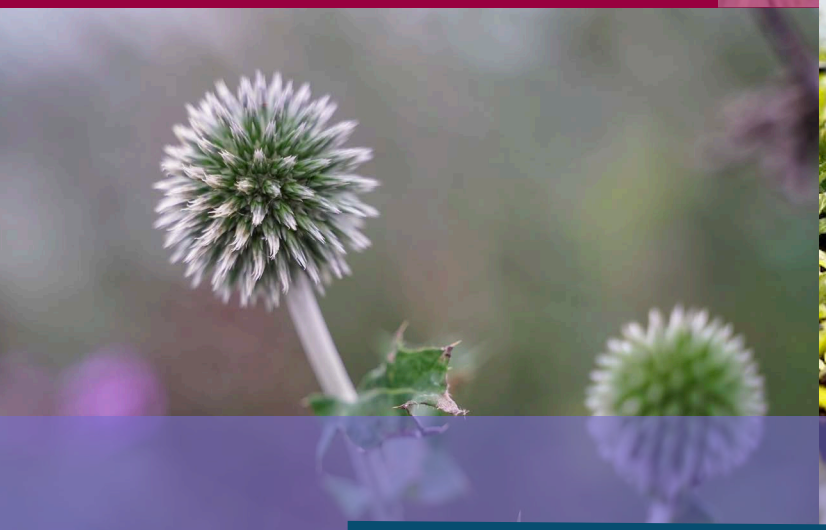
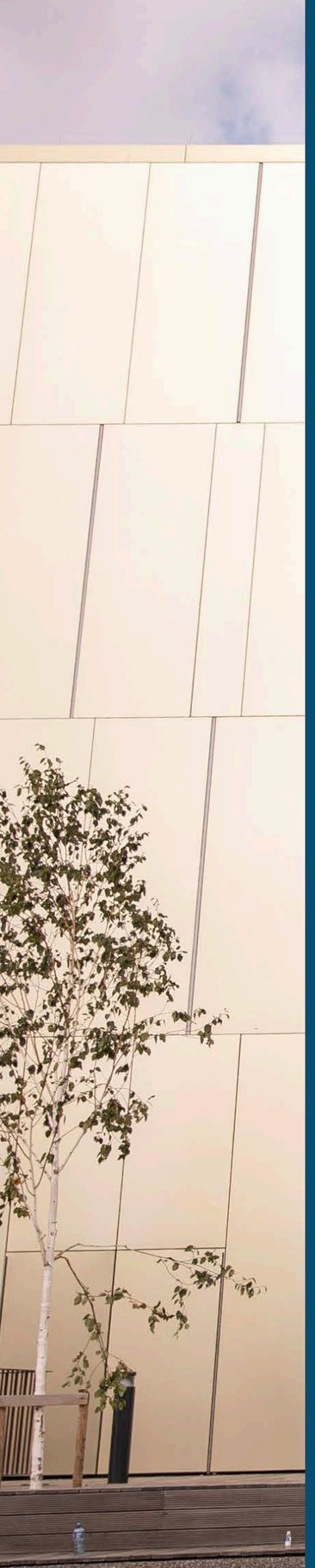
OLLSCOIL TEICNEOLAÍOCHTA
BHAILE ÁTHA CLIATH

TECHNOLOGICAL
UNIVERSITY DUBLIN



CLIMATE ACTION ROADMAP

MARCH 2023



FOREWORD

Technological University Dublin (TU Dublin) seeks to make the world a better place to live, work and prosper. In our role and working with stakeholders – our students, staff, communities, industry and governments – we are committed to taking climate action. As we transform to become one of the world's most sustainable universities, TU Dublin acts as a leader and a voice for sustainability and climate action, promoting a new way of living and working that protects our planet for future generations. With the United Nations' (UN) sustainable development pillars of People, Planet, and Partnership at the core of TU Dublin's Strategic Intent 2030, we advocate for and drive sustainability through our academic, research, operational and engagement practice to address societal challenges in collaboration with local, national, and global partners.

TU Dublin's Climate Action Roadmap 2023 outlines our response to reducing our environmental impact, increasing our knowledge and skills, and developing solutions for mitigating and adapting to climate change. Through our work, we address the Public Sector Climate Action Mandate and through the wider sustainability strategy we are developing, we outline larger ambitions of our University to achieve sustainability targets, educating and informing our students to become responsible and capable members as we transgress into a carbon-neutral society.

"Our vision is to create a better world together; where underpinned by the key Sustainable Development Goal (SDG) of Quality Education, TU Dublin is becoming one of the World's most sustainable universities."

Professor David FitzPatrick

TU Dublin President

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While European Union (EU) and Irish policy establishes our working regulatory context, the March 2023 ‘Synthesis’ report published in by scientists working internationally on the Intergovernmental Panel for Climate Change (IPCC), warns that human-induced climate change is now widespread, rapid, intensifying, with some areas of impact now irreversible. In describing the report as a ‘code red for humanity’, the UN Secretary-General spoke of the need to act now to avert climate catastrophe. This message is reflected nationally in Ireland’s latest Climate Action Plan 2023, citing that to achieve the emissions reduction targets required to address climate change, ‘the scale of systems and behavioural change required is transformational and ‘unprecedented’’. TU Dublin acknowledges the increasing urgency and call-to-action for all developed countries to implement significant change and bring forward long-term targets. In aiming for this, TU Dublin has committed to becoming carbon-neutral across our Scope 1 and Scope 2 emissions by 2040, where with appropriate engagement, training, and investment, we will rapidly reduce our impact within the areas of our organisation boundary. Through our talented students, academic, research, and professional staff, we will advance policy, promote responsible behaviours, and develop our University environment to reduce our Scope 3 impacts to become a carbon neutral by 2050.

In response, TU Dublin commits to take urgent climate action to achieve carbon neutrality across its operations, foster societal resilience through an inclusive and inspiring education model, develop open research and innovation, and enhance citizen agency at all levels for positive change.

“Now is a time for courageous leadership and unprecedented collaboration at all levels to protect the fate of our planet for future generations.”

Jennifer Boyer

Vice President for Sustainability

CONTENT

A CALL TO
CLIMATE ACTION

“Transformational changes are more likely to succeed where there is trust, where everyone works together to prioritise risk reduction, and where benefits and burdens are shared equitably... We live in a diverse world in which everyone has different responsibilities and different opportunities to bring about change. Some can do a lot while others will need support to help them manage the change.”

Hoesung Lee
IPCC Chair
‘Urgent climate action can secure a liveable future for all’ - Press release

1 INTRODUCTION

This first iteration of TU Dublin’s Climate Action Roadmap, informed by the requirements of Public Sector Climate Action Mandate, demonstrates our pathway and intent as a large public sector body to protect our planet with a focus on energy management and greenhouse gas (GHG) emissions reduction. In this first Roadmap, TU Dublin will focus most attention on our plans for reducing total energy related emissions and fossil fuel related emissions from our operations in line with the targets in the national Climate Action Plan.

In addition to transforming our campus environment and operations to deliver on carbon emissions reductions, TU Dublin recognises the role we play as a university in providing Quality Education (UN SDG 4), where our learners, educators, researchers, and partners share our ambition to be responsible global citizens who transform themselves to take action to address climate change in their daily lives.

ACRONYMS

°C	Degrees Celsius
AASHE	Association for the Enhancement of Sustainability in Higher Education
BER	Building Energy Rating
CASH	Centre for Applied Science in Health
CO_2 / CO_2e	Carbon dioxide / Carbon dioxide equivalent
COVID-19	SARS-CoV-2 / Coronavirus Disease 2019
CPD	Continuous Professional Development
CSO	Central Statistics Office
DECC	Department of the Environment, Climate and Communications
DEFRA	UK Department for Environment, Food and Rural Affairs
DEC	Display Energy Certificate
DCC	Dublin City Council
DH	District Heating
DFHERIS	Department of Further and Higher Education, Research, Innovation and Science
EC	European Commission
EDI	Equality, Diversity, and Inclusion
EMAS	Eco-Management and Audit Scheme
EMS	Energy Management System
EPA	Environmental Protection Agency
EPS	Environmental, Planning and Sustainability
ESD	Education for Sustainable Development
EPBD	Energy Performance of Buildings Directive
EU	European Union
FCC	Fingal County Council
GDA	Grangegorman Development Agency
GHG	Greenhouse gas
GPP	Green Public Procurement
HCI	Human Capital Initiative
ICT	Information and Communication Technologies
IPCC	Intergovernmental Panel on Climate Change
IUA	Irish University Association
$kgCO_2e/m^2$	Kilograms of carbon dioxide equivalent per square meter
KPI	Key performance indicator
Kt	Kiloton
LED	Light Emitting Diode
LCA	Life Cycle Assessment
kW / kWh / kWe	Kilowatt / Kilowatt-hour / Kilowatt electric
M&R	Monitoring and Reporting
MoU	Memorandum of Understanding
NTA	National Transport Authority
NLP	Natural language processing
OERs	Open Education Resources
OGP	Open Government Procurement
PPP	Public Private Partnership
R&I	Research and Innovation
RAI	The Relative Activity Index
RECs	Renewable Energy Communities
RDI	Research, Development, and Innovation
RKs	Root keywords
SEF	Sustainability Education Framework
SCO_2	Supercritical carbon dioxide
SDCC	South Dublin County Council
SDG	Sustainable Development Goal
SEAI	Sustainable Energy Authority of Ireland
SECs	Sustainable Energy Communities
SUDS	Sustainable Urban Drainage Systems
STEM	Science Technology Engineering and Maths
tCO_2 / tCO_2e	Tonnes of carbon dioxide / Tonnes of carbon dioxide equivalent
TF-IDF	Term Frequency - Inverse Document Frequency
$TgCO_2$	Teragrams of carbon dioxide
TFI	Transport for Ireland
TU Dublin	Technological University Dublin
TPE	Total Primary Energy
UEM	University Education Model
UET	University Executive Team
UN	United Nations
USC	University Sustainability Council
VP	Vice President
WEEE	Waste Electrical and Electronic Equipment
WTE	Whole-Time Equivalent
ZEB	Zero Energy Buildings

