

Design of Emissions Trading System in Japan (Based on lessons learnt from the European Union Emissions Trading System (EU ETS))

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Efforts are underway to initiate emissions trading as a voluntary measure in Japan from 2023 as one of the initiatives of the GX League, led by the Ministry of Economy, Trade and Industry (METI)¹. This initiative was framed as “preparation for a future mechanism to reduce emissions” in the interim report of Clean Energy Strategy². Also, the Japan Business Federation (Keidanren) recently stated that a cap-and-trade emissions trading system (ETS) “could be a strong option.”³ It, therefore, appears that both the public and private sectors are now prepared to introduce an ETS in Japan.

ETS have been introduced in some countries and regions. Among these, the European Union Emissions Trading System (EU ETS) has undergone a number of trial-and-error processes and systemic reforms since the start of the system in 2005; reviewing the practical realities of this system once again will allow Japan to obtain a number of suggestions for its ETS introduction.

This paper will analyze the reforms undertaken in the past and status of the EU ETS, and discuss the issues related to the ETS design.

1. Changes in the EU ETS

The EU ETS began operation in 2005 following the Emission Trading Directive (Directive 2003/87/EC) in 2003⁴. Looking back the late 1990s, the European Commission considered introducing the regional common carbon tax across the EU and presented its proposal to EU member states, with the aim of achieving the targets of the Kyoto Protocol. However, the consensus of all EU member states, which was required for this common tax proposal, could not be obtained. As this vision suffered a setback, the EU instead introduced an ETS, which could be introduced via the qualified majority voting method (in which votes are cast in accordance with the population of each member state), as an alternative.

The EU ETS, which started in 2005, underwent progressive systemic reforms under Phase 1 (trial phase), followed by Phase 2, Phase 3, and Phase 4. In addition, a trial-and-error process comprising reforms of several relevant regulations, both major and minor,

¹ METI (2022a)

² METI (2022b)

³ Japan Business Federation (2022)

⁴ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003, establishing a system for greenhouse gas emission allowance trading within the Union, and the amending Council Directive 96/61/EC

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have continued throughout the phases and is still ongoing, meaning that the system is still not fully complete as an ETS.

The greenhouse gas (GHG) emissions from facilities covered by the EU ETS Directive in 2020 stood at 1,398Mt-CO₂, covering 38% of the EU's total emissions (including land use, land-use change and forestry (LULUCF) activities and international aviation). Although this represents a 41% reduction from the 2,369Mt-CO₂ emitted at the outset of the EU ETS in 2005, assessing whether this reduction has resulted from the ETS requires careful deliberation.

(1) Excessive allocation and market intervention by the European Commission

The most principal element of an ETS is the formation of rules for the allocation of emissions allowances for covered facilities; designing such a system in an appropriate manner and building a consensus on this is complicated. The European Commission is working to improve the sluggish EUA prices that were caused by failures in allocation, by reducing the supply of EUAs to the market through auctioning.

Fig. 1 shows the emission cap in the EU ETS since 2005, the volume of allocations for covered facilities, emission volumes, and use of offset credits. During Phase 1 (2005-2007), which was the trial phase of the scheme, the postponement of decisions on National Allocation Plans (NAPs) for free EUA allocation to covered facilities, in addition to the overly loose guidance on allocation given by the European Commission, resulted in excessive allocation. Following this, the excessive allocation issue continued to be unaddressed in Phase 2 (2008-2012), with the emission volume exceeding the allocation volume in 2008 alone, while the allocation plans based on the NAPs continued to be maintained without necessary revisions being made. The issue then began to aggravate with the influx of large volumes of offset credits.

As a result of this excessive allocation, the price of EUAs traded in the market slumped. The EUAs that were allocated and left unused in Phase 2 could be “banked” from one phase to the next; as a result, the oversupply situation has continued.

