

Discussion Paper

Prototype of a Green Classification Framework for Hong Kong Annex



HONG KONG MONETARY AUTHORITY
香港金融管理局

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Climate Bonds INITIATIVE

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Prototype spreadsheet:

HSIC Industry Section	HSIC Industry Division (2 Digit)	HSIC Industry Group (3 Digit)	HSIC Industry Class (4 digit) (Corresponding ISIC / NACE)	HSIC Industry Sub-class (6 Digit)	Prototype Activities		Eligibility to be green		
					Taxonomy-level activity	Description			
					Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria		
Layer 1							Layer 2		Layer 3
F- Construction	41 - Construction of buildings	411: Erection of architectural superstructures, building construction	4110: Erection of architectural superstructures, building construction (ISIC: 4100 - Construction of Buildings) (NACE: 41.10 - Development of building projects; 41.20 - Construction of residential and non-residential buildings)	411000: Erection of architectural superstructures, building construction	Construction of new buildings	Construction of new buildings	CGT F1.1 Construction of new buildings	1) Primary Energy Demand: Amount of energy that must be generated originally in order to meet the total energy demand of a building (kWh/m2) 2) Energy Consumption: Total amount of electricity or equivalent electricity, and gas consumed by the building per annum (kWh/m2/year) 3) Direct emissions of building: Greenhouse gases emitted from activities under the tenant or landlords' control - (KgCO2/m2/year)	Please refer to the activity card for the full set of criteria
		412: Structural steel framework erection	4120: Structural steel framework erection (ISIC: 4100 - Construction of Buildings) (NACE: 41.10 - Development of building projects; 41.20 - Construction of residential and non-residential buildings)	412000: Structural steel framework erection					
		419: Other new building construction works	4191: Structural alteration and addition works (ISIC: 4100 - Construction of Buildings) (NACE: 41.10 - Development of building projects; 41.20 - Construction of residential and non-residential buildings)	419100: Structural alteration and addition works					
	43 - Specialised construction activities	432-Building services installation and maintenance activities	4321-Electrical equipment installation and maintenance (ISIC: 4321 - Electrical Installation) (NACE: 43.21 - Electrical installation)	4321XX: Electrical equipment installation and maintenance					
			4322-Ventilation, gas and water fitting installation and maintenance activities (ISIC: 4322 - Plumbing, Heat and Air-Conditioning Installation) (NACE: 43.22 - Plumbing, heat and air-conditioning installation)	4322XX: Ventilation, gas and water fitting installation and maintenance activities					

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					Taxonomy-level activity	Description			
							Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
			4329-Other construction installation and maintenance (ISIC: 4329 - Other Construction Installation) (NACE: 43.29 - Other construction installation)	4329XX: Other construction installation and maintenance					
		439 - Building finishing and other specialised construction activities	4391-Decoration, repair and maintenance for buildings (ISIC: 4330 - Building Completion and Finishing) (NACE: 43.3 - Building completion and finishing)	439101: Interior fitting, decoration and repairs for buildings					
			4399-Other general finishing and specialised construction works (ISIC:4390 - Other Specialized Construction Activities) (NACE: 43.9 - Other specialised construction activities)	4399XX: Other general finishing and specialised construction works					
F- Construction	41 - Construction of buildings	419: Other new building construction works	4191: Structural alteration and addition works (ISIC: 4100 - Construction of Buildings) (NACE: 41.10 - Development of building projects; 41.20 - Construction of residential and non-residential buildings)	419100: Structural alteration and addition works	Renovation of existing buildings	Renovation of existing buildings	CGT F1.2 Renovation of existing buildings	1) Primary Energy Demand: Amount of energy that must be generated originally in order to meet the total energy demand of a building (kWh/m2) 2) Energy Consumption: Total amount of electricity or equivalent electricity, and gas consumed by the building per annum (kWh/m2/year) 3) Direct emissions of building: Greenhouse gases emitted from activities under the tenant or landlords' control - (KgCO2/m2/year)	Please refer to activity card for the full criteria
	43 - Specialised construction activities	432-Building services installation and maintenance activities	4321-Electrical equipment installation and maintenance (ISIC: 4321 - Electrical Installation) (NACE: 43.21 - Electrical installation)	4321XX: Electrical equipment installation and maintenance					

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					Taxonomy-level activity	Description			
							Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
			4322-Ventilation, gas and water fitting installation and maintenance activities (ISIC: 4322 - Plumbing, Heat and Air-Conditioning Installation) (NACE: 43.22 - Plumbing, heat and air-conditioning installation)	4322XX: Ventilation, gas and water fitting installation and maintenance activities					
			4329-Other construction installation and maintenance (ISIC: 4329 - Other Construction Installation) (NACE: 43.29 - Other construction installation)	4329XX: Other construction installation and maintenance					
		439 - Building finishing and other specialised construction activities	4391-Decoration, repair and maintenance for buildings (ISIC: 4330 - Building Completion and Finishing) (NACE: 43.3 - Building completion and finishing)	4391XX: Decoration, repair and maintenance for buildings					
			4399-Other general finishing and specialised construction works (ISIC:4390 - Other Specialized Construction Activities) (NACE: 43.9 - Other specialised construction activities)	439101: Interior fitting, decoration and repairs for buildings					

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					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
D - Electricity and gas supply	35-Electric and gas supply	351-Electric power generation, transmission and distribution	3510 - Electric power generation, transmission and distribution (ISIC: 3510 - Electric power generation, transmission and distribution) (NACE:35.11 - Production of electricity)	35100- Electric power generation, transmission and distribution	Electricity generation using concentrated solar power	Electricity generation using concentrated solar power (CSP) technology. Construction and operation of facilities using solar thermal power to generate electricity.	CGT D1.2 Electricity generation using concentrated solar power (CSP) technology	gCO ₂ /kWh: Reflects the emissions intensity for electricity generation, and is based on life cycle emissions to account for GHG emissions throughout the value chain of energy production processes	Please refer to activity card for the full criteria. Automatically eligible if use of proceeds complies with activity description.
					Electricity generation using solar photovoltaic technology	Electricity generation using solar photovoltaic (solar PV) technology. Construction and operation of facilities using concentrated solar photovoltaic power to generate electricity.	CGT D1.1 Electricity generation using solar photovoltaic technology		Please refer to activity card for the full criteria. Automatically eligible if use of proceeds complies with activity description. Additional requirements for projects in: Mainland China
					Electricity generation from wind power	Construction or operation of electricity generation facilities that produce electricity from wind power.	CGT D1.3 Electricity generation from wind power		Please refer to activity card for the full criteria. Automatically eligible if use of proceeds complies with activity description.

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					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
H- Transportation, storage, postal and courier services	49 - Land Transport	491-Railway and cable transport	4910-Railway and cable transport (ISIC: 4921 - Urban and Suburban Passenger Land Transport) (NACE: 49.31 - Urban and suburban passenger land transport)	491000-Railway and cable transport	Construction and operation of public transportation system in urban and rural areas	Purchase, financing, leasing, rental and operation of urban and suburban transport vehicles for passengers and road passenger transport. This includes construction and operation of subways, light railways, tram, and other urban rail transportation facilities; construction and operation of high-capacity public transportation facilities, such as BRT bus stations, lines and other facilities construction and operation; purchase of public transportation vehicles, etc.	CGT H1.1. Construction and operation of public transportation system in urban and rural areas	Emission reduction thresholds are based on performance metrics: • CO2e emissions per passenger kilometre (gCO2e/pkm); • CO2e emissions per vehicle kilometre (gCO2e/vkm); • CO2e emissions per tonne kilometre (gCO2e/tkm).	Please refer to activity card for the full criteria. 1) The trains and passenger coaches have zero direct (tailpipe) CO2 emissions Additional requirements for projects in: EU
		492 - Land Transport by road	4921 - Public bus services (ISIC: 4921 - Urban and Suburban Passenger Land Transport) (NACE: 49.31 - Urban and suburban passenger land transport)	492100 - Public bus services					
			4923 - Non-scheduled public light bus services (ISIC: 4922 - Other Passenger Land Transport) (NACE: 49.39 - Other passenger land transport n.e.c.)	492300 - Non-scheduled public light bus services					
			4924- Scheduled public light bus services (ISIC: 4922 - Other Passenger Land Transport) (NACE: 49.39 - Other passenger land transport n.e.c.)	492400 - Scheduled public light bus services					
			4925 - School bus services (ISIC: 4922 - Other Passenger Land Transport) (NACE: 49.39 - Other passenger land transport n.e.c.)	492500 - School bus services					

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					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
H- Transportation, storage, postal and courier services	49 - Land Transport	499 - Other land transport services	4990 - Other land transport services (ISIC: 4922 - Other Passenger Land Transport) (NACE: 49.39 - Other passenger land transport n.e.c.)	499000 - Other land transport services	Construction and operation of personal mobility devices, cycle logistics	Selling, purchasing, financing, leasing, renting and operation of personal mobility or transport devices where the propulsion comes from the physical activity of the user, from a zero emissions motor, or a mix of zero-emissions motor and physical activity. This specifically also includes: - Construction of urban walking and cycling transportation systems, including public bicycle rental sites, non-motorized vehicle parking facilities, road crossing facilities and other slow-moving urban systems. - Construction and operation of shared transportation infrastructure, such as systems for public rental bicycles, online bicycle rental, online electric bicycle rental, online car rental, car sharing, parking facilities and equipment, and bicycle parking facilities. - The provision of freight transport services by (cargo) bicycles. - Selling, purchasing, financing, leasing, renting and operation of private electric or hydrogen vehicles	CGT H1.5. Construction and operation of personal mobility devices, cycle logistics	Emission reduction thresholds are based on performance metrics: • CO2e emissions per passenger kilometre (gCO2e/pkm); • CO2e emissions per vehicle kilometre (gCO2e/vkm); • CO2e emissions per tonne kilometre (gCO2e/tkm).	Please refer to activity card for the full criteria. 1) Automatically eligible if the propulsion of personal mobility devices comes from the physical activity of the user, from a zero-emissions motor (zero tailpipe emissions), or a mix of zero-emissions motor and physical activity. 2) The personal mobility devices are allowed to be operated on the same public infrastructure as bikes or pedestrians.

