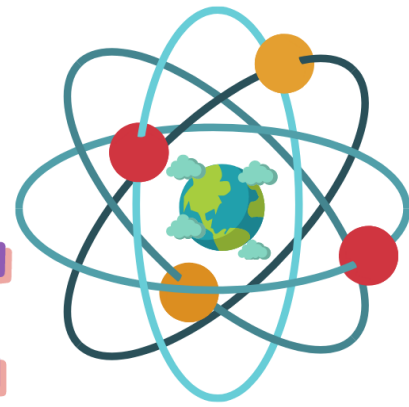# Welcome to the STEM Challenge

## Who we are?

We are a group of Civil Service Fast Streamers aiming to promote Science, Technology, Engineering and Mathematics (STEM) attainment in schools and encourage diversity, social mobility, and inclusion. Fast Streamers experience working in a range of different government departments to develop the skills required to become future leaders. We come from a wide range of fields, from anthropology to chemistry and engineering to human biology, and a diverse array of backgrounds but we all share a passion for science and communication.
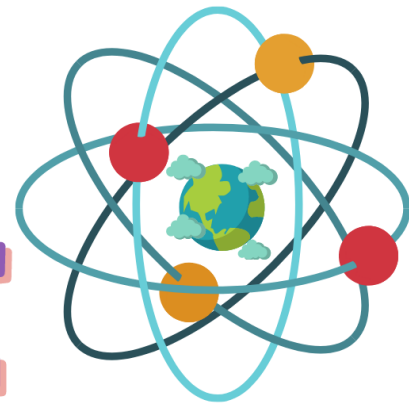
## The challenge.

We are launching the STEM challenge as a way to show students three real-world problems that STEM can tackle. The challenge involves a hypothetical, yet realistic, scenario that year 9-10 students will tackle in groups of 3-5. The students will need to justify and present their ideas in a creative and scientific way. Entries will be judged according to the success statements by a panel of policy experts. Prizes will include amazon vouchers and certificates signed by Government Chief Scientific Adviser Sir Patrick Vallance for the winning team. There will also be separate certificates for all participants commemorating their participation in the challenge.

2021's challenge will be 'a vision of a carbon neutral day in 2050'. This challenge will provide an opportunity for students to engage in discussion about the pressing issues of the environment and sustainability, while allowing scope for creative problem solving. Students will choose one of the three topics provided to explore and build your carbon neutral world: sustainable food production, sustainable homes, or humans in space. Challenge submissions should take the form of an A3 poster and a written statement explaining your team's vision for 2050 and focusing on your chosen topic. Each team member will also be expected to complete a reflection log. Further details on the challenge requirements and each topic can be found in the problem statements.

# Benefits to students.

This challenge has been tailored to target key skills in the [Skills Building Partnership Framework](#) and specific [Gatsby benchmarks of Good Career Guidance](#). We particularly want students to get an experience of what scientific based policy making looks like, and to provide a practical insight showing how skills in STEM are critical in a wide range of areas - not just in the lab!

This challenge will involve many skill strands within the Skills Builder Framework, but the work will specifically develop skills in the following strands:

- **Problem solving**
  The challenge will require consideration and evaluation of multiple routes to solving the problem statement, with selection of the most appropriate solution demonstrating steps 4, 5 and 9 of the problem-solving skill strand.

- **Creativity**
  Students are presented with a situation relevant to a current 'hot topic' in Government. This will involve a multidisciplinary and creative approach where participants will be encouraged to create mind maps to share and articulate their thoughts. These aspects will demonstrate skills in all steps 0 through 8 of the creativity skill strands.

- **Teamwork**
  This is a group task for teams of 3-5 where everyone will have to work cooperatively towards a common goal. Individuals will have responsibility to complete tasks and should contribute towards group decision making. Taking part in the challenge will help develop steps 3, 6, 7 and 8 of the teamwork skill strands.

