



ESTIMATION OF
**FINANCED
EMISSIONS**
IN HONG KONG
AND POLICY RECOMMENDATIONS

April-2024

Liang Dong, Linda Chelan Li, Phyllis Lai Lan Mo

Research Centre for Sustainable Hong Kong
City University of Hong Kong

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Executive Summary

Financed emissions refer to the greenhouse gas (GHG) emissions resulting from the investment and lending activities of financial institutions (FIs), including banks, investment managers and insurers. Estimation of financed emissions is an important tangible step towards a full assessment of the impact of FIs' financing and investment activities on climate change and the effectiveness of their climate-related initiatives. The estimated emissions can also provide benchmark information to facilitate science-based target setting on carbon mitigation and designing climate-related disclosure metrics. Understanding the structural data (e.g. portfolio of financial activities) required for measuring financed emissions is critical to formulating FIs' decarbonisation strategy in financial investment. Despite international efforts to peruse the reporting of financed emissions, for instance, initiatives by the Task Force on Climate-related Financial Disclosures (TCFD) and the Partnership for Carbon Accounting Financials (PCAF), progress has been limited because of data deficiency issues. These issues include the lack of emission data of downstream firms and ambiguities in emissions accounting boundary. In the current environmental, social and governance (ESG) or TCFD reports of FIs in Hong Kong and elsewhere, financed emissions have, in most cases, been excluded in the reported indirect Scope 3 emissions, even though financed emissions are, by definition, part of the Scope 3 emissions.

Drawing from PCAF's methodological guidance, this study aims to estimate the financed emissions resulting from bank business loans, residential mortgages and assets under management (AUM) in Hong Kong FIs. To overcome the data deficiency limitation at the FI level, we adopt a 'top-down' approach using the aggregate data on financial activities and related information from the Hong Kong Monetary Authority (HKMA) and Securities and Futures Commission (SFC) of Hong Kong to estimate the by-sector financed emissions associated with the full-scale financial activities. Our estimation hence covers *all* licensed banks and asset managers in Hong Kong. In addition, case studies on several major banks and asset managers are conducted to provide supplementary and detailed analysis.

Highlights of the key findings are:

1. *Overall.* The estimated total financed emissions in Hong Kong reached 380.27 million tonnes (Mt) CO₂e in 2021, involving a business volume of 3.62 trillion USD from residential mortgages, business loans and AUM. In comparison, drawing from recent estimates of financed emissions of other major financial centres, the UK emitted 805 Mt CO₂e in 2019, involving a loan amount of 5.42 trillion USD. The US emitted 1.968 billion tonnes (t) CO₂e in 2020, involving an amount of 11.03 trillion USD. Canada emitted 1.907 billion t CO₂e in 2020, involving an amount of 4.33 trillion USD. Hong Kong has the lowest emission intensity among these jurisdictions (105 t CO₂e/million USD), whereas Canada has the highest (440.42 t CO₂e/million USD). Prudence should be exercised in interpretation, however, given variance in estimation approach and data limitations, as discussed in Section V.
2. *Emissions associated with business loans.* In 2021, the financed emissions associated with business loans (including loans for property, wholesale and retail, manufacture, transportation and logistics and others) in Hong Kong was 31.61 Mt CO₂e. The average emission intensity was 89.7 t CO₂e/million USD. A total of 352.564 billion USD business loans were granted by Hong Kong's bank sector in 2021.
3. *Emissions associated with residential mortgage loans.* In 2021, the financed emissions associated with residential mortgage loans was 2.96 Mt CO₂e. The average emission intensity was 13.34 t CO₂e/million USD. The total value of residential mortgage loans granted by Hong Kong's banks in 2021 was 222.051 billion USD. However, the estimated emissions excluded the embodied carbon emissions from buildings (e.g. emissions embodied in the building materials).
4. *Emissions associated with AUM.* The estimated total financed emissions from AUM in Hong Kong in 2021 was 345.70 Mt CO₂e. The average intensity was 113.45 tCO₂e million USD. The AUM in 2021 was 3.05 trillion USD.

Based on the findings, this report puts forward several policy recommendations to advance the development of Hong Kong as a regional green finance hub and contribute to ongoing decarbonisation efforts in Hong Kong:

1. *Strengthening licensed FIs' GHG emissions disclosure, including financed emissions in the Data Disclosure Portal*

Apart from the Stock Exchange of Hong Kong Limited (SEHK), the HKMA and the SFC should require all licensed FIs to submit ESG reports covering overall GHG emission

data, including financed emissions. The estimated financed emissions can further connect to the current data disclosure portal programmes such as the ‘Calculator and Estimator for Scope 1 and Scope 2 Greenhouse Gas Emissions of a Corporation’ initiated by the Green and Sustainable Finance Cross-Agency Steering Group.

2. *Channelling the investment and financing activities of FIs towards low-carbon enterprises*

FIs can step up the financing support to low-carbon sectors, supported by an improved financed emission data infrastructure, to help drive these sectors to develop, mature and grow in their initial stage. Decoupling the economic system from the high carbon sectors, the economy can then be realised with low carbon intensity in the long run. We observed that other jurisdictions have started to institute similar sustainable investment platforms to speed up net-zero transition.

3. *Improving the green finance certification scheme*

Certification assesses the players (issuers, lenders and borrowers) in financial activities and is a critical component in the development of green industry and practices. Establishing a certification framework is closely associated with growing risk management capabilities. Both endeavours require inputs from research and drive growth in Hong Kong’s training and educational programmes on sustainability and ESG-related themes. Public–private partnerships should be strengthened, with emphasis on the collaboration between the government, FIs, industry and educational and research sector to advance green finance certification research, promotion and execution. In other jurisdictions, for example, the Singapore Green Finance Centre and Sustainable and Green Finance Institute have driven research and innovation in green finance.

4. *Strengthening the training of green-related talents*

Hong Kong can better equip its workforce for the transition towards a sustainable economy by expanding green job opportunities and increasing targeted training programmes. The government can collaborate with academic institutions to introduce a qualification certification framework. Specialised committees, such as the Green Skills Committee in Singapore, may be established to step up planning and guidance in the provision of diverse sustainability-focused training programmes. The institutions that provide relevant training can also adapt and increase resources to design appropriate courses. A licensing system may be considered in the long run to ensure the quality of relevant practitioners in fields related to climate and sustainability.

I. INTRODUCTION

In 2015, 195 members (194 states plus the European Union or EU) of the United Nations joined the Paris Agreement to substantially reduce global greenhouse gas (GHG) emissions. The goals of the agreement are to achieve net zero emissions on or before 2050 and limit the increase in average temperature to 1.5°C above pre-industrial levels by the end of this century. As the financial sector provides financial support to all industries, the business activities of financial institutions (FIs) (e.g. business loans, investments and asset management) become an important driver of emerging low-carbon businesses, pivoting the economy from the existing high-carbon-intensity industries over the long term [1, 2]. In this context, measuring the GHG emissions of FIs is an indicative assessment of the contributions of the financial sector towards carbon neutrality.

Such emissions include not only the direct emissions generated by the operations of the FIs (operational emissions) but also the indirect emissions associated with the lending and investment activities (financed emissions). The Carbon Disclosure Project estimates that, as of 2020, financed emissions by banks globally are over 700 times greater than their own direct emissions [3]. The measurement and disclosure of financed emissions can provide a scientific basis for the government and regulators to assess the effectiveness of green finance policies and formulate standards and guidelines towards the net-zero transition of FIs. How to achieve a good measurement—and disclosure—is thus of pertinent importance.

This study estimates the financed emissions in Hong Kong, covering all banks licensed by the Hong Kong Monetary Authority (HKMA) and asset management companies licensed by the Securities and Futures Commission (SFC) of Hong Kong. Our estimation involves three types of investment and financing activities: residential mortgages, business loans and assets under management (AUM), totalling 222.051 billion USD, 352.564 billion USD and 3.05 trillion USD, respectively. Owing to corporate-level data limitation in the disclosure of financial activities to date, we have adopted a ‘top-down’ approach to estimate the emissions, using aggregated and by-sector financial activity data available from the HKMA and SFC and official annual reports from major FIs. Case studies on

several major banks and asset managers, where more corporate-level data are available, are also conducted for detailed analysis.

To estimate emissions from the sector-wide lending and investment activities, we have applied the estimation formulas of the Global GHG Accounting Standard for the Financial Industry of the Partnership for Carbon Accounting Financials (PCAF) [4]. Our estimates indicate that, in 2021, Hong Kong's FIs generated financed emissions totalling 380.27 million tonnes (Mt) CO₂e from business loans (31.61 Mt CO₂e), residential mortgages (2.96 Mt CO₂e) and AUM (345.7 Mt CO₂e). In comparison, direct GHG emissions (which refer to Scope 1 and Scope 2 emissions and calculated under the Intergovernmental Panel on Climate Change (IPCC) guidance) generated by all sectors in Hong Kong in 2021 amounted to 34.7 Mt CO₂e.

II. GHG EMISSION DISCLOSURE STANDARDS

During the past few years, several important initiatives to promote carbon emission-related disclosure have emerged [5-7]. The Taskforce on Climate-related Financial Disclosures (TCFD) is established under the Financial Stability Board to step up the development of measures to improve the corporate-level climate-related disclosures of FIs. The Sustainability Accounting Standards Board (SASB) has continuously worked to improve industry-specific standards on environmental, social and governance (ESG) metrics. The International Sustainability Standards Board (ISSB) of the International Financial Reporting Standards Foundation (IFRS) issued two sustainability disclosure standards in 2023 (IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures).

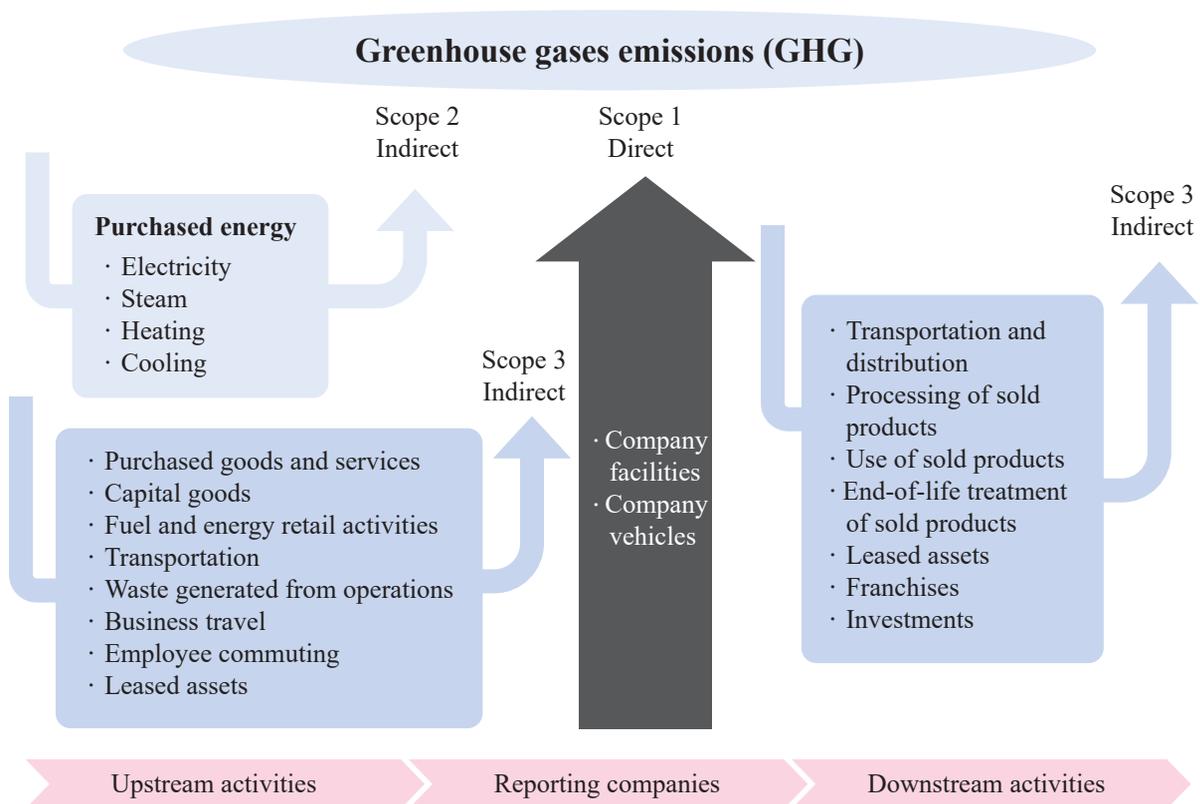
Against the background of stepped-up international reporting standards and related methodologies, which provide improved theoretical guidance to report firm-level GHG emissions, multiple practical issues have persisted. These issues include limited data availability at firm level, incompatibility of methodology for emissions accounting and lack of clarity in accounting scope, for example, the complicated Scope 3 emissions [8, 9]. As a result, in the latest corporate ESG or TCFD reports of FIs, financed emissions are still mostly excluded. Regulators in the EU, the US and other jurisdictions are signalling expectations for enhanced climate-related disclosure and instituting strict requirements. Although disclosure of financed emissions is voluntary in the US, it would be mandatory in the EU by June 2024, according to the requirement of the Sustainable Finance Disclosure Regulation [10]. In Hong Kong, in response to these international trends and in alignment with the international climate accounting regime from ISSB (IFRS S1 and S2), the SEHK recently announced plans to extend the existing mandatory climate-related disclosure requirements to cover various aspects on governance structure, reporting principles and reporting boundary. This expansion is set to take effect in January 2025.

