



ACEI – PLEDGE TO NET ZERO

Update to 2019 Baseline Figures to 2022

March 2023

GARLAND
Concepts Realised

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Description of change	Originator	Rev	Approval	Date
2022 Emissions Compared to Baseline Year 2019	ROM	1 st	KR	07/03/2023

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.

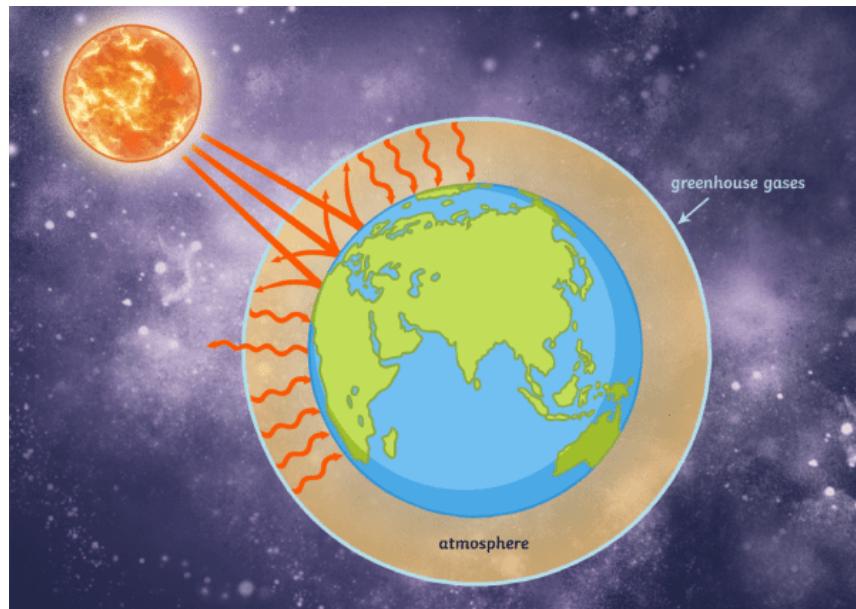


Figure 1 How GHG Warm Earth (twinkl.com)

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

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF₆)
- Nitrogen Trifluoride (NF₃)

As can be seen in Figure 2, CO₂ is the most common GHG. Therefore it is standard that the remaining gases are converted to their CO₂ 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 the 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.

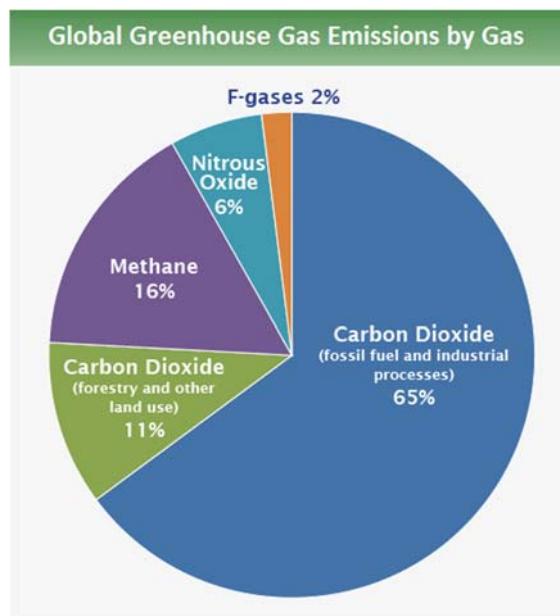


Figure 2 (Epa.gov)

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.

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 gas power air conditioning. Air-conditioning is outside the control of GARLAND and is under our respective landlord's control. Therefore, we do not have access to any servicing records or the supply of necessary refrigerants needed for the units operation. Another area which contributes to direct emissions is owning or leasing company cars or vehicles. GARLAND owns and operate 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).

$$\text{Activity data (e. g. kWh)} \times \text{Emissions Factor (kg of CO}_2\text{e per kWh)} = \text{kg of CO}_2\text{e}$$

