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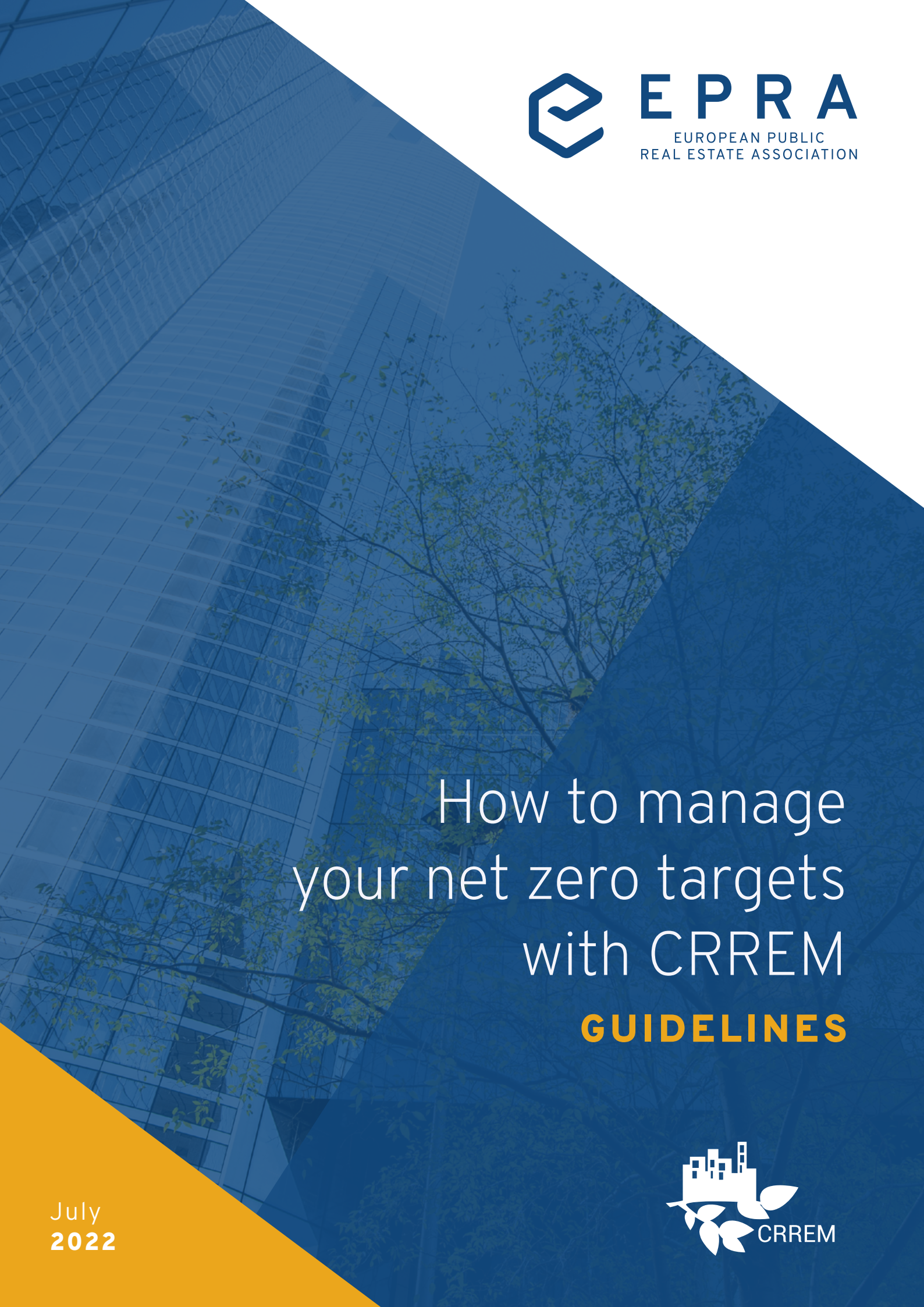

How to manage your net zero targets with CRREM

GUIDELINES

CRREM

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TABLE OF CONTENTS

1

Being ahead of the curve

1.1 CRREM & EPRA join forces

This document provides guidelines on the use of the Carbon Risk Real Estate Monitor (CRREM) pathways and on the tool for the European Real Estate Association (EPRA) members, promoting and representing the European public real estate sector with more than 280 members, covering the entire spectrum of the listed real estate industry. An overview of the **CRREM initiative is presented, including key benefits regarding assessment and climate risk analysis**, the implementation of mitigation strategies for **tackling transition risks**, and setting **decarbonization targets** aligned with the recommendations of the **Task Force on Climate-related Financial Disclosures (TCFD)**.

