# LESSONS LEARNED FROM ENGINEERINGUK PROGRAMME EVALUATIONS

Incorporating environmental sustainability content into outreach programmes



### Contents

Contents	2
Summary	3
Introduction and method	4
What do we mean by environmental sustainability?	4
How has EngineeringUK integrated environmental sustainability content into our programmes and activities?	6
What motivated schools and teachers to engage with environmental sustainability programm and activities?	es 7
What factors helped environmental sustainability programmes and activities work well?	8
What are the challenges to delivering successful environmental sustainability programmes?	12
Key learnings and recommendations	14
Appendix 1: Evaluation methodologies and sample sizes	17
Appendix 2: 5-point approach in promoting engineering and technology careers through environmental sustainability summary	17

### Summary

EngineeringUK runs a range of STEM outreach programmes and activities for schools across the UK to support its mission of inspiring, informing, and helping young people from all backgrounds progress into engineering and technology careers. In this thematic review, we share lessons learned from incorporating environmental sustainability into our STEM outreach programmes and activities. These lessons learned can be used by providers who are wanting to imbed environmental sustainability into their own outreach activities.

Key learnings and recommendations include:

- Incorporating environmental sustainability content into our outreach activities helped students understand the role of engineers in creating solutions to environmental problems
- Challenges to delivering successful environmental sustainability activities include school budget, time and resource limitations, along with students needing to engage with environmental sustainability material repeatedly and in a variety of ways
- Environmental sustainability content should be regularly adapted and updated to ensure outreach programmes remain relevant and engaging for students and schools
- Providers should link their resources with other environmental sustainability activities and the curriculum to enable a more holistic and sustained approach

What we have learned from our evaluations, in addition to the above, is that embedding environmental sustainability into existing activities or developing new activities with environmental sustainability as their focus helped teachers and schools address an important topic for students. Developing programmes and activities that focus on or include environmental sustainability content should use existing frameworks, such as the 5-step model<sup>1</sup>, to embed careers information and build on existing evidence, such as the insights provided by the Science Education Tracker<sup>2</sup>, along with testing the programme with key stakeholders and incorporating feedback.

<sup>&</sup>lt;sup>1</sup> Tomorrow's Engineers, Promoting engineering and technology careers through environmental sustainability, January 2025

<sup>&</sup>lt;sup>2</sup> EngineeringUK, Science Education Tracker 2023, April 2024

### **Introduction and method**

EngineeringUK is a not-for-profit that drives change so more young people choose engineering and technology careers. We work in partnership with hundreds of organisations, all of which share in our vision for a UK with the diverse workforce needed for engineering and technology to thrive and to drive economic prosperity, improve sustainability and achieve net zero.

EngineeringUK runs a range of STEM outreach programmes and activities for schools across the UK to support its mission of inspiring, informing, and helping young people from all backgrounds progress into engineering and technology careers. We recognise that students need to engage with the wider STEM curriculum to progress into engineering and technology careers, hence some of our activities are broader than just engineering and technology and focus on STEM. In this thematic review, we share lessons learned from incorporating environmental sustainability into our outreach resources and activities, collating evidence from the last 3 years.

We explore how we have included more environmental sustainability content in our programmes and activities, and what motivates schools to engage with this content. We then discuss what factors have helped these programmes work well, as well as the challenges involved in delivering these programmes and activities. Finally, we draw key learnings and recommendations about incorporating environmental sustainability into STEM engagement.

This paper was compiled from systematically identifying relevant extracts from 5 of EngineeringUK's evaluations and some additional raw data from the last 3 years. Themes were conferred with a second researcher, and we ran a focus group with EngineeringUK colleagues responsible for developing and delivering our activities. Some of the evaluation reports are not published externally. We've linked to published reports where possible and have made it clear when we're referencing unpublished reports. For more information on our internal evaluations, please <u>contact us</u>.

#### What do we mean by environmental sustainability?

Environmental sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. With the demand for STEM skills growing rapidly as we work towards a net zero future, EngineeringUK has created new activities and resources for school students around environmental sustainability and incorporated content into existing activities. This includes topics such as climate change, sustainability, green careers, and green initiatives.

