# Setting decarbonization targets – how to apply the CRREM pathways for China & Hong Kong

**First Version**

**March 2023**

# AUTHORS

**IIÖ**
INSTITUT FÜR
IMMOBILIENÖKONOMIE

**Institut für Immobilienökonomie / Institute for Real Estate Economics**
**(IIÖ, Austria)**

*Julia Wein, Sven Bienert, Maximilian Spanner, Hunter Kuhlwein, Vanessa Huber, Sebastian Leutner*

# LAYOUT & SUPPORT

The translation and layout of this publication has been kindly supported by:

**AEC**
**Allied Environmental Consultants Limited**

## WE WOULD LIKE TO THANK AEC FOR THE SUPPORT:

Allied Environmental Consultants Limited (AEC) has partnered with Carbon Risk Real Estate Monitor (CRREM) to **accelerate the net zero transition of real estate sector in the Asia Pacific region.** As the GRESB Asia-Pacific training partner and Partner of CRREM in Hong Kong and China, AEC strives to support companies of all sizes in their decarbonization journey using the updated CRREM-SBTi aligned pathway.

AEC is a Hong Kong based pioneering sustainability and environmental consulting firm with an extensive portfolio spanning Hong Kong, mainland China and the Asia Pacific region. It is the first listed sustainability and environmental consultancy service provider in Hong Kong. It strives to offer independent and professional advice to our clients, positively transform the environment and communities, and shape a sustainable future for the world.

## WE WOULD LIKE TO THANK OUR PARTNERS FOR THE FINANCIAL SUPPORT:

Laudes Foundation | Funded by the Horizon 2020 Framework Programme of the European Union | apg | NORGES BANK INVESTMENT MANAGEMENT | PGGM

PARTNERS (WHO HAVE ESPECIALLY ALSO SUPPORTED THE DEVELOPMENT & RELEASE OF THE GLOBAL PATHWAYS):

Ivanhoé Cambridge | GPIF | GRESB

# TABLE OF CONTENTS

# BEING AHEAD OF THE CURVE

## A.    NET-ZERO TARGET SETTING AND TRANSITION RISK

This document provides guidelines on the use of the CRREM (Carbon Risk Real Estate Monitor) pathways and on the CRREM tool, which will assist in **formulating, setting, and implementing science-based targets to reduce operational carbon emissions of buildings towards achieving a 1.5°C goal.**

The global real estate sector plays a critical role in achieving a net-zero future, as real state currently accounts for 36% of global $CO_2$ emissions.[1] In recent years, there has been a **growing awareness that the built environment faces significant transition risks**. Potential risks include rising costs due to the pricing-in of carbon emissions (through carbon taxes and pricing schemes), market effects, technological disruptions, legal liabilities, energy efficiency and other regulations and reputational risks, all of which can impact property values.[2] To address and potentially mitigate these impacts, real estate companies must be proactive. Since the "wave of regulation" related to energy efficiency and GHG[3] is becoming increasingly stringent, it seems more important than ever to stay ahead of the curve and ensure alignment. Especially in China and Hong Kong regulatory is increasing, for example the Stock Exchange of Hong Kong Limited published guidance to listed issuers on climate disclosures. The Exchange's ESG reporting requirements have now included key recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). Further, China also plans the expansion of the National ETS by 2023 (covering more than 80% of onshore emissions once completed). More and more companies are already setting **Net-Zero Targets,** which means having clear strategies and roadmaps in place. Changes should be driven by activities such as:

1.  Ensure **transparency** about the status quo of **GHG-emissions** related to the portfolio.
2.  Set **net-zero targets** aligned with CRREM pathways to decarbonize the assets.
3.  **Enhance controlling** capacity to ensure accurate data for GHG reporting and transition-risk analysis.
4.  **Align budgets, strategy, and activities** to meet the interim milestones and ultimately the net-zero target.
5.  Be sure to **monitor and assess progress** made on an annual basis.

**CRREM resources are available free of charge** and can help to accomplish the steps and measures needed to address and tackle transition risk. CREEM aims to address in its resources and offerings global alignment but at the same time also local expertise and data input. In China and Hong Kong, for example we have Grace Kwok (AEC) in the CRREM GSIC (Global Scientific Advisory & Investors Committee), providing valuable input as the CRREM baseline starts with the country- and property-type specific averages.

