



Sharing Ideas from the REAL ESTATE & DECARBONIZATION SUMMIT 2024

Joining Forces to Speed Progress



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INTRODUCTION: JOINING FORCES TO SPEED PROGRESS

Aiming to accelerate progress in reducing carbon emissions within real estate, Hang Lung Properties ("Hang Lung") convened a successful Real Estate & Decarbonization Summit in Beijing on September 20, 2024. Taking place at Yale Center Beijing, the Summit brought together over a hundred experts, practitioners and thought leaders across the real estate value chain for in-person discussions, with more than 3,000 people also joining online. Attendees in-person included academics, investors, landlords, policy experts, associations, startups, suppliers, and tenants.

The Summit examined challenges and opportunities for both construction and operations in real estate, with an emphasis on best practices and actionable ideas. It featured sharing from 10 individual speakers, as well as five interactive panels on topics ranging from low carbon construction to energy to cooling to interior spaces. The speakers included participants from Europe, the United States and Asia, representing organizations ranging from universities, think tanks, NGOs, companies and associations. The Summit was also the culmination of a global competition – jointly sponsored by Hang Lung and Undivided Ventures – to discover startups with promising decarbonization or circularity solutions for retail and office spaces.

We are grateful to the many experts and like-minded colleagues who generously shared their time and ideas at the Summit. With the Year of the Snake underway, we wanted to revisit some of the exciting ideas that were discussed, and to highlight areas where momentum is building.



OPENING REMARKS

There are plenty of challenges we need to address to reduce emissions in real estate - but there are also many opportunities. With this Summit, we brought together expert stakeholders to share the latest ideas and practices for real estate decarbonization, so we can all move faster towards our common goal.

> Adriel Chan, **Chair of Hang Lung Properties**

THE BIG PICTURE: DECARBONIZATION AND REAL ESTATE I

DECARBONIZATION AND REAL ESTATE IN CHINA: POLICY DIRECTIONS

 China's policies will gradually clarify emissions reduction requirements for various sectors, and emphasize market forces rather than direct government intervention.

• The real estate sector is shifting from a construction and sales phase to a holding and operations phase. Client demand, investor requirements, and government policies are driving the sector towards green and low carbon transformation.

• Real estate should focus on the entire lifecycle and value chain to reduce costs and increase profits. Energy saving measures can cut costs and boost profits. Risk-sharing mechanisms and green finance solutions can help ease financial pressures.

• On the journey to sustainability, the sector should look to progress steadily with actions that can be implemented in the present, based on current technological capabilities, service levels, and business conditions.



BUILDINGS' CARBON EMISSIONS STATUS IN CHINA AND DECARBONIZATION STRATEGIES



Mu Qijian, Director of Climate **Response Division, Depart**ment of Resources and Environment, China International **Engineering Consulting Corpo**ration (CIECC)

Professor, College of Urban and Environmental Science, Institute of Carbon Neutrality, **Peking University**

• Building carbon emissions span the entire lifecycle, from material production to demolition and recycling. Bulk materials like cement, steel, and aluminum account for a significant and growing share of embodied carbon emissions. The building sector, especially in developing countries, is a major emissions source, making embodied carbon management a key focus in decarbonization policies and green building standards.

• Research into embodied carbon in buildings employs methodologies such as advanced material analysis, the development of databases, and refined management of buildings and urban environments. These methods enable a detailed assessment of emissions by building type, region, and lifecycle stage. Together, they provide robust data and scientific support for evaluating diverse and multi-pronged decarbonization strategies in China's building sector.

 Decarbonization measures include optimizing building design and material use for greater efficiency; include: extending building lifespan to minimize emissions from frequent reconstruction; optimizing urban planning and land use to reduce carbon footprints; and promoting circular design and circular economy models.

