


ACEI – PLEDGE TO NET ZERO

Update from 2019 Baseline Figures to include 2024

REV C - June 2025

GARLAND
Concepts Realised

CONTENTS

Description of change	Originator	Rev	Approval	Date
2022 Emissions Compared to Baseline Year 2019	ROM	1st	KR	07/03/2023
Updated with 2023 figures, 2020 and 2021 figures also included as required	ROM	A	KR	19/02/2024
Updated to include 2024 figures. 2019-2023 commuting figures updated through more detailed calculations	ROM	B	KR	28/02/2025
Added Section 4 explanation to re-calculation of baseline commuting figures 2019	ROM	C	KR & SD	06/06/2025

1. INTRODUCTION

It is a well-established fact that human action is causing adverse effect on our environment. This started due to the industrial revolution when humankind began using coal and gas in manufacturing, transportation and most sectors of our lives.

The burning fossil fuels release Green-House-Gases (GHG) into the atmosphere. These gases create a blanket around the earth which traps the heat from the sun and warms the planet. See Figure 1 below.

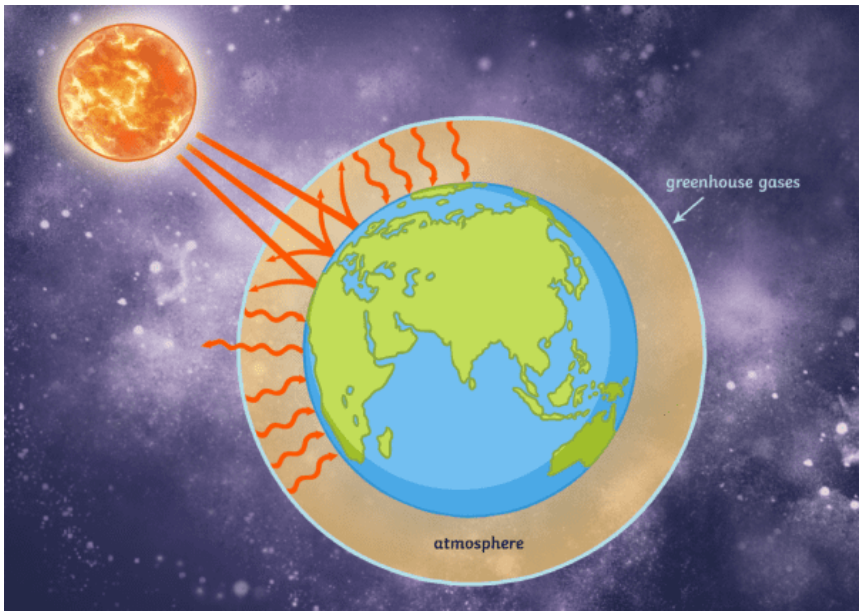

Figure 1 How GHG Warm Earth (twinkl.ie)

GHG is a term which refers to the seven main GHG emissions into the atmosphere. The seven GHGs are:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)
- Nitrogen Trifluoride (NF_3)

As can be seen in Figure 2, CO_2 is the most common GHG. Therefore, it is standard that the remaining gases are converted to their CO_2 equivalent. This makes it possible to compare them and to determine their individual and total contributions to global warming. In the report we will follow that principle.

About one-fifth of global human-driven emissions come from the industrial sector, which includes the manufacturing of goods and raw materials (like cement and steel), food processing and construction (nrdc.org). As our industry contributes such a large portion to Global Warming, it is our responsibility to act and combat our negative effect on the world. This is why the Association of Consulting Engineers of Ireland (ACEI) have pledged to reduce our emissions to Net Zero.

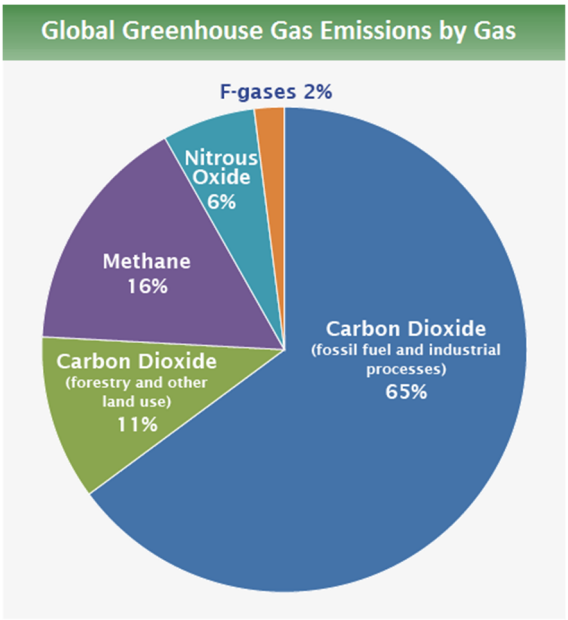

Figure 2 (Epa.gov)

2. NET ZERO PLEDGE

The Intergovernmental Panel on Climate Change (IPCC), the UN body for climate science, published a special report on the impacts of a 1.5°C rise in global temperatures above pre-industrial levels. To limit this rise, global GHG emissions must reach net zero by 2050.