2 OUR PEOPLE

2.1 LEADERSHIP AND GOVERNANCE FOR CLIMATE ACTION

Key Roles in Sustainability

In 2021, TU Dublin appointed a Vice President (VP) for Sustainability to provide leadership, strategic direction and oversight for the coordination and management of the University's activities in relation to sustainability, across both professional services and academic domains. The VP for Sustainability is responsible for developing and overseeing the implementation of a cohesive university sustainability strategy and establishing TU Dublin as one of the world's most sustainable universities. The VP for Sustainability is TU Dublin's Climate and Sustainability Champion and a nominated member of the University's Management Board (known as the University Executive Team (UET)) with responsibility for implementing and reporting on the Public Sector Climate Action Mandate. Other key roles for sustainability leadership in TU Dublin are set out in the diagram below and show the commitment of the University to climate action.

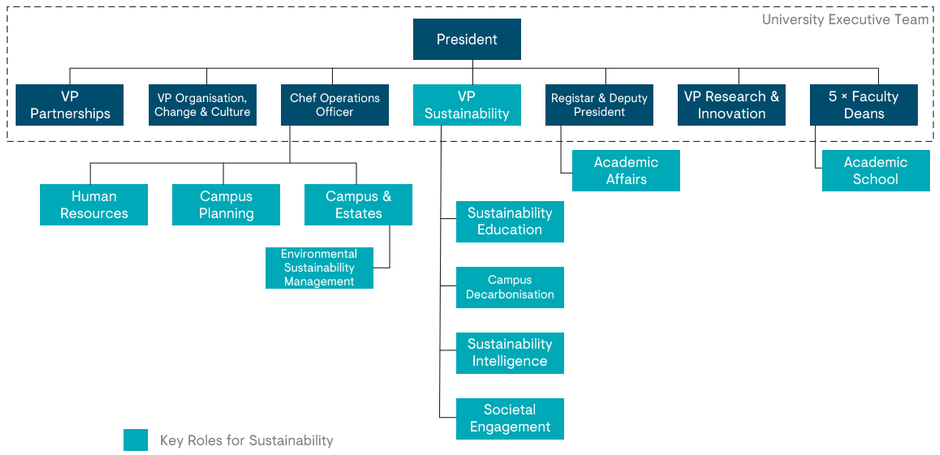


Figure 1: Key roles in TU Dublin for sustainability leadership

The Sustainability Team is designed to bring expertise, build capacity, and advance impact across several key areas, represented by the four functional pillars:

- Sustainability Education (capacity building).
- Campus Decarbonisation (campus operations and planning).
- Sustainability Intelligence (performance reporting and technology infrastructures).
- Societal Engagement (embedding sustainability activities with partners and supporting thought leadership).

Responsibilities of the Team include:

- Overseeing, coordination and reporting on the implementation of the TU Dublin Climate Action Roadmap and Sustainability Strategy.
- Developing new policies and setting University direction to becoming carbon neutral.
- Developing frameworks to support the development of our students, staff, and communities to be responsible global citizens.
- Enhancing information quality and flow for enhanced organisational performance to deliver our key goals.
- Measuring and communicating our climate and sustainability impacts and achievements.

2.1.b CAMPUS & ESTATES

Campus & Estates aims be to the forefront in ensuring the University becomes a 'Beacon for Sustainability' working closely with the VP for Sustainability to achieve this goal. There is a dedicated section within the function focussed on environmental sustainability management, acting as a champion for sustainability, energy, and environmental issues. It is responsible for the operational implementation and delivery of the elements of the Climate Action Plan that fall within their remit, implementing environmental policies and energy action plans and supporting the University in meeting global sustainability standards such as STARS, and delivering ISO 50001 and 14001 accreditation processes. It has a specific remit in the delivery of energy related projects, managing energy related data and processes and providing support for planning, regulation, monitoring, development and management of energy and the reduction of the University's carbon footprint.

2.1.c CAMPUS PLANNING

Campus Planning supports the UET in the planning and development of the physical infrastructure of the University. It seeks to ensure that all new university buildings are sustainable, and also to identify improvements in the sustainability of existing buildings across all campuses, working closely with the Sustainability Team to decrease the overall University carbon footprint, including plans for sustainable transport and commuting. Achieving and exceeding carbon and sustainability targets will require optimisation of existing infrastructure and the introduction of cutting-edge clean energy technologies such as district heating, deep bore geothermal, digital twins, and advanced solar technologies.

2.1.d GRANGEGORMAN DEVELOPMENT AGENCY

The development of TU Dublin's Grangegorman campus forms part of the overall development of a new Urban Quarter in Grangegorman. The Grangegorman Development Agency (GDA) is a fixed purpose government agency, established in 2006, acting as the contracting authority to develop the Grangegorman site for and on behalf of our stakeholders including TU Dublin, the Health Service Executive, and the Department of Education. The objective of the GDA is to develop the social and urban renewal of the 30 hectares of the former St. Brendan's Hospital site in Grangegorman and its surrounding areas, driven by the relocation of TU Dublin and the provision of modern primary and residential healthcare facilities. The GDA have established sustainability as a core objective and continue to develop a Climate Action Roadmap and associated implementation plans in close coordination with stakeholders including TU Dublin.

2.1.e GOVERNANCE FOR CLIMATE ACTION

The following diagram sets out the internal governance within the University.

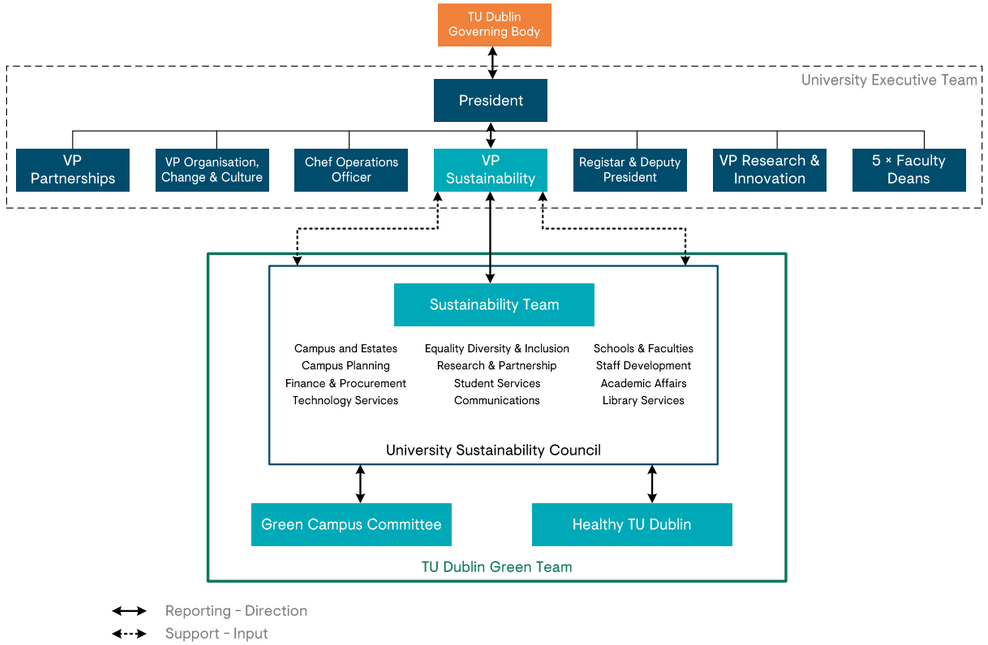


Figure 2: Internal governance for climate action

2.1.e.1 UNIVERSITY SUSTAINABILITY COUNCIL

To reflect the scale and pace of transformation needed to advance sustainability and deliver on climate action, the establishment of the TU Dublin University Sustainability Council (USC) will be a core enabler for establishing integrated delivery, ownership, and function-level accountability. With membership drawn from across the University, the terms of reference for the USC are currently being drafted.

2.1.e.2 THE TU DUBLIN GREEN TEAM

The TU Dublin Green Team is an extended group within the University designed to advocate, communicate, and mobilise activities to engage students and staff in the Climate Action Roadmap and Sustainability Strategy deliverables. Involving membership from the USC, the Green-Campus Committee and the University's Heathy TU Dublin workgroup, the Green Team will draw on students and staff representatives, priority taskforces, and nominated sustainability champions to grow the network of knowledgeable and committed students, staff, and external partners for climate action priorities.