This approach has allowed us to draw learnings from our findings so far. However, it should be noted that these findings are from evaluations with varying sample sizes and methods, which limits our ability to generalise our findings widely. To learn more about the individual evaluations, please refer to Appendix 1.

It should also be noted that within each evaluation, we used similar survey and interview questions, but wording differed slightly depending on an activity's specific outcomes. For example, some activities cover STEM more broadly, so survey items used science, engineering and

technology in their phrasing, while others were more specific to engineering and/or technology. To make sure we are not generalising, we have specified which word (engineering, technology or STEM) has been used throughout the report.

The 5 main outreach activities referred to in this review include:

Programme	Summary of programme	Expected student outcome related to environmental sustainability		
The Big Bang Fair	EngineeringUK organises and runs an annual STEM Fair held at the NEC in Birmingham that attracts approximately 20,000 10- to 13-year-olds			
Big Bang at School	Big Bang at School provides schools with delivery partners to organise a customised STEM event at their own institution. STEM providers and employers may be invited, and environmental sustainability resources and activities may be included during the event	For students to know more about the role engineering and technology play in creating solutions to environmental problems and the careers available		
Big Bang Blueprint	Big Bang Blueprint provides schools with resources (including activities relating to environmental sustainability) to organise a customised event at their own institution. Blueprint is organised and delivered by schools themselves, where they may invite STEM providers and employers			
Climate Schools Programme	The Climate Schools Programme was piloted in the 2023/2024 academic year. It is a set of English, geography and science resources that teachers from state-funded secondary schools can use in their lessons to inspire students to explore green engineering careers and how they tackle climate change			
Energy Quest	Energy Quest is a workshop for secondary students about sustainable energy and associated engineering careers. In 2023/2024, Energy Quest was adapted from being facilitator led to a teacher- led approach to help create a long-lasting legacy for this programme	For students to consider pathways into engineering careers, especially green careers		

#### Table 1: EngineeringUK activities containing environmental sustainability aims and content

Throughout this report, we refer to teachers and educators. Teachers deliver the Climate Schools Programme, whereas the other 4 activities may also be delivered by teachers, as well as by other members of school staff (such as careers leads) or external facilitators.

For more information on these activities, please visit the EUK Education website.

# How has EngineeringUK integrated environmental sustainability content into our programmes and activities?

We have integrated environmental sustainability content into our activities in 3 ways:

- 1. Within programme delivery, making sure that how we deliver our programmes is as environmentally conscious as possible
- 2. As standalone programmes or activities, with a primary focus on environmental sustainability and climate change
- 3. As supplementary materials, to enrich or complement the wider programme content

With regards to delivery, we focused particularly on programmes that had a larger carbon footprint and where changes in delivery were within our control. For example, in our internal evaluation report, we noted how we improved environmental sustainability and the carbon footprint of The Big Bang Fair 2023 by adding water refill points to limit single-use plastics and ensuring all printed materials were on recycled, FSC certified carbon balanced paper. We monitored our own carbon footprint and developed a guide to share with schools and supporters to help them limit theirs when attending the event. We also provided our suppliers with guidance on how to design and build stands to make sure these are as environmentally friendly as possible.

Given the importance of environmental sustainability already noted in this report, we also created new programmes that focus explicitly on this topic. For example, the Climate Schools Programme, which was piloted in the 2023/24 academic year, was created using the 5-point approach<sup>3</sup> in which promoting engineering and technology careers is achieved through an environmental sustainability lens. For example, within this set of resources and activities, the content focuses on solutions to environmental issues and how these link to skills and careers for students, rather than solely focusing on the problems of climate change. See Appendix 2 for a summary of the 5-point approach.

Additionally, the content of the Climate Schools Programme is evidence based, as it used insights from the Science Education Tracker<sup>4</sup> to identify themes for the science practicals and focus on climate change in particular in order to target girls in particular. The content was then tested with teachers, and following their feedback, we opted to include even more green content in the resources. This included creating introductory lessons that highlight the importance of group work for green jobs, along with resources to recap or introduce the underlying concepts of the lesson.

