

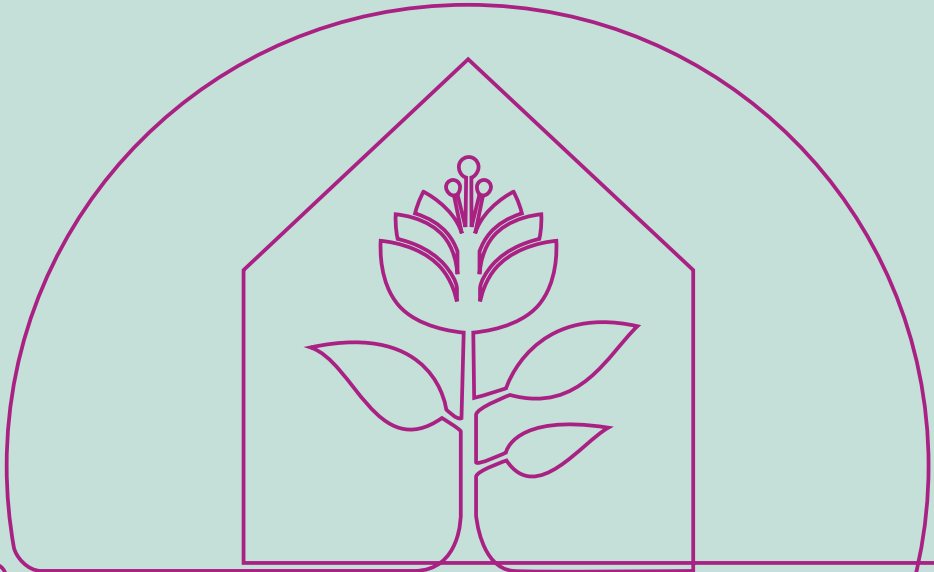


University of
St Andrews

STACEES

St Andrews Network for Climate, Energy,
Environment and Sustainability

The Sustainability Series



Creative breathing space for
big green research projects

Ian Hill
Eden Campus

September 2021

Creative breathing space for big green research projects

Ian Hill – Eden Campus

(Article written by Martin Ince)

Copyright © University of St Andrews 2021. For full terms, see end of article.

The University of St Andrews is a historic institution in a historic setting. In business since 1413, it now occupies dozens of more or less suitable buildings all over the medieval Scottish town known to millions as the home of golf.

But while these premises are great for original thinking and small-scale experimentation, they are not well adapted to developing the new, large-scale technology that the world needs in an era of climate change.

The answer to this conundrum lies about six kilometres from St Andrews, in the unlikely setting of a former paper mill by the banks of the lovely River Eden. Stretching over 13 hectares, this site is now the St Andrews Eden Campus and home to the University's most ambitious low-carbon projects.

A key team member for the development project is Ian Hill, Strategic Lead for Innovation at the University (himself locked down in England when we speak). He explains how Eden Campus, the University's first out-of-town development, is a "strategic ambition" that will facilitate "the translation of research to commerce and industry." The site will allow new technology to be developed and used at a near-industrial scale by both academic and industry experts working closely together.

But Eden Campus is far from an overnight project. Hill recalls, "We bought it in 2010, and began by developing the district heating centre. Then we moved the University's professional services here to free up space in town for teaching and research. Only then did we realise that it was a huge strategic opportunity. Companies often ask, 'Who do I talk to if I want to talk to the University?' Eden is the answer."

After buying Eden, St Andrews spent years demolishing some of the many small and unusable buildings that encrusted the site. Those that remain are now being gradually turned into research and demonstration facilities for future technology. The University has spent £70million on Eden, with an additional £30million coming from external sources.

"Face like a prune"

Hill says that the University's initial Eden investment was a biomass-burning energy centre that has reduced the University's carbon emissions as well as its heating bills. It provides heat and hot water for 45 University buildings in St Andrews town. "That investment cut the University's carbon emissions from energy by 20 per cent and encouraged more low-carbon projects," he notes. From summer 2021, the site will have a

one megawatt solar array for electricity with scope for another megawatt if all the suitable roof space on the site is used.

Now, the University is enhancing Eden's capacity to house a range of research and demonstration projects, with a focus on low-carbon technologies. One major field of interest is battery technology, a good fit for the University due to its strength in relevant areas of chemistry. "If we get more solar panels, we may add a big static battery to store the output," says Hill.