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					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
H- Transportation, storage, postal and courier services	50- Water transport	501-Cross-border water transport	5013-Ship owners of sea-going vessels (ISIC: 5011 - Sea and Coastal Passenger Water Transport; 5012 - Sea and Coastal Freight Water Transport) (NACE: 50.10 - Sea and coastal passenger water transport; 50.20 - Sea and coastal freight water transport)	501301: Ship owners of sea-going vessels for passenger transport	Transportation of passengers by sea	Transportation of passengers by sea	Climate Bonds Criteria	• Annual Efficiency Ratio (AER): The ratio of a ship's carbon emissions per actual capacity-distance (e.g., deadweight tonnage per nautical mile (dwt-nm), which is a measure of a ship's weight carrying capacity (not including the empty weight of the ship) x distance.	Please refer to activity card for the full criteria. 1) the ship must report an operational emissions intensity (using AER or EEOI) according to the criteria table below. Compliance can be reported by either AER or EEOI for a specific timeframe. For passenger vessels the denominator is GT-nm (gross tonne- nautical mile).
			5014-Operators of sea-going vessels (ISIC: 5011 - Sea and Coastal Passenger Water Transport; 5012 - Sea and Coastal Freight Water Transport) (NACE: 50.10 - Sea and coastal passenger water transport; 50.20 - Sea and coastal freight water transport)	501401: Operators of sea-going vessels for passenger transport					
			5013-Ship owners of sea-going vessels (ISIC: 5011 - Sea and Coastal Passenger Water Transport; 5012 - Sea and Coastal Freight Water Transport) (NACE: 50.10 - Sea and coastal passenger water transport; 50.20 - Sea and coastal freight water transport)	501302: Ship owners of sea-going vessels for freight transport	Transportation of freight by sea	Transportation of freight by sea	Climate Bonds Criteria	• Energy Efficiency Operational Indicator (EEOI): The total operational emissions to satisfy transport work demanded, this is usually quantified over a period of time which encompasses multiple voyages (e.g. a year). The ratio of a ship's carbon emissions per unit of transport work (e.g., Tonne-nm (t-nm) is a measure of useful work done and is calculated as deadweight carried X distance). • Dry bulk by tonnes carried (Tonnes) • Volume of coal transported (Tonnes)	Please refer to activity card for the full criteria. 1) The ship must report an operational emissions intensity (using AER or EEOI) according to the criteria table below. Compliance can be reported by either AER or EEOI. For freight the denominator is tnm (tonne-nautical mile) 2) Excluded assets: • Crude oil tankers and liquefied gas tankers • Dry bulk carriers IF transporting more than 20% of fossil fuels annually • Assets used for the exploration or production of fossil fuels (floating production, supply and offloading (FPSO) vessels; subsea, umbilicals, risers, flowlines (SURF) vessels; drilling units; platform supply vessels; well intervention vessels.
			5014-Operators of sea-going vessels (ISIC: 5011 - Sea and Coastal Passenger Water Transport; 5012 - Sea and Coastal Freight Water Transport) (NACE: 50.10 - Sea and coastal passenger water transport; 50.20 - Sea and coastal freight water transport)	501402: Operators of sea-going vessels for freight transport					

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					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
E - Water Supply; Sewerage, Waste Management And Remediation Activities	37 - Sewerage	370 - Sewerage	3700 – Sewerage (ISIC: 3700 - Sewerage) (NACE: 37.00 - Sewerage)	370000 Sewerage	Sewage sludge treatment – anaerobic digestion	Construction and operation of facilities for the treatment of sewage sludge by anaerobic digestion with the resulting production and utilization of biogas or chemicals.	CGT E1.1 Sewage sludge treatment – anaerobic digestion	• Tonnes CH4 per year	Please refer to activity card for the full criteria. 1) A monitoring and contingency plan is in place in order to minimise methane leakage at the facility 2) The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry 3) If anaerobic digestion is used in the facilities which produce power and/ or heat: total lifecycle methane emissions should not exceed 1,285g CH4/tonnes of waste input
	38- Waste collection, treatment and disposal activities; materials recovery	381-Waste collection	3811-Collection of non-hazardous waste (ISIC: 3811 - Collection of Non-Hazardous Waste) (NACE: 38.11 - Collection of non-hazardous waste)	381100 Collection of non-hazardous waste	Collection and transport of non-hazardous waste in source segregated fractions	Collection and transport of non-hazardous waste in source segregated fractions	CGT E2.1Collection and transport of non-hazardous waste in source segregated fractions	No specific quantifiable metrics necessary for the activity in question	Please refer to activity card for the full criteria. 1) All separately collected and transported non-hazardous waste that is segregated at source is intended for preparation for reuse or recycling operations 2) Bins used to collect waste should be made from 100% of recycled plastic

HSIC Industry Section	HSIC Industry Division (2 Digit)	HSIC Industry Group (3 Digit)	HSIC Industry Class (4 digit) (Corresponding ISIC / NACE)	HSIC Industry Sub-class (6 Digit)	Prototype Activities		Eligibility to be green		
					Taxonomy-level activity	Description	Closest Taxonomy Alignment	Key metrics	Substantial contribution criteria
Layer 1							Layer 2		Layer 3
E - Water Supply; Sewerage, Waste Management And Remediation Activities	38- Waste collection, treatment and disposal activities; materials recovery	382-Waste treatment and disposal	3821-Treatment and disposal of non-hazardous waste (ISIC: 3821 - Treatment and Disposal Of Non-Hazardous Waste) (NACE: 38.21 - Treatment and disposal of non-hazardous waste)	382100 Treatment and disposal of non-hazardous waste	Utilisation/ treatment of domestic waste – anaerobic digestion	Construction and operation of dedicated facilities for the treatment of separately collected bio-waste through anaerobic digestion with the resulting production and utilisation of biogas and digestate and/or chemicals.	CGT E2.4 Utilization/ treatment of domestic waste – anaerobic digestion	• Tonnes CH₄ per year • % of food and feed crops used as feedstock	Please refer to activity card for the full criteria. 1) A monitoring and contingency plan is in place in order to minimise methane leakage 2) The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry 3) The bio-waste that is used for anaerobic digestion is source segregated and collected separately 4) The produced digestate is used as fertiliser or soil improver 5) Food and feed crops used as input feedstock, measured in weight, as an annual average, is less than or equal to 10% of the input feedstock 6) If anaerobic digestion is used in the facilities which produce power and/ or heat: total lifecycle methane emissions should not exceed 1,285g CH ₄ /tonnes of waste input

Sector: Electricity, Gas, Steam and Air Conditioning Supply

Electric power generation, transmission and distribution

Overview

Hong Kong is determined to achieve carbon neutrality before 2050.¹ In the 2021 policy address, the Chief Executive called on the power companies to phase down coal-fired generation units and replace the use of coal with other alternatives such as natural gas and renewable energy for electricity generation. She reaffirmed the government's efforts to grapple with Hong Kong's geographical and environmental constraints in driving the development of renewable energy and strive to increase its share in the fuel mix for electricity generation through facilitating local projects, regional collaboration and joint ventures.²

Hong Kong's power sector accounted for approximately 66%, or 26.3 MtCO₂e of Hong Kong's total greenhouse gas (GHG) emissions in 2019.³ Hong Kong's electricity consumption was 44.1TWh in 2020, a slight decrease from 2019 levels due to the COVID-19 pandemic. In the past 20 years, growth in electricity demand has slowed. Per capita electricity consumption peaked in 2014, the same year that total emissions peaked.

In order to reach net-zero electricity generation, Hong Kong's Climate Action Plan 2050, aims to cease the use of coal for daily electricity generation; increase the share of renewable energy in the fuel mix for electricity generation to 7.5% to 10% by 2035, and to 15% subsequently; and to trial the use of new energy and strengthen co-operation with neighbouring regions to achieve the long-term target of net-zero electricity generation before 2050.⁴

The objective of the following energy sector criteria is to provide clear guidance on what technologies, assets and investments will provide a substantial contribution to climate change mitigation in the context of Hong Kong's decarbonisation objectives.

Metrics

- **gCO₂/kWh**

To be consistent with other taxonomies including the EU Taxonomy, the primary metric for measuring emissions in the energy sector is **gCO₂/kWh** as this directly reflects the emissions intensity for electricity generation, which is the major source of emissions from the energy sector. The metric is based on life cycle emissions to account for GHG emissions throughout the value chain of energy production processes (e.g., electricity generation from natural gas can have significantly large emissions due to methane leakage during extraction, transportation and distribution in addition to

¹ <https://www.info.gov.hk/gia/general/202110/08/P2021100800588.htm>

² <https://www.policyaddress.gov.hk/2021/eng/p95.html>

³ PD. 2021. 2019 Greenhouse Gas Inventory for Hong Kong. <https://www.climate.gov.hk/files/pdf/Greenhouse%20Gas%20Emissions%20in%20Hong%20Kong%20by%20Sector.pdf>

⁴ https://www.climate.gov.hk/files/pdf/CAP2050_4_en.pdf

combustion and, therefore, a lifecycle-based threshold is useful to check GHG emissions during entire supply chain and not just during combustion).

Criteria and thresholds

- **Lifecycle emission of the installation must not exceed 100gCo₂e/kWh**

A 100gCo₂e/kWh threshold applies across all technology types, declining to net-zero by 2050. This reflects international best practice and is aligned with the EU Taxonomy criteria.

Derogations can be available for renewable energy technologies which are well recognised to have emissions intensities below this threshold. However, it is noted that in the Common Ground Taxonomy (CGT) there are instances where additional technology specific criteria apply. For example, although solar photovoltaic technologies are well recognised to have lifecycle emissions well below the 100gCo₂e/kWh threshold, they are also subject to additional requirements regarding factors such as conversion efficiency. These are aligned with the Green Bond Endorsed Project Catalogue and are designed to help encourage innovation across the technology segment.

It is also noted that the Hong Kong Taxonomy should be a 'living' document. The threshold and respective derogations mentioned above should be reviewed and updated as the 100gCo₂e/kWh threshold declines to 0gCo₂e/kWh by 2050.

Activity cards

Electricity generation using concentrated solar power technology

Sector	Electricity, gas, steam and air conditioning supply				
Activity Category	Electric power generation, transmission and distribution				
Activity Description	Electricity generation using concentrated solar power (CSP) technology. Construction and operation of facilities using solar thermal power to generate electricity				
HSIC Code	351000	CGT Code	D1.2 Electricity generation using concentrated solar power (CSP) technology	Corresponding ISIC Code	3510
Closest EU Taxonomy Code	4.2. Electricity generation using concentrated solar power (CSP) technology	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		3.2.2.2 Construction and operation of solar energy utilization facilities	
HSIC Description	Operation of generation facilities that produce electric energy; including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable				
Criteria and Thresholds					
Main Criteria	Automatically eligible if use of proceeds complies with activity description				
Additional Requirements and Comments	None				

Electricity generation using solar photovoltaic technology

Sector	Electricity, gas, steam and air conditioning supply				
Activity Category	Electric power generation, transmission and distribution				
Activity Description	Construction or operation of electricity generation facilities that produce electricity using solar photovoltaic (PV) technology				
HSIC Code	351000	CGT Code	D1.1 Electricity generation using solar photovoltaic technology	Corresponding ISIC Code	3510
Closest EU Taxonomy Code	4.1. Electricity generation using solar photovoltaic technology	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		None	
HSIC Description	Operation of generation facilities that produce electric energy; including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable				
Criteria and Thresholds					
Main Criteria	Automatically eligible if use of proceeds complies with activity description				
Additional Requirements and Comments	Additional requirements for projects in Mainland China: The component products selected for solar photovoltaic power generation facilities should meet the following requirements: 1) The minimum photoelectric conversion efficiency of polycrystalline silicon cells and monocrystalline silicon cells shall not be less than 19% and 21% respectively; 2) The minimum photoelectric conversion efficiency of polycrystalline silicon cell modules and single crystal silicon battery modules shall not be less than 17% and 17.8% respectively; 3) The minimum photoelectric conversion efficiency of silicon-based, CIGS, CdTe and other thin-film battery modules shall not be less than 12%, 14%, 14%, 12%; 4) The decay rates of polycrystalline silicon battery modules and monocrystalline silicon battery modules shall not be higher than 2.5% and 3% in the first year, and not higher than 0.7% per year, and not higher than 20% within the period of 25 years; the attenuation rate of thin-film battery module shall not be more than 5% in the first year, no more than 0.4% per year in the following year, no more than 15% within the period of 25 years.				

