UCD Environmental Baseline Review 2019

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Introduction

As Ireland's Global University, University College Dublin undertakes world-class teaching and research in areas relating to environmental sustainability including climate change, renewable energy, biodiversity, sustainable transport, waste reduction and recycling. As a large organisation and a community of over 32,000 students and staff, there are also opportunities to put our teaching and research into practice and to endeavour to be an exemplar in the way our campus operates and how we go about our daily lives. The UCD Green Campus initiative seeks to harness the knowledge, energy and motivation of our diverse community of students and staff in order to find ways to work together to improve our campus environment, to make others aware of environmental issues and to promote engagement.

This document was prepared as part of the An Taisce Green Campus programme and provides an overview of progress to date, outlines environmental targets, will be used to identify areas where improvements can be made and sets a baseline upon which improvement can be measured in each of the thematic areas.

Our Community

The UCD community is composed of over 29,000 students and 3,500 staff. It is important to note that through commuting, working, learning and enjoying sports and recreational facilities, the UCD Community can have a significant impact on the environment – both positive and negative. Being part of this connected community, who share a collective goal of betterment through education and research, offers meaningful opportunities to work together to find ways to improve our environmental sustainability.

It is important to note is that approximately 7,000 students graduate from UCD each year. There is an opportunity to ensure that all of these students, through their time spent in UCD, will continue on their journey through life with an understanding and appreciation of environmental sustainability. By implementing best practice management techniques, publicising sustainability efforts, and ensuring engagement and participation by students and staff, the University aims to make this a reality.

UCD seeks to ensure that all our graduates are well-informed and environmentally aware citizens, ready to tackle the various environmental challenges the world is facing and become leaders in their workplaces, communities and homes. The UCD Green Campus Initiative, which is supported by An Taisce, is a key element of this vision.

Our Campuses

Belfield, our primary campus has a daily population of approximately 30,000 people, making it larger than most Irish towns. This comparison to towns or cities does not end there. The Belfield Campus has all the attributes of a small city, being home to a growing number of students who live on campus, a place of work and education as well as a place of recreation for our growing population and visitors alike. The 335-acre Belfield Campus is known for its woodlands, lakes and open spaces. This beautiful parkland setting provides space for recreation and sport and plays an important role in facilitating a balanced lifestyle.

Like a city, our campus buildings are varied and diverse, from our wonderful period houses such as Ardmore House and Belfield House, to the modern, state-of-the-art educational, office and laboratory facilities such as in the O'Brien Centre for Science. The functions of the campus buildings are equally

diverse and include office space, lecture theatres and laboratories, meeting rooms, classrooms, residences, a 50m swimming pool, gym, cinema, shops, restaurants and cafes.

Our Blackrock campus, although not on the same scale as Belfield has many of the same attributes, containing student residences, teaching and studying areas as well as office accommodation and hospitality facilities on a parkland campus. UCD Lyons Research Farm is the teaching and research facility operated by University College Dublin outside Newcastle, Co Kildare, about 30 kilometres west of the main UCD Campus at Belfield. UCD Lyons Research Farm sits on approximately 220 hectares and is part of the original Lyons Estate, purchased by UCD in 1963.

Purpose and Sources of Information

The Environmental Baseline Review was developed in order to provide a holistic overview of the management of the University from a number of environmental perspectives. The main purpose of the document is to facilitate the UCD Green Campus initiative, which involves students and staff working together in order to improve the sustainability of the campus, raise awareness and engagement and ultimately achieve the *Green Flag* for UCD. This document should not be considered an exhaustive environmental audit of the campus, but presents a good general overview of a number of areas which will allow those interested to gain a robust introductory knowledge from which further studies or reports can be developed.

This document, which is publicly available, is also intended to provide students and staff who are interested in becoming involved in the Green Campus Committee with the knowledge needed to allow them to consider projects and initiatives that they would like to get involved in that would result in improvements in environmental sustainability. These can be either within or outside the campus environment and will be supported by the Green Campus Committee in UCD where possible.

For information on the An Taisce Green Campus programme, please see http://www.greencampusireland.org/ or http://ucdestates.ie/about/sustainability/green-campus/ for more information on the UCD Green Campus initiative.

The Environmental Baseline Review aims to:

- Provide a clear view of the range of the campus' impacts and establish a baseline in each thematic area.
- Ensure that significant areas are not overlooked.
- Identify areas where current practice is good or areas where current practices are lacking.
- Communicate the impacts to the campus community.
- Help to prioritise actions to be taken.

The Green Campus Committee has identified several "themes" or areas where projects will be undertaken. These are as follows:

- Biodiversity
- Energy
- Water
- Waste Management and Recycling
- Sustainable transport

A number of reports, publications and surveys have been developed or are regularly undertaken by Estate Services which have informed this review:

- UCD Strategic Campus Development Plan 2016-2021-2026
- UCD Travel Plan 2016-2021-2026
- UCD Travel Plan Update 2017
- Annual Energy and Water Review (ISO50001)
- Annual Commuting Survey
- UCD Bioblitz (2016)

There have also been various reports completed relating to particular aspects of campus management, for example waste audits, energy audits, cordon surveys (commuting) which have also been used to inform this report.

Structure of the Environmental Baseline Review

Within this document, each theme is explored in terms of the management, policy and publications, key statistics as well as outlining some of the initiatives that have been delivered or are currently being progressed relating to the theme in question. The baseline environmental review also seeks to communicate how the UCD Community can play their part in ensuring the University reaches its goals under each of the themes and outlines some potential areas where the Green Campus Committee can become involved.

The report aims to be non-technical in nature with the aim of being accessible and informative to all. The information presented is not exhaustive; during the implementation of projects the Green Campus Committee and other groups will be provided with detailed data where necessary, such as energy and water consumption and the full data from the Bioblitz conducted on campus (biological survey).

Green Campus Programme

The University entered the *An Taisce Green Campus Programme* in April 2016. This will form an intrinsic part of the community engagement process and the promotion of the UCD community involvement in environmental initiatives.

By following the Green Campus *7 step programme*, the Green Campus initiative seeks to facilitate and encourage the involvement of students and staff in environmental projects, raising awareness across the campus and to ultimately achieve the An Taisce *Green Flag* for UCD.

A Green Campus Committee has been formed, tasked with implementing the 7 steps and identifying and undertaking a range of environmental projects which will improve the Universities “green” credentials and make students and staff more aware of what they can do to be more environmentally sustainable.

The Green-Campus Programme (based on the successful Eco-Schools/Green-Schools Programmes) provides a means to foster environmental awareness in a third level institution in a way that links to everyday activities and study and ties in with the operational requirements of a complex multi-use facility. The Programme is based on the EU EMAS (Eco-Management and Auditing System), and the Seven Steps also align with the 'plan-do-check-act' management method used in ISO 14001:2000 Environmental Management System Standards.

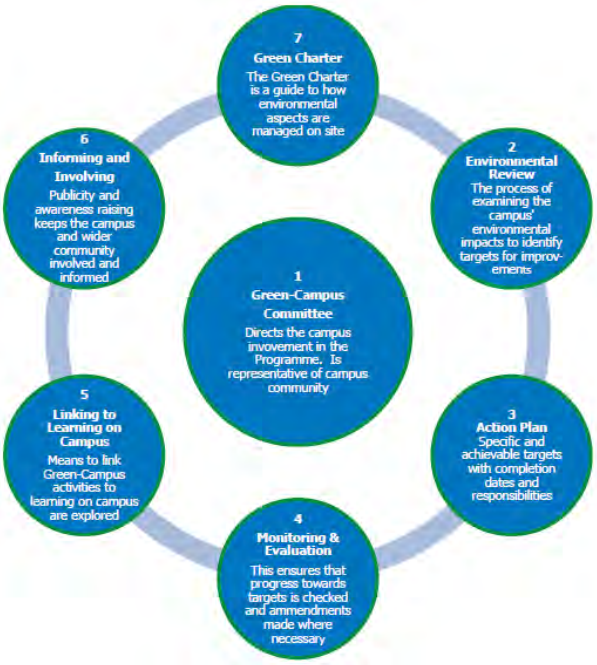

Fig. 1 The seven steps of the Green Campus Programme

University Management Principles

The University is operated and managed in a way that seeks to meet student and staff requirements whilst minimising negative environmental effects. A number of guiding principles helps to ensure this occurs and are detailed in this section.

Budgetary and procurement constraints and ensuring best value for University must be considered at all times. To this end, the principles of BATNEEC (Best Available Technology Not Entailing Excessive Costs) are typically employed when investments are being made in University infrastructure, services and systems. This means that the best technologies and techniques are investigated when undertaking any works, along with their cost and potential environmental benefits. The technology that provides the best results within budget is chosen where possible.

Ensuring synergy between projects is essential to ensuring best use of resources. This is done in a number of ways, including strategic planning, annual action plans and management reviews. Ongoing communication between management is essential to ensure potential synergies are not missed.

Efficient use of available resources is a fundamental management principle and is crucial both in terms of resource and budgetary sustainability. An example of this is in the University space management policy, where all spaces and occupants is recorded and audited. This, along with our room allocations system ensure space is used efficiently which means additional space will not be built unnecessarily.

The adoption of best management practices and systems where possible is another core principle which has relevance in this area. Controls, systems and standards can often be adopted at low cost but can have a significant positive effect on the area under management. An example would be in UCD's adoption of the international standard in energy management, ISO50001, for both our energy and water management systems. This standard, which UCD received certification for in 2016, focuses on the adoption of procedures, systems and policies which result in energy and water being managed in a considered and holistic way.

What is important to note is that the University does not need to spend large sums of money to introduce sustainability focused projects – very often, the way in which we use and manage our resources either at an individual or community level can provide significant positive impacts above and beyond large infrastructural projects. This is a key

UCD Groups, Units and Initiatives with links to Environmental Sustainability

VP for Campus Development

The office of the VP for Campus Development is responsible for the sustainable development of the University estate in a way that meets the requirement of the University and in support of the University Strategy. The Green Campus initiative which primarily focuses on the environmental sustainability of the campus, therefore comes under the responsibility of the VP for Campus Development.

UCD Estate Services

UCD Estate Services is charged with the management of the University Estate. This includes the physical infrastructure of the University campuses such as building and grounds maintenance, capital development, energy and water infrastructure, woodland, landscape and playing pitch management. Estate Services also manages a number of services, including hospitality and food services, conferences and events, the college collection, Copi-Print, telephone services, traffic and fleet management, security, waste management, energy and water management, residential services, Summer at UCD, room allocations and audio-visual services.

UCD Estate Services acts as custodian of the University estate and is responsible for the sustainable development of the campus to meet the needs of the University. The primary goals for Estate Services are as follows:

- Supporting teaching, research and innovation and ensuring that our facilities meet the needs of a global University.
- Providing for the recreational and sporting needs of the University community.
- Managing campus resources in an environmentally sustainable way.
- Providing services to ensure the smooth operation of the University.
- Ensuring a safe and attractive campus environment for students, staff and visitors.

UCD Estate Services have co-ordinated the developed this document in conjunction with the Green Campus Committee and the other groups detailed below.

UCD Student's Union & EcoUCD

Headed by the UCD Students' Union Environmental Campaign Coordinator, Eco UCD is a group within the SU working to promote environmental issues across the wider UCD Community and to move towards a more sustainable campus. Eco UCD works alongside Estate Services, UCD Green Campus, university authorities, and various other individuals and groups, to run events and initiatives such as UCD Green Week and talks by international speakers. Eco UCD also has a strong online presence posting regularly to nearly 1,000 followers between Facebook, Instagram, and Twitter and works closely with the main SU social media platforms to promote awareness of environmental issues and campaigns.

SU shops have undergone a number of changes in the last few months to become more environmentally-friendly. Plastic salad boxes and bin-liners have been replaced by compostable ones. Users can now bring hot beverages into the library if they are in a reusable cup. The price of buying hot drinks using your own coffee cup is now 40c cheaper than using a disposable one – twice what it was before. SU Shops sell about 350,000 hot drinks each year and it is hoped that this reduction will further incentivise customers to bring their own cup. SU shops also stock a wide variety of reusable coffee cups and over the summer transitioned to using compostable coffee cups as part of Insomnia's nationwide rollout.

Eco UCD and UCD Students' Union are continuously working alongside the groups mentioned above to make UCD and the wider community more sustainable for our future.

UCD Career Development Centre

As the number one university in Ireland for employability, UCD Career Development Centre joins the dots between students' time at university and their future careers. We help students to discover more about themselves, navigate the complex job market, introduce them to employers through our extensive network and develop the skills required for success in the workplace.

We offer a range of programmes to UCD students, aimed at helping them to develop personally and professionally. Two of these which may be of particular interest to students who wish to engage with the Green Campus initiative are:

- Co-curricular Skills Awards – UCD Embark and UCD Advantage
- The UCD SPARC Programme
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Co-curricular Skills Awards – UCD Embark and UCD Advantage

The UCD Embark and UCD Advantage Awards seek to acknowledge the value of co-curricular engagement at an individual, university and societal level and to promote citizenship by encouraging students to make a positive contribution within UCD and the wider community.

If you are actively involved in a Green Campus project or initiative, you can use this experience as part of a submission for one of the Awards. All you need to do is register for your Award of choice via SISWeb, attend a 45-minute induction session and then tell us, via an online form, what you did and what you learned from your experience. There are lots of reasons why you should apply for an Award:

- Achieving the UCD Embark Award or the UCD Advantage Award gives you a formal, acknowledgement by UCD of your engagement in co-curricular activities during your time at university. You will be presented with a certificate at a celebration ceremony. Achievement of the UCD Advantage Award will appear on the Diploma Supplement that you receive at graduation. You can list achievement of the UCD Embark Award or the UCD Advantage Award in the "Achievements" section of your CV.
- We meet lots of students at the Career Development Centre who are doing great things but struggle to articulate the development they have gained. So, it's great that you are working

on a Green Campus project but do you know how to communicate the value of this to a potential employer in your CV/application or at interview? The process of submitting your application for the UCD Embark Award or the UCD Advantage Award will really help with this.

- Participating in the Awards encourages you to expand the breadth of your co-curricular activity, to get involved in things that you may not have considered previously. This opens up a world of opportunity in terms of meeting new people, experiencing new situations and developing a whole host of new skills.
- Finally, we know you are not doing these things simply for recognition but sometimes a "well done" from your university is nice. What you are doing is important, in lots of ways. Let UCD show you its appreciation.

For more information on UCD Embark and UCD Advantage, including how to apply, please go to:

http://www.ucd.ie/careers/awards/

SPARC

The SPARC (Supporting Partnerships And Realising Change) programme enables UCD staff and students to work together on projects that make UCD and/or the surrounding community a better place to learn, work and live. The UCD Career Development Centre provides support for these projects in the form of funding, training and project planning/implementation expertise. By supporting staff and students to work in partnership, SPARC seeks to help students to become more engaged with their own learning, the university experience and the wider community while simultaneously helping staff to develop an insight into the student perspective.

In addition to giving participants the opportunity to bring an idea to life, SPARC offers tremendous scope for personal and professional development.

For students and staff alike, SPARC provides a fantastic opportunity to enhance skills such as project management, problem-solving, communication, planning and organising, leadership and teamwork.

In recent years, the SPARC programme has supported a number of projects in the area of sustainability, waste reduction, improving the campus environment etc. The SPARC team works closely with the UCD Green Campus team to identify suitable projects for funding and we would be delighted to see more applications coming through from UCD staff and students, that are aligned with the Green Campus aims and objectives. For more information on the SPARC Programme, including how to apply and key dates, please go to www.ucd.ie/sparc

Healthy UCD

Healthy UCD was established in 2015 and is a health promotion initiative endorsed by Healthy Ireland and the World Health Organisation (WHO). The aim of the initiative is to work with staff, students and the wider community to facilitate the holistic health and wellbeing of every member of the UCD community.

In 2015, a Health Promotion Strategic Plan 2016-2021 was developed and endorsed by senior management in UCD. One of the aims of the strategy is to engage UCD staff, students and the wider community in a healthier lifestyle, including physical activity and sustainable transport modes with a focus on walking and cycling to work/college.

Healthy UCD works closely with The National Transport for Irelands 'Smarter Travel' initiative, encouraging more physical activity and movement and creating healthier commuting choices to and from UCD campus. For example, walking, cycling, carpooling and using public transport. Healthy UCD has signed up to national campaigns promoting physical activity such as Transport Ireland's Smarter Travel 'Marchaton' challenge and 'Reboot you Commute'.

More information can be found at https://www.ucd.ie/healthyucd/

UCD in the Community

In 2016, UCD launched a campus-wide initiative, UCD in the Community, which seeks to promote greater civic engagement through its core activities. This initiative supports and complements UCD's involvement in the IUA Campus Engage programme.

It is sponsored by Professor Mark Rogers, Registrar and Deputy President, and Academic Leadership will be provided by Professor Joe Carthy, Principal College of Science.

UCD in the Community strives to strengthen its relationships with the community and work together in a collaborative and mutually beneficial way, contributing to positive and sustainable social outcomes. It is about working together, bringing our skills and expertise to support community-based organisations, and in exchange empowering our students and staff as socially aware citizens. It will also seek to actively involve interested alumni.

Engagement is one of the core values of UCD and our strategic plan commits to build engagement at local, national and international levels.

UCD in the Community wishes to support and promote engagement in all forms, including engagement of staff, students and alumni with the Green Campus Committee. UCD in the Community strives to support the Green Campus Committee as they aim to facilitate and encourage the involvement of students and staff in environmental projects, raising awareness across the campus and to ultimately achieve the *An Taisce Green Flag* for UCD.

Potential projects/collaboration

A large proportion of our work in UCD in the Community involves engaging with community-based organisations (CBOs) and non-governmental organisations (NGOs), to develop initiatives and projects that will contribute to the development of the organisation, whilst simultaneously educating staff, students and alumni on wider societal issues within the community and providing the opportunity for the UCD community to provide support and guidance to these organisations in a voluntary capacity.

UCD in the Community welcome proposals to develop projects from students and staff with CBOs, that would potentially contribute to the goals of five themes of the Green Campus Committee, whilst benefiting the organisation and the UCD community. We believe the development and implementation of these projects would contribute to ensuring that UCD reaches its goals under the themes of the Green Campus initiative.

As we engage with CBOs on a frequent basis, we occasionally receive requests that may be of interest to environmentally aware students and staff. Examples include designing and developing gardens, educating their service users on plant species and biology and planning how to best use an open space. For more information on these potential projects, please contact ucdic@ucd.ie.

Biodiversity

Biodiversity

Introduction

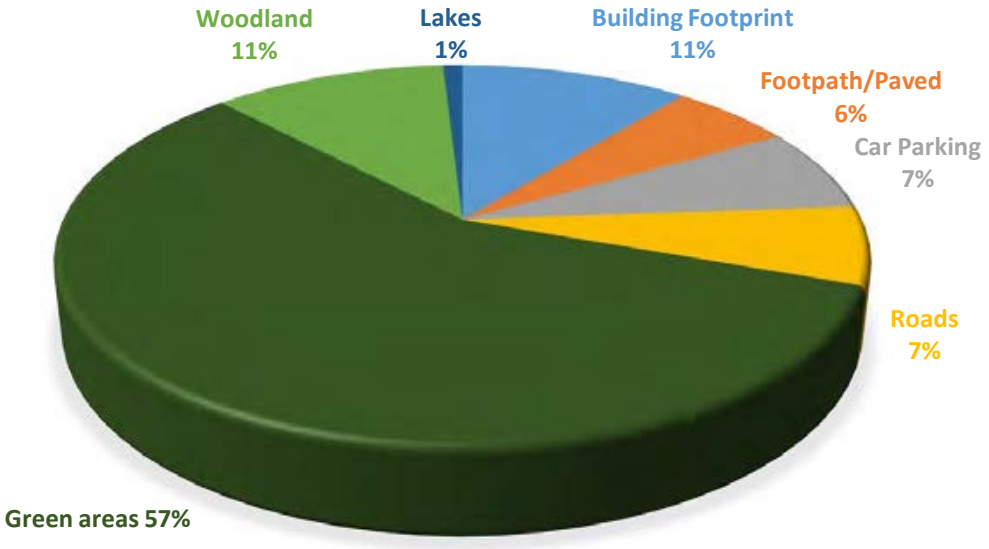
The 335 acre Belfield campus has been developed around several 18th and 19th Century estate houses and grounds and is the beneficiary of a rich cultural and environmental heritage.

The campus is widely known for its sylvan setting and green spaces, and in addition to its mature woodlands, encompasses a number of lakes and water courses, grass sports pitches, naturalised areas such as wildflower meadows and formally landscaped areas.

Promoting a healthy, living and sustainable campus is a key ambition of the University and the campus environment has become an increasingly important amenity and teaching & learning resource for the students, staff and neighbouring communities who reside on and visit the campus on a daily basis.

The phased development of a network of woodland walking trails around the campus boundary has opened up our mature woodlands to walkers and joggers of all ages, while our lakes and green spaces serve as areas for people to meet and relax and help bring nature to the forefront of campus life.

The Belfield campus is also an important biological resource in what is a largely suburban part of Dublin city, with the various habitats on campus supporting a rich mixture of biodiversity. A 'Bioblitz' undertaken in 2016 identified approximately 63 different species of birds, almost 300 species of plants and 8 species of mammals.



Grounds Management

UCD Estate Services is responsible for both the day-to-day and long term management of the University grounds in collaboration with University and external stakeholders such as Dun-Laoghaire Rathdown County Council. While many long-term sustainability initiatives have been on-going over a

number of years, an increased focus and understanding of the value of such initiatives among the wider community will both inform and challenge future grounds management methodologies.

For instance, this understanding has reinforced a long-term grounds management initiative to allow some areas of the campus to develop with minimal intervention in order to provide enhanced habitats for insects, birds and mammals. Examples of this include margins along streams, watercourses, and woodland walks, and areas at Richview, Belgrove and Roebuck to name a few. As these areas have developed, they have become important elements of the campus landscape in their own right.

Wildflower meadows have been developed at various sites on campus to encourage a more diverse range of natural flowering plants and associated insects that feed upon them. Sometimes this has involved the cultivation of meadows from a wildflower seed mix, such as the Conway meadow; and sometimes, as in the meadows at the rear of Agriculture and at the Upper Lake, it has involved changing the mowing regime to allow wildflowers to introduce themselves into an area over time.

Whilst there is a balance to be maintained on such a diverse campus between natural and more intensively managed areas, opportunities to promote and foster biodiversity in the core of the campus continue to exist. For instance, the inclusion of a diverse palette of flowering plants at the design stage of recent capital projects helps to support pollinators and also to reinforce the theme of encouraging biodiversity in the centre of campus.

A successful example of this is the construction of the Upper Lake which is outlined in more detail below.

From an overall sustainability point of view, the drive to reduce inputs both in terms of fertilisers and herbicides, and physical resources carries on apace. From a grounds-management perspective a number of practices have been and will continue to be developed to support this, including:

- No pesticides permitted to be used on the amenity landscape
- Grass clippings returned to the sward on sports pitches and amenity areas, eliminating the requirement for collection and returning nutrients to their source
- Irrigation of sports pitches, trees, plants etc. with water from campus wells only. No potable water is permitted to be used for irrigation purposes.
- On-site composting/ decomposition of organic material arising from maintenance and care activities
- No residual herbicides permitted to be used on the amenity landscape. Controlled spot treatment with amenity rated contact herbicides in formally landscaped areas and minimal use in naturalised areas in the event of noxious or invasive weed species. These are dealt with on a case by case basis according to risk and mediation measures including identification, logging, and appropriate treatment and monitoring.
- On-site trialling of next generation battery powered equipment such as strimmers, hedge trimmers, leaf blowers etc.
- Annual soil sampling on sports pitches to target fertiliser inputs. Results have shown minimal or no requirement for Phosphorous and Potash on pitches over the past five years.

The following sections outline a number of the habitat areas on campus, examples of the various management methodologies and initiatives undertaken to date and potential opportunities for development.

IMG_7796 Photo: Barrow Coakley Photography Tel: 087-2856527, 5th May 2016

Habitat Areas

Woodlands

The extensive woodlands of Belfield are recognised as playing a central role in the long-term development of the campus. They provide a healthy and engaging environment which provides opportunities for interaction with the natural world. These mature woodlands also provide a significant aesthetic contribution to the campus, providing a backdrop to the University buildings and contributing significantly to a sense of place and character for different sections of the campus.

The woodlands have an interesting and varied heritage. Many of the mature trees date from the late 18th and early 19th century and were originally planted on the estates which now comprise the campus. The history and heritage of the woodlands plays an important part in the woodland management programme, with original planting being respected and enhanced. Significant works have been done in recent years to ensure the health, viability and longevity of the woodlands.

The Belfield campus landscape portfolio currently includes approximately 50,000 trees comprising 76 different tree species of which roughly 25,000 have been planted since 2007. Approximately 38 acres (or 11%) of the campus is covered in woodland.

Woodland Management

The Trees and Woodlands Management Programme adopts a sensitive sustainable approach to the management of woodlands on campus. Different areas are managed in different ways, depending on the level and type of intervention required. The overall aim of the woodland management programme is to balance the necessity of intervention in the woodlands with an annual tree planting programme of appropriate species. Minimal interference is promoted where possible. Consideration is also given to the history of the woodlands, with different areas of the campus featuring different species types, such as the Belfield Beech Wood or the primarily Oak wood by the rear of the Veterinary Science Centre.

UCD Woodland Management Programme initiatives

- Allowing for a proportion of felled timber to decompose in woodlands to provide a habitat for fungi and invertebrates
- Pruning rather than felling trees where possible to leave ‘Habitat sticks’ for birds, mammals and insects
- Management of ivy removal on a selective phased basis to provide food for birds and a habitat for wildlife.
- Management of vigorous non-native species within woodlands.
- Use of non-potable water from campus wells for irrigation of trees and plants.

Below are two case studies of our original woodland areas, Belfield Wood and Rosemount Wood detailing the different management approaches adopted for each.

Belfield Wood Case study – Medium Intervention Approach

Belfield wood was an over mature woodland of approximately 3 acres in serious decline which was at risk of becoming dominated by ash and sycamore. Before intervention the two species dominated the under storey at the outer fringes of the wood. While ash is a native tree, sycamore is a highly invasive introduced species. This woodland was originally planted as a beech and lime woodland and therefore work has been undertaken to ensure it redevelops as was originally intended. Therefore, a planned and phased development is being undertaken in order to maintain the integrity of this woodland.

Main interventions

Under storey:

Much of the ash and sycamore have been removed from the under storey allowing regeneration of beech, holly, yew and white thorn. Many of the existing beech seedlings and young trees were formatively pruned, promoting good branching structure. Stakes were removed from beech inter-planted in previous years and ivy was removed from trees whose development was being adversely affected by its presence. In an attempt to encourage a more diverse species mix in the under storey, some areas of brambles have been brought under control.

Old and dead trees:

The decayed crowns of trees which have cracked off have been left in situ, providing a source of nutrition for the fungi and invertebrates of the wood.

Woodland Extension:

Belfield wood has been extended by approximately 1.5 acres, with a species mix which reflects existing and original plantings in the wood.

Inter-planting:

Selective planting of species such as semi-mature beech, copper beech, lime, oak and horse chestnut have greatly enhanced the structure of the wood. When the crowns rots on over mature trees or they die and are removed, openings occur in the canopy making light is available for the newly planted trees to thrive.

A number of heavy standards trees were planted in the northern half of the wood in addition to several hundreds of whips and seedlings which were planted in the under storey.

In the first years of active woodland management, only half of the wood was cleared and planted. It is important to retain some cover for wildlife and a phased approach to the management of the wood will benefit wildlife inhabiting the woods. Young trees which were removed or thinned were left in the wood to allow the rotting timber provide food and shelter for birds and insects.

Such management will ensure that this wood is maintained for future generations to enjoy.

Rosemount Wood – Low Intervention Approach
This woodland is located to the rear of the crèche. It is approximately 3 acres in size and was probably originally planted as a beech wood. However, in recent years opportunistic trees like sycamore and ash have increased in numbers at the expense of the beech.

The dominant species in the wood are beech, ash, and sycamore with some horse chestnut, holm oak and limes present also. The under storey is not very dense and comprises holly, elder, laurel, elm, and whitethorn. The herbaceous layer consists of nettles, brambles, ivy, cow parsley, herb robert, lords and ladies, hogweed, soft shield fern, anemone and bluebell.

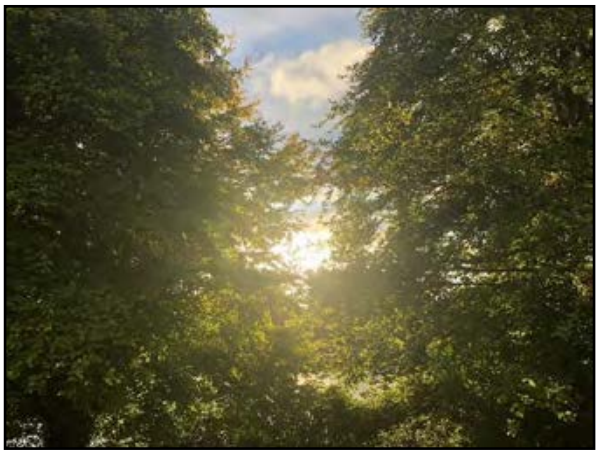
Very little intervention has been made in this woodland area in the last 100 years or so and a decision has been taken to leave this area undisturbed and employ a management approach of non-intervention. It provides a unique and undisturbed environment for birds and other wildlife in an area at the outer perimeter of the college campus.

Veteran Tree Programme

A Veteran Tree Management Programme is in place to enhance the lifespan of the cohort of 150-200 year old trees on campus by formative selective pruning based on arboriculture surveys. Veteran trees on campus are regularly surveyed and when appropriate, tree surgery is implemented to extend the life of the trees.

Woodland Linkages and Wildlife Corridors

The linking of woodlands by establishing new areas of planting has been recognised by Estate Services as being an important factor in strengthening the health and viability of the woodland as well as providing opportunities for wildlife corridors.



One example is the linkage between Belfield, Merville and Fosters Avenue Woods. The aim of developing this corridor was to link the existing woods, enhancing the sustainability of the fauna populations located in each wood as well as providing a visible physical linkage between them.

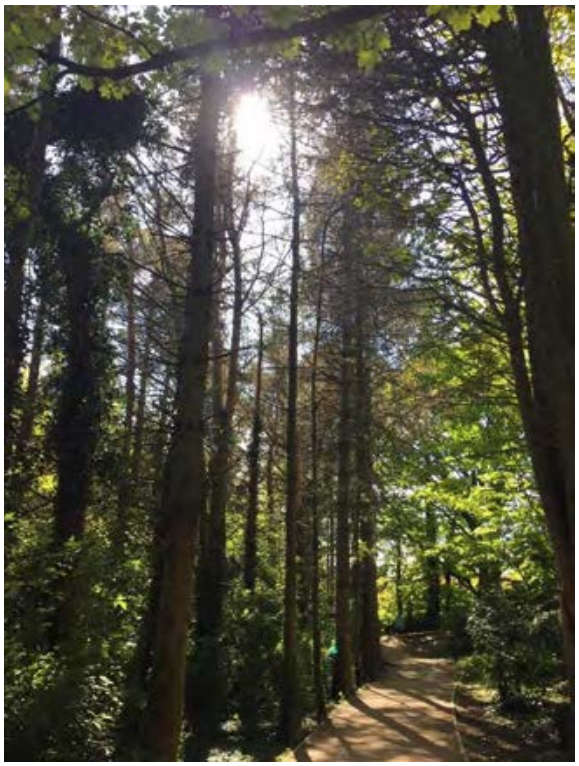
This wood was planted in 2004 with Oak, beech and walnut planted to become the dominant trees, and birch, bird cherry, willow and guelder rose in the under storey. The photos below (circa 2006 and 2017) illustrate the growth in this area of the time.

Bird-Friendly Planting

In Ireland, native species provide the best and most suitable food source and nesting capacity for birds. In UCD, birch, whitethorn, holly, elder and cherry amongst others have all been planted and encouraged by the Estates Services team, ensuring a rich and varied source of food for birds and it is intended to continue develop this over the coming years.

Woodland Walks Networks

A Boundary Woodland Walks Network is being developed and has been hugely popular with both the UCD and neighbouring communities. It consists of a series of paths which weave through and connect the various woodlands on campus. These pathways have allowed sections of UCD which had previously been underutilised to be discovered and enjoyed. They have also done much to promote a greater awareness of the wide range of biodiversity present on campus. Over 8km of walks have already been installed and it is intended that this will continue to be developed over the coming years. https://www.ucd.ie/WoodlandWalkMapGuide.pdf



How old are the UCD Woodlands?

Most of the Belfield Woodlands are hundreds of years old, dating back to the late 1700s and early 1800s. They were part of the original Estates associated with the campus period houses – Roebuck Castle, Ardmore House, Merville House, Belfield House, Woodview House and the University Lodge.

Lakes & Water Courses

Lakes and water courses form an important part of UCD's landscape and biodiversity portfolio. In total, the UCD lakes cover approximately 3 acres and host a wide variety of biodiversity, from microscopic phytoplankton, to fish such as rudd, our much loved swan population. These areas have been carefully planned and are actively managed to ensure they are a haven for wildlife and an amenity for all.

Lower Lakes

The development of the *Lower Lakes* coincided with the development of the Veterinary Science Centre in Belfield. Known by some staff and students as the "*secret lakes",* they are located in the Oak Walk woodland behind the Veterinary Science Centre. They consist of two interconnected ponds spanned by a footbridge. An island at the centre of the larger pond is planted with hazel, birch, alder and ivy. This island has become a valuable nesting site for birds. The area immediately surrounding the pond has been planted with marginal plants providing valuable cover for wildlife. Weeping willows and other water loving trees were planted to provide a beautiful backdrop to the area. The objective of creating the ponds was to enhance the area ecologically as well as providing a valuable amenity (both leisure and educational) for the users of the campus and the wider community.

Estate Services also developed a reed bed adjacent to the lower lake, to the rear of the Conway Institute. The reed bed purifies water as it passed throughout the Belfield campus. It has become an important wildlife habitat in its own right and is a particular favourite with water-loving birds. Furthermore it acts as a learning tool for students within the University.

Estate Services Grounds personnel planting the reed bed (circa 2006)

Middle Lake

Perhaps the best known of the UCD lakes, the Middle Lake is an ornamental lake located at the core of the campus. This lake was designed by Andre Wejchert in the 1960s as part of the main campus. It and the pair of breeding swans resident there, has become synonymous with UCD and has featured in thousands of graduation photographs over the years. As well as the swans, ducks, moorhens and the occasional visiting cormorant can be seen. The lake is also home to a number of fish, with rudd in particular being present in significant numbers.

Upper Lake

The Upper Lake located at the southern end of the campus and although relatively new, is quickly developing as one of UCD's most well-known and popular locations on campus. Constructed in 2013 as a natural lake, it is designed to attenuate rainwater from the Sutherland Law building and future developments.

Given the relative size of the campus and its suburban setting, ecological studies have reported a rich array of flora and fauna currently in existence, with the majority of the wildlife inhabiting the

perimeter woodlands. The new water feature, acting as a constructed wetland, is developing over time and providing a wildlife corridor between the perimeter and central core of the campus.

Small scale topographical features have assisted wildlife colonisation, incorporating a central island which provides a safe refuge for breeding birds and a small pebble beach which allows access onto a feeding lawn area for water birds.

As part of its construction a selection of native shrubs, aquatic plants and trees were planted along the perimeter and in the lake itself. The large selection of marginal planting includes food plants and vegetated islands for wildlife. The lake was inoculated with mud and aquatic plants from the lower lakes to help introduce invertebrates increasing the ecosystem biodiversity and has quickly developed into a haven for wildlife.

Lamb-Clarke Apple Collection

The Lamb-Clarke Irish Historical Apple collection is a heritage orchard located at Rosemount Environmental Research Station. It comprises some 75 cultivars of culinary and dessert apples of Irish origin. The collection, which has been supported in the past by the Department of Agriculture, Food and the Marine, is an important genetic resource for the development of new apple cultivars as well as being regularly utilised as a teaching resource.

Recent Biodiversity Related Projects and Initiatives

There are many ongoing and potential biodiversity projects on the UCD Belfield campus a selection of which are featured below. Many of these projects are closely connected and provide excellent opportunities to promote biodiversity on campus. One of particular project is UCD Campus Pollinator Plan which is in partnership with the All-Ireland Pollinator Plan a European wide framework to address the issue of pollinator decline and protect pollination services.

All Ireland Pollinator Plan - Campus Pollinator Plan

In 2018, UCD signed up as a partner organisation to the All Ireland Pollinator Plan (AIPP) with Biodiversity Ireland and the AIPP 2015-2020 to develop the UCD Campus Pollinator Plan together supported by UCD Estate Services team.

Dr. Úna FitzPatrick (National Biodiversity Data Centre) pictured below with Ciaran Bennett (UCD Grounds Facilities Manager) presented UCD with their certificate of participation in October 2018. UCD Estate Services are working with a number of academics, staff, students and our service providers to further develop our campus pollinator plan.

More information can be found at: http://UCD-Campus-Pollinator-Plan-2018.pdf In November 2018, UCD contributed to the National Biodiversity Data Centre Annual report on what actions have been taken to promote pollinator welfare on campus. http://www.pollinators.ie/2018.pdf

Biodiversity Trail and Biodiversity Hub

To accompany the Woodland walks, a biodiversity trail is being developed which includes signage and projects such as the Insect hotels. The trail ties together our rich biodiversity culture and promotes it to the UCD and wider community as a linked network. As part of this a Biodiversity Hub is being developed using the Wildflower Meadow and Bee Garden (outlined below) as an initial nucleus as they are located close together in one area of campus.

SPARC Projects

The SPARC (Supporting Partnerships And Realising Change) programme was introduced by UCD Teaching and Learning in 2014. The aim of the programme is to help students and staff progress ideas for improving the University experience or enhancing the wider community. It gives students and staff an opportunity to work as equal partners in innovative thinking and leadership. Working in partnership, it is hoped that they will also come to a better understanding of each other's roles in the university.

There are several biodiversity projects that are currently funded or have been funded in the past under the SPARC programme. These include:

- The Community Garden Project
- Bringing Bees back to Belfield
- Realising Rosemount
- Wildflower Meadow of Belfield

Pollinator Chess Garden

UCD Estate Services recently installed pollinator friendly planting in the popular Chess Garden a focal point adjacent to the middle lake.

Wildflower Meadow

The development of this meadow comes from another SPARC project: 'Wildflower Meadow of Belfield'. The aim of this project is to develop a wildflower meadow in Belfield to provide a new habitat for the wildlife on the campus. It will also provide a platform to increase the wider community's understanding of the conservation of species rich grasslands and the traditional farming practices to maintain them. It will be used as a new teaching resource for Agriculture and Biology staff, an amenity

for students, staff and the wider public, and an educational resource for community engagement. The site has been prepared and will be sown with a suitable wildflower seed mixture (September 2017) with the assistance of UCD Estate Services.

Bee Garden

UCD Estate Services recently UCD Estate Services are currently supporting the UCD Students Union and UCD Horticultural Society in developing a 'Bee Garden' on campus. Within this project a planting plan has been designed to plant the garden with a variety of flowering plants which will attract and increase the numbers of bees and other pollinators on campus. Students will be encouraged to plant and care for these plants.

Insect Hotels

Insect hotels are a great way to provide a safe environment for solitary bees and other pollinators around campus. One of the aims of the 'Building for the Future' SPARC project is to help secure a sustainable future for the Bees and Insects of Belfield. To achieve this flat pack beehives and insect hotels have been constructed and are being situated in suitable locations across campus.

These insect hotels complement the woodland management practice of allowing felled timber to decompose in the woods and in some cases the timbers left in-situ have been used in the construction of these hotels.



UCD Belfield Apiary

The Apiary has been created as part of 'The Bringing the Bees Back to Belfield SPARC project. The aim of which was to create an Apiary at the Rosemount Environmental Research station in conjunction with the development of a level 2 elective module in apiculture (Apiculture-bees, pollination and people) run by the School of Agriculture and Food Science. This project has close ties with the community. They share the same location and the interaction of bees as pollinators and gardens are closely intertwined. The apiary is located beside the Lamb-Clarke Historical Apple Collection in Rosemount providing a ready source of pollen and nectar for the bees. The project is partaking in an international study (COLOSS project) on pollen diversity and identification led by the University of Limerick. As part of this, a UCD pollen bank has been started that will see pollen being collected regularly during the growing season. Rosemount honey has now been collected, with a characteristic colour and taste from the many surrounding horse chestnut trees.

Community Garden

A community garden has been established at Rosemount with the initial support of a SPARC initiative. It uses the existing vegetable garden, poly tunnel and fruit trees to provide students, staff and members of the wider community with a place to work together to grow fruits, vegetables and flowers. The vegetable garden is currently managed and run by the SU Horticultural Society.

Ongoing potential:

The garden is still a work in progress. It has come a long way and with a little more time can only get better. It is envisaged that a second vegetable plot and soft fruit garden will be developed to extend the current garden. There are also future plans to develop a small scale hop growing facility on site. Another forthcoming project includes the development of a boundary windbreak. This will be constructed with sunflowers, providing a pollinator source for the adjacent apiary whilst also providing shelter for the vegetable garden. The plan for next summer would be to reinforce this with a permanent fencing boundary.

Composting Facilities-Green Waste

A facility currently under development to recycle waste from pruning works taking place on green campus i.e hedge trimming and leaf collection. The waste will now be composted and reused on campus.

August 2018

September 2018

December 2018

Evolution of Land Plants Garden

'UCD Evolution of Land Plants Garden' project was an educational garden project created to represent the evolution of plants over the past 600-500 million years since they appeared on Earth. It was led by Prof. Paul McCabe of the School of Biology and Environmental Science, designed by Dr. Caroline Elliott-Kingston, School of Agriculture and Food Science and architect and horticulturalist Ms. Nicola Haines of Tierney-Haines Architects, and it`s construction was supported by Estate Services. It was showcased at the 2016 Bloom Festival where it won two prizes, a Gold Medal and Best in Category for Concept Gardens.

The garden was reconstructed by Estate Services in UCD in 2017 and will be used as an outdoor classroom designed primarily to teach plant evolution by allowing students to 'walk' through time whilst highlighting the importance of biodiversity. Students and the wider community (including secondary school students taking part in the UCD Annual Plant Biology Workshop) will be able to walk through the garden, which incorporates a wide range of plant groups representing distinct plant innovations; demonstrating land colonisation by plants beginning with algae, and followed later by mosses, ferns, conifers and finally flowering plants. It also illustrates how plant evolution survived various mass extinction events in Earth history.

Bioblitz

Along with NUIM and UCC, UCD took part in an Intervarsity Bioblitz in September 2016. A Bioblitz is a period of biological surveying in an attempt to record all the biological species within a designated area. The aim of this project was to raise awareness of biodiversity on campus amongst students and staff. It was a very successful event, bringing together a diverse range of staff and students, both past and present from across the University to highlight and promote our campus biodiversity. It comprised an in-depth survey of the flora and fauna on campus, identification of species found, along with the production of booklets, information stands and student ambassador led biodiversity walks. We surpassed ourselves in the task, and were crowned Intervarsity Champions for 2016, recording an impressive 523 species of organisms across the campus in a 24 hour period. This included 212 vascular plants, 42 birds, 30 species of fungi and we even found a smooth newt.

Ongoing potential:

We subsequently validated our data set generated from the Bioblitz in coordination with the National Biodiversity Data Centre and are now in an excellent position to use it as a springboard for future biodiversity projects on campus. Reliable biodiversity data also provides an excellent platform for influencing and informing future capital projects on campus as well as holding much potential for our Teaching and Learning area.

Potential Future Projects

Habitat mapping

The Bioblitz project highlighted a rich mix of biodiversity over a 24 hour period and highlighted an opportunity to expand this type of study to develop an up to date Habitat Map for the campus. It is intended to table this proposal for discussion at Green campus Committee meetings in the coming semester.

Teaching and Learning

Biodiversity awareness on campus features strongly in our core Science programmes across the University. Below is a list of modules which use the biodiversity on campus currently as a teaching resource.

School of Agriculture and Food Science

AESC 40390 Practical Research Skills
AESC20060 Soil Science Basics (sampling)
AESC20070 Soil Resources (walkabout)
AESC30110 Diversity in the Rural Landscape
AESC30220 Soil Science Applications (fieldwork)
AESC30230 Climate Carbon and Soil (demonstration)
AESC40160 Research Project (occasional research projects)
AESC40440 Ecosystem Services and Natural Capital.
FOR20040 Tree structure and function
FOR20120 Apiculture, bees people and pollination
FOR10020 Trees and forests in Ireland
FOR40120 GIS and Experimental Design
FOR40130 Research Project
HORT10020 Plants and People
HORT20020 Fundamentals of Horticulture
HORT20070 Agricultural Botany
HORT30040 Landscape Management
HORT30050 Landscape Trees and Shrubs
HORT30190 Food Production
HORT30380 Horticulture Field Studies
HORT40080 Research Project
LARC10120 Plants and Landscape Architecture
BIOL30020 Landscape Ecology
CPSC20040 Physiological Plant Ecology
AESC 20060 Soil Science Basics
AESC 30220 Soil Science Applications
AESC 30230 Climate Carbon and Soil
AESC 30220 Soil Science Applications
AESC 40160 Research Project

School of Biology and Environmental Science

BOTN 20040 Principles of Plant Biology
BIOL 30010 Plant Diseases
BIOL 40360 Research Project
BIOL10030 Cell and Plant Biology
BIOL10130 Biology in Action
BIOL10140 Life on Earth

ENVB20050 Principles of Environmental Biology and Ecology
BOTN30050 Diversity of Plant Form and Function
ZOOL30020 Arthropoda
ENVB30010 Systems Ecology
ZOOL30050 Diversity of Invertebrates
ENVB40300 Vegetation Ecology
ENVB40490 Tropical Field Ecology

Energy & Climate Change

Energy and Climate Change

Introduction

Climate change is one of the defining environmental threats of our time and has been identified by the United Nations as a major impediment to peace and prosperity. As set out in the UCD Strategy 2015-2020, the University is committed to tackling global challenges, and climate change sits firmly within this classification.

UCD conducts research and teaching across a multitude of disciplines that aim to tackle climate change and respond to the challenges it presents. These include engineering, urban planning and agriculture as well as through groups such as the Earth Institute and Energy Institute.

The University has also taken major steps to ensure our campuses are operating to the highest levels in terms of energy conservation and efficiency. The University has signed up to an SEAI (Sustainable Energy Authority of Ireland) partnership agreement which affirms our commitment to being "exemplars" in the way in which we manage our energy usage. We seek to employ modern and innovative technologies where economically feasible, adopt structured management systems and foster a collective ownership approach to delivering a sustainable and efficient campus.

Our energy management system has been certified to the international standard in energy management, ISO50001. We have employed state of the art technology across the campus, including heat recovery ventilation systems, combined heat and power engines (CHP), biomass boilers, solar photovoltaic and solar thermal panels, a smart building management system (BMS) along with a host of control and automation technology. Energy and sustainability play a central role in our capital development projects which include new build and refurbishment projects. The Roebuck Castle Student Residences are certified Passive House, and when constructed, were the largest certified residences in Ireland and the U.K. The O'Brien Centre for Science is rated BREEAM Excellent, another first for an educational building in Ireland, whilst all new buildings are now being designed to Near Zero Energy Building (NZEB) standard.

The following pages give some more details on the University's energy usage, our management system as well as some examples of how we are seeking to improve the University's energy efficiency and reduce our carbon footprint.

What is Passive House?

Passive House (or Passiv Haus) is a building standard that requires rigorous requirements in terms of heating and cooling demand, airtightness as well as air quality and comfort. Passive House buildings use very low amounts of energy for heating and have very high levels of thermal insulation.

What is BREEAM?

BREEAM stands for: Building Research Establishment Environmental Assessment Method. It is the world's longest established method of assessing, rating, and certifying the sustainability of buildings. It is an environmental standard and covers areas such as energy, water, biodiversity and transport.

Management

UCD is in many ways' representative of a small city. We have offices and classrooms, a swimming pool and gyms, apartments, street lighting, restaurants and conference facilities. Just like in most cities, our buildings vary in age and scale, from our grand period houses to the modern and state of the art O'Brien Centre for Science. All of our buildings behave differently and have varying demands in terms of energy, however what they all have in common is that they are managed in a way that seeks to minimise unnecessary usage of energy.

In UCD, the Energy Unit, which is part of Estate Services, is responsible for the management of energy in the University. The Energy Unit is responsible for ensuring that energy is delivered to wherever it is needed in the University in the most cost-effect, efficient and sustainable way possible.

To ensure this happens, energy usage must be considered across many distinct functions - including maintenance, operations as well as new buildings and major renovations. Therefore, an energy management team was set up to ensure people working in key areas communicate regularly and specifically on energy related issues. The team meets regularly and consists of the Director of Estates, the Technical Services Manager, Commissioning Engineering, BMS Manager and Energy Programme Co-ordinator. The team also communicates regularly with key personnel across the University, including individual facilities and operations managers working within different buildings across the campus. This cross-campus, structured forum ensures that energy is considered in a holistic way.

ISO50001 Certification

UCD is certified to the international standard in energy management, ISO50001, since 2016. This is a management tool that helps to guide the University in a structured way towards our targets. In order to deliver and to retain this certification, requires commitment and contribution from people and units across the campus, including senior management, UCD Estate Services, the UCD Procurement and Contracts Office and a number of key individuals working in various areas across the University.

ISO50001 requires the University to identify and monitor Significant Energy Users (SEUs), identify projects and opportunities that can improve energy efficiency, report on progress and hold regular management reviews to allow senior management to review progress towards targets and adjust strategy where necessary.


CERTIFICATION EUROPE™

Energy Management System

University College Dublin (UCD)

ISO 50001:2011

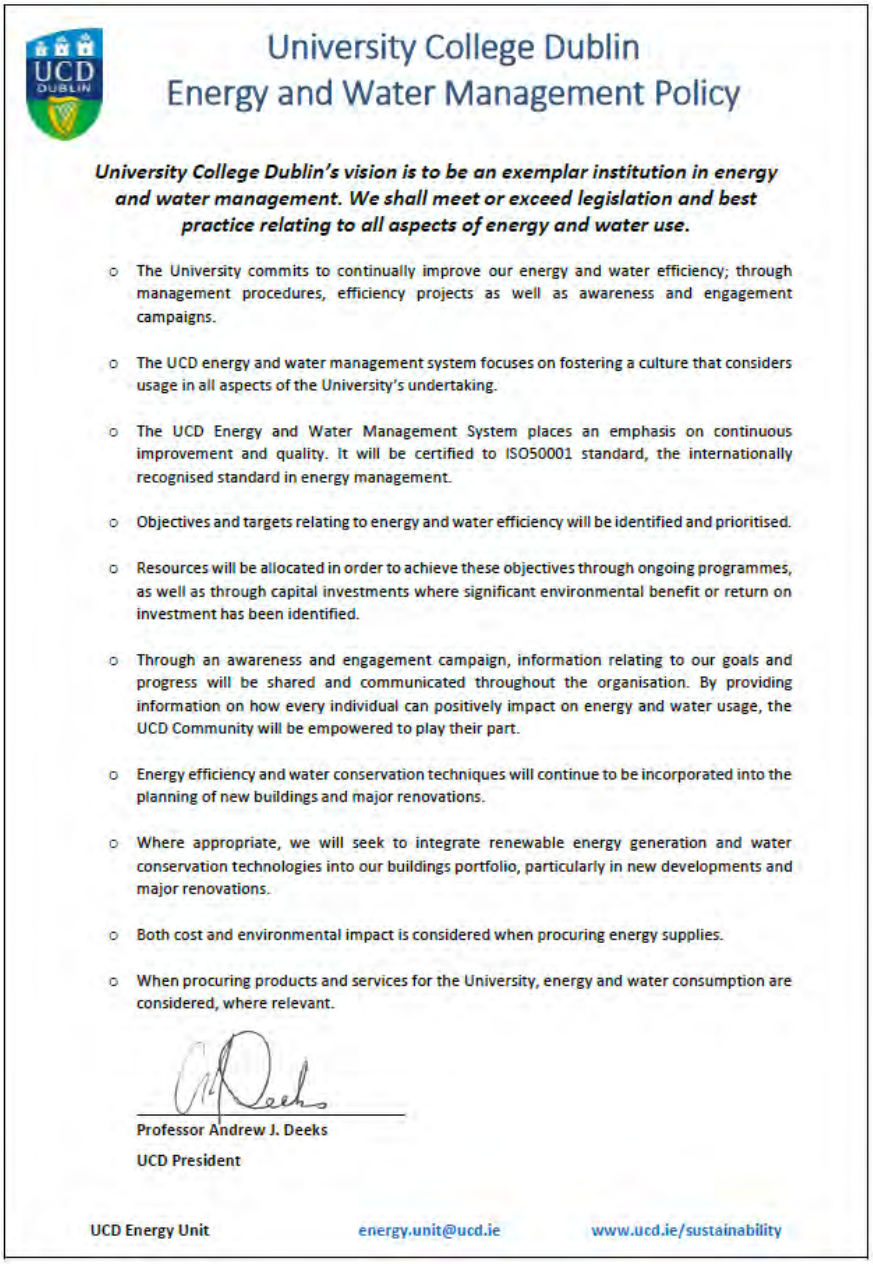
The management of all water and energy use within the UCD Estate.

Estate Services also manages water on campus and has been actively working to conserve water and improve our water management for many years. Therefore, a decision was taken to include water within the management system. By doing so, UCD became the first University in Ireland to have full organisational level ISO50001 certification for energy and water management. More information on water management can be found in the separate water management section within this document.

Policy

As part of preparations for ISO50001 certification, the University updated its old energy policy and strategy. A decision was made to produce a one-page policy which could be easily read, accessible and available online and be easily understood by people from a non-energy background.

The Policy, which as with the ISO50001 certification, also covers water management, was approved and signed off by President Deeks. It sets out a number of commitments relating to awareness and engagement, objectives and targets, new buildings and major renovations as well as procurement. The Policy is reviewed annually and will be updated and reapproved by the President where necessary.



University College Dublin
Energy and Water Management Policy

University College Dublin's vision is to be an exemplar institution in energy and water management. We shall meet or exceed legislation and best practice relating to all aspects of energy and water use.

- The University commits to continually improve our energy and water efficiency; through management procedures, efficiency projects as well as awareness and engagement campaigns.
- The UCD energy and water management system focuses on fostering a culture that considers usage in all aspects of the University's undertaking.
- The UCD Energy and Water Management System places an emphasis on continuous improvement and quality. It will be certified to ISO50001 standard, the internationally recognised standard in energy management.
- Objectives and targets relating to energy and water efficiency will be identified and prioritised.
- Resources will be allocated in order to achieve these objectives through ongoing programmes, as well as through capital investments where significant environmental benefit or return on investment has been identified.
- Through an awareness and engagement campaign, information relating to our goals and progress will be shared and communicated throughout the organisation. By providing information on how every individual can positively impact on energy and water usage, the UCD Community will be empowered to play their part.
- Energy efficiency and water conservation techniques will continue to be incorporated into the planning of new buildings and major renovations.
- Where appropriate, we will seek to integrate renewable energy generation and water conservation technologies into our buildings portfolio, particularly in new developments and major renovations.
- Both cost and environmental impact is considered when procuring energy supplies.
- When procuring products and services for the University, energy and water consumption are considered, where relevant.

Professor Andrew J. Deeks
UCD President

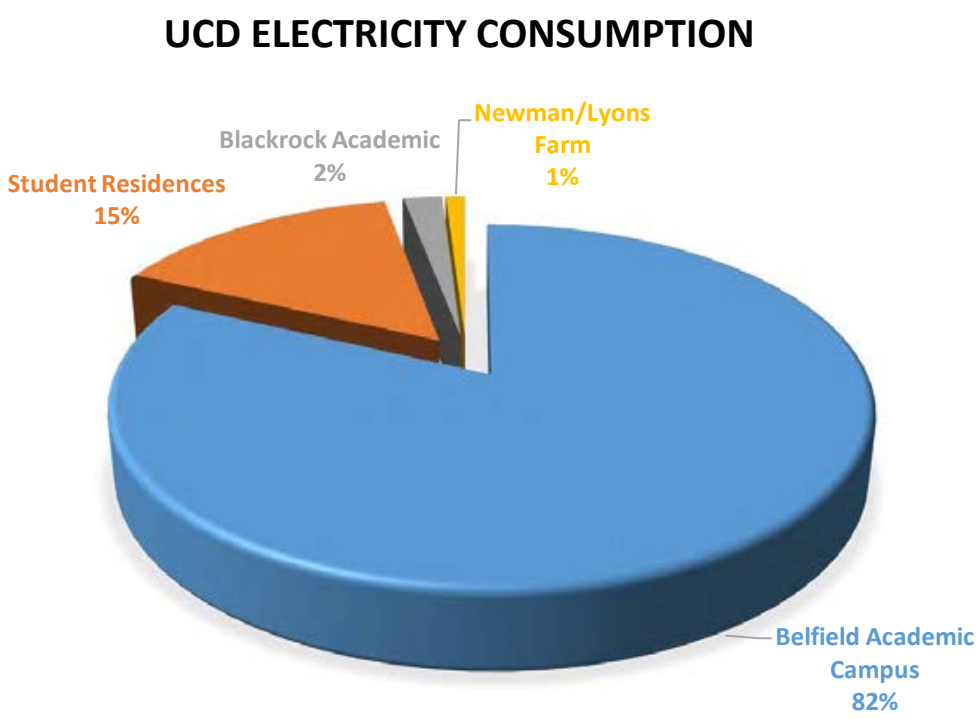
UCD Energy Unit energy.unit@ucd.ie www.ucd.ie/sustainability

UCD Energy Use and Sources

Electricity

Electricity is our biggest annual energy cost and the most significant contributor to carbon emissions. However, the fact that electricity usage it is very much influenced by user behaviour, means that it is a key area where carbon savings can be made.

The Belfield Campus, including the student residences, accounts for approximately 96% of the total University electricity consumption. The Belfield "academic" (excluding residences) section of the campus accounts for approximately 82% of University electricity usage with the student residences (in both Belfield and Blackrock) accounting for the second largest usage at 15%. The Blackrock Academic Campus, Newman House and Lyons Farm makes up the remaining 3% of electricity usage.



Electricity Sources

UCD has three sources of electricity:

- Grid or "imported" electricity.
- Combined Heat and Power (CHP) produced electricity.
- Solar Photovoltaic Panels (PV Panels).

Combined Heat and Power

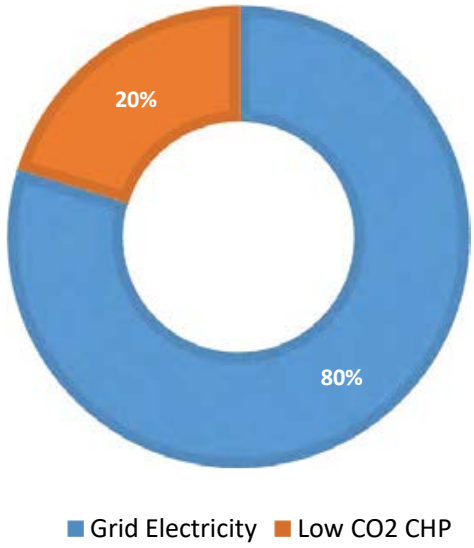
UCD has a total of 3.4 MWe of on-site CHP on the Belfield Campus. These engines are located in the O'Brien Centre for Science, Student/Sports Precinct and the Belfield Energy Centre.

Two new CHP engines were installed in the energy centre in Belfield in summer 2018 which will further help to reduce the University's carbon emissions. These new engines produce electricity that is used on-campus and supply heat to the Belfield District Heating System which is used to heat the buildings along the main "spine" of the campus.

What is CHP?

CHP is a low-carbon source of electricity and is a central part of UCD's sustainable energy strategy. CHP is like a small sized power plant that generates electricity through the combustion of gas. However, unlike a power-station, which dumps the heat produced in the generation process, the heat from CHP is used to heat hot water. This hot water is used for space heating and is supplied to sinks, showers and of course to UCD's 50m swimming pool.

UCD BELFIELD ACADEMIC CAMPUS ELECTRICITY SUPPLY

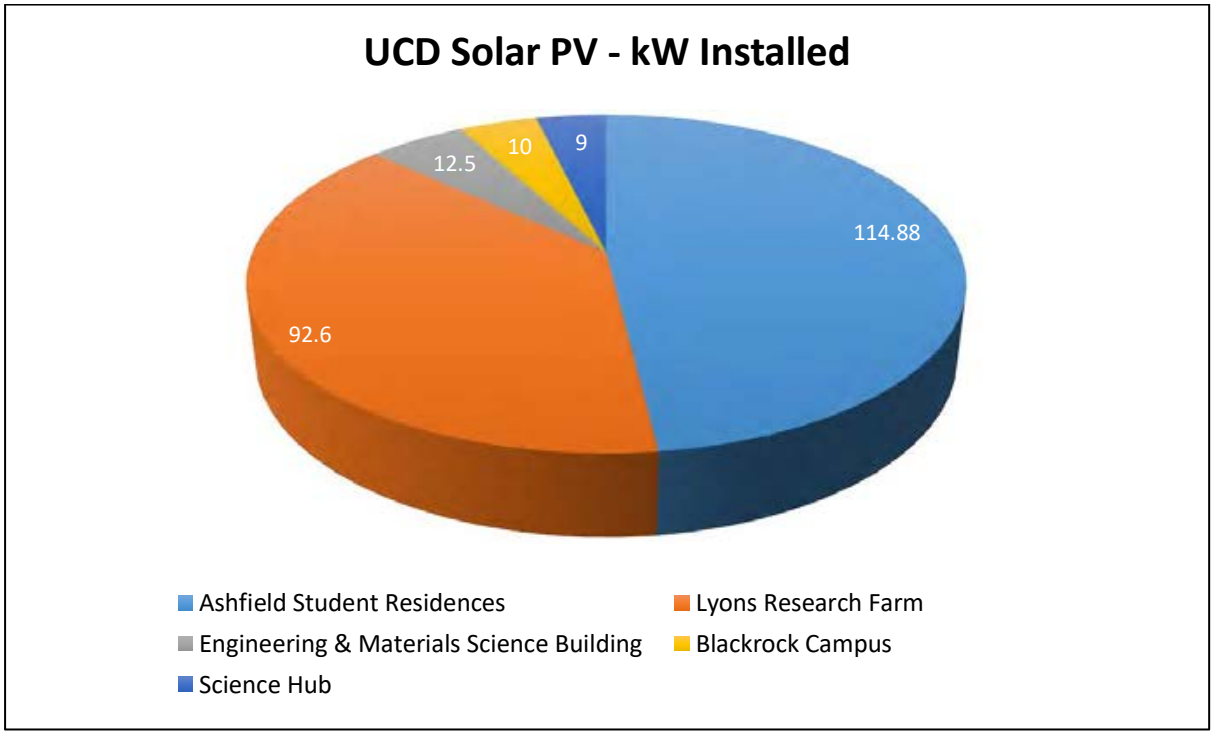


Solar Photovoltaics

There is also a growing amount of electricity being produced from solar photovoltaics (PV) on campus. Solar PV coverts sunlight into electricity which can be used on campus. UCD recognises that this technology has real potential to significantly reduce our carbon-footprint in the coming years and we are currently examining opportunities for the delivery of additional solar PV across the University estate.

Image: Ashfield Student Residences Solar PV

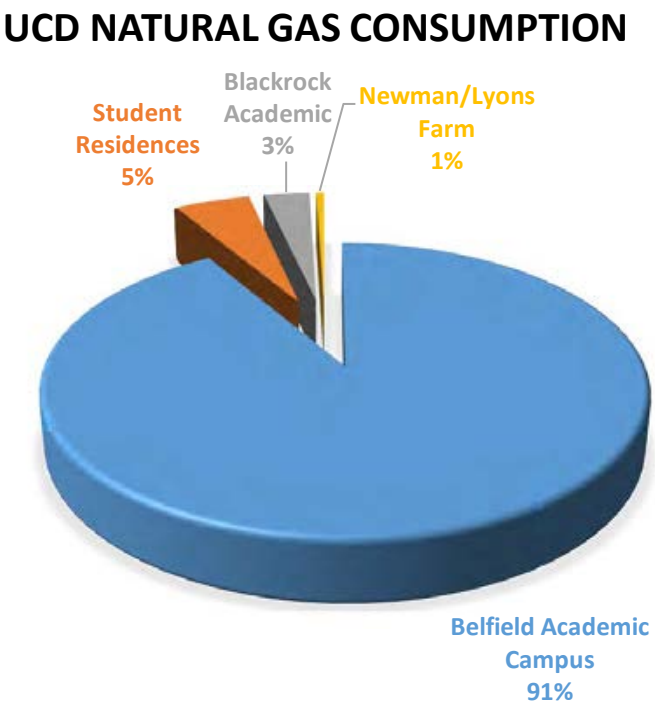
There is currently 239kW of solar PV installed on UCD buildings. Roof-mounted solar PV is installed on the Engineering Building, the O'Brien Centre for Science and Ashfield student residences in Belfield as well as in Lyons Research Farm in Co. Kildare and a smaller system installed in 2018 in Blackrock. These systems produce approximately 215,000kWh per annum. This is the equivalent electricity that would power over 50 households per year!



Natural Gas

The primary fuel using for heating and hot water in UCD is natural gas. Natural gas is a relatively low-carbon fossil fuel, is cost effective and can be used very efficiently as a heat source. It is also used to generate electricity on-site utilising CHP, which as explained earlier provides a way of providing electricity and heat with a reduced carbon footprint.

In terms of usage, the main Belfield academic campus is again the largest user, accounting for up to 91% of all gas. The on-campus student residences are the second largest user at 5%, while the Blackrock academic campus comes in at approximately 3% of usage. The reason why the student residences is proportionally less of the total usage when compared with electricity is due to the fact that many of the student residences (Belgrove, Merville, Glenomena 1-8) are electrically heated.



Solar Thermal

UCD has several solar thermal systems installed on the Belfield Campus. These solar panels use the sun's energy to heat water. Solar thermal systems are installed on the roof of Roebuck Castle Student Residences, the Charles Institute for Dermatology and the Science South Building.

Solar PV Panels and Solar Thermal Panels – what's the difference?!

Both systems look similar and typically come in "panels" which are typically mounted on roofs but can also be ground mounted.

However, solar photovoltaic (PV) panels produce electricity and solar thermal panels produce hot water.

In recent years UCD Estate Services has generally typically specify solar PV on new buildings instead of solar thermal – due to falling panel prices, the fact that electricity is always required on campus and the simplicity and reliability of solar PV.

Energy Consumption

Energy is used in a variety of ways:

- Thermal energy: Produced from gas, biomass, and solar thermal and is used for space heating and hot water.
- Electricity: Sourced from the electricity grid or produced from on-site CHP engines and solar PV, is used for external lighting, internal lighting, office equipment, space cooling, ventilation, research equipment, catering, building control and security systems, etc. There are also some student residences heated by electricity.

Given the size and complexity of the University buildings, their mixed use and evolving nature, it is not practical to have sub-metering in place that identifies and measures all of the above uses. However, UCD does have an extensive sub-metering system in place that accurately monitors energy usage across all of the University at a building level, with some newer buildings also featuring accurate sub-metering on large items of plant or specific areas within buildings.

UCD has a monitoring system that allows the energy unit to monitor and report on energy usage. This is used to monitor changes in consumption after implementing energy saving measures or projects and also flags if there is any issue in a building, for example equipment being left on.

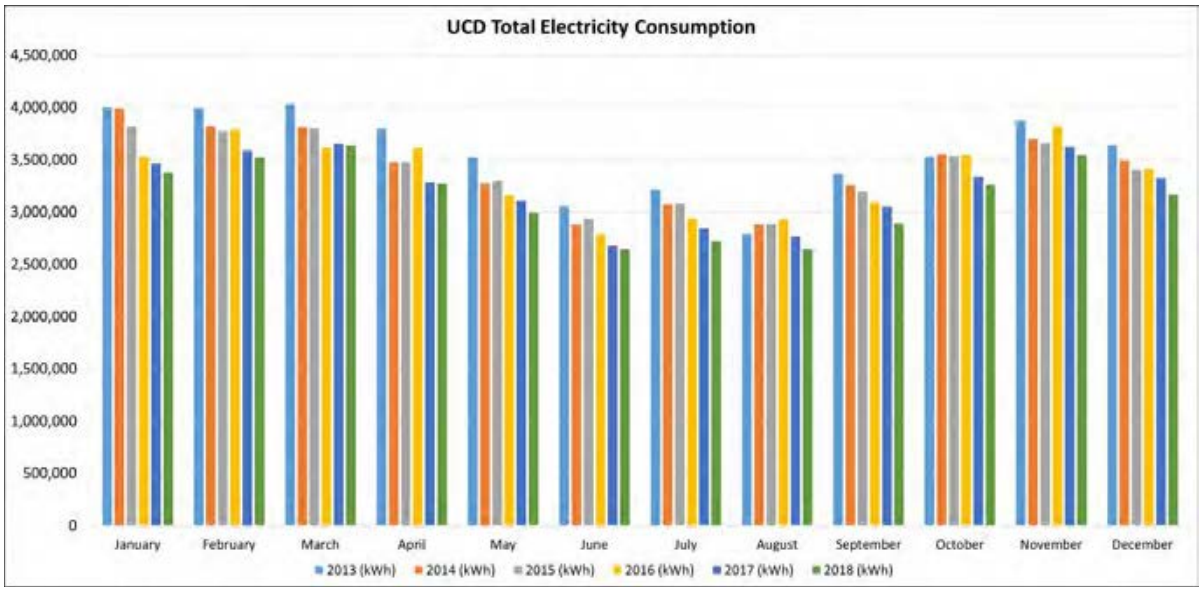
The log-in for this online system is also provided to researchers, lecturers and students who are undertaking research into the area of energy management, power systems and energy efficiency.

Electricity Consumption

The main driver of electricity usage is building occupancy. In recent years some realtively energy intensive buildings have been added to the campus, including the O'Brien Centre for Science and the Student and Sports Centre. Although these buildings have been built to very high efficiency standards and feature modern technology such as heat recovery ventilation and CHP, due to the activities within the buildings they typically use more electricity than a more "traditional" building which may contain mostly lecture theatres and office space. We have also added other buildings such as the Sutherland School of Law, Charles Institute and Ashfield Student Residences in recent years. Despite all of this added floor space we have managed to reduce our over-all electricity consumption. Details on total University electricity consumption on a monthly basis from 2013-2018 can be seen below. It should be noted that this is "total" electricity, therefore electricity from all sources, including combined heat

and power (CHP). The consumption data includes Belfield and Blackrock Campus as well as student residences. As you can see electricity consumption is down 3% between 2017 and 2018 which represents great progress in a growing estate.

UCD Total Electricity Consumption	2013 (kWh)	2014 (kWh)	2015 (kWh)	2016 (kWh)	2017 (kWh)	2018 (kWh)	% Change 2016-2017
January	4,001,181	3,987,938	3,815,387	3,528,594	3,465,521	3,378,326	-3%
February	3,993,407	3,819,045	3,771,875	3,789,755	3,585,495	3,518,607	-2%
March	4,034,662	3,811,458	3,799,082	3,610,090	3,651,814	3,636,603	0%
April	3,795,979	3,478,858	3,478,235	3,611,237	3,283,091	3,269,942	0%
May	3,520,102	3,277,294	3,301,447	3,156,878	3,108,736	2,990,672	-4%
June	3,052,171	2,879,113	2,935,945	2,780,946	2,683,353	2,642,763	-2%
July	3,216,460	3,071,860	3,080,152	2,936,181	2,844,998	2,721,086	-4%
August	2,785,229	2,879,899	2,880,750	2,926,615	2,769,905	2,643,084	-5%
September	3,362,920	3,256,863	3,198,431	3,093,487	3,051,680	2,884,668	-5%
October	3,522,369	3,552,161	3,533,557	3,543,565	3,332,751	3,257,750	-2%
November	3,875,646	3,693,076	3,662,574	3,818,162	3,622,803	3,543,865	-2%
December	3,638,288	3,494,957	3,405,942	3,415,199	3,323,967	3,163,432	-5%
Total	42,798,413	41,202,523	40,863,378	40,210,709	38,724,114	37,650,797	-3%

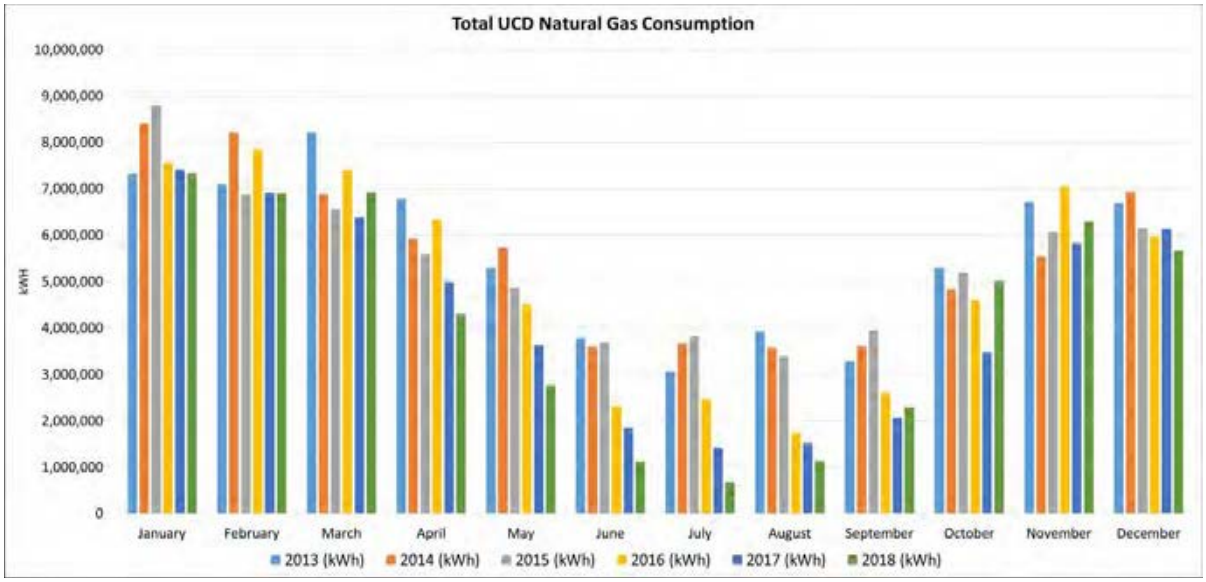


Natural Gas Consumption

The two main drivers of natural gas consumption in UCD are CHP operation hours and outside air temperature. UCD has increased the quantity of CHP on campus from 2MW (mega-watts) to 3.4MW in the past 5-years. This has resulted in a decrease in "imported" electricity and an increase in natural gas usage. The considerable decrease in natural gas usage during summer 2018 was due to two old CHP engines being decommissioned. Over-all, CHP has a positive impact on both primary energy consumption and carbon emissions. Gas consumption is also closely linked to temperature – when it gets colder our heating system responds automatically and works harder to deliver more heat to the buildings.

The consumption below details total natural gas consumption form Belfield, Blackrock and the UCD student residences. It is "total" consumption, therefore not degree day corrected.

UCD Total Natural Gas Consumption	2013 (kWh)	2014 (kWh)	2015 (kWh)	2016 (kWh)	2017 (kWh)	2018 (kWh)	% Change 2017-2018
January	7,327,091	8,413,749	8,799,106	7,559,957	7,421,405	7,334,791	-1%
February	7,095,050	8,224,731	6,877,290	7,849,397	6,912,015	6,900,891	0%
March	8,224,919	6,879,497	6,572,373	7,402,192	6,395,017	6,916,516	8%
April	6,797,526	5,930,248	5,596,974	6,341,923	4,989,079	4,313,303	-14%
May	5,296,978	5,747,489	4,870,083	4,518,852	3,629,874	2,771,504	-24%
June	3,785,739	3,595,917	3,685,985	2,328,119	1,853,105	1,135,598	-39%
July	3,059,003	3,674,779	3,820,466	2,458,712	1,409,131	687,718	-51%
August	3,931,412	3,563,666	3,377,844	1,741,627	1,526,220	1,140,548	-25%
September	3,285,765	3,607,622	3,962,418	2,599,333	2,071,215	2,300,621	11%
October	5,302,605	4,834,037	5,199,486	4,611,627	3,478,890	5,005,706	44%
November	6,714,084	5,547,723	6,058,310	7,052,873	5,832,573	6,292,579	8%
December	6,694,498	6,939,225	6,159,129	5,980,055	6,139,938	5,656,301	-8%
Total	67,514,671	66,958,684	64,979,463	60,444,666	51,658,462	50,456,077	-2%



Energy Efficiency Targets

In terms of consumption, the overarching target for UCD and public sector organisations is the *2020 energy efficiency targets* as outline in the National Energy Efficiency Action Plan (NEEAP).

NEEAP states that:

"The public sector will improve its energy efficiency by 33% and will be seen to lead by example — showing all sectors what is possible through strong, committed action."

This ambitious 33% energy efficiency improvement is measured against a baseline period, which is the average of 2006-2008. An "activity metric" is used which tracks energy efficiency relative to the growth or contraction of the University. For UCD this is kWh/m^2 - the amount of energy used per m^2 of building space. Energy is measured in terms of "primary energy". Primary energy is energy in its natural form and allows all types of energy (electricity, gas, diesel, biomass etc.) to be combined.

For UCD who at the beginning of the process, had the lowest energy use per m^2 of all Universities involved in a pilot study, and have been actively managing energy use for over 20 years, the target is therefore all the more challenging. However, the Energy Team is confident that through a University-wide approach and involvement this target can be achieved.

For 2017, which was the last reporting year, UCD had improved by 30.4% and is just ahead of the target "glidepath" to 2020 as can be seen in the graph below.

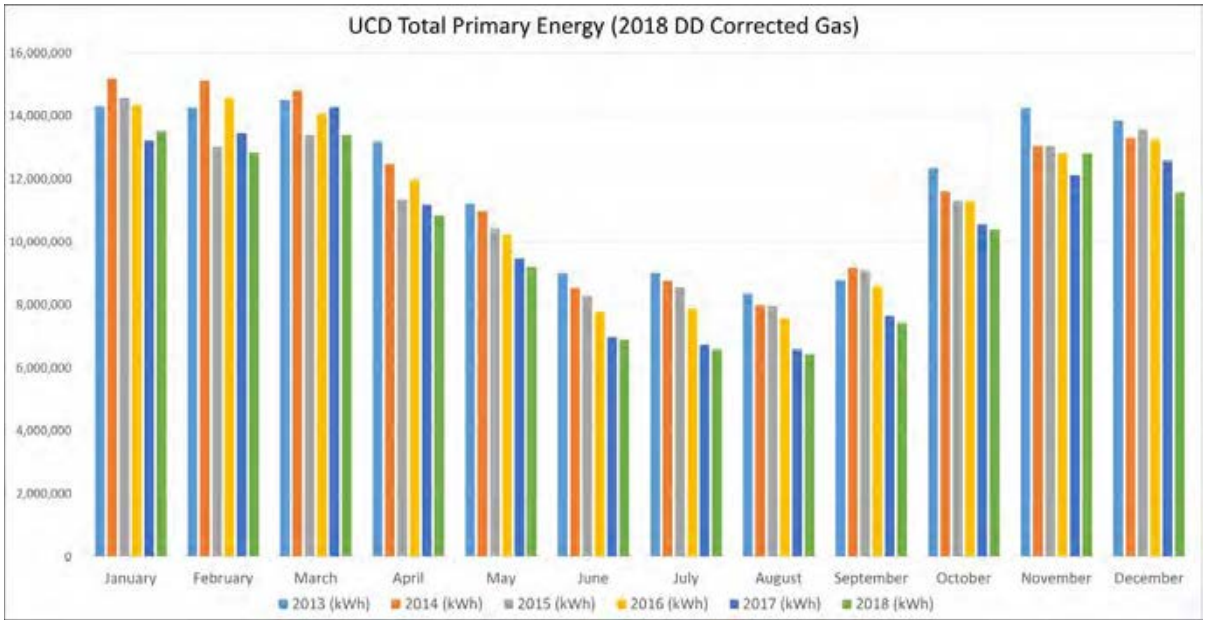
Progress in 2018

The annual results towards the 2020 targets are released by the SEAI every summer, which gives information on the previous year. However, the Energy Unit has set up its own tracking system using our own metering system and converts the data to primary energy in order to estimate where we are on the "glidepath". It should be noted that some variances may occur between UCD's data and the SEAI data due to different interpretations of "degree days" (how much heating is required based on temperature) as well as estimated versus actual national grid efficiency figures.

The following estimates on primary energy do however show some good progress. Based on this we estimate that we are at approximately 32% at 2019, so just 1% to go towards our 2020 target.

This has been achieved by a host of measures, with some of them detailed in the *Projects and Initiatives* sections below.

Total Primary Energy (DD Corrected)	2013 (kWh)	2014 (kWh)	2015 (kWh)	2016 (kWh)	2017 (kWh)	2018 (kWh)	Difference 2017-2018
January	14,317,188	15,189,414	14,585,588	14,351,678	13,201,372	13,509,563	2.3%
February	14,280,738	15,117,712	13,013,895	14,578,952	13,470,118	12,845,308	-4.6%
March	14,509,682	14,799,657	13,391,399	14,062,438	14,282,295	13,390,678	-6.2%
April	13,172,897	12,486,053	11,351,444	11,958,627	11,170,536	10,821,673	-3.1%
May	11,210,495	10,981,454	10,435,388	10,219,985	9,473,930	9,206,794	-2.8%
June	8,992,987	8,538,525	8,296,116	7,762,095	6,979,893	6,884,039	-1.4%
July	8,997,582	8,754,087	8,564,746	7,876,285	6,732,707	6,580,695	-2.3%
August	8,347,874	7,988,281	7,967,313	7,573,846	6,587,350	6,427,612	-2.4%
September	8,778,953	9,184,491	9,084,681	8,588,348	7,654,557	7,442,001	-2.8%
October	12,338,907	11,612,772	11,306,653	11,311,880	10,550,059	10,409,145	-1.3%
November	14,253,015	13,046,434	13,051,224	12,824,033	12,115,398	12,815,783	5.8%
December	13,850,226	13,304,633	13,570,650	13,252,267	12,563,471	11,582,412	-7.8%
Total	143,050,544	141,003,514	134,619,098	134,360,434	124,781,686	121,915,703	-2.3%



Projects and Initiatives

Estate Services progresses several energy conservations projects each year. These generally consist of two types:

Energy Efficiency Projects: "The greenest energy is the energy that isn't used!"

This type of project seeks to reduce the quantity of energy consumed while providing the same service or function, or, to reduce wastage of energy. This can be done by making equipment or lighting run more efficiency, replace existing equipment or lighting with more efficient technology or encourage and facilitate people going about their work or study in a more energy-efficient way.

Carbon Reduction Projects:

This primarily comes in the form of renewable energy or low-carbon technology. While reducing the quantity of energy used should always be the first step in any energy management system, it must be recognised that energy in some form will always be required. By choosing less carbon-intensive sources or renewables we can greatly reduce our impact on the environment. UCD use CHP, biomass, solar thermal and solar PV to bring down our overall carbon emissions. We also seek to maximise the quantity of electricity we import from renewable sources.

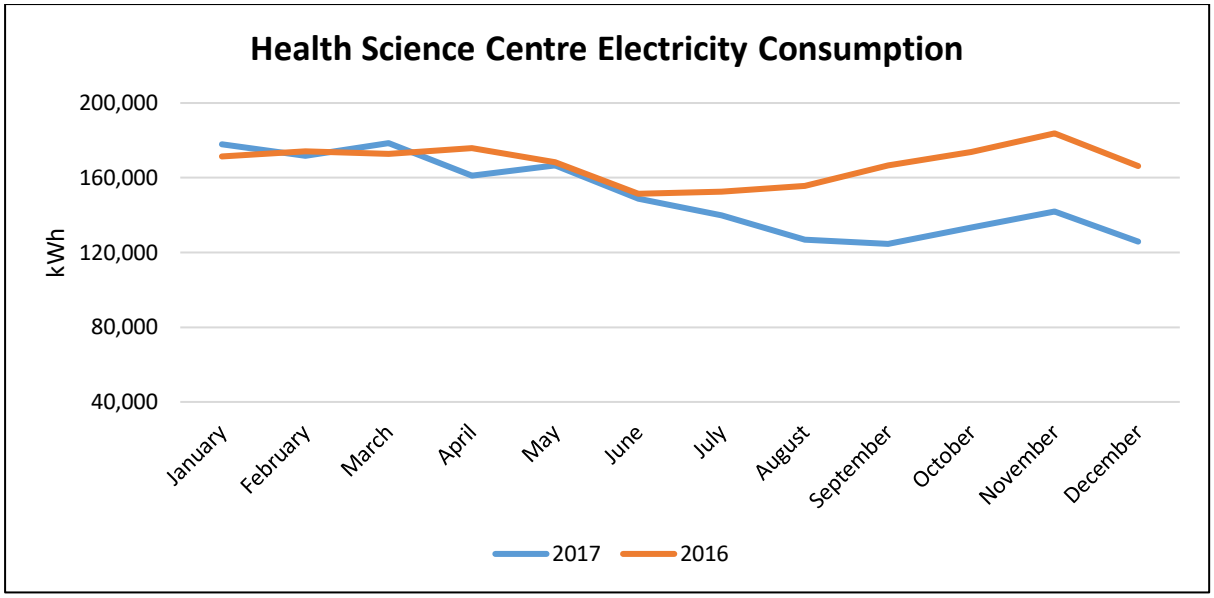
LED Lighting

LED (Light Emitting Diode) is a type of lighting that uses considerably less electricity than traditional lighting types while providing a high quality of light. LED lighting can use up to 60% less than traditional lighting. The quality of LED lighting has improved in recent years with the variety of types increasing while prices have been coming down. Estate Services have a policy of replacing failed lighting with LED only and furthermore, LED is a requirement in all new buildings.

In summer 2016 Estate Services commenced an ambitious programme of LED lighting upgrades. The Richview Campus was upgraded in 2016, Health Science Centre, Engineering and Materials Science, Daedalus, James Joyce Library and Conway Institute buildings as well as a significant portion of the Blackrock Campus, were all upgraded in 2017. In 2018, the Quinn School of Business, Newstead, Agriculture and Food Science building and the Veterinary Building were completed. Remaining sections of the Blackrock Campus were also upgrade to LED meaning that the Blackrock Campus is now effectively 100% upgraded to LED. Estate Services are planning to replace all lighting on the campus with LED on a phased basis which will lead to a very considerable reduction in electricity usage, associated carbon emissions and electricity costs.

The graph below shows the decrease in electricity consumption following the introduction of LED lighting to the Health Science Building, midway through 2017. Total electricity consumption in the Health Science Building 2016-2018 is also displayed in the associated table from 2016-2018, demonstrating the very significant impact LED lighting can have.

Health Science Centre Electricity Consumption	
Year	kWh
2016	2,012,536
2017	1,796,950
2018	1,565,807



Solar Photovoltaic (PV) Systems

Solar photovoltaic panels are becoming increasingly common across the University although you may not be able to see them! They are located on the roofs of the Engineering and Materials Science and Science Hub buildings as well as an extensive system installed on the roof of the Ashfield Student Residences, as well as system on the Blackrock Campus installed in 2018. They are also being specified for new buildings currently being planned, such as the new University Club.

UCD Estate Services has managed the installation of a 100kW solar PV system on the UCD Lyons Research Farm. This system, which has been installed an agricultural shed roof, will on sunny summer days provide the majority of the farm's electricity needs. Over the lifetime of the system it is estimated that it will save over 7,000 Tonnes of carbon dioxide, significantly reducing the farms and UCD's carbon footprint.

Insulation and Window Upgrades

Although electricity usage contributes the most to UCDs carbon emissions, heat usage must not be ignored. Many of our newer buildings, such as the Sutherland School of Law, Confucius Institute or Ashfield Student Residences have been constructed with high levels of insulation and high performing glazing, however we also have many buildings which below modern thermal performance standards.

Over the next 10 years many it is the ambition of the University that many of these buildings will undergo major renovations. Some, including the John Henry Newman Building and Tierney Building are currently in the process of being upgraded on a phased based, ensuring continuous improvement in energy usage and comfort levels in buildings. These upgrades ensure that much less heat is required to heat buildings during the winter months and results in better occupant comfort through the elimination of drafts. Other examples of such work include the Smurfit Graduate School of Business Blackrock and the Newstead Buildings, where new windows have resulted in significantly improved thermal performance.

Awareness and Engagement

By upgrading building fabric, equipment and lighting, significant savings can be made in energy usage. However, it must be recognised that a large portion of energy usage on the campus is user-generated

and beyond the control of the Energy Unit. This is the area where staff and students can have the greatest impact – by considering each day how and when they use energy. A very successful "Switch-Off" campaign has been operating in UCD for many years. This involves an email that is sent to all staff on the Friday before Bank-Holiday weekends. It encourages staff to switch off all non-essential equipment before they leave – the extra day-off means savings can be much greater than a normal weekend period. This campaign has been very successful with usage up to 20% less than a normal weekend day – this shows that concerted efforts and awareness can lead to savings. This is an area that has much potential and is an area that the Green Campus group can contribute new ideas and energy to.

Knowledge Sharing and Collaboration – e3 Bureau

Energy management personnel from UCD, DIT, DCU and Trinity are all working together with the collective goal of finding ways to reduce energy consumption and carbon emissions in each of their organisations. Representatives of the four organisations meet every quarter to discuss challenges in the field of energy management and how they might be over-come, share success stories, and explore areas of mutual interest. This arrangement has served the groups very well with each group learning from the experience and knowledge of the others. More information can be found on www.e3.ie

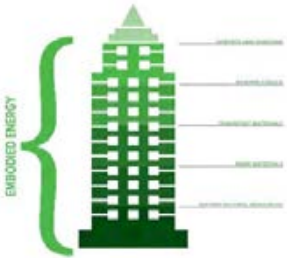
New Buildings and Major Renovations

UCD has a strong history of progressing energy efficient design in its capital development programmes.

The Belfield Campus is home to Roebuck Castle student residences which is a certified Passive House structure. At the time of construction was the largest Passive House apartment complex in Ireland and the U.K. The O'Brien Centre for Science which achieved a BREEAM Excellent rating (an environmental standard) was also a first in Ireland – being the first educational building to achieve this high standard- and is a significant achievement for the capital projects team and Estate Services.

What is embodied energy?

Embodied energy is the total energy required for the extraction, processing, manufacture and delivery of building materials to the building site. UCD seeks to keep the embodied energy in our buildings to a minimum by refurbishing older buildings and reusing existing structures to cut down on energy used through the creation of materials such as concrete and steel as well as their transportation to site.



As part of our ISO50001 requirements, energy efficiency is considered in the design of all new buildings. This starts at the very early stages of a project, when the architects brief is being developed even before concept drawings are considered. This ensures energy is considered from first principles all the way to final design.

A large portion of the Belfield Campus was constructed in the 1960s and 1970s. Most of these buildings will require a major upgrade in the next 5-10 years. This presents a significant challenge, but also an opportunity for the University to dramatically improve the energy performance of these buildings. The refurbishment of the Science South and Science Hub buildings which were constructed in the 1960s is an example of how buildings can be redeveloped in a sustainable way and brought to modern standards of comfort, functionality and energy efficiency. One of the options presented was to demolish the older buildings and construct new buildings in their place. However, this would have created large amounts of waste material and would have resulted in higher energy usage during the construction process. Therefore, UCD choose to reuse the original concrete structures which resulted in a much lower quantity of embodied energy in the building.


UCD Energy Management
Lowering emissions and reducing unnecessary consumption for a sustainable, healthy and living campus!
Just 1% to go!
We are nearing the end of our journey and have already improved our efficiency by 32%*
Help us reach our target of 33% by 2020 with one more big push!
(Baseline of 2006-2008)
A MINI-DISTRICT HEATING SYSTEM was developed in 2018, linking the Sports and Student Centre, facilitating the flow of low-carbon heat from the Student Centre CHP.
Our roll-out of LOW-ENERGY LED LIGHTING continues, with over 50% of the Belfield Campus and 100% of the Blackrock Campus upgraded.
TWO NEW 1MW COMBINED HEAT AND POWER (CHP) ENGINES have been installed in Belfield, supplying low-carbon electricity and heat to the campus.
CHP
ISO 50001
Our energy management system is CERTIFIED TO ISO50001 and we are actively working to identify more projects and opportunities for energy savings & reduced emissions.
With SOLAR-PHOTOVOLTAIC PANELS in Belfield, Blackrock and Lyons Farm, we are producing the equivilent electricity to power 50 homes a year using renewable electricity!
Our SWITCH-OFF CAMPAIGN, promoted before public holidays resulted in 12% savings over the last year!

What can you do to play your part at home, while studying or at work?

- Switch off lighting when leaving the room. Sometimes people assume that someone else will switch off, if everyone assumes this the lights will never go off!

- Don't leave equipment on standby – shutdown and switch off. Equipment on standby can use up to 30% of the electricity as when fully on.

- Close windows each evening. In winter if you leave the window open at night the building will cool down and require much more energy to heat the next morning.

- Don't overfill kettles – boil just the amount of water you need. Kettles use more electricity than most kitchen appliances.

- Spend less time in the shower! Even a couple of minutes less in the shower can greatly reduce your carbon footprint.

- Pull the curtains! Much of the heat loss in a house in winter is through the windows, curtains can considerably reduce this.

- When your light bulb goes replace with LED. They are more expensive, but will last longer and save you money through energy savings in the long run!

Water Management

Water Management

Introduction

Water is a precious, finite resource and UCD is committed to managing it in an efficient and sustainable way. In UCD, "water management" encompasses two distinct elements. Firstly, water that is used or consumed daily on campus for numerous reasons including washing, cleaning, swimming, drinking, irrigation and laboratory experiments. Secondly water management also involves dealing with surface water run-off in a sustainable and efficient manner providing suitable drainage systems, avoiding flooding or pollution and ensuring water course protection on campus. Both elements are equally important and effective management strategies are required to ensure the best outcomes for the environment.

Water Consumption

Mains Water which is piped to the campus has undergone a treatment process prior to its arrival, a process that requires the use of equipment and facilities which consume energy and resources. Energy is also required to pump this water to the campus and up to the UCD Water Tower prior to its distribution around the campus. Therefore, there is a direct linkage between water usage and energy usage and an associated carbon footprint.

With a population of over 3,000 full time residents and up to 30,000 daily visitors, UCD currently uses in excess of 350,000,000 litres of water per annum or equivalent to 116 Olympic sized swimming pools. Therefore, even a small percentage reduction results in a lot of water saved, less cost to the University and provides benefit to the environment. In addition, a reduction in water consumption also results in less wastewater being discharged from the campus, which requires costly treatment before returning to the water cycle.

Surface Water

The management of surface water involves sustainable methods of safely transferring water which falls as rain onto the campus, away to streams and rivers via underground pipes in a controlled manner. In areas with buildings or hard-surfaces such as a University campus, rain-water run-off must be managed in an appropriate way. Large quantities of rain water flowing from hard surfaces in an uncontrolled way to natural water courses such as streams could result in flooding, damage to natural habitats, erosion and potential pollution of water-ways further downstream.

Management of Water on Campus

As highlighted above, water management is important for a number of reasons – sustainable use of a finite resource, energy conservation, pollution and flood risk avoidance, environmental protection and climate change. The following pages detail how water is managed in UCD and gives some examples of projects that have been undertaken on campus to improve how we manage water. Some details on how you can play a part in efficiently using this precious resource is also included.

The water infrastructure and network is managed by UCD Estate Services water management team. Water consumption is managed in a very similar way to energy, using the "Plan Do Check Act" (PDCA) system. The system involves the identification of key water users on campus (either buildings or equipment), monitoring and reporting on usage, and identifying and implementing projects that will reduce the usage. Through the effective implementation of this system, UCD achieved ISO 50001 accreditation for water (and energy management) in 2016, the first third-level organisation in Ireland to achieve this certification for both water and energy management.

In addition, the water management team works with the grounds manager, technical services manager and capital projects team to ensure an efficient and effective rain-water and drainage system is in place on campus.

The water management team monitors the usage of water on campus, meets regularly to review this usage and to plan and implement projects aimed at reducing consumption or using water in a more sustainable manner. Water consumption is monitored using the same Building Management System (BMS) as is used for energy monitoring. This system ensures that water in each of the buildings is monitored, as well as some sub metering in some locations such as showers or the swimming pool in the sports centre. Importantly, there are also "check meters" or "district meters" located at different points of the water network which when correlated with the building water meters can highlight if there are any leaks along the system. Automated "4am" reads also take place weekly which can highlight to the water management team if there is any usage occurring at this time which could potentially signify a leak or some equipment left on unnecessarily. Building level meters or sub-meters within buildings allow the water management team to investigate at a more granular level, where the issue might be.

The management and strategic planning of UCD's drainage and rain-water management infrastructure is done in a way that ensures a holistic and cross-functional approach. This ensures that various impacts of this important aspect of water management is considered from numerous viewpoints – long-term planning, capital infrastructure and biodiversity for example. An example of this approach can be seen in the "upper-lake" in UCD which is detailed in a later section.

Water Sources

UCD's potable water is delivered to the campus from the Irish Water network. There are two main supplies, one to the main academic campus and one to the student residences precinct. Water is pumped to the water tower and then distributed by gravity around the campus through 24 km of internal water network pipes that are owned and managed by UCD.

What is potable water?

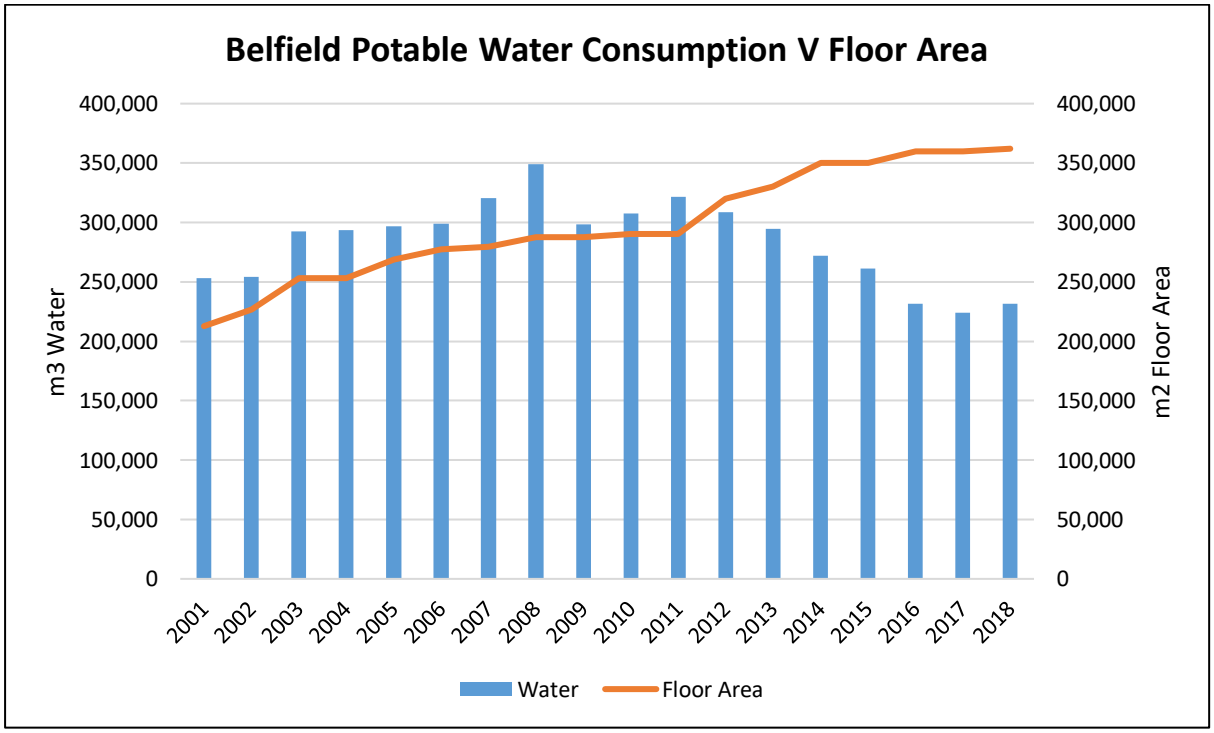
Simply put, potable water is water that can be safely consumed by people. By only using potable water where essential, UCD is seeking to cut down on unnecessary wastage.

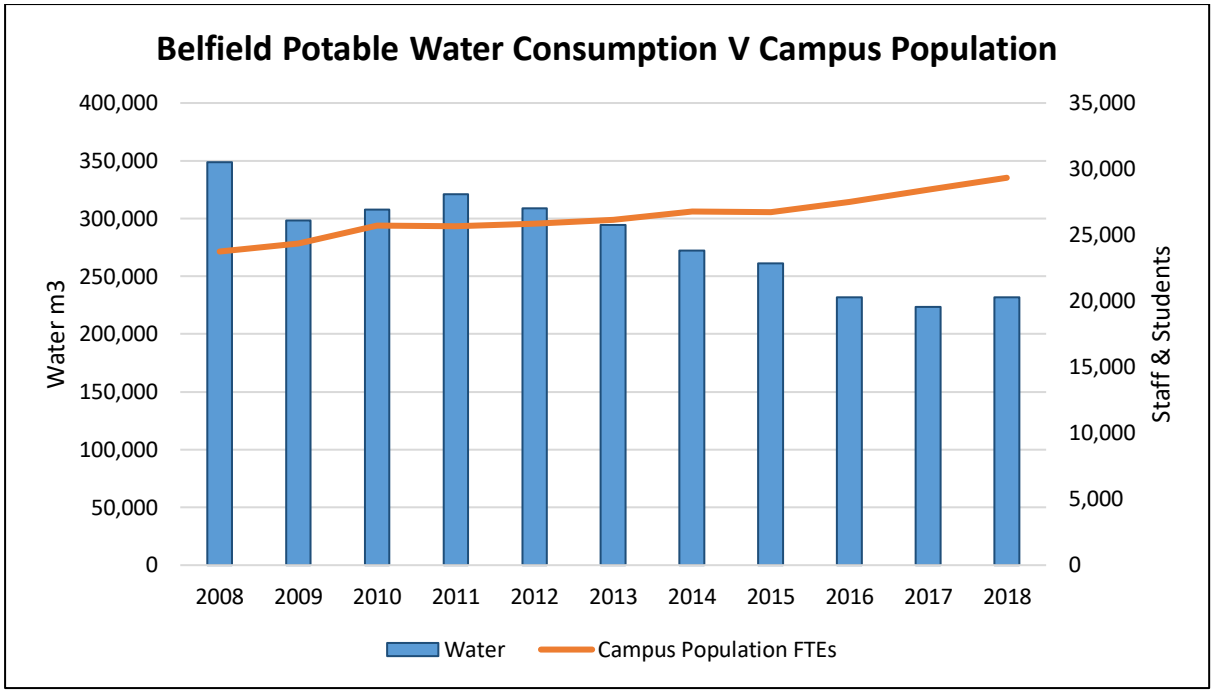
Where possible UCD uses non-potable water such as rainwater and well-water for a variety of uses including construction works, pitch irrigation, road cleaning, horticulture, cooling and toilet flushing in some buildings. Rain-water harvesting is becoming increasingly common, particularly on new buildings and is very effective for non-potable uses. A new rain-water harvesting system was installed on the roof of the O'Brien Centre for Science and was part of the initiatives that helped UCD to achieve the BREEAM Excellent rating for this building.

Well-water or white-water as it is also known, is also an important sustainable source for UCD. This water which is drawn from the ground from on-site wells is primarily used for pitch irrigation, cleaning and plant watering during dry periods over the summer months. Water not taken up by the plants or grass is therefore returned to the water cycle and is much more sustainable than using potable treated water.

Water Usage

As noted, potable water use within buildings includes catering, residential use, showers, laboratories, and sinks and this usage is measured at a number of points within the overall network. The total potable water usage has been decreasing since the adoption of a water mains renewal and upgrade programme in 2011. This has been achieved despite an increase of 12% in the overall campus building area in the same period. There has been a slight increase in 2018, however this is linked to the increase in student and staff over the last number of years. The graphs below detail water usage compared to both floor area and campus population. As can be seen potable water consumption has been reducing as the campus has been growing, both in terms of floor area and student and staff numbers.





Key Performance Indicators 2012-2018

The reduction of potable water use is one of the University's key water targets as this has a direct effect in reducing carbon emissions. These measure our potable water usage and total water usage and compares to the quantity used per person. The "3am" and "Christmas Day" usage figures tracks the improvements in leak and wastage detection.

Some of the main key performance indicators are detailed below:

UCD KPI's	2012	2018	% Difference
Mains (potable) Water Use	308,861 (m3)	231,783 (m3)	-33%
Total Water Consumption (Including non potable)	332,800 (m3)	318,543 (m3)	-4.48%
Water usage per person (student & staff) per day (Potable Water)	32.71 (L/person/day)	21.64 (L/person/day)	-51%
3am Night time use (Avg March)	5,230 (L)	4,120.96 (L)	-27%
Christmas Day Usage (potable)	443.83 (m3)	293.55 (m3)	-51%

Projects and Initiatives

Strategic Water Renewal and Upgrade Programme

In the context of a growing campus, with aging water infrastructure in some areas, the Estate Services water management team developed a strategic plan aimed at carrying out a major renewal and upgrade programme starting in 2010/2011. The over-riding aim of this strategy was to conserve water, improve control, reliability, firefighting ability, water quality and monitoring of the existing water main network and to enhance surface water protection. Achieving ISO accreditation for water management was also identified as a key milestone along the way.

To implement this strategy a number of distinct programmes were carried out as follows:

- Watermain rehabilitation and renewal programme
- Water metering roll out at both building and district level
- Development of alternative sustainable sources of water e.g. Rainwater Harvesting and Whitewater to replace potable (treated) water.
- Water conservation and demand management
- Development of surface water attenuation features as a campus amenity

Key outcomes arising from the implementation of these programme include:

- Close to 100% of principle buildings are now metered.
- Unaccounted for water (unmetered/leakage) is now less than 14% of total water used (due to a combination of additional metering and the elimination of leakage within the network as a result of the watermain renewal programme.)
- Water Leakage/wasted water has been reduced by 40% in the past 4 years
- Mains/Potable water usage has decreased by 28% in the past 4 years. This was achieved despite campus building growth of over 12%. This is equivalent to €225,000 saving per annum for water and wastewater.
- Total campus water use accounting for potable and non-potable water has reduced by 12% in the last 4 years.
- A large part of the water network and infrastructure has been modernised in recent years ensuring that the campus is catered for to continue to grow and develop to match the campus development plan.
- Key water-based activities such as pitch irrigation; window and road cleaning and cooling are now carried out using non-potable water.

- Additional alternative non-potable water supplies have been developed and the non-potable water network continues to expand.
- Campus Upper Lake has been delivered as a water attenuation feature and a campus landscape amenity space. This will avoid the necessity for large underground tanks by providing attenuation for future developments including the proposed Student Residence Master plan in this zone of the campus and the proposed Confucius Institute.
- Additional protection to existing streams and watercourse and associated habitats has been achieved through the implantation of SUDS initiatives with all new developments on the campus. In addition to the campus upper lake these include the use green roofs, swales, infiltration trenches and permeable paving.
- Achieving DLR EnviroCom Water Conservation Award 2014

Surface Water Management

- Incorporating sustainable urban drainage systems (SUDS) into all new developments on the campus.
- Some examples include the use of permeable paving (reducing the volume and rate of surface water run-off to underground drainage systems), rainwater harvesting tanks, swales, infiltration trenches, green roofs and water attenuation features.
- Ensuring all new designs including rain water disposal from roof areas include for the future effects of climate change.

UCD Upper Lake Water Attenuation and Biodiversity Infrastructure

Constructed in 2012 the UCD Upper Lake not only acts a surface water attenuation feature for this area of the campus but has also delivered a significant amenity space in addition to providing ecological benefits to the local wildlife. More information on the biodiversity features can be found in the Biodiversity section of this document.

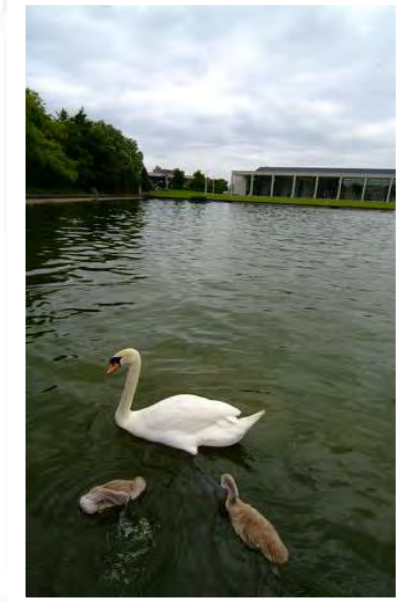
What is SUDS?

SUDS stands for "Sustainable Urban Draingage" SuDS seeks to replicate the drainage patterns of natural systems by using solutions with low environmental impact to drain away dirty and surface water run-off through collection, storage, and cleaning before allowing it to be released slowly back into the environment, such as into water courses.

Covering an area of 6,000m^2, the water body holds in excess of 9 million litres of water. Runoff from each rain event from the UCD Sutherland Law School Building and surrounding area is managed and treated in the water feature. The retention allows time for pollutant removal through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations. Aquatic vegetation and marginal planting will serve to assist the water purification. The lake has also been designed with excess capacity so all surface water from future developments such as the Confucius Institute, Quinn School of Business extension and Student Residence Masterplan will flow into the lake and be managed in this sustainable way.

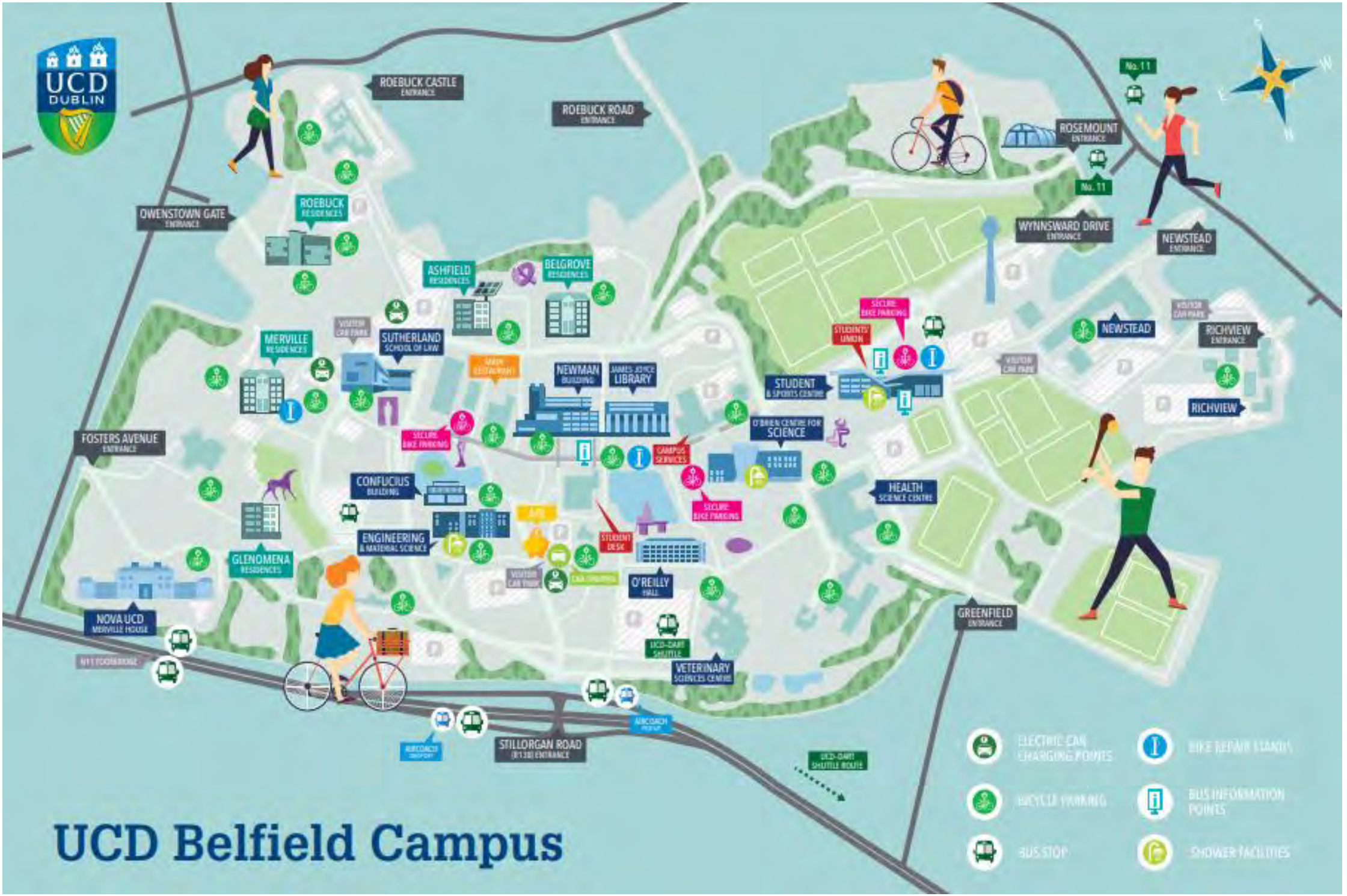
Future/Ongoing Initiatives include

- Develop of Smart Water Network to notify automatically of issues within the network
- Minimise the use of water, in particular treated water
- Continual roll out of water metering
- Increased monitoring and targeting for water usage for key buildings and users.
- Maintain up to date asset register for all water infrastructure.
- Increase awareness of the need to conserve water- finite resource



What can you do?

- Take shorter showers – we use up to 16 litres per minute when showering!
- Don't let the tap run when brushing your teeth –
- Use a sink plug or basin when washing up
- Report leaking water to maintenance@ucd.ie



UCD Belfield Campus

Sustainable Commuting

Sustainable Commuting

Introduction

The UCD community of staff, students and visitors consists of more than 30,000 people. This is a larger population than many towns in Ireland, and with the majority commuting to the UCD campuses each day from Dublin and its neighbouring counties, represents over 7 million journeys each year.

The impact that travel and commuting can have on the environment can be considerable. Car travel in particular has been identified as being a major contributor to carbon emissions and as a result, climate change. Recent discoveries relating to the harmful pollutants from diesel engines and increasing traffic congestion on Dublin and surrounding counties roads has placed a renewed focus on commuting and transportation.

Within the next decade, it's expected that the combined community population of UCD will grow to just under 35,000. That's a lot of people – and a lot of daily journeys to and from the University. Against this background, UCD is committed to the promotion of sustainable transport to, from and within our campuses.

Our vision is:

To create a high-quality campus environment which promotes sustainable, healthy and active lifestyles, while offering transport and mobility choice for the University community.

As a community we have already achieved positive change. For example, recent commuting trends have seen the proportion of employees and students driving to Belfield reducing from 30% in 2010 to 23% in 2018.

Strategy and Management

UCD Estate Services is charged with the management of commuting on campus and develops commuting strategy in conjunction with University management. Estate Services has developed a number of commuting strategies and strategy updates, the first covering the years 2009-2015. Our commuting strategies seek to set out a blueprint for how we will work as a community to improve in the field of sustainable transport.

A significant amount has been achieved since 2009, with UCD being supported by the National Transport Authority (NTA) and Dun Laoghaire Rathdown County Council (DLRCC). The commuting trends over the life of the previous Strategy were generally positive, with the proportion of staff and students driving to Belfield reducing from 30% in 2010 to 23% in 2015/16. Initiatives such as the 'UCD to DART shuttle bus', a new bus terminus, improved cycle parking facilities and the introduction of managed parking on-campus has assisted in this regard.

A strategy, the UCD Travel Plan 2016-2021-2026, *'Getting there the Sustainable Way'* was published at the end of 2016.

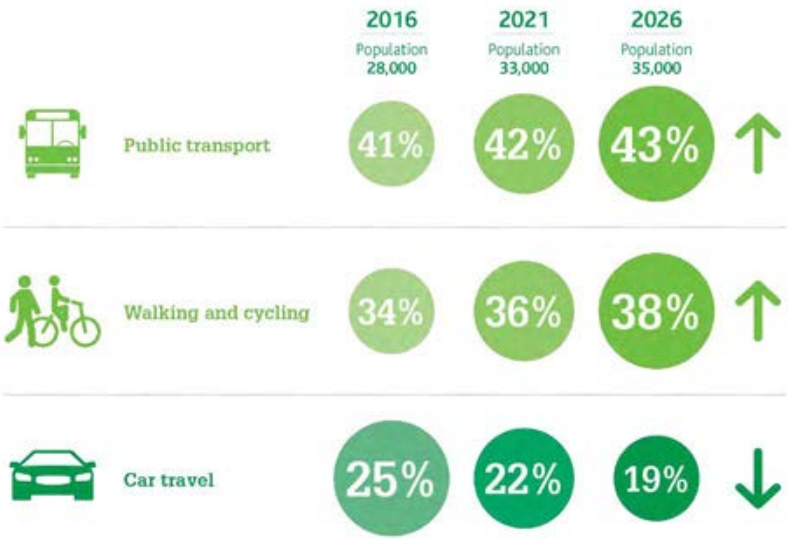
UCD Travel Plan: Getting There the Sustainable Way

Our new Travel Plan is guided by three core principles:

1. Promoting Sustainable Travel Options
2. Encouraging Activity, Health and Wellbeing
3. Developing an Accessible, Attractive and Welcoming Campus.

The key targets of the plan are to:

- Increase Public Transport usage from 41% in 2016 to 43% in 2026
- Increase Walking & Cycling from 34% in 2016 to 38% in 2026
- Decrease Car Travel from 25% in 2016 to 19% in 2026



The above is to be achieved in the context of a growing University population which is forecast to grow from 28,000 in 2016 to 35,000 in 2026.

Encouraging people living within a 3km radius of the UCD campuses is a key target of the strategy. A 3km walk takes approximately a half an hour and is a great way to prepare for study or work. In terms of the proportion of the people who actually walk we're looking to increase numbers from 14% in 2016 to 18% in 2026. We also have plans to further enhance the walkability of our campus, improving pedestrian and cyclist entrances and by keeping vehicular traffic to the periphery.

The Student Residences masterplan will transform a large part of the campus from being dominated by surface car parks to a walkable, pedestrian and cycle friendly area. This ambitious plan will provide an additional 3,000 on campus beds, bringing the total to over 6,000. Importantly, this means that an additional 3,000 students will not be required to travel to the University each day.

Travel Plan Update 2018

We are continually monitoring our progress on targets and undertake an annual commuting survey. Based on the results from the 2018 staff and student commuting survey Estate Services published an update to the Travel Plan in both 2017 and 2018

We once again showed steady progress towards targets in both years – some of the key figures from 2018 are seen here:

The Travel Plan and updates can be downloaded from: http://ucdestates.ie/about/sustainability/ucd-travel-plan/

Services and Initiatives

UCD Estate Services is actively working to improve the facilities for commuters on campus and to enable and encourage more sustainable patterns. Below are some details and highlights of the services and initiatives that have been implemented in recent years.

Public Transport

Public transport is a key part of UCD's sustainable commuting plan. UCD is well served by bus, particularly along the main R138 (formally N11) Stillorgan Road. Furthermore there are approximately 50 buses entering and exiting the campus per hour at peak times.

There are two bus terminus on campus – one near the new Confucius Institute for Ireland to the east of the campus and one adjacent to the Sports Centre. UCD works with the NTA and Dublin bus in order to identify demand for services and to improve current services. This partnership arrangement has ensured that key bus services not only serve the campus but importantly begin their journeys here throughout the day to ensure our students and staff can easily access the services.

Another partnership initiative between UCD and the NTA has been the "bus gate". Traffic barriers are closed to prevent cars travelling through the campus at peak commuting periods for safety reasons. The bus gate allows the No. 17 service to automatically pass through the traffic barriers which allow the bus to traverse the campus efficiently and safely.

A BRT (Bus Rapid Transit) working group has been set up with representatives from UCD, the NTA and DLRCC meeting regularly to discuss the proposed public transport system which is to terminate at UCD Belfield. The proposed service, which will run from Blanchardstown to UCD via the City Centre is a very welcome announcement from the NTA. UCD and the working group are actively engaged to ensure the service, which will be an invaluable addition to the campus, will be delivered in the best way possible at UCD. Potential locations of stops, entry and exit points to the campus, inter-connectivity with existing public transport services, pedestrian, cyclist and vehicular movements are all being discussed and explored as part of the "Future Campus" masterplan.

UCD-DART Shuttle Bus

UCD Belfield is approximately 2km from Sydney Parade DART Station. Although many of our students and staff choose to walk, Estate Services recognised that the distance might be a deterrent to some – particularly on rainy days!

A shuttle bus service has been provided which runs between the DART Station in Sydney Parade and the Belfield Campus. This improves the connectivity of the campus and encourages people to use the DART.

UCD Dart Shuttle patronage figures have steadily grown since the pilot scheme was launched in September 2014

- Sept 2014 to May 2015 – 6,660 users
- Sept 2015 to May 2016 – 10,698 users

Private Services

A number of privately-owned coach services operate from and around campus. A complete list of routes can be found at http://ucdestates.ie/commuting/getting-here/bus/.

UCD has a number of surface carparks on the Belfield and Blackrock campuses. With the aim of promoting sustainable commuting, the number of spaces UCD are allowed to provide on-campus are capped by the National Transport Authority (NTA).

Carparking and Demand Management

In advance of the start of the 2015/16 academic year UCD introduced a demand management system for car parking in UCD operating during term-time. This system entitles UCD students and staff to purchase a parking permit which allows them to park on the UCD campus on a first-come, first-served basis. As well as a demand management system in itself, this was introduced to ensure only members of the UCD community use the parking facilities. There was some evidence of individuals using UCD as a 'Park and Ride' facility given the availability of public transport from the campus – this is now no longer possible, freeing up spaces for UCD students and staff. Visitors who drive can avail of pay by the hour parking spaces.

UCD recognises that some students and staff need to drive because of their particular needs or due to a lack of availability of alternative modes. The demand management system is helping to ensure

that there are spaces available to those need them although the current cap rate means that there is likely to continue to be pressure in terms of demand for parking spaces.

Electric Charging Points

It is becoming well recognised that electric vehicles are gradually replacing traditional combustion engine vehicles. This will have an increasingly positive impact on carbon emissions and pollution. In order to facilitate staff, students and visitors who are already making this transition, UCD Estate Services have installed a number of electric vehicle charging points on campus.

Although private electric vehicles are a very welcome development, it must be recognised that they still lag behind cycling, walking and public transport in terms of their overall sustainability. Ireland's electrical system is still partially fuelled by fossil fuels, while a lot of energy and resources are used in producing cars – steel, plastics, rubber and other resources used in their production. Therefore walking, cycling and public transport will continue to be the primary sustainable transport modes promoted by the University.

Student and Staff Involvement

Involvement of students and employees in informing strategy and direction of commuting policy is very important. A Smarter Travel Implementation group has been formed to help in this process. This group provides us with feedback on current initiatives, communicates issues and problems from a number of different perspectives and acts a forum to generate ideas and to discuss solutions to these issues.

The group has a strong link with Healthy UCD, with some members active in both groups. This has helped promote UCD's walking and cycling upgrades (woodland walks / cycle facilities) to the wider UCD community and links Sustainable Commuting with Active and Healthy Lifestyles.

The Students Union in conjunction with the UCD Estate Services has helped to advertise numerous awareness campaigns and initiatives through social media outlets. The UCD Travel Plan went through a consultation process with staff and students. This proved to be a very engaging and worthwhile process as it generated numerous threads of constructive feedback.

The annual staff and student commuting survey has on average 4,000 participants, the survey is sent to all staff and students and acts as a reminder to all, of the commuting targets UCD strives to achieve. The introduction of the paid permit parking system touched on the whole UCD community, and the implementation of the system involved numerous Schools and Units.

Cycling

There has been significant investment by both the NTA, DLRCC and UCD in cycling, both on-campus and in the surrounding areas in terms of cycle infrastructure and provision of end of trip facilities such as cycle parking, showers and lockers. The cycle catchment of the campus, as presented in Figure 10, is significant, with the 30-minute catchment extending as far as the North Inner-City Centre to the north, Crumlin, Rathfarnham and Templeogue to the west, Stepaside to the south and Dun Laoghaire to the south-east. Other areas within the 30- minute catchment include Ballsbridge, Sandyford and Dundrum as well as a number of Luas and DART stations.

A cycle time of 45mins is generally considered to be the upper limit for commuting purposes, with the latest travel survey showing that the majority of students (85%) and staff (76%) who cycle, have journey times of 30 minutes or less.

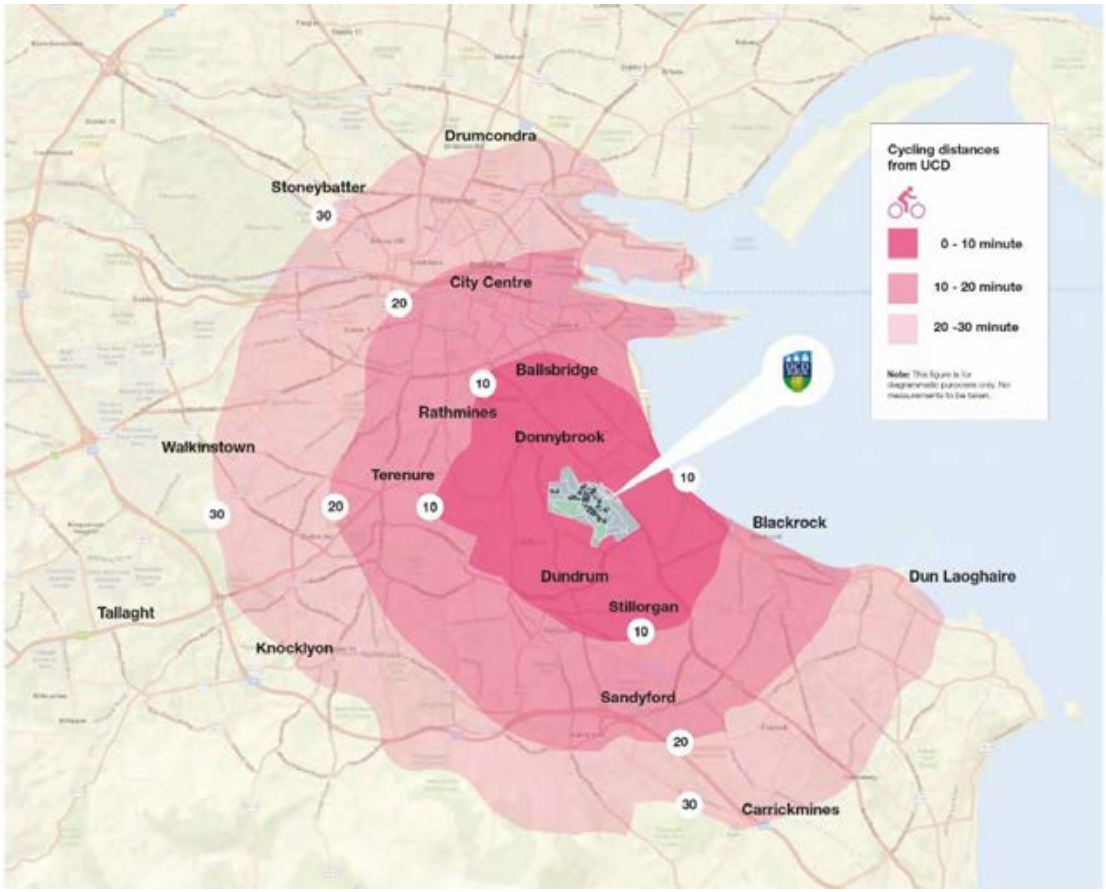
Cycling facilities within the vicinity of the campus include cycle tracks along the R138/N11 and cycle lanes along Roebuck Road and Clonskeagh Road (a section of which has recently been upgraded). The quality of these facilities vary however, with significant investment planned as set out in the GDA Cycle network Plan.

Within the campus, there is a limited amount of dedicated cycle routes, and in general, cyclists share traffic calmed roads with motor vehicles along the periphery or share routes with pedestrians within the central core area. The majority of cycle movements are confined to four main routes which connect the campus entrances with the core of the campus as shown in Figure 11.

There is currently approximately 4,100 formal cycle parking spaces on-campus, consisting of a mix of lockers, stands and wheel racks.

Significant investment, with funding support from the NTA has occurred over the last 5 years in the replacement of old cycle parking stands on-campus. Most parking is provided around the Science, Newman Joyce and Health and Agriculture Precincts.

Cycle spaces are now generally provided in well-lit, active areas that provide passive surveillance and easy access to relevant entrances of buildings. This cycle parking replacement programme will continue in the coming years as part of this Travel Plan with areas identified to provide new stands as well as replace the existing substandard cycle parking.



Walking

The accessibility of the campus within 10, 20 and 30 minutes by foot from the campus entrances is shown in Figure 9. A walk time of 45mins is generally considered to be the upper limit for commuting purposes, with the latest travel survey showing that the majority of students (84%) and staff (63%) who walk, have journey times of 30 minutes or less.

The 10-minute walk catchment extends to the surrounding residential areas and incorporates key bus stops along the R138 Stillorgan Road and Clonskeagh Road. Areas within 20- minute walk include Donnybrook, St. Vincent's University Hospital and the closest Luas and DART stops.

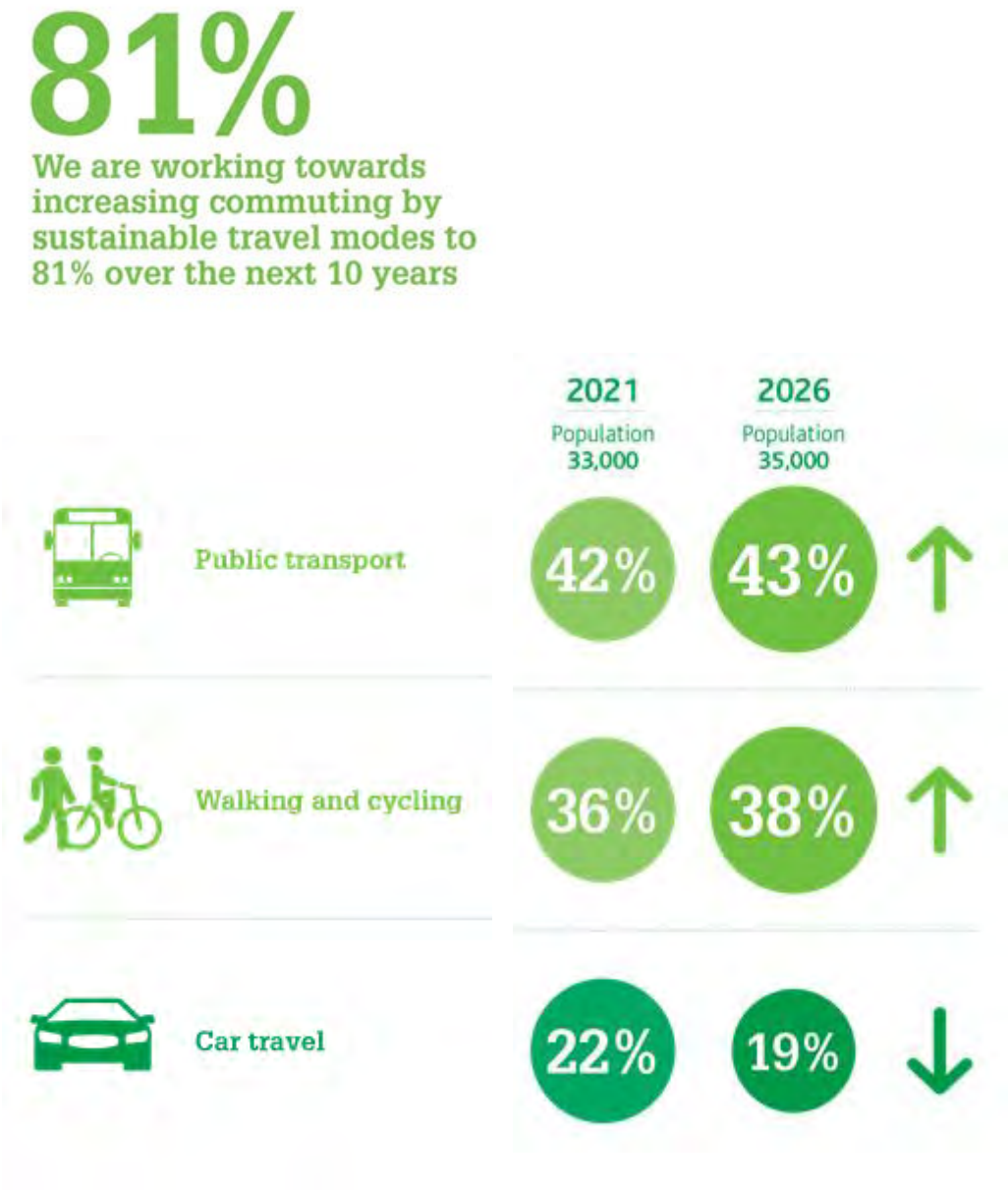
The 30-minute catchment extends to Ranelagh, Ballsbridge, Milltown, Stillorgan and the Merrion Road QBC.

The Belfield Campus has a permeable pedestrian network that is connected to the external network at multiple locations, thereby creating a relatively permeable campus. In total, there are currently 12 formal entrances for pedestrians into the campus, with an additional informal entrance used by pedestrians adjacent to the Stillorgan Road footbridge near UCD Nova. There are four entrances which are dedicated for pedestrians and cyclists only, namely:

- Greenfield Park;
- Roebuck Castle;
- Roebuck Wicket pedestrian gate;
- and
- R138 Stillorgan Road bus stop.

Within the campus the pedestrian network is of a high quality with wide, well-lit and well maintained footpaths connecting the entrances with the university academic buildings, facilities and residences. There are over eight kilometres of walking, jogging and cross-country woodland paths on-campus providing an attractive facility for both the UCD population as well as the local community. There has also been significant investment in the pedestrianisation of the heart of the campus, most visibly in the areas surrounding the UCD Sutherland School of Law Building, UCD O'Brien Centre for Science and the UCD Student Centre.

Targets


81%
We are working towards increasing commuting by sustainable travel modes to 81% over the next 10 years
2021
Population
33,000
2026
Population
35,000
Public transport
42%
43%
Walking and cycling
36%
38%
Car travel
22%
19%

Planned Actions and Initiatives

How can you get involved?

- Cycle to the campus – secure bike parking and showers are available
- Use public transport –the DART is now accessible with the UCD Shuttle Bus
- Car-share – why not find out if there are students or staff commuting from your area? (Include links using icons https://www.carsharing.ie/ and SU Icon https://www.facebook.com/groups/1290293111048449/?fref=mentions

Waste Management & Recycling

Waste Management & Recycling

Sustainable waste management: why should we care?

The management of waste is a responsibility for each and every waste producer – in other words, every one of us. The reasons behind why we should manage our waste are generally broken into the following headings:

- Moral imperative – the ethos of sustainable development places the onus on us all to manage resources and waste for the benefit of future generations.
- Economic – the cost of managing, treating and disposing of waste is considerable.
- Compliance – from littering fines to landfill levies, the management of waste is highly regulated.

A busy multi-disciplinary University produces a wide variety of wastes, from chemical wastes in laboratories to green wastes from playing pitches each with its own management system. The management of what could be called "general" waste produced day to day (municipal waste) is the main focus of this section. This waste can be generated by the production and consumption of food, the purchase of goods, e.g. packaging waste, and normal academic activities, e.g. paper waste.

This section of the Environmental Review examines what types and how much municipal waste we produce in UCD, how this is managed and its final destination. This section will examine developments in this area and also explore ways we can as a community, both reduce the quantity of waste we produce and increase recycling rates. We also explore how waste is currently being managed and plans for the future. When considering waste management what becomes very clear is the individual behaviour and choices is extremely significant. Therefore, we also detail how we can all make small changes to ensure we all play our part in reducing waste and outline Green Campus Committee plans in this area.

What are the key "general" waste types produced in UCD?

Packaging Waste

Packaging is a category of waste that has significant negative externalities and is an area that is received much attention in recent times. In Western Europe, we produce approximately 170kg per person per year[1]! Plastic packaging makes up a considerable portion of this – it is predicted that by 2050 there will have been 12 billion tonnes[2] produced and disposed of unless drastic action is taken. The vast majority of monomers used to make plastics, such as ethylene and propylene, are derived from fossil hydrocarbons, so again there is an embodied energy cost. Importantly, at the moment very few of the commonly used plastics are biodegradable.

[1] Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php/Packaging_waste_statistics
[2] National Geographic: https://news.nationalgeographic.com/2017/07/plastic-produced-recycling-waste-ocean-trash-debris-environment/

Plastic debris can be found in all major ocean basins, and reports of environmental contamination with synthetic fibres has become more commonplace. In Ireland today, only 36% of plastics are currently recycled, which although better than the 22.5% European target, still shows that despite best efforts, there is a long way to go.[3] In UCD the main types of packaging waste produced on a day to day basis would be sandwich boxes, crisp packets, bar wrappers as well as plastic bottles and coffee cups (discussed in more detail below).

Single-Use Items

Although these could also be described as "packaging", it is worth giving single-use items a category by themselves. In UCD, disposable coffee cups and plastic bottles (water and soft-drinks) represent the largest use of single-use items and indeed together represent one of the largest waste-types within our general waste stream.

Paper, plastic, ink and other materials are used in their production, energy is required to run the machines that produce them and to fuel the trucks that deliver them. After being disposed of, bin-trucks are used to collect and bring them to their final destination. While increasingly, modern single-use coffee-cups are either compostable, recyclable or a mix of both, resources are still used to produce, distribute, collect and dispose of them. With this in mind, reducing the number of disposable cups we use should be our ultimate aim as a University and a society. One of the Green Campus aims is the promote the use of reusable cups on campus and significantly reduce the quantity of single use cups produced and disposed of across the campus. It is acknowledged that some level of use of disposable coffee cups is inevitable, therefore the Green Campus Committee is working with Estate Services and our food-service providers to move to compostable cups and to divert these into the compostable waste-stream.

Similarly, although plastic bottles can be recycled (which is more favourable than energy recovery), avoiding their use entirely is a more favourable outcome. Plastic are derived from petrochemicals produced from fossil fuels. The manufacture of the bottles also requires energy, as does the manufacture of packaging used to hold the bottles for delivery, the vehicles used to deliver the bottles use energy and energy is consumed during the recycling process. The reduction in the use of plastic bottles on campus is therefore a key goal of the Green Campus Committee. As with disposable coffee cups, it is recognised that some level of plastic bottle use is inevitable, therefore the Green Campus is also working to identify ways of increasing recycling rates on campus in conjunction with Estate Services. See the "recycling" section below for more details. We are also looking at ways to introduce more readily recyclable materials including aluminium cans and glass.[4]

Food Waste

Many people do not consider food waste to be particularly harmful as it is biodegradable – however globally, approximately one third of food produced for human consumption goes to waste. This means that a third of the water, land use, energy and financial resources that went into growing, producing, distributing and cooking the food it is also wasted. Therefore, another area that the Green Campus Committee is seeking to focus on is food waste.

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[3] Repak: https://www.repak.ie/wp-content/uploads/2018/09/Repak_update_v2-with-cover.pdf

[4] Beverage Container Showdown: https://earth911.com/living-well-being/recycled-beverage-containers/

Paper and Cardboard

Paper and cardboard is another key category of waste that is produced on-campus. As with other waste-types, the key goal is to reduce the production of paper and cardboard and secondly to improve recycling rates. The Green Campus Committee is planning to look at ways to reduce the quantity of paper produced on campus, such as promoting minute-taking and note-taking digitally. A large quantity of UCD's paper is sorted and recycled off-campus, however in conjunction with UCD Estate Services, the Green Campus Committee is exploring more ways to segregate on campus in order to increase recycling rates.

Waste Quantity in UCD

In UCD, we produce over 2,000 tonnes of Municipal Solid Wastes* per annum or approximately 65kg of waste per person (students and staff):

Our long term vision is to:

1. Significantly reduce the quantity of waste being produced per person (kg/person)
2. Increase recycling and composting rates

These goals can only be achieved through a coordinated effort from all parties involved in the production and management of waste. This encompasses the management of our waste by our contracted Waste Management Service providers, how the University ensures that waste produced is properly managed all the way down to daily decisions that we make.

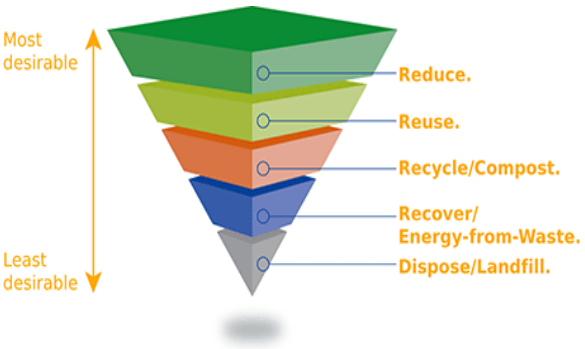
What is Municipal Solid Wastes (MSW)

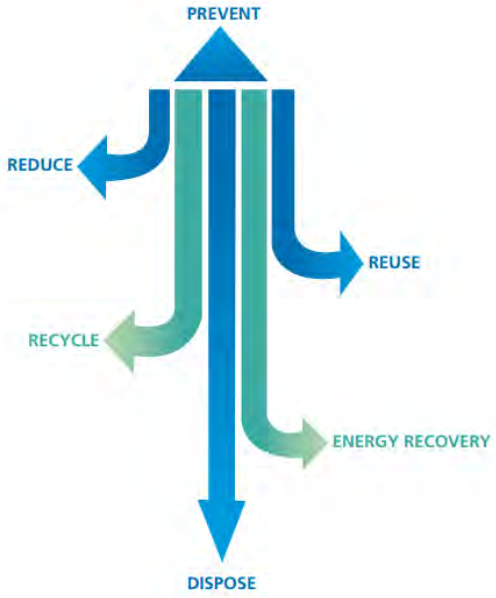
MSW is a waste type consisting of everyday items that are discarded by the public. It does not include hazardous, chemical or construction waste.

The Waste Hierarchy

The National Waste Policy - A Resource Opportunity: Waste Management Policy in Ireland (2012) clearly expresses Ireland's commitment to implement the waste hierarchy by aiming for more prevention, reuse and recycling and so that we reduce the impact of waste on the environment".

The waste hierarchy ranks waste management options in terms of their environmental impact. Waste prevention is at the top of the hierarchy and represents the most efficient and sustainable use of resources.





The well-known concept of the "3 Rs" – ***"Reduce, Reuse, Recycle***" is still very relevant and is core to the optimal management of waste generated in UCD.

Reducing, or avoiding producing waste is without doubt the best way to improve an individual's or an organisation's performance in terms of waste management. This can be from an institutional point of view, i.e. encouraging reusable cups etc. to a personal choice, e.g. reusable lunch containers. This is an area where user behaviour can greatly enhance an organisation's performance and an area of great opportunity for the Green Campus.

As previously outlined, not using materials that need to be disposed of is the most definite and cost effective way of cutting down on waste.

Not producing waste in the first place has a host of benefits:

- Less energy used in the manufacture of materials
- Less energy used in the transport and distribution of materials
- Less energy used in the disposal or recycling of waste materials.
- Less risk of waste becoming destined for land-fill.

This is an area where personal choice and the individual has a major role to play. Everyday decisions we make has a direct impact on the quantity of waste produced in UCD.

Waste can be reduced by following the three well know principles of reduce, reuse, recycling!

Reduce

- Avoid using disposable cups for tea and coffee – did you know most UCD outlets offer discounts when using reusable cups including the SU Shops.
- Purchase reusable net-bags and choose loose fruit and vegetables – this also cuts down on food wastage.
- Portion size – measure pasta, rice and porridge in a cup before putting in the pot.
- Avoid using tin-foil or plastic to wrap sandwiches as it is difficult to recycle and typically goes to landfill – consider biodegradable options or use lunch-boxes.
- Bring a reusable bottle each day and fill up at a water cooler or tap – plastic bottles are a major component of UCD's waste.
- Try to print as little as possible – encourage your classmates or colleagues to bring laptops to project groups or meetings and circulate documents beforehand.
- Take lecture notes and meeting notes on your laptop rather than using paper notes. This also makes it easier to save and organise your notes.
- Put a "no junk mail" sign on your letter box!
- Buy a battery recharger and charge batteries needed for bicycle lights, remote controls, clocks etc. clocks etc. rather than buying new one's each time.

Reuse

- Donate old clothes that are still in good condition to charity shops.
- Sell or donate old CDs, DVDs or household items online rather than dumping
- Many primary schools are happy to accept egg cartons, and cereal boxes for art and craft
- Jars, pots and shoe boxes serve as useful and quirky storage containers

UCD Furniture Re-use Project

The furniture reuse programme is part of a bigger scheme within UCD Estate Services to divert furniture from landfill. To reduce the carbon footprint of UCD and reduce the costs incurred by buying new furniture, the objective of this scheme is to maximise the reuse, repurpose (and fixing) and recycling of furniture while minimising the quantity of furniture that is disposed of. http://worksmartertogether.ucd.ie/smarter-furniture-reuse-ucd/

"Duvets for Dogs" Project

The "Duvets for Dogs" project came about as a result of a discussion at one of the first Green Campus Committee meetings, i.e. Could we come up with a way to re-purpose used duvets each year from the Student Residences and divert them from landfill?

An extensive amount of research went into finding a solution to this challenge and a number of avenues were explored, before the Dogs Trust Charity came on-board to take a delivery of duvets each month for use as bedding for rescue dogs.

At the end of each term, members of the Green Campus community including students, Residential assistants and Estate Services come together to collect and bag duvets which are stored on site and delivered each month to Dogs Trust.

This initiative has resulted in hundreds of duvets being diverted from landfill and has helped give something back to the community in the form of donations to a very worthwhile charity.

Recycle

After reduction and reuse, recycling is the next most favoured option in the waste hierarchy. At the moment the majority of UCD waste is segregated offsite, with some local on-site segregation in certain buildings on campus including a full segregated recycling in the Student Residences.

The biggest issue with and impediment to user-segregated recycling in Ireland and UCD at present is contamination. This is particularly an issue for "public" bins located outdoors or for example, in circulation areas in building. Contamination occurs when something that is not recyclable is placed in a recycling bin. In many cases, this results in the entire bin being considered "contaminated" by the waste disposal company and the contents being sent to landfill or waste to energy stations. For organisations such as UCD, this also results in fines being imposed by the waste management companies and overall reduced recycling rates.

A number of trial onsite segregation recycling initiatives are currently operating on the academic campus, including in UCD Research, UCD Agriculture Building, the Sutherland School of Law and the John Henry Newman building. The student's union is also operating a recycling system in the Student Centre.

In the UCD Student Residences, a full segregated recycling system is in place with bins for four waste streams in each apartment and corresponding bins in waste collection areas. Unfortunately, levels of contamination are higher than one would hope for in many instances. Before the University can invest

in additional physical infrastructure, it is necessary to improve recycling levels in order to avoid contamination and potential costs to the University.

A key focus of the Green Campus Committee over the coming years will be to raise awareness and educate students and staff on how to recycle with the aim of improving recycling rates.

It is likely that much of the issue with contamination is due to a lack of understanding of what is recyclable and what is not. Through the Green Campus initiative, it is hoped that a number of projects can be undertaken which will explore these issues and seek to inform and empower people to make better choices.

Such projects may be:

- Work with UCD Estate Services to identify key contamination types
- Undertake surveys of students and staff to understand their level of understanding
- Develop videos to help educate people on different recycling types
- Develop posters or social media communications to inform people
- Track changes and improvements
- Explore the potential of “bin-less offices”

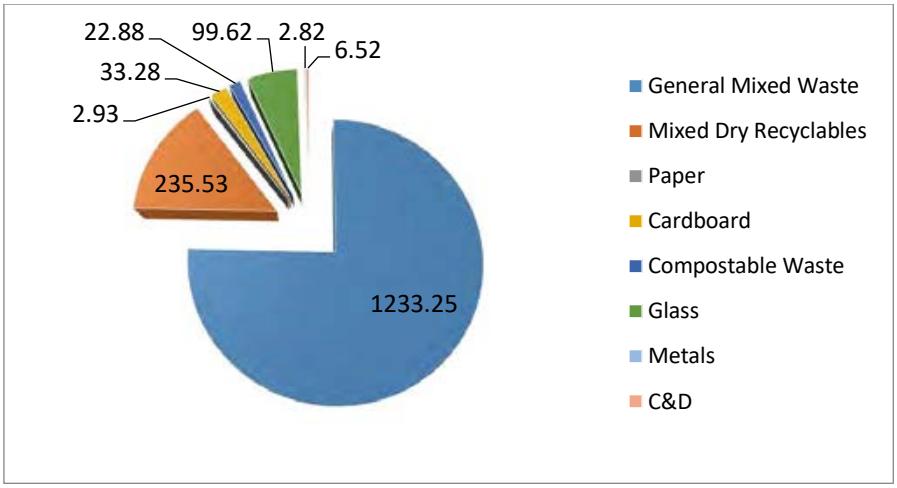
Sutherland School of Law Recycling Project

An example of this approach can be seen in the Sutherland School of Law. In 2018, through the Green Campus Programme, a group of students, supported by staff within Sutherland and Estate Services implemented a project where they developed a communications campaign to engage with people in the Sutherland School of Law and make them more aware of how the use recycling bins, and the different types of materials.

This project which was launched in October 2018 involved the team installing a number of three compartment bins in varies areas within the building. The team, with the assistance of Estate Services will monitor contamination levels from bin “audits”. From the results of these audits, the team may adapt their communications campaign, undertake research to understand why bins are not being used properly and potentially develop new ways to help get the message across to building users.

Figures and Statistics

Currently, the majority of the academic campus waste is segregated off-site where possible with over 20% of this waste being directly recycled and a large percentage of the remainder being used for the generation of energy, with food waste being composted. Through processes used by our waste management service providers, less than 10% of Municipal Solid Waste final destinations is landfill.



Plans for 2019 and Beyond

Recycling

It is proposed to further roll out recycling trials in other University buildings in the near future. Estate Services will work with the Student's Union, Green Campus Committee, and building users to build a better understanding of waste streams, identify any difficulties with implementation, build awareness amongst students and staff as to the different waste streams and to identify the most appropriate way for the University to increase recycling rates in line with best practice.

What are Mixed-Dry Recyclables (MDR)?

MDR refers to waste that is free from contaminants such as construction, food or garden waste. MDR includes clean materials such as paper, cardboard, plastic bottles and drinks cans which can be recycled.

Over time, as we learn more it is planned to roll-out increasing levels of onsite segregation.

Recycling Tips!

- Recycle more items from the bathroom, kitchen and other areas of the house – did you know that all of your shower gel, shampoo and detergent / cleaning agent bottles can be easily recycled?
- Rinse any food or liquid residues from containers and remove any plastic / metal inserts from boxes being placed into your recycling bin
- Do not place mixed recyclables compacted into boxes or bags into your recycling bin – instead empty the contents of the bags / boxes into the bin so that the recyclables are loose and easily separated into different material types – you can then reuse the box or bag to store your next batch of recyclable

- Do not put food waste or other compostable materials (such as garden waste, tissue paper and soiled pizza boxes) into your recyclables bin.

- WEEE (Waste Electrical and Electronic Equipment – anything with a battery or a plug) can contain hazardous components and should not be placed into any household or business premise bin.

- WEEE material can be swapped like for like at any electrical supplies store when you are getting a new appliance or can be taken to your local recycling centre from where it will be sent for recycling.

- Clothes or shoes should not be placed into your recycling bin, instead bring them to charity shops or dedicated clothes banks for recycling. Items of clothing can wrap around machinery parts and cause problems at recycling facilities.

- Batteries should not be placed into bins. Batteries must be recycled appropriately and can be placed in battery boxes located in any shop that sells them.

Contributors

- UCD Students Union
- UCD Estate Services
- UCD School of Biology and Environmental Science
- UCD Career Development Centre
- Healthy UCD
- UCD in the Community

Contacts

For more information or to get involved see http://ucdestates.ie/about/sustainability/green-campus/ follow us on Twitter and Instagram @UCDGreenCampus or drop an email to greencampus@ucd.ie

Remember, being part of the Green Campus Committee is open to everyone and you can join at any time!