Creating Resilience

The Journey to Net Zero

REPORT

Decarbonising China's Commercial Real Estate

CBRE RESEARCH
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Contents

International and Domestic Policy Regulations Promote Net Zero Carbon Emission Goals

The real estate industry chain accounts for more than one-third of total global carbon emissions, with the proportion in China estimated to reach as high as 50%. The decarbonisation of the real estate industry is therefore imperative as the world seeks to turn climate goals into action.

Key Goals and Milestones of China's Net Zero Strategy

Source: Government Information, CBRE Research

2025 14th Five-Year Plan

Energy consumption per unit of GDP to be cut by **13.5%** from 2020 levels
Carbon dioxide emissions per unit of GDP to be cut by **18%** from 2020 levels
Share of non-fossil energy consumption to reach **20%**

2030 Carbon Peak

Significant reduction in energy consumption per unit of GDP
65% reduction in carbon dioxide emissions per unit of GDP from 2005 levels
Share of non-fossil energy consumption to reach **25%**

2060 Carbon Neutrality

Energy utilisation efficiency to reach **international advanced levels**
Carbon neutrality goal achieved
Share of non-fossil energy consumption to reach **80%**

Recent International and Domestic Carbon Policy Events

International

Twenty-eighth Session of the United Nations Frame work Convention on Climate Change (COP28)

Publication of the first Global Stocktake Report

Carbon Border Adjustment Mechanism (CBAM)

EU decides on trial shipments from October 2023,
to be fully implemented in 2026

Domestic

China Certified Emission Reduction (CCER)

The Ministry of Ecology and Environment and the General Administration of Market Supervision jointly issued the Measures for the Administration of Greenhouse Gas Voluntary Emission Reduction Trading (for Trial) to ensure the orderly operation of the national greenhouse gas voluntary emission reduction trading market.

Accelerate the establishment of product carbon footprint management system

The National Development and Reform Commission (NDRC) proposed the establishment of a carbon footprint management system in line with national conditions; the improvement of carbon footprint accounting methods and standard systems for key products; the establishment of background database on carbon footprint; and the promotion of a carbon labeling certification system, among other objectives.

National Carbon Peaking Pilot Construction Programme

The NDRC identified 25 cities and 10 parks as the first batch of pilot cities and parks for carbon peaking, focusing on solving bottlenecks in green and low-carbon development, exploring paths to carbon peaking for cities and parks with different resource endowments and development bases, and providing the country with operable, replicable and general experiences.

Interim Regulations on the Management of Carbon Emissions Trading

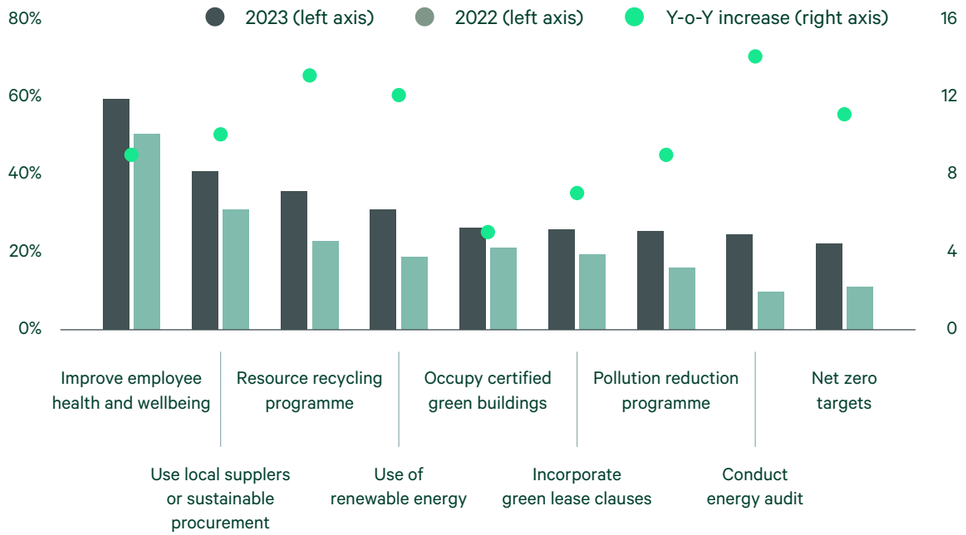
Effective from May 1, 2024, the basic framework for carbon emissions trading management will be constructed from six aspects: first, the legal status and responsibilities of registries and institutions; second, the scope of carbon emissions trading, as well as products, parties and methods; third, the determination of key emission units; fourth, the allocation of carbon emission allowances; fifth, the compilation and verification of emission reports; sixth, the clearing of carbon emission allowances and market trading.

Real Estate Carbon Footprint

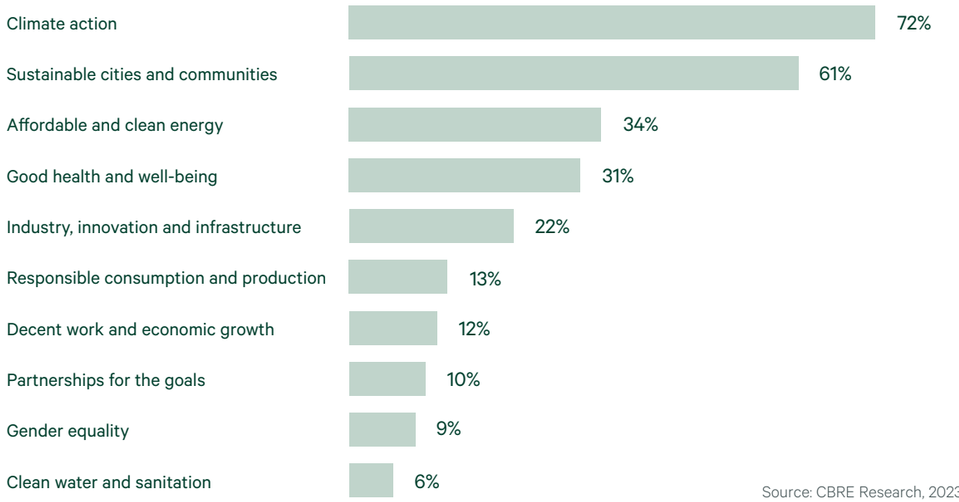
Robust data key to achieving net zero goals

Heightened expectations and demands from regulators, investors, and consumers have cemented sustainability as a strategic business imperative for both occupiers and landlords. CBRE's 2023 China Office Occupier Survey uncovered a notable increase in the number of companies implementing energy audits; promoting resources recycling; and setting net-zero emission goals. CBRE's Chief Sustainability Officer (CSO) Survey of major landlords and investors in Asia Pacific found that property owners in China continue to augment ESG performance and compliance. Despite recent progress, the lack of data related to operational, environmental and financial performance continues to impede companies seeking to realise net zero strategies. With occupier, landlord and investor decision-making dependent on robust data to assess current carbon emissions, the effectiveness of measures taken, and the financial costs and benefits, carbon footprint tracking and reporting has become a critical step for companies seeking to achieve net zero goals.

