

CRREM | CARBON RISK REAL ESTATE MONITOR

PROFESSOR MARTIN HARAN



DIRECTOR OF RESEARCH ON PROPERTY AND PLANNING

ULSTER UNIVERSITY

Research Seminar | Henley Business School |

04.03.2020



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 785058

PRESENTATION CONTENT

- ❖ Commercial Real estate sector carbon intensity and progress mapping.
- ❖ Stranding risk and value erosion.
- ❖ Moving beyond energy efficiency within the commercial real estate sector.
- ❖ Barriers and challenges to upscaling green retrofitting.
- ❖ 'Hard Targets' – Milestone Development and Decarbonisation Pathways (SBTs).
- ❖ The CRREM Tool – Open Access Investor Resource.

INSTITUT

Aberdeen Standard

Ruairi Revell (*ESG Manager, Real*)

alstria

Alexander Dexne (*CFO*)
Robert Kitel (*Head of Sustainability & Fu*)

APG Asset Management

Derk Welling (*Senior Responsible Investment & C*)

BNP Paribas Real Estate Con

Hermann Horster (*Regional Director, Head*)

Credit Suisse Asset Managen

Roger Baumann (*COO & Head of Sustainability*)

ECE Projektmanagement

Maria Hill (*Director Sustainability & Inte*)

Grosvenor

Emily Hamilton (*Sustainability Ma*)

Jan von Mallinck



INDUSTRY BODIES & ACADEMICS

DECARBONISATION OF THE COMMERCIAL REAL ESTATE SECTOR

- ❖ Heightened awareness of the impacts of decarbonisation has been evident within the real estate investment community over the course of the last decade.
- ❖ The **Paris Agreement** has catalysed a **momentum shift** in terms of expectations.
- ❖ The real estate sector has been proactive in embracing its environmental and social responsibility – performance enhancement? corporate image? investor pressures?
- ❖ Pronounced disparity in awareness of the risks posed by policy transformation and in the ability to respond.
- ❖ **The most carbon intensive assets reside with owners and investors with limited capacity to intervene/initiate change – even if they want to.**

THE CARBON INTENSITY FOOTPRINT

- ❖ Existing buildings account for approximately **40% of energy consumption** in many EU countries and approximately **30% of energy-related GHG emissions** (BIS, Lyons & IEEP, 2013; UNEP, 2014; Lucon et al., 2014, IEA, 2019).
- ❖ GHG values attributable to buildings anticipated to double by 2050 if no action is taken (IEA, 2019).
- ❖ **By 2060, building sector floor area is projected to double, adding more than 230 billion m² to the planet in new buildings construction.**
- ❖ In the UK, total non-domestic floor area is expected to increase by 35% by 2050 (Strachan et al., 2015).

PROGRESS MAPPING

- ❖ The energy intensity per square metre (m^2) of the global buildings sector needs to improve on average by 30% by 2030 (compared to 2015) to be on track to meet global climate ambitions set out in the Paris Agreement (UNEA, 2017).
- ❖ Final energy usage by buildings globally grew from 119 exajoules (EJ) in 2010 to nearly 125 EJ in 2016. Pertinently, fossil fuel use in buildings remained almost constant since 2010 at roughly 45 EJ (UNEA, 2017).
- ❖ The *actual* like-for-like energy consumption reported by **GRESB** in 2019 showed participants *falling behind* the **SDG** target for the first time since 2010.
- ❖ Current policies and investment fall short of what is needed, and moreover, what is realisable and achievable.

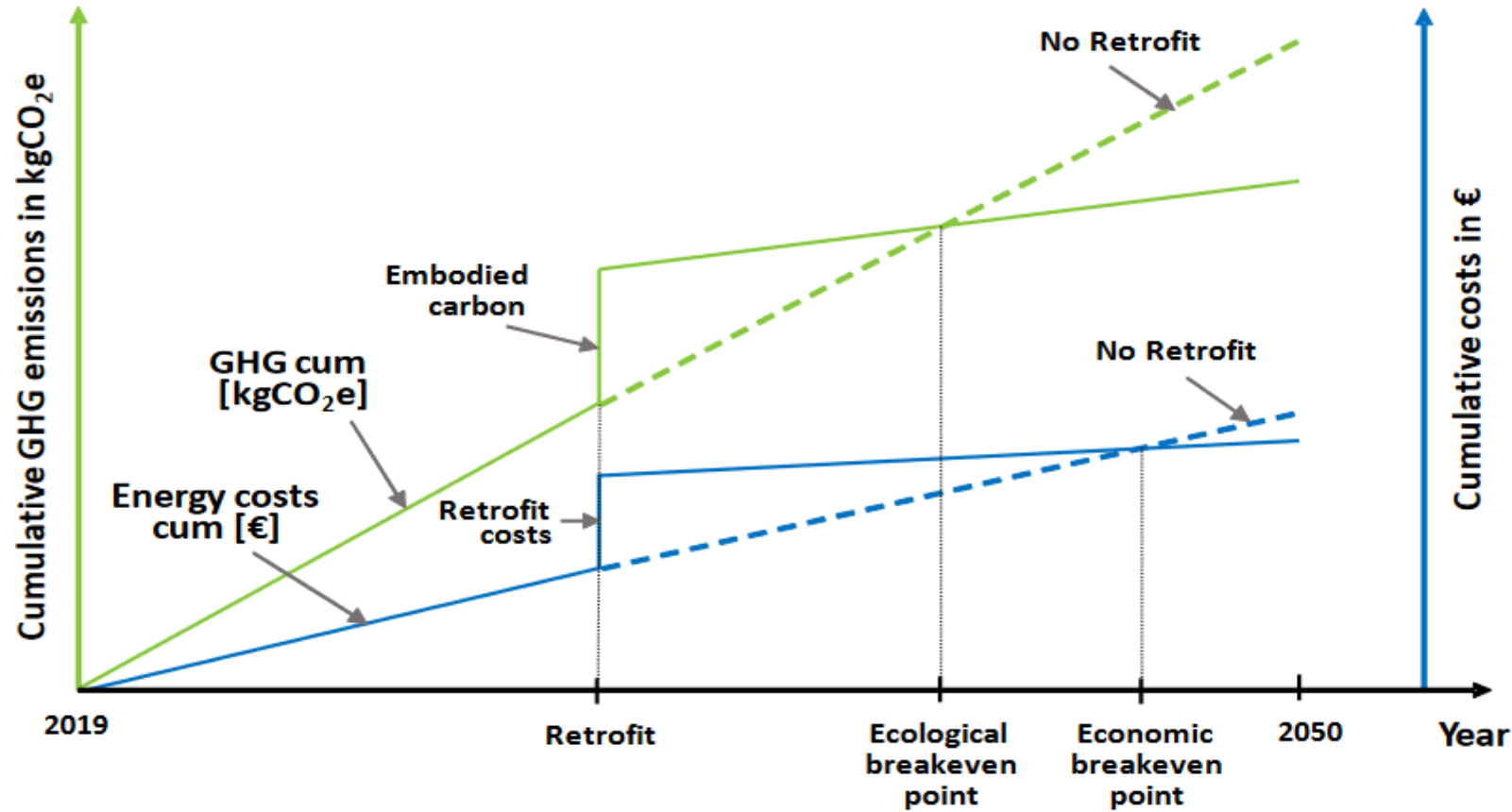
THE BUSINESS CASE FOR 'GREEN' RETROFITTING

- ❖ In the UK **65% of existing buildings will still be in use in 2050** – this is consistent for most OECD countries.
- ❖ **Commercial properties tend to turn over only every 30 to 50 years**, getting it wrong will lock in emissions, and potential costs, for decades.
- ❖ Focussed acceleration in this action area can close 20% to 55% of the gap between current emissions trends and 2030 abatement targets, depending on the local climate and population growth of the city, at an average cost of \$20 to \$100 per MtCO₂e (McKinsey and Company, 2017).
- ❖ Innovative energy saving measures in UK non-domestic buildings could save 86 MtCO₂ by 2050, depending upon the rate at which the measures can be deployed (Strachan et al, 2015).

BARRIERS TO 'GREEN' RETROFITTING

- ❖ Fragmented nature of the Real Estate value Chain.
- ❖ Inadequacy of data to support the business case – environmental impacts/payback.
- ❖ Split incentives – who benefits (owner or tenant) – willingness to pay?
- ❖ Ownership and practical considerations.
- ❖ Capitalisation of retrofit solutions – value creation or destruction?
- ❖ Optimal point in the asset lifecycle of retrofit action.
 - ❖ Improving technology.
 - ❖ Reduced costs.

Figure A-7: Cumulative GHG emissions, energy costs and breakeven points of retrofit measures including embodied carbon and retrofit costs (in kgCO₂e and €)



Source: CRREM.



