

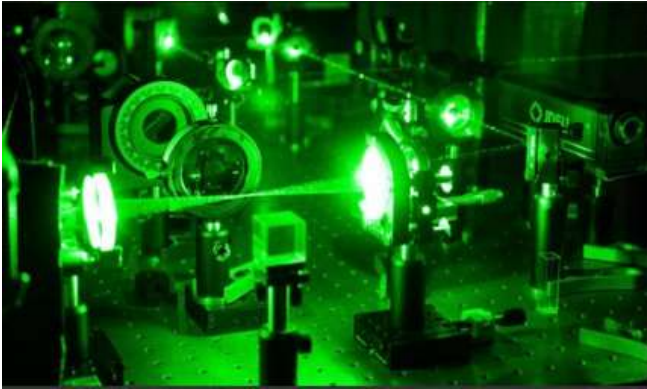
Making science greener: Researcher perspectives & solutions

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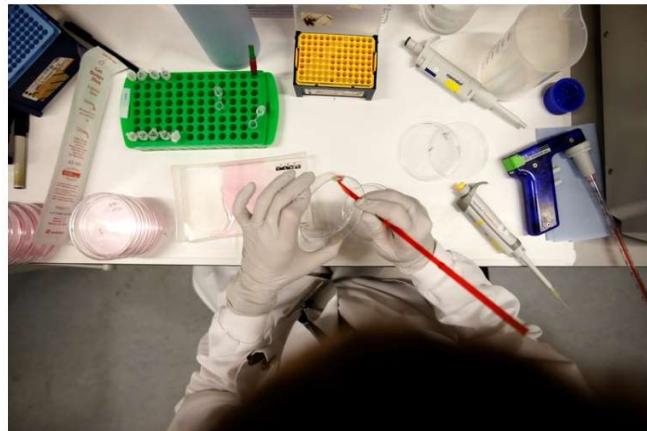
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Environmental impacts of scientific research



- *Labs typically use 5-10 times as much energy as an office building (can be as high as 100 times)*
- *Bio scientific research produces ~5.5M tonnes plastic waste annually (1.8% of global total)**
- *... supplies of lab equipment have much greater impacts on biodiversity overall than do international flights, the university's consumption of electricity or its use of construction materials (University of Oxford)***



* Urbino, Watts & Reardon, *Nature* **528**, 479 (2015)

** Bull et al, *Nature* **604**, 420-424 (2022)

Attitudes

- **79% know** how their actions in the laboratory impact the environment
- **84% would like to do more** to reduce the impact of their day-to-day scientific work on the environment
- **63% have made changes** in the last two years to reduce the environmental impact of their research activities, or those of their research group, team or department

Some people already embedding conservation

		% respondents selecting always	% respondents selecting often
Day-to-day actions (Q11)			
→	Switch off equipment when not in use to save energy	44	35
→	Wash and reuse single-use plastics, packaging, or other laboratory disposables	17	22
	Close fume hoods to reduce energy consumption	46	29
	Share equipment with other groups/teams to minimise downtime	27	33
	Consider energy impact of calculations/algorithms before running	9	11
→	Follow sustainability guidance or frameworks (e.g. LEAF, My Green Lab)	11	14
→	Measure the energy consumption of equipment to guide decision making	8	11
	Purchase more efficient models of equipment	13	21
	Reduce water consumption in the laboratory (e.g. using waterless condensers)	20	21

Detail on p29-46 *Sustainable Laboratories* (RSC, 2022)]

Table 3: Q11 (n=620) and Q12 (n=618). Which of the following measures do you, or does your group, team or department use to reduce the environmental impact of your work? RSC Sustainable Laboratories Researcher Survey 2021.

Challenges are context-dependent

- **Regional variations** in environmental concerns, mitigation options, regulation
- **Resources:** Money, expertise, knowledge
- **Scale** of organisation or lab
- **Type of research** e.g. wet/dry/computational lab, field, clinic

“Evaluation of alternative approaches is time consuming and takes resource. As a small company this is hard to justify when staff are working hard just to keep the company afloat. Availability of external advice would be valuable.”