Sustainability goals prioritised by occupiers in their real estate strategies



Sustainability goals prioritised by landlords and investors



Source: CBRE Research, 2023

What is Carbon Footprint?

Real estate has one of the highest carbon footprints of any industrial sector and is responsible for around 40% of global carbon dioxide emissions. A company's real estate carbon footprint encompasses activities such as building materials production, construction, and operations. Enterprises can achieve decarbonisation by measuring real estate carbon footprint, controlling and constraining their behaviours.

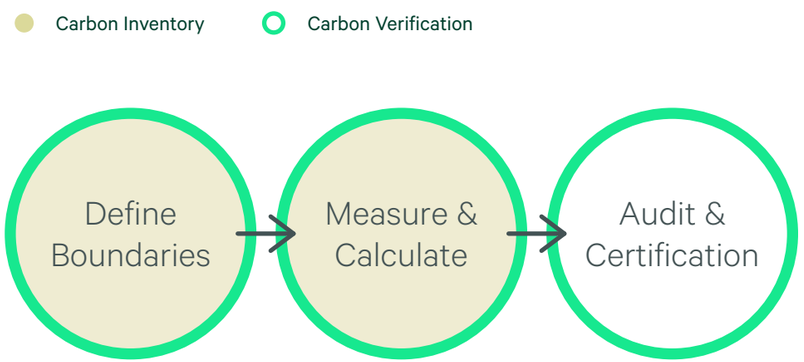
What is Carbon Inventory?

Enterprises collect, review and organise information related to their carbon footprint during building construction and operations; perform overall carbon emission calculations according to national norms; and compile reports for internal use.

What is Carbon Verification?

Carbon inventory findings can be used to perform internal assessment and estimations. Should enterprises be required to communicate these results with regulatory authorities, suppliers, customers, investors, the public and other stakeholders who are concerned about addressing climate change, a third-party organisation must be employed to perform an audit and compile a carbon consulting report on the whole life cycle of the project, thus completing the process of carbon verification.

Carbon Footprint Tracking & Reporting Process



Carbon Inventory

What does corporate real estate carbon footprint include?

The full life cycle covers four phases: the production of building materials, the construction of the building, the operational stage and finally the dismantling. The carbon footprint of the renovation phase (covering the production of building materials, construction and demolition) can be compared with the capital expenditure (CapEx), which is counted and reported only during the construction period; while the carbon footprint of the operation phase can be compared with the operational expenses (OpEx), which begin from the commissioning of the project and extends over the entire period of its use, and is generally counted and reported on a yearly basis.

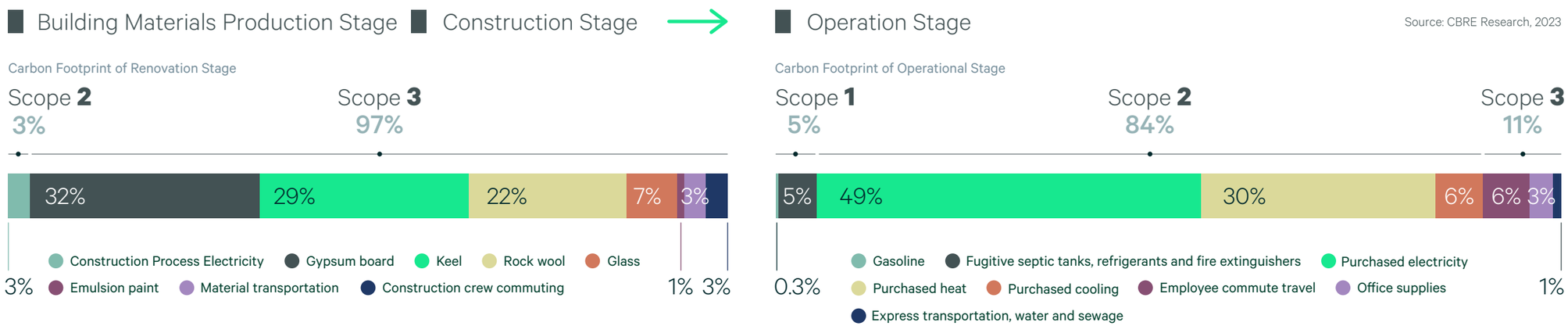
The production of building materials involves many carbon-intensive industries and is therefore a significant source of carbon emissions. Construction carbon footprint is mainly generated during project construction. Operational carbon footprint is mainly generated by energy consumption during building operations, which invariably involves a high volume of carbon emissions due to a building's typically long lifespan. decarbonisation must therefore occur at every stage of the building life cycle.

What are Scope 1, 2 and 3 carbon emissions for corporate real estate?

Scope 1 emissions are emitted directly from a company's building systems and vehicle fleet, which typically account for a very small proportion of the overall carbon footprint. Scope 2 emissions are indirectly emitted through electricity consumption of facilities such as lighting, air conditioning, heating, and water pumps, as well as fuel consumption involved in heating. Scope 3 emissions are emitted indirectly via the value chain, through the products and carbon produced by their suppliers, also known as "embodied carbon", which is theoretically the largest component of the carbon footprint. However, as data pertaining to Scope 3 emissions are more difficult to obtain, this is generally limited to major materials used in the construction process; logistics of the company's daily operations; transportation used by employees commute or take work-related trips; regular office supplies; and water and sewage treatment services.

CBRE recently performed a carbon inventory of the renovation phase of the office of an international life sciences enterprise and the operational phase of the office of a large domestic professional service enterprise. The findings of the main components of each company's carbon footprint are representative and applicable to most office using enterprises.

Corporate Real Estate Full Life Cycle Carbon Footprint



Carbon Verification

How to choose a carbon verification standard and certification body?

The professionalism and authority of carbon verification standards and certification bodies directly determine the value and scope of use of the certification. The most widely used and recognised standards are mainly those from international bodies such as the International Organisation for standardisation (ISO) and the British Standards Institution (BSI). Several domestic certification bodies also offer equivalent qualifications in accordance with specific international standards. As the use of carbon verification reporting becomes more extensive, domestic carbon verification standards and institutions specialising in the real estate and construction sector will continue to develop and improve.

Carbon verification standards are divided into two categories: quantitative greenhouse gas standards reflect the status of a company's carbon footprint, while carbon neutrality standards reflect the effectiveness of decarbonisation measures. The content of the different standards within the two categories varies depending on their scope of application. Before performing a carbon inventory, enterprises should select the carbon verification standard corresponding to its purpose and plan and state the statistical measurements according to their requirements. If the purpose of use cannot be determined, a standard with the widest possible scope of use should be selected.

