

**City University of Hong Kong
Research Centre for Sustainable Hong Kong¹**

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**Estimation of Financed Emissions in Hong Kong:
From the Perspective of Bank Loans and Asset Management**

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1. Introduction

As mentioned in our previous policy proposal,⁴ the estimated local equivalent amount of carbon dioxide emissions is 34.7 million tons in Hong Kong in 2021 as announced by the Environment and Ecology Bureau of the Government of Hong Kong SAR, which we consider to be an underestimate. This paper attempts to estimate the greenhouse gas (GHG) emissions of the financial sector in Hong Kong, focusing on banks licensed by the Hong Kong Monetary Authority and asset management companies licensed by the Securities and Futures Commission of Hong Kong. Our estimation involves their three types of investment and financing activities: mortgage, business loans and asset management, totaling USD 222.051 billion, USD 350 billion and USD 3.05 trillion,⁵ respectively.

Due to the incomplete disclosure of financial activities by Hong Kong financial institutions, which often involve cross-border figures, we have adopted a top-down approach to sort out the emission factor and estimate the emissions based on data from the Hong Kong Monetary Authority and the Securities and Futures Commission of Hong Kong, supported by official annual reports from major financial institutions.

¹ Established in June 2017 by a cross-disciplinary research team, the Research Centre for Sustainable Hong Kong (CSHK) is an Applied Strategic Development Centre of City University of Hong Kong (CityU). CSHK conducts impactful applied research with the mission to facilitate and enhance collaborations among the academic, industrial and professional service sectors, the community and the government for sustainable development in Hong Kong and the Region. Please email your comments of this policy paper to sushkhub@cityu.edu.hk.

² This policy paper is the second part of a 3-part series on Hong Kong's Financed Emission. For the first paper: Accelerating green finance development in Hong Kong: Improving the estimation on greenhouse gas emissions in the financial sector, please click [here](#). This research project is funded by The Sunrise Project and The Research Matching Grant Scheme of the University Grants Committee, Hong Kong.

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⁴ See [CSHK Policy Paper 25: Accelerating green finance development in Hong Kong: Improving the estimation on greenhouse gas emissions in the financial sector](#). The Environment and Ecology Bureau does not explicate the coverage of its emission statistics. Based on its categorization of emission sources, we deduce the coverage includes scope 1 and 2 emissions within the Hong Kong geographical boundary as well as part of scope 3 emissions including commutation and transport, but excludes the emissions in the supply chain.

⁵ For mortgage and business loan figures, refer to Hong Kong Monetary Authority's [Monthly Statistical Bulletin](#). For Asset management figures, refer to Securities and Futures Commission's [Asset and Wealth Management Activities Survey](#), the figures we use are from year 2021.

Given the significant spillover effect of the financial sector, it is important to include in the estimation the "financed emissions" generated by the financial activities in Scope 3, in addition to direct (Scope 1) and indirect (Scope 2) emissions.

In our estimation, we adopted the estimation formulas used by the *Global GHG Accounting Standard for the Financial Industry* of the Partnership for Carbon Accounting Financials (PCAF). *Our estimates indicate that Hong Kong's financial institutions generated GHG emissions (financed emissions) of 2.96 million tons, 31.61 million tons, and 429 million tons in 2021 from mortgage, business loans, and asset management, respectively, totaling 464 million tons.* If we include the operational emissions of approximately 1.6 million tons from these financial institutions, *the total GHG emissions in Scope 1, Scope 2 and Scope 3 would be 465 million tons, equivalent to thirteen times the Hong Kong-wide emission (34.7 million tons) announced by the Environment and Ecology Bureau in 2021* (see Table 1).

Table 1 Estimates of GHG emissions in Hong Kong's financial sector in 2021

	Direct Emission		Indirect Emission	
	Operational Emission		Financed Emission	
	Scope 1	Scope 2	Scope 3	
Bank	370,000 tCO ₂ e		34.57 million tCO ₂ e (Business loans: 31.61 million tCO ₂ e) (Mortgage: 2.96 million tCO ₂ e)	USD 570 billion (USD 350 billion) (USD 220 billion)
Asset Management	1.23 million tCO ₂ e		429 million tCO ₂ e	USD 3.05 trillion
Total	465 million tCO₂e			USD 3.62 trillion

Source: Compiled and collated by the authors.