LOW CARBON CONSTRUCTION AND BUILDING MATERIALS



Liu Yinghao, Technical Director, Low Carbon Metallurgy Innovation Center, China Baowu Steel Group **Corporation Limited.**



Lu Tao, Vice Dean of the Research Institute, Shanghai **E-Carbon Digital Technolo**gy Co., Ltd., / Technical **Committee Member of China Non-ferrous Metals**



Huang Jin, Deputy Director of Huaxin Concrete RMP (Ready-mix Manufacturing **Performance**)

 Steel manufacturing faces significant challenges due to its carbon emissions intensity, especially at the production stage. Currently, global long-process steel production is an iron-flow operation system driven by the flow of carbon (i.e. carbon-based energy), which results in high carbon emissions steel manufacturing.

 Furthermore, the lack of standardized regulations makes it more difficult to achieve unified carbon reduction goals. Globally diverse standards create inconsistent requirements for producers.

 To address these challenges, the <u>China low carbon emissions</u> steel standard has been developed to define low carbon emissions steel in China. This standard aligns with global decarbonization goals while accounting for China's unique resource and energy conditions under the principle of "Common but Differentiated Responsibilities." Currently, the standard's calculation boundary focuses on "cradle-to-gate" emissions, but it is expected to expand to the full lifecycle ("cradle-to-grave") as technology advances and cross-industry collaboration progresses.

Industry EPD Platform

 Aluminum applications in real estate, such as curtain walls and window frames, account for 12% of carbon emissions in building materials. Promoting low carbon aluminum is critical for achieving building decarbonization.

• The aluminum industry now faces challenges due to the lack of a unified carbon emissions management system and high-quality localized background data. To overcome these obstacles, it is necessary to accelerate the establishment of standardized databases and leverage digital platforms to enable regular and precise carbon management.

 Decarbonization efforts in the aluminum sector should prioritize not only increasing the share of renewable energy but also reducing direct emissions through process improvements, enhancing energy and resource efficiency, and gradually achieving sustainable transformation.

 To effectively manage and monitor low carbon building materials, it is necessary to establish unified carbon emission standards, lifecycle evaluation methods, and data platforms.

 Policy and market guidance should be used to encourage the use of low carbon cement and green building materials. At the same time, differentiated products should be developed based on market demand to promote the low carbon transformation of industry. Aligning supply-side innovation with demand-side initiatives can facilitate the widespread application of low carbon building materials in the real estate sector.

 The green premium for low carbon cement/concrete poses challenges for immediate adoption. However, smaller-scale pilot projects showcasing low carbon cement and concrete applications can inspire broader adoption across the real estate sector.

DATA IN CONSTRUCTION AND BUILDINGS



Li Yu, Vice Director General of Sci-tech and Environmental Protection Dept, China Iron • China's steel sector holds a significant share of global crude steel production, with its carbon emissions accounting for a high proportion of China's industrial emissions.

• In the real estate sector, carbon emissions from steel products account for about 50% of total emissions. To achieve carbon reduction targets, it is necessary to quantify and assess carbon emissions data.

• The Chinese steel sector has established an industry-wide <u>Environmental</u> <u>Product Declaration (EPD) platform</u>, covering carbon emissions data from raw materials to finished products. It has already partnered with multiple international platforms to promote data standardization and international mutual recognition.

• Through the quantification of carbon footprints and the revision of low carbon standards, the steel sector is driving carbon reduction across the entire value chain. A cooperation model has been established, combining international and local experts to ensure data quality and accuracy.

and Steel Association

• Digitalization and AI technology play a critical role in accelerating decarbonization in the building materials sector. These technologies, combined with carbon data quantification, can help companies scientifically analyze and achieve carbon reduction goals.

• The construction sector is a major contributor to global carbon emissions, particularly from building materials such as cement, glass, and aluminum. Relevant international standards (e.g., EN 15804) already exist for calculating and disclosing carbon footprints.

• There are still challenges in managing and calculating carbon emissions, especially the lack of local databases and suitable calculation tools. Localized databases and improved data accuracy are key to achieving efficient carbon reductions.



Gui Zhijun, Senior Vice President, Shanghai E-Carbon Digital Technology Co., Ltd.



• Through the SteelZero initiative, companies are encouraged to commit to using 50% low carbon steel by 2030 and 100% net zero carbon steel by 2050. One of the challenges is incomplete and inconsistent data from suppliers, particularly the differences in EPD standards across various countries and regions.