ACEI is advocating for all member firms to achieve operational Net Zero GHG emissions by the target date 2030, aiming to lead by example within the industry. As engineers, we must align our actions with our advocacy.

GHG emissions are categorized into three scopes: direct emissions, indirect emissions, and emissions from third-party services. ACEI has chosen 2019 as the baseline year for measuring progress, as it was the last "normal" year before the pandemic. 2019 was the last year all staff in GARLAND across Ireland were working in the three main offices. These are located in Dublin, Limerick and Waterford.

3. INTRODUCTION TO GARLAND

GARLAND is an international engineering company founded in 1937 with three offices across Ireland. GARLAND provides Engineering (both Civil and Structural), Safety Management, Assigned Certifier and Planning, Social & Economic Development services world-wide.

4. RE-CALCULATIONS OF BASELINE FIGURES

As part of GARLAND's commitment to improving the accuracy of our environmental reporting, we have enhanced our data collection methods. Specifically, we now capture more precise commuting data, including individual commuting distances and greater participation in employee's answer the survey. To ensure consistency and comparability across reporting years, we have retroactively applied this improved methodology to our 2019 figures, resulting in more accurate figures of commuting-related emissions. The revised 2019 figures are presented in Table 1 in Section 5.3.1.3 - Commuting.

5. INPUTS

The three main areas or scopes in which our company's actions emission GHGs are from Direct action (Scope 1), Indirect action (Scope 2) and emission by others in providing our company with the tools we need to operate (Scope 3). Each of these scopes have been broken down, measured, evaluated and presented in the following pages.

5.1. Scope 1 – Direct Emissions

Direct GHG emissions (Scope 1) stem from sources owned or controlled by the company, such as gas boilers, air conditioning, and company vehicles. For GARLAND this is our gas boiler which provides heat for the office. GARLAND owns and operates one electric vehicle. As this has no direct mobile combustion emissions, it does not affect the emission under Scope 1.

Only one of GARLAND's offices contributes to Scope 1, as it uses a gas boiler. The other two offices rely on electricity for their heating, which falls under Scope 2 (indirect emissions from electricity production).

Air conditioning in two of the offices is landlord-controlled, so GARLAND has no access to servicing records or refrigerant supplies. The Limerick office has no air conditioning, so it is not included in Scope 1.

GARLAND has updated all gas emission figures from 2019 to 2024 after discovering significant inaccuracies in estimated meter readings. To ensure accurate reporting, GARLAND has now recalculated emissions using only actual meter readings. This adjustment provides a more precise reflection of gas usage, particularly for the head office.

$$Activity\ data\ (e.g.\ kWh)\ x\ Emissions\ Factor\ (kg\ of\ CO2e\ per\ kWh) = kg\ of\ CO2e$$

