

Can we find practical ways to reduce the plastic in our environment?

1. Project overview

Through this project students will be able to investigate the potential options to replace the use of plastics and reduce plastic pollution. They will discover and gain a greater understanding of the properties of plastic, learning why it is such a well-used and versatile product. Working with their STEM partner, the students will be able to explore different ways to create or find plastic alternatives, evaluating the methods used and communicating their findings with the wider school community. Linking strongly to the curriculum, this project will enable teachers to inspire the next generation of chemists and material scientists. Details of the investigative work required to support this project can be found in section 4.

| Duration of project |
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| 2 terms minimum Easily repeatable year-on-year |
| Can be considered as part of the Tomorrow's Climate scientists programme |

2. Student involvement

This project is aimed at primary school students aged between 7 – 11, however, it could be adapted to suit other age groups and abilities. This project can be adapted to suit large groups, from clubs to whole year groups or larger, and we encourage projects to be as inclusive as possible. The project can be used to engage a wide variety of students in the school. For example:

- 1) older students mentoring younger years to engage with the observation and monitoring sections of the investigation
- 2) students with an interest in art and design helping to communicate the findings of the project to the wider school community via media such as video, posters etc.
- 3) students with an interest in design and technology helping to build any of the plastic re-purposing suggestions.

3. STEM partner involvement

Funding will only be offered to schools that can demonstrate a strong partnership. The partnership can either be with one individual STEM partner or a team of STEM partners. If there is a team of STEM partners, one must be identified as the lead STEM partner for the application process and must have sustained and meaningful engagement (in-person or online) with the students and teacher throughout the duration of the project. Additional STEM partners can support the project, if needed, to provide specialist knowledge or to help spread the time commitment and ensure the students have regular STEM partner engagement. For a two-term project such as described here, we would expect a **minimum of 7 in-person visits over the course of the project**, undertaken by any of the STEM partners involved. The STEM partner(s) will provide the students with relevant guidance and knowledge to help them with their investigations, as well as an insight into potential careers.

The main role of the STEM partner(s) is to support the planning, design and implementation of the investigation that the students will carry out. Examples of how the STEM partner(s) could support the implementation of the investigations include (but are not limited to):

- supporting students to form their own hypotheses
- supporting students to set up their investigations following the scientific method
- helping provide secondary research sources and support the understanding of technical information

- helping with data collection and identification
- helping the development and implementation of student plans to reduce plastic waste
- helping with any building or design elements.

Other activities that the STEM partner(s) could get involved with are:

- arranging a visit to their place of work
- providing an introductory talk to the project group, or whole school, regarding their career and the relevance of this to the project being undertaken; and
- supporting the students end of project presentations.

Examples of STEM partners that could support this project are university or industry-based researchers, with a degree or equivalent background in a subject such as chemistry or material sciences.

Professionals who are working in chemistry laboratories, lab technicians (not school-based) or in the design and manufacture of sustainable packaging.

For more information about the STEM partner eligibility requirements and guidance on how to find a STEM partner, please read the [What is the partnership](#) page on our website.

4. Investigation options

The following investigations described in the plan below will underpin this project and help the students answer the project title question. Please note some of the investigations may need to take place in parallel rather than sequentially throughout the year. The individual investigations suggested may need to be adapted or altered, dependant on the school facilities available. Teachers can also add in additional investigations and other project elements as required.

| Project plan | Equipment suggestions |
|--|---|
| <p>Initial survey: Collect examples of plastics used in school and at home and identify the different plastic types by their properties using research and sample testing.</p> | <p>Gloves to sort and collect samples</p> |
| <p>Baseline data collection: Explore how much plastic waste is collected by the students' households over a set period of time and extrapolate this data to estimate the plastic waste of the school, town/city, UK and over various time periods. Before the data is collected, make predictions on what is expected to be observed and see if the evidence supports or disproves the prediction(s).</p> | |
| <p>Secondary research: Carry out secondary research to learn about the different ways plastic is used and how long it takes the plastic highlighted in the initial survey to biodegrade. For investigation 3 - find out if there are any known alternatives to plastic currently in use and how widely these have been adopted.</p> | |

