RTIG Organisational & Activities Carbon Footprint

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This document is Published.

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1 Introduction

1.1 About this document

1.1.1 This document has been produced for the Real Time Information Group (RTIG). It provides the RTIG Board and its members with information on the carbon impact of RTIG and its activities - which forms a baseline against which the success of actions to reduce the carbon impact can be compared.

1.1.2 The report provides a preliminary assessment of RTIG's carbon footprint, focusing on partial Scope 1 and 3 emissions.

1.2 Background and context

1.2.1 Leadership:

1.2.1.1 RTIG is governed by a Board of Directors made up of representatives from its member organisations. The Board sets the strategic direction of the organisation and oversees its activities. The Chair of the Board leads the Board meetings and represents RTIG externally.

1.2.2 Membership:

1.2.2.1 RTIG has a diverse range of members, including:

- Local authorities responsible for public transport in their areas.
- Bus operators running services across the UK.
- System suppliers developing and providing technology solutions for public transport.
- Consultants offering expertise in the industry.

1.2.3 Membership is open to any organisation with an interest in public transport technology in the UK.

1.2.4 RTIG does not have its own dedicated offices. As a community organisation, it does not require a permanent physical space in which to operate.

1.2.5 Activities primarily involve information sharing, collaboration and project work, which can be effectively managed through remote communication and virtual meetings. These can be categorised as:

- **Face to face meetings and events:** RTIG holds Board meetings and working group sessions at various locations - often hosted in commercial meeting spaces. This facilitates networking and knowledge exchange among members in different regions.
- **Online platform:** RTIG maintains an online platform for member communications, resource sharing, and project management. This platform serves as a virtual hub for all its activities.
- **Secretariat support:** RTIG has a small secretariat team that provides administrative and logistical support - working remotely.

1.3 Scope of this Report

1.3.1 This report has no statutory or other legal basis and is purely to provide a baseline and measure of the carbon impact of RTIG and its activities.

1.4 Acknowledgements

1.4.1 RTIG is grateful to Jamie Hewetson for his work on this report and the calculations within it.

1.4.2 Any images are copyright RTIG unless specified.

2 Executive Summary

2.1 Period covered and basis of calculations

2.1.1 This report assesses RTIG's greenhouse gas (GHG) emissions for the fiscal year 2023 - 2024, calculated according to the Greenhouse Gas Protocol (GHG Protocol) Corporate Standard. As a remote organisation, RTIG's primary emissions stem from employee activities at home. Analysing and reducing this footprint is therefore - crucial to reducing the GHG emissions of RTIGs work.

2.1.2 Carbon dioxide equivalent (CO2e)

2.1.2.1 CO2e stands for "carbon dioxide equivalent." It's a metric used to account for the global warming potential of different greenhouse gases. Since various greenhouse gases have different warming effects, they are converted to the equivalent amount of CO2 that would have the same warming impact. This allows for easier comparison of the climate impact of different activities or products.

