CARBON AUDIT

2021

acme

2021
MISSION

ACME will continue to produce an annual Carbon Audit

ACME will offset the Carbon Footprint every year to achieve Net Zero

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ACME will seek to reduce the Carbon Footprint each year

ACME will work towards buildings that are Net Zero Carbon in construction & Carbon Free in use

2021
CARBON SUMMARY - LONDON & BERLIN

25.0 tonnes

0.3 tonnes per employee

** Not inclusive of WFH / Renovation*

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.

72,371
KWH OF GAS

2020: 41,010

$KgCO_2e/Kwh$: 0.18[1]
Enough to power 6 households a year

88,437
KWH OF ELECTRICITY

2020: 75,194

$KgCO_2e/Kwh$: 0.2123/ 0.0[2]
Enough to power 24 households a year

121
KG OF COFFEE BEANS

2020: 62

$KgC0_2e/Kg$: 17.72[3]
17,4k cups of coffee
239 cups per person

208/788
KITCHEN/TOILET ROLLS

2020: 178 /299

Kitchen Roll
$KgC0_2e/Kg$: 0.750[4]
Toilet Paper
$KgC0_2e/Kg$: 0.211

499
LITRES OF MILK

2020: 285

$KgC0_2e/Ltr$: 1.13[5]
99k cups of tea with milk
1,367 cups per person

0.09
TONS OF PAPER

2020: 0.2

$KgC0_2e/Kg$: 919[6]
17k sheets of A4
233 per person

11
NIGHTS IN HOTELS

$KgC0_2e/night$:[18]
Hotel Stay National - 13.9
Hotel Stay France- 6.5
Hotel Stay Germany - 17

1,673
KM ON THE BUS

2020: 4,840

$KgCO_2e/Km$: 0.0772[7]
0.4 times around the Earth

30,046
KM ON THE TUBE

2020: 48,313

$KgCO_2e/Km$: 0.0278[8]
0.75 times around the Earth

53,187
KM ON THE TRAIN (COMMUTE)

2020: 67,124

$KgCO_2e/Km$: 0.0355[10]
1.33 times around the Earth

187
KM IN THE CAR (COMMUTE)

$KgCO_2e/Km$: 0.1650[9]

822
KM IN UBER

2020: 1,279

$KgCO_2e/Km$: 0.208[9]
0.02 times around the Earth

51,339
KM ON THE TRAIN (CORPORATE)

2020: 43,049

$KgCO_2e/Km$: 0.0355[10]
1.28 times around the Earth

27,425
KM BY AIR

2020: 58,470

$KgCO_2e/Km$: [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

2020: 263

$KgCO_2e/Kwh$: 0.149[12]

162
CM WATER TREATMENT

2020: 263

$KgCO_2e/Kwh$: 0.272[12]

1,030
WASTE BAGS

2020: 1,780

$KgC0_2e/Kg$: 0.033[13]

3.7
TONNES WASTE NON-RECYCLING

2020: 5.4

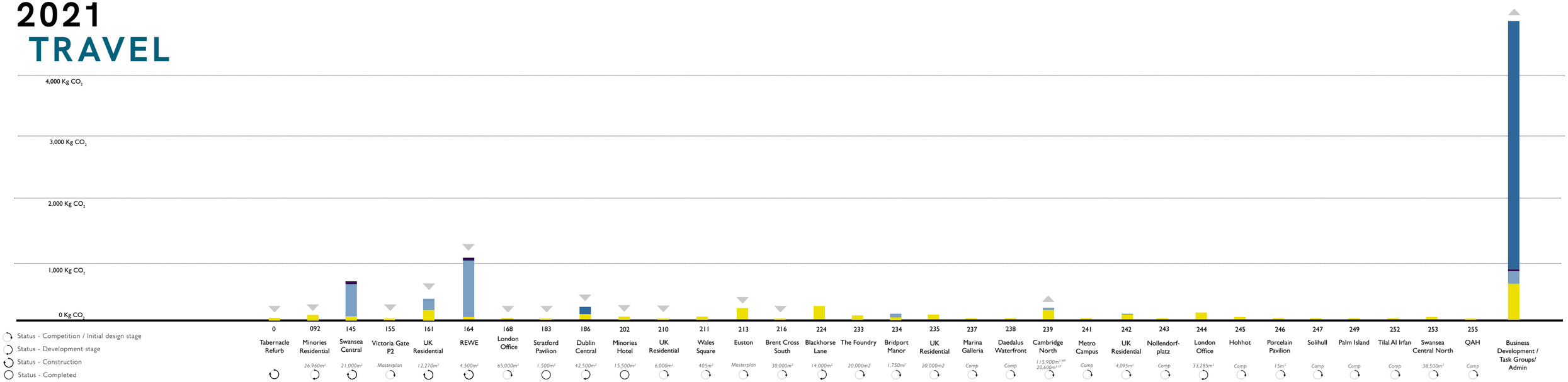
$KgC0_2e/Kg$: 446.242[13]

2.1
TONNES WASTE - RECYCLING

2020: 4.4

$KgC0_2e/Ltr$: 21.294[13]

2021
TRAVEL



PROJECT TRANSPORT

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

London Office Total:
Commuting: 2,715 KG Co2e
Corporate Travel (inc Air travel) : 5,330 KG Co2e
Berlin Office Total:
Commuting: 168 KG Co2e
Corporate Travel (inc Air travel) : 997 KG Co2e

This year office travel was significantly reduced mainly due to the impacts of COVID-19.
Corporate Travel made up 29% of Carbon .
Staff Commuting made up 13% of the total.
Office supplies accounted for the majority at 58% this year.
(Not including WFH & Refurbishment figures)
Several employees worked from various locations abroad during the year. Carbon has not been accounted for these trips.

FLIGHT LOCATIONS 2021

LONDON
BERLIN
BORDEAUX
BRUSSELS
DUBLIN
PARIS
TOULOUSE
VENICE

PROJECT FLIGHT LOCATION
WORKING LOCATIONS

2021
WORKING FROM HOME

We have audit items that are normally consumed in the office but which have been consumed at home for the period of 2021 where the office was working from home initially due to COVID-19. A new working from home policy was adopted from August 2021, so this is also accounted for during the period where the office was open.
Each element was converted to kg of Carbon based on generally published conversion factors, noted for each category.
Zoom calls have been accounted for in this section

21.8 tonnes

0.3 tonnes per employee

** WFH London and Berlin excluding Zoom*

2020: 26.7 tonnes
0.39 tonnes per employee

83,933

KWH OF GAS[16]

$KgCO_2e/Kwh$: 0.18[1]
Enough to power 9.6 households a year
Excludes Employees on Green Tariff

2020: 104,027

12,557

KWH OF ELECTRICITY[16]

$KgCO_2e/Kwh$: 0.2123/ 0.0[2]
Enough to power 4 households a year
Excludes Employees on Green Tariff

2020: 14,746

178

KG OF COFFEE BEANS[3]

$KgCO_2e/Kg$: 17.72[3]
25,457 cups of coffee
359 cups per person

2020: 203

277/446

KITCHEN/TOILET ROLLS[4]

Kitchen Roll
$KgCO_2e/Kg$: 0.750[4]
Toilet Paper
$KgCO_2e/Kg$: 0.221

2020: 314 /472

515

LITRES OF MILK[5]

$KgCO_2e/Ltr$: 1.13[5]
103k cups of tea with milk
1,391 cups per person

2020: 806

0

TONS OF PAPER[6]

$KgCO_2e/Kg$: 919[6]

2020: 0

Additional

Transferred from use in the office

ZOOM CALLS

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.