- Experienced manager,
Industry, United Kingdom

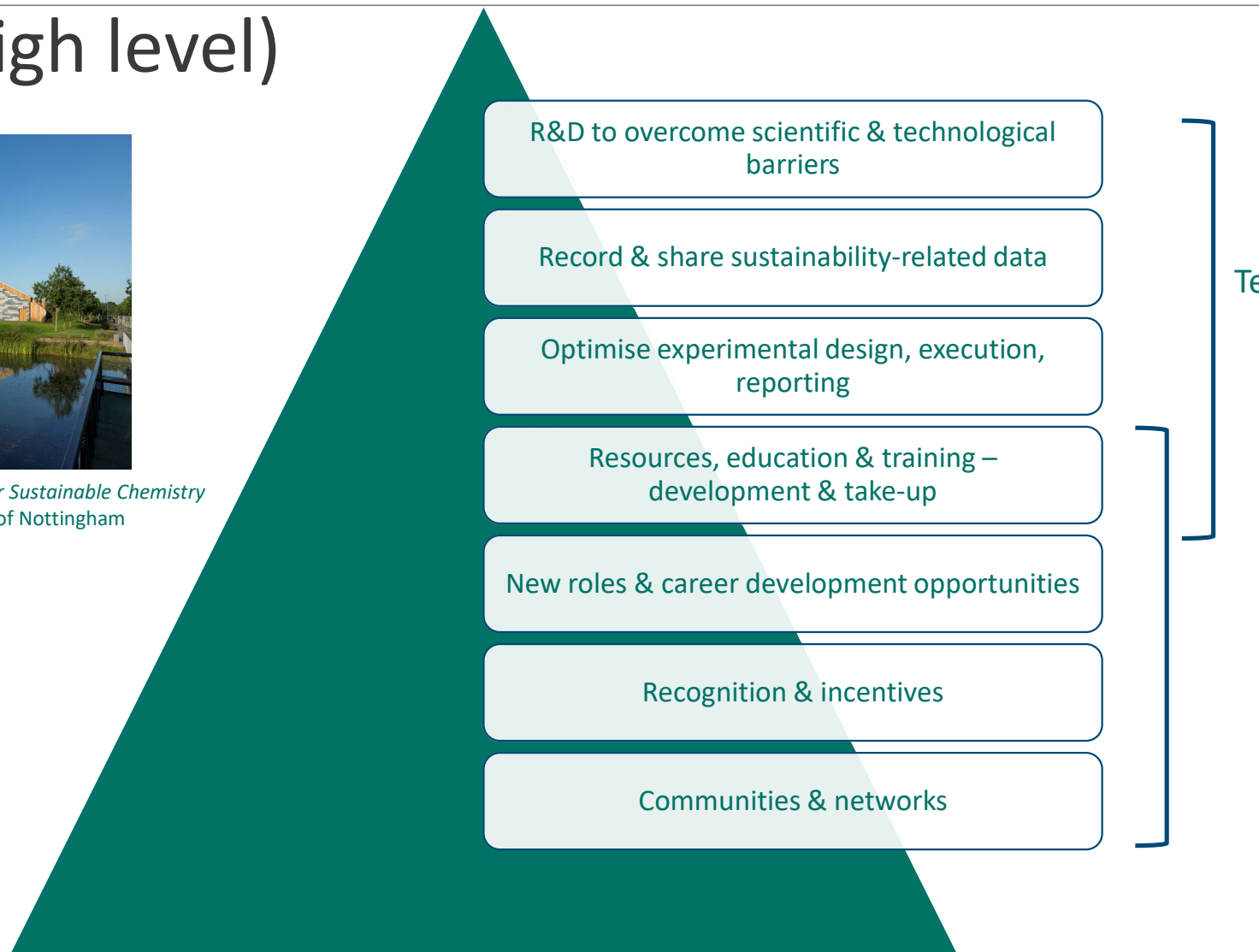
“Currently, sustainability is not discussed as much as health and safety. This needs to change. As we raise the profile of sustainability it will become more a part of everyday work. At present other drivers, eg cost and quality, feel stronger calls to action.”

- Mid-career scientist, Industry,
United Kingdom

Solutions (high level)



GSK Carbon Neutral Laboratory for Sustainable Chemistry
Photo credit: University of Nottingham



[Detail on p47-62 *Sustainable Laboratories* (RSC, 2022)]

Going greener in the lab: Where can I start?

- I'll shut fume cupboard sashes when not in use
- I'll look at ways to reduce, reuse and recycle lab plastics
- I'll report leaking faucets/taps
- I'll do an inventory of our lab freezers
- I'll consider what equipment can be switched off when not in use
- I'll find out more about energy use and carbon emissions associated with computing
- I'll see if we can measure how much electricity we use in our lab
- I'll see if we can measure how much water we use in our lab
- I'll ask about the sustainability credentials of our lab supplies
- I'll check out resources to help me select solvents and reagents
- I'll explore the *12 Principles of Green Chemistry* and how they might apply to my experiments
- I'll share ideas with colleagues about environmental sustainability in the lab
- I'll explore opportunities to share equipment with other researchers or groups
- I'll find out more about green labs programmes and tools
- I'll work with colleagues to develop an Environmental Sustainability Plan for our lab



Thank you

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