


ACEI – PLEDGE TO NET ZERO

Update from 2019 Baseline Figures up to 2023

February 2024

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

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.

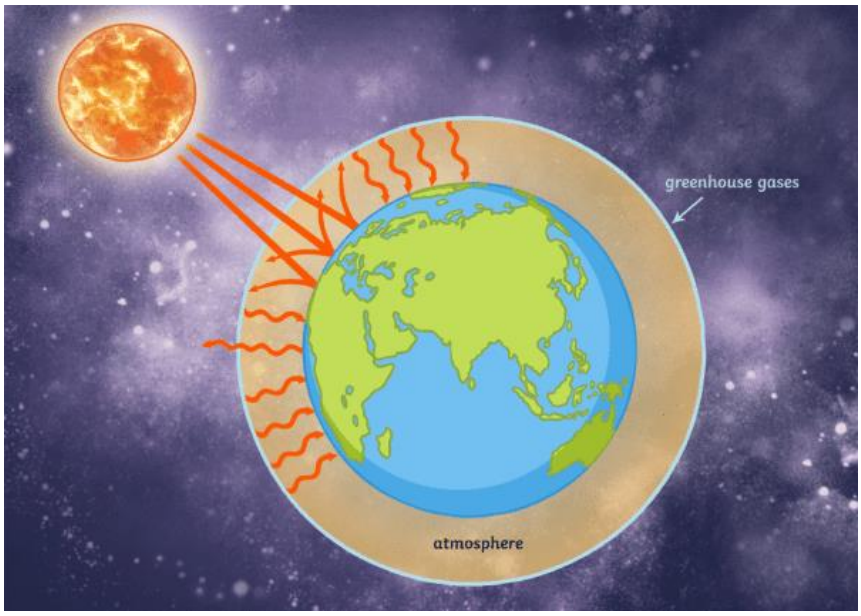

Figure 1 How GHG Warm Earth (twinkl.ie)

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.

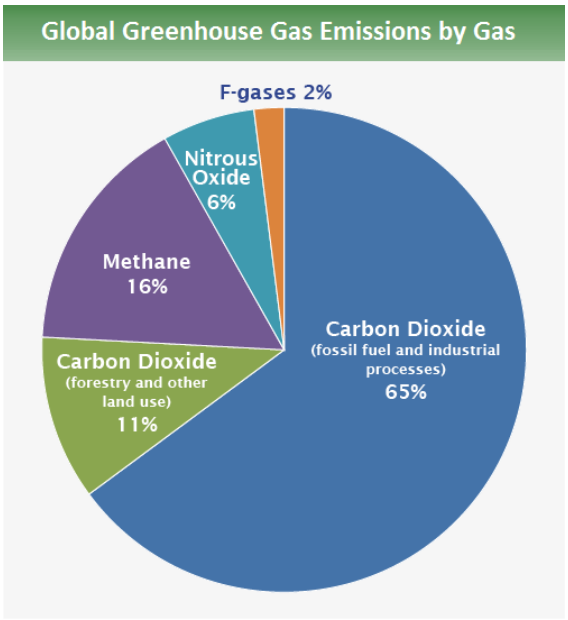

Figure 2 (Epa.gov)

2. NET ZERO PLEDGE

The Intergovernmental Panel on Climate Change is the UN body for assessing the science related to climate change. The IPCC has published a special report on the impacts of global warming of 1.5°C above pre-industrial revolution levels and related global GHG emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

A 1.5-degree (Celsius) scenario refers to a climate scenario that describes the projected rise in global temperatures since pre-industrial levels, qualified by a given timeframe, such as by the year 2050. To keep global temperature rise to less than 1.5°C above the pre-industrial average, GHG emissions need to reach net zero by 2050.

As such, ACEI is advocating that all member firms must commit to achieving operational Net Zero GHG emissions by 2030. The target date has been moved forward as the ACEI wishes to lead by example so other companies in our industry can follow us. As engineers we must practice what we preach.