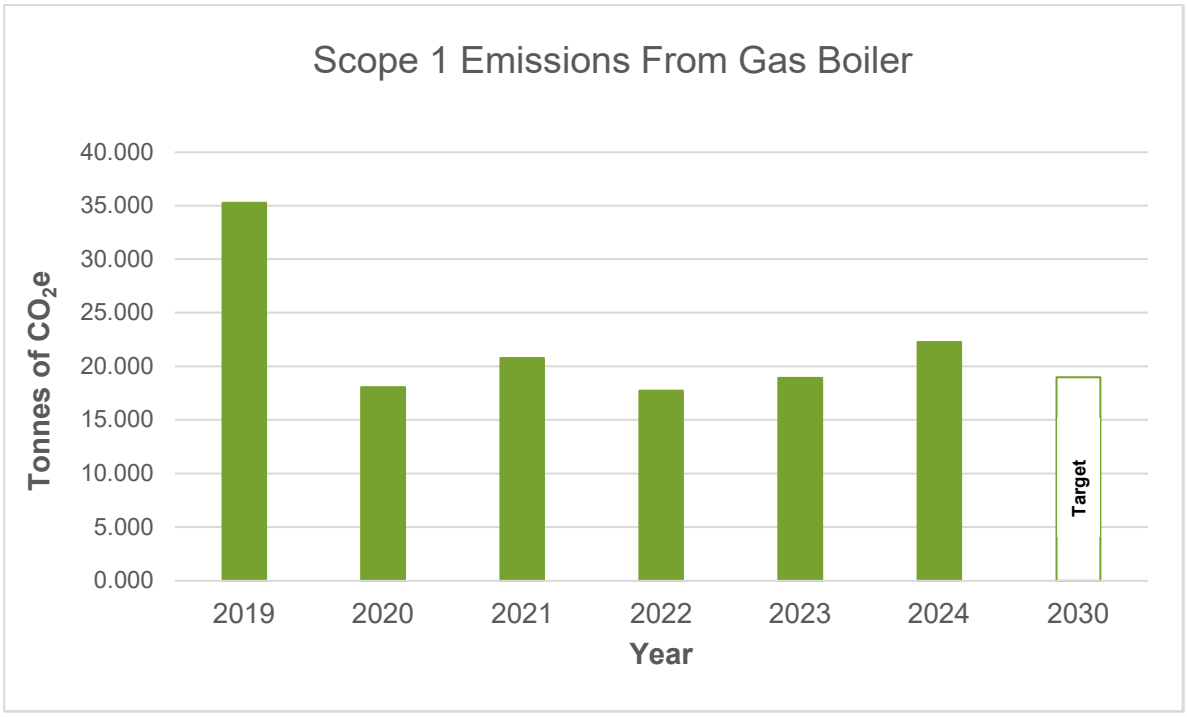

Figure 3 Scope 1 Emission Gas Boiler

5.2. Scope 2 – Indirect Emissions

In this scope, the indirect GHG emissions from the generation of purchased electricity consumed by the company is quantified.

There are two methods to work out the CO_2 emissions: either the location-based or the market-based method. Location-based utilises the average emissions intensity of grids on which energy consumption occurs, while market-based looks at the emissions from the specific electricity sources which are purchased.

With the Location-based method, emissions can generally only be reduced through reducing the amount of electricity GARLAND uses. On the other hand, with the market-based approach, emissions can be reduced through switching to a lower emissions energy provider and by reducing electricity consumption.

As there is a large variation in level of emissions from different electricity providers in Ireland, GARLAND chose to follow the market-based method.

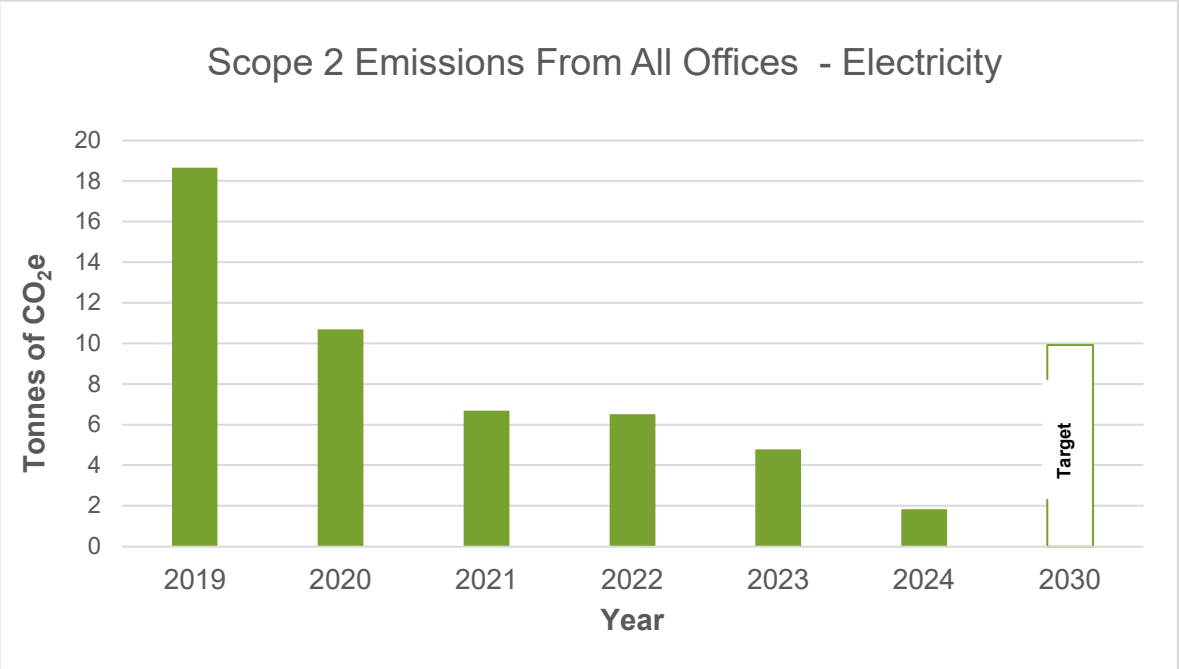

Figure 4 Scope 2 Emissions from All Offices - Electricity

Emissions dropped significantly from 2019 to 2020, driven by lower emission factors from Electric Ireland, the Covid-19 pandemic, causing reduced electricity consumption across all three offices. Further declines in 2021 and 2022 resulted from two offices switching to a renewable electricity provider, reducing their emissions to 0g CO2. The final office partially transitioned in Q2 2023, with ongoing discussions for the final office space to complete the switch and bring GARLAND's electrical emissions to zero.

Additionally, all GARLAND offices replaced fluorescent bulbs with energy-efficient LEDs, in line with an EU directive to phase out fluorescent lighting. This upgrade was funded through Energia's Lighting Efficiency Scheme and is being repaid via standard monthly billing.

