Research Office
Legislative Council Secretariat

Fact Sheet

Development of carbon markets in selected places

FS01/2022

1. Introduction

1.1 Carbon markets are trading platforms in which units of greenhouse gas ("GHG") emissions[1] are bought and sold, thereby providing the business sector with financial incentives to mitigate the impact of global warming. In Hong Kong, the Green and Sustainable Finance Cross-Agency Steering Group[2] has announced plans to develop a **global, high-quality voluntary carbon market** in the city, and is determining the most suitable pathway for its development.

1.2 Against this backdrop, the Panel on Financial Affairs will be briefed by the Administration on the latest development of green and sustainable finance and carbon trading in Hong Kong at its meeting on 3 October 2022. To facilitate the discussion, the Research Office has prepared this ***Fact Sheet*** on carbon markets in the **Guangdong Province**, **Singapore**, and **London** of the United Kingdom ("UK"). The Guangdong Province has one of the most active carbon exchanges on the Mainland, and is on track to introduce new carbon products at its newly launched futures exchange. Meanwhile, Singapore and London are harnessing their existing financial market infrastructure to develop global carbon markets that would facilitate the trading of carbon credits or related investment funds.

1.3 This Fact Sheet starts with explaining basic concepts pertinent to carbon markets, followed by a discussion of various approaches to developing carbon markets and trading platforms in the selected places, as well as the recent development in Hong Kong.

---

1 GHGs emitted from human activities trap heat in the atmosphere and warm the earth. Carbon dioxide, nitrous oxide, methane and fluorinated gases are examples of GHGs.

2 The Steering Group, formed in 2020, is co-chaired by the Hong Kong Monetary Authority and the Securities and Futures Commission. Members include the Environment and Ecology Bureau, the Financial Services and the Treasury Bureau, and the Hong Kong Exchanges and Clearing Limited.

2. Basics of carbon markets

2.1 Carbon markets can be established as compliance carbon markets ("CCMs") or voluntary carbon markets ("VCMs") with the following characteristics:

(a) CCMs operate based on the cap-and-trade principle. They are found in places with statutory caps on overall emissions, and compliance entities (i.e. businesses subject to emission caps) are allocated tradable quotas in the form of **emission allowances**, each representing the right to emit a tonne of carbon dioxide ("CO_2").[3] Examples of CCMs include the Mainland's national Emissions Trading System ("ETS") launched in July 2021 and its regional pilots in places like the Guangdong Province, as well as the European Union ("EU") ETS, which is the world's oldest and largest multinational ETS set up in 2005.

(b) VCMs, meanwhile, cater to a wider audience by allowing businesses and investors not covered by CCMs to voluntarily finance emission reduction activities (e.g. reforestation projects) that generate **carbon credits**. Each credit represents a tonne of CO_2 being removed or avoided. It can be sold or traded, or retired from the market once it is used by the owner for offsetting carbon footprint. The issuance, transfer and retirement of carbon credits are recorded on centralized registries, and are independently verified based on a set of standards. The CBL Global Emissions Offset Futures in the United States ("US") is an example of VCM.

(c) While CCMs are the more established segment of carbon markets, VCMs are expected to scale substantially, estimated to worth between US$5 billion and US$30 billion (HK$39 billion-HK$235 billion) globally by 2030, up from US$0.3 billion (HK$2.4 billion) in 2020.[4] This growth is partially fuelled by the adoption of the Paris Agreement[5] and the private sector's efforts to decarbonize for purposes like brand-building and fulfilling corporate social responsibility.

---

3 For more details about the basics of carbon markets, please refer to the Research Office's publication on "Development of Carbon markets in Selected Places" (RT02/2022). See Legislative Council Secretariat (2022).

4 See McKinsey & Company et al. (2021).

5 It is a legally binding international treaty on climate change, adopted by 196 parties and came into force in 2016. It aims to limit global warming to well below 2°C (preferably to 1.5°C) compared to pre-industrial levels.

2.2 A high-level comparison of CCMs and VCMs is at **Appendix 1**, covering trading modes, tradable products and types of market participants, with major examples of CCMs and VCMs provided. It is noted that:

(a) products traded on the markets can include emission allowances (for CCMs), carbon credits, and derivatives contracts based on emission allowances or carbon credits;

(b) while compliance entities participate mainly in CCMs, some of them may also participate in VCMs if regulations in their jurisdictions allow them to use carbon credits to offset part of their emissions; meanwhile, businesses not covered under CCMs, institutional investors[6] and retail investors are generally free to participate in VCMs; and

(c) even though bilateral trading (e.g. over-the-counter trades) and auctions are still often seen in carbon markets, more places are setting up for shifting trading to exchange-based modes, with a view to boosting price transparency, market liquidity and trading volume, and catering to a more diverse group of market participants, whether locally or globally.[7]

2.3 Salient features of the carbon markets in the Guangdong Province, Singapore, and London are presented in the ensuing sections and summarized in **Appendix 2**.