Electricity generation from wind power

Sector	Electricity, gas, steam and air conditioning supply
Activity Category	Electric power generation, transmission and distribution
Activity Description	Construction or operation of electricity generation facilities that produce electricity from wind power

HSIC Code	351000	CGT Code	D1.3 Electricity generation from wind power	Corresponding ISIC Code	3510
Closest EU Taxonomy Code	4.3 Electricity generation from wind power	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		3.2.2.1 Construction and Operation of Wind Generators	
HSIC Description	Operation of generation facilities that produce electric energy; including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable				
Criteria and Thresholds					
Main Criteria	Automatically eligible if use of proceeds complies with activity description				
Additional Requirements and Comments	None				

Sector: Transportation and Storage

Land transport including railways

Overview

Hong Kong's population surges from 5.3 million to nearly 7.4 million in the past 4 decades, and, in order to cater to the transport demand, the city has focused on upgrading its transport infrastructure and services for private mobility whilst also building a multi-modal public transportation system. The multi-modal public transport system in Hong Kong consists of a Mass Transit Railway, a tramway, franchised buses, public light buses, taxis, non-franchised buses, and ferry services. It has been estimated that 90% of Hong Kong's daily passenger trips are by passenger transport, a proportion that is amongst the highest in the world.

In 2021, the public transport patronage was about 10.6 million passengers per day, with the railway system being the largest passenger-carrying mode with around 4.29 million passengers per day and the franchised buses coming next with 3.47 million passengers per day. The ferry system carries just about an average of 97,270 passengers daily with 11 franchised and licensed ferry operators running 22 regular passenger ferry services, two dangerous goods vehicular ferry services and two special services at the harbour and to the new towns and outlying islands.⁵

Hong Kong's transport sector accounted for approximately 18%, or 7.2 MtCO₂e of Hong Kong's total GHG emissions in 2019⁶. Road transport (motor vehicles) is the largest source accounting for 89% of GHG emissions within the transport sector. As of 2019⁷, private cars account for the highest share of the motor vehicle fleet, but freight vehicles emitted the largest emissions, contributing 6% of Hong Kong's total GHG emissions, followed by private cars (4.5%), buses (3.6%), and taxis (1.9%).⁸

As per Hong Kong's Climate Action Plan 2050, the goal for the transport sector is to achieve zero vehicular emissions before 2050. This would require strengthening the public transport system and specifically promoting vehicle (and ferry) electrification. Seeing this as the primary goal, the Hong Kong Government aims to cease registration of new internal combustion engine-based- and hybrid private cars (including plug-in hybrid electric vehicles) by 2035 or earlier. It actively promotes electric vehicles at a large scale for commercial purposes by testing out hydrogen fuel cell electric buses and heavy vehicles.⁹

Metrics

- **CO₂e emissions per passenger kilometre (gCO₂e/pkm);**
- **CO₂e emissions per vehicle kilometre (gCO₂e/vkm);**
- **CO₂e emissions per tonne kilometre (gCO₂e/tkm).**

As in other taxonomies, the transport sector criteria require that operated fleets to become more efficient over time by linking eligibility to emissions performance below a certain threshold set to

⁵ https://www.td.gov.hk/mini_site/atd/2022/en/section5-1.html

⁶ PD. 2021. 2019 Greenhouse Gas Inventory for Hong Kong. <https://www.climate.gov.hk/files/pdf/Greenhouse%20Gas%20Emissions%20in%20Hong%20Kong%20by%20Sector.pdf>

⁷ Please note that the data and figures refer to years before the Covid-19 pandemic because the years 2020-21-22 are not representative of the status of the transport sector as economic activity decreased markedly.

⁸ https://www.climate.gov.hk/files/pdf/CAP2050_booklet_en.pdf

⁹ https://civic-exchange.org/wp-content/uploads/2022/10/HK-transport-report_-Final.pdf

ensure substantially reduced emissions. Emissions reductions thresholds are based on performance metrics (vehicle km, passenger km or tonne km).

Criteria and thresholds

Construction and operation of public transportation system in urban and rural areas

The type of infrastructure available in a specific jurisdiction is a crucial element of transport behaviour and choice. Transport investments decided by governments can therefore lock in a high carbon transport future when the projects and assets invested in are not aligned with low carbon technologies. In this context, the setting of the criteria for this activity was inspired by long term strategic vision of decarbonisation of the transport sector, as per the Hong Kong's Climate Action Plan 2050 wherein the goal for the transport sector is to achieve zero vehicular emissions before 2050. In line with other taxonomies (such as the EU, Thailand, Colombia, South Africa), certain transport modes, such as electrified rail transport, are already associated with relatively low carbon emissions whilst electronic vehicles and hydrogen vehicles are singled out as eligible assets as they are a clear part of the low carbon transport sector in 2050. The purpose is to provide a clear signal to the market and ease for issuers that are keen to finance such projects both in Hong Kong and other jurisdictions.

Description and scope:

The purchase, financing, leasing, rental and operation of urban and suburban transport vehicles for passengers and road passenger transport include the construction and operation of subways, light railways, tram, and other urban rail transportation facilities; the construction and operation of high-capacity public transportation facilities, such as BRT bus stations, lines and other facilities; the purchase of public transportation vehicles.

- **The trains and passenger coaches have zero direct (tailpipe) CO₂ emissions**

The criteria thus ensure substantial GHG emissions reductions by increasing the number of zero-emission vehicles and by improving the efficiency of the transport system in general.

Construction and operation of personal mobility devices, cycle logistics

The promotion of EVs for personal mobility devices, transport devices and the improvement of cycle logistic infrastructure is pivotal to achieve Hong Kong's Zero Emission Plan for the transport sector by 2050. Considering this activity defines that the propulsion of personal mobility devices should come from the physical activity of the user, from a zero-emissions motor, or a mix of zero-emissions motor and physical activity, the activity is automatically eligible. This aligns with other international taxonomies wherein the operation of vehicles with zero tailpipe emissions, or close to zero tailpipe emissions, is automatically eligible as it supports the decarbonisation of the transport sector. Furthermore, this activity also includes promotion and use of hydrogen fuel cell electric vehicles.

Description and scope:

The activity refers to the selling, purchasing, financing, leasing, renting and operation of personal mobility or transport devices where the propulsion comes from the physical activity of the user, from a zero emissions motor, or a mix of zero-emissions motor and physical activity. This specifically also includes:

- The construction of urban walking and cycling transportation systems, including public bicycle rental sites, non-motorised vehicle parking facilities, road crossing facilities and other slow-moving urban systems.
 - The construction and operation of shared transportation infrastructure, such as systems for public rental bicycles, online bicycle rental, online electric bicycle rental, online car rental, car sharing, parking facilities and equipment, and bicycle parking facilities.
 - The provision of freight transport services by (cargo) bicycles.
 - The selling, purchasing, financing, leasing, renting and operation of private electric or hydrogen vehicles.
- **Automatically eligible if use of proceeds complies with activity description.**

Activity cards

Construction and operation of public transportation system in urban and rural areas

Sector	Transportation and Storage				
Activity Category	Land transport including railways				
Activity Description	Purchase, financing, leasing, rental and operation of urban and suburban transport vehicles for passengers and road passenger transport. This includes construction and operation of subways, light railways, tram, and other urban rail transportation facilities; construction and operation of high-capacity public transportation facilities, such as BRT bus stations, lines and other facilities construction and operation; purchase of public transportation vehicles, etc.				
HSIC Code	491000 492100 492300 492400 492500	CGT Code	H1.1. Construction and operation of public transportation system in urban and rural areas	Corresponding ISIC Code	4921 4922
Closest EU Taxonomy Code	6.3 Urban and suburban transport, road passenger transport	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		5.5.1.5 Construction and operation of public transportation system in urban and rural areas	
HSIC Description	491000: Railway and cable transport 492100: Public bus services 492300: Non-scheduled public light bus services 492400: Scheduled public light bus services 492500: School bus services				
Criteria and Thresholds					
Main Criteria	The trains and passenger coaches have zero direct (tailpipe) CO ₂ emissions				
Additional Requirements and Comments	Additional criteria for projects in the EU: Other fleets/trains are eligible if direct emissions are below 50 gCO ₂ e/pkm until 2025 (non-eligible thereafter). The threshold of 50 gCO ₂ e/pkm until 2025 ensures that the carbon intensity remains similar to criteria for eligible road vehicles with low occupation factor (50 gCO ₂ /vkm) and significantly lower than emissions for an average car.				

Construction and operation of personal mobility devices, cycle logistics

Sector	Transportation and Storage				
Activity Category	Land transport including railways				
Activity Description	Selling, purchasing, financing, leasing, renting and operation of personal mobility or transport devices where the propulsion comes from the physical activity of the user, from a zero emissions motor, or a mix of zero-emissions motor and physical activity. This specifically also includes: - Construction of urban walking and cycling transportation systems, including public bicycle rental sites, non-motorised vehicle parking facilities, road crossing facilities and other slow-moving urban systems. - Construction and operation of shared transportation infrastructure, such as systems for public rental bicycles, online bicycle rental, online electric bicycle rental, online car rental, car sharing, parking facilities and equipment, and bicycle parking facilities. - The provision of freight transport services by (cargo) bicycles - Selling, purchasing, financing, leasing, renting and operation of private electric or hydrogen vehicles				
HSIC Code	499000	CGT Code	H1.5. Construction and operation of personal mobility devices, cycle logistics	Corresponding ISIC Code	4922
Closest EU Taxonomy Code	6.4. Operation of personal mobility devices, cycle logistics	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		5.5.1.6 Construction and operation of facilities for shared transport 5.5.1.4 Construction and operation of slow mode transportation system	
HSIC Description	499000: Other land transport services				
Criteria and Thresholds					
Main Criteria	Automatically eligible if use of proceeds complies with activity description.				
Additional Requirements and Comments	• The propulsion of personal mobility devices comes from the physical activity of the user, from a zero-emissions motor, or a mix of zero-emissions motor and physical activity. • The personal mobility devices are allowed to be operated on the same public infrastructure as bikes or pedestrians.				