5.3. Scope 3 - Business Activity Emission

All other significant indirect GHG emissions that occur as a consequence of GARLAND activities, but that are from sources not owned or controlled by the company (e.g. business travel and commuting), include:

- Business Travel
- Commuting
- Homeworking (not relevant in 2019 but from March 2020 onwards)
- Purchased Goods & Services
- Transmission & Distribution (Market-Based Electricity)
- Waste
- Investments

5.3.1. Business Travel

5.3.1.1. Air travel

Air Business Travel emissions were calculated for all offices using the GHG Protocol travel calculator.

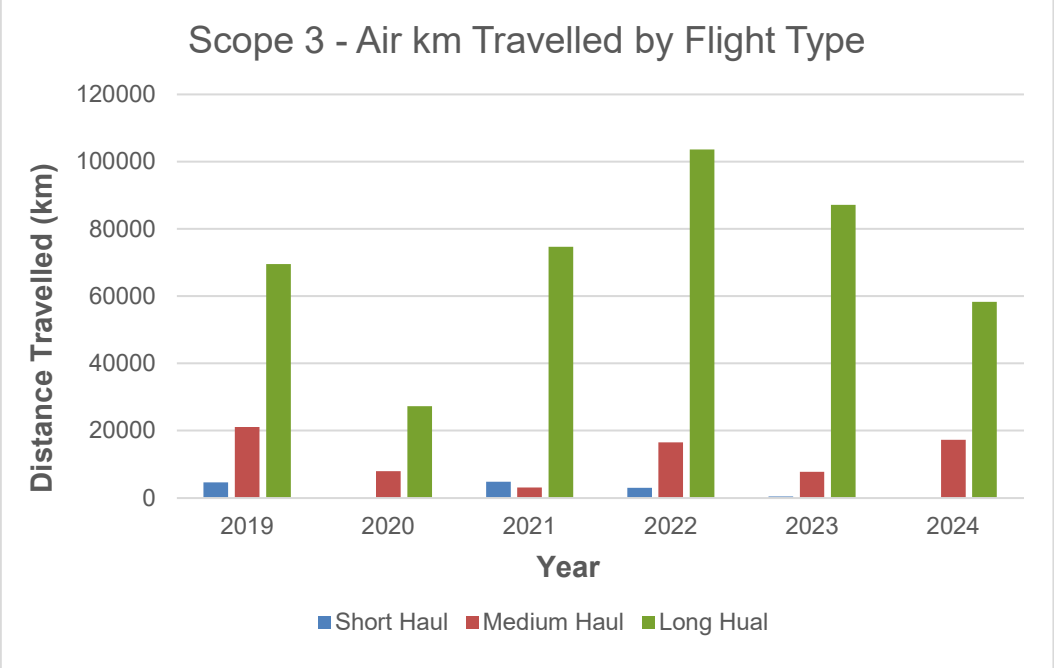

Figure 5 Air km Travelled by Distance Type

In 2024, there were no short-haul flights, and long-haul travel decreased significantly. The Environmental Team provided HR with an optimal connecting flight path for regular long-haul routes, which was followed multiple times to minimize carbon emissions.

While 2024 emissions are lower than pre-COVID-19 levels, international travel remains essential to GARLAND's business. To offset this, the company aims to reduce emissions in other areas.

5.3.1.2. Road travel

Claimed road mileage was also provided by our accounts team. This allowed us to calculate the emissions from employees travelling to sites and to business meetings. We used the GHG Protocol travel calculator.