There are three main areas or scopes in which our company's actions emission GHGs. Each scope is related to direct emission, indirect emission and emission by others in providing our company with the tools we need to operate.

2019 has been chosen by the ACEI as this was the most recent "normal year" before the Covid-19 pandemic. This year has been established as the base year to be used for our comparison to measure our progression to Net Zero, year on year. 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. 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.

4.1. Scope 1 – Direct Emissions

Direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc. For GARLAND this is simply our gas boilers and air conditioning. Air-conditioning is outside the control of GARLAND and is under our respective landlord's control. Therefore, GARLAND does not have access to any servicing records or the supply of necessary refrigerants needed for the unit's operation. Another area which contributes to direct emissions is owning or leasing company cars or vehicles. GARLAND owns and operates one electric vehicle. As this has no direct mobile combustion emissions, it does not affect the emission under this scope.

From each monthly bill the volume of gas used is equated to the power kilo-Watt-hour (kWh).

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

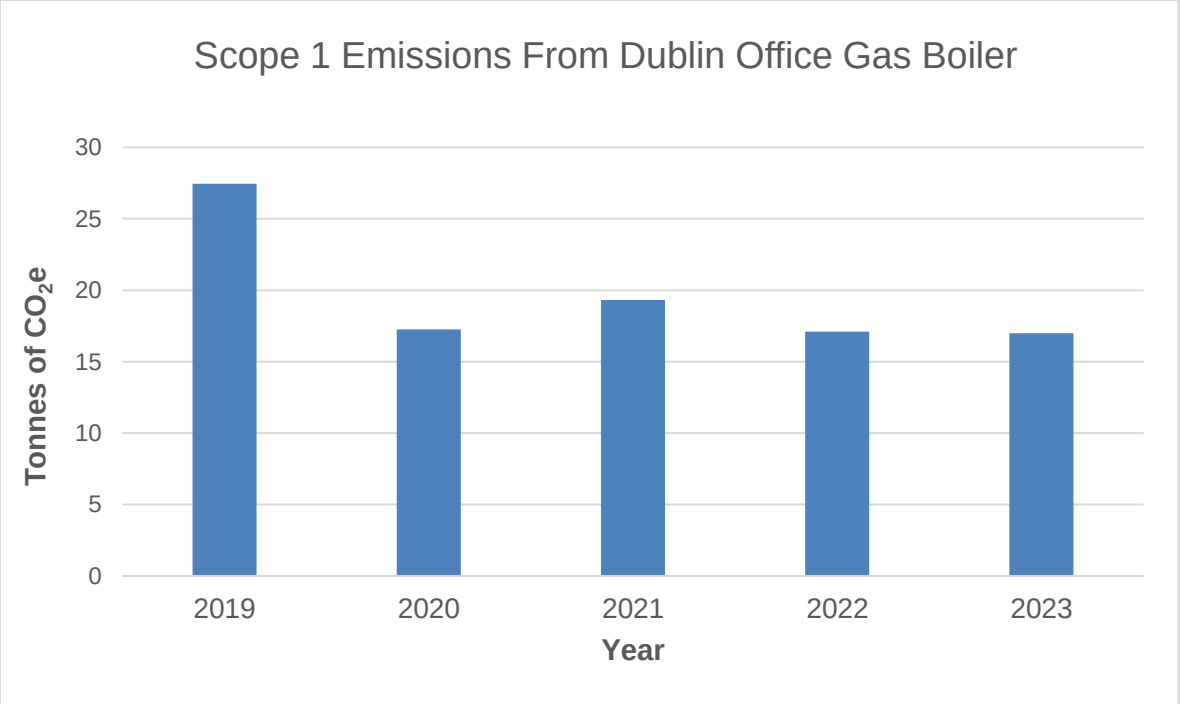

Figure 3 Scope 1 Emission Dublin Office Gas Boiler

4.2. 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.

