Office Carbon CO_2e Calculator

Methodology, Assumptions & Data Sources

Overview

This calculator estimates greenhouse gas emissions (tCO_2e) associated with office-based operations, supporting carbon audits, baseline footprinting, and carbon management.

It follows principles set out in the GHG Protocol and aligns with UK emissions reporting practices using Department for Environment, Food & Rural Affairs datasets.

The model is designed to:

- Provide a **clear and structured operational footprint**
- Capture key emission sources associated with office activities
- Support carbon reduction and offsetting decisions

Scope & Boundaries

This calculator captures emissions directly associated with office-based operations, combining Scope 1, Scope 2, and selected Scope 3 sources.

Included:

Scope 1 (Direct emissions)

- On-site fuel use (e.g. gas heating)

Scope 2 (Indirect energy emissions)

- Purchased electricity

Scope 3 (Selected indirect emissions)

- Water consumption
- Waste generation (including recycling)
- Paper use
- Digital services (e.g. web hosting)
- Purchased goods (office equipment, furniture, electronics)

Excluded:

- Employee commuting
- Business travel
- Detailed supply chain emissions beyond office-related spend
- Product lifecycle emissions

Employee-related emissions are assessed separately using the Citizen / Staff Carbon Calculator, allowing for a more detailed and scalable analysis.

These exclusions define a practical boundary, focusing the assessment on emissions directly associated with office-based activities while maintaining clarity, consistency, and usability.

Methodological Approach

All emissions are calculated using:

Activity Data × Emission Factor = Emissions ($kgCO_2e$)

Emission factors are primarily sourced from:

- Department for Environment, Food & Rural Affairs
- Supplementary spend-based datasets where required

1. Energy (Scope 1 & 2)

Inputs:

- Electricity consumption (kWh)
- Heating fuel use (e.g. gas)

Factors:

- UK grid electricity factors
- Fuel-specific combustion factors

Assumptions:

- Grid average applied unless a certified renewable tariff is specified
- Renewable electricity may be treated as zero emissions (market-based approach where evidence is provided)

2. Water (Scope 3)

Inputs:

- Water consumption (litres)

Factors:

- DEFRA water supply and treatment emission factors

Notes:

- Includes emissions associated with water supply and wastewater treatment

3. Waste (Scope 3)

Inputs:

- Waste generated (kg)
- Recycling (kg, where applicable)

Factors:

- DEFRA waste emission factors

Notes:

- Accounts for different disposal pathways (e.g. landfill, recycling)

4. Paper Use (Scope 3)

Inputs:

- Paper type (e.g. recycled, virgin)
- Weight (kg)

Factors:

- DEFRA material-specific emission factors

Assumptions:

- Standard weights applied where required (e.g. A4 paper estimates)

5. Digital Services (Scope 3)

Inputs:

- Annual spend on web hosting or digital services (£)

Methodological Approach:

Where supplier-specific emissions data is unavailable, emissions are estimated using:

£ Spend × Emission Factor ($kgCO_2e$/£)

Notes:

- Where providers offer verified carbon-neutral or low-carbon services, values may be adjusted accordingly
- Where supplier-specific emissions data is available, this should be used in preference to spend-based estimation

6. Purchased Goods (Scope 3)

Overview

This category captures emissions associated with office-related expenditure, including:

- Equipment
- Furniture
- Electronics

Methodological Approach

Where detailed product-level data is unavailable, emissions are calculated using:

£ Spend × Emission Factor ($kgCO_2e$/£)

Emission factors are sourced from:

- CarbonSaver Scope 3 factors (UK-aligned datasets)

Why This Approach Is Used

Most organisations do not have access to detailed product-level emissions data.

Spend-based factors provide:

- A practical and scalable method
- Broad coverage of otherwise unaccounted emissions
- Alignment with accepted carbon accounting practices
- **Accounts for emissions associated with the organisation's spending within each sector**

Limitations

- Based on sector averages
- Does not reflect supplier-specific differences
- Spend does not always directly correlate with emissions

Data Quality & Hierarchy

The calculator follows a recognised hierarchy:

1. Actual data (e.g. energy bills, measured usage)
2. Estimated data
3. Default assumptions
4. Spend-based estimates

Higher-quality data is always preferred where available.

Level of Accuracy

This model provides **robust, evidence-based estimates** of emissions using recognised datasets and transparent assumptions.

Results are:

- **Consistent and repeatable**
- **Traceable to input data and emission factors**
- **Proportionate to available data quality**

While some Scope 3 elements rely on estimation, conservative, average factors are used to align with standard practice in carbon accounting.

Appropriate Use

The calculator is suitable for:

- Establishing an operational carbon baseline
- Supporting organisational carbon audits
- Identifying emission hotspots within office activities
- Informing carbon reduction strategies
- Supporting voluntary carbon offsetting

When applied consistently and supported by appropriate underlying data, results may be used to determine carbon credit requirements.

Outputs can contribute to reporting aligned with recognised standards such as ISO 14064.

Limitations

- Not a full organisational lifecycle assessment
- Some inputs rely on estimates or industry averages
- Spend-based emissions represent sector averages
- Results depend on the accuracy of input data

Use in Carbon Audits

This calculator can be used as:

- A baseline emissions assessment tool
- A structured input layer for ISO-aligned carbon audits
- A method for quantifying key operational emissions

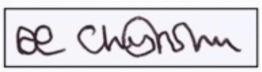
When supported by appropriate documentation and evidence, outputs contribute to credible carbon reporting.

Final Note

This methodology provides a **practical, structured, and defensible approach to office emissions estimation**, focusing on core operational impacts while maintaining alignment with recognised carbon accounting standards.

It enables organisations to:

- understand their operational emissions
- identify reduction opportunities
- and integrate office-based emissions into wider carbon management and offsetting strategies



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