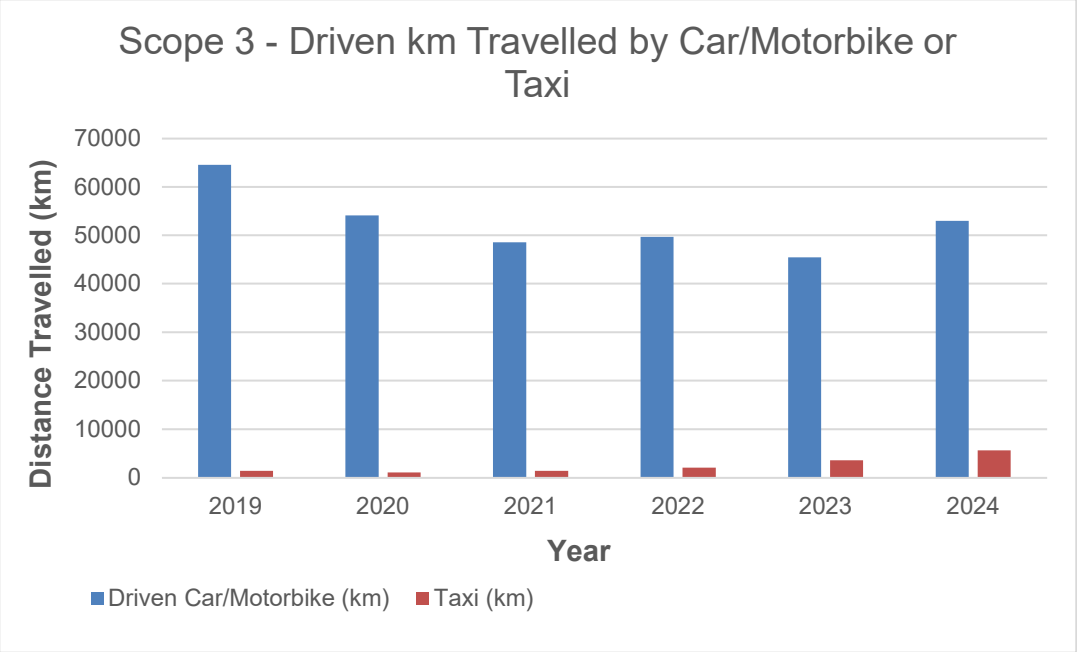

Figure 6 Scope 3 - Driven km Travelled by Car or Taxi

5.3.1.3. Commuting

This year a follow up survey was carried out to update the emissions of how the employees of GARLAND commuted to work in comparison to 2022 & 2019. The question was asked: “In 2024, how did you usually travel TO work?” Pick one only, for the longest part, by distance, of your usual journey to work.

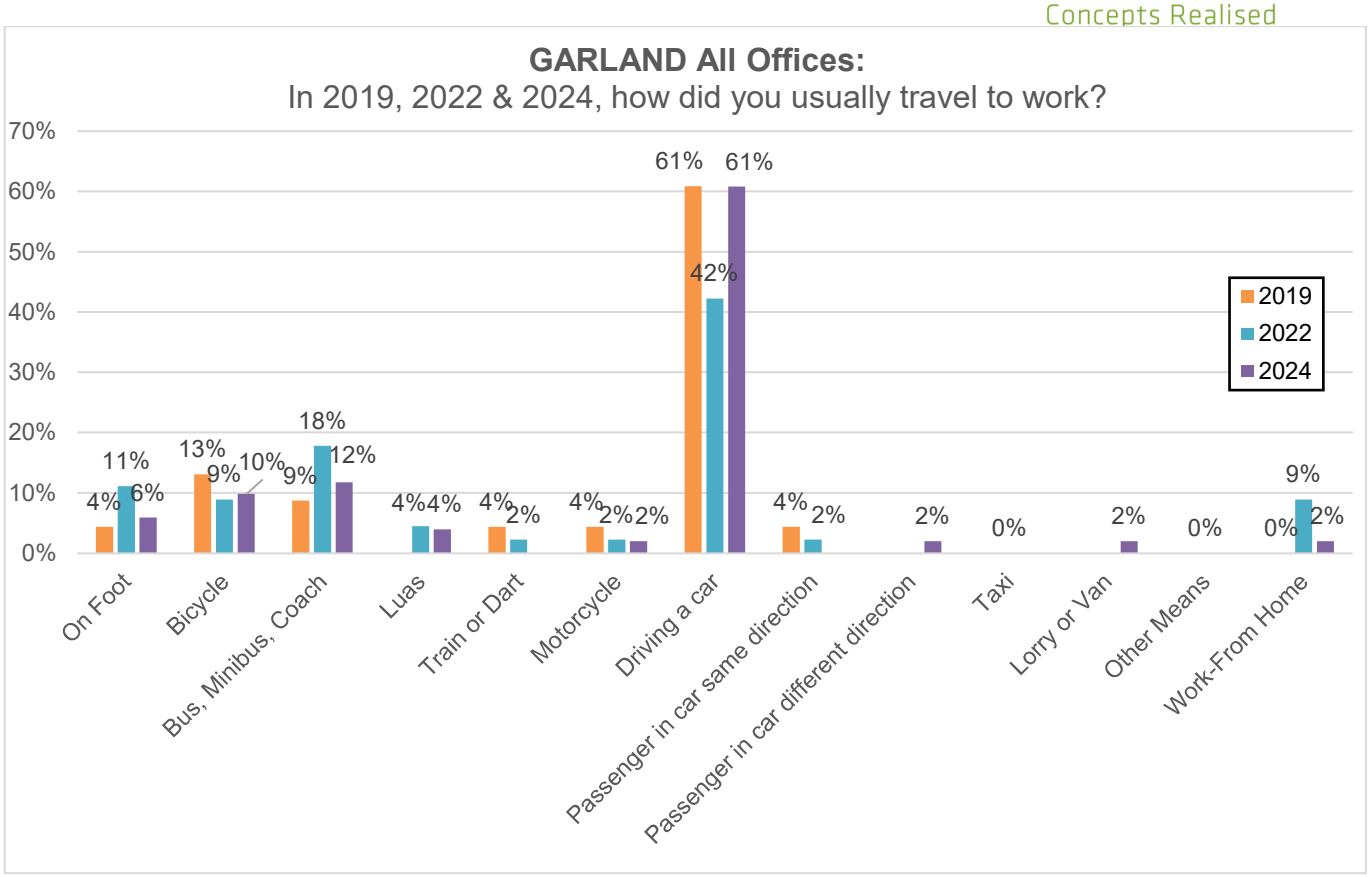

Figure 7: Scope 3 Commuting to the Office

Table 1: Scope 3 - Driving Car or taking the Bus 2019, 2022 & 2024

Year	Driven km Commuting		Tonnes of CO_2 by year
	Driving by Car (km)	Passenger on Bus, Minibus or Coach (km)	
2019	372,110	5,715	66.134
2022	147,965	4,536	26.533
2024	227,219	3,120	40.345

Driving remains the most common commuting method for GARLAND employees, followed by bus travel, with all other modes accounting for 10% or less of staff usage.