3. Carbon market in the Guangdong Province

3.1 The Guangdong ETS is an example of **CCM**, under which some 200 compliance entities are allocated **emission allowances**, and are allowed to buy additional allowances to cover excess emissions or sell the allowances when there is a surplus.[8] These compliance entities account for around 40% of the Province's carbon emissions, and cover traditional energy-intensive sectors including cement and petrochemicals as well as certain emerging emission sources like data centres.[9]

---

6 Institutional investors can, on one hand, gain a return from price appreciation of carbon products, and on the other, they can hedge against the climate transition risk that may affect the performance of other investments. See McKinsey & Company et al. (2021).

7 See International Swaps and Derivatives Association (2021).

8 Since the launch of the national ETS in July 2021, some power sector entities in the Guangdong Province have been transferred to the national scheme. See International Carbon Action Partnership (2022a) and 廣東省生態環境廳 (2021a).

9 Ibid.

3.2 In terms of products, the carbon market has a rather rich offering, covering not only emission allowances but also carbon credits as well as, possibly by the end of this year, carbon futures:

(a) carbon credits, in form of **China Certified Emission Reductions** (國家核證自願減排量, "CCERs")[10] and **Puhui Certified Emission Reductions** (碳普惠核證減排量, "PHCERs"), can be traded on the Guangzhou-based China Emissions Exchange (廣州碳排放權交易所, "CEEX"). PHCERs originate from a voluntary carbon offsetting mechanism introduced in 2017, where compliance entities can use PHCERs generated from verified emission reduction projects[11] to make up for a certain amount of excess emissions.[12] PHCERs are tradable on CEEX, which operates on a membership basis, with participants being compliance entities, eligible businesses and institutional investors including qualified foreign investors[13]; and

(b) in 2021, the China Securities Regulatory Commission ("CSRC") approved the launch of Guangzhou Futures Exchange (廣州期貨交易所, "GFEX") as the fifth recognized Futures Exchange on the Mainland. More specifically, CSRC has approved a total of 16 types of futures commodities that can be listed on GFEX so far, including **carbon emission allowance futures** and **electricity futures** for risk management and/or investment purposes.[14] Moreover, GFEX is the first of its kind featuring a mixed ownership, with the other four recognized futures/commodity exchanges on the Mainland and the Hong Kong Exchanges and

[10] CCERs were issued by the national China Greenhouse Gas Voluntary Emission Reduction Programme under the Ministry of Ecology and Environment (國家生態環境部), although the issuance of such credits has been suspended since 2017. The CCER programme would reportedly be reintroduced later in 2022. See China Daily (2022).

[11] Examples of eligible projects include forest restoration and renewable energy. See China Emissions Exchange (Guangzhou) (2020).

[12] PHCERs are issued by the Department of Ecology and Environment of the Guangdong Province (廣東省生態環境廳). For compliance entities, the use of carbon credits is limited to 10% of annual emissions, while at least 70% of the credits used must also be from within the Province. See 廣東省生態環境廳 (2021b).

[13] Foreign investors, similar to their local peers, can apply for CEEX membership if they fulfil certain conditions e.g. being legal persons/organizations with good business credit, etc.

[14] Other types of futures products include energy-related futures for silicon, rare earths and lithium, and agricultural futures for coffee and sorghum. See 廣州期貨交易所 (2022a).

Clearing Limited ("HKEX") each owning a stake.[15] To ensure market health and stability, GFEX requires local retail investors to have at least RMB100,000 (HK$116,000) on their accounts, while qualified foreign investors will need to have a minimum net capital of RMB10 million (HK$11.6 million) to be eligible for trading.[16] Trading is expected to start later in 2022.

