

# LABORATORY SUSTAINABILITY: COMMUNICATING BEST PRACTICE AND INNOVATION

Schools of Chemistry and Pharmacy Teaching Laboratories





## OUR MISSION STATEMENT

To enhance learning by providing safe, well-managed, increasingly sustainable teaching laboratories, serviced and supported by knowledgeable, approachable technical staff.



## Project overview

This project extends the reach of the Chemistry and Pharmacy teaching laboratory's work on sustainability; educating, engaging and showcasing continuous improvements and innovations.

The team has produced resources to compliment admissions events, facilitated knowledge exchange, gathered feedback, supported the implementation of sustainable practices in UEA laboratories and contributed to advancements beyond the University.

**THE TEACHING LABORATORY IS IDEALLY POSITIONED TO ACT AS A HUB FOR KNOWLEDGE-TRANSFER DUE TO ITS DIVERSE SET OF STAKEHOLDERS.**





# PART 1: COMMUNICATION AND ENGAGEMENT RESOURCES

A key component of the project was designing resources which communicate our advances in laboratory sustainability to a variety of audiences.

The team collaborated with the Directors of Admissions in the Schools of Chemistry and Pharmacy to showcase sustainability at admission events. The resulting display, shown below, highlights sustainable activities to applicants visiting UEA labs for the first time.

**FACT CARDS WERE DESIGNED TO GIVE APPLICANTS A TAKE HOME MESSAGE ABOUT SUSTAINABILITY IN OUR LABORATORIES.**



**DID YOU KNOW?**

Laboratories consume vast amounts of energy

Turn over to find out more!





**Sustainability in our teaching laboratories**  
Schools of Chemistry and Pharmacy

Laboratories are 3 to 4 times more energy intensive than offices.

We have significantly reduced energy consumption, whilst improving our facilities, by updating our laboratory equipment.

In one project alone we have saved enough electricity to power an average UK household for a year.

Tell us what you think!



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#sustainablelabs





University of East Anglia

## SUSTAINABLE LABS

# DID YOU KNOW? ✨

### Labs are resource-hungry

New technology gives us more control

### We're big on water savings

SmartCondensing saves 250,000 litres each year

### UEA is committed

Over £11 million to reduce our carbon footprint

### Our technicians are winners

A Green Gown and multiple Green Impact awards

## OUR STUDENTS ARE LEARNING IN AN AWARD WINNING SUSTAINABLE LAB USING OUR AWARD WINNING SUSTAINABLE EQUIPMENT

Student project assistant, Zahra Khosroshahi, wrote a blog series for SustainableUEA about the lab and it's journey to sustainability. The article aims to communicate the lab's progress to a non-scientific audience making it accessible to all.

### Read Zahra's blog here—

<https://tinyurl.com/sustuea-sustainablelabs>

**A SUSTAINABLE LABS BAMBOO BANNER, SHOWN LEFT, WAS DESIGNED AS AN EYE-CATCHING ACCOMPANIMENT TO EVENTS. FUNDED BY THE SUSTAINABILITY TEAM THIS IS A CENTRAL RESOURCE FOR USE AT SUSTAINABLEUEA EVENTS.**

Over the past year we have been collaborating with Asynt, a company based in Cambridgeshire, to create a new distillation attachment that can be used in conjunction with their waterless condenser, the CondenSyn. The attachment will soon be commercially available from Asynt. The 'you're on air' poster, on the following page, aims to highlight to our students how the innovation is contributing to water saving in the teaching lab and is also commercially significant.





## GREEN IMPACT GOLD LABS AWARD



The Green Impact programme sees teams from across universities challenge their School or Department to improve its sustainable credentials.

The scheme includes a lab-specific option.

The Schools of Chemistry and Pharmacy teaching laboratory achieved a Gold Labs Award in 2015-16 through the actions of the technical team and student project assistants.

A special award for Innovation was presented to the lab for the 'StarFin' project.

"UEA is able to do research on sustainability alongside other lab activities like teaching... There is such a huge cumulative work that went into making this lab more sustainable"  
- Green Impact student auditor, 2016

### ANY QUESTIONS?



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## OUR STARFISH HAVE FINS!



The UEA Chemistry and Pharmacy teaching lab has worked in partnership with manufacturer Radleys to develop a waterless multi-reflux apparatus – The 'StarFin'



- The Findenser is a super air condenser that uses increased internal and external surface area to transfer heat, cooling and condensing solvent vapours across a wide range of boiling points and eliminating the need for cooling water.
- The 'StarFin' combines the Findenser with a multi-flask baseplate, the StarFish, reducing heating requirements by up to 40% whilst saving vital fume cupboard space.
- In the UEA Chemistry and Pharmacy teaching laboratories this apparatus saves approximately 150,000 litres of water per year.

This project is a part of the ongoing SMARTCondensing Initiative, eliminating waste water for all condensing applications and saving over 275,000 litres of water per year.

