

# CRREM

## Carbon Risk Real Estate Monitor



### CRREM PUBLIC CONSULTATION

- *consolidated feed-back and CRREM comments regarding:*
- *CRREM METHODOLOGY DOCUMENT*
- *CRREM – The SBTi ALIGNED PATHWAYS*

*Final Version January 2023, V.1.0.*



**CRREM**

# CRREM PUBLIC CONSULTATION REGARDING THE RELEASE OF THE UPDATED CRREM-THE SBTi ALIGNED DECARBONIZATION PATHWAYS FOR THE IN-USE PHASE OF BUILDINGS

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# 1 GENERAL INFORMATION

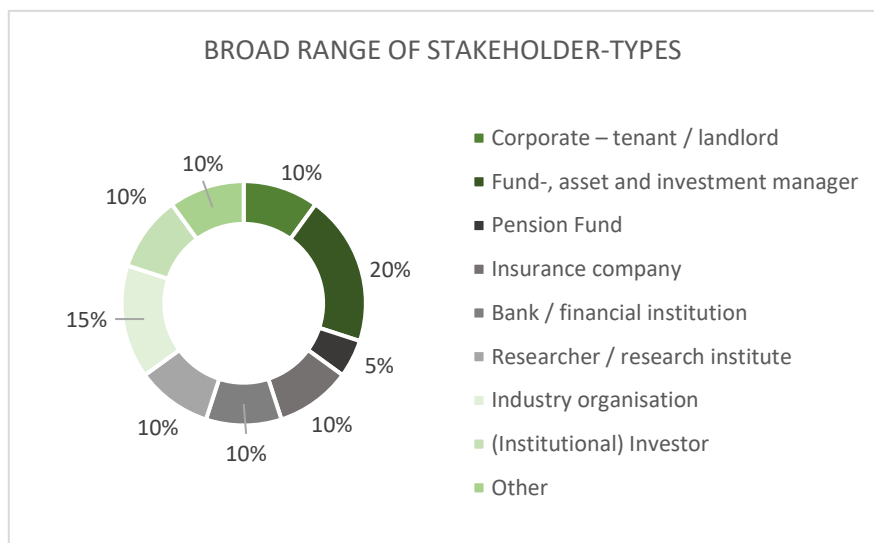
The joint CRREM-SBTi public consultation phase started on the 12<sup>th</sup> of October 2022 and closed officially on the 12<sup>th</sup> November – feed-back was accepted one week longer until Friday the 21<sup>st</sup> November. The consultation was referring to the two files:

1. CRREM downscaling and assessment methodology Public Consultation (provided as .PDF, date: 12.10.2022)
2. CRREM\_Global\_Pathways-v2\_Public Consultation (provided as .XLS, date: 12.10.2022)

Consultation was broadly announced via information on our webpage, linked-in posting and via direct mailing to all our partners and stakeholders we engaged with during the last years. The CRREM team hosted also four webinars for the CRREM Global Scientific and Industry Committees (GSC and GIC) to highlight and discuss changes and updates to the methodology, as well as data input and ensure sufficient input from the committees 60+ international real estate experts. Further, many webinars and 1-on-1 meetings were held globally in order to ensure full transparency with all partners, interested parties and all other stakeholders. The feedback received came evenly from all global regions (predominantly Asia Pacific, Australia, Americas and the EU). For feed-back we offered a structured web-based-survey-tool or direct submission via E-mail contact.

CRREM has a strong group of independent reviewers regarding the methodology. Subsequent to extensive internal and external review, CRREM has a Scientific Advisory Committee as well as Industry Committee, who also both provided valuable feedback and challenged the methodology. Further, already pre-release of the pathways, numerous data points and input parameters were already aligned with the many data-partners that CRREM has globally.

The respondents ranged from banks, CRREM service providers, other partners, consultants to fund-, asset as well as investment managers and also included state funds, pension funds and industry organizations. In total stakeholders providing feedback represented over \$ 1.000 bn of AUM (Assets Under Management), and managing over 30,000 buildings. This indicates that feedback was provided from global payers who are able to make well informed and accurate decisions and provide valuable feedback on the updated CRREM pathways.



**In total 46 responses to the update of the pathways have been received** – they range from participation in the online survey to long consolidated written statements sent as letter. Over 70% of the survey participants were already users of the CRREM pathways and the tool or industry bodies representing a larger group of investors/stakeholders acting in a specific region.

All feed-back was processed from the CRREM team in detail: it was commented and if the arguments or additional / new data sources lead to changes these were either integrated in the pathways itself or/and in the methodology document. The pathways improved regarding the granularity and accuracy in terms of the underlying data.

In regards to the carbon-intensity - a lower starting point is due to the progression in grid decarbonisation and exclusion of transmission and distribution losses. **Over 75% of the respondents stated good to very good detail on the methodological approach and approved of the updated energy- and carbon-intensity pathways.**

The outcome and our feedback on the consultation is structured in the following way:

- ❖ In this document we display all results stated in the survey in a structured way. If these comments and arguments stated triggered changes to the pathways and/or methodology document we transparently state that. **All aspects raised in the survey consultation are connected to a formal reply of the CRREM team in this document.** In addition to that, any **final changes or additions to the methodology document, the reference guide or the pathways are summarized in green text.**
- ❖ Further to this document we also **upload all letters directly addressed to us via mail** (GRREN, WGBC, DGBC, Australian Property Council, BBP, GBCA). In our **formal reply to each letters separately to this document**, it is stated who provided that input and we directly reply after each aspect to the raised topics. Again, clearly stating if and how these aspects led to changes regarding the pathways and /or methodology document.
- ❖ In total another **approx. 15 further mails** were sent to us (referring to the input from Nordea, NZAOA, Allianz, Deka, OCBC, CSR Design, SwissLife, IIGCC, Vonovia, Deepki, etc.). We **integrated points raised and our answers to those in a separate section in this document** if the topics were of general relevance to this consultation.
- ❖ If comments were purely individual remarks on user specific aspects or referring to spelling mistakes, we directly addressed these aspects in our documents (for mistakes) and potentially contacted the stakeholder for clarification. For transparency reasons we do not flag/display these aspects in this document.

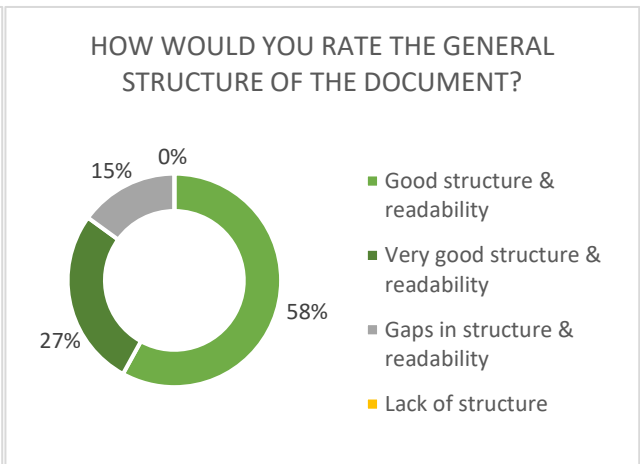
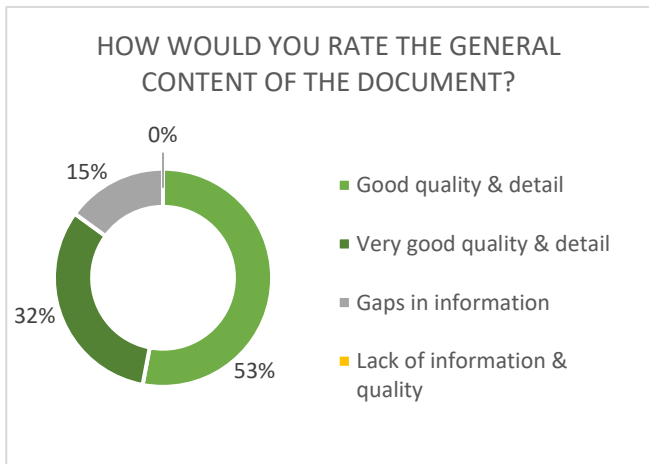
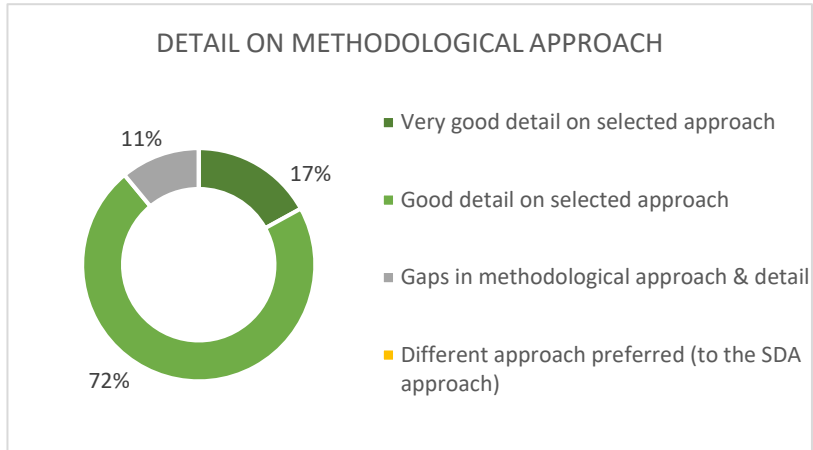
## 2 THE METHODOLOGY DOCUMENT

