Building a global culture of sustainability in science

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What does lab culture really mean, and how can it be used to combat the climate crisis?

The consequences of climate change due to human activity are not only recognised for their impact on the environment, but also for the resulting financial and political impacts [1]. Essential scientific research conducted in labs around the world also has a negative impact on the environment. While science is often meant to bring prosperity and support innovative development, researchers can have a larger carbon footprint than the average person's greenhouse emission in for example Europe [2]. But with this disproportional impact on the environment by scientists comes a greater opportunity for improvement, and ultimately long-term culture shifts in the science sector.

Culture is centred around peoples way of life, as expressed through their values, beliefs, habits and activities [3]. Addressing and changing culture is a fundamental tool in permanently transforming the science community into a global leader on sustainability [4]. While changes in energy sourcing and lab building infrastructure are important, behaviour change is also a key component in moving towards a meaningful sustainability shift in labs *(Figure 1)*.

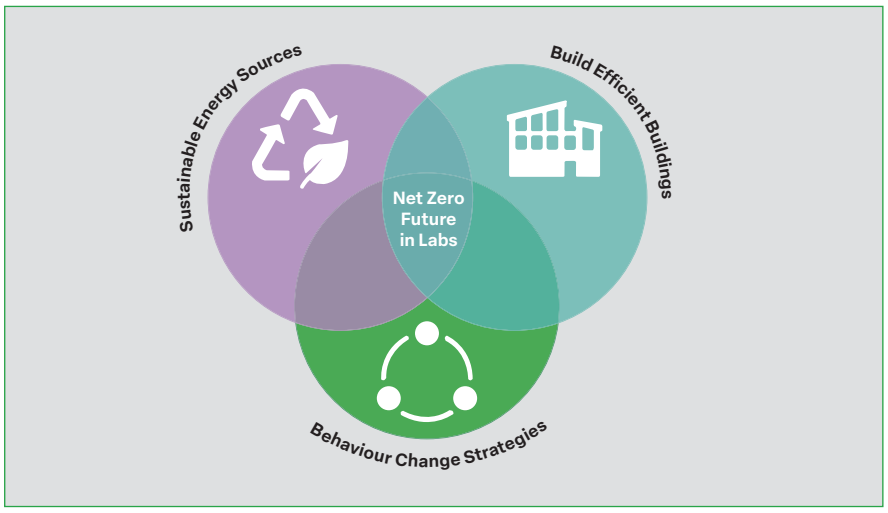

Figure 1. Three major components for creating a net zero lab.

The benefits of using lab culture as a mean to support sustainability efforts are numerous, including aligning company values with the values of personnel, the low cost of implementation, the opportunity to drive continuous improvement and leverage the vibrant, creative minds already present in the scientific community. As personnel in an organisation see how they can play a role and make a difference through their own actions, efforts by the organisation to cultivate inspired employees can lead to greater improvements in both the environmental footprint and internal sustainability culture.

Initiating and managing behaviour change has two main strategies, known as top-down and bottom-up. Top-down is when decision making comes from senior management and is communicated to the lab(s). Bottom-up is when a person or lab group begins a sustainability movement that leads to the formation of a larger sustainability community of labs. For behaviour change to be truly successful and durable, both top-down and bottom-up strategies are needed. Table 1 outlines the benefits of each approach. The two strategies can be connected by having mutual sustainability goals and practices on both an organisational and lab level. Engagement is further fostered when these sustainability goals align with both the organisation's values and with the values of personnel.

Although work at the individual level is important in creating a behaviour change through ownership and engagement, individual initiatives can only go so far. To support a true culture shift, there needs to be a move from individual actions to collective actions. Engagement lets everyone in a lab have specific responsibilities in a lab's sustainability efforts, which is key to the long-term and enduring success of sustainability programs. Additionally, networking both within and outside the lab, organisation, or business is important for sharing best practices and expanding support for sustainable labs.

Table 1. The benefits of top-down and bottom-up strategies in creating a culture shift.