2.1.f ACTIONS PLANNED

The following actions are planned to support sustainability leadership, governance, and implementation in TU Dublin:

- Establish multi-annual programmes of work and allocate resources, including budgeting to deliver on short-, medium-, and long-term targets.
- Align and utilise external funding opportunities to deliver on climate action mandate and sustainability objectives.
- Continue to build whole-of-University capacity and culture by empowering change at every level, through transformational change initiatives.

2.2 ENGAGING AND TRAINING STAFF

TU Dublin Sustainability Education Framework (SEF) is being developed to embed sustainability through a whole-of-University approach. It aims to ensure our student and staff acquire the knowledge, skills, attitude, and values necessary to build resilience for climate change and shape a sustainable future. To ensure our graduates can lead the sustainability agenda with passion and purpose, we must empower and build capacity among staff to deliver innovative programmes that address the global challenges set out in the UN (United Nations) Sustainable Development Goals (SDGs). We will also support all staff so that sustainability education will be delivered in a learning environment where our campus is a living lab to develop best practice in sustainability.

The SEF is aligned with government policy on sustainability[1] and with the technical, behavioural and leadership training requirements encompassed in Public Sector Climate Action Mandate. The objectives are set out below:

- To advance sustainability by leveraging collective knowledge, skills, and ambition to empower staff.
- To embed sustainability at the heart of the student experience and throughout all academic programmes.
- To provide wider societal capacity building in sustainability through open engagement, open education, and partnership.

In 2023 we will engage all senior management (PO and SL3 and above) in climate leadership training. Since 2021, the UET have engaged in multiple sustainability and climate workshops.

[1] National Education for Sustainable Development Policy and Implementation Plan, National Implementation Plan for the SDGs, National Climate Action Plan 2023.

3 OUR TARGETS

Under the National Climate Action Plan 2023, the Public Sector Climate Action Mandate sets out the targets for public bodies as:

- 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 (extended to Q1 2023).

3.1 ACHIEVING THE CARBON EMISSIONS REDUCTION TARGETS (51% REDUCTION BY 2030)

For TU Dublin to accurately report its greenhouse gas (GHG) emissions and consider how best to address these, it must first define its organisational boundary within Ireland, and a summary of this is provided at this point.

The University operates across five main locations spanning three local authority areas in the Dublin Region – Grangegorman, Bolton Street, and Aungier Street (Dublin City Council), Blanchardstown (Fingal County Council), and Tallaght (South Dublin County Council) with a regional catchment area of more than one million people. When considering the needs of the local catchment areas and distribution of needs, TU Dublin groups its activities under five overall campus areas of the Tallaght campus, Blanchardstown campus, and Grangegorman, Bolton Street, and Aungier Street campus locations.

All campuses are within a 10 km radius, comprising over 45 buildings (~194,000 m²) on 185 acres. As of February 2023, TU Dublin has almost 30,000 students and over 3,000 staff, and up to 450 community, enterprise, industry, academic, and research partners. The total estimated carbon emissions associated with TU Dublin in 2021 is just over 52,112 tCO_2e.

TU Dublin directly controls all but two buildings within its campuses. The exception to this direct operational control is with respect to two new buildings (55,000 m²) in Grangegorman, whereby the State has procured the construction of the buildings under a 25-year Public Private Partnership (PPP).

This Climate Action Roadmap encompasses the entire portfolio of assets and activities of the University and is treated as a live document that is continually expanded and developed through active engagement with buildings planning, operations, and end users. This will be reviewed and updated annually.

3.1.a ENERGY RELATED CARBON EMISSIONS BASELINE (AVERAGE 2016-2018 EMISSIONS)

Baseline years for measuring TU Dublin's Sustainable Campus Environment and Operations impact through GHG emissions (Scope 1 and some Scope 2) began in 2018 when the three original institutions of Dublin Institute of Technology, Institute of Technology Blanchardstown, and Institute of Technology Tallaght reported as separate entities. In 2021, the first joint reporting through the Sustainable Energy Authority of Ireland (SEAI) Monitoring and Reporting (M&R) tool was conducted, where all campus locations were reported under one organisational footprint.

TU Dublins operational GHG emissions baseline focuses on campus activities such as energy, water, waste, and transport and translates the data from these activities into a carbon equivalent to provide an amalgamated figure. The table below identifies the total consumption from the baseline year (average 2016-2018 for energy-related emissions and 2018 approximations for Scope 3 activity). From this, total calculated energy-related emissions (Scope 1 and 2) of 9,973 tCO_2 and Scope 3 emissions of 42,139 tCO_2 bring TU Dublin's total emissions baseline to 52,112 tCO_2. Estimated calculations for 2022 show absolute energy-related consumption reduced by 9%, with overall emissions figures reduced by 18% to 33,732 tCO_2. It should be noted that baseline emissions have been amalgamated from the three separate campus reporting figures (captured as Dublin City Campus, Tallaght Campus, and Blanchardstown Campus) since the formation of the TU Dublin in 2019.

Fugitive emissions refer to the number of fugitive gases escaping from closed refrigerated systems. These systems include air-conditioning systems utilised in buildings. Mechanical contractors report any additional gases deliver and injected into systems on campus. A delivery to top-up a system must be recorded; this volume equates to the amount of gas lost. Fugitive emissions from refrigerators, air conditioning units and cold rooms account for less than 1% of TU Dublin's total CO_2 emissions.

Baseline - GHG Campus Environment & Operations inventory		2018 Sector Baseline Year (tCO^2e)	2019* (tCO^2e)	2020 (tCO^2e)	2021 (tCO^2e)	2022* Estimates (tCO^2e)
Scope 1	Natural Gas	3,993	4,299	3,295	3,546	3,098
	TU dublin Owned Vehicles/Generator	2	2	1	1	2
	Fugitive Emissions	N/A	N/A	38	79	127
Sub Total		3,995	4,301	3,334	3,626	3,227
Scope 2	Purchased Electricity	5,978	4,491	3,231	3,793	3,313
Sub Total		5,978	4,491	3,231	3,793	3,313
Sub Total Scope 1 & 2		9,973	8,792	6,565	7,419	6,540
Scope 3	Student and Staff Commuting	11,503	11,827	10,949	11,271	10,810
	Expensed Air Travel	24	27	8	10	14
	Business Travel	1,579	1,556	293	27	396
	Waste	9	8	7	8	9
	Water	22	22	22	19	62
	Purchased Goods and Services	29,002	12,933	21,809	22,578	15,901
Sub total		42,139	26,373	33,086	33,913	27,192
Total Scope 1, 2 & 3		52,112	35,165	39,651	41,333	33,732

Table 1: TU Dublin baseline emissions campus environment and operations since 2018

When we estimate Scope 3 emissions as part of the TU Dublin footprint, we find that 18% of TU Dublin's total emissions are attributable to energy-related emissions in Scope 1 and 2, with the remaining 82% emissions arising from combined Scope 3 emissions, which include procurement, waste, water, and travel related to student and staff activities and commuting. Energy-related emissions are evenly distributed between gas and purchased electricity, with vehicles and fugitive emissions contributing small amounts to the overall total.

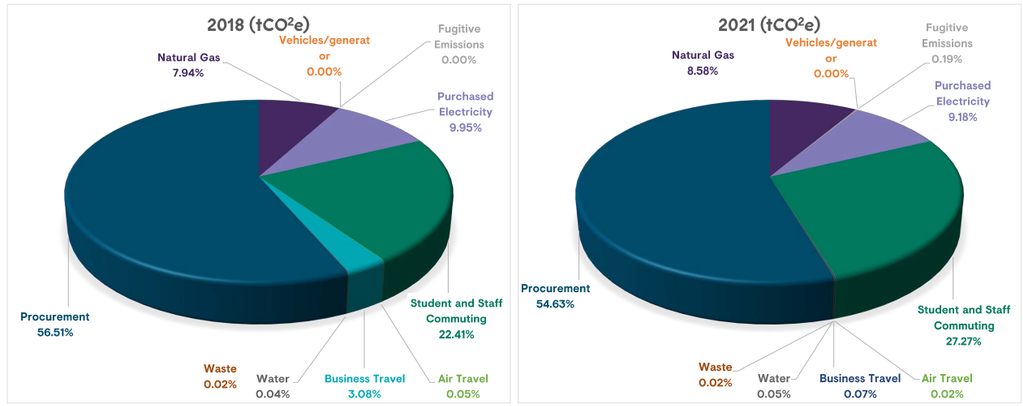


Figure 3: TU Dublin baseline emissions shown as a total across Scope 1, 2, and 3 activities for 2018 and 2021

[1]National Education for Sustainable Development Policy and Implementation Plan, National Implementation Plan for the SDGs, National Climate Action Plan 2023.

3.1.b TOTAL EMISSIONS AND THERMAL (HEATING AND TRANSPORT) EMISSIONS

The SEAI M&R reporting tool indicates that the average emissions over the GHG baseline period were 9,971 CO_2. This means that the maximum emissions below which TU Dublin must operate in 2030 are 3,306 tCO_2. The actual total energy-related emissions recorded in 2021 were 7,340 tCO_2. This does not include for emissions generated from new additional buildings.