Wei Jia, Senior Energy & Industry Systems Manager, Climate Group China • Data transparency is important for improving supply chain management and driving the low carbon transition. The sector should also look to unify carbon emissions reporting frameworks and promote upstream and downstream collaboration.

• Data transparency is not only the responsibility of steel producers but also requires joint efforts across the entire industry chain, including continuous carbon emissions monitoring during the design, construction, and operation stages.

CONNECTING DEMAND AND SUPPLY FOR STEEL









• Real estate and steel companies need to work together to tackle emissions and accelerate decarbonization in both sectors.



• The speakers together introduced the collaboration initiative on low carbon emissions steel for the real estate sector in China (launched in December 2024, see <u>here</u>) and encouraged more stakeholders to endorse the initiative, fostering partnership to drive meaningful progress toward decarbonization.

DECARBONIZING ENERGY



Vincent van Bijleveld, CEO, Global Real Estate Engagement Network

• Global institutional investors in the real estate sector have co-signed a <u>Real Estate Investor Statement</u>, as they consider climate risks, decarbonization, and energy intensities as financially material risks for themselves and for the companies they invest in.

• The statement asks real estate companies to set both decarbonization and energy intensity goals, to have enhanced data disclosure, to implement a strong governance framework, and to set asset-level net-zero plans.

 Grid-interactive Efficient Buildings (GEBs) are energy-efficient buildings that optimize energy use for grid services, occupant needs and preferences, and cost reductions in a continuous and integrated way.
GEBs is a key solution to maximize flexibility management capabilities for cost and carbon savings.



• A notable example of a GEB in China: The Shenzhen Institute of Building Research (IBR) headquarters building, which integrates natural lighting, natural ventilation and shading, high-efficiency energy equipment, and renewable energy with energy storage technologies, is the first fully direct current building in China to be completed in an actual engineering project.

• The development of grid-friendly buildings is essential for the integration of buildings as part of China's new energy system and has a great impact on cost savings and CO₂ reduction.

For more details, read RMI's <u>Unlocking New Opportunities for Carbon</u> <u>Neutrality in China's Building Sector (published in Oct, 2024)</u>. Li Wei, Principal of Building, Infrastructure, and Supply Chain, RMI China



Gao Peipei, Principal/Lead of Management Consulting China, AFRY Large commercial real estate companies are increasingly procuring renewable energy through power purchase agreements (PPAs) in China.

• Moving towards 100% renewable electricity is a key lever for corporates to achieve net zero.

• With a long-term, market-focused approach, corporates can look to achieve multiple strategic objectives (GECs, bundled PPAs, long-term PPAs).

• Taikoo Li Sanlitun of Swire Properties has implemented, at its Red and Building N15, an innovative project entitled PEDF (Photovoltaic, Energy Storage, Direct Current, Flexible Power). The PEDF solution can reduce energy consumption by 5-10%, add flexibility to a building's power control, and maximize the capture of variable renewable energy from the grid. Swire Properties' Beijing PEDF implementation was a part of a State Grid pilot. Effective tenant coordination facilitated agreement with tenants in the pilot buildings to benefit from direct current energy through the PEDF.



• Taikoo Li Xi'an is designed to achieve 100% electrification of its space heating system through an innovative hybrid of heat pump technologies, combining ground source heat pumps with air source heat pumps. This system employs both deep (2.5 km) and shallow (150m) piles to effectively harness geothermal energy, satisfying up to 60% of the project's annual heating demand. The remaining 40% is mostly supplied by air source heat pumps, which extract naturally stored heat from the outside air. The standing-by electric boilers ensure reliable heating supply during extreme weather conditions only. This comprehensive approach results in maximum system efficiency, sustainability and the potential for net zero emissions.

• For companies at an early stage of the energy efficiency journey, they can start with proper testing and commissioning (T&C) and fine tuning for buildings under operation, a basic housekeeping task that is not always done properly.

Jean Qin, Deputy Director -Technical Services and Sustainable Development, Chinese Mainland, Swire Properties



Anthony Wu, CEO, Asia Clean Capital • Sustainable development and energy efficiency saving is a long-term play, it will provide great rewards to commercial and industrial companies from ESG and financial perspectives.