These figures may seem surprising at first glance, but they are comparable to those of other international financial centers.⁶ In fact, mortgage and business loans in Hong Kong amount to as much as USD 570 billion, and assets under management reach USD 3.047 trillion. Together, the three amount to USD 3.62 trillion, equivalent to 9.85 times Hong Kong's GDP of USD 369.2 billion.

The method for estimating Hong Kong's financed emissions is set out below. It should be noted that despite the multiple limitations, this estimation serves as an important starting point to draw attention to the financed emissions in Hong Kong. It also provides as a basis to promote the disclosure of carbon emissions in Scope 3, with the goal of achieving net zero emissions in Hong Kong at an earlier date.

⁶ World Wide Fund for Nature (WWF)'s research indicates that London's financed emissions is almost 1.8 times more than the UK's domestically produced emissions ([WWF \(2021\) The Big Smoke – The Global Emissions of the UK Financial Sector](#)). New Economy's research indicates GHG emissions produced by cash deposits and investments in New York are two times more than transportations (New Economy (2022) New Analysis Reveals NYC Banking Activities Take Massive Hidden Toll on Climate).

2. Basic principles of financed emission estimation

In principle, GHG emissions of financial institutions are estimated based on the economic activity data and the corresponding carbon emission factor, and the formula can be listed as follows:

$$GHG\ emissions = Activity\ data \times Emission\ factor\ (1)$$

Wherein, activity data is a quantitative measure of the activity scale of specific uses and inputs directly related to the GHG emissions of the emission source. For financial institutions, it includes all their operation and investment & financing activities, such as energy consumption generated by operation, the scale of investment and financing, and the scale of productive activities caused by investment and financing. Examples of activity data for companies include the amount of electricity or fuel they use, the time their equipment is running, and the distance their vehicles travel. Activity data can be collected from many different publicly available sources, such as government publications and reports from individual firms.

The emission factor is the amount of greenhouse gas emitted per unit of consumption of an emission source and is used to convert activity data into GHG emissions. There are multiple categories of emission factors, such as activity-based emission factor, physical emission factor related to the firm's physical activities, and economic emission factor related to economic activities. Emission factors are usually available from government statistical yearbooks and international mainstream databases, such as EXIOBASE.

On this basis, the core theory for estimating carbon emissions of financial institutions involves two parts: (a) to determine the activity and quantity driven by financial activities, and (b) to distinguish the economic sector to which the activity belongs, so as to determine the emission factor. In practical terms, with reference to the PCAF guidelines, we present the estimation methods according to different financial activities.

3. Estimation of carbon emissions from mortgage and business loans in Hong Kong

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

$$\sum_c Outstanding\ investment_c \times Asset\ turnover\ ratio_c \times \frac{GHG\ emissions_c}{Turnover_c} \quad (2)$$

Wherein, 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), so that the average annual amount of financial activities such as loans can be estimated by year. GHG emissions/Turnover is the emission factor of the sector to which the loan belongs estimated on an annual basis. In practice, we obtain emission factors for different sectors from statistical yearbooks or corresponding global economy-sector databases (e.g., EXIOBASE), and we estimate the annual asset turnover ratio for different sectors from public statistics or by definition.

We found the total value of mortgage and business loans from approved institutions in Hong Kong in 2021 through "Loans and Advances" in the Hong Kong Monetary Authority's *Monthly Statistical Bulletin*. Out of this total, mortgage loans amount to USD 222.051 billion; business loans consist of five categories: Property Loan, Wholesale and Retail, Manufacture, Transportation and Logistics, and Others, at values ranging from USD 28.3

billion to USD 164.487 billion. These investment values are presented in Column 1 of Table 2, converted into million USD for the purpose of estimating carbon emissions.

Table 2 Estimates of carbon emissions by sector from mortgage and business loans in Hong Kong

Subitem	Estimates			
	Column 1	Column 2	Column 3	Column 4
	Outstanding investment (million USD)	Carbon emission factor by sector (tCO ₂ e/million USD)	Asset turnover ratio	Emissions # (CO ₂ e)
Mortgage	222,051	444.65	0.03	2.96 million tons
Business Loan				31.61 million tons
Property Loan	164,487	74.0	0.02	0.24 million tons
Wholesale and Retail	28,333	141.8	1.53	6.15 million tons
Manufacture	25,128	444.65	1.57	17.54 million tons
Transportation and Logistics	28,846	259.8	0.19	1.42 million tons
Others	105,769	182.0	--	6.26 million tons

Source: Data for mortgage and business loans in 2021 are from the Hong Kong Monetary Authority # Emissions in Column 4 are estimated according to Formula (2).