Water Transport

Overview

Maritime transport accounts for approximately 80% of global trade by volume, and 70% by value. In 2017, total volumes transported reached 10.7 billion tons. The UN Conference on Trade and Development (UNCTAD) is forecasting a 3.8% compound average growth rate for seaborne trade between 2018 and 2023. Hong Kong is one of the major ports in Asia and has a unique opportunity to facilitate the financing of transport operations and infrastructure.

While CO₂ represented almost all of the industry's GHG emissions (98%), methane (CH₄) emissions from ships have increased recently due to the methane slip associated with increased use and transport of liquefied gas in liquefied natural gas (LNG) carriers and other LNG-propelled ships. There

is potential for this trend to continue in the future if there is an increased uptake of LNG-powered ships. However, there is potential for the sector to make significant GHG reductions. These can be achieved through a combination of increasing the energy efficiency of shipping and reducing the GHG intensity of the energy used by ships.

According to the International Maritime Organisation (IMO), the shipping industry's governing body, the sector currently accounts for 2.2% of global emissions. If left unchecked, shipping emissions are expected to grow by 50-250% by 2050.

Metrics:

The shipping criteria are designed to apply to wide range of ships, provided that issuers are able to provide either the Energy Efficiency Operation Index (EEOI) or Annual Efficiency Ratio (AER) data of the vessels. Specifically, issuers are required to submit information reported on an annual basis of their achieved EEOI or AER, alongside documentation that the data has been submitted and verified for EU/IMO purposes through the EU MRV or IMO DCS systems. The use of such pre-existing systems also ensures that no additional data collection burden should be required.

- **AER:**

- The ratio of a ship's carbon emissions per actual capacity-distance (e.g., dwt x nm sailed).
- Assumes ships are fully loaded on all miles travelled during the year. In practice, ships are not always fully loaded and many ships (e.g., tankers and bulkers) operate with ballast voyages where for several voyages a year they have no cargo.

- **EEOI:**

- The total operational emissions to satisfy transport work demanded, this is usually quantified over a period of time which encompasses multiple voyages (e.g.: a year). The ratio of a ship's carbon emissions per unit of transport work (e.g., cargo x nm sailed).
- Considered the ultimate measurement of a ship's estimated real-world efficiency in that it incorporates all of the components listed above, emissions when the ship is in port/anchor etc. This is what the EEOI metric is attempting to measure.

Criteria and thresholds

The utilisation of EEOI and AER metrics and a 2020-2050 declining threshold are derived from the Climate Bonds Initiative Shipping Criteria ¹⁰ which are in turn based on IMO Secretariat's Third IMO GHG Study, published in 2014. The Third IMO GHG Study ¹¹ contains a dataset estimating the average operational emissions intensities of different ship types and sizes between 2010 and 2012. From this data, the criteria calculate the decarbonisation trajectories for each size and class of ship, adopting a linear threshold to net-zero by 2050.

For example, in any given year the AER emissions intensity is =

¹⁰ <https://www.climatebonds.net/standard/shipping>

¹¹ <https://www.imo.org/en/ourwork/environment/pages/greenhouse-gas-studies-2014.aspx>

$$\text{AER in 2020} - \text{Years since 2020} \times \frac{\text{AER in 2020}}{30 \text{ years}}$$

At any given year, a ship must be operating at the corresponding emissions intensity for that year. Ships remain compliant provided they are able to operate below the threshold.

While the Fourth IMO GHG Study was published in July 2020, the criteria proposed below still reference the Third IMO GHG Study, in line with Climate Bonds. With that in mind, these estimated emissions intensities can be continuously updated as the average emissions of the global fleet changes over time.

Activity cards

Transportation of freight by sea

Sector	Transportation and Storage																					
Activity Category	Water transport																					
Activity Description	Transportation of freight by sea																					
HSIC Code	501302 501402	CGT Code	None	Corresponding ISIC Code	5012 5022																	
Closest EU Taxonomy Code	6.10. Sea and coastal freight water transport, vessels for port operations and auxiliary activities	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		None																		
HSIC Description	501302: - Freight transport by own sea-going vessels - Chartering of own sea-going vessels with crews (i.e. on a full basis) to other operators for freight transport - Renting of own sea-going vessels without crews (i.e. on a bare vessel basis) to other operators for freight transport 501402: - Operation of sea-going freight vessels rented or chartered from others. - Re-renting out sea-going freight vessels, which are rented or chartered from others to third party operators.																					
Criteria and Thresholds																						
Main Criteria	In order to be compliant with the criteria the ship must report an operational emissions intensity (using AER or EEOI) according to the criteria table below. Compliance can be reported by either AER or EEOI. For freight the denominator is tnm (tonne-nautical mile) <table><tr><th>Type</th><th>Size (GT)</th><th>2020 AER/EEOI</th><th>2030 AER/EEOI</th><th>2040 AER/EEOI</th><th>2050 AER/EEOI</th></tr><tr><td rowspan="2">Bulk carrier</td><td>0-9999</td><td>35.1 / 24.6</td><td>23.4 / 16.4</td><td>11.7 / 8.2</td><td>0</td></tr><tr><td>10000-34999</td><td>12.2 / 6.6</td><td>8.1 / 4.4</td><td>4.1 / 2.2</td><td>0</td></tr></table>					Type	Size (GT)	2020 AER/EEOI	2030 AER/EEOI	2040 AER/EEOI	2050 AER/EEOI	Bulk carrier	0-9999	35.1 / 24.6	23.4 / 16.4	11.7 / 8.2	0	10000-34999	12.2 / 6.6	8.1 / 4.4	4.1 / 2.2	0
Type	Size (GT)	2020 AER/EEOI	2030 AER/EEOI	2040 AER/EEOI	2050 AER/EEOI																	
Bulk carrier	0-9999	35.1 / 24.6	23.4 / 16.4	11.7 / 8.2	0																	
	10000-34999	12.2 / 6.6	8.1 / 4.4	4.1 / 2.2	0																	

		35000-59999	9.2 / 4.6	6.2 / 3.1	3.1 / 1.5	0
		60000-99999	8.4 / 3.6	5.6 / 2.4	2.8 / 1.2	0
		100000-199999	4.6 / 2.4	3.1 / 1.6	1.5 / 0.8	0
		200000-+	4.1 / 2.3	2.7 / 1.5	1.4 / 0.8	0
	Chemical tanker	0-4999	40.3 / 35.4	26.8 / 23.6	13.4 / 11.8	0
		5000-9999	26.6 / 19	17.7 / 12.7	8.9 / 6.3	0
		10000-19999	18.7 / 11.9	12.5 / 7.9	6.2 / 4	0
		20000-+	12.3 / 6.5	8.2 / 4.3	4.1 / 2.2	0
	Container	0-999	27.3 / 16.9	18.2 / 11.3	9.1 / 5.6	0
		1000-1999	24.9 / 14.8	16.6 / 9.9	8.3 / 4.9	0
		2000-2999	19.5 / 10	13 / 6.7	6.5 / 3.3	0
		3000-4999	16.8 / 8.3	11.2 / 5.5	5.6 / 2.8	0
		5000-7999	16.2 / 7.8	10.8 / 5.2	5.4 / 2.6	0
		8000-11999	14.1 / 6.7	9.4 / 4.5	4.7 / 2.2	0
		12000-14500	10.4 / 4.6	6.9 / 3.1	3.5 / 1.5	0
		14500-+	10.4 / 4.6	6.9 / 3.1	3.5 / 1.5	0
	General cargo	0-4999	30.2 / 24.2	20.1 / 16.1	10.1 / 8.1	0
		5000-9999	27.2 / 16.7	18.2 / 11.1	9.1 / 5.6	0
		10000-+	24.2 / 13.1	16.2 / 8.8	8.1 / 4.4	0
	Other liquid tanker	0-+	106.6/ 97.6	71.1 / 65.1	35.5 / 32.5	0
	Refrigerated bulk	0-1999	72.8 / 48.7	48.5 / 32.5	24.3 / 16.2	0
	Ro-Ro	0-4999	258.2 / 212.4	172.1 / 141.6	86.1 / 70.8	0
		5000-+	63.9 / 45.9	42.6 / 30.6	21.3 / 15.3	0
	Vehicle	0-3999	124.7 / 46	83.2 / 30.7	41.6 / 15.3	0
		4000-+	58.1 / 13.8	38.7 / 9.2	19.4 / 4.6	0
Additional Requirements and Comments		Excluded assets: • Crude oil tankers and liquefied gas tankers • Dry bulk carriers IF transporting more than 20% of fossil fuels annually • Assets used for the exploration or production of fossil fuels (floating production, supply and offloading (FPSO) vessels; subsea, umbilicals, risers, flowlines (SURF) vessels; drilling units; platform supply vessels; well intervention vessels. Additional criteria for projects in the EU: the vessels must have zero direct (tailpipe) CO2 emissions				

Transportation of passengers by sea

Sector	Transportation and Storage
Activity Category	Water transport

Activity Description	Transportation of passengers by sea																																																															
HSIC Code	501301 501401	CGT Code	None	Corresponding ISIC Code	5011 5011																																																											
Closest EU Taxonomy Code	6.11. Sea and coastal passenger water transport	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		None																																																												
HSIC Description	501301: - Passenger transport by own sea-going vessels - Chartering of own sea-going vessels with crews (i.e. on a full basis) to other operators for passenger transport - Renting of own sea-going vessels without crews (i.e. on a bare vessel basis) to other operators for passenger transport 501401: - Operators of sea-going passenger vessels, rented or chartered from others - Re-renting out sea-going passenger vessels, which are rented or chartered from others to third party operators																																																															
Criteria and Thresholds																																																																
Main Criteria	In order to be compliant with criteria, the ship must report an operational emissions intensity (using AER or EEOI) according to the criteria table below. Compliance can be reported by either AER or EEOI for a specific timeframe. For passenger vessels the denominator is GT-nm (gross tonne- nautical mile). <table><tr><td>Type</td><td>Size (GT)</td><td>2020 AER / EEOI</td><td>2030 AER / EEOI</td><td>2040 AER / EEOI</td><td>2050 AER / EEOI</td></tr><tr><td rowspan="2">Ferry-pax only*</td><td>0-1999</td><td>1272135.8</td><td>848090.5</td><td>424045.3</td><td>0</td></tr><tr><td>2000-+</td><td>1740606.6</td><td>1160404.4</td><td>580202.2</td><td>0</td></tr><tr><td rowspan="6">Cruise*</td><td>0-1999</td><td>2044403.4</td><td>1362935.6</td><td>681467.8</td><td>0</td></tr><tr><td>2000-9999</td><td>1286641.3</td><td>857760.8</td><td>428880.4</td><td>0</td></tr><tr><td>10000-59999</td><td>1495064.7</td><td>996709.8</td><td>498354.9</td><td>0</td></tr><tr><td>60000-99999</td><td>1738613.6</td><td>1159075.7</td><td>579537.9</td><td>0</td></tr><tr><td>100000-+</td><td>1337274.9</td><td>891516.6</td><td>445758.3</td><td>0</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="2">Ferry-RoPax*</td><td>0-1999</td><td>822123.9</td><td>548082.6</td><td>274041.3</td><td>0</td></tr><tr><td>2000-+</td><td>1137003.8</td><td>758002.5</td><td>379001.3</td><td>0</td></tr></table>					Type	Size (GT)	2020 AER / EEOI	2030 AER / EEOI	2040 AER / EEOI	2050 AER / EEOI	Ferry-pax only*	0-1999	1272135.8	848090.5	424045.3	0	2000-+	1740606.6	1160404.4	580202.2	0	Cruise*	0-1999	2044403.4	1362935.6	681467.8	0	2000-9999	1286641.3	857760.8	428880.4	0	10000-59999	1495064.7	996709.8	498354.9	0	60000-99999	1738613.6	1159075.7	579537.9	0	100000-+	1337274.9	891516.6	445758.3	0						Ferry-RoPax*	0-1999	822123.9	548082.6	274041.3	0	2000-+	1137003.8	758002.5	379001.3	0
Type	Size (GT)	2020 AER / EEOI	2030 AER / EEOI	2040 AER / EEOI	2050 AER / EEOI																																																											
Ferry-pax only*	0-1999	1272135.8	848090.5	424045.3	0																																																											
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Additional Requirements and Comments	Additional criteria for projects in the EU: the vessels must have zero direct (tailpipe) CO2 emissions																																																															