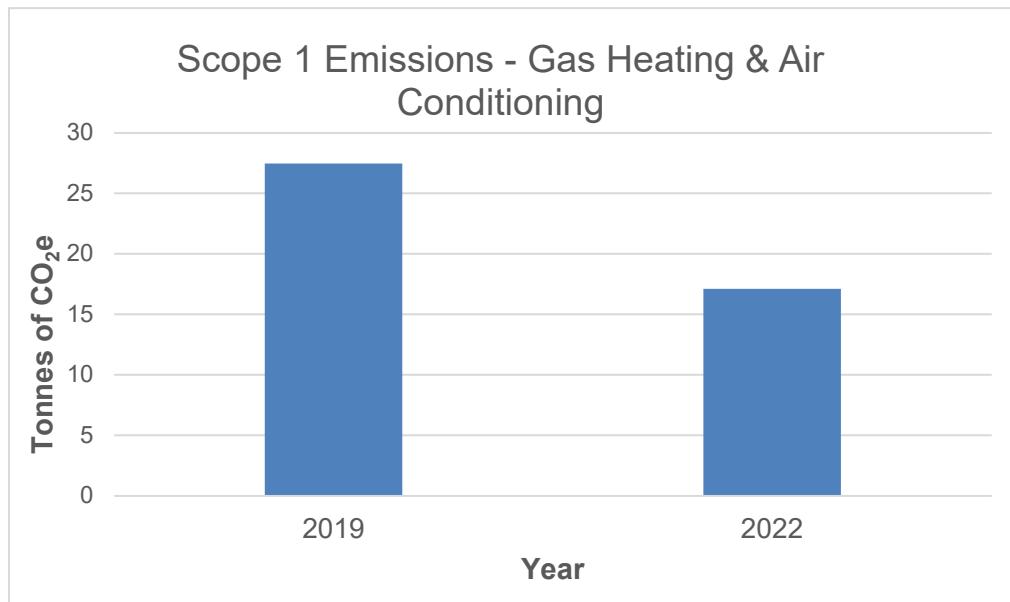


Figure 3 Scope 1 Emission Gas Boiler

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 CO₂ 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.

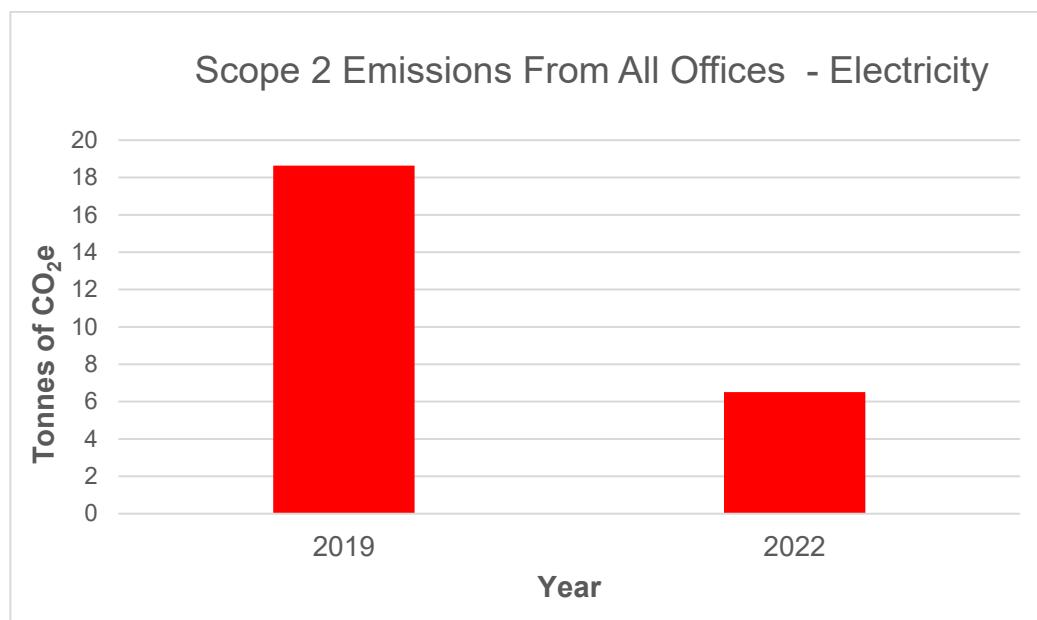


Figure 4 Scope 2 Emissions from All Offices – Electricity

As can be seen, there has been a dramatic decrease in emissions from 2019 to 2022. This is partly due to the Covid-19 pandemic and the reduction in electricity consumption across all 3 GARLAND offices. Further decrease in emissions have occurred since 2019 due to the 2 out of 3 offices switching electricity provider to a renewable provider. This provider produces all its electricity from renewable source and therefore the emission for both offices are 0g of CO₂.