A follow-up study detailing journey time, distance, and reasons for transport choice will be published on the GARLAND website in Q1 2025.

Post-COVID-19, GARLAND implemented a hybrid work policy, allowing employees to work from home about two days a week. As seen in Table 1, approx. 40% reduction in commuting directly results in an equivalent decrease in carbon emissions. Since driving emits twice as much carbon as other transport modes, any reduction has an immediate impact on overall emissions. This will be discussed further in the follow-up study detail report.

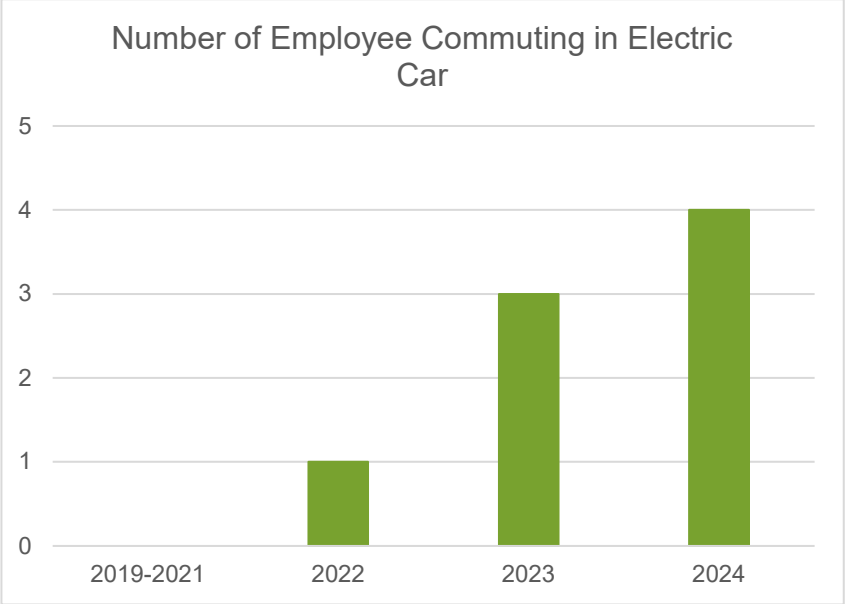

Figure 8 Number Employee Commuting by Electric Car

In Figure 8 above shows the number of employee commuting to the office by electric car. In computing our commuting emissions, electric cars have not been included. This has removed 12,100km of commuted kilometers driven and 2.1 ton of CO_2 emissions.

5.3.2. Homeworking

As mentioned above, homeworking was not relevant in 2019 but this became a GARLAND company policy in 2022. Through the company survey it was found that typically employees are working from home 2 to 3 days a week.

With updated figures from the 2024 employee survey and the GHG protocol average figures, a standard home work station requires 0.15kWh of electricity to power. This is multiplied by the number of days worked from home across the year and all employees. Total emission for all employee working from home equals 1.42 tCO_2 / year.

5.3.3. Purchased Goods & Services

In the office environment, the goods and services which are purchased are mostly office stationery, office cleaning and items for the communal kitchens. As of 2024 Garland has increase the range of categories which fall under this scope. The new categories added include: software licenses, server up grades and maintenance along with tech-support. Garland Has widened the scope for what falls under this category. Previously using the GHG protocol and the Quantis Scope 3 Evaluator Tool, the total spent on these in 2019 is an estimated €7,986 and the tonnes of CO2 emitted are 7.1t. For 2024, the increase in scope with a purchase value of €13,500 has resulted the CO2 emitted rising to 15.2t in total. This previous figure has remained constant since 2019 through to 2023, when adjusted for inflation.

5.3.4. Transmission & Distribution

This takes into account the amount of CO_2 emissions that occur while electricity is transmitted to our office. The World Bank provides the T/D loss rate in percentages for each country, Ireland's percentage is 8%.

The only way GARLAND can influence this figure is by reducing our electrical consumption.

$$\sum Electricity\ consumed\ (kWh) \times Electricity\ life\ cycle\ emission\ factor\ \left(kg\frac{CO_2e}{kWh}\right) \times TD\ loss\ rate\ (\%)$$

Following the formula above, this works out to be:

86,071kWh X 332.0 g$\frac{CO2e}{kWh}$ X 8% = 2.286 tonnes of CO_2 for all the offices in 2024.

