BBP | BETTER BUILDINGS PARTNERSHIP

REAL ESTATE ENVIRONMENTAL BENCHMARK: 2022 INSIGHTS REPORT

AUGUST 2023

Introduction

Every year, members of the Better Buildings Partnership (BBP) submit data on their managed UK commercial real estate portfolio into the Real Estate Environmental Benchmark (REEB).

The REEB dataset has been growing for over 10 years, and plays an important role in helping property owners to understand how their portfolios compare to industry peers and track their decarbonisation performance. It also provides valuable insight into the environmental performance trends of commercial properties in the UK. The data is made available on an anonymous basis to support a wide range of industry initiatives and research projects.

The last few years and the Covid-19 pandemic have presented significant challenges to the real estate sector, not least in relation to collecting and analysing environmental performance data. This report marks our first 'Insights Report' since the start of the pandemic, with two years of new data analysed for the period April 2020-March 2022. The analysis is presented in this context, with the report divided into four sections as follows:

1. REEB Submission overview & Property Profile
2. The Impact of Covid-19: Absolute and Like-for-like Performance 2019/20 – 2021/22
3. The Performance Gap: Comparing Operational Performance with Design Stage Ratings
4. Net Zero Pathways and Current Progress

Updating the Public REEB Benchmarks

A major output of the REEB project is to produce operational energy benchmarks for the wider industry.

These benchmarks were last updated in 2021 using pre-pandemic data from 2019-20. We plan to update these once we have collected another year of 'post-Covid-19' data (2022-23) from our members, and can have confidence in the new performance levels defined.

KEY FACTS (2021/22)

41
BBP MEMBERS SUBMITTING DATA

8
MAP MEMBERS SUBMITTING DATA

1,275
PROPERTIES

12.5M
M^2 OF FLOOR AREA

1,700
GWH ENERGY CONSUMPTION

REEB Submission overview & Property Profile

Chart 1. REEB Property Profile

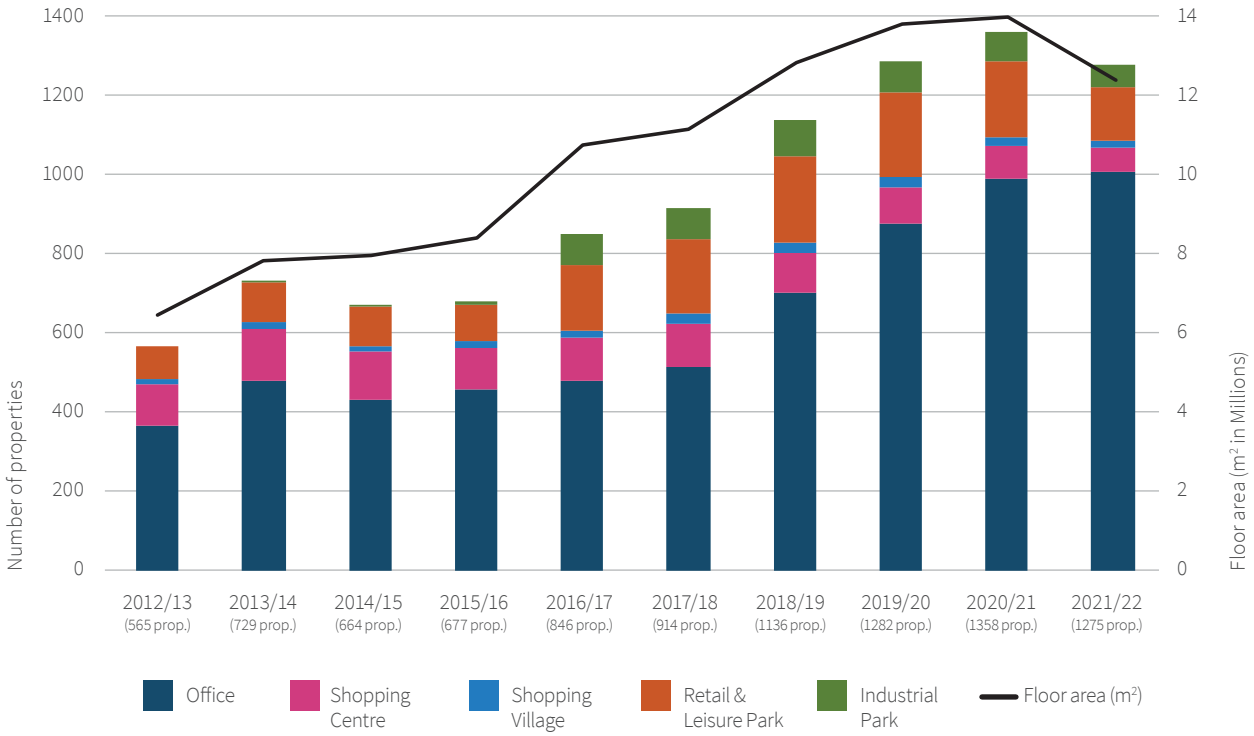


Chart 1 shows the size of the REEB dataset over time, by both floor area and the number of properties broken down by property type.

Please note that not all properties qualify for all analysis types in this report, therefore total samples vary throughout.

1,275 PROPERTIES IN THE REEB DATASET IN 2021/22

Chart 2. 2021/22 Floor Area Breakdown

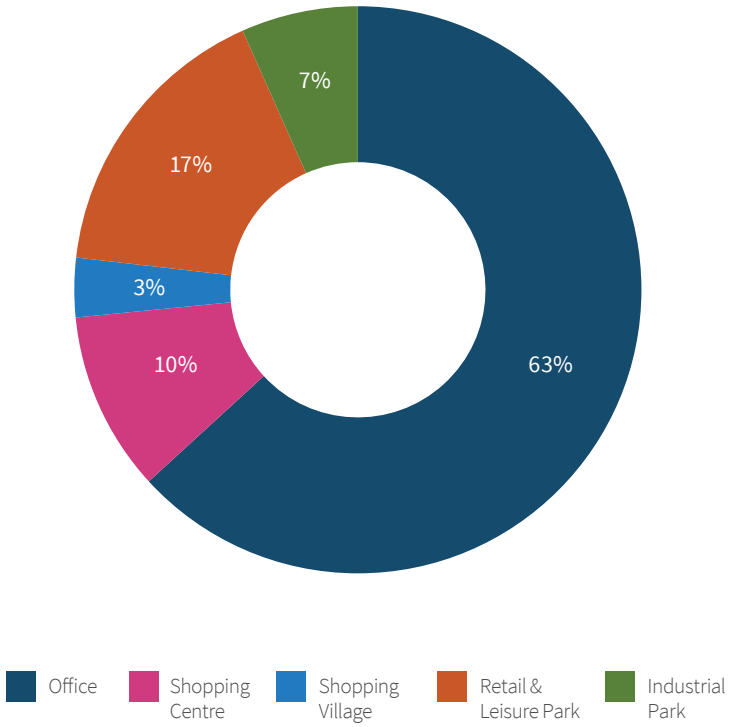
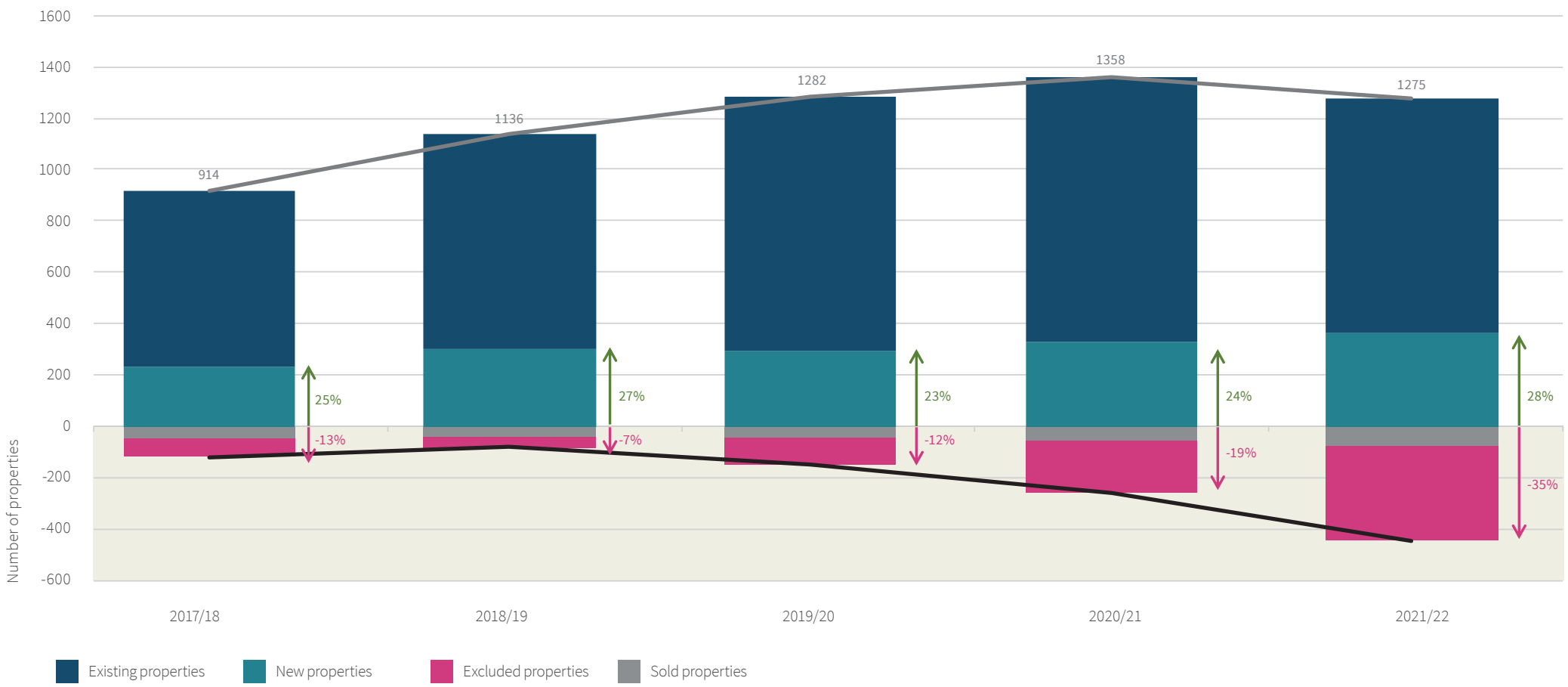


Chart 2 provides a breakdown of the 2021/22 floor area by property type.

