

acme

CARBON AUDIT 2022



MISSION

Produce an annual Carbon Audit

Offset the Carbon Footprint every year to achieve Net Zero

Reduce the Carbon Footprint each year

Build simple buildings

**Work towards buildings that are Net Zero Carbon in
construction & Carbon Free in use**

1

NET ZERO CARBON IN USE

CARBON SUMMARY - LONDON & BERLIN

We have audited everything we have used in the London and Berlin office over the year. Each element was converted to kg of Carbon based on generally published conversion factors, noted for each category.

36.5 tonnes

* Not inclusive of WFH / Renovation

0.5 tonnes per employee

59,176

KWH OF GAS

2021: 72,371
 KgCO₂e/Kwh: 0.18¹
 Enough to power 4.9 households a year

99,677

KWH OF ELECTRICITY

2021: 88,437
 KgCO₂e/Kwh: 0.2123/ 0.0²
 Enough to power 25 households a year

238

KG OF COFFEE BEANS

2021: 122
 KgCO₂e/Kg: 17.72³
 34k cups of coffee
 493 cups per person

239/1,062

KITCHEN/TOILET ROLLS

2021: 208 /788
 Kitchen Roll
 KgCO₂e/Kg: 0.750⁴
 Toilet Paper
 KgCO₂e/Kg: 0.211

727

LITRES OF MILK

2021: 499
 KgCO₂e/Ltr: 1.13⁵
 145k cups of tea with milk
 2,101 cups per person

0.14

TONS OF PAPER

2021: 0.09
 KgCO₂e/Kg: 919⁶
 27k sheets of A4
 391 per person

21

NIGHTS IN HOTELS

2021: 11
 KgCO₂e/night:¹⁸
 Hotel Stay National - 13.9
 Hotel Stay France- 6.5
 Hotel Stay Germany - 17

14,160

KM ON THE BUS

2021: 1,673
 KgCO₂e/Km: 0.0772⁷
 0.35 times around the Earth

91,779

KM ON THE TUBE

2021: 30,046
 KgCO₂e/Km: 0.0278⁸
 2.29 times around the Earth

213,627

KM ON THE TRAIN (COMMUTE)

2021: 53,187
 KgCO₂e/Km: 0.0355¹⁰
 5.33 times around the Earth

1,342

KM IN THE CAR (COMMUTE)

2021: 187
 KgCO₂e/Km: 0.1650⁹
 0.03 times around the Earth

1,912

KM IN UBER

2021: 822
 KgCO₂e/Km: 0.208⁹
 0.02 times around the Earth

39,512

KM ON THE TRAIN (CORPORATE)

2021: 51,339
 KgCO₂e/Km: 0.0355¹⁰
 1.28 times around the Earth

82,607

KM BY AIR

2021: 27,425
 KgCO₂e/Km: ¹¹
 Economy Short/Long Haul - 0.1510/ 0.1479
 Business Short/Long Haul - 0.2265/ 0.4288
 0.68 times around the Earth

238

CM WATER SUPPLY

2021: 238
 KgCO₂e/Kwh: 0.149¹²

162

CM WATER TREATMENT

2021: 162
 KgCO₂e/Kwh: 0.272¹²

1,502

WASTE BAGS - PLASTIC

2021: 1,030
 KgCO₂e/Kg: 0.033¹³

5.4

TONNES WASTE NON-RECYCLING

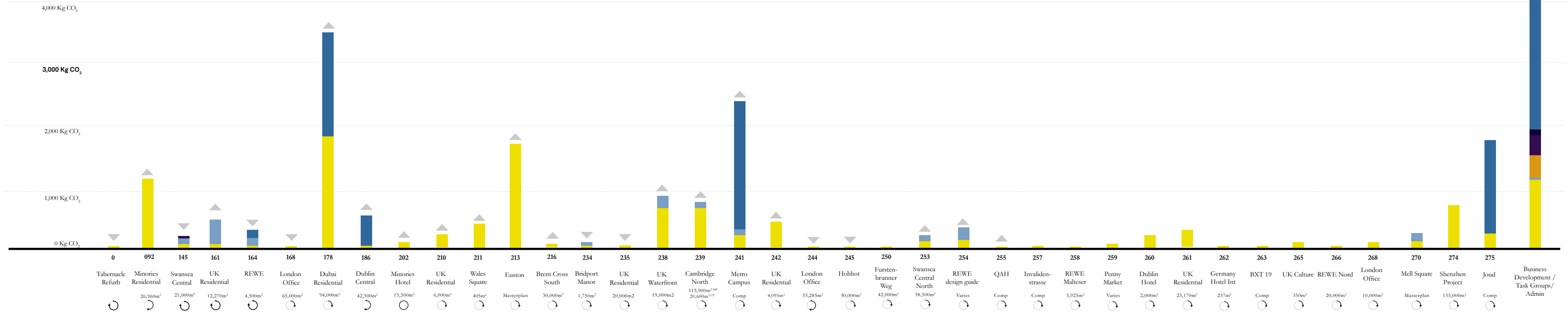
2021: 3.7
 KgCO₂e/Kg: 446.242¹³

3.2

TONNES WASTE - RECYCLING

2021: 2.1
 KgCO₂e/Ltr: 21.294¹³

TRAVEL



- Status - Competition / Initial design stage
- Status - Development stage
- Status - Construction
- Status - Completed

- PROJECT TRANSPORT
- Project Train Corporate
 - Project Air Corporate
 - Project Commute / Transport average (minus Air)
 - Project Hotel Stays Corporate
 - Project Uber Corporate

Corporate Travel made up 28% of total Carbon which is up from 2021.
 Staff Commuting made up 22% of the total Carbon which is up significantly from 2021.
 Office supplies accounted for 15% of total Carbon this year.

Several employees worked from various locations abroad during the year. Carbon has not been accounted for these trips.¹⁵



WORKING FROM HOME & ZOOM

We have audited items that are normally consumed in the office but which have been consumed at home for the period of 2022. This was the first year post-pandemic which we have measured incorporating the new working from home policy which was adopted from August 2021. Each element was converted to kg of Carbon based on generally published conversion factors, noted for each category.

We have audited Zoom Call usage via an office survey which identified whether employees used a Laptop or Desktop and their typical weekly zoom usage. Zoom calls are made both in a working from home scenario and regularly within the Office.