One GARLAND office remains with a non-renewable sourced electricity provider and so some emissions are still produced.

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.

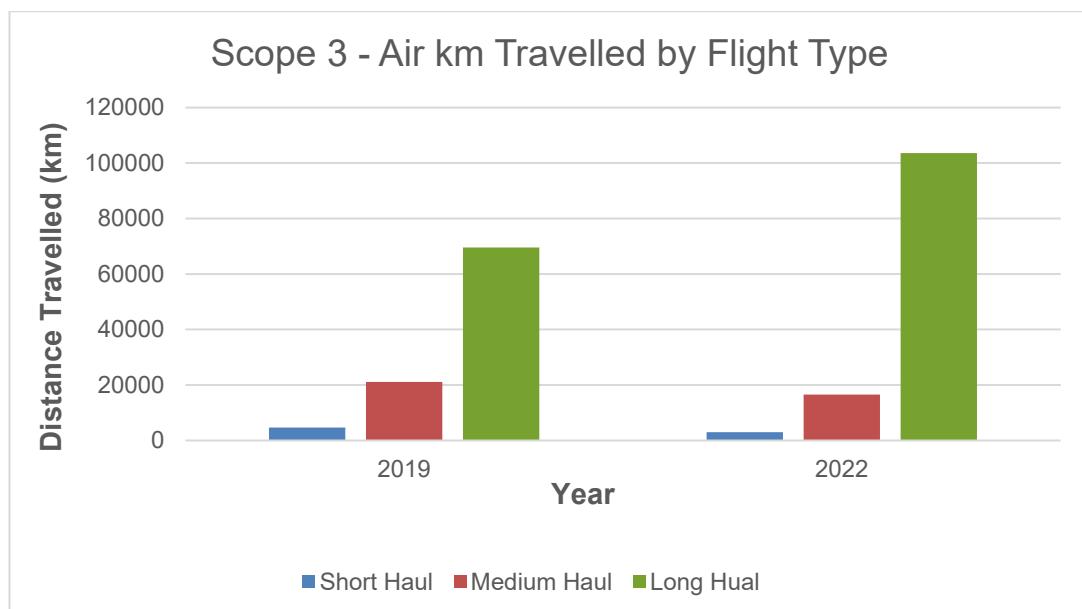


Figure 5 Air km Travelled by Flight Type

As can be seen, the short and medium haul flights have decreased. However, after Covid-19 travel restrictions were lifted in late 2021, international medium and long-haul flights increased beyond pre-pandemic figures. International travel is part of the GARLAND business model and will be difficult to reduce. 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.