32,743

HOURS OF ZOOM[17]

$KgCO_2e/h$[17]
Laptop 0.01
Desktop 0.05
1337 Days

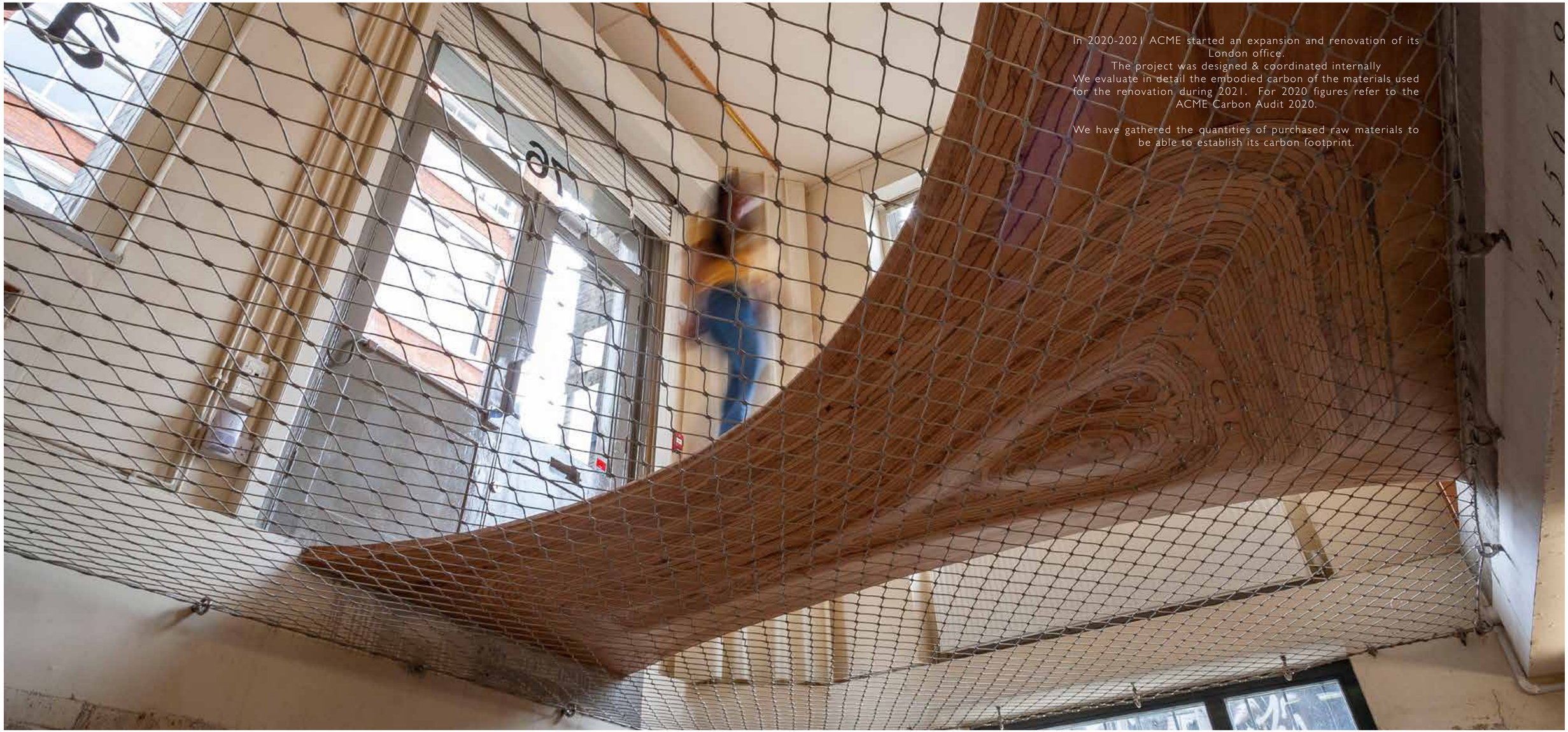
0.7 tonnes

0.01 tonnes per employee

** Only Zoom Calls*

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 everything[17]

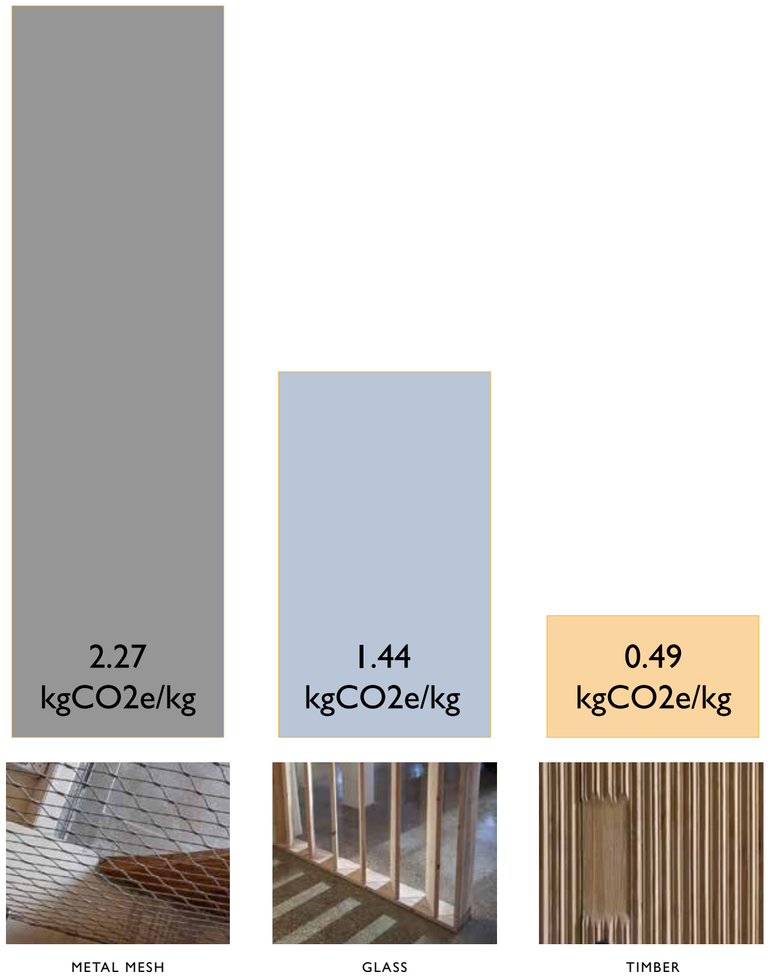
2021
OFFICE RENOVATION

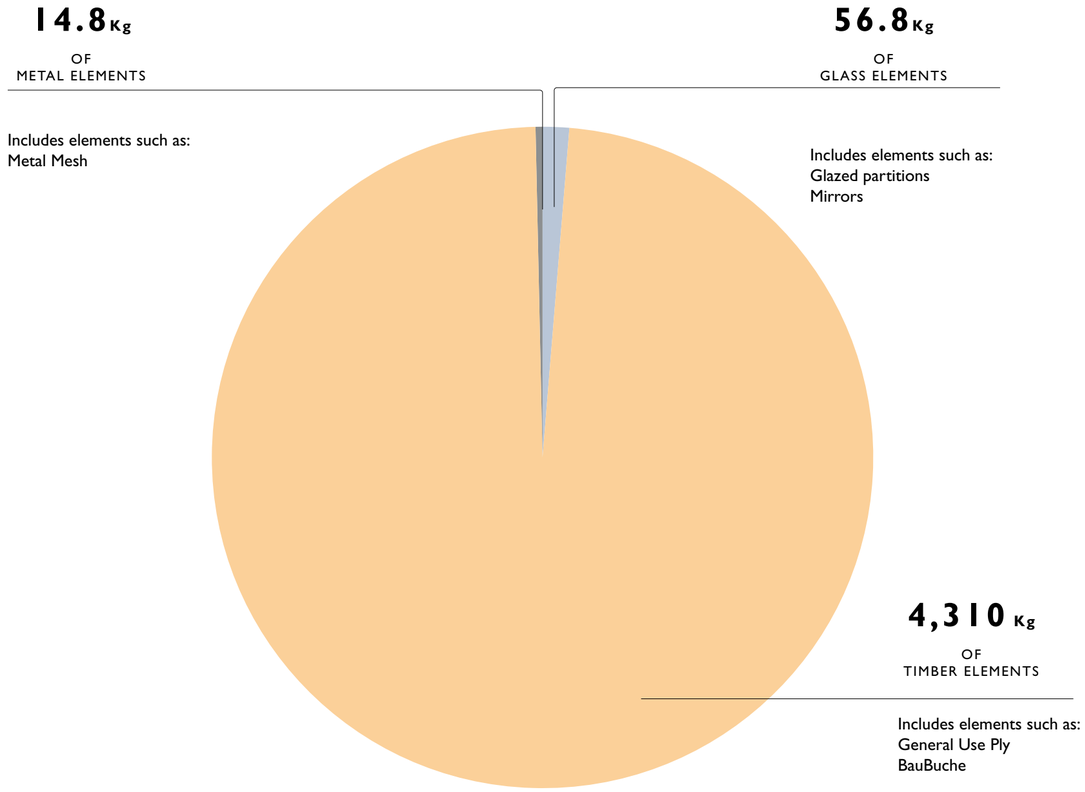


In 2020-2021 ACME started an expansion and renovation of its London office.
The project was designed & coordinated internally
We evaluate in detail the embodied carbon of the materials used for the renovation during 2021. For 2020 figures refer to the ACME Carbon Audit 2020.