### 2.1 GENERAL FEEDBACK

The CRREM initiative has published a downscaling methodology document along with the updated pathways to ensure transparency and educate the market on the current methodology used. Over **85% stated** that the general content of the document was in good or very good quality and detail.

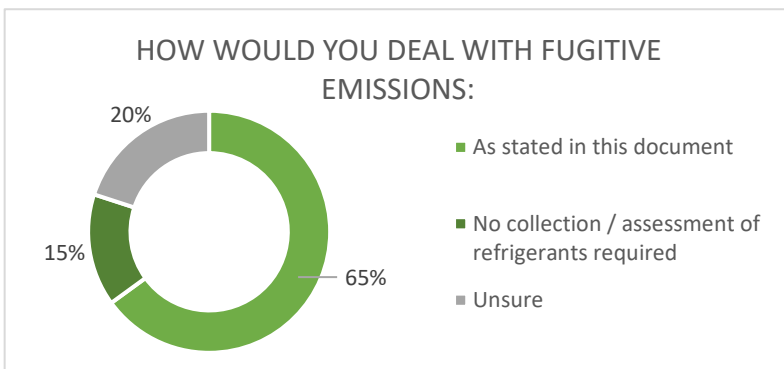
Further, responses indicate that the document had good to very good detail on the selected approach.

With more than 85% stating that the document had good to very good detail on the methodological approach. Nobody used the scoring “lack of information & quality”, “lack of structure” or “different approach preferred (to the SDA approach).”



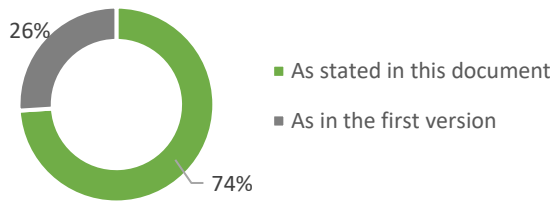
#### ADDITIONAL FEEDBACK:

Feedback was also requested regarding further methodological aspects of the underlying calculation of the pathways. Viewpoints included allocation of fugitive emissions/ F-gases, energy-targets, further granularity regarding the M-parameter, and switching to emission factors which exclude transmission and distribution losses.



Nearly 65% of the respondents agree with the current CRREM view regarding the need to collect and track fugitive emissions/F-gases. Most other participants stated that they see the need but are still struggling to collect the data and are unsure about this. Only 15% stated that the collection of fugitive emissions are from their point of view not required.

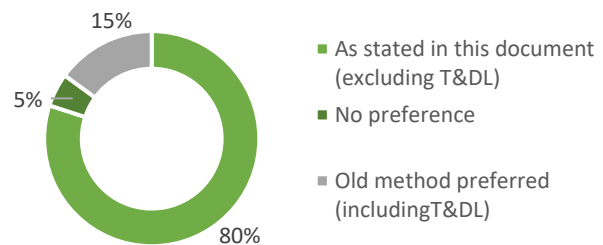
#### HOW WOULD YOU DEAL WITH THE ENERGY-INTENSITY TARGETS:



A further question asked the survey participants on the preferred approach regarding the energy-intensity targets. The graph on the left indicates that the **overwhelming majority prefer** the revised approach regarding final energy targets based on the available budget of renewable energy for the in-use phase of buildings. A further **83% also agreed on the new implemented cap of 1 on the M-parameter of the SDA approach**. The remaining 17% showed to be indifferent regarding the M-parameter.

Already well in advance of the public consultation, the CRREM initiative collected market opinions and feedback regarding the choice of grid emission factors to be used. The initiative concluded to exclude transmission and distribution losses in order to be fully aligned with the SBTi. Over **80% also agreed to align with the SBTi and exclude transmission and distribution losses**. It was also noted that starting this discussion via CRREM was for some market participants the first time to think about the differences and content related to some of the EF the applied in the past without questioning if they were representing on or the other concept.

#### HOW WOULD YOU DEAL WITH THE TRANSMISSION & DISTRIBUTION LOSSES OF THE ELECTRICITY GRID EMISSION FACTOR:



Further individual comments included:

- ❖ **Comment regarding location based vs. market-based EF:** Answer provided by CRREM - We recommend to carry out the transition-risk analysis on a location-based data level (since the property will be acting in the local grid still after the green energy procurement expires and / or the investors is changing). Of course, market participants can also use market-based views and we support the procurement of green-energy. The SBTi accepts market-based-emission factors for companies Scope 2 assessments. Also, in personal exchange with many market participants this aspect was raised numerous times. Thank you very much for the valuable comment (we will add more clarification to the document in this respect).
- ❖ **Comments regarding FAQ-document:** *"Questions might occur around refrigerant EF (GWP100?)" and "off-site" green electricity like PPAs, do they qualify for emission reductions on the balance sheet?"* Answer provided by CRREM - F-gases are based on GWP100. In the tool input data will be equally used/ updated. // Regarding PPA we will add more details to the reference guide.
- ❖ **T&D losses rate differentiation on a global scale:** Answer provided by CRREM - The T&D losses are based on the national level according to the EF gathered for the specific country. If market-based assessments are applied with the CRREM-tool market participants should also ask their energy provider for any specific figure on local/regional T&D losses accordingly. This aspect will be added to the reference guide (not the methodology document) accordingly. Thank you very much for the valuable comment.
- ❖ **Updates on 2-degree-pathway:** Answer provided by CRREM - After receiving feedback from the market, we will also update the 2°C pathway in 2023.
- ❖ **Country codes in the Excel:** Answer provided by CRREM - Some country codes were wrong Lithuania and Bulgaria. Thank you very much for the valuable comment, this has been fixed.
- ❖ **Emission factor Resi vs. CRE:** *"According to p51(PDFp52) of the document, the Energy intensity starting value of Residential will be lowered because of "slightly lower weighted emission factor for residential buildings". Could you explain in more detail the meaning "slightly lower weighted emission factor for residential*

*buildings”?” Answer provided by CRREM - Residential EUI and all EF were updated. If a certain EUI is combined with weighted EF (EF grid multiplied with the energy source share of the electric grid plus EF gas multiplied...) this is resulting in a revised carbon intensity. Lower EUI c.p. leads to higher carbon intensity. Lower weighted EF c.p. leads to lower carbon intensity (and of course vice versa).*

- ❖ **Sources used for Japan:** *“According to p52(PDFp53) of the document, Source 2020 is same as Source 2018. If I take into consideration the past performance EF and Japan’s latest Strategic Energy Plan, I think there is a possibility that Japanese EF could decline more”. Answer provided by CRREM - Thank you for this valuable comment – this has been updated!*
- ❖ **EUI intensity in the baseline year:** *“For certain countries (esp. Germany and Netherlands) the new pathways start much-much lower leading to similar problems as mentioned above (substantial immediate changes in targets). Probably the old values were somewhat too high but maybe the new ones are too low.” Answer provided by CRREM - In the Netherlands now for example, we have directly aligned the data with the DGBC and have confirmed the numbers with the DGBC. The pathways are now more accurate in term underlying data. In regards to the carbon-intensity- a lower starting point is due to the progression in grid decarbonisation and exclusion of transmission and distribution losses. For consistency you also need to apply the lower (excl. T&D losses) EF for your assessment.*
- ❖ **Request on update webinars to be held:** Answer provided by CRREM - The CRREM team will host multiple webinars in Q1 to highlight and explain in detail all changes from the previous to the new pathways. A presentation will also be available on our homepage summarizing the key changes. The CRREM initiative will further hold another GSIC meeting in Q1 and can also accommodate individual seminars focusing on the explanation of the differences.

