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Editor's Introduction

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Introduction

Welcome to the *SDAR Journal* which the Chartered Institution of Building Services Engineers (CIBSE Ireland) produces in partnership with the Dublin Institute of Technology (DIT). It is the eigth edition of the journal, which has gone from strength to strength down through the years, thanks in particular to the commitment and dedication of the editorial teams and reviewing panels involved each year.

The main objective of the *SDAR Journal* is to promote sustainable design and applied research and, having read the spread and diversity of papers in this issue, I'm sure you will agree that building services engineering has a great deal to offer in shaping the future of our environment for years to come.

This edition has again proved to be an excellent production with papers by Irish and international authors whose time and dedication to excellence in research and design should be applauded.

The *SDAR Journal* has been downloaded 27,000 times (from 100 countries) and, when employers are looking for the perfect candidate for a position, there is no doubt that having a paper published in the journal elevates the candidate to the top of the pile.

I wish to thank all of the researchers, authors, reviewers and editorial team on behalf of CIBSE Ireland for all of their great work, and I hope you will all take something from this publication that will go towards a more sustainable and safer environment.

Paul Martin *BEng Hons, CEng, FCIBSE*
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Since its inception the *Journal of Sustainable Design and Applied Research* (*SDAR Journal)* has been published by CIBSE in association with Dublin Institute of Technology. The journal represents an outstanding example of the synergies that result from very close cooperation between professional bodies and higher education institutions, and is now a significant mechanism by which the outcomes of research and development become available to, and are translated into, practice.

We live in an era where very low energy smart buildings are fast becoming a reality. In this context, the *SDAR Journal* has been a conduit for communicating key developments that will continue to reinvent and recast what "building services engineering" actually is.

Change is not only fundamental to our profession but also to higher education. With effect from 1 January 2019, the Dublin Institute of Technology, the Institute of Technology, Blanchardstown and the Institute of Technology Tallaght will be designated as Technological University Dublin. Education at TU Dublin will be career-focused, practice-led and research-informed. It will offer programmes from apprenticeships to PhD for school leavers, for those seeking advanced studies and for career advancement or change. To be a major force for innovation the proportion of research students will increase from 4% to 7%.

At this pivotal point in the history of DIT it is particularly timely to pay tribute to our distinguished colleague Professor Kevin Kelly. Kevin will be an Emeritus Researcher in TU Dublin but has recently retired as Head of the School of Multidisciplinary Technologies in DIT. As Editor Kevin has driven the *SDAR Journal*, maintaining a distinctive approach that has met a real need. As and from January, the Journal will be a jewel in the crown of TU Dublin. We look forward to your continued support as authors, readers and users of the information contained in the articles.

Professor Brian Norton
President DIT, Honorary Fellow CIBSE

Editorial

This is a challenging time for all building professionals in the built environment. In the UK the calamitous affects of Grenfell have had an awful impact on the many people affected, and they are being roundly felt by all in the industry. As a result, there is a determination there to change the culture across all sectors of the industry.

In Ireland, we too have had a nasty fire in the multi-storey Metro Hotel building in Ballymun. We also had to close (in some cases temporarily, in others maybe long-term) over 20 schools because of issues with construction. Previously we had problems with fire and safety standards in buildings that have resulted in costly and disruptive correction measures for residents and owners. Thankfully, so far all of this has been without fatalities.

However, many of us still remember the Stardust fire and know that complacency is never an option in this regard. We must face up to our issues in Ireland, especially those relating to procurement and the "mere minimum compliance" approach. As Dame Judith Hackett concluded from her review of practice in the UK, we have to change the culture from one of minimum compliance to one where buildings will be assuredly safe. This requires a whole change of mind-set for government, and clients generally, as well as the industry itself.

This edition of the *SDAR Journal* carries an invited paper from CIBSE Technical Director Dr Hywel Davies about the Grenfell review in the UK, and it has lessons for us all. While we strive for modern sustainable buildings, we must as a priority also make sure they are safe for their occupants. There is no suggestion that these two essential aims are in any way mutually exclusive … on the contrary, they align well.