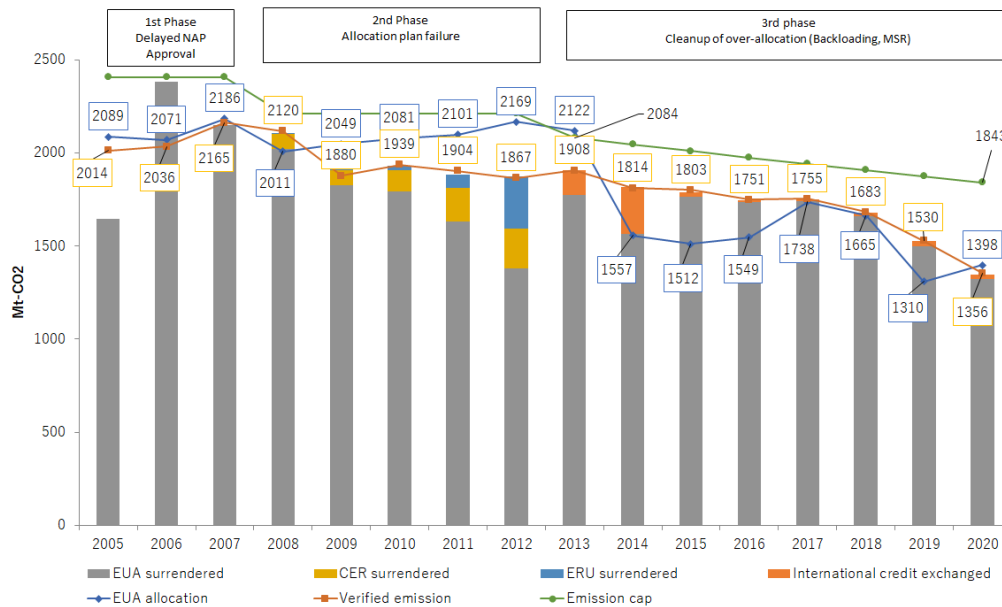


Fig. 1: Allocations, surrenders and emissions under the EU ETS

(Source) European Environment Agency, “European Union Emissions Trading System (EU ETS) data from EUTL,” and estimated by IEEJ based on materials from the European Commission.

In response to this situation, two countermeasures were proposed by the European Commission during Phase 3 (2013-2020) and were introduced after complicated negotiations between member states and industries.

- Backloading (restriction of the market supply): Over 2014-2016, the European Commission decided to set aside the auction supply of 900Mt-CO₂ EUAs.
- MSR (Market Stability Reserve): the European Commission calculate surplus allowances (Total Number of Allowances in Circulation, TNAC) in the market, then they decide on a number to set aside for the auction supply for the market based on the TNAC if it will be reaching a certain level. Those allowances are transferred to the MSR account from the auction account. This system was introduced in 2019, at the same time, unused New Entrant Reserves and 900Mt-CO₂ allowances (backloading) were transferred to the MSR.

The ETS Directive also includes a system for market intervention by the European Commission, to serve as a safety valve if EUA prices rise to very high levels. In such intervention, the authorities take steps to bring auctions forward if the market price of EUAs exceeds as much as three times the previous two years’ average price for six consecutive months; however, so far, such actions have never been carried out.

During Phase 3, the oversupply of allowances was temporarily alleviated through backloading and the MSR; however, EUA prices continued to be low at 3-30 euros/t-CO₂ due to the surpluses that were banked from Phase 2.

(2) Enormous amount of accumulated surpluses

From Phase 2 onwards, surpluses, which have remained unused for compliance, have accumulated in the operator accounts covered by the Directive. According to the European Commission, these currently exceed 1,579Mt-CO₂ (as of 2020), as shown in Fig. 2:. With annual GHG emissions from facilities covered by the EU ETS Directive standing at 1,398Mt-CO₂ as of 2020, this means that a surplus exceeding annual total emission is still held by operators covered by the Directive.

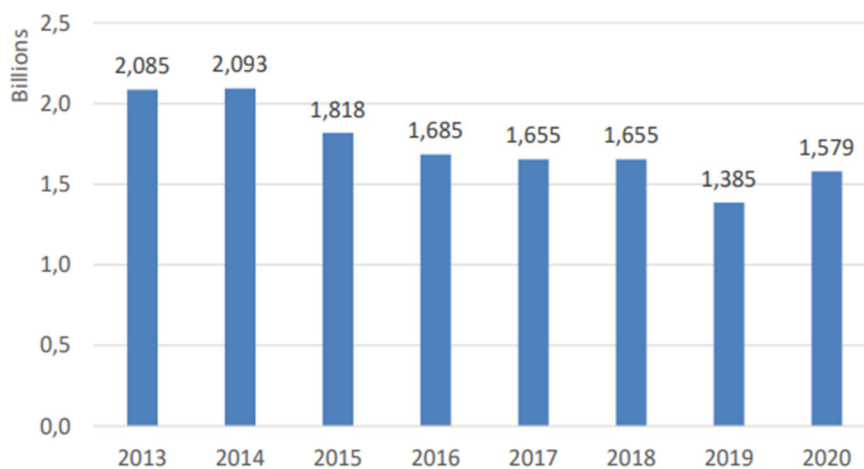


Fig. 2: Surplus of allowances in EU ETS

(Source) ,DG CLIMA (2021)

