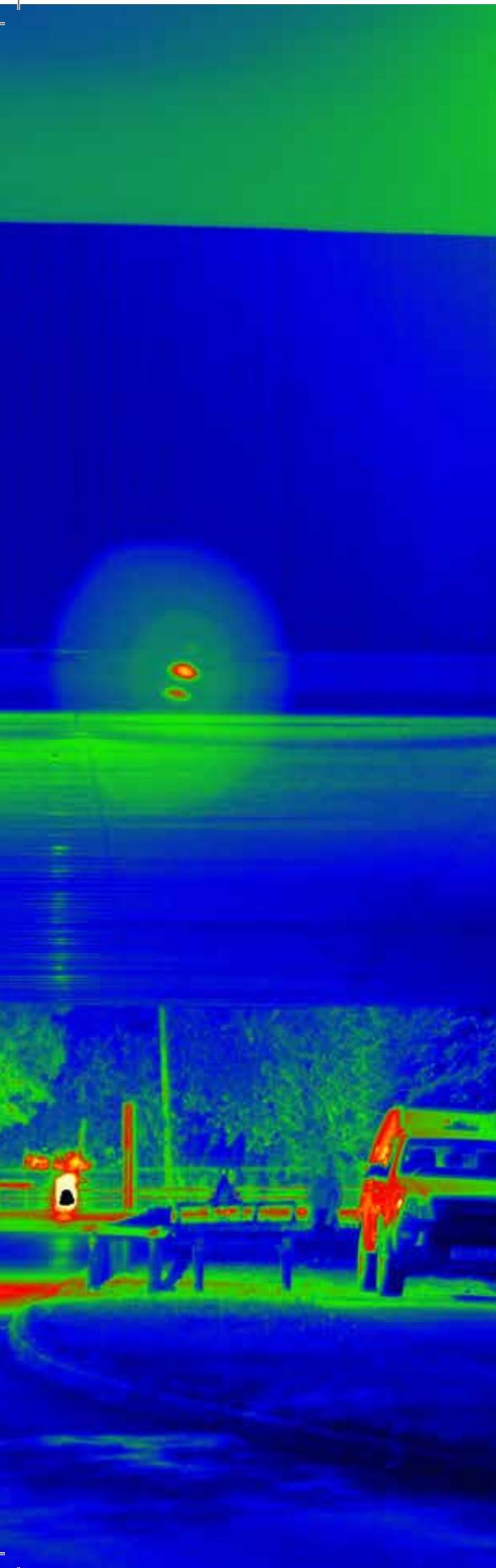




**ANNUAL REVIEW 2016/17**  
**Making buildings, towns and cities**  
**better places in which to live**



# ABOUT

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UCL IEDE's teaching and research tackles some of the greatest and most complex issues facing our daily environment.

The Institute is interested in making our buildings, towns and cities better places in which to live, with a focus on health, human well-being, productivity, energy use and climate change.

In 2013, IEDE was named by the Royal Academy of Engineering as a Centre of Excellence in Sustainable Building Design.

The Institute has also received a historic total of three Platform Grants, awarded to what the EPSRC calls 'well-established, world-leading research groups'.

For any queries regarding UCL IEDE, please visit  
[ucl.ac.uk/bartlett/environmental-design](http://ucl.ac.uk/bartlett/environmental-design)

## DIRECTOR

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## DEPUTY DIRECTOR

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Cover image: a luminance map of a short tunnel, part of a project that IEDE did for Highways England

# INTRODUCTION

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The annual review provides an ideal opportunity to reflect on where we have been in the 2016/17 year and where we are heading in 2017/18.

Four major successes marked the last year:

UCL Here East, set in the Queen Elizabeth Olympic Park, is our new 3,000m<sup>2</sup> space designed to enhance research and teaching interaction between The Bartlett and UCL's Faculty of Engineering. In 2018 we will establish our full presence at UCL Here East.

MEng Engineering and Architectural Design is the world's first course designed to satisfy architectural, structural and environmental accreditation requirements. By placing creativity and design at the centre of engineering education, this multidisciplinary course aims to challenge the current fragmentation in building-design education and practice.

MSc Health Wellbeing and Sustainable Buildings builds on our successful record of accomplishment in this field. For buildings, 'health and wellness' is the new mantra complementary to 'green' and our course will establish the educational requirements in this emerging field.

Engineering and Physical Sciences Research Council (EPSRC) Platform Grant: Systems Thinking in Built Environment (2017–22). Over the last decade, UCL IEDE has received three consecutive EPSRC Platform Grants. These prestigious grants, are awarded to what the EPSRC describes as 'well-established, world-leading research groups' and has given the Institute and BSEER a flexible foundation, allowing us to create a long-term research strategy.

All these projects required enthusiasm and dedication from all our staff and the continuous support from government, industry and alumni. Thank you.

We are also delighted to announce that in the recent Queen's Birthday Honours Neil May was awarded an MBE for 'services to sustainability and energy efficiency in buildings and communities'.

The 2017/18 academic year begins with promise of even greater accomplishments for our Institute.

We are looking forward to celebrating 40 years of our MSc in Environmental Design and Engineering (est. 1978) and 30 years of MSc in Light and Lighting (est. 1987). In September 2018, we will also launch our new MSc in Integrated Building Systems Design and Operation.

We will start rebuilding our expertise in Building Acoustics and Urban Soundscapes that we lost 25 years ago. Professor Jian Kang, recipient of a prestigious European Research Council (ERC) Advanced Grant, has been appointed to lead on this exciting project for our Institute. Our rapidly developing research theme on 'Health, Wellbeing and Human Performance' has been further underpinned by a major Wellcome Trust grant awarded to Professor Mike Davies. Professor Sarah Bell, Director of UCL Engineering Exchange, has been appointed to strengthen our links with communities, while helping staff and students to align their work with local needs. In 2018, we will be investing more than £350,000 to fit out of our new facilities at the UCL Here East.

Finally, I would like to take this opportunity to thank to Professor Mike Davies, the founding director of the IEDE, who has played a major role in shaping every aspect of the Institute's success.

