



CARBON RISK REAL ESTATE MONITOR

NET ENERGY VS. TOTAL CONSUMPTION VIEW



JULY 2024

Net-energy-demand (NED) vs. Total Consumption

Overview regarding the approach:

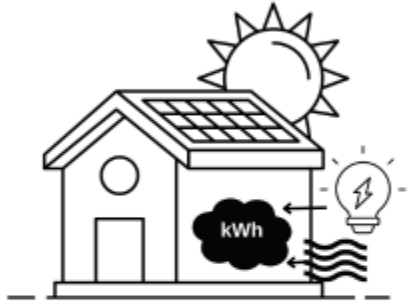
- The **CRREM EUI pathways refer to the total energy consumption** of a building.
- Based on projected emission factors and energy mix, typical carbon-to-energy-factors have been derived, enabling the conversion **of carbon-intensity to energy-intensity figures**.
- These carbon-to-energy factors are the reversal of emission factors, describing the same relation between carbon emissions and energy.
- CRREM requires (a minimum) **energy-intensity reductions in line with the UN Sustainable Development Goals** of at least **-2.9% per year**.
- **Differences:** If 1,000 kWh were produced via renewable on site like PV and also consumed on site and another 1,000 kWh electricity is procured from the electric grid, the 'Net energy demand' is still 1,000 kWh, the energy consumption of the property is however 2,000 kWh.

Full details in our
documents
here:



Calculation of an asset's kWh

energy-consumption
All consumed kWh are taken into account



$kWh = \text{all kWh from direct combustion [kWh]} + \text{electricity from the grid [kWh]} + \text{electricity produced and consumed on site [kWh]} + \text{district heat purchased [kWh]}$

vs. previously used methodology

$\text{net energy demand [kWh]} = \text{all kWh consumed [kWh]} - \text{electricity produced on site [kWh]}$

Key Difference:

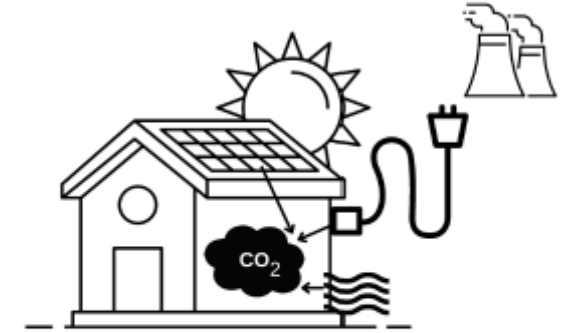
- Net-energy demand: What a property extracts from (public electr.) energy grids
- Energy consumption: Consumed energy of the asset regardless where the energy comes from
- CRREM:
 - v1=net-energy-pathways
 - v2=consumption-based-pathways
 - Main reason: most market participants did perceive the first curves already as “consumption” and are more used to that “view”
 - On-site produced energy and directly consumed energy doesn't lower the assets kWh performance (the overall consumption remains the same!)
 - V2 now also with “Final Energy Target” – which is purely run on renewables in 2050 (regardless if on or off site!)

Note that these different views have NO IMPACT on:

- CO2 Pathway (since on- and offsite renewables are decarbonized)
- CO2 Performance of the asset (since again on- and offsite renewables are decarbonized)

Calculation of an asset's CO₂

On-site generated electricity lowers the CO₂ emissions of the electricity consumption



$CO_2 = \text{all emissions from direct combustion [CO}_2\text{]} + \text{(all consumed electricity [kWh]} - \text{electricity generated [kWh])} * EF_{\text{grid}} [\text{kg CO}_2/\text{kWh}] + \text{emissions from district heating purchased [kg CO}_2\text{]}$

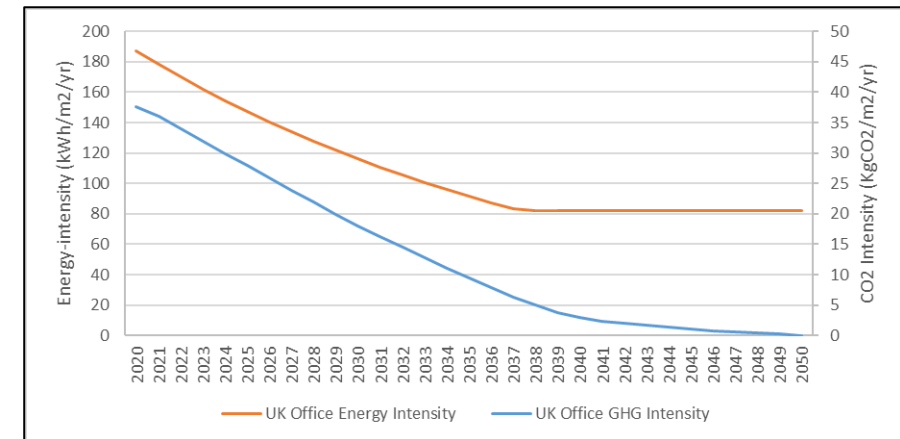
each summand has to be ≥ 0 , in case it isn't use 0

Further Details:

- CRREM Methodology Document, page 36
- CRREM Reference Guide, page 20
- PCAF Guidance on financing the European building transition to net zero, page 18