Background Information:

The criteria presented here leverage the guidance in the CGT and also the Climate Bonds Initiative Taxonomy.

The criteria for construction of low carbon water infrastructure reference the CGT. These only include the construction of infrastructure that enables low-carbon water transport. The criteria however do not provide any guidance on the operation of low carbon vessels themselves.

Thus, to complement this gap, we have provided criteria for the ownership and operation of low carbon vessels for freight and passenger transport.

It should also be noted that:

- The criteria for a low carbon vessel are categorised according to the size and class of ship, taking the average emissions for that segment and providing a linear threshold to zero by 2050.

According to the Climate Bonds Criteria, vessels must be compliant with the declining threshold in each year of operation. This can be proven through annual reporting.

The AER measures carbon emissions associated with transport work, but it uses a ship's size (deadweight) as a proxy for cargo carried. This does not provide an apples-to-apples comparison between two ships which carry different cargo amounts. Cargo influences the numerator (carbon emissions) because a ship which carries a larger cargo requires more energy for propulsion and the denominator (transport work is a function of cargo carried and distance). Because ships are not typically fully utilised, the AER would overestimate the efficiency of the ship. The IMO's Data Collection System, will require data to be collected (e.g., fuel consumption, distance sailed and DWT) for all ships 5000 DWT and will enable the calculation of AER.

Efficiency metrics (gCO₂/tonne-nm) allow for an apples-to-apples comparison between two vessels whose cargo movements produce different levels of transport work. They also enable the tracking of progress over time and comparison across different shipping fleets, companies, and different modes of transport. The carbon intensity of a ship in real operating conditions is known as the Energy Efficiency Operational Index (EEOI). It is the metric adopted by the IMO and represents the CO₂ emitted per tonne nautical mile for a voyage or specific time period. It can either be calculated from fuel consumption measurements and information on cargo carried and distance travelled or estimated using satellite tracking data and fleet technical specifications.

EEOI therefore accounts for the real operating conditions of the vessel and their impact on fuel consumption (e.g., speed, weather, draught). and is therefore a more accurate representation of the CO₂ efficiency than if the efficiency were estimated in the vessel's designed (or optimal operating) condition as is done by the Energy Efficiency Design Indicator (EEDI) or EVDI. The as-designed efficiency assumes that a ship operates in its designed speed (often above the actual ship speed) in ideal weather conditions and is fully loaded.

The EEOI is influenced by speed, utilisation and a ship's technical efficiency. Increasing the energy efficiency of a ship lowers the EEOI, controlling for all other factors. In practice however, there could be rebound effects as a result of the lower marginal operating cost from the technical efficiency improvement. If the ship is operating on zero emissions fuels, this rebound effect is no longer an issue.

Sector: Water supply; sewerage, waste management and remediation activities

Sewage sludge treatment

Overview

More than 93% of the population is served by the public sewerage system, with its sewerage network of about 1900 kilometres and around 300 sewage pumping stations and sewage treatment plants collecting and treating 2.8 million cubic metres of sewage per day¹². On average, the system treats a little over 1 million cubic metres of sewage per year, of which 7.3% undergo preliminary treatment, 73.0% chemically enhanced primary treatment (CEPT), and 19.1% secondary treatments. The remaining 0.6% undergo primary and tertiary treatments¹³.

For the purpose of the current phase of development of the taxonomy, the following activities will be assessed:

- Sewage sludge treatment – anaerobic digestion

Metrics

- **Tonnes CH₄ per year**

Methane (CH₄) is a much stronger absorber of the emitted thermal infrared radiation in Earth's atmosphere than carbon dioxide (CO₂) and, therefore, in practice, this means that methane is a much more powerful GHG with a warming potential 84-87 times higher than CO₂ over the first 20 years after it reaches the atmosphere¹⁴.

As a consequence, even though CO₂ has a longer-lasting effect, methane sets the pace for warming in the near term and its current level of estimated anthropogenic emissions correspond to a global temperature increase of over 3 degrees by 2100¹⁵.

Crucially, global methane emissions have increased drastically since 2007 and, in the longer term, their constant increase may be the biggest threat to keeping temperatures below the 2-degree scenario envisioned by the Paris Agreement and to avoid the tipping point towards catastrophic climate change^{16 17}.

¹² <https://www.gov.hk/en/residents/environment/water/sewage/sewagetreatment.htm>

¹³ https://www.dsd.gov.hk/EN/Publicity_and_Publications/Publicity/DSD_Sustainability_Reports/19/overview-of-sewage-treatment.html

¹⁴ <https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change>

¹⁵ <https://essd.copernicus.org/articles/12/1561/2020/>

¹⁶ <https://esd.copernicus.org/articles/12/601/2021/>

¹⁷ <https://www.ipcc.ch/sr15/chapter/chapter-3/>

Criteria and thresholds

Sewage sludge treatment – anaerobic digestion

- **A monitoring and contingency plan is in place in order to minimise methane leakage at the facility**

The anaerobic digestion unit converts a certain class of waste into methane. As a consequence, it is essential that the plant has all the necessary safety measures in place to prevent the possibility of its leakage.

Therefore, we are proposing a metric in order to monitor the whole lifecycle methane emissions of the plants and to minimise its leakage:

- **If anaerobic digestion is used in the facilities which produce power and/or heat: total lifecycle methane emissions should not exceed 1,285g CH₄/tonne of waste input**

The number of 1,285g CH₄/tonne of emission is roughly equivalent to 100 gCO₂/kWh as calculated by technical expert group that developed Climate Bonds Waste Management Criteria¹⁸. The threshold allows the activity to be compatible with international criteria for green energy generation.

- **The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry**

Biomethane that is produced as the result of anaerobic digestion has many potential negative effects on climate and human health. Leakage risks also include explosion, asphyxiation and poisoning. Therefore, it is very important to utilise it as fast as possible and in a proper way.

Activity cards

Sewage sludge treatment – anaerobic digestion

Sector	Water supply; sewerage, waste management and remediation activities				
Activity Category	Sewage sludge treatment				
Activity Description	Construction and operation of facilities for the treatment of sewage sludge by anaerobic digestion with the resulting production and utilisation of biogas or chemicals.				
Activity Scope	Construction and operation				
HSIC Code	370000	CGT Code	E1.1 Sewage sludge treatment – anaerobic digestion	Corresponding ISIC Code	3700
Closest EU Taxonomy Code	5.6. Anaerobic digestion of sewage sludge	Closest Chinese Green Bond Endorsed Projects Catalogue Codes	1.5.3.3 Comprehensive utilisation of sludge from urban sewage treatment plants		

¹⁸ https://www.climatebonds.net/files/files/Waste%20Management%20Criteria_August2022.pdf

HSIC Description	Sewage treatment
Criteria and Thresholds	
Main Criteria	• A monitoring and contingency plan is in place in order to minimise methane leakage at the facility • The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry • If anaerobic digestion is used in the facilities which produce power and/ or heat: total lifecycle methane emissions should not exceed 1,285g CH₄/tonnes of waste input
Additional Requirements and Comments	None

Waste Collection, Treatment and Recycling

Overview

Hong Kong is a densely populated area, so the issue of waste management is one of the keys to its sustainable development. Hong Kong generates about 6.4 million tonnes/year of municipal solid waste (MSW), construction and demolition waste, chemical waste, and other special waste (clinical waste, animal carcasses, livestock waste, radioactive waste, grease trap waste, and waterworks/sewage sludge)¹⁹. MSW **accounts for 7% of the city's GHG emissions**²⁰, with the major source being organic waste decomposition in landfills.

In 2021, the total quantity of MSW disposed to the landfills was 4.15 million tonnes (69% of the total), which represented an increase of 5.1% as compared to 2020. Applying a discount factor for population growth, the disposal rate of MSW was 1.53 kg/person/day, as compared to 1.44 kg/person/day in 2020²¹. The major component of MSW is domestic waste. Its quantity of disposal was 2.55 million tonnes in 2021, which has increased by 2.2% as compared to 2020.

On the other hand, the quantity of commercial and industrial (C&I) waste disposed of was 1.59 million tonnes in 2021, which has increased by 10.1% when compared to 2020. **The overall MSW recovery rate in 2021 was 31% (1.84 million tonnes), which has increased from 28% in 2020.**

Of the 11,358 tonnes of MSW landfilled daily in 2021, some 3,437 tonnes (30% of MSW) were **food waste**, which increased by 5.6 % as compared to 2020. The second largest constituent of MSW was **waste plastics**. Some 2,331tpd (21% of MSW) were disposed in landfills in 2021, which increased marginally by 0.8 % as compared to 2020. The third largest constituent of MSW was **wastepaper**, with a disposed quantity of 2,234tpd (20% of MSW) in 2021, which has decreased markedly by 15.5 % as compared to 2020.