| | |
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| <p>Main Investigation: Please choose at least 3 of the following:</p> <ol style="list-style-type: none"> 1. Plastic wrap alternatives Investigate the importance of plastic wrap for keeping food fresh. Research and test a variety of options to see if there are any suitable alternatives. Variables to consider – effectiveness, durability, hygiene, cost and accessibility. 2. Plastic bag alternatives Investigate why plastic bags are still more commonly used (both single use and ‘bag’s for life’) in retail. Research and test a variety of options to see if there are any suitable alternatives. Variables to consider – material properties, durability, hygiene, cost and accessibility. 3. Plastic alternatives Using information from the secondary research and support from your STEM partner, investigate how to practically create plastics and consider the pro’s and con’s for each method in terms of scaling up to be used in society – which options pose the best balance of cost, time, effectiveness and environmental impact? Example plastics include, those made from potato starch, milk, and reproducing nylon. 4. Reduce plastic from waterways Research the issue of plastics in water (and the rise of microplastics entering the food chain), consider ways in which plastics enter the water system and investigate practical options to reduce this. Options should be proposed with the most popular being created and tested in a simulated water system. 5. Reduce plastic waste by re-purposing Research ways in which plastic items can be re-purposed (eco bricks, materials, eco-lights etc) and investigate the effectiveness of some of these options, considering variables such as cost, durability, and what happens to the plastic used for re-purposing over time. | <p>Wax wrap Re-usable silicone food wrap Petri dishes + growth medium + sealing tape</p> <p>Sample bags such as recycled, cotton, paper.</p> <p>Gas safe bunsen burners (if at primary level) Tripods + Gauzes Clamp stands and clamps Heatproof ceramic mats Glass beakers, stirring rods + beaker tongs Lab coats Safety goggles Chemicals for plastic production</p> <p>Resources to make prototype models.</p> <p>Resources to make prototype models.</p> |
| <p>Wider communication: Communicate the results to the wider school community; methods could include information leaflets/posters, school assemblies, getting other years practically involved in the project, or a short film.</p> | <p>Please note: additional film grants towards a camera / software / microphones etc. are available to Partnership Grant holders.</p> |

A suggestion of essential equipment and supplies needed to undertake each of the parts of the project has been listed to assist you when putting together your budget. Please also consider any relevant additional costs permitted within the scheme, such as teacher cover, essential teacher CPD and/or travel costs for project related visits. For more guidance please read the [eligibility and judging criteria](#) page on our website.

5. Benefits and skills

Involvement in a long-term investigative project should enable students to have an in-depth experience of working scientifically as well as developing their general team working and communication skills.

Through this project the students will specifically learn about the use and development of plastics in a real-world context, gaining detailed knowledge about the material and chemical properties of a number of regularly used plastics as well as a broader understanding of the environmental and cost impact of plastic used globally. They will learn skills in research, identification, data capture, data analysis and problem solving. Dependant on the exact investigations and activities you propose to undertake, there may be additional benefits and skills you can identify in your application.

6. Legacy activities

It is important that Partnership Grant projects are sustainable, providing long-term benefits to your students and wider school community in terms of the teaching and learning of STEM subjects.

Your legacy activities could include (but are not limited to):

- repeating the project with successive year groups
- re-using the equipment to test other plastic alternatives, or gather evidence on the long-term impact of the student's suggested plastic alternatives
- testing out new plastic waste reducing methods and their successes
- expanding the project to include other schools in the area, helping them to create plastic alternatives, to collate more evidence to compare with your own.

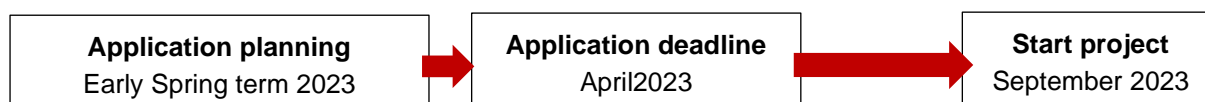
7. Next steps

1 - Securing your STEM partner

Using the information about STEM partners above, search for universities and businesses within reasonable travelling distance to you that might have suitable contacts to approach. A good route to finding these contacts is often your own school's Governors and student's parents, another is the national [STEM Ambassador](#) scheme. Once you have a few contacts in mind, write an email/letter inviting them to be involved in the project, providing clear and concise information about areas you need support with, the time commitment you are expecting, and the duration of the project. If you need further advice as to how to find a STEM partner, please contact the Schools Engagement team directly via education@royalsociety.org.

2 - How to start an application

This project can be started in any term, however the project should run for at least 2 terms. To get the funding secured and paid in time for the start of the next academic year, you will need to submit the full grant application for the April deadline in the academic year before. An example timeline is given below, and more information about [The application process](#) and timelines can be found on our website.



You can access the application form via the Royal Society's grant management system called Flexi Grant: <https://grants.royalsociety.org/>. When you first create your log-in and access Flexi Grant several grants will be visible on the screen. Please make sure you choose the **Partnership Grants stage 1** form to start.

3 - Where to get more information

You can find full information about the Partnership Grants scheme, including eligibility and judging criteria, application guidance and exemplar forms via our website: www.royalsociety.org/partnership

If you have specific questions about your project idea, STEM partner or application, please either attend one of our [online training sessions](#) or please contact the Schools Engagement team directly via education@royalsociety.org .