



YOHEI KITANO

Nomura Institute of Capital Markets Research (Singapore)

Singapore to Promote Carbon Credit Trading as Part of Sustainability Initiatives

Singapore's Aim to Be a Hub for Carbon Services

Singapore, one of Asia's leading international financial centers, has recently been putting more importance on carbon credit trading as part of its sustainability initiatives. Carbon credits are certificates awarded for the reduction or removal of a certain quantity of emissions of carbon dioxide (CO₂) or other greenhouse gases (GHG) generated by GHG reduction and absorption projects. Singapore, having already established itself as a hub for commodity trading in Asia, is now aiming to become a regional hub for carbon services by 2030 through implementation of the Singapore Green Plan 2030, a comprehensive environmental action plan announced in February 2021.

Carbon credit trading is a type of carbon pricing that assigns a value to GHG emissions with the objective of transforming the behavior of GHG emitters. There are two types of carbon credit trading: compliance markets operated by the United Nations and certain national and regional governments, and voluntary mar-

kets operated by private sector entities.¹ In Singapore, AirCarbon Exchange (ACX) was established as the country's first international carbon credit exchange in 2019. ACX is operating a voluntary carbon market. In 2021, Climate Impact X (CIX) was established under the cooperation between the public and private sectors as the new international carbon credit exchange, bringing carbon credit trading in Singapore into greater focus.

This article introduces Singapore's two international carbon credit exchanges—ACX and CIX—starting with overviews of the background to and reasons for their establishment, their key features, and business activities to date and concluding with a presentation of key points for the future advancement of carbon trading in Singapore.

ACX—Singapore's First International Carbon Credit Exchange

ACX establishment background and business overview

ACX was established as Singapore's first international carbon credit exchange in 2019, with support from Enterprise

Singapore, a government agency that promotes the growth of domestic companies, and the Singapore Sustainable Energy Association, a non-government and non-profit business association in the sustainable energy sector.

ACX began operations by offering trading opportunities focused on carbon credits established by the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). CORSIA was established by a resolution at the general assembly of the International Civil Aviation Organization in 2016 as a mechanism to promote carbon-neutral growth in the aviation industry by reducing GHG emissions and purchasing carbon credits. ACX initially provided carbon credit trading for airlines, but its clients now include financial institutions and companies in a wide range of industries. Buyers of carbon credits include companies that have a real demand for carbon credits as well as those that buy and sell carbon credits as a trading activity. Carbon credits traded on ACX have been issued in accordance with international certification standards.

ACX key features and recent business development

One of ACX's key features is its use of blockchain to make transactions more efficient. ACX trades tokenized carbon credits (hereinafter referred to as carbon credit tokens) on the Ethereum² blockchain. Tokenization refers to the transformation of physical assets into digital units that can be easily bought and sold. Using auto-

mated smart contracts on the blockchain streamlines transactions and enables T+0 settlements, with transaction fees as low as USD3 for the equivalent of 1,000 CO2 tonnes (hereinafter, t-CO2e). Conducting trades on blockchain prevents double counting, where a single carbon credit is associated with multiple emission activities. One carbon credit token, like general non-tokenized carbon credits, is equivalent to 1t-CO2e.

Carbon credit tokens traded on ACX include the CORSIA Eligible Token, two types of nature-based project tokens, the Renewable Energy Token, Sustainable Development Goal (SDG) Token, and the Household Offset Token (Table 1). All of these carbon credit tokens have a minimum trading unit of 1,000 t-CO2e.

The nature-based project-related Global Nature Token and Global Nature+ Token have rather wide price ranges, with older-dated carbon credits at the low end of the range and newer carbon credits at the higher end. In addition, Global Nature+ Token prices are generally higher than those for Global Nature Tokens, mainly because Global Nature+ Tokens are generated by projects that meet the Climate, Community and Biodiversity (CCB) Standards for having additional benefits other than GHG reduction, such as contributing to the local community and biodiversity

conservation.

In March 2022, ACX entered into a partnership with Carbon X, an Indonesian carbon project developer, with the aim of developing the Indonesian carbon credit market. ACX also formed a partnership with Deutsche Börse, the parent company of European Energy Exchange AG, an operator of energy and commodity exchanges. Through this tie-up, which includes a capital investment in ACX by Deutsche Börse, the two companies are collaborating on the development of a global voluntary carbon market. ACX currently offers only spot trading, but it is now preparing to offer futures trading, with assistance from Deutsche Börse. In April 2023, ACX signed a Memorandum of Understanding (MOU) with the Natural Capital Credit Consortium, which seeks to realize a decarbonized society by revitalizing the carbon credit market in Japan. Based on the MOU, the two parties plan to accelerate Japanese companies' decarbonization strategies and expand the carbon ecosystem in Japan. As these examples show, ACX is proactively internationalizing its operations.