3.3 CEEX is one of the most active carbon exchanges on the Mainland. In 2021, its spot trading volume of emission allowances in the secondary market reached 27.5 million tonnes of CO_2, exceeding those of global peers including the European Energy Exchange and the Korea Exchange, though still lagging behind the 179 million tonnes traded on the Mainland's national ETS and 612 million tonnes recorded on the Intercontinental Exchange ("ICE").[17] In terms of regulations, while emission allowances traded on CEEX are not considered as securities products, its trading and risk management designs are somewhat similar to securities trading.[18] For example, it has devised specific market rules on trading and disclosure to prevent market volatility[19], and reserves the right to suspend the membership of any participant due to suspected misconducts such as market manipulation.[20] As for trading of futures products on emission allowances, GFEX has published a list of rules concerned with trading, clearing, risk management, custodian services, etc.[21]

3.4 **Strategically**, CEEX and GFEX have the prospects of contributing to the development of the Guangdong-Hong Kong-Macao Greater Bay Area ("GBA"). According to the Guangdong Province PHCER Trading Management Rules (廣東省碳普惠交易管理辦法) released in 2022, PHCERs shall be actively promoted, notably through the development of a

---

15 The China Financial Futures Exchange, Shanghai Futures Exchange, Zhengzhou Commodity Exchange, Dalian Commodity Exchange each own 15% of GFEX. Other major shareholders include private companies on the Mainland. HKEX has a 7% stake. See 廣州市人民政府(2021).

16 Local investors must also have proven records in futures/options trading, and have completed at least 10 qualified domestic or overseas transactions over the past three years. See 廣州期貨交易所(2022b, 2022c).

17 See 廣州碳排放權交易所(2022).

18 See 陳波(2017) and International Carbon Action Partnership (2022a).

19 For example, CEEX imposes a price limit mechanism and requires market participants with large holdings to declare their position/ownership. See 廣州碳排放權交易所(2017a).

20 See 廣州碳排放權交易所(2017b).

21 See 廣州期貨交易所(2022d).

PHCER cooperation regime in GBA.[22] The mixed shareholding structure for GFEX is also considered a demonstration of economic integration in GBA and facilitative to the integrated development of the financial services industry.

4. Carbon markets in Singapore and London

4.1 Leveraging their positions as premier global financial centres, both Singapore and London are developing VCMs that are expected to cater to international demand and at the same time complement the local needs arising from their existing emission reduction initiatives.[23] While both have plans to develop exchange-traded products through their existing financial infrastructure, Singapore has already made a head start in offering platforms for auctioning or direct purchase of carbon credits from suppliers. Meanwhile, London's proposal offers a novel approach to carbon trading.

Singapore

4.2 In May 2021, Singapore announced the launch of a carbon exchange and marketplace for **carbon credits** known as Climate Impact X ("CIX"). On set-up design, CIX is established as a public-private venture between Singapore Exchange ("SGX"), sovereign wealth fund Temasek and two commercial banks. In particular, it targets carbon credits generated through nature-based solutions projects (i.e. protection and restoration of forests, wetlands and mangroves), and may gradually expand its offerings to include carbon removal and other projects.[24] It is worth noting that CIX comprises multiple platforms to serve the needs of different participants, as follows:

---

[22] See 廣東省人民政府(2022).

[23] **Singapore** has imposed a carbon tax on large emitters since 2019. The tax, at S$5 (HK$28.6) per tonne of greenhouse gas emissions ("tCO_2e") during 2019 to 2023, is applied on facilities that directly emit at least 25 000 tCO_2e annually. From 2024, local businesses will be allowed to buy high-quality, international carbon credits to offset up to 5% of their taxable emissions, in lieu of paying carbon tax. See Ministry of Finance (2022) and Ministry of Sustainability and the Environment (2022).
For the **UK**, the country originally participated in the EU ETS. The UK ETS was launched in January 2021 as a result of the Brexit, so that the UK can continue using the cap-and-trade system to achieve its long-term carbon abatement targets. The UK ETS covers about 30% of the country's carbon emissions. See International Carbon Action Partnership (2022b).

[24] See Climate Impact X (2022a).

(a) **Project Marketplace** for direct purchase of carbon credits from specific projects, introduced in February 2022: an online platform for carbon project suppliers to list carbon credits, and for businesses to compare, buy and/or retire them. All credits listed on the platform will undergo a **four-step** screening process, namely (i) verification by global registries using international standards (e.g. Gold Standard and Verra), (ii) assessment against CIX's internal scoring, (iii) examination by independent risk rating agencies and third-party pricing specialists, and (iv) for projects that are barely passed, further review by CIX's International Advisory Council.[25] Carbon credits sold via the platform are also monitored on an ongoing basis using advanced technology such as satellite monitoring and blockchain to ensure the quality of credits;[26]

(b) **Auction Platform** as a specialized digital venue for groups of buyers to bid for unique credit types/projects (e.g. newly issued credits and customized portfolios of projects): it is expected to hold its first major auction for 2022 in the second half of the year, following a pilot auction in late 2021 that attracted 19 global buyers and cleared 170 000 tonnes of carbon credits from eight projects in Asia, Africa and Latin America;[27] and

(c) **Exchange**, planned to launch in 2023: it will facilitate sale of standardized contracts on carbon credits, and will support trading by multinational corporations, global financial institutions and institutional investors through providing real-time market data and using technology from global exchange operator Nasdaq to power its platform.[28]

---

25 The Council is composed of over 20 experts from the academia, non-governmental organizations and industry, who join the Council in a personal capacity, to give views on the science, policy and market application of VCM, and advise on project evaluation and best-practice insights. See Climate Impact X (undated, 2022c).