The Gatsby Good Career Guidance Benchmarks are designed to enable young people to make informed decisions about their future. **Gatsby Benchmark 4: '*Linking curriculum learning to careers*'** will be met through the 'real world problem' presented to participants, with carbon neutrality being a priority area in Government. In addition, we will be providing an insight into some of our own 'journeys to the Fast Stream' to demonstrate how our degrees in various STEM subjects have brought us to the civil service. Through the challenge, there will be an opportunity for students to engage with civil servants working in Government, thus fulfilling **Gatsby Benchmark 5: '*Encounters with Employers and Employees*'.** Finally, this challenge will provide a virtual experience of working on policy development in Government through interactions with fast stream employees and potential further employer engagements, aligning with **Gatsby Benchmark 6: '*Experiences of workplaces*'**.
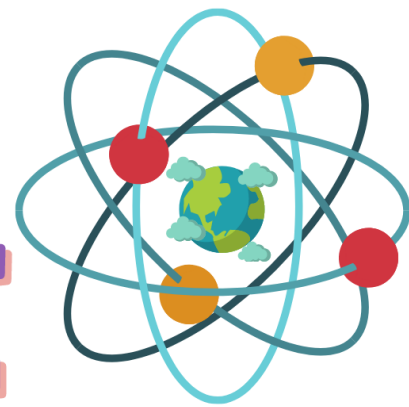
We hope that your students will get as much fun out of this challenge as we have had creating it, and we certainly believe it will be a fantastic chance to demonstrate how engaging work in STEM subjects can be! We look forward to working with you and to reading all of the entries.

## How to submit entries.

Entries must be submitted in PDF format to gse@go-science.gov.uk with the subject line "STEM Challenge Submission" by teachers/ career advisors.

**Entries must NOT include any personal information, including names of team members or schools to ensure anonymity in the judging process is maintained.** See Privacy Notice at the end of this pack for further information.

## Timeline

1. **13th May** – Launch date of the STEM challenge.
2. **13th May** (4-5pm) – We will be hosting an online event where we will present the STEM challenge and host a Q&A session from 4-5pm. This session will also be recorded for any schools joining later. We look forward to meeting you all!
3. **20th May** (4-5pm) – Additional Q&A session.
4. **25th May** (4-5pm)- Additional Q&A session.
5. **11th June** (6pm) – All submissions for the STEM Challenge will have to be submitted by 6pm.
6. **Mid July** (TBC) – Winner to be selected
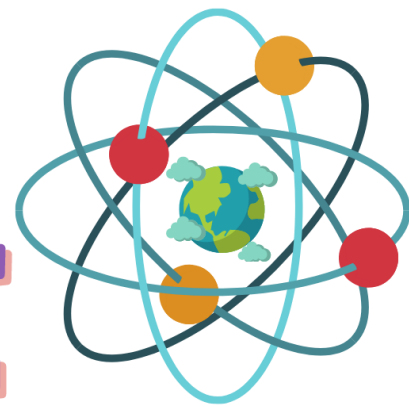7. **Mid July** (TBC) – Prizes to be distributed

## Who can I contact if I have any other questions?

You can email us at gse@go-science.gov.uk  with the subject line "STEM Challenge Enquiries"

All updates will be provided through each school's careers advisor with occasional updates also being posted on the Government Science & Engineering blog.

# Problem Statements

## A Vision of a day in 2050

Welcome to the Civil Service STEM Challenge. This year's challenge looks into the future, imagining how technological progress might overcome environmental problems we face today. For this challenge, please look at the problem statements below and choose **one** problem statement your team will tackle. Your team will need to produce a poster and report outlining an idea for a solution and the science and engineering behind that idea. We encourage you to think outside the box and do some wide research on your proposed solutions. Remember to consider the cost and practicality of implementing your ideas!

For completing this challenge all teams that take part will receive a certificate. The team that produces the best poster and report will have their certificates signed by the Head of Government Science and Engineering, Sir Patrick Vallance, to evidence their achievement! Amazon vouchers will also be awarded to the winning team!

## #1 Sustainable food production

With the global population estimated to reach 9.1 billion people by 2050, food production will have to be more efficient than ever to provide a nutrient-rich diet while ensuring sustainable use of land and water resources. We want you to imagine that you are overseeing food production in the UK. **What three ideas does your team think will have the largest impact in making UK food production more sustainable?**

**Consider ideas such as the following when evaluating your ideas:**

1. How will you utilise the limited land, in the UK (e.g. Extensive vs Intensive agriculture)?

2. How does food production impact water resource usage? Could water be recycled or are there alternative low-water farming methods?
3. What the role will emerging technologies and innovative agricultural practices play in 2050?
4. How will increasing the scale of food production impact on key parts of the food chain? Will this impact biodiversity and resilience?
5. How will food production be impacted with changing diets in the UK?
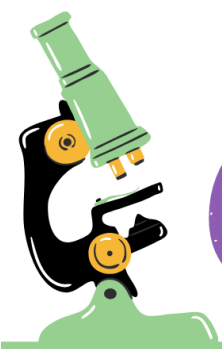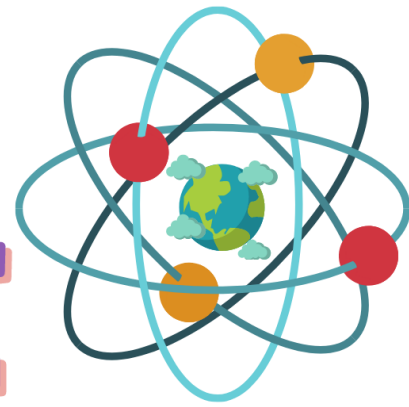
# #2 Humans in Space