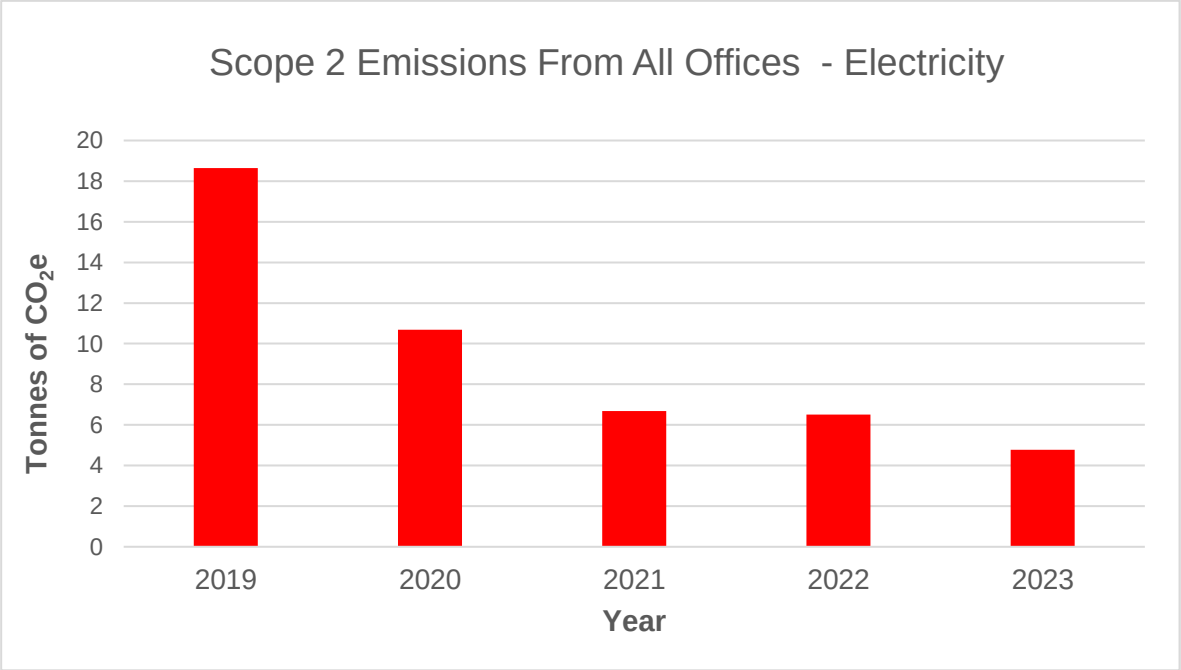

Figure 4 Scope 2 Emissions from All Offices - Electricity

As can be seen, there has been a dramatic decrease in emissions from 2019 to 2020. This is partly due to the decrease in emission factors from Electric Ireland's electricity production, the Covid-19 pandemic and the reduction in electricity consumption across all 3 offices. Further decrease in emissions occurred in 2021 & 2022 due to the 2 out of 3 offices switching to a renewable electricity provider. As this produces all its electricity from renewable source and therefore the emission for both spaces are 0g of CO_2.

The one remaining office switched a renewable energy provider during Q3 2023. The first Q1 & Q2 of the year have some emissions while after the switch emissions are 0g of CO_2.

All of the GARLAND offices have replaced the old fluorescent bulbs to low energy demand LED bulbs. This was done due to an EU directive to phase out all fluorescent lighting. Utilising the

Lighting Efficiency Scheme from Energia, GARLAND was granted funding for the works and repay Energia as part of the standard monthly billing.