2.2 Key Findings

2.2.1 The total carbon footprint of RTIG for 2023-24 was 4038.39 kg per annum of carbon dioxide equivalent (CO2e).

2.2.2 Home office working accounted for 1,911.16 kg CO2e of the overall footprint: 47.32% of the total.

2.2.3 Web activity, storage and webinars accounted for a mere 10.99 kg CO2e: just 0.27%

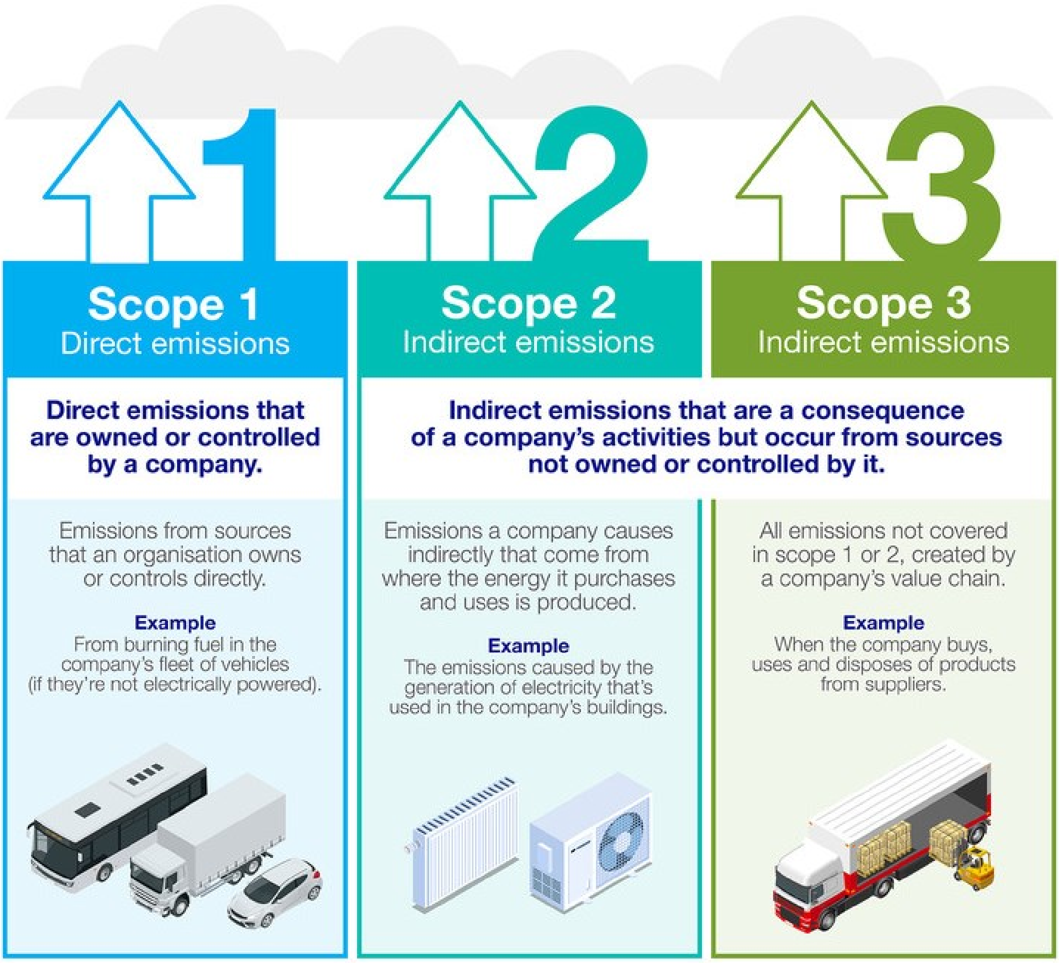
2.2.4 Delegates travelling to meetings were the largest contributor at 2,116.24 kg CO2e or 52.4%.

3 Methodology

3.1 Greenhouse Gas (GHG) Protocol

3.1.1 This report includes emissions from the following sources, classified according to the GHG Protocol scopes[1].

3.1.2 Essentially, scope 1 are those direct emissions that are owned or controlled by a company, whereas scope 2 and 3 indirect emissions are a consequence of the activities of the company but occur from sources not owned or controlled by it.



[1] https://ghgprotocol.org/about-us

3.2 Scope 1 (partial)

3.2.1 Direct emissions from owned or controlled sources, primarily focusing on home energy use for staff working remotely. Emissions are calculated based on:

- Average staffing work schedule: 2 staff working remotely from home for 2.5 days per week

3.2.2 Energy consumption data: Industry standard emission factors are used for common household appliances and electronics, combined with estimated usage durations for activities like computer use, video calls, printing, and internet.

3.3 Scope 2 (not applicable):

3.3.1 Scope 2 standardises how corporations measure emissions from purchased or acquired electricity, steam, heat and cooling (called “scope 2 emissions”).

3.3.2 RTIG does not purchase or acquire any in scope emissions.

3.4 Scope 3 (partial):

3.4.1 Members’ travel for workshops and meetings: This has been calculated based on travel distances, chosen modes of transport, and relevant emission factors, requiring specific data collection from participants or estimation based on typical routes and travel modes.