## 2.2 ADDITIONAL SUBMITTED FEEDBACK

- ❖ *“In your 2018 model description you show a residual GHG budget of 191 Gt. In your current version, there is still a residual budget of 102 Gt GHG emissions. This is a considerable reduction of the budget. Despite its importance, this deviation from your first version is not discussed in detail. Yet the new pathways represent a significantly higher level of ambition. How do you explain this massive reduction in the budget and can you outline how the reduction is distributed between the factor’s emission 2018-2019, recalculation of non-CO2 emissions and exclusion of performance losses and others? Can you please also address how the distribution of non-CO2 emissions between residential and non-residential buildings has changed and which pathway (CO2 only or GHG) is relevant according to SBTi?” Answer provided by CRREM:*

  - First CRREM version: 191 Gt CO2e is the total GHG budget for the building sector from 2018 to 2050 (first CRREM version). The 2018 to 2050 CO2-only budget in the first CRREM version was 130 Gt CO2 (excluding other GHG). The value for 2020 to 2050, based on these values, is 167 Gt (all GHG), or 111 Gt (CO2 only) - i.e. two years must be deducted for a like-for-like comparison.
  - 2nd CRREM update: If we were to include the transmission and distribution losses according to the IEA NZE, this would result in a CO2-only budget of 107 Gt for the period 2020 to 2050. This deviation from 111 to 107 (minus approx. 3% with the new version in relation to the total property-related budget in the period 2020 - 2050 vs. the first version) reflects in particular the overshoot of the past two years.
  - T&D losses effects: Without T&DL, the update now results in a budget of 91 Gt. for CO2-only (delta of approx. 15% from this effect over the entire period under consideration; 107 vs. 91) - whereby the T&D losses are higher in the first years and become lower in the further future.
  - Other GHG with increased accuracy: The remaining difference between the first CRREM version and the update is due to the increased accuracy for other GHG emissions. In the first CRREM version, a rough estimate of "other GHG" emissions was calculated using a factor calculation based on the global ratio in the total budget (assuming identical add-on for all sectors). However, the now possible closer examination shows that many of the non-CO2 emissions occur, for example, in agriculture, and thus the add-on/allocation to the real estate sector can be reduced. This results in a budget of further GHG emissions for the real estate sector of now 10.6 Gt (Share other GHG like F-Gases to CO2 only within real estate approx. 9.85 %). These are predominantly F-gases. This budget was calculated on the basis of the emissions in the base year (GHG inventory UNFCCC) and updated on the basis of the Kigali Amendment to the Montreal Protocol. (For further explanations see methodology document page 16 and page 37 - these data are now available and thus allow for better accuracy/removal of flat-rate surcharges).
  - Points 1-4 thus explain the transition from 167 to 102 in detail.
  - This increased accuracy of non-CO2 emissions has a particular impact on residential buildings. We have looked at the sources of non-CO2 emissions, where available, and distributed them accordingly. Here, especially in Central and Northern European countries (such as Germany, Austria, etc.), the majority of the other emissions occur in the area of food refrigeration and in warehouses. Accordingly, only a very small proportion of this budget was distributed to residential buildings.
  - The values for 2021 to 2050 are thus influenced in particular by the starting values and the global course of emission reduction as well as the area developments (cf. SDA Approach).
  - For SBTi the CO2 value is relevant, as this part of the publication (CO2 paths) is jointly agreed. Anything that concerns SBTi directly, please also coordinate directly with Karl Downey (Karl.Downey@cdp.net).

- ❖ *“We have tried to reproduce your calculations of the CRREM paths. In doing so, the source references provided are often not helpful and require more elaborate searches. This is especially true for the revaluation of non-CO2 emissions, which has a very high impact on the new pathways. Here, the transparency regarding the cause and derivation in detail is insufficient. After reviewing the IEA calculations, we understand that the absolute emission of the global building sector in 2020 is 9.3 Gt (source: <https://www.iea.org/data-and-statistics/charts/co2-emissions-from-the-operation-of-buildings-in-the-net-zero-scenario-2010-2030>).*



*However, we see emissions below 9 Gt in graphs 11+13 and emissions above 10 in graph 12. Could you please explain numerically how the exclusion of distribution losses and the addition of non-CO2 emissions determines the value? Or please refer to the specific source of absolute emissions.” Answer provided by CRREM:*

- Non-CO2 emissions are distributed by means of base year emissions after reporting to the UNFCCC (see 1.3) [https://di.unfccc.int/comparison\\_by\\_category](https://di.unfccc.int/comparison_by_category)
  - <https://cfpub.epa.gov/ghgdata/nonco2/>
  - The baseline figures are based on the IEA NZE scenario. An overshoot which occurred in 2020/2021 will be handled in future updates. As stated in the methodology document, an overshoot will lead to steeper pathways for the next decades.
- ❖ *“The same ambiguity exists for us with regard to the absolute emissions for 2030, 2040 and 2050. We understand you to say that the IEA data are again the source for the absolute target emissions here (source2030: <https://www.iea.org/data-and-statistics/charts/co2-emissions-from-the-operation-of-buildings-in-the-net-zero-scenario-2010-2030>; source2040+2050: <https://www.iea.org/data-and-statistics/data-tools/net-zero-by-2050-data-explorer-for-direct-emissions>). Could you please explicitly refer to your sources here as well? Is it your assumption that there will be no more indirect emissions in 2040 and 2050, through complete decarbonisation of the energy sector? If not, please show which indirect emissions you assume for the above years.” Answer provided by CRREM:*
- The data refer to the emissions that occur directly in the building (without emissions from district heating and electricity use). The figures used are identical to those in the IEA source you mentioned. (Yes,) on a global level, the IEA assumes a complete decarbonisation of the electricity sector.
- ❖ *“We understand with your calculation/methodology, we have to account for the emissions of our buildings including household electricity in order to follow the CRREM methodology. This is challenging and burdensome for us as landlords, as the purchase of household electricity is a matter for tenants and electricity suppliers. What was the assumption made for the level of household (HH) electricity in each country? How does the assumed household electricity develop until 2050? Please refer to the specific sources, at least in the case of Germany.” Answer provided by CRREM:*
- The share of household electricity is given as 19% for Germany in the base year. This is derived from Germany's energy balance.
  - The share increases overall due to electrification.
- ❖ *“From the information provided so far, the balancing of the buildings is not clear, we had to conclude a lot rather implicitly. The distinction between "net energy demand" and "energy consumption" on their document was not understandable. An explanation would be necessary here. It would be very helpful for us if the accounting rules of CRREM were presented in more detail. We understand that the CRREM methodology excludes the upstream chains for all energy sources. Have we understood this correctly? Furthermore, the treatment of heat pumps in particular should also be addressed and whether we can simply follow the national calculation methodology for final energy demand and emissions.” Answer provided by CRREM:*
- Thank you for the feedback on understanding energy consumption. We will adjust this in the methodology document.
  - The accounting is also explained in detail in the new joint GRESB/PCAF/CRREM document on carbon accounting (consultation version online).
  - In principle, all consumption within the building must be accounted for (direct combustion, electricity use and district heating).
  - Self-generated electricity (e.g. solar roof) is no longer deducted from energy consumption. We are responding to feedback from the market. It was often pointed out that the target paths according to "net energy demand" are not achievable or that for many market participants the difference to their own consumption was not clear / was not taken into account. Also, in many cases it is economically more efficient to generate the required energy in larger plants and not decentral. We will add more clarification on the EUI and GHG intensities resulting from renewable energy production on site to the methodology document.

