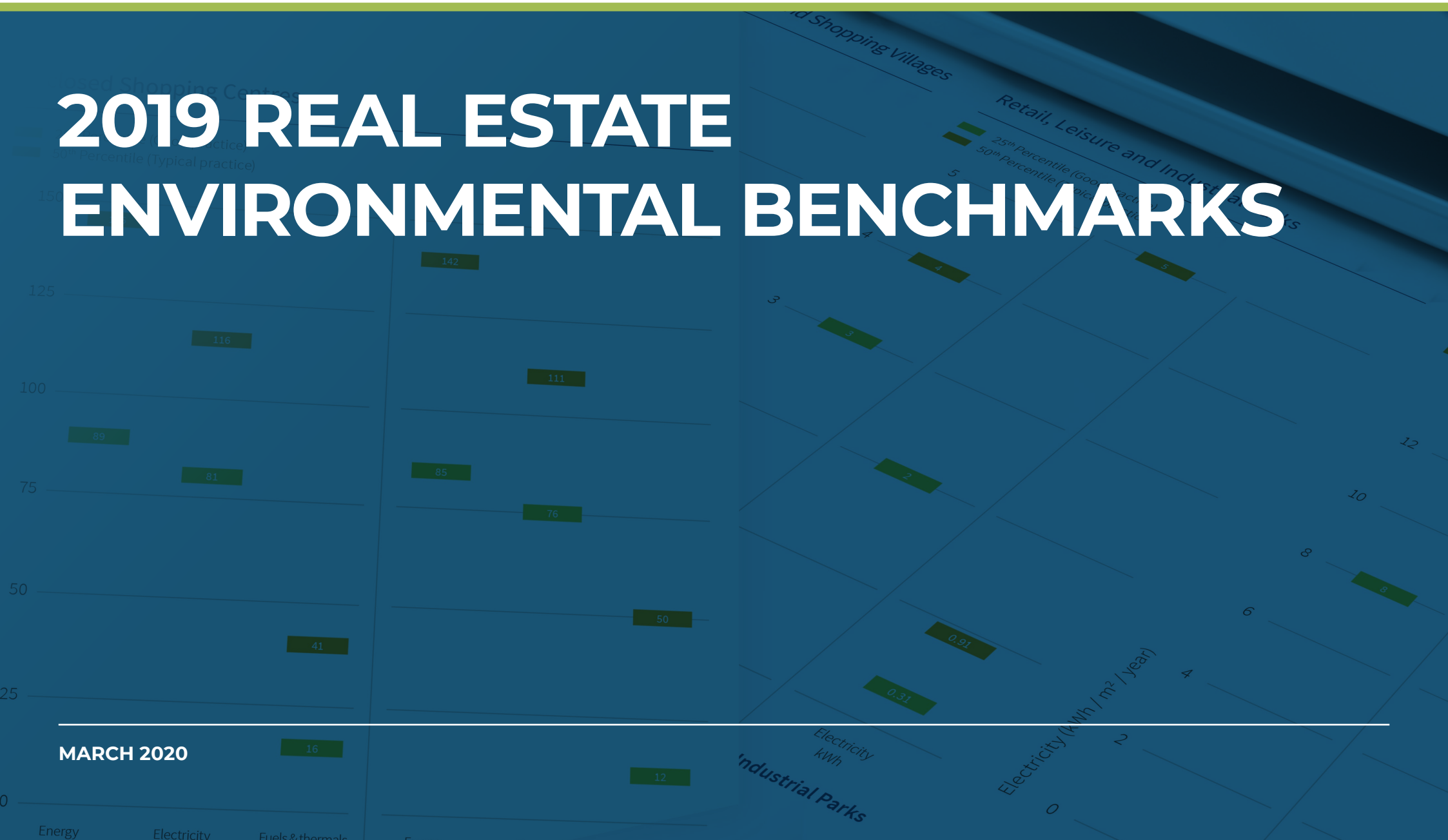# 2019 REAL ESTATE
ENVIRONMENTAL BENCHMARKS

MARCH 2020

What is the Real Estate Environmental Benchmark?

The Real Estate Environmental Benchmark (REEB) is a publicly available benchmark based on operational environmental performance for commercial properties in the UK. It is one of the only benchmarks based on the performance of buildings 'in-use' and is increasingly becoming the industry standard used by investors, fund managers and property owners to compare the performance of commercial properties across the UK.

