2021 Infrastructure Development Study Project for Bilateral Credit Acquisition, etc.

Survey Report of International Trends in Market Mechanism Negotiations, etc.

March 2022

The Institute of Energy Economics, Japan

Introduction

Although the Paris Agreement entered into force in November 2016, Republican candidate Trump, who had pledged to withdraw from the Paris Agreement, was elected in the U.S. presidential election held in November 2016, the same day the Paris Agreement entered into force. After his presidency, U.S. global warming policy changed dramatically in 2017, with the U.S. deciding to withdraw from the Paris Agreement. However, negotiations on the Paris Agreement 's implementing rules and the Paris Rulebook continued during this period, and eventually the Paris Agreement Implementing Rules were successfully adopted at COP24 in December 2018.

On the other hand, the rule book on the market mechanism stipulated in Article 6 of the Paris Agreement could not be agreed upon at COP24, and could not be adopted at COP25 in 2019, leaving it doubtful whether an agreement could be reached. Besides,COP26, originally scheduled to be held in 2020, was postponed due to the COVID 19 and finally came to be held in November 2021.

Despite these delays in negotiations, Democratic candidate Biden won the U.S. presidential election in 2020, and immediately after assuming the presidency, he took steps to return to the Paris Agreement, demonstrating his proactive stance on global warming countermeasures. Even outside of this shift in U.S. policy, the private sector is expanding its use of voluntary credits, and interest in market mechanisms is growing.

This finally led to the adoption of the implementing rules of Article 6 of the Paris Agreement at COP26. There is no doubt that this agreement represents a major step forward in the implementation of Article 6. It is expected that countries will implement various market mechanisms based on these implementing rules.

In this study, we investigated trends in the negotiation of market mechanisms under the Paris Agreement and various related developments (CORSIA, voluntary credits, etc.), as well as examined trends in market mechanisms in each country and analyzed issues related to these mechanisms.

We hope that this report will serve as a reference for future discussions on market mechanisms under the Paris Agreement.

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Glossary

- Assigned Amount unit.

  Initial quantified quotas allocated to Annex I countries.

- AILAC

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

- ALBA

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

- AOSIS

  Alliance of Small Island States. The UNFCCC negotiating group including St. Lucia, Maldives, Tuvalu, Fiji and others.

- BAU

  The case with no special measures taken (Business As Usual).

- CCS

  Carbon dioxide Capture and Storage. A generic term for technologies to store carbon dioxide separated and recovered from power plants, factories, and other sources in geological formations. Separation methods include chemical absorption, physical absorption, membrane separation, physical adsorption, deep cold separation, and hydrate separation. Storage methods include underground sequestration, ocean sequestration, and plasma decomposition.

- CDM

  Clean Development Mechanism. A generic term for a scheme whereby developed countries, which have numerical targets for greenhouse gas emissions under the Kyoto Protocol, implement emission reduction projects in developing countries where no numerical targets have been set, and transfer the resulting emission reduction credits to developed countries.

- CER

  Certified Emission Reduction. Credits issued through the CDM.

- CH_4

  Methane. A type of greenhouse gas that is produced from final disposal sites of organic waste, swamp bottoms, livestock manure, and anaerobic decomposition processes 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

  Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol. Meeting of the parties to the Kyoto Protocol. Along with the COP, it is held annually.

- Cooperative Approach

Collaborative approach. The market mechanism as stipulated in Article 6.2 of the Paris Agreement.

- CO_2

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

- COP

  Conference of the Parties to the United Nations Framework Convention on Climate Change. This is the conference of the parties to the United Nations Framework Convention on Climate Change, and is currently held once a year.

- EIG

  Environmental Integrity Group, a negotiating group under the UNFCCC. Switzerland, South Korea, Mexico, Luxembourg, and other countries participated.

- ERU

  Emission Reduction Unit. Credits issued through joint implementation.

- ETS

  Emission trade or Emissions Trading Scheme. It is an economic method used to reduce emissions of environmental pollutants. In order to control overall emissions, emission caps are allocated among emitters such as countries and companies, and the allowances are traded between entities that emit in excess of their allowances and those that emit below their caps. Various methods exist for allocating emission caps, including grandfathering, in which caps are allocated free of charge based on past performance, and auctioning, in which the necessary caps are procured from the government or other entities for a fee.

- EUA

  EU Allowance. Emission allowances traded under the EU ETS.

- EUETS

  European Emissions Trading Scheme. It was initiated in 2005 for the 15 EU countries in the European region with the aim of achieving the commitments of the EU Member States under the Kyoto Protocol in an economically efficient manner at the smallest possible cost. The number of countries covered has been gradually expanded and now it covers 27 EU countries.

- GHGs

  Greenhouse Gases. A general 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, dinitrogen monoxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are subject to control.

- HFC

  Hydrofluorocarbons. Gas covered by the Kyoto Protocol.
- IPCC

  Intergovernmental Panel on Climate Change. An intergovernmental mechanism that aims to compile and assess the latest scientific, technological, and socioeconomic findings on the risks of artificial climate change and to provide policy makers with the information. The need for comprehensive scientific information on climate change has grown since the extreme weather events in 1970s, and the idea of establishing the IPCC was proposed at the 1987 WMO General Assembly and UNEP Executive Board meeting and approved in 1988, when the IPCC was established
- ITMOs

  Internationally Transferred Mitigation Outcomes as defined in Article 6.2 of the Paris Agreement. Unit of the mitigation outcomes to be transferred under Article 6.2.
- JI

  Joint Implementation. A generic term for a scheme under which projects for emission reductions, etc. are implemented among developed countries for which numerical targets for greenhouse gas emissions are set in the Kyoto Protocol, and the credits for the emission reductions resulting from such projects can be transferred to project participants in the investing country.
- LMDC

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

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

  Measurement, Reporting and Verification.
- Modalities and Procedures

  Modalities and Procedures. Modalities and Procedures of the CDM and the Paris Agreement Article 6.4 mechanism.
- NF_3

  Trifluorinated nitrogen. Gas covered by the Kyoto Protocol. Added from the second commitment period.
- Non-market Approach

  Non-market approach. Efforts stipulated in Article 6.8 of the Paris Agreement.
- N_2O

  Nitrous oxide. Greenhouse gases produced by combustion, use of nitrogen fertilizers, chemical industry (production of nitric acid, etc.), and microbial decomposition of organic matter.

- PFC

  Perfluorocarbons. Gas covered by the Kyoto Protocol.
- REDD

  Reducing Emissions from deforestation and forest degradation in developing countries.
- RMU

  Removal Unit. Credits issued as net absorption from sink activities.
- SB

  Subsidiary Body of the COP and CMP. There are auxiliary bodies for scientific and technical advice (SBSTA : Subsidiary Body for Scientific and Technological Advice), as well as for implementation (SBI: Subsidiary Body for Implementation).
- SBI

  Subsidiary Body for Implementation.
- SBSTA

  Subsidiary Body for Scientific and Technological Advice.
- SF_6

  Sulfur hexafluoride. Gas covered by the Kyoto Protocol.
- UNFCCC

  United Nations Framework Convention on Climate Change. A treaty that sets an international framework for the global warming problem.
- 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 establishes mechanisms (emissions trading, Clean Development Mechanism, joint implementation, etc.) to achieve the target in an internationally coordinated manner. On the other hand, no new obligations, such as numerical targets, have been introduced for developing countries.
- Kyoto Mechanism

  A generic term for greenhouse gas reduction projects (joint implementation, Clean Development Mechanism) and emissions trading to achieve the targets set in the Kyoto Protocol.
- Annex I Parties

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

CHAPTER 1. Survey of Trends in Market Mechanisms at the United Nations

1. Negotiation trends on issues related to market mechanisms under the Paris Agreement (e.g., trends related to Article 6)

(1). Background and history of the negotiations and each country's position

[1] Instruments of article 6 and the history of negotiations leading up to COP26

Article 6 of the Paris Agreement stipulates three measures as market mechanisms, and requires the following instruments to be developed to implement each of these measures. Table 1 summarizes the nature of each measure and the documentation required.

Table 1 Market Mechanisms and Assumed Documents as Stipulated in Article 6.

Provisions	Specific efforts	Adoption schedule documents
Article 6.2.	**Collaborative Approach** A provision that allows each country to implement its own market mechanism initiatives under the Paris Agreement. Specifically, bottom-up and decentralized efforts by each country, such as linking Japan's JCM and Europe's EU ETS to other emissions trading schemes.	Guidance on accounting to avoid double counting
Article 6.4.	**Article 6.4 Mechanism** Market mechanisms are implemented in a centralized manner under the control of the Paris Agreement. A top-down and centralized approach similar to the Kyoto Protocol's CDM.	Rule, Modalities and Procedures (Rule, Modalities and Procedures, RMP)
Article 6.8.	**Nonmarket Approach** Assistance to developing countries by means other than market mechanisms.	Operation plan

(Source: Issued by the Institute of Energy Economics, Japan, based on various sources.)

It was agreed at COP22 in 2016 that all implementing rules, including Article 6, would be discussed with the aim of adopting them at COP24 in 2018. Based on this agreement, consultations have been held in 2017 and 2018 and have continued through various forums, including meetings hosted by the UNFCCC such as the Subsidiary Body meetings and COPs, as well as informal consultations conducted voluntarily by individual countries. In addition, in response to three other requests for written comments from governments, each country presented its own ideas on market mechanisms

and proposed specific systems.

At COP24 in 2018, agreement was reached on the rules for implementing most of the provisions of the Paris Agreement, with the exception of Article 6. However, at COP24, the conflicting views of countries on Article 6 remained unresolved and no implementing rules were adopted. It was agreed to continue consultations until COP25 in 2019, and vigorous discussions were held, but no agreement was reached at COP25. At COP25, it was further decided to continue the discussions with the aim of reaching an agreement at COP26, which was to be held in Glasgow, UK, in 2020. However, due to the 2020 COVID 19, COP26 was not held in 2020, and the conclusion was postponed until 2021.

There are many things behind this protracted discussions. The COVID 19 prevented the meeting from taking place, but the political conflicts among the countries affected the discussions in various ways, and the technical complexity of the Paris Agreement, due to its fundamental nature, contributed to prolonging the discussions.

Therefore, in 2021, various efforts were made to resolve political conflicts and technical issues in order to reach an agreement at COP26. First, with regard to political issues, the COP26 Presidency, the United Kingdom, held a meeting with ministerial-level participants from various countries in order to resolve issues that could not be compromised at the COP25 and political issues with the involvement of politicians in order to find a compromise. At the same time, the coordination was delegated to the Norwegian and Singaporean environment ministers to find a compromise. In addition, the Subsidiary Body for Scientific and Technological Advice (SBSTA), established under the United Nations Framework Convention on Climate Change (UNFCCC), held several consultations on technical issues by experts in the form of online meetings to discuss specific procedures, standards, and other technical issues.

Discussions aimed at resolving these political conflicts, as well as deepening technical discussions, led to the adoption of the implementing rules of Article 6 at COP26.

Table 2 History of Negotiations to Date

May 2016	**SB 44**	Start of discussions: Agreed to submit written opinions.	
November 2016	**COP22**	Agreed on a work plan. (Up to SB 46)	Round table held. Submission of written opinions.
May 2017	**SB 46**	Work plan agreed (by COP23).	Round table held. Submission of written opinions.
November 2017	**COP23**	Agreed on a work plan. (Up to SB 48)	Round table held. Submission of written opinions.
May 2018	**SB 48**	Discussion on informal documents.	
September 2018	**Additional meeting**	Discussion on informal documents.	
December 2018	**COP24**	Adoption of the implementing rules of the Paris Agreement (Market mechanism could not be adopted. Agreed only to continue talks.)	
June 2019	**SB 50**	Adoption of negotiation documents.	
December 2019	**COP25**	Agreed on the implementing rules of Article 6 of the Paris Agreement and continued consultation.	
2020	**SB52/COP26**	Postponed due to the COVID 19.	
June 2021	**SB52**	Online meetings.	
July - October 2021		Ministerial consultations and technical discussions.	
November 2021	**COP26**	Adopted the implementing rules of Article 6 of the Paris Agreement.	

(Source: Issued by the Institute of Energy Economics, Japan, based on various sources.)

[2] Background and reasons for protracted negotiations

Although an agreement was reached at COP26, there are various factors that contributed to the significant delay from the original schedule. Differences in political views among the countries over the basic direction of Article 6 prolonged the discussions. Specifically, the issues of adaptation finance, handling of past schemes, and application of the double-counting avoidance procedure to the Article 6.4 Mechanism are political issues for which no compromise could be found by the experts, and in order to find a way out, ministerial-level efforts made by the United Kingdom, the COP26 Presidency in 2021, finally led to a compromise on this issue. In addition, countries have conflicting views on the positioning, after 2021, of the Clean Development Mechanism of the Kyoto Protocol, which is outside the framework of the Paris Agreement and this has been a factor that has prolonged the discussions.