In the power sector, which has been subject to auctioning from Phase 3 onwards, surpluses carried over from Phase 2 appear to have been exhausted. Free allocation for the power sector in Eastern European countries has been maintained, but such free allocation is now provided on a project basis. The power sector basically procures EUAs from auctions and from the market. This means that industrial sectors other than the power sector hold several years of surpluses. The results of our calculations of the difference between allocation volumes and surrendered volumes for covered facilities for each sector, published by the European Commission, suggest that the iron and steel sector and the cement sector possess enormous surpluses, amounting to seven years and three years of their annual emissions respectively, as of 2020.

Fig. 3: shows the actual compliance costs for each sector. These represent the volume of EUAs purchased in the year multiplied by the average price of EUAs in that year, and then divided by the total emission volume for each sector. As for combustion facilities, most of which have transitioned to auctioning, surpluses have mostly become scarce, and therefore the compliance costs have been approaching the average

price of EUAs in recent years. Conversely, in other sectors, surpluses have continued to be ample and free allocation has continued; as a result, EU ETS compliance costs are close to zero, and only minor costs are being observed in aviation, petroleum refining and coke manufacturing.

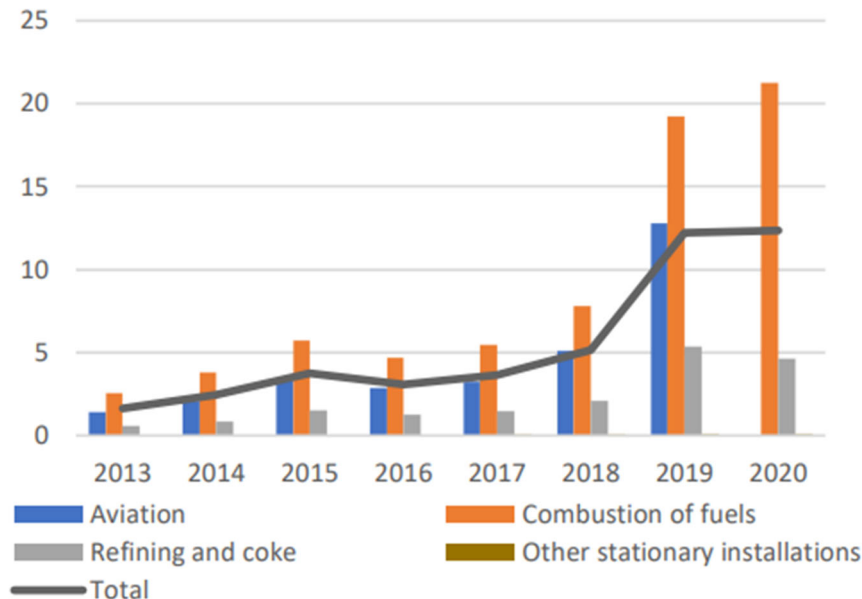


Fig. 3: Cost of compliance by sector (Unit: euros/t-CO₂)

(Source) The European Roundtable on Climate Change and Sustainable Transition (2022)

(3) Which sectors have seen decreases in emissions, and what are the reasons for the decreases?

From around 2012 onwards, emissions from facilities covered by the EU ETS Directive began to decrease, as shown in Fig. 4. This decrease in emissions can be largely attributed to combustion facilities, which contributed relatively more to the overall decrease than other sectors. Most of the emissions from combustion facilities are from thermal power generation facilities, with their emissions intensity improving by around 30% over the 2013-2019 period due to the introduction of renewable energy. However, there have been no major changes in emission intensities in other sectors than combustion facilities.

It therefore could be the case that the emissions reductions are not necessarily due to the EU ETS but due to the renewable energy policies undertaken in various countries, such as Feed-in Tariffs (FITs). The European Roundtable on Climate Change and

Sustainable Transition (ERCST) has noted that “...most of the reductions in Phase 3 were achieved in the power sector, and while the EU ETS played a guiding role, it is generally accepted that it was not the driving factor. This decarbonization is largely due to other policies and measures as well as a significant level of subsidies received by the power sector.”