26 Ibid.

27 See Climate Impact X (2021, 2022b).

28 See Climate Impact X (2022d).

4.3 Regarding the regulatory approach, the Singapore government has stated that it currently does not regulate voluntary carbon offset activities.[29] However, to reduce buyers' exposure to carbon trading risks, it is working with the industry and experts to develop a taxonomy and guidelines on the quality of carbon credits, for possible adoption by companies undertaking carbon offset activities, though further details have not yet been released.[30]

London

4.4 London is planning to develop a VCM that is expected to run in parallel with the domestic CCM (i.e. UK ETS). The London Stock Exchange ("LSE")'s proposed VCM differs noticeably from the conventional VCM approach, by offering a platform for investing in **carbon funds** through which investors are able to access carbon credits instead of direct trading of such credits. Based on the consultation document issued earlier this year, eligible carbon funds will be granted by LSE the "**VCM designation**". Major proposed criteria for the designation are summarized below:[31]

(a) **Asset class**: initially, only closed-ended investment funds[32] listed on or admitted to the LSE's markets[33] are eligible to participate in VCM, although other asset classes might be considered in the future. The funds must be managed by persons authorized by a recognized financial regulator specified in the rules;

(b) **Investment focus**: funds with the VCM designation should publish an **investment policy** focusing on investing non-cash funds in approved investments only, including carbon reduction and/or removal projects with the objective of supplying carbon credits to investors. To qualify, such projects should be registered with a recognized local or global carbon registry or body.[34] As an ongoing obligation, the funds must have also invested in at least

---

29 The Research Office has emailed CIX and the Ministry of Trade and Industry to request more information on relevant market rules in respect of carbon credit trading. Both have not responded to the enquiries as of the publication of this Fact Sheet.

30 See Ministry of Trade and Industry (2021).

31 See London Stock Exchange (2022).

32 They generally refer to funds that raise capital by issuing a fixed number of shares in a single initial public offering.

33 These include the Main Market and Alternative Investment Market. The latter is LSE's market for small and medium size growth companies.

34 Examples include the UK Woodland Carbon Code, Gold Standard and Verra's Verified Carbon Standard.

one qualified carbon reduction or removal project within three years upon receipt of VCM designation; and

(c) **Delivery of carbon credits to investors**: while relevant funds are allowed full autonomy in deciding how carbon credits will be delivered to investors, the mode of delivery must be disclosed to shareholders. Available options include paying dividends in cash or specie (i.e. carbon credits), or retiring carbon credits on behalf of investors (i.e. permanently removed from circulation).

4.5 In addition to the above requirements, VCM-designated carbon funds will come under the UK's existing regulatory regime in terms of disclosure, governance and protection against market abuse that apply to other publicly traded companies.[35] LSE also proposes in the consultation document that these funds will be subject to **additional requirements** and obligations specific to VCM.[36] For instance, to ensure transparency and good governance, funds with VCM designation will be required to disclose additional information in its financial statements, such as target yield of carbon credits and investment status into projects. It is proposed that LSE will retain powers to remove or refuse the provision of VCM designation where the eligibility requirements and obligations are not met.[37] To what extent the proposed requirements are adopted into rules will remain to be seen.

5. Hong Kong's recent development

5.1 Compared with its peers, Hong Kong's carbon market is considered to be at a nascent stage, although there are growing views that the city is well-positioned to become a regional carbon trading centre.[38] According to a preliminary feasibility assessment report issued by the Green and Sustainable Finance Cross-Agency Steering Group in March 2022, Hong Kong is poised to develop a global, high quality VCM.[39] It is envisaged that the creation of a unified carbon market in collaboration with relevant authorities and stakeholders in GBA will help connect global investors with carbon markets on the Mainland.

35 See London Stock Exchange (2022).
36 Ibid.
37 Ibid.
38 See 星島日報(2021) and 香港電台網站(2022).
39 See Hong Kong Monetary Authority (2022).