III. SCOPE, APPROACH AND METHOD

Scope of GHG emissions

The GHG Protocol jointly issued by the World Business Council Sustainable Development (WBCSD) and the World Resources Institute (WRI) classifies GHG emissions into three scopes [5]. Scope 1 emissions refer to direct emissions from company-owned and controlled resources, whereas Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions that occur in the up/downstream value chain of the company (Figure 1). As shown in Table 1, for FIs, financed emissions are part of Scope 3 emissions [9], which are emissions associated with their investment and lending activities in the supply chain for capital formation.

Figure 1 Scope 1, Scope 2 and Scope 3 of GHG Emissions



Source: Constructed by the authors with reference to WRI and WBCSD, 2011

Table 1 Scope and Relationship of Scope 1, Scope 2, Scope 3 and Financed Emissions for Financial Institutions

Direct Emission	Indirect Emission		
Operational Emission			Financed Emission
Scope 1	Scope 2	Scope 3 (3-1 and 3-2)	Scope 3 (3-3)
Direct emissions from company-owned and controlled resources.	Indirect emissions from the purchased energy, e.g. electricity consumed.	Indirect emissions from companies' operations, e.g. staff's business trip and waste management.	Indirect emissions associated with financial activities in the supply chain. They include the borrowers or investees' Scope 1, Scope 2 and Scope 3 emissions.

Approach

Our estimation covers three types of investment and financing activities of banks and asset managers in Hong Kong as of 2021: residential mortgages, business loans and AUM. We have not covered insurance because of data limitations and constraints.¹

In principle, the financed emissions can be accounted on the basis of by-sector financial activity and emission factor. The financial activity means the monetary volume of certain financial activity, and the emission factor is determined by the detailed energy consumption of the activity. In operation, two approaches --- 'top-down' and 'bottom-up' --- could be used depending on the data availability (see Appendix for details). This study adopts a 'top-down' approach for the estimation, employing the sector-wide data from the HKMA and SFC of Hong Kong and the official annual reports from major FIs. In addition, we have conducted case studies on three selected major banks and 18 asset managers for detailed analysis.

Our approach is materially different from prior relevant studies on the UK and the US [11, 12]. The UK and US studies adopted a bottom-up approach based on a sample of selected FIs. They also covered Scope 1 and Scope 2 emissions of borrowers and investees only, excluding Scope 3 emissions resulting from the FIs' loans or investment. Compared with the scope of these studies, our estimation covers a broader scope in terms of the scale of the financial sector (as we employ sector-wide information) and the scope of the emissions resulting from the FIs' lending and financial activities (as we cover the full scope of financed emissions associated with targeted financial activities).

¹ The first global measurement standard for insurance-associated GHG emissions was launched in late 2022 [14]. However, obtaining data and calculating insurance-associated emissions from a diverse client base (including large corporations, small businesses and individuals) is beyond the reach of this project.

Estimation methods

According to PCAF [4], GHG emissions of FIs are estimated on the basis of economic activity data and the corresponding carbon emission factor. Activity data is a quantitative measure of the scale of investment and financing activities. Activity data can be collected from diverse public sources, such as government publications and reports from individual firms. Emission factor is the amount of GHG emitted per unit of consumption of an emission source and is used to convert activity data into GHG emissions. Emission factors are usually available from government statistical yearbooks and international databases, such as EXIOBASE.

On this basis, following the methodology of PCAF, our approach to estimating financed emissions of FIs principally involves two parts: (a) determining the activity and quantity driven by financial activities and (b) distinguishing the economic sector to which the activity belongs to determine the corresponding emission factor.

Estimation of financed emissions from residential mortgages and business loans

Residential mortgage and business loans are the two main businesses of the banking sector in Hong Kong. For mortgage and business loans, the formula for estimating GHG emissions is:

$$\sum_c \text{Outstanding investment}_c \times \text{Asset turnover ratio}_s \times \frac{\text{GHG emission}_s}{\text{Turnover}_s}$$

Where outstanding investment is the loan amount, and asset turnover ratio refers to the operation cycle of different asset classes (the period is usually one year). The average annual volume of financial activities such as loans can then be estimated. GHG emissions/ Turnover is the emission factor of the sector to which the loan belongs estimated on an annual basis.

We obtained emission factors for different sectors from statistical yearbooks or corresponding global economy-sector databases (e.g. EXIOBASE). We arrived the annual asset turnover ratio for different sectors either from public statistics, if available, or through estimation (see Appendix for estimation formulae and details).

We obtained the total value of residential mortgage and business loans from approved institutions in Hong Kong in 2021 (Column 1) through ‘Loans and Advances’ in the HKMA’s *Monthly Statistical Bulletin*.

Table 2 Estimation Parameters for Carbon Emissions by Sector from Residential Mortgage and Business Loans in Hong Kong

	Estimation Parameters		
	Column 1	Column 2	Column 3
	Outstanding investment* (million USD)	Carbon emission factor by sector (tCO ₂ e/million USD)	Asset turnover ratio
Residential Mortgage Loans	222,051	444.65	0.03^a
Business Loans			
Property Loan	164,487	74.0	0.02 ^b
Wholesale and Retail	28,333	141.8	1.53 ^b
Manufacturing	25,128	444.65	1.57 ^b
Transportation and Logistics	28,846	259.8	0.19 ^b
Others	105,769	182.0	-

Source: *Outstanding investment from HKMA statistics, 2021

Note:

a. We assume a 30 year's payback time, $1/30=0.03$

b. See "Table S-1 By-sector turnover ratio applied in this study in the Appendix.

Column 2 presents the emission factor information by sector. No official or authoritative data on emission factor by sector are available in Hong Kong, so we have referred to EXIOBASE figures, which are compiled by the EU and adopted by 28 EU countries and 16 other major economies (Figure S-1 in the Appendix). These figures include a life cycle table for different sectors covering more than 160 sectors, 200 products, 400 emission items and 662 raw materials. As for the asset turnover ratio in Column 3, we have employed statistics on Hong Kong when such are available; when unavailable, we have used the average of China, Korea, the US and Japan as a proxy measure (Figure S-2 and Table S-2 in the Appendix).

Estimation of financed emissions from AUM

Hong Kong is one of the world-leading asset management hubs, with 3.05 trillion USD of AUM in 2021 [13]. We have estimated AUM-driven emissions according to the guidelines of PCAF (see Table S-3 in the Appendix).

We estimated the emissions from AUM using top-down approach. To obtain the emission intensity of AUM, there are two ways depending on data availability.

When the portfolio information is available:

*Average carbon emission intensity = Σ (Amount of AUM of different sectors * Emission factor of the sector * Asset allocation ratio by sector) / Σ Amount of AUM*

We have investigated the publicly published annual reports of asset management companies to collect their asset allocation data. Out of 18 asset management companies with 1.395 trillion USD of AUM (Table S-4 in the Appendix), only two companies (FIL and JP Morgan) disclose their asset management portfolios (Figure S-3 in the Appendix). We have estimated the emission intensity of these two companies through asset allocation data and the corresponding carbon emission factors of different sectors.

When the portfolio information is unavailable, we have investigated the emission intensity data from the asset managers' reports. Five other asset managers directly disclosed their 'average emission intensity' (Figure 11 in 'Results by financial activities').

In addition to the two previously estimated emission intensity values using portfolio information, we have seven asset managers with emission intensity values. We used these seven values to calculate a weighted average (considering their volume of AUM) emission intensity to represent the emission intensity for all of AUM. The details of the estimation on weighted average emission intensity are presented in the 'Financed emissions from AUM' section.

IV. KEY FINDINGS

Summary of results

Our estimates indicate that the total GHG emissions (financed emissions) generated by Hong Kong FIs' loans and AUM were 380.27 Mt CO₂e in 2021. These emissions were from residential mortgage loans (2.96 Mt CO₂e), business loans (31.61 Mt CO₂e) and AUM (345.70 Mt CO₂e) (Table 3).

Table 3 Hong Kong's Financed Emissions (Bank loans and AUM), 2021

Financial activities	Financial volume million USD	Emission intensity tCO ₂ e/million USD	Financed emission Mt CO ₂ e
Bank loans	574,615	60.18	34.57
· Business loans	· 352,564	· 89.68	· 31.61
· Residential mortgages	· 222,051	· 13.34	· 2.96
AUM	3,047,101	113.45	345.70
Total	3,621,716	105	380.27

These figures highlight the significant scale of financed emissions in Hong Kong. The results of other international financial centres also delivered a similar message. For example, a recent study of London's financed emissions, based on a sample of 15 banks and 10 asset managers, gives an estimate almost 1.8 times more than the UK's domestically produced emissions [11]. The UK study calculates the financed emissions of the selected FIs, covering the borrowers' and investees' Scope 1 and Scope 2 emissions across a range of economic sectors. Two studies on the emissions of New York's financial sector find that GHG emissions produced by cash deposits and investments in New York are twice more than those generated by transportations [17], or larger than the world's 5th largest GHG emitting country in 2020 --- Japan, with a total emission of 1.06 billion ton CO₂e) [12].

Results by financial activities

Financed emissions from business loans by sector

On the basis of the HKMA's statistics of the total amount of business loans by sector, with the by-sector emission factors and turnover ratios (Figure S-1 and Table S-1 in the Appendix), the estimated financed emissions from each sector are presented in Figure 2. With a total of 31.61 Mt CO₂e, 55.5% of the financed emissions are from the manufacturing sector (17.54 Mt CO₂e), although the amount of loans for this sector is the lowest among the different types of business loans in 2021, as shown in Figure 3. Figure 4 indicates that the emission intensity for the manufacturing sector is the highest (698.1 tCO₂e/million USD) among the sectors and is significantly higher than the average emission intensity for all business loans (89.68 tCO₂e/million USD).