- ❖ *“Page 10: Could you provide more insights on how you consider markets / emissions not explicitly covered by CRREM?” Answer provided by CRREM:*
  - Further documentation will be provided in Q1 for not covered regions.
- ❖ *“Do you, for example, reduce the “available” (operational) real estate budget you then allocate to CRREM-covered markets?” Answer provided by CRREM:*
  - Yes, the amount relevant/allocated to the countries and markets covered is taking into account the budgets that would be needed for market not explicitly included as a separate pathway yet. We will review the section in the methodology document and potentially add more clarity there.
- ❖ *“Do you adjust the “available” (operational) real estate budget considering e.g. embodied carbon? Or would embodied emissions be – in the spirit of SBTi – simply be considered via the respective industry sector?” Answer provided by CRREM:*
  - We are only focusing on the operational use phase. So only that amount is “extracted” from the IEA / IPCC etc. sources. The SBTi is working with Ramboll on pathways for embodied carbon.
- ❖ *“Could you explain in more detail why a “global district heating pathway” is required?” Answer provided by CRREM:*
  - This is required in order to take these emissions into account for Scope 2 (just like we take electricity consumption in buildings into account). If we wouldn’t take these into account, the carbon allowance of the building sector would not be accurate (too low).
- ❖ *“Country level pathways – these are based on a steady convergence to the benchmark value point from a starting point relative to the global average. Could you clarify how this is consistent with IEA NZE which specifies accelerated decarbonization for electricity generation in developed markets.” Answer provided by CRREM:*
  - The advanced and developing grid assumptions are indeed incorporated in the global pathways developed by CRREM. For advanced economies we applied 1,5 degree aligned decarbonization pathways by national sources which are of course also showing an accelerated grid decarbonization compared to the once applied for developing countries. In addition, further effects occur in advanced economies and must be taken into account. Base year emissions shares within the real estate sector (in use) from direct combustion tend to be higher for these countries (e.g. often more heating via direct combustion with gas or oil). The effect of comparably high shares of other energy sources than electricity would “reduce” the impact of a potentially faster grid decarbonization in those countries (since the energy mix must change towards more “electrification” in the first place). Also, the effects are dependent on the questions if the EF for other energy sources are lower or potentially already higher compared to the EF of electricity (this effect could change of course over time once the EF of the electric grid moves to figures below the EF of gas etc.). Also, the cap of the m parameter is leading ceteris paribus to steeper curves for advanced economies (for details see methodology document where more explanation is added regarding this aspect).
- ❖ *“Page 28: Could you explain in more detail how the “weighted EF” is derived and used via the downscaling procedure?” Answer provided by CRREM:*
  - We look at the country- and property-type (Residential vs CRE) energy-mix as it is today and create a weighted emission factor with the different energy sources. (e.g. (80% grid \* EF 0,5 + 20% gas \* 0,18 in 2020 etc.). All sources and their emissions factors add up (account for the relative shares in the energy mix) to the weighted factor in the base year. That is country specific and differentiated for CRE and RESI. For CRE we differentiate further for the share of electricity. Projections on the grid decarbonization and projected country specific changes regarding the energy mix for RESI and CRE change the weighted EF over time accordingly. Therefore, we clearly place also a 1,5-degree ambition on the energy sector. In 2050 this mix may be 90% grid \*EF 0,1 + 20% gas \*0,18 etc. The decarbonization pathway for certain use types in certain countries are then combined with the respective weighted EF applied to derive the EUI over time (until the energy target is reached).
- ❖ *“Page 28: Could you please provide an overview (a) for which countries / sub-sectors / ... national statistics were used and (b) for which countries / sub-sectors / ... calibration factors were used (if not available via the “data sources” section)?” Answer provided by CRREM:*

- Thank you for this comment. We will add some sources that might have been missing (the document was already quite long).
- ❖ *“Page 29: Could you elaborate on the “-2.9% p.a.” reduction requirement derived from the UN SDG? How does this relate to the general methodology / philosophy (esp. now in light of the new EUI methodology that assumes constant EUI from a certain point in time)?” Answer provided by CRREM:*
  - As the energy-intensity pathway is derived from the carbon-intensity pathway, in some cases there would be an increase in EUI “allowance”. The upward trend in the energy-intensity will then be noticed, if the weighted emission factor is decreasing at an accelerated rate in some years until 2050. This may be the case because of a high ratio of electricity in the energy-mix and a country with fast grid decarbonization. This would then impact the weighted emission factor and cause a steep decrease in carbon-intensity, however result in an increased “allowance” of energy-use. Therefore, the implemented cap of 2,9% will result in a decrease in energy-intensity along with the carbon intensity.
  - E.g.  
 2021: 50 KgCO<sub>2</sub>\*m<sup>2</sup> / weighted EF 0,2 = 250 kWh\*m<sup>2</sup>  
 2022: 47 KgCO<sub>2</sub>\*m<sup>2</sup> / weighted EF 0,18 = 261 kWh\*m<sup>2</sup>
- ❖ *“Page 35: This is a truly fundamental issue: I struggle with the statement that only the “ ‘location-based’ approach instead of the [...] ‘market-based’ approach” can be applied to “yield meaningful results” (esp. now in light of the new EUI methodology). Greatly simplifying (!), the SDA approach allocates the “fair share” of a carbon budget to a certain sector / company (considering certain parameters such as growth rates). It’s i.m.o. appropriate to rely on “average performance” (= “location-based” when it comes to elec.) to allocate the “fair share” – while still comparing “actual performance (maybe even best-in-class)” (“market-based” when it comes to elec.) against the “fair share”. Again, greatly simplifying (!), based on previous SBTi target setting methodology, one would have compared carbon performance against a single global pathway that was derived via the SDA approach (= “location-based”). Carbon performance could be derived after considering RECs etc. (= “market-based”). Ignoring all criticism concerning “green electricity” instruments for the time being.” Answer provided by CRREM:*
  - We agree generally with your view. Market-based assessments are also still possible within the tool and according to The SBTi assessment. For transition risk of the property itself bound to a specific location we still think that, if possible, you should use the location-based factors, which will allow the best “like-for-like” comparison and optimization on the asset. So: We recommend to use the location-based factors. However, in the tool we will keep the option for all users to switch to the market-based approach if they wish. The emission factors can be overwritten in the settings sheet.
- ❖ *“A 2-degree target should be presented in addition to the 1.5-degree target from the point of view of the German real estate fund industry, as some houses have chosen this 2.0 target path as implementation targets for sustainable products. A change to 1.5degrees in combination with the changed criteria for the conversion factor (without transmission losses) and the lower remaining CO<sub>2</sub> budgets would increase the costs and implementation requirements so much that the previous link to the CRREM path seems to be strongly questioned or no longer possible.” Answer provided by CRREM:*
  - A 2-degree path will be most likely added in Q1. // Regarding the T&D losses: since also on the object level the new EF (lower) should/must be used, no changed ambition/no stranding result of the objects can be derived for this reason (formulated differently: the benchmark is lower, but your result on object level accordingly as well).
- ❖ *“We welcome the inclusion of CO<sub>2</sub> equivalents, but the recording of these losses, for example of F-gases, is very difficult to implement (currently there are only a few companies that deal with this issue, this is even at a building very decentralized care, because, for example, the individual tenants of a shopping center usually organize their air conditioning repair themselves). So a systematic collection of this data is not easy.” Answer provided by CRREM:*
  - You can then only benchmark against the CO<sub>2</sub> path. // However, various market participants from the retail sector (e.g., Metro worldwide) already do this. Please note that even if there is the problem that you are not (contrary to Metro) a self-user, your tenants also need this data, since according to the GHG prot. the losses from refrigeration systems at your tenants in the case of operational-control at the tenant must be recorded and reported by them as Scope 1.