This year many people have been stuck indoors and not managed to travel very far. In the year 2050 we hope people can travel much further, explore off planet. We want you to look at some sustainability benefits they might find! **What three ideas does your team have which could have the biggest impact on improving sustainability?**

**Consider ideas such as the following when evaluating your ideas:**

1. How will we offset the negative impacts of space travel i.e. CO2 emissions? Perhaps, look historically at what technologies space travel has given us access to and then look to the future at what technologies could be developed.
2. What alternative energy sources or resources could human presence in space give us access too? Are they more powerful or sustainable than terrestrial alternatives? How would we get the energy/resources back to earth sustainably?
3. How could satellites and other space-based infrastructure be used in the future? For instance, autonomous vehicles may require low earth orbit satellites for navigation (see https://www.oneweb.world/, https://www.starlink.com/ for low earth orbit satellites)

# #3 Sustainable Homes

The government has signalled the UK is to have zero carbon emissions by the year 2050. To achieve this our housing stock is going to need to be updated and modernised. **What three ideas can your team bring to the design of a futuristic housing community that will have the biggest impact on sustainability?**

**Consider ideas such as the following when evaluating your ideas:**

1. How will these homes reach the future homes standard? Will the energy be sustainably resourced or offset to be carbon neutral?
2. What materials will the houses be made from? How will these be sourced sustainably?
3. How will you cope with land pressures, where will the plot be? (E.g. on a brownfield site vs greenfield), how will you maximise the number of people housed on this plot?
4. How will you ensure that the houses are affordable?
5. When building housing it is important to consider the communities that go alongside homes. What infrastructure and social systems would encourage greener living
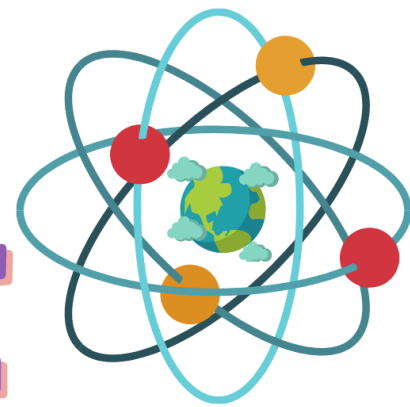
# Frequently Asked Questions

1. **How do I enter?**
   Please send your final PDF submissions to your teacher/ school careers advisor.

2. **Is there a cost to enter?**
   No, the STEM Challenge is completely free to enter.

3. **How do you recommend we start?**
   We recommend you start by looking at the problem statements and the relevant links included, using this information to guide your further searches. Exploring the general overview of your chosen topic, including current and future directions, should give you ideas for the specific information you should be looking for.

4. **How will I be kept up to date with information?**
   All updates will be provided through each school's careers advisor with occasional updates also being posted on the Government Science & Engineering blog.

5. **Do you recommend any tools to help us collaborate?**
   Platforms such as Zoom and MS Teams are excellent for group calls; WhatsApp and Messenger are useful messaging for quick updates; and the Google Tools or Office 365 are useful for working on documents or posters simultaneously.

6. **Do you recommend any tools to help us create the poster?**
   There are many options for building posters, and we would encourage you to be creative in your building process. Some good poster-building tools include MS PowerPoint, Prezi, InDesign, and MS Publisher.

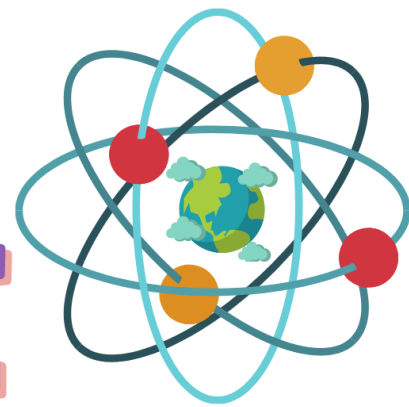7. **Why are entries required to be submitted as PDF files?**
   This is to ensure that the formatting and content of your files remain consistent across viewing devices and to reduce the risk of technical or software errors from affecting scoring.