3.1.c EXPECTED GROWTH IN EMISSIONS

This section provides an overview of planned increased growth in services planned between baseline and target years. It is expected that TU Dublin's planned projects will assist in decreasing operational emissions to reach our 2030 targets more globally and in some cases may qualify for deduction due the nature of activities supported. A full analysis of the energy and emissions impacts of these divestments and new building projects will form part of the work of the Climate Action Roadmap for 2023.

There are four new building projects currently underway and three planned for future use to 2030. The new Sports Science Health and Recreation Building on the Tallaght campus is due to be occupied imminently. Three projects are currently under construction in three campus locations – Áras Gael in Blanchardstown, the Academic Hub in Grangegorman and the Culinary Arts, Engineering and Teaching Building in Tallaght. Two new build projects are planned for the Grangegorman campus to commence in 2027- West Quad and the new FOCAS building facilitating the divestment of older, energy inefficient buildings on the Aungier Street campus and the Focus building on Camden Street which currently use fossil fuel based thermal heating systems. These new buildings will participate in the district heating systems in each location which are planned to move to fully renewable thermal heating sources before 2030. In terms of additionality, the University has plans to renovate a large warehouse structure on the Broombridge site as a home for a Design and Construct project (6000 m^2) to upskill the construction sector in modern methods of construction.

3.1.d PLANNED ENERGY RELATED CARBON REDUCTION ACTIVITIES (NEXT TWO-THREE YEARS)

Energy related carbon reduction activities will include, and not be limited to, the following activities:

- Develop a Register of Decarbonisation Opportunities.
- Develop a Building Stock Plan (as defined by EPBD) by the end of 2023.
- Update the Decarbonisation Pathway in line with TU Dublin's Risk Management Policy and Public Sector Climate Action Mandate.
- Establish Energy Efficiency Decarbonisation (EED) Expert Advisory Group drawn from TU Dublin Academic Researchers and Partners.
- Develop green criteria, evaluation, and prioritisation tools to review all campus development requirements against total emissions reductions impact to inform investment in line with our academic mission and concerning the total cost model (people, € invested, emissions avoided).
- Specify low-carbon construction methods and low-carbon cement material as practicable for directly procured or supported construction projects from 2023.
- Use digital construction practices to enable associated carbon data gathering and facilitate sustainability-based decision making through digital logbooks, materials passports, and environmental product declarations.
- Incorporate Life Cycle Assessment criteria and Whole Life Carbon design into all new buildings and major renovations.

3.1.e ANALYSIS OF SIGNIFICANT EMITTERS

The Grangegorman campus buildings are the largest significant emitter of CO_2e emitting almost 1,400 tCO_2e in 2021. The five buildings on the main Tallaght campus are emitting just over 1,200 tCO_2e as the second largest significant emitter. The emissions attributable to the Aungier Street building alone are almost equal to all the Tallaght campus buildings collectively. The nine Blanchardstown campus buildings together are the fourth most significant emitter with approximately 1,150 tCO_2e attributed and the Bolton Street building itself is contributing 800 tCO_2e. It should be noted that classification of buildings and campuses in diagrams below relates to historic SEAI M&R reporting information as per 2018 baseline.

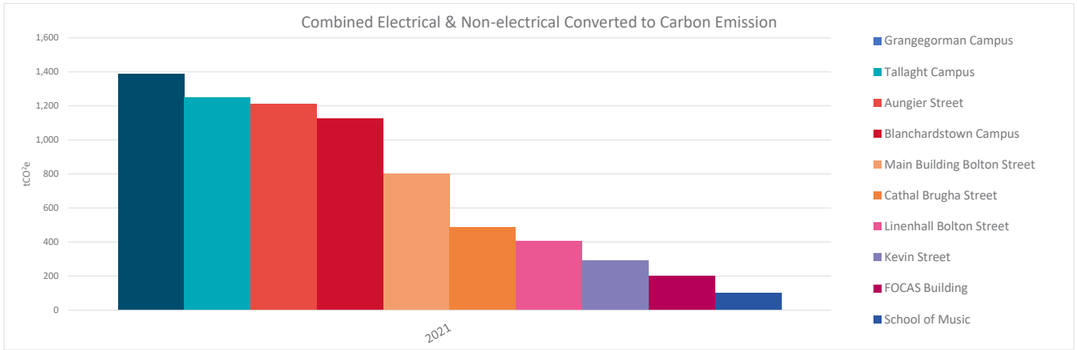


Figure 4: Combined electrical and non-electrical converted CO_2 emissions significant emitters.

3.1.f GAP TO TARGET TO BE ADDRESSED (NEXT TWO-TO-THREE YEARS)

The gap between the 2030 total GHG target of 3,306 tCO_2e and the 2030 non-electricity GHG target of 1,956 tCO_2e is 1,284 tCO_2e. This figure represents the reduction required from TU Dublin's own actions between 2021 – 2030 and is known as the 'gap to target'.

Based on current baseline figures from 2022, we estimate year-on-year emissions reductions of current building stock and additional emissions from new campus development to require an average reduction of 576 tCO_2e per year to 2030. Avoided emissions calculated since 2018 totalled 2,631 tCO_2e, which sets out year-on-year reduction achievement of 877 tCO_2e reduction per year during that period.

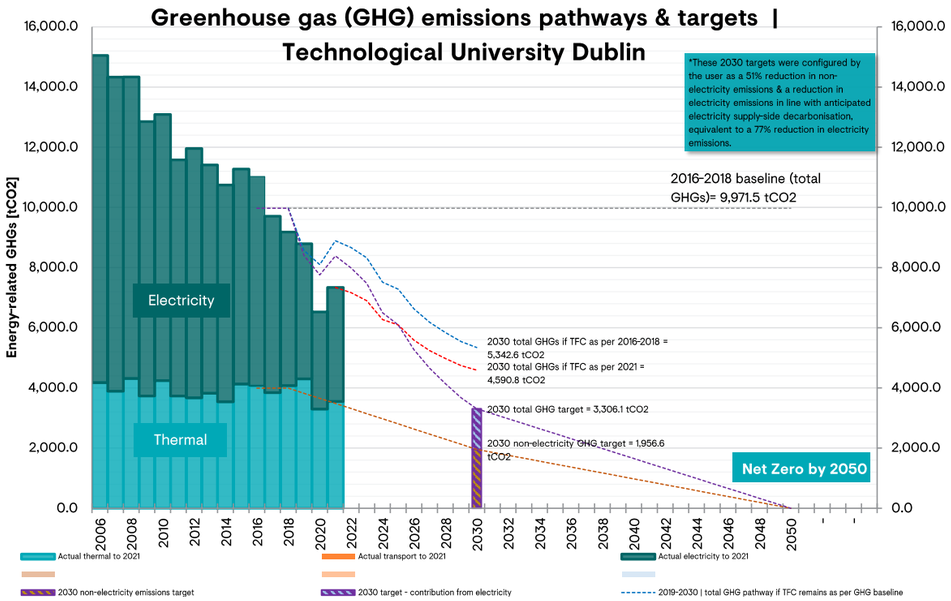


Figure 5: TU Dublin GHG pathways and targets as per SEAI M&R (2021)

3.1.g PROPOSED ACTIONS TO ACHIEVE ENERGY RELATED CARBON TARGETS

Decarbonising Thermal Heating

Natural gas is currently the primary source of space heating for TU Dublin. The challenge to decarbonise thermal energy is immense in terms of both the scale of work and related costs. As all public bodies have been instructed to do, our emissions savings relies on Government targets set out in the National Climate Action Plan to decarbonise the national grid to 70% renewable electricity by 2030 is met.

Sectoral risk arises from anticipated increased reliance on the national grid to decarbonise, and therefore, to distribute risk, a portfolio of additional measures to decarbonise our activities must also be developed in parallel. To that end, TU Dublin continues to review opportunities to implement renewable energy initiatives on campus. TU Dublin has developed district heating (DH) network systems on the Grangegorman and Tallaght campuses. These networks give the flexibility to use different, more sustainable centralised heating sources.

The Tallaght campus is heated by a DH network developed with South Dublin County Council, which uses waste heat generated from a nearby data centre, currently supplemented by water-source heat pumps. On the Grangegorman campus, the potential for deep-bore geothermal heating is being explored in partnership with Geological Survey Ireland (GSI), with the assistance of CODEMA and the Grangegorman Development Agency (GDA). An initial trial borehole to 1 km depth showed promising results, and the partners are actively exploring funding opportunities to develop a full production deep bore geothermal well that would largely decarbonise heat on the local network.

TU Dublin have submitted for funding in 2023 through the SEAI energy efficiency and decarbonisation Pathfinder programme to part fund a deep bore geothermal well on the Grangegorman campus to provide renewable heat to the already installed DH network, replacing existing gas-fired boilers. The chosen technology is a deep bore open geothermal doublet, extracting heat at 2.5 km and return water to a depth of approximately 1 km. It is proposed that most of the balance of funding will come from an EU Peace+ initiative where close partnership with GSI, Geological Survey Northern Ireland (GSNI), and CODEMA includes research and innovation, currently in submission. This will be an exemplar public sector project, with the potential to be replicated across other public sector locations, including universities, and large-scale infrastructure.