- ❖ *“eGRID data actually goes down to the ZIP code level which is more precise, linking the asset to the specific grid which feeds it energy and therefore the precise factor. This approach is used by both ENERGY STAR and BREEAM In-Use for calculating CO2 emissions. CRREM should consider taking this refined approach to future proof the methodology and align with standard practices in the US.” Answer provided by CRREM:*
  - In order to calculate a pathway for a sub-region in the USA (i.e. NY, LA, etc.), we require to use a location-based approach as we go with the average EF (average energy-mix, average emission factors and developments in the particular country or region) to derive our country or sub-regional pathway. We also recommend the location-based approach, however, in the tool ZIP code specific factors can of course be entered and our data overwritten. The asset baseline performance will then be exact to the emission factors the user has entered in the tool. Of course, in the next year we want to create even more specific regions in the USA.
- ❖ *“The CBECS survey is referenced as the source for building stock data. CBECS covers 14 defined building types (plus “Other” and “Vacant” categories). From the documents sent CRREM will continue to include just two main types. What’s the timeline for expanding this and will the CBECS data be the basis for this?” Answer provided by CRREM:*
  - With our current downscaling methodology, and for global consistency, we split the floor area only into Residential and Commercial. CRREM has pathways however for multiple property-types and also further plans to expand these in the future.
- ❖ *“In the Excel file “CRREM Global Pathways”, in the “1<sup>st</sup> step Global” tab, the Global.CO2.1.5D/m<sup>2</sup> (excluding DL) value in 2020 amounts is indicated in kgCO2e/m<sup>2</sup> (34.9 kgCO2e/m<sup>2</sup>) while in the “CRREM Downscaling Documentation and Assessment Methodology” pdf file, it is in kgCO2 only/m<sup>2</sup>. Should we understand that the 34.9 figure should be in kgCO2-only/m<sup>2</sup> in the Excel file?” Answer provided by CRREM:*
  - Correct. 34,92 is CO2-only starting point global and 37,27 is incl. all other GHGs so CO2e. Thanks for flagging this. (We will re-upload correctly with the final file).
- ❖ *“Have you had by any chance calculated both emission factors and pathways with the breakdown between scope 1 and scope 2?” Answer provided by CRREM:*
  - We have done this for the underlying calculations on the global level. Yes.
- ❖ *“Are the data provided in the table new “PCAF” average data by countries and asset class?” Answer provided by CRREM:*
  - The data received was either from one of our country specific data partners such as UKGBC, Dutch GBC etc. We also collaborate with PCAF however do not receive data from them. We will provide PCAF with the new data once finalized, since PCAF was building up on CRREM data and not vice versa.
- ❖ *“Exclusion of DL: does it mean that we are indeed focusing in the new model on final energy demand rather than primary energy demand?” Answer provided by CRREM:*
  - CRREM considers (and has considered) the final energy consumption (as read from the meter readings in the properties). WE want to support ongoing optimization of properties and since the owner sees the end-energy-consumption on his meter, we want to provide a guidance/benchmark regarding this figure. Excl. the distr. losses for the conversion to carbon intensities has to be viewed slightly different since this is only addressing part of the difference between final and primary energy demand (another aspect adding to the difference are aspects resulting from the energy “production” losses at the source). CRREM energy-reduction pathways refer to the so-called end-energy, as it can be read off electricity meters and utility bills, in contrast to primary energy, which indicates how much energy has been utilized in burning fossil fuels such as oil and gas, in order to produce the final amount of consumed electric energy. The difference between end-energy and primary energy is the result of conversion, transmission and distribution losses. Generally, the relationship between these two figures is expressed in terms of so-called primary energy factors, varying between different energy sources such as electricity or gas. See more details in methodology document.
- ❖ *“If this is the case, the approach would then be different than the one prevailing under EU Taxonomy for Real Estate. What would then be the rationale for using a different approach?” Answer provided by CRREM:*
  - See before regarding the reason for applying end-energy. The conversion of the end-energy to primary-energy can be done via primary energy factors according to the energy mix (for our benchmark, as well as for the results of users regarding individual properties). Since the application of

the taxonomy would in any case not allow real consumption but is referring to primary energy demand, user would need to get an EPC anyhow to check their compliance with the Top-15 % according to Taxonomy criteria for existing building. On-off EPCs are of course not applicable vice versa for ongoing asset-optimization and benchmarking. // For the conversion to CO<sub>2</sub>: CRREM mainly chose the EF excl. T&L as we want to be fully aligned with SBTi and this is the approach SBTi are taking. The emissions from the losses should be attributed to the utility sector and are Scope 3 for the real estate sector.

- ❖ *“If this is the case (cf 3.b. above), it may be also very difficult to reconcile data (eg between EPC, as a refined proxy, and the PCAF Proxy when looking at a portfolio). Can you comment on the potential distortion? Could you advise on how to then reconcile the various types of data : namely how could we then use EPC data in the CRREM model?” Answer provided by CRREM:*
  - We advice to use real consumption data (which needs to be normalized according to our reference guide). If users apply EPCs the difference resulting from end-energy vs. primary-energy can be sorted out via the conversion of primary energy factors available in every EU member state for each energy source. To compare the EUI with our benchmark also the energy mix needs to be taken into account.
- ❖ *“On page 12, it says that “...the EF of the grid are reflecting the actual ‘status quo’ and projections for the future based on a 1.5 degree alignment of the energy sector”. Is it correctly understood that this alignment is based on the assumptions in the IEA NZE 2050? If so, how are these assumptions converted down to national grid projections (if I recall correctly IEA does not provide national granularity)?” Answer provided by CRREM:*
  - The global projections are directly aligned with IEA NZE 2050. The national level is indeed based on 1,5 degree aligned national projections (ensuring that the energy sector as well as the real estate sector have a 1,5 degree ambition level). We will add some more wording in that section.
- ❖ *“Page 16. Is it correctly understood that the total budget is reduced with 4,8% between v1 and v2 but the RE budget is reduced with 39% (driven mainly by excluding T&D losses, increasing RE share of total budget and changes in F-gases calculation)?” Answer provided by CRREM:*
  - Yes – Details (see above) be added accordingly to the methodology document.
- ❖ *“Page 17. when T&D losses are excluded, it means that the responsibility for these emissions must be allocated to the power sector to ensure 100% o total budget is properly allocated. How aligned is this with IEA assumptions, how are they allocating T&D losses? Reason for asking is that we as universal investors need to ensure that we not mixing assumptions between sectors too much and thereby running with non-aligned total budgets.” Answer provided by CRREM:*
  - We are not aware of an IEA guideline regarding T&DL. The CRREM approach is now in line with the GHG protocol and The SBTi, where the energy sector gets the allocation for the T&DL.
- ❖ *“Whenever possible, I believe it would be extremely important to also build these pathways using the OECM model as a baseline scenario in addition to IEA NZE 2050. The reason is that GFANZ and the wider net-zero community in the financial sector a framework on pathways and scenarios is now emerging and the two most prominent scenarios used is IEA NZE 2050 and OECM. Most financial institutions would base their transition plans and targets on either one of these. Hence, two avoid cherry-picking in scenario assumptions it would be good to have CRREM pathways also based on OECM assumptions. I understand that this might not be possible or prioritised right now, but for future planning.” Answer provided by CRREM:*
  - Thanks for this valuable comment. We have chosen the IEA 1.5°C Scenario in order to be aligned with the SBTi (50% likelihood scenario). During the consultation phase, we also received requests for the update of the 2°C pathway – which we will focus on next. Of course, on the global level it is also possible to calculate the pathways based on other scenarios – such as the OECM model. The OECM model is consistent with the 1.5°C, however, chooses the 66% likelihood with a carbon budget of even less – 450 GtCO<sub>2</sub> as identified by the IPCC. Of course, for future planning, the CRREM initiative may also calculate the pathways based on different scenarios. We are in constant exchange with Sven Teske regarding OECM alignment anyhow.
- ❖ *“Clarification on the differentiation of RCAs and PPAs would be helpful”. Answer provided by CRREM:*
  - Will be added to the reference guide (see above).
- ❖ *“electricity and gas in KG per m2 per year?” Answer provided by CRREM:*
  - Correct, all data is in kg per m<sup>2</sup> (kgCO<sub>2</sub>e/m<sup>2</sup>/yr). We also include (the other GHGs (equivalents – “e”s)). So Netherlands in 2018 is 29.9 kgCO<sub>2</sub>e/m<sup>2</sup>/yr.

- ❖ *What is the exact source of the data in column "T" NL; Answer provided by CRREM:*
  - In the baseline year we convert the average energy-intensity (respective to the country and property-type) to a Carbon intensity. Here we look at the energy mix in the baseline year (2018) and create a weighted emission factor to derive the carbon intensity.
  - Source: EC (2020): Energy Modelling. EU Reference Scenario 2020. Online: [https://energy.ec.europa.eu/data-and-analysis/energy-modelling/eu-reference-scenario-2020\\_en](https://energy.ec.europa.eu/data-and-analysis/energy-modelling/eu-reference-scenario-2020_en)
  - Source: EC (2021): Summary report: Energy, transport and GHG emissions in the FF55 scenario. Online: [https://energy.ec.europa.eu/excel-files-mix-cp-scenario\\_en](https://energy.ec.europa.eu/excel-files-mix-cp-scenario_en). EFs incl. development for 2020-2030 were derived from the FF55. The projected development from 2031-2050 is based on the YoY changes from the Reference Scenario. For baseline EF the FF55 was checked via energy balances. In cases of smaller deviations, the higher number was applied due to a conservative methodology.

