



MAGIC CIRCULAR

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Envisaging a world with zero carbon cities

It's been a busy few months at MAGIC. On September 20th we held a full Partners' Meeting at Downing College, Cambridge, with over 50 participants from across academia, policy and industry. We heard updates from the MAGIC research team, as well as from Transport for London and Cambridge-based emissions-tech firm Cambustion. We'd like to thank everyone for coming and making it such a productive day. Please read on for a full update.

We've had some changes in the team over the last couple of months. Dr Dunhui Xiao (Reduced Order Modelling) and Dr Megan Davies-Wykes (Laboratory Modelling) have both secured lectureship positions, and we're looking forward to collaborating with them in their new roles going forward. We're pleased to welcome Dr Anna Schroeder to the team, who will be working on high resolution emissions modelling in the Engineering Department here at Cambridge.

We recently completed our work at the test site in Cambridge and are currently analysing the data. The geometry around the

site is very different to that surrounding the test room at London South Bank University, and there is still a lot of work to do exploring the impact of this in the wind tunnel and with Fluidity. We hope to get some interesting insights into the impact of green and blue space on pollution flows and we look forward to sharing our findings with you in due course.

The MAGIC project is a collaboration between the Universities of Cambridge, Surrey and Imperial College London, looking at the impact of urban flow on the potential for the increased use of natural ventilation in buildings. The project is supported by a number of academic and industrial partners, such as Dyson, Arup, Breathing Buildings, Reading University and IAP China, but we continue to look for collaborators and to develop our relationships with current partners.



Professor Paul Linden,
Lead Investigator
University of Cambridge

September 2018 Partners Meeting

Our September MAGIC Partners Meeting was held at Downing College, Cambridge, with over 50 colleagues and friends from across industry, policy and academia in attendance.

MAGIC researchers gave presentations on our modelling, experimental and test site work, and we dug down into plans to further expand our research into traffic and emissions modelling. All the MAGIC presentations are available on our website, [here](#).

We were pleased to welcome a number of external speakers to the meeting. Melanie Jans-Singh introduced us to [GrowGreen](#), a five-year, Horizon 2020 EU project investigating nature based solutions to urban challenges. There are strong overlaps with MAGIC on modelling the impact of green and blue space on pollution flows and we're looking forward to collaborating going forward.

Transport for London's Principal Modeller, Birendra Shrestha, explained the work being done to promote 'healthy streets' in London and reduce air pollution for all, including cyclists and pedestrians. For example, a trial of a gating strategy was recently undertaken on the highly polluted Putney High Street. Bus route NOx emissions were reduced during the trial, which only involved a 3-4 second change in traffic-light timing.

Finally, Mark Peckham, from Cambridge-based company [Cambustion](#), explained in detail the role of 'transients' (acceleration, deceleration and un-smooth driving, for example), in contributing to vehicle emissions and air pollution. Cambustion are developing technology to better understand vehicle emissions and give us tools to reduce pollution.

We'd like to thank all our presenters and everyone who took part in the discussion, making it a very informative and productive day.



September 2018 Partners Meeting @ Downing College, Cambridge

Research Updates



Cambridge Test Site:

Experiments have now concluded at the MAGIC Cambridge test site. Over the summer, we undertook ongoing monitoring of a room in the Architecture Department and the surrounding area. We also carried out a series of controlled experiments in the test room itself (which is next to a main road and close to both green and blue space). These controlled experiments were timed to compare conditions in the room at non-peak and peak traffic-hours (morning and evening).

Data from the summer monitoring period is still being analysed, but some observations already stand out. For example, significantly lower temperatures were observed at green and blue spaces, and outdoor pollutant distribution appeared to be influenced by street layout - with the street canyon effect particularly noticeable.

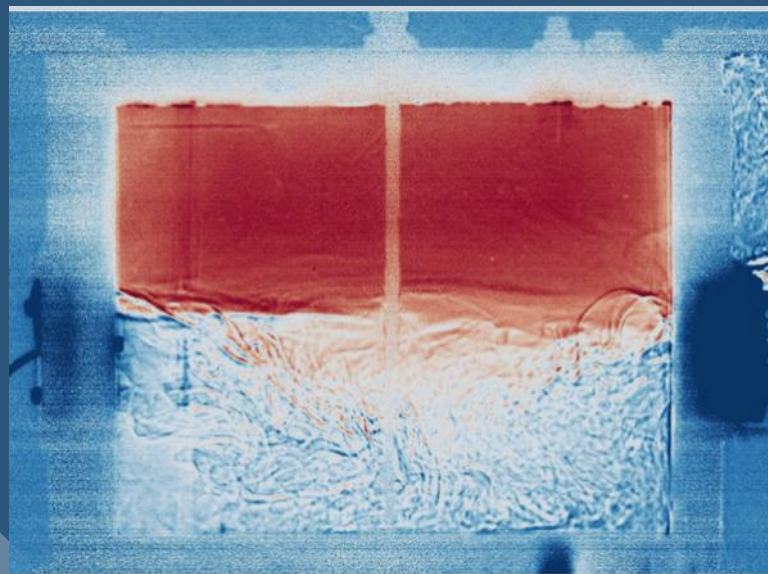
To support the data analysis, we're now recreating the site in the wind tunnel and have already created a drawing of each of the 167 buildings in the monitoring area.

New theory from the Water Flume:

Using the Environment Flume (purpose-built for the MAGIC project) laboratory experiments have examined the effect of temperature on cross-ventilation. A model room is placed in the water flume and filled with warm, dyed fluid. The room is cross-ventilated through windows on opposite walls of the room. Results show that the major effect of the initial temperature difference between the room and ambient is to create a two-layer stratification, reducing the effective volume of the room. New theory indicates that the temperature difference does not significantly impact the ventilation flow rate through the windows, but the change in effective room volume alters the timescale over which the room is ventilated. These results are currently being written up for publication.

Figure, right, shows an experiment in the water flume which has cross ventilation with a temperature difference.

Copyright @Megan Davies-Wykes



Other MAGIC news...

Staff Changes:

Dr Megan Davies-Wykes (Laboratory Modelling of Natural Ventilation) has recently taken up the position of Liz Acton Lecturer in the Department of Engineering at Cambridge.

Dr Dunhui Xiao (Reduced Order Modelling) has joined Swansea University as Lecturer in Computational AI Engineering.

We look forward to continuing to work with both Megan and Dunhui going forward.

We're pleased to welcome to the team Dr Anna Schroeder who will be working with Dr Adam Boies (University of Cambridge) and Dr Marc Stettler (Imperial College London) taking forward our work on high resolution emissions modelling. Anna will be based at the Engineering Department of the University of Cambridge.

Collaboration Opportunities:

We've recently met Researchers from a range of institutions, including INSA-Lyon and the Urban Observatory. We're also keen to talk to potential end-users of the MAGIC tools—planners, architects and local authorities, for example. If you're interested in MAGIC and would like to collaborate, then please get in touch.

Contact Us...



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