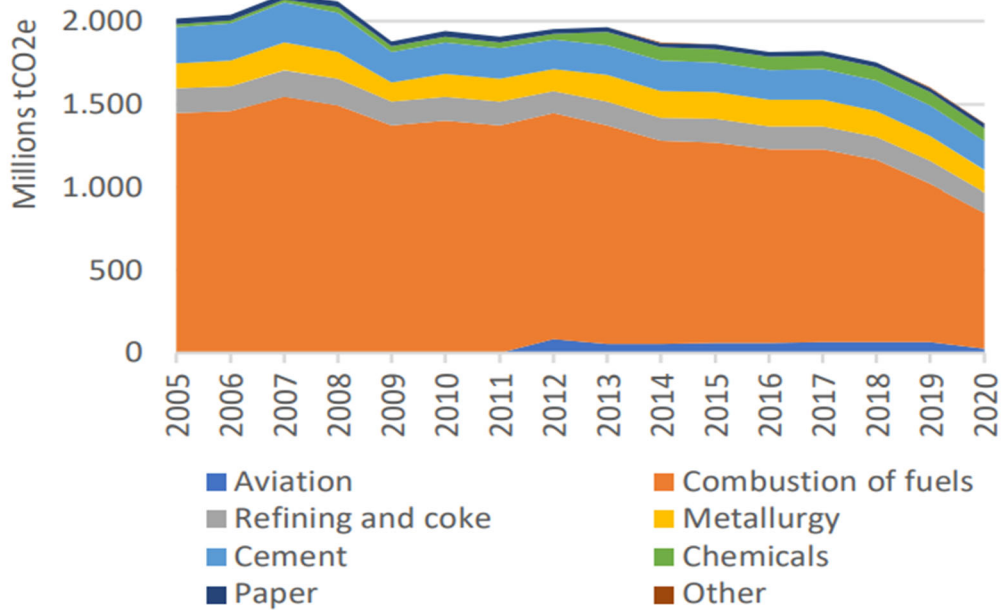


Fig. 4: Trends in emissions for each type of facility covered by regulations under the EU ETS

(Source) The European Roundtable on Climate Change and Sustainable Transition (2022)

Fig. 5 shows trends in emissions from power generation facilities covered by the EU ETS, and in the electricity generation mix within the region. Whereas emissions from power generation facilities stood at 987 million t-CO₂ in 2008, this figure had fallen to 462 million t-CO₂ as of 2020. Looking at trends in the electricity generation mix, the share of coal-fired power generation has fallen, while the shares of natural gas-fired power and nuclear power have also declined by around 20% each. Meanwhile, these have been substituted by a sharp increase in wind power and expansion in biomass, leading to reduced emissions.