Category	Standard	Origin	Features
Quantitative Greenhouse Gas Standards	ISO14064	International	Unified standard for accounting greenhouse gas emissions, while serving greenhouse gas emission trading. An internationally recognised standard with a high level of application.
	PAS2050	International	A unified method for evaluating the greenhouse gas emissions of goods and services throughout their entire lifecycle; used for carbon footprint verification.
	GHG Protocol	International	Provides standardised methods for carbon emissions inventory throughout the entire life cycle of the product, including the supply chain.
	ISO 14067	International	A standard developed for the quantification and external communication of product carbon footprint.
	Guidelines and Requirements for Quantifying the Carbon Footprint of Greenhouse Gas Products	Domestic	Provides information for product research and development, technological improvements, tracking product carbon footprint performance, and communication.
Carbon Neutrality Standards	PAS 2060	International	An international open standard that provides a set of implementation rules for carbon neutrality certification, offering normative requirements for proving carbon neutrality in products, corporate operations, services, and activities.
	The Carbon Neutral Protocol	International	The earliest released international open standard. Provides a clear set of guidelines for enterprises to achieve carbon neutrality, a commits every year to providing a robust framework for credible carbon neutrality actions.
	Guidelines for Implementing Carbon Neutrality in Large-scale Events	Domestic	Fills a gap in this area in China.

In what scenarios do companies use carbon verification reports?

Carbon Trading

Prior to engaging in carbon trading, companies must determine how many carbon permits or credits they can purchase to offset the carbon emissions they have already generated, thus achieving net zero. This requires the validation and endorsement of a carbon verification report.

Policy Restrictions or Incentives

When evaluating the financial subsidies and compliance conditions of enterprises, regulatory authorities require carbon verification reports provided by relevant departments as support and proof.

Investment and Financing

Carbon emission data disclosure has become a standard component of listed companies' ESG reports. In order to improve standardisation and credibility, under the guidance of rating and standard agencies, CBRE expects more listed companies to append carbon verification reports and the certifying body of the data source.

Supply Chain Management

Enterprises needing to decarbonise their supply chains will require suppliers to show carbon verification reports. For example, the EU's CBAM imposes specific requirements for carbon verification report disclosure.

Occupier Decarbonisation Strategy

Understanding carbon footprint and identifying areas of significant impact underpin the development of occupier decarbonisation strategy. Scope 2 carbon emissions are the main component of the carbon footprint of a building's operational phase, and the area where occupiers are more likely to decarbonise through autonomous behaviour. Decarbonisation of the energy sector can achieve the most significant results and therefore should be given priority. Scope 3 carbon emissions will need to be measured and reduce in collaboration with upstream and downstream partners in the supply chain. After full implementation, occupiers will still have some carbon footprint remaining, in which case it will be necessary to find credible and high-quality channels for carbon offsetting. CBRE recommends that occupiers follow the steps below:

Occupier Decarbonisation Strategy

Improving Energy Efficiency

Step 1 Energy Audit

Improving energy efficiency is the most visible and fastest decarbonising measure. Before ascertaining which energy efficiency programmes to use and invest in, CBRE recommends that occupiers begin by gathering data and conducting systematic energy audits, including regular inspections to obtain information such as asset and facility lifespans, operational status, and location of major carbon emissions. The following is an example of a recent energy audit that CBRE performed at **BEIJING MSD R&D BUILDING**, which illustrates the components of the energy audit and resulting next steps. Occupiers with advanced energy and facilities management systems can capture and display such data at any time.

Audit Contents

- Overview of relevant buildings and energy systems
- Energy management status of energy-using units
- Status of energy metering and statistics for energy-using units
- Analysis of building energy consumption of energy-using units
- Analysis of major energy-using systems and equipment
- Analysis of energy-saving capacity
- Energy management and energy-saving technology reform proposals

Audit Outcomes

- Evaluate the status of the auditee's energy utilisation, including energy management, energy metering and energy system operations
- Detecting problems and weaknesses in energy utilisation
- Ascertaining the direction of energy saving; exploring capacity; and proposing measures and remedial actions, for example:
  - Replacement of deteriorated pipe insulation in the boiler room and parts in the refrigeration plant room
  - Installation all LED light sources
  - Adjustment of the fresh air system according to outdoor ventilation and air temperature
  - Installation of smart energy metering and management systems
  - Introducing zoning control of different functional areas of the building
- Provide a basis for reasonable levels of energy use in comparable buildings

Step 2
Investment in Energy Efficiency Projects

Accurate data on energy usage enables office occupiers to assess and identify which assets and facilities need to be replaced, upgraded, or retrofitted, and prioritise tasks to achieve optimal energy savings. Data is especially important for occupiers with limited budgets as it enables them to identify priority areas for focused investment.

CBRE's sustainability team recently worked with the owners of **GRAND HOTEL BEIJING** to help the property achieve energy savings. During the retrofitting process, CBRE carefully evaluated past usage data and recommended that the client install equipment and systems with appropriate specifications without compromising functionality, while taking advantage of external natural conditions and/or internal energy recovery to address the needs of the building in order to achieve energy savings. Specific measures include:

Reduction of cold load configuration

Through the analysis of operation data, CBRE found that the original configuration of the chiller unit meant it was idle most of the time. By reducing the equipment unit area cold load by 25%, this cut the level of energy consumption of the daily operations of the building, but also improved the utilisation of the architectural space as well as the corresponding transformer/distributor system, which saved project costs;

Selection of magnetic levitation chiller

CBRE recommended the installation of a a magnetic levitation oil-free compressor that eliminates mechanical friction losses, which are more noticeable when the air conditioning load is low;

Frequency conversion applications

Frequency conversion adjustment of chilled water pump operation and cooling tower fan according to chilled water side load demand, temperature and operation time setting. Frequency control of the exhaust fume fan and the corresponding make-up air system is carried out in accordance with the operation of the kitchen;

Free cooling system

With the inner area of the project requiring winter cooling, setting up a free cooling system through cooling towers enabled air-conditioning chilled water to be provided with the help of outdoor air temperature conditions without turning on the chiller;

All-air system

Through the double fan (AHU fan + exhaust fan) system form, fresh air ratio operation can be increased, making full use of outdoor air temperature conditions, saving air conditioning energy consumption;

Centralised fresh air and exhaust air heat pipe heat recovery system

Centralised fresh air is sent in after heat exchange with centralised exhaust air. A heat pipe heat recovery system with complete separation of the fresh and exhaust air ducts is used to reduce air-conditioning energy consumption;

Water supply systems

The use of a copper water storage tank and water supply pump group caused a waste of water pressure. The project itself has the advantage of municipal water supply security and water quality conditions, so the use of an energy-saving water supply programme exempted from the storage tank link and making full use of the original water pressure, reduced the energy consumption of water supply pumps.

