Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Climate Action Roadmap 2023

NOVEMBER 2023

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CONTENTS

1. Introduction

Trinity College is located in the heart of Dublin's city centre and has a student population of over 20,000 per year as well as a workforce of approximately 3,500. The college was established in 1592 and is Ireland's oldest university with an international reputation for excellence in education and research. The university spans over 47 acres ranging from the main campus at College Green to St. James Hospital site as well as two large sports campuses in Santry and Crumlin. The university also offers residential accommodation and has over 1,500 places located in the historical College Green Campus and at Trinity Halls, Dartry.

Trinity College is also a site of historical significance and there are a number of protected structures as well as a protected monument on the College Green campus. The university is also a tourist destination with over 1.5million tourists visiting the College Green Campus per annum. The campus also caters for a diverse number of activities with 320 labs, lecture halls, libraries, offices, catering facilities and a large sports hall. The range of activities that take place in the university means that a multifaceted approach to tackling greenhouse gas emissions is required to meet the 51% emissions target by 2030.

Trinity College focuses on plans for reducing the total energy related emissions and fossil fuel related emissions from our operations, in line with the targets in the Climate Action Plan 2021 (CAP21), and SEAI/EPA guidance[1]. Although Trinity has the ambition to achieve the targets set by Government for Public Body Greenhouse Gas (GHG) emissions reductions, our ability to do so is severely constrained by resource availability and the age and condition of our infrastructure. Meeting these targets will require significant financial input and external assistance will be required. Future Climate Action Plans will respond to updated government level plans[2], reflect progress on campus infrastructural projects, and detail how the University could support large scale structural and cultural changes to mitigate and adapt to climate change, and become a nature positive university, where environmental sustainability is embedded across education, research and operations, through partnership, collaboration, engagement and innovation.

1 https://www.seai.ie/publications/Public_Sector_Bodies_Climate_Action_Roadmaps_Guidance.pdf
2 https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/

2. Our people

2.1 GOVERNANCE

Trinity is focused on strengthening the governance structure of the University to support climate and biodiversity action as well as broader sustainability aims. A new Principal Committee of Board has been established entitled the Environment and Sustainability Committee, this committee will be operational from December 2023. The committee will be supported by a Sustainability Management Group, which will drive the delivery of the new sustainability strategy and action plan.

Trinity's Green Campus Committee, established in the early 1990s, is still in operation and comprises staff and students. The committee is co-chaired by the Students Union Environment Officer and the Sustainability Manager and supports a partnership approach to environmental management and action. Members actively engage in changing behaviours for better environmental stewardship across key areas.

The University also has a Green Labs committee which has been operational since 2019. To date, five labs have been certified as My Green Labs and another twelve are in the process of accreditation. The aim is to have all 320 labs working to reduce their energy, water and waste footprint in line with our 2030 GHG targets. TCD is also an active member of the network of Irish Green Labs and also sits on the SEAI Public Sector Labs Working Group. The university's draft Sustainability Strategy has set out the following objectives and actions to support the progression of greening our labs:

OBJECTIVE 2.2 Enable research to be conducted in a way that reduces resource use and generates less waste.

- **2.2A** Implement the Green Labs Guidelines wherever possible (reducing use of water, energy and other consumables), minimising waste, purchasing from sustainable suppliers, and managing substances sustainably.
- **2.2B** Recruit Green Labs Officer to oversee the transition and certification, and aim for all labs to reach Green Lab status by 2025.
- **2.2C** Implement Green Labs procedures through the dissemination of information, training, recruitment and advice for staff and students. Work with the Technical Officers and Safety Officers to roll out Green Labs training as part of their course.
- **2.2D** Investigate the Green Labs Ambassador programme for incoming students.
- **2.2E** Instigate a Green Labs steering committee, with key aims and targets.

2.2 ESTABLISHMENT OF GREEN TEAMS

The Sustainability Management Group is the de-facto high-level 'Green Team'[3] in Trinity College, comprising a wide range of senior management, who oversee core implementation, academic and operational areas and are involved in delivery of the Climate Action Roadmap. These areas include: education, research, energy, waste, food, procurement, capital projects, finance, communications and human resources.

Prof. Jane Stout, VP for Biodiversity and Climate Action has been nominated as the Climate and Sustainability Champion for the university with responsibility for overseeing development and implementation of Trinity's Sustainability Strategy. She is also responsible for implementing and reporting on the Mandate across the entire University.

