

## EPG Newsletter: September 2023

Welcome to the September 2023 newsletter from the Environmental Physics Group (EPG). In this edition we set out our proposed programme for 2024, introduce our committee members, invite you to contribute to our activities over the coming 12 months, and summarise our activities during the last 12 months.

### 1 PROGRAMME FOR 2023/24

#### 1.1 EPG Day 2024

Every year IOP funds each of its groups to hold events, talks, conferences and prizes. We are now planning our programme for 2024, which aims to fully return to a pre-COVID19 format.

Our key annual event is the EPG Day and we have decided that the 2024 event will focus on **‘The Impact of Volcanic Eruptions on the Environment: Observations and Insights’**. The EPG Day is being organised jointly with the Royal Meteorological Society by Dr Helen Rogers (Chair of the EPG); Dr Natalie Harvey (EPG Committee Member), and Prof. Don Grainger (University of Oxford), and will bring together experts on the impact of volcanic eruptions; including the impact on local air quality, atmospheric composition, aviation, and climate change. Through a series of talks, the day will provide valuable insights and observations regarding the impact of volcanic eruptions on the environment starting with an overview of volcanic processes and effects before three focussed sessions on: *Local Volcanic Effects*; *Volcanic Changes to Atmospheric Composition and Climate*; and *Volcanic Effects on Aviation*. The day will end with a look at the future of volcanic monitoring and hazard warning.

The event will be held on Tuesday 12<sup>th</sup> March 2024 in the Martin Wood Lecture Theatre, Physics Department, University of Oxford. Attendees are requested to register for the event in advance. Further details can be found on the IoP and [Royal Meteorological Society](#) websites.

Of course, we are always looking for suggestions for new events, so if you have any thoughts or ideas please contact us through [groups@physics.org](mailto:groups@physics.org)

#### 1.2 An ‘Alternative’ Essay Competition in 2023: *Net Zero in 3*

The annual Institute of Physics Environmental Physics Group essay competition is now open although this year sees a new format. The competition is open to students in the UK and Ireland, in their final two years of pre-university education (as of the closing date). This includes A-level, International Baccalaureate, Scottish Higher and Advanced Higher (S5 and S6), Irish Senior Cycle, or equivalent courses. Organised jointly between the Environmental Physics Group and the Energy Group, the challenge is to explain Net Zero in a 3-minute video or podcast to a 16-year old with no prior knowledge of the various definitions. Submissions can be made individually or in a team of up to four people and must be received by midnight on **Friday 22<sup>nd</sup> September 2023**. Prizes of up to £200 are available. Further details of the ‘Net Zero in 3’ competition can be found on the relevant [IOP webpages](#).

#### 1.3 Other Events for 2024

Although we have already adopted the theme of **‘The Impact of Volcanic Eruptions on the Environment: Observations and Insights’** for 2024 we always welcome suggestions from members of EPG for events which would be of interest to all members, not necessarily related to the year’s theme. If you have an idea for a talk or for a

seminar within the overall subject of Environmental Physics then the committee would be very pleased to hear from you and to help you organise the event.

## 2 EPG COMMITTEE

As with all IOP groups the Environmental Physics Group committee has three officers (chair, secretary, and treasurer) along with a number of ordinary members, some of whom are co-opted because of their other affiliations or specialist skills. Below is a list of the current committee members and their roles. We can be contacted at any time through the general IOP Groups email address ([groups@iop.org](mailto:groups@iop.org)). We welcome enquiries from our members and we encourage all members to participate in the activities of the group.

Current committee members:

<b>Chair</b>	Dr Helen Rogers
<b>Secretary</b>	Professor Alan Drew
<b>Ordinary Member</b>	Dr Julie Fitcher
<b>Ordinary Member</b>	Dr Aaron Golden
<b>Ordinary Member and Interim Treasurer</b>	Dr Martin Goodchild
<b>Ordinary Member</b>	Professor Paul Harrison
<b>Ordinary Member</b>	Dr Natalie Harvey
<b>Ordinary Member</b>	Mr Luthais McCash
<b>Ordinary Member</b>	Professor George Victor
<b>Early Career Physicist</b>	Mr Matthew Minter
<b>Early Career Physicist</b>	Dr Tobias Thornes
<b>Co-Opted Member</b>	Dr Stefan Smith
<b>Co-Opted Member</b>	Dr Hugh Deighton

Further details on the group and committee can be found on the Environmental Physics Group pages of the IOP website (<https://www.iop.org/physics-community/special-interest-groups/environmental-physics-group>).