Based on the annual utility consumption data of the commercial property portfolios of BBP members, this report provides energy and water performance benchmarks for offices, shopping centres, shopping villages, retail parks, leisure parks, industrial parks and car parks, which others can use to compare the performance of their own buildings.

The benchmarks provide one of the most up-to-date reflections of industry performance; they are based on a 3-year rolling average and are updated every two years. Details outlining how the benchmarks are calculated are provided at the end of this report.

The REEB dataset is one of the most comprehensive concerning performance in-use and, with the permission of BBP members, the data is made available on an anonymous basis to support a wide range of research projects in this important field.

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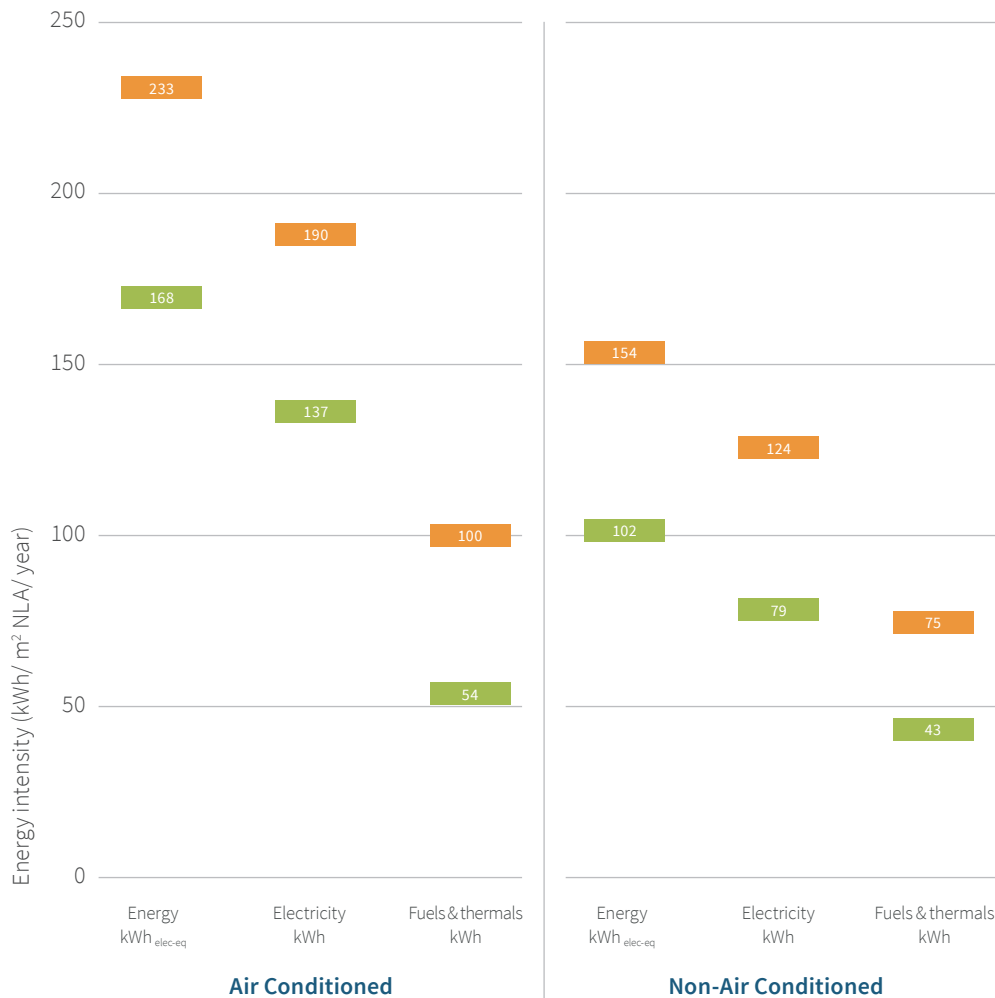
Key Changes since 2017

- Two new property types have been added to the REEB benchmarks. These are:
  – Shopping Villages
  – Industrial Parks

- Enclosed Shopping Centres are now split by their HVAC category into Air Conditioned and Non-Air Conditioned

- Car Parks are split into Open-air Surface Level Car Parks and Multi-Storey Car Parks

- Due to concerns over the energy intensity profile observed for Unenclosed Shopping Centres, further investigation into the data and methodology was undertaken to increase the level of confidence in the data. As a result of this exercise a number of properties were reclassified as Retail Parks or Shopping Villages. This impacted the sample size of Unenclosed Shopping Centres, which has reduced from 60 to 10.