4.3. 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

4.4. Business Travel

4.4.1. Air travel

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

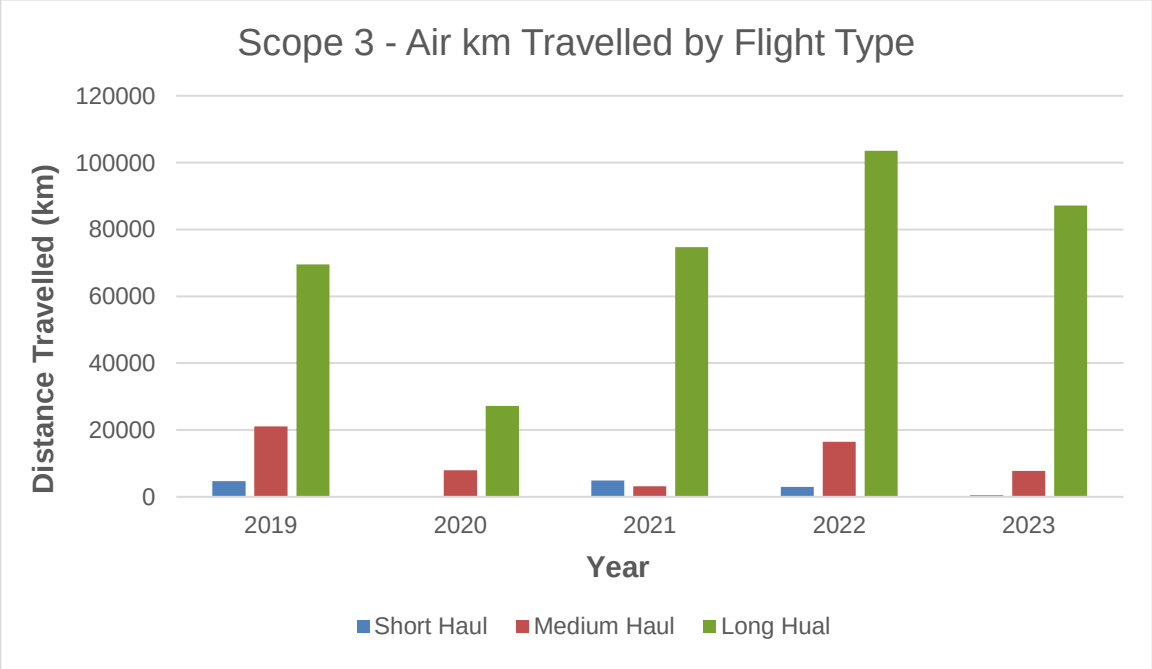

Figure 5 Air km Travelled by Distance Type

As can be seen, the short and medium haul flights have decreased dramatically in 2023. They were lower this year than pre-Covid-19 figures. International travel is part of the GARLAND business model and will be difficult to reduce to zero. Therefore, it is proposed to compensate this by reducing our emissions in other aspects of our business.

4.4.2. 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.