12.5 tonnes

* WFH London and Berlin excluding Zoom

0.18 tonnes per employee

2021: 21.8 tonnes

0.3 tonnes per employee

0.58 tonnes

* Only Zoom Calls

0.01 tonnes per employee

46,081

KWH OF GAS¹⁷

KgCO₂e/Kwh: 0.18¹
Enough to power 9.6 households a year
Excludes Employees on Green Tariff

4,082

KWH OF ELECTRICITY¹⁷

KgCO₂e/Kwh: 0.2123/ 0.0²
Enough to power 4 households a year
Excludes Employees on Green Tariff

144

KG OF COFFEE BEANS³

KgCO₂e/Kg: 17.72³
25,457 cups of coffee
359 cups per person

144/642

KITCHEN/TOILET ROLLS⁴

Kitchen Roll
KgCO₂e/Kg: 0.750⁴
Toilet Paper
KgCO₂e/Kg: 0.221

439

LITRES OF MILK⁵

KgCO₂e/Ltr: 1.13⁵
103k cups of tea with milk
1,391 cups per person

0

TONS OF PAPER⁶

KgCO₂e/Kg: 919⁶

39,350

HOURS OF ZOOM¹⁸

KgCO₂e/h¹⁷
Laptop 0.01
Desktop 0.05
1337 Days



1) Figure Calculated using The Homeworking Emissions Whitepaper for 2020
 2) Figure derived from quantity used in the office from pre working from home months
 3) Assumed negligible printing whilst people are working from home
 4) Zoom calls Source How Bad are Bananas. The Carbon Footprint of everything¹⁷

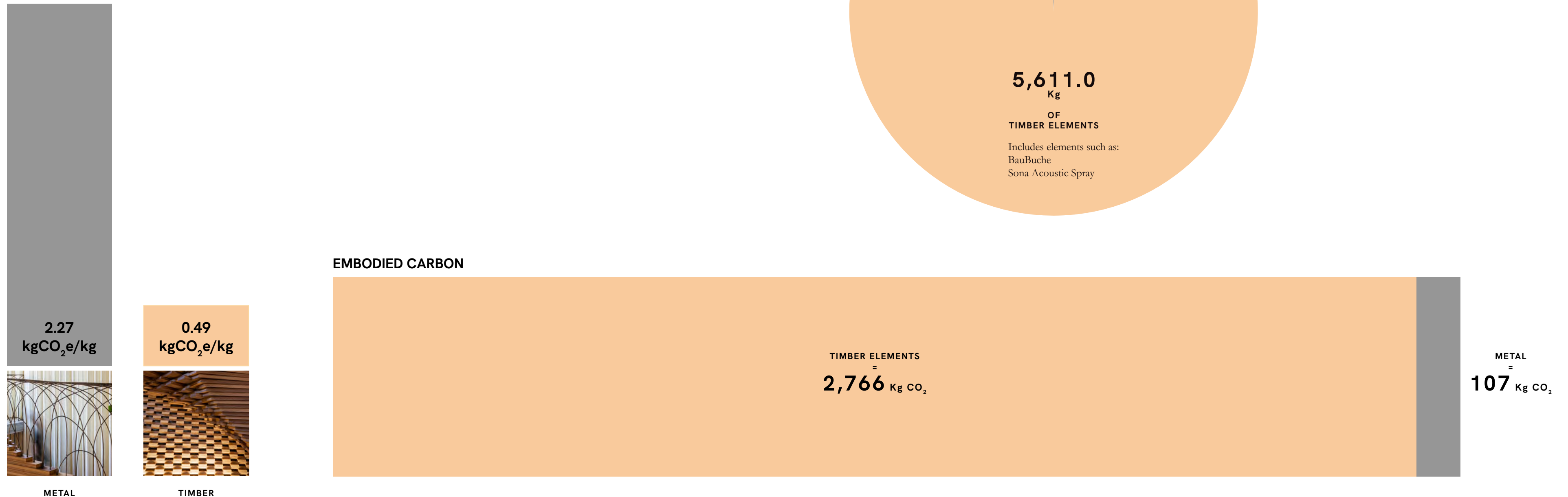
OFFICE RENOVATION



OFFICE RENOVATION

2.8 tonnes

In 2020 ACME started an expansion and renovation of its London office. The project was designed and coordinated internally. We evaluated in detail the embodied carbon of the materials used for the renovation during 2022. We have gathered the quantities of purchased raw materials to be able to establish its carbon footprint. Only materials purchased during 2022 are included in the calculations. For 2020 and 2021 figures refer to the previous ACME Carbon Audits. Embodied carbon values are based on the Inventory of Carbon & Energy published by Circular Economy and the University of Bath in 2019¹⁶



CARBON IN USE

The Carbon used by ACME this year is shown below, broken down into the three internationally recognized scopes:

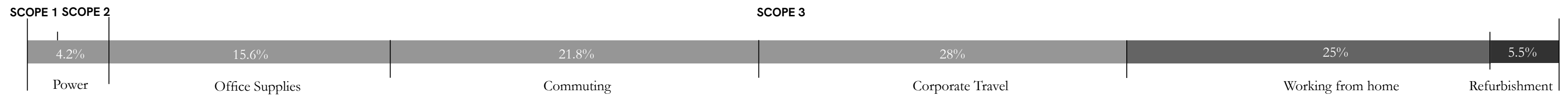
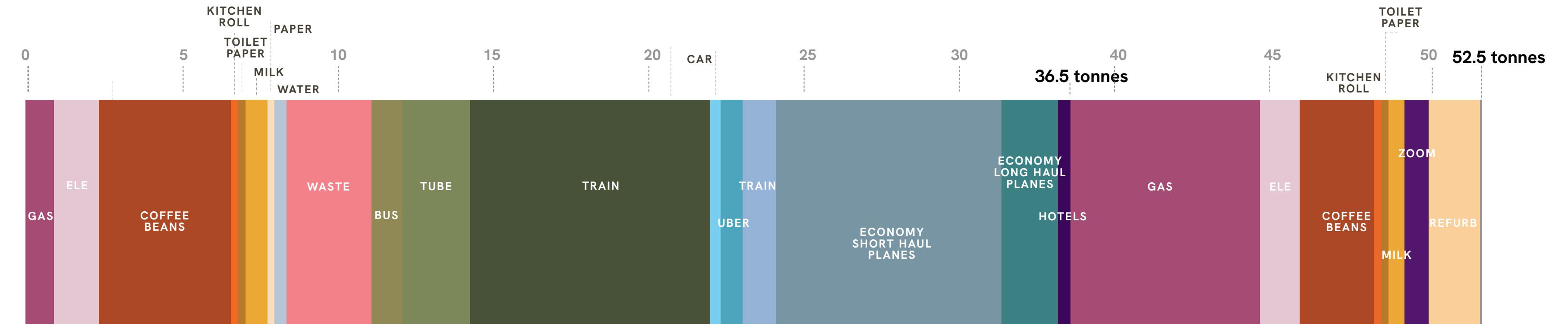
Scope 1: (Direct Energy Use) 0.788t