### ANY QUESTIONS?



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A VARIETY OF POSTERS DISPLAYED IN THE TEACHING LABORATORY ARE REGULARLY ROTATED AND AIMED AT ENGAGING USERS AND VISITORS.

## ROTARY EVAPORATORS

We have installed two banks of six rotary evaporators each supported by a novel centralised vacuum supply system and recirculated cooled water.

Each evaporator works independently with its own vacuum gauge, non-return valve and tap for individual control.



### Water savings

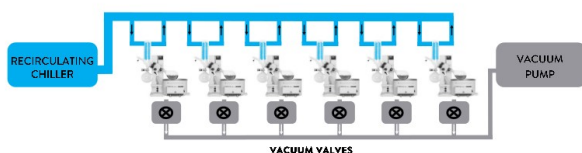
- Water is cooled and recirculated leading to a saving of 24 litres of water per minute at full capacity.
- Vacuum previously supplied by water jet pumps has been replaced by an efficient variable control diaphragm pump leading to 48 litres per minute savings.
- Total savings in the Chemistry and Pharmacy teaching laboratory exceed 40,000 litres per year.

### Improved function

- Improved vacuum control with individual gauge measurement.
- Robust and efficient removal and condensing across a wide range of boiling points.

### Energy efficiency

- Single intelligent Vario pump reduces energy consumption.



### ANY QUESTIONS?



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## A CUSTOM DISTILLATION HEAD ALLOWS US TO FULLY ELIMINATE RUNNING WATER FROM ALL OUR TEACHING LABORATORY CONDENSING

Developed in partnership with Asynt (manufacturers of the Condensyn air condenser), and made in-house by our glassblower, this is the first product of its kind and will be commercially available soon.

Air distillation in the lab contributes 15,000 litres to the water savings from the Condensyn – now over 60,000 litres every year for our undergraduate practicals.

All part of the SmartCondensing initiative – saving over 250,000 litres of waste water every year  
WANT TO KNOW MORE? Find us @SustainableUEA



## PART 2: TRYSUSTAINABLE

**On the 24th January 2018, the team hosted the TrySustainable exhibition in the Schools of Chemistry and Pharmacy foyer.**

Over 30 individuals engaged with the exhibition which aimed to showcase sustainable solutions from the teaching lab and make them accessible to other labs via an equipment loan scheme. Information was also provided on the support labs could receive from UEA's Sustainability Team for energy efficiency projects.

## 10 LABS SIGNED UP TO TRYSUSTAINABLE

**FOLLOWING THE EVENT LAB USERS BORROWED EQUIPMENT. ONE PARTICIPANT BORROWED A WATERLESS CONDENSER AND IN JUST 1 WEEK SAVED OVER 9,000 LITRES OF WATER.**



**UEA**  
University of East Anglia

**SUSTAINABLE  
WAYS**

**GREEN IMPACT**

- Staff and student networks
- Energy and carbon reduction
- Travel and transport
- Waste and water management
- Sustainable campus projects

HOW WILL YOU MAKE AN IMPACT?  
[www.uea.ac.uk/about/sustainability](http://www.uea.ac.uk/about/sustainability)

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# 'TrySustainable' Exhibition

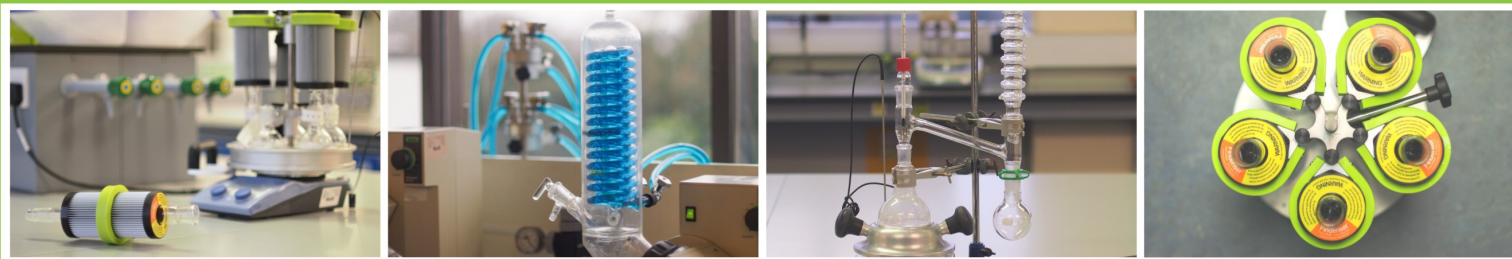
**Schools of Chemistry and Pharmacy foyer  
Wednesday 24th January 10am – 2pm**



A showcase of sustainable solutions

Information on university initiatives and funds to support sustainability in labs

Opportunity to loan equipment



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#sustainablelabs

**In February the team followed up interest from the exhibition by supporting energy monitoring, procurement decisions and reconfiguration of equipment in labs to achieve resource savings.**

This is just beginning; reductions in energy and water consumption have already been achieved but the team hopes the TrySustainable scheme will deliver projects with annual savings equivalent to the usage of 5 average UK households.