One important asset is a dry room for handling battery chemicals. The atmosphere contains so little moisture that, Hill explains, "You come out after ten minutes with your face looking like a prune." More seriously, it allows new types of battery to be charged, discharged and tested in near-real conditions. For Hill, "This is a good example of our ambition for Eden because it allows us to carry out research and to demonstrate the technology at scale on our own low-carbon campus."

"Our approach," he says, "is to make this a living lab for demonstrating low-carbon technology. We don't expect many academics to be permanently based here. The labs for basic research will mostly stay in town." There will likely be up to 650 people onsite when it is in full use, with 200 of them external to the University.

Expertise in batteries is important to the University's interest in green transport.

So, too, is its background in hydrogen technology. Possibilities currently under research include hybrid power systems that combine hydrogen and fuel cells for large-but-unglamorous vehicles, such as buses and bin lorries. On a more photogenic note, the University is now the owner of a former Scotrail train. The plan is to convert the train to run on hydrogen, then use it to convey delegates to the UN climate change conference (the COP26) in Glasgow in November 2021.

One option for obtaining hydrogen fuel is to use surplus solar electricity to produce it from water, instead of or alongside storing power in batteries. And as a final alternative to fossil fuels, researchers at St Andrews are looking at direct replacements. Hill says, "If you have hydrogen and carbon dioxide available, it's an interesting combination. It will be possible to create synthetic methanol or biodiesel."

Another technology of interest is carbon capture, which is the notion of stopping carbon dioxide generated in bulk from reaching the atmosphere. Here, too, Eden can play a role. Candidate approaches involve the use of flue gases from the University's heating system or possibly those from an onsite distillery (one of the non-academic enterprises on site at Eden).

Policy interest

Eden's main intellectual assets are the University's skills in areas such as chemistry, physics and earth sciences.

It is also a place where, for example, anthropologists can talk to scientists about how people use energy, or where experts from the management school can think about accounting for carbon use.

But Hill is also clear that the Scottish policy environment, with its strong support for low-carbon research, is an important part of the story. He points out that companies based in England are choosing to do energy innovation in Scotland. “While the issues are global,” explains Hill, “Scotland has the right people and the political will to

address them. For example, 90 per cent of Scotland’s electricity came from renewable sources in 2019, and we are now moving on to decarbonise heating, which will be a bigger challenge.”

As he sees it, Eden is a site on which people from both business and politics can find useful answers to big problems. New buildings will soon be opened up to meet anticipated demand, including the seven buildings that make up the iconic road frontage to the site. As Hill says, “All of this needs to be out of town: it is very important for us to have lots of hands-on industry here.”

Find out more

Website: <https://edencampus.wp.st-andrews.ac.uk>

Publisher: St Andrews Network for Climate, Energy, Environment and Sustainability, University of St Andrews.

Editors: Sarah Bennison and Laura Pels Ferrá.

Copyright: © University of St Andrews 2021. All rights reserved. Licences issued by the Copyright Licensing Agency Limited do not extend to this work. The reproduction or transmission of all or part of the article, whether by photocopying or storing in any medium by electronic means or otherwise, without the written permission of the owner, is prohibited. The commission of any unauthorised act in relation to the work may result in civil or criminal actions.

Disclaimer: This article is one of a series of articles collectively entitled 'The Sustainability Series', written for STACEES, the St Andrews Network for Climate, Energy, Environment and Sustainability. STACEES is a research network at the University of St Andrews. The articles contained in the Series are based on research and may also contain opinion-based information. The opinions stated herein do not necessarily reflect the ideas, ideologies, or points of view of the Editors, the University of St Andrews or any other organisation.

Neither the University of St Andrews nor the Editors or Author(s):

- makes any warranties about the completeness, reliability and accuracy of the information contained herein and in particular takes no responsibility for the accuracy or otherwise of any part of the information contained herein (including any claims made herein) or for any errors or missing information. Any reader who relies on the information or views expressed in the article does so at their own risk. Any action taken as a result of the information or views contained in the article is at the reader's risk;
- will be liable for any losses and/or damages whether directly or indirectly from or arising in connection with the use of this article; and
- will be held responsible for any misuse, reuse, recycled and cited/uncited copies of content from by others.



University of
St Andrews

The St Andrews Network for Climate, Energy, Environment and Sustainability (STACEES) is an interdisciplinary research-focused initiative launched in April 2021 at The University of St Andrews.

The Sustainability Series comprises 15 professionally written, accessible articles commissioned by STACEES to showcase the breadth of the world-leading sustainability-focused research at the University.

Designed and produced by University of St Andrews Print & Design Unit, September 2021. The University of St Andrews is a charity registered in Scotland. No: SC013532.