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Editorial and reader's guide

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Editor's foreword

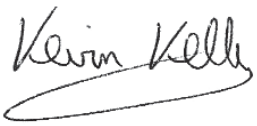
This is the fifth edition of the *SDAR Journal* and all 25 papers are now available online at: http://arrow.dit.ie/sdar/

Presently we publish five papers in one edition annually but we are considering extending to more papers in 2016. The *SDAR Journal* is coming in for very favourable comment, both in Ireland and internationally, and you will see if you open the link above that there have been 12,000 downloads of papers from over 100 countries worldwide. Presumably, you are currently reading a hard-copy printed edition and you may be interested to know that we have also distributed 10,000 paper copies to industry and academia throughout Ireland.

The intention of the *SDAR Journal* is to encourage the publication of insightful evidence-based findings from innovative practice in low-energy design of the built environment. Industry engineers who submit their work can rely on us to assist by offering free support and peer review processes supported by experienced authors and academics. *SDAR Journal* papers come from a combination of experienced authors, practicing engineers and researchers. However, many of our authors have not previously published in a scholarly journal and so we consciously act as an entry point for working engineers and inexperienced researchers.

To publish, we demand critical reflection and objective evaluation of real-world projects, but we help authors achieve this. I would encourage every company to implement applied research in their companies through post-occupancy evaluations and similar evaluation. If you are doing this already, then consider submitting short abstracts of proposed papers to us so that we might engage with you to help bring these ideas to fruition through publication of the findings. Such publications help leading companies add value to their work by evidencing claims through a rigorous (and free) peer-review process.

Would-be contributors are also encouraged to submit abstracts for the annual SDAR Awards and Irish Lighter competitions. This issue carries two papers from this year's *SDAR Awards* and two papers from the Irish Lighter competition. The final paper is derived from a presentation at the CIBSE/ASHRAE annual conference.



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A Reader's Guide

In this issue we have five papers — one on energy storage, another on post-occupancy evaluation from the UK and a third on making cathodic protection of concrete more sustainable. The other two papers are on lighting, a topic that is presently the most downloaded online from the *SDAR Journal*.

The first paper addresses the challenge of storing energy more efficiently. This research builds and tests an innovative phase change material, the thermal energy storage unit (PCM-TES), that was invented at DIT's Dublin Energy Lab and installed in an office building in Cork in 2014. The PCM-TES is connected to a micro-CHP unit and also addresses the problem of what to do with waste heat from a combined heat and power unit at evening peak tariff periods, when the building heating loads are lowest.

The research is carried out using a 2000-litre water tank and a 2000-litre PCM-TES unit and comparing both storage systems. Test results prove that the PCM-TES stores 6.5 times more heat for the same plantroom footprint, allowing the CHP unit to run continuously during peak periods. The stored energy is then used to pre-heat the building early in the morning. This allows CHP thermal demand to align better with the electrical tariff, reduce utility bills and eliminate the need for back-up boilers.

The second paper is a two-year post-occupancy performance evaluation of a new high-density development in London. Three apartments were studied in detail whereby the building fabric, MVHR units and the communal heating system were evaluated by comparing actual performance against design intent.

The study findings highlight the gaps in expected performance. The building fabric has been shown to perform well but some issues have been identified with the performance of the MVHR systems. The study also summarises the lessons learnt, which informs the delivery of future developments and highlights areas for improvement in terms of design, installation, commissioning and post-occupancy maintenance.

The research for the third paper investigates the first steps in developing innovative cement-based batteries to power cathodic protection in reinforced concrete structures. Cathodic protection is a well-used method to protect embedded steel in concrete but research into more sustainable alternatives to supply the external electrical supply has not received much attention to date. This research focuses on developing cement-based batteries which increases the ionic conductivity of the solution in the cement pores, how best to seal the batteries from moisture loss and comparing different electrode materials and treatments.

The preliminary findings demonstrate that cement-based batteries can sustainably produce sufficient electrical outputs for cathodic protection by using the correct materials and arrangement of cast-in anodes and cathodes.

The fourth paper focuses on the design and methodology of an interesting lighting installation at the re-constructed St Mel's Cathedral in Longford, Ireland. Restored after a catastrophic fire in 2009, a lighting scheme using modern LEDs and intelligent lighting controls is used to recreate the historic atmosphere of this significant building. The project posed particular problems and the way they are addressed is insightful in that it moves away from standard lighting practice using horizontal illuminance as the main emphasis, to a more tailored methodology focused on real user need, producing an appropriate atmosphere in this building that emphasises visual quality.

The final paper is from an engineer who does not rely on standard practice but works much more intuitively to provide a more artistic outcome and a stunning visual effect. This is a unique project posing artistic and many practical challenges with respect to local fauna and wildlife. The former were dealt with intuitively and the latter by using sound engineering evaluation.

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