Figure 2 By-sector Financed Emissions from Business Loans in Hong Kong, 2021

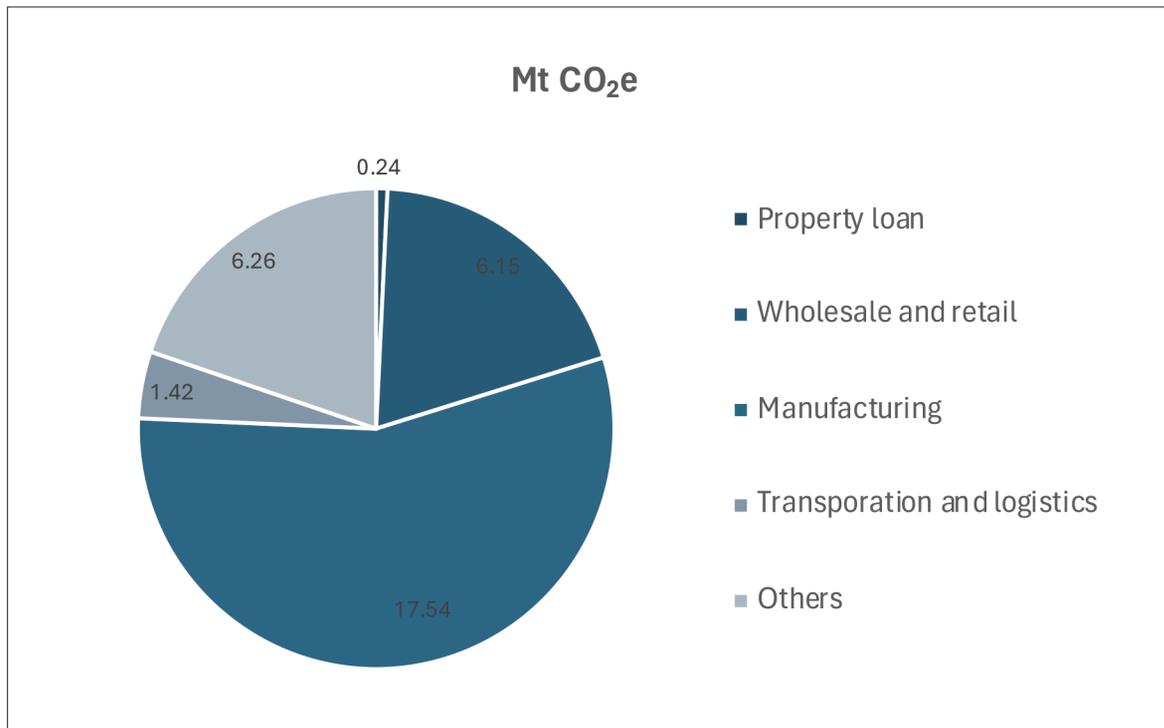
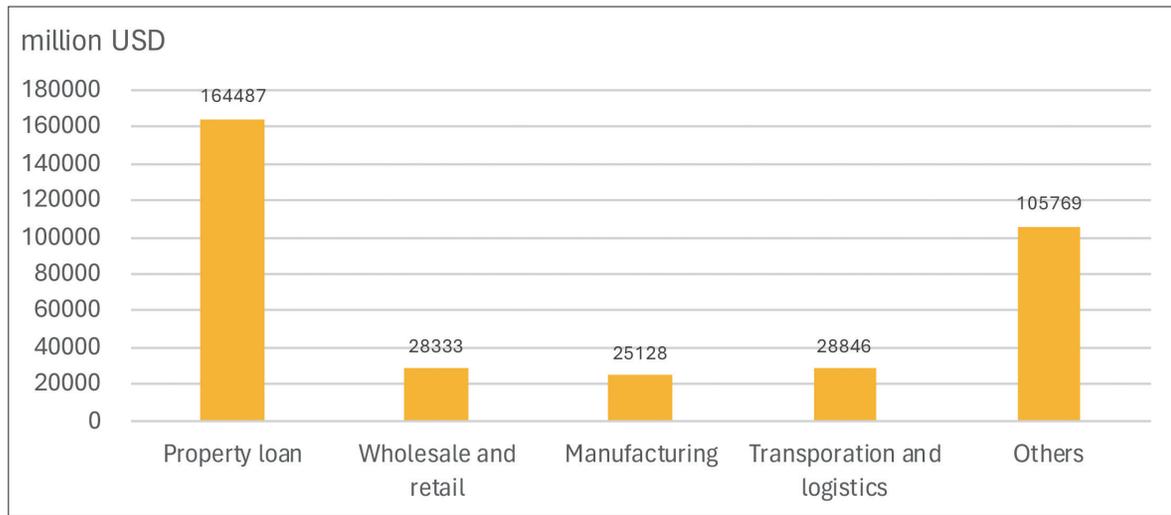
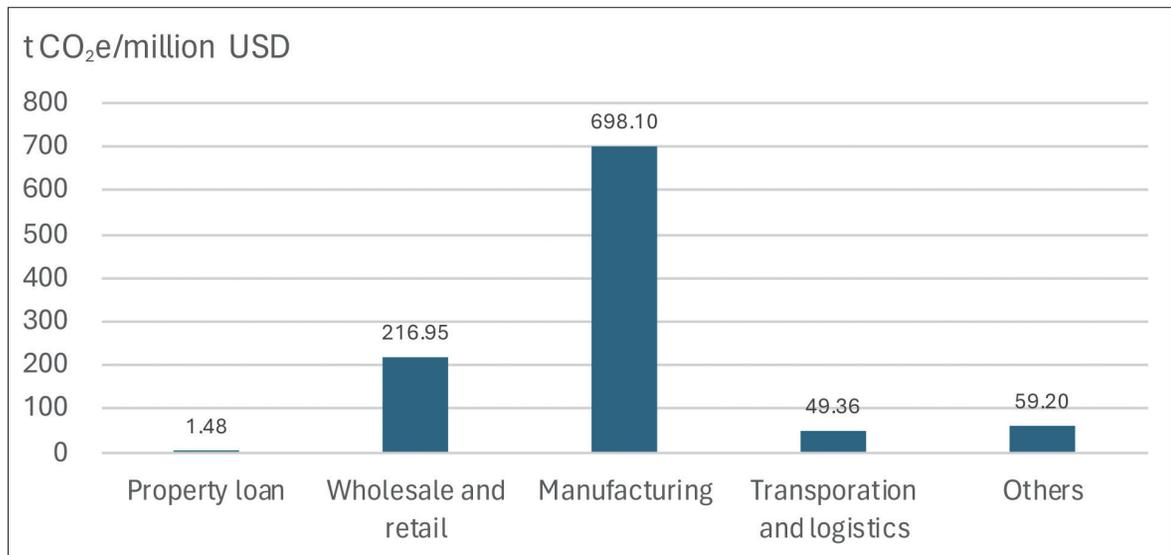


Figure 3 By-sector Business Loans in Hong Kong, 2021



Source: HKMA Annual Report 2021

Figure 4 By-sector Emission Intensity of Business Loans in Hong Kong, 2021





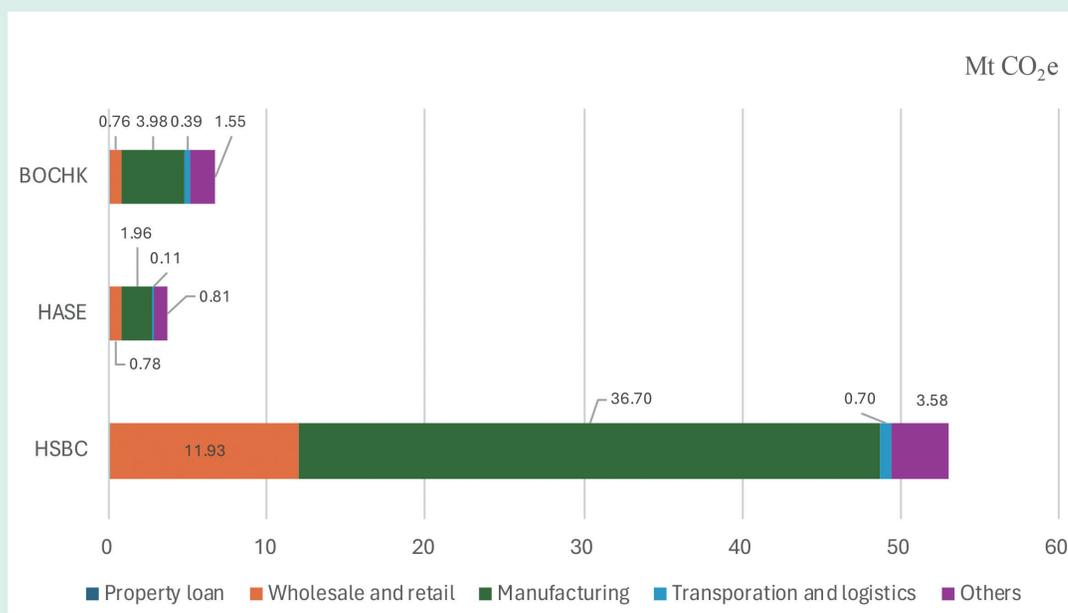
Case study:

Financed emissions from business loans of three major banks

Three major banks in Hong Kong, namely, Hong Kong & Shanghai Banking Corporation (HSBC), Hang Seng Bank (HASE) and Bank of China (Hong Kong) (BOCHK), were selected for a case study on business loan. The HSBC data refer to the global value and do not differentiate loans contracted in Hong Kong and those contracted in the rest of the world.

The estimated financed emissions from HSBC, HASE and BOCHK were 53.03 Mt CO₂e (global value), 3.70 Mt CO₂e and 6.73 Mt CO₂e, respectively (Figure 5). These figures were estimated based on their respective carbon emission intensity (Figure 6) and by-sector business loans in 2021 (Figure 7). The carbon emission intensity for HSBC, HASE and BOCHK were 201.05, 71.84 and 90.17 tCO₂e/million USD, respectively, compared with the average of 89.68 tCO₂e/million USD from business loans in Hong Kong. The higher value of HSBC's financed emissions was partly due to the observed higher proportion of loans to carbon intensive sectors like manufacturing industries.

Figure 5 By-sector Financed Emissions from Business Loans of Three Major Banks



Note: HSBC data represent global value.