3 See Appendix 1 for a list of members

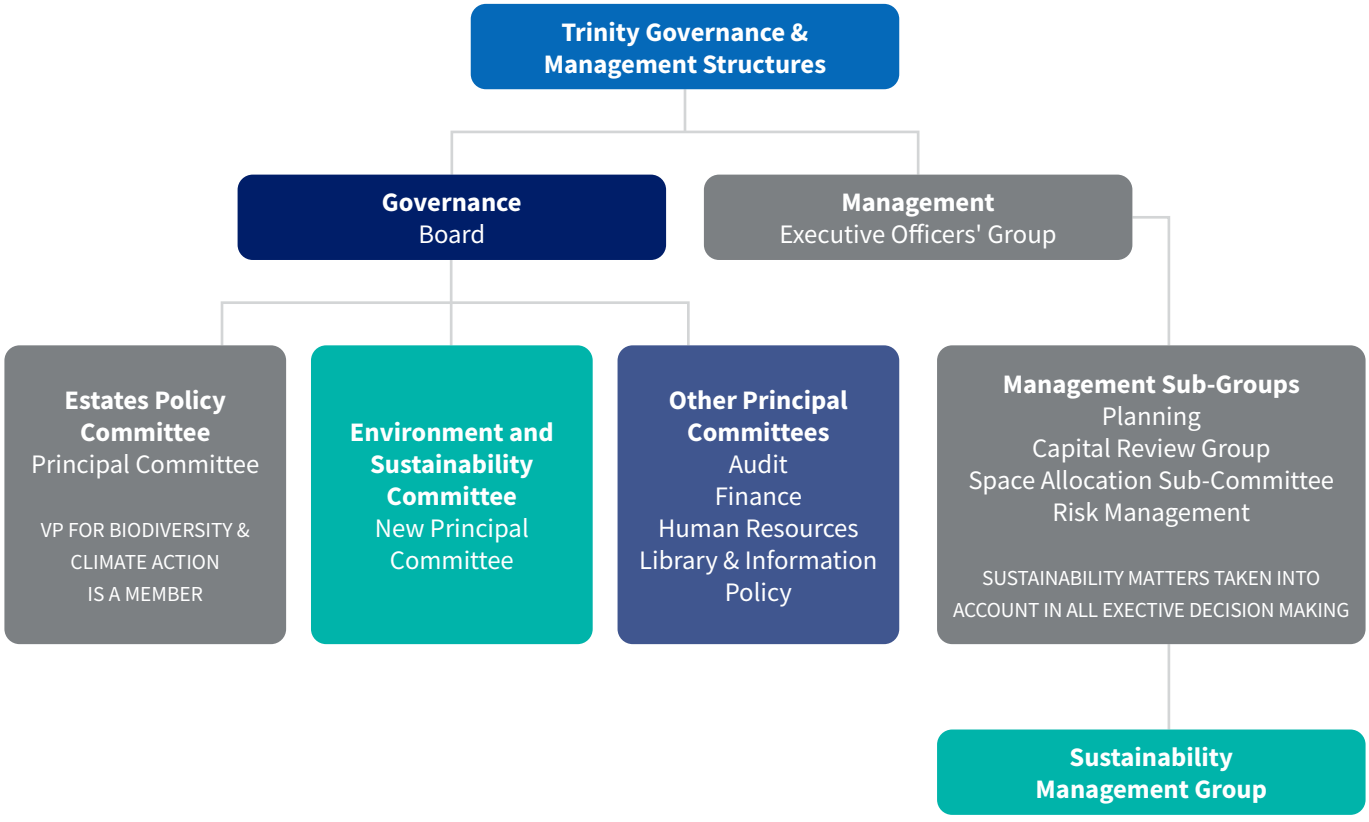


FIG 1 Governance Structure in TCD

2.3 ENGAGING AND TRAINING STAFF

In addition to the actions listed in this current document, Trinity's Sustainability Strategy (2023-2030) and Action Plan are currently being drafted and will be brought to Board by November 2023. The draft Action Plan sets out the key action in relation to the establishment of Green Teams and staff training as follows:

OBJECTIVE 3.2.10 Creation of Green Teams/Champions

- **3.2.10A** Support behaviour change campaigns, communication and action within the college community for the delivery of the Sustainability Action Plan. Senior Management and the Climate & Sustainability Action Champion will investigate the need and capacity for creating Green Teams/Champions to ensure both a bottom up and top-down approach.

OBJECTIVE 3.2.11 Incorporate appropriate climate action and sustainability training (technical and behavioural) into learning and development strategies for staff.

- **3.2.11A** Climate literacy & leadership training for all senior staff members.
- **3.2.11B** Develop appropriate climate literacy & action training for all staff.
- **3.2.11C** Organise staff workshops (at least annually) to engage on climate issues, including a focus on decreasing the organisation's carbon footprint.

These actions will be delivery from 2024 onwards once the Strategy has been approved by Board.

Trinity Sustainability will deliver Climate Leadership Training for all staff members with the grade PO Level and above. Over 350 staff members have been identified as requiring this training and the training will be rolled out as follows:

- 1 day in person training for senior leaders (Dec. 14th).
- 5 ½ day online webinars for up to 350 staff members (Nov. 2023 – Jan. 2024).

The content of the training will be in line with Minister Ryan's letter of June 2023 as well as delivering a multidisciplinary, interactive, solutions driven training where barriers and solutions can be freely aired. The ultimate aim of the training is for staff to walk away feeling empowered with an understanding about the basics of climate science as well as how it applies to their lives and the professional decisions they make.

Presentations were delivered to all new postgraduates and undergraduates in September to inform them about our GHG targets, existing sustainability initiatives and how they can get involved. In addition, a number of staff members have undertaken the following training in the last three months:

- Energy Basics SEAI.
- Carbon footprinting training Dublin Chamber.
- Climate Literacy Training (Certified).

3. Our Targets

3.1 GHG AND ENERGY EFFICIENCY TARGETS

The Climate Action Mandate sets emission reduction and energy efficiency targets for public bodies as follows:

- Reduce GHG emissions by 51% in 2030.
- Increase the improvement in energy efficiency in the public sector from the 33% target in 2020 to 50% by 2030.
- Put in place a Climate Action Roadmap by the end of 2022.

Trinity's draft Sustainability Strategy 2023–2030 Action Plan sets out the key actions in relation to our sectoral targets as follows:

OBJECTIVE 3.2.1 Decarbonise energy sources to meet 2030 and 2040 targets across all activities.