8. **Can multiple teams enter from the same school?**
   Yes, a maximum of 135 students can participate.

9. **What skills will the challenge help develop?**
   The challenge will help develop creativity, problem solving, teamwork and leadership in line with the [Skills Building Partnership Framework](#); additionally, this challenge works towards benchmarks 4,5 and 6 of the [Gatsby Benchmarks of Good Career Guidance](#). Please ask your teacher/ Careers advisor for more information on this.

10. **Can I run the challenge as part of a school club?**
    Yes, providing that the total number of teams from your school is within the allowed limit of 45 teams.

11. **Should the reflection log be completed by each student or the team as a whole?**
    Each individual team member should complete a reflection log and submit this along with the poster & report.

12. **What are the prizes?**
    For completing this challenge all teams that take part will receive a certificate. The team that produces the best poster and report will have their certificates signed by the Head of Government Science and Engineering, Sir Patrick Vallance, to evidence their achievement! Amazon vouchers will also be awarded to the winning team!

## Privacy Notice – STEM Challenge 2021 - Teacher

**Entries must NOT include any personal information, including names of team members or schools to ensure anonymity in the judging process is maintained.**

This statement covers the services provided by the STEM Challenge. The Data Controller for submissions and general enquires submitted through the GSE mailbox (GSE@go-science.gov.uk) is the Government Office for Science (GOS). The purpose of this statement is to inform users of the inbox, which is managed by the GSE team in GOS, about what information is collected about them when they contact this inbox, how this information is used, if it is disclosed and the ways in which we protect users' privacy. This privacy statement only covers the STEM Challenge. The information collected is voluntarily provided by the user when they contact the GSE mailbox.

## Purpose

The purpose for which we are processing your personal data is to respond to email enquiries and receive STEM Challenge submissions from members of the public, in this case specifically the teachers of the schools participating in the STEM Challenge.
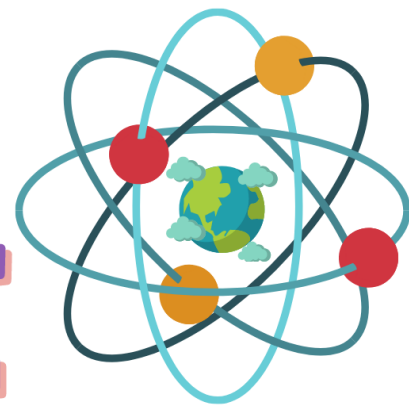
# The data

We will process the following personal data:

- your name
- email address

We will also:

- collect details of any enquires raised in your correspondence
- process any other information you volunteer about yourself

We are only collecting this information to allow the judging of STEM challenge entries and for queries related to this to be responded to. The processing is necessary for reasons of substantial public interest for the exercise of a function of the Crown, a minister of the Crown, or a government department. The substantial public interest is promoting diversity, inclusion and social mobility by promoting both STEM engagement and attainment. This is achieved through demonstrating how STEM is relevant to real world policy in the STEM Challenge.

Winning teams will be approached to gain consent prior to collecting any personal data (name, age, school) which will be used to distribute prizes and and publish the winning entries on the Government Science and Engineering blog page. If students consent, the winning entry will be shared with the Government Chief Scientific Advisor, the STEM Ambassador Programme and published on the GSE blog page.

If students are not happy to provide this information they can still take part in the competition but they will not be able to receive a prize if their entry wins.

If you are not comfortable with the use of data in this way, you can contact the GSE mailbox with the subject line "STEM Challenge Enquiries". You can choose not to take part in the challenge at any point. Any correspondence will usually be deleted 1 calendar year after the correspondence is closed.
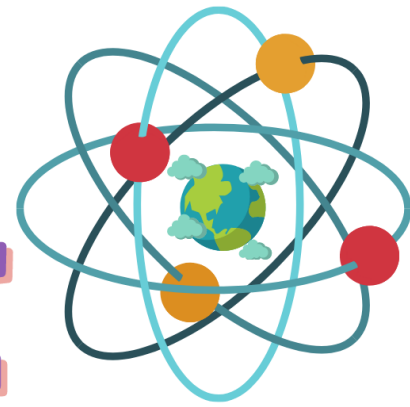
This challenge is organised by civil servants on the Fast Stream and will be used to count towards their corporate objective.

# Recipients

Your information will be shared with the STEM Challenge team to allow enquires to be responded to.