	Top-Down	Bottom-Up
Targets and Actions	Creates shared goals that aligns with operational strategies	Allows everyone to be involved, where all personnel can influence decisions and goals
Governance	Supports coordination of efforts and policies	May allow faster decision making
Roles and Responsibilities	Allows a clear allocation of time, resources, and funding	Allows more options for creativity and inspirational ideas
Communication and Reporting	Creates infrastructure and communication platforms for sharing best practices and data collection	Smaller groups can have faster and easier communication
Values	Can lead to mindset changes in many lab groups	Creates ownership of sustainability by all personnel

Changes in behaviour that lead to a substantial culture shift takes a long time and can be hard to implement, especially in a complex working space as the science lab. There is no one solution that fits all challenges, as each laboratory is different. Furthermore, the top priority for scientists is to conduct impactful research, and the extra time demands that may come with sustainable initiatives can be challenging. Change will only happen if the scientist believes a change will be beneficial to them, again emphasising the importance of institutional support and motivation. Certification programs like My Green Lab Certification can provide a framework to tackle the challenges of starting a sustainability program and define the benefits that are seen in an improved approach to sustainability [5]. One of the many benefits of green lab certification programs is their ability to engage scientists and labs through proven and effective approaches, accelerating the process of sustainability transformation.

Building a global culture of sustainability in science is the key goal of the non-profit organisation My Green Lab [5]. My Green Lab brings together scientific communities as they work towards a better world in which all research reflects the highest standards of environmental responsibility. Recognised by the United Nations Race to Zero campaign as a key measure of progress towards a zero-carbon future, My Green Lab Certification is considered the worldwide gold standard for laboratory sustainability [6]. The continuous improvement driven by My Green Lab Certification draws on the My Green Lab Theory of Change *(see Figure 2)* to drive both bottom-up and top-down transformation and create lasting cultural impact [7].

The My Green Lab Theory of Change outlined in *Figure 2* shows the stages of building a culture of sustainability in science. The model begins with awareness, as the personnel, group, lab, or organisation must first become aware that there is a problem before they will act. Research shows that simply providing information or requirements is not an effective strategy to motivate behaviour change. Instead, bringing awareness of the massive environmental impact of science, while demonstrating to the lab community that there is a more sustainable way to conduct lab work, is a far more effective approach. Next, the community, from individual scientists to global institutions and companies, needs to take action through sustainability programs and initiatives, and encourage a culture of continuous improvement. Finally, it is important to recognise, elevate, and reward leadership from those who supported the building of a new culture in the organisation, to permanently transform the scientific community into a global leader in sustainability. True culture change ensures the long-term success of the sustainability program.

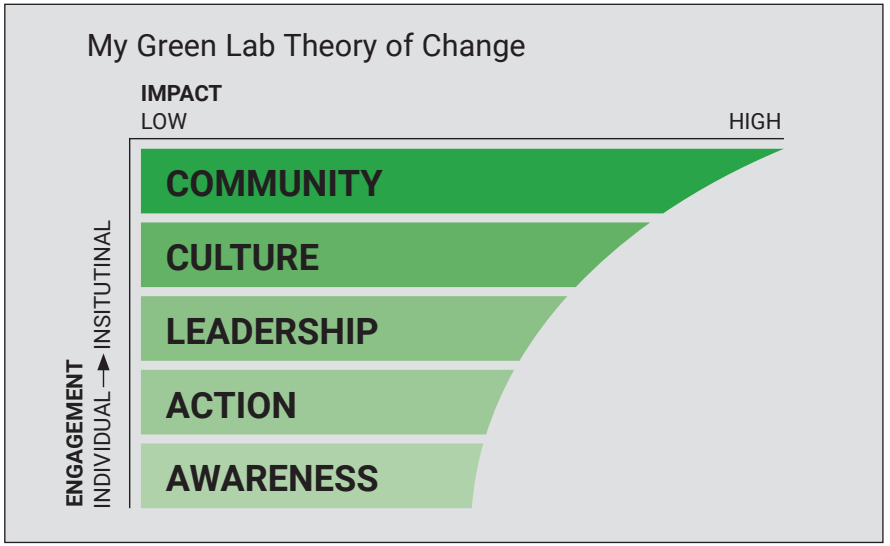

Figure 2. The My Green Lab Theory of Change.

In summary, a strong sustainability culture is a key factor in driving towards a net zero lab. It is a component that allows scientists to take ownership of improvements and shift from awareness to actions, leading to a reduction in the environmental impact of their own lab work. Additionally, the sustainability program must be flexible enough to enable the integration of sustainability goals in harmony with lab operations and objectives. When considering solutions to the climate crisis, remembering that people and culture are integral to creating a generation of sustainable research.

References

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