Enjoy reading our annual review and please get in touch if you wish to collaborate or study with us.



**Professor Dejan Mumovic**  
Director, UCL IEDE

# KEY HIGHLIGHTS

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## Key staff promotions

In recognition of their hard work and success in research and teaching, IEDE was delighted to announce the promotion of a number of key staff members this year.

**Jonathon Taylor** was appointed as Lecturer in 2017, as part of the new MEng programme, contributing to the Urban Physics module in year two. Jonathan has been at The Bartlett since 2012, having been previously based in the Civil, Environmental, and Geomatic Engineering (CEGE). His research interests include modelling indoor heat, air pollution, and moisture risks using building simulation tools, particularly at the housing stock level, and mapping the housing modification of exposure to these hazards for use in health research.

**Rokia Raslan** was promoted to Senior Lecturer in Building Performance Simulation in 2017. Rokia is also Vice Dean for Innovation and Enterprise at the Bartlett. After training as an architect and completing a PhD at UCL, she is currently undertaking research focusing on the use of computational modelling to aid the development of technologies and design solutions for energy efficient buildings design and retrofit.

**Anna Mavrogianni** was promoted to Senior Lecturer in 2017. Anna has a background in architecture and building physics and is an expert in indoor environmental quality, building energy retrofit and climate adaptation of the built environment sector, with a focus on indoor overheating. As the deputy programme director of the new MSc Health, Wellbeing

and Sustainable Buildings, Anna's current research interests lie in the area of integrated building design for enhancing health, wellbeing and comfort whilst simultaneously achieving climate change mitigation and adaptation targets.

**Hector Altamirano** was promoted to Senior Lecturer in 2017 and is the current programme director for the long-standing MSc Environmental Design and Engineering. A building scientist with a broad research interest in energy, the indoor environment and the operational performance of buildings, Hector is also a trained architect with an MA in Energy, Environment and Sustainable Design, and a PhD in Building Science.

**Clive Shrubssole** was promoted to Senior Research Associate in 2017, focussing on Environmental and Healthy Buildings. Having also recently completed a PhD, Clive specialises in the formation, movement and impact of airborne pollutants particularly as this affects the indoor environment and health and is a member of the Complex Built Environment Systems Group (CBES) at UCL and the IBPSA.

**Kevin Mansfield** was promoted to Senior Lecturer in 2017 and for over 15 years was the course director for the MSc Light and Lighting programme. Educated as an architect and holding a PhD in Lighting, he has undertaken years of research into lighting in the built environment. He has been influential in producing a generation of lighting practitioners and academics sensitive to the impact of light on people and able to deploy lighting technology with confidence.

## Welcome to new staff

The Institute was delighted to welcome a number of new staff members this year from a wide range of academic and industrial backgrounds.

Sarah Bell joined IEDE from UCL CEGE as Professor of Environmental Engineering in 2017. She is an EPSRC Living With Environmental Change Research Fellow, working on community engagement with infrastructure. In her current fellowship she is working with partners including Tideway, Repowering London, Arup, Groundwork and Thames Water to document and share existing community engagement practice and to propose new approaches to better integrate infrastructure and community resilience.

Sarah is part of the CUSSH team led by Mike Davies, and previously collaborated with Ben Croxford on the Bridging the Gaps programme. As Director of the Engineering Exchange she works with UCL researchers to improve community engagement with engineering and built environment research.

Ivan Korolija joined the Institute as a Lecturer in Building Systems Modelling in June 2017. Ivan is a graduate of the Faculty of Mechanical Engineering University of Belgrade, division for Heating, Ventilating and Air-Conditioning.

His responsibilities, among others, include being a module leader for the Building Physics and Energy module at the new MEng in Engineering and Architectural Design, the new MSc Integrated Building Systems

Design and Operation programme deputy director and module leader for the Integrated Building Systems Simulation module.

Esfand Burman was appointed as a Lecturer in 2017, having joined The Bartlett for his doctoral studies in 2010 with a background in mechanical engineering and experience of working in the construction industry as building services design engineer and energy consultant.

Esfand will lead the Environmentally Responsible Building Systems module for the MEng programme in Engineering & Architectural Design and the Building Systems Design and Operation module for the new MSc programme in Integrated Building Systems Design and Operation.



Professor Sarah Bell, who joined UCL IEDE in 2017.

# KEY HIGHLIGHTS

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## Historic third Platform Grant awarded

In 2017 UCL IEDE was delighted to announce the successful renewal of the EPSRC Complex Built Environment Systems (CBES) Platform Grant 'Built Environment Systems Thinking'.

This grant, the third of its kind won by the CBES group, represents the only current Platform Grant given in the Built Environment area, and only one of two currently held by a department at UCL. At the time of the announcement there were just 52 Platform Grants in the whole country.

With the grant, IEDE and partners aim to develop a new strategic programme of research aimed at informing the scientific understanding of the systemic nature of a sustainable built environment. The grant will support retention and career development of key staff members through bridging between projects and by funding concept development project work.

Led by Principal Investigator and IEDE Deputy Director Professor Mike Davies, the grant runs from May 2017 to April 2022.

## New teaching space at 22 Gordon Street

In December 2016 the Bartlett Faculty unveiled 22 Gordon Street, the new central London home of our new MEng Engineering and Architectural Design (see pg 21).

Situated on the site of the former Wates House, the building provides facilities for 1,000 staff and students.

The building, designed by leading architects Hawkins\Brown, allows UCL IEDE to expand into state-of-the-art teaching facilities. In line with IEDE's emphasis on environmental engineering, the building is on track to achieve an overall environmental rating of 'BREEAM Excellent' which represents best practice in sustainable design and construction.

Improved energy performance is being achieved through enhanced building fabric and low energy systems. The building's carbon emissions are 30% lower than requirements of Building Regulations and photovoltaic panels provide the building with additional clean energy.



22 Gordon Street. Image credit: Jack Hobhouse

## UCL's Here East site nears completion

In 2017 UCL began finalising arrangements on its new space at Here East, a development in London's Queen Elizabeth Olympic Park. The site will see architects, engineers, computer scientists, mathematicians, anthropologists – and more – working side by side in state-of-the-art teaching and research facilities.