Scope 2: (Indirect Energy Use) 1.418t

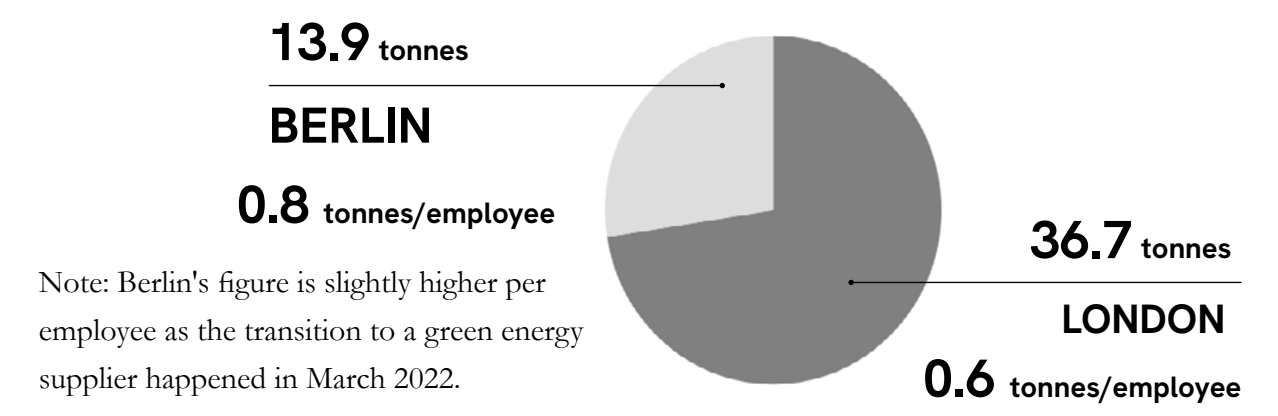
Scope 3: (Indirect activities from assets) 50.294t

Travel represented 50% of all Carbon used.

52.5 tonnes
0.76 tonnes per employee



- GAS
- ELECTRICITY
- COFFEE BEANS
- KITCHEN ROLL
- TOILET PAPER
- MILK
- PAPER
- WATER
- WASTE
- BUS
- TUBE
- TRAIN (COMMUTE)
- CAR
- UBER
- TRAINS (CORP)
- EC SH PLANES
- EC LH PLANES
- B SH PLANES
- B LH PLANES
- HOTELS
- ZOOM
- TIMBER
- METAL



CARBON IN USE 2019-2022

Between 2019 and 2022, ACME experienced an annual decrease in its carbon usage, with a slight increase in 2022 due to the normalization of working and commuting patterns following the pandemic. The total carbon usage in 2022 was lower than that of 2019, which serves as the most comparable year.

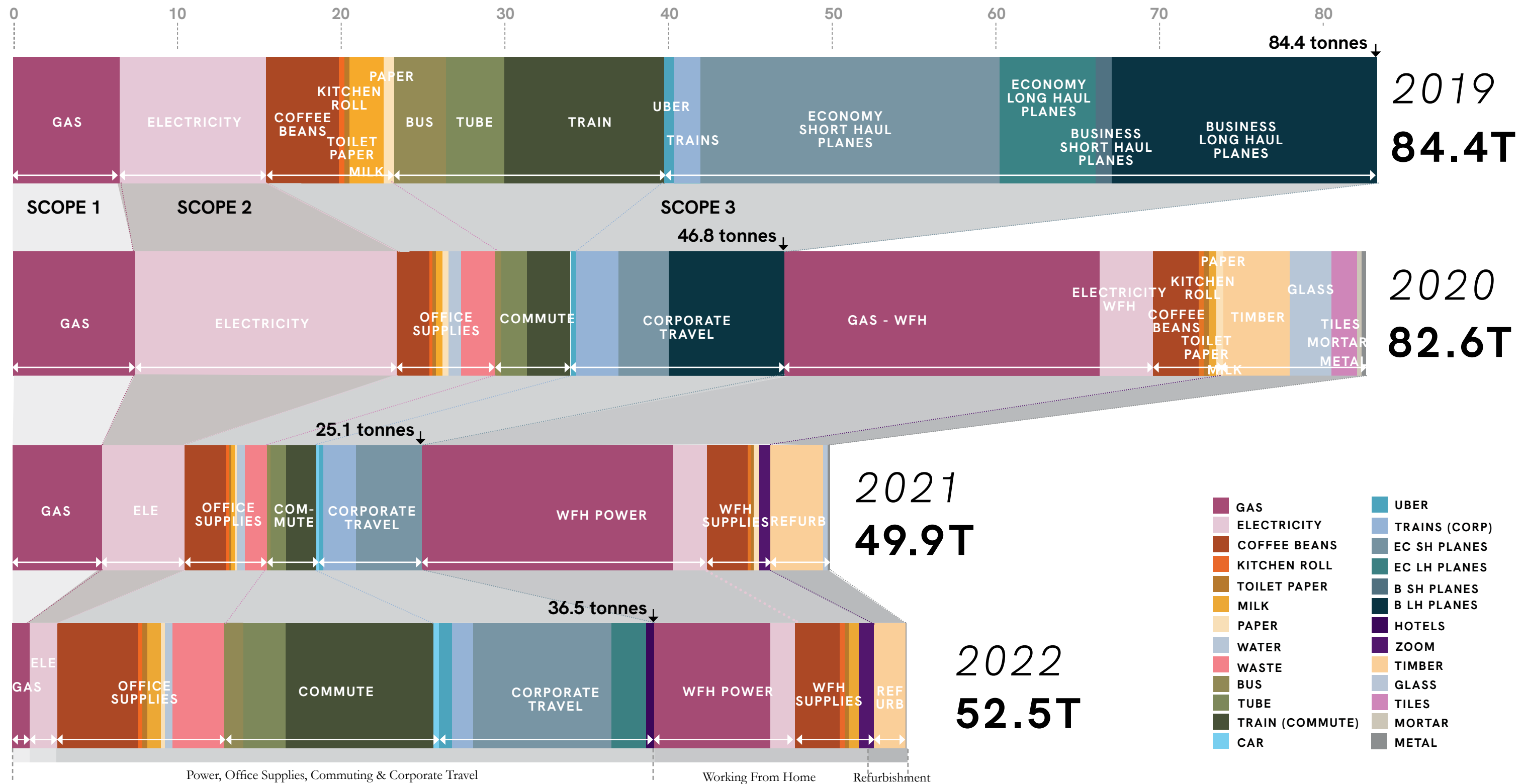
Each year, there were significant changes in the distribution of carbon usage across different categories, including Power, Office Supplies, Commuting, Corporate Travel, Working from Home, and Refurbishment works.

The pandemic had a substantial impact on reducing commuting and corporate travel, which greatly influenced the office's carbon usage.

The Berlin office moved in January 2022 & transferred to a green energy supplier in March 2022 significantly reducing the Berlin office's carbon footprint.

In the future, efforts will be made to support the reduction of personal carbon usage while working from home. In 2022, there was a decrease in total carbon emissions from working from home due to fewer employees opting for remote work following the pandemic. Additionally, a considerable portion of the staff, 38%, switched to a green energy tariff.

*Note: Data collection has been optimised to maximise accuracy over each year. Additional elements have been added as listed below. Water & Waste data included 2020 onwards. Hotel Stays & Zoom Calls data included 2021 onwards. WFH Green Energy Tariffs included 2021 onwards. German Electricity Factor added 2021 onwards.