The majority of properties in REEB are offices, which account for 79% of the dataset by number. However, when this is broken down by floor area, offices account for around 63% of the total.

Chart 3: Portfolio Churn in the REEB Dataset



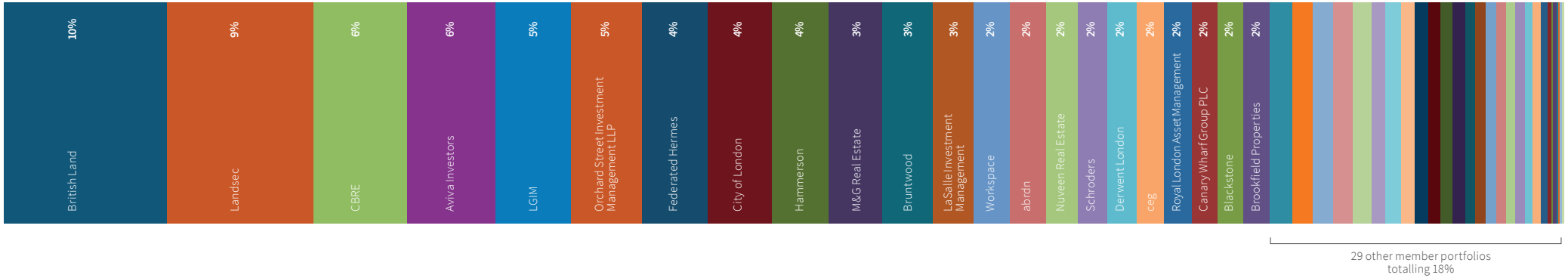
The REEB dataset reduced in size in 2021-22 by 6% in terms of property numbers and 11% in total area. It has been impacted by some significant portfolio churn in the last two years, as illustrated by Chart

3. Exclusions refer to properties that have previously been in the REEB dataset but members have excluded from their submissions in 2021-22, for reasons other than being sold (e.g. data quality/availability, refurbishment, or change of use).

Portfolio churn is a feature of the 2021-22 dataset. Interestingly, the energy intensity of properties sold was higher (166 kWhelec-equiv/m^2/yr) than the new ones added (97 kWhelec-equiv/m^2/yr), implying that improving energy intensity may be a factor in how member portfolios are evolving.

Chart 4: 2021-22 Dataset Breakdown by BBP Member

Share of floor area



Share of property numbers

Chart 4 provides a breakdown of the 2021/22 dataset by individual BBP members and managing agent partners. The upper row provides a breakdown of the total floor area by member, whilst the lower row provides a breakdown of the total number of properties by member.

With a number of new members submitting data to REEB in 2021/22, and property exclusions linked to the existing dataset, these charts show the REEB dataset more evenly distributed across BBP members than in previous years.

ELEVEN PARTICIPANTS ACCOUNT FOR OVER HALF OF THE REEB DATASET BY PROPERTY NUMBERS

The Impact of Covid-19: Absolute and Like-for-like Performance 19/20–21/22

Chart 5: Change in Absolute Energy Consumption over time

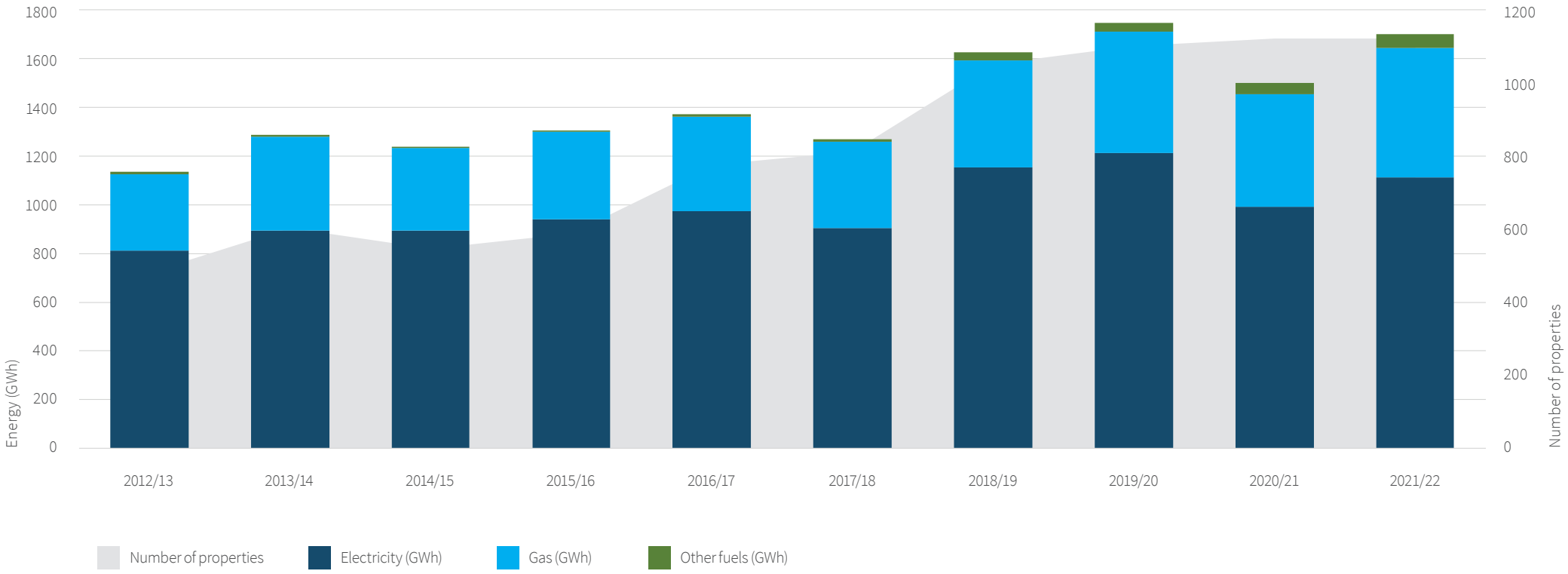
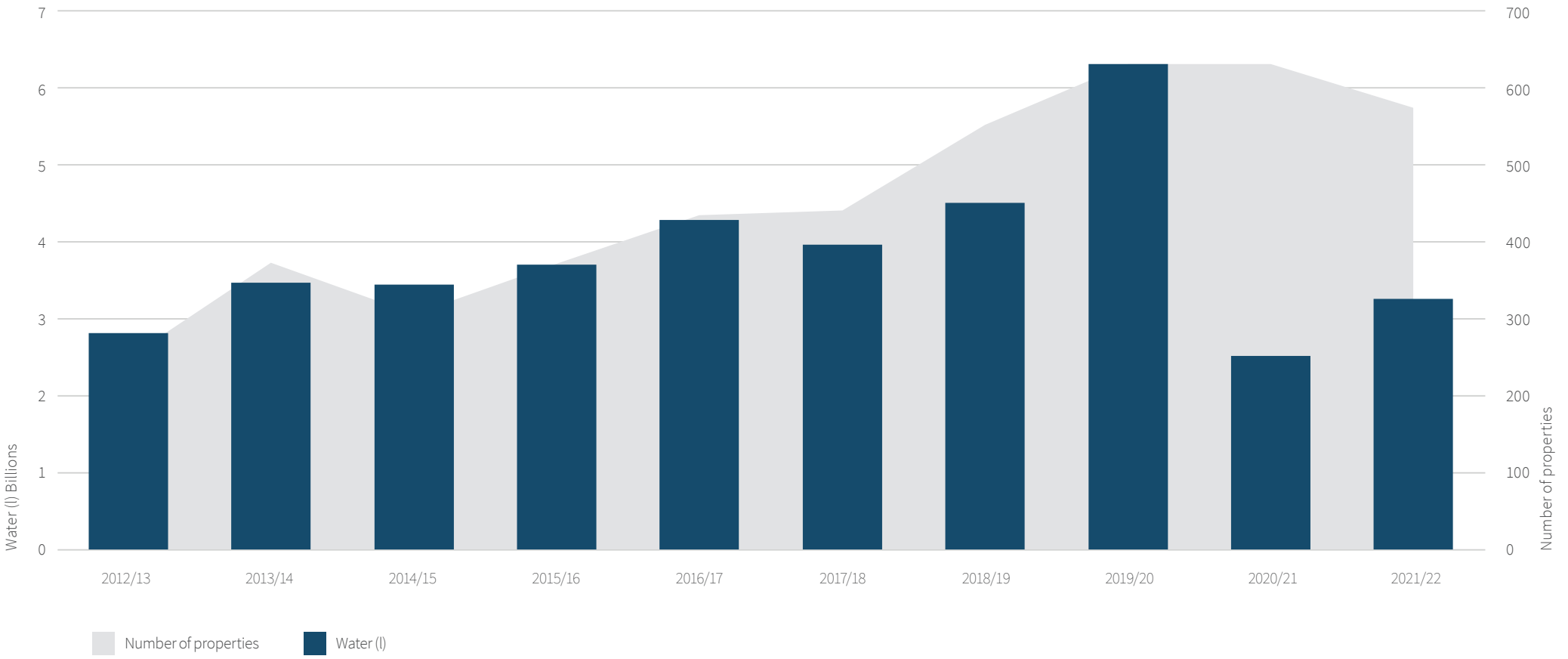


Chart 5 shows the total energy consumption of the REEB data set in GWh over time, broken down by fuel type. The 'Other fuels' here represents consumption related to district heating and cooling, LPG, wood pellets, diesel and fuel oils.