IEDE facilities at Here East will include a teaching lab and two high-performance thermal chambers housed in over 240m<sup>2</sup> of dedicated floor area. The first of these, the Human Chamber, provides precise control of temperature, humidity, ventilation rates and carbon dioxide levels for studies into occupant comfort and cognitive performance.

The second chamber, the Thermal Chamber, consists of two adjoining and separable rooms, providing the same level of control over temperature, humidity and ventilation rates, this time featuring the capacity to simulate driving rain.

The teaching lab will provide a space for practical sessions and demonstrations for up to 60 students.

This lab space includes apparatus demonstrating the components of mechanical ventilation systems, heat transfer and the use of building controls. At the same time, live data will be streamed to the lab, showing up to date energy and environmental performance data from current research projects.

Here East will house a wide range of teaching and research equipment to be used in the field. This includes thermal cameras, blower door kits, smoke guns, an array of sensors and data logging systems to evaluate indoor air quality, thermal comfort, acoustic and lighting performance.

IEDE will also have access to two new light facilities. The first and larger of these will house the variable luminance artificial sky, a dome that is approximately 5m in diameter the inside of which carries a number of light sources that can be individually be adjusted so as to simulate the distribution of daylight.

The second light facility is a dark room, 3m by 8m. The 8m length allows the space to be used for a wide range of basic optical and vision experiments. These spaces will be used for both research and teaching.

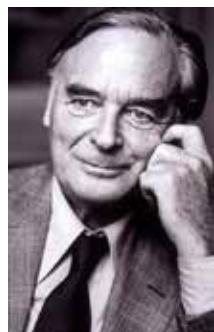


Digital rendering of Here East. Image credit: ©Hawkins\Brown

# TIMELINE

**1960**

Richard Llewelyn-Davies joins The Bartlett



**1965**

Richard Llewelyn-Davies' planning practise works on the design of Milton Keynes



**1975**

Wates House opens

**1978**

John Musgrove is appointed as Haden-Pilkington Professor of EDE

**1989**

Pat O'Sullivan appointed Haden-Pilkington Professor of EDE and Head School and Dean of the Faculty of the Built Environment.



**1965**

Ralph Hopkinson is appointed as first Chair in EDE

8

**1969**

Ralph Hopkinson receives RIBA Honorary Fellowship for establishing lighting as a core architectural skill



**1978**

MSc in EDE is launched

**1987**

MSc in Light and Lighting is launched

**1992**

The Bartlett School of Graduate Studies is founded

## 1992

MSc in Facility and Environment Management is launched

## 2011

EPSRC Platform Grant awarded for The Unintended Consequences of Decarbonising the Built Environment project

## 2017

UCL IEDE acquires premises at Here East on the Queen Elizabeth Olympic Park, to be used for groundbreaking research and teaching

## 2017

MEng in Engineering and Architectural Design launched, the Institute's first undergraduate programme



## 2006

EPSRC Platform Grant awarded for the Complex Built Environment systems project

## 2014

The UCL Institute for Environmental Design and Engineering is established

## 2017

MSc in Health, Wellbeing and Sustainable Buildings launched

## 2017

IEDE awarded a historic third Platform Grant by the EPSRC

## 2017

IEDE, with the Bartlett Faculty, opens new teaching space at 22 Gordon Street, on the site of the former Wates House

# RESEARCH

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Research at IEDE has a thriving, dynamic agenda; our themes are interdisciplinary, overlapping and in a constant state of evolution.

Our body of 60 academics, doctoral and postdoctoral researchers undertake world-leading research in the field of sustainable building design and engineering.

The Institute's research is original, influential and relevant to the biggest practical and scientific challenges facing industry, policymakers and academia.

At the heart of this is a commitment to working across disciplines, drawing knowledge and skills from across The Bartlett and UCL more widely.

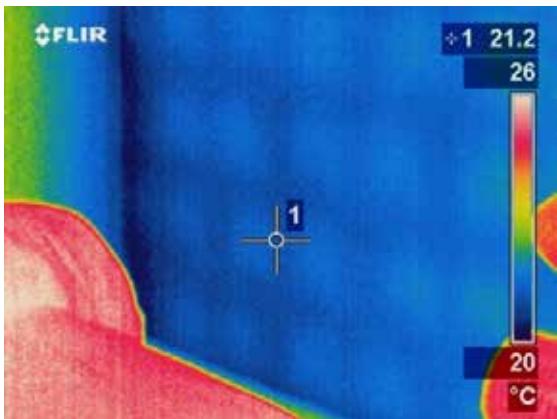
The Institute is involved with addressing UCL's cross-disciplinary Grand Challenges in Sustainable Cities, Intercultural Interaction, Wellbeing and Global Health.

## Research themes

Our research falls within the following themes:

1. Building Performance and Processes (pg 11)
2. Health, Wellbeing and Human Performance (pg 12)
3. Outdoor Environment (pg 13)
4. Systems Thinking (pg 14)

For more details on all research work, please contact Sarah Bell at [s.bell@ucl.ac.uk](mailto:s.bell@ucl.ac.uk)



UCL IEDE research into moisture-related problems in buildings

# RESEARCH: BUILDING PERFORMANCE AND PROCESSES

A core focus of IEDE's work is how to improve the design, operation and environmental quality of buildings.

This includes providing expert information and advice on design technologies and techniques to industry, as well as developing innovative engineering tools.

IEDE works closely with Government departments, including the DBEIS and the DfE, and professional bodies, including CIBSE and RICS, to develop evidence for policy decisions and to help improve building processes.

## Project case study

### The Total Performance of Low Carbon Buildings in China and the UK (TOP) – 2016-2019

Funding body: EPSRC and NERC

Partners: Tsinghua University, China; project partners from industry, government and NGOs.

Meeting carbon emission targets will require a major shift in the performance of buildings. To help achieve this, IEDE is exploring how policy and regulation can be used to improve the total performance of buildings, using both the UK and China as case studies.