Table 2 Transmission & Distribution

Year	Transmission & Distribution Tonnes of CO_2 by year
2019	3.095
2020	2.812
2021	2.026
2022	2.231
2023	2.283
2024	2.286

5.3.5. Waste

From previously using the GHG protocol and the Quantis Scope 3 Evaluator Tool, the total spent on this for 2019 was €1,412 and the tonnes of CO_2 emitted were 2.566t.

There has been no change in the number of bins collected across the 3 GARLAND offices since 2019, which shows the amount of waste has remained constant. In all 3 offices waste is communal across all tenants in the building and its cost is part of each building's lease contract. This does limit the power GARLAND has over reduced the total waste produced and any reduction coming through in the cost of disposal.

Table 3 Waste Management Emission

Year	Tonnes of CO_2 by year
2019	2.566
2020	2.566
2021	2.566
2022	2.566
2023	2.566
2024	2.566

5.3.6. Investments

There are no investments in which GARLAND are involved with presently.

6. OUTPUTS

The following table (Table 4) shows the summary of the output from Scopes 1, 2 and 3. This is shown in the following section graphically compared to the target figures.

OUTPUT	Source	Baseline year 2019 (tCO_2e)	2020 (tCO_2e)	2021 (tCO_2e)	2022 (tCO_2e)	2023 (tCO_2e)	2024 (tCO_2e)
Scope 1	Gas, oil, biomass	35.267	18.057	20.773	17.718	18.914	22.261
	HFC & CFC	0	0	0	0	0	0
	Company-owned fleet	0	0	0	0	0	0
Scope 2	Electricity (location-based)	n/a	n/a	n/a	n/a	n/a	n/a
	Electricity (market-based)	18.46	10.69	6.68	6.51	4.78	1.83
	Heating (if any)	n/a	n/a	n/a	n/a	n/a	n/a
	Cooling (if any)	n/a	n/a	n/a	n/a	n/a	n/a
Scope 3	Business Travel	29.154	17.64	24.59	44.62	16.46	16.42
	Commuting	66.134	5.10	5.10	26.553	26.533	40.35
	Homeworking	-	-	-	1.392	1.392	1.42
	Purchased Good & Services	7.1	7.1	7.1	7.1	7.1	15.2
	Transmission & Distribution Losses	3.095	2.812	2.026	2.231	2.283	2.286
	Waste Generated in Operations	2.566	2.566	2.566	2.566	2.566	2.566
	Investments	n/a	n/a	n/a	n/a	n/a	n/a
Total	**(using electricity emission of location-based method)**	**153.967**	**63.188**	**67.392**	**108.092**	**71.014**	**101.255**

Table 4 GARLAND Carbon Footprint

7. TARGET

7.1. Scope 1 & 2

All new signatories to the Pledge to Net Zero challenge from October 2021 must aim for a 1.5°C trajectory – this implies a 4.2% annual linear reduction in Scope 1 and 2 emissions over the target period.