## 3 EVENTS & ACTIVITIES IN 2023

### 3.1 The Role of Physics in Urban Climate Resilience, 27<sup>th</sup> April 2023

This event explored our current understanding of physical system processes in urban environments and the interaction of urban form and function with those processes; the current thinking on urban resilience to environmental extremes; and what role physics can play in addressing the expectation of increased occurrence of adverse weather events. The event was organised by Dr Julie Fitcher, Professor Alan Drew, and Dr Stefan Smith, and brought together leading urban physical scientists and engineers together with built environment practitioners and policy leaders, to engage in a focused exchange of ideas and information on the current and future urban climate resilience challenges. This interdisciplinary, multi-perspective approach is an important element in developing insights into the rationale behind current drivers of urban development and where future urban development and research should be focussed.

For the event, there were 10 speakers with 70 registered in-person participants and more than 100 registered online participants. The day was split into the following broad areas:

#### ***Urban Physical Processes and Interdependencies***

Presentations outlined the use of urban models for different land use types in an urban environment, e.g high rise, low rise, low density, industrial, green space, tree canopy, roads etc. Parameterised urban data, for 33 USA cities, was discussed (NUDAPT), which was then broadened to include information on the weather (WUDAPT). Some very exciting results were presented on the digital synthetic city using computer game models. Multiscale modelling of

overheating risk assessment was also discussed, including the role of buildings (density/development) on outdoor temperature, using Hong Kong as a case study. Future research is expected to focus on developing models that relate indoor and outdoor temperatures.

### ***Engineering solutions***

It was initially noted there are problems with the government net zero policy, which is likely to fail - either failure to deliver net zero or power cuts, or both. Discussions focused on how it might be possible to both mitigate power cuts in the future and deliver net zero fossil fuels with a focus on essential collaboration with humanities and social sciences to enact the social need for change. The role of green infrastructure to improve people's health, biodiversity, and address climate change was discussed, including the cooling of our urban areas with nature-based solutions. To conclude, there was a presentation on rethinking urban design for climate resilience, focussing on mitigation and adaptation to climate extremes, and areas of conflict.

### ***Policy and Industry Challenges***

Discussions focussed on active planning of infrastructure, such as water management strategies, for which it is necessary to go beyond standard administrative boundaries, with modelling of water supplies and usage across large areas, under different scenarios, for the purpose of adaptive planning. This was followed by a more general talk on climate change, including UK sustainability achievements to date and potential problems in the future. It was argued that various energy/climate change mitigation schemes adopted by the government are not working or aren't very efficient/effective.

## **3.2 Physics Powering The Green Economy**

Physics Powering the Green Economy is the IoP flagship impact project for 2023, which will highlight how physics has enabled the green economy of today and set out how physics will enable the green economy of tomorrow. The purpose of this work with the IoP community is to build evidence that will influence related national strategies and actions, and lead to impact.

The first phase of the project is to generate a seminal report which will span:

- application case studies in energy production, transport, industry, buildings, and CO2 management from across the nations and regions
- technology roadmaps in nuclear, renewables, energy storage, hydrogen, and carbon capture, usage and storage (CCUS) that also set out recommendations for technology advances to accelerate transition to net zero
- commentary on innovation enablers such as materials, climate science, magnetism, smart energy (and geoengineering)
- "talking head" views from individuals showing how physicists think around the bigger picture of the green economy; sharing community thinking on recycling, adaptation, a systems approach to deliver solutions, and the need for a fair, just and affordable transition.

To date, members of the Environmental Physics Group have added their voice to the debate on how we move towards a low-carbon, resource-efficient and socially inclusive economy via our survey, roundtables and one-day workshop. The IoP is due to be launching the report in the last quarter of 2023.