Table 3 Political Issues

Political Issues		Technological Discussion Points	
Point in question	Point at issue in discussion	Point in question	Point at issue in discussion
Adaptation funding issues	Conflict between countries that seek to apply the SOP for adaptation funding to efforts under Article 6.2 and countries that oppose the application of the SOPs not stipulated in Article 6.2.	Units of ITMOs	Conflict between countries that take the position that CO2 is the only unit of internationally transferred mitigation outcomes (ITMOs) under Article 6.2 and countries that take the position that non-CO2 should also be included.
Positioning of CDM	Conflict between countries seeking to continue the CDM as Article 6.4 Mechanism and those opposed to it. In particular, there was a conflict regarding use of the credits issued for emission reductions up to 2020 under the Paris Agreement. In addition, there is a conflict between countries that take the position that the CDM should be abolished and those that do not see the need to do so.	Specific procedures for avoiding double counting.	How to avoid double counting for various NDCs (single-year targets, multi-year targets, targets other than CO2 emission reductions, etc.)
Application of Double Counting Avoidance Procedures to Article 6.4	There is a conflict between countries that believe that the double-counting avoidance procedure stipulated in Article 6.2 should be applied to the Article 6.4 Mechanism and countries that take the position that there is no need to apply the procedure.	Methods of setting baseline emissions and determining additionality in the Article 6.4 Mechanism	How to set specific baseline emissions and determine additionality, taking into account the host country's environmental policy.

(Source) The Institute of Energy Economics, Japan

Along with the deep-rooted political conflicts described so far, the technical challenges stemming from the Paris Agreement's unique nature have also contributed to the prolonged talks. Specifically, issues such as the need for a method to avoid double counting for various NDCs, measures to ensure environmental integrity, and application to initiatives outside the Paris Agreement framework complicated the technical discussions.

Thus, a variety of political and technical factors complicated and prolonged the consultation process and prevented the adoption of the implementing rules of Article 6.

(2). Summary of the adopted implementing rules of Article 6 of the Paris Agreement.

As we have mentioned, consultations were held amidst various political conflicts and technical difficulties, and agreement on the Paris Agreement Article 6 rulebook was reached at COP26 in 2021, three years later than originally planned (2018). The agreed-upon content is broad, this agreement not only lays out the market mechanism under the Paris Agreement after 2021, but also has implications for other global warming measures that utilize the market mechanism, and is expected to affect a wide range of activities in the future. This section will briefly describe the specifics of the agreed-upon Article 6 at COP26.

[1] Summary of guidance in Article 6.2

As already mentioned, countries have been at odds with each other on various issues regarding Article 6.2, but at this COP26, agreement was reached not only on issues that have been politically contentious, but also on technical issues (see Table 4 for details).

Not only the units and definitions of ITMOs, but also how to avoid double counting under Article 6.2, which has attracted the most attention, how to make corresponding adjustments, and the development of report submission, review procedures, and databases to ensure environmental integrity, were agreed upon. Compromise was reached on the adaptation finance, which had been a pending issue. Furthermore, the agreement leaves open the possibility that the guidance in Article 6.2 may be applied beyond the Paris Agreement to other market mechanisms, leaving space for the guidance in Article 6.2 to be applied widely in the future.

The agreement provided provisions for units and definitions of ITMOs, allowing for CO2 and non-CO2 units, as well as specific details such as mitigation outcomes created since 2021. In addition, specific procedures were clarified on how to proceed with corresponding adjustment. For countries with NDCs with multi-year targets, it was decided that they would use one method, and for countries with NDCs with single-year targets, it was decided that they would be allowed to choose between two options, based on their own circumstances.

The "first transfer" occupies an important place in the implementing rules adopted at COP26. The "first transfer" is the procedure for authorization of the transfer of mitigation results (emission reductions, sinks, renewable energy installations, etc.) by the host country to foreign countries.

Table 4 Agreement on Article 6.2

Items	Agreement		
(a) Unit (definition) of ITMOs	Both CO2 and non-CO2 units are allowed. (ITMOs are defined as a wide range of initiatives and various conditions, such as being the result of mitigation occurring after 2021).		
(b) Scope of application of corresponding adjustment	Application to mitigation results where the host country approved international transfer ("initial transfer") for use to NDC or for "other international mitigation purposes". *"Other international mitigation purposes" include "international mitigation purposes other than NDC" (such as use for CORISA) and "other purposes" as determined by the host country (such as use for voluntary credits)[1].		
(c)Method of corresponding adjustment			
i. Subject to adjustment	ITMOs with CO2 as unit.		Emissions and removals covered by NDC
	ITMOs with unit other than CO2.		Non-CO2 index
ii. Adjustment method			
The unit is CO2.	"First transfer"	Added to emissions and removals. (Adjusted for the year in which ITMOs occurred.)	
	For use	Deducted from emissions and removals. (Used in the same NDC implementation period as the year in which ITMOs occurred.)	
The unit is other than CO2.	"First transfer"	Deducted from non-CO2 index. (Adjusted for the year in which ITMOs occurred.)	
	For use	Added to CO2 index. (Used in the same NDC implementation period as the year in which ITMOs occurred.)	
iii. How to make adjustment over single and multiple years			
-Single-year targets	(i) Multi-year emission pathways or carbon budgets are established to adjust each year the amount of "first transfers" and utilization for both the delivery and acquiring countries. (ii) Each year, the "first transfer" and utilization of ITMOs on a moving average basis will be calculated and adjusted as an index, and the average "first transfer" and average utilization during the NDC implementation period will be added, deducted and adjusted in the final year of the NDC.		
-Multi-year targets	Multi-year emission pathways or carbon budgets are established to adjust each year the amount of "first transfers" and utilization for both the delivery and user countries. In the final year, the total "first transfer" volume and the total use volume are added or deducted and adjusted.		
(d) Report submission (report to be submitted and contents of report)			
i Initial Report	Overview of Article 6.2 cooperation, selected corresponding adjustment approaches, etc.		
ii Yearly Information	Report the quantity of ITMOs relocated and utilized		
iii Biennial Report	Updated content of initial report and annual information. Report on contributions to the achievement of NDC, efforts to ensure environmental integrity, and responses to non-permanence of mitigation results, etc.		
(e) Examination	The reported content is reviewed by experts.		
(f) Development of infrastructure	• A database to record reports submitted by each country is established. • A registry to track the transfer, acquisition, etc. of ITMOs (international registry established). • Centralized Accounting and Reporting Platform (CARP) is established.		
Adaptation Funding and OMGE	Obligation to voluntarily contribute to adaptation funds and report on efforts. Recommendation of voluntary revocation to each country and each stake holder for their contribution to OMGE and report on their contribution to OMGE		

(Source) Kiyoshi Komatsu, Energy and Power in "The Paris Agreement Article 6 Rulebook adopted at COP26"

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[1]CORSIA is a CO2 emission regulation for the international civil aviation sector implemented under the International Civil Aviation Organization (ICAO). While CORSIA allows the use of credits for regulatory compliance, it requires that double counting be avoided in their use.

In this agreement, the host country's authorization of use for NDC or "other international mitigation purposes" was defined as the "first transfer," and the "first transfer" would initiate a reasonable coordination process. No corresponding adjustment will be made unless there is a "first transfer."

In addition, corresponding adjustments can now be applied not only to the use of credits for NDCs under the Paris Agreement, but also to the use of credits for other international global warming measures, such as CORSIA, and to the use of credits for voluntary global warming measures by the private sector. The procedures for avoiding double-counting and corresponding adjustments outlined in Article 6 of the Paris Agreement could be applied beyond the UNFCCC and in various market mechanisms.

In addition, a system will be introduced whereby each country will report on the status of its own efforts to implement Article 6, and whereby the contents of such reports will be reviewed to ensure transparency and enhance credibility. To this end, it was agreed upon to establish a database to record what is reported from each country, a registry to track the "first transfer" of ITMOs, their transfer, acquisition, use, etc., and a platform to ensure transparency (Central Accounting and Reporting Platform, CARP), and an infrastructure for transparency was agreed to be established.

Regarding the application of the SOPs, it was agreed voluntary contribution to the adaptation funding and obligatorily reporting on the status of their efforts. Although it was not a political confrontation, the application of the OMGE, which had conflicting views in many countries, also required a voluntary response.

[2] Procedures to avoid double counting (corresponding adjustments)

The guidance in Article 6.2 also determined the details of the procedures for avoiding double counting. Three methods were presented as shown in Table 4, and each country was to choose which method to apply based on its own situation and NDC. The specific methods are as follows

i. Method of setting and adjusting emission pathways in NDCs for single-year targets

For a method applied to NDC with single-year targets, an emission pathway or carbon budget is established for the period of NDC implementation, and then each year, the host country adds the amount of "first transfer" of ITMOs to its emissions, acquires ITMOs, and the country that used the ITMOs for its NDC adjusts its emissions by deducting the amount used from the amount of emissions. The emissions to be adjusted are those in the year in which the mitigation outcome of the ITMOs subject to the "first transfer" occurs for the host country, and the user countries adjust the emissions in the NDC implementation period in which the ITMOs occur.

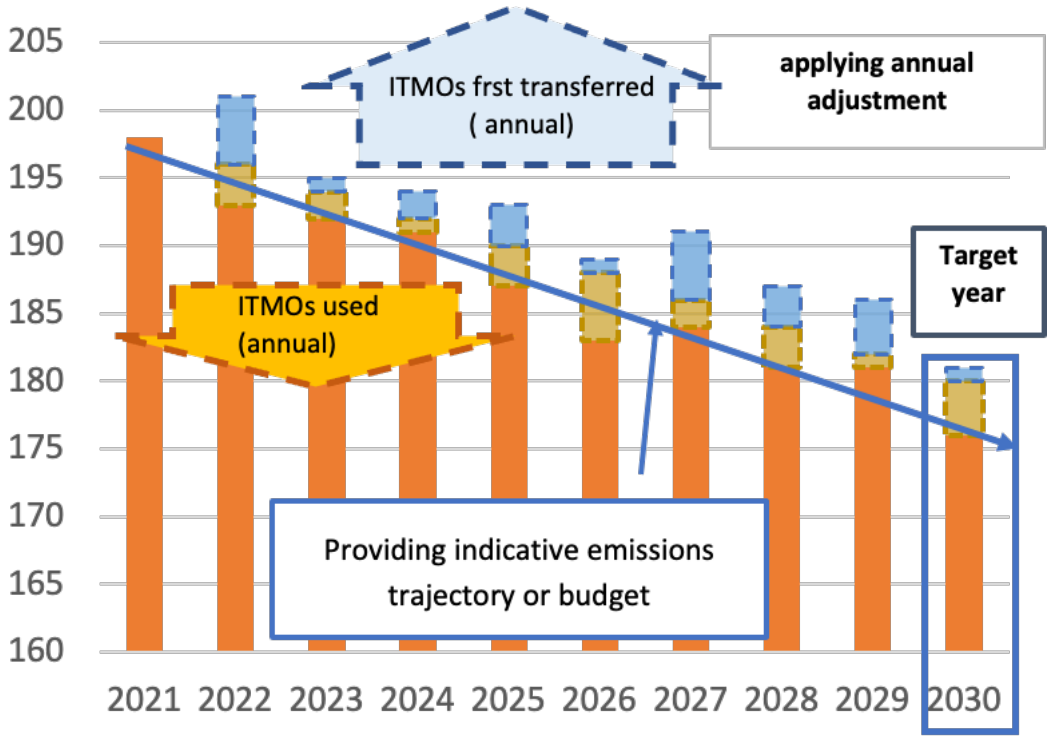

Figure 1 How to set and adjust emission pathways with single-year targets

(Source) The Institute of Energy Economics, Japan

ii. Adjustment by average in single-year targets

Method applied to NDC with single-year targets For both host and ITMOs-using countries, a moving average of amount of ITMOs "first transfer" and use will be calculated annually, and indicative adjustments for additions and deductions will be made.

