



Project Partners



Climate Smarter is an exciting topical project for second and third level pupils. This project is designed to enthuse and inspire pupils to think creatively to come up with solutions to the biggest global problems to face them, now, and in their future. The project takes them on a journey of investigation and experimentation to look at how we can tackle the climate emergency.

The experiments and activities can be delivered as one-off sessions in an extra-curricular club over several weeks or alongside other lessons as a full programme with a class. **The programme culminates in the pupils designing and building models of their future school**, incorporating all their research into energy efficiency, smart controls, electricity generation, responsible water and sustainable building material use. We are also asking schools to build a model floating wind turbine as part of the challenge.

They will showcase these models at one of our celebration of STEM events.

What schools will get

YESC will provide all schools taking part in the project with a kit of equipment worth ~ £150 that will allow pupils to carry out experiments and investigations into renewable energy, smart controls energy storage and more. The materials in the kit can be incorporated into the end of project model, which can be built out of readily available recycled materials.

Teachers will be provided with face to face or online training, guide booklet, including an overview of the activities and guidance on where the project could support you, as you plan learning and teaching using the experiences and outcomes, across several curricular areas. We will also provide any workbooks and handouts required. Our team provides support to hundred of schools across Scotland through the academic year, offering guidance and targeted resources where they are needed most.

Health and Safety

Please note that it is teachers' responsibility to ensure activities are carried out safely within the club or class, and to complete a risk assessment in accordance with usual practice before undertaking any practical activities please don't hesitate to get in touch if you require any further guidance.

Support is available to schools from SSERC. You can find health and safety guidance on their website at <https://www.sserc.org.uk/> or by contacting primary@sserc.scot

Input from Partners

Working with industry partners is at the heart of everything we do and helps bring our projects to life. We have worked with our partners to shape this programme so that careers and skills information is embedded throughout. Our partners are keen to offer further support such as career talks, Q & A sessions and mentoring to schools taking part in the project.

Bring it all together

1) Model of your future school

Your final challenge is to **design and build a model of your future school** to demonstrate the results of your investigation into electricity generation and storage, water sustainability smart controls/sensors and sustainable materials / timber.

We would like your model to include at least:

2 electricity generation methods including a floating turbine

1 electricity storage method

1 water-saving or collection device/system

1 smart system (using the micro:bits)

Some timber/wooden elements (and a plan for where you will source this wood)

Please note for entering the Climate Smarter competition **this does not need to be a working model** and should be no larger than 60cm(w) x 60cm(d) x 60cm (h).

You can use any of the materials provided in the kit as part of your model. You can use other materials to build the model, with more credit going to those that use recycled materials or build their own parts (rather than buying ready-made parts).

The YESC team will be on hand throughout the duration of the project to offer support and guidance.



Joint winners in 2021 were Grandtully and Auchinloch Primary Schools. Above is Grandtully's amazing entry

2) Research Diary

Schools/groups should keep a scientific diary as they research and take part in the activities and experiments. These do not need to be neat but could include records, photos, sketches and results from the investigations.

This can be done in jotters/notebooks or even digitally if possible, on tablets using an app.

3) Research Presentation Poster

We would also like to see a research poster. This could show some nice pictures of group/classwork photographs along with the research findings. In this we would like to see your plan for how you will use wood in the building and where you will source this from. We would also like to see your experiments around building a floating wind turbine.

The competition

We are aiming to bring schools together to showcase their work at face-to-face celebration events in 2022.

These events are an amazing opportunity to showcase STEM work including the climate smarter project as well as take part in hands on STEM challenges and activities on the day.

Key Dates:

September/October 2021 – School sign up & kit delivery

November 2021 - Climate Smarter Teacher training CPD

December – March 2022 – Schools work on Climate Smarter Project

March – April 2022 – Celebration of STEM Events

Highland (Inverness) – Thursday 10th March 2022

Orkney – Thursday 17th March 2022

Shetland – Tuesday 22nd March 2022

North East – Aberdeen Science Centre – Thursday 21st April 2022

Dundee & Fife – Dundee Science Centre – Thursday 28th 2022

Please note these dates/locations are subject to change. For the most up to date information about our celebration events visit our website