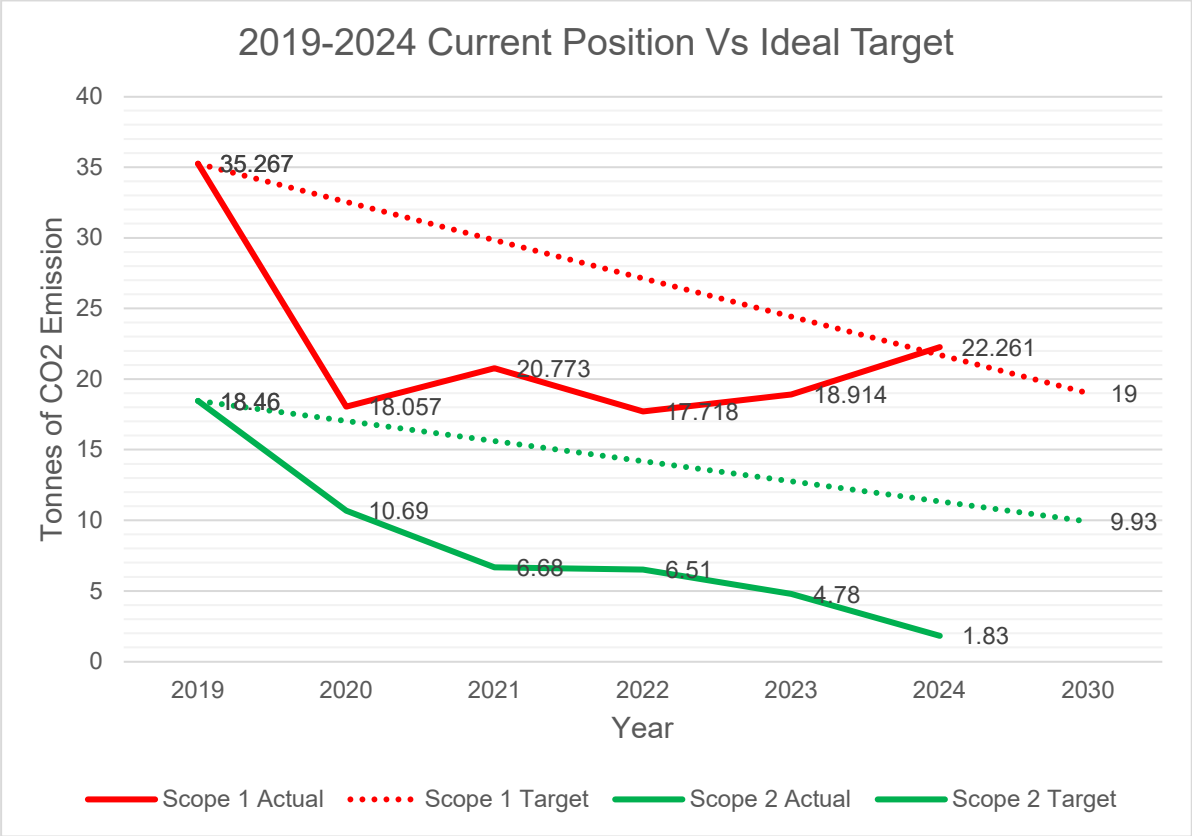

Figure 9 GARLAND - Net Zero – Current Position Target Levels

The dashed line in the graph represents the target and the ideal linear decrease in emissions, while the solid line reflects GARLAND's current position.

Scope 1 (Gas emissions – red line): GARLAND has updated all gas emission figures from 2019 to 2024 after discovering significant inaccuracies in estimated meter readings. To ensure accurate reporting, GARLAND has now recalculated emissions using only actual meter readings. This adjustment provides a more precise reflection of gas usage, particularly for the head office.

Scope 2 (Electricity emissions – green line): Emissions have dropped significantly below the 2030 target, thanks to switching to a renewable energy provider. The only exception is the 2nd floor of the Dublin office, which remains under the landlord's control. Directors are in discussions with the landlord to transition this space to a renewable provider. GARLAND has currently met its 2030 targets for Scope 2.

7.2. Scope 3

All signatories must aim for a trajectory at least well below 2°C – this implies a minimum 2.5% annual linear reduction. It is encouraged for signatories to pursue greater Scope 3 ambition with targets which are consistent with a 1.5°C trajectory (4.2% linear reduction).

The total Scope 3 emission for 2024 was 78.242 tCO2e. This is 72% of out 2019 which is tracking below the 2025 requirement of a 87.5% reduction. The figure of 72% matches our required 2030 target.

8. WORKS COMPLETED

Since 2019 the following tasks have been completed to help reduce our emissions as a company:

- Calculated in greater depth and accuracy Scope 3 emissions such as commuting since 2019.
- New gas boiler has been installed in the only GARLAND Office which is heated by gas.
- New insulation has been installed in the least thermal efficient office, resulting a low heating emission in part.
- Changed all the lightbulbs in all the GARLAND offices to LED low energy fittings.
- Removed one of the un-used hot water devices in a communal kitchen (i.e. kettle + hot water on demand over sink).
- Switched to a renewable energy provider for all offices. (one portion of an office is the exemption)
- Encouraged staff to use ECO option for FREENOW Taxi app. Use electric or hybrid taxis as a preferred option over petrol or diesel.
- Reduce road mileage by arranging site visits to multiple sites which are in the same vicinity of each other, where feasible. On-going
- Introduced GoCar as a substitute to employees driving their personal cars for business travel such as to and from site.
- The ongoing reduction in printing of documents & drawings and the use digital mark-up software instead.

9. NEXT STEPS

In this year 2025 our goals are:

- Conclude a detailed commuting report, outlining current trends and reduction strategies, will be published in Q1 2025 and commence the implementation of the required actions from this report with the main aim of reducing commuting by private car
- Add a section to our internal monthly newsletter which discusses environmental advice & tips to reduce electricity usage and reduce waste.
- Bring in new guidance and education to reduce electricity usage around staff's workstations, i.e. enable auto screen turn-off while idle, put computer to sleep when at lunch, turn off in the evenings.
- Introduce a bicycle mileage claim for site visits, subject to safety and time considerations.
- Promote the Cycle-to-Work scheme.
- Investigate upgrades to the heating system in the Limerick office to improve efficiency.
- Identify further strategies to reduce our Scope 1,2 & 3 emissions. For example:
    - More signage to show what materials are allowed in the Green / Black bins.
    - Reduce travelling to meetings and use video conferencing instead, such as Microsoft Teams – ongoing.
    - Create an environmental policy to ensure all employees are aware of their carbon emission and outline what they can do to reduce it through their daily activity while working for GARLAND.

10. USEFUL LINKS USED

- https://ghgprotocol.org/calculation-tools#cross_sector_tools_id
- https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/
- https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf
- https://www.pledgetonetzero.org/guidance

Signed: Ronan O'Mahony
RONAN O'MAHONY
SENIOR STRUCTURAL ENGINEER

Date: 6 June 2025

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