Absolute consumption changes each year based on a number of factors including the number and type of properties in the dataset, but regardless of these changes we see a marked drop and bounce-back in the energy consumption, linked to the impact of Covid-19.

WE CAN SEE A CLEAR 'FALL' AND 'BOUNCE-BACK' IN ENERGY CONSUMPTION, LINKED TO THE IMPACT OF COVID-19

Chart 6: Change in Absolute Water Consumption over time



Charts 6 shows the change in member water data over time. These data types are less mature in REEB and hence there are a lower number of properties in the final dataset. They are presented as an interesting companion to Chart 5 showing the energy trends. We see a much sharper decline in water volumes in 2020/21, and a smaller 'bounce-back' in 2021/22. Water is likely to be a better indicator of reduced occupancy through the period most impacted by Covid-19, and therefore the analysis implies that many buildings were not able to reduce their energy consumption in line with their reduced occupancy.

THE ANALYSIS SUGGESTS THAT BUILDINGS WERE NOT ABLE TO REDUCE THEIR ENERGY CONSUMPTION IN LINE WITH THEIR REDUCED OCCUPANCY

Chart 7: 2021/22 Energy Breakdown by Member

Chart 7 presents the breakdown of total energy consumption of the 2021/22 dataset by individual BBP member.

NINE PARTICIPANT PORTFOLIOS REPRESENT HALF OF THE TOTAL ENERGY CONSUMPTION IN THE REEB DATASET IN 2021/22

Chart 8: Change in Energy Use over time (consistent set of properties)

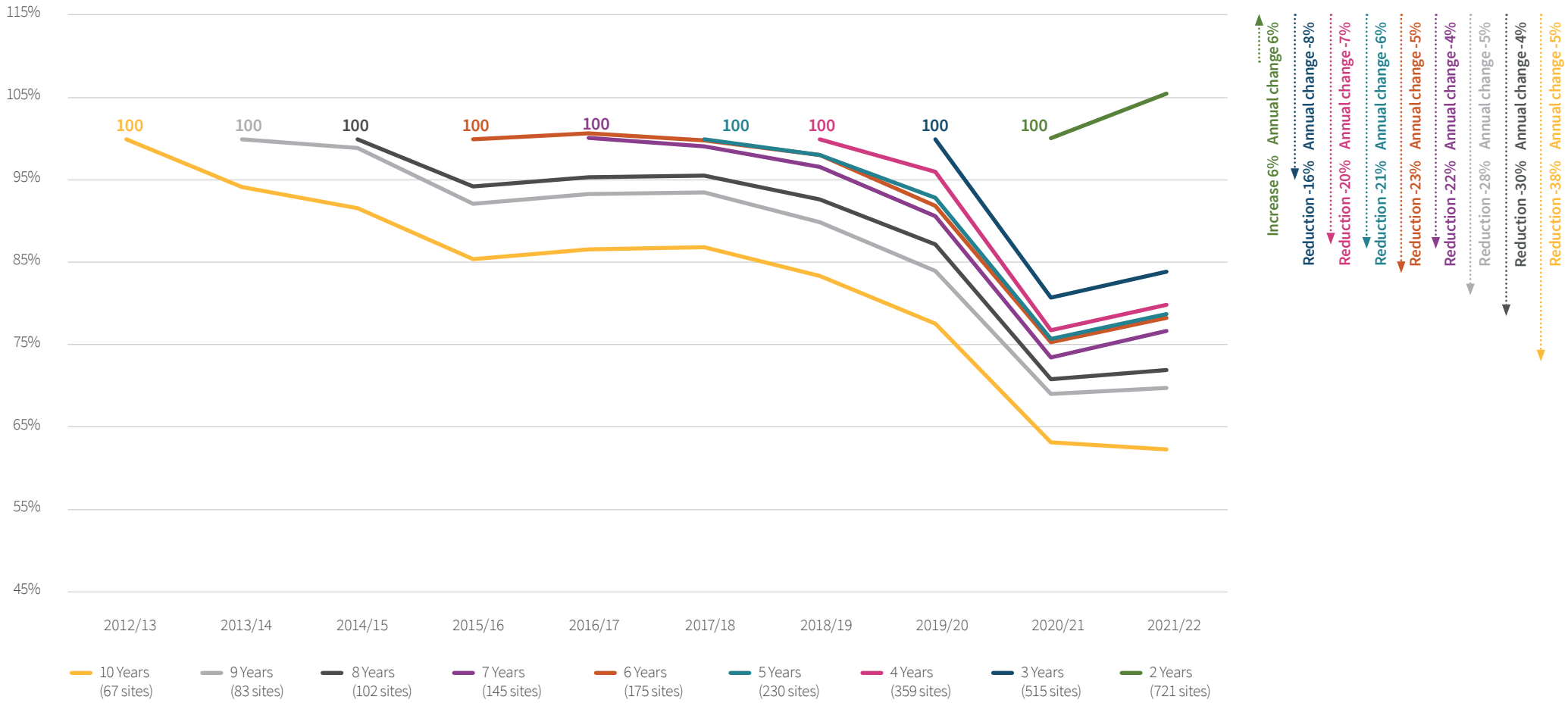


Chart 8 shows the like-for-like energy performance of properties over time. Each line represents a consistent set of properties starting at a different base year and the percentage change in energy consumption tracked each year from that baseline. Figures on the right show the total percentage energy reduction and the annualised rate of reduction per year for the corresponding period.

Comparing properties on a like-for-like basis removes the impact of portfolio churn and provides a fair comparison between a consistent set of properties across years.

THE DECREASE IN ENERGY CONSUMPTION LINKED TO COVID-19 IS MORE SIGNIFICANT WHEN THE IMPACT OF PORTFOLIO CHANGE IS REMOVED

Chart 9: Change in Water Use over time (consistent set of properties)

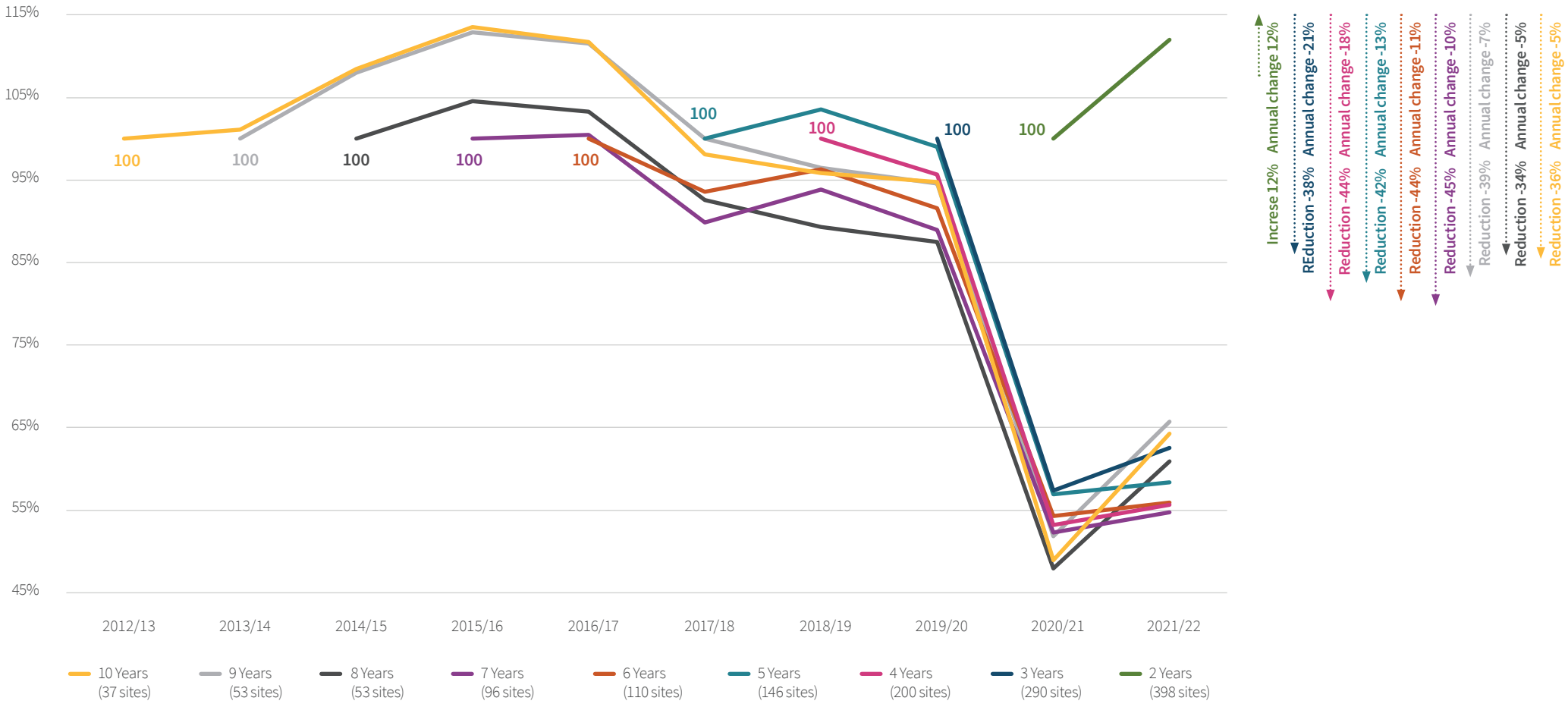


Chart 9 shows that the impact of Covid-19 is more significant for water usage, consistent with the findings described for the absolute consumption trends.