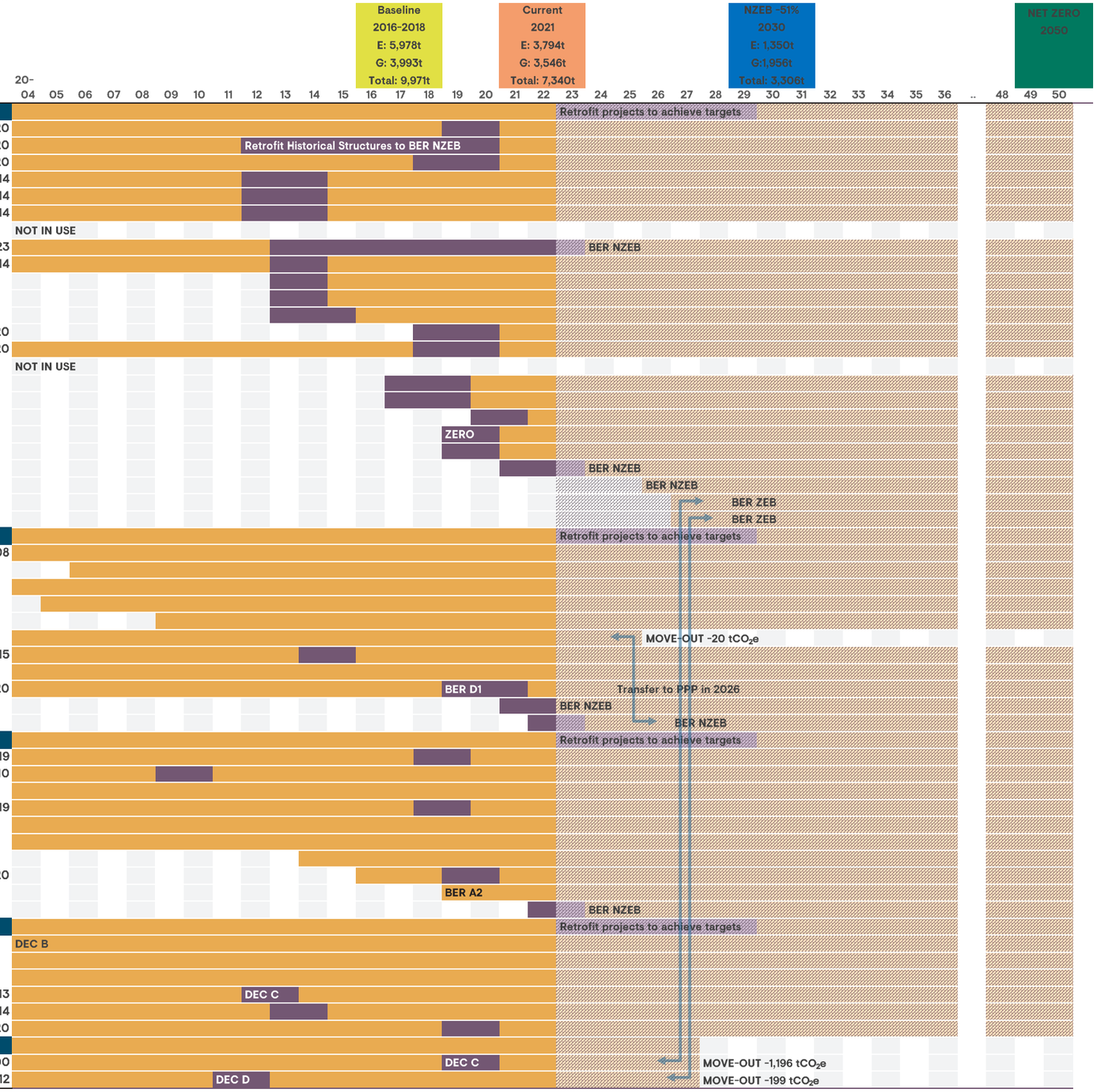
Through these and related performance enhancing initiatives, and subject to availability of funding, TU Dublin aims to provide a minimum of 70% renewable space heating on site by 2030 and will engage in opportunities to extend these benefits to local Sustainable Energy Communities (SECs) and Renewable Energy Communities (RECs).

DECARBONISATION ROADMAP

SUSTAINABILITY OFFICE @ TU DUBLIN

Upcoming Construction/ Retrofit | Complete Construction/ Retrofit | Building Remining Lifetime | Building Used Lifetime | To be Discountinued Buildings | New Builds

ID	Building Stock	Electricity tCO_2e	Gas tCO_2e	Electricity + Gas 2021 tCO_2e	Square Metres m^2	$kgCO_2e/m^2$	Tenancy	Built Year	Most Recent Retrofit
	Grangegorman Campus	**1,028**	**361**	**1,394**	**75,648**	**18.43**	**Hybrid**		
GC1	Broombridge	4		4	250	17.95	Owned	2000	2020
	Historical Cluster*:		10	10	3,485	2.79	Owned	1850	2020
GC2	Rathdown House*			128	2,313		Owned	1850	2020
GC3	St. Lawrence's Church				287		Owned	1850	2014
GC4	Glassmanogue				374		Owned	1850	2014
GC5	Bradogue				511		Owned	1850	2014
GC6	Church of Ireland				0		Owned	1860	
GC7	Clock Tower				1,428		Owned	1816	2023
GC8	Orchard House			8	268	29.85	Owned	1850	2014
GC9	Energy Centre				290		Owned	2014	
GC10	Hub 2				280		Owned	2014	
GC11	Greenway Hub		103	103	4,270	24.10	Owned	2016	
GC12	Lower House				4,392		Owned	1814	2020
GC13	Park House			234	7,000	33.43	Owned	1972	2020
GC14	Kirwan House				0		Owned	1830	
GC15	East Quad				16,300		Owned	2020	
GC16	Central Quad				36,044		Owned	2020	
GC17	Estates Yard				826		Owned	2021	
GC18	Print Workshop				315		Owned	2021	
GC19	Sports Changing				500		Owned	2021	
GC20	Academic Hub				12,600		Owned	2024	
GC21	Broombridge New				6000		Owned	2026	
GC22	West Quad				21,000		PPP	2027	
GC23	FOCAS New				4,500		PPP	2027	
	Tallaght Campus	**792**	**452**	**1,244**	**26,968**	**46.12**	**Hybrid**		
TC1	Main Building			918	16,300	56.32	Owned	1992	2008
TC2	Synergy			66	932	70.82	Owned	2006	
TC3	CASH			55	1,587	34.66	Owned	1999	
TC4	Student Union Building			17	290	58.62	Owned	2005	
TC5	Creche				323		Owned	2009	
TC6	Tech Dev Building	24	2	26	1,209	21.26	Leased	1996	
TC7	Premier House	11		10	1,808	5.74	Owned	1992	2015
TC8	Synergy Global	35	61	96	1,341	71.77	Owned	1999	
TC9	Airton Close				3,179		Leased	2000	2020
TC10	SSHRB				3,093		Owned	2021	
TC11	CAETB				5,200		PPP	2024	
	Blanchardstown Campus	**477**	**648**	**1,126**	**25,573**	**44.02**	**Hybrid**		
BC1	Aras Aontas		73	73	3,254	22.52	Owned	1999	2019
BC2	Linc (B)			75	2,282	32.87	Owned	2000	2010
BC3	Aras Croí			115	3,490	32.95	Owned	2002	
BC4	Aras Doras			151	4,584	32.94	Owned	2002	2019
BC5	Aras Eolas			126	3,821	32.98	Owned	2002	
BC6	Aras Fíos			127	3,862	32.88	Owned	2002	
BC7	Horticulture Building (T)			30	910	32.97	Owned	2014	
BC8	Aras Spraoi			42	1,570	26.75	Owned	2016	2020
BC9	Aras Ceangal (Connect)			59	1,800	32.78	Owned	2019	
BC10	Aras Geal				4,000		PPP	2024	
	Bolton Street	**477**	**856**	**1,333**	**39,317**	**33.90**	**Hybrid**		
BS1	Bolton Street	272	528	801	24,612	32.53	Owned	1911	
BS2	81 Caple Street	8		8	166	45.45	Owned		
BS3	E Block	19		19	1,461	13.13	Owned		
BS4	Linenhall	144	264	408	9,921	41.12	Owned	1963	2013
BS5	Beresford Street	22	64	86	1,957	44.09	Owned	1950	2014
BS6	Aviation Tech Centre	11		11	1,200	9.39	Leased	1980	2020
	Aungier Street	**593**	**824**	**1,416**	**26,923**	**52.60**	**Owned**		
AS1	Aungier Street	479	734	1,214	23,908	50.76	Owned	1994	2000
AS2	FOCAS	114	89	203	3,015	67.21	Owned	2001	2012
	Total	3,794	3,546	7,340	194,429				



* The Historical Cluster comprises 18th-century buildings, including Rathdown House, St. Lawrence's Church, Glassmanogue, and Bradogue. These structures are located close to one another and currently share a combined energy measurement system.

Figure 6: Initial Decarbonisation Roadmap as of March 2023

3.1.h TU DUBLIN DECARBONISATION ROADMAP

To illustrate TU Dublin's current and anticipated energy demand relative to an overall decarbonisation pathway to net zero, an overview by campus and buildings will be refined to indicate key targets with milestones for reviewing our emissions profile across 2025, 2030, 2040 and 2050 time horizons. (Figure 6)

3.2 ACHIEVING THE ENERGY EFFICIENCY TARGET (50% IMPROVEMENT BY 2030)

3.2.a ENERGY EFFICIENCY BASELINE

Baseline figures for measuring TU Dublin's energy efficiency improvements constitute an average usage between 2006-2008. During this period, the three original institutions of Dublin Institute of Technology, Institute of Technology Blanchardstown, and Institute of Technology Tallaght reported as separate entities. In 2021, the first joint reporting through the SEAI M&R tool was conducted, where all campus locations were reported under one organisational footprint.