Apart from reducing carbon emissions, energy efficiency also generates other social benefits and is thus valued by regulatory authorities, who establish relevant standards and rules to recognise and subsidise incentives for good practices in energy efficiency. This project meets the government's criteria for energy efficiency subsidies after retrofitting and was awarded the relevant incentives.

Transition to Renewable Energy

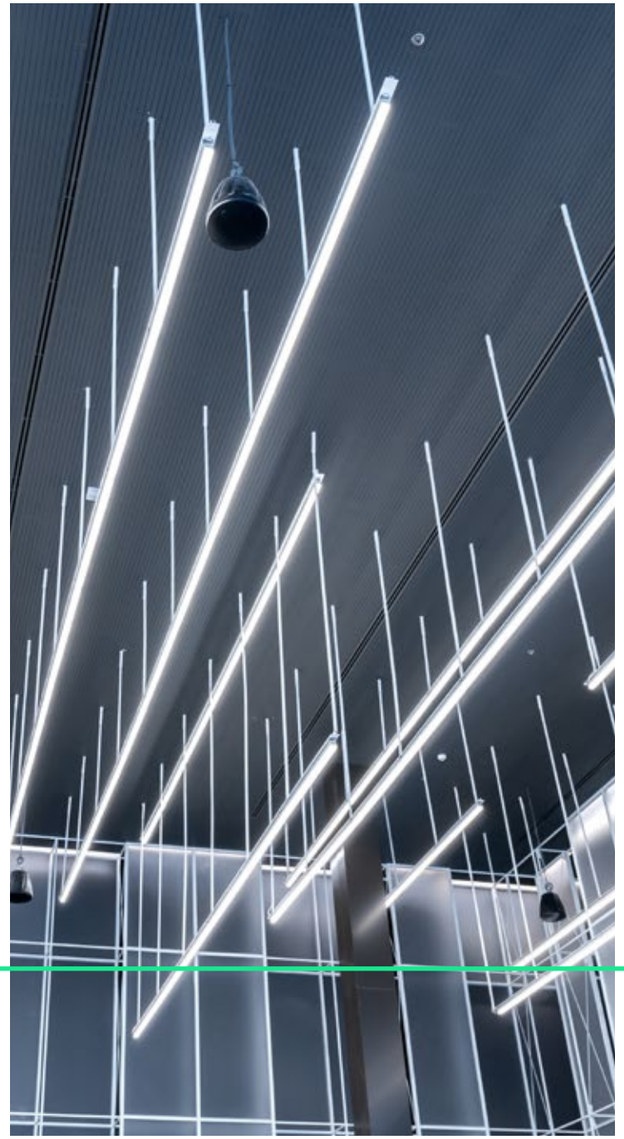
Step 1
Options for accessing renewable energy

After minimising energy use, occupiers can further decarbonise their energy chain by replacing traditionally consumed energy with renewable energy. Occupiers can install equipment to produce renewable energy on-site or purchase renewable energy produced through centralised equipment in the marketplace and deliver it remotely to the site of use through the grid, pipelines, and other infrastructure.

The following renewable energy sources can be accessed through both on-site, near-site production and remote delivery. Nuclear and hydroelectric power also qualify as forms of renewable energy but are generally only available through remote delivery for real estate projects. Solar power is the most feasible and least expensive form of renewable energy for real estate.

	Feasibility for a commercial property	Up-front investment
Solar Including distributed photovoltaic power generation and solar thermal power generation	High	Low
Solar Thermal The energy harnessed from the sun is converted to heat rather than electricity	High	Medium
Wind Large turbines harness the kinetic energy of the wind and convert it to electricity	Low	High
Geothermal Extracts heat from the Earth's interior using technology including wells and heat pump technology	Low	Medium
Biofuels Organic materials including wood, charcoal, algae and manures produce heat and power. They create GHG emissions, but at lower levels than fossil fuels	High	High

If occupiers are unable to produce their own renewable energy, external renewable energy can be purchased in two forms:



Physical Power Purchase Agreement (PPA)

Green power refers to the power generated by renewable energy power generation projects, whereby power users obtain both the right to use the power and the "green certificate" through a power trading centre, or by signing a direct PPA with a renewable energy developer.

In 2023, authorities in Beijing, Tianjin and Shanghai clarified that the carbon emissions of green power purchased and used by enterprises were classified as zero, thus providing a carbon offsetting effect. CDP requirements state that the 12 months of the financial reporting period of the enterprise in the current year, plus the green certificates by the power generated in the first six months and the last three months, can effectively offset carbon emissions during the period.

With the gradual adoption and increased availability of green power and the continuous improvement of related technologies, the cost of such energy will decline in the long-term, making it even more attractive to potential purchasers.

Visual Power Purchase Agreement (vPPA)

A vPPA (referred to as "green certificate") enables energy consumers to make declarations on the use of renewable energy. There are three kinds of vPPA, namely, domestic vPPA (GEC), international vPPA (APX TIGR) and I-REC. Enterprises purchasing a vPPA from trading platforms, intermediaries or renewable energy developers can claim that they are using green energy, and do not need to rely on the physical transmission of green power.

At present, due to the limited application scenarios of a domestic vPPA, its price is significantly lower than its foreign counterpart. In the future, with the opening of the national electricity and carbon market; the domestic vPPA trading in line with international standards; as well as the improvement of the relevant top-level regulations, the value of both PPAs and vPPAs will be enhanced.

Step 2
Investment and installation of renewable energy equipment

Distributed solar PV is the most technically and commercially feasible type of sustainable energy source. The cost of distributed PV has fallen significantly in recent years as a result of its large-scale application, especially in China, which is a global leader in PV technology. The extent to which a user's energy can be replaced by PV depends on a variety of factors such as electricity demand; usage; available area for panels; efficiency of power generation; and surrounding climatic and natural conditions.

The following section summarises the process of **HANERGY RENEWABLE ENERGY CENTRE** becoming self-sufficient in electricity through PV power generation. The project is located in the North Park of Beijing Olympic Forest Park, covering an area of 7,119 sq. m., with a display area of more than 1,100 sq. m. It is an all-solar-powered green building and features the following technologies:

Building Integrated Photovoltaics (BIPV)

The use of a photovoltaic curtain wall, adopting glass-based copper indium gallium selenide chips, endows the glass curtain wall of the building facade with power generation properties and splices it into a power-generating wall through integrated systems such as electrics. Together with the application of flexible thin-film power generating modules on a curved roof, with a total installed capacity of 270 kw and an annual power generation of about 200,000 kwh, this saves 104 tonnes of standard coal and reduces carbon dioxide emissions by 314 tonnes per year;

Intelligent Microgrid Management System

Through solar weather station real-time monitoring of the current temperature, daily irradiance, wind speed and air quality and other data, this system runs calculations in the background of an intelligent microgrid, analysing power supply strategy to maximise economic benefits. The system can realise its own power generation, consumption, storage, sales of intelligent management and optimal operation in real-time with the headquarters of the energy interconnection;

World's first LEED Zero Carbon certification

By generating more energy than it uses, the project offsets carbon emissions from energy consumption to human transportation, thus achieving the building's net-zero goals and, with the help of CBRE, obtaining the world's first LEED Zero Carbon certification.