- **3.2.1A** No installations of heating systems using fossil fuels after 2023 in new buildings and in major renovation retrofits, as per the Climate Action Mandate 2023 (BE GREEN).
- **3.2.1B** Undertake a comprehensive feasibility analysis to a) identify low carbon energy supply option(s) i.e. heat pumps, solar panels and micro generation etc.
- **3.2.1C** Identify other types of on-site green energy generation opportunities if these exist.
- **3.2.1D** Review the operation of combined heat and power plant units owned by Trinity and decide in what running pattern to operate them from greenhouse gas emissions and total primary energy requirement perspectives (BE CLEAN).
- **3.2.1E** Develop a campus energy strategy to inform Trinity's transition to clean energy and net zero emissions.

OBJECTIVE 3.2.2 Reduce our overall greenhouse gas emissions from our existing buildings thermal and electricity by 51% in 2030.

- **3.2.2A** Complete a set of audits on a chosen sample set of buildings to identify the decarbonisation pathways and associated costs.
- **3.2.2B** Use this as a guide to predict the college-wide expected decarbonisation costs and methods/ technologies.
- **3.2.2C** Develop a building decarbonisation plan to identify register of opportunities and prioritise buildings for retrofitting.
- **3.2.2D** Identify sources of funding to implement the Building Decarbonisation Plan.
- **3.2.2E** Identify internal headcount and consultant engineer resources to implement Building Decarbonisation Plan.
- **3.2.2F** Output of all of these will be an Annual Implementation Plan.

OBJECTIVE 3.2.4 Improve energy efficiency of college to meet 2030 target of 50% improvement on baseline (BE LEAN).

- **3.2.4A** Metering system to understand energy usage in main campus buildings.
- **3.2.4B** Energy review and tracking of significant energy users, and communicate with management and staff.
- **3.2.4C** Identify register of opportunities on E&F owned systems (lighting, pumping power etc).
- **3.2.4D** Identify sources of funding to implement the measures.
- **3.2.4E** Output will be an Annual Implementation Plan.
- **3.2.4F** Display an up-to-date Display Energy Certificate on publicly accessible buildings.

GAP TO TARGET UPDATE OCTOBER 2023

Trinity's Gap to Target model has been recalculated from first principles due to:

- Better quality energy data.
- Increased capacity and expertise within the Estates & Facilities team.
- Limited building fabric retrofit potential due to Trinity's unique and largely protected building stock (60% of buildings are over 100 years old and 25% over 200 years old).
- Learnings from the U9 university network group about the real-world limitations of heat pumps in terms of efficiency and whether they can deliver the high temperatures the heating systems require, particularly in the West End (Front Square of Trinity's College Green campus) buildings.
- New information available to determine the potential impact of projects i.e. for Arts Block (post retrofit), new Book of Kells Pavillion exhibition, and Dartry student accommodation new build.

This has enabled us to review and revise our decarbonisation model and to determine our projected thermal emissions gap. This gap is now 3,469 tonnes CO_2, but the key projects and initiatives in our revised decarbonisation model should lead to a reduction in this gap. However, additional financial support is required if we are to deliver new deep retrofit projects annually. The historic nature of our campus means that each new project is expensive and complex, thus requiring a guaranteed multi annual budget to plan and execute such projects.

In the meantime, smaller projects will be rolled out to improve energy efficiency and a reduction in energy demand. The main projects are:

- LED lighting retrofits will continue, focussing on our largest buildings to deliver the maximum benefit.
- Heating and ventilation savings through control system upgrades and demand-driven ventilation.
- A conservative estimate of heat pump deployment and assuming that most will require gas boiler-assist in peak winter season.
- A conservative estimate of carbon savings if the Arts Building (heritage building) retrofit project proceeds.
- Solar PV on Arts Building and selected other buildings.
- A campus wide behavioural change campaign.