CIX—International Carbon Credit Exchange Established under Public-Private Cooperation

Background of CIX establishment

CIX was established under public-private cooperation with the goal of re-energizing the Singapore economy, which stagnated during the COVID-19 pandemic. In May 2020, Singapore launched the Emerging Stronger Taskforce, with members from the public and private sectors, under the Future Economy Council, which is tasked with driving the future growth and transformation of Singapore's economy. The taskforce launched nine action alliances in response to the pandemic. One of them is the Alliance for Action on Sustainability.³ Representative members of this alliance include DBS Group Holdings, Singapore's largest bank; Olam International, an agricultural commodities trading company; Singapore Exchange (SGX); Temasek, a Singaporean state-owned investment company; and the Monetary Authority of Singapore.

Aiming to make Singapore a hub for carbon services and trading, the Alliance for Action on Sustainability recommended (1) establishing an exchange offering high-quality carbon credits, and (2) introducing a green standard and a one-stop solution for companies to measure, mitigate, and offset their carbon footprint. The proposal to establish a carbon credit exchange took into consideration the prospects for the growth of the voluntary carbon market. According to a report by the Taskforce on Scaling Voluntary Carbon Markets (TSVCM), efforts to achieve the goals of the Paris Agreement will boost the demand for carbon credits in the voluntary market, with demand projected to be 15 times greater in 2030 than the 151.6 million t-CO2e per year recorded in 2020 and continuing to expand up to 100 times the 2020 figure by 2050.⁴

When considering establishing a carbon credit exchange, the Alliance for Action on Sustainability held talks with more than 70 organizations about issues with existing voluntary carbon markets. These discussions highlighted the insuffi-

Table 1: Carbon Credit Tokens Traded on ACX

Token name	Description	Price per 1t-CO2e
CORSIA Eligible Token (CET)	Carbon credits eligible under CORSIA	USD0.88
Global Nature Token (GNT)	Carbon credits generated by nature-based projects, such as agriculture and forestry projects	USD0.70~8.50
Global Nature+ Token (GNT+)	Carbon credits generated by nature-based projects that have obtained certification under the Climate, Community & Biodiversity (CCB) Standards	USD2.00~15.00
Renewable Energy Token (RET)	Carbon credits generated by renewable energy projects	USD1.75
Sustainable Development Goal Token (SDGT)	Carbon credits generated by projects certified as contributing to the Sustainable Development Goals (SDGs)	USD11.00
Household Offset Token (HOT)	Carbon credits generated by improved cooking solution projects certified as having at least three SDGs	USD4.50

Note: As of June 6, 2023.
Source: ACX

cient credibility of carbon credits as one of the major challenges facing existing voluntary carbon markets.⁵ In voluntary carbon markets, carbon credits that meet certification standards set by non-profit and/or non-governmental organizations are traded. Major certification standards include US-based Verra's Verified Carbon Standard and Gold Standard. However, it has been pointed out that the wide variety of certification standards and certification processes has created wide divergences in carbon credit quality. For this reason, particular emphasis was placed on carbon credit quality when establishing CIX.

CIX's emphasis on carbon credit quality and price transparency

DBS Bank, SGX, Standard Chartered, and Temasek announced their joint establishment of CIX in May 2021. DBS Bank, SGX, and Temasek are members of the previously mentioned Alliance for Action on Sustainability. CIX initially is focusing on carbon credits generated from Natural Climate Solutions (NCS)-related projects. NCS refers to the protection, management, and restoration of natural ecosystems, such as forests, wetlands, and mangroves. NCS-related projects have the potential to reduce GHG emissions by about 11 billion t-CO₂e per year, which is estimated to amount to more than one-third of the reduction in GHG emissions needed to achieve the goals set by the Paris Agreement for 2050.⁶ In addition to being cost-effective, NCS-related projects can generate such additional benefits as the preservation of biodiversity and contributions to the local community.

CIX emphasizes the quality of its carbon credits and price transparency. Toward that end, CIX utilizes such technologies as satellite monitoring of NCS projects and machine learning. The process for selecting carbon credits to be traded on CIX is as follows. First, eligible carbon credits must meet internationally recognized certification standards. Second, a scoring assessment is then conducted that examines the related project's carbon credit attributes, its impact on biodiversity and local society, and project risk management. Third, third-party analysis and ratings are then used to evaluate and monitor the carbon credit-generating projects. Fourth, projects that are difficult to evaluate will be judged on the basis of advice from an international advisory council comprising experts from research institutes, non-governmental organizations, and international certification bodies.