Workplace Strategy Planning

Occupiers can decarbonise their real estate operations by properly planning their workplace design and daily management, with specific measures including:

Increasing Utilisation

Harness real estate technologies like Internet of Things (IoT) to collect and analyse data reflecting employee behavioural patterns to scientifically formulate workplace design and strategies. Adopt shared and flexible layouts to increase the utilisation of space and facilities, and minimise carbon emissions due to wastage of space and energy.

Telecommuting and Videoconferencing

Facilitate remote working and reduce unnecessary commuting and travel through improved digital infrastructure, online working and videoconferencing, thereby reducing related carbon emissions.

Automation and Big Data

Lowering energy consumption through automated control of lighting, temperature control, fresh air and other equipment, as well as tracking and analysing energy usage data through management platforms and systems, thereby reducing related carbon emissions.

Employee Behaviour Change Management

With low-carbon office space being built on the scientific use habits of employees, the process of reducing workplace carbon emissions also needs to be synchronised with the development of management systems and changes in organisational culture;

Sustainability Certification

Green certification provides a reliable norm and standard for the design, decoration and operation of office space, and also enhances the low-carbon recognition of enterprises. Enterprises can adopt widely recognised green certified interior standards, such as LEED ID+C, WELL, FitWel, RESET and Carbon Neutrality Certification for their own workplace, or choose to lease buildings with green certification (see page 25 for details);

Green Leasing

Work closely with landlords, including sharing data on energy, water and waste emissions, jointly setting decarbonisation targets and management rules for renovation, waste disposal and recycling, and procuring and using renewable energy. These are all elements that can be raised and negotiated with landlords at the lease term negotiation stage.

As the world's leader in commercial real estate services and investment, CBRE is focused on fulfilling its commitment to net zero by 2040. In 2021, **CBRE BEIJING** relocated its office to the CP Centre and is committed to creating a green office that fully complies with the highest international environmental and health standards. CBRE aims to achieve net-zero office operations through increased utilisation, support for telecommuting and conferencing, adoption of a digital energy/carbon management system, implementation of change management, and carbon offsetting.

After implementing CBRE Workplace 360, CBRE reduced the overall area of its Beijing office by **30%** and cut energy use by **15%**.

8%↓ Intelligent lighting control saves **22,400** kilowatt-hours of electricity

6%↓ Air conditioning self-control saves **16,800** kilowatt-hours of electricity

1%↓ Energy-saving distribution transformer saves **2,800** kilowatt-hours of electricity

Annual electricity consumption reduced **42,000 kwh**

Annual energy reduced **12.81 tce**

Annual carbon emission reduced **32.58 tons**

Equivalent to planting **141.54 trees**

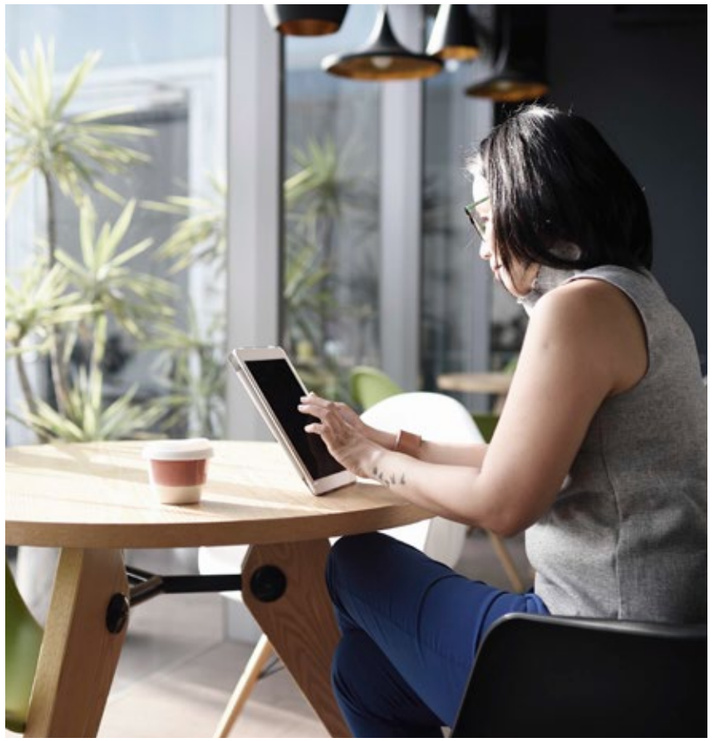
Decarbonising the Supply Chain

Although embodied carbon (Scope 3) is much more difficult to measure and reduce than operational carbon generated within the boundaries of an organisation (Scope 1 and 2), it accounts for a significant portion of an occupier's total carbon emissions and should therefore not be ignored or avoided. Occupiers can reduce Scope 3 emissions, especially construction materials, the most important implied carbon in corporate real estate activity, through several measures:

Reduce the amount of goods and services purchased

Purchase from companies that have decarbonised

Installation/use in a low-carbon manner



Due to the different types of building materials with different custom carbon factors (calculation of the carbon emissions for every individual product purchased or service used), carbon emissions can be measured by comparing the materials of the design scheme as one of the criteria, including but not limited to:

PARTITION The value per sq. m. can be significantly reduced by using gypsum board partitions instead of glass partitions;

VENEER Latex paint and wood finishes have lower carbon emissions than back-painted tempered glass;

CARPET Carpet suppliers are already offering carbon-neutral products, meaning that this building material can be net zero in renovation projects.

There are differences in the carbon emissions of products from different suppliers for the same type of building materials, and the level of green building materials product certification can be incorporated into procurement criteria. Existing national standards define six categories of 51 kinds of building materials products for evaluation. Standards for more products will be released in future.

Carbon Offsetting

After fully implementing other tactics, the last step is to explore credible, high-quality carbon offset opportunities.

What are carbon offsets?

Carbon offsets mainly refer to projects with approved emission reduction activity. These include the four categories of offshore wind power, solar thermal power, forestry carbon credits, and mangrove forest planting, which were announced and approved by the Ministry of Ecology and Environment in October 2023. The emission reductions generated after verification are traded in the carbon trading market, thereby used as offsets of emissions.

How are carbon offsets carried out?