3.4.2 Catering and heating at workshops and meetings: Industry averages or specific data are used to estimate emissions from catering choices and venue energy consumption.

3.5 Data sources

3.5.1 The audit used the following data sources and methodologies:

- Delegate travel surveys.

- GHG emissions factors from recognised sources such as the EPA eGRID database.[2]

[2] https://www.epa.gov/egrid

4 Results - Scope 1 (partial): Home energy use for remote staff

4.1 Home Energy Breakdown:

4.1.1 Heating and Cooling:

- Location: UK with average seasonal temperatures.
- Heating/Cooling Hours: Average daily heating hours for the half-day work period based on the season (e.g., 4 hours heating in winter).
- Energy Consumption: Research average kWh consumption for typical heating/cooling systems in the UK (e.g., 10 kWh/hour for gas boiler).
- Efficiency Adjustment: Applies an estimated average efficiency adjustment factor (e.g., 0.8 for 20% more efficient than average).

4.1.2 Lighting:

- `Additional hours: lighting hours during work-from-home periods (e.g., 3 hours).
- Wattage: Uses average wattage of commonly used home office lighting (e.g., 10W for desk lamp, 60W for ceiling lights).

4.1.3 Electronics:

- Devices: Identifies typical work-from-home electronics (computer, monitor, printer).
- Energy Consumption: Research average energy consumption of each device while in use (e.g., 100W for computer).
- Usage Time: Estimated average usage time during the work-from-home period.

4.2 Information Sources:

4.2.1 Department for Environment and Food (DEFRA): Provides carbon emission factors for various activities and energy sources in the UK.

4.2.2 Energy Saving Trust: Offers appliance energy consumption guides and comparison tools[3]:

4.3 Underlying assumptions and estimations

- Number of staff: 2
- Remote workdays per week: 2.5
- Industry standard emission factors:
- Computer use: 20 Wh/hour
- Video calls: 50 Wh/hour
- Printing: 50 Wh/page
- Internet browsing: 10 Wh/hour
- Average weekly computer use: 20 hours
- Average weekly video call time: 5 hours
- Average printing frequency: 20 pages per week
- Average weekly internet browsing time: 10 hours

[3] https://energysavingtrust.org.uk/

4.4 Calculations:

4.4.1 Heating:

- Winter weekly consumption: 20 hours * 12.5 kWh/hour = 250 kWh
- Winter annual consumption (assumes 4 winter months): 250 kWh/week * 4 weeks/month * 4 months = 4000 kWh
- CO2 emissions from heating: 4000kWh * 0.23 kg CO2/kWh= 920 kg CO2e
- 2 staff = 1,840 kg CO2e

4.4.2 Lighting:

- Weekly consumption: (10W + 60W) * 15 hours = 1.05 kWh
- Annual consumption: 1.05 KWh/week * 52 weeks = 54.6 kWh
- CO2 emissions from lighting: 54.6 kWh * 0.23 kg CO2/kWh= 12.56 kg CO2e
- 2 staff = 25.12 kg CO2e

4.4.3 Electronics:

- Total active power: 20W + 50W + 50W + 10W = 130Wh (0.13kWh)
- Weekly consumption (active + standby): Computer Use (0.02kWh *20hrs) + Video Calls (0.05kWh*5hr) + Printing (0.05kWh*20 sheets), Internet Browsing (0.01 KWh * 10 hours)* 1.1 (standby power multiplier)=1.93 kW
- Annual consumption: 1.93kW * 52 weeks = 100.10 kWh
- CO2 emissions from electronics: 100.10 k kWh * 0.23 kg CO2/kWh = 23.02 kg CO2e per employee
- 2 staff= 46.05 CO2e

4.5 Total Annual Office CO_2 Emissions:

4.5.1 1 person: 920 kg CO_2 (heating) + 12.516 kg CO_2 (lighting) + 23.02 kg CO_2 (electronics) = 955.58 kg CO_2

4.5.2 Multiplying this by 2 (2* 955.58kg CO_2), the estimated average annual carbon footprint for 2 RTIG staff working from home under these assumptions is 1911.16 kg CO_2e per annum which works out over 2,080 hours at 0.46 kg CO_2 hourly. (N.B. this figure is used elsewhere to calculate the work that delegates put into RTIG pre-meeting