The *CRREM* Approach to Real Estate Decarbonisation

CRREM DOWNSCALING: FROM GLOBAL EMISSIONS TO CARBON INTENSITY PATHWAYS

Global GHG budget and emissions pathway (consistent with a certain amount of global warming)

EU emission pathway (convergence of per capita emissions until 2050)

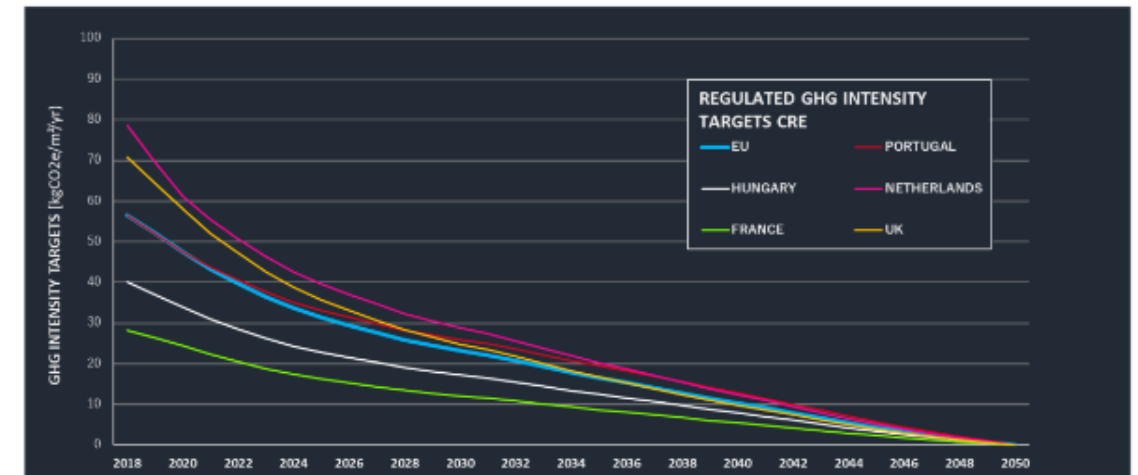
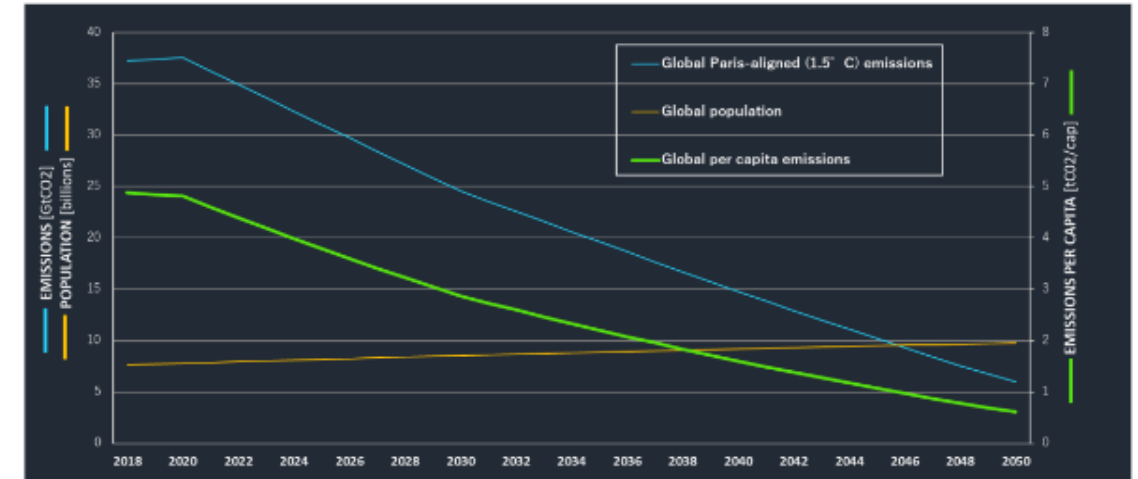
EU commercial real estate (CRE) sector

Country-specific targets (convergence of GHG intensity)

Sector-specific GHG targets for each country

Energy reduction pathway

DOWNSCALING



STRANDING RISKS & CARBON

available on
www.CRREM.eu

Science-based decarbonising of the EU commercial real estate sector

available on
www.CRREM.eu

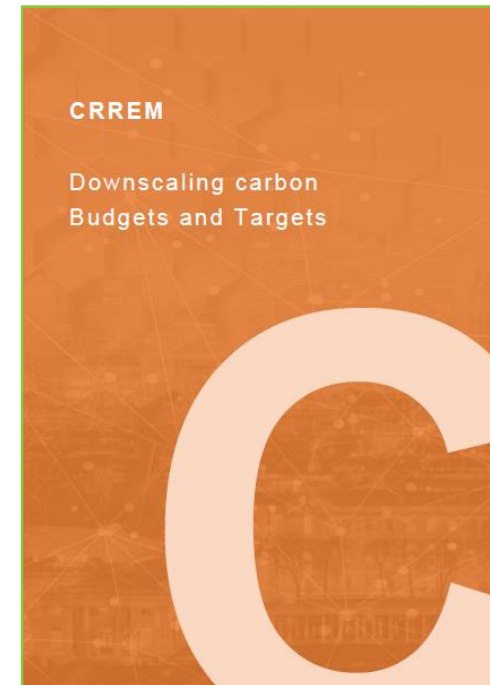
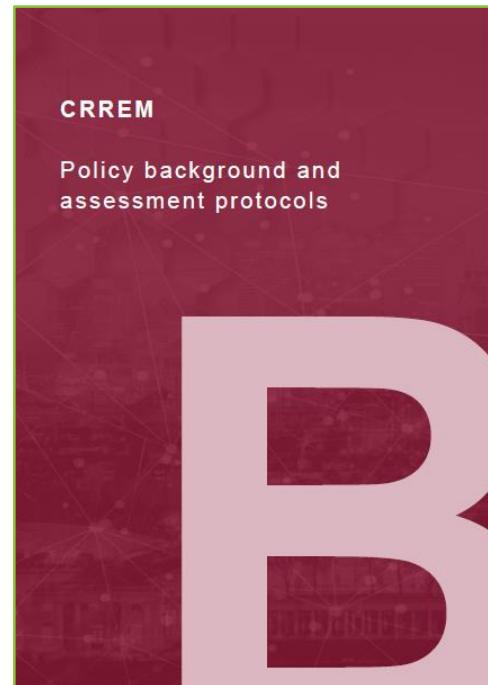
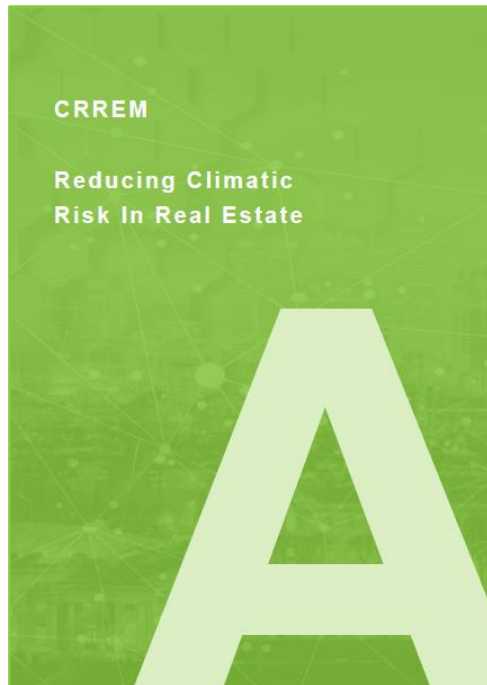
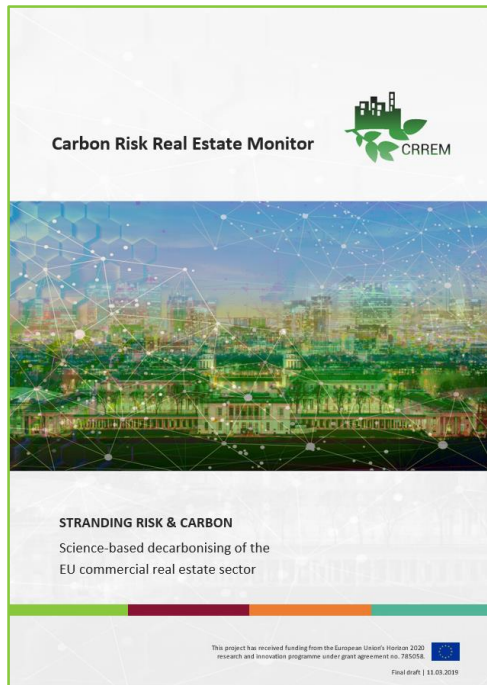
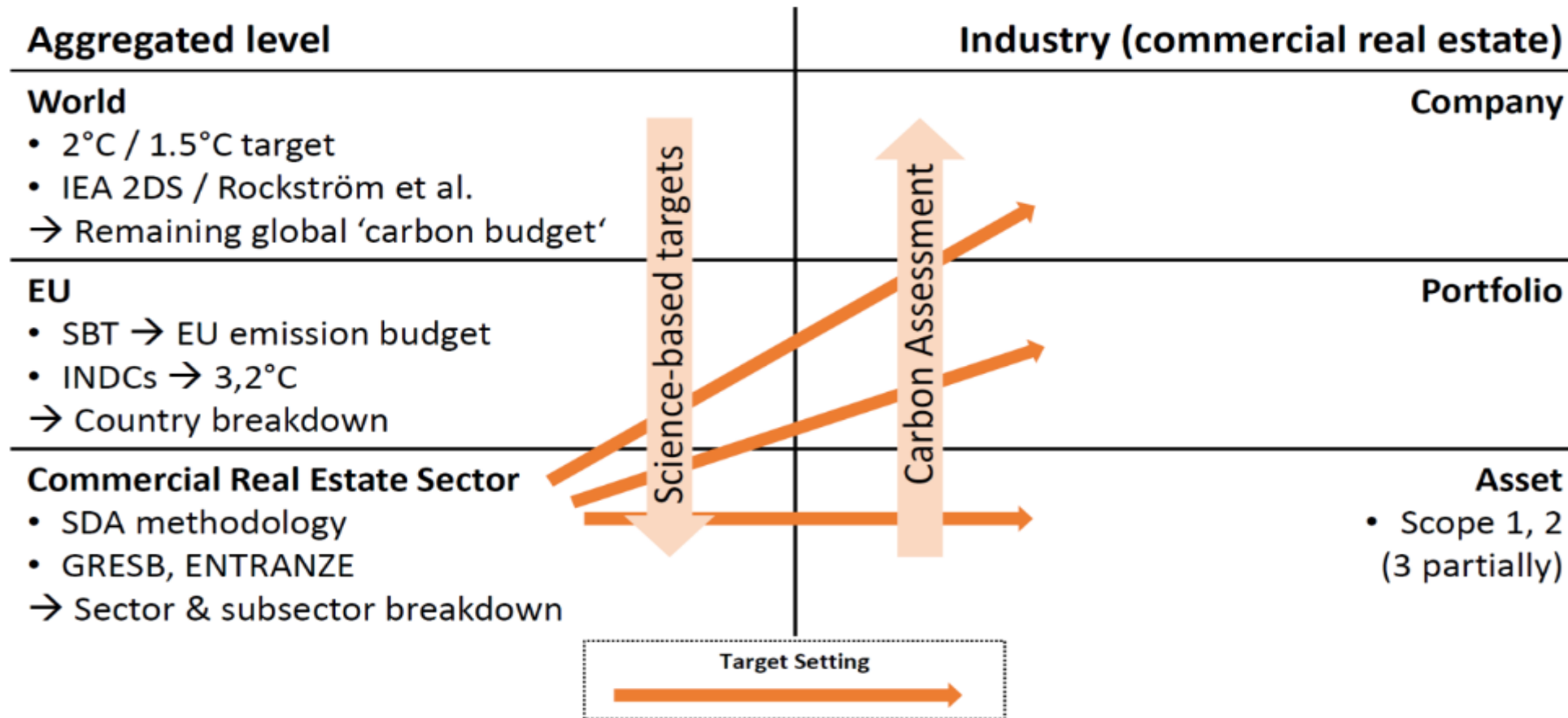
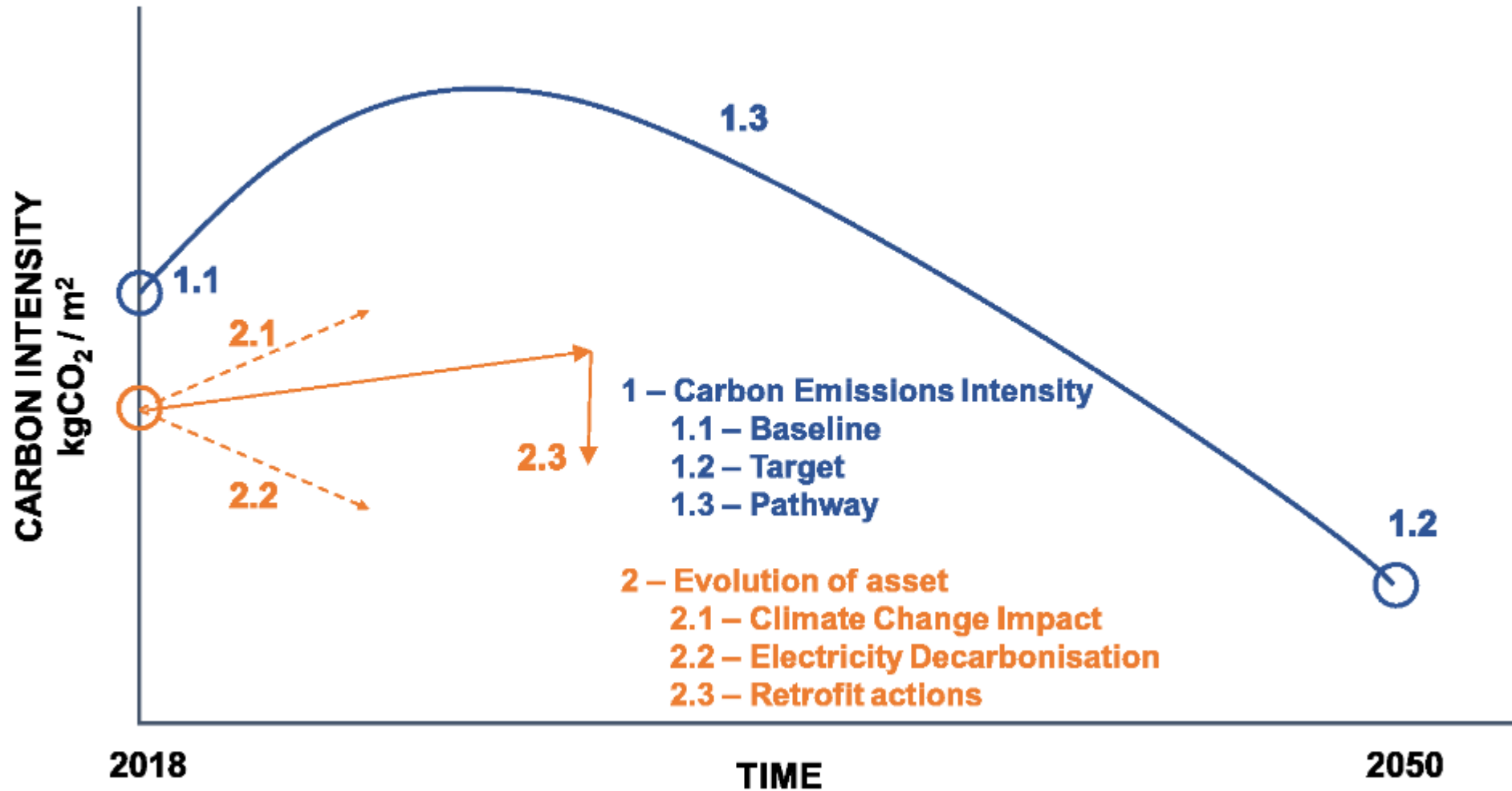