EPRA and CRREM joined forces in April 2022 to educate the EPRA members, and the listed real estate sector more broadly on CRREM resources and to support real estate market participants **in formulating, setting, and implementing science-based targets to reduce operational carbon emissions of buildings towards achieving a 1.5°C goal.** This partnership combines previous work from both parties and will ensure clarity for EPRA members that their decarbonization plans are aligned with climate science.

1.2 Net-Zero target setting and transition risk

The (listed) global real estate sector plays a critical role in achieving a net-zero future, as real state currently accounts for 36% of global CO2 emissions.[1] In recent years, there has been a **growing awareness that the build 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. 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. If necessary, **enhance controlling capacity** to ensure timely and 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 to EPRA members free of charge and can help to accomplish the steps and measures needed to address and tackle transition risk. 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.

1.3 About the CRREM-initiative

The Carbon Risk Real Estate Monitor (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** 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 decarbonization initiatives	Ensure higher awareness of transition risk

CRREM has **published 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 EPRA, also INREV, SBTi, PCAF, ULI Greenprint, NZAOA, IIGCC, UNEP FI, E-CORE, MSCI, GRESB, NAREIT, ANREV and many more (see www.crrem.eu/partners/). To date, **over 1.000 institutional investors with trillions of Euros 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). EPRA members can choose to use the resources either directly or via those tools.

THE RIGHT RESOURCES FOR THE JOB:
BENEFITS FOR EPRA MEMBERS

1

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.

2

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.

3

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.