5 Results - Scope 2

5.1.1 These are included in Scope 3.

6 Scope 3 (partial): Indirect emissions

6.1 Delegate travel to workshops and meetings:

6.1.1 Assumptions and estimations:

- Number of workshops per year: 6-8
- Number of general meetings per year: 3
- Average number of participants per event: 30-40

6.1.2 Estimated emission factors for various travel modes

Bike/ Walking: "walking and cycling have very low life cycle GHG emissions." The World Bank[4]:

- Car: Source: Our World in Data[5] - CO2e per km: 170 g (0.17 Kg)
- Public transport: Source: International Energy Agency: CO2e per mile: 0.059 kg
- Train: Source: The World Bank: CO2e per mile: 0.02 Kg
- Domestic flight: Source: Our World in Data[6] - CO2e per mile: 394 g (rounded from 246 g per km) (0.394kg)

6.1.3 Travel to Venue:

6.1.3.1 Surveys of delegates' travel arrangements were undertaken for events in Leeds and London and are used for these calculations.

6.1.3.2 London

- In London there were 28 delegates who returned travel forms.

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4 https://documents1.worldbank.org/curated/en/660861468234281955/pdf/696590ESW0P1010UBLIC00GHG0Web0final.pdf

5 https://ourworldindata.org/travel-carbon-footprint

6 https://ourworldindata.org/travel-carbon-footprint

- The total number of miles travelled by delegates to London and back was: 5,970 miles- an average of 213 miles per delegate.
- The total CO2e emitted was 462.76 kg: an average of 16.53 kg CO2e per delegate.
- Of this 5,970 miles:

Mode	Distance (Miles)	% of Total	CO2e per mile	CO2e
Bike/Walking	5.6	0%	0kg	0kg
Car	966	16%	0.102 kg	98.634 kg
Bus	290	5%	0.059 kg	17.11 kg
Train	4054	68%	0.02 kg	87.08 kg
Plane	660	11%	0.394 kg	260.04 kg
	5975.6	100%	n/a	462.76 kg

6.1.3.3 Leeds

- In Leeds there were 28 delegates who returned travel forms.
- The total number of miles travelled by delegates to Leeds and back was: 5,208 miles - an average of 186 miles per delegate.
- The total CO2e emitted was 407 kg an average of 14.55 kg CO2e per delegate

Mode	Distance (miles)	% of Total	CO2e per mile	CO2e
Bike/Walking	3	0%	0 kg	0 kg
Car	439	8%	0.102 kg	244.37 kg
Bus	16	0%	0.059 kg	0.944 kg
Train	4572	88%	0.02 kg	91.44 kg
Plane	178	3%	0.394 kg	70.132 kg
	5208	100%	N/A	407.29 kg

6.2 Venue

6.2.1 Catering and heating at workshops and meetings:

6.2.2 Assumptions:

- Venue type: Hotel (assumed standard energy consumption)
- 3 meetings
- Number of delegates: 28, 28, 45
- Event duration: 6 hours
- Catering: Sandwiches for lunch (average emissions)

6.2.3 Calculations:

Venue energy consumption:

- Estimated consumption per person per hour: 1.2 kWh/hour/person (source: International Energy Agency)
- Total consumption for 99 people: 1.2 kWh/hour/person * 18 hours * 98 people = 712.8 kWh
- Emission factor for grid electricity: 0.4 kg CO2e/kWh (source: The World Bank)
- Venue emissions: 712.8kWh * 0.4 kg CO2e/kWh = 285.12 kg CO2e

So the average emission for a meeting venue is 95 kg CO2e

6.2.4 Catering emissions:

- Emission factor for sandwiches: 2.5 kg CO2e/delegate (source: Sustainable Business Network)
- Catering emissions: 2.5 kg CO2e/delegate * 99 delegates = 247.5 kg CO2e

6.2.5 Venue emissions:

- Total of 3 event emissions: 282.24 kg CO2e (venue) + 245 kg CO2e (catering) = 161.4 kg CO2e
- Per-person footprint: 527.24kg CO2e / 99 people = 5.38 kg CO2e/person

6.3 Delegates' Time Spent on RTIG

6.3.1 At the Leeds meeting delegates were asked how long they spent on RTIG work back at the office and this averaged 1hr per delegate.