CARBON OFFSETTING

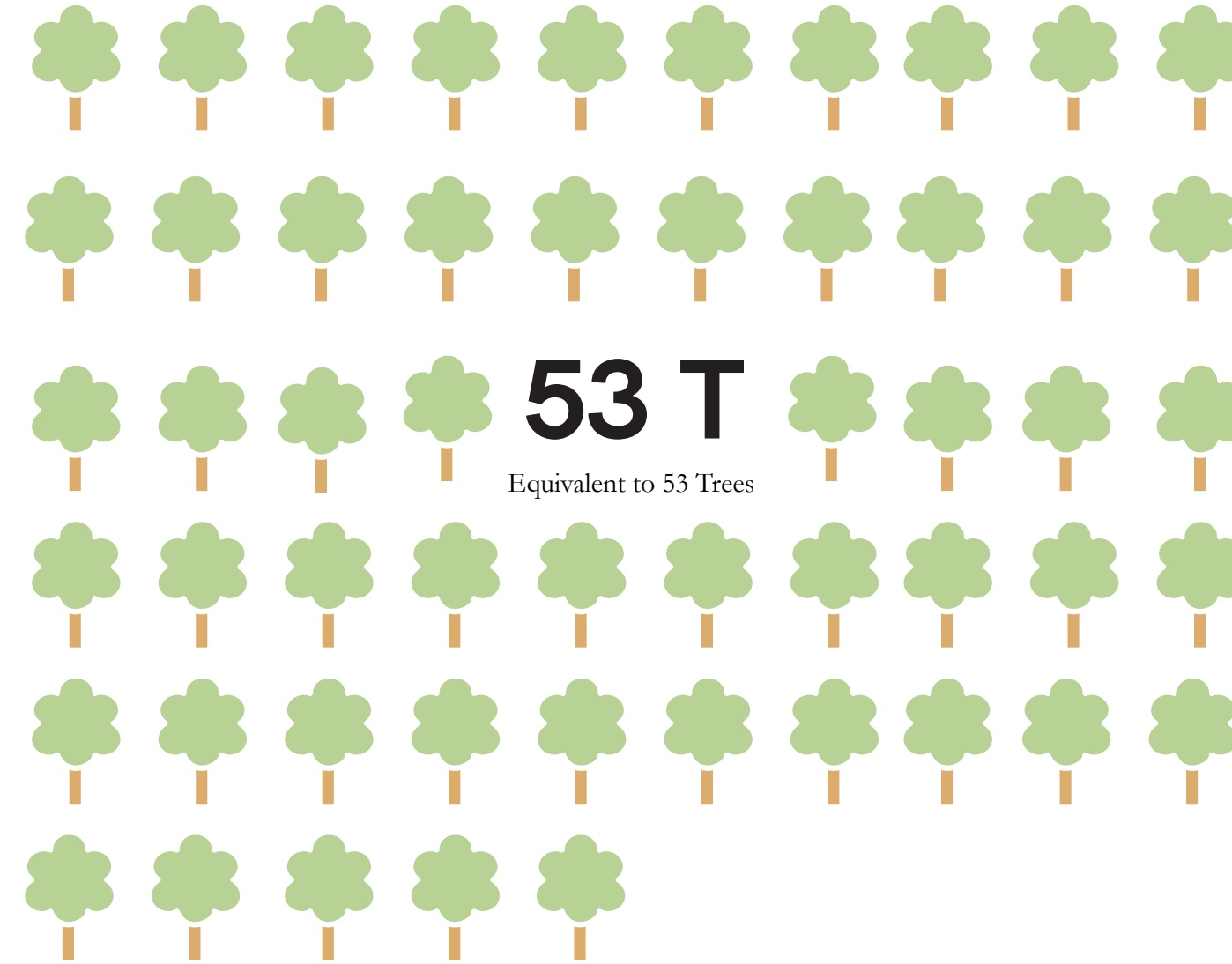
We have offset all Carbon used in 2022 by investing via 'Carbon Footprint' in the following scheme:

UK Tree Planting Scheme

OFFSETTING SCHEME

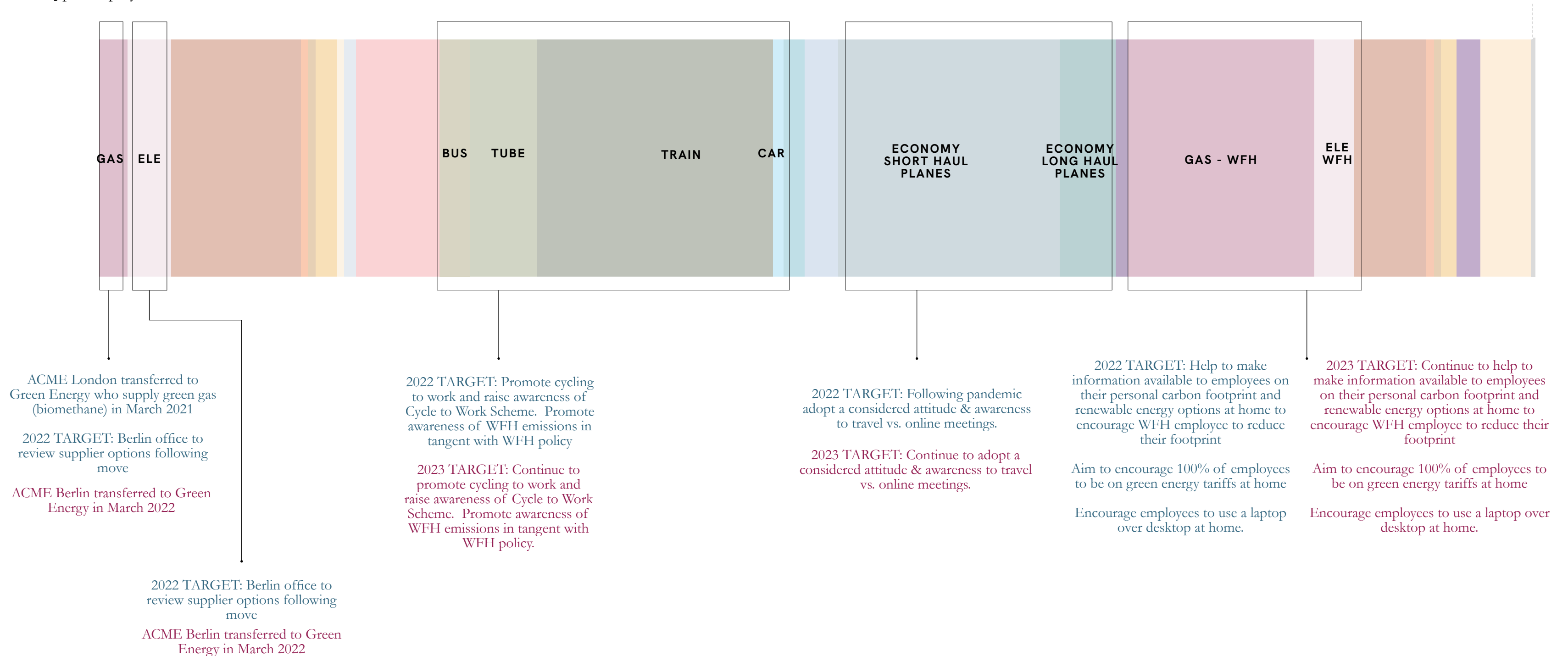
UK Tree Planting Scheme is a Verified Carbon Standard (VCS) offsetting scheme, that pairs global carbon offsetting projects with tree planting in the UK. Planting takes place in school locations and other biodiversity sites in the South East of the UK. For every tree that is pledged, a tonne of carbon is saved via a VCS avoided deforestation programme.

