



Webinar: Translating Scope 1, 2 and 3 for Commercial Real Estate

April 22, 2020



Panellists



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**ADVANCING
NET ZERO**



**WORLD
GREEN
BUILDING
COUNCIL**



Setting the Context

Matthew Adams

Project Manager, Advancing Net Zero



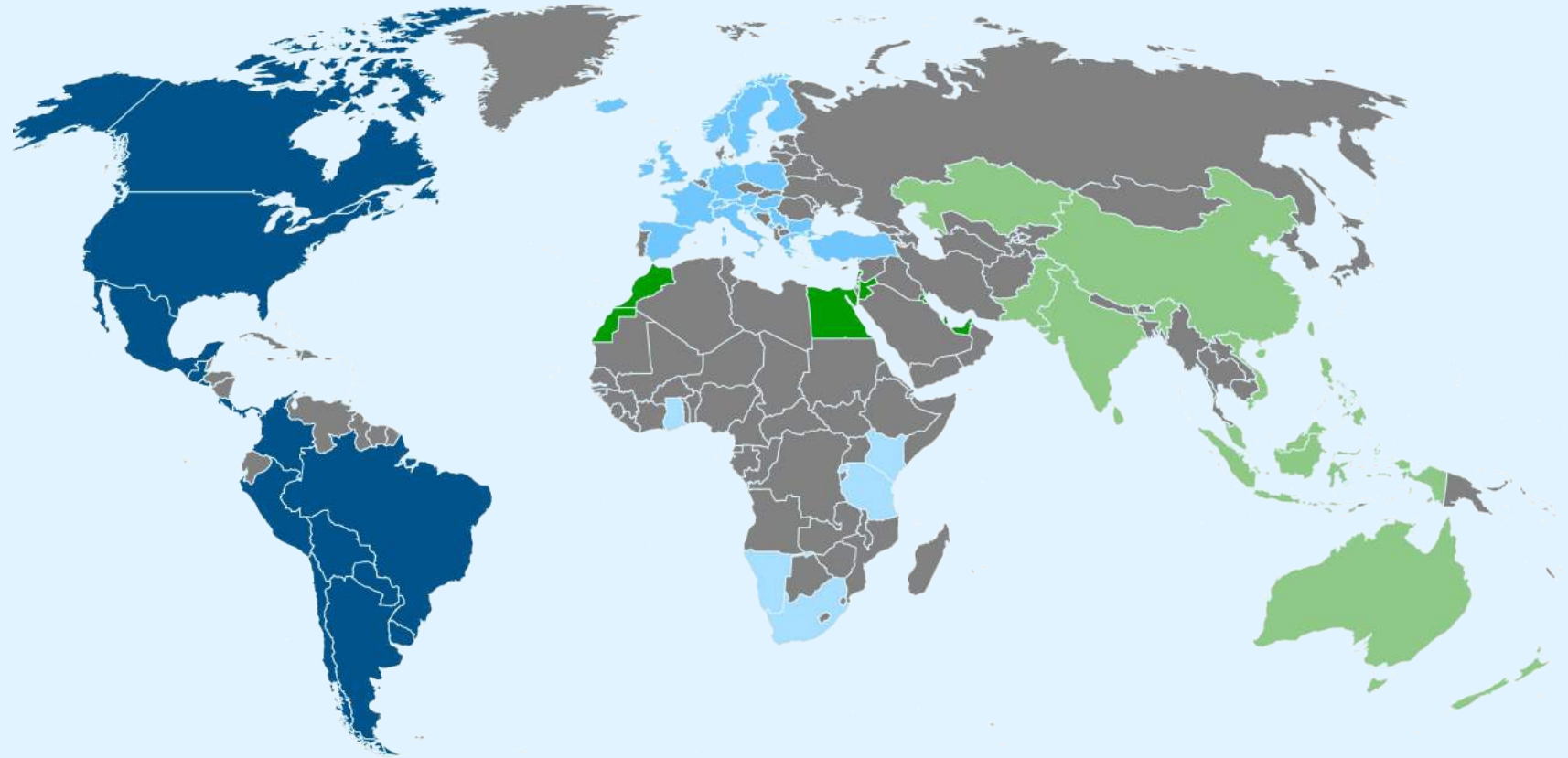


**Buildings are a critical solution
to climate change**



World Green Building Council

- The World Green Building Council (WorldGBC) is a global network leading the transformation of the built environment to make it healthier and more sustainable.
- Collectively, with our Green Building Councils (GBCs) in around 70 countries, we accelerate action to deliver on the ambition of the Paris Agreement and UN Sustainable Development Goals (SDGs). We do this by accelerating critical systems transitions that need to take place across the sectors to achieve our goals for a sustainable built environment.
- We are committed to green buildings for everyone, everywhere to build a better future.





ADVANCING NET ZERO

A global campaign to accelerate uptake of
Net Zero Carbon Buildings to 100% by 2050

Project targets

- Increase awareness and education of the urgency and achievability of net zero carbon buildings
- Achieve alignment and commonality between GBC approaches and certification schemes
- To expedite uptake in global markets by sharing market leadership examples

Advancing Net Zero



ADVANCING
NET ZERO



WORLD
GREEN
BUILDING
COUNCIL

WorldGBC definition:
A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources

100% of buildings must operate at net zero carbon

2050

2030

All new buildings must operate at net zero carbon

GOVERNMENT
ENGAGEMENT

TRAINING &
EDUCATION

CORPORATE
ENGAGEMENT

CERTIFICATION

Key Principles

1. Measure and disclose carbon

Carbon is the ultimate metric to track; buildings must achieve an annual operational net zero carbon emissions balance based on metered data



2. Reduce energy demand

Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy



3. Generate balance from renewables

Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets



4. Improve verification and rigour

Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste



What is your role?





Defining scopes

This is where organisational and operational boundaries become important!

From the **GHG Protocol**, scopes of emissions are direct and indirect emissions sources within an organisation's operational boundary.

They are broken down **for reporting and accounting purposes** into three categories:

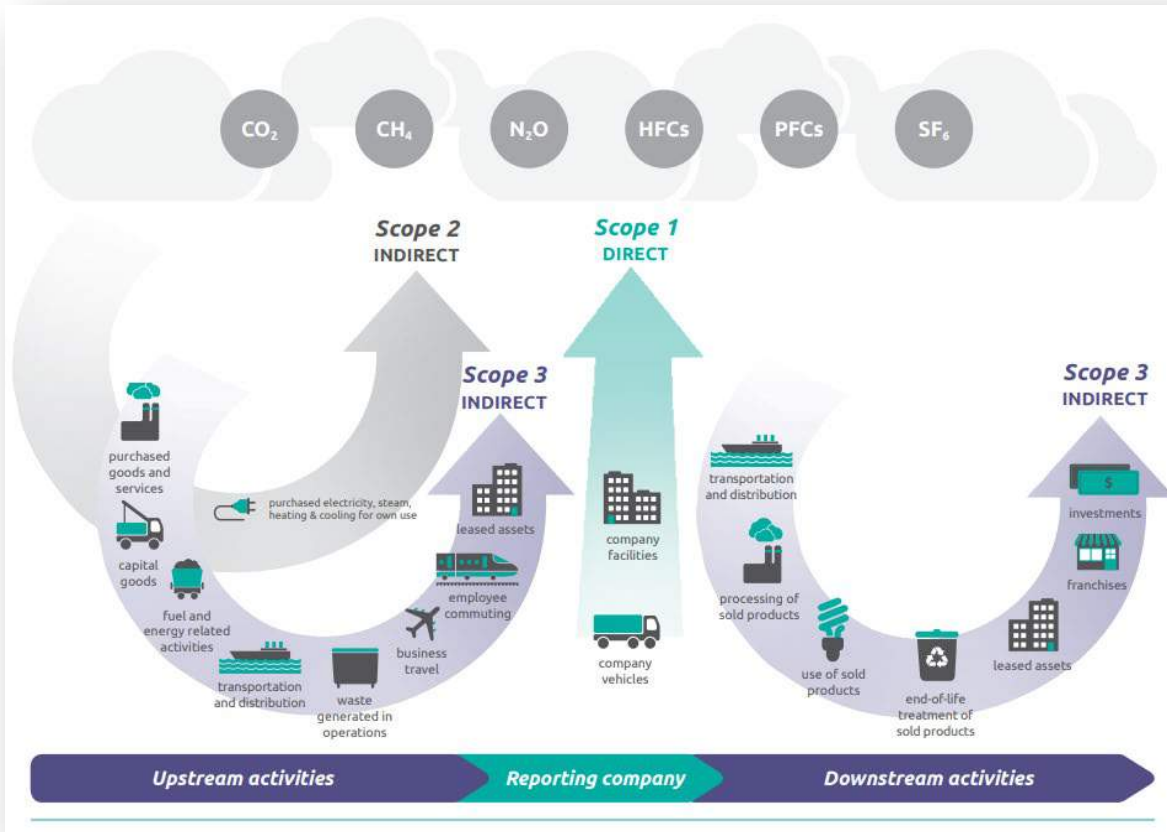
Scope 1 emissions: Direct GHG emissions occur from sources that are owned or controlled by the company

Scope 2 emissions: Indirect GHG emissions from the generation of purchased electricity consumed by the company

Scope 3 emissions: Indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions



Common sources



Scope 1:

- on-site fuel combustion (gas, diesel)

Scope 2:

- sources of electricity for lighting, plug loads etc (renewable or fossil fuel)

Scope 3:

- tenant emissions
- embodied carbon (new buildings)
- waste and wastewater

Figure 1.1 GHG Protocol Corporate Value Chain (Scope 3) Standard

Challenges and opportunities

Challenges

- Lack of regulation
- Capital costs
- Large supply chains
- Double counting
- Limited understanding

Become

Opportunities*

- Understand potential impact
- Manage climate risk
- Demonstrate climate action
- Reduce operational expenses
- Improve collaboration with value chain
- Improve engagement with tenants



*Opportunities adapted from UKGBC Guide to Scope 3 Reporting in Commercial Real Estate

WorldGBC



Scope 1

Scope 2



Scope 3

Net Zero Carbon Buildings Commitment

Bringing Embodied Carbon Upfront

Green Building Councils

GBC Certification Schemes

UKGBC Scope 3 Guidance



SBTi

Science Based Targets
Sector Decarbonisation Approach (SDA)



GHG Protocol



GHG Protocol Corporate Accounting and Reporting Standard

GHG Protocol Scope 2 Guidance



GHG Protocol Corporate Value Chain (Scope 3) Standard



Reporting



Disclosure through reporting initiatives





City Developments Limited

Esther An

Chief Sustainability Officer



**CHANGING THE
CLIMATE**

**CHANGING THE
FUTURE**

**WorldGBC Webinar
Translating Scope 1, 2 and 3 for
Commercial Real Estates
22 April 2020**

**Building Global Leadership through
Sustainability Integration -
CDL's Strategic Transformation to
a *Low Carbon Economy***

**Presented by:
Esther An
Chief Sustainability Officer**

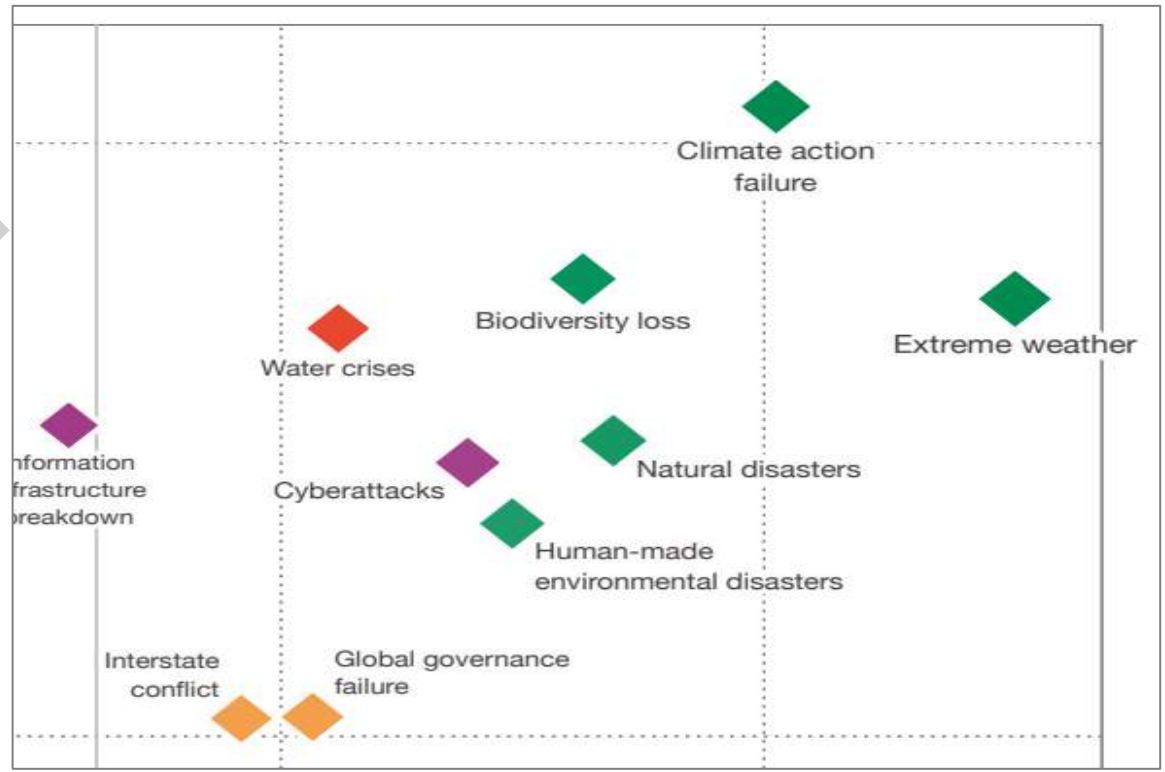
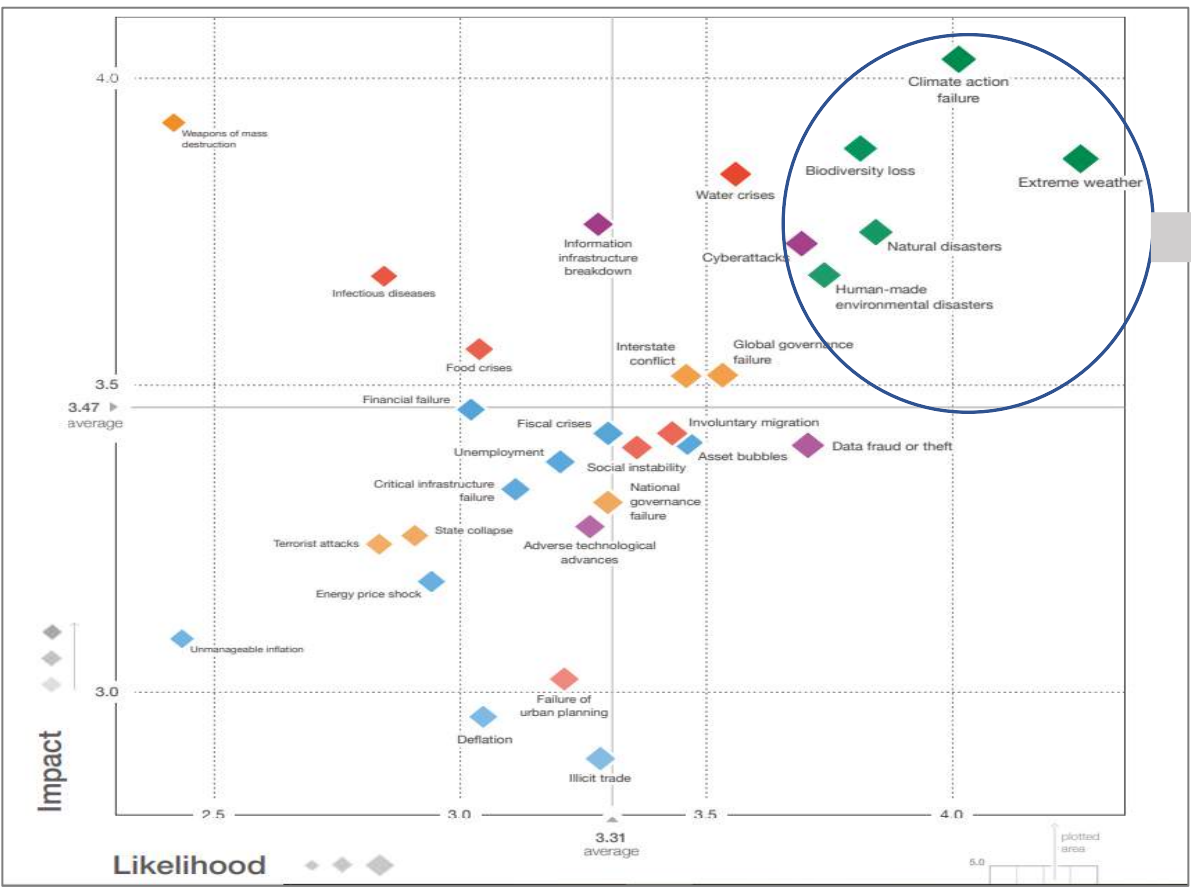


CITY DEVELOPMENTS LIMITED

Climate Risks are Investment and Business Risks, Voted by Global Leaders and Businesses at World Economic Forum 2020

Jan 2020, WEF Global Risks Report: a survey involving 750 global experts and decision-makers from public & private sectors, academia & civil society assessed the risks facing the world.

