BRITISH SCIENCE ASSOCIATION

The role of public opinion in shaping engineering biology

sciencewise

What is the role of public opinion in shaping engineering biology research and policy?

Engineering biology is the application of engineering principles to biological systems. As a fast-developing field of science, and a low carbon technology, engineering biology could bring benefits for the economy, food and materials production, public health, and energy consumption. However, like other major technologies, engineering biology's transformative potential means that it needs to be developed and deployed in a responsible and ethical manner.

To ensure that engineering biology benefits society and that the social and ethical risks are properly regulated, there is a need to start the conversation with the public early on. In 2024, UKRI's Sciencewise programme published two reports on public perceptions of engineering biology in health and food applications. The reports outline what is known about public views and values on engineering biology and identify key themes which could be further explored through public dialogue.

To build on this work and the growing momentum behind engineering biology, in May 2025 **Sciencewise and the British Science Association (BSA), brought together leaders** from UK universities, the private sector, research funders, bioethics organisations, civil society, and policymakers **to discuss the UK public's role in shaping engineering biology research and policy.**

In this roundtable discussion, professionals discussed how the scientific community could start a more open and inclusive discussion with the public about the fundamental research underpinning engineering biology and its applications, meaningfully considering tensions and challenges as well as potential benefits. Many comments and views expressed were about the nature of public engagement generally and are relevant to different areas of research and innovation.

Key messages

1. Engineering biology has developed as an overarching 'brand' term for a range of technologies and research and innovation areas which have transformative potential, but they have **potential for different social impacts in different spheres**. Some applications are consumer/citizen focused and some are not – it might be helpful to differentiate between these and give more attention to areas where public engagement is needed more.

2. It could be beneficial to have a **more balanced approach to public engagement**. Many dialogues are risk based, which sometimes can backfire. Rather than always approaching the public with a problem, some participants thought that this should be balanced with a discussion on the potential benefits. Overemphasising risks can discourage people from engaging with science and might have a particularly negative effect on marginalised communities. We might also need to rethink our framing of responsible innovation – telling people that a technology could be harmful is not enough.

3. It is important to consider who the **trusted voices** on the ground are and how we can best use them when engaging the public in conversations about science and technology. We often talk about the need for another David Attenborough or a 'Brian Cox of biology', but in the community engagement context, the key brokers might not be celebrities, but faith leaders, local schools or libraries' representatives – they are trusted locally and can help intermediate these important conversations.

4. There is a need to build a **coordinated system of public dialogue**. Rather than episodic engagement, the focus should be on sustaining and deepening interwoven dialogues around engineering biology and other emerging technologies in the context of evolving socio-political culture. This also needs to be reflected in a budget. Public engagement is not an add-on to research and innovation, and investment needs to be made mid/long-term.

5. It is important to engage the public in **conversations about science and technology at all levels**, from high-level ethical questions to specific applications of particular technologies, and not just current 'hot topics'. There is also a need for the sector to get better at **evidencing impact** and demonstrating how people's feedback can influence science.

Engineering biology: current context

Engineering biology is one of the five critical technologies identified by the UK government as key for ensuring growth and building a competitive advantage. As such, investment in this area is increasing and in 2023, the Department for Science, Innovation, and Technology (DSIT) announced its National Vision for Engineering Biology.[1] This included a commitment to developing robust insights into public attitudes towards engineering biology.

In August 2024, DSIT surveyed 3,000 UK adults online, aged between 18-65+ to gain insight into their understanding and their perceptions of engineering biology in five applications: health, agriculture and food, low carbon fuels, chemicals and materials, waste and environment.[2] The survey found that the majority of respondents felt comfortable with using new and emerging technologies, but relatively few could explain what engineering biology is. There was also a strong belief that applications of engineering biology could be useful and will be positive for society.

At the roundtable we heard from a DSIT representative that this survey was the starting point. With a view to fostering adoption, DSIT plans to continue to build public awareness of the potential of engineering biology and is now ramping up this work to deepen its approach to public engagement on engineering biology.

DSIT also noted that there is also a role to play for the newly set up Regulatory Innovation Office (RIO).[3] The RIO was launched in October 2024 to help position the UK as the best place in the world to innovate by ensuring safety, speeding up regulatory decisions and providing clear direction. Engineering biology has been identified as one of the RIO's four early priority areas, recognising its disruptive potential to deliver growth across wide-ranging sectors of the economy, from health to agriculture.