Figure C-3: Top-down approach for downscaling global carbon budgets and bottom-up approach from asset to commercial real estate sector carbon counting



Source: CRREM.

Figure A-4: CRREM approach: Graphic output

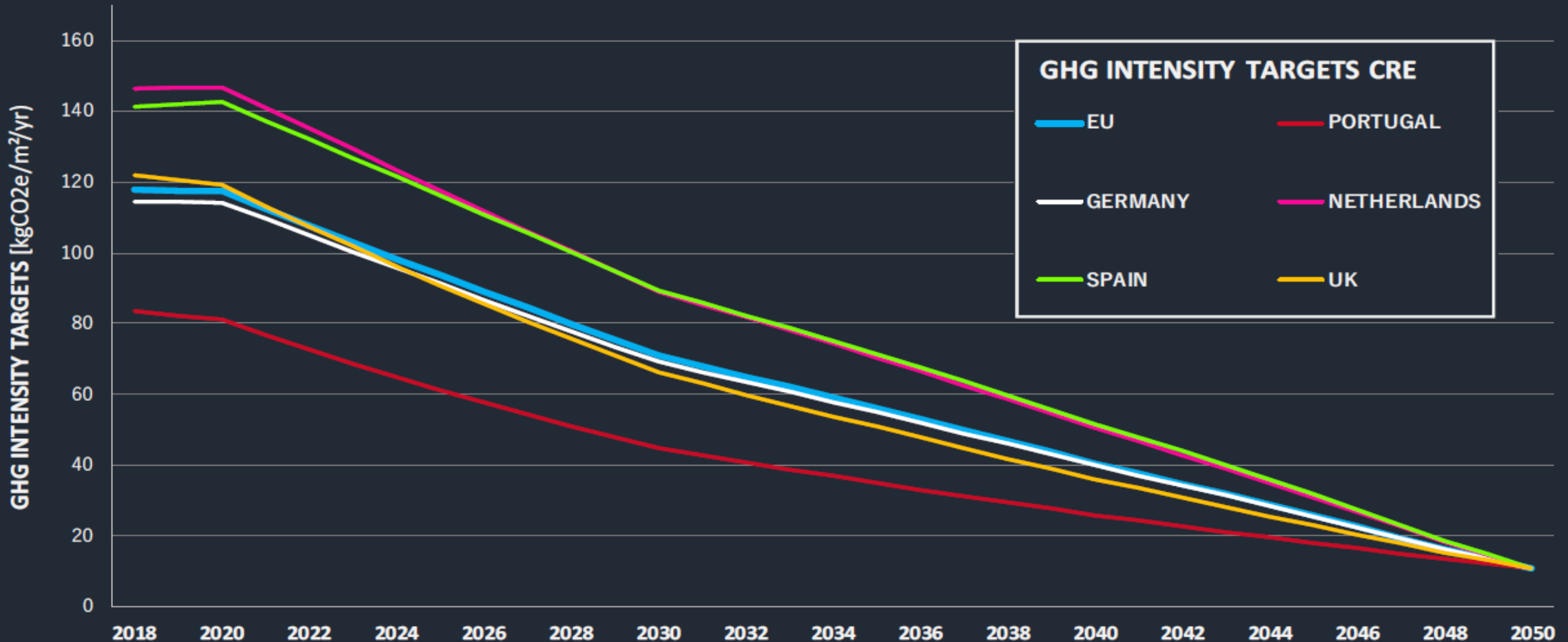


- ❖ **CRREM** calculates the decarbonisation efforts of the *EU* commercial real estate sector by downscaling global carbon budgets and its associated decarbonisation pathways following data from the International Energy Agency (IEA).
- ❖ **CRREM** further downscales each country's carbon budget and carbon intensity pathway (emissions per square meter) to commercial real estate subsectors. This downscaling considers country and subsector specific stock size, expected growth and current carbon emission intensity in each country.
- ❖ Using existing emissions rates, **CRREM** calculated that the maximum amount of carbon that the commercial real estate sector can emit from 2020 until 2050 is 10.3 GtCO₂e for a 2°C warming scenario.
- ❖ At the current rate of emissions the 2°C 'carbon budget' scenario will last until 2034. In a 1.5°C warming scenario, the budget amounts to 7.5 GtCO₂e and will be depleted by 2030.