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Energy Benchmarks

Offices

- 25th Percentile (Good practice)
- 50th Percentile (Typical practice)

Offices — Air Conditioned (Energy intensity kWh/ m² NLA/ year)

	Energy kWh elec-eq	Electricity kWh	Fuels & thermals kWh
50th Percentile	233	190	100
25th Percentile	168	137	54

Offices — Non-Air Conditioned

	Energy kWh elec-eq	Electricity kWh	Fuels & thermals kWh
50th Percentile	154	124	75
25th Percentile	102	79	43

Enclosed Shopping Centres

- 25th Percentile (Good practice)
- 50th Percentile (Typical practice)

Enclosed Shopping Centres — Air Conditioned (Energy intensity kWh/ m² CPA/ year)

	Energy kWh elec-eq	Electricity kWh	Fuels & thermals kWh
50th Percentile	145	116	41
25th Percentile	89	81	16

Enclosed Shopping Centres — Non-Air Conditioned

	Energy kWh elec-eq	Electricity kWh	Fuels & thermals kWh
50th Percentile	142	111	50
25th Percentile	85	76	12

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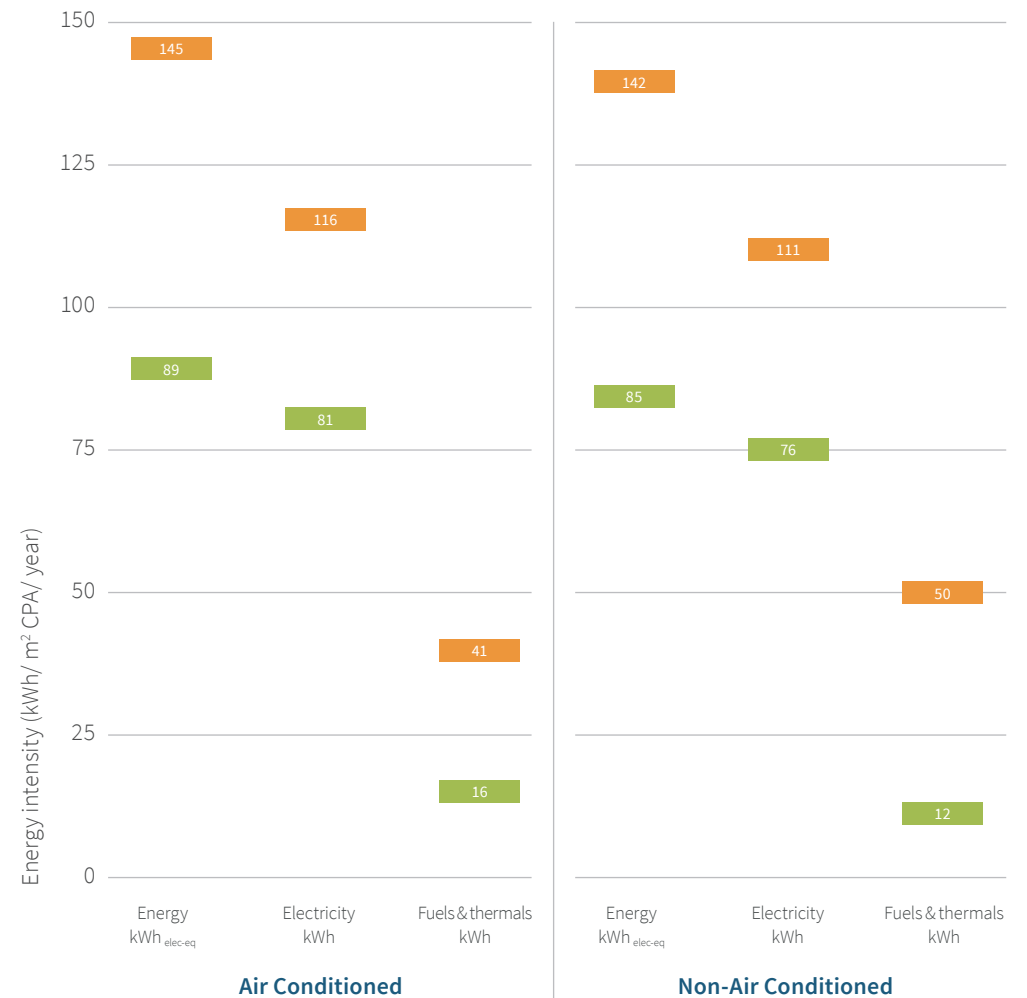
Energy Benchmarks