Note that CRREM only covers **operational GHG emissions**. Therefore, embodied carbon is only considered in operational carbon savings related to the embodied carbon of the retrofit itself (if the user also enters this in the input sheet).

---

[1] INREV, EPRA 2018.

[2] Bienert et. al., 2022.

[3] GHG Protocol, 2004.

## B.    ABOUT THE CRREM-INITIATIVE

CRREM is the **leading global initiative regarding target-setting** and additional resources aimed at enabling market participants to **manage and reduce their operational carbon emissions for standing real estate investments**. The initiative provides institutional real estate investors, managers, and other stakeholders globally, with a clear **Paris-aligned direction to set and control ambitious 1.5-aligned decarbonization targets[4]** in order to stay in the downscaled "fair share" of the GHG budget for real estate in the use phase (**operational emissions**).

The ongoing objectives of the CRREM initiative cover four aspects: A) **increase transparency**, B) encourage **adoption of the Paris-aligned decarbonization targets** and empower real estate investors and asset managers to measure and reduce their operational carbon footprint at the property and portfolio levels, C) to **drive global harmonization** of decarbonization initiatives within the real estate sector, and D) to ensure **greater awareness of transition risk** by various dissemination activities.

| Increase transparency in the real estate sector | Encourage adoption of the Paris-aligned decarbonization targets | Drive global harmonization of de-carbonization initiatives | Ensure higher awareness of transition risk |

CRREM has **published SBTi-aligned decarbonization pathways** that translate the ambitions of limiting global warming to 1.5°C by the end of the century, into **regionally- and property-type-specific trajectories** against which **real estate assets and portfolios can be benchmarked**.

The pathways can be downloaded and used separately (see www.crrem.org/pathways/). Also, these pathways are integrated into the CRREM-tool (see www.crrem.eu/tool). Using the xls.-based **freeware-CRREM-tool** enables market participants to **insert their property-specific energy consumption data, and then directly benchmark the results against the target paths** (see more details below). A **detailed reference guide** explains all steps of the application in various sections (see www.crrem.eu/tool/reference-guide/).

The resources provided help market participants to assess asset alignment in relation to 1.5-degree-pathways and help the market to price risks associated with carbon emissions from buildings. They are **in line with the TCFD requirements.**

**CRREM is aligned with the leading international accounting and reporting frameworks, disclosure guidelines and recommendations published by initiatives** working within the field of decarbonization and real estate.

Partners include, besides AEC as a service provider/consultant in China and Hong Kong, also many internationally well-known and Asia-Pacific based organizations like ANREV[5], SBTi, PCAF, ULI Greenprint, NZAOA, IIGCC, UNEP FI, IIGCCMSCI, GRESB, NAREIT, Australian GBC and many more (see www.crrem.eu/partners/). To date, over **1,000 institutional investors with trillions of Dollars of Assets under Management already refer to CRREM**. Besides **Europe,** CRREM is lately also intensively applied in **Asia-Pacific and the Americas**. Besides using the CRREM resources directly, **IT-companies and benchmarking providers also have, via licence agreements, incorporated the CRREM-pathways into their analytics** (Measurable, PWC, GRESB, Deepki, MSCI, etc.).

---

[4] China and Hong Kong have both signed the Paris Agreement (see http://www.gov.cn/, https://www.gov.hk/tc/residents/environment/global/climate.htm.)

[5] CRREM, ANREV & apg report can be downloaded here: https://www.crrem.eu/adoption-of-the-crrem-pathways-in-asia-pacific.