Tree species were a mix of UK native broadleaf, which includes oak, wild cherry, downy birch, silver birch, beech and hazel.



CARBON IN USE TARGETS 2022/2023

Since 2019 ACME have made significant improvements to reduce our Carbon In Use. Both offices are now using renewable energy suppliers and efforts have been made in reducing the other scope items. There are some further improvements that can be made, but we have managed to reduce our employee average from 1.2 TCO₂ per employee in 2019 to 0.76 TCO₂ per employee in 2022.



2

CARBON IN DESIGN

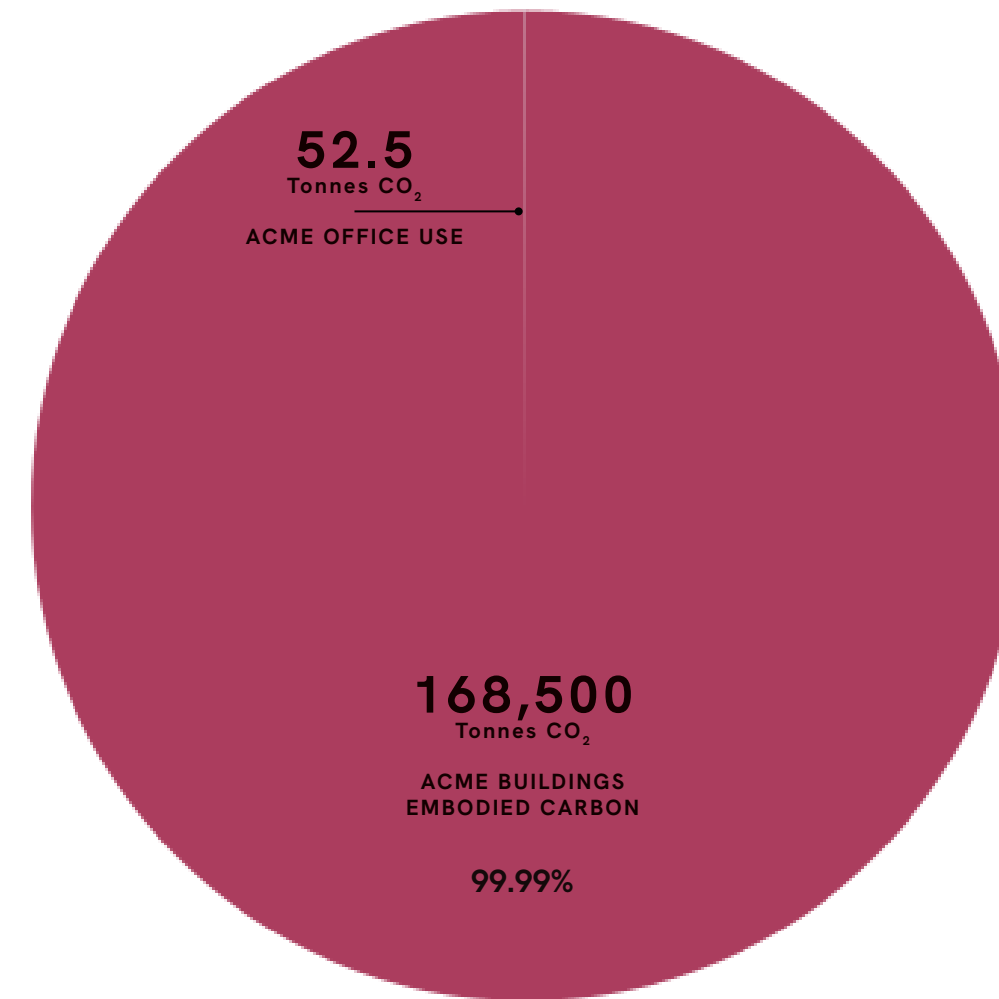
CARBON IN USE, CARBON IN DESIGN

ACME have used **53t** of carbon for heating and power, supplies, staff commuting, working from home, zoom calls and the office refurbishment.

While we have used 53t of carbon over the course of the year, we have designed buildings that need **168,500t** of carbon to construct the structural frames. Our Carbon In Use is **0.03%** of our Carbon In Design.

As designers, we create buildings. The buildings we design use carbon during construction, and in operation. As responsible designers, we need to review our own use of carbon, and the use of carbon to construct and use our buildings.