## 2.3 RESULTING CHANGES TO CRREM RESSOURCES

### I) ADDITION TO THE METHODOLOGY DOCUMENT AFTER PUBLIC CONSULTATION:

- **Statement on market-based vs. location-based emission factor:** CRREM will revise the statement to “The pathways are location-based benchmarks for the respective use-type and country. For a “like-for-like” comparison and analysis regarding transition risk of the asset we recommend to use the location-based emission factors (EF). In the tool there is still the option for all users to switch to the market-based approach if they wish. The emission factors can be overwritten in the settings sheet. Note that The SBTi accepts also market-based-EF for scope 2 targets.”
- **Definitions:** Include further definitions such as for EU and Carbon intensity in the baseline year.
- **Summary of future planed changes:** we will add a section of aspects which will be a focus area for future updates of the pathways.
- **Clarification regarding national ambition level of the grid decarbonization.**
- **Clarification on consumption-based assessment vs. net energy demand.**
- **Clarification on budget break-down:**
  - o First CRREM version budgets: 191 Gt CO<sub>2</sub>e is the total GHG budget for the building sector (in use phase) from 2018 to 2050 (first CRREM version). The 2018 to 2050 CO<sub>2</sub>-only budget in the first CRREM version was 130 Gt CO<sub>2</sub> (excluding other GHG). The value for 2020 to 2050, based on these values, is 167 Gt (all GHG), or 111 Gt (CO<sub>2</sub> only) - i.e., two years must be deducted for a like-for-like comparison.
  - o Current update budgets: If the T&D-losses were again included the CO<sub>2</sub> only for 2020 until 2050 would amount to 107 Gt for the building sector (in use). The delta of 111 to 107 (minus 3 % old vs. update) is mainly resulting from the overshoot during the last years.
  - o T&D-losses effect: without T&D-losses the updated budget amounts to 91 Gt (CO<sub>2</sub> only). The delta of approx. 15 % for the entire period are the effect resulting from losses (107 vs. 91).
  - o Other GHG / increased granularity): the remining delta between first and updated version regarding all GHG budgets is resulting from the increased granularity regarding the other GHG. Whereas in the first version a lump sum aligned with the add-on-factor for all sectors was applied we could now extract more precise data from new data sources available to isolate the other-GHG (mainly F-gases) resulting from the use-phase of properties only.

### II) ADDITION TO THE REFERENCE GUIDE

- **E-Charging:** CRREM does not include E-Charging stations. Their consumption effects be excluded for a like-for-like comparison.
- **Data Normalisation:** on operating hours. E.g. a 24/7 operated building should be normalized to typical operating hours in that region.
- **Stranding definition:** “Stranded assets in the build environment are properties that will be increasingly exposed to the risk of early economic obsolescence due to climate change because they will not meet (potential) future regulatory efficiency standards or market expectations. These buildings will become less marketable and may require costly refurbishment measures. However, this does not indicate that properties face a complete and immediate write down in asset values once they are at the “stranding point” in our diagram. CRREM will add a complete statement in the reference guide.”
- **Property-type definitions:** For example, for food-based retail: “Retail – Warehouse: Refers to buildings in an unenclosed retail space, otherwise known as a strip centre or strip mall, whereby buildings are usually stand-alone and situated side-by-side with their entrance facing a main street or carpark.”. CRREM of course is continuing to add more property-types in the future.
- **Primary- vs. end-energy:** CRREM applies end-energy

- **Water & Waste:** Please note that CRREM only considers operational emissions / operational carbon, therefore waste & water is not included in the analysis.
- **The “Whole-building” approach:** CRREM accounts for both tenant and common area and all energy sources regardless of the operational control
- **Energy pathways:** the methodology was changed from NED (Net Energy Demand) to consumption-based pathways.
- **Embodied carbon:** The CRREM pathways do not cover embodied carbon/ emissions. The CRREM decarbonisation pathways are only looking at operational carbon. Please note in the tool, a scenario analysis is possible by entering one retrofit action which also covers embodied carbon.
- **GHG Pathway vs CO2 pathway:** definition will be made clear (GHG pathway is only the add-on from the F-gases).
- **Differentiation between RECS (Renewable Energy Certificate System) and PPA (Renewable Energy Certificate System) for market-based-instruments.**
- **Add/update GWP related to other GHG.**

### III) CHANGES TO PATHWAYS

- **Changes to the country codes:** Bulgaria and Lithuania have been changed accordingly.
- **Add correct wording to global pathway in xls.**

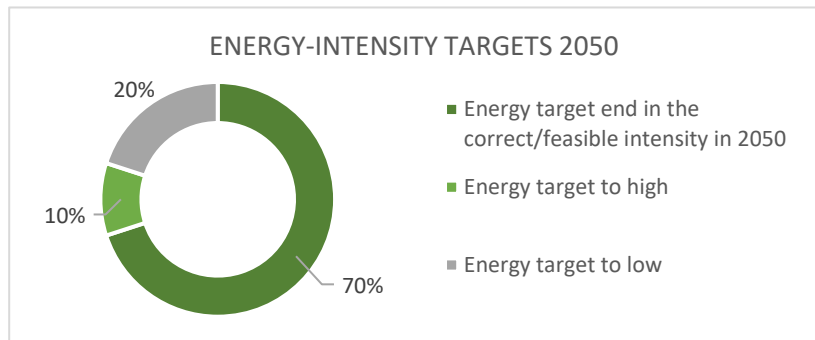
The next section of the survey asked public consultation participants for detailed review and feedback on the CRREM and The SBTi aligned decarbonisation pathways. The majority provided feedback on the pathways and property-types in general.



### 3 THE CRREM – SBTi ALIGNED DECARBONISATION PATHWAYS

#### 3.1 ENERGY-INTENSITY PATHWAYS

Around **70%** of the respondents both agree with the current energy baseline intensities as a starting point in 2020 as well as with the energy-intensity targets in 2050. This underlines that the country and property-type averages are in the **correct and plausible range**. For their answers where survey participants felt that starting point and/or end targets were not in line with their perceived



market state, CRREM team again challenged the applied data sets with the data sources provided in the consultation. Regarding the targets some all market participants noted their agreement with the change regarding the methodology but still felt targets in 2050 might be hard to achieve. Interestingly some survey participants stated that the targets are closely related to the energy targets set out by ambitious local regulators already.

Further individual comments included:

- ❖ **Country-specific EUI sources:** *“It is unclear how the final EUI is derived for each specific region and asset type (Hong Kong and China) based on the IEA data source”* Answer provided by CRREM - This is a misunderstanding - initial EUI values are derived based on country-specific sources (see details in methodology document). Carbon intensity pathways were then derived via SDA from IEA data. EUI pathway based on carbon pathway & forecasts from energy mix and EF development within a specific country.
- ❖ **Sub-regional pathways:** *“Lacking regional differences to take into account diverse climatic conditions between different parts of China”*. Answer provided by CRREM - For the USA and Australia this has been done, the next step is to expand the pathways for China.
- ❖ **EUIs variations in Asia:** *“From experience, China’s EUI should be lower than Hong Kong’s EUI due to policy and usage behaviour”*. Answer provided by CRREM - For the initial values this is the case. The different targets in 2050 are because of the heating and cooling degree days (HDD/CDD) and assets are of course different closer to Hong Kong or further away. We plan to update the China pathway and also create more sub-regional pathways for China.
- ❖ **Sustainable development goal 2.9% decrease p.a.:** *“While the assumption of 2.9% decrease p.a. for EUIs in countries forecast to decarbonise their grid rapidly is good, should this reduction rate not depend on the baseline to take account of previous efforts to improve efficiency and reduce the financial impact of the law of diminishing returns?”* Answer provided by CRREM - Thank you for highlighting this. Firstly, the use of % causes absolutely higher change in “bad” countries and secondly, this is also compensated via the targets.
- ❖ **EUI targets for shopping centres:** *“Further, shopping centre (EUI) targets require substantial reduction, which is quite far beyond (our) perception of current technical capabilities.”* Answer provided by CRREM - In relation to CRE targets, the energy targets for Shopping centers (SC) are already adjusted (to account for a slightly higher allowance compared to CRE average targets). Targets EUI for SC are already one of the highest (in relation to CRE). An average 65% is ambitious but innovation & improvements on tech cap, is still required to reach 1.5.