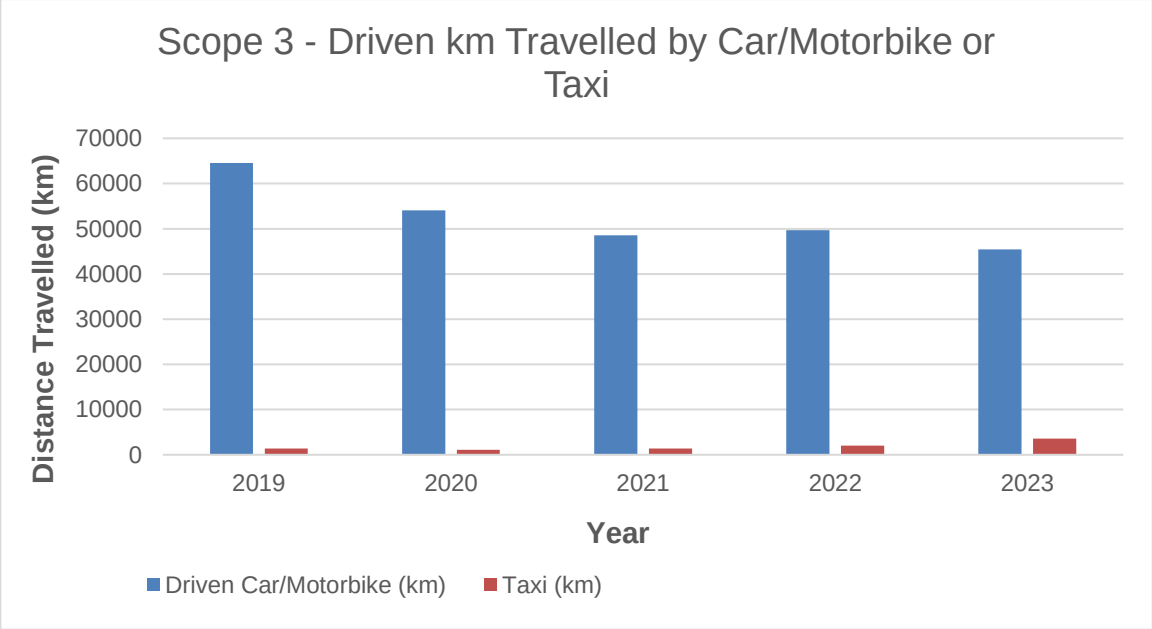

Figure 6 Scope 3 - Driven km Travelled by Car or Taxi

4.5. Commuting

This year a survey was carried out to establish the emission of how the employees of GARLAND commuted to work in 2019 (baseline) and compared to 2022. The question was asked: "*In 2019, how did you usually travel TO work?"* Pick one only, for the longest part, by distance, of your usual journey to work.

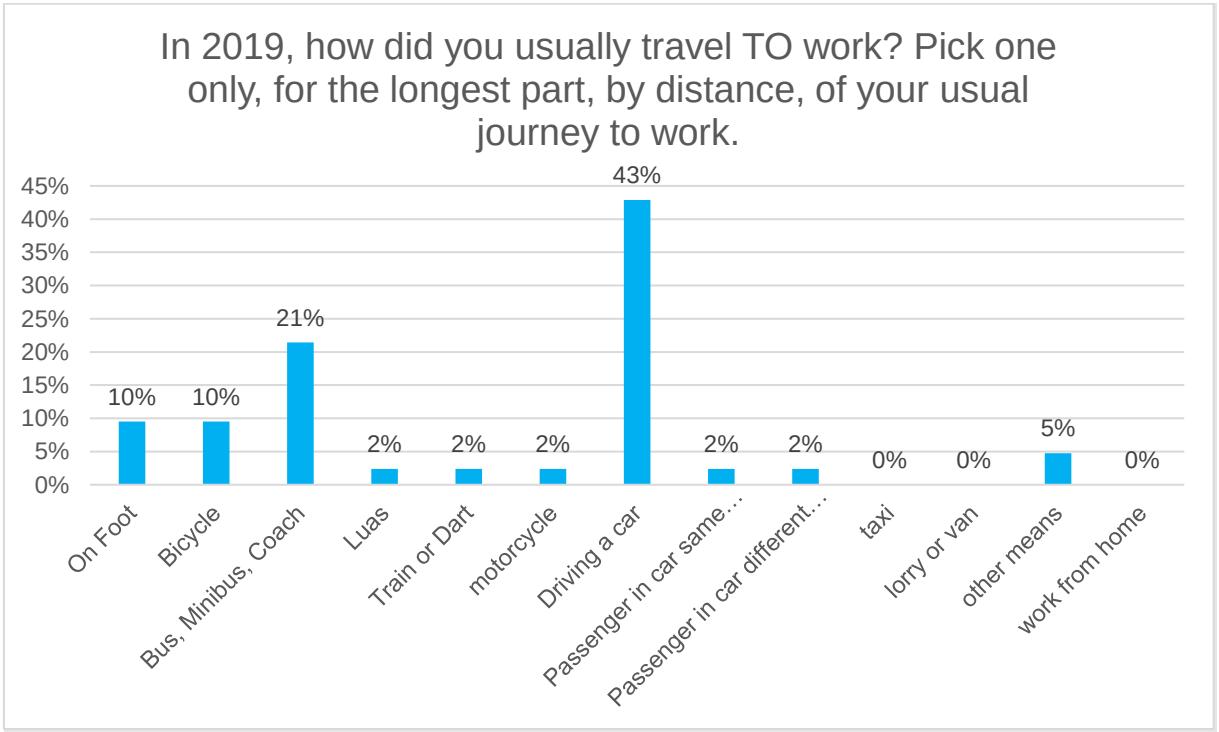

Figure 7: Scope 3 Commuting to the Office

As can be clearly seen, driving a car to work is the most popular option for GARLAND employees to commute to the office, followed by taking the bus. All other methods of transport are only 10% of staff usage or less.