6.3.2 Using the hourly office figure of 0.45 kg CO2e per hour taken from the Office Work section.1 hr x 99 delegates =99 hrs @ 0.46 kg CO2e = 45.48 kg CO2e office time before meeting. This will be added to the Travel Footprint of Delegates. (see below)

6.3.3 Per Delegate Carbon Footprint

Delegate travel per meeting	15.54
Delegate Office Time pre meeting	0.46
Venue and catering	5.38
	21.3 kg CO2e per delegate
TOTAL for the 99 attendees	2,116.24 kg CO2e

6.4 Carbon Footprint of Digital Activities

6.4.1 Video uploaded to YouTube:

6.4.1.1 Factors affecting footprint: Video length, resolution, number of views, streaming quality, data centre efficiency.

6.4.1.2 Estimates:

- 1-5 minutes, 50 views: 0.2-1 gram CO2e (source: The Shift Project, corrected estimate)
- 5-10 minutes, 100 views: 0.4-2 grams CO2e (Source: The Shift Project report)

6.4.1.3 Limitations:

- Data on individual video footprints is not readily available from YouTube.
- Estimates may not reflect specific video characteristics or Youtube's evolving infrastructure

6.4.2 Webinar:

6.4.2.1 Carbon footprint per GB stored/transferred: 5 grams CO2e (source: Google Sustainability Report)

- Total data usage for remote delegates per event: (2 hours/delegate) * (1GB/hour) = 2 GB

- Carbon footprint per event: 2 GB * 5 g CO2e/GB = 10 grams CO2e
- Teams calls (webinars) with 20 people, 30, 50 and 100 – 24 per year
- 401 delegates attended 17 events an average of 24 attendees per webinar.
- 24 webinars * 24 attendees* 10g CO2e = 5.56 kg CO2e

6.4.3 Cloud storage:

6.4.3.1 Factors affecting footprint: Data size, storage type (e.g., hard disk, SSD), data centre location, energy efficiency.

6.4.3.2 Estimates:

- 1GB stored for 1 year: 2-10 grams CO2e (source: Google Sustainability Report)
- 100GB RTIG data in the cloud.
- 100GB* 10g= 1 Kg CO2e

6.4.4 Web Visitor Activity

6.4.4.1 Estimates:

- 1-5 minutes, 50 views: 0.2-1 gram CO2e (source: The Shift Project, corrected estimate)
  - Minutes Watched: 250 CO2e per second: 6.67E-05
- 5-10 minutes, 100 views: 0.4-2 grams CO2e
  - Minutes Watched: 1000 CO2e per second: 3.33E-05
- 150 YouTube videos of an average of 45 minutes, with 30 views average

6.4.5 Calculations:

- Total data usage for remote delegates per event: (2 hours/delegate) * (1GB/hour) = 2GB
- Carbon footprint per event: 2 GB * 5 g CO2e/GB = 10 grams CO2e

Summary		
Web Activity	4.42222	
Storage	1	
Streaming	4.01	
Total	**9.43222**	KgCO2e

Appendix 1 Glossary

CO_2	Carbon Dioxide
CO_2e	carbon dioxide equivalent
EEA	European Environment Agency
GB	Gigabyte
GGP	Greenhouse Gas Protocol
KWh	Kilo Watt Hour
W	Watt
Wh	Watt Hour

Appendix 2 References

- International Energy Agency: https://www.iea.org/
- Our World in Data: https://ourworldindata.org/
- Sustainable Business Network: https://www.sbn.org/
- The World Bank: https://www.worldbank.org/
- The Greenhouse Gas Protocol: https://ghgprotocol.org/corporate-standard
- CDP: https://www.cdp.net/en
- The Climate Registry: https://theclimateregistry.org/
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