TOTAL GREEN HOUSE GAS TARGET

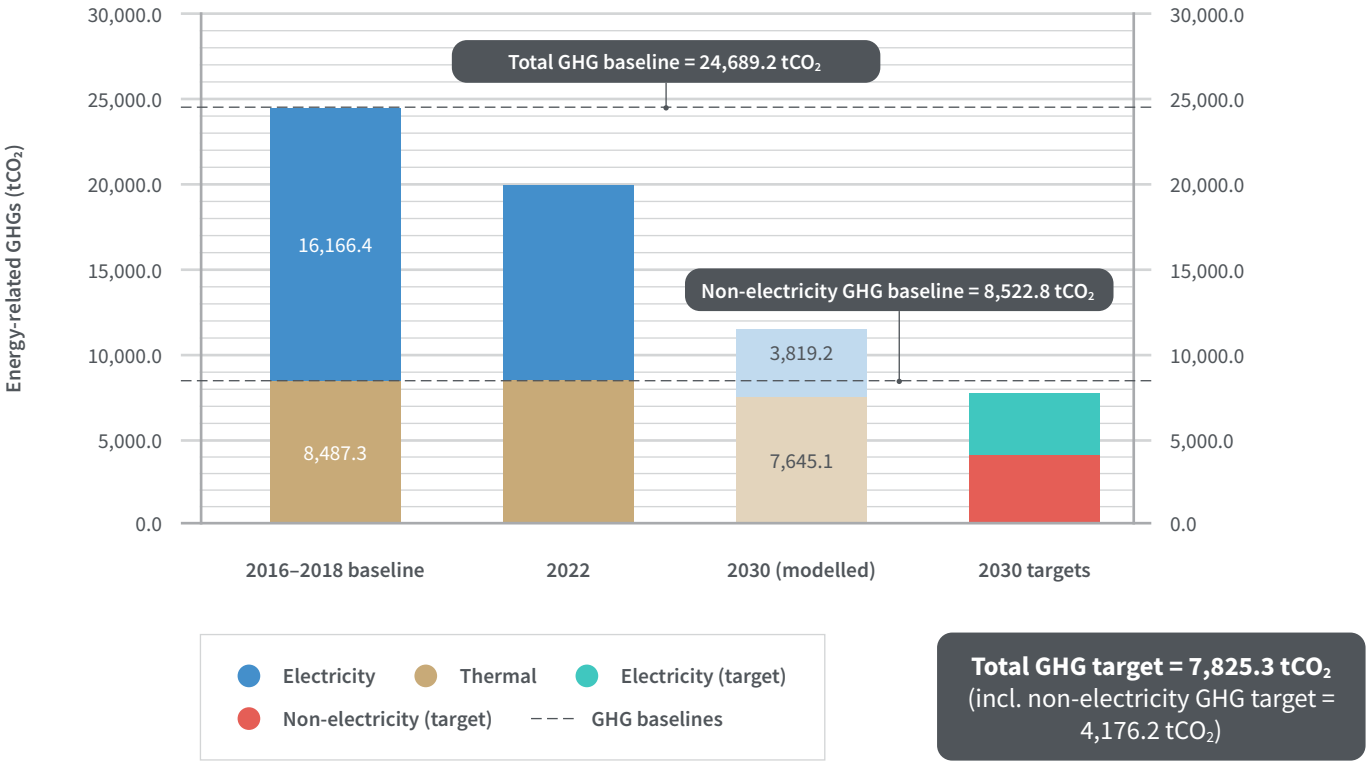


FIG 2 Gap to Target Tool Report October 2023

3.2 TRAVEL AND COMMUTING EMISSIONS

Trinity has undertaken a carbon footprinting exercise for the financial year 2021–2022. This process estimated the total carbon emissions related to the majority of activities under Scope 1,2 and 3 with the inclusion of staff travel and commuting. The key findings for the period for business travel and commuting are at 0.42% and 3.26%, respectively for 2021–2022 which is a small percentage of total carbon emissions of the university. Most of Trinity's staff business travel emissions arise from flying, which in 2021–2022 emitted 690.60 tCO_2e compared to 26.43 tCO_2e from all other modes of transport (private road vehicles, ferry, trains, light tram and rail, bus, and taxi) combined. Trinity's Financial Service Division capture information about staff travel through the iExpenses process which is hosted on our Oracle financial information system. Additional data are captured through our travel provider, Club Travel, and all data are then uploaded to the M&R 2030 Staff Business Travel.

The draft Sustainability Strategy has a number of objectives that focus on reducing staff travel and supporting sustainable commuting to campus. A selection of draft objectives related to staff travel and commuting are as follows:

- **OBJECTIVE 3.3.3** Reduce the number of vehicles using the College Green Campus.
- **OBJECTIVE 3.3.4** Reduce car parking by 50% in the College Green Campus.
- **OBJECTIVE 3.3.5** Continue to support sustainable travel to all sites.
- **OBJECTIVE 3.3.6** Support the delivery of walking and cycling infrastructure.
- **OBJECTIVE 3.3.7** Reduce all air travel generated from college activities.

4. Our Way of Working

4.1 GHG EMISSIONS

Trinity has carried out a Carbon Footprinting Exercise for the 2021–2022 financial and academic year. The exercise looked at all carbon emissions associated with the activities of the university using the Greenhouse Gas Protocol Methodology which assesses Scope 1, 2 and 3 emissions. Scope 1 emissions included fuels for thermal heat sources such as natural gas, LPG, gasoil as well as fuels for vehicles owned by the university; road diesel, petrol and marked diesel. Scope 2 included purchased electricity and Scope 3 emission sources included purchased goods and services, capital goods, water consumption, fuel and energy related activities, waste generated in operations, business travel, student and staff commuting, upstream transportation and distribution, and investments.

We found that Trinity College emitted a total of 171,184 tCO_2e in this time period. Broken down by Scope, this amounts to 8,564 tCO_2e in Scope 1, 11,283 tCO_2e in Scope 2, and 146,123 tCO_2e in Scope 3. The exercise went beyond GHG emissions from our heating and electricity (Scope 1 & 2) but also attempted to examine the GHG emissions coming from our supply chain both in terms of upstream and downstream emissions (Scope 3). This exercise goes beyond the data captured in the SEAI M&R platform and gives a more holistic picture of where GHG emissions are generated by the university's activities over an academic and financial year.