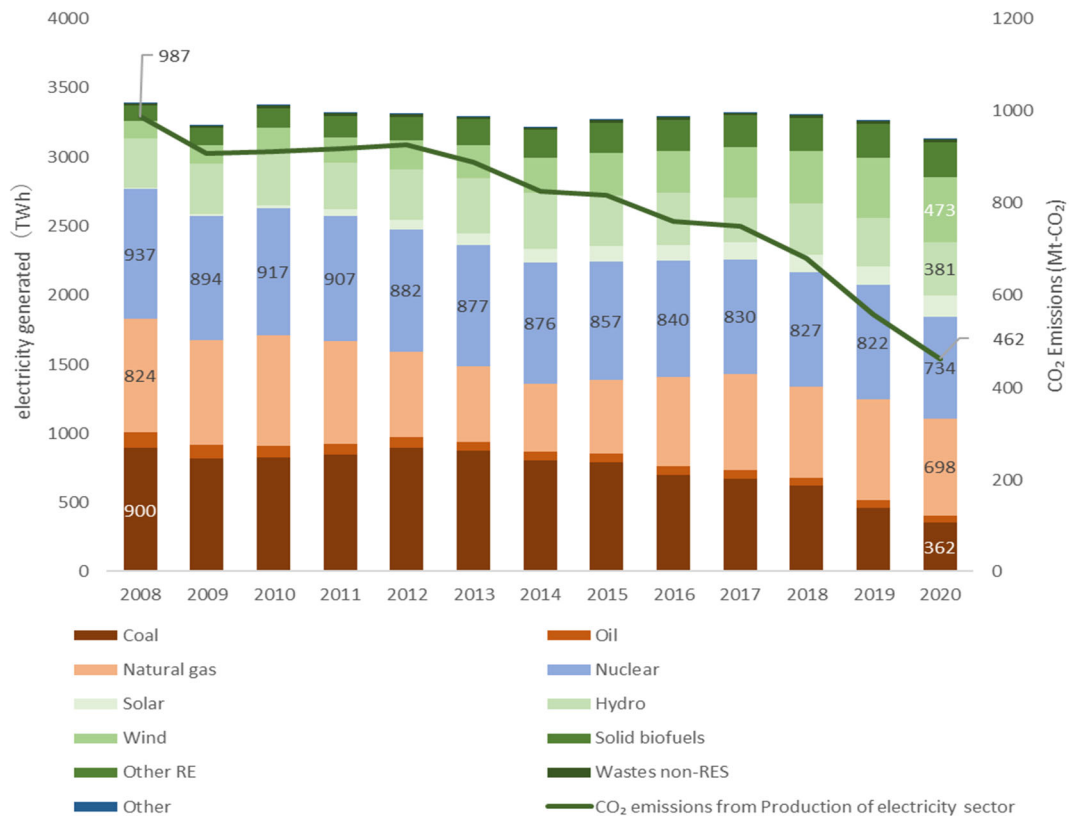


Fig. 5: CO₂ emissions from production of electricity sector covered by the EU ETS and in the electricity generation mix in the EU

(Source) the power generation mix from Eurostat, CO₂ emissions from production of electricity sector from the European Union Transaction Log (EUTL) and the European Commission estimation

(4) Who is trading allowances?

EU ETS allocation is split approximately equally between auctioning and free allocation (benchmarks). According to the auction reports from the European Energy Exchange (EEX)⁵, which conducts auctions on behalf of the European Commission, and reports by the European Commission⁶, in recent times, around 60% of successful bids have been from operators covered by the EU ETS, with the rest being from financial organizations. Conversely, looking at the participants in the “secondary market” (exchange trading) which follows this, transactions by financial organizations overwhelmingly dominate, as shown in Fig. 6:. In the wake of soaring EUA prices, the European Securities and Markets Authority (ESMA) undertook a survey of the EUA trading markets such as ICE and EEX in response to requests from Poland and

⁵ European Energy Exchange (2022)

⁶ DG CLIMA (2022)

other member states but concluded that speculation was not taking place. However, it is probably the case that prices are fluctuating much more due to the transactions by financial organizations, given the large share of EUA transactions are made by them in ICE and other markets.

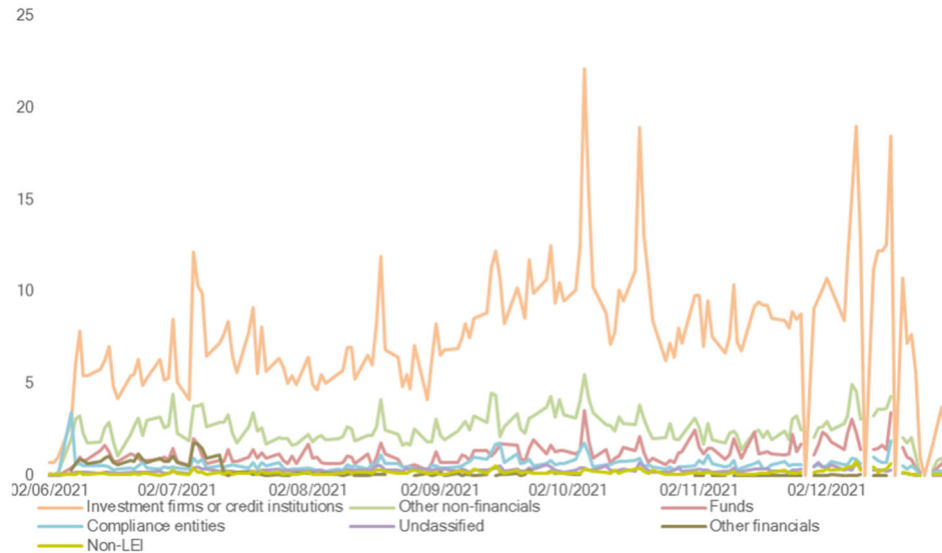


Fig. 6: Number of EUA transactions, by type of market participant

(Source) European Securities and Markets Authority (2022)