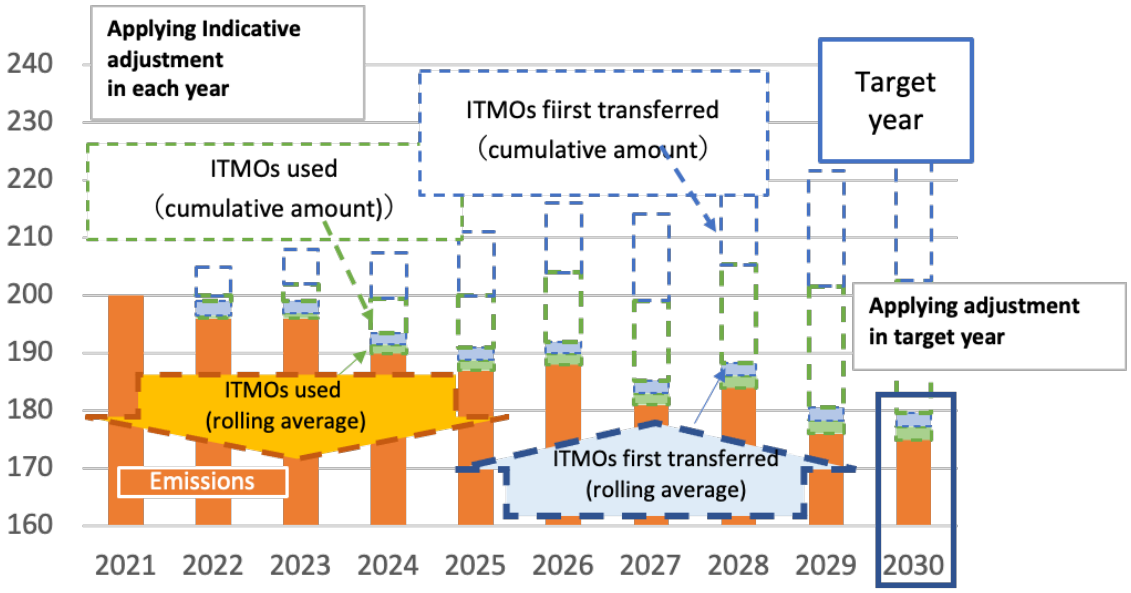

Figure 2 How to adjust by average with a single year target

(Source) The Institute of Energy Economics, Japan

Finally, in the target year, the average of ITMOs transferred or used in the NDC implementation period is calculated for both the host country and the ITMOs user country, and the host country adds it to emissions and the ITMOs user country deducts and adjusts it. The emissions to be adjusted are those in the year in which the mitigation outcome of the ITMOs subject to the "first transfer" occurs for the host country, and the user countries adjust the emissions in the NDC implementation period in which the ITMOs occur.

iii. How to adjust NDCs for multi-year targets and carbon budgets

How to adjust NDCs for multi-year targets or carbon budgets. A method of establishing an emission pathway or carbon budget for the NDC implementation period and adjusting it annually by adding ITMOs "first transfer" amount to the emissions and deducting the amount used. Finally, in the final year of the NDC, emissions will be adjusted with all emissions in the NDC implementation period as well as with the sum of the ITMOs "first transfers" and used amount. The emissions to be adjusted are those in the year in which the mitigation outcomes of the ITMOs covered by the "first transfer" occurred for the transferring country. Use of ITMOs shall be made in the NDC implementation period when mitigation results occur.

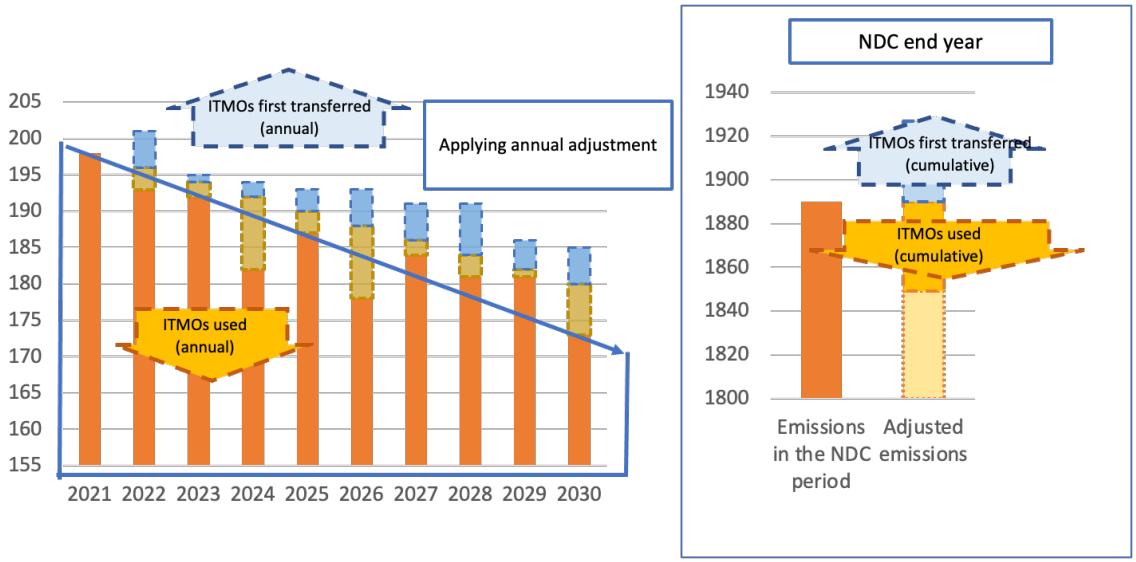

Figure 3 Adjustment method for multiple-year targets or carbon budget

(Source) The Institute of Energy Economics, Japan

[3] Summary of Agreement in Article 6.4

The discussions on Article 6.4 were difficult due to complex issues such as the transition of the CDM of the Kyoto Protocol, as well as difficult technical issues such as how to set baseline emissions and how to determine additionality. However, compromises were reached on these issues at COP26, and agreement was reached on basic principles for technically complex issues. (See Table 5 for details.)

A compromise was reached on the application of the corresponding adjustment procedure to avoid double counting toward the Article 6.4 Mechanism, with only credits corresponding adjustment applied can be used for NDCs as ITMOs. Regarding the CDM, projects registered under the CDM that comply with the rules of the Article 6.4 Mechanism can be registered as activities under the Article 6.4 Mechanism. On the other hand, credits derived from the CDM projects registered after 2013 will be allowed to be used in the first NDC and no corresponding adjustment will be applied to their use.

Certain directions regarding the method of setting baseline emissions and determining additionality have been provided, and further specific criteria and procedures will be established under the Article 6.4 Supervisory Body in the future.

As for the post-2021 state of the CDM, which is implemented under the Kyoto Protocol outside the framework of the Paris Agreement, the CDM will cease its activities by 2023, when the additional period of the Kyoto Protocol's second commitment period ends, although credits will be issued for emission reductions until December 31, 2020, when the Kyoto Protocol's second commitment period ends. The funds that have been used to operate the CDM will be used to the Article 6.4 mechanism and the adaptation fund.

Table 5 Agreement on Article 6.4

Items	Contents	
(a) Governance	The Article 6.4 Supervisory Body will perform the Article 6.4 Mechanism under the CMA (the decision-making body of the Paris Agreement) (conducting procedures for operation, setting standards, maintaining the registry, etc.)	
(b) Article 6.4 Supervisory Body. (Composition and procedures)	Twelve Directors (two each from the five regional divisions of the UN, one from the least developed countries, and one from the small island states) and their respective Alternate Directors were elected with gender balance in mind.	
(c) Responsibility for participation	• Explanation of the country's membership in the Paris Agreement, submission of NDC, designation as a National Designated Entity, and contribution to sustainable development, along with clarification of the activities allowed under Article 6.4. • The host country may also indicate in advance to the Article 6.4 Supervisory Body the methodological requirements (such as additionality) and credit period, including the baseline setting method.	
(d) Role of host country and other participating countries	Host country	• Approves activity prior to registration and at renewal of the credit period. • Provides authorization to Article 6.4 Supervisory Body for use in NDCs or for "other international mitigation purposes," etc.
	Other participating countries	Provides the Article 6.4 Supervisory Body with authorization for private or public entities to participate in Article 6.4 Activities prior to the "first transfer".
(e) Method of setting baseline emissions (Applied under the performance based approach, considering the following three approaches.)		
i. Best Available Technology (BAT)	Baseline emissions are a series of economically feasible and environmentally sound activities.	
ii. Ambitious benchmarks	Baseline emissions are at least the average of the highest performance that provides equivalent services and outcomes in similar social, economic, environmental, and technological circumstances within a certain range.	
iii. Gradual reduction of past emissions	Baseline emissions are gradually reduced ones from the past or current emission levels.	
(f) Proof of additionality	It is certified that the activity could not have been carried out without the incentives of the Article 6.4 Mechanism. In doing so, relevant policies, laws, and regulations of the host country are taken into account, and it is considered to avoid initiatives that exceed the level required by law or regulation and that lock in carbon-intensive technologies and initiatives.	
(g) Avoiding double counting	Application to Article 6.4 Credits "approved" as "first transfer." Only "approved" credits can be used for NDCs as ITMOs.	
(h).SOP・OMGE	SOP	A 5% credit will be deducted at the time of credit issuance (A separate monetary SOP will also be charged at the time of credit issuance (amount to be determined).)
	OMGE	2% cancellation on the "first transfer" of credits(The host country makes a corresponding adjustment to the volume after the 2% cancellation.)
(j)Transfer of CDM	Project	Registration as an activity under the Article 6.4 Mechanism, provided that the rules of Article 6.4 are met (Application must be made by December 31, 2023, and the procedure ends on December 31, 2025.) For projects that have been transferred, the methodology if CDM can be applied by 2025.
	CER	Those from projects registered after 2013 can be used for the first NDC (without applying corresponding adjustments). Credits derived from afforestation projects are not allowed.

(Source) Kiyoshi Komatsu, Energy and Power in "The Paris Agreement Article 6 Rulebook adopted at COP26"

[4] Summary of Agreement in Article 6.8

Under Article 6.8, it was agreed to establish a Glasgow Committee on non-market approaches. The Glasgow Committee will be convened by the SBSTA Chair and meeting will be held in conjunction with the SBSTA meeting to implement the work plan for the non-market approach. Work will begin in 2022 and will be conducted through workshops.

Table 6 Agreement on Article 6.8

Items	Contents
(a) Governance	• Establishment of the Glasgow Committee on non-market approaches and implementation of its work plan. • The Glasgow Committee will be convened by the SBSTA Chair and the its meeting is held twice each year in conjunction with the SBSTA. • New systems are needed and will be considered in 2027.
(b) Work Plan	• Work plan begins in 2022. • Workshops, sub-missions from various countries, and technical documentation under the work plan, as well as the involvement and work of various stakeholders, experts, and relevant organizations. • Review of work plan in 2026

(Source) Kiyoshi Komatsu, Energy and Power in "The Paris Agreement Article 6 Rulebook adopted at COP26" Spring 2022 (No. 298)

(3). Remaining challenges to implementing Article 6 of the Paris Agreement

The adoption of the implementing rules of Article 6 at COP 26 was undoubtedly a major step forward in the implementation of Article 6. On the other hand, however, there are still some technical issues to be addressed, and further technical studies are required to be conducted in the future to implement Article 6. In this section, we will analyze what challenges remain for the future implementation of Article 6.

[1] Technical issues for implementation

With regard to Article 6.2, specific procedures will be set forth for the corresponding adjustment procedures, and at the same time, reports will be submitted on the status of their application and an examination will be conducted. It was agreed to develop a database to manage the information reported in the reporting process and a registry that would allow tracking of ITMO s transfers.

However, the procedures for submitting reports, recording the information provided, the infrastructure (database and registry) for public access, and the specific procedures and methods for reviewing the information provided to confirm its integrity were left as issues for further works.

To this end, it was decided to work toward adoption at COP27 in 2022, of a reporting format, a database for recording information, a registry for tracking the transfer and use of ITMOs, and other infrastructure, as well as procedures for reviewing the contents of reports under Article 6.

These procedures and infrastructure are essential for the effective implementation of the Article 6 Paris Rulebook and potentially affect the implementation of Article 6.

The Article 6.4 Mechanism system must begin operating promptly. Although basic rules and

regulations were adopted at COP26, specific procedures and standards for their implementation are left for further works. The detailed procedures and criteria for their implementation will be determined by the Article 6.4 Supervisory Body (hereinafter referred to as "Supervisory Body") that oversees the Article 6.4 Mechanism. The Supervisory Body meeting is supposed to be held twice in 2022, but no board members have yet been officially elected. In order to provide credits under the Article 6.4 Mechanism as soon as possible, a supervisory body must be established and begin operating as soon as possible.

This also applies to the transition of CDM. There is a need for CDM projects to meet the rules of Article 6.4 in order to be approved as an activity under the Article 6.4 Mechanism, but it is not clear what the specific rules are, and is left to the discretion of the Supervisory Body. The prompt CDM transition would contribute the sooner issuance of 6.4 credits, and thus the faster transition of the CDM also contributes to ensure the supply of credit. Therefore, it is desirable to start the operation of the Supervisory Body as soon as possible.

[2] Application of procedures of corresponding adjustment

There are various views on the application of corresponding adjustment for the use of credits in voluntary efforts by companies. Even in credit standards, there are different views. For example, the VCS leaves it to the user to decide what type of credit to use, and issues two types of credits, one with the double-counting avoidance procedure applied and one without. The Gold Standard, on the other hand, in principle requires to apply corresponding adjustment for all usage. Therefore, there were expectations that certain guidelines would be provided in the Article 6 Rulebook to be adopted at COP26 on the application of the corresponding adjustment to the use of voluntary credits.

The implementing rules of Article 6, adopted at COP26, stipulate that if the host country authorizes the use for "other purposes," the corresponding adjustment procedures is applied. In other words, it does not require as a mandately corresponding adjustment to the use of voluntary credits. Therefore, although detained procedures of the corresponding adjustment were clarified, no clear criteria or guidelines were provided as to whether or not such procedures should be applied to voluntary credits, leaving it to the decision of each host country or private company.