Looking to the future, one of the aims of the *SDAR Journal* is to provide a platform for working engineers to publish their "real world" project performances and cutting-edge practices. Safety is at the top, followed by sustainability and then modern, efficient construction practices. We would welcome abstracts and submissions on these issues for next year's publication to *kevin.kelly@dit.ie* We will provide support to working engineers, and new writers, where this is requested

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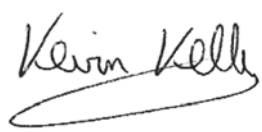

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A Reader's Guide

Professor Peter Boyce delivers a paper that outlines the gaps in knowledge in lighting research internationally, both today and in what the future may hold. Professor Boyce is Editor in Chief of what is probably the leading lighting research journal worldwide, *Lighting Research & Technology*. It receives over 200 papers per year and publishes eight editions per annum. In this regard, there is no one in the world better placed to identify the emerging lighting research areas. He does this succintly and his paper is a "must read" for those involved in lighting. Boyce's review of the topics range from residual studies on visibility and visual discomfort, through attempts to identify the influence of lighting on factors beyond visibility such as *mood and behaviour*, to the whole new field of *light and health*. But activity alone is not enough to justify a future, he argues. For lighting research to have a future it is necessary for it to be influential and focus its attention on outcomes that matter to people.

Thomas Shannon, a company CEO and an engineer, provides an excellent account of energy efficiency measures investigated and implemented in a manufacturing facility in Ireland that led to substantial savings in energy bills and CO2 emission reductions. These measures could be applied in many companies. Simple and effective, and a good example of applied research in everyday engineering practice.

The paper from **Roberts and Lomas,** Loughborough University, addresses the problem of overheating in houses in summer. It is based on a presentation made at this year's CIBSE Symposium in London South Bank University and is an excellent example of the links between CIBSE and the *SDAR Journal*. The

methodology is also interesting. They adapted two adjoining, semi-detached houses to create a matched pair of test houses for full-scale, side-by-side over-heating experiments under real weather conditions. Synthetic occupancy was applied with dynamic remote control of actuated windows, motorised curtains, automated internal doors and internal heat gains. The houses were provided with calibrated sensors to measure the internal and external conditions.

Wilkins, Penacchio and **Leonards** provide a psychologist's insight, and a different perspective than we are used to seeing, into the effects everyday visual patterns in buildings can have on the people both indoors and outdoors. Highly-geometric and repetitive patterns

can be aversive; patterns in our visual environment are rarely considered with regard to their impact on brain, behaviour and well-being. Patterns in public spaces can lead to discomfort, avoidance behaviours and falls, particularly in older citizens.

Recent developments in analysis now allow us to measure and predict adverse effects of patterns in the real world. This insightful paper reviews the evidence of neurological behaviour effects arising from aversive patterns in "real world" examples. It is a "must read" for architects and engineers and is part of a series of such presentations and papers by Professor Wilkins on this topic.

The catastrophic fire at Grenfell Tower in London in 2017 killed 72 people and shocked the world. Subsequently, Dame Judith Hackett was appointed by the UK Government to lead the independent review of Building Regulations and Fire Safety in the UK. **Dr Hywel Davies**, Technical Director of CIBSE, represented CIBSE in that review and chaired one of the working groups established. In this paper he informs us of the lessons learned in the UK. However, these lessons apply much more widely than just to the UK, and in a far more widespread way to just fire safety. Dame Hackett expressed shock regarding some of the practices in the UK. She has called for a change of culture from one of *minimum compliance* to one that *delivers a safe system*. This paper summarises the activity associated with the review and where changes in practice are needed in the UK. Davies concludes that the industry must change in order to reduce, as far as is humanly possible, the prospect of any such horrific fire ever occurring again.

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