The Steering Group is deliberating on the most suitable market and regulatory model for Hong Kong, and will prepare a roadmap and implementation plan after consultation with relevant stakeholders.[40]

5.2 Like SGX and LSE, HKEX is playing an active role in promoting the development of carbon markets. It has earlier announced the signing of memorandums of understanding with GFEX and CEEX in the Guangdong Province to explore carbon finance opportunities, as part of the joint effort to promote a unified carbon market in GBA. Recently, HKEX has announced its collaboration with corporates and financial institutions to form the Hong Kong International Carbon Market Council, with a view to gathering insights on building an international carbon market. Furthermore, the first carbon futures Exchange Traded Fund ("ETF") that tracks a carbon futures index has also been allowed to list on HKEX since March 2022, a move that extends the coverage of Hong Kong-listed commodity ETFs to carbon credits.[41]

6. Concluding remarks

6.1 Platforms for trading carbon credits and related products have been gaining momentum. The Guangdong Province, Singapore, and London have all started or planned to offer such platforms to a wide range of potential participants. Yet the carbon-related product offering is rather diverse across the three places, ranging from emission allowances and carbon credits, to derivatives and investment funds. Moreover, these places have instituted credible mechanisms to uphold the quality of the carbon credits, though their approaches differ noticeably: Guangdong Province's CCERs and PHCERs are issued by the relevant ministry/government department, whereas Singapore and London rely on private expert organizations. Singapore also puts in place an international advisory council and is developing guidelines to further ensure the quality of carbon credits.[42]

[40] See GovHK (2022).
[41] Ibid.
[42] The quality of carbon credits is often a concern for market participants. For example, EU has since 2021 refrained from accepting the use of international carbon credits under its 2030 climate and energy framework, partly due to concerns over quality of the credits.

6.2 Carbon credit/fund trading platforms in the Guangdong Province and London would serve to complement their CCMs, while Singapore's carbon market distinguishes itself by concurrently supporting multiple trading modes under various platforms when its carbon exchange is in place. As Hong Kong is planning to develop a global and high-quality VCM, the experience of selected places in developing carbon markets might provide valuable reference.

Research Office
Research and Information Division
Legislative Council Secretariat
27 September 2022
Tel: 3919 3181

Comparison of compliance and voluntary carbon markets

<table>
<tr><th></th><th>Compliance carbon market ("CCM")</th><th>Voluntary carbon market ("VCM")</th></tr>
<tr><td colspan="3">1. Overview</td></tr>
<tr><td>• Key features</td><td>• Trading by entities to fulfill mandatory obligations under national or regional regulatory regimes on emission control</td><td>• Trading by entities on a voluntary basis to meet their own decarbonization goals, or sell carbon credits generated through decarbonization projects</td></tr>
<tr><td>• Market value (in 2020)(1)</td><td>• HK$785 billion</td><td>• HK$2.4 billion
(estimated to rise to as much as HK$235 billion in 2030)</td></tr>
<tr><td>• Common trading modes</td><td>• Exchange-traded, over-the-counter trading and/or auction(2)</td><td>• Exchange-trade, over-the-counter trading and/or auction(3)</td></tr>
<tr><td colspan="3">2. Tradable carbon products</td></tr>
<tr><td>• Emission allowances</td><td>✓</td><td>✗</td></tr>
<tr><td>• Carbon credits</td><td colspan="2">✓</td></tr>
<tr><td>• Derivatives</td><td colspan="2">✓</td></tr>
<tr><td colspan="3">3. Market participants</td></tr>
<tr><td>• Compliance entities</td><td>✓</td><td>✓/✗
(subject to regulations in the jurisdictions of the compliance entities)</td></tr>
<tr><td>• Businesses not under ETSs</td><td rowspan="3">✓/✗
(subject to CCMs' regulations)</td><td rowspan="3">✓
(subject to operation of individual VCMs)</td></tr>
<tr><td>• Institutional investors</td></tr>
<tr><td>• Retail investors</td></tr>
<tr><td colspan="3">4. Major carbon markets</td></tr>
<tr><td>• Examples (Year of launch)</td><td>• Mainland: a national ETS (2021) and seven regional-based ETSs(4) (2011)
• European Union ETS (2005)
• UK ETS (2021)
• Regional Greenhouse Gas Initiative, the US (2009)
• Western Climate Initiative ("WCI")(5), Canada and the US (2011)
• NZ ETS, New Zealand (2008)
• K-ETS, South Korea (2015)</td><td>• CBL Global Emissions Offset Futures, CME Group (2022)
• Singapore (being piloted and further developed)
• London (being studied/developed)
• Hong Kong (being studied)</td></tr>
</table>

(1) See McKinsey & Company et al. (2021).
(2) In CCMs like EU ETS, auctions can be used for allocation of emission allowances to compliance entities.
(3) In VCMs like Singapore, auctions are designed for groups of buyers to bid for unique credit types/projects.
(4) Including the Guangdong Province as well as Beijing, Chongqing, Shanghai, Shenzhen, Tianjin and Hubei Province.
(5) WCI supports four participating jurisdictions (including California State in the US and Nova Scotia Province and Quebec Province in Canada, all of which have cap-and-trade programmes in place, and Washington State in the US for which a cap-and-trade programme will begin in 2023) in executing coordinated auctions and reserve sales of emission allowances that conform to each jurisdiction's requirements. It also maintains a centralized market registry to record and track issuance, transfer and retirement of compliance instruments in accordance with the regulatory requirements of the participating jurisdictions. See Western Climate Initiative (2022).