(ANREV is the Asian Association for Investors in Non-Listed Real Estate Vehicles, homepage: https://www.anrev.org/en/)

## APPLYING THE CRREM PATHWAYS FOR CHINA & HONG KONG

### A.     ASIAN MARKET UPTAKE OF CRREM IS GROWING FAST

*"CRREM is a useful tool for a global investor to understand where the portfolio sits against the pathway that aligns with the Paris Agreement in a globally consistent manner. Therefore, GPIF supports the expansion of CRREM to include major real estate markets outside the EU. We expect more fund/asset managers will be encouraged to assess their own portfolios and disclose the result to investors, through which we hope the market as a whole will become more transparent in terms of carbon risk in the long run."*

*Hideto Yamada, Head of Global Real Estate, GPIF (Government Pension Investment Fund)*

*"CRREM is a great solution for Japanese investors to adopt global standards for climate risk management. Especially for us who focus on ESG stakeholder engagements, CRREM tool is very helpful and practical to visualize and assess climate risks of real estate, carbon reduction target and financial & social impacts to share with not only investors but also tenants and other stakeholders in real estate, to foster ESG / sustainable behavioural changes."*

*Yukihiko Ito, Founder and CEO, GOYOH Inc. – a tech-based ESG /*

*Sustainable Real Estate solution*

*"CRREM addresses the industry need for one global comprehensive science-based route to achieve 'net zero'. With the recent expansion of the tool to cover the Asia Pacific region, the industry now has a truly global (and importantly transparent) set of pathways that will allow us to understand how our current portfolio is aligned to the Paris Agreement but also to inform future investment decisions going forward. We encourage all market participants to use these pathways."*

*Jonathan Waite, Senior Responsible Investment Manager,*

*APG Asset Management Hong Kong*

*"AEC is honoured to be the first sustainability and environmental consulting firm to collaborate with Carbon Risk Real Estate Monitor (CRREM) and provide CRREM-aligned transition risk assessment to analyse the stranding risk for real estate portfolios in Hong Kong and Mainland China. With the updated CRREM-SBTi aligned decarbonisation pathways for Residential and Commercial Real Estate, we help our clients to better navigate the net zero transition, with practicable decarbonization strategy and with due consideration of time and cost, to ensure the transition is on track with the required carbon reduction progress to achieve the 1.5degree pathway."*

*Grace Kwok, Managing Director, Allied Environmental Consultants Limited*

## B.    CRREM – THE RIGHT TOOL FOR THE JOB

Major investors have already applied CRREM on a regular basis to avoid stranding risk, address transition risk and comply with Paris-aligned decarbonization efforts. The tool has already been used for over **15,000 properties, representing more than 150 million m² space globally**. CRREM resources have undergone intensive quality assurance and international consultation. Stakeholders applying tool and pathways have therefore a reliable and proven methodological approach to address transition risk.

In Asia Pacific current CRREM users range from banks, asset managers to investors, consultants and many more. Global players include UBS Asset Management, GPIF, GOYO, CSR-Design, Orix Asset Management, LINK REIT, National Australia Bank Ltd, apg Hong Kong and many more.

### THE RIGHT RESOURCES FOR THE JOB: BENEFITS OF CRREM

❖  The tool is useful **for setting science-based, Paris-aligned, net-zero-targets** for individual commercial and residential real estate properties with regard to the carbon intensity of their assets.

❖  The tool clearly provides added value for the industry, for example, enabling a **transparent analysis of carbon risks**, calculation of **abatement costs and evaluating the correct timing of future retrofit** measures.

❖  The tool provides the perfect opportunity to start a **dialogue between investors and fund managers** about the carbon performance of their assets and possible ways to reduce the carbon footprint.

❖  Assists **reporting carbon risks in line with other major initiatives**, including the **TCFD SBTi target setting and controlling and PCAF, etc**.

❖  The CRREM resources are **globally aligned** and are setting the **industry standard**.

❖  Global alignment and harmonization with other sectors / approaches / initiatives is required such as the **NZAOA, the SBTi, IIGCC, EPRA, ANREV, NAREIT, UNEP FI** etc. etc.

❖  One general/uniform global pathway will not do – **country- and use-type differentiation – here for Hong Kong and China - has been provided for industry guidance**/ and target setting.

❖  Not just the GHG-intensity but likewise the energy efficiency (EUI) should be addressed. **CRREM provides both a carbon- and energy-intensity pathways**.

❖  Tenant-landlord relations & scope attribution (S1, S2, S3) causes complexity for stakeholders. **Whole building approach** is needed since only holistic view allows to decarbonize the asset.