We have gathered the quantities of purchased raw materials to be able to establish its carbon footprint.

2021
OFFICE RENOVATION - MATERIALS





2021
OFFICE RENOVATION - EMBODIED CARBON

Only materials purchased during 2021 for the renovation are included in the calculations.

Embodied carbon values are based on the Inventory of Carbon & Energy published by Circular Economy and the University of Bath in 2019[15]

2.3 tonnes

Embodied Carbon In Office Renovation

2021
CARBON USE

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

Scope 1: 5.2t[19]

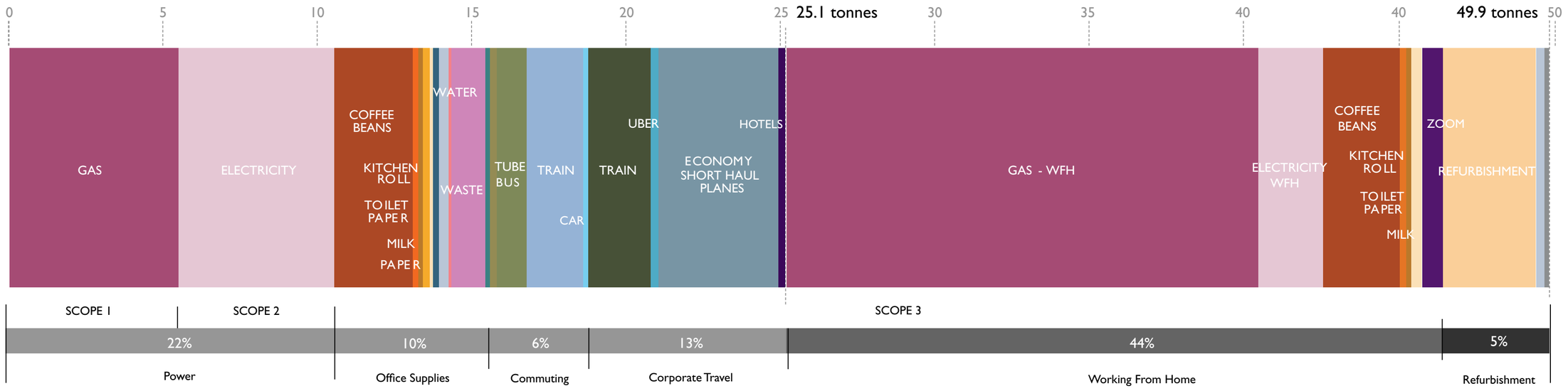
Scope 2: 5.7t[19]

Scope 3: 38.9t[19]

Travel represented 19% of all Carbon used.

49.9 tonnes

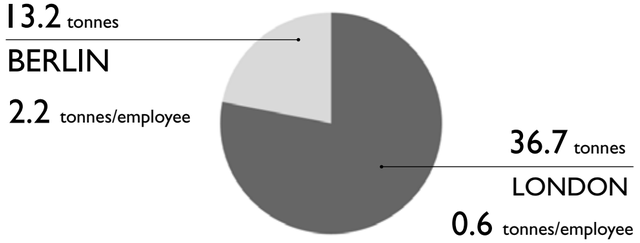
0.68 tonnes per employee



2019 Power, Office Supplies, Commuting, Corporate Travel - 84.4 tonnes

2020 Power, Office Supplies, Commuting, Corporate Travel - 46.8 tonnes

2021 Power, Office Supplies, Commuting, Corporate Travel - 25.1 tonnes

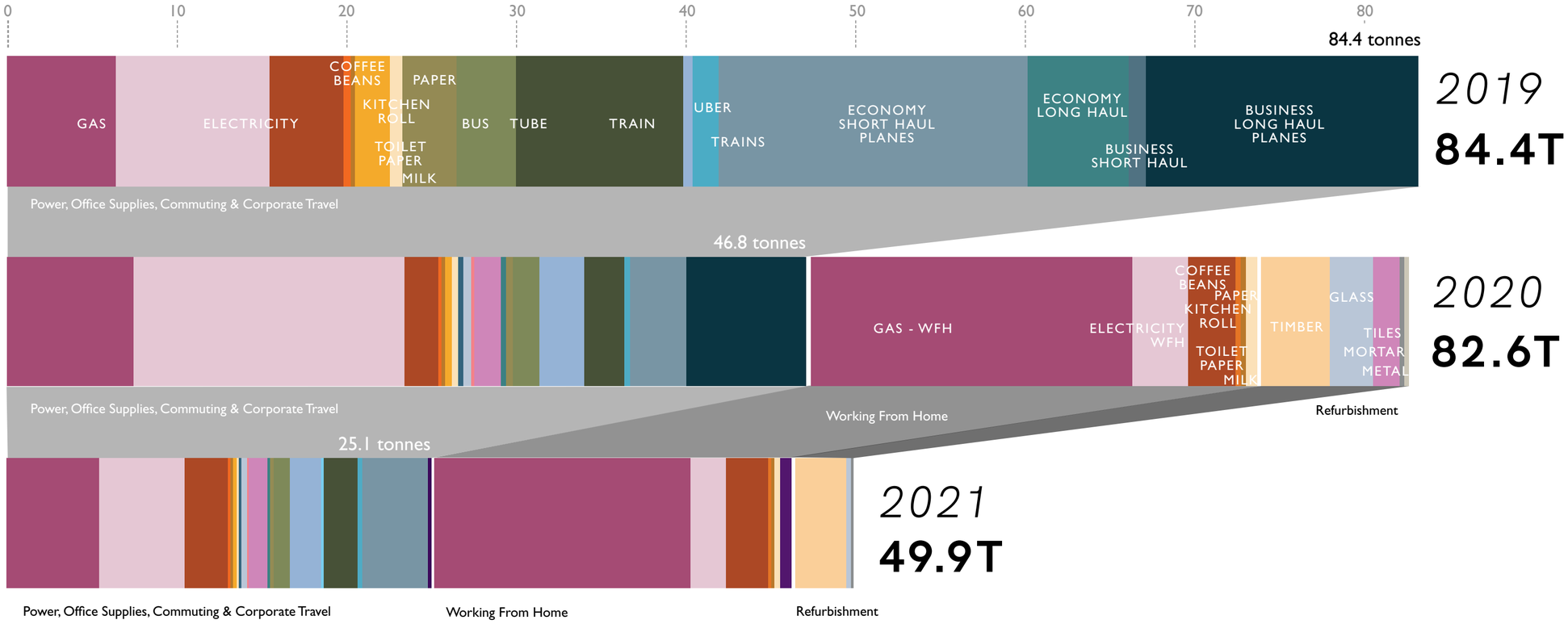


2019 - 2021
CARBON USE

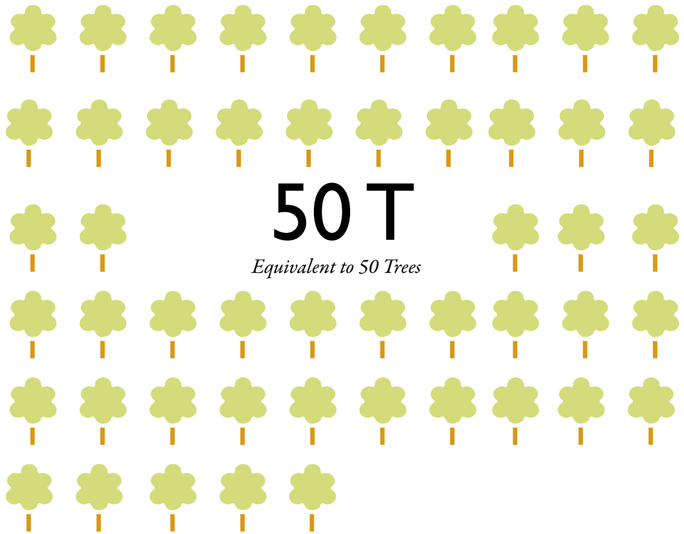
Between 2019-2021 ACME's Carbon Use has decreased annually. Each year the distribution between Power, Office Supplies, Commuting, Corporate Travel, Working from Home and Refurbishment works has changed significantly.

- Carbon has reduced within the office.
- During 2020 the London office increased in size & had refurbishment works resulting in an increased Gas & Electricity use. Switching to green electricity in August 2020, and biomethane gas in March 2022 brought the carbon figure down significantly for 2021.
- The pandemic has significantly reduced commuting and corporate travel which has a significant impact on the office carbon use.
- Future efforts to include support in reducing personal carbon use when WFH.