Key features of carbon markets in selected places

	Guangdong Province	Singapore	London[1]
1. Basic facts			
• Background on establishment	• In 2011, the National Development and Reform Commission (國家發展和改革委員會) announced the launch of seven pilot ETSs, one of which was in the Guangdong Province	• In 2020, the Alliance for Action on Sustainability[2], set up under the Ministry of Trade and Industry, proposed that Singapore could leverage its financial and legal infrastructure to develop an "Asian voluntary carbon credit market at large scale"[3]	• The London Stock Exchange carried out a two-month market consultation during May-July 2022 on the admission and disclosure standards of carbon products, and is pending the consultation conclusions with the publication of final rules (expected to be released in the second half of 2022)
• CCM/VCM	CCM	VCM	VCM[4]
2. Key platform(s) (Year of launch)	• Guangzhou-based China Emissions Exchange (2012) • Guangzhou Futures Exchange (2021)	• Climate Impact X on Singapore Exchange (2021)[5] • Comprises (a) Project Marketplace for direct purchase of carbon credits from specific projects; (b) Auction Platform for unique credit types/projects; and (c) Exchange for standardized contracts	• Voluntary Carbon Market on London Stock Exchange (to be announced)
2.1 Tradable carbon products			
• Emission allowances[6]	✓	N/A	✗[7]
• Carbon credits[6]	✓	✓	✗
• Carbon futures	✓ (expected later in 2022)	✗	✗[7]
• Investment funds	✗	✗	✓[8]

(1) Information pertaining to market participants, tradable carbon products and quality assurance is based on the consultation document.
(2) The Alliance is an industry-led coalition formed in 2020 under the Ministry's Emerging Stronger Taskforce and is tasked to help identify new growth opportunities for Singapore amid the COVID-19 pandemic.
(3) See Monetary Authority of Singapore (2020).
(4) London's proposed VCM is expected to run in parallel with the national UK ETS.
(5) It is expected to become fully operational in early 2023.
(6) They refer to spot trading only.
(7) Emission allowances for the UK ETS and relevant daily futures are traded on ICE Futures Europe, which is owned by Intercontinental Exchange (the parent company of the New York Stock Exchange).
(8) They only include closed-ended funds focusing on climate mitigation projects that are expected to yield carbon credits.

Key features of carbon markets in selected places (cont'd)

	Guangdong Province	Singapore	London
2.2 Market participants	• Primarily local	• Local and international	
• Compliance entities	✓	N/A	✓[9]
• Businesses not under ETS	✓	✓	✓
• Institutional investors	✓ (including qualified foreign investors)	✓	✓
• Retail investors	✓	Information not available	
2.3 Quality assurance of carbon products			
• Certification mechanism(s)/ issuer(s) of carbon credits	• Local: Guangdong Puhui Offset Crediting Mechanism	• Global: Verra and Gold Standard	• Local: UK Woodland Carbon Code, etc. • Global: Verra and Gold Standard, etc.
• Other method(s)	• Using carbon registry to track ownership and location of allowances and/or credits issued	• Using satellite monitoring and blockchain to ensure the quality of credits issued	• Satisfying the VCM designation requirements on investment funds

(9) London's VCM is open to corporates, but it is not clear whether compliance entities can use carbon credits generated through fund investment to offset their emissions.

References^

Hong Kong

1. GovHK. (2022) *Country Backs HK's Green Finance,* 16 June. Available from: https://www.news.gov.hk/eng/2022/06/20220616/20220616_155335_713.html

2. Hong Kong Monetary Authority. (2022) *Carbon Market Opportunities for Hong Kong – Preliminary Feasibility Assessment*. Available from: https://www.hkma.gov.hk/media/eng/doc/key-information/press-release/2022/20220330e3a1.pdf

3. Legislative Council Secretariat. (2022) *Research Task on Development of Carbon Markets in Selected Places*. LC Paper No. RT02/2022. Available from: https://www.legco.gov.hk/research-publications/english/2022rt02-development-of-carbon-markets-in-selected-places-20220510-e.pdf