Oct 2018, IPCC Report: The world is headed for painful problems as emissions keep rising; the impacts & costs of 1.5°C of global warming will be far greater than expected.



For the first time in the survey's 10-year outlook, the top five global risks in terms of likelihood are all climate & environment related

Source: [World Economic Forum's Global Risks Report \(2020\)](https://www.weforum.org/reports/global-risks-report-2020)

Cities and Buildings have High Carbon and Energy Impact

Even with more active climate actions after COP21 (2015) & Paris Agreement (2016), global carbon emissions have not declined

Global carbon emissions may have flatlined from 2018-2019

metric gigatons of CO₂

Advanced economies Rest of the World

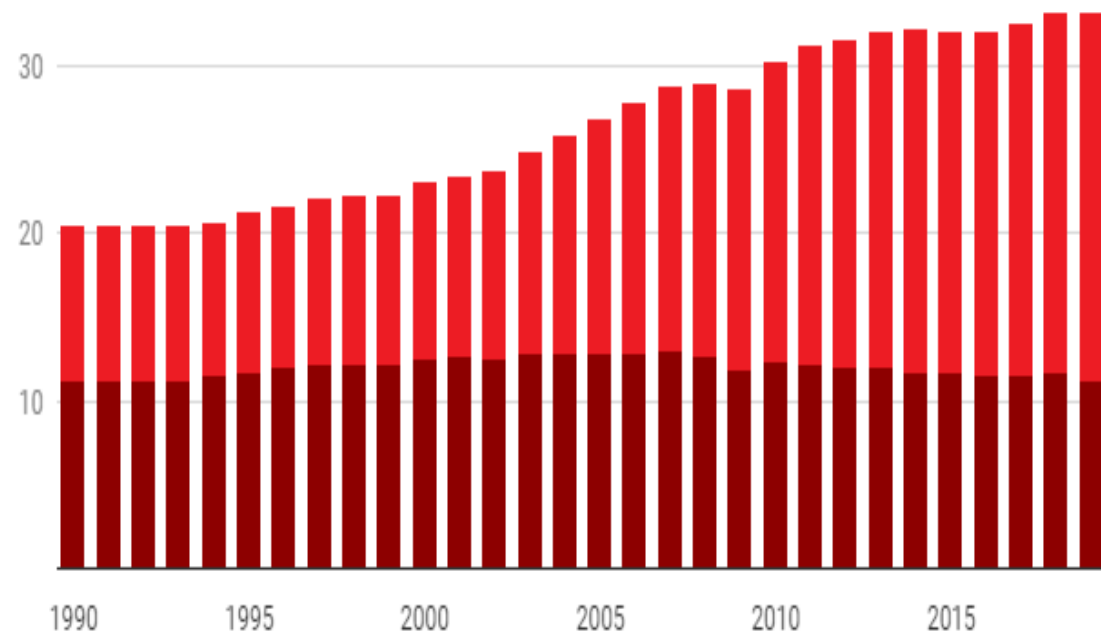


Chart: Elijah Wolfson for TIME • Source: IEA • Get the data • Created with Datawrapper

Cities' Footprints*

- 2% of world's landmass, consuming over 2/3 of world's energy;
- More than 70% of global CO₂ emissions

Buildings & Construction Sectors' Footprints*

- 36% of global final energy consumption;
- Some 40% of total direct & indirect CO₂ emissions;
- Energy demand continues to rise at nearly 3% p.a. from buildings and buildings construction

C40: To achieve a 1.5°C-consistent pathway[#], cities & buildings need to work towards the following Goals

Emissions from the global building stock in place in 2050 will need to be **80-90% lower than the present day.**

Av per capita emissions across cities need to **drop 42% by 2030** (from over 5 tCO₂e per capita today to around 2.9 tCO₂e per capita.)

Sources:

*2019 Global Status Report for Buildings and Construction, Global Alliance for Buildings and Construction, International Energy Agency and the United Nations Environment Programme, December 2019

[#]Summary for Urban Policy Makers by C40, December 2018

Global Call for Urgent Climate Action >> Mitigation & Adaptation are Mainstream



BUSINESS AMBITION FOR 1.5°C   **OUR ONLY FUTURE**

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES



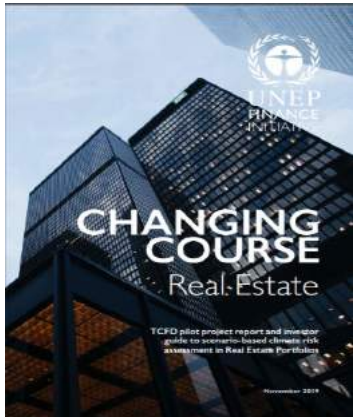
UN Climate Action Summit (Sept 23, NYC) & COP25 at Madrid: Urging businesses to take bold and urgent actions to avoid disastrous consequences caused by climate change. Evidence indicates that 1.5°C-compliant business model will be best-placed to thrive as the global economy undergoes a transition to a net-zero future by 2050. Embracing & investing in SDGs is the pathway to a sustainable future. >>> **A Decade of Urgent Action.**



Bringing embodied carbon upfront

Coordinated action for the building and construction sector to tackle embodied carbon

- By 2030: All new buildings to be 'Net Zero'; new buildings to have 40% less embodied carbon
- By 2050: All buildings, new and old, to be 'Net Zero'; new buildings to have net zero embodied carbon
- Singapore Green Building Master Plan: Greening 80% of all buildings by 2030



UNEP Finance Investor Report, Changing Course: a Guide to help global investors and capital markets be better prepared for climate risks and capture opportunities through ESG investing in real estate portfolios. It advocates Principles for [1] Responsible Investing; [2] Responsible Lending & [3] Sustainable Insurance with premium pegged to resilience of buildings. This aims to address the high cost and risks of inaction on climate change, to the tune of USD 1.2 trillion for 30,000 of the largest listed companies.



CDL'S 4 STRATEGIC PILLARS IN TRANSFORMING TO A GREEN ECONOMY

- Integration
- Innovation
- Investment
- Impact

– *CDL as a Business Case*

A Sustainable Business Model: Committed to Doing Well, Doing Good



RESIDENTIAL
DEVELOPED OVER
46,000
LUXURIOUS RESIDENCES
GLOBALLY



COMMERCIAL
OWNS OVER
24 MILLION
SQ FT
OF GROSS FLOOR AREA
OF OFFICE, INDUSTRIAL,
RETAIL, RESIDENTIAL AND
HOTEL SPACE GLOBALLY



HOTELS
GLOBAL
FOOTPRINT OF
156
HOTELS,
45,000
ROOMS



**FUND
MANAGEMENT**
TARGETS
US\$5
BILLION
IN ASSETS UNDER
MANAGEMENT (AUM)
BY 2023

- 1963: established with eight employees
- 1995: “Conserving as We Construct” corp ethos
- Today: a listed international real estate operating company; >15,000 employees globally
- Group revenue: S\$3.4B (FY 2019)
- Market Cap: S\$8.1B*
- Acquired 50% stake in IREIT Global (April 2019)
- Privatised M&C Hotels (Oct 2019)

* As of 13 Apr 2020, based on share price – S\$7.68



106 Locations in 29 Countries and Regions

ASIA

CHINA

- Beijing
- Chengdu
- Chongqing
- Danggwan
- Fujian
- Fuqing
- Guizhou
- Hangzhou
- Hong Kong
- Shanghai
- Suzhou
- Wenzhou
- Wuji
- Xiamen

INDONESIA

- Jakarta

JAPAN

- Tokyo
- Osaka

MALAYSIA

- Cameron Highlands
- Johor Bahru
- Kuala Lumpur
- Malacca
- Penang

MALDIVES

- Meradhoo Island
- Velavaru Island

SINGAPORE

- Singapore

SOUTH KOREA

- Seoul

TAIWAN

- Huailien
- Taichung
- Taipei

THAILAND

- Bangkok
- Phuket

PHILIPPINES

- Manila

AUSTRALASIA

AUSTRALIA

- Brisbane
- Melbourne
- Perth

NEW ZEALAND

- Auckland
- Bay of Islands
- Dunedin
- Greymouth
- Hokanga

- Masterton
- New Plymouth
- Palmerston North
- Queenstown

- Rotorua
- Taupo
- Te Anau
- Wanganui
- Wellington

MIDDLE EAST

IRAQ

- Sulaymaniyah

JORDAN

- Amman

KUWAIT

- Al Jahra
- Al Kowait
- Al Salmiya

OMAN

- Muscat
- Musannah
- Salalah

PALESTINE

- Ramallah

QATAR

- Doha

SAUDI ARABIA

- Hail
- Madinah
- Makkah

TURKEY

- Istanbul

UNITED ARAB EMIRATES

- Abu Dhabi
- Dubai
- Fujairah
- Sharjah

EUROPE

FRANCE

- Paris

GEORGIA

- Tbilisi

GERMANY

- Munich

ITALY

- Rome
- Florence

RUSSIA

- Moscow

THE NETHERLANDS

- Amsterdam
- Utrecht

UNITED KINGDOM

- Aberdeen
- Birmingham
- Cambridge
- Cardiff
- Dudley
- Gatwick
- Glasgow
- Leeds
- Liverpool

- London
- Manchester
- Newcastle
- Plymouth
- Sheffield
- Slough-Windsor

NORTH AMERICA

UNITED STATES

- Anchorage
- Avon
- Boston
- Boulder

- Buffalo
- Chagrin Falls
- Chicago
- Durham

- Kissimmee
- Los Angeles
- Minneapolis
- Nashville

- New York
- Scottsdale
- Sunnyvale

Integration: Value Creation Model embracing ESG and SDGs into its Business ~ Conserving as We Construct & Manage since 1995



Aligned to Global Standards & Goals

UN GLOBAL COMPACT

SUSTAINABLE DEVELOPMENT GOALS

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

GRI

INTEGRATED REPORTING <IR>

TCFD

Integrated ESG Strategy:
Biz and Financial Impact of ESG
Track, Measure & Report Value-driven KPIs and Progress to Stakeholders, Harnessing Six Capitals for Growth

CDL Future Value 2030 Blueprint
Raising the Bar for Green Building Commitment and ESG Best Practices with Tangible, Long-term Goals and Targets

Adaptation & Innovation. Tapping on Financing to Accelerate Green Building and Sustainability Agenda
E.g. PropTech, Green Bonds, Green Loans, Sustainability-linked Loans etc.

Addressing Global/National Goals: CDL's Proactive Strategy/Action



- CDL set targets validated by Science Based Targets initiative (SBTi), July 2018. The first real estate company in Singapore to achieve this.
- Sep 2019: Joined the pioneer batch of 87 companies to pledge support to the UNGC's "Business Ambition for 1.5°C" campaign



- CDL: Amongst first few supporting companies in Singapore in 2017
- CDL conducted Climate Change Scenario Planning on 2°C and 4°C in 2018
- Expanded to 1.5°C and 2°C scenarios in 2019, aligned with IPCC report



- Committed to green buildings since 2002 & attained the most BCA Green Mark Awards for buildings & office interiors (2019: 110)
- GM Super Low Energy Building 2018: one of 14 public and private developers to voluntarily aim for at least one within the next 5 years
- 2 net zero single storey buildings – CDL Green Gallery and SG Sustainability Academy



- 2017: CDL's Integrated Sustainability Report embraced 10 SDGs, ref to SDG Reporting Toolkit, by UNGC, GRI and UNPRI
- 2019: CDL has embraced 14 SDGs, aligned with the company's Material ESG Issues

Robust Corporate Carbon Strategy and Milestones

Supporting Global Goals

2003

Corporate EHS Policy underscored our commitment to be a socially and environmentally friendly organisation

2015

Climate Change Policy affirmed our corporate-wide commitment towards low-carbon operations

2016 & 17

Amongst first few SG corporates to pledge support to **Paris Agreement, UN SDG & TCFD**

2018

First in Singapore to be SDG Pioneer in green infrastructure & a low carbon economy by UNGC

Sep 2019

Amongst pioneer batch of 87 companies to support **UNGC's call for 'Business Ambition for 1.5°C'**

Pioneering Low-Carbon Initiatives

2002

Launched Savannah CondoPark - Singapore's **first Eco-Condo with solar panels installation**

2009

Carbon Neutralised 100% of Corporate Office operations and Tampines Concourse(1st in APAC)

2018

Complementing onsite Solar energy production: **Pioneering purchase of RECs** through SP Group's innovative RECs Marketplace

2019 - 2020

Climate Change Scenario Planning: Quantify climate-related risks and opportunities with 1.5°C, 2°C and 4°C scenarios for key business units in SG, China, UK and the US.

Only company in SEA and HK recognised on the 2019 CDP A List for corporate climate action and water security. (Reporting since 2008)



Validating & Tracking Progress

2016

First Singapore developer to validate our GHG data against stringent **ISO 14064**

2018

Released carbon intensity disclosure report for our flagship building Republic Plaza, in accordance with **ISO 16745**

Carbon Management is an Important Priority for Businesses

First Singapore Developer to set SBTi validated Carbon Reduction Targets

Paris Agreement's Recommendation



Assessed by:



WORLD
RESOURCES
INSTITUTE



Scope 1 & 2

Reduce GHG emissions intensity (**Scope 1 + 2**)* across Singapore operations by **59% by 2030** (from base-year 2007)

***Scope 1** Includes direct emissions from fuel used in power generators, petrol for company vehicles, loss of refrigerant in air-conditioning systems, and loss of insulating and arc quenching media in switchgear systems

Scope 2 Includes indirect emissions from purchased electricity consumed by the operational activities of CDL at both our corporate office and managed buildings.

Scope 3

Commit to use sustainable materials to reduce embodied carbon of materials by **24% by 2030** (as compared to conventional materials).