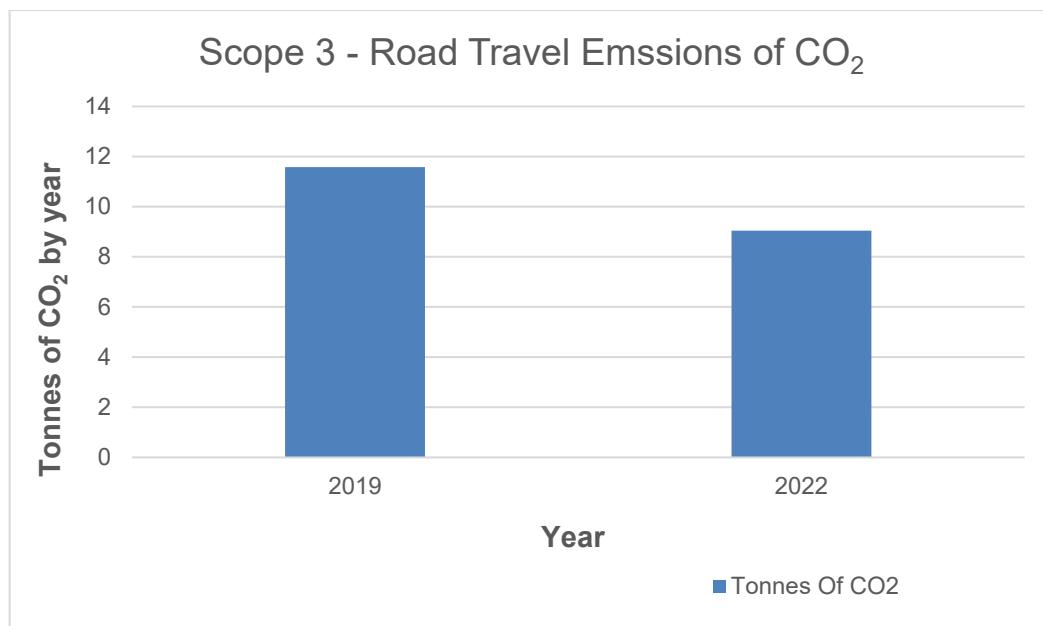


Figure 6 Scope 3 - Driven km Travelled by Car or Taxi

4.5. Commuting

This information is currently being gathered via a companywide anonymous survey. The figures will be analysed and the figures for 2022 will be included in the next update of this report.

4.6. Homeworking

As mentioned above it was not relevant in 2019 but this information is currently being gathered via a companywide anonymous survey. The figures will be analysed and the figures for 2022 will be included in the next update of this report.

4.7. Purchased Good & Services

In the office environment, the goods and services which are purchased are mostly office supplies and items for the communal kitchens. Using the GHG protocol and the Quantis Scope 3 Evaluator Tool, the tonnes of CO₂ emitted are 7.1t.

This figure has remained relatively constant since 2019.

4.8. Transmission & Distribution

This takes into account the amount of CO₂ 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%.

$$\sum \text{Electricity consumed (kWh)} \times \text{Electricity life cycle emission factor (kg CO}_2\text{e/kWh)} \times \text{TD loss rate (\%)}$$

Following the formula above, this works out to be:

For example, 2019:

$$119,204 \text{ kWh} \times 324.5 \text{ g CO}_2\text{e/kWh} \times 8\% = 3.095 \text{ tonnes of CO}_2 \text{ for all the offices.}$$

Year	Transmission & Distribution Tonnes of CO ₂ by year
2019	3.095
2022	2.231

Table 1 Transmission & Distribution

4.9. Waste

Using the GHG protocol and the Quantis Scope 3 Evaluator Tool, which uses cost to estimate carbon emissions give the result emissions shown in Table 2.

There has been no change in the number of bins collected across the 3 GARLAND offices since 2019, which demonstrates the amount of waste has remained constant. In all 3 offices waste is communal across all tenants in the wider building. This does limit the power GARLAND has over reducing the total waste produced and so reduces the results coming through in the cost of disposal.

Year	Tonnes of CO ₂ by year
2019	2.566
2022	2.566

Table 2 Waste Management Emission

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 ₂ e)	2022 (tCO ₂ e)	Percentage of Change
		2019	2022	
Scope 1	Gas, oil, biomass	27.458	17.12	-38%
	HFC & CFC	0	0	0%
	Company-owned fleet	n/a	n/a	n/a
<i>Total S1</i>				-38%
Scope 2	Electricity (location-based)	0	0	0%
	Electricity (market-based)	18.46	6.51	-65%
	Heating (if any)	n/a	n/a	n/a
	Cooling (if any)	n/a	n/a	n/a
<i>Total S2</i>				-65%
Scope 3	Business Travel	29.154	44.62	+53%
	Commuting	in progress	in progress	in progress
	Homeworking	n/a	in progress	in progress
	Purchased Good & Services	7.1	7.1	0%
	Transmission & Distribution Losses	3.095	2.231	-28%
	Waste Generated in Operations	2.566	2.566	0%
	Investments	0	0	
<i>Total S3</i>				+25%
Total	(using electricity emission of locations based method)	88.24	80.147	-9%

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).

