which after reaching the peak of CO_2 emissions by 2030, China will achieve carbon neutral by 2060. In the past, the Chinese government promised that it would maximize its emission in around 2030. This time, however, China not only brought forward this goal before 2030 but also committed to achieve long-term carbon neutral, which is surprise for the rest of world.

Taking this declaration into account, the Central Committee of the Communist Party of China announced "the 14th Five-Year Plan (2021-2025) for National Economic and Social Development and the Long-Range Objectives Through the Year 2035" on October 29, 2020. In this announcement, the Chinese government stated that "China will develop an action plan under which emission intensity of CO_2 will be lowered to reach the peak of emissions in the areas where situations allow to take actions for achieving the peaking-out of emissions before 2030" while the accelerating the introduction of emissions trading. In addition, China stated that it will actively participate in and lead international cooperation in the field of climate change.

In addition, with regard to the 2030 national reduction targets, President Xi Jinping said that it would decrease CO_2 emissions per GDP by 65% or more from the level of 2005 (previous goal was the range between 60 and 65 %) by 2030 at the UN online meeting on climate change held on December 12, 2020. Furthermore, percentage of non-fossil energy accounting for the consumption of primary energy will be raised to around 25% (from the

[50] TRADE AND COOPERATION AGREEMENT BETWEEN THE EUROPEAN UNION AND THE EUROPEAN ATOMIC ENERGY COMMUNITY, OF THE ONE PART, AND THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND, OF THE OTHER PART

previous goal of 20%), and accumulation amount by forests will be increased by 6 billion m^3 (from the previous goal of 4.5 billion m^3) compared to the level in 2005 and promised wind and solar power generation facilities exceeding 1.2 billion kW as a new goal.

Using these top-down declarations as a base, China's national CO_2 emissions trading scheme which has been waiting since 2015 finally started in a substantial manner. At the end of December 2020, China's Ministry of Ecology and Environment successively released the "Management method of carbon emissions right trading (trial)," "Setting of total emissions of national carbon emissions trading and proposed policies for quota allocation during 2019 to 2020 (power generation industry)" and "List of major business operators subject to management of national carbon emissions trading quotas during 2019 to 2020" and consequently, specific procedures and standards were formally issued to start the aforementioned scheme.

In particular, enforcement of the "Management Method" on February 1, 2021 led to substantive start of the scheme. In fact, the detailed procedures (allocation of quotas, establishment of trading systems, determining implementation time, etc.) have not been clarified yet, and the time when trading starts is unclear. However, it can be said that the world's largest carbon emission trading market was born.

Although the power generation industry is the only target of the trading market newly developed this time, captive power generating units that emit 26,000t-CO_2e or more in a year in other industries are also included. In addition, targeted power generation units include 4 types as shown in Table 17 while unconventional power generating units such as IGCC and biomass mixed fuel are not included.

Table 14. Carbon emission benchmark values of each unit type during 2019-2020 (BM value)

Unit Type	Range of Unit Type	Power Supply BM Value (tCO2/MWh)	Heat Supply BM Value (tCO2/GJ)
I	Conventional coal-fired power unit of 300MW grade or more	0.877	0.126
II	Conventional coal-fired power unit of 300MW grade or less	0.979	0.126
III	Unconventional coal unit such as coal dowel and coal water mixture (including coal-fired power circulating fluidized bed unit)	1.146	0.126
IV	Gas-fired power unit	0.392	0.059

(Source) Prepared by the Institute of Energy Economics, Japan based on various data

Furthermore, quota systems and standard values that were reported in the past by some media were formally announced. Specifically, the quota system in the power generation industry adopts the benchmark system in which respective benchmark values were set for each type of power generation and heat supply while considering cogeneration units (Table 17). The specific calculation formula is as follows: **Emission quota = Power supply BM value × Actual amount of power supply × Operating rate correction factor + heat supply BM value × Actual amount of heat supply**. In addition, two special measures have been established, and the upper limit of performance gap of operators has been set to 20 % (no performance for the part exceeding 20%) and preferential treatment is given to gas units (the upper limit has been set to the free emission quota of performance obligation).