For third-party ratings, CIX has partnered with Sylvera, a UK-based carbon

credit rating agency. Sylvera is one of the companies selected by the Alliance for Action on Sustainability for its accelerator program launched in December 2020 in collaboration with Google, the World Bank, and others. Sylvera ratings are based on analysis using machine learning and satellite data. Evaluated carbon credits are assigned one of four ratings, ranging from AAA (highest) to D (lowest) based on their scores for four indicators: 1) a carbon score that evaluates the adequacy of the project's reporting on GHG emission reductions and removals, 2) the project's "additionality" characteristic, which indicates that it contributed to the reduction or removal of GHG emissions that would not have been achieved without the revenue generated by carbon credits, 3) the permanence of the project's GHG emission reduction and removal, and 4) the realization of co-benefits, such as biodiversity preservation.

In addition, to ensure that the quality of its carbon credits meets international standards, CIX is collaborating with such environmental organizations as Conservation International, which makes policy recommendations on climate change and biodiversity, and the Natural Climate Solutions Alliance, which promotes knowledge-sharing of nature-related projects.

CIX's three carbon credit trading platforms

CIX has established three carbon credit trading platforms: CIX Auctions, CIX Project Marketplace, and CIX Exchange. Following is a brief introduction of each platform.

- **CIX Auctions**

The Auction platform efficiently provides users with carbon credit supply and demand data that enables them to discover appropriate pricing. In November 2021, CIX announced that it had completed a pilot auction of high-quality carbon credits. The tendered carbon credits were from eight registered NCS projects in Asia, Africa and Latin America. A total of 170,000 t-CO₂e carbon credits were successfully cleared at a price of USD8 per 1t-CO₂e. The auction was said to be the world's first ever auction of a portfolio of carbon credits in a voluntary market. A total of 19 companies, including global energy and commodity trading companies, participated in the auction.

A second large-scale auction was held in November 2022. The auction successfully sold 250,000 t-CO₂e of

vintage 2021 credits from a mangrove restoration project in Pakistan at a price of USD27.80 per 1t-CO₂e. That price represents a premium of about 40% on the average spot price for nature-based solutions of the same credit vintage.

- **CIX Project Marketplace**

Launched in March 2022, the Project Marketplace is a platform for trading carbon credits generated from specific projects. An example is the carbon credits generated from a biodiversity preservation project in Peru. In addition to reducing GHG emissions, the project will protect natural forests that are home to 30 endangered species.

Project Marketplace participation is open to businesses of all sizes. For example, early participants range from such Singapore-based small and medium-sized enterprises as information technology (IT) solutions company Rentalworks and shipping company Singfar International to corporations active on the global stage, such as resources major BHP, South Korea-based Mirae Asset Securities, and Singapore Technologies Telemedia, a company that invests in the communications, media, and technology sectors.

- **CIX Exchange**

Launched in June 2023, the CIX Exchange platform specializes in carbon credits traded under standardized contracts, primarily targeting multinational companies and institutional investors. The platform's first standardized contract, CIX Nature X, comprises 11 large, globally accepted carbon credit projects that support reducing emissions from deforestation and forest degradation (REDD), the conservation of tropical forests, and biodiversity reserves in such developing countries as Brazil, Cambodia, Congo, Guatemala, Indonesia, Kenya, and Peru.

Transactions on the CIX Exchange will be settled by Carbonplace⁷, a carbon credit settlement platform established by global financial institutions.

By providing multiple platforms as described above, CIX is responding to the diverse needs of its participants.

Key Points for the Future of Carbon Credit Trading in Singapore

The following three factors are considered key points for the future of carbon credit trading in Singapore: (1) the use of carbon credits to offset Singapore's carbon tax, (2) expansion of the carbon credit ecosystem, and (3) the possibility of competition with Hong Kong's carbon credit market.

Use of carbon credits to offset carbon tax partially

GHG emissions in Singapore have

been on an upward trend for some time. Hoping to curb this trend, in January 2019 the Singapore government introduced a carbon tax, a type of carbon pricing and the first such tax in the ASEAN region. Industrial facilities that emit more than 25,000 t-CO₂e of GHGs per year are subject to the carbon tax. About 50 industrial facilities responsible for about 80% of Singapore's GHG emissions currently are subject to the carbon tax, which is set at SGD5 per 1t-CO₂e until 2023, well below the carbon taxes of Western countries (Figure 1).