Unenclosed Shopping Centres and Shopping Villages

- 🟩 25th Percentile (Good practice)
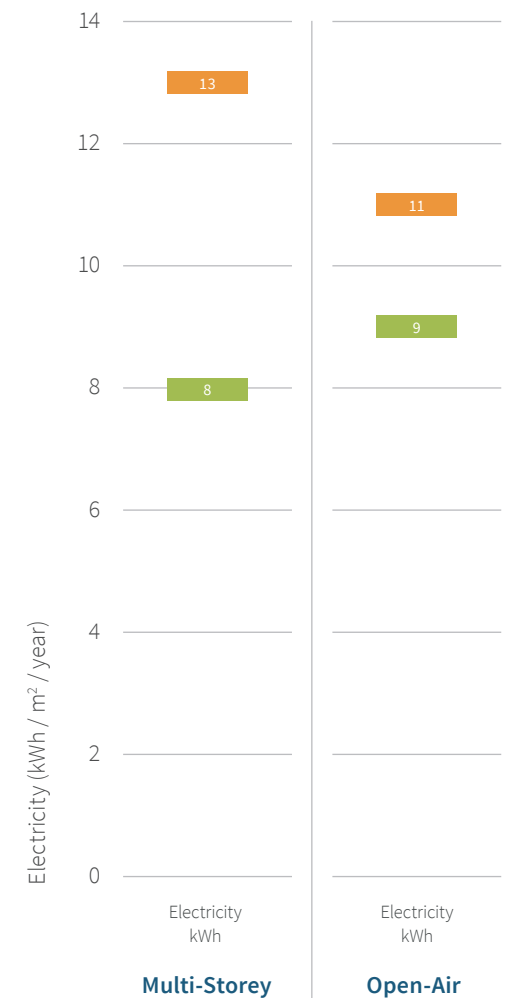- 🟧 50th Percentile (Typical practice)

Energy intensity (kWh/ m² / year)

Unenclosed Shopping Centres

Energy kWh elec-eq	Electricity kWh	Fuels & thermals kWh
75 (orange)	70 (orange)	21 (orange)
45 (green)	25 (green)	17 (green)

Shopping Villages

Electricity kWh: 24 (orange), 11 (green)

Retail, Leisure and Industrial Parks

- 🟩 25th Percentile (Good practice)
- 🟧 50th Percentile (Typical practice)

Electricity intensity (kWh/ m² / year)

Retail Parks — Electricity kWh: 4 (orange), 3 (green)

Leisure Parks — Electricity kWh: 5 (orange), 2 (green)

Industrial Parks — Electricity kWh: 0.91 (orange), 0.31 (green)

Car Parks

- 🟩 25th Percentile (Good practice)
- 🟧 50th Percentile (Typical practice)

Electricity (kWh / m² / year)

Multi-Storey — Electricity kWh: 13 (orange), 8 (green)

Open-Air — Electricity kWh: 11 (orange), 9 (green)

Water Benchmarks

Offices

- 🟩 25th Percentile (Good practice)
- 🟧 50th Percentile (Typical practice)

Water intensity (litres / person / working day)

- 35
- 23

Water intensity (litres / m² NLA / year)

- 651
- 450

Enclosed Shopping Centres

- 🟩 25th Percentile (Good practice)
- 🟧 50th Percentile (Typical practice)

Water intensity (litres / visit)

- 1.17
- 0.68

Water intensity (litres / m² CPA / year)