4. 香港電台網站(2022)：《亞投行：香港有能力成為區域性碳權交易中心》，8月17日，網址：https://news.rthk.hk/rthk/ch/component/k2/1662758-20220817.htm?spTabChangeable=0

5. 星島日報(2021)：《港交所研夥內地　建大灣區碳市場》，9月6日，網址：https://www.singtaousa.com/2021-09-06/港交所研夥內地-建大灣區碳市場/3620769

Guangdong Province

6. China Daily. (2022) *Nation Set to Relaunch Carbon Cut Program*. Available from: https://www.chinadaily.com.cn/a/202206/14/WS62a7c524a310fd2b29e62750.html

7. China Emissions Exchange (Guangzhou). (2020) *Carbon Market and Green Finance in CEEX*. Available from: https://citynet-ap.org/wp-content/uploads/2020/09/CLP3_Qing-Liu.pdf

8. International Carbon Action Partnership. (2022a) *China – Guangdong Pilot ETS*. Available from: https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-57.pdf

9. 陳波(2017)：《論我國碳市場金融化的監管困境及其制度完善》，證券市場導報，9月號，第69-78頁，網址：https://www.szse.cn/aboutus/research/secuities/documents/P020180328494002147530.pdf

10. 廣州市人民政府(2021)：《廣州期貨交易所揭牌成立》，網址：http://www.gz.gov.cn/xw/jrgz/content/post_7229445.html

11. 廣州期貨交易所(2022a)：《產品》，網址：http://www.gfex.com.cn/gfex/index.shtml#page3

12. 廣州期貨交易所(2022b)：《廣州期貨交易所期貨交易者適當性管理辦法》，網址：http://www.gfex.com.cn/gfex/ywbf/202206/c6d0cdf232594975ac6e2c7d777fc5a2.shtml

13. 廣州期貨交易所(2022c)：《廣州期貨交易所境外特殊參與者管理辦法》，網址：http://www.gfex.com.cn/gfex/ywbf/202206/37a4f582c9bf4410b3732b358dbde786.shtml

14. 廣州期貨交易所(2022d)：《關於發布〈廣州期貨交易所交易管理辦法〉等12項業務規則的公告》，網址：http://www.gfex.com.cn/gfex/tzts/202206/1870d1fd9912451bbdbe74a87fcde733.shtml

15. 廣州碳排放權交易所(2017a)：《廣州碳排放權交易中心碳排放權交易風險控制管理細則(2017年修訂)》，網址：http://www.cnemission.com/article/jydt/jygzxl/201708/20170800001337.shtml

16. 廣州碳排放權交易所(2017b)：《關於發布〈廣州碳排放權交易中心會員管理暫行辦法(2017年修訂)〉的通知》，網址：http://cnemission.com/article/news/jysgg/201702/20170200001219.shtml

17. 廣州碳排放權交易所(2022)：《2021年廣州碳排放權交易所市場報告》，網址：http://cnemission.com/article/news/jysdt/202202/20220200002427.shtml

18. 廣東省人民政府(2022)：《廣東省生態環境廳關於印發〈廣東省碳普惠交易管理辦法〉的通知》，網址：http://www.gd.gov.cn/zwgk/gongbao/2022/11/content/post_3919087.html

19. 廣東省生態環境廳(2021a)：《廣東省2021年度碳排放配額分配實施方案》，網址：http://gdee.gd.gov.cn/attachment/0/478/478112/3735194.pdf

20. 廣東省生態環境廳(2021b)：《廣東省控排企業使用國家核證自願減排量(CCER)或省級碳普惠核證減排量(PHCER)抵消2021年度實際碳排放的工作指引》，網址：http://gdee.gd.gov.cn/attachment/0/483/483262/3846741.pdf

Singapore

21. Climate Impact X. (2021) *CIX Completes First-of-its-kind Portfolio Auction of Voluntary Nature-Based Carbon Credits with Leading Global Companies*. Available from: https://uploads%2Dssl.webflow.com/617023faf0a2fb7dfc2e047f/617f995198e81b9589075a01_20211101%2DCIX%20Pilot%20Auction%20Press%20Release.pdf

22. Climate Impact X. (2022a) *CHIMEI is Officially Onboarded with Climate Impact X (CIX), a Global Exchange and Marketplace for Quality Carbon Credits*. Available from: https://uploads%2Dssl.webflow.com/6230bcdb48cea9dee3e38a3b/6278b0a1ff3f422e246023e3_Chimei%20CIX%20News_12042022_V2.pdf