2

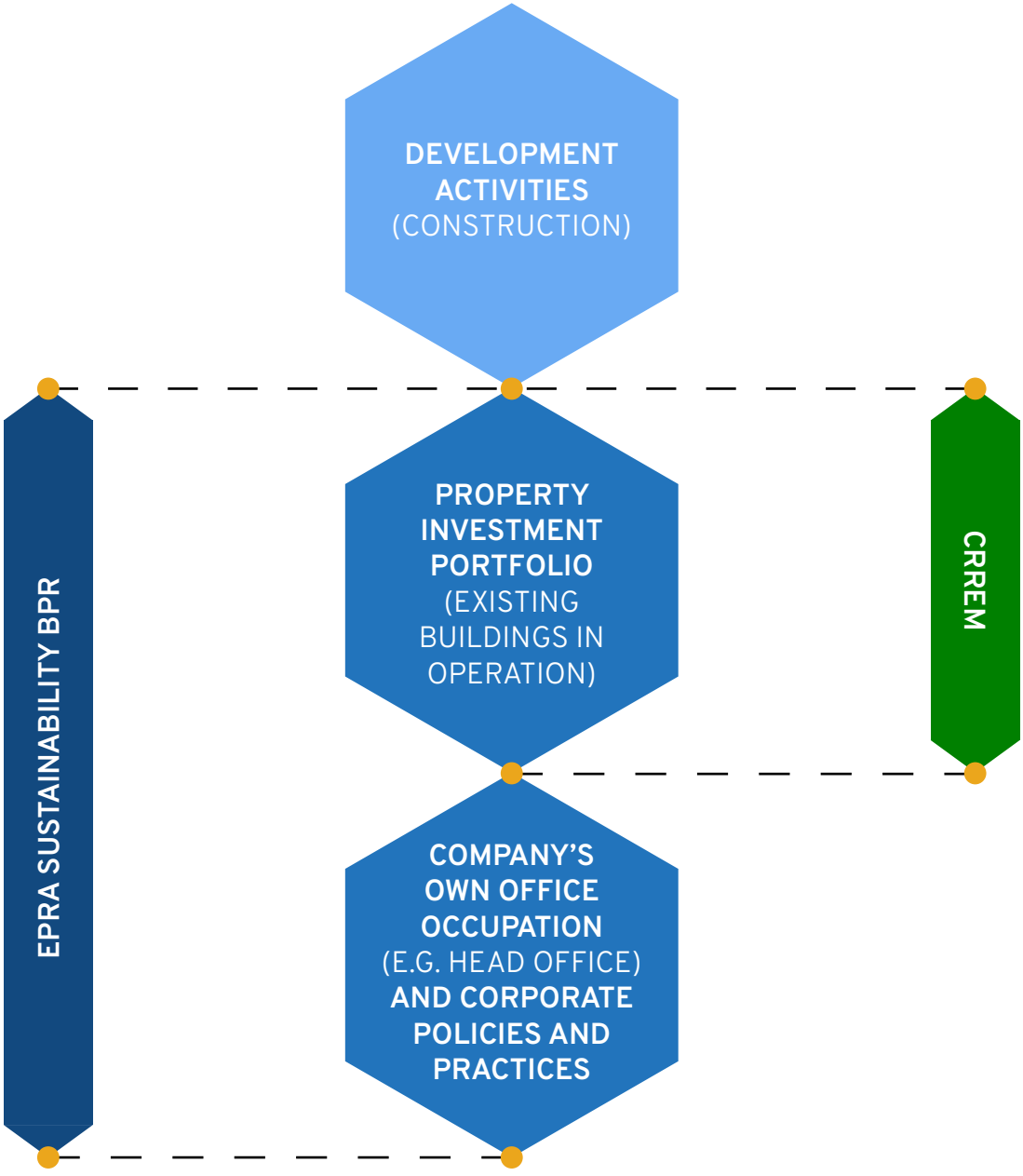
CRREM - The right tool for the job

2.1 Relationship to existing EPRA resources

Alignment with EPRA sBPR Guidelines

CRREM is fully aligned with the EPRA sBPR Guidelines (2017)[4], providing a consistent way of measuring the sustainability performance of listed real estate companies in Europe. EPRA sBPR Guidelines are based on the latest GRI (Global Reporting Initiative) standard procedures, covering all environmental, social and corporate governance impact categories.

However, note that **CRREM is addressing transition risk and therefore focusses on the whole building**. Thus, scope attribution regarding the allocation of Scopes 1, 2, 3 is not relevant in this context. Also, CRREM does not include any corporate emissions that might be related to the company level, since the focus is on asset-level **data (for existing buildings in operation** or new construction based on modelled data). **CRREM analytics support the aggregation to portfolio and entity level.**



[4]EPRA SBPR, 2017.

EPRA Sustainability best practices recommendations are calculated according to CRREM in the same way:

ENVIRONMENTAL SUSTAINABILITY PERFORMANCE MEASURES					
EPRA Guidance		**GRI Standard**	**Unit of Measure**	**EPRA sBPR Core recommendation[5]**	**CRREM Application**
Elec-Abs	Total electricity consumption	302-1	annual kWh	Companies must report: 1) total electricity consumption; 2) the proportion of electricity consumption from purchased and self- generated renewable sources	Only property-related consumption must be included here. It is important to use ALL property-related consumption for CRREM, including consumption by tenants.
DH&C-Abs	Total district heating & cooling consumption	302-1	annual kWh	DH&C-Abs refers to the total amount of indirect energy consumed from district heating or cooling systems over a full reporting year. In this instance, 'indirect' means energy generated off site and typically bought from an external energy supplier.	Furthermore, total energy consumption for both district heating and cooling can be entered into the CRREM tool which is then considered together with the respective emission factor.
Fuels-Abs	Total fuel consumption	302-1	annual kWh	Fuels-Abs refers to the total amount of fuel used from direct (renewable and non-renewable) sources ('direct' meaning that the fuel is combusted on site) over a full reporting year.	CRREM also converts fuels with the corresponding emission factors into a GHG-intensity.
Energy-Int	Building energy intensity	CRE1	kWh/ appropriate denominator	Energy-Int refers to the total amount of direct and indirect energy used by renewable and non-renewable sources in a building over a full reporting year, normalised by an appropriate denominator.	Important in this case, is to take into account the correct denominator which is the floor area per IPMS 2. If applicable, the correct conversions must be calculated.
GHG-Dir-Abs	Total direct greenhouse gas (GHG) emissions	305-1	annual metric tonnes CO2e	GHG-Dir-Abs refers to the total amount of direct greenhouse gas emissions generated ('direct' meaning that GHG emissions are generated on site through combustion of the energy source/ fuel) over a full reporting year.	Note that all GHGs are taken into account for the asset's use-phase. Therefore, the "other GHGs" such as F-gases from refrigerants should also be reported.
GHG-Indir-Abs	Total indirect greenhouse gas (GHG) emissions	305-2	annual metric tonnes CO2e	GHG-Indir-Abs refers to the total amount of indirect greenhouse gas emissions generated ('indirect' meaning that GHG emissions are generated off site during combustion of the energy source) over a full reporting year.	As CRREM uses the "whole-building" approach, for example all purchased electricity is also considered and multiplied by an evolving emission factor until 2050.
GHG-Int	Greenhouse gas (GHG) emissions intensity from building energy consumption	CRE3	tonnes CO2e/ appropriate denominator	GHG-Int refers to the total amount of direct and indirect GHG emissions generated from energy consumption in a building over a full reporting year, normalised by an appropriate denominator.	Important again is the correct denominator, which is the floor area in IPMS 2.