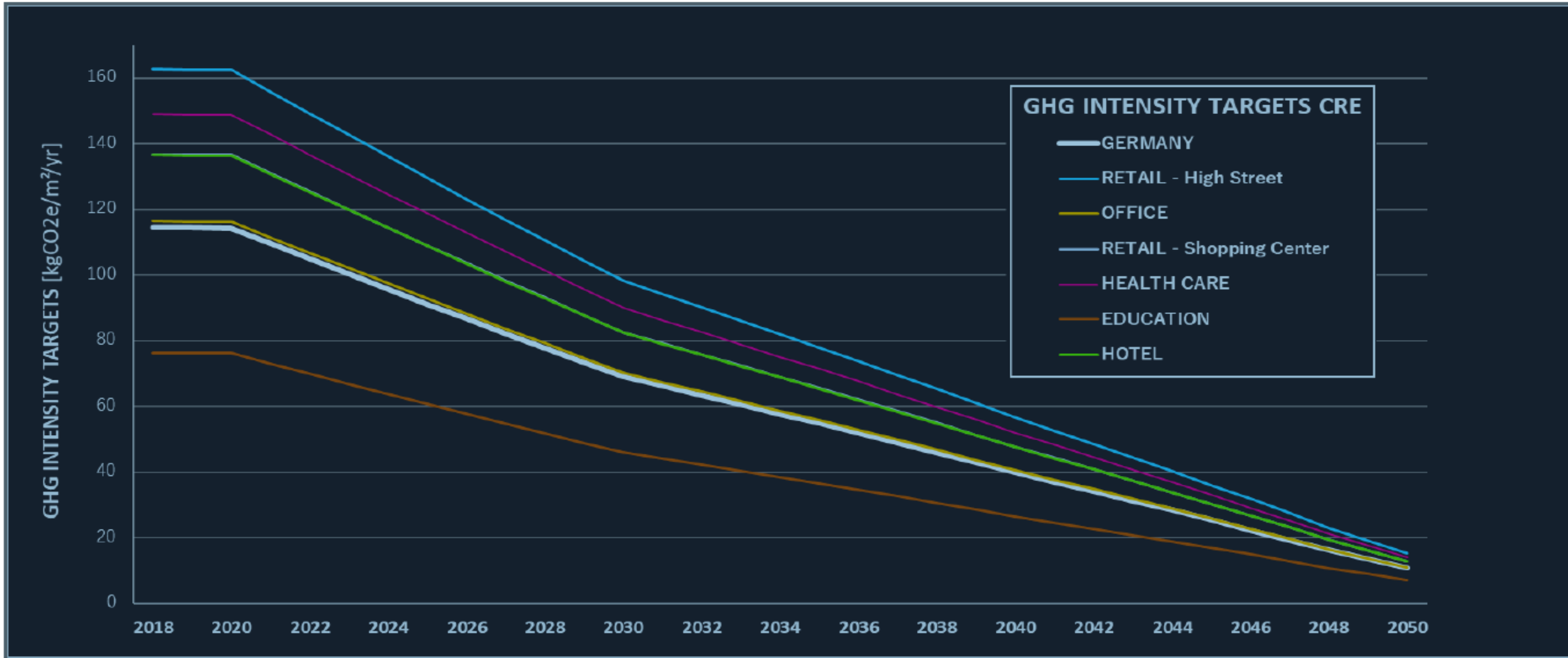
EU COMMERCIAL REAL ESTATE – FROM ABSOLUTE TO INTENSITY TARGETS



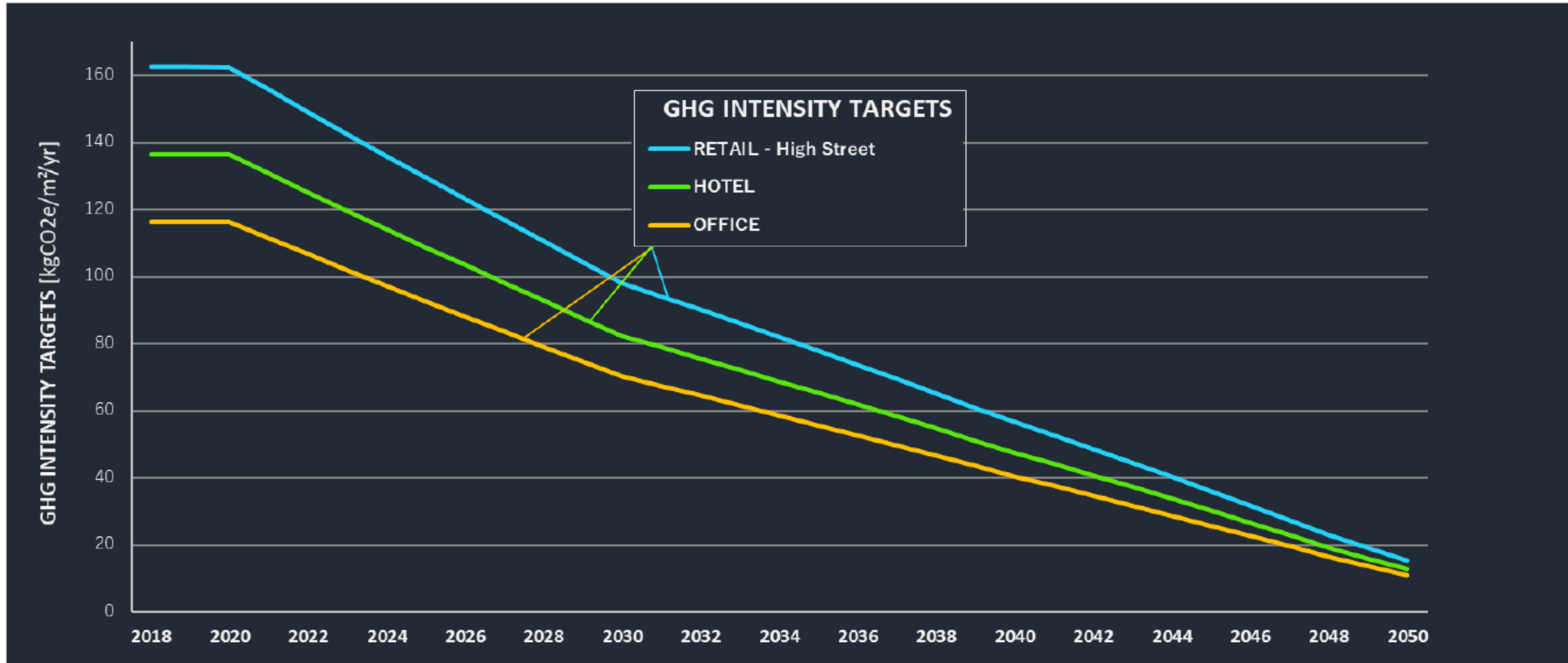
EU COMMERCIAL REAL ESTATE – FROM ONE EU-WIDE TO COUNTRY-SPECIFIC TARGETS



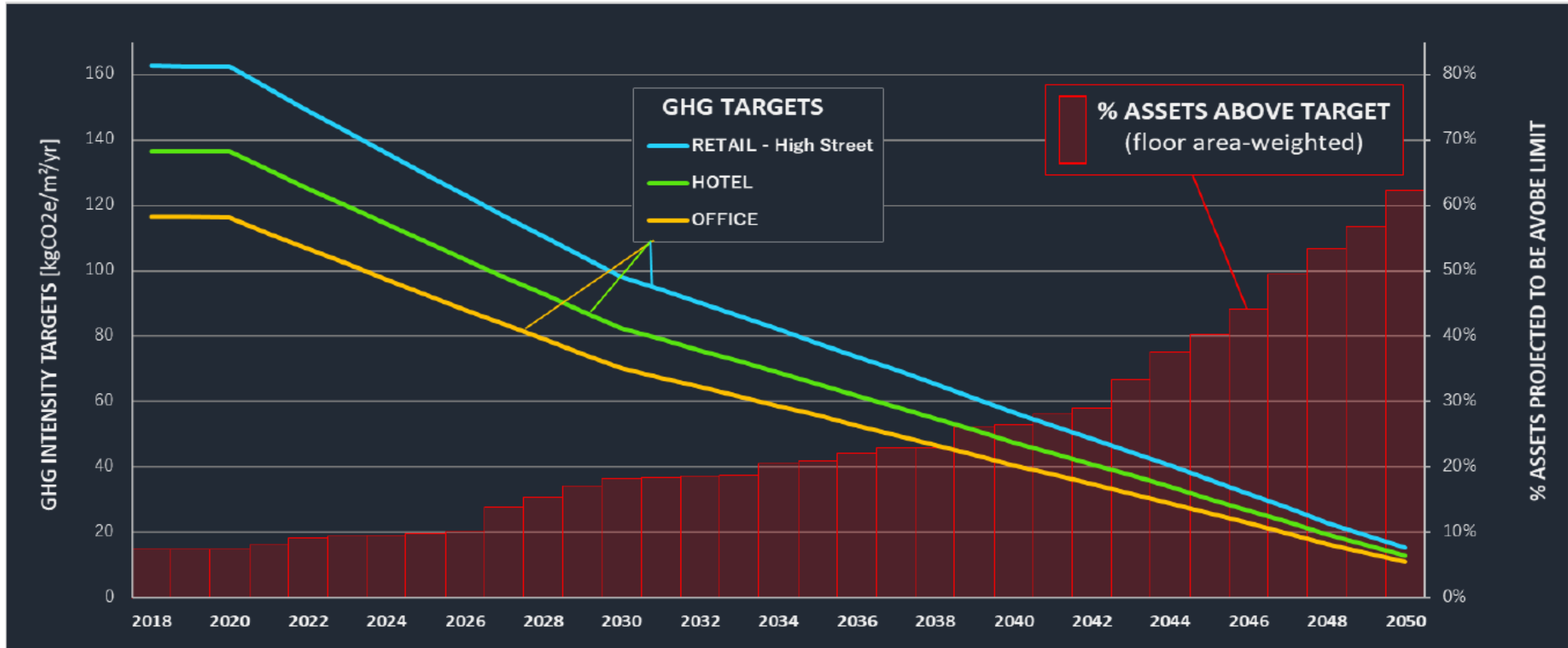
DIFFERENTIATION OF BUILDING TYPES WITHIN EACH COUNTRY



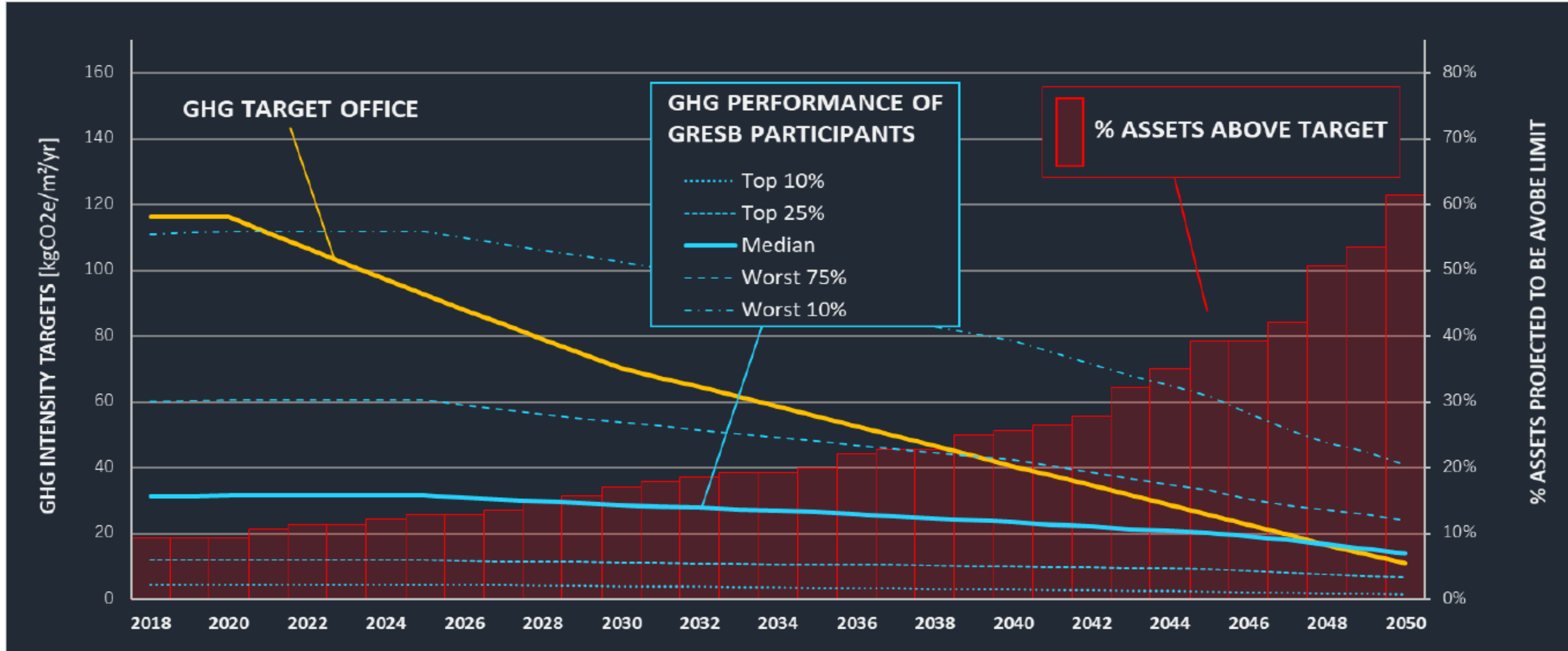
CASE STUDY GERMANY



GERMANY: CRREM DECARBONISATION TARGETS + GRESB PERFORMANCE



GERMANY: CRREM DECARBONISATION TARGETS + GRESB PERFORMANCE





The *CRREM* Risk Assessment Toolkit

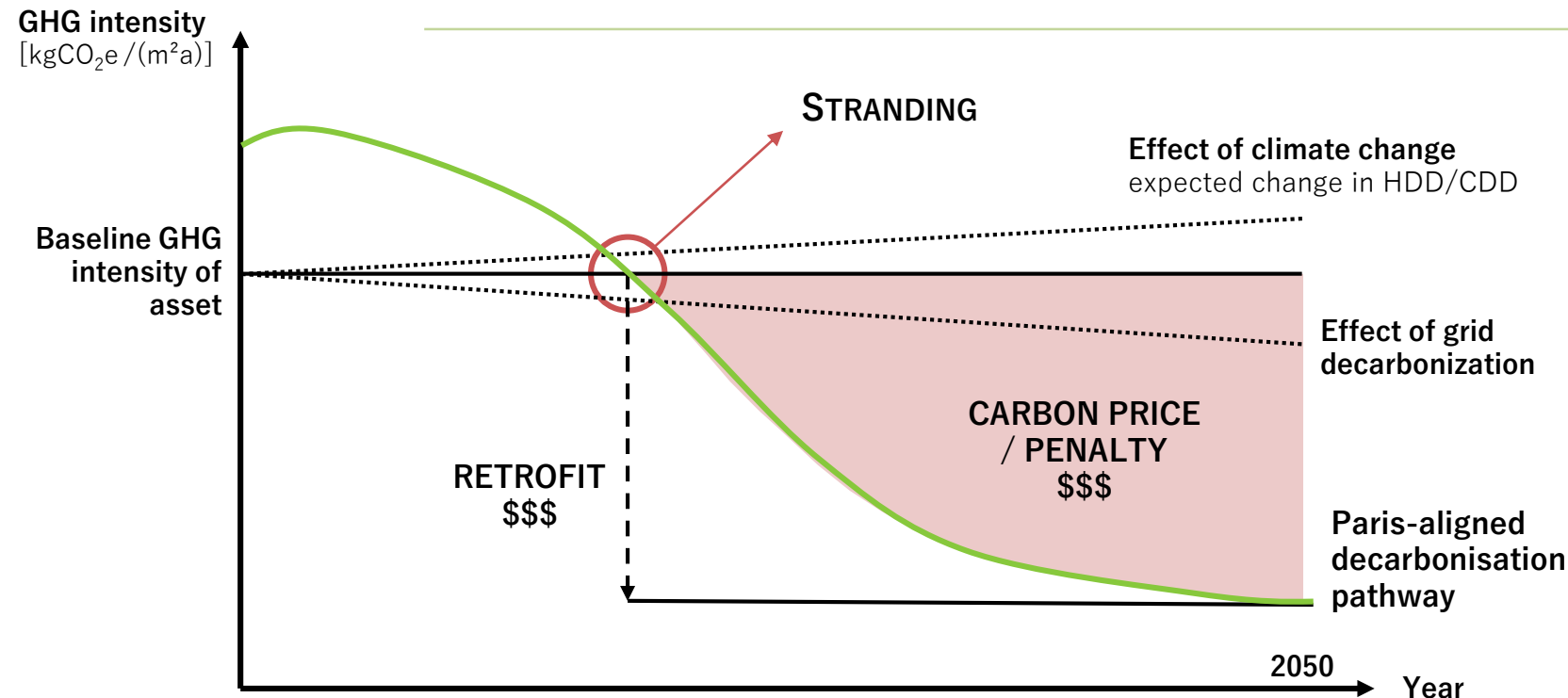
CLIMATE BENCHMARK
IDENTIFY STRANDED ASSETS'

CRREM DECARBONISATION PATHWAYS CRREM RISK TOOL