SCOPE 1, 2 AND 3 EMISSIONS

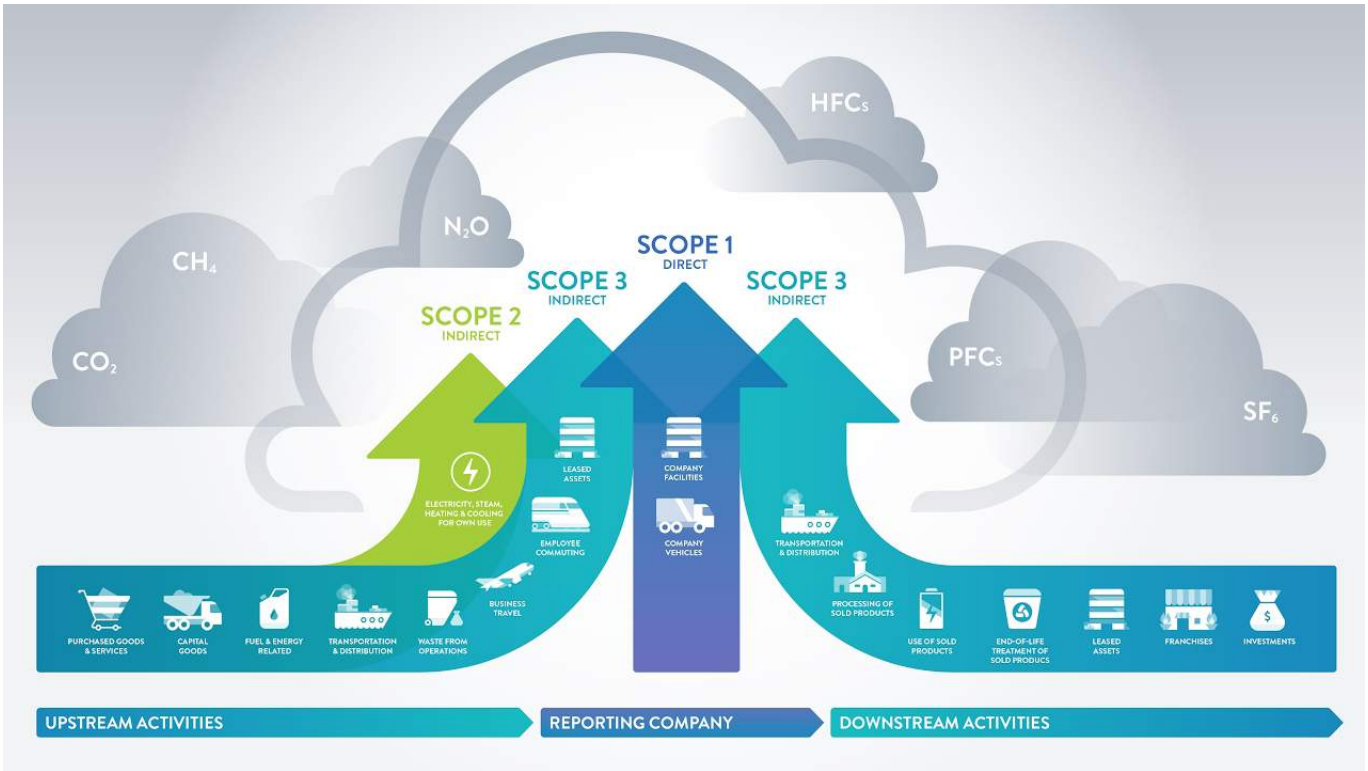


FIG 3 **Greenhouse Gas Protocol Methodology:** What are Scope 1, 2 and 3 Emissions? **(esganalytics.io)**

4.2 SUSTAINABILITY INITIATIVES

Trinity has been progressing sustainability initiatives on campus over the last six months to increase awareness of our climate targets and biodiversity commitments as well as to empower students and staff to take real action. The main initiatives which have been undertaken can be summarised as follows:

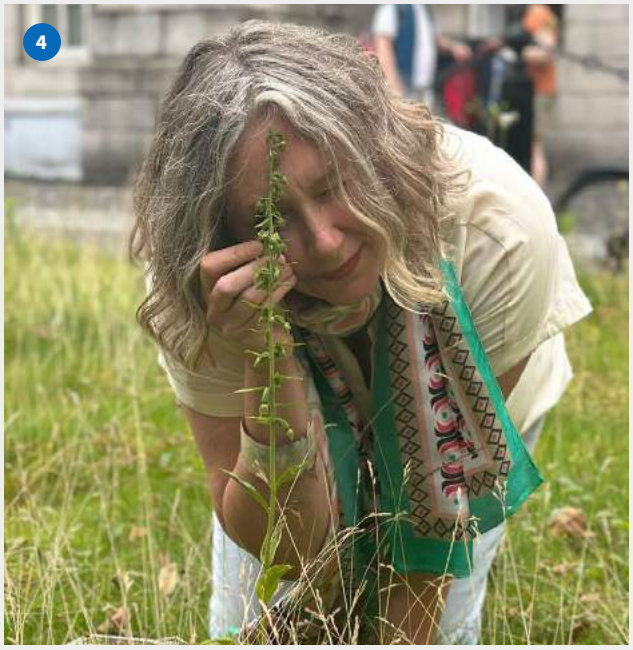
- Awarded a fourth Green Flag under the international Green Campus programme for ongoing work on sustainability.
- Celebrated the 21st birthday of Green Week with a range of events including forums on transport, health, biodiversity, greening careers and research. The week culminated in a Ministerial Address by Minister Eamon Ryan TD. More information can be found here: Green Week 2023 – Provost & President (tcd.ie)

IMG 1 Education for Sustainable Development Fellows
IMG 2 Sustainability Leadership Awards 2023
IMG 3 Green Flag Raising