• Suggest following the advanced technical approach and solutions to utilize renewable energy, and monitor both operational and financial performance of RE projects.

• Companies should not overlook capital as a lever for advancing sustainability; wise use of capital can lead to win-win in terms of financial and ESG benefits.

DECARBONIZING COOLING



Anastasia O'Rourke,

• Cooling is a human necessity, but also poses challenges for the climate, including from potent refrigerant gases emitted during equipment operations and at end-of-life. The demand for cooling will almost quadruple by 2050.

• Large volumes of Hydrofluorocarbons (HFCs) and Ozone Depleting Substances (ODS) contained within existing equipment and those that will enter the market by 2100 are equivalent to three years' worth of global energy sector emissions.

• Building decarbonization strategies such as heat pumps are a great solution - but also require good refrigerant management to realize all their benefits.

• Effective Lifecycle Refrigerant Management (LRM) can be a low cost strategy to reduce emissions, and includes developing an inventory, improving refrigerant management practices such as detecting and stopping leaks, ensuring proper handling of gases at end of life, purchasing climate-friendly products and equipment such as reclaimed refrigerant, and considering alternative cooling technologies with low or even zero global warming potential.

Senior Managing Director, Carbon Containment Lab; Lecturer, Yale University

For more details, read Carbon Containment Lab's <u>LRM Background Paper</u>.

• Case study sharing: a tenant sought various sustainability commitments from their landlord including decarbonizing cooling systems.

• The landlord has committed to: a phase out of Ozone Depleting Potential (ODP) and high Global Warming Potential (GWP) refrigerants present in base building equipment by 2030; ensuring that all new refrigerant-containing equipment installed for the duration of the lease have a GWP \leq 150; ODP of 0; installing a refrigerant leak detection program; and maintaining refrigerant top up data.

• Building a consensus-based collaborative framework among the landlord, tenant and suppliers is key to decarbonization.



Sam Crispin, Head of Sustainability and ESG at Savills Asia Pacific



Andrew Ge, Director of Commercial Industry Development, Midea Building Technology It is important to consider technical tools in refrigerant management to monitor the operation process and detect leakage. Midea has innovated a technology to create a five-layer backup capability to ensure stable operation of the equipment, backed up by multi-connected refrigerant condition sensors. The built-in model analyzes sensor data in real time and calculates the operating status of the refrigerant system.

• There are regulatory restrictions in Singapore that limit the use of high-GWP refrigerants for AC equipment.

• Need to balance considerations when choosing the refrigerant type, as refrigerants with lower GWP sometimes also have lower energy efficiency.

DECARBONIZING INTERIORS



Raefer Wallis, Founder and CEO of GIGA/RESET Standard • Embodied carbon emissions from interiors are hard to measure and are underestimated. The industry tends to focus on core and shell (concrete, steel, glass, etc).

• Once we properly account for the materials used and the frequency of renovations in retail and offices, the embodied carbon associated with interiors is 3-7 times higher than it is for core and shell, over the life of buildings.

• In order to reduce carbon, we must increase circularity. To increase circularity, harmful chemicals must be removed. Carbon, circularity and health are all interconnected.

• Lighting Power Density is an important KPI for us: a recommended target level is 20w/m².

• The Sephora store in Champs-Élysées, in Paris, reduced by half its power consumption with new lighting layouts and the façade design.

• We cannot ignore embodied carbon, or harmful chemicals, these issues must be addressed together. The acceleration of circularity needs joining forces.

• The environment is embedded in the retail designer's journey, without compromising desirability, but a systemic problem requires a systemic approach: # joiningforces.



Nicolas Martin, Sustainable Store Planning Manager, LVMH; Building Materials Project Lead, LVMH Gaia



• To those who want to start the circularity journey, it's important to be transparent with all internal and external stakeholders, share the challenges, targets, and plans with them, and get them on board for the journey.

• Ideally all carpet floorings should only be made with raw materials from bio-based and recycled sources, without compromising quality and performance. The carpets could be in use for 10 or 20 years as usual, before being taken back for recycling into new carpets. Interface's European & U.S. operations are getting closer to this goal.