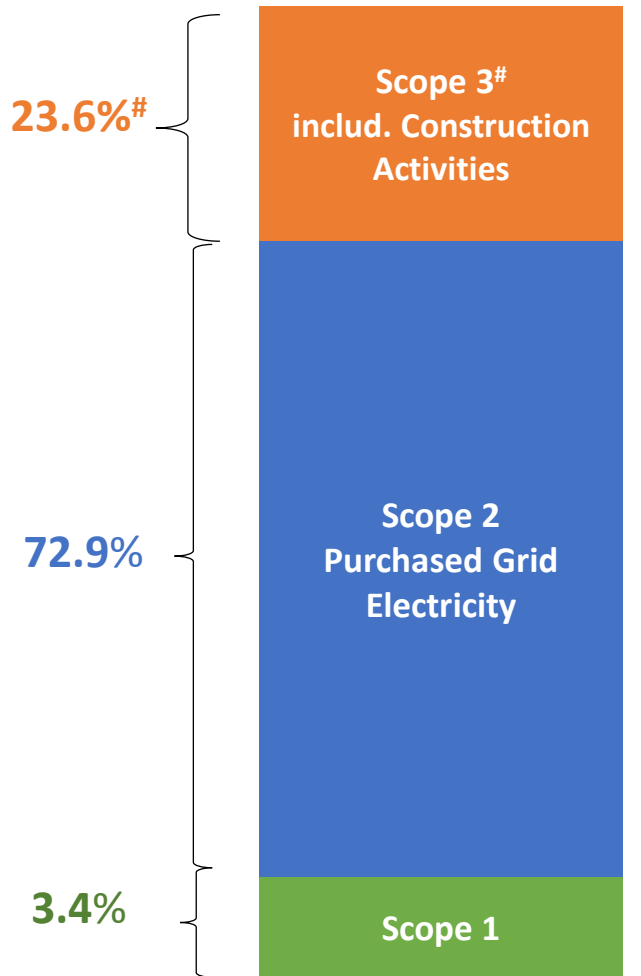
Interim target of a 7% reduction has been set for all new projects awarded from 2018 onwards:
Projects that are due for completion in 2021/2022 have an average expected embodied carbon footprint of 0.55 tCO₂e/m², which puts us well underway to achieve our interim target set.

Engage CDL's largest subsidiary, Millennium & Copthorne (M&C) Hotel, to set science-based emissions reduction target by 2025.

Following CDL's SBTi validation, Millennium and Copthorne (M&C), the largest contributor of carbon emission from CDL's subsidiaries, has set their own science-based target in early 2019:

M&C has committed to reduce absolute Scope 1, 2 & 3 GHG emissions by 27% by 2030 vs 2017 base year.

CDL's Carbon Emissions & Energy Analysis for Targeted Strategy and Impacts



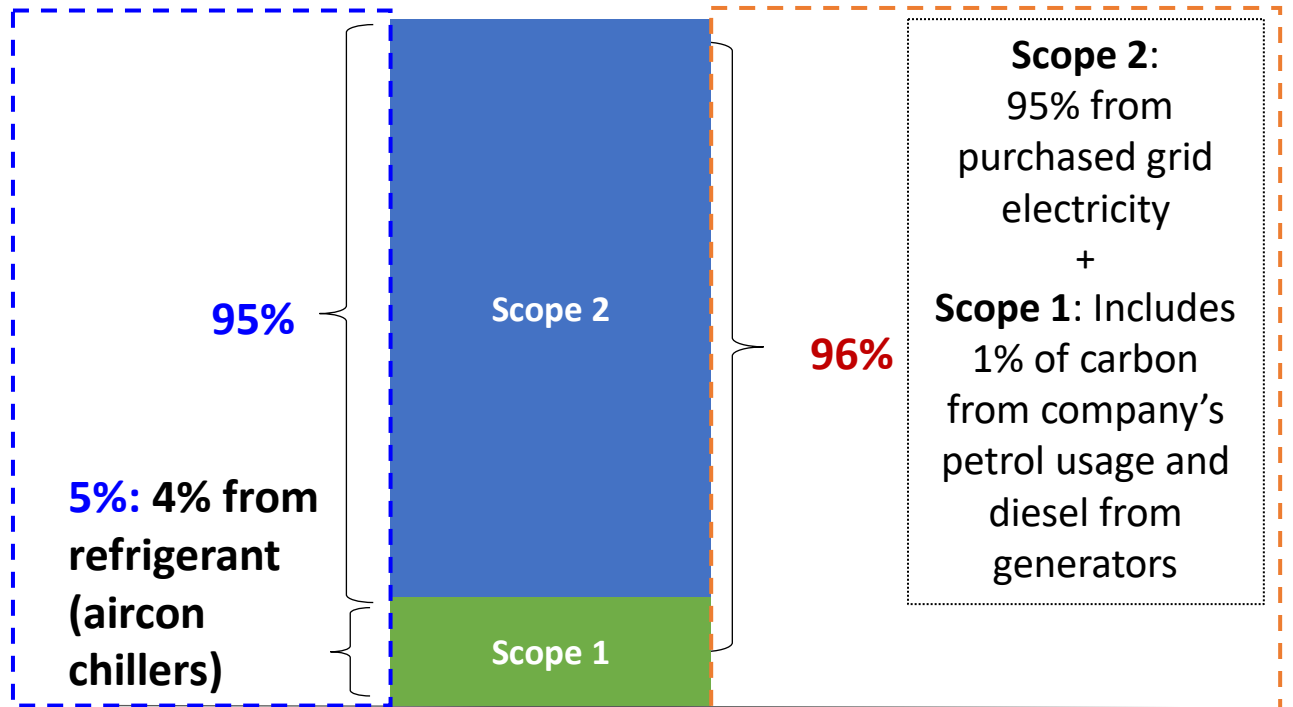
Scope 3 including M&C

Globally, with growing emphasis on value chain emissions-

Since 2014: CDL voluntarily tracks carbon emissions of key subsidiaries (including 70+ global M&C hotels)

Since 2016: CDL voluntarily tracks embodied carbon of construction materials.

SBTi-validated target of 59% reduction in GHG intensity by 2030 (from base-year 2007).



Av. Annual Carbon Emissions In Singapore Operations (2015-19)

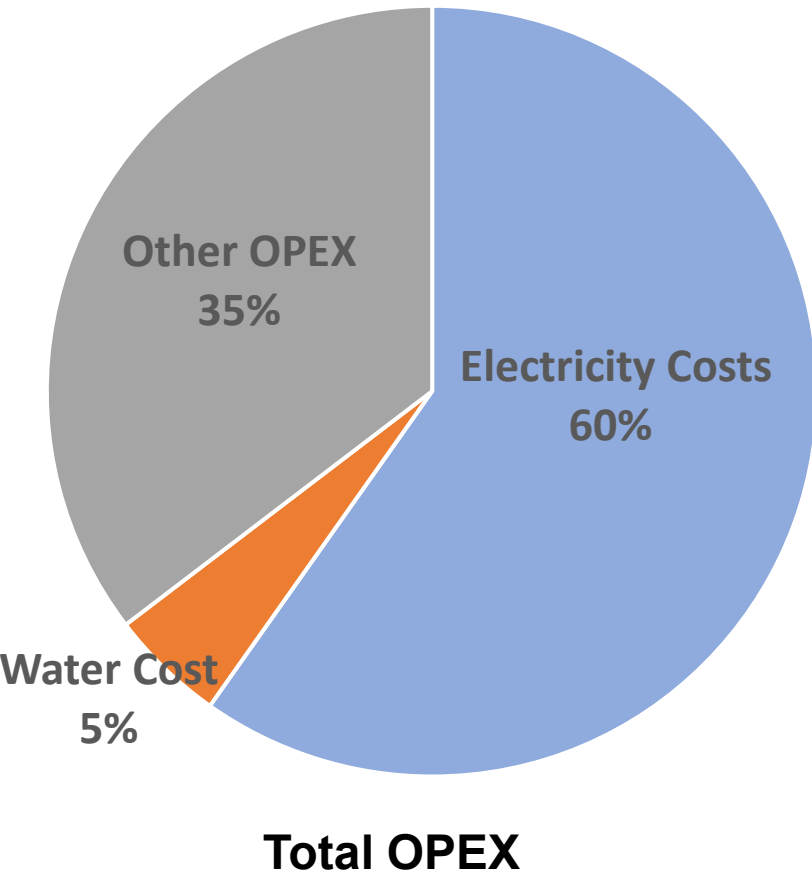
Average Annual Scope 1+2 Carbon Emissions (2015-19)
20,818 tCO₂e

Average Annual Energy Consumption (2015-19)
44,400 MWh

Scope 3 includes: GHG emissions arising from construction activities, electricity upstream emissions and transmission losses, courier services, employee commute, air travel and hotel, water supply and wastewater treatment at corporate office, managed buildings audited to ISO 14064.




Carbon and Energy Reduction Initiatives make Business Sense

Energy costs account for **50%-70% of Total OPEX** for our operating buildings*:



* Average data shown is based on past three years (2017-2019)

Energy efficiency and mgmt aspects of leading green building standards have **high weightages of 22-49%**:

	 Rating System v4.1	 Existing Non-Residential Buildings	 In-Use Rating System
Aspects	<ul style="list-style-type: none"> • Energy Efficiency Best Management Practices • Energy Performance • Grid Harmonization 	<ul style="list-style-type: none"> • Thermal Performance of Building Envelope • Air Conditioning System • Natural Ventilation / Mechanical Ventilation • Artificial Lighting • Ventilation in Carparks • Ventilation in Common Areas • Lifts and Escalators • Energy Efficient Practices & Features • Energy Policy & Management • Renewable Energy 	Energy Management for: <ul style="list-style-type: none"> • Asset Performance • Building Management • Occupier Management
Weightage on Energy	34%	49%	22%

Proactive Management of Embodied Carbon from Construction Materials

- **Why?** Building and construction are responsible for some 40% of all carbon emissions in the world: comprising approximately 28% from Operational Emissions and some **11% from Embodied Carbon emissions**[#]
- CDP: Companies with better overall understanding of their product's carbon emissions along their life cycle **achieved larger reported carbon reductions**.^{##}

Setting Targets & Tracking Progress Since 2016:

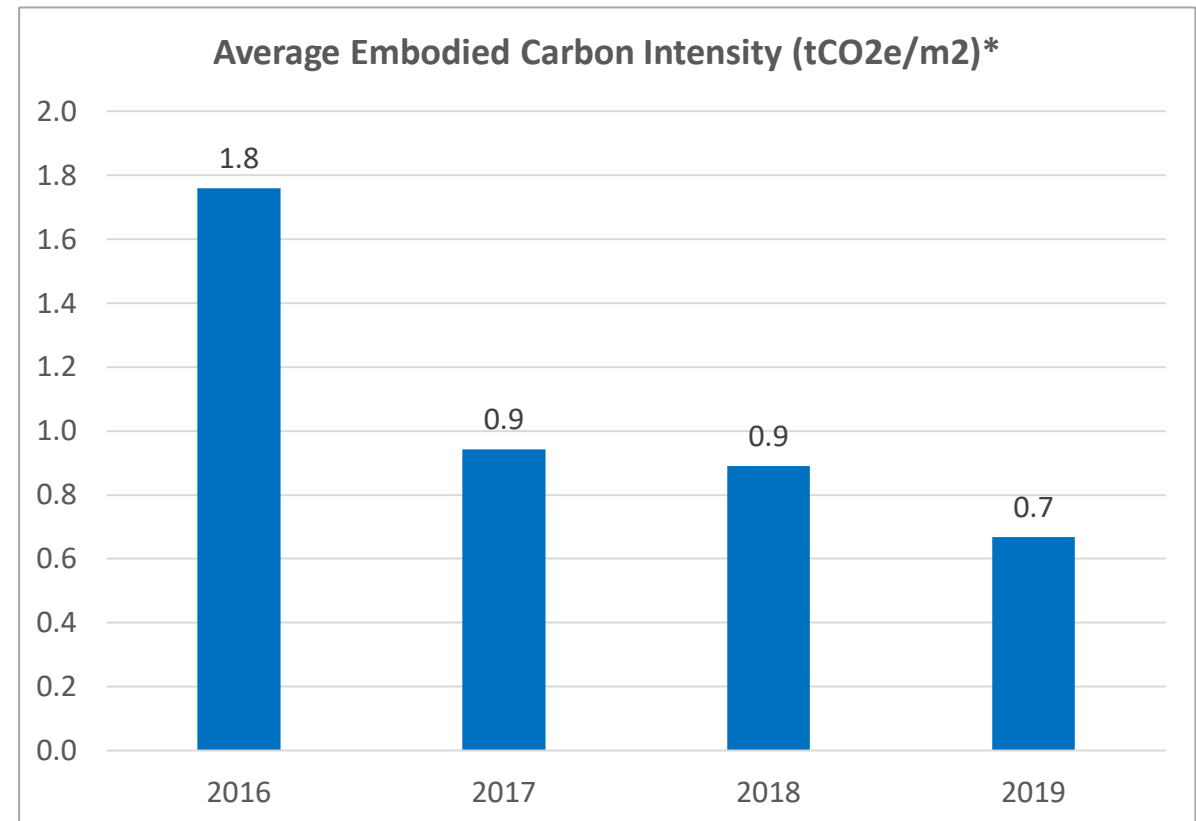
- **SBTi-validated GHG reduction targets:** Reduce embodied carbon of our building materials by 24%, instead of their conventional equivalents, by 2030.
- **Interim target of a 7% reduction** has been set for all new projects awarded from 2018 onwards
- Tracking carbon footprint of top 5 construction materials including granite, sand, cement, steel and ceramic/marble tiles.

Sources:

[#] Press release by World Green Building Council, Sep 2019.

^{##} Scientific Report titled 'Carbon emissions embodied in product value chains and the role of Life Cycle Assessment in curbing them' (Conducted based on CDP data), Apr 2020.