Figure 6 Emission Intensity of Business Loans in Hong Kong's Major Banks

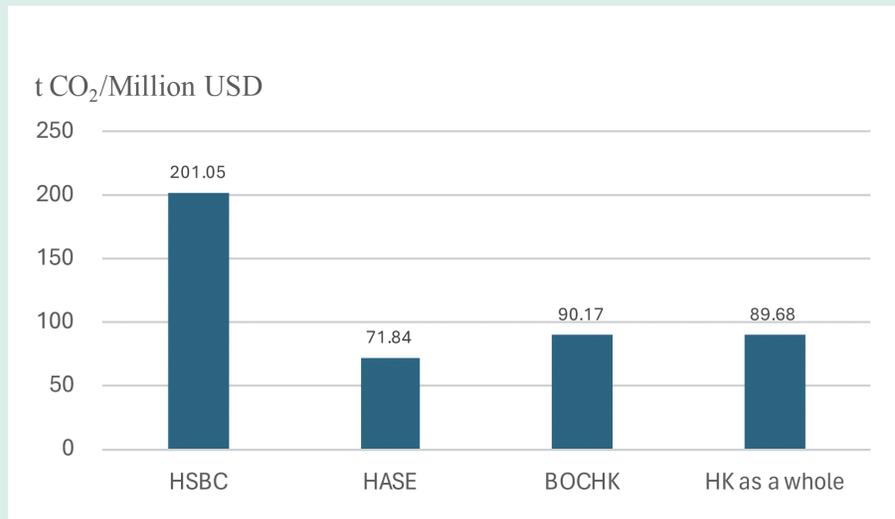
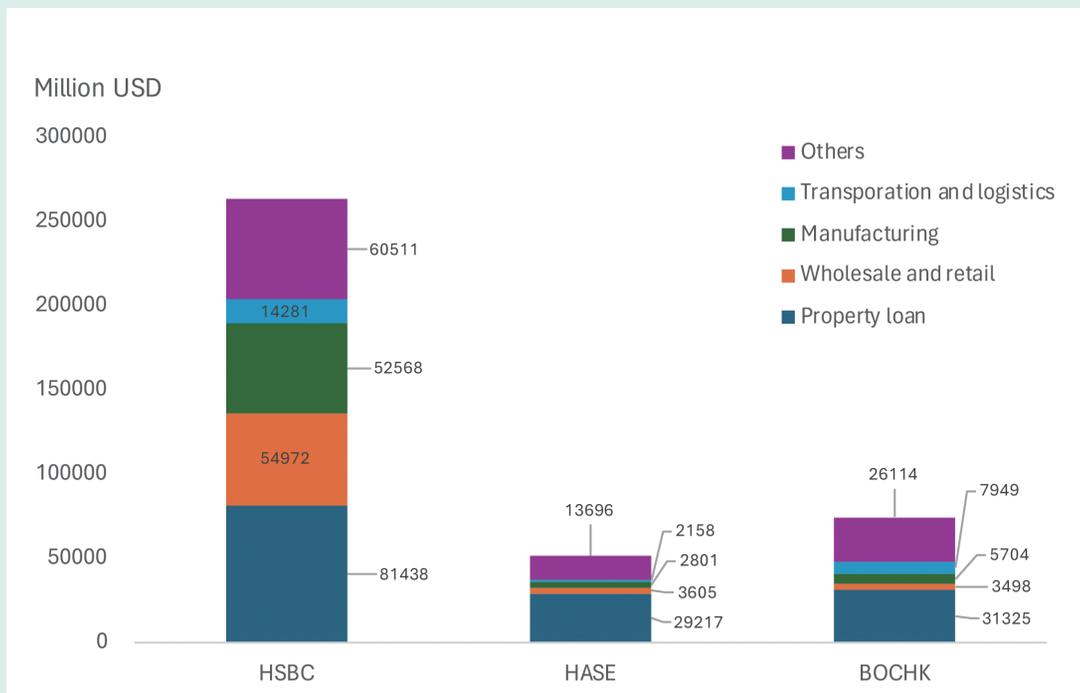


Figure 7 By-sector Business Loans in Three Major Banks, 2021

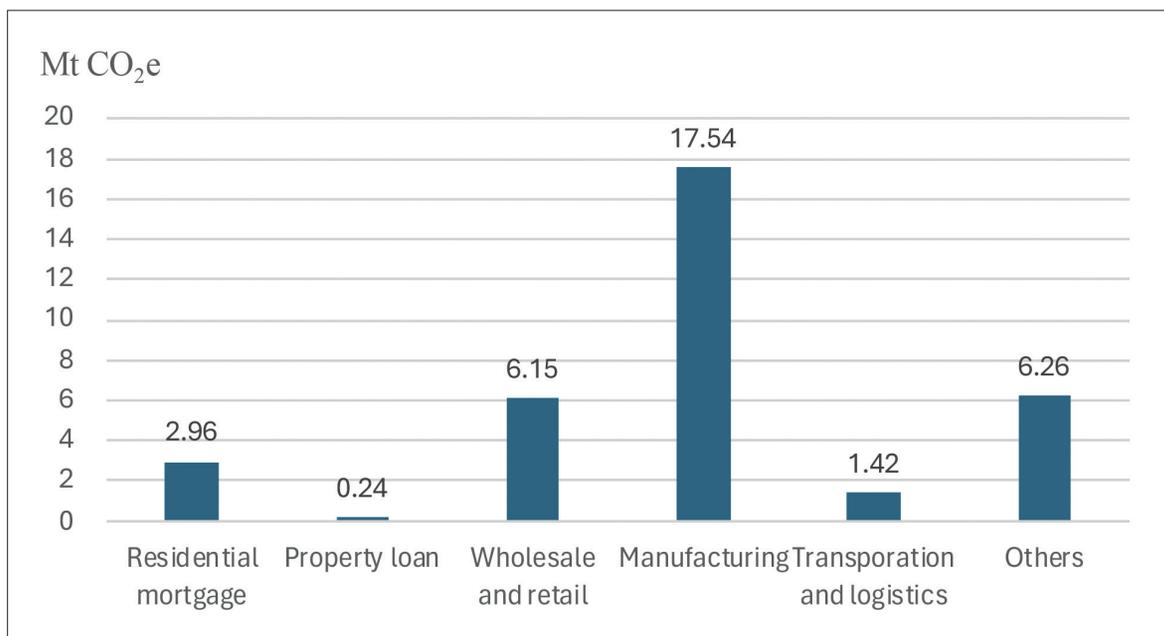


Data source: HSBC, HASE and BOCHK Annual Report 2021

Financed emissions from residential mortgage loans

The estimation of financed emissions from residential mortgage loans is based on the outstanding investment volume of residential mortgages, relevant emission factors and turnover ratios (Figures S-1 and S-2 in the Appendix). The estimated financed emissions from mortgages in 2021 were 2.96 Mt CO₂e (based on a residential mortgage payback time of 30 years). Figure 8 illustrates the total financed emissions from residential mortgages and its comparison to the financed emissions from business loans. The emission intensity was 13.34 tCO₂e/million USD.

Figure 8 Financed Emissions from Residential Mortgages and By-Sector Business Loans, 2021



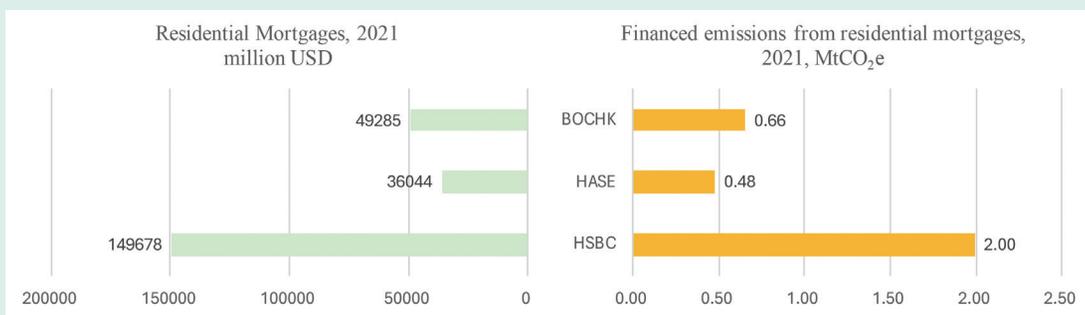


Case study:

Financed emissions from residential mortgages of three major banks

Most residential mortgage loans in Hong Kong were from HSBC, HASE and BOCHK. The amounts of residential mortgages in HSBC, HASE and BOCHK were 149,678 million USD, 36,044 million USD and 49,285 million USD in 2021, respectively. Accordingly, the estimated financed emissions from residential mortgages of HSBC, HASE and BOCHK were 2.00, 0.48 and 0.66 Mt CO₂e, respectively (Figure 9). As in the case of business loans, HSBC did not disclose by-sector mortgage loan data for their operations in Hong Kong and the rest of the world. Therefore, the values for HSBC are global.

Figure 9 Residential Mortgage Loans and Financed Emissions: 3 Major Banks



Financed emissions from bank loans in Hong Kong (2021)

According to the above estimation and analysis, the total financed emissions from business and residential mortgage loans were 31.61 Mt CO₂e in 2021.

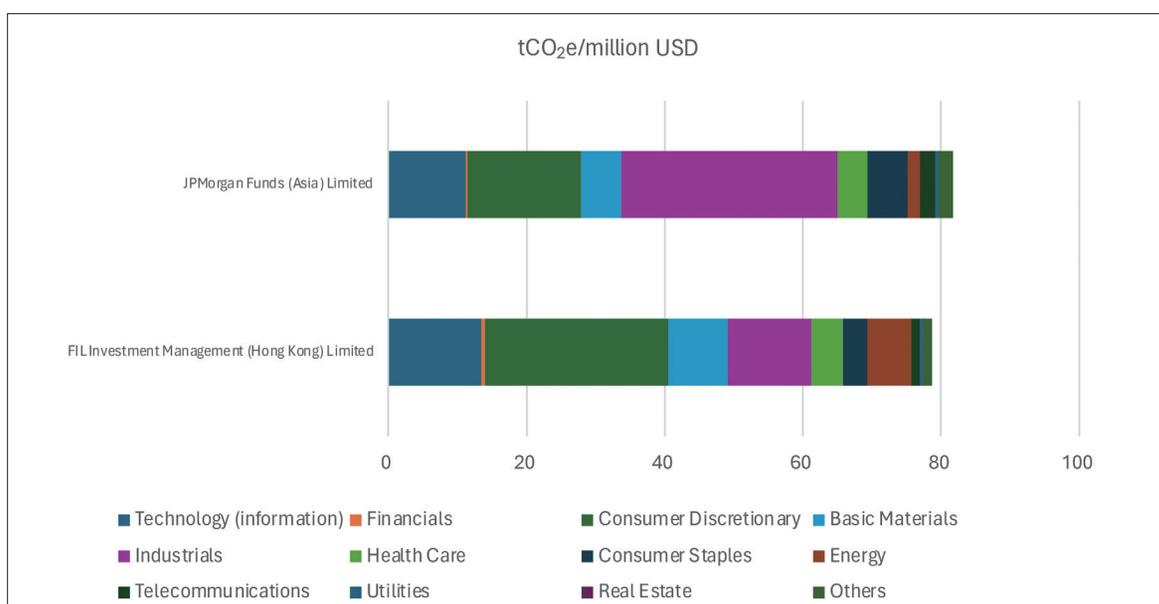
The comparison of by-sector emissions reveals that the industries engaged in the loans affect the emissions. Hong Kong's major banks currently provide more loans to high-carbon-intensity sectors like manufacturing than low-carbon-intensity sectors. In the future, redirection of loans to low-carbon-intensity sectors, such as the high-tech and green-tech sectors, will be helpful to support the decarbonisation of the economy.

Financed emissions from AUM

The weighted average emission intensity is calculated as the average emissions per unit investment or AUM across various asset managers with varying AUM sizes. It is utilised to approximate the financed emissions associated with AUM. The emission intensities can be either estimated by analysing portfolio information or derived from a company’s report based on available data samples.

To estimate the financed emission intensity for AUM with available portfolio data, we have collected the available portfolio information to calculate the average emission per investment for FIL and JP Morgan, two major asset managers listed in Hong Kong, to compile the emission intensity. Based on the AUM by breakdown (Figure S-3 in the Appendix), the estimated average emission intensity for FIL and JP Morgan was 78.78 and 81.62 t-CO₂e/million USD, respectively (Figure 10).