Finally, continuous advancements in technology and green messaging means that the environmental sustainability content in our existing programmes must be updated regularly to ensure they remain relevant and engaging. For example, Big Bang at School and Big Bang Blueprint

<sup>&</sup>lt;sup>3</sup> Tomorrow's Engineers, Promoting engineering and technology careers through environmental sustainability, January 2025

<sup>&</sup>lt;sup>4</sup> EngineeringUK, Science Education Tracker 2023, April 2024 findings that females had higher interest in climate change (page 11) and that there has been a decline in practical science work, with an increase in demand for this from students (pages 80 to 94)

resources include up-to-date green career path documents for teachers to use in planning their events.

Additional ways to update content could include information about new careers that may emerge due to technology, new policies created by the government, and new discoveries in this field.

# What motivated schools and teachers to engage with environmental sustainability programmes and activities?

Our evaluations showed that teachers and schools were motivated to engage with activities that included environmental sustainability content because:

- schools are committed to environmental sustainability, as it is an important topic within the education system
- teachers found the environmental sustainability resources engaged students in the topic in a relatable way
- teachers had a personal interest in climate change
- teachers were looking for new ways to talk to their students about climate change and environmental sustainability

Environmental sustainability content is important to schools, and in some cases, this was why they chose to deliver one of our programmes. For example, teachers who were interviewed as part of the Climate Schools Programme internal evaluation said they were motivated by their school's commitment to environmental sustainability. They also wanted to teach students about climate change in an understandable way, help students become more engaged in the topic, and highlight what students can do to help.

"It [environmental sustainability] feels like a hot topic, and it affects the world now and what they'll [students] have as a world in the coming years. So, I feel like sustainability is such a good thing to ingrain when they are young because then it becomes common practise. I really think sustainability would be a good focal point" Teacher interview from Big Bang Blueprint evaluation

Some teachers also took part in the Climate Schools Programme because they had a personal interest in learning more about climate change:

"I just thought there's something that I would like to take part in because I feel very passionate about the environment. I'm a science teacher, so it just felt really, really right." Teacher interview from Climate Schools Programme evaluation

Environmental sustainability content will remain a key focus within schools as the Department for Education's 2025 goal is for all educational settings to nominate a sustainability lead to align with

their sustainability and climate change strategy and to implement a climate action plan<sup>5</sup>. While we did not ask about this explicitly, teachers participating in the Climate Schools Programme noted that climate change is a growing topic within their school's taught curriculum and the importance of environmental sustainability content in these kinds of career and outreach activities:

"I think it's important that students have a good climate education and that actually can be said for the school as a whole. We are doing a fair number of pushes too, particularly in science, to include a number of climate based activities to get students thinking about climate change and what they can do to help." Teacher interview from Climate Schools Programme evaluation

"All these activities can be based on Climate School Programme activities, so the timing is really important, so it can be embedded to our scheme of work and curriculum for all subjects." Teacher interview from Climate Schools Programme evaluation

Climate School Programme teachers also liked receiving resources linked to environmental sustainability as it provided them with new ideas for teaching the topic to students:

"I think it's been good for getting both the teachers to start thinking about different ways to introduce climate change and being given options from pre-prepared resources means that we don't have to spend so long focusing on the content and instead think about how to tailor the delivery, which is good and for the kids getting more formalised lessons on climate" Teacher interview from Climate Schools Programme evaluation

Additionally, EngineeringUK's Programme Lead of Big Bang at School and Big Bang Blueprint noted that the programmes can be seen as STEM celebration days that also celebrate teachers, and may boost community perceptions of schools, which schools are always keen to do.

Some educators also demonstrated appetite for more green content, for example in our internal evaluation of The Big Bang Fair, surveys conducted at the event in 2024 revealed that 40% of educators and 45% of students wanted more information specifically about the solutions to environmental problems.

These findings suggest that teachers, educators and schools value environmental sustainability content in outreach activities, and that this should continue to be a topic that outreach providers focus on when creating new programmes and resources for schools.