There is a further breakdown on journey time and distance, reason for chosen method, in a follow-up piece of research which will be published on the GARLAND website Q1 2024.

GARLAND introduced a formal hybrid working policy following the Covid-19 pandemic, allowing employees to work from home a number of days a week. Employees typically work 2 days at home. It is clear that a 40% reduction in commuting equals a 40% decrease in carbon emissions. As driving a car to the office emits twice the amount of carbon than any other mode of transport, any reduction here would be immediately reflected in GARLAND overall emission.

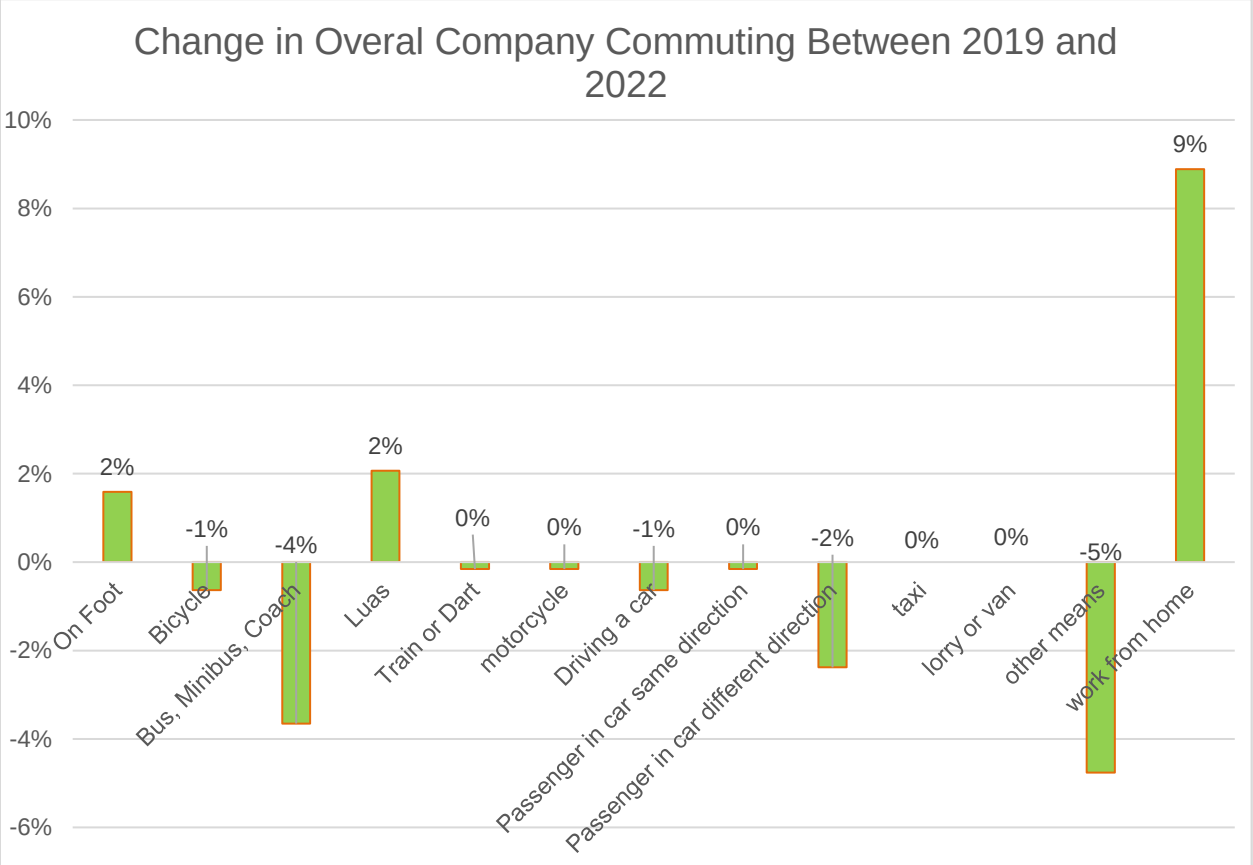

Figure 8: Scope 3 - Commuting Trends 2019 Compared to 2022

When comparing the chosen mode of transport for commuting in 2019 to 2022, there are only slight differences. Driving a car to the office is still the preferred method. However, more employees now work from home part-time.

4.6. Homeworking

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

Using figures from the GHG protocol website, a standard home work station requires 0.15kWh of electricity to power. Total emission for all employee working from home equals 1.392 tCO_2 / year.

4.7. Purchased Goods & Services

In the office environment, the goods and services which are purchased are mostly office supplies and items for the communal kitchens. From 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 CO_2 emitted are 7.1t.

This figure has remained constant since 2019. With the removal of the Scope 3 Evaluator tool, further reviews and calculations are required to potentially broaden the boundary to carry out more detail calculations on purchased goods & services.

4.8. 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%.