¹⁹ <https://www.sciencedirect.com/science/article/pii/S2772737822000098>

²⁰ <https://www.scmp.com/comment/letters/article/3167424/why-hong-kongs-landfill-problem-wont-be-solved-waste-energy-plants>

²¹ Here and to the end of the third paragraph:

<https://www.wastereduction.gov.hk/sites/default/files/msw2021.pdf>

The quantity of generated (the sum of disposal and reuse) **construction waste** in 2021 was 53,011tpd (19.35 million tonnes), representing a decrease of 6% as compared with the 2020 level. Among them, the quantity transferred for direct reuse registered an increase of 9% and, since inert materials generated from some large-scale construction projects were directly reused, the amount delivered to public fill reception facilities decreased by 17%. In the past decade, **the recovery rate of construction materials has remained at above 90% and was 93% in 2021.**

Currently, most of the MSW in Hong Kong is disposed of in the following landfills:

- South-East New Territories (SENT)
- West-New Territories (WENT)
- North-East New Territories (NENT)

There are 13 closed landfills in Hong Kong and their restoration works were completed between 1997 and 2006 to minimise their potential adverse impacts to the environment and to render them safe for beneficial use²². **There are also nine recycling plants in Hong Kong working with different types of wastes.**

In February 2021, the government adopted a plan called Waste Blueprint for Hong Kong 2035²³, which indicates the priorities for the upcoming decades. According to the plan, the per capita MSW disposal needs go down to 40-45% of the total, while recovery rate must go up to 55% in the medium term. In the long term, the city authorities plan to abandon landfills altogether.

For the purpose of the current phase of Hong Kong's taxonomy development, two activities within this sector will be addressed:

- Collection and transport of non-hazardous waste in source segregated fractions
- Utilisation/treatment of domestic waste – anaerobic digestion

Metrics

- **Tonnes CH₄ per year**

Methane is a much stronger absorber of the emitted thermal infrared radiation in Earth's atmosphere than carbon dioxide (CO₂) and, therefore, in practice, this means that methane is a much more powerful GHG with a warming potential 84-87 times higher than CO₂ over the first 20 years after it reaches the atmosphere²⁴. As a consequence, even though CO₂ has a longer-lasting effect, methane sets the pace for warming in the near term and its current level of estimated anthropogenic emissions correspond to a global temperature increase of over 3 degrees by 2100²⁵. Crucially, methane emissions have increased drastically since 2007 and, in the longer term, their constant increase may be the

²² <https://www.gov.hk/en/residents/environment/waste/treatment/msw.htm>

²³ https://www.eeb.gov.hk/sites/default/files/pdf/waste_blueprint_2035_eng.pdf

²⁴ <https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change>

²⁵ <https://essd.copernicus.org/articles/12/1561/2020/>

biggest threat to keeping temperatures below the 2-degree scenario envisioned by the Paris Agreement and to avoid the tipping point towards catastrophic climate change²⁶²⁷.

- **% of food and feed crops used as feedstock**

Excessive utilisation of edible crops and food as a feedstock for producing bioenergy may lead to prices distortion and negatively affect vulnerable populations. Therefore, it is important to limit these kinds of feedstock and give preferences to non-edible types.

Criteria and thresholds

Collection and transport of non-hazardous waste in source segregated fractions

Description and scope: Separate collection and transport of non-hazardous waste in single or comingled fractions aimed at preparing for reuse or recycling.

- **All separately collected and transported non-hazardous waste that is segregated at source is intended for preparation for reuse or recycling operations**

Waste that is destined to recycling plants should be collected from segregated sources in order to avoid contamination with non-recyclable waste. More specifically, if contaminated with non-recyclable materials and biowaste, the feedstock might not be able to be used in the recycling plant and, hence, it might need to be landfilled or incinerated.

- **Bins used to collect waste should be made from 100% of recycled plastic**

This criterion is intended to promote the recycling of plastics and enhance the overall effect of the activity on the environment. The plastic production chain is one of the most emission-intensive in the world and it puts immense burden on nature. Throughout their lifecycle, plastics have a significant carbon footprint and emit 3.4%²⁸ of global GHG emissions. Moreover, estimated global plastic leakage to the environment (terrestrial and aquatic) stands at 22-24 Mt per year²⁹. Using recycled plastics as much as possible helps to prevent this.

²⁶ <https://esd.copernicus.org/articles/12/601/2021/>

²⁷ <https://www.ipcc.ch/sr15/chapter/chapter-3/>

²⁸ [https://sdg.iisd.org/news/global-plastic-outlook-calls-for-more-circularity-national-roadmaps/#:~:text=The%20build-up%20of%20plastics,GHG\)%20emissions%20throughout%20their%20lifecycle](https://sdg.iisd.org/news/global-plastic-outlook-calls-for-more-circularity-national-roadmaps/#:~:text=The%20build-up%20of%20plastics,GHG)%20emissions%20throughout%20their%20lifecycle)

²⁹ <https://www.oecd-ilibrary.org/sites/aa1edf33-en/1/3/2/4/index.html?itemId=/content/publication/aa1edf33-en&csp=ca738cf5d4f327be3b6fec4af9ce5d12&itemIGO=oecd&itemContentType=book>

Description and scope: Construction and operation of dedicated facilities for the treatment of separately collected bio-waste through anaerobic digestion with the resulting production and utilisation of biogas and digestate and/or chemicals.

- **A monitoring and contingency plan is in place in order to minimise methane leakage at the facility**

The anaerobic digestion unit converts a certain class of waste into methane, a dangerous GHG , with a much higher global warming potential than carbon dioxide. It is essential that the plant has all the necessary safety measures in place to prevent the possibility of its leakage.

- **The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry**

Biomethane that is produced as the result of anaerobic digestion has many potential negative effects on the climate and on human health. Leakage risks include explosion, asphyxiation, and poisoning. It is very important to utilise it as fast as possible and in a proper way.

- **The bio-waste that is used for anaerobic digestion is source segregated and collected separately**

Bio-waste that is used for anaerobic digestion should be collected from segregated sources in order to avoid contamination of the feedstock. More specifically, if contaminated with plastics, metals and other non-biodegradable materials, the feedstock might not be able to be used in the anaerobic plant and, hence, it might need to be landfilled or incinerated.

- **The produced digestate is used as fertiliser or soil improver, either directly or after composting or any other treatment.**

The material that is left after anaerobic digestion is called digestate. It is a wet mixture that is usually separated into solid digestate and liquid digestate. Digestate is rich in nutrients and can be used as fertiliser for crops.

- **In the dedicated bio-waste treatment plants, the share of food and feed crops used as input feedstock, measured in weight, as an annual average, is less than or equal to 10% of the input feedstock.**

It is very important that the production of biomethane affects as little as possible the food supply chain as the use of food-quality feedstocks may lead to an increase of food prices in the market.

- **If anaerobic digestion is used in the facilities which produce power and/or heat: total lifecycle methane emissions should not exceed 1,285g CH₄/tonne of waste input.**

The number of 1,285g CH₄/tonne of emission is roughly equivalent to 100 gCO₂/kWh as calculated by technical expert group that developed Climate Bonds Waste Criteria³⁰. The threshold allows the activity to be compatible with international criteria for green energy generation. Methane is a gas that produces a strong greenhouse effect in the atmosphere. It has more than 80 times the warming power of carbon dioxide over the first 20 years after it reaches the atmosphere.

Activity cards

Collection and transport of non-hazardous waste in source segregated fractions

Sector	Water supply; sewerage, waste management and remediation activities				
Activity Category	Waste collection, treatment and recycling				
Activity Description	Separate collection and transport of non-hazardous waste in single or commingled fractions aimed at preparing for reuse or recycling				
HSIC Code	381100	CGT Code	E2.1Collection and transport of non-hazardous waste in source segregated fractions	Corresponding ISIC Code	3811
Closest EU Taxonomy Code	5.5. Collection and transport of non-hazardous waste in source segregated fractions	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		5.3.1.2 Construction and operation of garbage treatment facilities	
HSIC Description	Collection of non-hazardous waste				
Criteria and Thresholds					
Main Criteria	- All separately collected and transported non-hazardous waste that is segregated at source is intended for preparation for reuse or recycling operations. - Bins used to collect waste should be made from 100% of recycled plastic				
Additional Requirements and Comments	None				

³⁰ https://www.climatebonds.net/files/files/Waste%20Management%20Criteria_August2022.pdf

Utilisation/ treatment of domestic waste – anaerobic digestion

Sector	Water supply; sewerage, waste management and remediation activities				
Activity Category	Waste collection, treatment and recycling				
Activity Description	Construction and operation of dedicated facilities for the treatment of separately collected bio-waste through anaerobic digestion with the resulting production and utilisation of biogas and digestate and/or chemicals.				
HSIC Code	382100	CGT Code	E2.4 Utilisation/ treatment of domestic waste – anaerobic digestion	Corresponding ISIC Code	3821
Closest EU Taxonomy Code	5.7 Anaerobic digestion of bio-waste	Closest Chinese Green Bond Endorsed Projects Catalogue Codes		1.5.3.1 Comprehensive utilisation of urban and rural household waste	
HSIC Description	Treatment and disposal of non-hazardous waste				
Criteria and Thresholds					
Main Criteria	• A monitoring and contingency plan is in place in order to minimise methane leakage at the facility • The produced biogas is used directly for the generation of electricity or heat or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel or as feedstock in chemical industry • The bio-waste that is used for anaerobic digestion is source segregated and collected separately • The produced digestate is used as fertiliser or soil improver, either directly or after composting or any other treatment • In the dedicated bio-waste treatment plants, the share of food and feed crops used as input feedstock, measured in weight, as an annual average, is less than or equal to 10% of the input feedstock • If anaerobic digestion is used in the facilities which produce power and/ or heat: total lifecycle methane emissions should not exceed 1,285g CH₄/tonnes of waste input				
Additional Requirements and Comments	None				

Sector: Construction

Construction and renovation of buildings

Overview

Hong Kong's Climate Action Plan 2050 sets out the vision of "Zero-carbon Emissions Liveable City Sustainable Development", and outlines strategies and targets for combating climate change and achieving carbon neutrality.³¹ As part of the Action Plan, the Hong Kong government has set out to reduce the overall electricity consumption of buildings through promoting green buildings, improving buildings' energy efficiency and promoting a low-carbon lifestyle. The goal is to reduce the electricity consumption of commercial buildings by 30 per cent to 40 per cent and that of residential buildings by 20 per cent to 30 per cent from the 2015 level by 2050, and to achieve half of the above targets by 2035.³²

The criteria below are proposed to help building developers, owners, operators and investors to determine whether a building can be considered to be contributing to climate change mitigation. This is done by referencing locally and internationally available building certifications schemes that can serve as proxies which denote whether a building is 'green'.

The criteria presented here are primarily focused on the operational emissions of the building, and do not include the emissions associated with the construction of buildings. As will be explained in the following section, a major challenge for standardising the comparison of buildings' operational emissions at both the local and international level is the uptake of globally applicable green building certification schemes.

Metrics

Currently, Hong Kong's building market typically references BEAM Plus to determine whether a building can be considered 'green'.³³ However, a commonly cited shortcoming of the BEAM Plus certification is that the broad coverage of the scoring system can potentially shift the focus away from energy performance of buildings.