- 852
- 412

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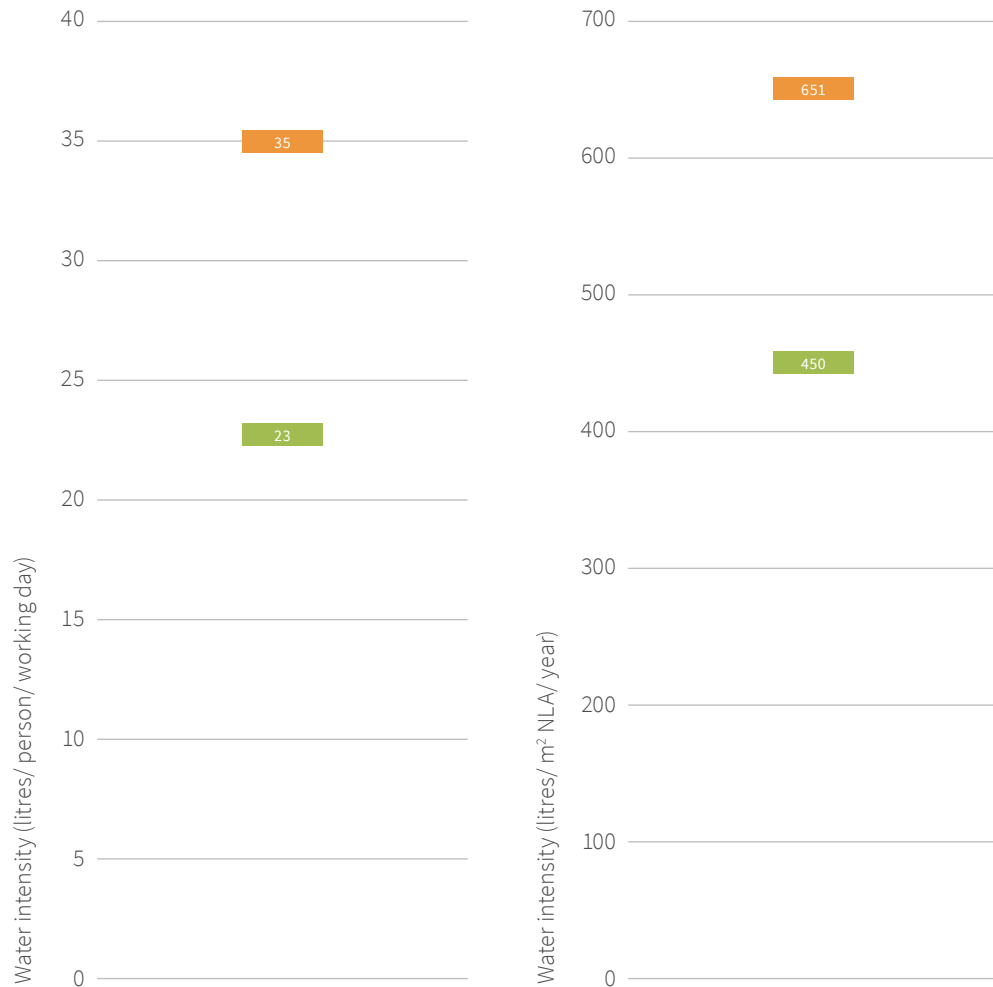
Calculating the Benchmarks

Calculation methodology

- Property submissions from the past 3 years are selected.

- Properties that fail any data quality controls are excluded.

- All annual data submissions not excluded are considered to be "eligible annual data submissions".

- The unadjusted energy intensity figures for each eligible annual data submission over the last three years is selected. Where an individual property has more than one year of data, the mean energy intensity is calculated and used for that property.

- These property intensities form the final dataset on which the quartile analysis is performed to produce the benchmarks as follow:
  - 50th Percentile (median) = REEB Typical Practice
  - 25th Percentile (lower Quartile) = REEB Good Practice

Property Type	Lower Threshold (kWh $_{elec-eq}$/m²/year)	Higher Threshold (kWh $_{elec-eq}$/m²/year)
Office (Non-Air Conditioned)	30	600
Office (Air Conditioned)	50	1000
Enclosed Shopping Centre (Non-Air Conditioned)	30	600
Enclosed Shopping Centre (Air Conditioned)	30	600
Unenclosed Shopping Centre	0.4	400
Shopping Village	-	150
Retail, Leisure and Industrial Park	-	50

- Water Benchmarks: To calculate the water benchmarks by litres/person/working day the following information is used.
  - No. of persons = workers based on best available of either FTEs (full time equivalents) or actively used workstations.
  - Working days = 260 per year.

Data Quality

- Properties included within benchmark calculations must meet strict data quality controls. The criteria for excluding properties are:
  - Properties with missing data that are vital to the analysis.
  - Properties that show abnormal changes between years or data anomalies that cannot be explained or confirmed by the data provider.
  - Energy Intensity Thresholds are applied to identify further data quality issues. Where these remain unexplained the properties are then excluded. The thresholds in the table below are applied.

Sample size

The figures below represent the total number of properties used to create each benchmark category.