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

Following the formula above, this works out to be:

85,942kWh X 332.0 $g\frac{CO_2e}{kWh}$ X 8% = 2.283 tonnes of CO_2 for all the offices in 2022.

Table 1 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

4.9. Waste

From previously using the GHG protocol and the Quantis Scope 3 Evaluator Tool, the total spent on waste for 2019 gave the tonnes of CO_2 emitted as 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. This does limit the power GARLAND has over reducing the total waste produced and any reduction coming through in the cost of disposal.

Table 2 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

4.10. Investments

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

5. OUTPUTS

The following table (Table 3) 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)
Scope 1	**Gas, oil, biomass**	27.458	17.28	19.33	17.12	17.00
	HFC & CFC	0	0	0	0	0
	Company-owned fleet	n/a	n/a	n/a	n/a	n/a
Scope 2	**Electricity (location-based)**	n/a	n/a	n/a	n/a	n/a
	Electricity (market-based)	18.46	10.69	6.68	6.51	4.78
	Heating (if any)	n/a	n/a	n/a	n/a	n/a
	Cooling (if any)	n/a	n/a	n/a	n/a	n/a
Scope 3	**Business Travel**	29.154	17.64	24.59	44.62	16.46
	Commuting	25.10	5.10	5.10	15.77	15.77
	Homeworking	0	-	-	1.392	1.392
	Purchased Good & Services	7.1	7.1	7.1	7.1	7.1
	Transmission & Distribution Losses	3.095	2.812	2.026	2.231	2.283
	Waste Generated in Operations	2.566	2.566	2.566	2.566	2.566
	Investments	n/a	n/a	n/a	n/a	n/a
Total	**(using electricity emission of location-based method)**	**113.34**	**60.622**	**67.392**	**97.309**	**67.345**

Table 3 GARLAND Carbon Footprint

6. TARGET

6.1. 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.

6.2. 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).