In the meantime, in January 2021, the Ministry of Ecology and Environment announced "Guidance opinion on cooperation and enhancement of work related to climate change and protection of ecology" to express its direction of concrete policymaking mainly focusing on the goals of medium- to long-term carbon emission peak-out and long-term carbon neutral. In particular, the ministry clarified its policy to promote the following matters related to climate change: (1) ensuring that all regions present specific goals for achievement of peak-out and develop implementation plans and support measures to achieve the goals, (2) encouraging major sectors such as energy, industry, transportation, construction to develop individual plan to achieve peak-out, (3) ensuring that major industries such as steel, building materials, nonferrous metals, chemical industry, petrochemicals, electric power, coal production present specific goals for achievement of peak-out and develop action plans to achieve the goals, (4) strengthening emissions trading systems in the nation and expanding the scope by positioning the power generation industry as breakthrough to promote transition to the national market from local pilot markets, and (5) strengthening the target responsibility system of greenhouse gas emissions. Judged from these trends, the trend utilizing market mechanisms will be accelerated also in major industries that consume large amount of energy other than the power generation industry.

4. Trends on market mechanisms in Korea

As a major trend of Korea's climate change policy and market mechanisms in FY2020, "Korean New Deal" announced in June 2020, "Clean Air for blue skies initiative" declared by the President in September to strengthen climate change policy, the policy of "Achieve zero coal-fired power generation currently accounting for 40% by 2045" proposed at the President's National Climate and Environment Conference in November, and the development of "2050 Carbon Neutral Strategy" and "Allocation during the period of the third plan" of Emissions Trading Scheme in December.

[Korean New Deal][51]

In June 2020, the Korean government held the sixth “emergency economic policy meeting” presided by President Moon to discuss policies on economies affected by the COVID-19 pandemic and decided the direction of economic policies for the latter half of the year. The President is planning to spend approx. 76 trillion won for the “Korean New Deal” that consists of two axes, the “Digital New Deal” and the “Green New Deal” basically to strengthen the safety net for employment by 2025. In particular, the Green New Deal specified the five issues described below to respond to the climate change such as reduction in greenhouse gases.

Table 15. Major initiatives of Korean Green Deal

Green Smart School	Promoting energy efficiency for aging schools by installing solar power generation facilities, insulation work, etc.
Smart Green Industrial complex	Building smart ecological factories (reuse of waste heat and waste materials) and clean factories (factories that minimize pollutants by the use of renewable energy)
Green Remodeling	Newly opening public nursery schools, sports centers, and other facilities that utilize high-efficiency energy equipment and environmentally friendly materials
Green Energy	Supporting wind direction measurement and validity examination for the development of large-scale offshore wind power and gradually constructing complex for demonstration
Green Mobility	Introducing 1.13 million electric vehicles, 200,000 hydrogen vehicles, expanding recharging infrastructure, promoting conversion to LPG and electric vehicles and early retirement of old light oil vehicles

(Source) Prepared by the Institute of Energy Economics, Japan based on various data

[Clean Air for blue skies Initiative][52]

In September 2020, President Moon declared the strengthening of climate change policy such as phasing out coal power, the Green New Deal and international cooperation through the video message to the public in a remark at the United Nations' International Day of Clean

[51] Korean policies briefing site news
https://www.korea.kr/news/policyNewsView.do?newsId=148875338

[52] Yonhap News (2020.9.7) “Moon vows S. Korea will quickly transition to 'clean, safe' energy to reduce greenhouse gas, fine dust”
https://en.yna.co.kr/view/AEN20200907008400315

Air for blue skies. Clean Air for blue skies is an initiative launched under the leadership of the Republic of Korea last year. First, toward phasing out coal power, 10 units will be closed within the term of President Moon, and 20 units will be closed by 2034. Then, wind and solar power will be increased up to three times the 2019 level by 2025. In addition, President Moon emphasized the importance of international cooperation and stated that Korea will strengthen Japan-China-Korea cooperation specially to address the PM2.5 issue.

[Zero coal-fired generation by 2045][53]

In November 2020, the President's National Climate and Environment Conference proposed to completely abolish coal-fired generation that currently accounts for 40% by 2045 and to allow only electric vehicles and hybrid vehicles as new vehicles from 2040 as national policies to respond to climate change. The National Climate and Environment Conference is a committee established in April 2019 under the direct authority of the President to examine national polices and proposed policies for cooperation with neighboring countries related to the PM issues in response to a series of occurrence of high-concentration PM problems in March 2019, and former UN Secretary-General Ban Ki-Moon is the current chairperson of the committee.