The project, led by Professor Mike Davies, aims to reduce CO<sub>2</sub> production, ensure energy security and boost British and Chinese economies.



UCL IEDE at the 15th biennial Building Simulation Conference in San Francisco

## Project news

In August 2017, IEDE participated in the 15<sup>th</sup> biennial Building Simulation Conference in San Francisco.

The conference brought together design practitioners, software developers, building physics researchers and students allowing the exchange of simulation ideas and methods from an international perspective.

Professor Dejan Mumovic chaired a panel that discussed the Total Performance of Low-Carbon Buildings – UCL, Tsinghua University, Buro Happold and AHR Global Architects shared their expertise on the issues related to building performance and the research methods used to tackle these issues.

An outline and preliminary results of a novel approach to use System Dynamics along with building simulations to investigate the impacts of communication and collaboration among construction teams on the quality of a building were also presented. The IEDE team received very positive and helpful feedback that will support the ongoing activities within TOP, a collaborative research project between UCL and Tsinghua.

# RESEARCH: HEALTH, WELLBEING AND HUMAN PERFORMANCE

The issue of 'Healthy Buildings' is a key focus at IEDE and we have a extensive programme of exciting work in this field.

Our work on built environment choices and their implications for energy use and health has contributed to a fundamental shift in global understanding of the possible health impacts of carbon mitigation measures.

At regional and national levels, our research has informed London's Climate Change Adaptation Strategy; led to changes in the Building Regulations for England and Wales; and produced a tool used by the UK Department of Energy and Climate Change to inform aspects of its Energy Efficiency Strategy.

Internationally, our work has increased policy-makers' awareness and understanding of the health implications of energy efficiency policies. More specifically it has informed the development of World Health Organisation guidance.

## Project case study

### Optihouse

The Optihouse project aims to inform housing design for low-income populations that optimize the fulfilment of health protection needs and environmental sustainability in the context of climate change and growing energy insecurity through participatory and transdisciplinary research processes.

IEDE is working with residents of a low-income resettlement colony in the North-West of Delhi and a local NGO to assess housing conditions and identify potential improvements under the context of incremental development. The research so far has revealed that the key risks are damp, mould, mosquitoes, heat, indoor air pollution, pests and food infestations, with the poorest households at highest risk in most categories.

In 2017 community and expert

workshops were held in Delhi to gain further inputs on design and understand the constraints for implementation. A number of alternative design and interventions were presented and valuable feedback on the feasibility of solutions was gained.

Outcomes of the workshops included novel design ideas for housing improvements, further collaborative links and the formation of a workgroup to inform the development of housing policy.



Optihouse expert workshop, Delhi, India, 2017

# RESEARCH: OUTDOOR ENVIRONMENT

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IEDE has a broad range of expertise in relation to the outdoor environment.

Our work has produced new guidance on the measures that can be used to reduce negative aspects of urban heat islands, such as increased summer cooling energy demand and increased summer health risks due to overheating, while retaining their beneficial effects — decreased winter heating demand and decreased winter health risks due to reduced exposure to cold.

This landmark body of research also studied factors influencing overheating in dwellings. It provided guidance relating to the relative importance of the location of a dwelling in the UHI versus its intrinsic thermal properties; and the impact of interventions on overheating in dwellings. We are currently working with CIBSE to produce relevant guidance for CIBSE members.

## Project case study

### **MERLIN 2 (Mesopically Enhanced Road Lighting, Improving Night-Vision)**

**Funding body:** EPSRC

**Partners:** University of Sheffield

Road lighting is essential to ensure the safety of pedestrians and drivers at night. This project will explore the possibility of reducing the energy usage and cost of lighting while maintaining its effectiveness.

The previous MERLIN project investigated people's use of streets at night to assess what role lighting should play. This project will build on this by further analysing the data and making detailed lighting policy recommendations.

Led by Senior Lecturer Peter Raynham, MERLIN 2 aims to create a clear evidence base for reducing the energy costs of road lighting by reducing lighting levels in a way that maintains positive social effects.

## Project news

This year MERLIN 2 investigated the shape and size of the useful visual field over which pedestrian visual gaze tends to fall during day and night and pointed out the factors affecting useful visual field and the function of peripheral vision.

The project previously explored what people look at at night in the streets employing an eye tracking methodology. Now the project continues with a secondary analysis of the data captured by the previous study. The study shows that street lighting affects and reduces useful visual field of pedestrians and provides guidelines to more effective distribution of light at night based on the optimum pedestrian useful field of view.

Luminance mapping of the pedestrian UVF is in progress using HDR photography. Furthermore, we are measuring the reflectance and estimating the typical area of surface materials (e.g. building facades, foliage, pavement surfaces) by field surveys of residential roads in a range of areas.

# RESEARCH: SYSTEMS THINKING

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In addition to researching the scientific and practical issues facing design and the environment, IEDE also conducts research to improve the decision-making systems of policymakers, regulators and industry.

The Institute is developing this theme with an initial focus on the housing system. This includes looking at refining decision-making systems so that they account for a broader range of factors, including wellbeing, society and culture, the economy and the environment.

We consider housing policies in an integrated way that involves collaborative learning by policy, research, community and industry representatives. We have already developed a collaborative causal maps describing housing, energy and wellbeing and are in the process of producing a policy simulation tool using System Dynamics Modelling (SDM), which will simulate the effects of different policies on the system.

## Project case study

**EPSRC Complex Built Environment Systems (CBES) Platform Grant  
'Built Environment Systems Thinking'**

**Funding body:** EPSRC

**Partners:** AHR Global (UK), Allford Hall Monaghan Morris (AHMM), Buro Happold, CIBSE, DCLG, DCMS, Feilden Clegg Bradley Studio, GLA, Inst of Historic Building Conservation, NHBC Foundation, Public Health England, Smithsonian Institution, the Library of Congress, UKCIP

The third Platform Grant awarded to IEDE will allow the Institute and partners to develop a new strategic programme of research aimed at informing the scientific understanding of the systemic nature of a sustainable built environment.

The grant will support retention and career development of key staff members through bridging between projects and by funding concept development project work.