The top 10 attributable consumers of energy reported during that baseline period are charted in Figures 7 and 8 for electricity and non-electrical energy consumption. With regards to electricity, top significant users include the five buildings on the Tallaght campus reported as one user, DIT Aungier Street, DIT Kevin Street, the entirety of the Blanchardstown campus buildings as one user, DIT Bolton Street main building and DIT Cathal Brugha Street. With regards to non-electrical energy consumption, significant users at the baseline period include DIT main building Kevin Street, the five buildings on the Tallaght campus reported as one user, six buildings on the Blanchardstown campus reported as one user, DIT Bolton Street main building and DIT Aungier Street.

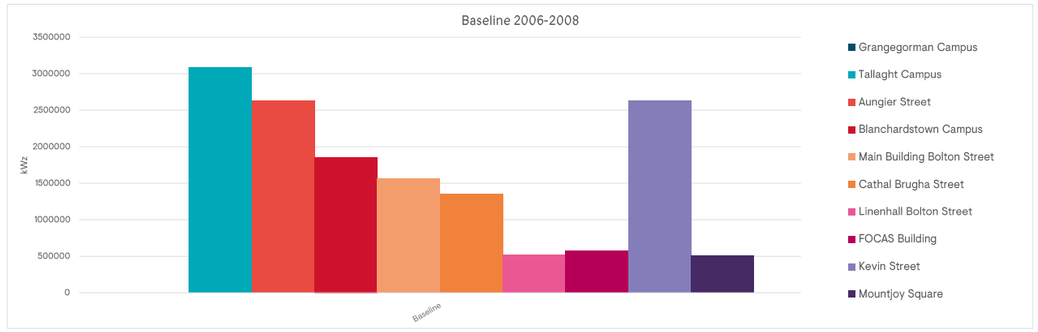


Figure 7: Top 10 MPRNs - Attributable consumption (kWh) baseline (2006-2008) as per SEAI M&R

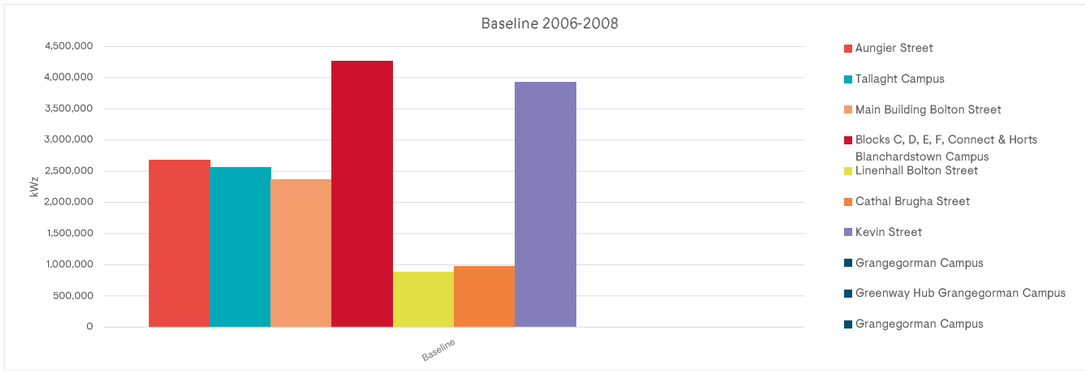


Figure 8: Top 10 GPRNs- Attributable consumption (kWh) baseline (2006-2008) as per SEAI M&R

Of the top five significant energy users from the baseline period, Kevin Street and Cathal Brugha Street have been divested and accommodated in new buildings on the Grangegorman campus. The remaining three significant energy users are the five buildings on the Tallaght campus, the nine buildings on the Blanchardstown campus and the main building at Bolton Street. The top user of electrical energy during the baseline years used on average more than 2,350,000 kWh/year with the top five users combined using approximately 11,800,000 kWh/year. The top user of non-electrical energy used on average just under 3,200,000 kWh/year with the top five users combined using approximately 15,800,000 kWh/year. Total energy consumption of the top five energy users during that period was approximately 27,600,000 kWh/year.

3.2.b ENERGY EFFICIENCY IN TARGET YEAR IF NO NEW PROJECTS IMPLEMENTED

The SEAI M&R reporting tool indicates that the average annual energy consumed over the energy efficiency baseline period was 36,983,394 kWh/year. This means that the maximum energy consumption below which TU Dublin must operate in 2030 is 18,491,697 kWh. The actual total annual energy consumption recorded in 2021 was 27,943,193 kWh.

3.2.c PLANNED ENERGY EFFICIENCY ACTIVITIES

Actions to achieve increased energy efficiency will include, and not be limited to, the following activities:

- Develop a Register Energy Efficiency Opportunities.
- Develop a Building Stock Plan (as defined by Energy Performance of Buildings Directive (EPBD)) by the end of 2023.
- Develop TU Dublin building stock retrofit programme (and associated targets) to be completed by the end of 2023.
- Achieve Nearly Zero Energy Buildings (NZEB) targets for buildings built, retrofitted, or leased (from 2025) and Zero Energy Buildings (by 2030) by scheduling a minimum of 3% of existing buildings stock per annum to undergo energy improvements, subject to funding being made available.
- Subject to funding and resourcing, commence a deep retrofit of at least one building in 2023 in pursuit of the 2030 51% target.
- Achieve Display Energy Certificate (DEC) A rating or better for 60% of our building stock by 2030.
- Optimise the use of our existing campus infrastructure assets to achieve optimal utilisation of buildings in line with our academic mission.
- Recertify ISO 50001 certification by 2023.

Existing Buildings

- Undertake data gathering and consider the long-term (to 2050) retrofit key performance indicators to upgrade all building stock to Nearly Zero Energy Buildings (NZEB) or Zero Energy Buildings (ZEB) as outlined in the recast EPBD and Energy Efficiency Directive.

3.2.d ANALYSIS OF SIGNIFICANT ENERGY USERS

TU Dublin Building Stock

TU Dublin's building stock currently includes 194,429 m² in 45 buildings across five campus locations. Most of these buildings are owned by TU Dublin, with a small number of leased buildings. In addition, there are live plans to build seven new buildings and to divest of three older buildings. This will potentially bring the entirety of the building stock to 49 buildings by 2030.

TU Dublin Campus	Site (m^2)	Gross Internal Area (m^2)				No. of Buildings					
		Existing	New Planned	To be Discountinued	Total	Current Owned	Current PPP/Leased	NEW Planned Owned	NEW Planned PPP/Leased	To be Discountinued	Total
	As of 2023	As of 2023	By 2030	By 2030	By 2030	As of 2023	As of 2023	By 2030	By 2030	By 2030	By 2030
TU Dublin Grangegorman	225,000	75,648	44,100		119,748	17	2	4			23
TU Dublin Tallaght	182,700	26,968	8,293	-1,209	34,052	7	2	1	1	-1	10
TU Dublin Blanchardstown	230,900	25,573	4,000		29,573	9			1		10
TU Dublin Bolton Street	12,275	39,317			39,317	5	1				6
TU Dublin Aungier Street	10,000	26,923		-26,923	0	2				-2	0
Sub Total	660,875	194,429	56,393	-28,132	222,690	40	5	5	2	-3	49

Table 2: TU Dublin campuses building stock inventory

TU Dublin's current buildings register includes 45 extant buildings. Of these 45 buildings, the M&R reporting tool is recording data for two buildings in Aungier Street, nine buildings on the Tallaght campus, nine buildings on the Blanchardstown campus and five buildings in Bolton Street and Linenhall for both electricity and non-electricity energy. The Broombridge building reports one electricity meter. This covers 27 of the 45 buildings. The Grangegorman campus is reporting 18 buildings to one electricity meter and four gas meter reporting data points. Group reporting of buildings against single meter points for both electricity and non-electricity currently makes it difficult to disaggregate data to get a full picture of significant energy users per building.

The M&R platform lists top energy users for 2021 as illustrated in Figures 9 and 10 for MPRN and GPRN reporting respectively. In terms of electricity, the Grangegorman campus buildings (18 buildings) together report almost 3,000,000 kWh/year as the top electricity user with the main buildings on the Tallaght campus (five buildings reported as one user) as the second highest user with just over 2,000,000 kWh/year. The building in Aungier Street and on the Blanchardstown campus (nine buildings reporting as one user) are the next two significant electricity users at approximately 1,300,000 kWh/year each. The Bolton Street building uses approximately 750,000 kWh/year.