- Five academics have been appointed as ESD (Education for Sustainable Development) Fellows. The fellows support the delivery of Ireland's National Strategy on Education for Sustainable Development to 2030.
- The inaugural Sustainability Leadership Awards took place in March with twenty-one awardees being recognised for their work and commitment to sustainability.
- Trinity supported the annual campaign #NoMowMay which is an annual campaign started by Plantlife in the United Kingdom and promoted in Ireland by the All-Ireland Pollinator Plan, which was co-founded by Trinity's Vice President for Biodiversity and Climate Action, Professor Jane Stout. The initiative resulted in a rare orchid appearing on Trinity's College Green campus as well as a multitude of wildflowers like clovers and daisies to bloom and provided food for pollinating insects, which are currently in decline.[4]

4 No Mow May gives life to rare orchid: Botany (tcd.ie)

- Trinity also launched an online sustainability game Trinity Tops Trash which focused on increasing awareness of waste segregation on campus.
- Trinity also ran an initiative to promote circularity on campus entitled Trash to Treasure. The initiative was spearheaded by students on the Green Campus committee who wanted to reduce waste and to support their fellow students. Students were asked to donate unwanted items in May and these were then sold at a reduced price back to new students in September.
- The Reduce Your Use Winter 2023 campaign by SEAI was recently launched, aiming to control our building temperatures to 19°C this winter to reduce energy use.
- The Optimising Power @ Work campaign has also been relaunched in two buildings and will support us with behavioural change materials as well as running campaigns throughout the winter.
- Climate and Biodiversity Action Week took place in October and a range of talks, activities and events took place to increase awareness and take action to reduce our GHG emissions and to support local biodiversity



IMG 4 Chair of Botany, Professor Jenny McElwain, spots an orchid called a *broad-leaved helleborine* growing in the Front Square.
IMG 5 Trinity Tops Trash online sustainability game.
IMG 6 Trash to Treasure hosted in September of each new academnic year.

4.3 PROCUREMENT OF PAPER

Trinity set a target of 20% decrease in paper use by 2020 versus 2011 baseline. This target was reached in the 2014/2015 financial year. Since 2014/2015 there has been a consistent reduction in the amount of paper used with a 66% reduction in total. The current annual rate of consumption equates to 9 pallets/3,600 reams/1.8m sheets per year. Trinity has recently switched from 100% recycled paper to 100% Carbon Neutral Paper (Black Label Zero) which is certified by FSC, Nordic Ecolabel and EU Ecolabel as being produced in a carbon neutral way. The ultimate aim is to reduce the use of paper across all functions of the university and to move to digital processes, however these processes will also be mapped against potential carbon emissions.

4.4 DISPOSABLE ITEMS

Trinity continues to reduce the number of disposable items on campus and has ensured that all disposable cutlery is fully compostable since 2020. The catering team have also eliminated the sale of disposable coffee cups from one outlet (The Forum Trinity Business School) since March 2023 and have carried out a trial in another outlet (The Perch Arts Block) in July & Oct. 2023. The university also gives a discount for reusable coffee cups as well as promoting the 2GoCup scheme across all outlets. The draft Sustainability Strategy has identified a number of key actions to promote circularity and a reduction in resource use as follows:

OBJECTIVE 3.4.1 Develop a Waste Action Plan for a Circular Campus.

- → **3.4.1D** Eliminate all single use disposable items (plates, coffee cups, containers) related to catering.
- → **3.4.1H** Introduce schemes to support reuse i.e. Vytal, Loop etc.

The university has also drafted key actions relating to green procurement as follows:

OBJECTIVE 3.4.3 Support Green Procurement practices to reduce resource consumption by eliminating unnecessary purchases and promoting resource sharing.

4.5 ENVIRONMENTAL MANAGEMENT AND ACCREDITATION

Trinity is committed to implementing ISO50001-based energy management system and ISO14001 environmental management system over the coming years. The implementation of the systems will require significant investment in terms of human capacity due to the length of time it takes to gain certification which can take between 18–24 months.

Currently there are a number of limitations to achieving the accreditation as follows:

- Trinity does not have sufficient human resources in place,
- It will be complicated to implement due to the historic site,
- It will give a low return on investment in terms of management time (high) versus decarbonisation impact (low).
- Building an energy project delivery pipeline is far more urgent than achieving certification.

The draft Sustainability Strategy has identified the need for the EMS and has set out the following objective and actions:

OBJECTIVE 3.2.8 Introduce an Energy Management System and/or Environmental Management System.

- **3.2.8A** Seek accreditation under the ISO 50001 or ISO 14001 Standard by Q4 2025.
- **3.2.8B** Where applicable, display an up-to-date Display Energy Certificate on publicly accessible buildings.

5. Our Buildings and Vehicles

5.1 SUSTAINABLE TRAVEL

Trinity College is part of the National Transport Authority's Smarter Travel Campus programme and celebrated its tenth anniversary in 2021. Trinity undertakes travel surveys every three years to determine modal shift and on average over 90% of all students and staff travel in a sustainable way to campus. The travel survey was undertaken in early 2023 and results show a continued preference for sustainable travel based on the city centre location and availability of extensive public transport networks. The survey has shown a slight decline in active travel modes (5% decline in cycling and 8% decline in walking modes between 2018 and 2023) as well as an increased reliance on bus transport due to longer commuting distances. The university is committed to supporting sustainable travel and has installed extensive bike parking in various locations across the university to support cycling, including Ireland's very first disabled bike parking space in 2019. The university has gained additional funding from the National Transport Authority to install and upgrade 1000 bike parking spaces in October 2023. The university also operates the Bike-to-Work scheme for all staff. In addition, car parking is restricted on all sites.