**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.



2021
CARBON OFFSETTING



We have offset all Carbon used in 2021 by investing via 'Carbon Footprint' in the following scheme:

UK Tree Planting Scheme

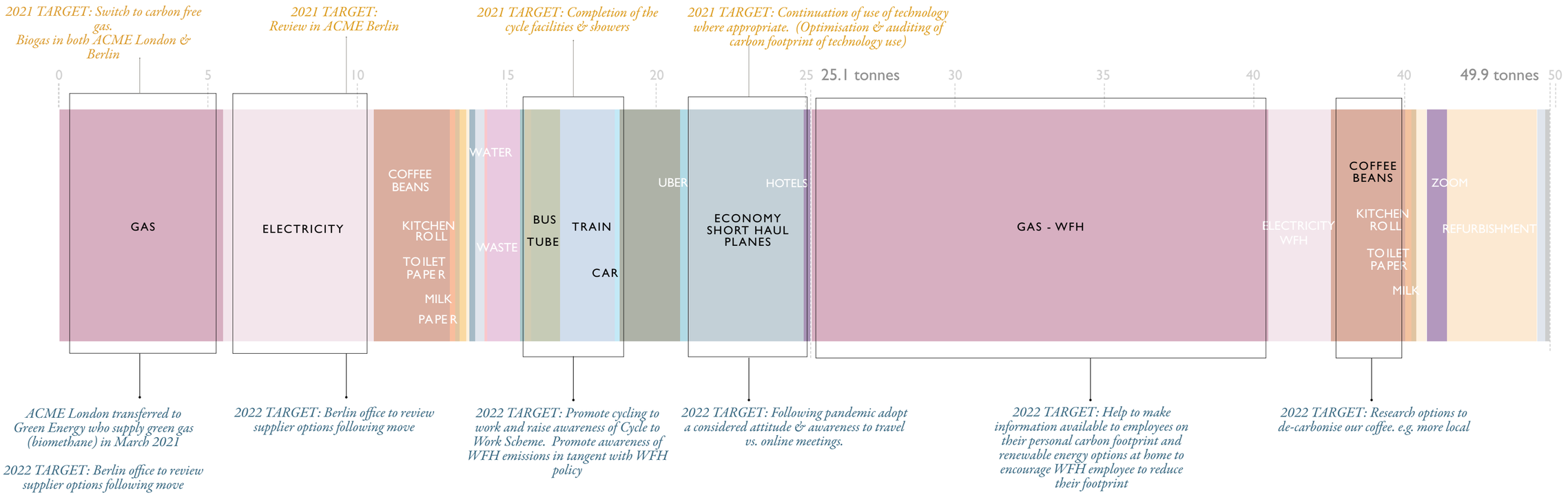
Planting takes place in school locations and other biodiversity sites in the South East of the UK. For every tree that is pledged, a tonne of carbon will also be saved in the Brazilian Amazon via a VCS avoided deforestation programme.

In our 2020 Audit trees were planted in Farney Close School in Haywards Heath, Sussex. Tree species were a mix of UK native broadleaf, which includes oak, ash, downy birch, silver birch, beech and hazel.

This meets BSI's PAS 2060 guidance on carbon neutrality.

2022 TARGET

Reduce Carbon In Use



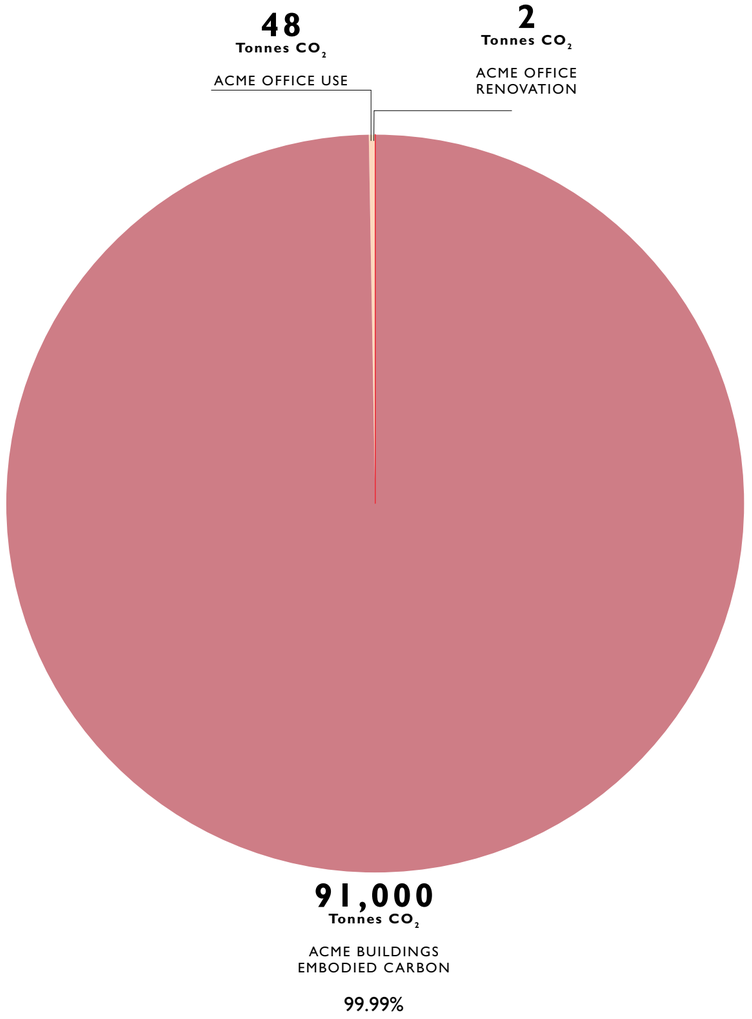
2021
CARBON IN USE, CARBON IN DESIGN

*ACME have used **50t** of Carbon for heating and power, supplies, staff commuting, working from home, zoom calls and the office refurbishment. This equates to **0.68t** of Carbon per employee.*

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.

*While we have used 50t of Carbon over the course of the year, we have designed buildings that need **91,000t** of Carbon to construct the structural frames.*

*The Carbon Embodied in the Structural Frame of the buildings we design is **1,820 times** more than the Carbon we use ourselves.*



2021
EMBODIED CARBON

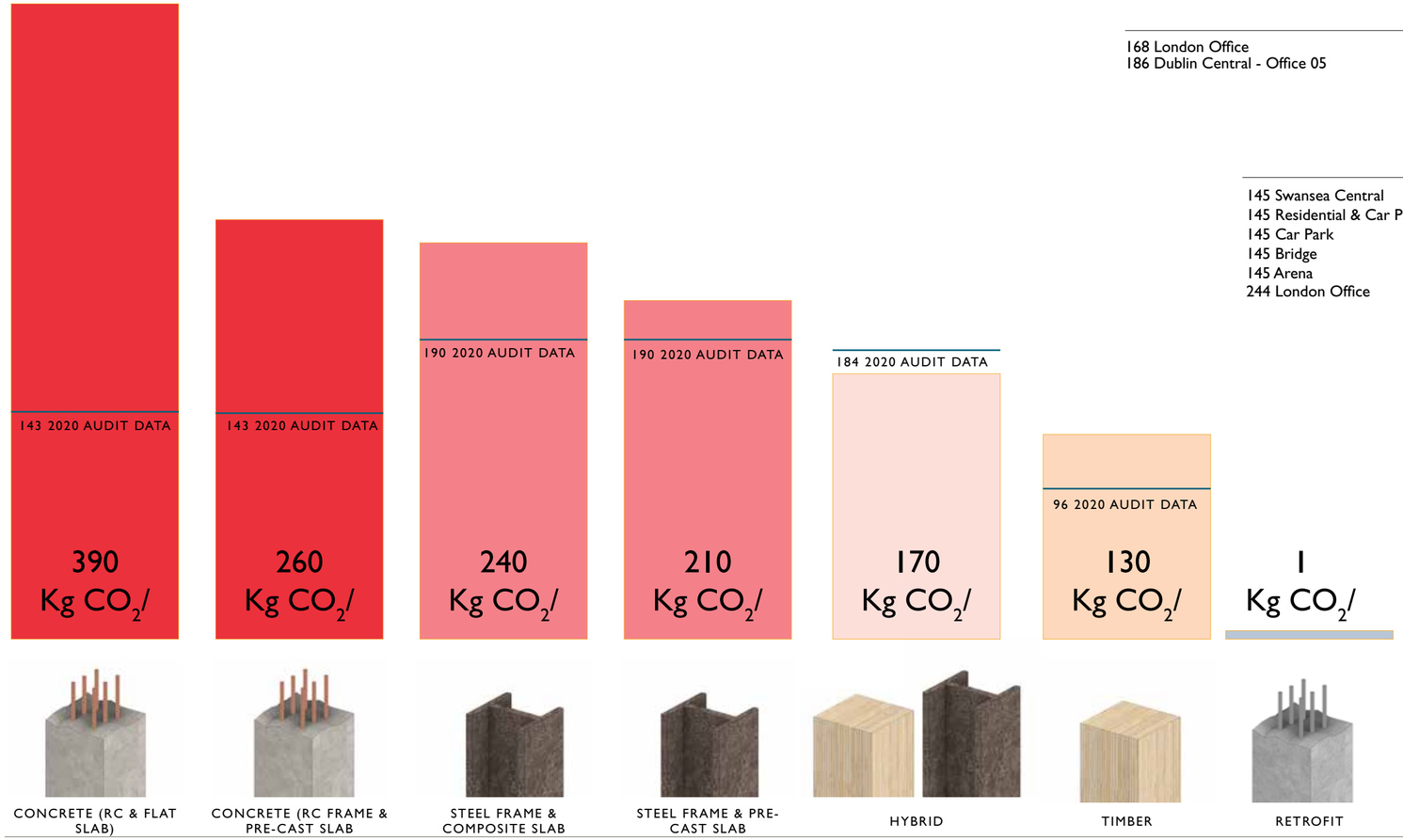
ACME design buildings. These buildings use Carbon in construction (Embodied Carbon) and in use (Operational Carbon).