MANAGE STRANDING/
TRANSITION RISKS

“Stranded assets are properties that will be exposed to the risk of early economic obsolescence due to climate change because they will not meet future regulatory efficiency standards or market expectations.” (CRREM, 2019)

Stranding assets do not meet decarbonisation targets and face potential write-downs



EU SUSTAINABLE FINANCE TAXONOMY

Sustainability Disclosures	EU Climate Benchmarks	EU Eco Label	EU Green Bond Standard
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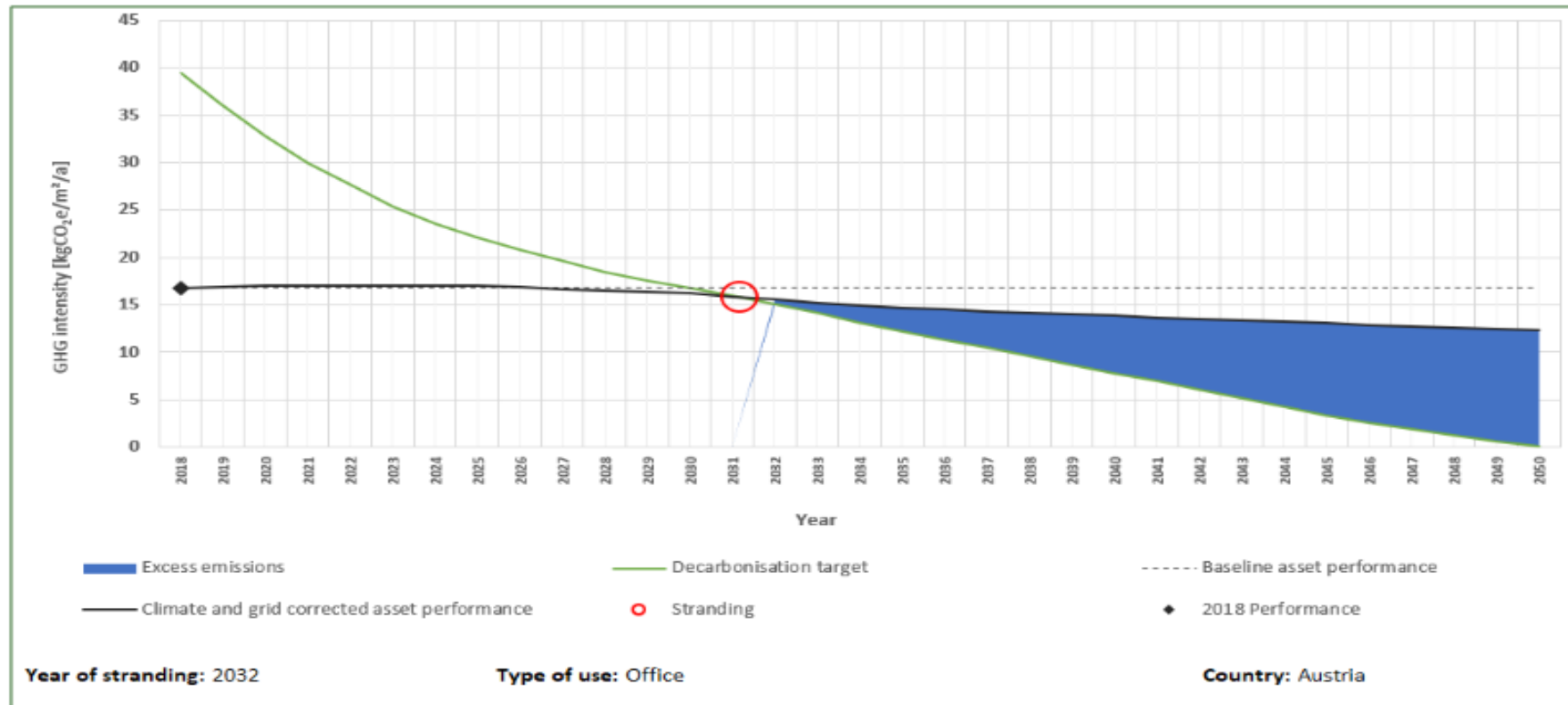
Sustainability Metrics and Thresholds determining eligibility of activities and assets