## C. MANAGING TRANSITION RISK WITH THE CRREM TOOL
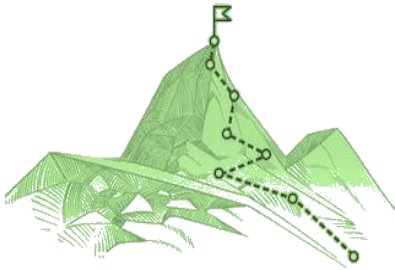
The CRREM pathways have been integrated into the CRREM tool, an xls-based software which enables investors,[6] lenders and other stakeholders to **analyse assets and portfolios with regard to transition risk** (incl. Paris-alignment, identifying assets with high stranding risks due to noncompliance with pathways, analyse retrofits etc.). It thereby offers an **independent, unique all-in-one solution for strategic planning, benchmarking, management of GHG-related aspects**, and facilitates **reporting requirements related to the TCFD** and other initiatives. The **CRREM tool is already available for Asia-Pacific (including pathways for China, Japan, South Korea, Hong Kong and Singapore).**

Due to increasing awareness of the need for enhanced energy efficiency and decarbonization requirements, **property owners or developers might have the following questions related to their real estate** holdings, which can be answered using the CRREM resources:

- ❖ Are our properties **currently above or below country average** regarding energy intensity in the reporting year in China and Hong Kong?
- ❖ Do we have sufficient **energy-consumption data** and general property information to make the right strategic decisions?
- ❖ What is the **carbon footprint** of our energy consumption in China and Hong Kong?
- ❖ Are our properties already **"1.5-degree-ready"**?
- ❖ What might constitute **future payments** related to high consumption - if **carbon pricing** will be introduced or intensified?
- ❖ What is a **benchmark** against which we could compare our own consumption in China and Hong Kong?
- ❖ How might **climate change and decarbonization of energy grids** affect our CO2 balance over time?
- ❖ Do we have particularly "**good" or "bad" properties** in our portfolio in terms of energy consumption?
- ❖ Which properties should be our priority for **energetic retrofits**?
- ❖ Can we **visualize and communicate** our carbon footprint for sustainability and risk reporting?
- ❖ How can we **aggregate the results** for a (partial) **portfolio-analysis** based on individual assets?
- ❖ How do we deal with missing information/**data gaps** (e.g., no full year of reporting data available, missing tenant data/ data coverage, occupancy)?
- ❖ What are **our own assumptions** regarding energy prices, CO2 prices, development of the energy mix etc. (today & over time until 2050)? Do we want to **overwrite default-assumptions**?
- ❖ Do we have **asset-specific** Emission Factor information available (**market-based EFs**)?
- ❖ How do we deal **with refrigerant losses** / fugitive emissions?
- ❖ Do we already have **input on refurbishment budgets** and capex (capital expenditure) for **energetic retrofits** of the properties?
- ❖ How do options like **renewable energy** production on site, energetic retrofit investments and/or simply buying green energy relate to each other?

---

[6] The CRREM pathways can be downloaded at www.crrem.org/pathways and the CRREM tool can be accessed at www.crrem.eu/tool.

Subsequently, to enter the input data concerning the properties energy use, users can immediately analyse their real estate portfolio, especially regarding the performance measures:

❖ CO2 intensity: kgCO2/m²/yr (kilograms of carbon dioxide equivalent per square metre per year)
❖ **Or** GHG intensity: kgCO2e/m²/yr (kilograms of carbon dioxide equivalent per square metre per year)
❖ Energy intensity: kWh/m²/yr (kilowatt hours per square metre per year)