* Embodied carbon intensity and top building materials for currently operating project sites are reported based on project design stage



Mitigating Supply Chain Risks & Strengthening Supply Chain Management

Managing impact of Top Building Materials:

Materials	Initiatives since 2010s
Concrete (including granite, cement and fine aggregate/sand)	<ul style="list-style-type: none"> Using SGBC or SEC-certified materials such as low-carbon and recycled concrete Using recycled concrete aggregates and washed copper slag from approved sources to replace coarse and fine aggregates Using precast concrete volumetric PBU systems where possible
Steel	<ul style="list-style-type: none"> Using recycled steel in projects for reinforcement works (since 2018)

Sharpening Procurement Strategy with Supply Chain Study:

Why? Prepare businesses for events such as natural disasters, extreme weather conditions and **health pandemics** that lead to transport or **supply disruptions**

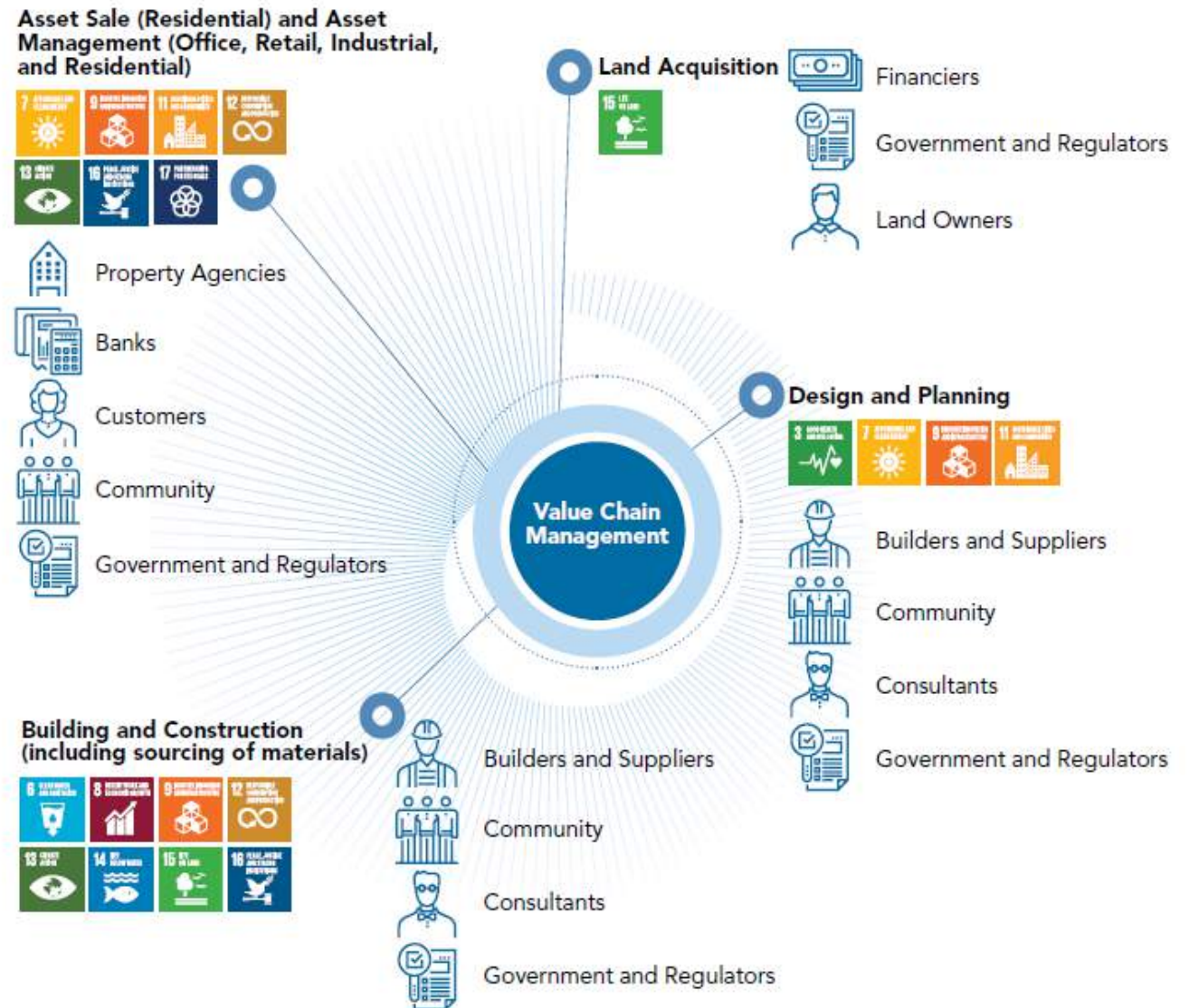
- **2019:** commenced a **Supply Chain Risk Study** to identify **environmental and social sourcing risks posed by our top 100 suppliers and top five building materials**
- Enables CDL to **better prioritise procurement strategies, enhance supplier engagement and management programmes**
- Preliminary findings: An estimated 19% of our top 100 suppliers, from whom we source our building materials from, fall into the 'Priority' category due to high social risks and high procurement spent

Engaging Stakeholders to Catalyse Change within the Larger Ecosystem

Providing accessible platforms and timely responses to ESG stakeholders

- Since 2014, we engage our stakeholders through **materiality assessments to prioritise and respond to material ESG issues**. 2019: 600 online surveys and interviews
- **Tenant engagement & empowerment:** 100% Green Lease Programme adoption as at end 2017; CDL-Tuas Power Automated Meter Reading Portal to enable real-time tracking of electricity usage
- **Builder and Supplier engagement:** CDL 5-Star EHS seminars conducted bi-annually; Supplier code of conduct and Green procurement specifications ensure alignment with CDL policies & standards
- **Community/Homeowners engagement:** Green Living Guides, Homebuyer e-portal, Customer satisfaction surveys etc.
- **Investors, Analysts, Lenders, Media:** Annual Reports, Integrated Sustainability Reports, Sustainability website, ESG rating agencies/analysts

STAKEHOLDER MANAGEMENT ALONG CDL'S VALUE CHAIN



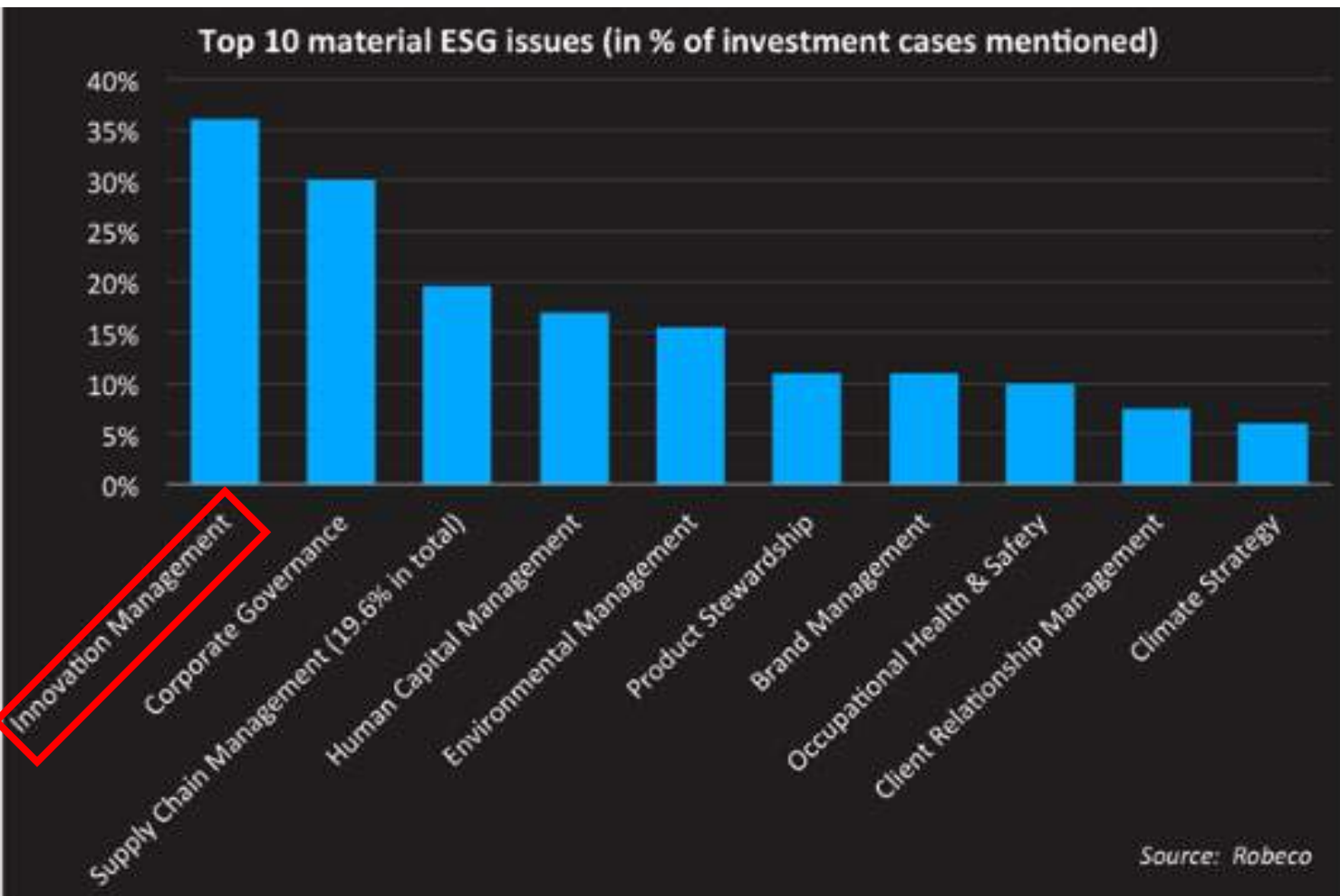


INNOVATION

**Technologies & Solutions to
Accelerate a Low Carbon &
Resilient Economy**

Embracing Innovation for Long-term Sustainability: Communicating Top Material Issues to Investors/Stakeholders

ESG factors on average now account for 7% of a company's valuation, based on 200 investment cases studied over three years.



CDL's Top 10 Critical & Highly Material ESG Issues identified by Investors and Stakeholders (2019)

1. Innovation
2. Energy Efficiency & Adoption of Renewables
3. Climate Resilience
4. Product Quality and Responsibility
5. Occupational Health, Safety and Well-Being
6. Ethical and Transparent Business
7. Economic Contribution to Society
8. Responsible Supply Chain
9. Cyber-readiness and Data Privacy
10. Sustainable Finance

Source: Robeco Quarterly, 'Two Worlds Colliding' (2017)

Sustainability Focused Strategy: Green Building and Low Carbon Operations

Investing **2–5% of construction cost** of a new development in green design/features/methods for over a decade

- Since 2011: voluntarily set minimum **target for all new developments to be GM Gold^{PLUS} certified** (2 levels above min. requirement)
- **2019: 110 GM awards received** (86 GM awarded for buildings, 14 GM for Healthier Workplaces, 10 Pearl & Pearl Prestige); highest amongst private developers
- **GHG emission reduction targets validated by SBTi**

Asia Pac's 1st CarbonNeutral® Dev't



11 Tampines Concourse (2009)

Prefabricated Prefinished Volumetric Construction (PPVC)



The Tapestry (TOP 2021); 861 units

**Microclimatic Canopy;
1,800 m² Solar Panel**



South Beach (2014)

SG Book of Records: Largest Solar Panel [1,520 m²; 219,000 kWh/yr]



D'Nest (2018); 912 units

Climate Action through Greening, Technology & Innovation

- Singapore is heating up twice as fast as the rest of the world
- Climate change will amplify urban heat island effect in Singapore



TREE HOUSE

***Green wall:**
reduces heat absorption by up to 3°C, lowers energy needed to cool indoor spaces

***Energy savings:**
estimated 15 to 30% (or est. *\$12 - \$24K annually) from reduced use of air-conditioning

*[*Study by NUS School of Design and Environment, 2014]*

Guinness World Record for the Largest Vertical Garden for 14 months (Apr 2014 – Jun 2015)



BOULEVARD 88

Adopted virtual design & construction technology e.g. use of architectural 3D models to make informed decisions for ventilation and building layout

Expected impact:
50% productivity gain and 20% reduction in heat gain

CDL on the Path to Net-Zero Energy buildings

- **Zero Energy Building @ BCA Academy (retrofitted)**

Completion: October 2009

Area: 4,500 m²

Levels: Three

Green Mark Certification Level: Platinum

Solar Generation: 196,536 kWh/yr

Energy Consumption: 184,465 kWh/yr

- **CDL Green Gallery (first zero-energy gallery)**

Completion: November 2013

Area: 314 m²

Levels: One

Green Mark Certification Level: Platinum

Solar Generation: 31,000 kWh/yr

Energy Consumption: 30,000 kWh/yr

- **SDE4 (SG first new-build net-zero energy building)**

Completion: January 2019

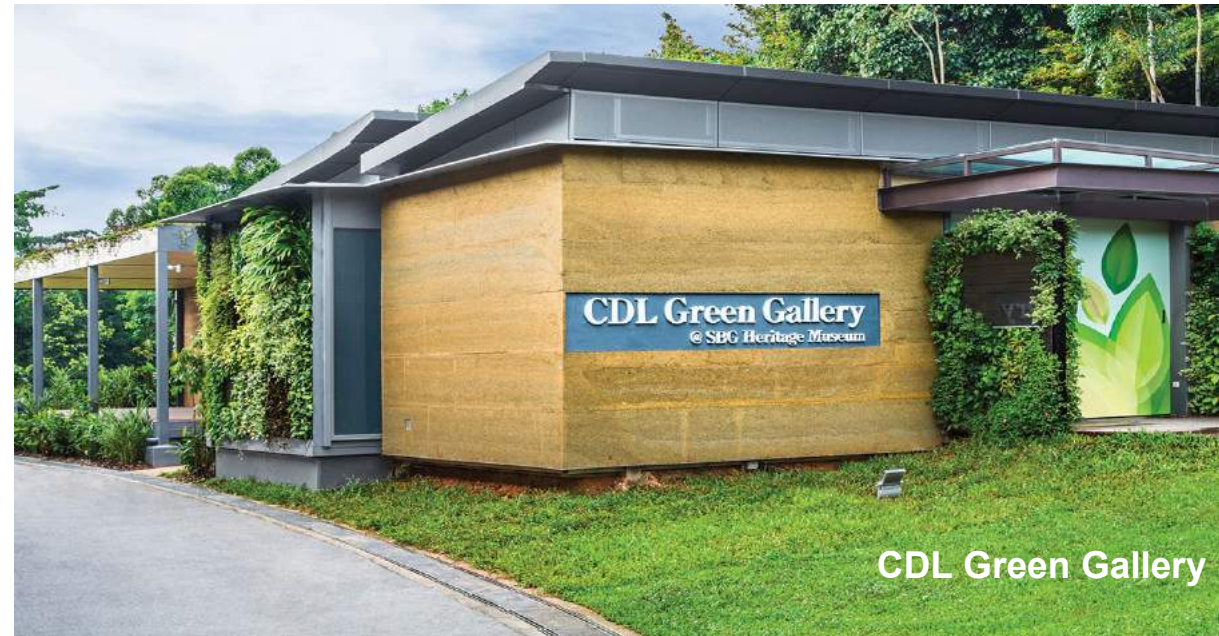
Area: 8,500 m²

Levels: Six

Green Mark Certification Level: Platinum

Solar Generation: 500,000 kWh/year (rooftop solar farm of over 1,200 solar PV panels)

Energy Consumption: 497,000 kWh/yr



Positive-Energy Singapore Sustainability Academy- Hub for Capacity Building, Knowledge Sharing and Networking



First Dedicated 3P Platform to build Communities for a Greener and More Sustainable Future:

- Completion: June 2017
- Area: 399 m²
- Green Mark Certification Level: Highest tier at **Platinum**

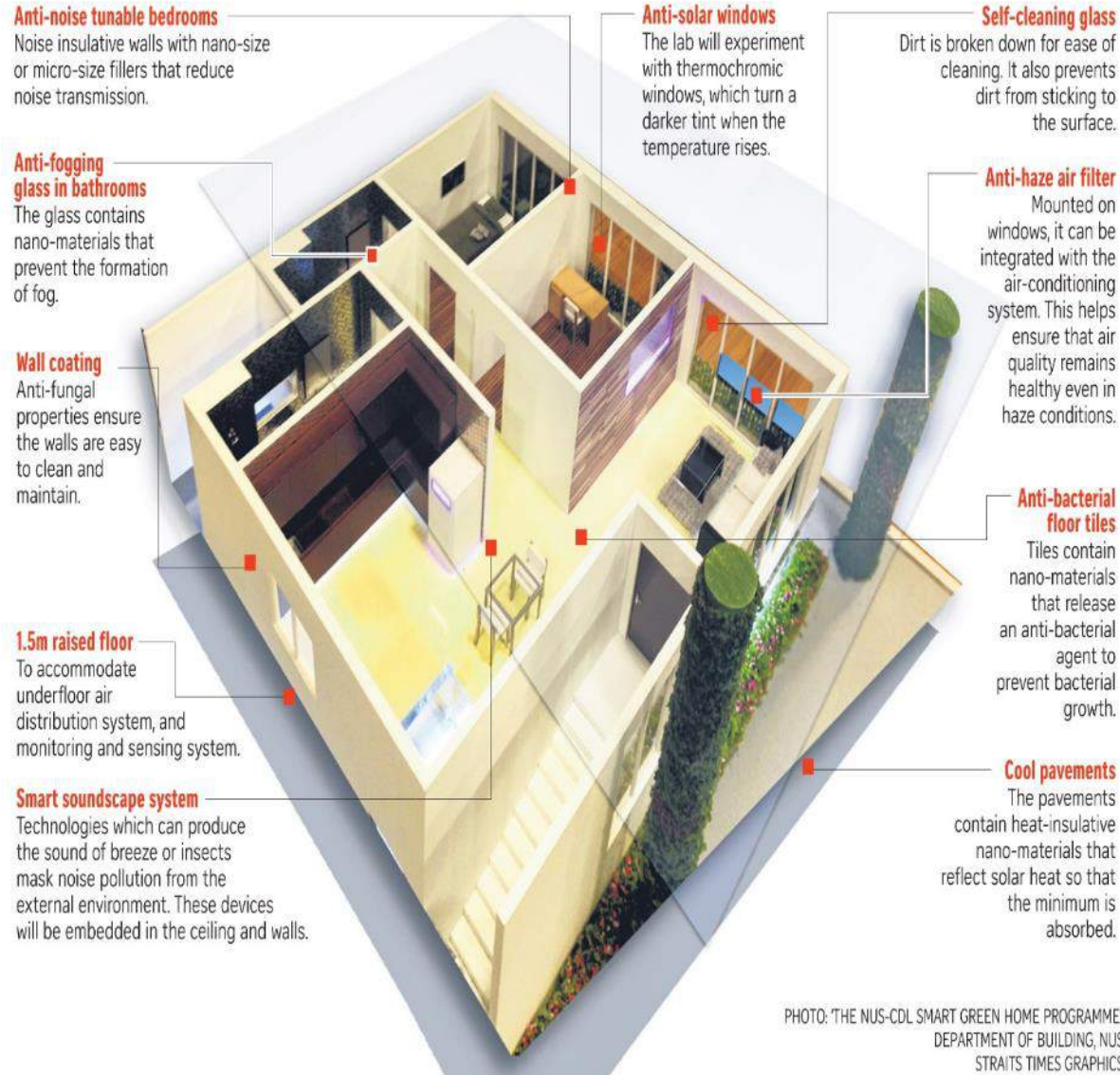


Net-Positive Energy Building:

- **3,200 ft² of solar panels installed on rooftop**
- **Real-time energy tracker dashboard** for monitoring and education
- 1st year of operation:
Solar Energy Generation: 60,000 kWh/yr
Energy Consumption: 50,000 kWh/yr

Innovation Towards Smart and Green Living: Future Proofing Built Environment

R & D Work at the NUS-CDL Smart Green Home Lab



- CDL invested in **Smart Green Home and Tropical Technologies research labs** with NUS in 2016 to research on **creating people-centric, climate-resilient homes**
- NUS-CDL Smart Green Home has developed an **innovative hybrid cooling system to ensure rooms would not be overly-cooled**
- **Biophilic experience for occupants** - seeks to connect or integrate natural elements & living things (e.g. vegetation, flowing water, and sunlight)
- The two Labs continue to **research new expressions of climatic response** using architecture and technology

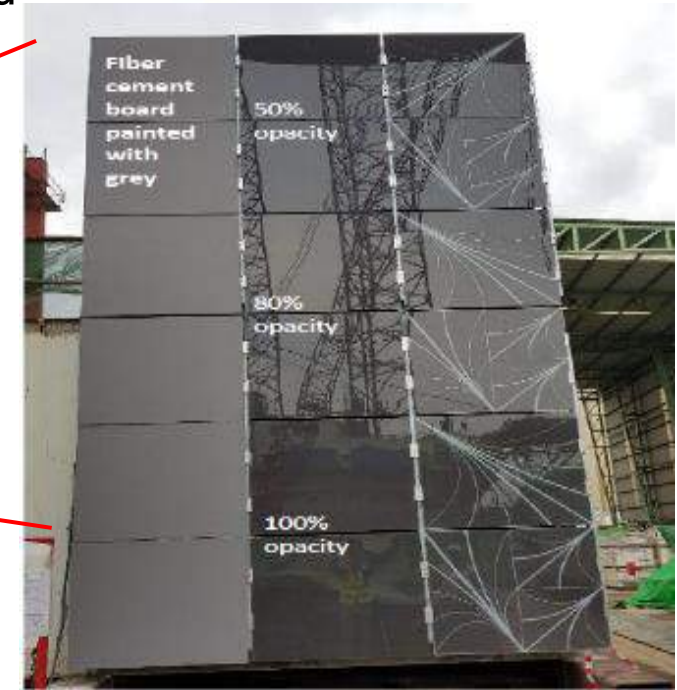
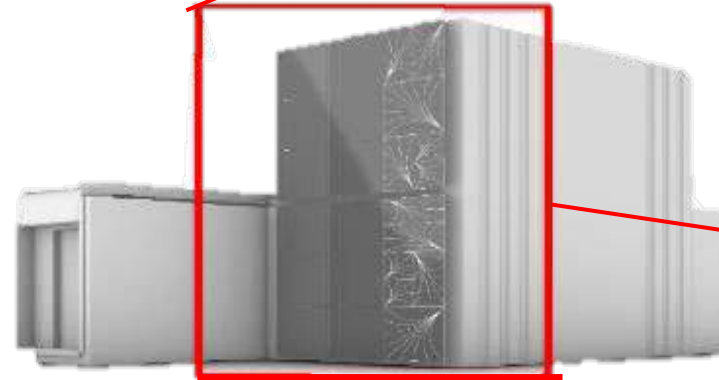
Innovation for Lower Carbon: R&D Partnership with SERIS on New PV Tech

Solar Competitive Research Programme (CRP) Pilot Project at Tapestry project (June 2018 – June 2021):

- **Aim:** Develop cost-effective BIPV modules with high power density, designed to seamlessly integrated with innovative construction process technologies such as Prefabricated Prefinished Volumetric Construction (PPVC)
- Integration of 757W, ~12m² of panels at initial design stage: crucial for optimal performance



+



High
Performance
PV Module
Development

BIPV
functionality
integration

BIPV
Deployment





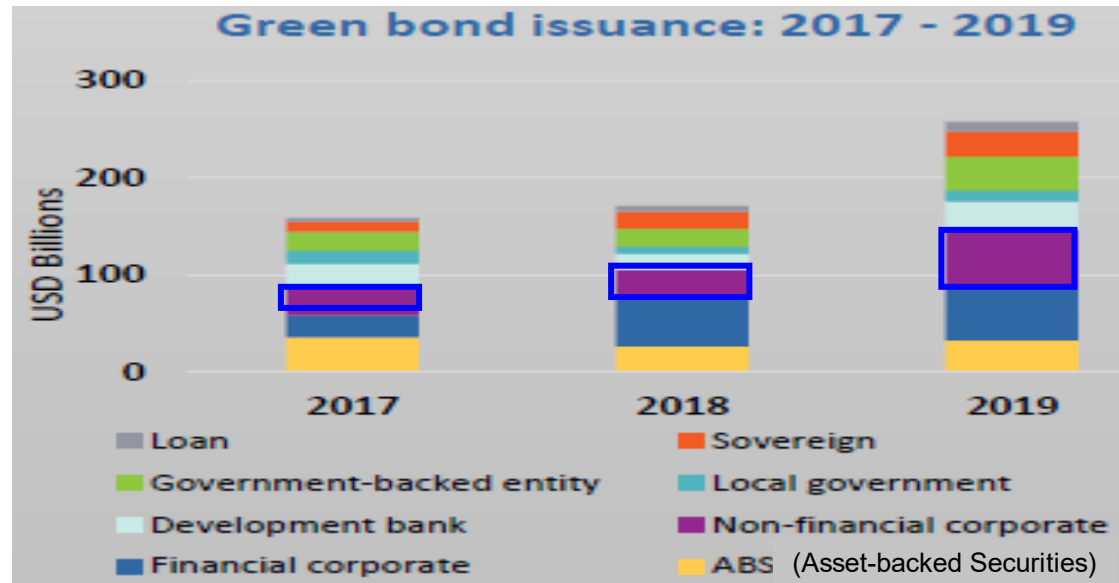
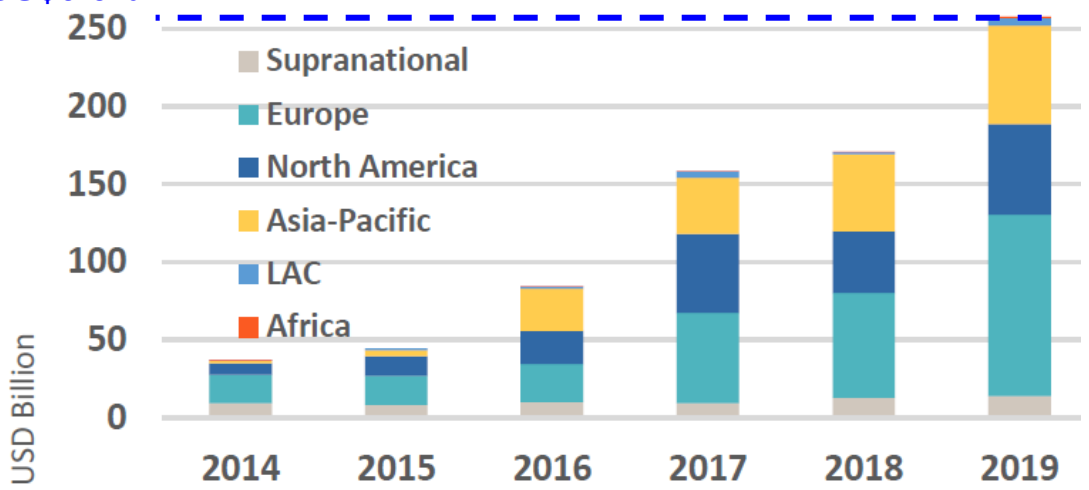
SUSTAINABLE INVESTMENT & FINANCING

- **Rewards Green & Responsible Businesses**
- **Accelerates Climate Action & Sustainable Development**

Tapping on Green Financing to Accelerate Sustainable Development

Global Green Bond Market Growth, 2012 – 2019

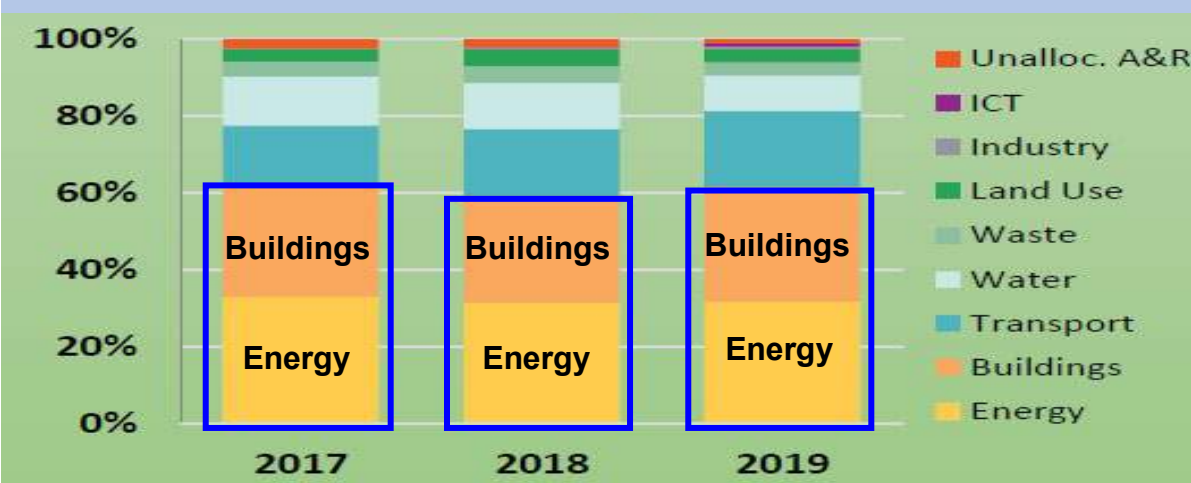
2007: US\$0.6 bn Total & APAC Volumes are Rising US\$257.7 bn



Increasing traction by Non-Financial Corporates

Green Bonds for Low-Emission or Zero-Carbon Buildings: A Growing Market

Combined Top Users of Green Bond Proceeds



Top Users of Green Bond Proceeds (2017 - 2019)

1. Energy
2. Buildings
3. Transport

Buildings contributes globally to

- 36% Energy consumption
- 40% GHG emissions

Sources: Climate Bonds Initiative, C40, 2019 Global Status Report for Buildings and Construction, Global Alliance for Buildings and Construction, International Energy Agency and the United Nations Environment Programme, December 2019

Pioneering Efforts in Green Financing to Accelerate Green Building, Low Carbon & SDG Innovation



Republic Plaza



Whistler Grand



First Green Bond by a Singapore-listed Company

- Two-year senior secured green bond issued on Apr 2017
- Raised S\$100m at 1.98% fixed rate; Fully-allocated
- Refinancing of loan initially taken to construct and maintain Republic Plaza
- **Good governance:** Second Party Opinion by Sustainalytics, Pre and Post-issuance assurance by KPMG, Post-issuance certification by CBI, Final Bond Allocation Report

First Green Loan for New Developments in Singapore

- Obtained S\$100m (HSBC) & S\$400m (DBS) green loans for financing CDL's new property developments in Apr 2019
- Second Party Opinion by Sustainalytics
- Opens new financing stream to fund new green developments, local and overseas

First-of-its kind SDG Innovation Loan

- S\$250m, three-year revolving credit facility provided by DBS in Sept 2019
- Concept & Aim: To tap on sustainable financing **to accelerate innovative solutions or technology in the built environment** that have **positive impact on the SDGs.**
- **Sustainability-linked loan discount:** Discount on interest rate will be granted when innovations are piloted and/or applied to CDL's projects that meet the pre-determined sustainability performance targets, mutually agreed between CDL and DBS
- Usage: **Working capital and corporate funding on projects that will contribute to innovation, green infrastructure, sustainable cities and climate action**

Investing in the Future to Advance Innovation in Sustainability

CDL Enterprise Innovation Committee (EIC)

- Generates customer- and digital-centric ideas to support the advancement of CDL's business
- Innovation engine comprising 3 mutually reinforcing gears – Pipeline, People & Culture, **Investments**

Investment in VC funds



- US **real estate tech-focused** VC with a strong track record of investing in innovative companies.

Dragonrise Capital **龙腾资本**

- Established **technology-focused** VC fund manager and investor based in Beijing, Shanghai and Shenzhen.
- Leverage strategic partnerships to access synergistic new tech.

Investment in Solutions



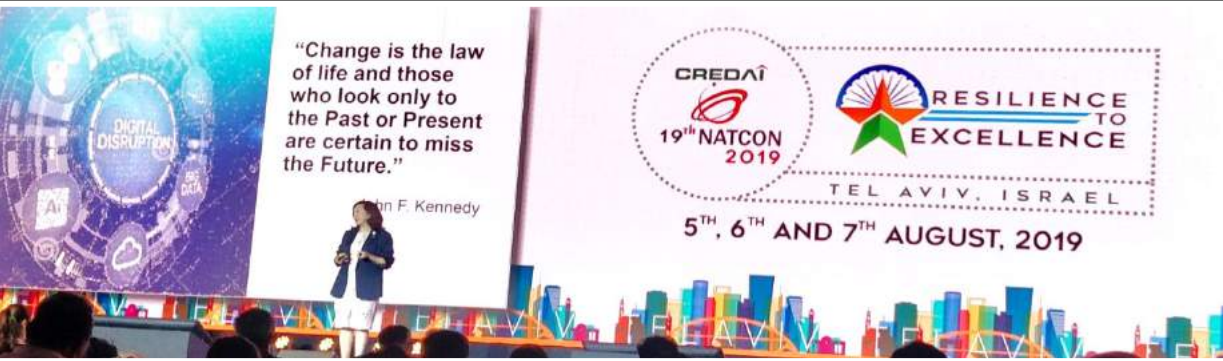
- London-based **real estate AI measurement startup**. Uses **3D spatial data** to accurately measure the build world through its patent-pending digital twin technology, Spec.