In February 2022, the Singapore government announced plans to significantly increase the carbon tax from the current level, starting in 2024. Specifically, it plans to raise the carbon tax to SGD25 per 1t-CO₂e in 2024 and 2025, to SGD45 in 2026 and 2027, and to SGD 50-80 by 2030.

The Singapore government also announced a policy that will allow GHG emit-

ters to use high-quality international carbon credits to partially offset their carbon tax payments from 2024 onwards. Initially, carbon credits could replace up to 5% of GHG emissions subject to carbon tax. Details are expected to be released in 2023. The Singapore government hopes that this measure will reduce the burden on companies that can cost-effectively purchase high-quality carbon credits and contribute to the development of Singapore's carbon credit market by increasing demand for carbon credits.

Expansion of the carbon credit ecosystem

Expansion of the carbon credit ecosystem will be crucial to increasing carbon credit trading in Singapore. One significant development related to this theme is an initiative to create carbon credits through the use of electric vehicles (EVs).

CRX CarbonBank, a carbon services company based in Singapore, launched its Electric Vehicle Accelerator (EVA) Programme in April 2022. The EVA Programme is designed to generate carbon credits through EV charging. It targets companies that own EV fleets and operators of EV charging stations in Singapore. Carbon credits are issued based on international certification standards, and a portion of the sale proceeds is paid to companies registered in the EVA Programme (Figure 2). Gojek, the provider of a leading ride-hailing app based in Indonesia and also operating in Singapore, is the first company to register for the EVA Programme.

Although the penetration rate of EVs is still low in Singapore, the government plans to promote the spread of EVs and increase the number of EV charging stations in the country to 60,000 by 2030. The EVA

Figure 1: International Comparison of Carbon Tax (per 1t-CO₂e)

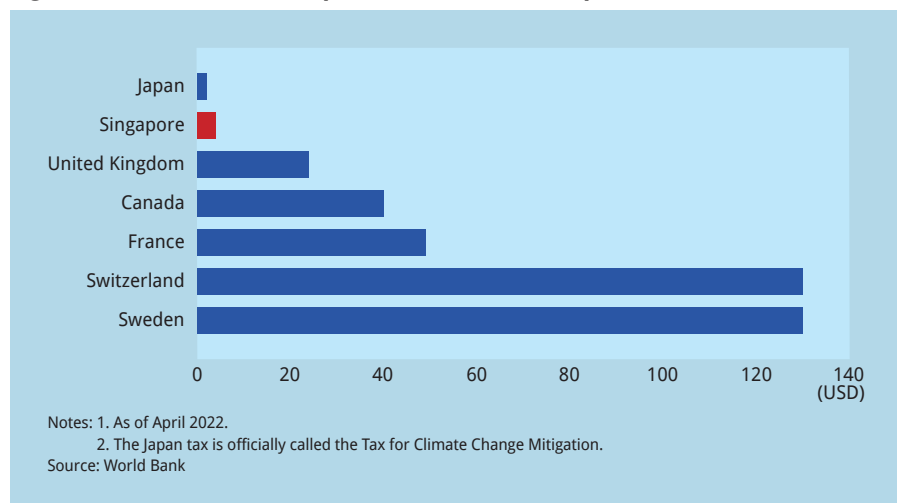
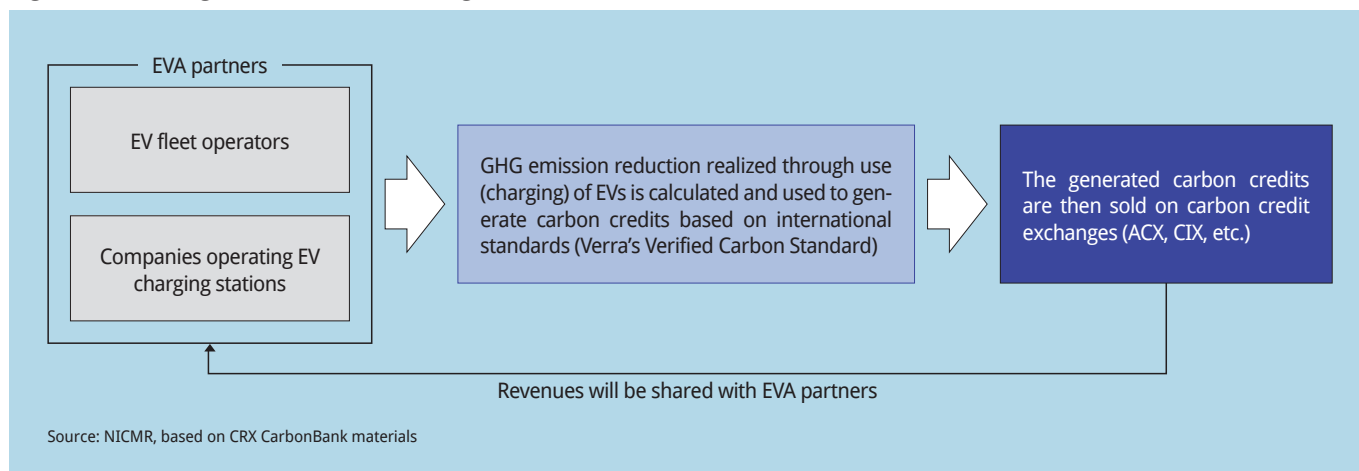