Figure 10 Weighted Aggregated Values for Carbon Intensity: FIL and JP Morgan

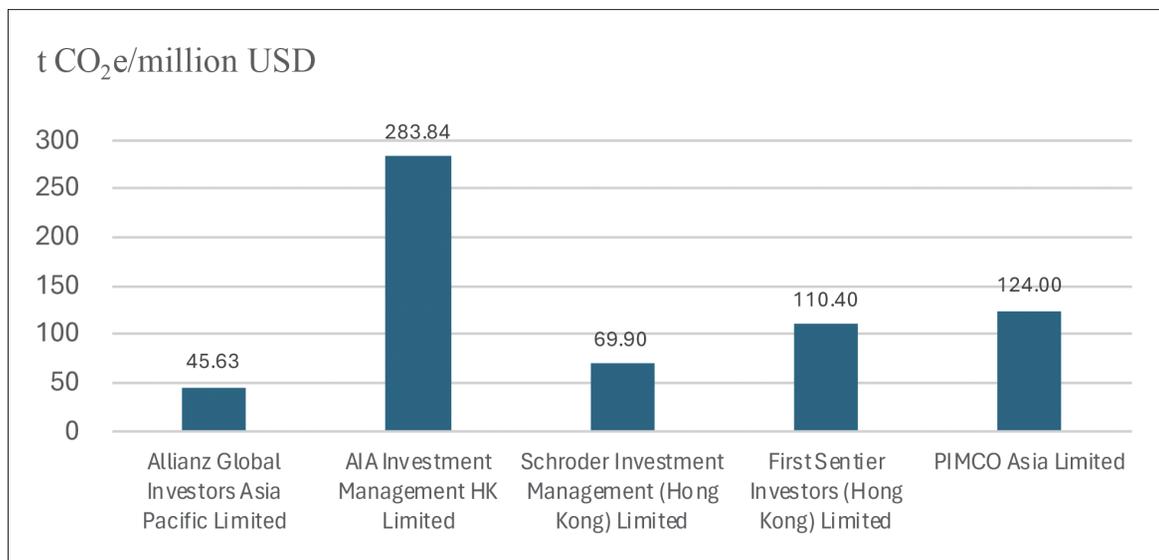


We also obtained the disclosed emission intensity data directly from the ESG and TCFD reports of five asset managers (Figure 11). The intensity values range from 45.63 to 283.84 t CO₂e /million USD. For the 18 selected major asset managers, the related emissions—a total of 155.30 Mt CO₂e—are listed in Figure 12.

By the weighted aggregation of these disclosed values and calculated values of FIL and JP Morgan, the average carbon emission intensity value estimated was 113.45 t CO₂e / million USD. Based on this carbon intensity value and the total AUM, the estimated full-scale financed emissions from asset management are 345.70 Mt CO₂e.

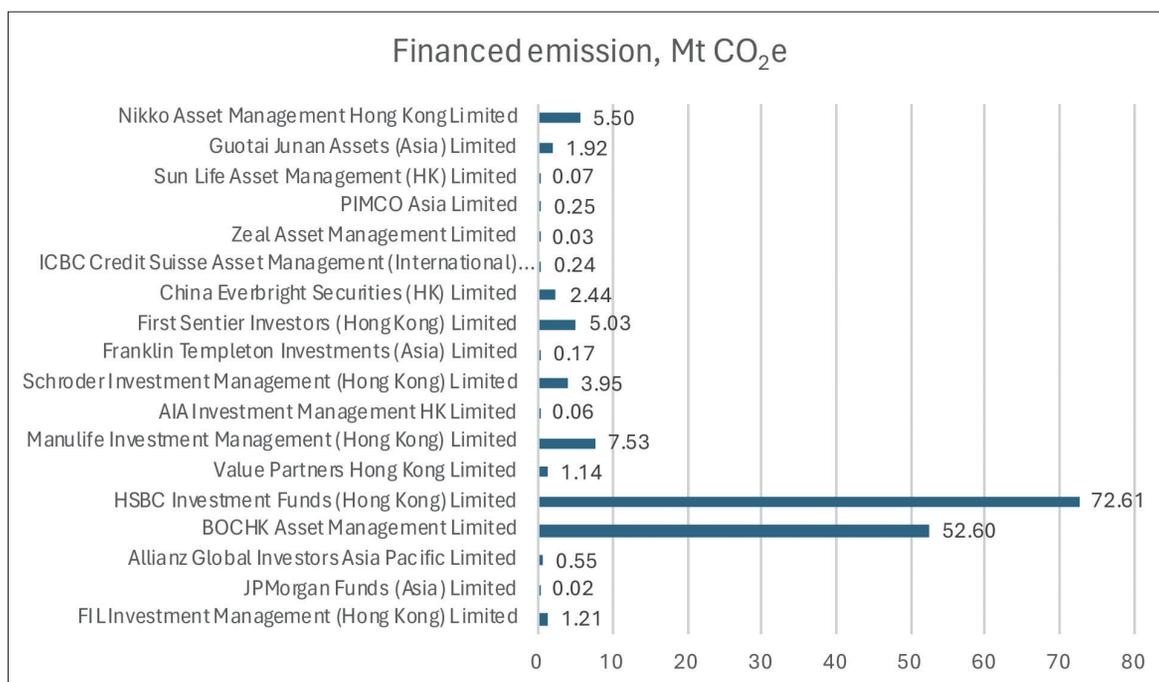
It should be emphasized that the above estimations are based on the average intensity values calculated from sample information and should thus be read with caution.

Figure 11 Disclosed Carbon Intensity for Investment of Major Asset Managers



Source: ESG and TCFD reports of the asset managers

Figure 12 Estimated Financed Emissions from Sample Asset Managers, 2021



V. COMPARISON WITH FINANCED EMISSIONS IN OTHER JURISDICTIONS

Table 4 presents the GHG emissions from the financial sector in Hong Kong, the UK, the US and Canada. Hong Kong emitted 380.27 Mt CO₂e, involving a business volume of 3.62 trillion USD. The UK emitted 805 Mt CO₂e, involving a loan amount of 5.42 trillion USD. The US emitted 1.968 billion t CO₂e, involving an amount of 11.03 trillion USD. Canada emitted 1.907 billion t CO₂e, involving an amount of 4.33 trillion USD. In terms of emission intensity, Hong Kong has the lowest among the jurisdictions (105 t CO₂e/million USD), whereas Canada has the highest (440.42 t CO₂e/million USD).

Table 4 Comparison of GHG Emissions in the Financial Sector across Jurisdictions

			The UK (2019)	The US (2020)	Hong Kong (2021)	Canada (2020)	
Total Emissions Amount involved	Emission intensity	tCO ₂ e /million USD	148.50	178.37	105	440.55	
	tCO ₂ e	805 million	1.968 billion	380.27 million	1.907 billion		
	USD	5.42 trillion	11.03 trillion	3.62 trillion	4.33 trillion		
Bank	Total loans and lending	Emission intensity	tCO ₂ e /million USD	152.03	126.04	60.18	/
		Emissions	tCO ₂ e	415 million	668 million	34.57 million	/
		Amount involved	USD	2.73 trillion	5.30 trillion	574.6 billion	/
	Business loans	Emission intensity	tCO ₂ e /million USD	/	/	89.68	/
		Emissions	tCO ₂ e	/	/	31.61 million	/
		Amount involved	USD	/	/	352.5 billion	1.34 trillion
	Residential mortgage	Emission intensity	tCO ₂ e /million USD	/	/	13.34	/
		Emissions	tCO ₂ e	/	/	2.96 million	/
		Amount involved	USD	/	/	222 billion	/
AUM	AUM	Emission intensity	tCO ₂ e/ million USD	144.93	226.76	113.45	/
		Emissions	tCO ₂ e	390 million	1.30 billion	345.7 million	/
		AUM sampled	USD	2.69 trillion	5.73 trillion	3.05 trillion	/
		Total AUM	USD	6.90 trillion	27.30 trillion	3.05 trillion	/
		Sample coverage	%	39%	21%	100%	/

Data sources: The Hong Kong figures are compiled and collated by the authors (see Estimation Methods). The UK figures are sourced from WWF (2021) The Big Smoke Report [11]. The US figures are from CAP (2021) Wall Street's Carbon Bubble [12]. The Canadian figures are from X. Hubert Rioux (2022), A Closer Look at the Carbon Footprint of Canadian Bank Portfolios [18].

We draw attention to the following differences among the studies when interpreting the comparative figures in the table:

1) Differences in the estimation approach and coverage.

As emphasised, our estimation approach differs from that of other studies in the UK and the US. We have used the weighted average emission intensity of the sample enterprises (i.e. 113.45 t CO₂e/million USD) as the overall carbon emission intensity to estimate the financed emissions from the full-scale AUM. The small sample size and large variance of the emission intensity among the samples (from more than 40 t CO₂e/million USD to more than 200 t CO₂e/million USD) may, in theory, lead to underestimation.

By contrast, the UK and the US studies used a ‘bottom-up’ method to calculate the financed emissions of a relatively small number of major FIs (the sample coverage for AUM in the UK and US is 39% and 21%, respectively). From the perspective of scope issues, their estimation covers the Scope 1 and Scope 2, but not the Scope 3 emissions of the borrowers and investee companies (see Table 1 for explanation on the scopes of emission). Hence, their results can be seen as a part of financed emissions from the banks and asset managers.

2) Differences in industrial structures

When discussing the carbon emission intensity of investment and financing in each country and region, the local business environments must be considered to fully assess whether the emission intensity is higher or lower than the targeted state. Each region has its specific factors contributing to carbon emission intensity. The industrial structure of Canada (based on eight major banks) is relatively homogeneous, and high-carbon sectors such as mining and oil and gas are the leading sectors, resulting in a significantly higher financed emission intensity. Compared with those in Canada, the investment portfolios of large FIs in the UK and the US comprise a more diverse range of industries. Although the traditional relatively high carbon sectors still account for a larger proportion, their emission intensity is significantly lower than that of Canada. On the contrary, the emission intensity of many large manufacturing and energy enterprises in the UK and the US is higher than the estimated emission intensity of those in Hong Kong. Specifically, for FIs in Hong Kong, many of their investment and financing activities are focused on the Greater Bay Area. Compared with the Beijing–Tianjin–Hebei region, the Greater Bay Area and the Yangtze River Delta have a higher proportion of light industries. Loans to local businesses are focused on the service industry. For example, the loans from Hong Kong’s banks to the manufacturing sector, the largest source of pollution, are only USD 25.128 billion in 2021, accounting for less than 10% of its overall business loans.

Although services represent the dominant sector in Hong Kong and the industrial structure in the Greater Bay Area is also dominated by light industry, this study reveals that the emission intensity in Hong Kong is not significantly low, indicating that its investment and financing structure still has great low-carbon potential. That is, investment and financing will/can shift to more high-tech and green industries, such as hydrogen energy and new energy power generation.

VI. MAJOR CONCLUSIONS

Overall, we estimated the financed emissions from Hong Kong's financial sector to be 380.27 Mt CO₂e in 2021 (2.96 Mt CO₂e from residential mortgages, 31.61 Mt CO₂e from business loans and 345.70 Mt CO₂e from AUM). However, we faced challenges and limitations in our estimation. Firstly, the basic data are incomplete, especially for AUM. Hong Kong regulators do not require asset management companies to disclose their asset allocations, so we resorted to using sample data in the estimation. In addition, without official or authoritative statistics for the emission factors by sector and asset turnover ratios in Hong Kong, we used the emission factors from internationally accepted databases such as EXIOBASE and those from the literature.

Despite the limitations, the estimation of financed emissions is an important first step in taking stock of the current situation of financed emissions in Hong Kong. This report can, hopefully, increase the awareness of the society about financed emissions, and this first step can pave the ground for further research to develop better accounting criteria and methods.

The data limitations encountered in this study suggest the priorities for future emission reduction policies. The Hong Kong government, regulators and the community as a whole need to work together to develop better mechanisms for emission estimation, including the formulation of rules requiring FIs to disclose comprehensive financial activities and the delineation of emission factors appropriate to Hong Kong. To encourage FIs to promote emission reduction in other economic sectors through their investment and financing activities, the carbon emissions of their investment and financing portfolios should be transparent and clearly accounted for. With the availability of these data, financed emissions can be estimated and properly disclosed as a benchmark for FIs to formulate strategies to transit to a net zero target. After all, Hong Kong's financial sector plays an important role locally and globally and should play a more central role in the global carbon emission agenda. Therefore, improving the information and data on financed emissions from FIs is indispensable for promoting the development of Hong Kong as a regional green finance hub.