WATER USE AT THE PROPERTY LEVEL HAS BEEN VERY SIGNIFICANTLY IMPACTED BY COVID-19. ENERGY INTENSITY HAS NOT BEEN IMPACTED TO THE SAME EXTENT.

Chart 10: Three Year Energy Trend by Building Type

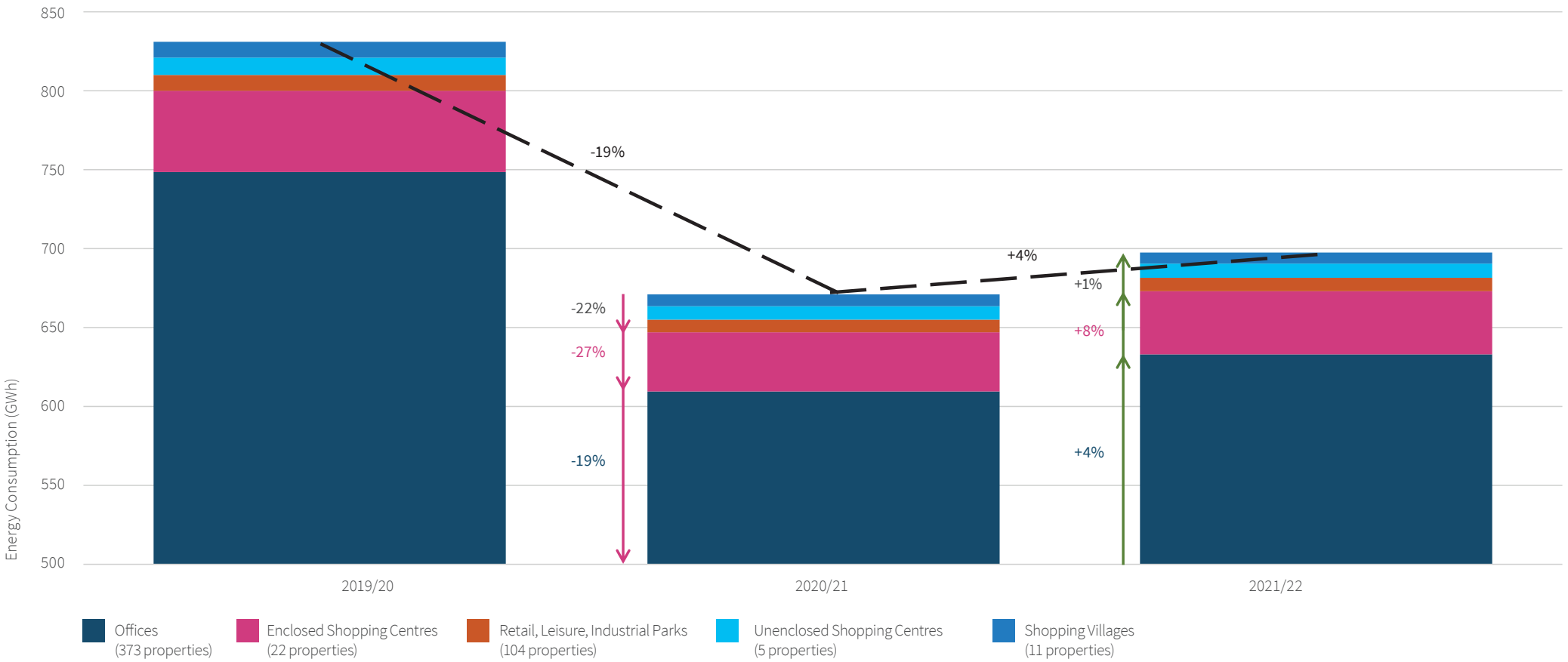


Chart 10 shows the change in like-for-like energy consumption for 515 properties that remained consistent in the dataset for the last three years, broken down by property type.

It shows their overall consumption in 2021/22 is still significantly below 2019/20, despite increasing relative to 2020/21. The 'fall' and 'bounce-back' trend has been more significant for enclosed shopping centres than for offices. This may be because shut down regimes could be better enforced with non-essential retail than office buildings.

THE 'FALL' AND 'BOUNCE-BACK' TREND HAS BEEN MORE SIGNIFICANT FOR ENCLOSED SHOPPING CENTRES THAN FOR OFFICES.

Chart 11: Indexed Energy Intensity of the REEB Dataset over Time

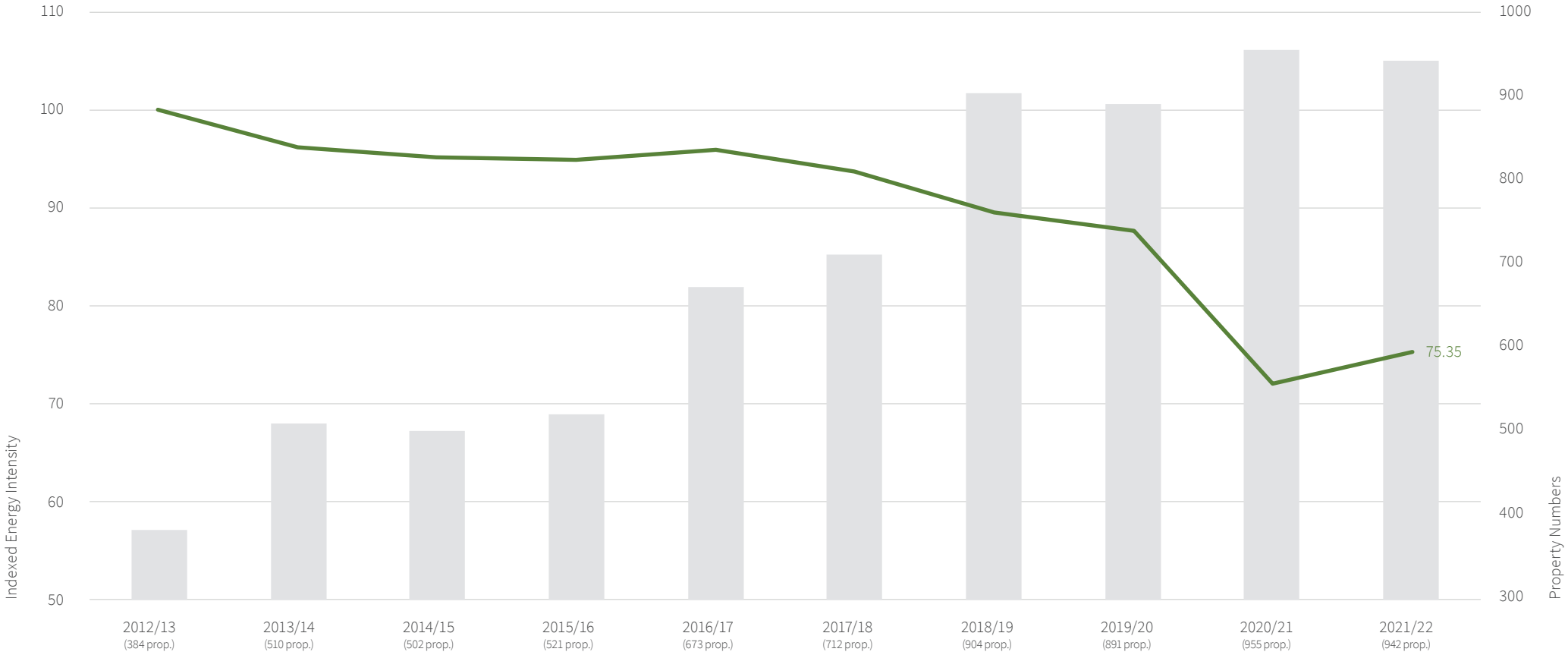


Chart 11 puts the pandemic years in wider context, and shows the indexed energy intensity of the REEB dataset over the last decade. It shows the improvement in energy intensity in the 8 years prior to the pandemic, and the marked drop and bounce-back in intensity linked to the impacts of the Covid-19 pandemic.

At this level, it can be seen that the indexed energy intensity has decreased (improved) by around 25% since 2012/13, but more than half of this decrease has come in the last two years.

THE INDEXED ENERGY INTENSITY FOR THE WHOLE DATASET HAS DECREASED BY 25% SINCE 2012/13, BUT MORE THAN HALF OF THIS REDUCTION HAS COME IN THE LAST TWO YEARS.