One of the main outputs regarding asset-level analysis is the stranding diagram. The asset-level analytics in the CRREM tool allow the user to **map how a particular asset performs against a specific 1.5 degree-aligned decarbonization and/or energy-reduction pathway**. The baseline performance of an asset is projected, and the **estimated date of stranding,** if no countermeasures were undertaken, can be derived.
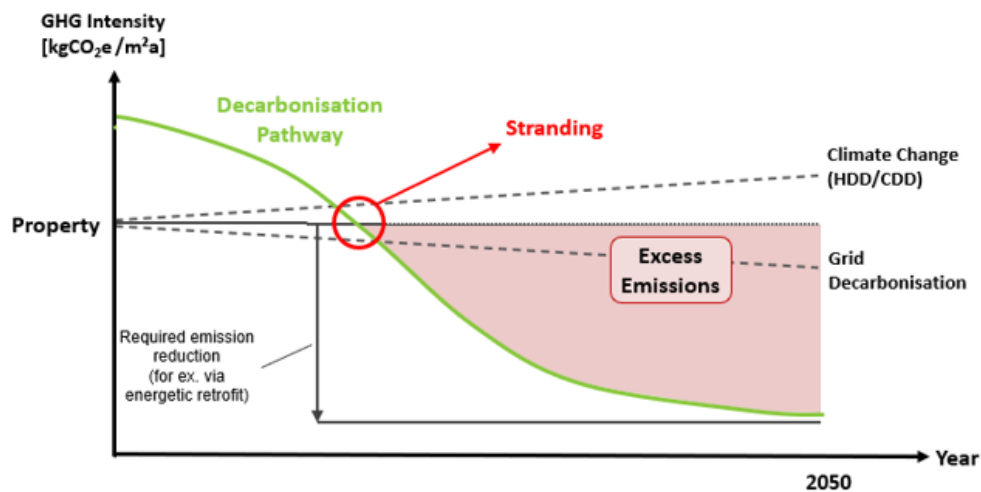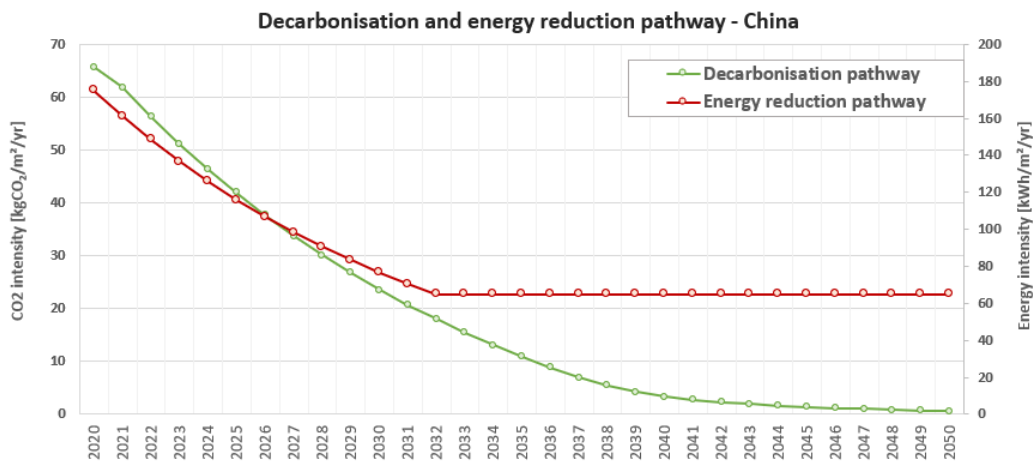


*Source: CRREM, 2023.*

In the figure above, the building (black curve) is Paris-aligned (green curve) only at the very beginning of the observation period. If no energetic retrofit or other measures were considered, the property would be stranded long before 2050 (red circle). Appropriate energetic retrofit measures, changing energy sources, renewable energy production on site or other activities could reduce its GHG emissions and ensure that the property gets back on track and stays below the Paris-aligned green curve. The asset's performance projection takes into account climate change (resulting in changing heating or cooling demand) as well as other aspects, such as the projected decarbonization of the electric grid. This benchmarking exercise allows asset managers, institutional investors, banks and other stakeholders to estimate not only when a particular asset might be exposed to transition risk as a result of non-compliance with defined GHG intensity and energy-efficiency goals, the software also enables users to put a price tag related to these risks and initiate countermeasures.

The CRREM output is **presented at either asset- or portfolio-level**. The input parameters are split between mandatory and optional entries – **also offering a lot of default data in the backend,** if market participants are just starting to analyse transition risk and have only limited data availability. In order to show the main output such as the "stranding points", only a few entries are required (as listed in the table below).

Of course, the more data entered, the more output KPIs becomes available to the users. These may include the CVaR (Carbon Value at Risk) for example, if further optional data is provided such as the GAV (Gross Asset Value).