(5) Uncertainty of EUA prices

Since the system began in 2005, EUA prices had been within the 3-30 euros/t-CO₂ range, repeating a cyclical movement of sharp rise, crash in prices and continuing slump; then, from 2018 onwards, prices began to rise, and increased even more sharply in 2021. The main factor behind this is believed to be the fact that the EU in December 2020 raised its target for 2030 emission reduction to 55% compared to the 1990 level, making it easier to envisage that the emission cap for sectors covered by the EU ETS would become more stringent. In July 2021, a package of policies aiming to achieve the stricter 2030 target was announced as “Fit for 55”. The impact assessment of the reform of the EU ETS Directive, which was proposed as part of this package, estimated that the EUA price would rise to a level of more than 90 euros/t-CO₂ by 2030. This assessment served to drive a rapid increase in the price. Following this, unpromising weather conditions within the region resulted in a slump in wind power generation, causing the price of natural gas to soar. As a switch away from excessively expensive natural gas to coal-fired power generation was therefore anticipated, this created a chain reaction that pushed up the prices of EUAs as well.

As spot prices of EUAs reached a historic high of 96.9 euros/t-CO₂ in early February

this year, Poland and some other countries suggested the possibility of speculation, as discussed previously. EUA prices were expected to rise still further amid skyrocketing natural gas prices because of Russia’s invasion of Ukraine. Contrarily, however, EUA prices fell to 60.9 euros/t-CO₂, before coming to hover around the 80 euros/t-CO₂ mark. With storage of natural gas being prioritized this summer in preparation for the winter, some expect a move towards coal-fired power generation and an increasing demand for EUAs, which would lead EUA prices to exceed 100 euros/t-CO₂. However, with concerns also being expressed about an economic slowdown due to the increasingly tight energy supply, it is not unclear whether the price will move upward or downward.

Other than market trends of this kind, ERCST has noted that EUA prices fluctuate in line with the net positions of financial organizations. As Fig. 7 shows, when EUA prices have fluctuated in the past, substantial changes have occurred in the net positions of financial organizations, suggesting that this is one factor behind price fluctuations.

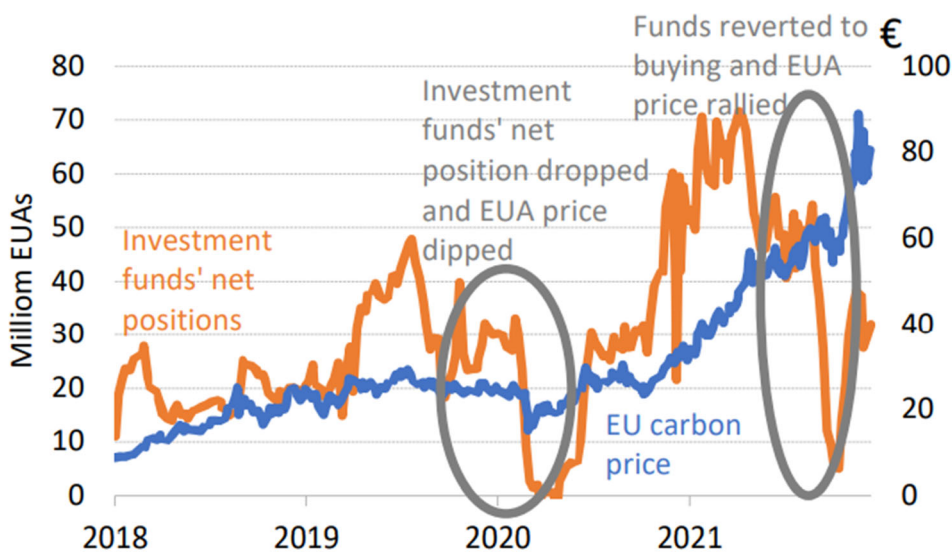


Fig. 7: Trends in investment funds’ net positions and the EUA price

(Source) European Securities and Markets Authority (2022)

(6) Further changes to the system during Phase 4 (2021-2030)

Fit for 55 proposes reforms to the EU ETS Directive⁷. Proposed reforms include increasing the 2030 emissions reduction target for facilities covered by the EU ETS Directive from 43% to 61% compared with the 2005 levels and introducing a new ETS

⁷ COM (2021) 551 final

which would include fuel suppliers for residential building heating and for land transportation as its targets. Regarding this proposed ETS, as rises in the prices of energy have a tremendous impact on ordinary citizens, steering a path to consensus among the European Commission, European Parliament and European Council will be a difficult task in the wake of soaring energy prices in recent times.