**1 MILLION LITRES  
OF WATER**



**200,000 kWh  
OF ENERGY**



**Equivalent to over 5 average UK households**

**THE TRYSUSTAINABLE SCHEME IS ABOUT SHARING  
RESOURCES, KNOWLEDGE AND EXPERIENCE TO SUPPORT  
SUSTAINABLE ACTIVITIES IN LABS ACROSS THE UNIVERSITY.**



## PART 3: STAFF & STUDENT SURVEY

**To communicate effectively with our students and academic staff it is important to have an idea of their awareness and views on the lab's sustainable activities.**

**A SHORT SURVEY WAS DESIGNED TO GATHER INFORMATION FROM LAB USERS. THERE WERE A TOTAL OF 95 RESPONDENTS, 59 STUDENTS AND 36 STAFF.**

The survey responses have provided an insight into the awareness, perceptions and opinions of staff and students on sustainable practices in the teaching laboratory. The findings will shape plans for the future, directing efforts to areas users believe to be of high value. The survey will also form part of an engagement strategy highlighting actions in response to feedback obtained.

**65%** of participants believe the introduction of **energy and water saving** equipment has had a **positive impact** on practical training and **employability skills**.

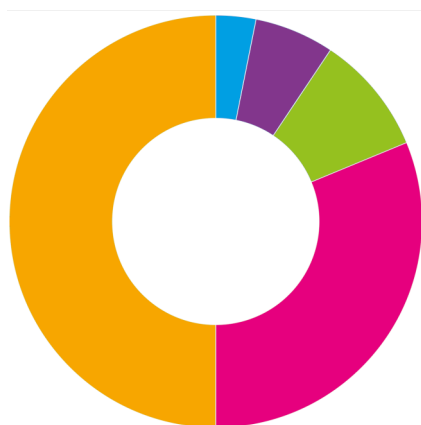
**75% of staff** believe the introduction of this **equipment** has had an **impact** on their **awareness of sustainability in laboratories**.



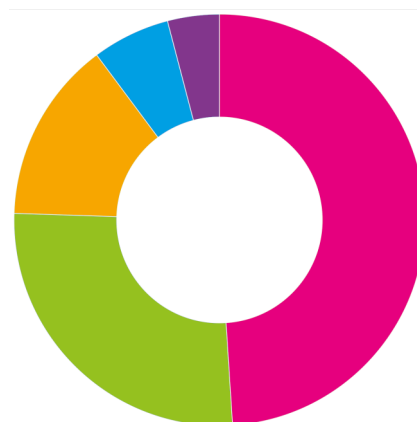
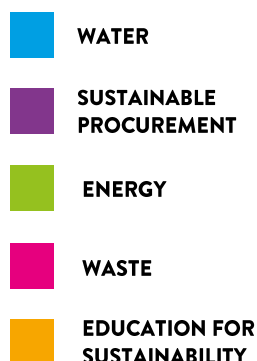




## WHAT DO OUR STAFF AND STUDENTS WANT TO SEE A FOCUS ON?



**50% of staff**  
participants want to see a  
focus on **Education for  
Sustainability**



**49% of student**  
participants want to  
see a focus on  
**Waste reduction**

## SUSTAINABILITY PROVIDES ADDITIONAL BENEFITS IN THE LAB TOO!

**74% of staff**  
participants believe  
**sustainable activities** could  
benefit **learning** in  
the laboratory

**65% of student**  
participants believe  
**sustainable activities** could  
benefit **safety** in  
the laboratory



## PART 4: EXPOSURE AND REACH

**We are spreading the word on best practice and innovation for sustainability in labs!**

### SO HOW WIDESPREAD IS OUR MESSAGE?

#### Exposure in the lab

The laboratory facilitates practical teaching in Chemistry and Pharmacy undergraduate courses. Students regularly use our innovative equipment with sustainability benefits, taught by academic staff and postgraduate students in associate tutor roles. The lab also hosts admission events for visitors and outreach sessions for schools. Our informative posters, equipment, training and exhibitions communicate our commitment to sustainability to a large number of individuals.

**500+**  
**UNDERGRADUATE**  
**STUDENTS**

**200+**  
**VISITORS**  
**TO UEA**

**40+**  
**POSTGRADUATE**  
**STUDENTS**

**30+**  
**ACADEMIC**  
**STAFF**



#### Beyond the lab

The team is engaging, supporting and communicating sustainability through outward facing events, schemes, development of new equipment and publications. These are extending the reach of our work which has been recognised nationally with potentially international impact.

## ON THE HORIZON

In summer 2019 the teaching lab will be moving to a brand new purpose built state-of-the-art learning and teaching facility housing three floors of laboratories. The design team have been busy incorporating sustainable options in to building plans and we are looking forward to transferring our sustainable activities and innovations to their new home.





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