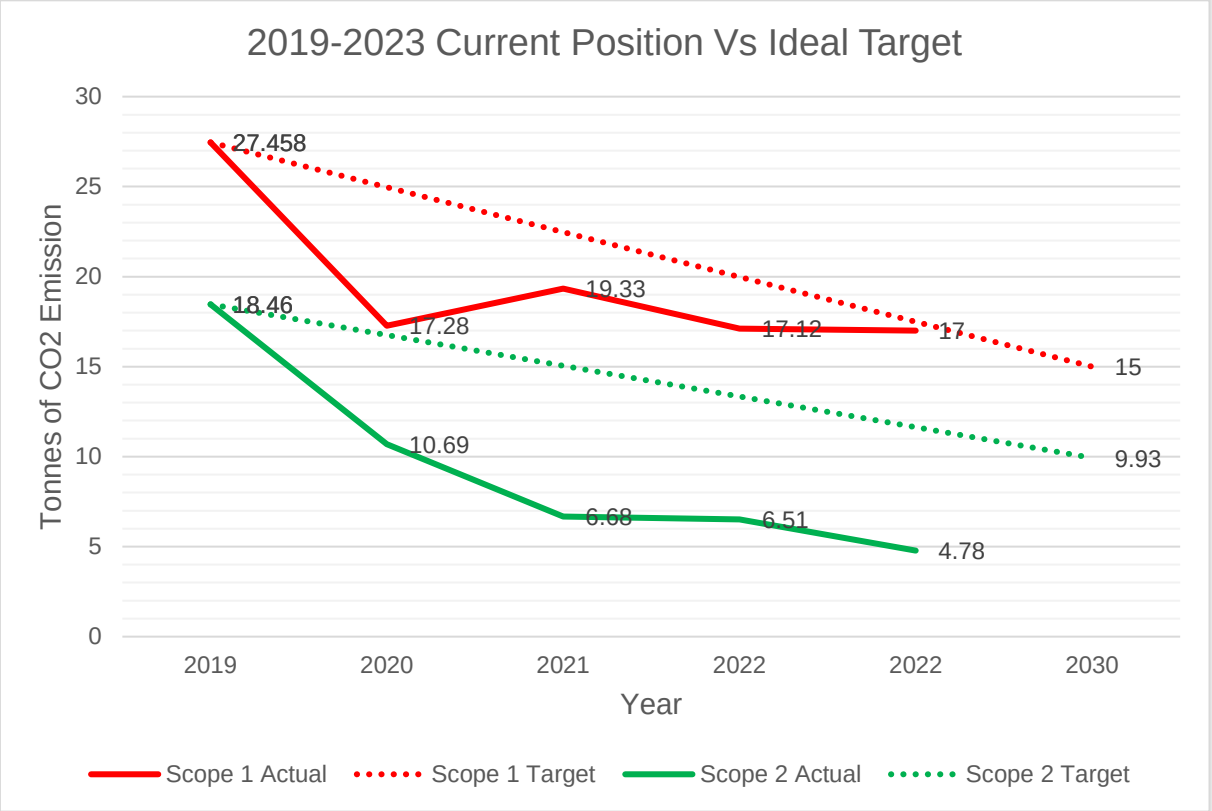

Figure 9 GARLAND - Net Zero – Current Position Target Levels

From the graph above, the dashed line represents the target and ideal linear decrease in emissions. The solid line shows our current position in relation to the target.

In Scope 1 (Gas emissions) are decreasing at an acceptable rate, while Scope 2 (electricity) emissions have dropped significantly below the target. This is due to the change in electricity providers to a renewable provider.

7. WORKS COMPLETED

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

- Calculated the remaining Scope 3 emissions such as homeworking & commuting and included these within our baseline year and current findings.
- New gas boiler has been installed in one of our offices.
- New insulation has been installed in the roof of one of our offices, increasing the thermal efficiency of the building.
- Changed the fittings within all GARLAND offices to LED low energy fittings.
- Switched to a renewable energy provider for the last remaining office in 2023.
- Encouraged staff to use ECO option for *TaxiNow* app. Use electric or hybrid taxis as a preferred option over petrol or diesel. On-going

8. NEXT STEPS

In this year 2024 our goals are:

- Propose to the landlords of all the three GARLAND Offices a solar panel installation offer.
- Bring in new policies 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.
- Reduce road mileage by arranging site visits to multiple sites which are in the same vicinity of each other, where feasible. On-going
- Consider Introducing a bicycle mileage claim for site visits, subject to safety and time constraints.
- Further promote the Cycle-to-Work scheme.
- Reduce printing of documents & drawings, use digital mark-up software.
- Investigate upgrades to the heating system within two GARLAND offices.
- Staff awareness CPD: Show how little things around the office can make a big difference to our overall emission levels.
- Identify 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.
    - 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.

9. 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: 19 February 2024

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