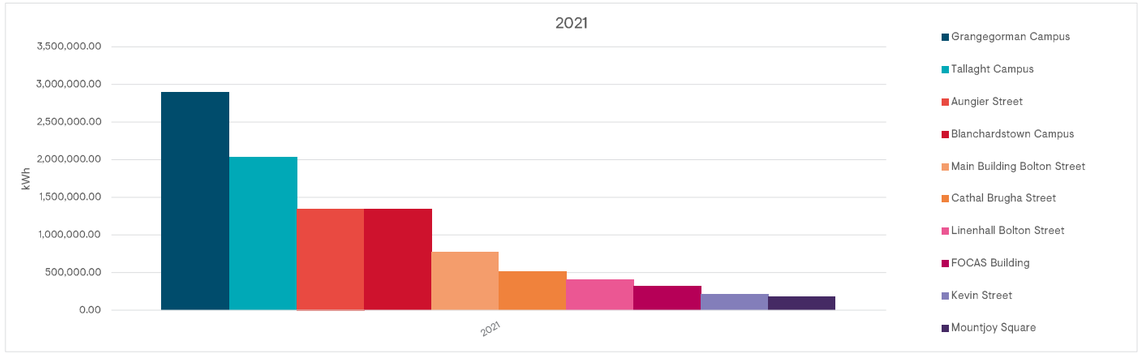


Figure 9: Top 10 MPRNs - Attributable consumption (kWh) in 2021 as per SEAI M&R (2023)

The Aungier Street main building constitutes the largest significant energy user of non-electrical energy using more than 3,500,000 kWh/year. The main buildings on the Tallaght campus (five buildings reported as one user), the Bolton Street building and seven of the nine buildings on the Blanchardstown campus are approximately equal as the next three significant non electricity users with approximately 2,500,000 kWh/ year. The Linenhall building is the next largest user with approximately 1,200,000 kWh/ year.

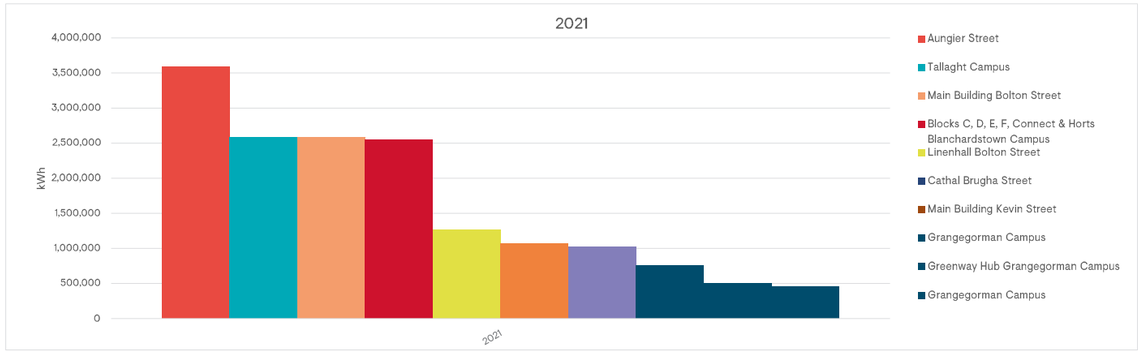


Figure 10: Top 10 GPRNs- Attributable consumption (kWh) in 2021 as per SEAI M&R (2023)

3.2.e GAP TO TARGET TO BE ADDRESSED

Based on the 2006-2008 benchmark year TU Dublin is required to reduce Total Primary Energy (TPE) by 50% by year 2030. In line with the 2020 targets TU Dublin has already reduced TPE by 33% on the benchmark year resulting in a gap to target of 17%. TU Dublin will continue to target a 2.4% TPE reduction per year to achieve our Energy Efficiency Target.

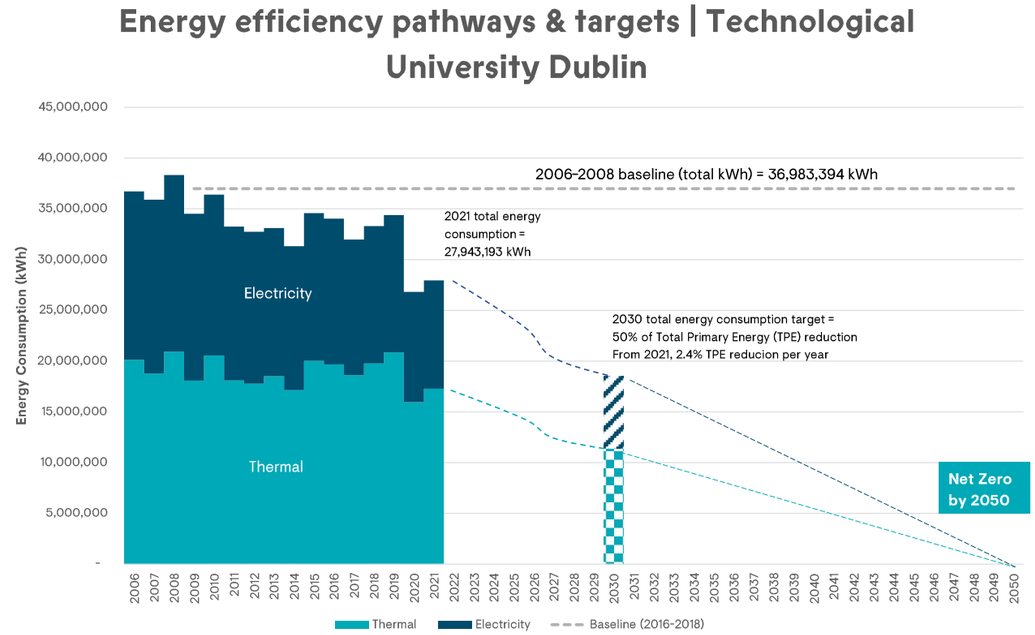


Figure 11: TU Dublin energy efficiency pathways and targets as per SEAI M&R (2021)

3.2.f PROPOSED ACTIONS TO ACHIEVE ENERGY EFFICIENCY TARGET

Using Less Energy

TU Dublin will continue to promote demand reduction wherever possible through participation in the Reduce Your Use campaign, Green Labs certification procedures, reviewing building opening hours, assessing and reviewing Information and Communication Technologies (ICT) loads concerning auto-energy savings systems, and enhancing overall energy management systems at building level. In addition, demand response technologies will be investigated to incorporate measures across building stock.

Optimising our Assets

A review of blended working policies to ensure that full advantage from a climate action perspective can be taken provides an opportunity to support remote/hybrid working, which will change space requirements and reduce energy use. Working models will be reviewed within an assessment of TU Dublin's building programme to ensure space optimisation is achieved. Where practical, zoned heating and lighting will be incorporated to align servicing of buildings to utilisation. The University will continue to achieve good space utilisation and rigorously interrogate the need for additional spaces.

Deep Energy Retrofit Pilot for 2023

TU Dublin have submitted for funding in 2023 through the SEAI energy efficiency and decarbonisation pathfinder programme to commence a deep retrofit project. The Áras Fíos building comprises 3862 m² over three levels with a roof top plant room and was one of four buildings constructed in 2002 on the Blanchardstown campus. A thermal imaging survey was completed in January 2021 at the Blanchardstown campus on the 2001 and 2002 buildings, which identified several areas of heat loss. The project proposal is to review, in depth, areas identified in the thermal survey and rectify the heat loss through deep energy retrofit measures including, entrance areas, doors, windows and the roof. This review will include, but is not limited to, optimal operation energy efficiency utilising passive architectural solutions, optimal life cycle energy and environmental impacts from materials, optimal thermal, daylight and air quality and advanced circularity utilising MMC and modularised solutions. By taking a more in-depth look at heat loss and other energy performance gaps in the pathfinder building, a programme of measures for implementation can be created to replicate at scale across other buildings within the TU Dublin building stock to decarbonise through deep retrofit measures.

Energy Efficient Buildings

The retrofitting of existing buildings to sufficient standards to reach our energy efficiency improvement targets will require significant financing. With 45 buildings and more than 194,000 m² of accommodation space to be upgraded at a nominal cost of €2500/m² to retrofit to BER B2 would exceed €480 million and may not provide sufficient energy reductions to meet our absolute emissions targets. To more accurately quantify the scope of works and costs, utilising the DEC advisory reports as a start, we will undertake feasibility assessments of all existing buildings to determine retrofit requirements and energy source considerations to ensure our climate action targets can be attained. TU Dublin will develop a high-level prioritised retrofit plan for buildings on all campuses as a priority action of the Energy Management Team established through the ISO 50001 process.

Design for Efficiency

Embedding energy efficient design practice and expertise at the earliest stages of all new projects as they develop will ensure that lifecycle costs, energy efficiency and carbon reductions are considered at the outset, recognising the goal of absolute reduction across the University boundary. In this way, we will ensure maximum value for money and the greatest carbon savings as a whole life consideration across buildings, building systems, services, and materials.

We will introduce systems to include the environmental costs of carbon using the Public Spending Code guidance on measuring and valuing changes in GHG emissions in economic appraisals to feed into the business plans for proposed projects.

4 OUR WAY OF WORKING

4.1 SUSTAINABILITY ACTIVITIES REPORT

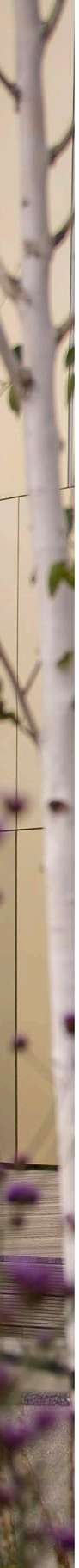
TU Dublin endeavours to offer a range of sustainability activities suitable for all members of the TU Dublin community to participate in and engage with. The scale, format, and location of our activities depend on the activity purpose and target audience. Sustainability activities operate as both long-term planned and ad-hoc events, including;

- Series of annual University sustainability events.
- Celebrating relevant UN international days.
- Hosting sustainability events led by community partners.
- Supporting students and staff in the development of new sustainability activities.