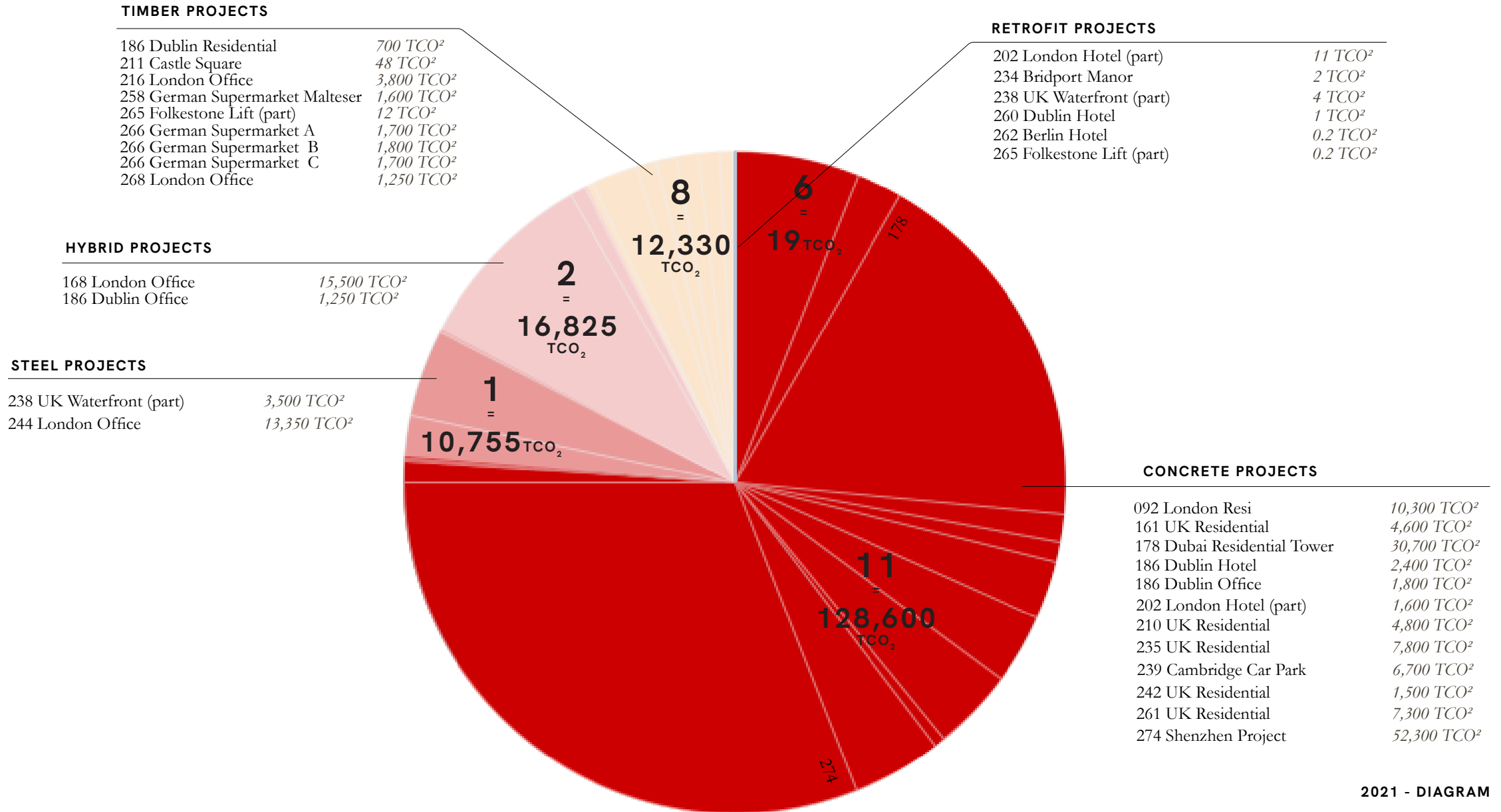
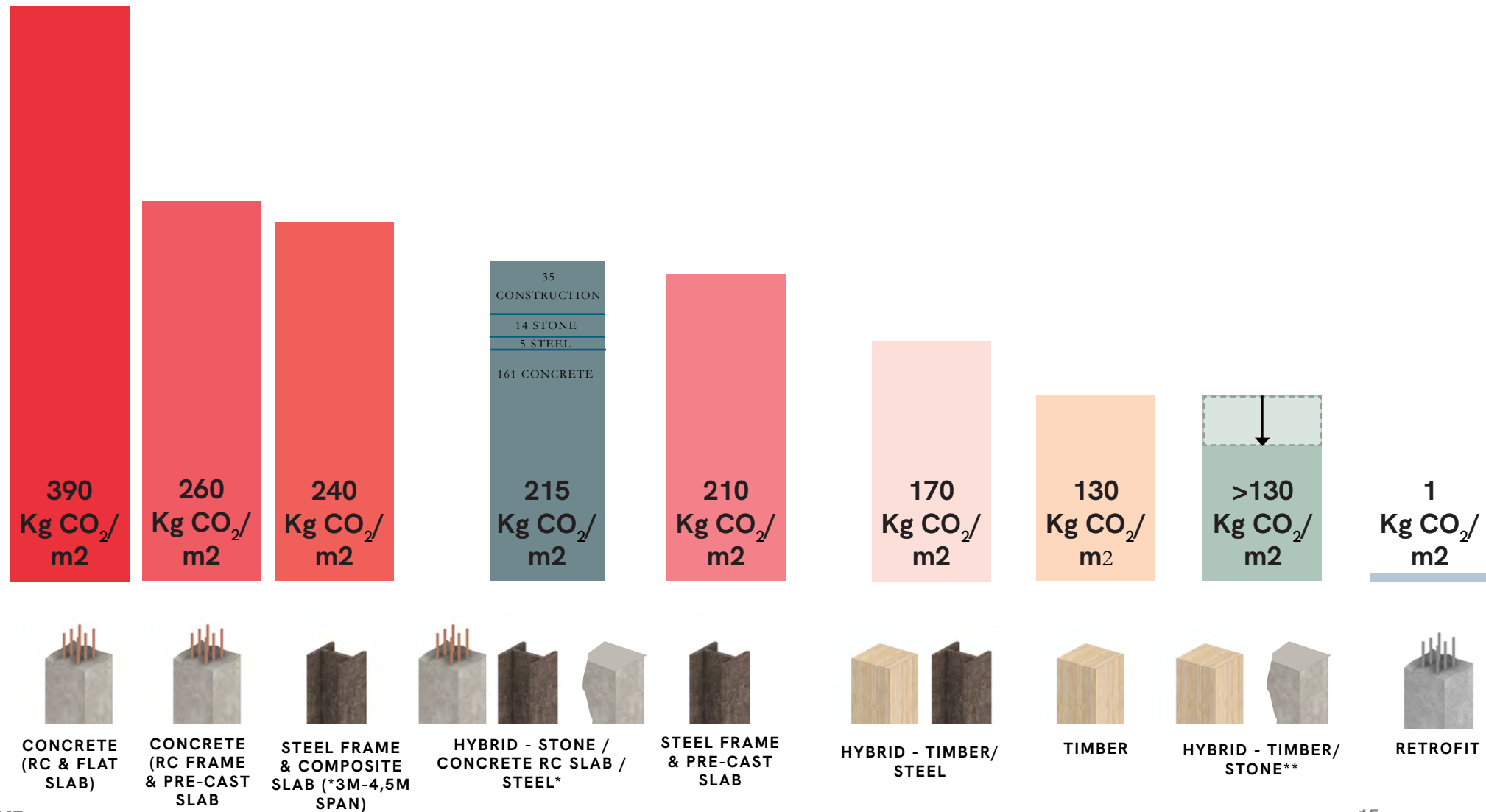
The embodied carbon in the structural frame of the buildings we design is 3,210 times more than the carbon we use ourselves.



EMBODIED CARBON

ACME design buildings. These buildings use Carbon in construction (Embodied Carbon) and in use (Operational Carbon). The primary structure of a building is responsible for approximately 75% of the overall embodied carbon. (Francesco Ranaudo ETH, Zurich). We have audited the primary structural frame in this embodied carbon assessment.

The 2 projects with the highest Embodied Carbon were 274 Shenzhen Project (52,300 TCO²) & 178 Dubai Residential Tower (30,700 TCO²). These are significant concrete frame projects. The lowest embodied Carbon Projects are all the Retrofit Projects.