The Performance Gap – Comparing Operational Performance with Design Stage Ratings

Chart 12: Distribution of Office EPCs in the REEB Dataset over Time

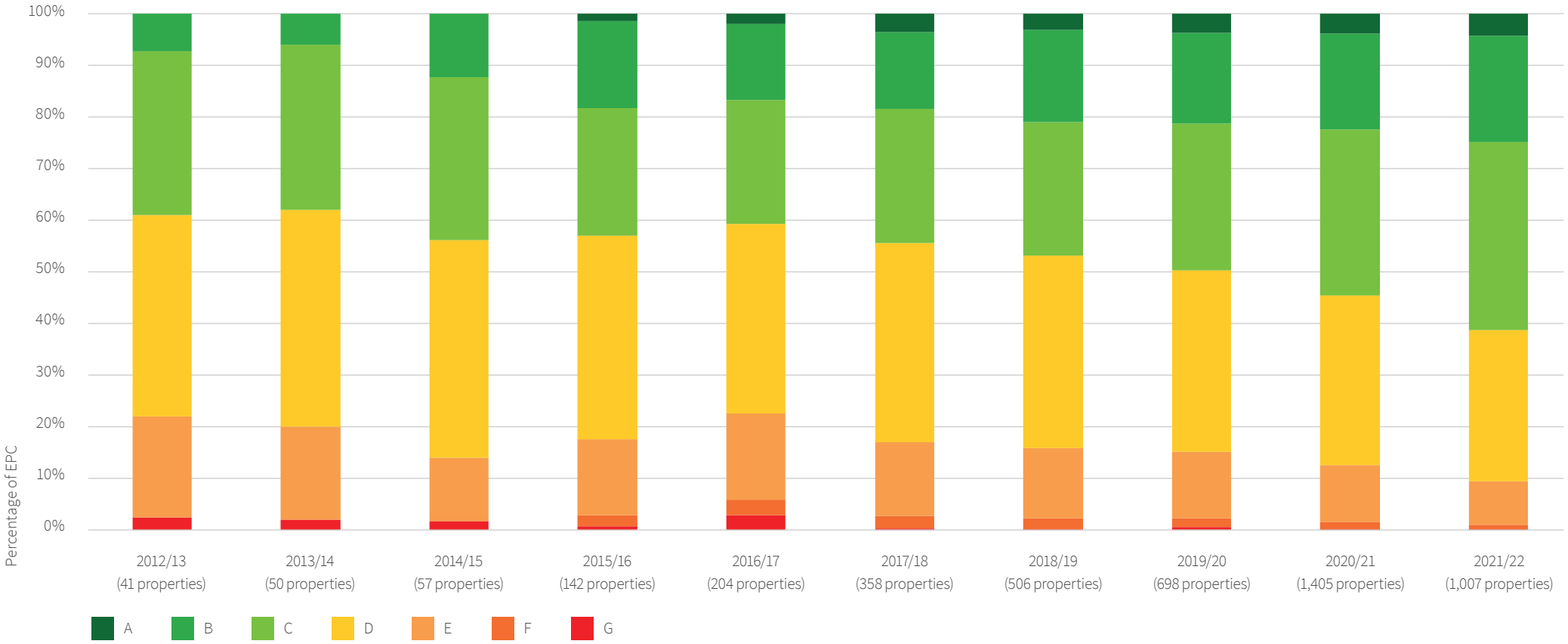


Chart 12 shows how the distribution of Office EPC ratings has changed over time. Each column stack represents the proportion of EPCs belonging to its respective band in the given year. The distribution of office EPC ratings shows an improvement in performance over time.

It is important to note that the UK Government has set-out a long term EPC trajectory under the Minimum Energy Efficiency Standard (MEES) Regulations of an EPC B by 2030. In 2021/22 25% of the offices in the REEB dataset had EPC A or B ratings, indicating that 75% of these properties will need to improve their ratings by 2030 in order to comply.

75% OF PROPERTIES WILL NEED TO IMPROVE THEIR EPC RATINGS BY 2030 IN ORDER TO GET AN EPC B RATING

Chart 13: Office Energy Intensity (Electricity Equivalent) by EPC Rating 2021/22

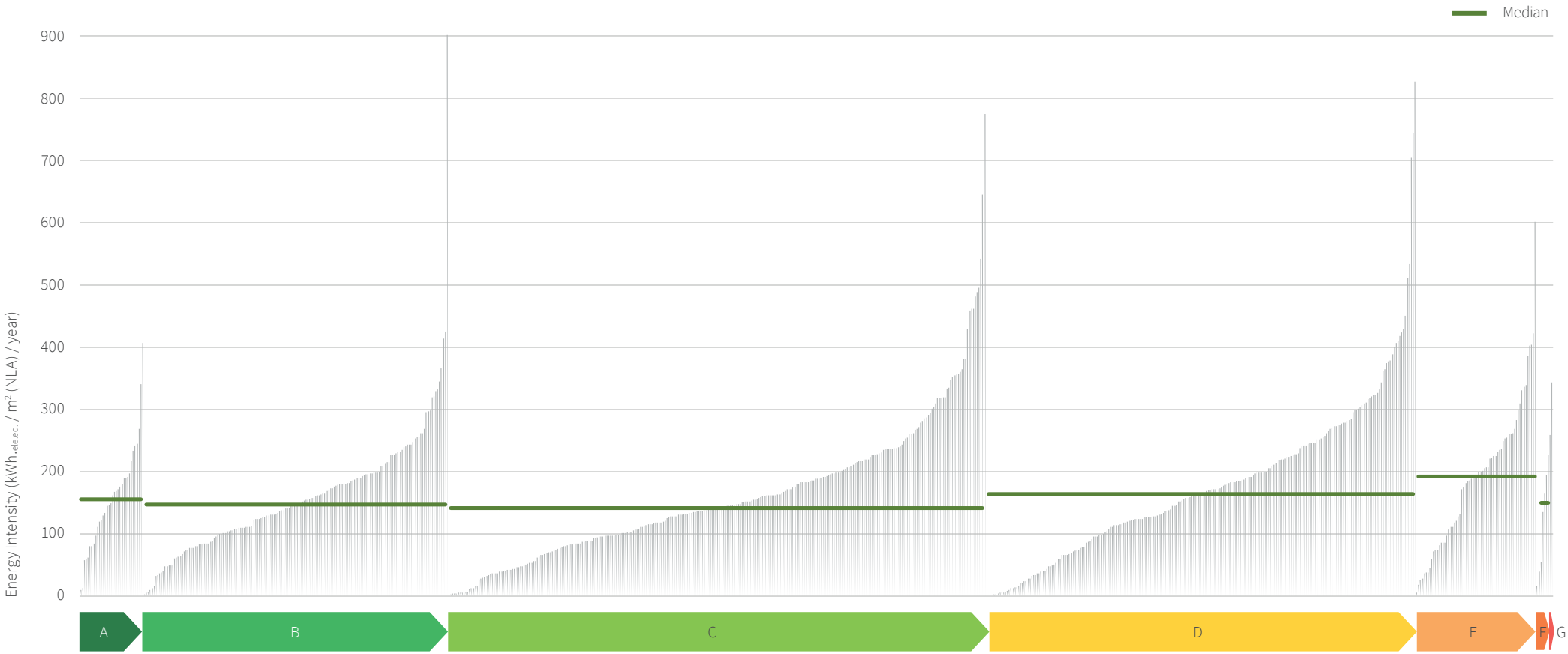


Chart 13 compares the office energy intensities in the REEB dataset with the EPC ratings for those properties. Each grey column represents a single office's energy intensity for a year. They are then grouped together by their EPC rating. The green horizontal line represents the median value of the energy intensities for that group.

When looking at the relationship between EPC ratings and operational energy intensity, the data suggests a very weak relationship. It can be seen that properties within a high performance band can have intensities higher than a lower performance band. Furthermore, there is a significant variation in the range of energy intensity within each EPC band.

Despite the steady improvement in EPC ratings shown in Chart 12, Chart 13 above highlights that EPCs are not a good indicator of operational energy use, and a continuous ratcheting up of design ratings alone will not be adequate to achieve the UK's energy efficiency ambitions.

Chart 14: Office Energy Intensity (Electricity Equivalent) 2021/22 Mapped to the NABERS Whole Building Rating Scale