As personal data will be stored on our IT infrastructure it will also be shared with our data processors who provide email, and document management and storage services.

## Retention

Personal information in correspondence will usually be deleted 1 calendar year after the correspondence or case is closed or concluded.

## Your rights

You have the right to:

• request information about how your personal data are processed, and to request a copy of that personal data

• request that any inaccuracies in your personal data are rectified without delay

• request that any incomplete personal data are completed, including by means of a supplementary statement

• request that your personal data are erased if there is no longer a justification for them to be processed

• in certain circumstances (for example, where accuracy is contested) to request that the processing of your personal data is restricted

• object to the processing of your personal data

• A full list of your rights under the General Data Protection Regulation (GDPR) is available on the ICO website.

## International transfers

As your personal data is stored on our IT infrastructure, and shared with our data processors, it may be transferred and stored securely outside the European Union. Where that is the case it will be subject to equivalent legal protection through the use of Model Contract Clauses.

## The right to withdraw consent

You have the right to withdraw your consent at any time where GO Science is relying on consent to process your personal data.
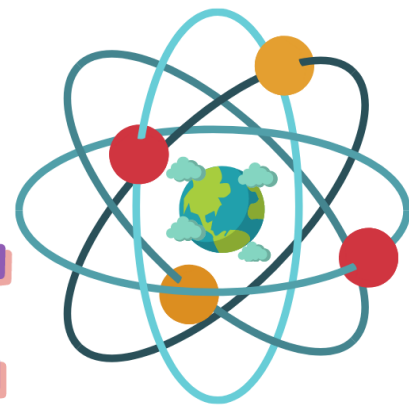
We will collect data from winning students in order to distribute prizes. We will approach winning students of the STEM Challenge again to achieve consent prior to the collection of their personal data. Winning entries will be published on the GSE blog page and shared with STEM ambassador Programme and Government Chief Scientific Adviser. All other data and entries will only be shared with the team of Civil Service Fast Streamers and the Government Science and Engineering Profession team who are running this challenge. We will not release data to anyone who is unauthorised. All data will be deleted after 1 year.

## Process for contacting students of winning entries and giving prizes:

- The teacher from the school winning entry came from will be contacted using the email they used to submit entries. They will be contacted from the GSE mailbox.
- We will inform you which entry has been designated the winning entry.
- We will request that teachers seek consent from the students who put together the winning entry. We request that teachers explain the following to students, and make it very clear that this is optional, but prizes cannot be allocated without consent from students.

- We will request teachers seek student consent from the winning team for:

- their names to be shared with the Fast stream team, the GSE team and the Government Chief Scientific Adviser.
- Their entry to be shared with the STEM Ambassador Programme, the Government Chief Scientific Adviser and to be published on the GSE blog anonymously
- Ask for consent to run a career mentoring session, facilitated by teachers (if teachers consent), with the fast stream science and engineering network.
- We will request that teachers reply to the GSE mailbox confirming that consent is given and provide student names.
- The Government Chief Scientific Adviser will sign certificates for the winning team
- The entry will be published anonymously on the GSE blog
- The entry will be shared with the STEM Ambassador Programme
- Amazon vouchers will be sent to the teacher to distribute to students
- A career mentoring session with the fast stream science and technology network would be run virtually with teacher supervision.
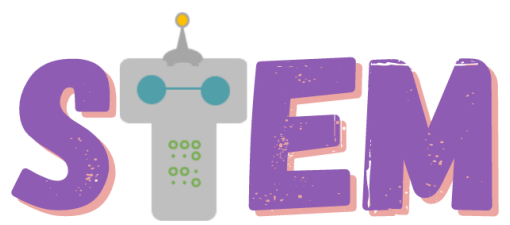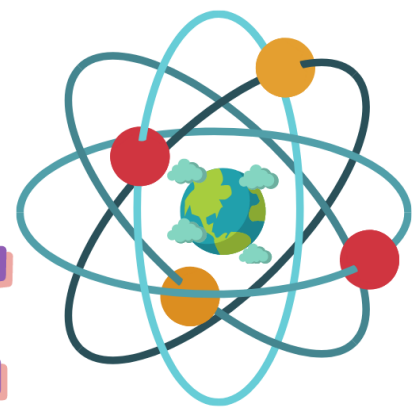
For runners up, this process will be repeated for the prize offer of a career mentoring session with the fast stream science and engineering profession.

If consent is not given, this process will be repeated with prizes offered to sequential runners up.

## Contact us

If you have any questions about this, please contact GSE@go-science.gov.uk.