IMG 7 Installation of more bike parking areas across the University which include's Ireland's first disabled bike parking space.

Trinity's draft Sustainability Strategy and Action Plan focuses on supporting sustainable and active travel through the following objectives:

- **OBJECTIVE 3.3.3** Reduce the number of vehicles using the College Green Campus.
- **OBJECTIVE 3.3.4** Reduce car parking by 50% in the College Green campus.
- **OBJECTIVE 3.3.5** Continue to support sustainable travel to all sites.
- **OBJECTIVE 3.3.6** Support the delivery of walking and cycling infrastructure.

5.2 OUR VEHICLES

Vehicles owned or leased by Trinity accounts for less than 1% of our annual energy use. We do however have a small number of college-owned vehicles, and these will be replaced by full electric models at time of renewal. Grounds maintenance equipment is already being replaced by electric equivalent at time of renewal and this process is 50% complete. We will review the current fleet and assess the need for replacement on a 'like for like' basis with a view to reducing the number of vehicles required by requiring shared use across the different academic/ operational areas. Trinity's draft Sustainability Strategy outlines the proposed actions associated with vehicles:

OBJECTIVE 3.2.3 Reduce the greenhouse gas emissions from transport vehicles owned by Trinity by 51% in 2030.

- **3.2.3A** Review the number of petrol/diesel cars/vans that are owned by various departments on campus.
- **3.2.3B** Reduce the number of vehicles owned by various departments on campus by 50%
- **3.2.3C** Investigate a car/van sharing scheme i.e. GoCar,YUKO.
- **3.2.3D** Procure (purchase or lease) only zero-emission vehicles.
- **3.2.3E** If applicable develop a comprehensive ZEV Charging and Maintenance Strategy to guide ZEV transitions on campus

5.3 OUR BUILDINGS – EXAMPLE OF A DEEP RETROFIT PROJECT

Trinity has recently completed an extensive deep retrofit of the Rubrics building which is the oldest building on campus which dates back to 1699. The Chief Stewards House was also part of the renovation project and the ambition was to have a BER rating of B2 (from D2) to ensure that the building was future proofed as student residences for the next century. The works have now been completed which included:

- Ground sourced heating from 21 boreholes in New Square
- Reroofing with a warm roof construction and with Irish sourced slate
- Ground floor insulation with recycled foamed glass
- Insulated limestone external render
- Refurbishment of all existing windows and shutters

Initial tests have shown 100% of space heat and 84% of domestic hot water now come from the decarbonised ground source heat pumps in Rubrics. More information can be found here: [The Rubrics – Estates & Facilities (tcd.ie)]

IMG 8 The Rubrics refurbishment project featuring extensive retrofitting to B2 rating.
IMG 9 The Rubrics refurbishment project featuring extensive retrofitting to B2 rating.
IMG 10 The Rubrics refurbishment project featuring extensive retrofitting to B2 rating.

In addition, the Old Library Redevelopment Project will begin in Q.4 2023 which will conserve and safeguard the Old Library and its collections. This will involve the following:

- Improving insulation to minimise heat loss;
- Refurbishment of the windows;
- Installation of approximately 28 ground source heat pumps to meet heating and cooling requirements;
- Energy Efficient Active Systems including sensors (Temp, RH, CO_2, Particulates, VOCs),
- Building Management System Control,
- Automatic LED lighting controls,
- Automatic daylighting controls in the Long Room;
- Use of Air Handling Units with energy efficient motors and incorporating heat recovery.

5.4 BUILDING STOCK PLAN

Trinity is starting to develop a building stock plan to identify buildings for retrofitting in line with GHG emissions targets. We are at an initial stage of data gathering and need to determine which buildings are the most energy intensive so that building works can be prioritised when funding becomes available. There is a need to increase capacity within the team to undertake this work and funding must be made available so that project planning can be put in place not only on an annual basis but for the next decade.

Projects that are already underway or in preparation phase are:

- **O'Reilly Building Decarbonisation Pilot Project**
  To be completed during late 2023, funded by HEA Devolved Grant 2022/23. The objective is to ensure >80% of heating and hot water from heat pump, rather than the existing gas boiler arrangement. Where there is potential for solar PV arrays on the roofs, this will require additional surveys and planning consent will be required. A set of templates will be prepared which could then be utilised for the adjoining Watts & Hamilton Buildings, Panoz Institute and Smurfit Institute (all located at Trinity's East End).
- **Arts Building Refurbishment**
  Built in 1978 and a heritage building, the current 20,283 m2 building is a relatively high consumer of energy in its day-to-day running. Under this project, the existing infrastructure will undergo a deep energy and functional retrofit. It is part of a current Higher Education Strategic Infrastructure Fund (HESIF) bid, alongside the proposed development of a new Law School which will be developed along NZEB or Passive House standard. The Arts building has a current estimate of "D" BER band, but the proposed project have been estimated to provide carbon savings of 50%, enabling a "B" rating to be achieved from the proposed works.
- **Existing Trinity Hall student accommodation**
  Trinity Hall currently houses 1,176 students in student accommodation dating from 2003. A number of student accommodation will be upgraded to include; PV installation to existing Buildings 1, 2 & 3, installation of ground source heat pumps and LED lighting upgrades. Installing renewable energy sources will reduce GHG emissions but needs to be developed in conjunction with the implementation of the Trinity Hall (2022) consented scheme.
- **Trinity East**
  Located in the heart of the Dublin Docklands and comprises of a number of existing research, office and community facilities, as well as the new Portal innovation hub, which is currently under construction. The site was earmarked for demolition and reconstruction, however a new vision for the site has now emerged which will have sustainability at its core. The university is now exploring how sustainability can be put into practice to refurbish, retrofit and revitalise the site with a reduced impact upon our GHG emissions both during the refurbishment phase and over the lifetime of the buildings. It is hoped that the site will be Trinity's new Sustainability Quarter and will a place for new ideas to be tested and explored both in terms of innovation and cultural change.