Another problem that is typically encountered when assessing the climate impact of buildings is the availability of universally comparable data. Ideally, information about the energy consumption (including both electricity and gas) of a building is available for use. This could be in the form of Primary Energy Demand (PED) and Energy Usage Intensity (EUI). However, it is often the case, particularly in buildings with multiple tenants, that building owners and operators cannot provide this information without the tenant's consent.

Therefore, in lieu of the data unavailability, the proposed criteria reference the BEAM Plus certification scheme that is widely used in Hong Kong, with an additional focus on the energy use component *within* the BEAM Plus certification scheme. Applicants under the proposed HK Taxonomy would be required to provide both their overall BEAM Plus rating (which should be at either Gold or Platinum) and show that they meet a minimum energy use threshold, using the BEAM Plus energy use scoring methodology.

³¹ <https://www.info.gov.hk/gia/general/202110/08/P2021100800588.htm>

³² <https://www.info.gov.hk/gia/general/202110/08/P2021100800588.htm>

³³ <https://www.hkgbc.org.hk/eng/beam-plus/beam-plus-new-buildings/>

Furthermore, we also suggest that as the Hong Kong prototype taxonomy is developed, it can consider incorporating the Hong Kong Green Building Council's ³⁴(HKGBC) anticipated Zero-Carbon-Ready Building Certification and Net Zero Building Certification schemes.

Metrics for New Buildings

Design and operational data are required. Design-level and simulation data should be provided for new construction with a commitment to monitor and report emissions following construction.

- 1) **Operational emissions:** Operational emissions encompass all activities related to the use of buildings, over their life span. This can be further disaggregated into the following measures:
 - a. **Primary Energy Demand:** Primary energy is the amount of energy that must be generated originally in order to meet the total energy demand of a building. Decrease of this parameter as well as the source of energy may influence carbon footprints of buildings.
 - b. **Energy Consumption:** Total energy consumption is defined as the total amount of electricity or equivalent electricity, and gas consumed by the building per annum. Decrease of this parameter as well as the source of energy may influence carbon footprints of buildings.
 - c. **Direct emissions of building:** Greenhouse gases emitted from activities under the industry's control such as from burning fuel for cement production are direct emissions; those from sources outside of its control including from the electricity it purchases are indirect emissions. This may also include the use of LPG or Towngas (for example use of Towngas in gas boilers).
 - d. Reference can be made to the Product Carbon Accounting Footprint (PCAF) technical guidance for "Accounting and Reporting of GHG Emissions from Real estate Operations", for further details on the process for conducting an operational emissions assessment.
- 2) **Energy savings:** The share of total or relative energy consumption that can be saved because of the implemented measures.
- 3) **Energy consumption of buildings compared to peers:** Energy consumption compared to best-in-class peers. The EMSD provides an online building-based electricity Energy Use intensity (EUI) Benchmarking Tool³⁵ and HKGBC also has a Benchmarking and Energy Saving Tool³⁶ which building owners could use to compare their energy consumption to peers.
- 4) **Buildings Certification Schemes:** Many jurisdictions have their own building certification schemes. For example, BEAM Plus is commonly used in Hong Kong. Other building certification schemes used globally include the US Green Buildings Council (US GBC) Leadership in Energy Efficiency and Design (LEED),³⁷ and the National Australian Built Environment Rating System (NABERS).³⁸ The International Finance Corporation (IFC) has also developed a buildings rating system Excellence in Design for Greater Efficiencies (EDGE),³⁹ that can be easily applied to emerging market contexts. The CGT also outlines the minimum requirements for buildings to be considered green under the EU and Mainland China's respective building certification schemes (i.e. NZEB and Mainland China's three-star rating system).
- 5) Given Hong Kong role as a global financial centre, the proposed buildings criteria are designed to facilitate the mobilisation of capital for green buildings in Hong Kong and internationally. Therefore, the criteria are designed to recognise that certification of buildings outside of Hong

³⁴ <https://www.hkgbc.org.hk/eng/about-us/index.jsp>

³⁵ https://eui.emsd.gov.hk/en/EUI_Introduction.html

³⁶ <https://hkbest.hkgbc.org.hk/>

³⁷ <https://www.usgbc.org/leed>

³⁸ <https://www.nabers.gov.au/>

³⁹ <https://edgebuildings.com/>

Kong, provided that they meet certain thresholds under those international building certification schemes.

- 6) **Zero-Carbon-Ready Building Certification & Net Zero Building Certification:** We are aware that the HKGBC is in the process of developing a new building certification scheme which is primarily focused on the emissions performance of buildings in Hong Kong. We anticipate that this upcoming scheme will help to plug the gaps in Hong Kong's existing certification systems and look forward to incorporating this work in the near future, when the scheme becomes available for public use.
- a. The Zero-Carbon-Ready Building Certification scheme is an energy performance certification whereby buildings will be certified according to their rating of building energy efficiency. It includes a Target Setting Certification, whereby buildings are awarded a certification if a target to zero-carbon-ready building requirements is set, and a Progress Certification rewarded when the reduction target is achieved.
 - b. The Net Zero Building Certification is awarded if the annual on-site renewable energy generation is equal, or more than the annual energy consumption of the building.

Note: Items 1 to 3 in the above list of Metrics for New Buildings are the most ideal metrics, however, this data may not be adequately available across the buildings sector. As such, as an interim measure, it is recommended that item 4 (BEAM Plus) is recommended for use in the short term, with the eventual adoption of item 5 (Zero-Carbon-Ready Building Certification & Net Zero Building Certification) when this is made available by the HKGBC.

Metrics for Renovations

- 1) **Primary Energy Demand:** Primary energy is the amount of energy that must be generated originally in order to meet the total energy demand of a building. Decrease of this parameter as well as the source of energy may influence carbon footprints of buildings.
- 2) **Energy Consumption:** Total energy consumption is defined as the total amount of electricity or equivalent electricity and the total amount of gas consumed by the building per annum. Decrease of this parameter as well as the source of energy may influence carbon footprints of buildings.
- 3) **Direct emissions of building:** Greenhouse gases emitted from activities under the industry's control such as from burning fuel for cement production are direct emissions; those from sources outside of its control including from the electricity it purchases are indirect emissions.

Criteria and alignment

The proposed taxonomy criteria for the certification of buildings in Hong Kong is currently cover four separate economic activities, construction of new commercial buildings, construction of residential buildings, renovation of commercial buildings and renovation of residential buildings.

The criteria for construction of new commercial buildings and construction of new residential buildings are proposed to cover buildings that may be constructed in Hong Kong, but also buildings that are constructed outside of Hong Kong.

It is important to note that the criteria for construction of new commercial buildings in Hong Kong references the existing BEAM Plus certification scheme, but also paves the way for referencing the anticipated Zero-Carbon-Ready Building Certification Scheme developed by the HKGBC.⁴⁰

We suggest that the criteria for construction of new residential buildings should be updated in the future to reflect developments in the green building certification schemes offered by the HKGBC.

⁴⁰ The scheme is anticipated to be launched in H2 2023.

For the construction of new commercial buildings in Hong Kong:

- 1) Buildings must be BEAM Plus certified (to either gold or above) or designed to certify as such, *and* the Energy Use component of applicant's BEAM Plus Certification must meet at least a minimum of 10 credits under EU2 (Reduction of CO₂ Emissions) *and* a minimum of 70% in Energy Use category and, *either*:
 - a. For projects certified under BEAM Plus 1.2: 30% energy saving against the BEC 2018 baseline, *or*
 - b. For projects certified under BEAM Plus 2.0, 20% energy saving against BEC 2021 baseline.
- 2) Or buildings certified at least Extra Low in Energy Usage Intensity (EUI) or level 2 improvement (i.e. 25% reduction) in Energy Performance Certification under the upcoming Zero-Carbon-Ready Building Certification Scheme,
- 3) Or buildings have achieved either Net Zero Energy Building Certification or Net-Zero Operational Carbon Building Certification.

For the construction of new residential buildings in Hong Kong:

- 1) Buildings must be BEAM Plus certified (to either gold or above) or designed to certify as such, *and* the Energy Use component of applicant's BEAM Plus Certification must meet at least a minimum of 10 credits under EU2 (Reduction of CO₂ Emissions) *and* a minimum of 70% in Energy Use category and, *either*:
 - a. For projects certified under BEAM Plus 1.2: 30% energy saving against the BEC 2018 baseline, *or*
 - b. For projects certified under BEAM Plus 2.0, 20% energy saving against BEC 2021 baseline.
- 2) Or buildings certified at least Extra Low in Energy Usage Intensity (EUI) or level 2 improvement (i.e. 25% reduction) in Energy Performance Certification under the upcoming Zero-Carbon-Ready Building Certification Scheme,
- 3) Or buildings have achieved either Net Zero Energy Building Certification or Net-Zero Operational Carbon Building Certification.

For the construction of new commercial and residential buildings outside Hong Kong:

- 1) **For buildings in the European Union:** Primary Energy Demand (PED), defining the energy performance of the building resulting from the construction, is at least 10 % lower than the threshold set for the Nearly Zero-Energy Building (NZEB) ⁴¹requirements in national measures implementing Directive 2010/31/EU of the European Parliament and of the Council. The energy performance is certified using an as built Energy Performance Certificate (EPC).
- 2) **For buildings in Mainland China:**
 - a. Projects should be rated to the third-level of the Evaluation Standard (operational) for Green Building⁴² Three Star System, *and*
 - b. For buildings larger than 5000m², upon completion, the building resulting from the construction undergoes testing for air-tightness and thermal integrity, and any deviation in the levels of performance set at the design stage or defects in the building envelope are disclosed to investors and clients.
- 3) **For buildings in other markets:**

⁴¹ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings_en

⁴² <https://www.gbig.org/collections/14970>

- a. Certified under Leadership in Energy and Environmental Design (LEED)⁴³ to Gold level *and*
- b. Minimum score of 9 points under Energy Assessment Credits *and*
- c. Optimize Energy Performance for 30% improvement above ASHRAE 90.1⁴⁴ in energy performance
- 4) Certification under NABERS⁴⁵ of at least five stars
- 5) Certification under IFC-EDGE⁴⁶

For the renovation of commercial buildings:

The building renovation leads to a reduction of primary energy demand (PED), energy consumption, or direct GHG emissions of at least 30% against the building's historic average.

For the renovation of residential buildings:

The building renovation leads to a reduction of primary energy demand (PED), energy consumption, or direct GHG emissions of at least 30% against the building's historic average.

Questions and outstanding issues

- Criteria provided for construction of new buildings in the CGT are not directly usable in the Hong Kong context due to the reference to policies and standards unavailable in Hong Kong.
- Due to the limited availability of data regarding the energy usage of residential units in Hong Kong, we are unable to provide an accurate benchmark for performance improvement. However, in the long run, having a data-based set of criteria (which consist of emissions-relevant metrics and thresholds) will be the most ideal way to monitor and manage buildings-related emissions. This could be done by taking the average emissions intensity performance of the top 30% of buildings in the selected locations (the baseline) and drawing a straight line to hit net-zero carbon by 2050.⁴⁷
- The HKGBC anticipated launch of a Zero Carbon Ready Building scheme can help to improve the focus of climate change mitigation criteria for buildings in Hong Kong, and we recommend that this can be incorporated into the Taxonomy when it becomes available.
- The current proposed levels of emissions reductions against baselines are based on the improvement performance of buildings that would have achieved a BEAM Plus Gold standard, i.e. buildings that have achieved a BEAM Plus Gold Certification will generally meet the emissions intensity threshold, but this is not categorically true. Thus, it is important that additional information on the energy and emissions performance of the building is provided.
- We recognise that the proposed criteria do not include all of the existing labelling codes and standards globally. As a 'live' document, it is intended that other proxies may be incorporated

⁴³ <https://www.usgbc.org/>

⁴⁴ <https://www.ashrae.org/technical-resources/standards-and-guidelines>

⁴⁵ <https://www.nabers.gov.au/>

⁴⁶ <https://edgebuildings.com/>

⁴⁷ This would be aligned with the Climate Bonds Initiative's approach to developing a globally applicable standard for buildings.

in future, provided they can demonstrate that it reflects building emissions performance in line with the emissions performance trajectory.

Activity cards

Renovation of existing buildings

Sector	Construction				
Activity Scope	Construction and renovation of buildings				
Activity Description	Renovation of existing buildings				
HSIC Code	419100 439101 439102 4321XX 4322XX 4329XX 4399XX	CGT Code	F1.2 Renovation of existing buildings	Corresponding ISIC Code	4100 4321 4322 4329 4300 4390
HSIC Description	419100 - structural alteration at erected buildings and structures 439101 - Interior fitting, decoration and repairs for buildings 439102 - Exterior renovation and repairs for buildings 4321XX - Electrical equipment installation and maintenance 4322XX - Ventilation, gas and water fitting installation and maintenance activities 4329XX - Other construction installation and maintenance 4399XX: Other general finishing and specialised construction works				
Criteria and Thresholds					
Main Criteria	For the renovation of existing <u>commercial</u> buildings: The building renovation leads to a reduction of primary energy demand (PED), energy consumption, or direct GHG emissions of at least 30% against the building’s historic average. Use HKGBC’s upcoming Zero-Carbon-Ready Building and Net Zero Building Certifications when they become available: 1) Must be at least Extra Low or Level 2 improvement (i.e. 25% reduction) according to Zero-Carbon-ready building Certification Scheme OR 2) Must have either: a. Net Zero Energy Building Certification or Net-Zero Operational Carbon Building Certification, and either i. Energy Performance Certification or ii. Target setting Certification and Progress Certification For the renovation of existing <u>residential</u> buildings: The building renovation leads to a reduction of primary energy demand (PED), energy consumption, or direct GHG emissions of at least 30% against the building’s historic average. Proving the absolute performance improvement of 30% with disclosure of data.				

	Improvement of at least 30% based on verified consumption data.
Additional Requirements and Comments	For the renovation of existing <u>residential</u> buildings: We expect that at this stage, the upcoming Zero-Carbon-Ready Building Certification & Net Zero Building Certification will only be available for commercial properties. Based on the work of the Hong Kong Green Buildings Council, a Beam Plus Residential/Interiors Proxy might become available in the H2 of 2023. We will update this set of criteria once the proxy has been finalised.

Construction of new buildings

Sector	Construction				
Activity Scope	Construction and renovation of buildings				
Activity Description	Construction of new buildings				
HSIC Code	411000 412000 419100 439101 4321XX 4322XX 4329XX 4399XX	CGT Code	F1.1 Construction of new buildings	Corresponding ISIC Code	4100 4321 4322 4329 4330 4390
HSIC Description	411000 - Erection of architectural superstructures 412000 - Structural steel framework erection 419100 - Structural alteration at erected buildings and structures 439101 - Interior fitting, decoration and repairs for buildings 4321XX - Electrical equipment installation and maintenance 4322XX - Ventilation, gas and water fitting installation and maintenance activities 4329XX - Other construction installation and maintenance 4399XX: Other general finishing and specialised construction works				
Criteria and Thresholds					
Main Criteria	For the construction of new commercial buildings in Hong Kong: 1) Buildings must be BEAM Plus certified (to either gold or above) or designed to certify as such, <i>and</i> the Energy Use component of applicant’s BEAM Plus Certification must meet at least a minimum of 10 credits under EU2 (Reduction of CO2 Emissions) <i>and</i> a minimum of 70% in Energy Use category and, <i>either</i> : a. For projects certified under BEAM Plus 1.2: 30% energy saving against the BEC 2018 baseline, <i>or</i> b. For projects certified under BEAM Plus 2.0, 20% energy saving against BEC 2021 baseline. 2) Or buildings certified at least Extra Low in Energy Usage Intensity (EUI) or level 2 improvement (i.e. 25% reduction) in Energy Performance Certification under the upcoming Zero-Carbon-Ready Building Certification Scheme, 3) Or buildings have achieved either Net Zero Energy Building Certification or Net-Zero Operational Carbon Building Certification.				

	For the construction of new <u>residential</u> buildings in Hong Kong: 1) Buildings must be BEAM Plus certified (to either gold or above) or designed to certify as such, <i>and</i> the Energy Use component of applicant's BEAM Plus Certification must meet at least a minimum of 10 credits under EU2 (Reduction of CO₂ Emissions) <i>and</i> a minimum of 70% in Energy Use category and, <i>either</i>: a. For projects certified under BEAM Plus 1.2: 30% energy saving against the BEC 2018 baseline, <i>or</i> b. For projects certified under BEAM Plus 2.0, 20% energy saving against BEC 2021 baseline. 2) Or buildings certified at least Extra Low in Energy Usage Intensity (EUI) or level 2 improvement (i.e. 25% reduction) in Energy Performance Certification under the upcoming Zero-Carbon-Ready Building Certification Scheme, 3) Or buildings have achieved either Net Zero Energy Building Certification or Net-Zero Operational Carbon Building Certification. For the construction of new <u>commercial and residential</u> buildings outside Hong Kong: 1) For Projects in the European Union: Primary Energy Demand (PED), defining the energy performance of the building resulting from the construction, is at least 10 % lower than the threshold set for the Nearly Zero-Energy Building (NZEB) requirements in national measures implementing Directive 2010/31/EU of the European Parliament and of the Council. The energy performance is certified using an as built Energy Performance Certificate (EPC). 2) For buildings in Mainland China: a. Projects should be rated to the third-level of Mainland China's Three Star System, <i>and</i> b. For buildings larger than 5000m², upon completion, the building resulting from the construction undergoes testing for air-tightness and thermal integrity, and any deviation in the levels of performance set at the design stage or defects in the building envelope are disclosed to investors and clients. 3) For buildings certified under Leadership in Energy and Environmental Design (LEED): a. Gold Certification is required <i>and</i> b. Minimum score of 9 points under Energy Assessment Credits <i>and</i> c. Optimize Energy Performance for 30% improvement above ASHRAE 90.1 in energy performance 4) Certification under NABERS of at least 5-stars, or 5) Certification under any grade for IFC-EDGE
Additional Requirements and Comments	For the construction of new <u>residential</u> buildings: The criteria for construction of new residential buildings outside Hong Kong reference international best practices. However, the criteria proposed for the construction of new residential buildings within Hong Kong are designed as a proposal. This is because in Hong Kong there is a relatively limited pool of data available for which a

	baseline can be constructed. For example, there is no BEC baseline against which a reduction target can be set. Furthermore, to our knowledge, we do not expect that at this stage, the forthcoming HKGBC zero-carbon buildings scheme will be applicable for residential buildings.
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Background Information:

Hong Kong uses BEAM Plus, a green building rating system (GBRS) to assess and recognise buildings which meet certain green requirements or standards. BEAM Plus is recognised and certified by the Hong Kong Green Buildings Council. As of May 2020, there were 929 buildings within Hong Kong that had been certified by BEAM Plus. BEAM Plus defines a comprehensive set of performance criteria covering a range of sustainability issues relating to the planning, design, construction, commissioning, management, operation and maintenance of buildings.

However, one limitation of scoring-based rating systems such as BEAM Plus is that they do not solely focus on the climate-performance of buildings. This is because BEAM Plus covers multiple aspects of a building (beyond climate change mitigation) including water, waste, material, site and transport, indoor environments, building management and more.

Although energy is always one critical aspect of the BEAM Plus assessment process, and green buildings generally have better energy performance than non-green buildings, the overall multi-aspect assessment does not solely measure the goal of decarbonisation (i.e. to lower energy use during the construction and operation stages of a building project). In some situations, it is possible for a building to receive a gold or platinum rating while under-performing on the energy intensity and use factors. This shortcoming can impede the interoperability of BEAM Plus with the focus of the criteria outlined in the CGT, EU and Mainland China taxonomies.

Therefore, as can be seen in the criteria above, in order to balance the accuracy of the proposed taxonomy criteria with usability and practicality, we use both the overall BEAM Plus performance level, but also ask for an additional set of climate and energy-related criteria.

More information comparing the green building rating systems of different markets can be found here: <https://www.hkgreenfinance.org/wp-content/uploads/2020/12/Green-Building-Rating-Systems-Energy-Benchmarking-Study.pdf>

For reference, the construction of new buildings criteria in the CGT is outlined below:

A variety of technical measures is applied to greatly reduce the energy demand for heating, air conditioning and lighting in such buildings, maximizing the energy efficiency of energy-consuming equipment and systems, making full use of renewable energy sources, and providing comfortable indoor environment with minimum energy consumption.

Constructions of new buildings for which:

- 1) The Primary Energy Demand (PED)*, defining the energy performance of the building resulting from the construction, is at least 10 % lower than the threshold set for the nearly zero-energy

building (NZEB) requirements in national measures implementing Directive 2010/31/EU of the European Parliament and of the Council**. The energy performance is certified using an as built Energy Performance Certificate (EPC).

- 2) For buildings larger than 5000 m²***, upon completion, the building resulting from the construction undergoes testing for air-tightness and thermal integrity****, and any deviation in the levels of performance set at the design stage or defects in the building envelope are disclosed to investors and clients. As an alternative; where robust and traceable quality control processes are in place during the construction process this is acceptable as an alternative to thermal integrity testing.

* The calculated amount of energy for a building expressed by a numeric indicator of total primary energy use in kWh/m² per year and based on the relevant national calculation methodology and as displayed on the Energy Performance Certificate (EPC).

** Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).

*** For residential buildings, the testing is made for a representative set of dwelling/apartment types.

**** The testing is carried out in accordance with EN13187 (Thermal Performance of Buildings - Qualitative Detection of Thermal Irregularities in Building Envelopes - Infrared Method) and EN 13829 (Thermal performance of buildings - Determination of air permeability of buildings - Fan pressurization method) or equivalent standards accepted by the respective building control body where the building is located.