(4). Trends in Projects Related to Article 6 of the Paris Agreement

The implementing rules of Article 6 of the Paris Agreement were agreed upon over three years atCOP26, which took place in October-November 2021. In anticipation of its use under Article 6, many projects are currently in the preparatory stage, although some projects shown in Table 7 have begun before the implementing rules of Article 6 were agreed upon. Even within this context, some countries, such as Switzerland, have clearly stated that they will utilize the Article 6 Mechanism for their own NDCs, and are pursuing projects centered on the bilateral type of Article 6.2. Below is a summary of developments in each country related to Article6.2 in 2021.

In 2021, international credits are becoming increasingly important in Australia, which has announced a 2050 net-zero goal, New Zealand, Japan, and South Korea, which have strengthened their 2030 targets. In particular, Australia is promoting the launch of new carbon markets in the Indo-Pacific. In addition, Switzerland, which is active in Article 6, may further increase its reliance on international credits in the future, as the rejection of the amended CO2 bill in the referendum has made it difficult to strengthen domestic measures. Sweden is also active in Article 6, but has announced a partnership with Gold Standard and is aiming for a stable supply of credits by utilizing the existing framework, in contrast to JCM and others that are developing their own processes.

-Switzerland

In June 2021, the revised CO2 bill, which outlines broad climate change measures beyond 2021, including a tax on airline tickets and an increase in the gasoline tax, was rejected in a referendum by a narrow margin of 51.6% against. The rejected bill would have set a 2030 emission reduction target of at least 50% below 1990 levels, with up to 25% of the required reductions to be covered by international credits. [2] [3]

In response, the new revised CO2 bill covering the period 2025-2030, for which consultation was launched in December 2021, forbids any increase or new CO2 tax, but raises the use of international credits to the equivalent of one-third of the required reduction. The bill is scheduled for consultation until April 2022. [4]

Switzerland had signed bilateral agreements with Peru and Ghana in 2020, and in 2021 it signed a series of new bilateral agreements with Senegal, Georgia, Vanuatu, and Dominica. A joint statement on cooperation on climate change issues was also issued with Thailand, Iceland, and Morocco. [5]

Immediately after the agreement on the Article 6 rule, the Klik Foundation, and Microsol S.A.S., the developer of the project to promote high-efficiency cook stoves in rural Peru, signed a contract to purchase the world's first ITMOs. The maximum volume traded is 960,000 tCO2. [6]

-Sweden

Sweden is vigorously implementing efforts related to Article 6.2, including nine virtual pilot projects in seven countries. During COP26, Sweden signed an MOU with Ghana on bilateral cooperation. In the future, it is seeking cooperation with Dominica, Cambodia, and Nepal. [7]

In August 2021, the Swedish Energy Agency (SEA) announced a partnership with Gold Standard,

[2] https://www.bk.admin.ch/ch/f/pore/va/20210613/can644.html
[3] https://www.fedlex.admin.ch/eli/fga/2020/2013/fr
[4] https://www.bafu.admin.ch/bafu/fr/home/themes/climat/communiques.msg-id-86492.html
[5] https://www.bafu.admin.ch/bafu/fr/home/themes/climat/info-specialistes/climat--affaires-internationales/staatsvertraege-umsetzung-klimauebereinkommen-von-paris-artikel6.html
[6] https://www.international.klik.ch/news/publications/purchase-agreement-paris-certificates
[7] https://www.energimyndigheten.se/klimat--miljo/internationella-klimatinsatser/samarbeten-parisavtalet/bilaterala-samarbeten-under-parisavtalet/

a certification body for voluntary credits. Instead of SEA developing its own new process for Article 6, it seeks to reduce transaction costs and increase certainty of credit supply by utilizing the rules, framework and infrastructure of the Gold Standard. [8]

-Australia

In October 2021, prior to his attendance at COP26, Prime Minister Morrison announced a net zero target for 2050 (the 2030 target remains unchanged at 26-28% below 2005 levels). In this context, it is indicated that 10-20% of emission reductions are to be achieved through domestic and international offsets. [9]

A few days later, the design principles for the Indo-Pacific Carbon Offset Scheme (IPCOS), which had announced a $59.9 million investment in April, made new announcement that indicated it would be consistent with the Article 6 rules, including avoiding double counting. Fiji and Papua New Guinea have announced their participation as the first partner countries. [10]

A joint statement on green economy and energy transition was also issued with Indonesia, and cooperation in offset mechanisms was mentioned. [11]

-New Zealand

In October 2021, the emission reduction target for 2030 was raised from 30% to 50% of 2005 levels. Although NDC positions the use of foreign credits as a supplemental measure, the carbon budget for 2021-2030 of 5 71M tCO2 is significantly lower than the projected domestic emissions, suggesting that NDC may have to purchase 102M tCO2 of credits from abroad over the next decade. [12] [13]

-Japan

In October 2021, the emission reduction target for 2030 was raised from 26% to 46% of the 2013 level. Under the updated NDC, Japan aims to contribute to international emission reductions and removals at the level of a cumulative total of approximately 100 million t- CO2 by fiscal year 2030 through public-private collaborations. Japan will appropriately count the acquired credits to achieve its NDC. [14]

In November 2021, the Ministry of the Environment set forth three actions as its Article 6

[8] https://www.energimyndigheten.se/en/news/2021/the-swedish-energy-agency-partners-with-gold-standard-to-ensure-integrity-in-international-cooperation-under-paris-agreement/
[9] https://www.industry.gov.au/data-and-publications/australias-long-term-emissions-reduction-plan
[10] https://www.industry.gov.au/policies-and-initiatives/international-climate-change-commitments/supporting-climate-action-in-the-indo-pacific-region
[11] https://www.pm.gov.au/media/australia-indonesia-joint-statement-cooperation-green-economy-and-energy-transition
[12] https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/nationally-determined-contribution/#how-does-new-zealand-plan-to-meet-its-ndc
[13] https://carbon-pulse.com/142711/
[14] https://www.env.go.jp/earth/earth/ondanka/ndc.html

implementation policy after COP26, consisting of (i) expanding the number of JCM partner countries and strengthening project formation and implementation in cooperation with international organizations, (ii) expanding JCM mainly through private financing, and (iii) contributing to the global expansion of market mechanisms. [15]

In January 2022,a new JCM Implementation Guideline was adopted. With a view to use in CORSIA, it was added that JCM can be used for "international emission reduction schemes" other than Japan's NDC achievement . [16]

-South Korea

In October 2021, the emission reduction target for 2030 was raised from 26.3% to 40% below 2018 levels. 11. 5% of the reductions, or 33.5 MtCO2, are expected to come from overseas. International credits are planned to be procured through the Article 6.2 Mechanism, and the state is reportedly seeking to conclude bilateral agreements with four countries: Vietnam, Peru, Myanmar, and Sri Lanka. [17] [18]

[15] https://www.env.go.jp/annai/kaiken/r3/1126.html
[16] http://carbon-markets.env.go.jp/jcm/index.html
[17] https://www.2050cnc.go.kr/eng/contents/view?contentsNo=43&menuLevel=2&menuNo=50
[18] https://carbon-pulse.com/141612/

Table 7 Summary of Projects Aimed at Publishing ITMOs (1)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
1	Adaptive Benefit 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 (expanding)	Article 6.8 (non-market approach)	ABM is the first attempt to operationalize a mechanism to support adaptation activities and aims to quantify, validate, and demonstrate the benefits of sustainable development using results-based finance. Ten to twelve pilot phases will be initiated between 2019 and 2023 for potential non-market approaches based on Article 6.8.
2	Emission Reduction Programs in the Waste Sector	Environment and Climate Change Canada	Chile	US$5.3 million (C$7 million) (2017-2021)	Method neutral, Article 6.2 is considered as an option.	The Canada-Chile Environmental Cooperation Agreement, which entered into force in July 1997 in parallel with the bilateral free trade agreement, provides a framework for bilateral cooperation on environmental issues. Within the context of this cooperation, and in light of the approval of the 2016 Paris Agreement, Canada provided financial and technical support to Chile to deploy technology and pilot innovative approaches to support the reduction of methane emissions in the waste sector.

(Source) Climate Focus (2020): Article 6 Piloting: State of Play and Stakeholder Experiences.

UNEP DTU Partnership: Prepared by the Institute of Energy Economics, Japan, based on Article 6 Pipeline overview.

Table 7 Overview of Pilot Project for Issuance of ITMOs (2)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
3	Integrated Carbon Program (ICP) for the Southern and Eastern Mediterranean (SEMED)	European Bank for Reconstruction and Development (EBRD), Government of Spain	Egypt, Jordan, Morocco, Tunisia	N/A	Technical cooperation, technology transfer, policy dialogue, results-based financing	The European Bank for Reconstruction and Development (EBRD) is supporting the transition to a low-carbon economy in the Southern and Eastern Mediterranean (SEMED) region through the development of an Integrated Carbon Plan (ICP), along with financial support from the Spanish Climate Change Office (OECC). The program includes technical assistance in carbon markets, policy dialogue and capacity building, and financing instruments for emission reduction activities.
4	Pilot project by BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)	Zambia, Uganda, Mozambique, Zimbabwe	US$5.9 million (€5 million) (carbon payment) combined with a low-interest loan (interest payment reduction of approximately US$41.23 million (€34.71 million))	Article 6.2	BMU's support for the development of the Article 6 Pilot. The first step is to build capacity in partner countries through support under Article 6, and the second step is to create emission reductions. The ongoing BMU-funded Article 6 pilot project includes a program to reduce technical losses in the power grid (TD-Losses).

Table 7 Overview of the pilot project to issue ITMOs (3)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
5	Joint Crediting Mechanism (JCM)	Japanese government	Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Laos, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Philippines, Thailand (17 countries)	Project budget for 2013-2020 is approximately US$580 million (61 billion yen)	Possibility of moving to a coordinated approach to Article 6.2.	Joint Crediting Mechanism (JCM) is a credit framework that facilitates the implementation of mitigation actions in developing countries. Japan established JCM in 2010 and has already signed agreements with 17 countries around the world. As of February 2022, there were 71 registered projects, 95 approved methodologies, and 94,991 tCO2 of credits issued[19]. Under the updated NDC in 2021, Japan set a target on the international emission reductions and removals at the level of a cumulative total of approximately 100 million t- CO2 by fiscal year 2030.

[19] https://www.jcm.go.jp/

Table 7 Overview of pilot project to issue ITMOs (4)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
6	Pilot project by NEFCO	Sweden, Norway, Finland, Nordic Environmental Finance Corporation (NEFCO)	Peru, Vietnam	N/A	Method neutral	The Nordic Initiative for Collaborative Approaches (NICA) is an initiative managed by NEFCO and jointly established by Finland, Norway, Sweden, and NEFCO in 2018. Cooperation funded through NICA is based on work developed by NEFCO under the extended mitigation actions of the Nordic Partnership Initiative (NPI). Between 2011 and 2018, NPI supported the development of the preparatory program for the National Appropriate Mitigation Action (NAMA) in developing countries for the solid waste sector in Peru and the cement sector in Vietnam.
7	Projects by SEA	Swedish Energy Agency (SEA)	Nigeria, Kenya, Chile, Mongolia, Philippines, Indonesia, Colombia, Dominica, Argentina, Ethiopia, Ghana, South Africa	N/A	Currently implementing Article 6.2 and method-neutral activities. Once operational, Article 6.4 will also be in view.	The Swedish Energy Agency (SEA) has been working to pilot Article 6 by exploring ways to support the development of mitigation activities that have the potential to generate ITMOs. While SEA's work is currently still in the conceptual or early development phase and has not yet committed to the Article 6 deal, SEA is involved in various initiatives to initiate an Article 6 project pipeline.

Table 7 Overview of the pilot project to issue ITMOs (5)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
8	Pilot project by CCF	CCF (Swiss Government)	Mexico, Peru, Thailand	Approximately US$20 million (CHF 20 million)	Based on Article 6.2 and an intergovernmental approach with approvals from host and buyer countries and corresponding adjustments to GHG inventories	In 2013, the Swiss government mandated the Climate Cent Foundation (CCF) to use CHF 100 million of its assets (at least CHF 20 million) to fund Article 6 pilot activities with interested countries and the private sector through 2032. The Swiss government and CCF jointly agree and decide on the pilot activities. All resulting certificates are delivered to the Swiss government at no additional cost.
9	ITMOs Purchase Program by Klik Foundation	CCF, KliK Foundation (Swiss Government)	Ghana, Peru, Senegal, Georgia, Vanuatu, Dominica (, Thailand, Iceland, Morocco)	Costs are expected to range from US$550 million to US$1.1 billion (CHF 500 million to CHF 1 billion) over 10 years.	Based on Article 6.2 and an intergovernmental approach with host and buyer country approval and corresponding GHG inventory adjustment.	Klik Foundation, under the current CO2 law, supports domestic projects that generate carbon credits based on the Swiss carbon standard. The CO2 law approved by parliament in September 2020, which allowed the use of international carbon credits for 25% of Switzerland's NDC target, was rejected in a referendum the following June. The new revised CO2 bill covering the period 2025-2030 raises the use of international credits to the equivalent of one-third of the required reductions.