In early 2024, the Government's Chief Scientific Adviser, Dame Angela McLean, made it her mission to expand the evidence base around the applications and benefits of engineering biology, as part of her 'Year of Engineering Biology'. The work concluded with the Government Office for Science publishing its Engineering

[1] Department for Science, Innovation & Technology. (2023). National Vision for Engineering Biology https://assets.publishing.service.gov.uk/media/656de8030f12ef07a53e01ac/national_vision_for_engineering_biology.pdf
[2] Department for Science, Innovation & Technology. (2024). Engineering biology public trust survey findings https://www.gov.uk/government/publications/engineering-biology-public-trust-survey-findings
[3] Department for Science, Innovation & Technology. (2024). Game-changing tech to reach the public faster as dedicated new unit launched to curb red tape https://www.gov.uk/government/news/game-changing-tech-to-reach-the-public-faster-as-dedicated-new-unit-launched-to-curb-red-tape

Biology Aspirations Foresight report in April 2025.[4] This report is about the power of engineering biology to drive economic growth and deliver enduring solutions to a wide range of complex problems in areas such as healthcare, environmental sustainability, agriculture and energy.

Better practice engagement: should we isolate conversations about engineering biology from its applications?

Participants were interested in the question of whether we should be engaging the public in conversations about engineering biology outside its applications. Several attendees advocated for disaggregating engineering biology. It was pointed out that it would be difficult to imagine engaging the public on biology as a whole. Similarly, engineering biology might be ready to be split into smaller areas.

From previous work, we know that public views are context-dependent and likely to be shaped by the values and views associated with potential domains of application - food, medicine, or sustainability - rather than engineering biology in general. This means that there is scope for more in-depth public engagement in these different domains as there are different risks, benefits and trade-offs to explore in different areas.

It was also highlighted that it is important to meet the public where they are, rather than where the research is, and that thinking about engineering biology in context helps people make technology relatable. For example, we know that young people are interested in climate change and energy. Linking engineering biology to these applications gives people an opportunity to ask questions on their terms.

While disentangling science from its applications can be hard, it was noted that when the public are told about the different applications, the dialogue is already downstream. Therefore, it is important to include discussion of the principles and upstream research potential, but to walk a line carefully between giving examples of potential future uses and constraining what can be envisaged.

It would be very expensive and time consuming to engage the public on every single application of engineering biology. To overcome this challenge, it is helpful to use 'softer engagement' and build on ongoing engagement with communities. There might not have been a particular dialogue on a specific issue, but there will be existing mechanisms and infrastructure.

[4] Government Office for Science. (2025). Engineering Biology Aspirations Foresight report. https://www.gov.uk/government/publications/engineering-biology-aspirations-report/engineering-biology-aspirations

Participants also noted the value of public panels to help overcome the issue of having set up new dialogues for every engineering biology application. It was hypothesised that this could create a more sustainable method to engage and involve public participants in such a wide and rapidly advancing field.

Strong sense of equity and trust

There is a lot of existing research on how people respond to synthetic biology. We know that people have a strong sense of equity and are concerned about the motivations of different actors and profit-making intensions. The discussion highlighted that it is important to have conversations with the public about trust in those actors and their trustworthiness, and to ensure that there are boundaries that exist to protect public interests.

Participants noted that the key questions from earlier dialogues by Biotechnology and Biological Sciences Research Council (BBSRC)[5] and the Royal Society[6] remain valuable. In 2009 and 2017, when these dialogues were conducted, participants wanted to know: What is the purpose? Why do it? Who benefits? What are the risks? How do you know you're right? The dialogues also found that people wanted those developing new genetic technologies to be impartial and independent, expert and ethical, and to be working for science and the global good, not profit.[7]

The discussion highlighted that trust in companies is generally low, while academics (especially in medicine) enjoy higher trust. This is particularly pertinent given that engineering biology now (especially in the development of foundation models, and convergence of AI and biotechnology) is increasingly dependent on public-private partnership or private funding.

It was also pointed out that engineering biology is a disruptive technology. With its development, some people and organisations' vested interests will be affected or at risk of being displaced, and they will fight against it. We have seen it in conversations about, for example, heat pumps, where the oil and gas industry has been successful in stirring opposition.