This committee proposed the seasonal management system for PM and other short-term countermeasures in October 2019. It also proposed medium- to long-term measures to respond to PM issues and climate crisis as the secondary proposal this time. Specifically, issues related to four areas of transportation, power generation, climate and atmosphere and vision strategies have been identified.

Table 16. Major Proposals of Medium- to Long-Term Measures to Respond to PM Issue and Climate Crisis

Power generation	Completely abolishing coal-fired generation currently accounting for approx. 40% of the power generation amount by 2045 Reflecting 50% of the environmental costs related to electricity production in electricity prices in a phased manner by 2030
Transportation	Ensuring that newly sold vehicles are limited to non-polluting vehicles and plug-in hybrid vehicles from 2035 or 2040
Sustainable green growth vision	Presenting 2030 PM reduction goal Achieving 2050 carbon neutral

(Source) Prepared by the Institute of Energy Economics, Japan based on various data

[53] National Climate and Environment Conference press release (2020.11.23)
https://www.ncca.go.kr/cmn/pres/1510.do

[Strategy to promote achievement of 2050 carbon neutral][54]

The Korean government announced its 2050 carbon neutral goal on October 28, 2020 for the first time and “Strategy to promote achievement of 2050 carbon neutral” centering on the re-constructure of carbon pricing systems such as current emissions trading schemes on December 7,2021. This strategy presented the “3+1” strategy consisting of three directions of policies; “achievement of low-carbon economic structure, development of low-carbon industrial ecosystem, and process shift to carbon neutral society” and “enhancing foundation of carbon neutral systems.” In particular, by conducting comprehensive review of tax systems (carbon tax), (carbon) burden charge, trading system, etc., the Korean Government stated the policy to re-establish carbon pricing systems. Specifically, in 2021, Korea will start study to examine the effectiveness of the current emissions trading schemes and formulate a road map to promote technological innovation. Korea is planning to set up the “Climate Response Fund” by abolishing or merging similar existing funds and to increase the ratio of financial support for new energy sector of policy-based financing institutions up to 13% in 2030 from the current 6.5%. In addition, through revision of investment tax credit systems for expansion to sectors related to carbon neutral, Korea is planning to give tax benefits to corporate activities contributing to the achievement of carbon neutral goal. In addition, support for industries and workers who incur loss from the trasition to carbon neutral will be increased.

Upon the announcement of the strategy, the government reviewed its 2030 Nationally Determined Contribution (NDC) and changed then-current “2030 targets of 37% reduction compared to BAU” to “24.4% reduction from the level of 2017.”

In the “Strategy to promote achievement of 2050 carbon neutral” announced in December, the government expressed the review of carbo tax for the first time, which requires urgent response of sectors consuming large amount of energy such as steel, cement and petrochemistry. In the meantime, the Korean Ministry of Environment completed allocation of 2,608 million tons quotas for the period of the third plan (2021-2025) on emissions trading schemes in December. The number of business sectors subject to the quotas increased from 589 companies from 62 sectors during the period of the second plan to 685 companies from 69 sectors during the period of the third plan. In the transportation sector, railways and maritime traffic have become subject to regulations. In particular, during the third plan period and onward, the ratio of paid quotas increased to 10% from 3%, leading to possible increase

[54] Ministry of Economy and Finance press release (2020.12.7)
https://www.moef.go.kr/nw/nes/detailNesDtaView.do?searchBbsId1=MOSFBBS_000000000028&searchNttId1=MOSF_000000000052647&menuNo=4010100

in burden on companies subject to regulations. Carbon emission rights prices for 2020 which soared to 42,500 won in April 2020 dropped to 17,800 won in August due to economic recession caused by the Covid-19 pandemic. Although the price increased to 30,000 won or more in December because of the government policy of strengthening climate change countermeasures and final determination of quotas, the price stayed around 19,000 won as of February 2021.

（様式２）

二次利用未承諾リスト

報告書の題名　Research on International Trends on Market Mechanism Negotiations Report

委託事業名　FY2020 Infrastructure Development Research Project for Joint Credit Acquisition

受注事業者名
一般財団法人日本エネルギー経済研究所

頁	図表番号	タイトル
13	Figure 3	Global landscape the article 6 pilot project