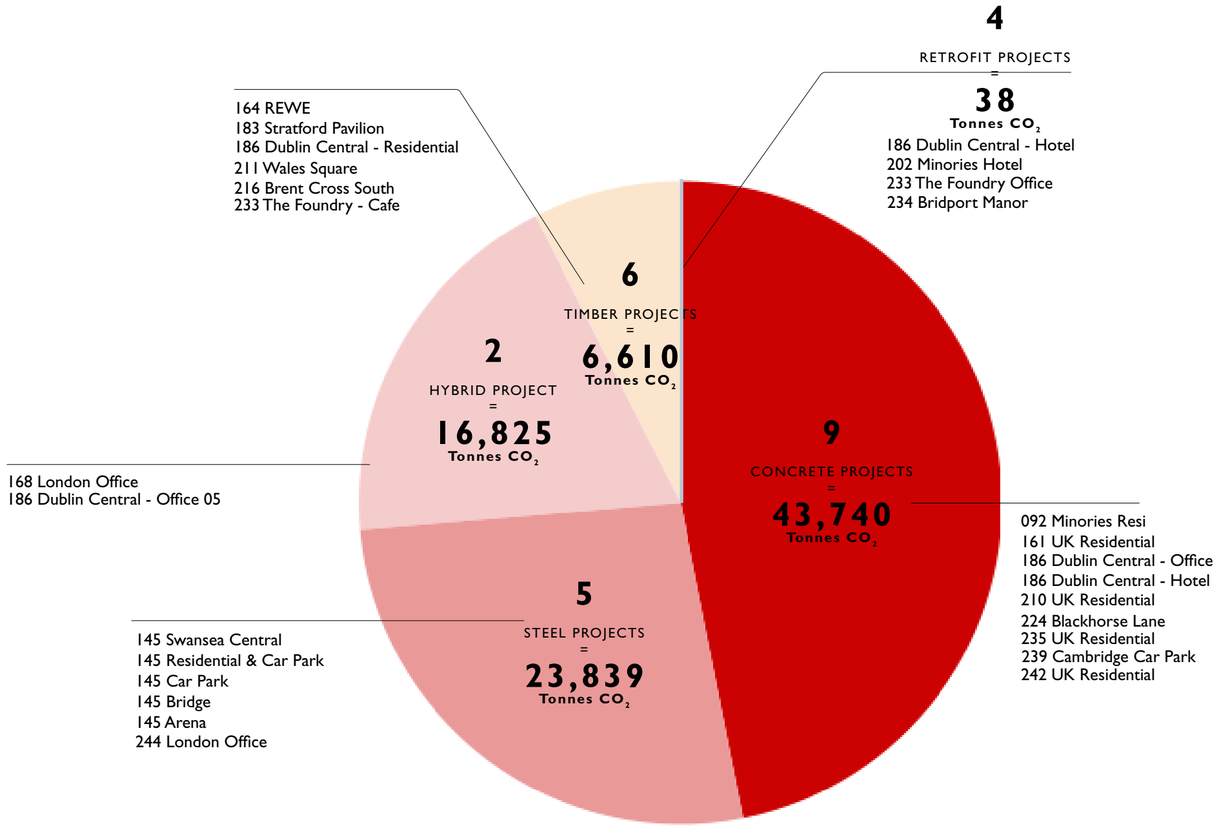
The primary structure of a building is responsible for approximately 75% of the overall embodied carbon.
(Francesco Ranaudo ETH, Zurich).

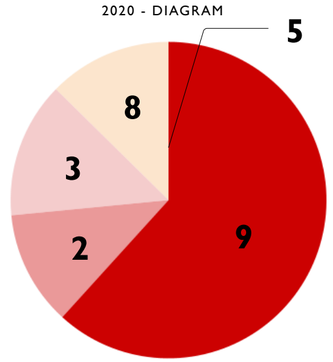
We have audited the primary structural frame in this embodied carbon assessment.

The carbon values are based on a study conducted by Thornton Tomasetti Engineers and represent the amount of embodied carbon per square metre of GIA.
Excludes masterplans & lost competitions.

Included all Projects within the Office between Stage 0-7[14]







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

2021
EMBODIED CARBON IN DESIGN

Methodology:
GIA x Embodied carbon of structural system

Note:
The graph illustrates the embodied total embodied carbon per project based on its structural system only.

The graphs exclude masterplans & lost competitions

Over 2019-2021 the total tCo2e relating to projects has fluctuated in relation to the total sqm of projects as noted**.

Over 2019-2021 our tCo2e/sqm has slightly increased. The impact of 2 large office projects has contributed to this increase. London Office (168) Stage 1 design began with a timber frame but as the project developed this evolved into a hybrid frame. In 2020 we also included 60 Aldgate (244) which is a significant steel frame scheme. In 2020, we had more retrofit, timber and hybrid live projects. ACME will endeavour to monitor how projects evolve over their design life and encourage the use of low embodied solutions where possible.

91,052 tonnes

0.264 tonnes per sqm

2019: 58,236 tonnes
0.213 tonnes per sqm

2020: 98,202 tonnes
0.198 tonnes per sqm

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

**Note. 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.*

***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 337,000 sqm across 26 projects
Carbon totals relate to the sqm value across the years which explains the increase from 2019 to 2020/2021. (Masterplan projects / competitions are not included.)
The best comparative data is in tonnes per sqm.