- no final definition of targets for real estate
- potentially based on „best in class“ approach
- no clear trajectories of „Paris-proof“ targets yet
- starting with energy intensity targets - GHG emissions will be integrated later on

CRREM offers Paris-aligned, country-specific decarbonisation pathways until 2050 and a tool to assess & manage carbon risk

QUANTITATIVE CARBON PERFORMANCE AND RISK INDICATORS: ASSET LEVEL

CRREM TOOL STRANDING DIAGRAM



QUANTITATIVE CARBON PERFORMANCE AND RISK INDICATORS: ASSET LEVEL

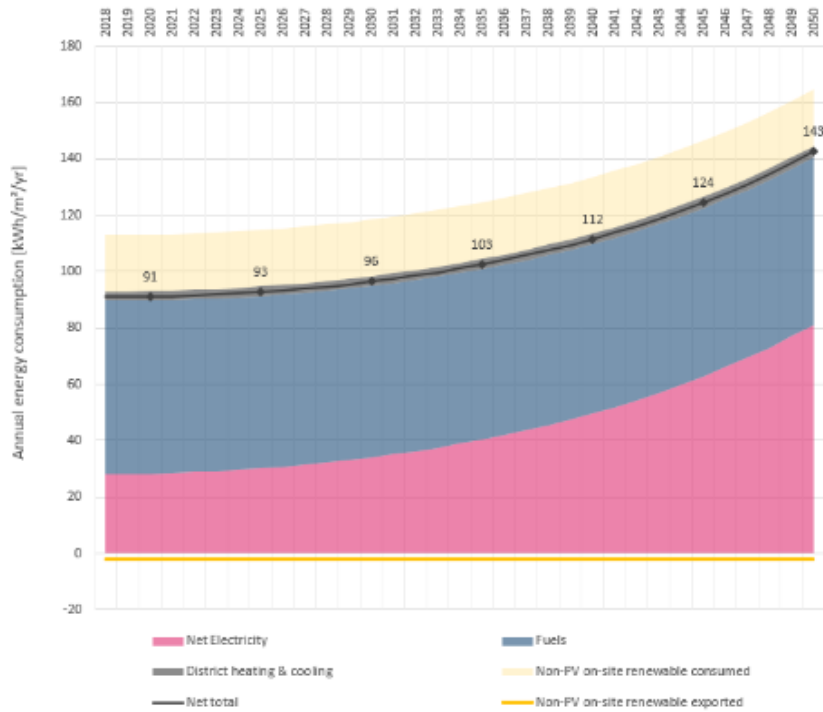
ENERGY CONSUMPTION

Total net energy per floor area (Asset #1 - Steinbach Tower)

Net-energy = procured energy - exported energy = consumed energy - on-site generated energy

Produced energy as percentage of consumed energy (100% means-net zero energy): 45.8%

Share of renewables on energy consumption: 13.1%

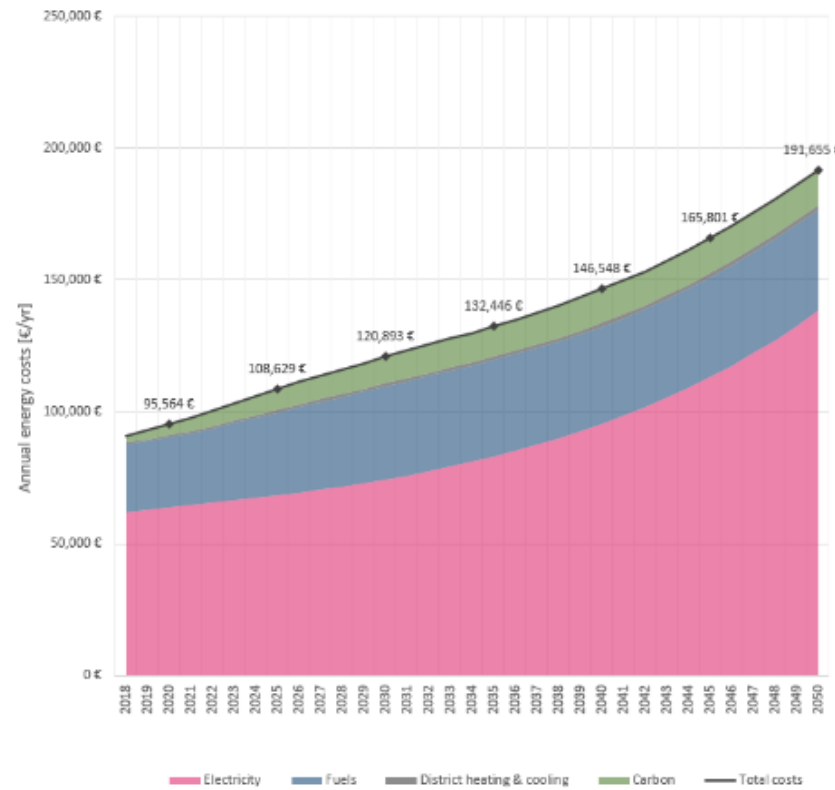


Based on (optionally) normalised baseline consumption and projected data considering changed heating and cooling demand

COSTS OF ENERGY AND CARBON

Costs of energy and carbon emissions (Asset #1 - Steinbach Tower)

[Click here to change default assumptions on energy and carbon prices in the 'Settings' sheet.](#)

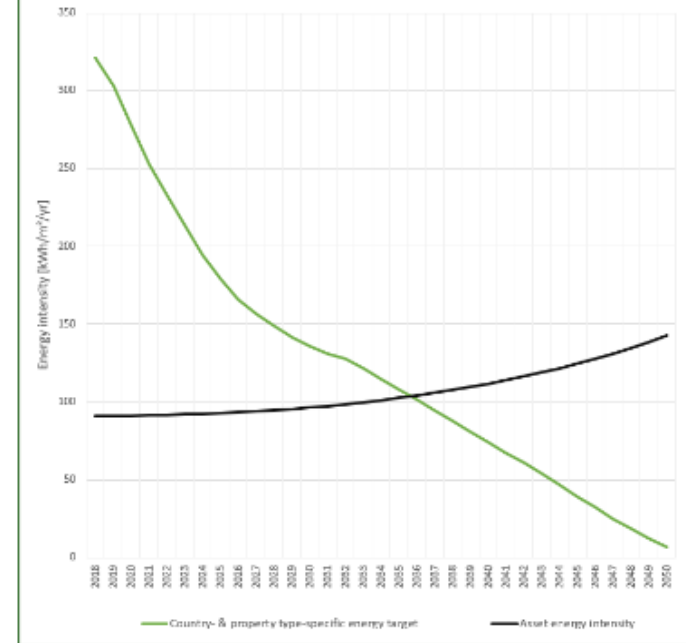


Based on energy and carbon price projections (IEA, EU etc.)

ENERGY REDUCTION PATHWAYS

Energy reduction pathway (Asset #1 - Steinbach Tower)

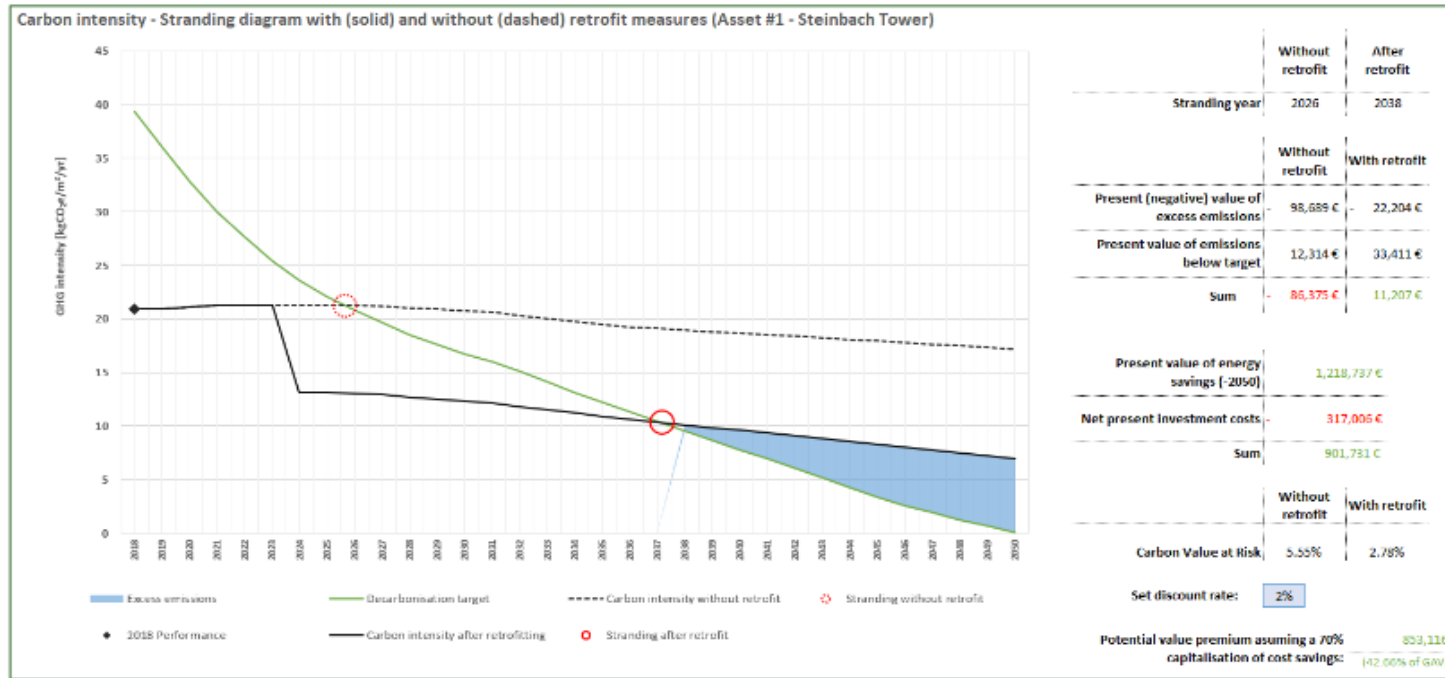
Based on net energy = procured energy - exported energy = consumed energy - on-site generated