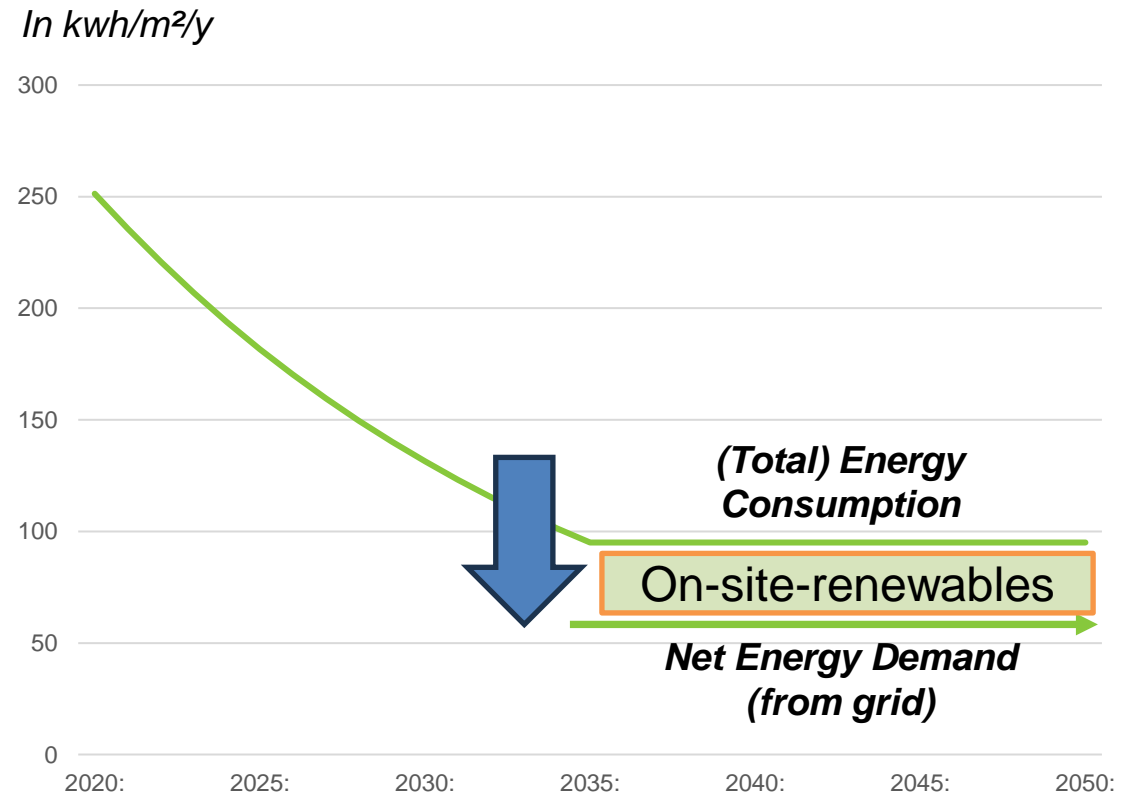
2050 ENERGY TARGETS (EUI targets)

- (Based on the) **available renewable energy (for each sector, like eg. real estate) in 2050** according to IEA (Net Zero by 2050).
- Global breakdown takes into account the **climate zones and allocates the budget based on bioclimatic zones and resulting HDD/CDD**. Building stock of the country is also considered, based on population projections in order to ensure that the available budget is not exceeded.
- The EUI targets are **not differentiating if the renewable energy is self-produced or procured. On-site produced energy and directly consumed energy don't lower the assets kWh performance** (the overall consumption remains the same!)
- **Calculation of kWh pathways 2020-2050** based on existing CRREM methodology and “switch” once the 2050 target figure is reached (see orange line).



Main implications of difference on energy pathway:

- Net-energy-pathway (target) is lower (“runs below”) the consumption-based curves (since the portion of “on-site-generated & on-site-consumed-energy” needs to be “subtracted”).
- At the beginning the portion of renewables in the curves is low and identically the portion of the on-site-renewables is low.
- The portion of the on site would increase over time.
- The final energy target for net-energy from the grid is LOWER compared to the consumption-based view (since the on-site-portion needs to be subtracted).
- The kWh - asset level consumption performance of a property with PV panels is THE same in both methodologies regarding the CONSUMPTION, but within the net-energy-assessment the results are lower (like-for-like with the benchmark).



How much energy (kWh) of renewables should be produced on site?

General advice:

Purely looking at CO₂ emissions the best risk mitigation would be:

- Completely electrified or other renewables / no-fossil-fuel comb. on site
- Covering all consumption with self produced energy (or district / neighborhood solutions)
- Including an energy storage system to balance peak generation and load

Target setting for on-site renewables:

- A meaningful target **on portfolio level** (over a full reporting year) would suggest that over 70% of the energy consumed in 2050 should be provided by self-produced (or close by) capacity if the current CRREM kWh pathways shall be achieved (for Europe). So **only up to 30% should be covered via the grid (Net-Energy-Demand)**.
- At **asset level** the maximum renewable capacity possible should be realized. E.g., logistic or retail assets are particularly suitable for large-scale PV systems (NED < 10 %) whereas other asset classes like hospitals, healthcare or offices in CBD location with less rooftop and plot size might have only limited capacity (NED < 60 %).
- **Please note: these figures are only rough indicators, we note a significant research gap regarding this topic - therefore further research is needed.**



CRREM | CARBON RISK REAL ESTATE MONITOR

info@crrem.eu WWW.CRREM.EU / WWW.CRREM.ORG

iiö
INSTITUTE FOR REAL ESTATE
ECONOMICS