- Specialises in **mould prevention and air-purifying paints**; improving indoor air quality and occupants' wellness.
- Pilot project at CDL's project, Nouvel 18.



- China's leading operator of **co-working spaces**
- State-of-the-art technologies that raise efficiency and productivity for its occupants.
- Joint collaboration with CDL to create "CityNexus" smart office and building app for Republic Plaza.



IMPACT

- Creating Long-term Value for Our Business, Stakeholders and the Environment
- Driving Green & SDG Agenda Via Advocacy & Thought Leadership

2019 Sustainability Highlights and Value Created via Sustainability Integration



Financial Capital



\$3.4bn

Group revenue in 2019



Organisational Capital



Top-ranked real estate company in the world on 2020 Global 100 Most Sustainable Corporations in the World



Organisational Capital



Only Company in Southeast Asia and Hong Kong to score double "A"s by CDP for both climate change and water security



Manufactured Capital



110 Green Mark developments and office interiors* – Highest amongst local developers

*Includes subsidiaries and associated companies



Natural Capital



Financial Capital



Secured **\$250m SDG Innovation Loan** and **\$500m Green Loans** for new developments



Organisational Capital



Maintained favourable ratings on **12 prominent international sustainability rankings and indexes**



Organisational Capital



Sector Leader for Office, Asia for 3rd consecutive year in the Global Real Estate Sustainability Benchmark (GRESB)



Social and Relationship Capital



100% tenant participation in CDL Green Lease Partnership Programme



Natural Capital



Financial Capital



More than **\$28m in savings** from energy-efficient retrofitting and initiatives implemented for eight commercial buildings from 2012 to 2019



Financial Capital



2nd Climate Change Scenario Planning based on **TCFD recommendations** – Raised the bar to 1.5°C and 2°C warmer scenarios with expanded scope



Natural Capital



Natural Capital



Amongst pioneer batch of 87 global companies pledged to support **UNGC's Business Ambition for 1.5°C**



Natural Capital



38% reduction in carbon emissions intensity from 2007 levels

Global Sustainability Rankings >> Enables Corporates to Attract ESG/SRI Investment & Tap on Alternative Financing



FTSE4Good

Since 2002



2019 CDP A-List for Climate Action & Water Security. (Reporting since 2008)



GLOBAL100

2020: Ranked Top amongst Real Estate Companies Globally; Listed since 2010.

MSCI ESG RATINGS



'AAA' since 2010

MEMBER OF

Dow Jones Sustainability Indices



In collaboration with a RobecoSAM brand

DJSI Asia Pacific and World Index, since 2011



Since 2013; Rated Prime in 2018



Since 2014. Industry Leader, Real Estate, 2018
ESG Risk Rating: 1st / 541 (Real Estate Group);
3rd / 9,545 (Global Universe)



Since 2014



iEdge SG ESG Indices

Top 10 Constituent Companies since 2016
- ESG Leaders Index
- ESG Transparency Index



Regional Sector Leader since 2017



Bloomberg Gender Equality Index since 2018



Since 2018

Impact: Building a Larger Ecosystem to Drive Sustainable Best Practices



Food Waste Minimisation Forum by CDL, Jan 2020

- Food waste is one of the biggest waste streams in Singapore; ~10% of total waste generated
- Panelists from NEA, FoodBank Singapore, WWF, Miniwiz, TreeDots and EcoWiz.
- Attendance: >90 from businesses, government, schools, youths



Gender Diversity: Women4Green Network/Actions

- Sustainable Fashion, Aug 2017
- Sustainable Tourism, Nov 2017
- Sustainable Jewellery, Dec 2018
- Sustainable Diet, May 2019
- Zero Waste Santa, Dec 2019



Sustainable Sourcing & Practices: Recognition of SASPO commitments on Sustainable Palm Oil by WWF

- Minister Masagos announced 10 new companies joining the Southeast Asia Alliance for Sustainable Palm Oil (SASPO)
- Attendance: >100 business executives, sustainability advocates and the media, Feb 2018

CHANGING THE CLIMATE. CHANGING THE FUTURE.



CITY DEVELOPMENTS LIMITED

www.cdlsustainability.com



Dexus

Rob Sims

Senior Manager, Group Sustainability and Energy



Net zero From targets to delivery

Rob Sims

Dexus Funds Management Limited
ABN 24 060 920 783
AFSL 238163 as responsible entity for Dexus

About Dexus

Who we are

- Dexus is an owner and manager of high quality workplaces across the office, industrial, retail and healthcare sectors. Our properties are located across central business districts of Sydney, Melbourne, Brisbane and Perth

Why we come to work

- To create spaces where people thrive

What we believe in

- We are here to create sustained value for all of our stakeholders



Our approach

Our vision

Net zero emissions & smart, sustainable workplaces

- Advance our vision for the Workplace
- Adopt new technologies and products
- Bring customers on the journey
- Futureproof and embed value in the portfolio



Our target

Net zero emissions by 2030

- Achieve a net zero position for all carbon emissions across Dexus's managed property portfolio by 2030

Commitments



Delving into the details of the plan

Identifying opportunities



Improving energy efficiency

Improving energy efficiency

Energy efficiency is critical to the delivery of our targets. Our aim is to achieve up to 50% in savings by 2030, reduce occupancy costs and create a unique customer experience



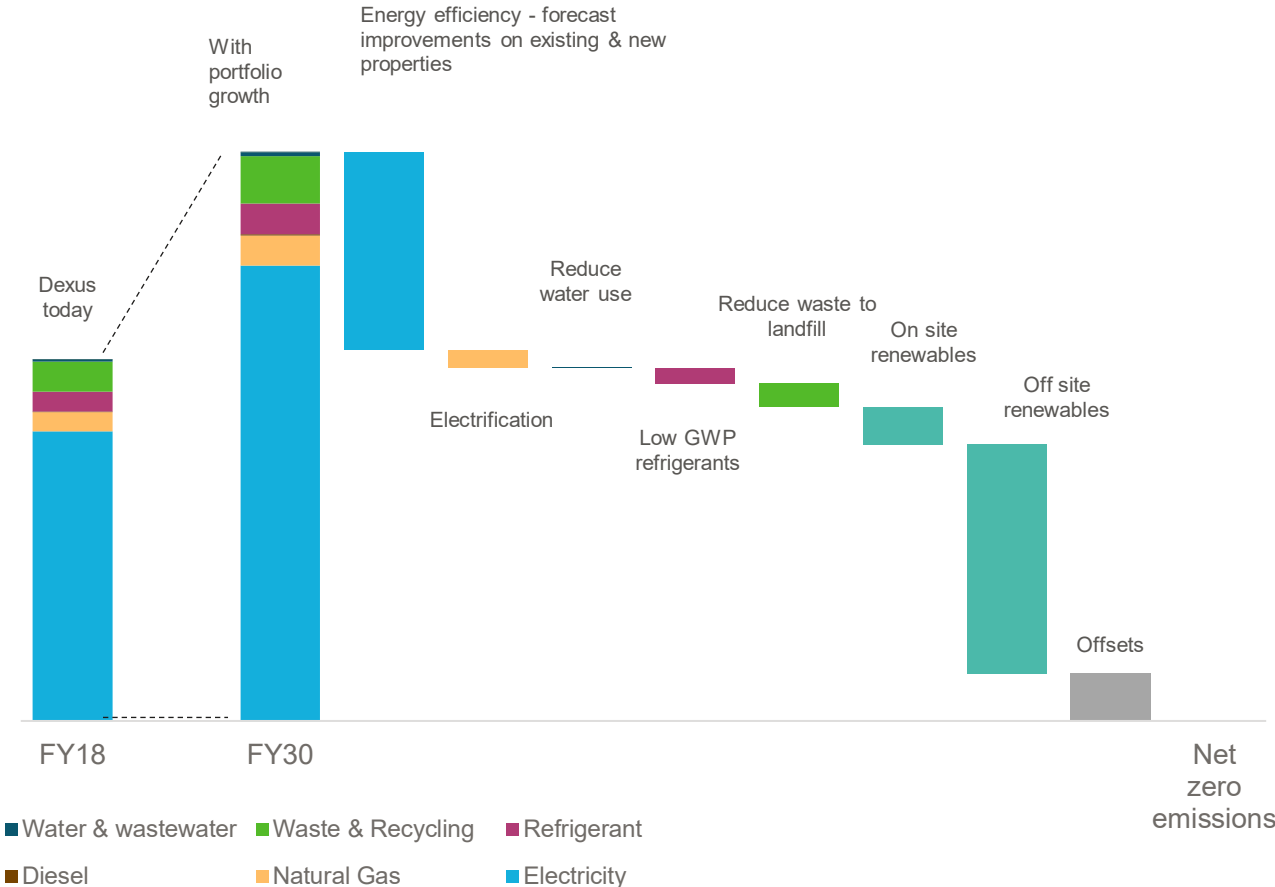
Increasing renewables

Off-site renewables

Transformation of the national electricity market opens up opportunities for large scale renewable sources to become a viable option within the national energy grid



On-site renewables

We will harness existing and emerging business models to deploy solar panels across our portfolio



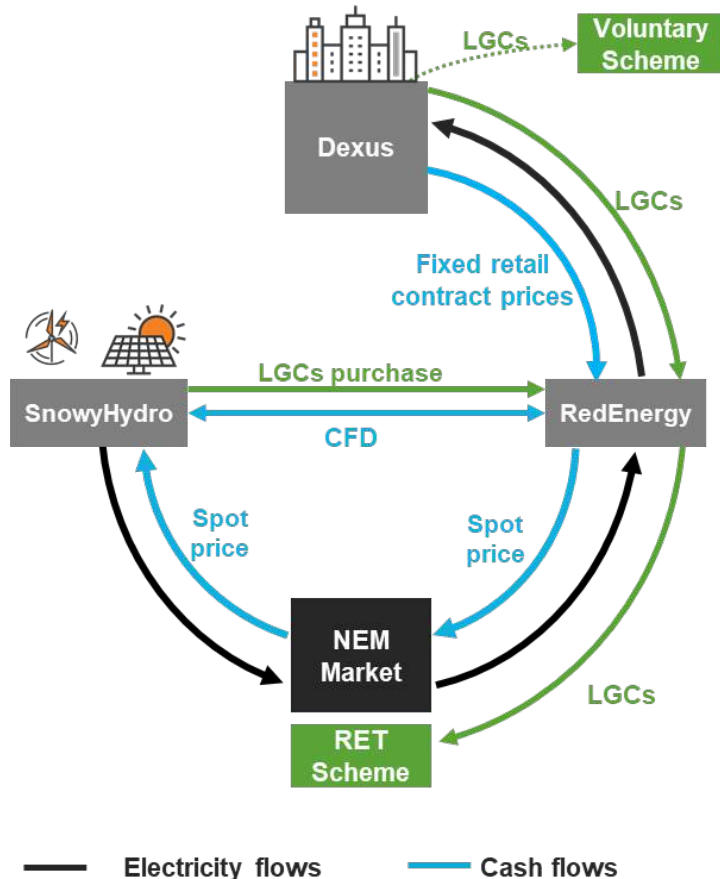
How we frame priorities

Turning ambition into action

	Opportunities	Aligned issues	Levers	Quick wins	Strategic programs
<p>Electricity is the main source of energy used to operate central services within our buildings and therefore produces the most emissions</p>	 <p>Improving energy efficiency</p>	<ul style="list-style-type: none"> • Customer priorities • Workplace productivity and experience • Property resilience 	Behaviour	<ul style="list-style-type: none"> • Signage & training • Good housekeeping • Measurement, analysis and benchmarking • Responsiveness 	<ul style="list-style-type: none"> • Customer engagement programs and tools • Supplier and FM incentives linked to performance
			Control and technology	<ul style="list-style-type: none"> • Commissioning and fault detection • Controls upgrades 	<ul style="list-style-type: none"> • Data driven maintenance programs • Smart building with advanced analytics and AI
			Equipment and Façade	<ul style="list-style-type: none"> • Asset lifecycle upgrade program 	<ul style="list-style-type: none"> • Site master planning • Innovation
			Design	<ul style="list-style-type: none"> • Design goals for new buildings 	<ul style="list-style-type: none"> • Net zero new buildings
	 <p>Increasing renewables</p>	<ul style="list-style-type: none"> • Cost • Availability • Reliability • Flexibility • Quality 	On site production	<ul style="list-style-type: none"> • Sub 100kW Rooftop PV systems 	<ul style="list-style-type: none"> • On-site solar PV program • Battery storage
			Fuel switching		<ul style="list-style-type: none"> • Electrification and/or gasification
			Procurement	<ul style="list-style-type: none"> • Progressive purchasing • Bill optimisation • GreenPower purchases 	<ul style="list-style-type: none"> • Integrated procurement models involving progressive purchasing, and renewable energy PPA • Embedded networks

Transitioning to renewables

Dexus's renewable energy supply agreement



Dexus has partnered with Red Energy to source renewable energy off-site to power the base building services of more than 40 buildings across its NSW property portfolio, from January 2020.

The agreement builds in flexibility and risk management features:

- Term
- Price
- Firm delivery
- At market pricing
- Load and meter flexibility
- Renewable % flexibility
- Supply linked
- GreenPower accredited

Progressing the plan

What is Dexus doing?

Activation & engagement


- Internal engagement
- Setting interim targets
- Updates to policy and EMS
- Established Board ESG Committee

Measurement & disclosure

- Market-based emissions reporting
- Certified goal as Science-based target
- Green Star Performance

Emission reduction activities

- Repositioned GreenPower purchasing
- Signed Renewable Energy Supply Agreement
- Accelerating on-site solar program
- Updating Asset Strategic Improvement Plans



1.4MW
Solar PV system
Townsville

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dexus



Swire Properties

Dr. Raymond Yau

General Manager, Technical Services
and Sustainable Development





Driving Long-term Decarbonisation for Low-carbon Transition

WorldGBC Webinar - Translating Scope 1, 2 and 3 for Commercial Real Estate

Dr. Raymond Yau

General Manager, Technical Services and Sustainable Development

22 Apr 2020

 SWIRE PROPERTIES

OUR COMPANY

Headquartered in Hong Kong since 1972, Swire Properties is a leading developer, owner and operator of office, retail, hotel and residential properties, with a particular focus on mixed-use investment developments in Hong Kong, Mainland China and Miami, U.S.A., with a presence in Singapore.



Pacific Place



Citygate

Hong Kong



Taikoo Place



Cityplaza



INDIGO, Beijing



Taikoo Li Sanlitun, Beijing



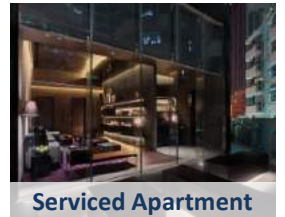
Hotel



Restaurant



Residential



Serviced Apartment

2019 Investment Properties: 25.6 million sq.ft.

- HK portfolio: 13.2 million sq. ft.
- PRC portfolio: 8.8 million sq. ft.
- U.S.A portfolio: 1.2 million sq. ft.
- Hotels: 2.4 million sq. ft.

2019 Underlying Profit Attributable to Shareholders: ~US\$3,000 million

United States

Mainland China



Brickell City Centre, Miami, U.S.A.