Column 2 presents the emission factor by sector. Since there is no official or authoritative statistical quantification on emission factor by sector in Hong Kong, we refer to the EXIOBASE figures. Compiled by the European Union and adopted by 28 EU countries and 16 other major economies, EXIOBASE has developed 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 employ statistics on Hong Kong when such are available; in cases not available, we use the average of China, the United States, and Japan instead.

By combining Formulas 1 and 2 with the emission factor of EXIOBASE and the average asset turnover ratio of different regions, *we estimate that Hong Kong's mortgage carbon emissions are 2.96 million tons of CO₂ equivalent, and the carbon emissions from the five categories of business loans are 31.61 million tons.*

4. Estimation of carbon emissions from asset management

When estimating GHG emissions from asset management, we use the value of assets under management, the emission factor of the investment sector and the turnover ratio to estimate asset management-driven emissions according to the PCAF guidelines in the following two ways:

*a. If the portfolio information is known, Emissions = Σ (Value of assets under management in different sectors * emission factor of the sector)*

b. If the portfolio information is unknown, Emissions = Σ (Emissions of the investee downstream of asset management)

Hong Kong is one of the world-leading asset management hubs, with USD 3.05 trillion of assets under management in 2021, according to the Securities and Futures Commission. As asset management companies in

Hong Kong generally do not disclose their portfolio information, we will use emission intensity (emissions per unit of investment or asset management) for estimation in this case. The formula is as follows:

$$\text{GHG emissions} = \text{USD 3.05 trillion} \times \text{carbon intensity (3)}$$

In order to obtain the emission intensity of asset management, we used the following methods for estimation:

First, we have looked at the publicly published annual reports of asset management companies, collecting data on a total of 18 asset management companies with USD 1.395 trillion of assets under management. A problem we have faced is that some of these asset management companies disclose their asset allocations but some do not.

Secondly, for asset management companies that disclose their asset allocations, we calculated the emission intensity through asset allocation data and the corresponding carbon emission factors of different sectors. We have selected two large asset management companies with listed asset allocations, focusing on investment in information technology, financials, consumer discretionary, industrials, health care and consumer staples (see Table 3). According to their investment distribution and the corresponding emission factor by sector, we obtained the average carbon emission intensity by weighted estimation: *Average carbon emission intensity* = Σ (*Amount of assets under management of different sectors * Emission factor of the sector * Asset allocation ratio by sector*). The final estimate is an average emission intensity of 159.98 tons and 193.69 tons of carbon dioxide equivalent/million USD, respectively.

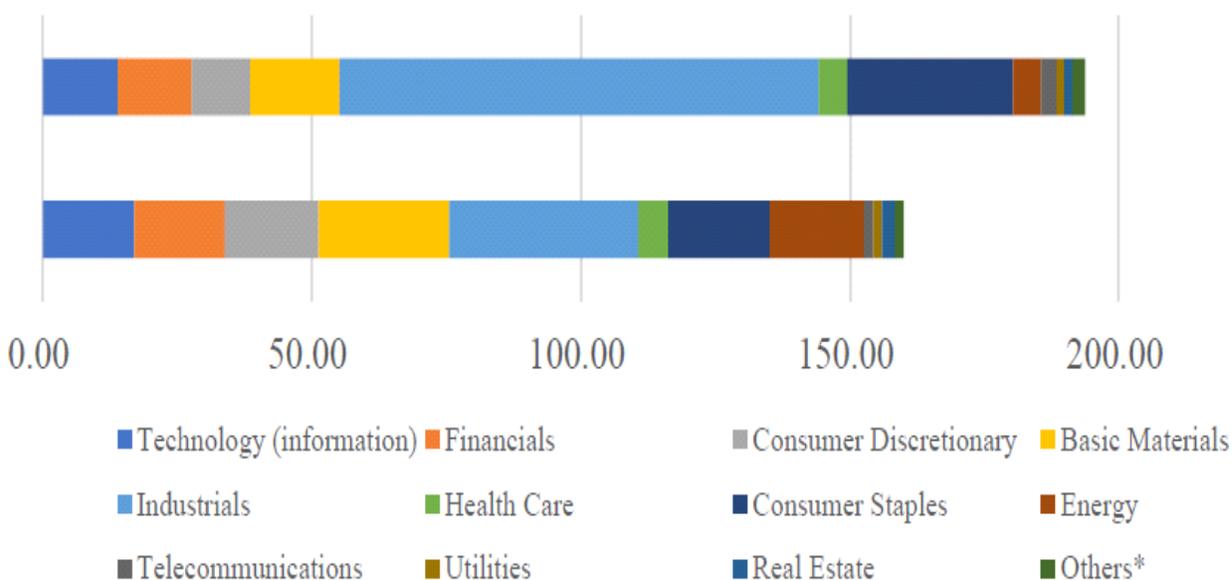
Table 3 Investment distribution of two selected major asset management companies