Participants also discussed the importance of the language we use to talk about technology. As engineering biology is one of the priority areas, the language the government is using is very innovation and growth centered. This can make people concerned about who's going to benefit from the technology and how the public will be affected.

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[5] UKRI. (2010). Synthetic biology: public dialogue. https://www.ukri.org/publications/synthetic-biology-public-dialogue/

[6] Hopkins Van Mil. (2017). Potential uses for genetic technologies: dialogue and engagement research conducted on behalf of the Royal Society. https://royalsociety.org/~/media/policy/projects/gene-tech/genetic-technologies-public-dialogue-hvm-full-report.pdf

[7] University of Cambridge. (2025). Engineering Biology and the Public: Navigating Engagement and Trust. https://www.engbio.cam.ac.uk/news/engineering-biology-and-public-navigating-engagement-and-trust

Evidencing impact

One of the key challenges to public engagement with science and technology is evidencing impact or change and establishing a circular feedback loop between the public and the research community. Participants noted that there is a need to demonstrate to interested public and relevant researchers that their views can make a difference, otherwise it can lead to disengagement and mistrust.

Equally, it is important to think about how we can make sure that the research community, or those involved in further development of technology, listen to the public's views on it. Public engagement should not be seen as a 'researcher-led exercise in persuading the public to agree with them'.

Public perspectives and policymaking

It was noted that policymakers are very time-stretched and focused on their portfolios. It is difficult to know what public engagement work has already been done and what is currently being carried out. A repository of what is already out there would be helpful to avoid duplication and support decision making.

There is still considerable room for the public to play a greater role in science and innovation policy. The connection between public input and policy making has been tenuous. What are the ways to make it more systemic? Providing training for civil servants and making sure they have the right skills and know when it is important to do engagement could be a useful start.

What lessons can we learn from other technologies and previous public engagement?

A large part of the discussion and views expressed were about what good public engagement with science and technology looks like, which could be applied to engineering biology as well as other areas of research and innovation.

Several contributors pointed out that if public engagement is not done well or use of engineering biology is not in line with public expectations, the technology could be in jeopardy. If there is no social license granted, the adoption that the government is working towards might not happen. Past examples, such as genetically modified organisms (GMO), are instructive.[9] Early and meaningful engagement where elements of the approach are genuinely 'up for grabs' is vital. Participants noted that we should not talk to the public only about issues which are already hot topics in the media, or only on issues where there are strong feelings. The key to good public engagement is asking the right questions about

the choices we really have as a society, and helping people engage with the subject.

The discussion also highlighted the need to engage the public in conversations at all levels. Conversations could be on practical applications, but we also need to ensure we have not completely bottomed out some of the important high-level ethical questions like 'What is life?' or 'What responsibilities should we assume towards different forms of life?'. Developing a process to embed these questions in public engagement would help develop shared orientations across different lines of discussion.

We sometimes underestimate that as individuals, service users and consumers, people feel they don't have a choice about how they engage with technology. Indeed, in the extreme case of wholesale adoption of technologies that shape markets, public services and society, individuals sometimes don't have a choice of whether to take part or not.

Public engagement and participation in this space should be informed by ethical analysis – utilising a range of scenarios to assess the necessity of such blanket adoption, and to assist collective exploration of trade-offs and acceptability. For example, people should have a say in the framework of incentives and regulation around lab grown meat to ensure that consumer choices are respected and can be protected.

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About Sciencewise

Sciencewise is a UKRI funded public engagement and public dialogue programme that supports government departments and other public bodies to listen to and act on diverse voices, to shape policy and priorities.

Important benefits of the programme include:

- Helping decision makers to formulate policy with a deeper understanding of public views, concerns and aspirations;
- Supporting high quality, best practice public dialogue; and
- Bringing credibility and independence to government-led public dialogue projects.

Since 2004, Sciencewise has supported over 75 public dialogue projects on often controversial technologies and cross-cutting issues of societal change, from AI, gene editing, and climate technology to low-carbon growth and the future of food production.

The programme is run in a partnership between UKRI and a consortium led by public engagement charity Involve, with the British Science Association (BSA) and National Co-ordinating Centre for Public Engagement (NCCPE).