There are two carbon offset mechanisms in China: Carbon Emission Allowances (CEA) and China Certified Emission Reduction (CCER):

CARBON EMISSION ALLOWANCES are carbon emission limits allocated by the government for key targeting industries within a specific period. The shortfalls and surpluses between traded allowances and actual emissions can be traded in the carbon market, with participating industries purchasing to offset their emissions. While the electric power industry is the only sector currently able to purchase CEAs, seven other industries will be added during the 14th Five-Year Plan period. While landlords and most occupiers are not covered, the electric power, iron and steel, building materials, and petrochemicals industries are all closely related to real estate operating carbon or embodied carbon;

CHINA CERTIFIED EMISSION REDUCTION, also known as carbon credits, are realised emission reductions that have been validated and certified by regulatory authorities and traded in the carbon market. These can be purchased by both targeted and non-targeted industries to achieve offsets, and are therefore commonly used by landlords and most occupiers. Under present rules, targeted industries can only offset part of their carbon emissions by purchasing CCER, not exceeding 5% of their total carbon emissions. There is no such limit for non-targeted industries.

How to measure the cost and risks of carbon offsets?

Although carbon credits have a wider scope of use, there is little demand for corporate purchases as China still adopts a voluntary mechanism for most industries. However, as corporate awareness of decarbonisation increases, purchases have increased significantly. The commencement of emission reduction activity will see both the supply and demand side expand considerably, leading to a rise in market trading activity .

In addition to the price of carbon credits, the costs incurred in hiring second-party validation, third-party review and issuance, and engaging an intermediary to find tradable carbon credits to complete the transaction process, can also impact the cost of offsetting. Before deciding to purchase carbon credits, companies must consider the following:

DURABILITY How long will the projects capture and hold carbon for? Purchasers must ensure that projects have longevity;

TRANSPARENCY AND CREDIBILITY Purchasers should ensure that carbon offset projects are organised transparently and that data information is available and certified by the relevant authorities. The State Council recently announced the Interim Regulations on the Management of Carbon Emissions Trading, which will further promote the standardisation of the market.

The difference between the costs of carbon offsets and technical carbon reduction is reflected in the difference between operating expenditure (OpEx) and capital expenditure (CapEx). Carbon offsets, although much lower in unit cost than technical carbon reduction, can only meet current decarbonisation requirements and require continuous investment, whereas the impacts of technical carbon reduction have continuity and costs can be spread over a longer time span.

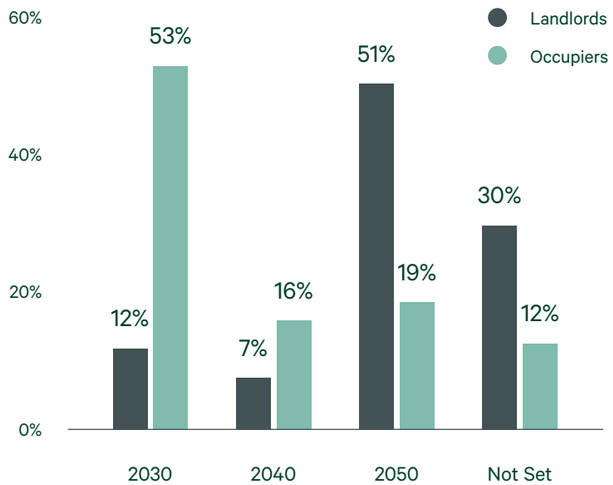
	Unit Cost	Technical Difficulty	Policy Incentives/Restrictions	Impact on decarbonisation
Improving Energy Efficiency	Medium	Big room for improvement	More incentives	High
Transition to Renewable Energy	High (On-site) Low (PPA or vPPA)	High (On-site) Low (PPA or vPPA)	More incentives (On-site) Less incentives (PPA or vPPA)	High
Workplace Strategy Planning	Medium	Medium	More incentives	Medium
Decarbonising the Supply Chain	Medium	Low	More incentives	Medium (Scope 3)
Carbon Offsetting	Low	Low	Certain restrictions	Low (current period)

Landlord Decarbonisation Strategy

Occupiers' embrace of decarbonisation is placing more intensive demands on landlords' decarbonisation performance and capability. CBREs surveys indicate that occupiers are well ahead of landlords in terms of their progress to reaching net zero, and this is putting pressure on property owners. Landlords are responding by focusing on designing and installing sustainable building features and acting to decarbonise and incentivise occupiers to reduce carbon, energy, and waste. By doing so, property owners can promote the concept of sustainable development; establish an image of being environmentally and socially responsible; and attract high-profile occupiers while realising their own net-zero targets.

Landlords and Occupiers' Net-zero Target Schedule

Source: CBRE Research, 2023

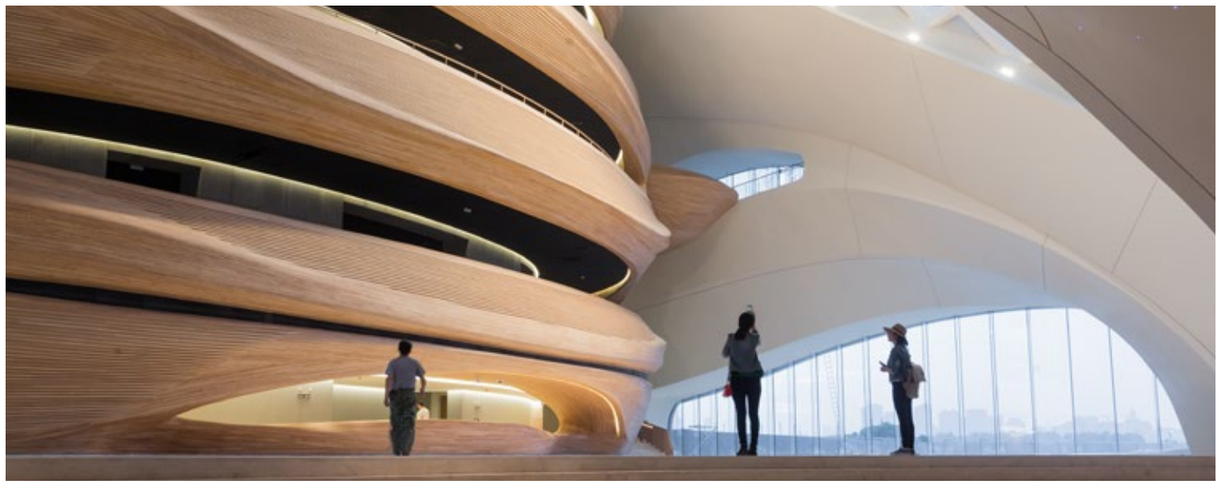


Landlord Decarbonisation Strategy

Sustainable Building Certification

Intelligent Building Systems

Green Leasing



Sustainable Building Certification

Obtaining a sustainable building certification carries significant weight in demonstrating a landlord's commitment to decarbonisation, while leasing a building with sustainable certification is the most tangible manifestation of an occupier's real estate decarbonisation strategy. CBRE's 2023 China Office Occupier Survey found that 66% of respondents expressed an interest in relocating to green-certified buildings, marking a significant increase of 16-pps from 2022. The proportion of companies willing to pay additional rents to relocate to green buildings rose from 3% in 2022 to 16% in 2023, which included a significantly higher than average share of occupiers who have set net-zero targets, as well as those in sectors such as finance, professional services, pharmaceuticals and life sciences, which are typically high-quality occupiers that landlords aim to attract. In addition to achieving rental premiums, sustainable certification can also therefore help landlords optimise their tenant-mix. The market for sustainable building certification in China is becoming increasingly sophisticated and diverse, with different certifications focusing on different areas:

LEED is a tool for evaluating green buildings. It aims to effectively minimise negative impacts on the environment and users during design, construction and operation.