Table 7 Overview of the pilot project to issue ITMOs (6)

#	Name	Investor	Host country	Fund scale	Relationship to Article 6	Summary
10	Standardized Credit Framework (SCF)	World Bank Carbon for Development Initiative (Ci-Dev)	Rwanda, Senegal, Kenya, Laos, Madagascar, Ethiopia, Mali, Burkina Faso, Uganda	Utilization of $267 million in private funding by 2025	Method neutral	The Standardized Credit Framework for Energy Access (SCF) was developed in anticipation of the transfer of the CDM's Projects and Activities Programs (PoAs) to Article 6. SCF pilots have been selected for implementation in Senegal and Rwanda, and have realized significant time and cost savings compared to the traditional CDM process. Ci-Dev is currently working on full SCF rollout in all Ci-Dev countries.
11	Transformational Carbon Asset Facility (TCAF)	World Bank TCAF (Canada, Germany, Norway, Sweden, Switzerland, UK)	India, Morocco	US$212 million, with a target to increase its funding to US$500 million	Method neutral	TCAF is a World Bank Trust Fund piloting innovative CO2 crediting and a quantification mechanism. The Fund promotes use of conservative baselines and rigorous monitoring and accounting for performance of selected sectors and policy interventions to ensure environmental integrity. Forest/fossil fuel related projects are not eligible for the fund.

CHAPTER 2. Survey of Other Trends Affecting International Market Mechanism

1. Trends in the Voluntary Carbon market

(1). Movement to ensure the quality of voluntary credit

Taskforce Scaling Voluntary Credit Market (TSVCM), established in September 2020 with a goal to activate the voluntary carbon market while maintaining its credibility, headed by Mark Carney, former Governor of the Bank of England, has released the Phase 2 report on July 8, 2021.

In the Phase 1 report already released in January 2021, it showed its basic principles for concrete efforts to ensure credibility of the voluntary carbon market and grow the market in the future. In the Phase 1 report, it has been recommended to clarify legal principles and contractual contents, establish a supervisory body, and set standards to ensure integrity of credits based on principles (Core Carbon Principles, CCP) as also shown in the report .

Table 8 Summary of recommendations in TSVCM ' s Phase 2 report

(Data) Item	Recommendations
Supervisory Body	• Composition of Supervisory Body (Board of Directors, Expert Panel, Secretariat, Consultation Group) • Transparency Initiatives and Appeal System • Setting of procedures and schedule for establishment of supervisory body
Legal Principles and Contracts	• Presentation of specific examples of contracts tailored to buyer's intended use of credits • Operational standard rules to encourage trading of credits based on CCP Principles • General rules of trading
Efforts to ensure credit integrity	• Criteria for evaluation of credits based on CCP Principles • Analysis of methodological issues to be reviewed by the supervisory body in the future • Consideration of how to set up additional contributions (Additional Attribute) *Additional Contribution" refers to such efforts to clarify characteristics of projects to generate credits (e.g., emission reduction/avoidances/removal, co-benefits, application of equivalent adjustments, etc.) and to cope with various requests from credit buyers and their selections.

(Source: Prepared by Institute of Energy Economics, Japan based on the TSVCM Phase 2 Report)

Based on the recommendations in the Phase 1, specific ways to implement the Phase 1 recommendations were reviewed in the Phase 2 and the final report has been released on July 8, after public consultations. Further detailed recommendations are provided in the published report on voluntary credit supervisory bodies, legal principles and contracts, and credit integrity.

Furthermore, the final report of Phase 2 of the TSVCM indicated that they would proceed with operations toward establishment of the supervisory body for voluntary credits while providing recommendations to the supervisory body as a parent body, members of the expert panel, and a host institution of the secretariat in September.

Subsequently, establishment of a new supervisory body was announced on September 21. The newly established supervisory body includes various supporting organizations such as research institutes, industry associations, and environmental NGOs, with participation in the body of representatives from each of these organizations as well as those of indigenous peoples as board members, allowing the body to reflect diverse views.

Under control of this supervisory body, it is expected to make further efforts from now on to grow the voluntary credit market based on the Core Carbon Principle. In October, it was announced that the supervisory body would be named as Integrity Council for Voluntary Carbon Markets (IC-VCM), with a determination to make various efforts to ensure credibility of the voluntary carbon market led by IC-VCM.

(2). Trends of companies utilizing voluntary credits

[1] New entry into voluntary carbon market

Various companies have started to enter the voluntary carbon market. For example, U.S. financial institution JP Morgan announced in June that it has acquired Cambell Global ("Cambell"), a company investing in forests/forestry and management of assets[20]. While Cambell was originally focusing on management of forests as assets, it has a proven record recently in project development to create voluntary credits. JP Morgan has admitted in its press release that the acquisition was made with an intention to enter carbon and carbon markets in mind, stating that it expects to "become a positive participant in the carbon market." This indicates not only that financial institutions expect significant growth in the area of carbon market in the future, but also that JP Morgan has a prospect of increase in demand of credits in relation to the forest sink in the future because Cambell has experiences in project development in the field. In any case, it may indicate that companies with an interest especially in carbon market and trying to participate in the market.

In addition, as discussed below, big agri company, Cargill and insurance company, Swiss Re appeared to enter the voluntary carbon market, indicating a trend of expanding range of participants

[20] https://www.prnewswire.com/news-releases/jp-morgan-asset-management-acquires-campbell-global-a-leading-player-in-forest-management-and-timberland-investing-301316396.html

in the market.

[2] Movement to utilize for new technology introduction

There have been attempts to introduce new technologies to cope with global warming, especially those related to CO2 removal with using the carbon market. The first one of them is a trend to utilize voluntary credits for introducing direct capture of CO2 (DAC), for example, a Canadian company Carbon Engineering (CE) that developed Direct Air Capture (DAC) has announced to develop a project in cooperation with BeZero in order to create offset credits using such technologies to directly capture CO2 from the atmosphere, store underground, or fix as synthesized fuel [21]. Some initiatives have a potential to achieve utilization of voluntary credits in the future, although it is still uncertain whether or not they will utilize voluntary credits.

In September, Switzerland-based Climeworks announced a startup of a geothermal-based Direct Air Capture (DAC) plant in Iceland . Although Orca Plant, which has just started its operation, has annual CO2 capture capacity of only about 4,000 tons, it plans to increase the capacity within a few years to come. The scheme is characterized in its attempt to achieve stable storage of CO2 by storing captured CO2 mixed with water permanently under the ground and making it petrified. The plant also uses electricity from a nearby geothermal power plant , showing another feature that CO2 is not emitted during its operation.

It appears that a calculation method for emission reductions has already been established, but it is unclear what kind of credit standard will issue the credits.

Reinsurance giant Swiss Re has agreed to conclude a 10-year, $10 million purchase agreement for carbon removal by Climeworks, making a statement that they will build up a partnership between them [22]. The partnership is positioned as an important effort to help Swiss Re achieve its net-zero emissions target by 2030. But, the term ”purchase agreement” used in the announcement has not clarified about what to be purchased. However, as they stated that the purchase agreement has " made at an unprecedented price for high quality carbon removal in the voluntary market," it implies they have purchased offset credits. And they mentioned that such efforts would send "an important signal to project developers, investors, and buyers as well.

While Swiss Reis supposed to work cooperatively on risk management and seek for opportunities for future investment and project financing by this agreement, they seem to aiming at providing new services by leveraging its insurance expertise in addressing the permanence issues associated with CO2 removal, showing a possibility that it will evolve into new form of initiatives in the future.

[3] Removal and Voluntary Credits through Natural Ecosystems

Cargill Inc. announced on September 16, 2021 that it would start an initiative to generate credits by

[21] https://carbonengineering.com/news-updates/partnership-expands-access-to-carbon-removal/
[22] August 25, 2021Swiss Re Press Release
https://www.swissre.com/media/news-releases/nr-20210825-swiss-re-climeworks-partnership.html

improving soil with changing cultivation methods and expanding amount of CO2 absorption into the soil in North America including the U.S [23]. Specifically, farmers are required to choose to plant cover crops during off-season, or no-till farming (or as little tillage as possible) when cultivating their land to ensure absorption of CO2 into the soil, and whether they comply with the requirements is monitored by Cargill. On that condition, Cargill is supposed to pay $20 for each ton of CO2 retained on the farmland, assuming the payment for farmers to be made by utilizing voluntary credits.

New initiatives have been started gradually also in Japan regarding voluntary credits. At a regular press conference, the mayor of Kobe City announced that the city will work on creation of credits through Blue Carbon, an initiative to absorb CO2 through algae in freshwater ponds.[24] In addition to the rare initiative to utilize Blue Carbon in freshwater , Kobe City is also implementing a canal restoration project to create "J Blue Credits" . “J Blue Credits" are issued by the Japan Blue Economy Technology Research Association (JBE), an organization affiliated with the Ministry of Land, Infrastructure, Transport and Tourism. The JBE intends to achieve the J Blue Credits to be admitted in the future to use for adjustment of emission factors in emissions reporting under the Global Warming Prevention Law (currently, they simply claim to have contributed to remove CO2). Although other blue carbon-related efforts have been made under the JBE in Japan, the JBE has issued only a small amount of credits, at a level of several dozen tons. While this approach may attract more attention in the future as it relates to elimination of blue carbon CO2, there are still many issues to be addressed.

[4] Trading with Crypto Assets

Efforts have been started that trade voluntary credits as crypto assets or Non Fungible Token (NFT).

For example, in September 2021, Klima Dao launched an initiative to issue crypto assets, KLIMA, by cancelling voluntary credits, many credits have been converted to KLIMA.[25] Firstly, voluntary credits are converted into Base Carbon Tones (BCTs), and then these BCTs are converted into crypto-asset KLIMA tokens. Klima Dao says, such initiatives may make it possible to attract funds of small and medium-sized companies and private investors, who are otherwise unable to purchase large amount of credits, into the carbon market and that the market will promote retirement of low-quality credits and growth of a high-quality, high-priced carbon market.

Other companies have also embarked on utilization of NFTs. In a press release on December 14,

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[23] Reuter “Cargill launches U.S. carbon farming program for 2022 season,” September 16, 2021 https://www.reuters.com/business/sustainable-business/cargill-launches-us-carbon-farming-program-2022-season-2021-09-16/

[24] City of Kobe Press Release, January 27, 2022: https://prtimes.jp/main/html/rd/p/000000079.000078202.html

[25] Carbon Pulse , "New offset-backed crypto currency” aims to drive up voluntary carbon prices, " September 16, 2021 https://carbon-pulse.com/138594/
Carbon Pulse, "FEATURE: Crypto has big plans for the carbon market," November 21, 2021. https://carbon-pulse.com/144731/

2021, XELS announced that it has created a platform to trade voluntary credits as NFTs[26]. Here, it becomes possible to trade tokens issued by cancelling 10tCo2e of voluntary credits as NFTs. As XELS explains, the platform “makes it possible to securely track ownership and credibility as well as to transfer it online making it non-reusable after deactivating the credits."

This trend has been reported one after the other also in 2022, indicating further widespread movement to expand voluntary credit transactions through the use of blockchain, crypto assets, and NFTs.

[5] Series of start-up of voluntary credits trading at commodity exchanges

Some commodity exchanges have begun handling new voluntary credits, especially those obtained through protection of natural ecosystems, called Nature Based Solutions (NBS) . Intercontinental exchange (ICE) , a commodity exchange in Europe and the United States that handles oil and gas as well as existing emission allowances such as EUAs and CERs, announced in November 2021 that it will offer futures trading of voluntary credits, especially those derived from the NBS since the first quarter in 2022. [27]

Chicago Mercantile Exchange (CME), a commodity exchange that competes with the ICE, has already begun trading NBS-derived credits, making the ICE a step behind it in entering the voluntary carbon market. ICE operates another exchange also in Europe along with that in the U.S. and so launch of trading on ICE could further expand the voluntary carbon market by making voluntary credits more readily available to a wide range of companies. In addition, as prices will be made public through trading on the exchanges, it is expected to contribute to improvement of transparency of the market with a possible trend to further spur growth of the voluntary credit market.

Furthermore, Xpansive, an exchange that trades NBS-derived credits along with CME, has announced that it will embark on trading of credits in the future according to Core Carbon Principles (CCP) set up by the Integrity Council for Voluntary Carbon markets[28]. At this time, credits in accordance with the CCP have not yet been certified, but demand is expected to increase in the future as a quality-assured credit.

There has been a series of moves to list voluntary credits on exchanges. At the end of 2021, while ICE announced that it would begin trading voluntary credits by March 2022, EEX, the European energy commodity exchange, announced in 2022 that it would also begin trading Global Emission Reduction (GER), a resale agreement for voluntary credits, with Air Carbon Exchange, an exchange

[26] Press release by XELS Limited , on December 14, 2021: https: //prtimes.jp/main/html/rd/p/000000002.000077096.html

[27] ICE press release on November 5, 2021 https://ir.theice.com/press/news-details/2021/ICE-to-Launch-its-First-Nature-Based-Solutions-Carbon-Credit-Futures-Contract/default.aspx

[28] Xpansive press release on December 21, 2021: https://medium.com/xpansiv/scaling-global-climate-solutions-c53a5d5d6b76

that has been already trading voluntary credits. [29] Timing of start-up of trading has not been announced, but it is believed to be at early 2022.