*"I am delighted that the hard work of all the Institutes that constitute BSEER has been recognized by EPSRC as world leading.*

*This grant will help BSEER retain this position and strengthen it further."*

**Professor Tadj Oreszczyn**  
Director, UCL Bartlett School of Environment, Energy and Resources



Work supported by previous Platform Grants has allowed policy-makers and other stakeholders to better understand the links between housing, energy and wellbeing.

# EPSRC PLATFORM GRANTS

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Over the last decade, IEDE has received three five-year Engineering and Physical Sciences Research Council (EPSRC) Platform Grants.

These prestigious awards of funding are given to what the EPSRC calls ‘well-established, world-leading research groups’ and are designed to ensure researchers are underpinned by a solid base of resource.

These grants have given the Institute a flexible foundation, ensuring key staff can be retained, networks developed and the creation of a longer-term research strategy.

## EPSRC Platform Grant (2006-11): Complex Built Environment Systems

The Institute’s first Platform Grant enabled the establishment of a multidisciplinary research group that was able to grow, evolve and innovate while carrying out pioneering research, publishing influential papers and books and winning international prizes.

## EPSRC Platform Renewal Grant (2011-16): The Unintended Consequences of Decarbonising the Built Environment

The Institute’s second Platform Grant (in collaboration with UCL-Energy, UCL ISH and UCL ISR) enabled the establishment of a strategic programme of research to transform the understanding of the system-level effects of climate change policies.

Conventional scientific approaches designed to analyse systems into simple components are limited in their ability to predict potential system outcomes. This grant is allowing new models to be developed to minimise the unintended consequences of future climate change policies.

## EPSRC Platform Renewal Grant (2017-22): Built Environment Systems Thinking

The third Platform Grant awarded to IEDE will allow the Institute and partners to develop a new strategic programme of research aimed at informing the scientific understanding of the systemic nature of a sustainable built environment.



# UK CENTRE FOR MOISTURE IN BUILDINGS

2016/17 saw the newly-launched UK Centre for Moisture in Buildings (UKCMB) — an independent organisation dedicated to furthering the understanding of the effects of moisture in buildings — continue to thrive.

The centre is a collaboration between UCL, the Building Research Establishment (BRE), Heriot Watt University and the London School of Hygiene and Tropical Medicine.

It engages widely with academia, policymakers, industry and the public to improve the way moisture in buildings is managed and understood.

The UKCMB is led by Managing Director Neil May MBE, Academic Director Hector Altamirano-Medina and Technical Manager Valentina Marincioni.

## Technical working groups

Technical Working Groups (TWGs) are central to the work and the development of the UKCMB, providing input about concerns and knowledge gaps, scoping research issues, reviewing and then promoting and disseminating the findings of research.

The following groups formally began in the autumn of 2016:

- Monitoring and modelling of moisture in buildings
- Ventilation, airtightness and moisture in buildings
- Moisture in new build
- Moisture in existing buildings and retrofit
- Flooding and escape of water

Learn more at  
[ukcmb.org](http://ukcmb.org)

## Neil May awarded MBE

In June 2017 UKCMB Managing Director Neil May was awarded an MBE for services to sustainability & energy efficiency in buildings and communities.

*"I feel extremely honoured and humbled to have received an MBE in this year's Queen's Birthday Honours in acknowledgement of my work and the work of my colleagues in many areas of the built environment."*

*"There is still much to be done and I look forward to working with all my friends and colleagues on this task in the years to come."*



Neil May MBE  
UKCMB

# TEACHING AND LEARNING

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Our undergraduate, postgraduate and research programmes help students to make our buildings, towns and cities healthier, more sustainable and more efficient places in which to live.

The Institute explores exciting, emerging themes in built environment study and reflect the joined-up, interdisciplinary ways of thinking, communicating and working that are increasingly in demand in industry. It takes place at the centre of London, an inspirational world capital of the building design industry.

Our strong research culture means that students are led by experts in their fields, and not just taught; they are involved in groundbreaking research as it is happening.

## **Undergraduate taught programmes (pg 21):**

- MEng Engineering and Architectural Design

## **Postgraduate taught programmes (pg 18, 19, 20):**

- MSc Environmental Design and Engineering
- MSc Health, Wellbeing and Sustainable Buildings
- MSc Integrated Building Systems Design and Operation
- MSc Light and Lighting

## **Doctoral research programmes (pg 22):**

- MPhil/PhD Built Environment
- EngD Engineering Doctorate

**Learn more at**  
[ucl.ac.uk/bartlett/environmental-design](http://ucl.ac.uk/bartlett/environmental-design)

*"The EDE course supports students to move onto a variety of career paths backed by sound technical knowledge.*

*"In my case, it was a crucial career moment, which enabled my transition from architecture into environmental design and engineering.*

*"Our company employs a large and growing number of EDE alumni, evidence of the course's relevance and recognition in the industry."*

**Ricardo Moreira**  
XCO<sub>2</sub> Energy



MSc EDE trip to Wales

# MASTER'S PROGRAMMES: EDE AND L&L

## MSc Environmental Design and Engineering

First taught four decades ago, the MSc EDE is a world-leading programme that turns students from across the globe into high-achieving graduates sought after by the biggest names in design and construction.

It is geared towards professionals looking to enhance their careers in environmental design and engineering.

Areas covered by the programme typically include smart energy systems, building simulation software, noise control and lighting design — but every year it is adapted to meet the needs of its intake, drawing on always-developing connections to expertise through the help of alumni in senior positions in academia and industry.

*"Would I do the MSc EDE if I had the time again? Yes, Yes ..... Yes! The issues that the programme covers are of particular importance to the world."*

**Michael Corcoran**  
Emeritus Professor, Strathclyde University



MSc EDE students

## MSc Light and Lighting

This graduate programme — Europe's longest-running and most-respected in lighting — brings together the technical and creative sides of lighting design to solve the many problems and questions posed by lighting both inside buildings and outdoors.

Since 1987 it has continually produced world-leading lighting engineers and designers — and has greatly contributed to solving some of society's most practical problems, from how best to light indoor spaces to how to efficiently light streets.