Figure 2: EVA Programme Schematic Diagram



Programme has the potential to contribute not only to the expansion of the carbon credit ecosystem but also to the promotion of EVs in Singapore.

Possibility of competition with Hong Kong's carbon credit market

Several initiatives to create voluntary carbon credit markets in Asia have emerged in recent years. Of these, the initiative launched in Hong Kong, Asia's other leading international financial center, is perhaps the most relevant for a comparison with Singapore. In October 2022, the Hong Kong Exchange (HKEX) established an international carbon credit market called Core Climate. The carbon credit markets in Singapore and Hong Kong have several similarities, such as the trading of carbon credits based on international certification standards managed by Verra and Gold Standard, and an emphasis on transaction efficiency and price transparency. It may therefore be said that the carbon credit markets of Singapore and Hong Kong are, to some extent, competitors.

On the other hand, a key difference between these two carbon credit markets is their market participants. As a regional hub for commodity trading, Singapore aims to expand its carbon credit market by attracting multinational companies, including energy and commodity trading companies, from around the world. In contrast, participants in Hong Kong's carbon credit market are mainly Chinese companies and HKEX-listed companies. HKEX intends to develop its carbon credit market in the Greater Bay Area (an economic zone comprising Guangdong Province and Macau, as well as Hong Kong) by strengthening ties with mainland China. Considering this difference in market participants, the carbon credit markets of Singapore and Hong Kong may develop in different paths.

It is worthwhile monitoring closely Singapore's efforts to establish itself as a major hub for carbon services and trading in Asia and to contribute to the reduction of GHG emissions in the region over the medium to long-term.

Notes

1 Other major types of carbon pricing include 1) carbon taxes, which essentially set a price for greenhouse gases by taxing the use of fuel and electricity in proportion to the amount of GHG emitted, and 2) domestic emissions trading, a carbon pricing scheme that sets upper limits on company emissions and then promotes emissions allowance



trading between companies whose emissions exceed their upper limit and companies whose emissions are below the limit.

- 2 Ethereum refers to a platform for creating decentralized applications and automated smart contracts.
- 3 Other alliances, such as AgriTech, EdTech, and MedTech, promote initiatives in their respective domains.
- 4 Taskforce on Scaling Voluntary Carbon Markets (2021). "Final Report."
- 5 Global Financial Markets Association and Boston Consulting Group (2021). "Unlocking the Potential of Carbon Markets to Achieve Global Net Zero."
- 6 Conservation International, DBS Bank, National University of Singapore, and Temasek (2020). "The Business Case for Climate Solutions: Insights and Opportunities for Southeast Asia."
- 7 Carbonplace was established in 2021 by BNP Paribas, CIBC, Itau Unibanco, National Australia Bank, NatWest Group, Standard Chartered and UBS.

YOHEI KITANO

Senior Analyst, Nomura Singapore Limited
NICMR

Yohei Kitano has been Senior Analyst at Nomura Institute of Capital Markets Research (NICMR) in Singapore since 2015. Prior to joining NICMR in 2014, he was seconded to the Ministry of Finance Japan and was engaged in enhancing financial cooperation with ASEAN countries as well as the Asian Bond Markets Initiative (ABMI) from 2012 to 2014. He was also seconded to the Japan Bank for International Cooperation (JBIC) where his main responsibility was providing loans to Indian companies from 2007 to 2009. He was an equity analyst covering Japanese small and mid-cap stocks from 2004 to 2006. He joined Nomura Securities in 2002.

Kitano earned a bachelor's degree in economics from Keio University in 2002. He is a CFA® charterholder.