[6] Trends among Japanese Companies

In Japan, it has been observed many moves to use voluntary credits and participate in transactions. For example, various gas companies such as Shizuoka Gas and Iruma Gas have begun purchasing carbon neutral LNG and supplying it to consumers, indicating widespread of efforts for shifting to carbon neutral LNG among local gas companies.

NYK and Mitsubishi Corporation, announced that they would jointly invest by 40% in Australian Integrated Carbon (AIC), a company that operates on carbon dioxide (CO2) absorption and selling of carbon credits through a primary forest restoration project in Australia. [30]

Although the share of 40% between NYK and MC has not been disclosed, AIC is implementing a project to restore old-growth forests that have been lost due to past logging and overgrazing, as well as to absorb and sequester CO2 from the atmosphere through a review and improvement of farmers' cattle raising processes. Through this project, the company will earn and sell carbon credits officially certified by the Australian government.

While the Australian government does not allow international transfers of domestic credits, NYK is eligible to purchase and utilize Australian credits since it has been developing business activities in Australia. NYK has announced that it intends to use this capital participation as a foothold to acquire knowledge of the carbon credit creation business and expand the business to Australia and other regions.

Other moves have been also observed including a Japanese financial institution that has reportedly decided to invest in a credit purchase fund managed by the World Bank.

[7] Doubts and criticisms about reliability of voluntary credit

There has been a lot of criticisms against credits excessively issued by the VCS. On December 8, 2021, the Verra made a statement in response to an accusation in a report published by German NGO Foodwatch that a REDD + project registered on the VCS (REDD Project in Brazil Nut Concessions in Madre de Dios) had issued excessive credits, causing conflicts of interest at the time of registration of the project.

Specifically, the Verra has made a rebuttal statement that there is no question of additionality as pointed out by the Foodwatch, that the baseline setting was not based on an assumption of perfect prevention of deforestation in the first place, that there is no conflict of interest by charging a fee at

[29] January 11, 2022 EEX Press Release: https://www.eex.com/en/newsroom/detail?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Bnews%5D=4159&cHash=083aa36453d67a946165f53b86253db8

[30] September 21, 2021 NYK Press Release https://www.nyk.com/news/2021/20210921_01.html

the time of project registration, and that efficacy validation of the project has been conducted by a third-party verification organization.

Reasons for these criticism against REDD + reflect difficulty of estalishing baselines because it is difficult to accurately predict trends in deforestation in the first place. In addition, REDD + has potential of becoming a source of large amounts of credits issuance, with a tendency easy to attract attention from stakholders.

(3). Expanding Voluntary Carbon market

[1] Rapid market growth and entry of speculators

On September 15, Ecosystem Marketplace, which has been researching trends in the voluntary carbon market for many years, released new report on voluntary carbon market trends until August 2021.[31] According to the report, the voluntary carbon market grew rapidly in 2021. Amount of transactions is expected to reach about US$750million by August 2021, with a momentum to reach US$1billion annually, and volume of transactions is also expected to reach 240 million tCO2e, both already exceeding last year's level and being expected to achieve the highest annual volume ever recorded[32].

Demand from the use of these credits for private companies' voluntary actions of climate change, such as setting of corporate net-zero targets, may have contributed to the expansion of this market. The report also indicates that the most active buyers were companies in the sectors of energy, consumer goods, and financial and insurance sectors. On the other hand, quantities required for such growth in demand have not been supplied sufficiently. As a result, they appear to have pushed up trading prices of credits.

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[31] The report is published at https://www.forest-trends.org/publications/state-of-the-voluntary-carbon-markets-2021/ The press release is available from the site below.
https://www.ecosystemmarketplace.com/articles/press-release-voluntary-carbon-markets-rocket-in-2021-on-track-to-break-1b-for-first-time/

[32] Forest Trends' Ecosystem Marketplace. 2021.'Market in Motion', State of Voluntary Carbon Markets 2021, Installment 1. Washington, DC: Forest Trends Association .p3-4

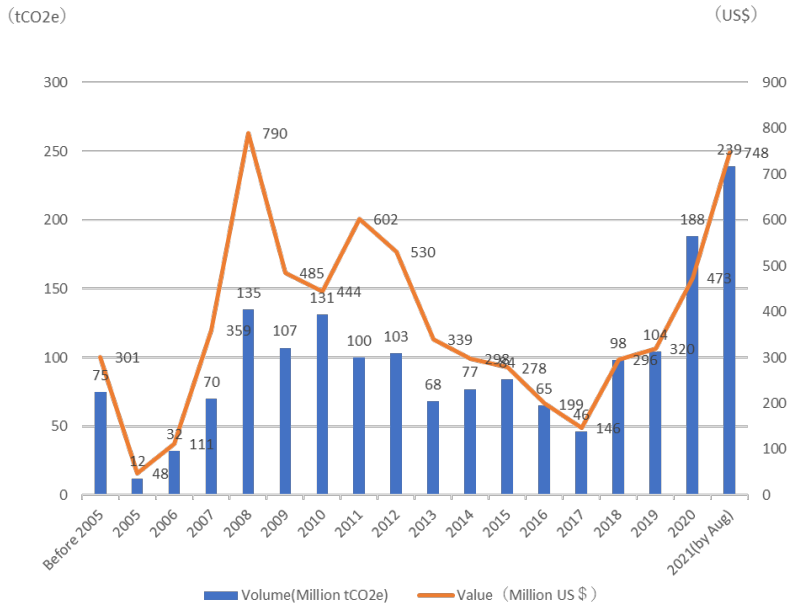

Figure 4. Voluntary Carbon market Trends

(Source) Forest Trends' Ecosystem Marketplace. 2021. Prepared by the Institute of Energy Economics, Japan based on 'Market in Motion', State of Voluntary Carbon Markets 2021, Installment 1. Washington, DC: Forest Trends Association .

Table 9 Trends of price movements by project type

Project Type	2019			2020			2021 (by the end of August)		
	Transaction volume (million tCO2e)	Transaction volume (million US$)	Average price (US$/tCO2e)	Transaction volume (million tCO2e)	Transaction volume (million US$)	Average price (US$/tCO2e)	Transaction volume (million tCO2e)	Transaction volume (million US$)	Average price (US$/tCO2e)
Forestry and Land Use	36.7	159.1	4.33	48.1	269.4	5.6	115.7	544	4.73
Renewable energy	42.4	60.1	1.42	80.3	70.1	0.87	80.0	88.4	1.1
Energy efficiency improvements/Fuel transition	3.1	11.9	3.87	31.4	32.3	1.03	16.1	24.2	1.57
Agriculture	-	-	-	0.3	2.8	9.23	3.4	4.6	1.36
Waste management	7.3	18	2.45	8.3	22.9	2.76	2.7	10.6	3.93
Traffic	0.4	0.7	1.70	1.1	0.7	0.64	2.1	2.1	1
Household articles	6.4	24.8	3.84	3.5	17.3	4.95	1.8	10.4	5.75
Industrial process	4.1	7.7	1.9	1.3	2.5	1.9	1.1	3.5	3.22

(Source) Forest Trends' Ecosystem Marketplace. 2021. 'Market in Motion', State of Voluntary Carbon Markets 2021, Installment 1. Washington, DC: Forest Trends Association modified by the Institute of Energy Economics, Japan

[2] Credits through protection and restoration of natural ecosystems with increasing demand

Popularity remains higher for credits derived from emission reductio through protection and restoration of natural ecosystems, called Nature Based Solutions (or Natural Climate Solutions)[33]. In particular, for REDD+, which issues credits for emission reductions obtained by preventing deforestation, prices have reportedly increased nearly threefold from 2020 to August 2021.

Such demand for credits through the protection and restoration of natural ecosystems is a major factor in the expansion of the market, suggesting at the same time that demand is growing from voluntary efforts made by companies, resulting in contribution to the growth and expansion of the voluntary carbon market. While voluntary credits are allowed to be used in CORSIA, a global warming countermeasure implemented by the International Civil Aviation Organization (ICAO), its impact on expansion of demand for REDD + is believed to be limited because use of credits derived from forest sinks has been restricted. Furthermore, with a prospect that demand for compliance with CORSIA will be lower than originally anticipated due to the slump in aviation demand caused by the COVID 19, , the impact of CORSIA credit transaction market will remain limited.

[3] Prospect of Market Expansion

Thus, the voluntary carbon market has grown rapidly in 2021, but what would the prospects be like for the future? Several study findings have also been published on future trends in the voluntary credit market.

A market outlook for carbon credits including voluntary credits, published by an oil company Shell in collaboration with a consulting firm BCG shows that, trading volume in the market is estimated to expand to be tripled to 1.1 billion tons by 2030 from 360 million tons traded in 2021 as an intermediate case between three scenarios, with a forecast that demand will exceed supply by 2024. [34]

Meanwhile, Bank of America has projected that demand for voluntary credits will surge to 7 billion tons, 50 times the current level, due to increased demand for carbon-neutral LNG, according to some reports. [35] Bank of America has noted that carbon prices need to rise from the current $2 to $20/tCO2e level in order to promote taking actions to cope with higher cost in reforestation, direct air captures.. In relation carbon neutral LNG that oil majors are paying attention to, it explains that if the price per tCO2e of credits stays at only about $5, cost shift to consumers could be acceptable enough. Global CO2 emissions from LNG in 2021 are estimated to be equivalent to 1.3 billion tCO2e, which would require six times the amount of voluntary credits issued worldwide in 2020 to make all carbons neutral.

Thus, the projections indicate that the voluntary carbon market is expected to grow further in the future. However, it may be necessary to carefully assess whether the trend seen in 2021 will continue

[33] Forest Trends' Ibid .p12
[34] https://www.shell.com/shellenergy/othersolutions/carbonmarketreports.html
[35] https://www.cnbc.com/2021/09/27/bank-of-america-carbon-offset-market-to-x-50-to-meet-net-zero-goals.html

in the future.

2. Trends in ICAO's Efforts on Market Mechanism

(1). CORSIA Overview

In October 2016, the International Civil Aviation Organization (ICAO) agreed to launch Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) since 2021. Since the international civil aviation sector is not regulated by the UNFCCC and has been required to make its own efforts under the ICAO, CORSIA has attracted attention as a major climate change policy for the international civil aviation sector beyond 2021.

Table 10. CORSIA Overview

Summary of regulations	Airline companies operating international airline flights intend to curb emissions at a level of standard amount of emission (average amount of emissions of 2019 and 2020) from 2021 onwards. If increased, it is possible to offset it with credits.
Regulation Schedule	
2021 - 2023	Pilot phase (voluntary participation)
2024 - 2026	Phase 1 (voluntary participation)
2027 - 2035	Phase 2 (mandatory participation)
Compliance period	3 years
Compliance Method	Use of fuel-efficient aircraft Use of biofuels Offset credits
Usage is permitted. credit	Credits issued from Offset Credit Issuance Program that meet certain conditions set by ICAO[36] .

(Source) Compiled by the Institute of Energy Economics, Japan, based on ICAO publications.

Under CORSIA, companies operating international flight in each country are required to curb increase in emissions from their baseline emission (average amount of emissions of 2019 and 2020). In order to achieve standard, part of emissions exceeding the baseline emissions can be offsetted by credits that meet certain conditions. Technical Advisory Board (TAB), an expert group established under ICAO, has reviewed credit standards that are approved for use, and credits derived from eight standards have been approved for use in CORSIA.

[36] For specific criteria, see the following documents.
See "International Trends Survey Report on Infrastructure Development Survey Project Market Mechanism Negotiations for Bilateral Credit Acquisitions in FY2020," on p. 30, issued by the Institute of Energy Economics, Japan.

Table 11 Restrictions/conditions applicable to all programs

(1) Eligibility of term	Period from 2021 to 2023 (CORSIA trial implementation period)
(2) Credit eligibility	a. Credits issued for projects in which the first crediting period begins on or after January 1, 2016 b. Credits issued corresponding to emission reductions achieved by December 31, 2020 (by December 31, 2023 for ACR, CAR, and ART)

(Source)Compiled by the Institute of Energy Economics, Japan, based on ICAO publications

Table 12 Offset programs (schemes and agencies) approved for use and restrictions on use

Programs (Schemes/agencies)	Restriction
American Carbon Registry (ACR)	Offset credits used under the California Emissions Trading Scheme and emission reductions by REDD + that are derived from projects, exceeding 7,000 Emission Reduction Tonnes (ERTs) annually are not eligible.
China GHG Voluntary Emission Reduction Program	Offset credits derived from new and reforestation projects, CCUS, N2O, agriculture (e.g., improved fertilizer application methods) , fluorine gas, HFC, SF6, and HCFC22 projects are not eligible.
Clean Development Mechanism (CDM)	Credits derived from new and reforestation projects are not eligible.
Climate Action Reserve (CAR)	Credits derived from projects that have not submitted a report on their contribution to sustainable development in accordance with the manual prepared by CAR, offset credits used in the California Emissions Trading System, and credits such as Forecast Mitigation Units (FMUs) are not eligible [37].
Global Carbon Council (GCC)	Offset credits derived from nuclear, HFC-23reduction, REDD, new and reforestation, and CCS projects are not eligible. In addition, credits derived from activities that are automatically considered additional in the GCC procedures are not eligible.
The Gold Standard (GS)	Planned Emission Reductions [38] (PERs) , uncertified small-scale credits, and credits by REDD+emission reductions which are derived from projects, exceeding 7, 000 VERs (Verified Emissions Reductions) annually are not eligible.
Verified Carbon Standard (VCS)	Offset credits used under the California Emissions Trading System and credits derived from projects that have reported on their contribution to sustainable development are not eligible. Eligibility of credits derived from REDD+ are certified for those under the JNR framework[39].
Architecture for REDD+ Transactions(ART)	No restrictions.