## What factors helped environmental sustainability programmes and activities work well?

Positive outcomes associated with environmental sustainability programmes and activities include:

<sup>5</sup>Department for Education, Sustainability and climate change: a strategy for the education and children's services systems, December 2023

- helping schools take more holistic approaches to environmental sustainability, complementing their existing green initiatives
- helping schools see and demonstrate the value of environmental sustainability by giving them content they can embed and link across subjects
- providing schools and teachers with realistic content they can use at key points in the year (such as British Science Week, drop-down days at the end of the year) and in future years
- showing students the role engineers play in creating solutions to environmental problems
- reducing students' climate anxiety, as commented on by teachers interviewed in the Climate Schools Programme evaluation
- providing students with ideas for green careers and helping them make the connection between sustainability and potential jobs

Delivering programmes and activities that cover environmental sustainability has provided EngineeringUK with a unique opportunity to see how schools incorporate these into their own plans for the year. Our internal evaluations showed that schools who valued environmental sustainability aimed to take a holistic approach and integrated our activity into the wider curriculum, rather than focusing on just one lesson or event.

Teachers described how participating in EngineeringUK programmes complimented other green initiatives in their schools. Examples of schools' current green initiatives include:

- Lunchtime/afterschool clubs
- Student green group
- School status of 'plastic free'
- Green school awards
- Cross school trust sustainability group
- Eco school status
- Green flag school status
- Drop down days where students focus on activities linked to the environment
- Green Careers Week

Many teachers interviewed in the Climate School Programme internal evaluation also agreed that it was important to embed and link elements of sustainability across all subjects:

#### "It's all about sharing these ideas and collaborating really between the departments, between the industries, between the teachers, between other schools. So it's [Climate Schools Programme] a brilliant starting point." Teacher interview from Climate Schools Programme evaluation

Similarly, EngineeringUK colleagues who develop and deliver these programmes and activities noted that as environmental sustainability is not a key focus in the school curriculum, it is important to incorporate the topic throughout different lessons and subjects and ensure that all school staff are upskilled to discuss environmental sustainability with students.

As EngineeringUK's programmes cover a range of different delivery models, we can identify patterns in when schools integrate these programmes into the school year. We see the most

popular times with schools delivering the programmes being British Science Week in March, June and July. This is mainly worked around mock and exam season. This shows potential timings for providers to consider when creating programmes for schools.

Teachers also discussed how they would continue to use the Climate School Programme resources, which included incorporating it into the curriculum and continuing to deliver the lessons in future years:

"My next steps will be to go back the students and find out what areas of climate change they want to investigate further...I would give them the CSP research information and get them to do a bit more research themselves" Teacher interview from Climate Schools Programme evaluation

Teachers also commented on what aspects of the programmes they liked that were linked to green content. This included climate change information being presented in a realistic way, rather than through social media. A teacher noted that social media tends to be more of a platform for "standing up and shouting" rather than effectively informing people about what is actually happening. Teachers also liked the content that focused on solutions to environmental issues, and not just the problems caused by environmental issues, as they felt this helped to reduce students' climate anxiety.

#### Student outcomes in environmental sustainability programmes

Across most of EngineeringUK's programmes and activities, a key outcome was teaching students about the role of engineers in creating solutions to environmental problems. For example, our internal evaluation of Big Bang at School 2022/23 found a significant improvement in young people's knowledge about the role engineers play in creating greener technologies. Before the event, 65% of students already agreed they knew about the roles engineers play in creating green technologies. This increased to 72% of respondents following the event.

This finding was consistent in other programmes, including:

- The Big Bang Competition 2023/24
- The Big Bang Fair 2023 and 2024
- Energy Quest 2022/23

These findings suggest that EngineeringUK's programmes that contained environmental sustainability content helped students to know more about the role engineers play in creating solutions to environmental problems.