**A full guide on using the tool and further information in English such as the CRREM methodology document** can be downloaded at www.crrem.eu/tool as well as the CRREM tool which is also available for Asia-Pacific (including pathways for China, Japan, South Korea, Hong Kong and Singapore). The Asia-pacific version can be also downloaded via www.crrem.eu/tool.

The following graph shows the energy- and carbon-intensity reduction pathway from 2020 to 2050 for China. These target paths can a.) be used as a benchmark for assessing whether the company's own properties are currently performing above or below the national average. More importantly, b.) these targets can also be used to ensure that the own consumption and emission levels entered in the CRREM tool remain below the 1.5-degree target development over time until 2050.



Source: CRREM, 2023.

**Relevant boundaries – whole building consumption**

Organisational boundaries for asset-level performance measures, as defined by the **GHG Protocol**, include Operational Control, Financial Control and Equity-share. For CRREM transition risk analysis, the whole building emissions (or the equity share of the investment) shall be included.

To derive correct intensity indicators, tenant-obtained consumption should be included in the assessment, in order to derive the whole building absolute consumption (tenant-obtained and landlord-obtained), which is then divided by the building floor area according to IPMS standard.

Conversions: Conversions may be required if the national data collected is not automatically available in terms of GIA (Gross Internal Area) as per IPMS 2. This may be the case for come locations such as Hong Kong (e.g., Residential Leasable Area has been converted to GIA using a factor of 1.15).

**Local reference and specific data for China and Hong Kong**

The CRREM tool has of course also been adapted for Asia-Pacific in regard to the HDD/CDD (heating and cooling degree days), location-based default emission factors for electricty, and the CRREM decarbonisation and energy-reduction pathways. Applying CRREM ensures a globally aligned and broadly accepted methodology for transition risk analyses and at the same time the relevant local reference and data input for the appropriate regional analysis (here China and Hong Kong) is made available.

CRREM also offers country- and property-type specific pathways covering: *Office, Retail Hight street, Retail Shopping centre, Retail warehouse, Hotel, Leisure & Recreation, Healthcare, Industrial Distribution warehouse (cold vs. warm)* and *Residential*. As the pathways start with the property-type specific average, the pathway for hotel will start much higher than e.g., the residential pathway (example China: has a starting point of around 103 KgCO2/m2 in 2020 for hotels vs. 22 KgCO2/m2 for residential assets in 2020).

**Increasing granularity**

The CRREM initiative is constantly improving granularity regarding the global data sets applied. In 2023 already CREEM already introduced besides the available national pathway for Australia further sub-regional pathways. In 2023 further sub-regional pathways for the US will be developed based on the existing pathways. Likewise for **2023/2024 CRREM would like to add to the national Chinese pathways already available a sub-regional breakdown** to constantly increase granularity – for this **we invite all interested stakeholders to team up with us!**

<div style="background-color:#c9e0a9; padding:20px; text-align:center;">

**CONTACT THE CRREM TEAM FOR FURTHER INFORMATION**

**Email: crrem@iioe.at**

**Email: Julia.wein@iioe.at**

</div>

## SOURCES:

Government of HK (2022): Hong Kong's Climate Action Plan 2050, Online: https://www.climateready.gov.hk/files/pdf/CAP2050_booklet_en.pdf

EMSD (2022): Energy Consumption Indicators and Benchmarks, online: https://ecib.emsd.gov.hk/index.php/en/energy-utilisation-index-en/residential-sector-en.

Climate Transparency (2020): China - CLIMATE TRANSPARENCY REPORT. Online: www.climate-transparency.org

INREV, EPRA (2018): Real Estate in the Real Economy—2018. Online: inrev.org/system/files/2019-04/INREV-EPRA-Real-Estate-Real_Economy_2018_Report.pdf.

Bienert, Sven; Wein, Julia; Spanner, Maximilian; Kuhlwein, Hunter; Huber, Vanessa; Künzle, Chiara; Ulterino, Matthew; Carlin, David; Arshad, Maheen (2022): Managing Transition Risk in Real Estate: Aligning to the Paris Climate Accord, 2022, Wörgl, Austria.

Greenhouse Gas Protocol (2004): The GHG Protocol: A corporate reporting and accounting standard (revised edition). Online: ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf.