



# Water Institute Strategy 2019 - 2021





## Water

Everything on the earth bristled, the bramble  
pricked and the green thread  
nibbled away, the petal fell, falling  
until the only flower was the falling itself.  
Water is another matter,  
has no direction but its own bright grace,  
runs through all imaginable colors,  
takes limpid lessons  
from stone,  
and in those functionings plays out  
the unrealized ambitions of the foam.

— Pablo Neruda, 1904-1973

# Foreword

The Water Institute was established in 2013 recognising the significant capacity and success in world-class water-related research and training in Dublin City University.

Globally, we are witnessing a time of unprecedented change and the management of water resources is a significantly underestimated, geopolitical challenge. Globally, the World Economic Forum has consistently ranked water crises among the most important risks for the global economy in the coming decade, thus indicating the magnitude of the challenge. The United Nations estimate that almost three billion people in 48 countries will face water scarcity by 2025. Similarly, the World Health Organisation estimates that one million people per year will die from diseases directly attributable to unclean water, with 90% of those being children under the age of five years of age, mostly in developing countries.

Nationally, our freshwater ecosystems and biodiversity are under increasing pressure. Ireland will face critical decisions around water quality, water availability and flooding, and the underinvestment in ageing infrastructure. Through resilience design, stakeholder

engagement and communication to find solutions to shared water challenges, the Water Institute will be at the forefront in aiding the future-proofing of Ireland's water development and the welfare of the citizens.

The Water Institute reputation has grown substantially since its establishment. Over the coming years the Water Institute will establish itself as an international centre of excellence in water, focusing on impact for society through talent growth, technology development and innovative bio-design and ethical approaches. We aim to align our strategic objectives with the Sustainable Development Goals as set out by the United Nations and we aspire to deliver on these grand challenges through a spirit of embracing talent, discovery and transformation

Prof Fiona Regan  
Director, Water Institute

# Executive Summary

In 2013 The Water Institute was established to bring together the significant capacity and success in water-related research and training in the University to address a significant global need.

Dublin City University



The brand has grown significantly in the 5 years since its establishment. In the next three years the Water Institute plans to establish itself as an international centre of excellence in water, focusing on impact for society, using talent growth, technology development, innovative and bio-design and ethical approaches. The establishment and continued support of the Water Institute signified the recognition by the university, of the unique capacity of the initiative to fill a gap, and grow a significant expertise of relevance to the university strategy Talent, Discovery and Transformation. The Water Institute is a cross-faculty centre of excellence, with academic members from all five faculties of the university and support from key areas of sustainability, communications and enterprise. The recognition and support of senior management in the university confirms the need for and success of a collaborative approach.



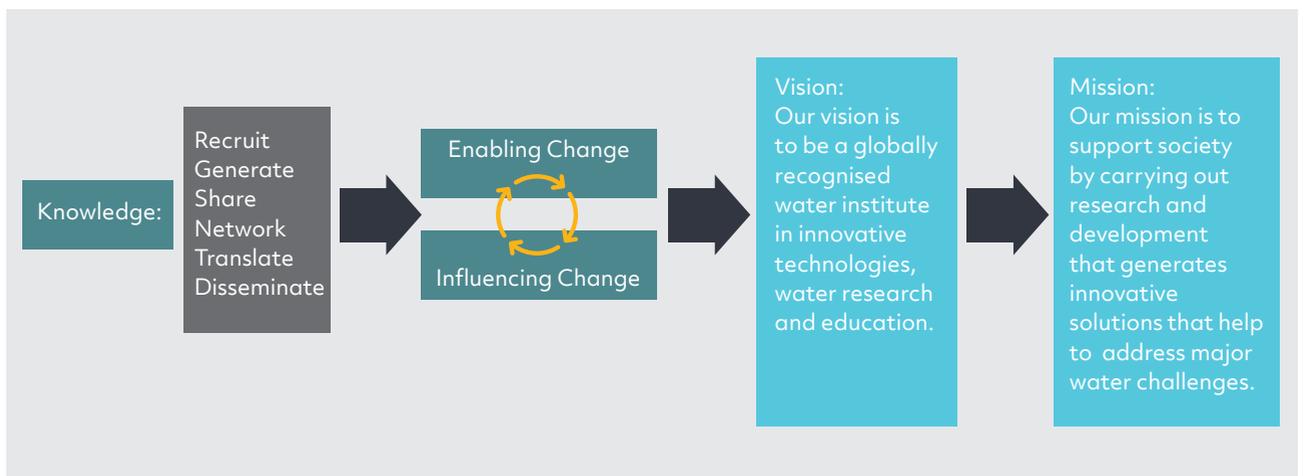
# Our Vision

Our vision is to be a globally recognised water institute in innovative technologies, water research and education.

# Our Mission

To support society by carrying out research and development that generates innovative solutions that help to address major water challenges.

Dublin City University

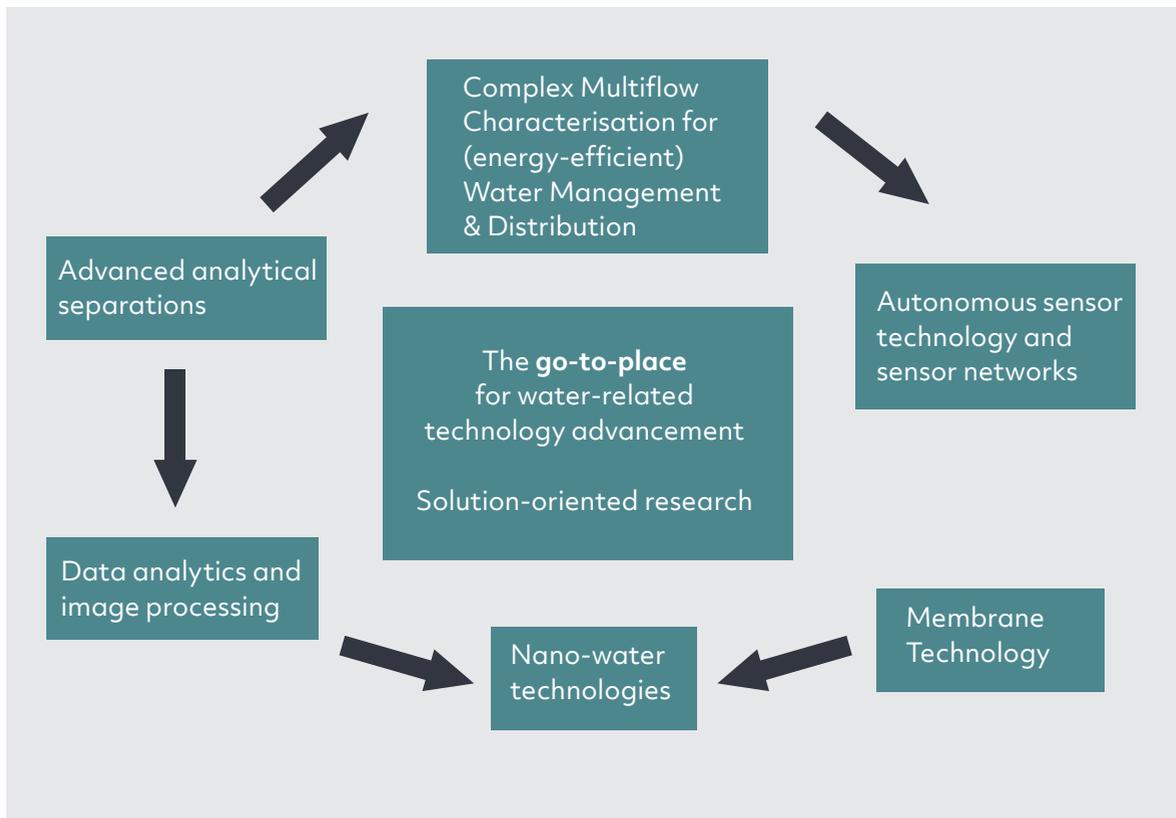


## Collaborations

The Water Institute has had significant success in attracting funding to enable the world class research to take place. Its success has grown substantially, to enable it to focus on areas of novel innovative technologies and solutions. The projects involve national and international collaborations with numerous government bodies, academic institutions, industry partners and state agencies.

## A Centre of Excellence for Water Technology

During the past five years the Water Institute has become recognised as a leader in water related technology. Through the success with the global collaborations the Water Institute has become a leader in solution orientated research.



# Values

We provide an environment where researchers can help develop solutions to water related problems. Our values relate to how our work has an impact on people and our environment.

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## **A Knowledge Hub**

We will translate our research to valuable solutions for our partners.

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## **Safe Water for All**

We will work to develop technologies that can be adopted to improve how we monitor and manage our water

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## **Doing More with Water**

We will work to change how we treat and use water resources

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## **Nature-based Solutions**

We will innovate using inspiration from nature to develop more sustainable solutions.

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# Strategic Pillars

Our Strategic Plan 2019-2021 is based on 3 Pillars, which are the foundation stones of our strategy, from which our objectives stem.

**Pillar 1:  
Technology Innovation**

Design, development and deployment of technologies using a hierarchy of approaches, taking into account need, demand and market uptake.

**Pillar 2:  
Policy and Impact**

Key drivers for research are informed by people, regulation and policy.

**Pillar 3:  
People and Ethics**

We are informed by people's needs and challenges which drives our need for expertise and talent to deliver solutions.

Water Institute - Strategy 2019-2021

**Research Thematic Areas**

**Policy, Governance, RRI\*, Ethics**

<b>Energy</b> Water Economics Water Energy Nexus Wind and Ocean Energy Wastewater Efficiency	<b>Water and Health</b> Emerging Contaminants Pathogens Water Scarcity Real-time Monitoring	<b>Marine</b> Monitoring and Decision Support Biotechnology and Discovery Aquaculture and Biomass Invasive Species, Ballast Water	<b>Sustainable Agriculture</b> Monitoring and Decision Support Biotechnology and Discovery Aquaculture and Biomass Invasive Species, Ballast Water
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**Technology**

Autonomous Sensors and Technology Networks	Membrane Technology	Complex Multi-flow Characterisation and Engineering Systems
Data Analytics and Image Processing	Advanced Analytical Separations	Advanced and Conventional Treatment Technology

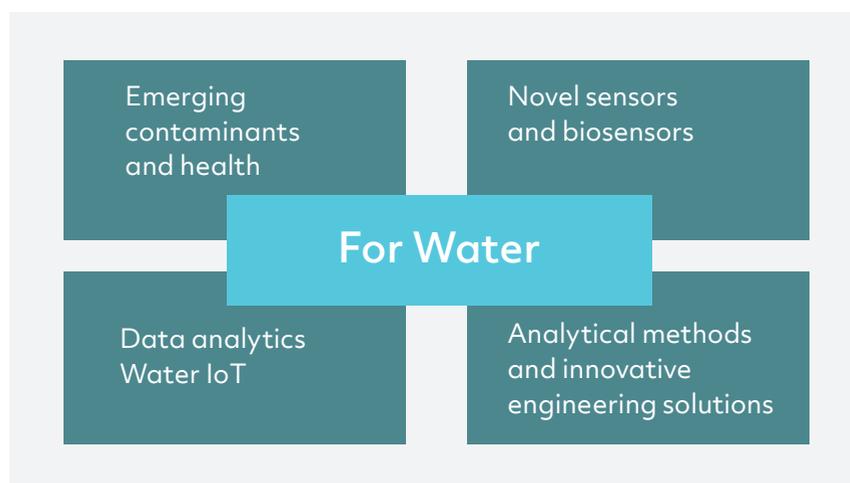
\*RRI - Responsible Research & Innovation

# Strategic Objectives

Strategic Objectives are specific goals what we will achieve, with a clearly stated outcome and deadline.

## Technology Innovation

1. Delivery of innovative engineering, science, data analytics and decision support systems and knowledge transfer of multidisciplinary research and innovation capabilities collaboratively with industry and agencies.
2. Development of novel strategies, capability and excellence in bio-design approaches for water management and future emerging technologies.



## Policy and Impact

3. Partnering with university, industry and agencies to support commercialisation of discoveries and transformative approaches.
4. Establishment of protocols to monitor and track projects, and build trust in the use of technology, to inform regulation and policy.

## People & Ethics

5. Attract, select, motivate and retain talent and innovative skills and to advance the design and deployment of technological solutions without harm.

## PILLAR 1: TECHNOLOGY INNOVATION

Strategic Objective 1	Action	Measurable
<b>Delivery of Innovative Engineering, Science, Data Analytics and Decision Support Systems</b>	Lead the establishment of a research testbed in engineering, analytical science and data analytics through collaboration with industry and agencies. Draw on grand challenges such as flooding, scarcity, pollution to establish generic EDSS as part of research projects by 2020.	Attract funding under H2020 for up to 5 projects Water IoT space (EDSS) <hr/> Working with Agencies to demonstrate value of integration of information to provide solutions

### Example

**The Water Institute conducts multidisciplinary research collaborating with industry and agencies that can lead to outputs of value to stakeholders**

The development of sensor technology for E. coli levels in bathing waters involves integration of skills in engineering, chemistry and biology to deliver a novel hand-held sensing device.

The validation of this first generation sensor was beta-tested during a bathing water season at 11 beaches in collaboration with a County Council.

The next stage of development involved an industry partner to scale up and test a second generation sensor to obtain sufficient data to prove the technology and commercialise the system.



## PILLAR 1: TECHNOLOGY INNOVATION

Strategic Objective 2	Action	Measurable
<b>Novel and bio-design approaches</b>	Using bio-inspiration to develop technologies for water management, through biofilm management, membrane and materials development.	Establish sustainable projects with Arizona State University in this space around health (by end 2020) Appointment of a knowledge broker in 2019 to track existing and new projects with Invent and RIS Establishment of a graduate programme in 2020 in Water Innovation and Stewardship to recruit 20 students by 2021.

### Bio design approaches for water management and future emerging technologies

In wastewater treatment systems, aeration plays a key role in the biological breakdown processes.

Current aeration systems can be power hungry and lacking in efficiency. The Water Institute engineers in collaboration with microbiologists, modelled, designed and developed innovative micro bubble technology for use in industrial wastewater plants. The microbubble systems have been translated to and tested at pilot scale at collaborating industry sites showing potential for transforming how wastewater can be aerated more efficiently and effectively.



## PILLAR 2: POLICY AND IMPACT

Strategic Objective 3	Action	Measurable
<p><b>Commercialise solutions</b></p>	<p>Through the establishment of capacity and emergence of Water Institute as a knowledge broker to attract industry and agency to spend time in the institute. Two people per year by 2021 and seek funding to grow that.</p>	<p>Write four commercialisation grants by 2020 Cost action network engagement by end 2020 in bio-design or nature based solutions space</p> <hr/> <p>Write four innovation partnership proposals</p> <hr/> <p>Inform PIs about technology transfer roadmap (webinar, bi-annual seminars, and documenting case studies)</p>

### Delivery of multidisciplinary research and innovation capabilities through collaboration with industry and agencies

Working with a sensor developer and a local authority the Water Institute deployed and demonstrated a network of affordable sensors for water level monitoring. This work was conducted over a 12 month period and has led to the development of a simple decision support tool that could be integrated into a flood management system to inform citizens and operators more rapidly of water level increase in advance of it happening.



## PILLAR 2: POLICY AND IMPACT

Strategic Objective 4	Action	Measurable
<p><b>Translate innovation to policy</b></p>	<p>Establish protocols to track research projects, from start to finish linking to inform policy by 2019.</p> <p>To work closely with Invent to select project elements that can be commercialized and provide supports through the work of the Water Innovation Officer.</p> <p>Use Sustainable Development Goals and relevant policy to drive research agenda in particular SGD 6, (and 7, 11, 13, 14 and 15).</p> <p>Applying for funding to carry out this research.</p>	<p>Discuss the appointment of a knowledge broker in 2018 to track existing and new projects with Invent and RIS</p>

### Development of novel strategies, capability and excellence in bio design approaches for water management and future emerging technologies.

Use of membranes in water treatment processes can be hampered by fouling of materials over time. Novel antifouling hybrid ultrafiltration membranes were designed at the Water Institute. These unique nanotechnology-based membranes were synthesized and tested to determine their effectiveness in prevention of membrane fouling.



## PILLAR 3: PEOPLE AND ETHICS

Strategic Objective 5	Action	Measurable
<b>Excellent People, Ethical Approach</b>	Work with university to establish mechanisms to build a sustainable capacity of research leaders in water by 2020.	Investigate models for retention and attraction of research and operational expertise
	Establishment of a graduate programme in 2019 in Water Innovation and Stewardship to recruit 20 students by 2021.	Confirm best approach that the university can support
	To take a holistic approach to all strategic goals in an ethical fashion.	Maintain and grow PI activity with 70% publishing in water related topics by 2019  Establish an ethics committee that supports all PIs from Q3 2019

### Global Reach

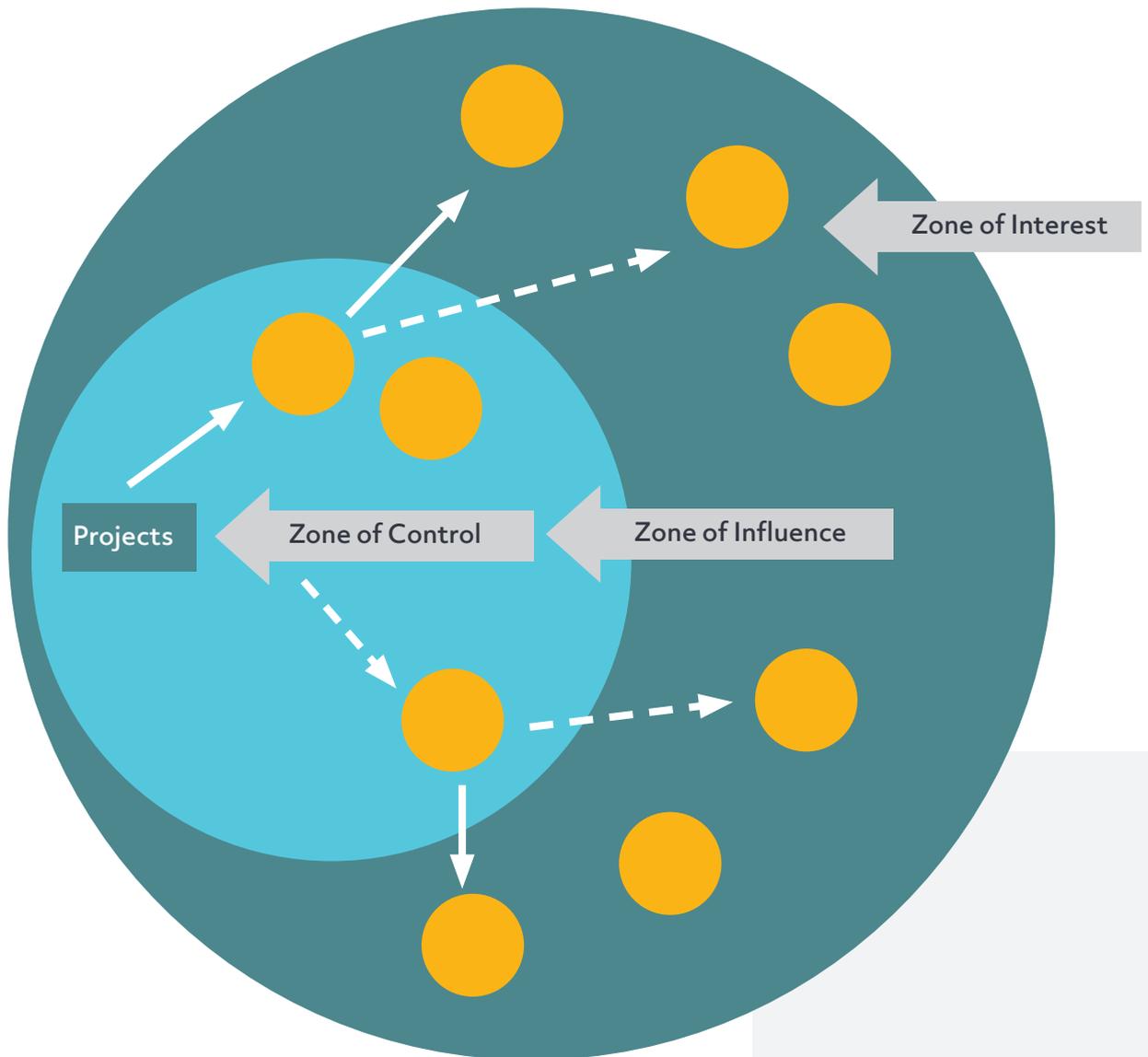
Our international partnerships with universities like Arizona State University, Tecnológico de Monterrey, University of South Australia and others, enable our students to gain international experience, learn new skills, represent the Water Institute and lead collaborative research and training programmes.

The Water Institute is part of a project funded through the Global Consortium of Sustainable Organisations (GCSO) where real water challenges are being dealt with at global scale. The Water Institute collaborates on the UN GEMS Water programme focused on building capacity through training in Africa.

The Water Institute supports the development of a water wise world through involvement in Water Joint Programming Initiative and other key international networks.



# Project Mapping to Assessment Impact



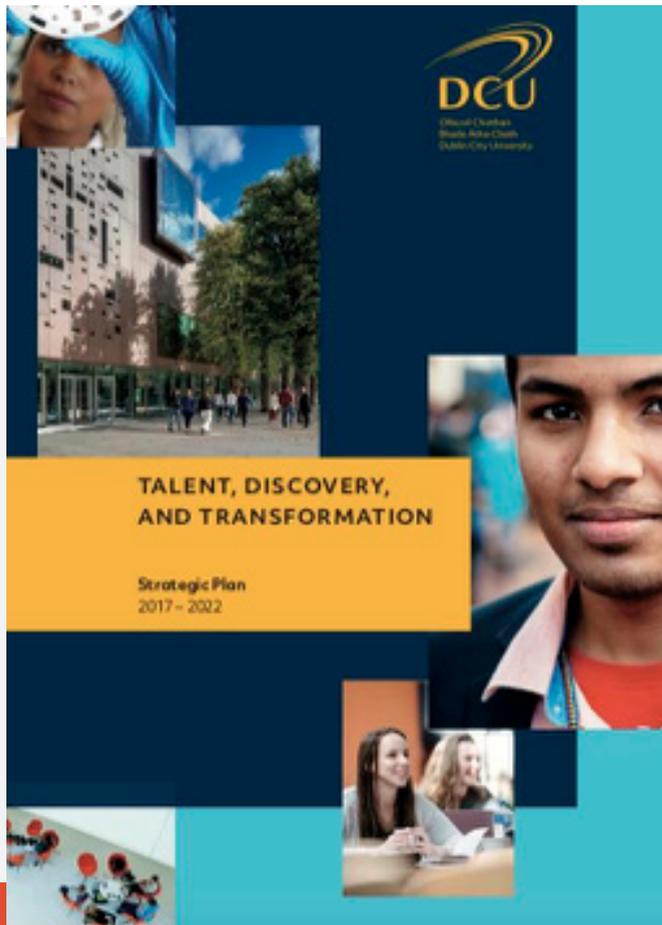
At the core DCU Water Institute's strategy, we believe it is important not only to assess projects based on their final outcome, but their resultant societal impact. As part of this, we develop an individual, project-specific 'Impact Assessment', whereby knowledge transfer and avenues of collaboration can be fully studied from the outset. Within the zone of control are our Water Institute collaborating partners and in the zone of influencers are those areas where we seek to have impact and the stakeholders who can benefit from the research.

# Major Influencers

## DCU's Strategic Plan:

The DCU Water Institute has grown to be a technology-focused institute that generates and transforms knowledge to inform decision-making for sustainable water management.

It is now at the forefront of research, development and deployment of technological solutions and its efforts focus on the grand challenges of water scarcity, pollution, disaster risk reduction and flooding. Its aim is to further deliver solutions that can help address these grand challenges in an environment that nurtures talent and discovery, underpinned by global developments in scientific and engineering domains.



# Sustainable Development Goals

A key document that influences our strategy is the 2030 Agenda for Sustainable Development, with 17 Sustainable Development Goals at its core. These goals allow the Water Institute to link with specific targets of the UN ensuring our objectives are relevant, mutual and targeted.



## SUSTAINABLE DEVELOPMENT GOALS



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[dcuwater.ie](http://dcuwater.ie)

