

Decarbonisation Network Symposium: Innovations in UK Building Retrofits

Date: 30th Sep 2022

Location: Maxwell Centre, JJ Thomson Ave, Cambridge CB3 0HE.

Agenda

09:30 – 10:00: Arrival and Welcome

10:00 – 12:30: Workshop - AI/Data Science for decarbonisation of the Built Environment

Roadmapping workshop on the use of cyber-physical infrastructure to decarbonise the Cambridge University estate as a demonstrator project.

10:00 - 11:00: 'World Café' – exploration of key issues in relation to priority challenges.

11:00 - 11:10: Break

11:10 - 12:30: Deeper exploration of priority challenges in small groups.

12:30 - 13:30: Networking lunch, with gallery of topic roadmaps from morning workshop.

13:30 - 16:45: Emerging technologies in Retrofit

13:30 - 13:45: Special Interest Group (SIG) overview and perspectives on innovations for Retrofit.

- Built Environment SIG, Ruchi Choudhary
- Hard to Decarbonise Technologies SIG, Adam Boies
- Light Harvesting SIG, Rachel Evans

13:45 - 14:25: 'Quick-fire' technology presentations

- Viridian Solar, KT Tan: How to unleash the full potential of roof-integrated PV?
- NSG Pilkington, Neil McSparran: Advanced glass technology for retrofits
- Celsius Energy, Inês Cecílio: Low-carbon heating and cooling - Inclined wellbores for reduced footprint; digital solutions to model, construct and operate.
- EcoSync, Len Don: Energy-harvesting IoT tech to easily retrofit smart TRVs to radiators.
- Q-Flo, Martin Pick: Producing a continuous web of ultra-long carbon nanotubes with various applications.
- Thermulon, Rozalie Ryclova: Retrofitting at scale, a materials problem: aerogels and their application in buildings

14:25 - 14:35: Break

14:35 - 15:45: Breakout groups – one group for each technology presentation.

15:45 - 16:30: Plenary discussion and next steps.

16:30 – 17:00: Thank you and move to West Hub (across the road from the Maxwell centre on JJ Thomson Ave)

17:00 - 18:00: Networking drinks in West Hub

Workshop - AI/Data Science for decarbonising the Built Environment

10:00 – 12:30

The workshop will be facilitated by IfM Engage, led by Diana Khripko.

The Built Environment Special Interest Group is building a Flagship Project proposal on the use of cyber-physical infrastructure to decarbonise the Cambridge University estate. The objective is to develop and demonstrate coordinated site-wide use of interoperable cyber-physical infrastructure in the electrification of multiple building types across the estate. Strong partnerships will allow this work to extend to colleges as well as the wider Cambridge area, and the work is intended to provide templates for using cyber-physical infrastructure to decarbonise other campuses and estates.

In this session, we will conduct a roadmapping workshop to clarify the strategic direction of the project and ensure that internal and external stakeholders are aligned. The workshop aims to identify priority challenges, what are the critical answers in order to address them and what are the resources, enablers and capabilities required.

Format:

The workshop will begin by an introduction to the prioritised challenges for AI and Data in decarbonising the built environment identified via the pre-event survey. Attendees will then go into facilitated break-out sessions. The aim of the first section, the world café, is to discuss the key issues with respect to a challenge and identify stakeholders. Each group will discuss up to three challenges. After the break, attendees will be assigned a challenge for a deeper exploration. Discussion will focus on where we are now, challenge scope, critical questions to be answered, data capabilities and risks. Summaries of each session will be on display during the networking lunch and attendees will be able to register their interest in future collaboration.

Emerging technologies in Retrofit, 'Quick-fire' technology presentations

13:45 – 14:15

The discussion will be facilitated by IfM Engage, led by Arsalan Ghani.

Viridian Solar, KT Tan

How to unleash the full potential of roof-integrated PV?

As a source of renewable energy, Solar PV is a well-established technology to tackle the decarbonisation process. In addition to the utility scale power generation, roof-top PV actually plays an important role in microgeneration and decentralisation. Within this sector, the combination of new-builds and roof-integrated PV seems like a match made in heaven – but how do we unleash the full potential of this technology and what problems do we need to overcome? This presentation will chart the journey of Clearline Fusion becoming a mainstream product.

NSG Pilkington, Neil McSporran

Advanced glass technology for retrofits

The most effective way to reduce embodied carbon is by re-use of existing building materials. NSG – Pilkington will present new glazing concepts that remove some of the pain points around renovation while improving building energy efficiency.

Celsius Energy, Inês Cecílio**Low-carbon heating and cooling: inclined wellbores for reduced footprint; digital solutions to model, construct and operate**

Celsius Energy is a technology company with a mission to decarbonize the building Heating Ventilation and Air-Conditioning industry. A Celsius Energy system comprises a borehole heat exchanger, a heat pump for both heating and cooling, and a digital energy management system. One of the distinguishing features of Celsius Energy systems is the geometry of the borehole heat exchanger, including both vertical and inclined wellbores. Inclined wells, and in particular a star-shaped layout, drastically reduces the surface footprint required for an installation, making it viable for retrofit solutions in urban areas. The challenge will be having the required skill base and regulatory framework available on time.

EcoSync, Len Don**Energy-harvesting IoT tech to easily retrofit smart Thermostatic Radiator Valves to radiators**

EcoSync are currently working with colleges in Oxford and Cambridge delivering a possible 30-50% reduction in heating-related carbon emissions and costs. They utilise energy-harvesting IoT technology to easily retrofit smart Thermostatic Radiator Valves to radiators, allowing colleges to only heat rooms according to occupancy and need. Once fitted, EcoSync's AI-enabled software allows remote and individualised control of heating using a cloud-based dashboard and QR code app. The solution can be easily installed within hours, with no major disruption to students, and no need for wires or additional sensors.

Q-Flo, Martin Pick**Producing a continuous web of ultra-long carbon nanotubes with various applications.**

Q-Flo's technology produces a continuous web of ultra-long carbon nanotube that can be collected as Torstran Mat, Fibre or Web. The Web, in turn, can be converted into a dispersion. This opens an almost endless number of application opportunities. Front-runners include EMI Shielding in composites, air and water filtration and inclusion in energy storage systems. The technology is also of importance due to its ability to convert methane, including from landfill and other sources, into solid carbon and hydrogen without harmful Green House Gas emissions. At scale, this offers an economic and viable 'green bridge' to support our transition from fossil fuel dependency to renewables. Q-Flo is ready to expand and is looking for opportunities to demonstrate its technology at a meaningful industrial scale.

Thermulon, Rozalie Ryclova**Retrofitting at scale, a materials problem: aerogels and their application in buildings**

With 80% of the building stock that will exist in 2050 already built, ~30% of the UK's existing buildings are hard-to-treat due to moisture problems and space restrictions. Current products have simply not delivered on their demands. Thermulon is developing a novel insulation material: aerogels. Aerogels are super-insulating materials that minimise transfer of heat through building fabric, thanks to their material structure. Additionally, they can be fire-safe, moisture-permeable and made from materials otherwise destined for landfill. In addition to being suitable for hard-to-treat buildings, aerogels can be integrated into insulation panels, batts and blankets for new-builds. Thermulon are excited to share their learnings from retrofits to date, as well as discuss industry challenges and potential partnerships.

Event team

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More information about the University of Cambridge Decarbonisation Network can be found [here](#).