(Source) Compiled by the Institute of Energy Economics, Japan, based on materials of ICAO publications.

[37] Under the CAR, credits are (credits issued ex post) issued not only for emission reductions already implemented, but also before reduction projects are actually implemented (credits issued in advance, Forecast Mitigation Units).
[38] Credits issued for an amount of absorption expected in the future.
[39] Credits issued by VCS under the framework of Jurisdictional Nested REDD+ (JNR).

These eight standards include CDM that is not allowed to issue credits for emissions reduction occurred after 2021, and it will stop issuance as the agreed at COP 26. Until 2023, credits issued under these standard that meet the conditions can be used for compliance with CORSIA. However, after 2024 and beyond, TAB has not choosen eligible credits standard.

(2). Projection of emissions from the international civil aviation sector

Significant reduction in CO2 associated with sharp reduction of airline demand due to the COVID 19 has also affected implementation of the CORSIA. In particular, with regard to the calculation method for the baseline emission, the original regulation defined the baseline emission to be average amount of emissions of 2019 and 2020, but due to the significant decrease in emissions in 2020, the baseline emissions could fall much below than originally assumed by taking the emissions in 2020 into account when calculating the baseline emissions. Such low level of baseline emission means that when airline demand recovers in the future, reductions beyond those original assumption would be required to comply with the CORSIA regulations, and action was required to cope with it.

ICAO considered measures to address this issue, resulting in a decision by the ICAO Council in June 2020to set baseline emission only for 2019 emissions during the pilot phase from 2021 to 2023.[40] It will be reviewed again in 2022, and the baseline emission for the second phase after 2024 is expected to be considered again at that time.

Table 13 Result of analysis on impact of modification of baseline emission in the ICAO(emissions potentially subject to the CORSIA regulation from 2021 to 2035)

Baseline emission	CAEP/10 (2016)	Estimates presented to the 22ndICAO Executive Board Meeting (Feb-Mar 2021)	Estimates presented at the 223rdICAO Executive Board Meeting (June 2021)
If average amount of emissions of 2019 and 2020was appliedfrom2024through2035	2,500 MtCO2	1300 - 2500 MtCO2	1600 - 3200 MtCO2
If 2019 emissions are appliedfrom2024through2035	Not estimated	400 - 1300 MtCO2	230 - 1700 MtCO2

(Source: CAEP "COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION (CAEP)")

UPDATE TO SCENARIO-BASED ANALYSIS OF POTENTIAL IMPACTS OF COVID-19 ON CORSIA

Prepared by the Japan Institute of Energy Economics based on (referenced un C-WP/15029) May 2021

[40] https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx

Therefore, whether setting of baseline emission will revert to the original average amount of emissions of 2019 and 2020 or remain at emission level in 2019 will determine the demand for the first phase and beyond, starting in 2024.

The impact of these changes has been analyzed within the ICAO. According to the results, if the baseline emission is set to that in 2019 even after 2024, in a case of the lowest demand from 2021 to 2035,it is projected to be 230 milliontCO2e, which isa reduction by one-tenth compared with the demand expected as of 2016. On the other hand, if it was set to the average amount of emissions of 2019 and 2020 as originally stipulated, it would be up to 3.2 billiontCO2e, which conversely would result in a much higher demand than originally anticipated[41].

However, since the COVID 19 forced many commercial airlines to suspend international flights, emissions in 2020 were expected to decrease sharply. It meant that the baseline emission level would be much lower than originally assumed, and furthermore, if operation of international airlines returned to previous levels after the coronavirus was contained, airlines would be required to purchase more credits, resulting in increase in the cost of compliance for them.

In response to this situation, IATA, an international airline industry association, issued a statement on March 30 calling for adopting emission measured in 2019 as a baseline emission. In contrast, environmental NGOs criticized that it would take the teeth out of the CORSIA regulations, but the U.S. strongly urged approval of request from IATA.　It was officially approved on an ICAO board meeting held in June 2020 that baseline emission would be set based solely on emissions in 2019.

However, if the number of flights in the civil aviation sector remains sluggish for a long period of time, it will further affect the demand for credits and the future trend of the international carbon market mechanism.

41 CAEP UPDATE TO SCENARIO-BASED ANALYSIS OF POTENTIAL IMPACTS OF COVID-19 ON CORSIA (referenced in C-WP/15209)− Executive Summary —p2

CHAPTER 3. Survey of Trends in Overseas Market Mechanism

In recent years, there have been moves to introduce market mechanism not only in developed countries, but also in emerging countries such as China and South Korea. While EUETS had a lot of influence as the largest source of credit demands on international carbon markets until 2012, in recent years, China, Korea, and other countries have steadily introduced emissions trading schemes with approval of use of CDM credit in Korea, for example, affecting the international carbon market. In this section, we report the results of our survey of overseas trends in market mechanism (e.g., in the U.S., the EU, China, and South Korea).

1. Trends in Market Mechanism in the U.S.

In the course of turnaround from the previous administration, the Biden administration has pushed forward enhancement of climate change policies in a variety of sections. In the U.S., there is no carbon tax or emissions trading scheme at the federal level, but remarkable aspects related to carbon pricing may include two items; i.e. (1) trade negotiations between the U.S. and Europe and (2) concept of social cost of carbon.

- Trade negotiations between the U.S. and Europe

The United States and Europe have agreed to negotiate for an agreement by sector that is believed to be oriented toward carbon border adjustment measures (CBAM), which would adjust differences between domestic and international carbon prices.

In the course of trade negotiations on steel and aluminum, including tariffs, the U.S. and Europe agreed in October 2021 to negotiate for sectoral agreements according to emissions of both products.[42] According to the White House press release, market access will be restricted for both products with high carbon intensity in response to overproduction by China and others. The agreement also allows participation in the market by countries other than the U.S. and Europe, being open to countries interested in reductions of trade volume of products with high carbon intensity. In the timeline for the future, it is targeted to conclude sectoral agreements by 2024.

These sectoral agreements are also listed as one of the major initiatives in the decarbonization plan for manufacturers published by the U.S. in February 2022[43], indicating a high interest of the U.S. in

[42] White House "FACT SHEET: The United States and European Union To Negotiate World's First Carbon-Based Sectoral Arrangement on Steel and Aluminum Trade" https://www.whitehouse.gov/briefing-room/statements-releases/2021/10/31/fact-sheet-the-united-states-and-european-union-to-negotiate-worlds-first-carbon-based-sectoral-arrangement-on-steel-and-aluminum-trade/

[43] White House "Fact Sheet: Biden-Harris Administration Advances Cleaner Industrial Sector to Reduce Emissions and Reinvigorate American Manufacturing" https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/15/fact-sheet-biden-harris-administration-advances-cleaner-industrial-sector-to-reduce-emissions-and-reinvigorate-american-manufacturing/

the agreements

-Social Cost of Carbon(SCC)

There is a debate about social cost of carbon, which represents amount of social damage per unit of emission, in the U.S. In the U.S., introduction of regulations requires implementation of a cost-benefit analysis, and the social cost of carbon is used to quantify effects of regulations related to climate change and energy. The social cost of carbon estimated by the Obama administration was recalculated under the Trump administration and the value of social cost of carbon was changed from about $50 to $7. While tentatively adopting the estimated values by the Obama administration, the Biden administration is reconsidering them with a view to raise the social cost of carbon.

In this context, a Louisiana district court ruled that current SCC, which is being used on an interim basis, has not followed proper procedures, and issued a preliminary injunction regarding the use of the SCC on February 11.

Even though the administration is expected to appeal the preliminary injunction, if it actually takes effect, it would be a major blow to the Biden administration reviewing many of its climate change policies.

2. Trends of Market Mechanism in the EU

At the end of 2020, the EU raised its 2030 greenhouse gas emission reduction target from 40% to 55% from the amount in 1990. To achieve this target, the European Commission proposed a policy package called Fit for 55 on July 14, 2021, aiming at a 55% reduction in 2030.

The policy package including a number of amendment proposals for directives and regulations proposes enhancement of efforts to reduce emissions in a wide range of sectors. Specifically, the package is as follows

- ETS Directive: Raise of reduction target (from 43% to 61% from the amount in 2005), phased reduction of free allocation through application of CBAM, general revision of free allocation benchmarks, addition of shipping, transportation and building heating sectors
- Effort-sharing rule: Raise of reduction target (from 30% to 40% from the amount in 2005), raise of each member country's target
- Renewable Energy Directive: Raise of introduction target (from 32% to 40% of final energy consumption), review of sustainability indicators for biofuels, and raise of renewable energy ratio in sectors of transportation, heating, etc.
- Energy Efficiency Directive: Raise of target (from 32.5% to 36-39% of BAU in 2007, 9% of BAU in 2020), strengthened numerical targets for improving energy efficiency in the public sector
- Automobile and Commercial Vehicle Fuel Economy Regulations: Ban on sales of new

vehicles with internal combustion engines since 2035 onward

- Alternative Fuel Infrastructure Rule: Expansion of infrastructure improvement for recharging, hydrogen, etc.
- Sustainable Aviation and Marine Fuel Supply Initiative: Expansion of Supply of Biofuels
- Energy Tax Directive: Change from quantity-based to calorific value-based scheme, taxation of aviation and shipping fuels
- CBAM: Require importers to purchase CBAM certificates for imported iron, cement, fertilizer, aluminum, electricity, etc. from outside the region.

In addition, as the second phase of Fit for 55,amendment proposals were announced in December 2021about Energy Efficiency Directive for Buildings (EPBD) and Gas Directive to take measures for integration of hydrogens with low-carbon gas and methane leakage, as a part of Wave Renovation proceeded by European Commission. In addition, at the end of December, the European Commission announced that it would proceed with consultation with member states on the pending conditions for classifying nuclear power and natural gas as sustainable under the taxonomy rules, and the Commission's proposal was published in February.

Fueled by these vitalized policy trends over climate change, the contract month price on December 2021 as a benchmark for emission allowance (EUA) prices of the European Emissions Trading Scheme set a new record high exceeding the all-time high of €90.75/t-CO_2 during trading hours on December 8, 2021. As results of increased electricity supply uncertainties due to unstable gas supplies in the region, decreased wind generation caused by poor wind conditions than usual years, and unplanned shutdowns of nuclear power plants in France, an increase in unplanned increase in coal-fired generation primarily caused higher demand for EUAs. Furthermore, subsequently the price remains at high level, recording € 97.45/t-CO_2 during trading hours on February 4, 2022.

In spite of the EUA price hovering at around € 30 to € 35 at the beginning of 2021, it was strongly believed in the market that the EUA price would rise in anticipation of a further reduction in emissions allowances supply due to revised ETS directive because the European Commission raised the target for reducing GHG emissions in 2030, 55% reduction from emissions in 1990, at the end of 2020. Subsequently in July, as the European Commission published Fit For 55 proposing enhancement of the ETS Directive as planned, it led the price level to rise above €50/t-CO_2, but the price range was at assumed level for 2030 in an impact assessment published by the European Commission [44]. The trend changed dramatically in November when a severe winter was predicted by a long-range forecast, and the price of emission allowances also soared along with soared gas price due to concerned supply of natural gas.

[44] COM(2021) 551 final
https://ec.europa.eu/info/sites/default/files/revision-eu-ets_with-annex_en_0.pdf

One of institutional factors other than the proposed revision of the ETS Directive in July that has contributed to these price spikes is amount of auctions to electric power providers reduced by Market Stability Reserve (MSR). The European Commission announced in May that auction volumes would be reduced by 370 million tons from August 2021 onward under the MSR rule [45], resulting the price hike in November.

While Article 26a of ETS Directive allows EUAs to be supplied to the market in response to higher EUA prices, the Commission has not stated to apply the Article as of now. In response to requests of a market investigation on speculative price movement in the EUA market from Poland and other countries, the European Securities Market Supervisory Authority (ESMA) has published results of a preliminary investigation [46]and the investigation report is expected to be submitted next year.