### 3.2 RESULTING CHANGES TO CRREM RESSOURCES (EUI)

#### I) ADDITION TO THE METHODOLOGY DOCUMENT AFTER PUBLIC CONSULTATION:

- **Hong Kong:** New source applied: EMSD, increase of intensities for e.g., Retail Shopping Centres.
- **Singapore:** New source applied – higher starting point for Retail Shopping Centres.
- **Japan:** New source for Grid decarbonisation (faster projected grid decarbonisation) applied. New data directly supplied from our data partner CSR-design.
- **Switzerland:** All sources used for Switzerland will be displayed in a separate table in the appendix.

#### II) ADDITION TO THE REFERENCE GUIDE

- **Not applicable**

#### III) CHANGES TO PATHWAYS

- **Hong Kong:** New source applied: EMSD, increase of intensities for e.g., Retail Shopping Centres. New source: <https://ecib.emsd.gov.hk/index.php/en/energy-utilisation-index-en/residential-sector-en>.
- **Singapore:** New source applied – higher starting point for Retail Shopping Centres. New sources: <https://www1.bca.gov.sg/buildsg/sustainability/bca-building-energy-benchmarking-and-disclosure/past-editions-of-bebr>, <https://sleb.sg/DashBoard/EnergyBenchmarking>.
- **Japan:** New source for Grid decarbonisation (faster projected grid decarbonisation) applied, also increased intensities for residential multifamily applied. New data directly supplied from our data partner CSR-design.
- **EUI Targets:** The energy targets have been rounded to the nearest 5.

### 3.3 GHG-INTENSITY PATHWAYS

Some participants were questioning whether the switch to consumption-based instead of net-energy-demand-approach created disincentives for ambitious decarbonization and energetic retrofitting. Both pathways - the energy-intensity as well as the carbon-intensity target - should be taken into account when analysing single assets or portfolios. Due to that need CRREM is convinced that the switch to consumption-based energy pathways is therefore not causing a disincentive for the implementation of on-site renewables since this will still have a direct (positive) impact on the carbon-intensity and stranding point.

Respondents also indicated that the **weighted emission factors derived were mostly accurate**. Over 65% stated the correct energy-mix and emission factors were used in order to derive the correct starting carbon-intensity for 2020. With survey participants stating that they were questioning some specific EF we directly exchanged on a one-on-one meeting. In Hong Kong now for example, we have directly aligned the data with a new data partner in Asia and have confirmed the numbers with OCBC. For some countries such as China, the CRREM initiative is planning to increase data accuracy and granularity. China for example also has two main grids as well as large discrepancies in HDD/CDD (heating and cooling degree days) across the country. Users for now can of course enter their own user-defined emission factors in the tool. In the future, CRREM is planning to add more sub-regional pathways.

Further individual comments included:

- ❖ **Treatment of embodied carbon:** *“In the old method, embodied emissions of (future) renovation measures were included. Why is this not the case anymore?”. Answer provided by CRREM - This is a misinterpretation. The embodied carbon part of the retrofit is treated no identically compared to the first version. Within the pathways/benchmark there is NO embodied carbon piece. However, we offer in the tool the possibility to calculate the “ecological payback” of the retrofit measure since one can analyse the embodied carbon that is triggered due to the retrofit itself vs. the resulting operational savings.*
- ❖ **District heating:** *“It was noted that there are specific implications of the new guidance for assets connected to district heating. The CRREM energy requirements specify that all energy is to come from renewable energy with an emission factor of 0. This is very challenging for assets connected to district heating schemes which will have energy sources for a while into the future.” Answer provided by CRREM - District heating of course also needs to decarbonise faster. However, CRREM highlights the focus on both pathways, meaning that stranding should be avoided for both the EUI and the carbon intensity.*
- ❖ **Allocation of Scope 3:** *“GHG Intensity Pathway should be considered with the whole building approach. That means that it should indeed include F-gases emissions and category 3 emissions. Removing T&D losses from Scope 2 emissions is okay as long as they are indeed added back to Scope 3, Category 3.” Answer provided by CRREM - For reporting you could consider adding back scope 3, cat 3. For transition risk analysis, we think it is sufficient to deal with the EF excluding T&DL.*
- ❖ **Collaboration with PCAF:** *“Same comment as on the energy. Missing country differentiation that was in previous model. Also, the fact that DL are now excluded make the tool and pathways difficult to reconcile proxies (PCAF) and collected data like EPC. Also, real issues/questions on revised tool vs previous one for France”. Answer provided by CRREM - PCAF is directly aligned with CRREM, PCAF will of course also adopt the new emission factors etc. Regarding EPCs, please note data has to be adjusted as this data is often not accurate and requires further additional adjustments.*

### **3.4 RESULTING CHANGES TO CRREM RESSOURCES (GHG)**

#### **I) ADDITION TO THE METHODOLOGY DOCUMENT AFTER PUBLIC CONSULTATION:**

- **Not applicable**

#### **II) ADDITION TO THE REFERENCE GUIDE**

- **Energy Targets:** further calculation examples and clarity on the EUI targets.
- **Total GIA:** clarity will be added on the use of the IPMS 2 (International property-measurement standard) and possible conversion factors referenced from countries such as Switzerland for example (conversion from EBF to GIA).

#### **III) CHANGES TO PATHWAYS**

- **Grid emission factors:** The emission factors will be listed for all countries (including the development until 2050).

## 4 FURTHER COMMENTS & FEEDBACK

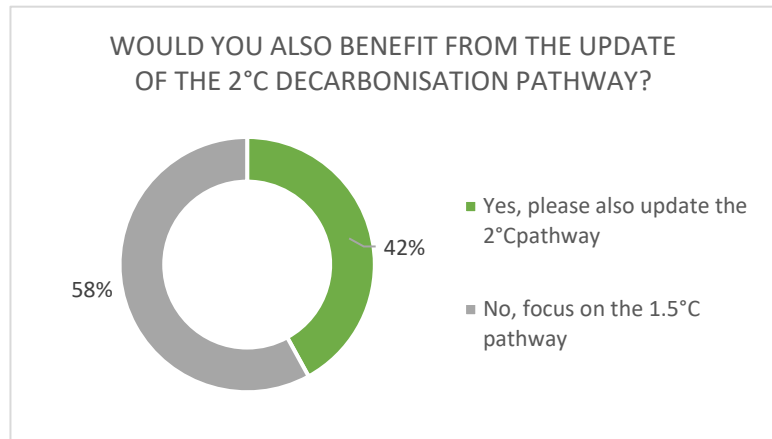
### 4.1 COMMENTS & FEEDBACK SUBMITTED

Lastly, market respondents provided final thoughts and conclusions on the update of the new CRREM-SBTi aligned decarbonisation pathways.

One main request was also the update of the 2°C pathway. Over 42% of the respondents indicated that it would be beneficial to also include the 2°C target.

Further, respondents indicated for future updates to include further sub-regional pathways for regions such as Asia and further property-types as well as city level data.

CRREM is planning for future updates to add more granularity to the pathways (e.g. China and US).



**Please also note:** CRREM is aligned with the SBTi, hence, the SBTi will also implement the new pathways developed together with CRREM.