- Offices
  - Energy: 405 air-conditioned; 103 non air-conditioned
  - Water: 302 (per person); 508 (per m²)
- Enclosed Shopping Centres:
  - Energy: 53 Air conditioned; 53 non-air conditioned
  - Water: 97 (per person); 76 (per m²)
- Unenclosed Shopping centres: 10
- Shopping Village: 24
- Retail Park: 174
- Leisure Parks: 45
- Industrial Park: 97
- Multi-Storey Car Park: 29
- Open-Air Car Parks: 6

Offices:

- **Definition:** A property with a single tenant or multiple tenants used to conduct commercial business activities. Offices are further classified by their HVAC category. These are:
  - **Naturally Ventilated:** Such buildings employ windows, skylights and such other operable systems (either manually or automatically controlled), to supply and remove air from the building without any mechanically assisted ventilation. The natural ventilation is driven by pressure differences between one part of the building and another or between the inside and the outside.

  - **Mixed Mode:** Mixed mode buildings employ a hybrid approach to space conditioning that uses a combination of natural ventilation from operable windows (either manually or automatically controlled) and mechanical systems that include air distribution equipment which may also include refrigeration equipment for cooling. A mixed-mode building uses air-conditioning only when and where it is necessary, optimising the use of natural ventilation whenever it is feasible
  - **Mechanically Ventilated and/or Air-Conditioned:** Such properties are fully sealed and controlled via a combination of components required to provide full control of temperature, humidity and air quality. This includes fixed, self-contained systems such as split units and centralised systems. Mechanical ventilation systems that provide no mechanical cooling but serve spaces that are cooled by other means are included within this HVAC category. Air conditioning is often provided by Air Handling Units (AHU) connected to ductwork that supplies air to and extracts air direct from within a space. AHU that consist of only a fan and a heating or cooling element located within the space they serve, known as Fan Coil Units (FCU) should be included here. Cooling itself could be generated either within the unit itself or can be provided by connection to central chillers.

  The 'Offices Non-Air Conditioned' category includes Naturally ventilated and Mixed Mode properties and the 'Offices Air Conditioned' category includes the Mechanically Ventilated and/or Airconditioned properties.

- **Floor Area:** Net Lettable Area (NLA) includes all lettable or rentable space (excluding car parks) in the whole property. This should include all available lettable space, even if vacant.

- **Scope of Data Collection:** Energy consumption relates to whole building but excludes any mixed-use elements such as retail spaces and gyms. Where offices include special use consumption, e.g. data centres, the consumption relating to these uses are removed from energy intensity calculations where sub-metered consumption and floor area is provided. Additionally, the following is applied when calculating the benchmarks:
  - Energy benchmarks are based on whole building data only. Buildings that submit only partial building energy consumption are excluded.
  - The benchmarks are based on Offices which have an average annual occupancy rate of 75% or more.

It is recognised that whole building energy intensity using NLA as the denominator is, to an extent, a mismatch between numerator and denominator (using NLA as opposed to GIA with whole building energy) 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.

  Similar to Offices, Enclosed Shopping Centres are also further categorised into Naturally Ventilated, Mixed Mode and Mechanically Ventilated and/or Air-Conditioned. The 'Enclosed Shopping Centre Non-AC' category includes Naturally ventilated and Mixed Mode properties and the 'Enclosed Shopping Centre AC' category includes the Mechanically Ventilated and/or Airconditioned properties.

- **Floor Area:** Common Parts Area (CPA) is the area within a retail destination that is typically referred to as the 'mall' area. It is the area controlled by the

landlord and for enclosed shopping centres includes the enclosed mall area including circulation area, 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) is 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 including external walkways, staircases, escalators, lifts, enclosed service and storage areas and courts that may be semi-covered or open. Area let to tenants and car parks is not included.

- **Scope of Data Collection:** Energy consumption relates to the common parts area and excludes all retail units and car parks. Energy consumption typically constitutes artificial lighting associated with common parts area but typically will 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:** This 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 BCSC 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. It is acknowledged that the energy data in this case predominantly represents external lighting.

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 on-site 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 free-standing properties, 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 by multiplying the car park numbers by 25m^2 (based on REVO Guidance Note 76 - Construction Costs of Shopping Centre Car Parks)

As a denominator, it is recognised that the area of the car parks may not be the most accurate. However, in the absence of a more suitable denominator that is consistently available and accurately recorded by participants, this is seen as the best alternative.

- **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, free-standing 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.

Adjustments

- Electricity equivalent ($kWh_{elec-eq}$) = kWh of electricity equivalent. Electricity 'equivalence' is calculated using the ratio of carbon intensities between each fuel and 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 = 1, fuels = 0.4 and thermals = 0.5.

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

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REEB 2019 participants

Aberdeen Standard Investments

AVIVA INVESTORS

Blackstone

BMO Real Estate Partners
BMO Global Asset Management

British Land

bruntwood

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WORKSPACE

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