Energy targets based on country-specific sector-wide emission factor reflecting energy mix and evolving grid decarbonisation

QUANTITATIVE CARBON PERFORMANCE AND RISK INDICATORS: ASSET LEVEL

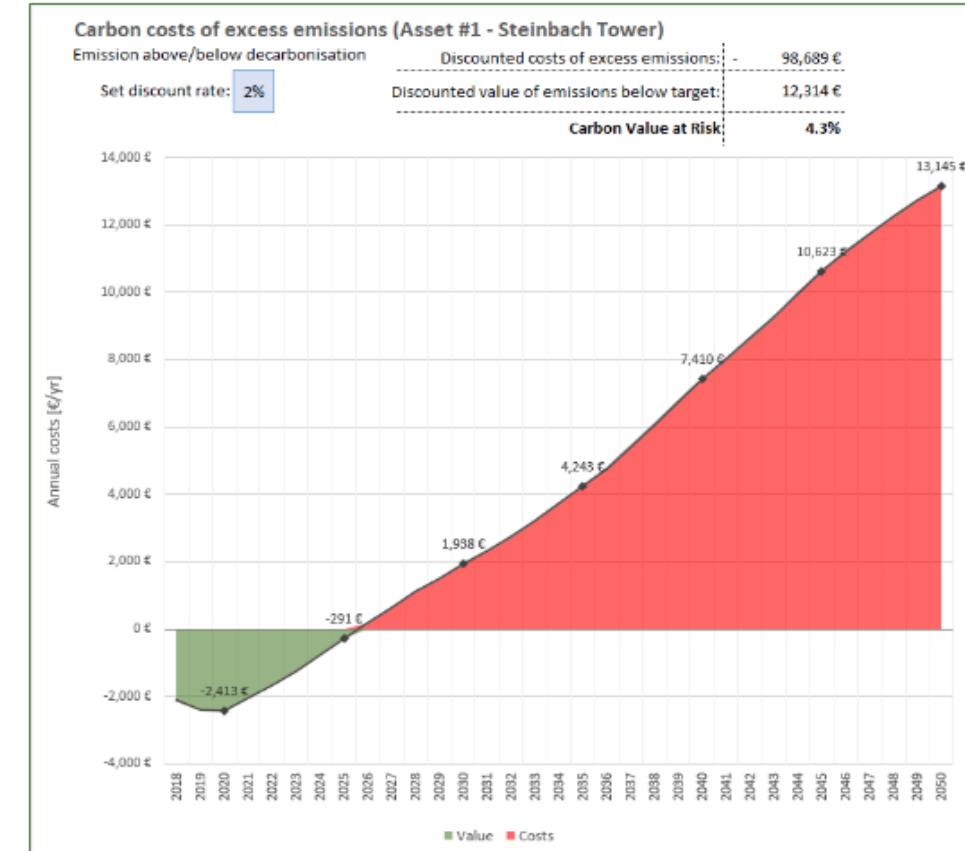
EFFECT OF POTENTIAL RETROFIT MEASURES



Based on marginal abatement costs curves.

Model the effect of retrofit measures on key carbon risk indicators.

COSTS OF EXCESS EMISSIONS ABOVE TARGET



Analogous to the NY City model with penalties for each ton of emission above emission limit (and possibility of trading emission credits)

QUANTITATIVE CARBON PERFORMANCE AND RISK INDICATORS: PORTFOLIO LEVEL

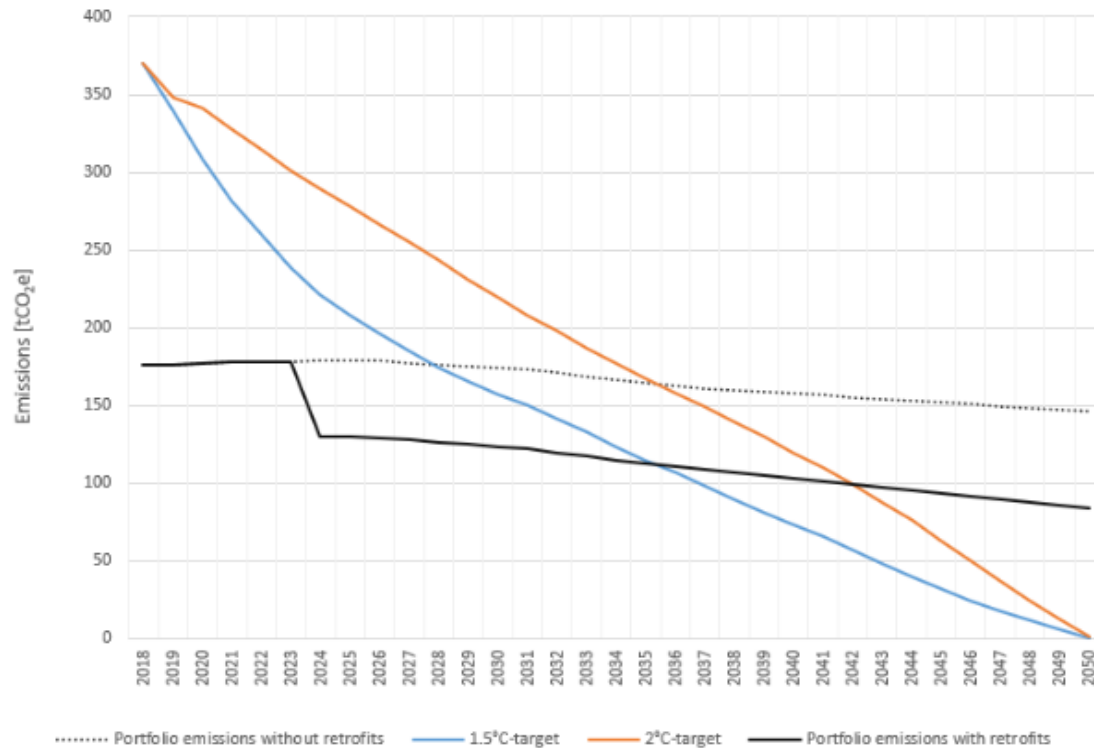
AGGREGATED RESULTS. TOTAL PORTOFOLIO OR FILTERED BY COUNTRY, PROPERTY TYPE OR ENTITY/FUND

PORTFOLIO SUMMARY		Set filter:		Country:	All	Property type:	All	Entity/Fund:	All								
Asset ID (click on an Asset ID to enter updated data)	Year of Stranding		Cumulative excess emissions until 2050				GHG-Intensity 2018 [kgCO ₂ e/m ²]	Cumulative emissions 2018-2050 [tCO ₂ e]	Emission budget 2018-2050 [tCO ₂ e] (red: budget < cum. emissions - green: budget ≥ cum. Emissions)		Discounted costs of excess emissions (incl. value of emissions below pathway) (red: costs > value - green: value ≥ costs)						
	1.5°C-target	2°C-target	Absolute [kgCO ₂ e]		Per GFA [kgCO ₂ e/m ²]						Absolute [€]		Per floor area [€/m ²]		Per gross asset value ('Carbon value at Risk')		
			Set discount rate: 3%														
				1.5°C-target	2°C-target	1.5°C-target			2°C-target			1.5°C-target	2°C-target	1.5°C-target	2°C-target	1.5°C-target	2°C-target
1	2026	2033	1,410,805	853,749	235	142	21	3,890	3,136	4,071	66,240	16,527	11	3	3.31%	0.83%	
2	2028	2035	292,514	178,050	293	178	27	850	728	945	12,733	1,195	13	1	0.21%	0.02%	
3	2037	2043	149,762	86,042	75	43	12	721	1,045	1,357	- 7,171	- 23,742	- 4	- 12	-0.15%	-0.50%	
4	2021	2024	512,858	369,650	1,026	739	72	1,004	560	717	27,951	19,616	56	39	0.59%	0.41%	
5	2023	2028	183,260	82,112	611	274	74	545	420	544	9,541	2,958	32	10	0.95%	0.30%	
6	2040	2045	5,891,230	2,974,680	211	107	59	44,288	79,637	102,685	- 1,076,197	- 2,296,356	- 39	- 82	-3.07%	-6.56%	
7	2024	2031	4,187,293	2,528,000	279	169	28	11,111	7,986	10,448	221,188	89,809	15	6	0.88%	0.36%	
8	2041	2046	2,693,614	1,269,662	180	85	71	27,379	55,498	71,560	- 931,895	- 1,782,207	- 62	- 119	-2.66%	-5.09%	
9	2024	2033	48,326,963	19,368,663	690	277	99	167,248	141,039	183,247	2,396,455	152,413	34	2	0.80%	0.05%	
10	2021	2024	115,558,931	58,334,187	1,651	833	184	299,712	203,795	264,782	6,286,461	3,043,930	90	43	2.10%	1.01%	
11	2024	2033	48,326,963	19,368,663	690	277	99	167,248	141,039	183,247	2,396,455	152,413	34	2	0.80%	0.05%	
Σ			227,534,192	105,413,458	819	380	108	723,996	634,883	823,603	9,401,760 -	623,445	34 -	2	0.93%	-0.06%	