When conducting teacher interviews for the Climate Schools Programme internal evaluation, some teachers mentioned that they felt it helped make students feel less anxious about climate change because it showed them solutions to environmental problems and provided examples of how they could live more sustainably. Recent research with a large sample of years 7 to 9 students revealed that while students appreciate that learning about climate change and sustainability is important,

they do not necessarily enjoy it<sup>6</sup>. As such, helping students feel hopeful about finding solutions to environmental issues and lowering their climate anxiety has been added as an intended outcome to the Climate Schools Programme 2024/25 evaluation. We are currently testing ways to measure this, including a teacher discussion activity where teachers facilitate a conversation with their class about how learning about the ways engineers are helping the environment makes students feel.

Additionally, another intended outcome for the Climate Schools Programme is that students understand there are careers available in engineering and technology that tackle climate change. Teachers who took part in the Climate Schools Programme felt that the resources:

- provided students with ideas for green careers
- helped them to make the connection between sustainability and jobs available
- supported teachers in explaining that careers are changing due to the environment, with new jobs being created to find solutions

"As well, thinking about the career side of things sort of given a few examples of things that they could do to because I know a lot of my students are very climate aware and want to do something to help with it. So this has hopefully given them at least a few of them some ideas of exactly what they could do for that." Teacher interview from Climate Schools Programme evaluation

One teacher felt that the Climate Schools Programme helped their students gain more awareness of how to interrogate the media and the messages that they're being told about climate change rather than assuming that what they're told is true.

"On the curriculum and it [climate action] is already taught, but it [the resources] expanded it much further than the existing curriculum and it gave the children a chance to think about it other than just facts and stuff that they need to know for their GCSEs it was like, well, actually, let's think about this in a different way." Teacher interview from Climate Schools Programme evaluation

Similarly, teachers at 2 schools that took part in Climate Schools Programme said that their aims of supporting students in understanding how they can help their school become more environmentally friendly and to increase student and teacher awareness of climate issues were achieved:

"I think the goal of teaching them more about climate change and the goal of expanding nowadays and thinking outside the box and thinking like an engineer or thinking like a scientist was achieved" Teacher interview from Climate Schools Programme evaluation

This suggests that the environmental sustainability content in EngineeringUK's programmes helps students understand the role of engineers in creating solutions to environmental problems, the careers available in this field, and encourages students to think more about the environment.

<sup>&</sup>lt;sup>6</sup> UCL, Climate Change and Sustainability Education: A survey of students in England, 2024

# What are the challenges of delivering successful environmental sustainability programmes?

While there were several positive outcomes associated with including environmental sustainability content, participants also noted a number of challenges to delivering these within schools:

- there is a high degree of variability in the extent to which the sustainability content is included in what schools deliver
- budget and resource limitations limit schools' ability to take part in programmes and engage students with green initiatives
- schools have limited time to deliver environmental sustainability programmes
- students need to engage with environmental sustainability material repeatedly and in a variety of ways
- teachers may avoid delivering environmental sustainability resources due to their own worries about climate change

#### Environmental sustainability content isn't always delivered in schools

The extent to which environmental sustainability content is delivered varied across schools participating in EngineeringUK activities, and it may depend on the type of programme. For example, the Climate Schools Programme includes ready-to-use lesson plans and resources that cover environmental sustainability topics. While the majority of teachers interviewed in the Climate Schools Programme evaluation used the environmental sustainability content in their lesson, some teachers used the resources to inspire their own activities linked to environmental sustainability, such as a cut and stick worksheet to demonstrate the climate change process, or created their own starter activities for the lesson based on the lesson plans topic. Some teachers also covered green careers with their students, which was included in the Climate School Programme resources:

#### "I would love to do these lessons again and I will be incorporating them in at our climate change topic." Teacher interview from Climate Schools Programme evaluation

In contrast, programmes that give teachers the autonomy to organise STEM events, such as Big Bang Blueprint, did not always include environmental sustainability content in their events. This may have been because including this content wasn't a focus for that specific school. For example, in the internal evaluation of Big Bang Blueprint, one school's Blueprint event contained many STEM activities for students, however none that linked to environmental sustainability. Some Big Bang Blueprint schools did include environmental sustainability content at their event, and they did this by having:

- A sustainability group project ran by a facilitator at an event
- An environmental A level subject stall that covers different environmental career pathways
- A carbon footprint calculator activity

• Careers stalls which link to sustainability and green careers

This suggests that when designing a programme or activity with environmental sustainability content, it should be considered that schools may not necessarily use all of what's available. This has implications for evaluation, as variability in the delivery of an outreach programme or activity means that results need to be interpreted with caution. It is important not to attribute impact to a given programme or activity without understanding to the fidelity of that activity's delivery. In other words, measuring the degree to which programme delivery varies – as we have in the Climate Schools Programme for example – helps an evaluator understand the relationship between an activity and its intended outcomes in greater detail.

Another way around this issue is to ensure that environmental sustainability content is embedded throughout all of the content or at least into its core materials (if taking a modular approach).

#### School budget and resource limitations

Some teachers in the Climate Schools Programme highlighted challenges in engaging students with green initiatives due to budget constraints. For example, one of the teachers interviewed in the Climate Schools Programme internal evaluation pointed out that limited financial resources restricted their students' ideas for improving the school's eco-friendliness, such as not being able to implement recycling or install solar panels. Additionally, EngineeringUK programme leads highlighted schools' resources limit their ability to take part in programmes as not all schools have the resources needed for practical experiments in science lessons. EngineeringUK offers bursaries to help schools with limited resources participating in Neon activities and Big Bang at School, and in our evaluation of the 2023/24 bursaries, 89% of teachers said that their school would not have been able to take part in the programme without the bursary.

#### **Limited time**

Environmental sustainability is not a required topic in what is an already packed curriculum, making it difficult for some schools to find space for environmental sustainability programmes in their timetables. Teachers also found it difficult to fit the content into their lesson time, and the amount of green content covered depended on the time available at each school. For example, one teacher in the Climate Schools Programme interviews mentioned that addressing students' misconceptions about climate change took longer than expected, leaving insufficient time to cover all the planned content. However, these misconceptions emphasised the importance of including green content in programmes for students.

#### Students need ongoing learning on environmental sustainability

The evaluations described above suggest that environmental content had an immediate impact on students in terms of their understanding of how people working in engineering and technology are working towards solutions and potential career pathways they could explore. However, to embed this learning, students need to engage with the material repeatedly and in a variety of ways. A number of teachers in the Climate Schools Programme highlighted this, saying their next steps would be to lead a whole-school initiative on climate change and integrate it into the curriculum.

### **Key learnings and recommendations**

The above describes how environmental sustainability is an important topic for teachers, schools and the wider education sector. However, our analysis revealed a number of key learnings for outreach providers delivering this kind of content.

Outreach providers should link their resources with other environmental sustainability activities and the curriculum. This will help schools take a holistic approach to integrating content into other aspects of the curriculum rather than focusing on just one lesson or event.

Programmes and activities should incorporate evaluation measures linked to environmental sustainability into their design to understand and report on student and teacher outcomes. Our evaluations suggest that incorporating environmental sustainability content not only helps students understand the role of engineers and technologists in creating solutions to environmental problems, but also increased their awareness of the careers available and made them think about the environment more. Additionally, when aiming to reduce climate anxiety through a programme or resources, it is ethically important to measure this via evaluation to ensure the programme or resource doesn't increase climate anxiety. To understand more about how to evaluate STEM outreach programmes, please refer to the evaluation resources on the <u>Tomorrows Engineers</u> website.

**Environmental sustainability content must be regularly adapted and updated to ensure outreach programmes and activities remain relevant and engaging for students and schools.** Examples of what can be included in updated content are new careers, policies, and discoveries, as well as making outreach events more environmentally conscious.

The extent to which schools deliver environmental sustainability content varies, depending on the schools' time and financial resources. Programme delivery method also played a role in how much this content was delivered, with some being more flexible to allow materials to fit the school's context and priorities.

**Students need ongoing learning on environmental sustainability.** Environmental sustainability programmes should be designed to be integrated into students learning journey, rather than being a one-off programme or activity.