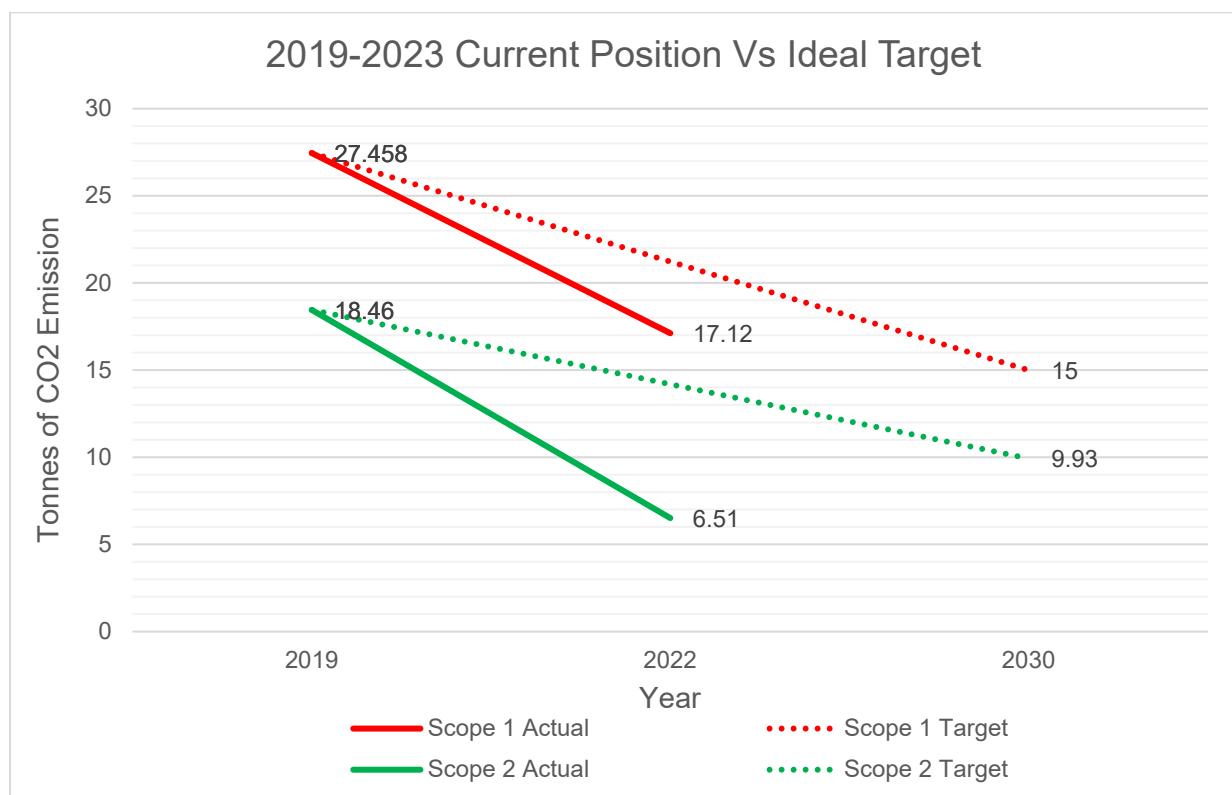


Figure 7 GARLAND - Net Zero – Current Position Target Levels

From the graph above (Figure 7), the dashed line represents the target or 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 provider to a renewable provider.

7. WORKS COMPLETED

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

- 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.
- New more efficient LED low energy light fittings have been installed in two out three of our offices.

8. NEXT STEPS

In this year, 2023, our goals are:

- Calculate the remaining Scope 3 emissions such as home-working & commuting to be included in our baseline year and current findings.
- Conclude the installation of the more efficient LED low energy light fittings in the third GARLAND Office.
- Propose a solar panel installation offer to the landlord of GARLAND's head office.
- 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 electricity consumption in the communal kitchens for all offices.
- Reduce road mileage by arrangement site visits to multiple sites which are in the same vicinity of each other, where feasible.
- Encourage staff to use ECO option for TaxiNow app. Use electric or hybrid taxis as a preferred option over petrol or diesel.
- Promote the Cycle-to-Work scheme.
- Reduce printing off documents & drawings, use digital mark-up software.
- Switch the final office to a renewable energy provider.
- Identify further strategies to reduce our Scope 1, 2 & 3 emissions. For example:
 - Staff awareness CPD: Show how little things around the office can make a big difference to our overall emission levels.
 - 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://quantis-suite.com/Scope-3-Evaluator/>
- 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.pledgetonzero.org/guidance>

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SENIOR STRUCTURAL ENGINEER

Date: 7 March 2023

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