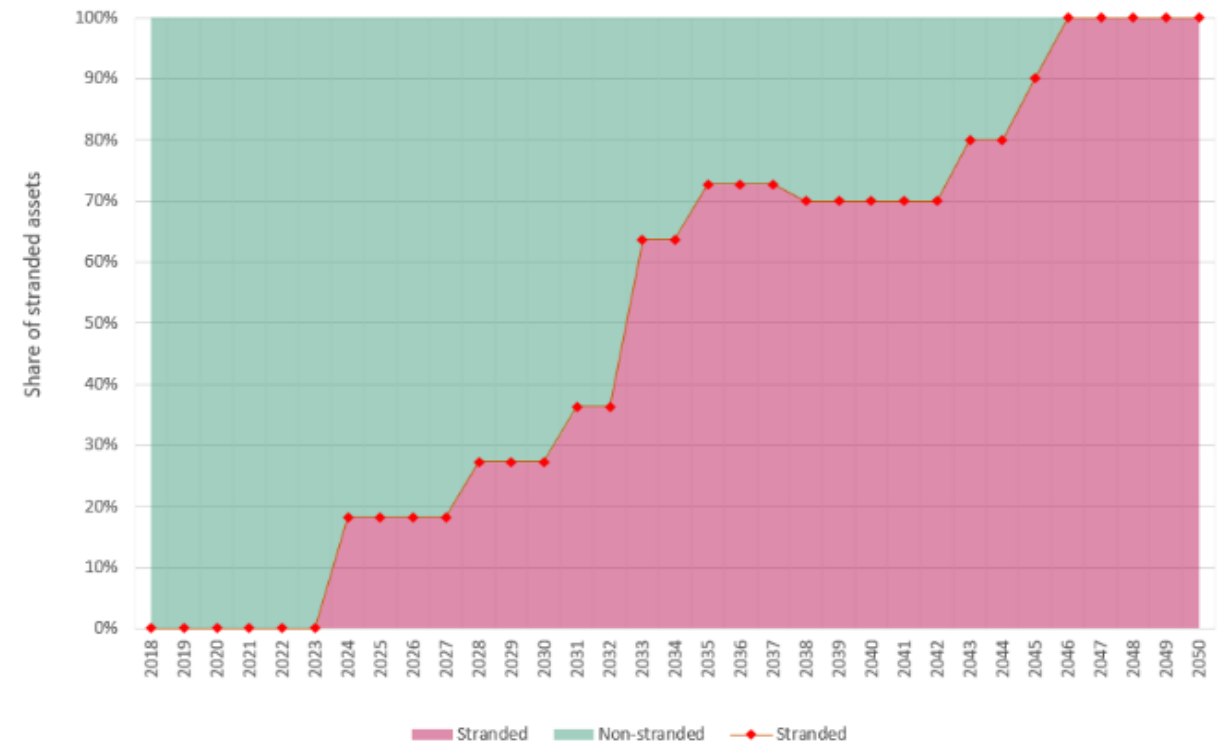
QUANTITATIVE CARBON PERFORMANCE AND RISK INDICATORS: PORTFOLIO LEVEL

ALIGN YOUR PORTFOLIO WITH PARIS DECARBONISATION TARGETS

EMISSIONS OF PORTFOLIO VS. EMISSIONS ACCORDING TO DECARBONISATION PATHWAY



SHARE OF STRANDED ASSETS OVER TIME



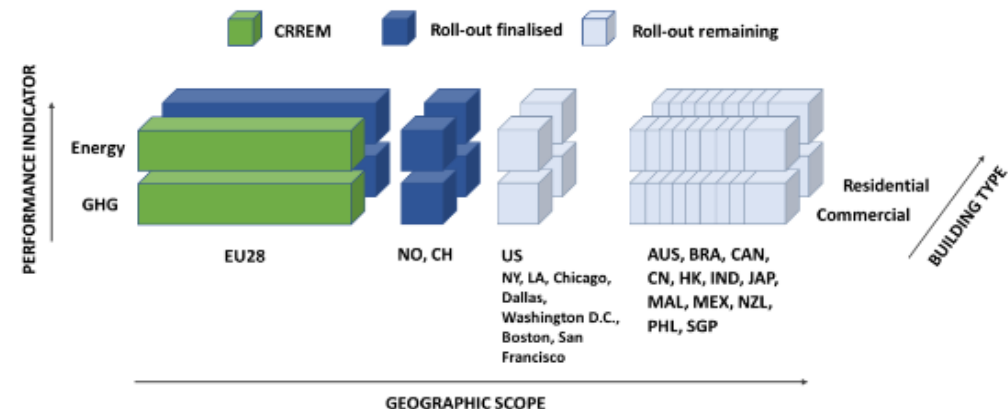
Shares based on number of buildings, floor area or asset value.
Simulate effect of selling building x in year y (here: 2038)

STATUS QUO:

- PILOT TESTING WITH MEMBERS OF CRREM EUROPEAN INVESTOR COMMITTEE (FURTHER PILOT TESTERS ON REQUEST): 01/2020
- INCORPORATION OF EIC PILOT TEST FEEDBACK: 02/2020
- FINAL TESTING WITH FURTHER TESTERS: 03/2020
- PUBLICATION OF PATHWAYS AND TOOL ON WWW.CRREM.EU: 04/2020

RECENT EXTENSION OF SCOPE THANKS TO FUNDING BY 3 MAJOR GLOBAL INVESTORS

- PATHWAYS FOR RESIDENTIAL BUILDINGS AND FURTHER COUNTRIES BEYOND THE EU28
- PUBLIC CONSULTATION: 02/2020
- PUBLICATION OF PATHWAYS: 04/2020



INTENDEND EXTENSION OF SCOPE:

- FURTHER REGIONAL EXTENSION OF PATHWAYS (WITH REGIONAL INITIATIVES)
- PATHWAYS FOR FURTHER PROPERTY TYPES (E.G. INFRASTRUCTURE)
- EXTENSION OF CRREM TOOL BEYOND EU COMMERCIAL REAL ESTATE
- REFINEMENT OF CRREM TOOL FUNCTIONALITY (ABATEMENT COSTS, EMBODIED CARBON, ONLINE TOOL...)



***CRREM* Real Estate Decarbonisation Policy Roadmap**

TAILORING POLICY APPROACHES FOR DIFFERENT TYPES OF INVESTORS.....

- ❖ *The CRREM Policy Roadmap for the 'Hard Cases' – the reluctant laggards.*
- ❖ *The CRREM Policy Roadmap for the 'Mid Market' – Pragmatic Adaptors.*
- ❖ *The CRREM Policy Roadmap for the 'Leading Edge' – Pioneers and early adaptors.*

POLICY RECOMMENDATIONS

Long-term targets for 2030 and 2050 need to be preceded with meaningful 'hard' and enforceable milestones if the ultimate end goal is to be realised. Procrastination is no longer an option either for policy makers or for owners and investors.

Robustness and transparency of construction of new energy efficient buildings and energetic refurbishment measures will inevitably cause resource use and (carbon) emissions. Policy makers' must include these emissions more clearly in assessing their overall approach to tackle climate change.

Process mapping must be enhanced and supported in order to attain the potential benefits to be derived from technologies such as **smart metring and sensor enabled technologies** in a consistent and comparable methodological process in order to improve the robustness of the data collation and performance evaluation at building level.

Policy must place stronger emphasis **on behavioural changes of all stakeholders when it comes to data sharing and collaborative partnering frameworks.**

POLICY RECOMMENDATIONS

Exploration of New and Innovative Funding Models.

Targeted support for investors and owners who are motivated but lack capacity (financial or technical) could initiate impactful reductions in carbon emissions within the real estate sector. In many cases these assets/portfolios have the most intensive carbon profiles and as such can generate 'significant gains' through coordinated intervention strategies.

The exploration of innovative '**city-level**' **financial solutions** also need to be accompanied with the requisite statutory powers for targeting and adaptation of 'stranded' assets where owners/investors are unwilling or lack capacity to conform with policy evolution.

Dates

The seminar will take place in London on **March 20th, 2020** from 14.00 to 18.00.

Final timetable will be confirmed at a later stage depending on space availability.

Drinks will be served after the second panel.

Venue

The seminar will be hosted by **Aberdeen Standard Investment**, which is an active member of CRREM'S European Investors Committee (EIC). The venue is in the City of London, with capacity to accommodate 80-100 attendants.

Address: Bow Bells House, 1 Bread St
London EC4M 9HH
United Kingdom

Nearest stations: St Paul / Bank / Mansion House



How to register

By fulfilling the following form reached through clicking on the link below:

<https://forms.gle/SbkzSx3Wy83XE14b8>

Deadline for registration: March, 10th 2020

Chairs of the Seminar:

Paloma Taltavull de La Paz, *University of Alicante, Spain*

Juan José Lafuente, *IIÖ, Germany*

Organizers:



Universitat d'Alacant
Universidad de Alicante



G R E S B



Ulster
University

TIAS

SCHOOL FOR
BUSINESS AND SOCIETY

IIÖ

INSTITUTE FOR REAL ESTATE
ECONOMICS



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 785058.

With the collaboration of:



European Real Estate Society

LONDON INDUSTRY SEMINAR CRREM-ERES

STRANDING RISK



March 20th, 2020
LONDON



CONTACT

CRREM | CARBON RISK REAL ESTATE MONITOR



PROF. MARTIN HARAN

DIRECTOR OF RESEARCH ON PROPERTY AND PLANNING ULSTER UNIVERSITY

Martin.haran@ulster.ac.uk

+44 90 368757



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