Andy Lee, Sales Director Greater China, Interface

• In China, which is our manufacturing base for Asia markets, we have not yet invested in this new technology for bio-based materials, but our products already have average recycled content of 60% or more, and our China ReEntry take-back and recycling program has been in operation since 2014. While we are not yet able to sequester carbon in our China products, circularity is already happening in Asia.

EXPERT INSIGHTS

We were also fortunate to hear from individual experts with specialized subject matter expertise as follows:



Wu Bixuan, Founder of Climate Perspective / Senior Partner of Hiways (Beijing) Law Firm

STEEL DECARBONIZATION FROM A REGULATORY PERSPECTIVE

• If the EU's Carbon Border Adjustment Mechanism (CBAM's) is not proven to prevent carbon leakage effectively in 2025, there may be delays in reducing free allowances for EU businesses. Possible options for postponing the phase-out of free allowances include: 1) CBAM will be not levied; 2) CBAM will continue, but the burden on imported products will be lighter; and 3) decoupling CBAM from free allowances

• The Chinese carbon market can be designed to award steel decarbonization, drawing from the EU's free allowances for liquid iron which considered both the dominant blast furnace enterprises and the direct reduction iron (DRI) companies that are performing well in decarbonization. This approach would avoid placing excessive pressure on the former while rewarding the latter.

• Concrete and cement production account for a significant share of global carbon emissions. While Carbon Capture and Storage (CCS) technology is a key solution, scaling it to meet carbon neutrality targets involves significant transformation risks and uncertainties.

• Decarbonizing concrete from a lifecycle perspective requires integrating production-side strategies such as enhancing energy efficiency, adopting low carbon fuels, optimizing clinker formulations, introducing alternative cementitious materials, and implementing Carbon Capture and Utilization (CCU), with demand-side innovations such as 3D printing, integrated timber, circular design, and component reuse.

• Production-side measures can achieve some level of carbon reduction but remain heavily dependent on kiln technology improvements, low energy cement chemistries, clinker substitutions, and CCS. This finding underscores the vital role of a whole-systems approach that combines materials efficiency with broader stakeholder collaboration (architects, urban planners, etc.) to reduce reliance on energy-intensive solutions and accelerate progress toward carbon neutrality.

For more details, please read the <u>report</u> by Industrial Sustainability Analysis Laboratory



Cao Zhi, Professor from College of Environmental Science and Engineering, Nankai University



Callum Douglas, Nature and Climate Advisor

CLIMATE AND NATURE

• The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has identified five key drivers of biodiversity loss: land-use change (e.g., deforestation); climate change (e.g., reef contraction); pollution (e.g., nitrogen-phosphorous fertilisers); natural resource use and exploitation (e.g., overfishing); and invasive species (e.g., alien species or weeds). Fighting climate change and preventing nature loss must be interconnected efforts.

• Nature underpins the global economy, with significant nature-related risk as well as opportunities arising from a nature-positive transition.

• The Global Biodiversity Framework – the 'Paris moment' for biodiversity - requires businesses to monitor and disclose their interactions with biodiversity.

• If companies, governments, and individuals work together and collaborate, we can make significant progress towards net positive nature by 2030.

RETAIL AND OFFICE COMPETITION WINNERS



<u>uHoo,</u> Dustin Jefferson Onghanseng, Co-founder and CEO of uHoo uHoo provides smart environmental quality monitoring and management solutions to create healthier and people-centric spaces. It uses patented uHoo devices strategically deployed to monitor the environment, and tracks at least 13 parameters, including temperature, relative humidity, carbon dioxide, TVOCs, formaldehyde, 4 sizes of PMs, air pressure, light, noise index, and carbon monoxide, and upgradable to 16 by choosing up to 3 among ozone, nitrogen dioxide, sulfur dioxide, ammonia, oxygen and hydrogen sulfide. uHoo also has patented AI algorithms to determine virus risk and mold risk in real time. The uHoo Business Dashboard can be accessed from desktops or mobile devices to manage trends, detailed information, and analysis of indoor air quality data and can be integrated directly into your building management system to automate your heating, ventilation and air conditioning.