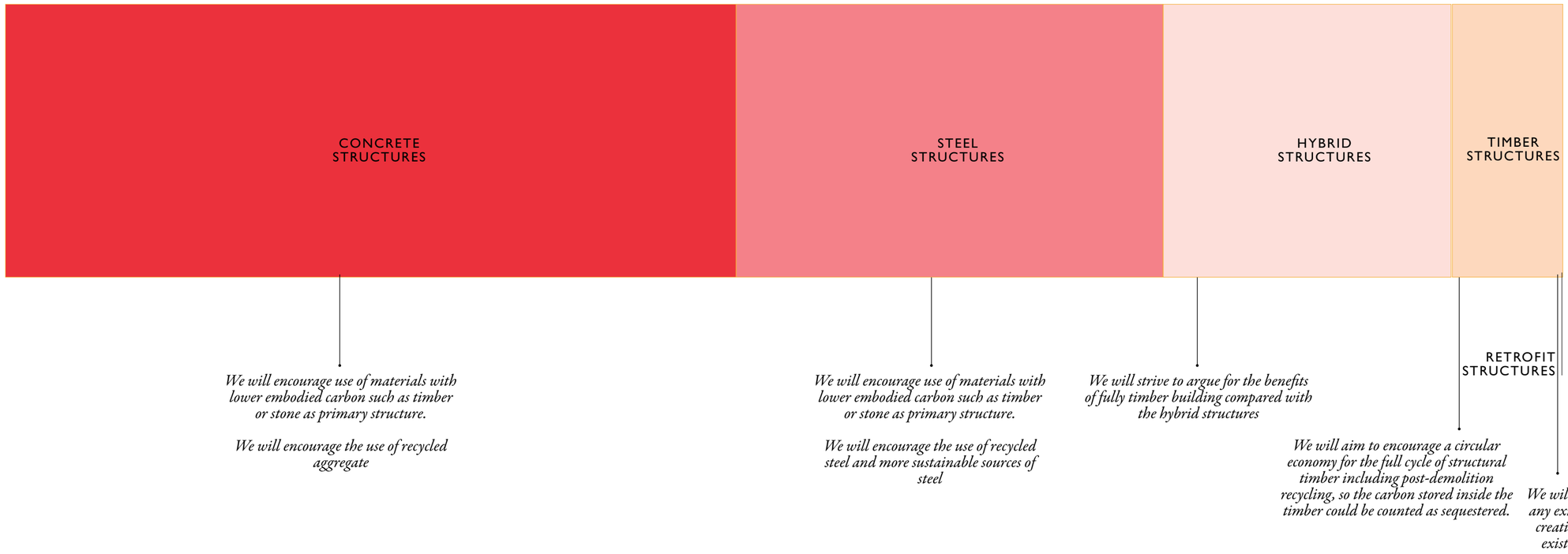
2022 TARGET

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



2021
EMBODIED CARBON SIZE & IMPACT

ACME projects in RIBA Stages 0-7 in 2021. 25 ACME Building projects have been assessed.

The graph shows the impact of live projects in order of scale (GIA). The graph shows that the majority of projects achieve the B/C rating (RIBA 2030 Built target/ LETI 2020 Design Target) with a few performing better and worse.

The graph also demonstrates the importance of larger projects in the office and that ACME should focus on optimising these in order to make the most impact overall in terms of carbon reduction.

PROJECT IN RELATION TO INDUSTRY TARGETS (WHOLE LIFE CYCLE ASSESSMENT)

- **C** LETI 2020 Design Target
- **B** RIBA 2030 Built Target
- **A** LETI 2030 Design Target

TOTAL CARBON OF STRUCTURE: STRUCTURAL MATERIAL:

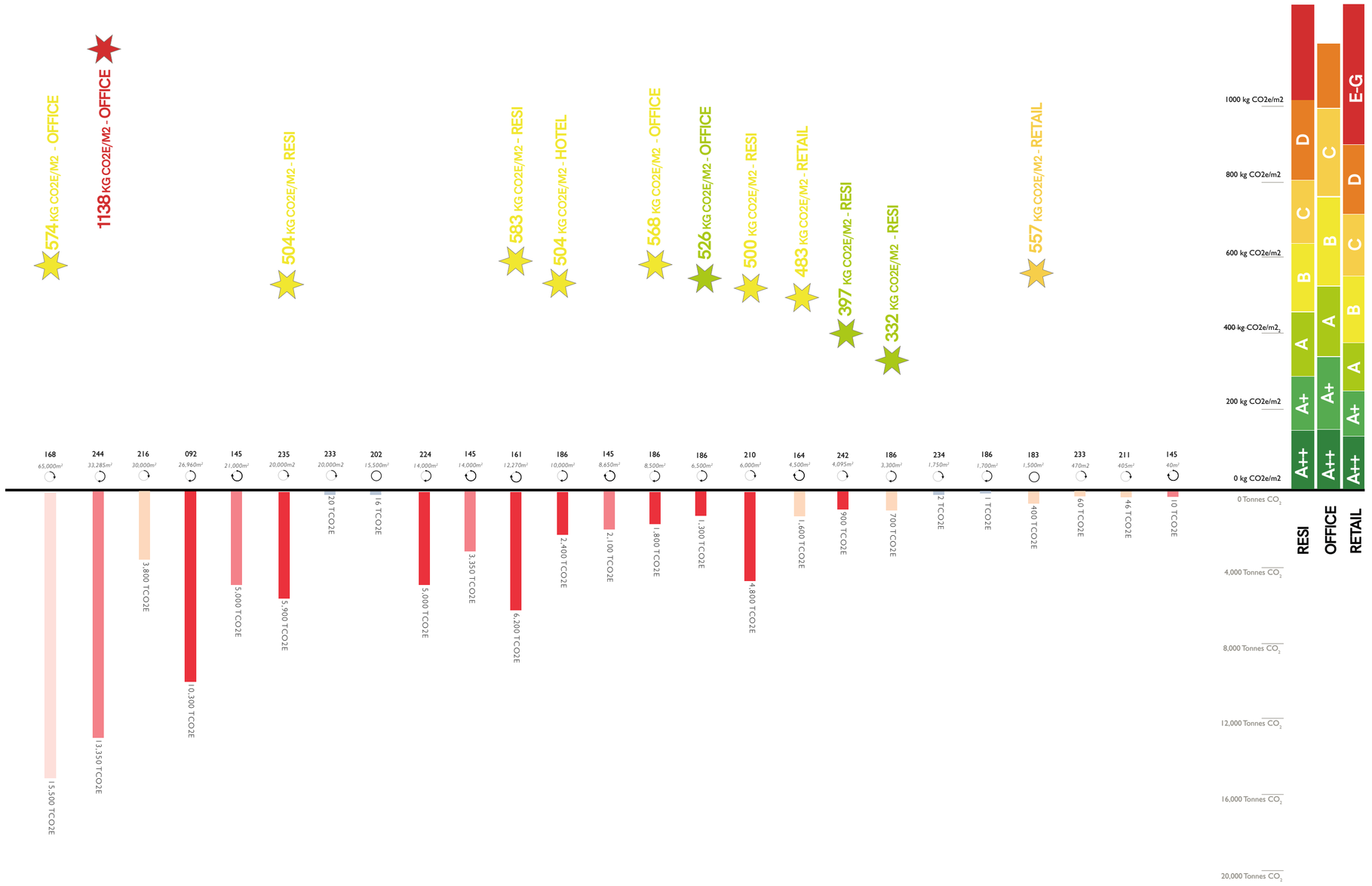
- Concrete Structure
- Steel Frame
- Hybrid Structure
- CLT/Timber Frame
- Retrofit

PROJECT STAGES

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

Carbon Totals(TCo2e) - The graph illustrates the embodied carbon per project based on the structural system only. Calculated using m2 average for Structural frame[14] (GIA x Embodied carbon of structural system) or using information provided by LCC assessment and/or Whole Life Carbon Assessments.

Whole Life Carbon Assessments(KgCo2e/m2) This figure includes A1-C4 (exB6,B7). The figure has either been provided by consultants as part of Whole Life Carbon Assessments/LCC assessment or calculated by ACME Sustainability team using OneClickLCA Software with the information available at the time of calculation.
Figures also include targets set by design team.



2020-2035
EMBODIED CARBON OVER LIFE CYCLE

ACME projects in RIBA Stages 0-7 in 2021. ACME buildings that have OneClickLCA data or full embodied carbon assessments have been compared against targets and date of completion. Projects are categorised by typology: Residential, Office, Retail.

The graphs show that the majority of projects achieve the B/C rating (RIBA 2030 Built target/ LETI 2020 Design Target) with a few performing better and worse. In most cases the general pattern is that carbon reduces over time with some outliers.

PROJECT IN RELATION TO INDUSTRY TARGETS
(WHOLE LIFE CYCLE ASSESSMENT)