VII. POLICY RECOMMENDATIONS

The Hong Kong government has been vigorously promoting green finance and mitigating emissions within the financial sector. Our research aims to complement and further advance the ongoing initiatives, in particular, the recently released Vision Statement that outlines the government’s dedication to building a comprehensive ecosystem for sustainability disclosure in Hong Kong [19].

Recommendation 1: Strengthening climate-related disclosure requirements

Benchmarking information, particularly data on emission level and their compositional analysis, is fundamental to the successful advancement of net-zero initiatives of the industry and the government. Although operational emissions are currently reported at the corporate level, financed emissions are mostly *unreported* in current corporate reporting templates.²

Thus, improving the reporting of the full scope of emission data and, short of comprehensive reporting, the technology of estimation is of critical importance. The HKMA database comprises bank residential mortgage and business loan information, including sector-wide totals and sub-sectoral breakdowns. An annual SFC *Asset and Wealth Management Activities Survey* collects financial activity information from asset managers. Still, gaps in the information remain. For example, the SFC survey differentiates types of investment products and investment regions but not investment by industry. A complete set of carbon emission factors by sector or a complete database for asset turnover ratio is unavailable. In this study, we have to rely on ‘proxies’ of a Hong Kong emission factor via the EXIOBASE or regional averages. The lack of portfolio data and emission factors

2 Recent new initiatives have emerged to further enhance operational emissions disclosure at the corporate level, such as the ‘Calculator for Scope 1 and Scope 2 Greenhouse Gas Emissions of a Corporation’ device developed by The Hong Kong University of Science and Technology, in partnership with the Green and Sustainable Finance Cross-Agency Steering Group (CASG) of the HKSARG. CASG and CDP jointly developed a Climate and Environmental Risk Questionnaire for non-listed companies and small-to-medium-sized enterprises to solicit inputs to improve work on climate data and sustainability reporting. However, these efforts focus on Scope 1 and Scope 2 emissions.

constitutes a bottleneck to estimating the level of financed emissions in Hong Kong and conducting a rigorous investment structure analysis.

Hong Kong can bridge these data gaps and relax the bottleneck by mandating FIs to divulge precise and comprehensive data on their emissions. For example, given that many multinational and local FIs operating in Hong Kong are not listed, *all licensed FIs should be required to submit ESG reports covering overall GHG emission data (Scope 1, Scope 2 and Scope 3 emissions)*. This is in line with the government's vision to develop the Hong Kong Standards to cover all financial services sub-sectors in Hong Kong [19]. Disclosure of these data will facilitate improved monitoring and assessment of the ecological footprint of the financial activities.

International experience underscores the significance of clearly understood disclosure norms and mandatory reporting. Mitigating the data gap will also facilitate pro-low-carbon policies. Examples are the pivoting of capital allocation towards low-carbon enterprises and investment projects, which are discussed below.

Recommendation 2: Channelling the investment and financing activities of FIs towards low carbon enterprises

The Hong Kong government has implemented various green finance policies and instruments to advance carbon neutrality goals by focusing on renewable and/or efficient energy projects and waste management through green bonds and loans. However, banks can step up their role in driving the low-carbon transition, particularly by providing essential financing support. For example, they can offer preferential interest rates to sustain the survival of low carbon corporations at their early stage of development. The HKMA can also reduce the regulatory reserve requirement for banks that meet the financed emission targets. The reserves released by this move will provide banks with additional lending capacity to support customers engaged in low-carbon businesses. Table 5 summarises the preferential interest rate policies that have been implemented in other regions.

Table 5 Green or Climate-related Bank Loans in Other Regions

Initiatives	Region and Country	Bank	Interest	Scale
Climate change-related lending programme ¹	Japan	The Bank of Japan (BoJ)	Zero interest (0–0.1% in operation)	3.6 trillion JPY (24 billion USD), 2.7% of the bank’s total outstanding loans, 0.5% of bank’s total assets
IFC green loan to developing countries ²	IEnova (Mexico), 2019–2020	World Bank	-	541 million USD
	Sicredi (Brazil), 2021	World Bank	-	120 million USD
Green personal loans ³	Ireland	Allied Irish Banks (AIB)	This loan is offered with a lower rate of 6.40% (APR).	€3,000 and €30,000 per case

Sources:

¹ <https://greencentralbanking.com/2022/01/20/japan-green-loans-scheme/>

² <https://www.worldbank.org/en/news/feature/2021/10/04/what-you-need-to-know-about-green-loans>

³ <https://aib.ie/our-products/loans/green-personal-loan>

To simulate how adjustments to the bank loan portfolios may contribute to carbon neutrality, we use the total value of bank loans and estimated results of financed emissions in 2021 as the benchmark. We assume 10% of the outstanding loan from higher carbon intensity sectors ‘Residential mortgage’ and ‘Manufacturing’ will be shifted to green business, such as renewable energy and related business. We use the same by-sector emission factor in Figure 6 and assign ‘zero emission’ to the renewable energy sector. Following the same estimation methods, the emission intensity is reduced from 60.18 t CO₂e /million USD into 56.61 t CO₂e /million USD. Consequently, the financed emissions from the simulated business loans are reduced from 34.58 Mt CO₂e to 32.53 Mt CO₂e, with the same total amount of business loans in 2021. The reduction volume equals to 6% of Hong Kong’s total financed emissions from bank loans.

Figure 13 Simulated Scenario: Green Loan vs Business-as-Usual (BAU) loan, 2021

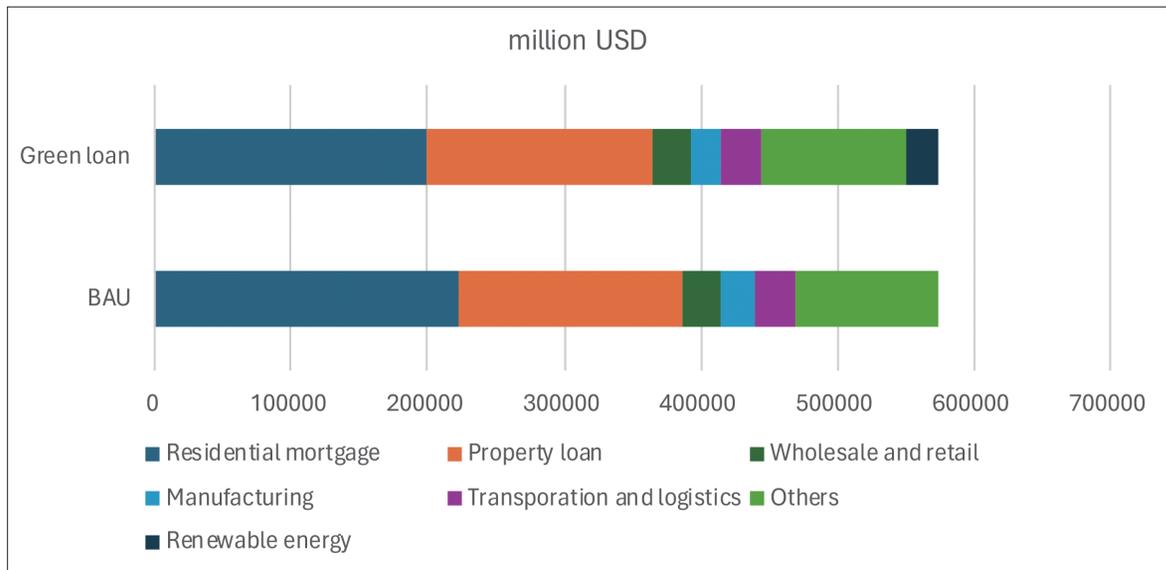
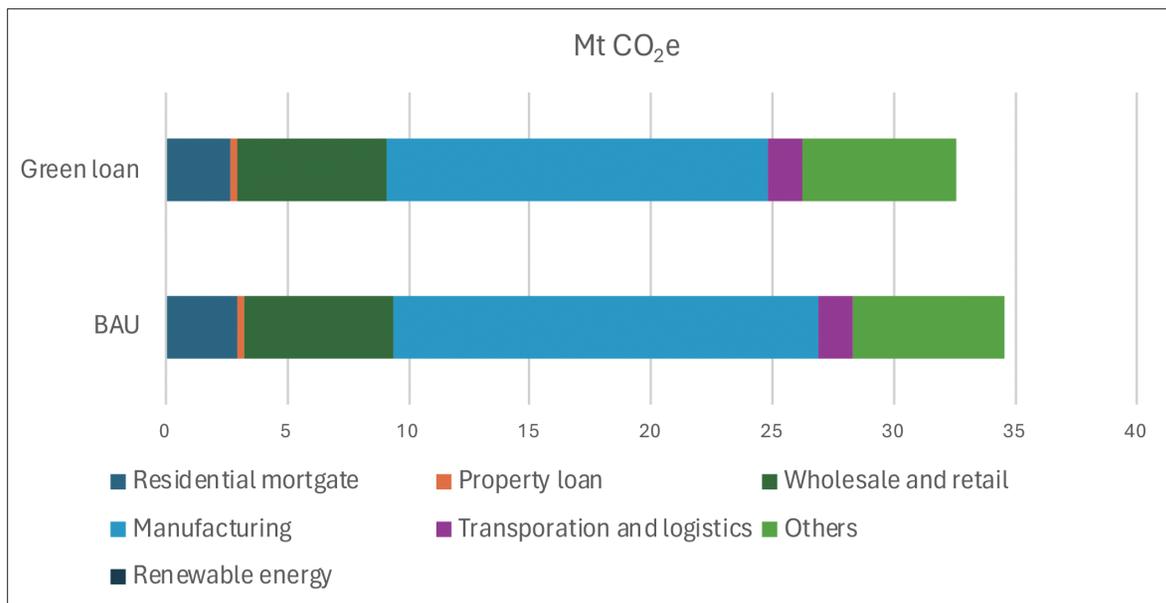


Figure 14 Simulated Financed Emission Change for Mortgage and Business Loans



A significant hurdle in the transition towards a decarbonised economy lies in the difficulty of obtaining support from asset-based financing structures. Typically, public funding and subsidies serve as crucial support during the initial stages of the transition. However, to achieve a sustainable transition, asset-based financing structures tailored for low-carbon businesses and sectors must be established. In this context, FIs play a pivotal role.

The AUM breakdown information can help in conducting scenario analysis to investigate the effect of transitional investment strategies on financed emission mitigation. To illustrate the effects, we conduct a simple simulation in 2021 to investigate the asset-related financed emission change under the redirection of investment to assets, using the AUM of the same two companies in our results section (Figure S-4 in the Appendix). In the transition scenario, we assume the investment to two high-carbon intensity sectors, such as energy and industrials, will decrease by 20%. Whilst the investment to green business, such as renewable energy, increase by this amount, others remain the same as in the BAU scenario.

The results of this simulation show that compared with the BAU scenario, emissions under the green transition scenario are reduced from 1.56 Mt CO₂e to 1.45 Mt CO₂e, under the same total AUM in 2021. **The emission reduction ratio was about 7%.** The overall emission intensity is reduced noticeably from 81.19 to 75.02 t CO₂e /million USD.

Figure 15 AUM Allocation in BAU and Green Transition Scenario, 2021.