Further individual comments included:

- ❖ **Pathways for Bulgaria, Greece and Lithuania:** Answer provided by CRREM - The country code has been changed. Please note there was an error for Bulgaria, Greece and Lithuania.
- ❖ **Exclusion of embodied carbon:** Answer provided by CRREM - Over 80% of standing investments are already built today. Other initiatives such as SBTi's work with Ramboll are focusing on 1.5°C pathways for embodied carbon – we advise you refer to SBTi/ Ramboll here.
- ❖ **GIA, IMPS 2:** *“By use of GIA in denominator, CRREM favours commercial buildings with inefficient (low) net to gross area ratio. NIA is the productive area of a commercial building and more well known by property owners (and less expensive to measure).”* Answer provided by CRREM - Thanks a lot for this answer. We acknowledge that the net area is the productive bit the whole internal area needs to be heated. Also, for “Gross internal area” is easier to align on this basis since the areas used for net internal differ widely in the market.”
- ❖ **Including residential as an option in the CRREM tool:** Answer provided by CRREM - The CRREM team will also update the tool with the new pathways and country-specific default values. The updated tool will be available for download in Q1 2023 via [www.crrem.eu/tool](http://www.crrem.eu/tool). Please note: residential pathways can also easily be inserted into the CRREM tool using our guide “How to use the tool outside the EU”. The CRREM pathways will also be adopted by our multiple data partners and service providers. Our partners and service providers offer various solutions for stakeholder such as for example integrated CRREM into front-end solutions to allow for larger portfolios. A full list is available on our homepage: <https://www.crrem.eu/partners/>.
- ❖ **More information about emission factors:** Answer provided by CRREM - All sources for used EFs as well as pathways and energy mix are obtained from methodology document. The weighted EFs are automatically derived from the ratio of CO2 int and energy-int pathway. And electricity EF and pathway are published in the tool and will also be included in the annex.
- ❖ **Fall-back Approximation for non-covered countries:** Answer provided by CRREM - Thank you for mentioning this - we will publish guidance for this in Q1 2023.

- ❖ **CRREM plans on requesting f-gas reporting to GRESB:** Answer provided by CRREM - CRREM of course encourages GRESB to do so. We will publish more on this in the upcoming technical guidance together with PCAF.
- ❖ **Data transparency:** *“Greater transparency on the growth rate assumptions for each sub-sector would be welcome.”* Answer provided by CRREM - Differentiation has been made for CRE and residential. We will review the methodology document are made clear. Further, please note: please also take into account our documentation to the M-parameter.
- ❖ **Greater transparency in how CRREM are using the IEA NZE scenarios:** Answer provided by CRREM - Thank you for flagging this. We will include exact page numbers/ tables etc.
- ❖ **Portfolio-level analysis:** *“As the CRREM pathways are based on average targets across the building stock, can a fund claim alignment if the average intensity of the fund matches the pathway or can the term stranding risk only be used at the asset level?”* Answer provided by CRREM - This is of course fine, if a fund has properties above / below the pathways.
- ❖ **Comment regarding CRREM vs the IEA:** *“A guiding principle of the roadmap is that clean energy transitions must be fair and inclusive. Are there significant differences (CRREM vs IEA) in outcomes for floor area growth, embodied carbon or target EUIs which affect equity? We must be sure CRREM is acting fairly in setting the global transition agenda for the RE sector. It is not transparent how CRREM has made allowance for the 2 bn population growth expected (2020-2050) mainly in emerging market and developing economies (the population of Africa alone is projected to increase by more than 1.1 billion between 2020 and 2050), whereas this growth is an explicit attribute of IEA’s analysis.”* Answer provided by CRREM - Firstly, there are no differences between CRREM and IEA as the assumptions on the overall budget and its distribution over time are fully compliant with IEA. Further, we have implemented the M-Parameter cap, putting more pressure on advanced economies. Additionally, population growth of course is included via floor space growth. For advanced economies a higher starting point leads to higher emissions. Lastly, as you know we are not addressing embodied carbon but of course it is essential to build moving forward net zero decarbonised buildings (esp. new buildings should be build carbon zero ready (no fossil fuel comb. On site)). Therefore, the CRREM assumptions for growth is included in the FA growth assumptions.
- ❖ **Data localisation - the sources CRREM provided are mostly international studies (i.e. Climate Transparency, Carbon Footprint, Twinview, IEA) and not country specific studies:** Answer provided by CRREM - Please see page 44-83 in the appendix. We will also make the sources more transparent (including page numbers and table references where applicable).

## 4.2 RESULTING CHANGES TO CRREM RESSOURCES

### I) ADDITION TO THE METHODOLOGY DOCUMENT AFTER PUBLIC CONSULTATION:

- **Grid emission factors:** The emission factors will be listed for all countries (including the development until 2050).
- **Sources:** Further granularity on the global sources (including page numbers, table references, etc.).
- **Sources:** The source FF55 for the EU grid decarbonisation has been added to the sources in the appendix.
- **Sources:** New source for Portugal used: [https://ec.europa.eu/energy/eu-buildings-factsheets\\_en](https://ec.europa.eu/energy/eu-buildings-factsheets_en) & for the floor area - Estimating the sufficiency potential in buildings: the space between under-dimensioned and oversized Anja Bierwirth.
- **Sources:** Added a more granularity to the sources of Singapore. Differentiation regarding the different asset-types added.
- **Sources:** Updated sources for UK regarding the grid EF & Office EUI. New sources are ND NEED Data & HM Treasury Green Book, (Link: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>).
- **Total consumption vs NED:** Graph 23 has been revised and further clarification on the NED vs total consumption added.
- **EUI Targets:** A note has been included stating that all EUI targets have been rounded to 5.
- **F-gases:** Further clarification on the F-gas AR4 vs AR5.
- **High EFs for District Heating:** Further clarification on the emission factors for DH has been added.

### II) ADDITION TO THE REFERENCE GUIDE

- **Embodied carbon:** We will add the reference to Ramboll and further information to embodied carbon in the reference guide.

### III) CHANGES TO PATHWAYS

- **EUI HK:** Updated EUI for Hong Kong Residential MF. A conversion factor was applied of 1,15 to convert leasable area to GIA. The EUI changed from 193 to 167 kWh/m<sup>2</sup>.
- **Grid EF HK:** Update of the grid decarbonisation from 2020 to 2050 according to the HK Climate Action Plan.
- **EUI CH:** New conversion factor applied to Switzerland, to convert EBF to GIA to ensure global consistency.
- **EUI UK:** Update from the new source provide for the UK office EUI, increasing the intensity from 187 to 226 kWh/m<sup>2</sup>.
- **Grid EF UK:** Slightly higher weighted EF due to the new source of the grid emission factor for 2020.
- **EUI NL:** Update for Netherlands residential from 109 to 120 kWh/m<sup>2</sup>.

### 4.3 FURTHER GRANULARITY AND EXPANSION

The CRREM team will also update the tool with the new pathways and country-specific default values. The updated tool will be available for download in Q1 2023 via [www.crrem.eu/tool](http://www.crrem.eu/tool). Please note: residential pathways can also easily be inserted into the CRREM tool using our guide “How to use the tool outside the EU”. The CRREM pathways will also be adopted by our multiple data partners and service providers. Our partners and service providers offer various solutions for stakeholder such as for example integrated CRREM into front-end solutions to allow for larger portfolios. A full list is available on our homepage: <https://www.crrem.eu/partners/>.

Please contact the CRREM initiative if you have any further specific questions! The CRREM team can also supply concrete numbers on the energy-mix and specific underlying data such as emission factors, grid decarbonisation etc. upon request. Contact: [crrem@iioe.at](mailto:crrem@iioe.at) or [Julia.wein@iioe.at](mailto:Julia.wein@iioe.at)

For China and many non-EU countries Data accessibility is still an issue. CRREM is planning to engage and collaborate with more data partners in Asia and also to engage with more national GBCs to further increase granularity and data accuracy! Further, CRREM will also publish further **guidance on how to deal with the non-covered CRREM countries**.

### 4.4 WHERE WE WANT TO GET BETTER IN THE FUTURE

#### WHERE WE WANT TO GET BETTER IN THE FUTURE (ONE STEP IN TIME)

The CRREM team is constantly working on improving the pathways and adding granularity.

Potential next upcoming updates include:

- Further (sub-regional) granularity for the USA
- Further sub-regional pathways for Canada
- Further sub-regional pathways for China
- Further property types: e.g., elderly homes, food-anchored retail etc.

#### BECOME A CRREM DATA PARTNER

Our data partners provide and link us to national sources on country-specific data such as emission factors, energy-mix, energy-use intensities, floor area projections etc.

Please contact [crrem@iioe.at](mailto:crrem@iioe.at) if you would like to become a CRREM [data partner](#).

CRREM team will host multiple webinars in Q1 2023 to highlight and explain in detail all changes from the previous to the new pathways. A presentation will also be available on our homepage summarizing the key changes. The CRREM initiative will further hold another GSIC meeting in Q1 and can also accommodate individual seminars focusing on the explanation of the differences.

**THE UPDATED PATHWAYS WILL COME INTO EFFECT on 10<sup>th</sup> January 2023!**



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



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