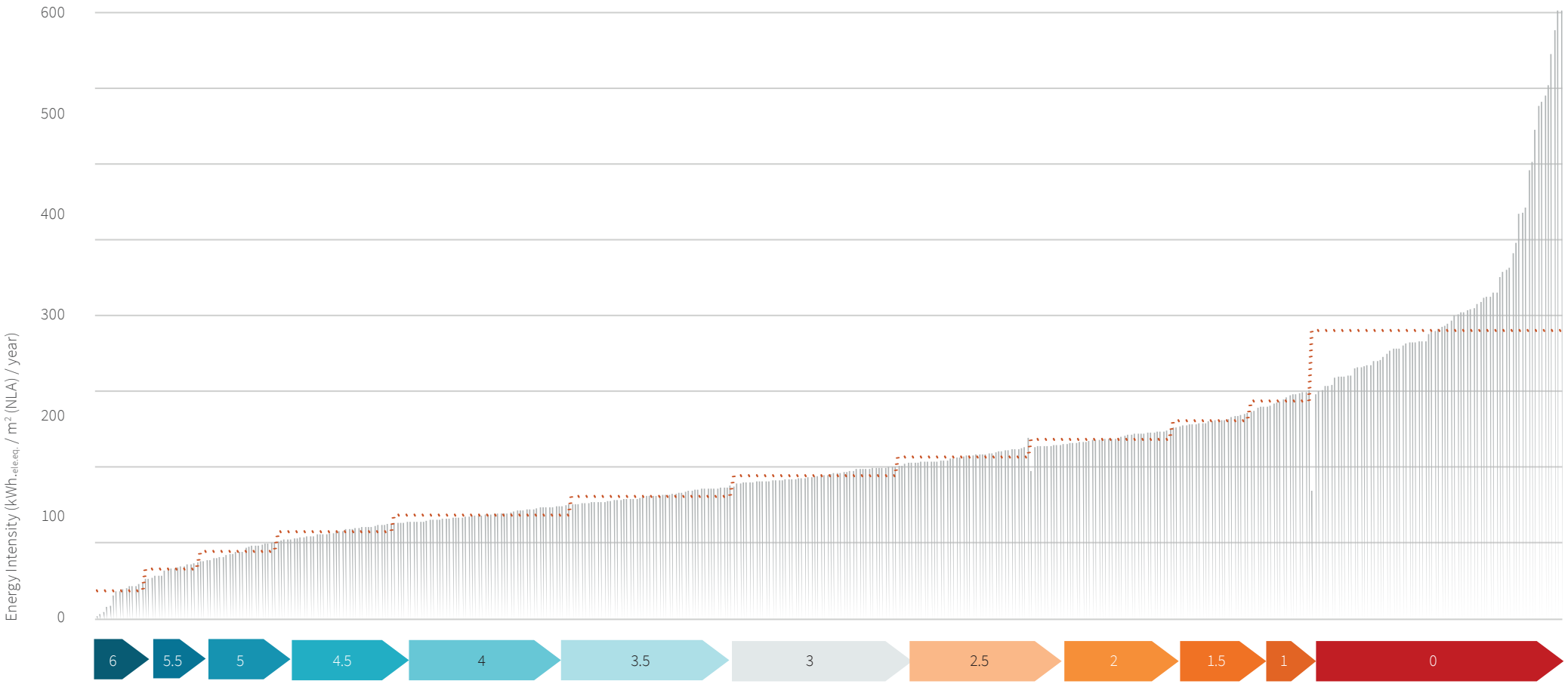


Chart 14 compares 457 office energy intensities from the REEB dataset with an estimated NABERS Whole Building Rating. This indicative analysis was conducted for offices that submitted whole building data, and reported greater than 75% 'let area'. It assumed that the offices were operating for 40 hrs per week with occupant density of 1/20m^2. Intensities have also been stated using NLA as the denominator.

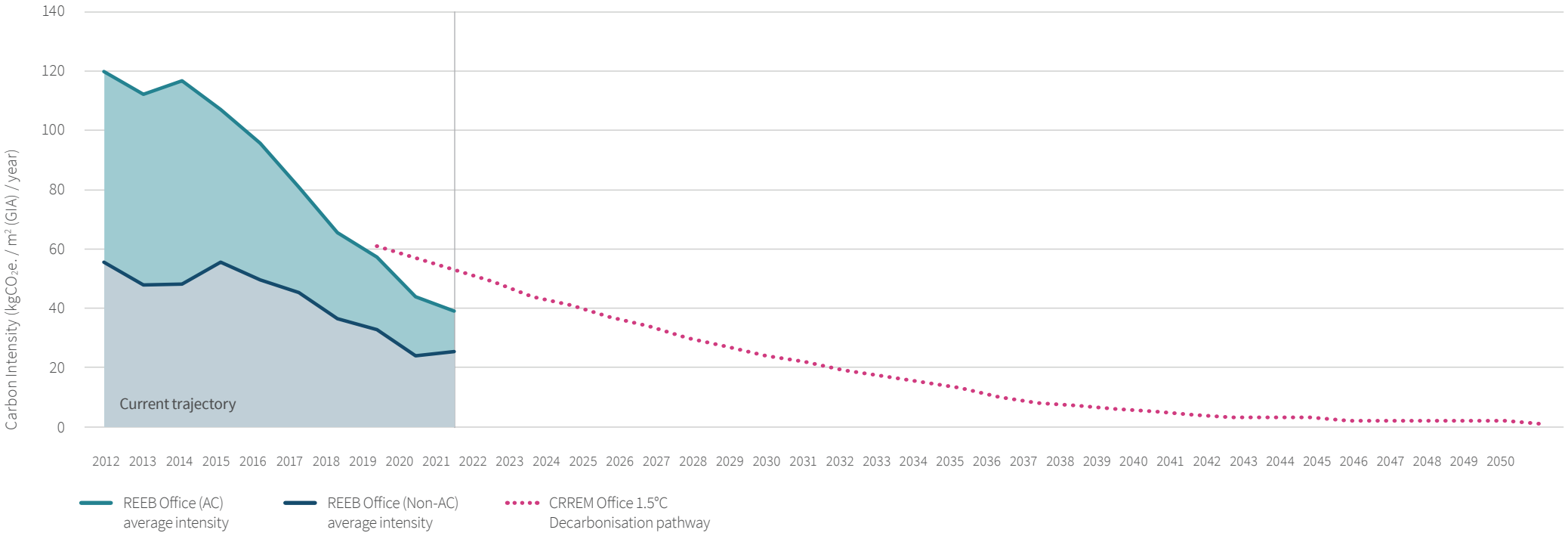
Each grey column represents a single office's energy intensity for a year. They are then grouped together by their indicative NABERS Whole Building Rating, with the dotted line showing the median energy intensity of the sample of offices in each band.

Please note that this analysis is indicative only, and the offices in this sample would perform differently on the NABERS scale when actual occupancy and operating hours are applied

The strong correlation between the 2021/22 operational intensities and the indicative NABERS UK Whole Building ratings highlights the benefit of using a dedicated rating scheme to measure operational performance.

Net Zero Pathways and Current Progress

Chart 15: REEB Office Intensity vs CRREM (v2) Carbon Targets for Offices



When assessing whether a building is "net zero carbon", the definitions of a net zero carbon building and their associated specifications are still the subject of discussion and debate within the industry. However, an accepted part of this debate is that an asset should be able to demonstrate a level of operational efficiency that is consistent with an appropriate 'decarbonisation pathway'.

The CRREM initiative has published carbon and energy pathways for a range of property types in different countries across the globe from 2018 through to 2050. The published data from REEB is one of the sources that CRREM uses to determine the 'current' intensity of office buildings in the UK.

Chart 15 shows the REEB office carbon intensity data for the last 10 years in the context of the 'version 2' CRREM 1.5°C decarbonisation pathways. The reductions in carbon intensity for the REEB dataset relate to both improvements in the energy efficiency of assets and the wider decarbonisation of the electricity grid in that period.

Assessing the REEB data in relation to the CRREM pathways requires a high degree of caution at present, as the analysis remains significantly impacted by the Covid-19 pandemic. It is unlikely that a new normal has been established and therefore we have not commented on the relevance of this analysis for future target setting.

Please note that for this analysis the REEB data has been presented without converting fuels to electricity equivalent, and with GIA as the floor area denominator. This aligns more closely to the CRREM methodology.