<https://www.scdi.org.uk/yesc/>

Contact Us

yesc@scdi.org.uk @scdiYESC

Kit List

Section	Part	Number	Supplier	Order Code	Source
SMARTER	Pack Crocodile Leads	1 pack	Rapid	17-0350	Link
	BBC micro:bit Starter Kit	4 packs	Rapid	75-0116	Link
	Nails	4 per kit	Amazon	B01BHQKVIG	Link
	Multimeter	1 per kit	Rapid	85-4082	Link
	2.1V Green LED	2 per kit	Rapid	55-1792	Link
	2V Yellow LED	2 per kit	Rapid	55-1794	Link
	1.7V Bright Red LED	2 per kit	Rapid	55-1796	Link
	3.3V White LED	2 per kit	Rapid	55-1758	Link
	AA Battery Holder	1 per kit	Rapid	18-0122	Link
	AA Battery	2 per kit	Rapid	18-1092	Link
BATTERY	2p Coins	50 per kit			
	25 x Steel Washers	25 per kit	Amazon	B079X2H3F3	Link
WIND	Digital Anemometer	1 per kit	Amazon	B077JLV7C6	Link
	Low Inertia Motor 6V	1 per kit	Rapid	37-0445	Link
	2.54mm LED Holder	1 per kit	Rapid	55-0167	Link
	Propellers 5" x 3 Blade	1 per kit	Rapid	06-0629	Link
HYDRO	Swimming Noodle	10cm / kit	Amazon	B07PX49THT	Link
	Wooden spoons	8 per kit	Amazon	B07GPHSG58	Link
	Wooden dowells	2 per kit	Rapid	06-0765	Link
	Gears 60 tooth gear	1 per kit	Rapid	37-0251	Link
	Plastic Gears for Moto	1 per kit	TTS	708-GGO-MSGEAR	Link
	Electric motor 1.5 to 4.5v	1 per kit	TTS	708-TM-60	Link
	Self-Adhesive Motor Mount	1 per kit	Rapid	37-0360	Link
SOLAR	Polythene Fan	1 per kit	Rapid	06-0690	Link
	Miniature Solar Motor	1 per kit	Rapid	37-0441	Link
	High Power Red LED	5 per kit	Rapid	56-0420	Link
	Solar Module 3V 100mA	1 per kit	Rapid	56-0124	Link
PACKING	Gratnells Tray Lid	1 per kit	Rapid	14-0436	Link
	Gratnells Storage Tray	1 per kit	Rapid	14-0430	Link
TIMBER	Samples generously provided by BSW and Logie Estate				

Ensuring STEM is for all

Many learners feel that STEM is 'not for them'. This page offers suggestions for overcoming some of the inherent barriers to participation in STEM. Girls in particular are, in general, less likely to feel STEM is 'for them', although research strongly suggests that there is no inherent difference between girls and boys which should limit young people's interests, capabilities or ambitions.

Addressing self-selection

Even very young learners will already be self-selecting into and out of activities based in part on their perception of what is 'right' for them.

- Consider running an initial activity for everyone, rather than as an optional extra.
- Extend personal invites to those who may not be considering participating, but who might particularly benefit from the experience.
- Reflect on who you expect to participate. Might unconscious bias be influencing perceptions?

Confidence

Some learners lack confidence in their abilities in STEM.

- Build confidence in less resilient individuals by encouraging a growth mindset. Concentrate on praising effort and processes rather than attainment.
- Challenge belief in natural talent.
- Consider the role of competition. Competitions might motivate the successful, but there are always more losers than winners. Are there ways to reinforce skills of collaboration and team working?

Pathways/skills

Many learners do not feel STEM is relevant to them or to their futures.

- Be explicit about the skills that are being developed and link those skills to the wide range of pathways STEM offers.
- Counter the perception that STEM is only for the very high attainers. (e.g. *the field of architecture employs [architects](#) but also [architectural technicians](#), [architectural technologists](#), [building surveyors](#), [stone masons](#) etc.*)
- Consider assigning explicit roles for group work (e.g. time keeper, scribe, resource manager etc...). This allows the quieter, less confident individuals to contribute, and the more exuberant class members to learn how to collaborate.
- Reflect on the resources and images used in the classroom. Do they challenge stereotypes about who does what kinds of job?

Reflective Questions

- Are activities building STEM capital for all learners, not just those who already have an interest?
- Are all learners developing a range of skills, and relating them to future pathways?
- Are learners developing an understanding of the breadth of opportunities available through developing STEM skills?

For further information including more detailed action guides for ELCs, primary and secondary schools please visit www.bit.ly/NIHIGB



Curriculum Links

This project is designed to be cross-curricular and cover a wide range of experiences and outcomes. It is up to you how you use the resources, and how you incorporate them into your teaching plan as we want this to be as flexible as possible. Below is a list of the key experiences and outcomes that this programme may support however it could also include others depending on how you use the kit.