In conjunction with training and education activities planned as per section 2.2, a summary of Sustainability Roadmap Actions and Activities will be included in the TU Dublin Annual Report.

4.2 EMISSIONS ASSOCIATED WITH AIR TRAVEL

TU Dublin is reviewing travel policies in compliance with circular 01/2020 procedures for offsetting the emissions associated with air travel.



4.3 ENERGY AND ENVIRONMENTAL MANAGEMENT SYSTEMS AND ACCREDITATION

TU Dublin will implement and achieve ISO 50001 certification by end of 2023.

4.4 GREEN PUBLIC PROCUREMENT

TU Dublin intend to implement Green Public Procurement (GPP) processes in new sourcing of goods, services and work to ensure a reduced environmental impact.

- Develop sustainable purchasing practices in our procurement policies and procedures supported by Environmental Protection Agency (EPA), GPP, and Office of Government Procurement (OGP) guidance.
- Develop/train staff and engage with suppliers to be knowledgeable about GPP.

Review purchasing needs considering the changing nature of work, learning and teaching, and research, digital infrastructure and resilience enhancement.

- Implement circular economy principles.
- Provide for the inclusion of measurable data for greenhouse gas (GHG) emissions savings in tenders and is then brought into contracts to provide figures for energy consumption, waste generated, circular economy and financial savings, with savings reviewed for ringfencing for recirculation into other sustainability projects and initiatives.

Review purchasing categories in detail, identifying ongoing contracts and critical timelines of contracts up for renewal. Where new contracts are considered;

- Include green criteria in our procurement processes in a manner that allows suppliers sufficient timelines and understanding to respond.
- Ensure implementation by establishing gateway signoff for business cases to procure goods and services with a minimum 10% award weighting for green award and selection criteria. Increase to 30% over time as appropriate by 2024.
- Include contract clauses requiring suppliers to monitor the environmental footprint of activities carried out by them to fulfil the contract, provide data verification, and record the improvement performance incrementally over the contract period.
- All new public sector procurement contracts for delivery and haulage should specify zero emissions vehicles where possible.

Review ongoing contracts, identify the largest suppliers to measure emissions associated with TU Dublin purchasing and identify areas in which we can influence emissions reductions.

- Review existing contractual arrangements to ascertain how quickly green criteria can be incorporated into the provision of services and products. Make the renewal or extension of the contract contingent on achieving TU Dublin climate action targets.

Increase sustainable purchasing criteria and performance of suppliers using future-proof frameworks provided by OGP through GPP guidance.

- Apply lifecycle costing principles at pre-procurement, tender evaluation, and contract monitoring phases to mitigate key environmental impacts of purchased products and services.
- Implement innovation procurement for new green solutions to support green fuels. innovative renewables processes, and circular economy initiatives.

4.5 RESOURCE USE

The Climate Action Mandate requires public bodies to review any paper-based processes and evaluate the possibilities for digitisation, so it becomes the default approach.

TU Dublin will review paper-based processes to understand the potential for digitisation.

TU Dublin will review purchasing requirements to reduce or eliminate single use disposables (including cups, plates, and cutlery) on campus to reduce or eliminate waste.

5 OUR BUILDINGS AND VEHICLES

Display Energy Certificates

TU Dublin will display up-to-date Display Energy Certificates (DECs) in each campus building 'frequently visited by the public' to clearly show energy use. These will be in place by end 2023.

Fleet Conversion

TU Dublin currently owns and manages two diesel vans with 1.6L and 2.0L engine capacity. These vehicles are planned for replacement with zero emission vehicles in 2023 through procurement process, meeting the minimum targets set out by SI381/2021 Clean Vehicles Directive.

Procurement and Design Procedures

TU Dublin will update the procurement and design procedures to comply with the requirement for no fossil fuel heating systems will be installed from 2023.

Sustainable Mobility

TU Dublin will promote the use of bicycle and shared mobility options as an alternative to car use among employees and visitors by creating and maintaining facilities that support sustainable transport and mobility and promote active travel health benefits. TU Dublin will create secure, accessible bicycle parking which is simple for cyclists to recognise and increase use.

TU Dublin will review all on-site car parking considering public transport services to promote the use of sustainable transportation alternatives whilst ensuring accessible parking is maintained for those with physical mobility issues.

5.1 UPDATES AND REPORTING

- This Climate Action Roadmap will be updated within three months of issuance of additional guidance from SEAI and EPA if necessary to reflect revised mandate requirements.
- The roadmap will be reviewed and updated annually, including summary progress against the plans set out in the previous year's roadmap, assess progress against meeting those requirements and include a statement on when they will be achieved or delivered.
- SEAI M&R system will be used to track progress towards energy efficiency and energy related carbon targets as well as the SI281/2021 Clean Vehicle Directive procurement targets.
- TU Dublin will report annually on progress on implementation of Green Public Procurement (GPP) using the template provided by the Environmental Portection Agency (EPA).
- Climate action roadmap targets and progress will feature in TU Dublin annual reports.

6 CONCLUSION

From the baseline analysis provided in section 3.1.a on TU Dublin carbon emissions reduction since 2018, it indicates a total emissions reduction of 34%. TU Dublin continues to pursue renewable on-site and community networked energy solutions. However, we anticipate that even with the additional operational energy loads and embodied carbon produced from buildings planned and in construction, a programme of cross-campus deep retrofit, and the intensified use of existing buildings across our campuses, that a sustained rate of total emissions reductions over the coming years will be significantly challenging.

Our current carbon emission gap to target, without additionality and assuming continued reductions in energy use and increases in energy efficiency, is currently projected at 3,306 tCO_2 from our current position of 9,971 tCO_2. With the expectation that the electricity grid will decarbonise by 70% by 2030, TU Dublin's emissions reductions are estimated as 1,284 tCO_2. To deliver on our Climate Action targets and ensure we have the resources to support the transition to carbon neutrality, significant investment is required. As set out earlier, the retrofitting of existing buildings to sufficient standards to reach our energy efficiency improvement targets will require significant financial investment, estimated at €480m, to achieve the National Climate Action Plan targets by 2030.

To more accurately quantify the scope of works and costs for all retrofit and new buildings updates will require feasibility assessments of both retrofit requirements and energy sources to ensure our climate action targets can be attained. TU Dublin will develop a high level prioritised retrofit plan for buildings on all campuses over the next year as a priority action of the Energy Management Team established through the ISO 50001 process.

This financial investment in our building stock and sustainable energy solutions to achieve absolute reductions, rather than a separate exercise, must be accompanied by a continuing investment in our people, to nurture their sustainability mindsets and build upon their expertise to ensure we offer relevant education, research and innovation, and engagement necessary to support society at this critical time.

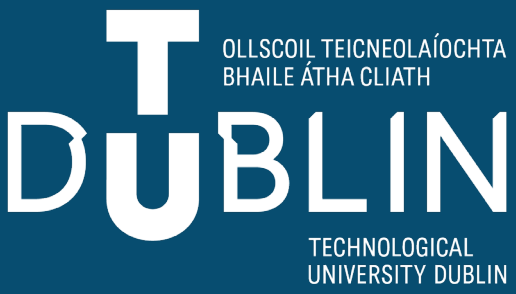
6.1 GAP TO TARGET FOR INVESTMENT AND ACTIONS

The detailed actions listed in this roadmap will be enabled through the following overarching gap to target supporting actions that TU Dublin intend to pursue.

- Advocate directly and through sectoral representative bodies for multi-annual budgeting for capital infrastructure requirements. This includes consolidated funding streams to deliver strategic decarbonisation impact across two-to-seven years minimum programme to ensure full life-cycle costing (€ invested/kWh/ CO_2 reduced) to create lasting societal value and mitigate further climate risk.
- Establish green budgeting internally to enable funding for and co-funded delivery on decarbonisation implementation programmes and timelines in line with our Climate Action Roadmap, and in anticipation of external funding opportunities. Allocation of budgeting to be informed by return-on-investment models with respect to climate action impacts on people and emissions reductions targets achieved and reported to the University Executive Team (UET).
- Develop and enhance information and reporting systems to support the measuring, monitoring of climate action plan gap-to-target performance to achieve of our targets.
- Work with the Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) and other appropriate national government departments and agencies, and European Union (UN) bodies, to identify appropriate external funding vehicles to obtain private equity funding opportunities.

6.2 CONCLUDING REMARKS

TU Dublin's Climate Action Roadmap sets out a route towards meeting our obligations under the Public Sector Climate Action Mandate, but also more broadly our ambitions to develop responsible citizens, advance new knowledge, shape policy, and transform our campus infrastructure and operations into a living breathing beacon of sustainability. Our roadmap is the first step to developing a sustainability strategy that is ambitious and wholistic. It calls on every person within the TU Dublin – students, educators, researchers, professional services, alumni, industry, global network of partners, and our local communities to engage in climate action and to work collectively to limit global warming to ensure a safe future for our planet the next generations.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