Chart 16: REEB Office Intensity vs CRREM (v2) Energy Targets for Offices

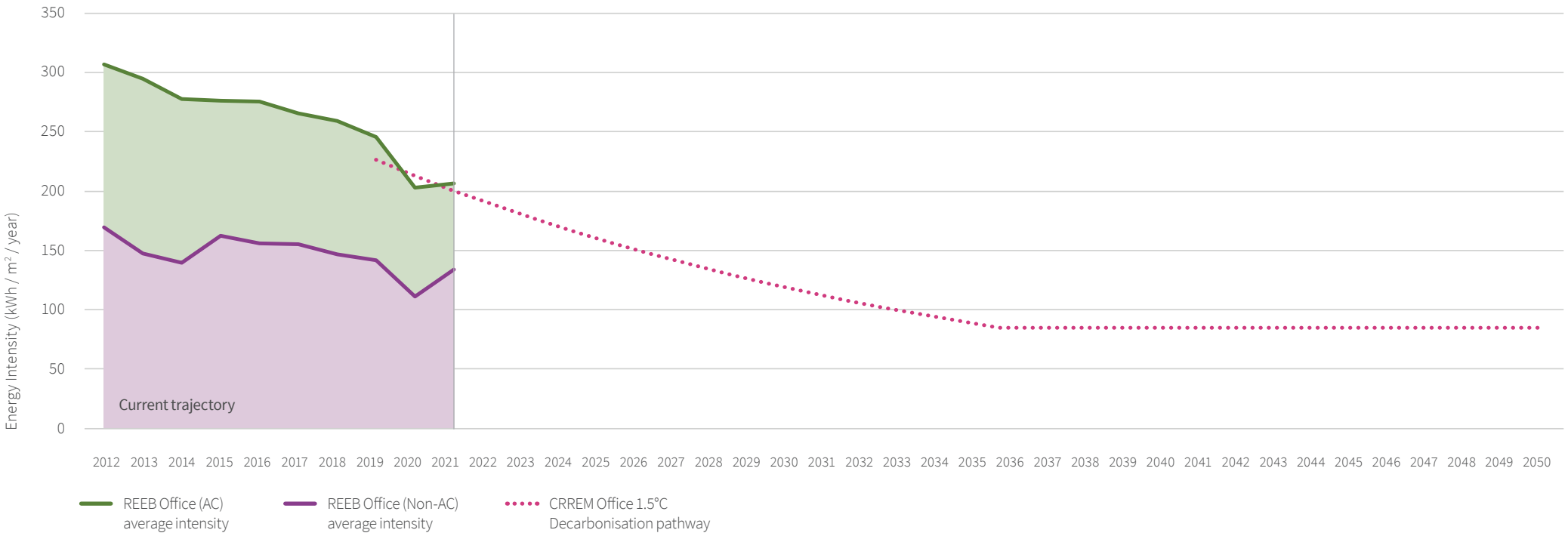
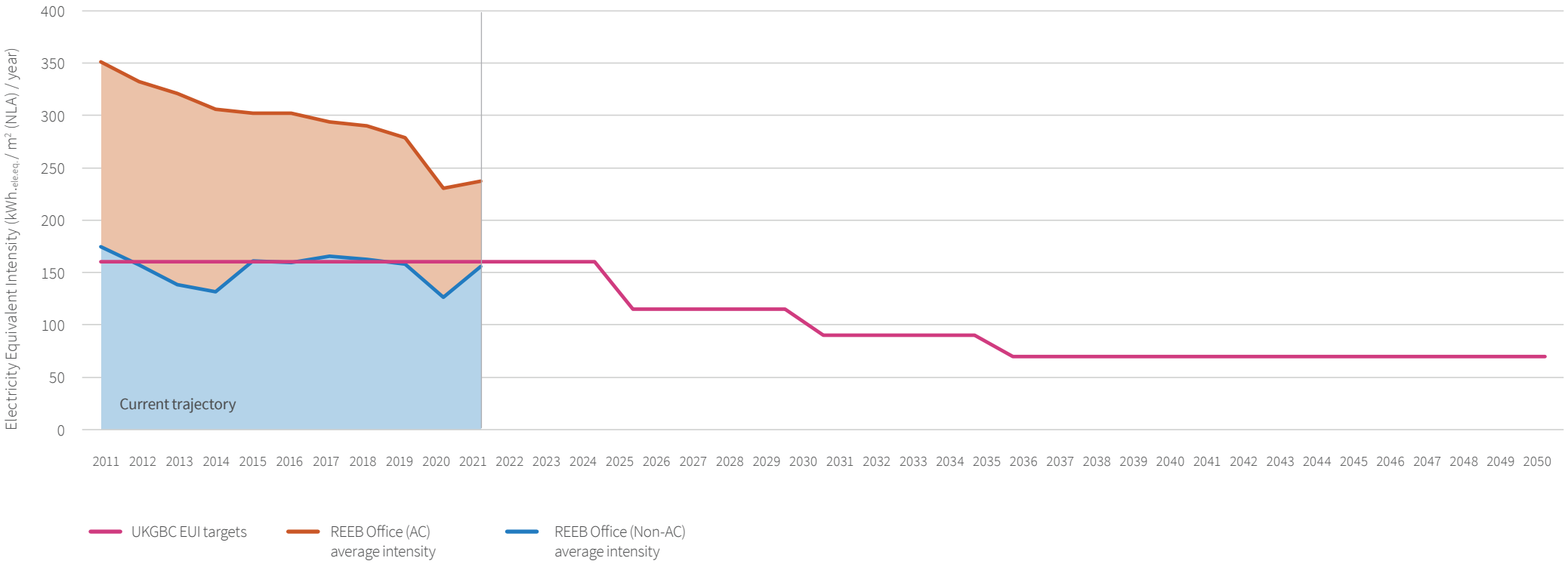


Chart 16 shows the REEB office energy intensity data for the last 10 years in the context of the 'version 2' CRREM 1.5°C decarbonisation pathways.

Assessing the REEB data in relation to the CRREM pathways requires a high degree of caution at present, as the analysis remains significantly impacted by the Covid-19 pandemic. It is unlikely that a new normal has been established and therefore we have not commented on the relevance of this analysis for future target setting.

Please note that for this analysis the REEB data has been presented without converting fuels to electricity equivalent, and with GIA as the floor area denominator. This aligns more closely to the CRREM methodology.

Chart 17: REEB Office Energy Intensity vs UKGBC Energy Targets for Offices



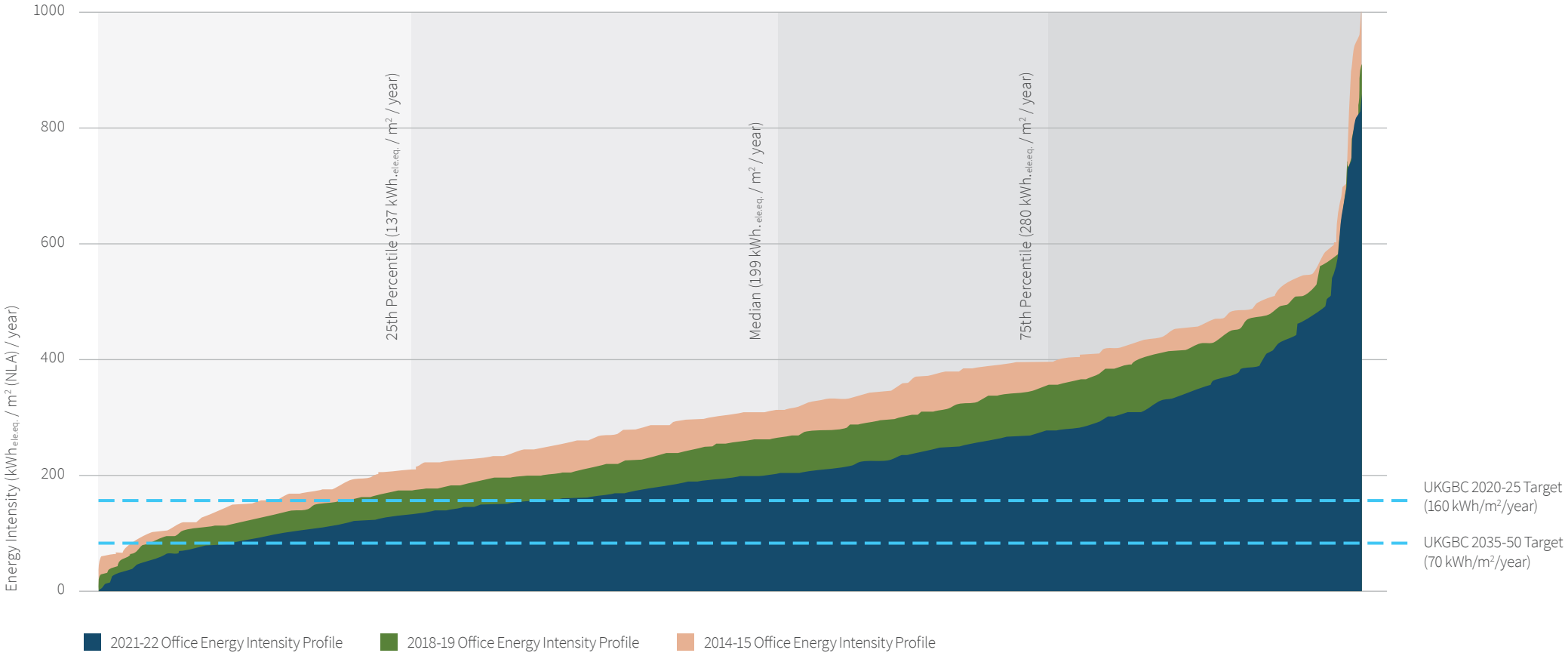
The UK Green Building Council (UKGBC) also publish decarbonisation pathways in their 'Energy Performance Targets for Offices' report.

Chart 17 highlights the change in average energy intensity for the REEB air-conditioned and non-airconditioned offices from 2011/12 to 2021/22, in the context of the future performance levels advised by UKGBC.

Assessing the REEB data in relation to the UKGBC pathways requires a high degree of caution at present, as the analysis remains significantly impacted by the Covid-19 pandemic. It is unlikely that a new normal has been established and therefore we have not commented on the relevance of this analysis for future target setting.

Please note that for comparison with the UKGBC EUI targets the REEB averages have been presented in kWh.ele.eq. / m² (NLA) / year. This explains the difference in the starting point for the REEB office energy trajectories in relation to the CRREM chart on p.17.

Chart 18: REEB Office Energy Intensity by Asset vs UKGBC Energy Targets for Offices



Whilst previous charts have focused on averages from the REEB dataset, chart 18 presents the profile of individual office intensities in the context of the UKGBC targets. The individual offices are ranked from least energy intensive to most energy intensive for three different years: 2014-15, 2018-19 and 2021-22.