TIMBER PROJECTS

186 Dublin Residential	700 TCO ²
211 Castle Square	48 TCO ²
216 London Office	3,800 TCO ²
258 German Supermarket Malteser	1,600 TCO ²
265 Folkestone Lift (part)	12 TCO ²
266 German Supermarket A	1,700 TCO ²
266 German Supermarket B	1,800 TCO ²
266 German Supermarket C	1,700 TCO ²
268 London Office	1,250 TCO ²

HYBRID PROJECTS

168 London Office	15,500 TCO ²
186 Dublin Office	1,250 TCO ²

STEEL PROJECTS

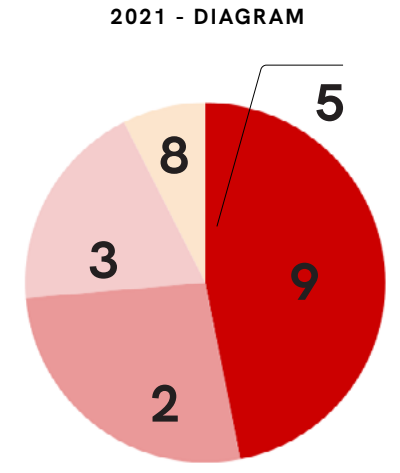
238 UK Waterfront (part)	3,500 TCO ²
244 London Office	13,350 TCO ²

RETROFIT PROJECTS

202 London Hotel (part)	11 TCO ²
234 Bridport Manor	2 TCO ²
238 UK Waterfront (part)	4 TCO ²
260 Dublin Hotel	1 TCO ²
262 Berlin Hotel	0.2 TCO ²
265 Folkestone Lift (part)	0.2 TCO ²

CONCRETE PROJECTS

092 London Resi	10,300 TCO ²
161 UK Residential	4,600 TCO ²
178 Dubai Residential Tower	30,700 TCO ²
186 Dublin Hotel	2,400 TCO ²
186 Dublin Office	1,800 TCO ²
202 London Hotel (part)	1,600 TCO ²
210 UK Residential	4,800 TCO ²
235 UK Residential	7,800 TCO ²
239 Cambridge Car Park	6,700 TCO ²
242 UK Residential	1,500 TCO ²
261 UK Residential	7,300 TCO ²
274 Shenzhen Project	52,300 TCO ²



* Note Figures re-calculated using Thornton Tomasetti Engineers Information ¹⁴

EMBODIED CARBON IN DESIGN

Between 2019 and 2022, we observed a rise in our TCO_{2e}/m², which can be attributed to the influence of two significant international concrete frame projects. These projects resulted in a higher proportion of concrete usage. However, it is essential to note that during this period, the number of retrofit projects also increased from 5 to 6. Moreover, our office actively engaged in various timber and hybrid projects. In 2022, we introduced a new typology of hybrid stone and timber projects.

ACME will endeavor to monitor how projects evolve over their design life and encourage the use of low embodied solutions where possible.

168,500 tonnes
0.313 tonnes per sqm



Over 2019-2022 the total TCO_{2e} relating to projects has fluctuated in relation to the total sqm of projects as noted below:

- 2019: Live Project area - circa 275,000sqm across 18 projects
- 2020: Live Project area - circa 468,000sqm across 27 projects
- 2021: Live Project area - circa 337,000sqm across 26 projects
- 2022: Live Project area - circa 570,000sqm across 29 projects

Carbon totals relate to the sqm value across the years which partially explains the increase from 2019 to 2022. (Masterplan projects / competitions are not included.) The best comparative data is in tonnes per sqm.

2019: 58,236 tonnes
0.213 tonnes per sqm

2020: 98,202 tonnes
0.198 tonnes per sqm

2021: 91,052 tonnes
0.264 tonnes per sqm

* Note Figures re-calculated using Thornton Tomasetti Engineers Information ¹⁴

2023 TARGET

- Reduce Embodied Carbon - Integrate LCA Software with BIM
- Reduce Operational Carbon through design stages
- Assess Operational Carbon of completed ACME buildings - (POE)
- Evaluate and Increase Biodiversity within our projects



3

APPENDIX

SOURCES & REFERENCES

1. Gas

A conversion factor of 0.18 KgCO₂e/Kwh has been used to calculate the emitted carbon.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

<https://www.greenenergyuk.com/greengas>

*Note Berlin Gas totals assume same consumption as 2021 as information for 2022 is not currently available.

2. Electricity

A conversion factor of 0.2123 KgCO₂e/Kwh is the government factor for UK electricity. Bulb (first half of year)/Eon supply 100% renewable electricity which has been supplied to acme.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

<https://bulb.co.uk/carbon-calculator/calculating-carbon-emissions/>

<https://www.greenenergyuk.com/sparklingenergy>

A conversion factor of 0.42 KgCO₂e/Kwh is the government factor for German electricity.

Source: <https://de.statista.com/statistik/daten/studie/38897/umfrage/co2-emissionsfaktor-fuer-den-strommix-in-deutschland-seit-1990/#:~:text=Im%20>

Jahr%202020%20wurde%20der,mit%20kleinen%20Ausnahmen%20kontinuierlich%20ab.

*Note Berlin Electricity totals assume same consumption as 2021 as information for 2022 is not currently available, however a Green Energy Tariff was adopted in March 2021.

3. Coffee Beans

A conversion factor of 17.72 KgCO₂e/Kg has been used to calculate the emitted carbon.

Source: <https://www.vegansociety.com/take-action/campaigns/plate-planet/carbon-calculator>

4. Kitchen Rolls and Toilet Paper

A conversion factor of 0.750 KgCO₂e/Kg has been used to calculate the emitted carbon of Kitchen Roll.

A conversion factor of 0.211 KgCO₂e/Kg has been used to calculate the emitted carbon of Toilet Paper.

Source: https://www.myclimate.org/fileadmin/user_upload/myclimate_-_home/02_Take-action/01_Corporate_clients/15_Climatop_label/Products/Migros/

Produkte/Migros_Soft_Recycling/Factsheet_e_Migros_Soft_Recycling.pdf

5. Milk

A conversion factor of 1.13 KgCO₂e/Ltr has been used to calculate the emitted carbon.

Source: <https://www.vegansociety.com/take-action/campaigns/plate-planet/carbon-calculator>

6. Paper

A conversion factor of 919 KgCO₂e/tonne has been used to calculate the emitted carbon.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

7. Bus

A conversion factor of 0.0772 KgCO₂e/Km has been used to calculate the emitted carbon.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

8. Tube

A conversion factor of 0.0278 KgCO₂e/Km has been used to calculate the emitted carbon.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

9. Uber / Car

A conversion factor of 0.208 KgCO₂e/Km has been used to calculate the emitted carbon of Uber transport

A conversion factor of 0.1650 KgCO₂e/Km has been used to calculate the emitted carbon of Car transport

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

10. Train

A conversion factor of 0.355 KgCO₂e/Km has been used to calculate the emitted carbon.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

11. Plane

A conversion factor of 0.1510 KgCO₂e/Km has been used to calculate the emitted carbon of Economy Short Haul Flights.

A conversion factor of 0.1479 KgCO₂e/Km has been used to calculate the emitted carbon of Economy Long Haul Flights.

A conversion factor of 0.2265 KgCO₂e/Km has been used to calculate the emitted carbon of Business Short Haul Flights.

A conversion factor of 0.4288 KgCO₂e/Km has been used to calculate the emitted carbon of Business Long Haul Flights.

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

12. Water

A conversion factor of 0.149 KgCO₂e/cm has been used to calculate the emitted carbon for Water Supply

A conversion factor of 0.272 KgCO₂e/cm has been used to calculate the emitted carbon for Water Treatment

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

*Note Berlin Water totals assume same consumption as 2021 as information for 2022 is not currently available.