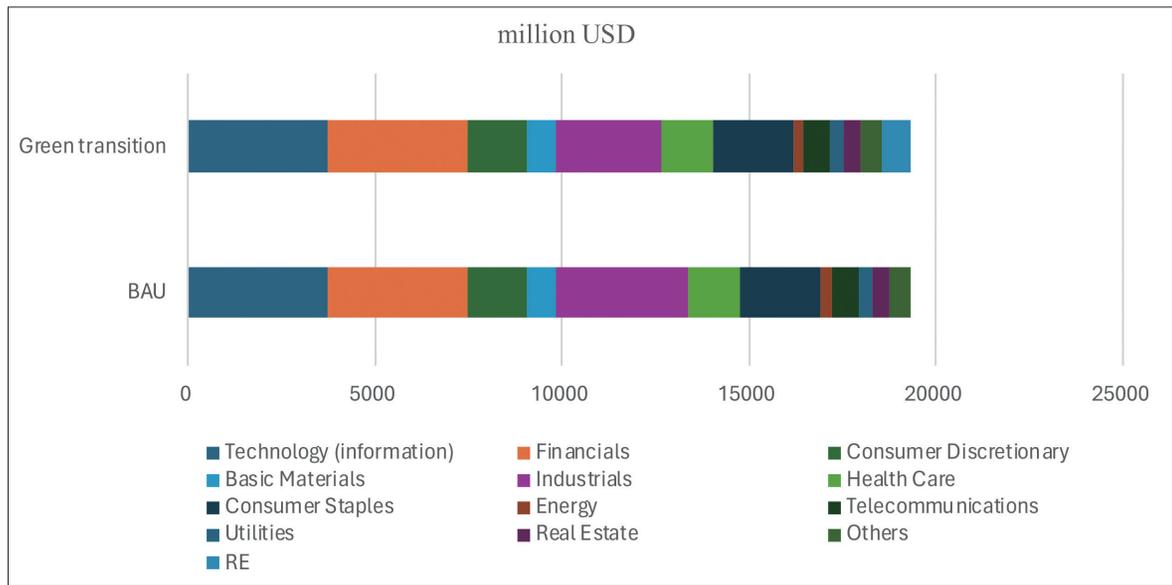
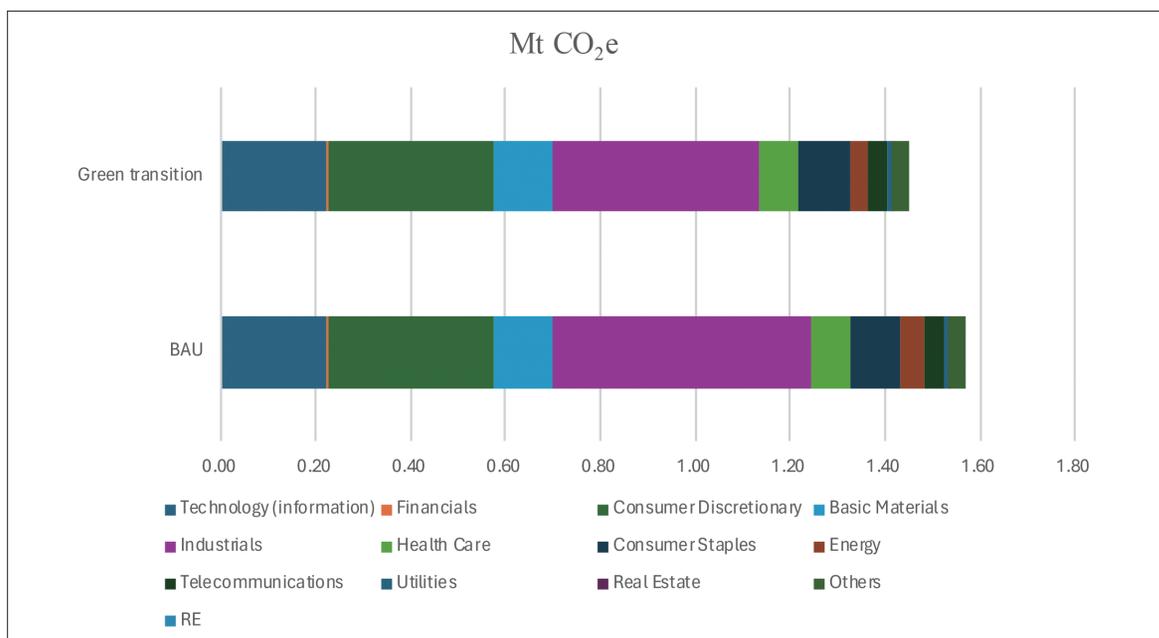


Figure 16 Simulated Financed Emission Change for AUM



Recommendation 3: Improving the green finance certification framework to facilitate the sustainable investment initiatives

Green finance certification is conducted by independent third-party certification agencies to assess whether enterprises and investment projects are qualified to issue green bonds, obtain green loans and make green equity financing. Certified enterprises can often obtain financing at lower costs. Certification thus assesses the players (issuers, lenders and borrowers) in the financial activities and is a critical component in the development of green industry and practices. Since its launch in 2018, the Green and Sustainable Finance Certification Scheme of Hong Kong Quality Assurance Agency has facilitated hundreds of green bonds and loan projects traded in Hong Kong.³

Green finance certification involves iterative communications between third-party institutions and FIs. How to leverage previous experience and further improve the green finance certification framework should be a priority to improve the green finance support infrastructure in Hong Kong. After accumulating sufficient experience, Hong Kong can also export its experience to neighbouring regions and develop cross-border collaborative initiatives towards net-zero goals.

³ The certified enterprises include large enterprises (New World China Land and Shenzhou International), government agencies (Hong Kong SAR Government, People’s Government of Guangdong Province and Shenzhen Government) and city investment companies (Weifang Urban Construction and Development Investment Group Co., Ltd. and Wuhan Urban Construction and Development Investment Group Co., Ltd.).

Developing a certification framework is closely associated with growing risk management capabilities. Both endeavours require inputs and drive growth in Hong Kong's existing training programmes on sustainability and ESG-related themes. This topic is the subject of the next recommendation.

Public–private partnerships should be strengthened, with emphasis on the collaboration between the government, FIs, industry and educational and research sector to advance green finance certification research, promotion and execution. Establishment of collaborative platforms to facilitate collaboration and draw in new resources may be considered as well. In other jurisdictions, for example, the Singapore Green Finance Centre and Sustainable and Green Finance Institute have driven research and innovation in green finance.

Recommendation 4: Strengthening the training of green-related talents

In a recent study on green jobs in Hong Kong, industry experts interviewed (audit professionals, ESG consultants and business executives) converged to emphasise that the green training (including GHG accounting) and professional qualification framework in Hong Kong would require further investment and efforts [15, 16]. Hong Kong can better equip its workforce for the transition towards a sustainable economy by expanding green job opportunities and increasing targeted training programmes.

We observe that SEHK has established a centralised education platform to support listed companies and the business and investor community by providing guidance and training materials about ESG disclosure requirements. In the Vision Statement, the government commits to developing capacity enhancement programmes for preparers, reporting and assurance professionals, and sustainability-related service providers [19]. Singapore has also taken a proactive stance in assisting its workforce in acquiring new green skills for the upcoming low-carbon era. Specialised committees, such as the Green Skills Committee, are established to enhance planning and guidance in the provision of diverse sustainability-focused training programmes.

In line with these initiatives, the government can collaborate with academic institutions to develop and introduce a green qualification certification framework with correspondent training. Such a collaboration will allow individuals to acquire sufficient knowledge and skills systematically. The institutions that provide relevant training can also adapt and increase resources to design appropriate courses. ESG consultants, auditors and green finance certification practitioners in climate- and sustainability-related fields should pursue a professional path. For example, a licensing system may be considered in the long run to ensure the quality of relevant practitioners [15].

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Appendix: Methodology and Estimation Parameters

This part provides the supplementary information for the estimation methodology in this study.

Top-down versus bottom-up approach

For estimating financed emissions from mortgage and business loans:

Top-down approach is to estimate the emissions based on the overall financial activity volume and emission factors or emission intensity.

When portfolio data is available,

Emissions = Σ by - sector financial activity * emission factor

When portfolio data is unavailable:

Emissions = Σ total financial activity * average emission intensity

Bottom-up approach is to estimate the emissions using the individual borrowers' emission data.

Emissions = Σ borrower's (Scope 1 + Scope 2 + Scope 3)emissions

For estimating financed emissions from AUM:

We have estimated AUM-driven emissions according to the guidelines of PCAF as follows:

Top-down approach

Emissions = Σ (Value of AUM in a sector * Emission intensity of the sector)

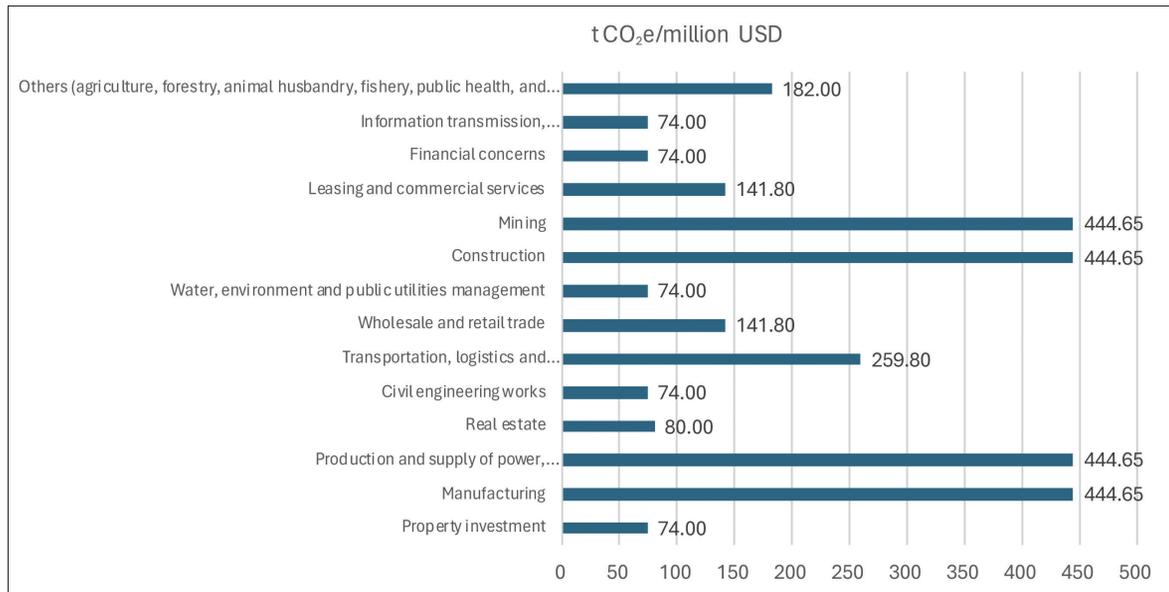
Bottom-up approach

Emissions = Σ (Emissions of the investee downstream of AUM)

Emission factors by sector

We use the following approach to calibrate the emission factors for the estimation. For sectors that report GHG emissions in Hong Kong, we obtain the emission factor from the official statistical data. For those that do not report GHG emissions in Hong Kong, we derive the sector-based emission factors from databases like EXIOBASE and relevant literature.

Figure S-1 Sector-based Emission Factors Applied in This Study



Turnover ratio by sector

The turnover ratio used in the estimation process is based on the following approach:

For sectors reporting their turnover ratios in Hong Kong, we directly use the reported statistical data. For those not reporting turnover ratios in Hong Kong, we derive the sector-based turnover ratios from the average value of the US, Mainland China, Korean and Japanese markets.