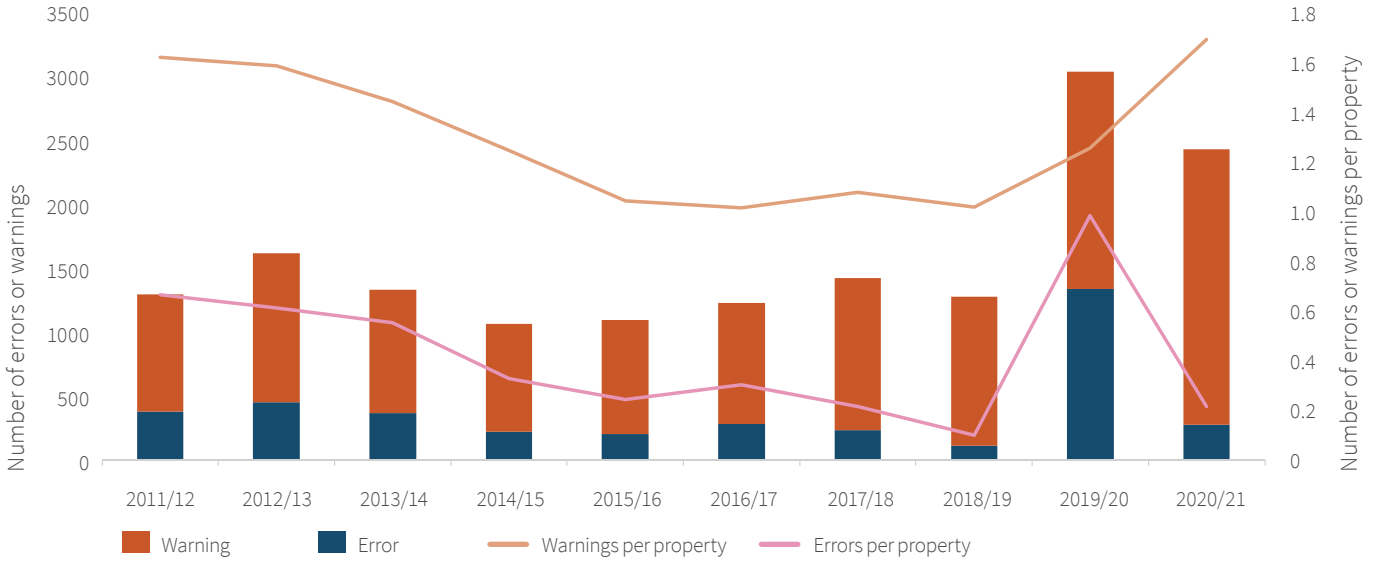
The chart illustrates the shift in intensity profiles over time and compares that to the target values associated with the UKGBC decarbonisation pathways.

This demonstrates that whilst the profile has shifted significantly since 2014-15, currently over 93% of the REEB Offices would fall short of the UKGBC 2035–2050 target and over 64% fall short of the 2020-25 target.

WHILST PROGRESS IS BEING MADE, THE SCALE OF THE CHALLENGE AHEAD IS HUGE.

Methodology Notes: Data Quality

Chart 19: Errors and Warnings in the REEB Dataset over time



TOP 5 ERRORS	
Significant Like-for-like Consumption Change	35
Water consumption data submitted is not consistent with the area of the water data requested for the property type	35
Water Intensity Threshold Breach	18
Significant Like-for-like Consumption Change (Water)	16
Blank Landlord Procured Electricity	14

TOP 5 WARNINGS	
Blank Area (No GIA data provided)	250
Blank Water Consumption	287
Occupancy Change +25%-	273
Blank EPC Rating	169
Blank FTE or Workstation	166

Properties included within the REEB analysis must meet strict data quality controls. The criteria for excluding properties are:

- Properties with missing data that is vital to the analysis.
- Properties that show abnormal changes between years and data anomalies that cannot be explained or confirmed by the data provider.
- Intensity thresholds are used to identify properties where data may be have been submitted incorrectly. The thresholds are set out in table 1 below. Properties that trigger threshold flags, and remain unexplained, are removed from all energy intensity analyses.

Chart 19 tracks the data quality of the REEB dataset over time. The pink bar shows the number of errors, that highlight critical data quality issues that result in a property being excluded from the benchmarks and analyses. The orange bar highlights the number of warnings i.e. less critical items that do not exclude the site from the benchmarks and analyses.

Whilst we consistently saw a decreasing trend in errors and warnings pre-Covid-19, the last two years have produced significant increases and variability. We use errors and warnings per property as a proxy for data quality, and it should be noted that this has deteriorated through the Covid-19 period. This is partly to be expected, with unprecedented changes in trend values inevitably triggering more warnings.

Table 1 REEB data quality energy intensity thresholds

Property Type	Lower Threshold ($kWh._{ele.eq.}/m^2/year$)	Higher Threshold ($kWh._{ele.eq.}/m^2/year$)
Office (Non-airconditioned)	30	600
Office (Air-conditioned)	50	1000
Enclosed Shopping Centre (Non-Airconditioned)	30	600
Enclosed Shopping Centre (Air-conditioned)	30	600
Unenclosed Shopping Centre	0.4	400
Shopping Village	-	150
Retail, Leisure and Industrial Park	-	50

Please note on historic data that historic data presented in this report may differ from previous reports if (for example) new properties have entered the dataset in 2021/22 providing multiple years of historic data, or participants have identified inaccuracies in historic data and updated these.

Methodology Notes: Property Type Definitions and Scope of Data Collection

Offices

Definition: A property with a single tenant or multiple tenants used to conduct commercial business activities.

Floor Area: Net Lettable Area (NLA), all lettable or rentable office space (excluding car parks) in the property. This should also include vacant space.
Scope of Data Collection: Energy consumption relates to whole building but excludes any mixed-use elements such as retail spaces and gyms. It is recognised that whole building energy intensity using NLA as the denominator is, to an extent, a mismatch between numerator and denominator (using Net Lettable Area as opposed to Gross Internal Area) but this is the most consistently available and accurate denominator from participants.

Enclosed Shopping Centres

Definition: An enclosed retail property that includes a central common mall area and adjoining retail units. The retail units typically do not have any independent access and are accessed through the common mall area. Such properties are typically not accessible to the public after closing hours.

Floor Area: Common Parts Area (CPA), the area within a retail destination that is typically referred to as the 'mall' area. It is the area controlled by the landlord and includes the mall area, circulation areas, staircase, escalators, lifts fully enclosed service areas and storage areas.

Scope of Data Collection: Energy consumption relates to common parts area. It excludes all retail units and car park energy consumption.

Unenclosed Shopping Centres

Definition: A partially open retail property that includes a central common mall area. The common mall area is not fully sealed, e.g. there is a roof but open entrances, and therefore accessible to the public after store closing hours.

Floor Area: Common Parts Area (CPA), area within a retail destination that is typically referred to as the 'mall' area. It is the area controlled by the landlord and includes the mall area, circulation areas including external walkways, staircases, escalators, lifts, enclosed service and storage areas and courts that may be semi-covered or open.

Scope of Data Collection: Energy consumption relates to the common parts area and excludes all retail units and car parks. Energy consumption constitutes artificial lighting associated with common parts and may or may not have no centralised heating or ventilation.

Shopping Village

Definition: A shopping destination characterised by rows of shops/retail units that are accessed via open pedestrianised streets and are located within well landscaped areas. The car park, where present, is generally located on an adjoining site, but a small amount of car parking may exist around the shops as well.

Floor Area: Includes the Common Parts Area and the Open-Air Car Park. The common part constitutes the external landscaped areas, pedestrianised streets and service yards that fall within the site boundary. The Open-Air Car Park Spaces are calculated using the car park numbers multiplied by 25m^2 (based on REVO Guidance Note 76 – Construction Costs of Shopping Centre Car Parks).

Scope of Data Collection: Energy consumption is mainly associated with the lighting of external areas, service yards, open-air car parks external landscaped area and walkways. Multi-storey car parks are not included.

Retail and Leisure Park

Retail Park Definition: An out-of-town, open-air retail facility that comprises mainly medium and large-scale specialist retailers. It is characterised by mostly free-standing properties, with ample onsite parking located in front of the stores and/ or around the site at ground level.
Leisure Park Definition: An out of town, open-air leisure facility, that may also include some retail units. Similar in nature to a Retail Park, but includes facilities such as bowling, cinemas etc. It is characterised by mostly freestanding, with ample on-site parking located in front of the stores and/or around the site at ground level.

Floor Area: The denominator used is the number of car park spaces, which is then converted into area. Each car park space represents 25m^2 (based on REVO Guidance Note 76 – Construction Costs of Shopping Centre Car Parks). It is recognised that car parking spaces may not be the most accurate denominator. However, in the absence of a more suitable denominator that is consistently available and accurately recorded by participants, this is seen as the best option.
Scope of Data Collection: Energy consumption is mainly associated with the lighting of an open-air car park, service yard and any external landscaped areas. Multi-storey car parks are not included.

Industrial Park

Definition: A site that contains multiple, freestanding office or logistics buildings grouped together. On-site parking is typically located in front of each building and/or around the site. Landscaped areas may also exist within the site.

Floor Area: External area, given as Gross Plot Area minus Building Footprint.

Scope of Data Collection: Energy consumption is mainly associated with the lighting of an open-air car park, service yard and any external landscaped areas. Multi-storey car parks are not included.

Methodology Notes: Adjustments & Conversions

Adjustments

Electricity equivalent (kWh.ele.eq.) = kWh of electricity equivalent. Electricity 'equivalence' is calculated using the ratio of primary energy of each fuel compared to electricity. It combines into kWh of electricity equivalent, measuring the amount of electricity used and adding an equivalent amount to account for any other fuels used. Electricity equivalent adjustments (where applied), use the co-efficient factors in Table 3 below.

Fuels and thermal energy consumption for heating is not adjusted for weather or operating hours.

Table 3: Factors for converting to Electricity Equivalent

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas / LPG	0.45	0.47	0.46	0.47	0.49	0.53	0.56	0.59	0.66	0.70	0.72	0.75	0.75
Fuel oil	0.47	0.49	0.48	0.49	0.52	0.56	0.59	0.61	0.69	0.73	0.75	0.79	0.79
Wood pellets	0.54	0.56	0.55	0.57	0.59	0.64	0.67	0.70	0.79	0.84	0.86	0.90	0.90
District heating	0.55	0.56	0.55	0.57	0.59	0.64	0.67	0.71	0.79	0.84	0.86	0.91	0.90
District cooling	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40

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