[5]EPRA, 2017.

Companies report the total amount of direct and indirect energy used (including renewable and non-renewable sources) within the building over a full reporting year, whereas square meters are used as a denominator. Energy Intensity (Energy-Int) should be calculated (based on GRI Standard 302-3) as the sum of energy consumption reported for Elec-Abs, DH&C-Abs & Fuels-Abs and potentially, other energy sources as well.

Greenhouse Gas Intensity (GHG-Int) refers to the total amount of direct and indirect GHG emissions generated from energy consumption in a building over a full reporting year, whereas again, square meters are used as a denominator. Note that CRREM also includes other gases such as (especially) F-Gases that are automatically converted into CO2e via the respective Global Warming Potential (GWP).

Reporting GHG vs. Transition risk assessment

Whereas for pure reporting requirements, the as-is consumption and scope delineation is relevant, risk management and net-zero target setting at asset level require a holistic, whole-building view of the property.

It is essential to understand here that the reported consumption data according to GRI reporting can be inserted directly into the CRREM input sheet (see extract below), but that data will be normalized - e.g. regarding climate conditions in a given year and occupancy levels. For Net-Zero target setting and controlling, as well as for transition risk management at asset level, the reference is always the rented/ in-use building, assuming a typical/normal market environment..

		General information					
Asset ID	Inclusion	Asset Name	Reporting year	Gross Asset Value (GAV)	Reporting period		Entity
					Starting month	Months of data	
Pre-filled			Mandatory	Optional (required for calculating certain risk indicators)	Mandatory	Mandatory	Optional (for further possibilities of aggregation)
	Dropdown	Text	Year	[€]	Drop-down	Number of Months	Text
ID	INC	NAME	AS.YR	GAV	AS.MON	AS.LENG	ENT
1	Include	Steinbach Tower	2018	2,000,000	January	12	
2	Include	Steinbach Tower	2018	2,000,000	January	12	
3	Include	Steinbach Tower B	2021	4,750,000	January	12	Fund 2
4	Include	Maison Eiffel	2021	4,750,000	January	12	Fund 2
5	Include	Example Name 2	2018	1,000,000	February	5	

Building characteristics

Asset ID	Inclusion	Location				Property type	Air conditioning	Asset size	
		Country	City	Zip Code	Address			Total gross internal area (IPMS 2)	Average annual vacant area
Pre-filled		Mandatory	Optional (only to be displayed in results)	Optional (for improved accuracy)	Optional (only to be displayed in results)	Mandatory	Optional	Mandatory	Mandatory
	Dropdown	Drop-down	Text	Text/ Numbers	Text	Type of use	Drop-down	[m²]	[m²]
ID	INC	COUN	CITY	ZIP	Address	AS.TY	AC.YN	TO.FL	BSR_OC.AN
1	Include	Austria	Wörgl	6300	Josef-Steinbacher-Straße 1	Office	No	10,000	-
2	Include	Austria	Wörgl	6300	Josef-Steinbacher-Straße 1	Office	No	10,000	-
3	Include	Netherlands	Amsterdam	2514		Office		1,500	-
4	Include	France	Paris	75000		Office		1,000	-
5	Include	Austria	Wörgl	6300		Retail, High Street		300	-

Total energy procurement

Whole building total energy procurement
Combined energy procurement of Common Areas + Tenant Space
Energy procured by tenants and base building services to lettable/leasable and common spaces. This should include all energy supplied to the building for the operation of the building and the tenant space except from energy procured as part of refurbishment measures.