The Martin Naughton E3 Learning Foundry is currently being constructed to be a Nearly Zero Energy Building (NZEB) and to achieve Building Research Establishment Environmental Assessment Method (BREEAM). The specifications for the project are as follows:

Mechanical Systems, Electrical Systems & Equipment

- The final design includes Air Source Heat Pumps, water to water heat pumps and PV panels which will contribute positively to the facility's energy consump-tion and associated carbon emissions.
- The building will have a high specification Building Management System which allows full control and adjustment of systems and equipment and incorporates strategies to improve control and flexibility of the installations such as the provision of local user controls where appropriate. Energy monitoring and water monitoring is included.
- The design includes for the efficient use of potable water: eg. WCs 6/4l dual flush cisterns, Wash hand basin and kitchenette Taps 3.7l/min and 5l/min and Showers 8l/min.
- The design includes high efficiency LED lighting systems and the use of appro-priate artificial lighting levels, lighting controls with perimeter areas switched separately from internal areas with daylight and occupancy (presence/absence) linking where appropriate.
- Energy efficient equipment includes the use of premium efficiency motors with variable frequency drives where practical (e.g. fans, pumps, lifts etc.)
- The heating and cooling of the building will utilize embedded slab piping as a Thermally Activated Building System (TABS). TABS helps the building cope with extremes of hot and cold temperatures. The proposed slab build-up incorporates the heating and cooling system within the structural depth, minimising the services zone required in the ceiling void, providing flexibility for future layouts and arrangements within the space.

Other sustainability features include:

- The Façade designers and architects have developed the façade and material packages in line with the aim of reducing the environmental impacts of building materials. The design specifications identify the BREEAM requirements and require the Contractor to consider the procurement of materials and to follow the Green Public Procurement guidance as well as prioritising materials with environmental certification and identifying products with environmental product declarations (EPD).
- A rainwater harvesting system will be incorporated into the development.
- 25% of the total material value of building elements (elements described in the specification) are to be certified as responsibly sourced.
- All timber and timber based products are to be legally harvested and comply with the Forestry Stewardship Council (FSC) certification system – or Programme for the endorsement of forest certification schemes (PEFC) if FSC timber is not available. Certification must be confirmed.
- A high percentage of GGBS concrete is included in the design.
- The volume of concrete is minimised by the inclusion of voided slabs. The voids are created using recycled plastic spheres.
- The building is designed for flexibility and future adaptation to a different use. The internal spaces have been planned around a 1200mm grid. The structural design can accommodate an additional two floors should the Dublin City Council guidelines on acceptable building heights change.

5.5 PROJECTS COMPLETED IN 2023

A number of energy efficiency projects were completed in 2023 which have led to signifi-cant energy savings across the campus. The projects are:

LED lighting retrofit projects completed in O'Reilly, East End 4/5 and Sniams Building.

- Projected savings of 60% energy consumption and 100 tonnes of CO2 per annum (across the four buildings).
- Automatic light sensors. More comfortable working environment for the staff.
- Reduced maintenance requirement.

Energy Management System for automatic recording of the 36 largest meters in the campus.

- Install progress 40% so far with the remainder due for completion before the end of 2023.
- Improved timeliness and quality of energy consumption data.

Building Management System (BMS)

- New contract in place with double the resource allocation.
- 50% of the time is allocated to energy-targeted maintenance or energy-saving re-programming of it.
- Partnering with Tech Services on a long-term strategy for modernisation of the BMS.

New meters for the domestic hot water use in each large building.

- To determine actual hot water use, an enabling step to possibly generating hot water separately from the heating requirements.
- Meters to be ordered Nov 2023.

Heating demand of each building in winter.

- Metering the gas and lowering radiator temperatures to see if buildings are "heat pump ready".
- Measurement of Rubrics ground source heating performance so we can apply knowledge to similar buildings.

6. Conclusion

Trinity College continues to be highly motivated to reduce its GHG emissions in line with Government targets by 2030 and is establishing a robust governance structure and action plan to support the ongoing decarbonisation and energy efficiency of the university.

However, the challenges we face are complex and costly with the need for substantial in-vestment if our historic buildings are to undergo largescale retrofit projects to future proof them for the next century. There is a need for greater support from Government so that these projects can be delivered over the next six years in order to meet our 51% GHG reduc-tion targets set for public sector organisations. There is also a need for the rapid deploy-ment of key infrastructure with external partners, such as the district heating supply from the Dublin City Waste to Energy facility. The delivery of this infrastructure could supply 33% of our main campus heat requirement and it would close our Gap to Target by 40%.

There is also college-wide support to go beyond these targets and focus on wider sustaina-bility challenges, and to set meaningful targets to become a nature positive, low carbon, healthy university. The staff and students of the university are strongly supportive of these actions and our aim is to embed environmental sustainability across everything we do in-cluding education, research, operations and partnership.

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Climate Action Roadmap

NOVEMBER 2023