23. Climate Impact X. (2022b) *Climate Impact X and Respira Collaborate on Major Auction for Quality Nature-based Carbon Credits*. Available from: https://uploads%2Dssl.webflow.com/6230bcdb48cea930e5e38a3e/62a926b5ce05e800ae81d90c_Media%20release%20%2D%20CIX%20and%20Respira%20collarate%20on%20auction.pdf

24. Climate Impact X. (2022c) *Climate Impact X Launches Global Carbon Marketplace to Accelerate Climate Action Through Quality Carbon Credits*. Available from: https://uploads%2Dssl.webflow.com/6230bcdb48cea930e5e38a3e/62318cb9db6a33f63ecca969_Project%20Marketplace%20Media%20Release%2016%20March%202022.pdf

25. Climate Impact X. (2022d) *Climate Impact X Selects Nasdaq Technology to Power New Global Carbon Exchange*. Available from: https://uploads%2Dssl.webflow.com/6230bcdb48cea930e5e38a3e/62bba4f9d721c4072b3b8f4d_Media%20release%20%2D%20CIX%20Selects%20Nasdaq%20Technology%20for%20Spot%20Exchange.pdf

26. Climate Impact X. (undated) *CIX Project Marketplace*. Available from: https://www.climateimpactx.com/cix-project-marketplace

27. Ministry of Finance. (2022) *Budget 2022 Speech*. Available from: https://www.mof.gov.sg/docs/librariesprovider3/budget2022/download/pdf/fy2022_budget_statement.pdf

28. Ministry of Sustainability and the Environment. (2022) *Carbon Pricing Act*. Available from: https://www.mse.gov.sg/policies/climate-change/cpa

29. Ministry of Trade and Industry. (2021) *Oral Reply to PQ on Credibility of Carbon Products Traded Through Singapore*. Available from: https://www.mti.gov.sg/Newsroom/Parliamentary-Replies/2021/05/Oral-reply-to-PQ-on-Credibility-of-Carbon-Products-traded-through-Singapore

30. Monetary Authority of Singapore. (2020) *"FinTech for an Inclusive Society and a Sustainable Planet" - Remarks by Mr Ravi Menon, Managing Director, Monetary Authority of Singapore, at Singapore FinTech Festival 2020 on 8 December 2020*. Available from: https://www.mas.gov.sg/news/speeches/2020/fintech-for-an-inclusive-society-and-a-sustainable-planet

London

31. International Carbon Action Partnership. (2022b) *United Kingdom.* Available from: https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-99.pdf

32. London Stock Exchange. (2022) *Market Notice: Consultation on the Creation of London Stock Exchange's Voluntary Carbon Market and Amendments to the Admission and Disclosure Standards*. Available from: https://docs.londonstockexchange.com/sites/default/files/documents/n1222_2.pdf

Others

33. Asian Development Bank. (2018) *The Korea Emissions Trading Scheme – Challenges and Emerging Opportunities*. Available from: https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf

34. CME Group. (2022) *CME Group to Launch CBL Core Global Emissions Offset Futures*, 7 February. Available from: https://www.cmegroup.com/media%2Droom/press%2Dreleases/2022/2/08/cme_group_to_launchcblcoreglobalemissionsoffsetfutures.html

35. European Commission. (undated) *Development of EU ETS (2005-2020)*. Available from: https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020_en

36. IEA/IRENA Renewables Policies Database. (2019) *Regional Greenhouse Gas Initiative (RGGI)*, 26 July. Available from: https://www.iea.org/policies/74-regional-greenhouse-gas-initiative-rggi

37. International Swaps and Derivatives Association. (2021) *Role of Derivatives in Carbon Markets*. Available from: https://www.isda.org/a/soigE/Role-of-Derivatives-in-Carbon-Markets.pdf

38. McKinsey & Company et al. (2021) *Putting Carbon Markets to Work on the Path to Net Zero*. Available from: https://www.mckinsey.com/~/media/mckinsey/business%20functions/sustainability/our%20insights/putting%20carbon%20markets%20to%20work%20on%20the%20path%20to%20net%20zero/putting-carbon-markets-to-work-on-the-path-to-net-zero.pdf

39. New Zealand Ministry for the Environment. (2022) *The NZ ETS Market*, 22 June. Available from: https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/ets/nz-ets-market/

40. Refinitiv. (2022) *Carbon Market Year in Review 2021*. Available from: https://www.refinitiv.com/content/dam/marketing/en_us/documents/gated/reports/carbon-market-year-in-review-2022.pdf

41. UK Department for Business, Energy & Industrial Strategy. (2022) *Guidance Participating in the UK ETS*. Available from: https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets

42. Western Climate Initiative, Inc. (2022) *Our Work*. Available from: https://wci-inc.org/

Note: ^ Internet resources listed in this section were accessed in September 2022.