Figure S-2 Sector-based Turnover Ratio Applied in This Study

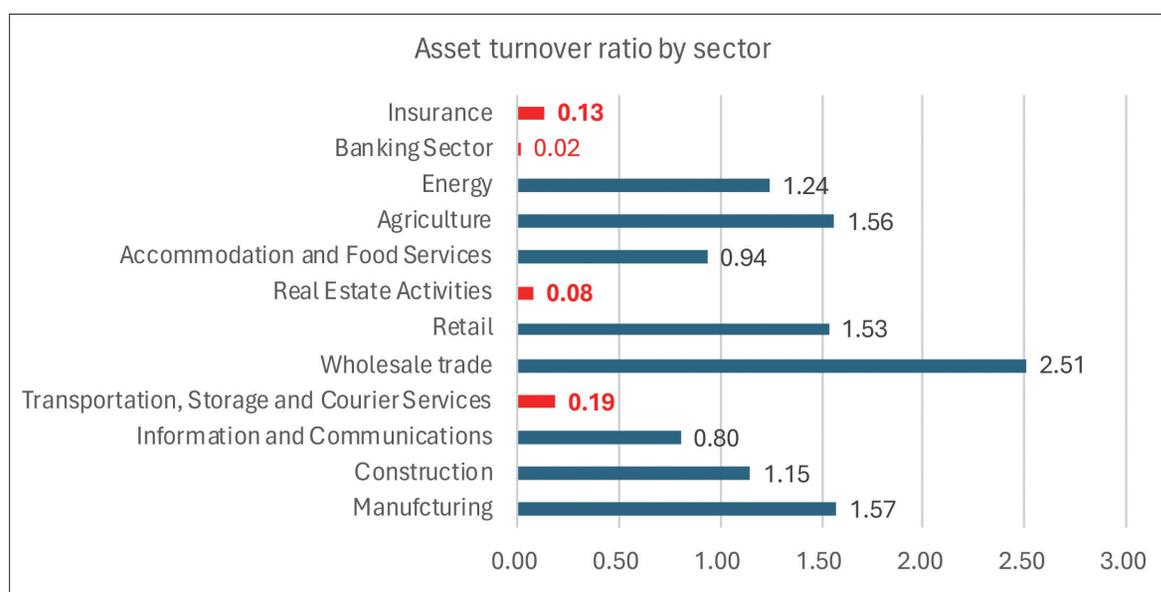


Table 6 (S-1) Scheme of the Estimation of Localised Asset Turnover Ratios

Sector	Sales (million HKD)	Total assets (million HKD)	Asset turnover ratio
Manufacturing	220743 ^a	-	1.57
Construction	396136 ^b	361025 ^k	1.15
Information and Communications	233027 ^c	-	0.80
Transportation, Storage and Courier Services	726738 ^d	3862560 ^l	0.19
Wholesale trade	308216 ^e	-	2.51
Retail	446931 ^f	-	1.53
Real Estate Activities	-	-	0.08 ^g
Accommodation and Food Services	145997 ^h	-	0.94
Agriculture	-	-	1.56
Energy	-	-	1.24
Banking Sector	430214 ⁱ	21510700 ^m	0.02
Insurance	646852 ^j	4817280 ⁿ	0.13

Sources:

a <https://www.censtatd.gov.hk/en/scode310.html>

b <https://www.censtatd.gov.hk/en/scode330.html>

- c <https://www.censtatd.gov.hk/en/scode560.html>
d <https://www.censtatd.gov.hk/en/scode340.html>
e <https://www.censtatd.gov.hk/en/scode550.html>
f <https://www.censtatd.gov.hk/en/scode530.html>
g <https://www.hanghangcha.com/hhcQuestion/detail/984088.html>
h <https://www.censtatd.gov.hk/en/scode540.html>
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m <https://assets.kpmg.com/content/dam/kpmg/cn/pdf/en/2022/06/hong-kong-banking-report-2022.pdf>
n <https://www.statista.com/statistics/1284573/insurance-companies-assets-hong-kong/>

* Red coloured values are calculated based on Hong Kong local data. Others are calculated based on Table S-2 using the weighted calculation method (the regional market scale and the by-sector turnover ratio of that region).

Table 7 (S-2) Turnover Ratios in Japan, Korea, the US and Mainland China

Sector	Japan	The US	Korea	Mainland China
Manufacturing	1.7 ^a	1.84 ^c	1.62 ^f	0.92 ^g
Construction	1.29 ^b	1.16 ^c	1.52 ^f	0.86 ^g
Information and Communications	1.06 ^b	0.32 ^c	1.89 ^f	1.13 ^g
Transportation, Storage and Courier Services	1.17 ^b	0.45 ^c	0.94 ^f	1.02 ^g
Wholesale trade	1.71 ^b	3.59 ^c	1.82 ^f	2.15 ^g
Retail	2.03 ^b	1.40 ^c	1.25 ^f	2.04 ^g
Real Estate Activities	0.37 ^b	0.38 ^c	0.37 ^f	0.16 ^g
Accommodation and Food Services	1.46 ^b	0.80 ^c	0.92 ^f	0.74 ^g
Agriculture	2.63 ^c	1.27 ^c	1.54 ^f	1.05 ^g
Energy	1.38 ^d	1.14 ^c	1.72 ^f	1.32 ^g

Source:

^a https://www.jfc.go.jp/n/findings/pdf/sme_findings2_201710_04a.pdf

^b <https://biz.moneyforward.com/accounting/basic/45446/>

^c <https://www.e-stat.go.jp/stat-search/file-download?statInfId=000040036097&fileKind=0>

^d <https://www.statista.com/outlook/io/energy-supply/japan#:~:text=Revenue%20in%20Energy%20Supply%20is,US%24266.70bn%20in%202023.>

<https://www.statista.com/statistics/868685/leading-companies-electricity-industry-by-total-assets-japan/>

^e <https://csimarket.com/screening/index.php?s=at&pagel=10&fis=#tableind>

^f https://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_501Y008&vw_cd=&list_id=000001134&scrId=&seqNo=&lang_mode=ko&obj_var_id=&itm_id=&conn_path=R1&path=

^g <https://data.stats.gov.cn/easyquery.htm?cn=C01>

Methods and parameters for estimation of financed emissions from AUM

Table 8 (S-3) Methods and Parameters of Financed Emissions from Asset Manager Holdings

For asset manager holdings emission calculation			
Method	Data requirement:	Definition	Data source
<u>Method 1: for those disclosed carbon intensity in their investment portfolio:</u> carbon intensity (for equity and fixed income)*AUM (for equity and fixed income)	Carbon intensity	(tCO ₂ e / million invested)	
	AUM	Asset under management	
<u>Method 2: for those have not disclosed carbon intensity in their investment portfolio:</u> (equity and/or fixed income portfolio)*GHG Emissions (by investees) / Total invested amount	Equity and fixed income portfolios	/	Corporate Reports
	Positions for a number of equity and fixed income funds	Allocation ratio of funds in the investment portfolio	Corporate Reports
	GHG Emissions (by investees)	/	Corporate reports or estimation based on by-sector emission factor

Table 9 (S-4) Coverage Analysis of Asset Managers in the AUM sample

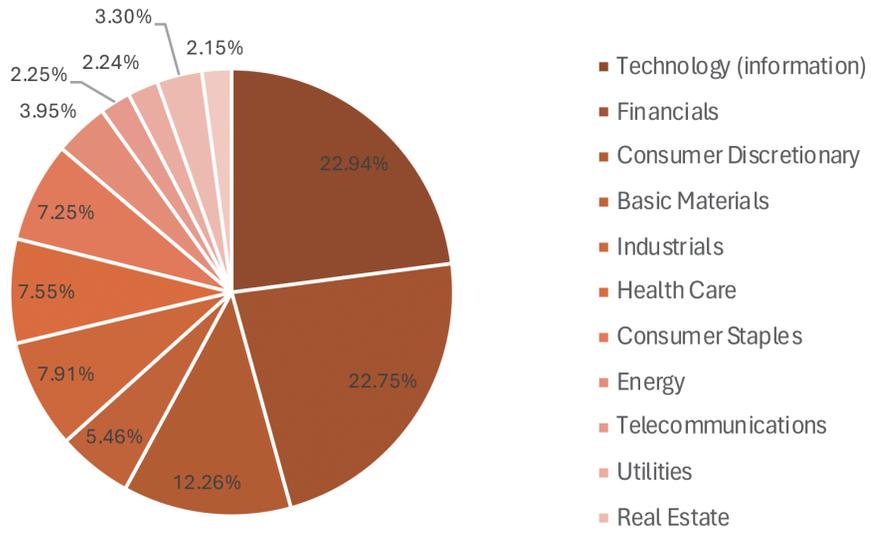
Asset Managers with available disclosures and with headquarter in HK	AUM(USD million)	Location of business	Coverage
FIL Investment Management (Hong Kong) Limited	15,340	HK	Coverage= Sum of total AUM of selected firms/ Total Asset Management in Hong Kong a
JPMorgan Funds (Asia) Limited	222	HK	
Allianz Global Investors Asia Pacific Limited	11,960	HK	
BOCHK Asset Management Limited	468,395	HK	
HSBC Investment Funds (Hong Kong) Limited	640,000	HK	
Value Partners Hong Kong Limited	10,037	HK	
Manulife Investment Management (Hong Kong) Limited	67,014	HK	
AIA Investment Management HK Limited	212	HK	
Schroder Investment Management (Hong Kong) Limited	56,500	HK	
Franklin Templeton Investments (Asia) Limited	1,530	HK	
First Sentier Investors (Hong Kong) Limited	45,600	HK	
China Everbright Securities (HK) Limited	21,502	HK	
ICBC Credit Suisse Asset Management (International) Company Limited	2,130	HK	
Zeal Asset Management Limited	269	HK	
PIMCO Asia Limited	2,000	HK	
Sun Life Asset Management (HK) Limited	469	HK	
Guotai Junan Assets (Asia) Limited	13,637	HK	
Nikko Asset Management Hong Kong Limited	39,000	HK	
SUM (USD million)	1,395,817		46%

Note:

According to Hong Kong Securities and Futures Commission (SFC) 'Asset and Wealth Management Activities Survey 2021' (link1-https://www.sfc.hk/-/media/EN/files/COM/Reports-and-surveys/AWMAS-2021_final_e.pdf?rev=3e3da8c9415441f1a8187923b9f3dd45&hash=139E7588CCD89C2947610F821EED1835), the total AUM in 2021 in Hong Kong were 3,047,101 USD.

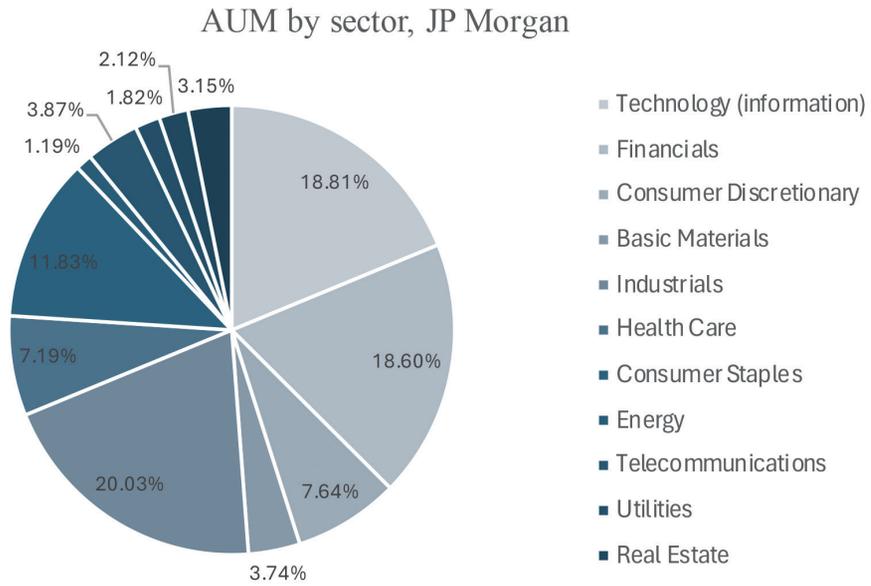
Figure S-3 AUM Portfolio Breakdown for Selected Asset Managers

(a) AUM by sector, FIL, 2021



Data source: Funds report of FIL

(b) AUM by sector, JP Morgan, 2021



Data source: Funds report of JP Morgan