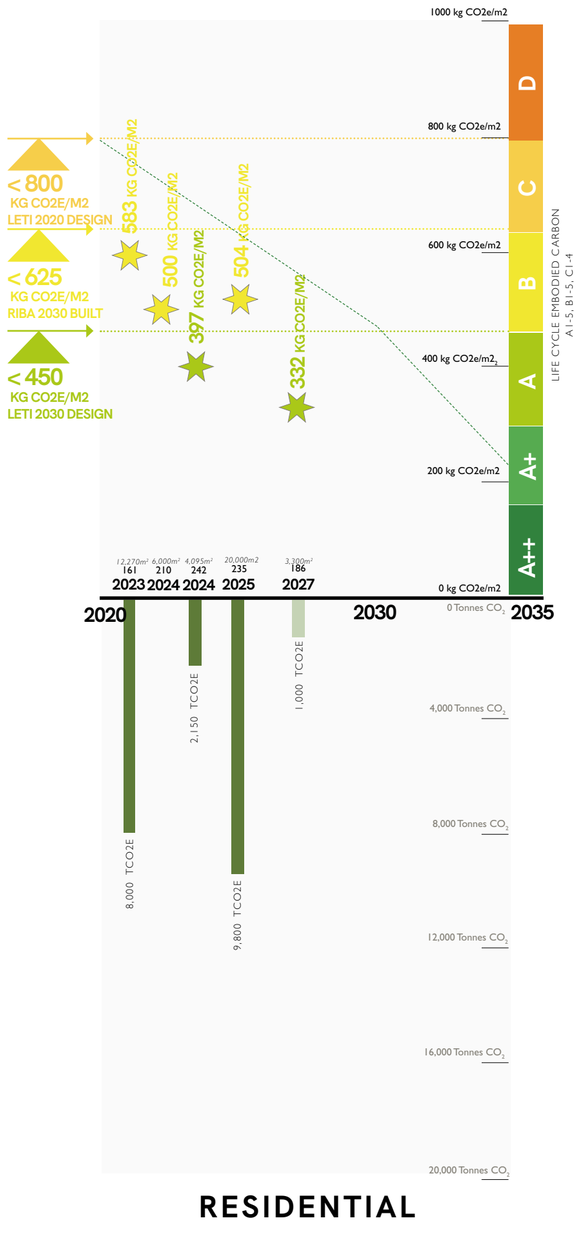
- **C** LETI 2020 Design Target
- **B** RIBA 2030 Built Target
- **A** LETI 2030 Design Target

TOTAL EMBODIED CARBON OVER LIFE CYCLE:
STRUCTURAL MATERIAL BY COLOUR:

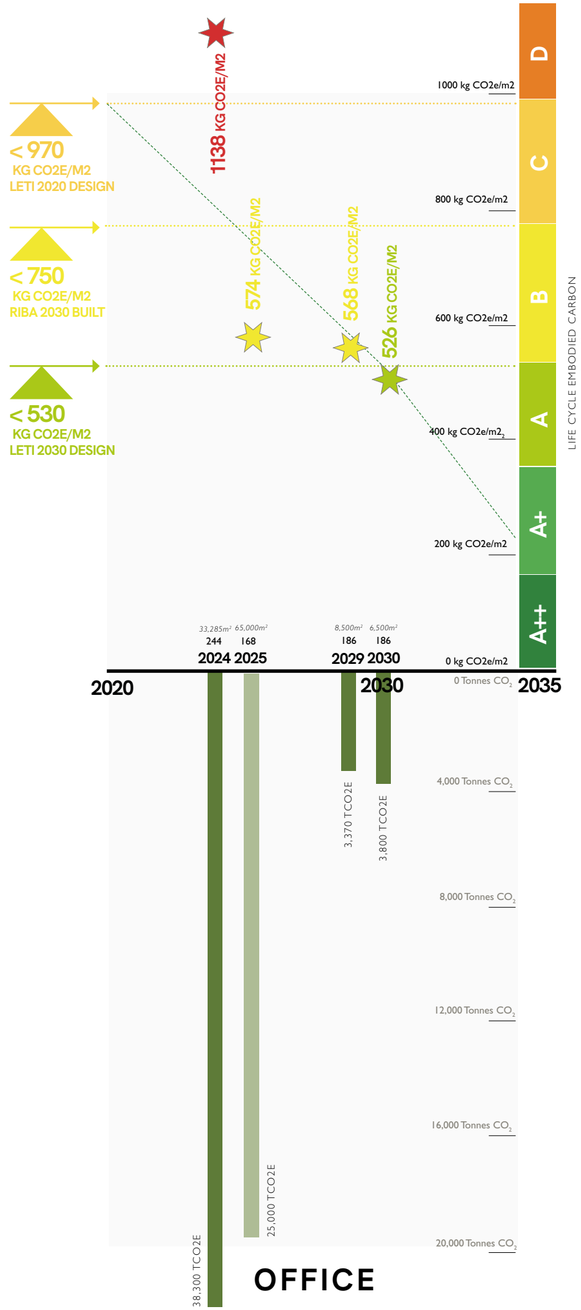
- Concrete Structure
- Steel Frame
- Hybrid Structure
- CLT/Timber Frame
- Retrofit

Carbon Totals(TCo2e) - The graph illustrates the embodied carbon per project based on the all project aspects A1-C4 (exB6,B7)

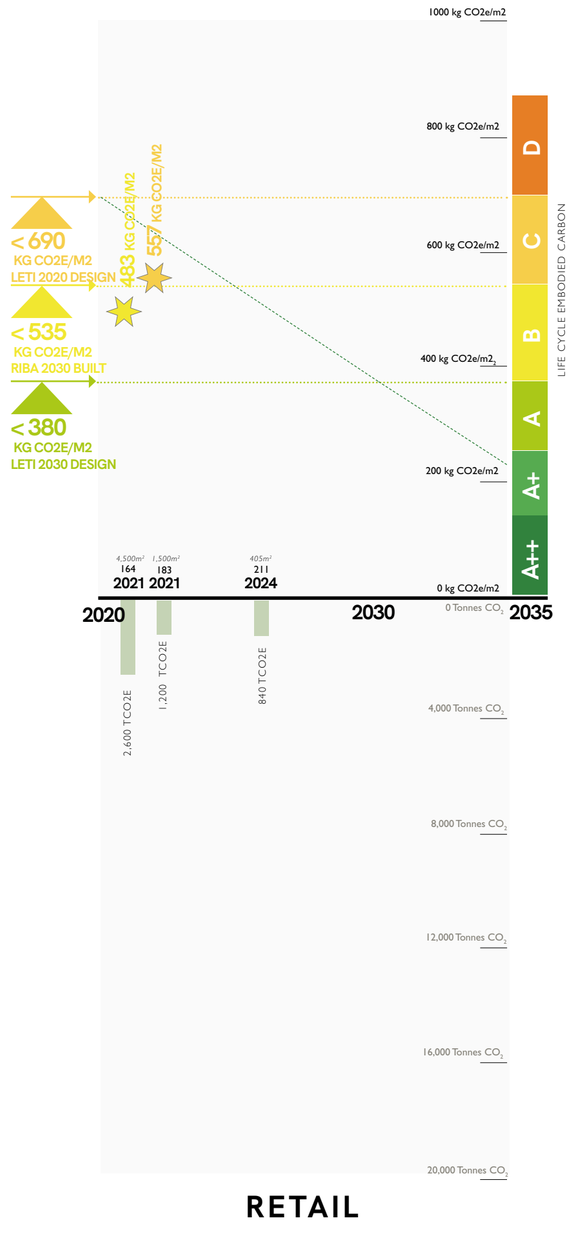
Whole Life Carbon Assessments(KgCo2e/m2)
This figure A1-C4 (exB6,B7). The figure has either been provided by consultants as part of Whole Life Carbon Assessments/LCC assessment or calculated by ACME Sustainability team using OneClickLCA Software with the information



RESIDENTIAL



OFFICE



RETAIL

2021
OPERATIONAL CARBON IN DESIGN

Carbon emissions are spread across both embodied carbon and operational carbon.

The graph shows how live projects are performing against industry standards/ targets.

ACME is monitoring operational carbon across our projects however will prioritise our efforts to reduce embodied carbon.

This considers a future greening of the grid.