MIMiC Systems' purpose is to radically improve how buildings manage heating and cooling. They have developed a breakthrough, refrigerant-free heat pump using solid-state technology for the post-refrigerant era. It uses a modular system, which is scalable, easy to deploy, compatible, tunable, and uses no refrigerants.



MIMiC Systems, Berardo Matalucci, Co-Founder and CEO of MIMiC Systems



<u>TablePointer</u>, Matthieu Quentin, Head of Sales & Operations of TablePointer Pte Ltd TablePointer aims to unlock savings with sustainability by creating an artificial intelligence solution for small and medium commercial/ F&B facilities to optimize energy efficiency, manage assets, and upgrade profitability. TablePointer leverages artificial intelligence and the Internet-of-Things, matched with a laser focus on customers, to gather detailed energy consumption and operations data across customer portfolios of facilities and equipment in their platform.

Yi Design is a group of conscious artists and designers and is inspiring others to see that ceramics is too valuable to waste. Its mission is to solve the ceramic waste management problem, and to produce green, sustainable, circular ceramic that can be used in architecture, art and commercial products. The elegant, regenerated materials help customers to move towards net zero. Yi Design is continuously working on new applications for their innovative products and welcomes new projects.



<u>Yi DESIGN</u>, Caroline Cheng, Co-Owner of Yi DESIGN

CLOSING REMARKS



John Haffner, Deputy Director -Sustainability, Hang Lung Properties

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Some highlights from the discussion:

- China has a robust policy framework that sets the direction.
- There was a lot of discussion about the need for standardization and harmonization of data.
- We can look for co-benefits for example, measures that are good for nature or health may also support climate mitigation efforts.
- We have some blind spots in addressing emissions in real estate (e.g., emissions from interiors, refrigerants) that we will need to confront if we want to take a whole building approach and tackle the entire challenge in a transparent manner.
- By collaborating and joining forces, we can accelerate progress together.

• Special thanks to: all our speakers, panelists and conference participants, including: our MCs and moderators Aamir Sakhia, Eli Konvitz and Tony Wang; from Climate Group, Jen Carson; from Hang Lung, our Chair Adriel Chan, CEO Weber Lo, Director - Cost & Controls Gabriel Cheung, and our Sustainability Team, especially Viki Du, Ruifei Gao, Sage Wen, and Tiffany Xiao; and from Undivided Ventures, Alexander Bent, Amie Shuttleworth, Denise Ho and Josephin Dufour.

AFTER THE SUMMIT: BUILDING MOMENTUM

Following the Summit, there has been further exciting momentum in key areas (all the organizations mentioned below were Summit participants). Some highlights:

• In <u>November 2024</u>, Hang Lung announced that it is advancing real estate decarbonization with the first Mainland project using nearly 100% low carbon emissions steel in its building structure in its Plaza 66 Pavilion Extension project in Shanghai. Procured from Baoshan Iron & Steel Co., Ltd. ("Baosteel"), the steel set a new benchmark for steel emissions data collection and achieved a 35% reduction from baseline steel emissions.

• In November 2024, the Carbon Containment Lab, Hang Lung, GIGA (RESET), LVMH Group and several consulting experts who attended the Summit formally launched a project to examine opportunities and challenges in reducing cooling emissions in commercial real estate in Asia. Asia is an important region for cooling and economic growth, and commercial real estate represents an important segment for the real estate sector. The project will produce a white paper by the end of 2025.



• In <u>December 2024</u>, the China Iron and Steel Association (CISA), the Urban Land Institute (ULI), and the World Steel Association together brought together leading real estate companies, steel producers and organizations to announce a collaboration statement on low carbon emissions steel for the real estate sector in China. Endorsing organizations will meet at least annually to review progress against the commitments of the statement.

• In March 2025, Hang Lung will publish a discussion paper analyzing our own journey to net zero. We will discuss scenarios, challenges and opportunities on our path to achieving net zero greenhouse gas emissions across our value chain by 2050.

Hang Lung wishes to thank once again the many colleagues and experts who came together to share ideas and best practices at the Summit. If you have ideas for collaboration, please reach out to us at <u>Sustainability@HangLung.com</u>.

May the Year of the Snake bring more progress together! #JoiningForces.