Outreach providers should acknowledge and address the challenges schools face in their programme delivery plans. These challenges include being time and resource poor, budget constraints, and school recruitment. Specific recommendations from teachers about school recruitment include:

- highlighting how participating will help schools to meet Gatsby Benchmarks or other Ofsted reporting requirements
- aligning programmes with existing initiatives (such as Green Flag schools or Science Week)
- encouraging schools to share what they have done with other schools in the local area
- leveraging spaces teachers already use to network and share resources, such as forums, Facebook pages or teacher conferences

Finally, EngineeringUK staff involved in programme development and delivery provided their own advice for designing outreach programmes that incorporate environmental sustainability content:

- utilise the 5-step model as a guide for how to promote engineering and technology careers through environmental sustainability<sup>7</sup>
- test programme content with key stakeholders, incorporating feedback from teachers and students into the programme design
- ensure language around environmental sustainability is inclusive and accessible for students by providing definitions of words and phrases
- develop content that is evidence-based, using research such as the Science Education Tracker<sup>8</sup> as a guide
- ensure resources can be adapted by teachers to offer flexibility (for example, not making resources as PDF files)

<sup>7</sup> <u>Tomorrow's Engineers, Promoting engineering and technology careers through environmental sustainability, January 2025</u>
<sup>8</sup><u>EngineeringUK, Science Education Tracker 2023, April 2024</u>

# **Appendix 1:** Evaluation methodologies and sample sizes

Programme	Teacher feedback survey	Teacher interviews	Student surveys	Observations
The Big Bang Fair 22/23	$\boxtimes$		$\boxtimes$	
	291 responses		2,456 responses	
The Big Bang Fair 23/24	$\boxtimes$		$\boxtimes$	
	276 responses		2,414 responses	
Big Bang at School 22/23	$\boxtimes$		$\boxtimes$	
	40 responses		380 pre-post	
			survey responses	
Big Bang at School 23/24	$\boxtimes$	$\square$	$\boxtimes$	
	50 responses	4 interviews	221 pre-post	
			survey responses	
Big Bang Blueprint 22/23				$\boxtimes$
		5 pre- and post-		5 observations
Big Bang Blueprint 23/24				
	26 responses	6 interviews		4 observations
Climate Schools				
Programme 23/24	21 responses	15 interviews		13 observations
Energy Quest 22/23	$\boxtimes$	$\boxtimes$	$\boxtimes$	
	96 responses	4 interviews	Post-survey only =	
			1,267 responses	
			Pre-post survey = 102 responses	
Energy Quest 23/24				
		7 interviews	101 responses	
		,	101 responses	

# **Appendix 2:** 5-point approach in promoting engineering and technology careers through environmental sustainability summary

Point	Summary of point		
1) Link to the curriculum	When designing content, linking environmental sustainability to the school curriculum allows teachers to include it in their school day. It also makes the issues relevant and understandable for young people.		
2) Identify the environmental problem(s) to be addressed	When planning engagement activities, it's important to showcase environmental issues that resonate with young people. Research suggests that girls and boys can engage with environmental issues differently. Girls tend to show more interest and are more consistent in their engagement with climate change topics throughout school.		
<ol><li>Identify the engineering and technology solutions</li></ol>	In the content, it's important to explain what engineers and technicians do, as many students may not know. This could include showcasing real-life impact that engineering and technology careers will have in addressing sustainability challenges.		
4) Highlight careers linked to engineering and technology solutions	There are lots of different pathways into engineering and technology careers, including T Levels, apprenticeships, degree apprenticeships and university degrees. It's important to showcase the diversity of routes in your activity, which will support Gatsby Benchmark 7, 'Addressing the needs of each pupil'. By linking environmental solutions to the curriculum and future careers, you will also support schools to meet Gatsby Benchmark 4 'Linking curriculum learning to careers'.		
5) Skills for the future	Engineers and technicians use their skills to improve the design and performance of everything we use today – and to develop the products and technologies of the future. Future engineers will need to be able to handle complex information, embrace change and be inclusive and ethical.		