The programme covers topics ranging from lighting design to the scientific research and engineering behind lighting, providing a uniquely comprehensive package of knowledge and skills to students.

*"The MSc Light and Lighting course offers a solid foundation for both lighting design and lighting research. It covers theoretical, practical, artistic and technical aspects, perfectly complementing my architectural skills."*

*"My lecturers and fellow students have been incredibly supportive throughout, which made the course not only more productive but also more manageable and enjoyable. The course has been enriching — not only on an educational level but also on a personal level; together we have shared enjoyable, unforgettable moments."*

**Simone Bonavia**  
MSc Light and Lighting student  
2015/16

# MSc HEALTH, WELLBEING AND SUSTAINABLE BUILDINGS

Recent decades have seen an increasing focus placed on the impact that buildings, and the built environment in general, have on the health and wellbeing of the people who interact with them.

The MSc Health, Wellbeing and Sustainable Buildings is a new programme, first taught from September 2017. It aims to create a new generation of experts with the skills required to innovatively tackle health and wellbeing issues relating to the design, assessment, retrofit and operation of residential and non-domestic buildings.

This course builds on IEDE's strong links with industry and health- and wellbeing-related research projects, including examining the impact of greenhouse gas reductions on public health, indoor air quality in schools and the health effects of moisture in buildings.

*"We are looking to the MSc Health, Wellbeing and Sustainable Buildings to nurture a new generation of designers, engineers, analysts and clients who can seize the huge opportunity presented by our renewed focus on wellbeing."*

*"Clients increasingly want design teams that truly understand how the built environment impacts health, happiness and productivity. It is an interdisciplinary challenge requiring new skills and collaboration between industry and academia."*

**Edward Garrod**  
Principal, UK Head of Sustainability + Integrated Design Elements Consulting

## Why choose the MSc HWSB?

The programme builds on IEDE's strong links with industry, throughout which demand for professionals with relevant expertise is expanding rapidly.

The Bartlett has the country's highest percentage of 'world-leading' architecture and built environment projects — with students learning alongside true experts.

London is a global design hub providing unrivalled networking opportunities, with alumni in many major London firms.



Course director and Senior Lecturer Dr Marcella Ucci

# MSc INTEGRATED BUILDING SYSTEMS DESIGN & OPERATION

Launching September 2018, this new programme is designed to create a new generation of innovation and research leaders in the engineering design and operation of integrated building systems, with an expertise grounded in technical excellence.

Buildings are engineered products that must be designed to provide productive, safe and healthy environments for those who live and work within them.

Integrated building systems design takes a unified view of the building form and its systems, as a prerequisite to delivering effective

operation. Creating innovative designs requires advanced modelling and simulation skills, collection and interpretation of data, and understanding that goes beyond individual building components.

Students will learn how to apply scientific principles to the design and operation of integrated building systems, adapting new technology and techniques to both new and existing systems to deliver lifelong sustainable building system performance.

An industry survey of more than 150 responses from building services industry professionals in the UK and globally showed that 91% agreed or strongly agreed that the IBSDO MSc was appealing, and 88% agreed or strongly agreed that if the MSc IBSDO programme was developed and offered at UCL they would likely to recommend it to colleagues and prospective students.

*"The use of advanced modelling and simulation tools, as well as, the extraction of insights from data are playing an increasingly important role in the way buildings are designed and operated.*

*"The new IBSDO MSc aspires to instil students with contemporary knowledge and skills to excel in this domain."*

Dr Dimitrios Rovas  
Course Director, MSc IBSDO



Credit: Vicente García Marín de

# MEng ENGINEERING AND ARCHITECTURAL DESIGN

IEDE is building on its successes by launching its first undergraduate programme — the four-year integrated Masters in Engineering and Architectural Design.

Being taught from September 2017, the MEng has been designed in collaboration with industry to combine the major disciplines of architecture and engineering of the built environment and prepare graduates to be future industry leaders.

Placing creativity and design at the centre of engineering education, this multidisciplinary programme will give students the chance to understand and develop advanced design methodologies while becoming experts in how they are augmented and resolved through engineering.

The programme will be delivered by a world-class team of experts drawn from across UCL — with the Bartlett School of Architecture and UCL Civil Environmental and Geomatic Engineering joining IEDE in its delivery.

*"Our industry needs to evolve to respond to pressures we all face to improve effectiveness and efficiency, in terms of resources, time and cost."*

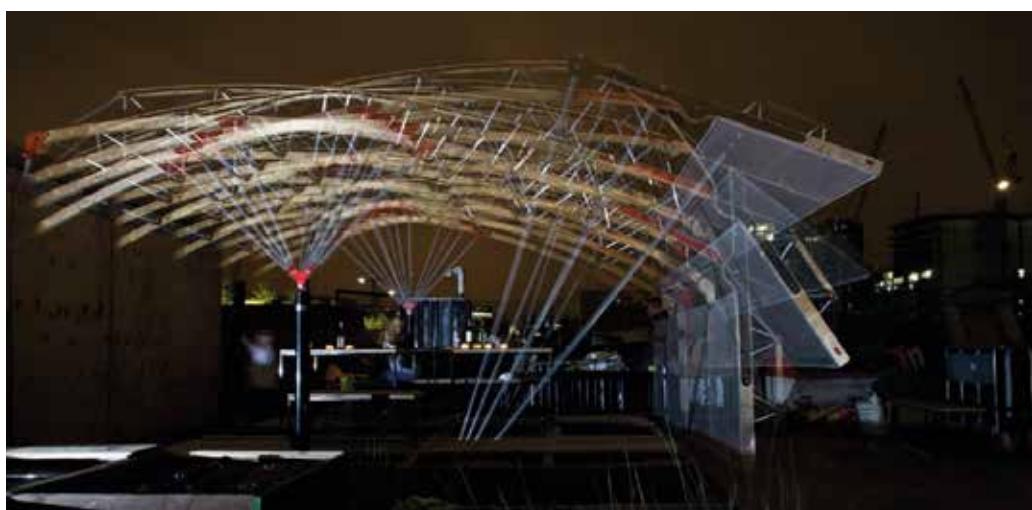
*"What better place to start than training a whole new group of engineering and architectural designers who think and work collaboratively with cross disciplinary skills."*

Ian Durbin  
Partner, Hoare Lea

*"The Engineering and Architectural Design course at UCL offers undergraduates the opportunity to be taught in a project- and design-focused format, in collaborative settings."*

*"This course promises to deliver new professionals set to engage in these criteria to define our future built environment."*

Ian Taylor  
Managing Partner, Feilden Clegg Bradley Studios



'Welcoming Shelter' by BSc Architecture student Charlie Redman

# DOCTORAL RESEARCH

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IEDE offers research degrees in a range of built environment-related areas, through which students demonstrate the capacity to organise, undertake and write-up an original and substantive piece of research.