	Percentage of Assets of Company F	Percentage of Assets of Company J
Technology (Information)	22.94%	18.81%
Financials	22.75%	18.6%
Consumer Discretionary	12.26%	7.64%
Basic Materials	5.46%	3.74%
Industrials	7.91%	20.03%
Health Care	7.55%	7.19%
Consumer Staples	7.25%	11.83%
Energy	3.95%	1.19%
Telecommunications	2.25%	3.87%
Utilities	2.24%	1.82%
Real Estate	3.30%	2.12%
Others	2.15%	3.15%

Source: Annual reports of asset management companies and collation by the authors

Figure 1: Carbon emission intensity of the two sample companies obtained by weighted estimation according to the asset management allocation

Carbon emission intensity under the portfolios of the two asset management companies, tCO₂e/million USD



Source: Annual reports of asset management companies and collation by the authors

Thirdly, for asset management companies that do not disclose their asset allocations, we directly extracted their disclosed emission intensity data from disclosure reports. In the 18 samples, we collected emission intensity data from the ESG and TCFD reports of five asset management companies and their disclosed carbon emission intensity of investment is as listed in Table 4.

Table 4 Asset management companies that disclose carbon emission intensity of investment

	Carbon Intensity of Investment (tCO ₂ e/million USD)
Allianz	45.63
AIA	283.84
Schroder	69.9
First Sentier	110.4
PIMCO	124

Source: 2021 annual reports of asset management companies

Finally, by integrating the 7 companies (2 disclosed asset management allocations, 5 disclosed overall financed emission intensity) and referring to the amount of assets under management, the weighted average emission

intensity is 140.92 tons of carbon dioxide equivalent/million USD. This emission intensity data is used to estimate the overall carbon emissions of asset management companies.

Based on the above estimation methods, we estimate Hong Kong's total financed emissions to be 429 million tons based on approximately USD 3.05 trillion of assets under management in Hong Kong with an emission intensity of 140.92 tons of carbon dioxide equivalent per million USD.

5. Summary

Overall, we estimate the financed emissions from Hong Kong's financial sector to be 464 million tons in 2021 (including 2.96 million tons from mortgage; 31.61 million tons from business loans and 429 million tons from asset management), 13 times the total emissions of all sectors in Hong Kong published by the Environment and Ecology Bureau. There are some limitations in our estimation. First, the basic data is incomplete, especially for asset management. Hong Kong regulators do not require asset management companies to disclose their asset allocations, so we resorted to sampling and estimation. In addition, since the emission factor by sector and asset turnover ratio are not available in Hong Kong in terms of official or authoritative statistics, we used the internationally accepted databases such as EXIOBASE as the basis for estimation and set the estimation factor with the help of other literature.

In our view, the above data limitations point out the priorities of future improvement of emission reduction policies: the Hong Kong government, regulators and the community as a whole need to work together to develop better emission estimation criteria, including the formulation of rules requiring financial institutions to disclose more comprehensive financial activities and the delineation of emission factors appropriate to Hong Kong. In fact, as can be seen from Table 1, the financed emissions in Scope 3 of the financial sector account for a very high proportion of the total emissions in the sector. In order to encourage financial institutions to promote the emission reduction in other economic sectors through their investment and financing influence, the carbon emissions of their investment and financing portfolios need to be made transparent and clearly accounted for. Consequently, the financial institutions can formulate strategies accordingly to achieve emission reduction targets. Therefore, information and data on financed emissions from financial institutions are indispensable for promoting the development of green finance. After all, Hong Kong's financial sector plays an important role both locally and globally, and should play a more central role in the global carbon emission agenda.

We believe that our estimation, despite its limitations, is an important first step in sorting out the current situation of financed emissions in Hong Kong. This paper will, hopefully, arouse the wider attention of society to financed emissions, and our first step will encourage further research to develop better accounting criteria and methods. In our next paper, we shall, based on findings from this paper, compare with and draw lessons from other international financial centers, and put forward a number of suggestions that we believe can promote the development of green finance in Hong Kong.