Sino-Ocean Taikoo Li Chengdu



Taikoo Hui, Guangzhou



HKRI Taikoo Hui, Shanghai

SD PERFORMANCE



**Rank 8th globally
(DJSI World)
in 2019**



**Top Company
since 2018**



**Global Sector Leader
in Other (mixed-use
development) category
since 2017**



'AAA' rating (2019)¹

The only HK and Mainland China
developer listed

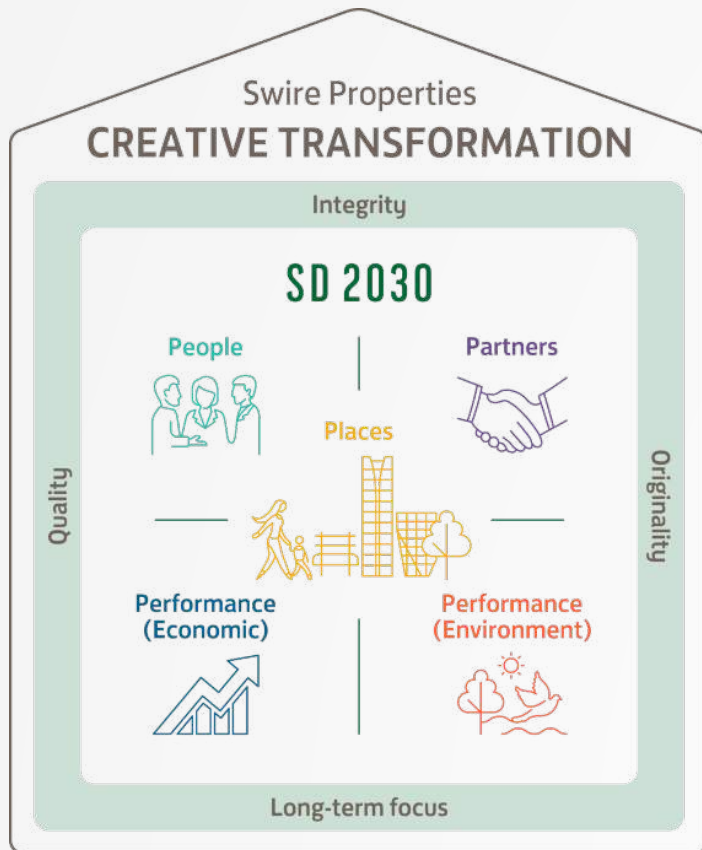
FTSE4Good
(2017, 2018, 2019)

2017 Winners
2020 Shortlisted

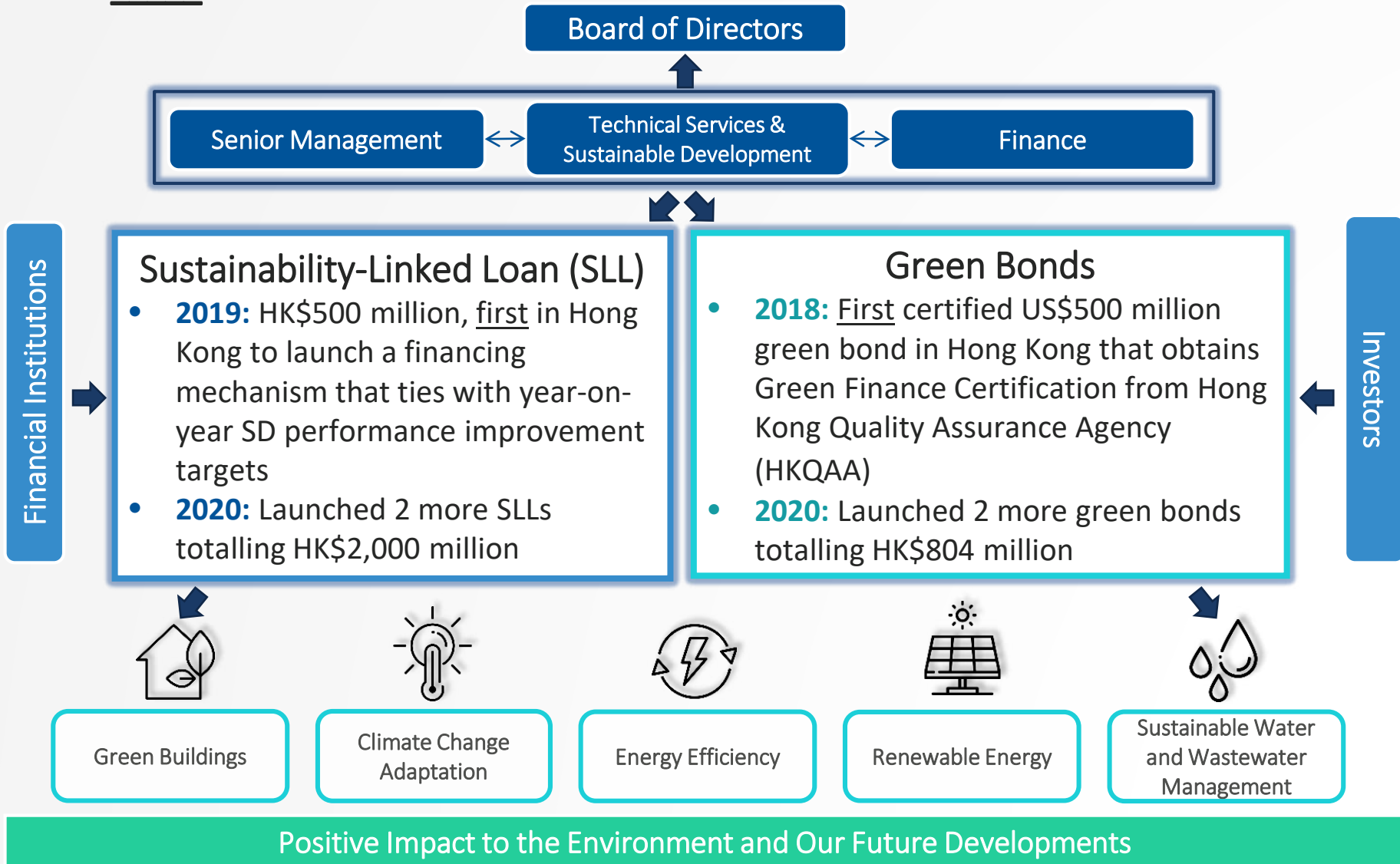
SUSTAINABLE DEVELOPMENT (SD) 2030 STRATEGY

COMPREHENSIVE SD STRATEGY INTEGRATED INTO EVERY FACET OF BUSINESS OPERATIONS

SD Vision: "To be the leading SD performer in our industry globally by 2030"



GREEN FINANCING



Our Green Bond Reports (2018 & 2019)



CLIMATE CHANGE MANAGEMENT STRATEGY



Reduce greenhouse gases through energy efficiency improvement



Adapt to climate impacts to avoid harm or exploit beneficial opportunities



Recover from climate-related hazardous events to maintain functions and structure and continue to thrive



SDG 13 Climate Action

We are responding to Climate Change with initiatives on mitigation, adaption, and resilience that align with **SDG13**: take urgent action to combat climate change and its impacts

CARBON EMISSIONS IN SWIRE PROPERTIES' VALUE CHAIN

Scope 1 - Direct GHG Emissions

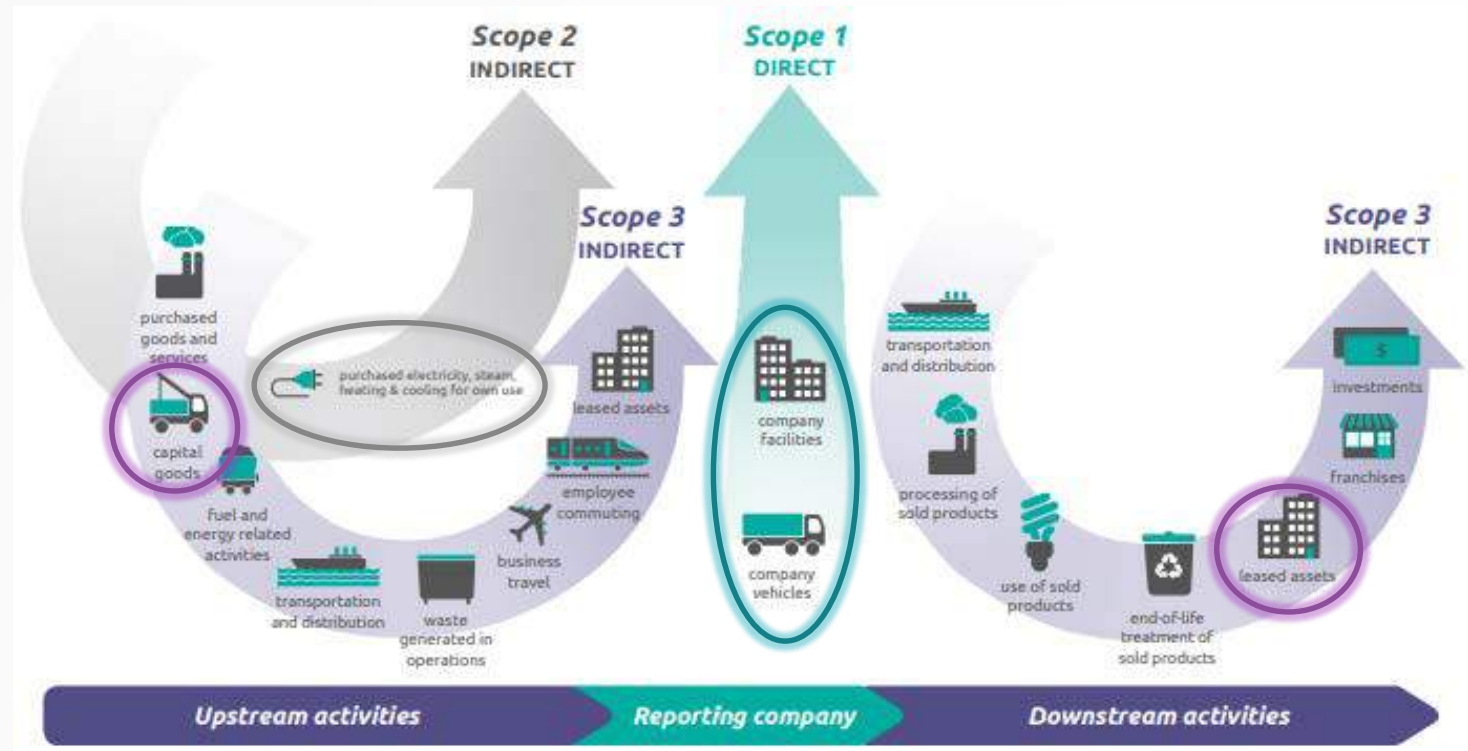
- from sources that are owned or controlled (e.g. emissions from natural gas, diesel and town gas burned onsite)

Scope 2 - Electricity Indirect GHG Emissions

- from the generation of purchased or acquired electricity, steam, heating, or cooling consumed

Scope 3 - Other Indirect GHG Emissions

- SBTi requirement: set target for scope 3 emissions if it is >40% of total GHG emissions
- Conducted screening test to identify our major scope 3 categories (which cover >2/3 of total Scope 3 emissions):
 - capital goods
 - downstream leased assets



(Source of Graphic: Corporate Value Chain (Scope 3) Accounting and Reporting Standard)

OUR APPROVED SBT

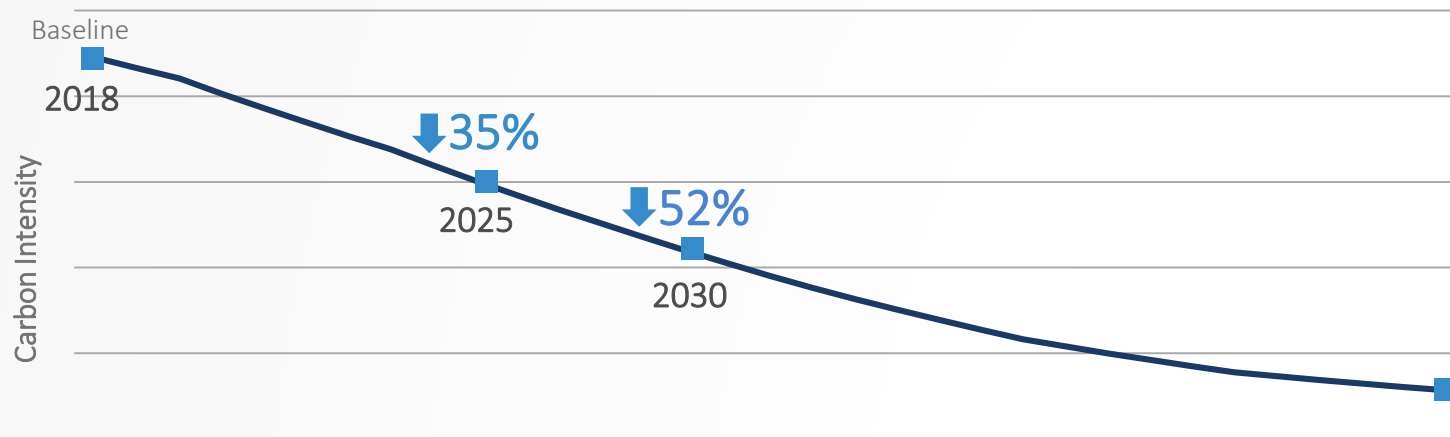


For our global investment portfolios

WE'VE HAD OUR SCIENCE-BASED TARGET APPROVED in 2019

Scope 1 & 2 GHG Intensity ↓ 35% By 2025 ↓ 52% By 2030	Scope 3 GHG Intensity Downstream Leased Assets: ↓ 28% Capital Goods: ↓ 25% By 2030
--	--

Long-term Decarbonisation Pathway (2°C Scenario)



Scope 1 emissions are direct greenhouse gas (“GHG”) emissions from sources that are owned or controlled by Swire Properties, such as emissions from natural gas, diesel and town gas burned onsite. Scope 2 emissions are indirect GHG emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by Swire Properties. Scope 3 emissions are all indirect emissions that occur in the value chain of the reporting company, including both upstream and downstream emissions.