Asset ID	Inclusion	Grid Electricity			Natural Gas			Fuel oil			District heating [steam]	...
		Usage	Data Coverage	Maximum Coverage	Usage	Data Coverage	Maximum Coverage	Usage	Data Coverage	Maximum Coverage	Usage	
Pre-filled			Mandatory if usage ≠ 0	Mandatory if usage ≠ 0		Mandatory if usage ≠ 0	Mandatory if usage ≠ 0		Mandatory if usage ≠ 0	Mandatory if usage ≠ 0		
	Dropdown	[kWh]	[m²]	[m²]	[kWh]	[m²]	[m²]	[kWh]	[m²]	[m²]	[kWh]	
ID	INC	EL.GRID	EL.DC	EL.MC	NG.CON	NG.DC	NG.MC	OL.CON	OL.DC	OL.MC	DH.CON	
1	Include	300,000	10,000	10,000							-	
2	Include	300,000	10,000	10,000							-	
3	Include	120,000	1,000	1,000	-	700	900				10,000	...
4	Include	10,000	1,000	1,000	80,000	700	900				-	
5	Include	20,000	300	300	20,000	300	300				-	

Source: CRREM, 2022.

Relevant boundaries – whole building consumption & emission data

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 (EU-int and GHG-int), 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.

2.2 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.

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

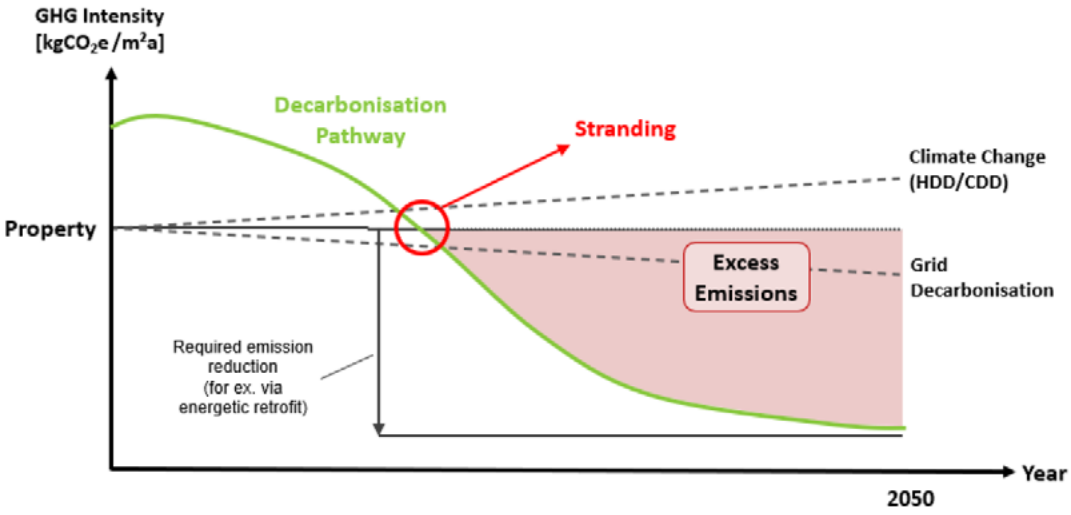
- Are our properties **currently above or below country average** regarding energy intensity in the reporting year?
- Do we have sufficient **energy-consumption data** and general property information to make the right strategic decisions?
- What is the **carbon footprint** of our energy consumption?
- Are our properties already **“2 or even 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?
- 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 does climate change affect our property in terms of **HDD/CDD**? How does the output differ against the climate change projection RCP4.5 vs. RCP8.5?
- How do we deal **with refrigerant losses** / fugitive emissions?
- Do we already have i**nput 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?

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

- 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, 2022.

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 however be stranded long before 2050 (red circle). Appropriate energetic retrofit measures, changing

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

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 cure. 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 can be downloaded at www.crrem.eu/tool.

2.3 CRREM & EPRA alignment with TCFD-recommended disclosures

The following table contains a summary of the **CRREM tool's alignment with the TCFD recommendations for disclosure** on metrics and targets, which can be used to assess and manage transition risk within the real estate sector. Outputs derived from the C**RREM tool can be extracted directly and used for further risk analysis and reporting requirements**, as suggested by the TCFD.