(7) Concerning the abolition of free allocation through the CBAM and the handling of exports

In June 2022, the European Parliament, and European Council compiled their opinions on the European Commission's proposals concerning the introduction of the Carbon Border Adjustment Mechanism (CBAM) in the EU. The most important issue was how to move forward with the reduction/abolition of free allocation for sectors covered by the CBAM (which the European Commission proposed to be steel, cement, aluminum, and fertilizer). The following variations in opinion were noted; the progress of behind-the-closed-door discussions on the CBAM as well as revisions to the ETS Directive will merit attention going forward.

- European Commission⁸: Phase in the CBAM by carrying out reductions of free allocation in 10% annual increments over 10 years from 2025.
- Relevant industries⁹: Initiate the reduction of free allocation from 2030 after ascertaining the efficacy of the CBAM.
- European Parliament¹⁰: Abolish free allocation by 2032 (brought forward three years from the date proposed by the European Commission).
- European Council¹¹: Abolish free allocation over 10 years, but initially reduce it by 5% increments each year rather than 10%, and thereafter gradually raise the rate of reduction.

Demands for the rebate of EUAs cost for exports have also been heard from the relevant industries. In response, the European Commission, European Parliament, and European Council's position are that charges will initially be levied on imports, and that the impact of carbon leakage, which may emerge due to competitive disadvantage for exports, will then be assessed going forward.

(8) Is the EU ETS a model to be imitated, or a negative example?

The above discussions concerning the EU ETS could be summarized as follows.

- The EU ETS is a regulatory system that includes tools for quantitative market

⁸ COM (2021) 564 final

⁹ CEMBUREAU, EUROFER, EUROMETAUX, EUROPEAN ALUMINIUM and FERTILIZERS EUROPE (2022)

¹⁰ European Parliament P9_TA (2022) 0248

¹¹ European Council 7226/22

intervention by the authorities, and cannot be described as a system that functions solely through market mechanisms. The European Commission may wish to use the EUA price as a price signal, but has been unable to control the range of price fluctuations through it. Conversely, some European industrialists argue that EUA prices can be predicted more readily than a carbon tax, since the tax rate can be changed by politicians' will; a perspective which goes against opinions heard in Japan.

- A certain level of compliance cost is observed in the power sector; however, this has recently stood at around the 20 euros/t-CO₂ level, and some believe that the previous reductions in emissions are the result of other renewable energy policies. In other sectors, the costs of compliance are close to zero due to free allocation, and in addition, enormous surpluses are still held due to excessive free allocation in the past. In particular, with the iron and steel sector holding EUAs equivalent to seven years of annual emissions and the cement sector holding three years, significant inequalities have emerged among different sectors.
- With the announcement of proposed reforms to the ETS Directive being brought forward as part of Fit for 55 in July 2021, EUA prices rose substantially largely due to increasingly active trading by financial organizations, which expected EUA prices to surge. In addition to this, instability in the energy supply within the EU and Russia's invasion of Ukraine led to a situation where EUA prices could reach 100 euros/t-CO₂.
- With the prospect of free allocation being reduced/abolished due to the introduction of the CBAM, the industry has, at last, started to recognize EU ETS as a price signal for cutting emissions. It has taken 17 years since the start of the EU ETS for this to happen; by the time free allocation is actually reduced, more than a quarter of a century will have passed.

2. Suggestions for Japan, and future issues

On the basis of the above consideration of the EU ETS, the major issues of ETS could be set out as follows.

- Roadmap of the cost burden (who will participate, when and how): If auctions are made mandatory among those sectors where alternative technologies are not anticipated, it will result in a fine and nothing else, rather than an incentive to reduce emissions; the original intention of ETS. Based on the experience of the EU ETS where free allocation still remains, it is essential to consider how to draw a line between auction and free allocation, to clarify the timing and terms of the transition towards auction, and alternatively to design a system which will start with auction only and thereafter increase the participating sectors gradually. As such, a roadmap for shouldering the emission reduction costs is necessary, taking into account the sectoral prospects of transition to alternative technologies. On the other hand, Japan

cannot enjoy the luxury of spending 20 years to create a system, as the EU did.

- Handling free allocation and ensuring fairness: The experience of the EU ETS attests to the difficulties of free allocation. Free allocation through grandfathering is based on historical emissions, while the benchmark will be based on CO₂ intensity; however, whichever is the case, allocation can only depend on the previous actual values. To avoid the unfairness of enormous surpluses building up in particular sectors, systematic arrangements are essential such as through monitoring the operational status and the volume of production activities of companies and facilities covered by the ETS. Moreover, while over-allocation has been a problem for the EU ETS, in the case of South Korea's ETS there have been numerous cases of companies suing the government for insufficient allocation. Both ETSs have a problem with free allocation.
- Securing international competitiveness and responding to carbon leakage: In the case of Japan, ensuring a level playing field with the overseas companies that Japanese firms compete with is essential, as overseas markets have greater importance for Japan than for the EU. As there are concerns that the CBAM could obstruct free trade, as well as worries about compatibility with World Trade Organization (WTO) rules and about stirring up north-south confrontations, addressing carbon leakage through the CBAM must be handled with great care.
- Use of external credits: The EU ETS has completely prohibited the use of offset credits outside the region from Phase 4 onward. In the case of Japan, efforts are underway to reduce overseas emissions via the Joint Crediting Mechanism (JCM), and companies will be able to contribute to emission reductions while minimizing their cost burden by using offset credits by this mechanism. In addition, carbon removal technologies, such as direct air carbon capture and storage (DACCS), forests as carbon sinks and blue carbon, will be essential in order to achieve carbon neutrality by 2050. Since locations outside Japan will be superior as sites for these technologies' implementation from a cost perspective, a platform for enabling overseas carbon removal credits to be used, in addition to offset credits, will be essential.
- Stability and liquidity of emission allowance prices: Whether we should accept intervention by the authorities as a price stabilization measure given the nature of a government-regulated market, or whether we should pursue a market mechanism, is a fundamental question related to the ETS design. In considering this question, it should be noted that the participation of financial organizations brings the advantage of increasing the liquidity of the market and the transparency of prices through transactions at exchanges. On the other hand, as is the case in the EU ETS, there is also a possibility that the price could be more uncertain due to transactions with expectations for a tighter supply-demand balance in the future. This is one of the issues to be considered.
- Measurement, reporting, and verification (MRV) preparation period, system design and administrative costs in public-private sectors: In Japan, companies have up to

now reported their emissions to the authorities based on the Act on the Rational Use of Energy and the Act on Promotion of Global Warming Countermeasures, but these reported emissions have not been verified by third parties. If monetary value is to be bestowed in the form of emission allowances based on past emissions, reliable verification will surely be necessary to start with. In addition, more than 100 officials across the whole EU are believed to be implementing the EU ETS, including more than 40 officials in charge at the European Commission DG CLIMA (which has jurisdiction over the EU ETS), as well as more at the relevant departments within EU member states' governments for their national implementation. Even greater administrative costs are likely to be required for the design and introduction of the ETS, in addition to implementation.

The following issues surrounding the ETS also need to be addressed.

- Could a carbon tax initiative be suspended by the ETS introduction? How could the ETS be demarcated from a carbon tax?: It is hard to envisage a new carbon tax being raised under the present circumstances when soaring energy prices have become a social issue, but it is also difficult to imagine that the introduction of an ETS will bring about a complete halt to this initiative. Demarcation between the ETS and a carbon tax needs to be elaborated with the European countries' cases as a reference.
- Setting out the relationship with the Act on the Rational Use of Energy and the Act on the Promotion of Use of Non-fossil Energy Sources and Effective Use of Fossil Energy Materials by Energy Suppliers: As a matter specific to Japan, it is of course essential to set out the relationship between the ETS and existing legislation such as the Act on the Rational Use of Energy and the Act on the Promotion of Use of Non-fossil Energy Sources and Effective Use of Fossil Energy Materials by Energy Suppliers, which have been built, developed and refined over the course of many years. Questions will no doubt arise as to whether officials themselves are ready to take up this task concerning the changes in these existing legislations.
- Burden on the public: When targeting the power sector, it will be essential to take into account the impacts that must be borne by the public, given the highly regressive nature of the burden of energy prices for households.

In any event, public and private sectors must push forward discussions sooner than later with firm resolution.

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