Research areas offered include energy use in buildings, building stock modelling, healthy buildings, environmental policy and performance, light and lighting and workplace innovation.

IEDE also offers Engineering Doctorates (EngD) — enhanced PhDs designed by the EPSRC. These projects involve a one-year technical MRes course followed by three-years' full-time work with a sponsor.

## PhD projects live in 2016/17 involving IEDE staff

**Atiyeh Ardakanian:** Integrated urban water for arid climates: wastewater and green infrastructure in Tehran, Iran

**Badria Jaffar:** Drivers of residential energy consumption in Kuwait: An exploratory socio-technical study

**Chryssa Thoua:** Total performance of Passivhaus schools: making heritage schools fit for purpose

**Daibin Xie:** Cultural Influences on Chinese Workplace: Regional and organisational effects

**Dane Virk:** The urban climate: an integrated approach to building performance and urban design

**Dolapo Oluteye:** Matching organisations, technology and

buildings: ICT Performance Certificates

**Dong Hyun Kim:** Light, emotion and interaction: Exploring human affect in lighting.

**Emily Nix:** Housing health and energy use in low-income settings: employing building science to evaluate housing improvements in Delhi, India

**Esther Borkowski:** Optimising The Building Performance Simulation Of Control Strategies For Adaptive Building Skins

**Evan Lloyd Greenberg:** Adaptive environments through the design of urban microclimates

**Fernanda Garcia Alba Garciadiego:** Is urban-water sustainability possible? Concepts, implementation, and barriers to enhance Green-Blue Infrastructure in Mexico City

**Giorgos Petrou:** Development of a standard methodology for the assessment of indoor overheating in UK dwellings

**Helen Pineo:** The Value and Use of Urban Health Indicator Tools in Urban Planning Policy and Decision-Making

**Ivan Garcia Kerdan:** An exergy-based modelling tool for retrofit analysis in non-domestic buildings

**Jackline Kibe:** Semantic data models for built environment applications

**Jeremy Webb:** Stress testing the Framework Convention on Climate Change

**Kaveh Dianati:** London's housing crisis: A system dynamics approach

- Ke-Ting Pan: Carbon monoxide uptake and elimination in the human body
- Longyu Guan: New Metrics for Daylight
- Lorna Villa: Daylight and the Elderly
- Madalina Hanc: Productivity and wellbeing in the workplace: Implications of choice
- Miguel Casas Arredondo: Circular Economy and Office Refits
- Oriana Landa Casigno: Environmental assessment of urban water reuse systems based on the nutrient-energy nexus
- Pascale Hofmann: Trajectories of urban water poverty
- Paula Morgernstern: Understanding hospital electricity use: an end-use(r) perspective
- Rochelle Schneider dos Santos: Exploring temperature data enhancement through remote sensing techniques to better understand the location-based effects on human health
- Sebastian Junemann: Occupant-driven Mitigation Strategies for Poor Indoor Air quality in UK Homes
- Seunghyeon Wang: Development of Algorithm for Energy Consumption Prediction Using Machine Learning in New Buildings
- Shih-Che Hsu: Human-oriented spatial assessment on climate change risk and policy benefit: from energy use to health status
- So Hyun: Extended Information Delivery Manual (IDM) — Model View Definitions (MVD) framework for Building Performance Analysis
- Sofia Tolia: Road Accidents and Pedestrians at Night
- Usman Akeel: Engineering Sustainability: Devising a suitable sustainability education intervention for Nigerian engineering curriculum
- Vera Bukachi: The use of information technology in delivering water and sanitation to the urban poor — the case of Nairobi
- Yair Schwartz: Creative Reuse: The Life Cycle Carbon Footprint and Life Cycle Cost of Refurbished and New Buildings
- Yekatherina Bobrovva: Understanding decision-making structures enabling home-owners to achieve high carbon savings through retrofit. A UK study using system dynamics
- Zeyu Yao: Closing the implementation gap in urban water management — the dynamics of knowledgenetwork in China's Sponge City

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# INDUSTRY PARTNERS

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IEDE has an established record of translating world-leading research into competitive advantages for partners in industry, policy and charity.

The Institute works with companies of all sizes, government departments, NGOs and charities.

Work can take the form of a Knowledge Transfer Partnership (KTP), an R&D Partnership, Research Engineers, consultancy or CPD.

## Case study: Property Care Association KTP

IEDE, in partnership with the Property Care Association (PCA), is developing a moisture assessment protocol and innovative model tool for the improved prevention, management and remediation of moisture-related problems in buildings.

The development of moisture assessment protocols and a modelling diagnostic tool for redressing problems in a relatable, predictable and transparent way, represents a huge opportunity for The PCA to fully understand issues related with dampness and mould growth in buildings, but also to deliver both commercial advantage to surveyors and contractor, and massively improving consumer outcomes.

The model diagnostic tool to be developed will help streamlining data collection on site, and persistence on a normalised database, but also streamlining on the implementation of the protocol to be developed in the project's first phase.

This project will significantly increase the understanding of moisture risk and remediation measures, it will help in the streamlined and effective process of assessment and diagnosis along with recording of data, and it will enable PCA to develop a long term learning and the ability to assess new and innovative methods of treatment.