13. Waste

A conversion factor of 446.242 KgCO₂e/tonne has been used to calculate the emitted carbon for Non-Recycled Waste

A conversion factor of 21.294 KgCO₂e/tonne has been used to calculate the emitted carbon for Recycled Waste

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

14. Office Project Carbon Calculations

Data collection has been optimised to maximise accuracy over each year. For projects with Whole Life Cycle Assessments accurate structural information has been extracted. For other projects a sqm rate based on Thornton Tomasetti data has been used. The carbon values represent the amount of embodied carbon per square metre of GIA of the superstructure primary frame. The following assumptions have typically been made in the calculations:

- Excludes masterplans & lost competitions.
- Included all Projects within the Office between Stage 0-7
- Projects Stage 3-7 measured using OneClickLCA / consultant information. Excludes projects in Planning before 2015.
- Ready mix concrete C30/37, 0% recycled biners
- 90% Recycled Steel

15. Travel

Work locations 2022: London, Berlin, Austria, Prague, China, Cyprus, Croatia, Greece, New Zealand, Ukraine, Italy, South Korea

London Office Total:

- Commuting: 10,907 KgCO₂e
- Corporate Travel (inc Air travel) : 12,520 KgCO₂e

Berlin Office Total:

- Commuting: 541 KgCO₂e
- Corporate Travel (inc Air travel) : 2,185KgCO₂e

16. Refurbishment

A conversion factor of 0.493 KgCO₂e/kg was used for all timber elements

A conversion factor of 3.03 KgCO₂e/kg was used for all metal elements

A conversion factor of 45 KgCO₂e/m² was used for all glass elements

A conversion factor of 21.6 KgCO₂e/m² was used for all mirror elements

A conversion factor of 0.832 KgCO₂e/kg was used for all cement tiles & mortar

Source: ICE DB V3

SOURCES & REFERENCES

17. Working From Home

Working hours per year - 1920 (For 2020 a factor of 0.8 has been applied to account for the period of work from the office resulting in 1536 hours being the figure used)

Average Domestic Gas Usage (OFGEM) - 12000kWh / year

Gas usage attributed to heating (OFGEM) - 77%

Average Domestic Homeworking Electricity power per person (OFGEM) - 150 W / hour

Source: Homeworking Emissions Whitepaper 2020

18. Zoom Calls

Laptop - 10 gCO₂e/h - 0.01 KgCO₂e/h

Desktop - 50 gCO₂e/h - 0.05 KgCO₂e/h

Source: How Bad are bananas. The Carbon Footprint of everything

19. Hotel Stays

A conversion factor of 13.9 KgCO₂e/night has been used to calculate the emitted carbon of Hotel Stay National

A conversion factor of 6.5 KgCO₂e/night has been used to calculate the emitted carbon of Hotel Stay France

A conversion factor of 17 KgCO₂e/night has been used to calculate the emitted carbon of Hotel Stay Germany

Source: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

20. Carbon Emission Scopes

Scope 1: Emissions from sources that an organisation owns or controls directly

Scope 2: Emissions that a company causes indirectly when the energy it purchases and uses is produced.

Scope 3: Encompasses emissions that are not produced by the company itself, and not the result of activities from assets owned or controlled by them, but by those that it's indirectly responsible for, up and down its value chain.

Source: <https://www.nationalgrid.com/stories/energy-explained/what-are-scope-1-2-3-carbon-emissions>

21. Life Cycle Embodied Carbon Targets

LETI Embodied Carbon target alignment paper

<https://www.leti.london/carbonalignment>

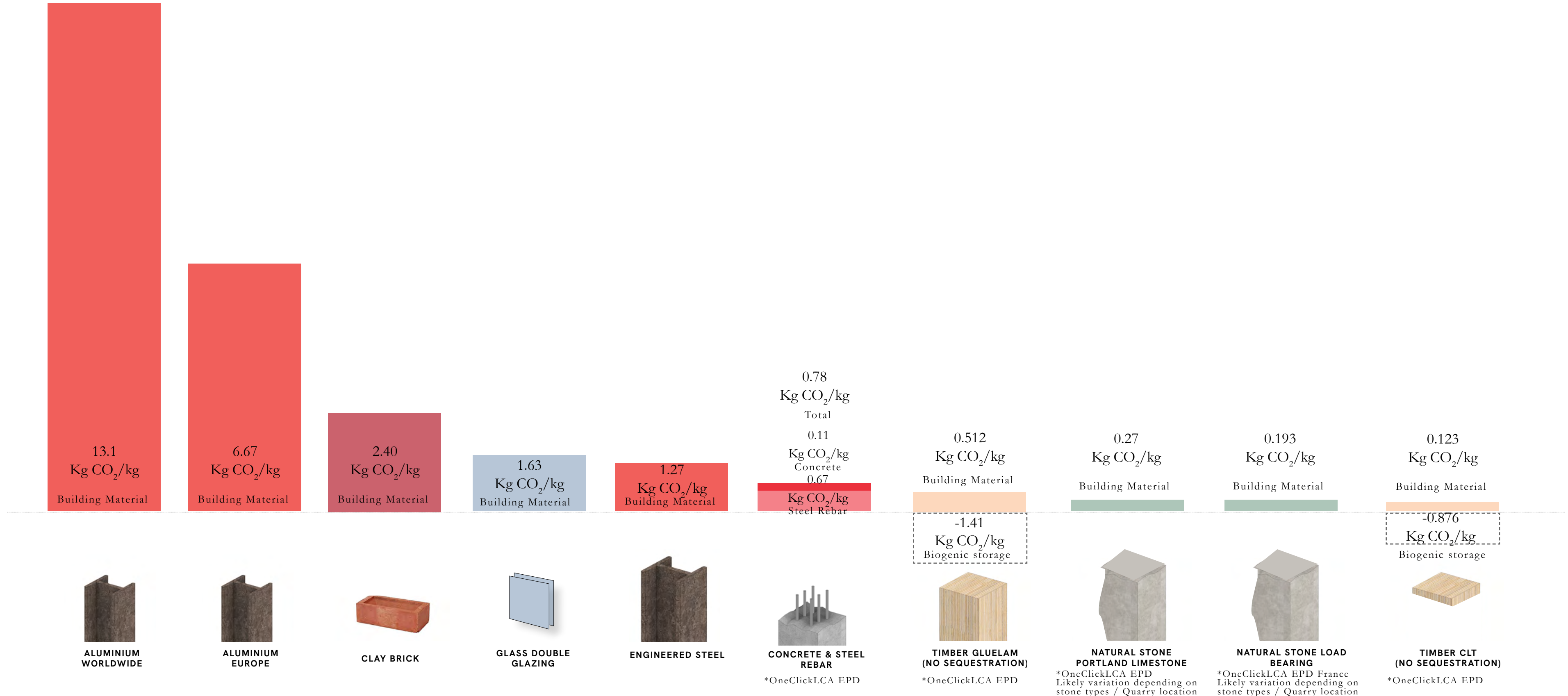
22. Operational Carbon Targets

LETI Net Zero Operational Carbon

https://www.leti.london/_files/ugd/252d09_0f7760d9a2ba4ab8920f69f8ccc3e112.pdf

SOURCES & REFERENCES

Summary of Kg CO₂/kg of building materials
 Note Figures source ICE Database V3 2019 / OneClickLCA Database A1-A3





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