SCOPE 1 & 2 – MITIGATION STRATEGIES

DEEP DECARBONIZATION STRATEGIES

Equipment Operation and Upgrading

- Equipment operating at rated condition
- Chiller and boiler replacement
- Replacement of low efficiency equipment
- Variable speed drive
- New equipment technology (e.g. EC Plug Fan)

Retro-commissioning and Monitoring Based Commissioning

- Chiller and pump operation sequence optimization
- Control logic review
- Fresh air supply and control
- AHU pressure and VAV minimum flow reset
- Automatic lighting control

Digital Solutions and Modern Technology

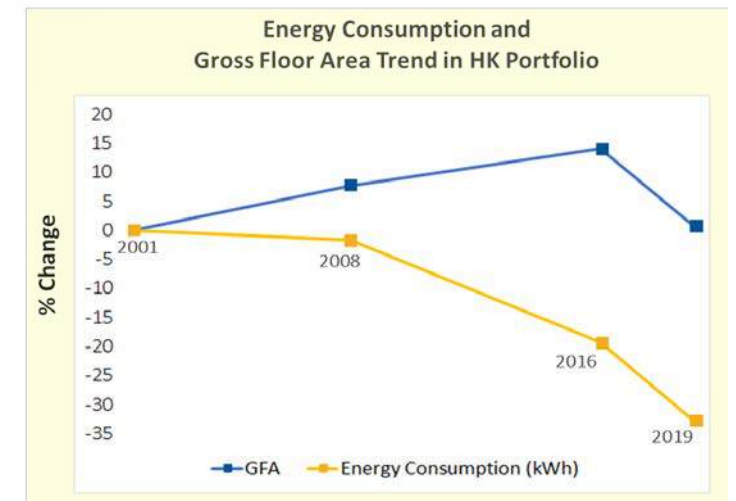
- Smart meters & IoT sensors
- Big data analysis
- Cloud computing
- AI & Machine Learning
- Predictive maintenance

Renewable Energy

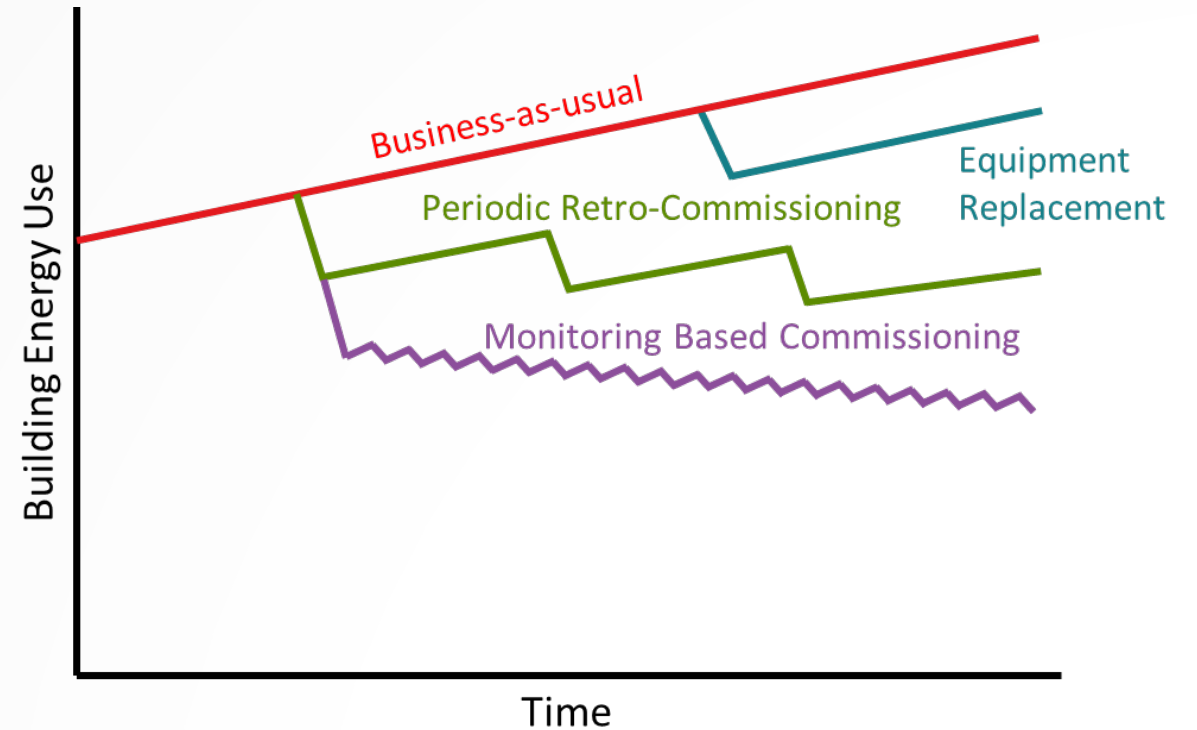
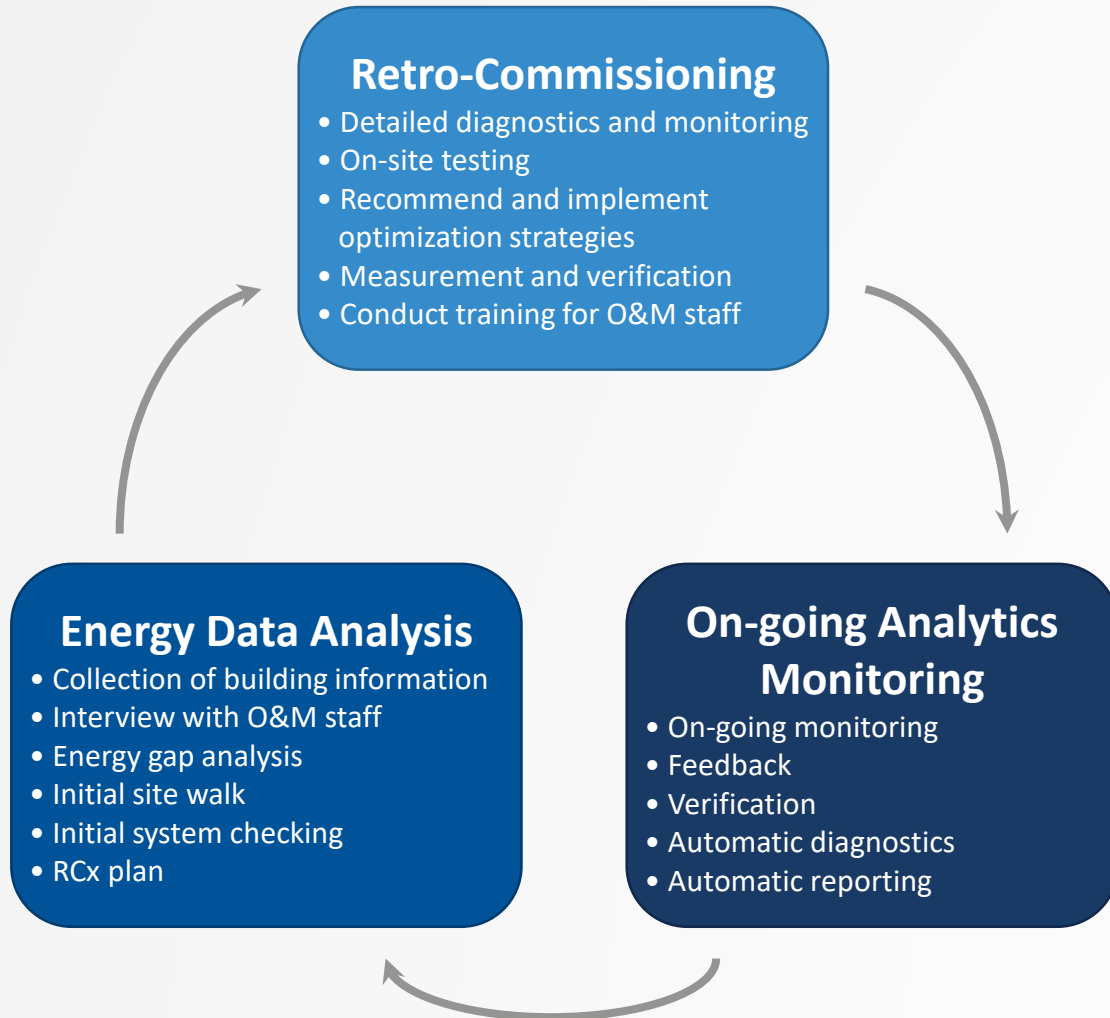
- On & off-site renewable energy
- PV panel installation
- Waste-to-energy trigeneration

Passive Design

- High performance façade
- Green roof



MONITORING-BASED COMMISSIONING



SCOPE 1 & 2: INVESTMENT IN RENEWABLE ENERGY

Installation of Solar Photovoltaic (PV) Panels



INDIGO, Beijing



Taikoo Li Sanlitun, Beijing



Taikoo Hui, Guangzhou



Combined PV system and green roof
One Taikoo Place, Hong Kong



On and Off-site RE
Procurement Strategy
and Roadmap



HK's 1st bio-diesel powered
tri-generation and absorption
chiller system in commercial
building



SCOPE 3 – DOWNSTREAM LEASED ASSETS MITIGATION STRATEGIES

SCOPE 3: DOWNSTREAM LEASED ASSETS – TENANT ENGAGEMENT

Energy and Carbon Reduction Strategies:



Free energy audits for tenants

8.6m kWh

potential energy savings
identified in **free energy audit**
(in 5.3m sq. ft. of tenanted space)



Green Kitchen Initiative

75%+

F&B tenants
recycle food waste



Tenant energy optimisation
program

(Source of Photo: <https://www.se.com/hk/en/work/products/product-launch/powertag/>)

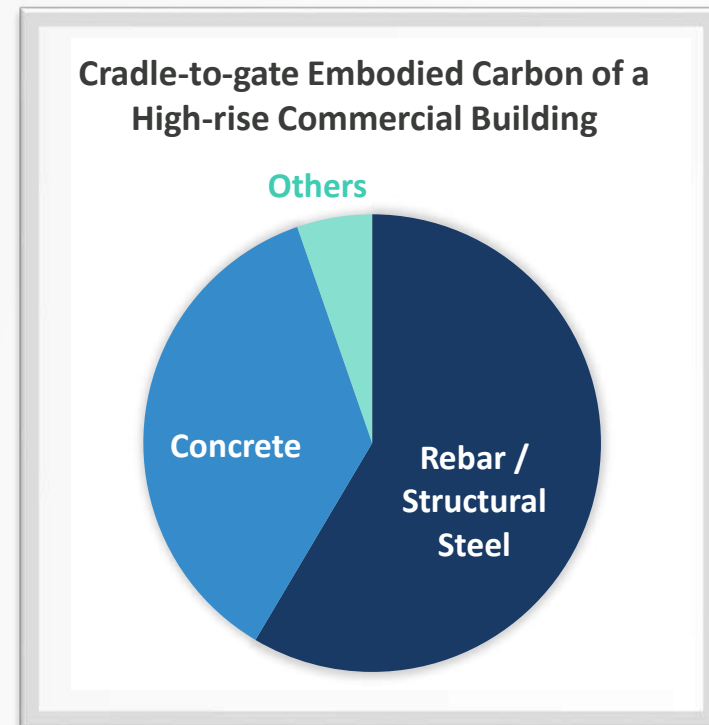


SCOPE 3 – CAPITAL GOODS MITIGATION STRATEGIES

CASE STUDY – REDUCE EMBODIED CARBON EMISSIONS FROM PROJECTS DEVELOPMENT

In partnership with a university partner, we completed a pilot study to measure:

- Carbon emissions from construction activities
- Embodied carbon from major construction materials used



The embodied carbon in the building's **concrete, rebar and structural steel**

contributes to nearly **90%** of **One Taikoo Place's** total carbon emissions.



One Taikoo Place, Hong Kong



CASE STUDY – REDUCE EMBODIED CARBON EMISSIONS FROM PROJECTS DEVELOPMENT

Energy and Carbon Reduction Strategies :

- Material selection and building design
 - Procure construction materials with lower embodied carbon wherever applicable



Concrete: with 25% - 35% Pulverised Fly Ash (PFA) as cement substitute



Rebar / structural steel: more recycled steel content (e.g. >20%), and adopt low carbon production method

- More efficient use of materials through structural optimisation
- More efficient construction equipment and processes



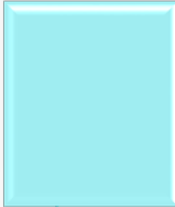
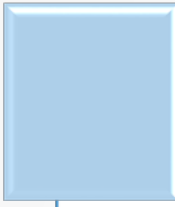
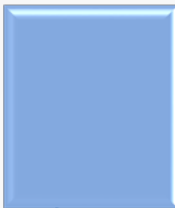
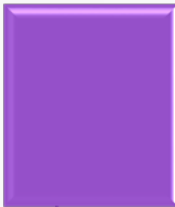
One Taikoo Place, Hong Kong





THE WAY FORWARD

THE WAY FORWARD

-  Review our decarbonisation strategy for 1.5°C scenario
-  Super low-e buildings
-  Net zero carbon buildings
-  Scope 3 hotspots – reporting & management





Panel discussion

Submit your questions through the attendee dashboard



ADVANCING NET ZERO

What have we learnt:

- ***The value of market leading initiatives*** – demonstrate leadership action and help to drive the market forwards
- ***Support collaboration & integration*** – engage with your supply chain to raise awareness and educate on the importance of carbon reductions
- ***Pick low hanging fruit*** – understand the major impact areas of your emission scopes and start to take action now!
- ***Align with business strategy*** – great potential to achieve business as well as environmental outcomes.



Aligning Initiatives

Aligning initiatives
Comparing the Net Zero Carbon Buildings Commitment and SBTi

Net Zero Carbon Buildings Commitment (the Commitment)
The Commitment from the World Green Building Council members, businesses, organisations, cities, states and challenges to remain net zero operating emissions in their global portfolios by 2050, and to advocate for all buildings to operate at net zero by 2050.

Science Based Targets Initiative (SBTi)
SBTi champions science-based target setting as a powerful way of boosting companies' competitive advantage in the transition to the low-carbon economy. It is a collaboration between CDP, World Resources Institute (WRI), World Wildlife Fund (WWF), and the United Nations Global Compact (UNGC).

Key Stats

- Over 80 signatories from businesses, organisations, cities, states and regions including California, Scotland, New York, London, Paris and Tokyo.
- Business signatories have committed to reducing 1,200,000 tonnes of carbon across 4,500 assets; meaning more than 250,000 employees will work in net zero carbon buildings by 2050.

Why join?

- Local, regional, global - net by WorldGBC and their member network of national GBCs, the Commitment is about local solutions in a local context for a global crisis.
- Action oriented - focus on both energy efficiency and renewable energy (on-site and off-site) to achieve a net zero emissions balance annually.
- Power of advocacy - advocates for wider emissions reductions through core business activities.
- Global reach - not locally but commercially globally.
- Support the 'ambition loop' - businesses and governments share a common goal and language that enables the Commitment to be a framework for collaboration and best practice approaches to achieve emissions reductions at scale.

Why join?

- Remove technical barriers for the adoption of science-based targets - translate climate science and emission scenarios into accessible and actionable target-setting methods, tools and guidance.
- Increase innovation - set ambitious targets to lead innovation and transformation tomorrow.
- Strengthen investor certainty and credibility - taking a leadership position on climate bolsters credibility and reputation among stakeholders.
- Increase profitability and competitiveness - ensure a lean, efficient, and durable company in a future and reduce reliance resources derived from fossil fuels.

Applicable to
Corporates and cities who do both are: Corporates

FOCUS ON

- Setting science-based targets
- Aligning with science-based targets
- Improving asset performance
- Transparency and accountability
- Creating a net-zero future

The value of doing both

As a signatory of the Commitment and SBTi, you would target - the Commitment provides a prescriptive approach for scope 1 and 2 energy-related emissions from buildings to help simplify an organisation's greenhouse gas inventory. By following the SBTi methodology for the remaining emissions (from the third category), you can easily understand how you align with globally relevant science-based targets.

Signify yourself as an industry leader - join a community of over 900 businesses committed to the Building Agreement, a part of the Commitment, you future-proof your assets against the Agreement and go beyond a 1.5°C trajectory.

Give confidence to your investors - demonstrate that your organization's activities and the Building Agreement, as part of the Commitment, you future-proof your assets against the Agreement and go beyond a 1.5°C trajectory.

Create global opportunities - best initiatives are well embedded across the world and will be invaluable as tools for global business opportunities and collaboration.

Further information <https://sciencebasedtargets.org>
<https://www.wgbc.org/ourcommitment>

Embodied Carbon Basecamp

Embodied Carbon in Asia Pacific

A A AD A AN AA CC CW CK CT DL DC DF DW ET EC EB FC Add/remove people

Message Board

- Embodied Carbon Primer: Great new document from
- Welcome to the Embodied Carbon in Asia Pacific
- Circularity Gap Report 2020: PACE (Platform for
- Why collaboration is important in reducing
- What is embodied carbon? As part of WorldGBC's release

Docs & Files

- Embodied Carbon 101
- Embodied Carbon Primer

Campfire

Matthew Adams: 3:25pm
Good! Fuel-free sites is an...

Matthew Adams: 3:30pm
<https://www.worldgbc.org/>

Rayning Gal: 1:40pm
Hi Matthew - there is an art...

Hi All,

It is great to have you join the Asia Pacific Embodied Carbon Basecamp. It will be a community of Asia Pacific professionals from across the built environment who have an interest and want to discuss all things embodied carbon. Please feel free to:

- ask questions to the group
- share success stories or case studies
- let us know about important events
- post about any reports you are reading.

We look forward to being able to engage with you in this space to communicate and collaborate on embodied carbon. Thank you.

Rethinking Timber Buildings

Seven perspectives on the use of timber in building design and construction

ARUP

Rethinking Timber Buildings.pdf

Posted by Matthew A. - December 3, 2019 - 8:51 MB

[Download - Replace with a new version](#)

Thank you!

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