3. Trends of Market Mechanism in China

China is set to introduce a nationwide emissions trading system only for the power sector in 2020, with emissions allowances trading expected to be launched from 2021. The average transaction price on the opening day of trading on the exchange in July was RMB 51 per ton, with a turnover of RMB 210 million. With subsequent expansion of transactions, total transaction volume has grown to RMB 3,514 million by the end of 2021. In December 2021, the price remained around RMB 42, with no significant price fluctuations.

As for trading volume after the start of trading in July 2021, the average trading volume in July was about 540 ,000 tons per day, but it settled at about 250 ,000 tons per day on average volume from August to October. Trading volume has recovered since November, with the trading volume exceeding 1 million tons per day on average. Finally, the total emission allowances traded on the market since the start of trading in July through December amounted to 84,948,200 tons.

Currently, as a review work is underway to make the industrial sector, including the steel sector , it is expected that areas subject to the regulations will be further expanded in the future.

In addition to these movements, the Chinese government has established a policy of " active response to climate change, building of a resource reuse system, promotion of green economy, and implementation of energy security resource strategy" in its "National Economic and Social Development, 14th Five-Year Plan" (released in March 2021) in consideration of climate change measures. In the policy, numerical targets for energy conversion and climate change are defined as shown in Table 14.

[45] C(2021) 3266 final
https://ec.europa.eu/clima/system/files/2021-05/c_2021_3266_en.pdf
[46] https://www.esma.europa.eu/press-news/esma-news/esma-publishes-its-preliminary-report-eu-carbon-market

Table 14 Various Energy and Environmental Policy Goals in China's Five-Year Plan and NDC

BENCHMARK	BENCHMARK	TARGET	TERM	BASE YEAR (VALUE)
NDC RELATED	CO_2 emissions	Peak out	Before 2030*.	
	GDP intensity of CO_2 emissions	▲65% or higher*.	2030	2005
	Non-fossil fuel ratio	25%*		
	New forest stock	6 billion m^3* (*)		2005
	CN Target	CN*	2060	
14.5 RELATED	GDP energy intensity	▲13.5%	2025	2020
	GDP intensity of CO_2 emissions	▲18%		2020
	Forest coverage (%)	24.1%		2020(23.3)
	Energy production capacity (standard coal)	46 t or larger		
	Urbanization rate (%)	65		2020(60.6)
	Ratio of digital industry to GDP (%)	10		2020(7.8)

(Note: 14.5 indicates "14th Five-Year Plan". *indicates upward revision or new.

(Source: Issued by the Institute of Energy Economics, Japan, based on various sources.)

Meanwhile, the China government submitted its second NDC to the United Nations on October 2021, updating its targets as follows

(1) Efforts to peak out CO_2 emissions **by 2030 (previously by around 2030**)

(2) Decrease CO_2 emissions per unit of GDP **by at least 65%from**the amount in 2005 **(previously 60-65%**)

(3) Increase the ratio of non-fossil fuels to primary energy consumption to **about25%(previous 20%**)

(4) Increase forest stock volume by**6(previous 4.5)billionm3** compared to 2005

(5) Increase installed capacity of wind and solar power generation to more than 1.2 billion kW (new)

(6) Efforts to reduce CO_2 emissions to virtually zero by 2060 (new)

On the other hand, as for the long-term strategy , the Chinese government submitted a long-term strategy for "Development strategy based on long-term low greenhouse gas emission by the middle of this century " to the United Nations in October 2021, showing a vision that "China will fully establish a clean, low-carbon, safe and efficient energy system by 2060, achieve internationally high energy use efficiency and 80% or higher non-fossil energy consumption ratio." As a midway point in the process, it showed policies to realize the NDC target, develop energy-saving technologies and low-carbon/ decarbonization technologies, promote electrification of energy use and sophistication of power generation systems, as well as enhance improvement of technologies to utilize hydrogen, natural gas,

bioenergy and CCUS, afforestation and land . In addition, 10 key strategies have been shown that included establishment of a low-carbon circular development economic system and a low-emission industrial system, as well as building of a low-carbon, safe and efficient energy system, low-carbon cities, and a low-carbon integrated transportation systems.

In terms of specific policies, China's State Council announced its "Action Plan for Peaking-Out" in October 2021, showing its policies to gradually reduce coal consumption, accelerate construction of wind and solar power plants, increase hydroelectric power plants, and build nuclear power plants in order to achieve the target of peaking-out by 2030. Specifically, it intends to make efforts to significantly promote improvement and optimization of industrial and energy structures, improve energy use efficiency in key industries ,strictly control growth of coal consumption, and accelerate building of new power systems during the period of “14th Five-Year Plan”. Furthermore, it showed such perspective that policy systems leading to green and low-carbon development will be further improved by achieving new advances in the development and application of green and low-carbon technologies, and widely enhancing green production and lifestyles. In addition to this, it announced that it will make further efforts to achieve about 25% of non-fossil energy consumption ratio by 2030, reduce CO_2 emissions per unit of GDP by more than 65% from the amount in 2005, and achieve the peaking-out target before 2030 during the period of 15th Five-Year Plan.

4. Trends of Market Mechanism in Korea

The Korean government announced its 2050 carbon neutrality target on October 28, 2020, and announced the "2050 Carbon Neutrality Realization Promotion Strategy" outlining restructuring of a carbon pricing system, including an emissions trading system, thus establishing a legal foundation to achieve the carbon neutrality target in 2021.

The main movements related to Korea's policies for climate change and market mechanism in FY2021 include "Basic Act on Carbon Neutrality and Green Growth" (hereinafter referred to as the "Carbon Neutrality Act"), which has been passed by the National Assembly in August 2021. The "Carbon Neutrality Law" defines national strategies to achieve carbon neutrality in 2050, medium- and long-term national reduction targets, basic plans, and legal procedures for implementation checks.

In October 2021, the 2030 national reduction target for greenhouse gases was raised to 40% from the amount in 2018, and two "2050 Carbon Neutral Scenarios" were released to show the future vision and sectoral outlook when carbon neutrality is achieved. In relation to the emissions trading system, as a follow-up work after the finalization of the National Allocation Plan for the Third Plan Period in September 2020, the "Guidelines for Allocation and Cancellation of Greenhouse Gas Emission Credits (2021.12.30)" and “Guidelines for emission certification (2022.1.1)” were revised in order to expand reduction incentives for companies, concerning that such incentives might be inhibited by the past allocation method of emission standards. The specifics of these key laws and policies are as follows

- Basic Law on Carbon Neutrality and Green Growth (passed by the Diet on Aug. 31, 2021)[47]

The Carbon Basic Law enacted in August 2021 specifies 2050 carbon neutrality as the national vision, and systematizes legal procedures such as national strategies, mid- and long-term national reduction targets, basic plans, and implementation checks to achieve carbon neutrality in 2050. In particular, it calls for initiating social discussion on the 2030 reduction target as an interim target of 35% or higher, which is raised by 9% from the previous target (26.3% reduction from the amount in 2018). In addition, 2050 Carbon Neutrality Commission established in May 2021 was reorganized as a commission by law, and the following policy measures were newly established to achieve carbon neutrality; a climate change impact assessment system (to promote major national development projects and assess impact on climate), a greenhouse gas reduction recognition budget system (to set/inspect greenhouse gas reduction targets when formulating national budget plans), and a new Climate Response Fund to support industrial structural shift.

- 2050 carbon neutral scenario and increase in national greenhouse gas reduction targets (NDC) (announced on October 27, 2021.10.27)[48]

On October 27, 2021, the 2050 carbon neutral scenario and 2030 national greenhouse gas reduction targets were finalized by the Council of State. The 2050 carbon neutrality scenario presents a vision of the future when carbon neutrality is achieved and outlook by sector, showing two proposals aiming for net zero in 2050. Proposal A in which thermal power generation is completely eliminated aims to achieve zero emissions from the energy conversion sector in 2050, setting a power supply configuration to consist of renewable energy, nuclear power, and carbon-free gas turbines by 70.8%, 6.1%, and 21.5%, respectively.. In proposal B, which retains LNG gas-fired power and utilizes carbon dioxide capture/storage (CCUS), 2050 power supply configuration is set to consist of renewable energy, nuclear, gas, and carbon-free gas turbines by 60.9%, 7.2%, 5.0%, and 13.8%, respectively. Note that the two scenarios assume that all countries will promote 2050 carbon neutrality with no reduction achieved overseas. At the Council of State on the same day, it was also decided to raise the 2030 reduction target from the previous reduction ratio of 26.3% to 40% from the amount in 2018. Details of the raised target are as follows

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[47] Korean Ministry of Environment press release document, "The National Assembly passed Economic/Social Transformation Legislation Carbon Neutrality Basic Law toward 2050 carbon neutrality", Aug. 31, 2021.
http://me.go.kr/home/web/board/read.do?pagerOffset=40&maxPageItems=10&maxIndexPages=10&searchKey=title&searchValue=%ED%83%84%EC%86%8C&menuId=10525&orgCd=&boardId=1473295&boardMasterId=1&boardCategoryId=&decorator=

[48] Korean Ministry of Environment Press Release "Preparation for Milestone Toward 2050 Carbon Neutrality" 2021.10.27
http://me.go.kr/home/web/board/read.do?pagerOffset=30&maxPageItems=10&maxIndexPages=10&searchKey=title&searchValue=%ED%83%84%EC%86%8C&menuId=10525&orgCd=&boardId=1483250&boardMasterId=1&boardCategoryId=&decorator=

· 44.4% reduction from 2018 emissions in the energy conversion sector

	2018	2030
Coal power generation	41.9%	21.8%
Renewable energy	6.2%	30.2%

- Industrial sector will achieve reduction by 18.5% from the amount in 2018 by 2030 by utilizing process transformation in the steel industry, etc.
- In the building sector, achieve reduction by 32.8% by 2030 through expansion of ZEB, spread of high-efficiency equipment, etc.
- In the transportation sector, more than 4.5 million units of non-polluting vehicles will be popularized, and achieve reduction by 37.8% by 2030.
- Reduction ratio to be achieved in agriculture and livestock sector and waste sector is 27.1% and 46.8%, respectively.

● Revision of Implementation Guidelines for the Emissions Trading Scheme[49]

The third planning period of the Korean Emissions Trading Scheme was initiated in January 2021. In September 2020, the National Emissions Allocation Plan for the Third Plan Period was announced indicating policies such as increase in the paid allocation ratio (from 3% to 10%), introduction of environmental power supply to reflect the cost of purchasing emission credits in the electricity market, and expansion of application of the benchmark allocation method (from 50% to 60%), and the amount of allocation of credits for companies was finalized in December. Then, the system was revised based on experiences in the previous 1st~2nd planning periods in 2021. In particular, in order to strengthen incentives for reduction by companies, the “Guidelines for Allocation and Cancellation of Greenhouse Gas Emission Credits (2021.12.30)” and “Guidelines for Emissions Certification (2022.1.1) have been revised for diverse reduction performances to be certified, because it had been certified only for reductions at facilities directly associated with business activities of companies. The main revision contents are as follows

[49] Korean Ministry of Environment Press Release, "Greenhouse Gas Emissions Trading System to Benefit Diverse Reduction Activities" (2021.12.29)
http://me.go.kr/home/web/board/read.do?pagerOffset=180&maxPageItems=10&maxIndexPages=10&searchKey=&searchValue=&menuId=10525&orgCd=&boardId=1498360&boardMasterId=1&boardCategoryId=&decorator=

(Reduction outside boundary) If any reduction effect is confirmed outside a boundary due to capital investment within a company subject to allocation, it is certified as a reduction amount.

(Twinning Program) When a company subject to **allocation** supports small and medium-sized companies to reduce their emissions, the amount is certified as reduction.

(RE100) If indirect emissions are excluded due to a purchase of **renewable** electricity (fulfillment of RE100), the corresponding amount will be certified as a reduction achievement in the allocation process.

(Exclusion of emissions from waste heat **production** electricity **)** If **waste** heat electricity is used, it is excluded from indirect emissions.

(Reuse of waste plastics) In a case of reuse of **waste** plastics, emission reductions due to avoidance of incineration of waste plastics are certified as emission reduction.

Besides, the Korean Ministry of Environment has increased the budget for support for companies subject to allocation in fiscal 2022 to 97.9 billion won (up by 341% from 22.2 billion won the year before) enhancing financial support scheme, and decided to provide 50 to 70% of project costs to companies subject to allocation for their direct reductions in equipment upgrades and fuel substitutions as well as reduction support for other small and medium-sized enterprises (SMEs).

The system was also revised in a way to expand liquidity in relation to the trading market. In March 2021, cap on use of foreign offset emission credits (within 50% of offset emission credits) was abolished, and in September 2021, participation in the market by third parties such as securities companies was approved ("Notification on Emissions Trading Market Emissions Trading Intermediary Companies (2021.9)").

On the other hand, the price of emission credits remained at 20,000 won level in the first half of 2021 due to the economic downturn amid the coronavirus disaster, but recovered to the 35,000 won level due to economic recovery and impact of banking restrictions. However, the price fell again in 2022 due to decline in trading volume and surplus emission credits, remaining at 30,000 won level.