For more details on all consultancy work, please contact Rokia Raslan at [r.raslan@ucl.ac.uk](mailto:r.raslan@ucl.ac.uk)

# OUTREACH

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IEDE regularly interacts with external stakeholders, including the public, media, industry and policy.

Our regular events attract hundreds of guests, while our media outreach efforts have helped to bring our research to the attention of thousands of those interested in the built environment.

Our lectures, conferences and workshops offer academics, students, stakeholders and the public the opportunity to engage with experts from both IEDE and elsewhere.

IEDE events this year included:

- **IEDE/CIBSE Conference:** Health, Wellbeing and Productivity in Non-Domestic Buildings
- **IEDE Seminar:** Building Health and Wellbeing: Standards and Business Case
- **IEDE hosted:** REHVA Annual Meeting 2017



'Building Health and Wellbeing: Standards and Business Case' seminar, March 2017

## Digital outreach

This year saw IEDE increase its digital media efforts, using social media platforms, blogs and newsletters to reach more stakeholders than ever before.

Blogs this year included:

- 'Overheating housing – is it worth getting hot and bothered about?' by Dr Jonathon Taylor
- 'Health and Wellbeing in Buildings: A Real Appetite for Change' by Clive Shrubsole
- 'Building Health and Wellbeing: Standards and Business Case' by Clive Shrubsole

Please find our blog at [blogs.ucl.ac.uk/iede/](http://blogs.ucl.ac.uk/iede/)

## Case study: Health & wellbeing conference

On 8th November, IEDE and CIBSE hosted the Health, Wellbeing and Productivity in Non-Domestic Buildings conference, led by IEDE's Dr Marcella Ucci.

With tickets selling out in record time, the timely event offered hundreds of attendees valuable insights into a very topical subject.

Along with two international speakers, UK-based experts delivered a variety of views on the growing theme of health, wellbeing and productivity in buildings.

The event's reception suggests this area has wide-ranging implications and has gained real traction with industry, with IEDE leading its academic development.

# STAFF LIST

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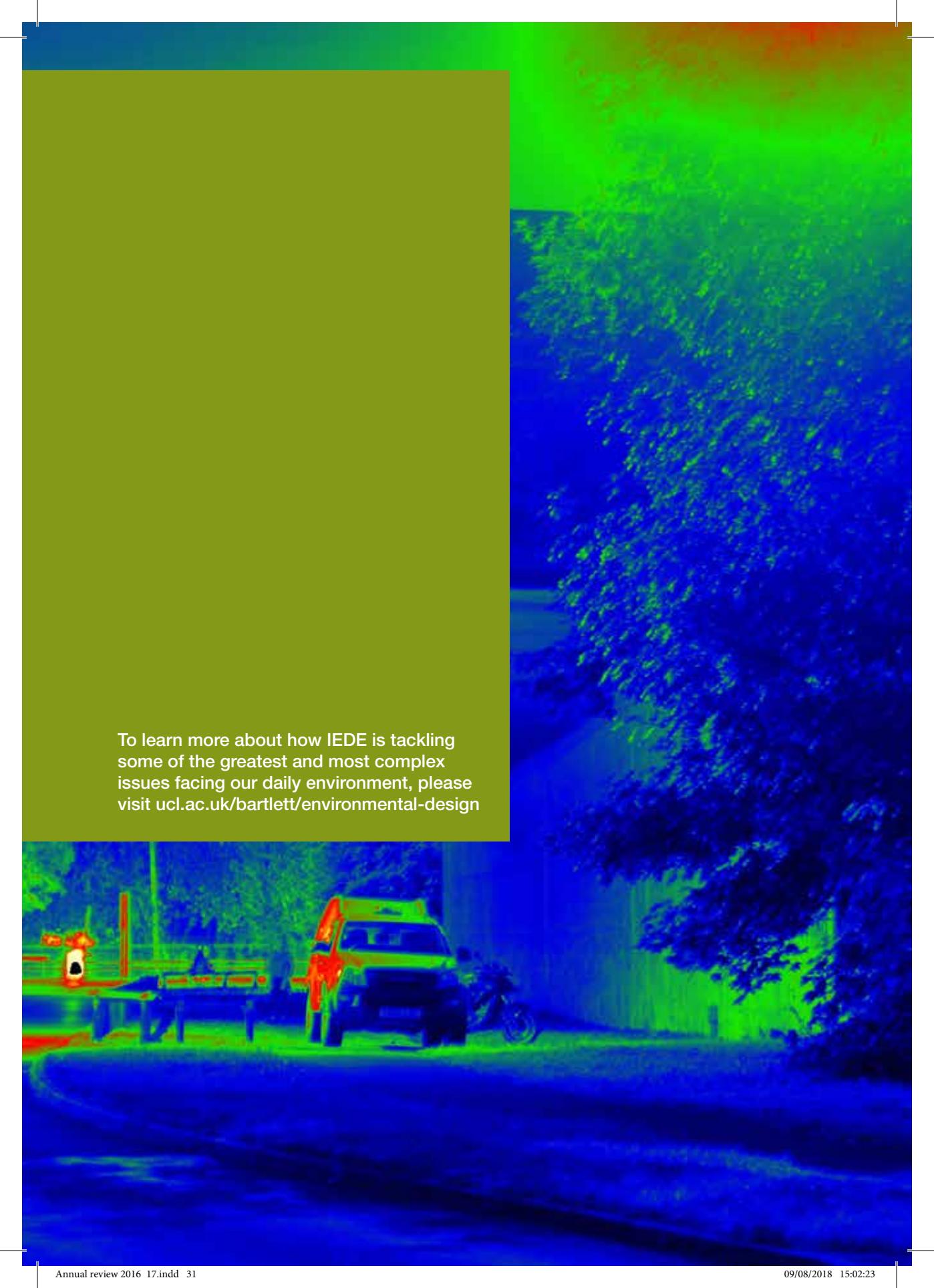
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To learn more about how IEDE is tackling some of the greatest and most complex issues facing our daily environment, please visit [ucl.ac.uk/bartlett/environmental-design](http://ucl.ac.uk/bartlett/environmental-design)