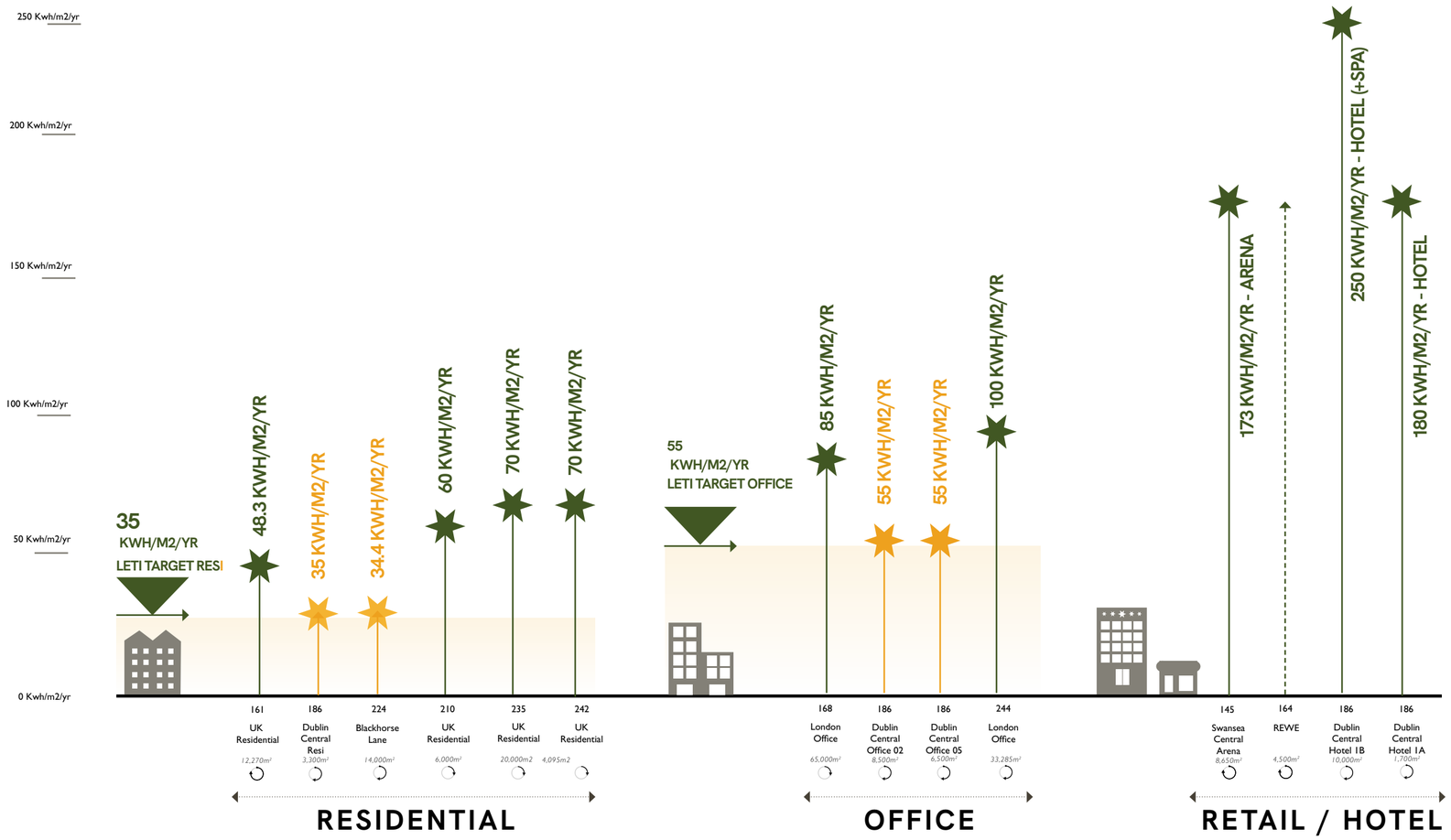
Kwh/m2/yr - Project figures have been taken from a combination of team targets set at early stages to data from sustainability reports & energy reports.

PROJECT IN RELATION TO INDUSTRY TARGETS

- Business as Usual
- LETI Target

PROJECT STAGES

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



2021
SOURCES & REFERENCES

1. Gas
A conversion factor of 0.18 $KgCo_2e$/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

2. Electricity
A conversion factor of 0.2123 $KgCo_2e$/Kwh is the government factor for UK electricity. Bulb (first half of year)/Eon supply 100% renewable electricty 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 $KgCo_2e$/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%20Jahr%20 2020%20wurde%20der,mit%20kleinen%20Ausnahmen%20kontinuierlich%20ab.

3. Coffee Beans
A conversion factor of 17.72 $KgCo_2e$/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 $KgCo_2e$/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 $KgCo_2e$/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 $KgCo_2e$/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 $KgCo_2e$/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 $KgCo_2e$/Km has been used to calculate the emitted carbon of Uber transport
A conversion factor of 0.1650 $KgCo_2e$/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 $KgCo_2e$/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 $KgCo_2e$/Km has been used to calculate the emitted carbon of Economy Short Haul Flights.
A conversion factor of 0.1479 $KgCo_2e$/Km has been used to calculate the emitted carbon of Economy Long Haul Flights.
A conversion factor of 0.2265 $KgCo_2e$/Km has been used to calculate the emitted carbon of Business Short Haul Flights.
A conversion factor of 0.4288 $KgCo_2e$/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 $KgCo_2e$/cm has been used to calculate the emitted carbon for Water Supply
A conversion factor of 0.272 $KgCo_2e$/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

13. Waste
A conversion factor of 446.242 $KgCo_2e$/tonne has been used to calculate the emitted carbon for Non-Recycled Waste
A conversion factor of 21.294 $KgCo_2e$/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
The carbon values are based on a study conducted by Thornton Tomasetti Engineers and represent the amount of embodied carbon per square metre of GIA.
Excludes masterplans & lost competitions.
Included all Projects within the Office between Stage 0-7
The following assumptions have typically been made in the calculations
Ready mix concrete C30/37, 0% recycled biners
90% Recycled Steel

15. 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

16. 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

17. Zoom Calls
Laptop - 10 gCo_2e/h - 0.01 $KgCo_2e$/h
Desktop - 50 gCo_2e/h - 0.05 $KgCo_2e$/h
Source: How Bad are bananas. The Carbon Footprint of everything

18. Hotel Stays
A conversion factor of 13.9 $KgCo_2e$/night has been used to calculate the emitted carbon of Hotel Stay National
A conversion factor of 6.5 $KgCo_2e$/night has been used to calculate the emitted carbon of Hotel Stay France
A conversion factor of 17 $KgCo_2e$/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

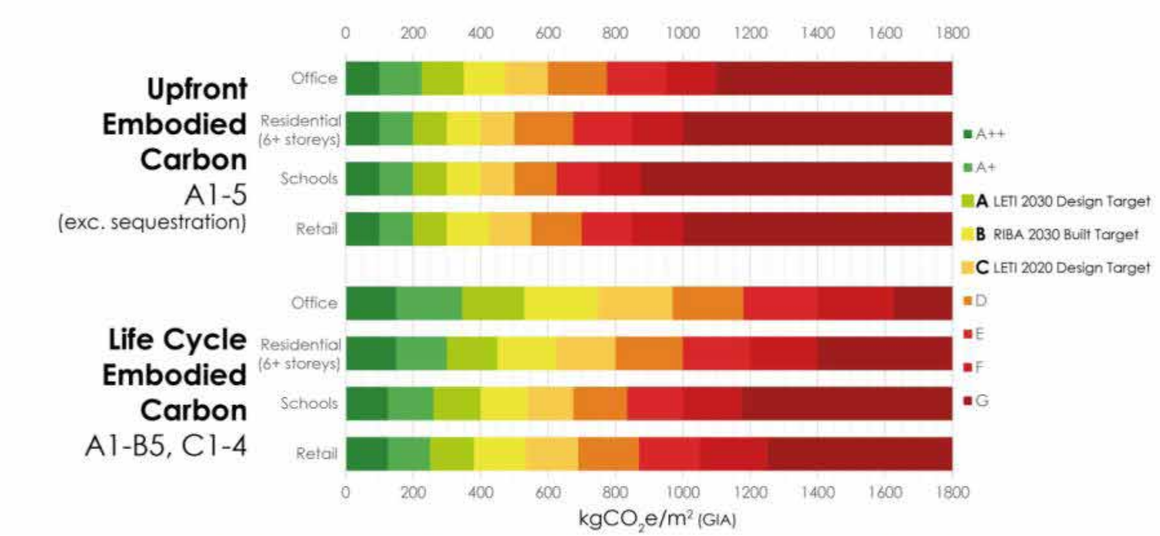
19. Carbon Emission Scopes
Scope 1: Emissions from sources that an organisation owns or controls directly
Scope 2: Emissions that a company causes indirectly when the energy it purchases and uses is produced.
Scope 3: Encompasses emissions that are not produced by the company itself, and not the result 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

2021
SOURCES & REFERENCES

20. Life Cycle Embodied Carbon Targets
LETI Embodied Carbon target alignment paper
https://www.leti.london/carbonalignment

21. Operational Carbon Targets
LETI Net Zero Operational Carbon
https://www.leti.london/_files/ugd/252d09_0f7760d9a2ba4ab8920f69f8cee3e112.pdf

20. Life Cycle Embodied Carbon Targets



RIBA 2030 Design Target

Life Cycle Embodied Carbon, A1-5, B1-5, C1-4

Band	Office	Residential (6+ storeys)	Education	Retail
A++	<150	<150	<125	<125
A+	<345	<300	<260	<250
A	<530	<450	<400	<380
B	<750	<625	<540	<535
C	<970	<800	<675	<690
D	<1180	<1000	<835	<870
E	<1400	<1200	<1000	<1050
F	<1625	<1400	<1175	<1250
G	<1900	<1600	<1350	<1450