The TCFD recommendations are also supported by EPRA. A report highlights examples of best practice public disclosure from EPRA membership against the main recommendations of TCFD, as well as overreaching recommendations, which are fully aligned with the CRREM approach.[7]

TCFD recommendation	TCFD Recommended disclosure	CRREM element	EPRA sBPR Performance Measures
Strategy: **Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning, where such information is material.**	a. Describe the climaterelated risks and opportunities the organization has identified over the short, medium and long term.	The CRREM tool identifies stranding risk/ transition risk due to non-compliance with regional energy efficiency and GHG-intensity pathways aligned with the Paris Agreement, from 2020 until 2050. These climate risks are related to the transition to a lower-carbon economy, including policy, litigation or legal, technology and market risks.	EPRA sBPR like-for-Like performance measure tracks evolving exposure to chronic risk and resource efficient opportunities by recording impact of efficiency improvements on comparable assets over time. For example: ELEC-LFL, DH&C-LFL, FUELS-LFL, WATER-LFL

[7]EPRA, 2020.

TCFD recommendation	TCFD Recommended disclosure	CRREM element	EPRA sBPR Performance Measures
	b. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy and financial planning.	Carbon value-at-risk and excess emissions, as well as other financial figures, are estimated at the asset and portfolio level, to put a price-tag on carbon-risk.	Carbon pricing and enhanced emissions-reporting obligations, more stringent energy performance requirement and a tight regulatory framework may result in increased operating, compliance costs and capex requirements. EPRA's overreaching recommendation of normalisation allows consistent reporting over time and enables comparability among peers, portfolios, and asset types.
	c. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios.	The CRREM tool applies the 1.5°C or 2°C target. The organization can also calculate a retrofit budget needed to upgrade properties and relate that to internal budgets and available cash flow. Downscaling follows scientific guidelines.	Intensity performance measures impact on resilience opportunities by using emissions to track energy efficiency measures. For example: Energy-Int, Water-Int and GHG-Int.
Risk management: **Disclose how the organization identifies, assesses and manages climate-related risks.**	a. Describe the organization's processes for identifying and assessing climate-related risks.	Asset-level performance projections and benchmarking of energy and GHG intensities against science-based pathways. The whole CRREM methodology and process and how to apply the pathways and tool are described in detail in various documents. These could be used to describe also the companies process and approach to assess and tackle these transition risks.	Absolute performance measures track exposure to policy, legal & reputational risks by tracking total emissions of direct and indirect GHG emissions. Also, track exposure to chronic risks by measuring resilience to water stress and water costs. Additionally, track exposure to risks/ opportunities by recording total consumption and renewable & non-renewable energy. For example: Elec-Abs, DH&C-Abs and Fuels-Abs, Water-Abs
	b. Describe the organization's processes for managing climate-related risks.	The retrofit functionalities in the asset sheet allow for planning of actions to mitigate stranding risk. Scenario analysis with greater renewable energy production on site, more procured green energy or even disinvestment of non-compliant properties are options that can be simulated with the tool.	Reporting on total number of assets with a green building certification measure, and certifications by type, enables reporting entities to track their portfolio's resilience to changing tenant preferences and investor demand for 'green' assets
Metrics and targets: **Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities, where such information is material.**	a. Disclose the metrics used to assess climate-related risks and opportunities in line with its strategy and risk management.	GHG emissions intensity (kgCO2e /m2); Energy intensity (kWh/m2); Costs of excess emissions; CRREM clearly states the KPIs needed to assess and manage transition risk. Also, the data quality and how inputs are clearly described.	EPRA's Environmental Performance Measures track physical and transitional risks related to energy, GHG emissions, water etc For Example – Absolute and Like for like Asset-level environmental performance measure,
	b. Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks.	CRREM applies the so-called whole building approach. The analysis includes tenant and landlord-controlled spaces. Disclosure of Scope 1 and 2 (and Scope 3 if tenant space is reported here) is therefore a key focus area.	EPRA sBPR GHG emissions Performance Measures provide a framework to report Scope 1 & 2 emissions, with the option to include Scope3

TCFD recommendation	TCFD Recommended disclosure	CRREM element	EPRA sBPR Performance Measures
	c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	The decarbonization pathways developed by the CRREM initiative serve as science-based, widely recognized, easily understandable and actionable targets. They are 1.5°C or 2°C and Paris-aligned.	EPRA sBPR recommended reporting period enables a timely basis for reporting and identification of benchmarked years for the purposes of target setting The methodology meets each of these minimum requirements to disclose their Scope 1 and Scope 2 GHG emissions(GHG-Dir-Abs, GHG-Indir-Abs and GHG-Int).

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