WELL is a performance-based rating system created by IWBI and is designed to measure building characteristics that impact human health and enhance health and quality of life by improving living spaces.

Green Building Label's evaluation standard aims to maximise resource conservation, protect the environment and reduce pollution throughout the life cycle of a building, and to provide healthy, suitable and efficient spaces for use.

BREEAM helps landlords, designers, builders, operators, infrastructures and urban masterplans to achieve sustainability goals and improve environmental, social and economic sustainability, fairly assessing, rewarding and incentivising actions to improve the built environment.

PARKSMART Sustainable Parking Certification promotes sustainable transportation through wiser siting, design and operation of parking facilities.

TRUE Zero Waste Certification, by changing the way waste circulates in society, ensures that all products end up being reused and diverted instead of ending up in landfills.

SITES Sustainable Landscape Certification, a comprehensive program for sustainable site design and maintenance. SITES meets a variety of requirements for site best practices to create better resilient communities.

EDGE was developed by the World Bank to help design teams and project landlords find the most cost-effective rating system for achieving energy, water, and material savings goals.

RESET is a series of standards and assessment tools around data quality and data transparency designed make the built environment (air, water, energy, waste) healthier and more sustainable.

Fitwel is a building evaluation system that improves health and energy efficiency at work by optimising building design and operation. It tunes the health and productivity of building occupants through targeted improvements in workplace design and operations.

Intelligent Building Systems

The development of Internet of Things (IoT) and digital technologies are enabling landlords to collect data through measuring instruments and sensors, and read, integrate and cross-analyse with intelligent building systems. This ensures that the investments, returns and impacts of decarbonisation can be measured, evaluated, and demonstrated throughout the lifecycle of the planning, implementation, and retrospective adjustments.

When selecting and implementing intelligent building management systems, landlords are advised to focus on the following aspects:

INPUT Ability to interface, aggregate, clean and standardise various data sources in real time and automatically;

OUTPUT Quickly select targeted indicator dimensions, export and display data results according to specific report templates and formats (e.g., ESG reports, carbon audit reports, etc.) under different application scenarios, and connect to external data (e.g., carbon emission factor databases, various types of assessment benchmarks, etc.) for cross-comparison and analyses when needed.

Intelligent Management System Application Scenarios

Track Trends

- Indicators on the structure and design of buildings and spaces
- Data such as varieties, suppliers, and usage of building materials, facilities, and equipment
- Cost and process data on energy, waste and water consumption over time
- Carbon Factor Database

Identify Risk

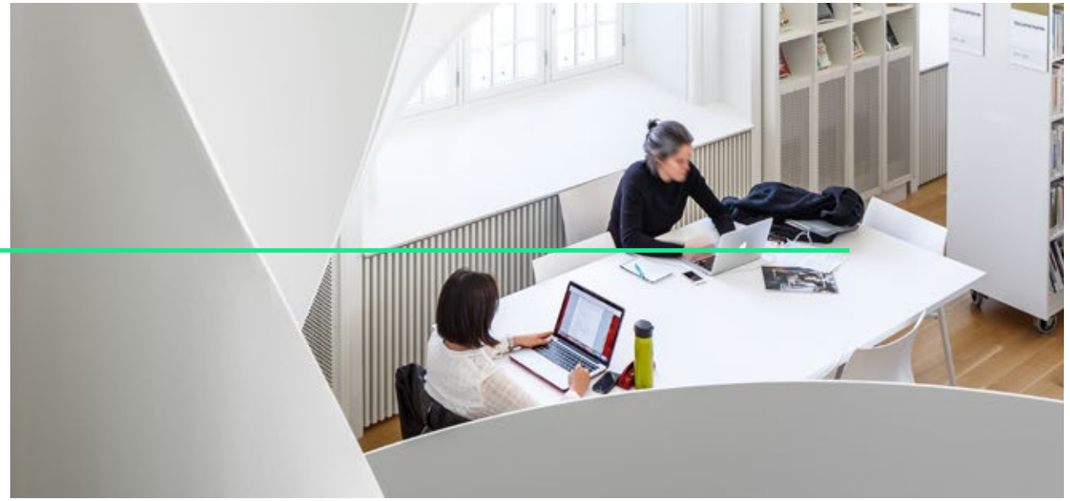
- External environmental data such as geography, climate, transportation
- Data on space use, human activities, logistics and transportation

Monitor Compliance

- International, national and local policies and regulations
- Relevant certifications, ratings, standards
- Disclosure and reporting requirements

Develop Strategy

- Unified and centralised management of equipment, applications and data, the system automatically responds and makes decisions in real time based on external environmental conditions and other inspection data.
- Machine learning and prediction through modeling algorithms, analysing and calculating optimal strategies



CBRE is rolling out Deepki, a sustainable data management system, to properties in multiple markets around the world, in the following three phases of building competitiveness:

PHASE I: LAUNCHED FEATURES

- Link with Energy Star Portfolio Manager
- Location Based and Market Based carbon emission calculations
- Climate Risk analytics
- IoT connectivity - sensors (indoor air quality, indoor environmental quality, etc.)
- Visualisation platforms and tools
- Customisable reporting

PHASE II

- Local Law Penalties Calculator/Compliance Tool
- Tax Credit Calculation linked to Action Plans
- National benchmarks for relevant indicators

PHASE III

- LEED Pre-Assessment Tool
- CDP Aligned reporting
- Data integration with Host/VTS and PM Dashboards
- Risk Rating for assets

Green Leasing

61%

of landlords highlighted the need to drive a common agenda with tenants

CBRE Asia Pacific Real Estate Chief Sustainability Officer Survey

Occupiers' decarbonisation initiatives are often constrained by the outdated hardware base of their buildings and their landlord's lack of operational capacity. Landlords are particularly passive in obtaining building operational carbon emission indices. Most of the decarbonisation pathways for occupiers require support and investment from landlords, particularly for energy efficiency improvements and transition to renewable energy. Fostering close collaboration between occupiers and landlords therefore plays a crucial role in helping both parties achieve their net-zero goals.

CBRE believes that occupier-landlord cooperation can be effectively promoted and implemented through the adoption of green leases. By clarifying the obligations and rights of landlords and occupiers in leasing terms, both parties can share the costs and benefits of green retrofitting and operation and participate more actively in decarbonisation.

Although green leases in China's commercial real estate market are still at a nascent stage of development, interest in such practices is picking up rapidly. The results of CBRE's China Office Occupier Survey show that 19% of surveyed occupiers plan to include green clauses in future leasing agreements. Practices closely related to decarbonisation, such as green retrofitting, waste management, the disclosure of energy consumption data, and the use of renewable energy sources, can be discussed during negotiations between occupiers and landlords in the form of lease clauses and implemented after occupiers have taken possession.

Companies'preferred elements of green leases

Source: CBRE Research, 2023

Disclosing Best Practices

Recent years have seen more leading Greater China commercial real estate landlords address different areas of decarbonisation. A CBRE study of ESG reports issued in 2022 by 14 leading listed landlords (eight in mainland China and six in Hong Kong) found that all had disclosed Scope 1 and 2 carbon emissions data. Selected groups such as China Overseas, Swire, Hang Lung, SHKP and Kerry had also disclosed Scope 3 carbon emissions data, underscoring the importance they are placing on decarbonisation initiatives. Of the aforementioned landlord decarbonisation practices, Sustainable Building Certification is the most widely adopted initiative. Intelligent Building Systems are also a key area of investment, with 71% of landlords reporting doing so, led by mainland Chinese landlords. Finally, around half of the landlords stated that they had taken action or addressed goals to implement green leasing practices.

Leading commercial real estate landlords are also building and improving infrastructure and services to support their tenants' decarbonisation goals. The most popular initiatives include energy efficiency, building materials, workplace strategy planning, and on-site renewable energy facilities. Some 36% of landlords, all in Hong Kong, reported having commenced a transition to renewable energy in some or all their buildings through the procurement of green electricity.

CBRE expects more commercial real estate landlords in mainland China and Hong Kong will implement initiatives to achieve net-zero goals in the coming years. Formulating, disclosing and promoting best practices will play a key role in boosting landlords' brand image and reputation among stakeholder groups including the government, occupiers, investors, suppliers, employees and consumers.

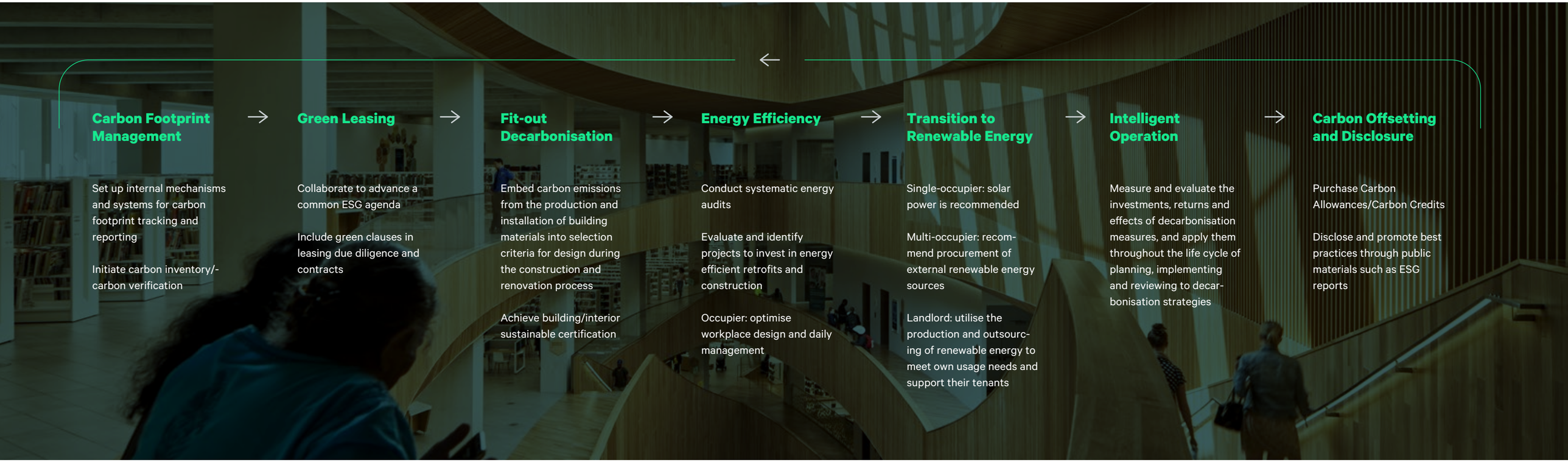
Decarbonisation measures mentioned by ESG reports of several listed landlords

Source: Public 2022 ESG Reports, CBRE Research, 2023

		China Resources	Lujiazui	China Overseas	Yuexiu	Joy City	Jinmao	Poly	Longfor	Swire	Hang Lung	Wharf	Hong Kong Land	SHKP	Kerry
Carbon Emission Disclosure	Scope	1/2	2	1/2/3	1/2	1/2	1/2	1/2	1/2	1/2/3	1/2/3	1/2	1/2/3	1/2/3	1/2/3
Sustainable Building Certification		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Intelligent Building Systems		●	●	●	●	●	●		●	●	●			●	
Green Leasing				●	●		●	●	●	●	●				
Support for Occupiers' Decarbonisation															
Improving Energy Efficiency		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Transition to Renewable Energy (On-site)		●	●	●	●		●	●	●	●	●	●		●	●
Transition to Renewable Energy (PPA)										●	●		●	●	●
Workplace Strategy Planning				●	●		●		●	●	●		●		●
Decarbonising the Supply Chain (construction material)			●	●		●	●	●	●	●	●		●	●	●

Conclusion

CBRE recommends occupiers and landlords adopt the following processes to achieve decarbonisation and ensure net-zero emissions:



Carbon Footprint Management

Set up internal mechanisms and systems for carbon footprint tracking and reporting

Initiate carbon inventory/-carbon verification

Green Leasing

Collaborate to advance a common ESG agenda

Include green clauses in leasing due diligence and contracts

Fit-out Decarbonisation

Embed carbon emissions from the production and installation of building materials into selection criteria for design during the construction and renovation process

Achieve building/interior sustainable certification

Energy Efficiency

Conduct systematic energy audits

Evaluate and identify projects to invest in energy efficient retrofits and construction

Occupier: optimise workplace design and daily management

Transition to Renewable Energy

Single-occupier: solar power is recommended

Multi-occupier: recommend procurement of external renewable energy sources

Landlord: utilise the production and outsourcing of renewable energy to meet own usage needs and support their tenants

Intelligent Operation

Measure and evaluate the investments, returns and effects of decarbonisation measures, and apply them throughout the life cycle of planning, implementing and reviewing to decarbonisation strategies

Carbon Offsetting and Disclosure

Purchase Carbon Allowances/Carbon Credits

Disclose and promote best practices through public materials such as ESG reports

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