Science

Planet Earth

Through carrying out practical activities and investigations, I can show how plants have benefited society. **SCN 2-02b**

I have collaborated on investigations into the process of photosynthesis and I can demonstrate my understanding of why plants are vital to sustaining life on Earth. **SCN 3-02a**

Energy sources and sustainability

By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy. **SCN 2-04a**

Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use. **SCN 2-04b**

By investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems. **SCN 3-04b**

Processes of the planet

By contributing to experiments and investigations, I can develop understanding of models of matter and can apply this to changes of state and the energy involved as they occur in nature. **SCN 3-05a**

I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. **SCN 3-05b**

Forces electricity and waves

By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects. **SCN 2-07a**

By contributing to investigations of energy loss due to friction, I can suggest ways of improving the efficiency of moving systems. **SCN 3-07a**

By investigating floating and sinking of objects in water, I can apply my understanding of buoyancy to solve a practical challenge. **SCN 2-08b**

Used a range of electrical components to help make a variety of circuits for differing purposes. I can represent my circuit using symbols and describe the transfer of energy around the circuit. **SCN 2-09a**

To begin to understand how batteries work, I can help to build simple chemical cells using readily available materials which can be used to make an appliance work. **SCN 2-10a**

I can help to design simple chemical cells and use them to investigate the factors which affect the voltage produced. **SCN 3-10a**

Topical Science

Through research and discussion, I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society. **SCN 2-20a**

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. **SCN 2-20b**

I have collaborated with others to find and present information on how scientists from Scotland and beyond have contributed to innovative research and development. **SCN 3-20a**

Literacy and English

Tools for listening and talking

When I engage with others, I can respond in ways appropriate to my role, show that I value others' contributions and use these to build on thinking. **LIT 2-02a**

I can respond in ways appropriate to my role and use contributions to reflect on, clarify or adapt thinking. **LIT 3-02a**

Finding and using information

I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience. **LIT 2-06a**

I can independently select ideas and relevant information for different purposes, organise essential information or ideas and any supporting detail in a logical order, and use suitable vocabulary to communicate effectively with my audience. **LIT 3-06a**

Social studies

People, place and environment

I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally responsible way. **SOC 2-08a**

I can identify the possible consequences of an environmental issue and make informed suggestions about ways to manage the impact. **SOC 3-08a**

I can investigate the climate, physical features and living things of a natural environment different from my own and explain their interrelationship. **SOC 3-10a**

By comparing my local area with a contrasting area out with Britain, I can investigate the main features of weather and climate, discussing the impact on living things. **SOC 2-12a**

I can investigate the relationship between climate and weather to be able to understand the causes of weather patterns within a selected climate zone. **SOC 3-12a**

Numeracy and mathematics

Estimation and rounding

I can use my knowledge of rounding to routinely estimate the answer to a problem then, after calculating, decide if my answer is reasonable, sharing my solution with others. **MNU 2-01a**

I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem. **MNU 3-01a**

Number and number processes

Having determined which calculations are needed, I can solve problems involving whole numbers using a range of methods, sharing my approaches and solutions with others. **MNU 2-03a**

I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions. **MNU 3-03a**

Measurement

I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure. **MNU 2-11a**

I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. **MNU 2-11b**

Solve practical problems by applying my knowledge of measure, choosing the appropriate units & degree of accuracy for the task and using a formula to calculate area or volume. **MNU 3-11a**

Angle, symmetry and transformation

I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary. **MTH 2-17a**

I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. **MTH 2-17b**

Data and analysis

I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way. **MNU 2-20b**

I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading. **MNU 3-20a**

I can display data in a clear way using a suitable scale, by choosing appropriately from a range of tables, charts, diagrams and graphs, making effective use of technology. **MTH 2-21a / MTH 3-21a**

Expressive arts

Art and design

I have the opportunity to choose and explore a range of media and technologies to create images and objects, comparing and combining them for specific tasks. **EXA 2-02a**

I have experimented with a range of media and technologies to create images and objects, using my understanding of their properties. **EXA 3-02a**

Create & present work that shows developing skill in using the visual elements & concepts. **EXA 2-03a**

I can use and combine the visual elements and concepts to convey ideas, thoughts and feelings in expressive and design work. **EXA 3-03a**

I can develop and communicate my ideas, demonstrating imagination and presenting at least one possible solution to a design problem. **EXA 2-06a**

While working through a design process in response to a design brief, I can develop and communicate imaginative design solutions. **EXA 3-06a**

Technologies

Digital Literacy

I can extend and enhance my knowledge of digital technologies to collect, analyse ideas, relevant information and organise these in an appropriate way. **TCH 2-01a**

I can explore and use the features of a range of digital technologies, integrated software and online resources to determine the most appropriate to solve problems **TCH 3-01a**

Investigate how product design & development are influenced by changing lifestyles. [TCH 2-05a](#)

I understand how scientific and technological developments have contributed to changes in everyday products. [TCH 3-05a](#)

Technological Developments in Society and Business

I can analyse how lifestyles can impact on the environment and Earth's resources and can make suggestions about how to live in a more sustainable way. [TCH 2-06a](#)

I can evaluate the implications for individuals and societies of the ethical issues arising from technological developments. [TCH 3-06a](#)

I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment. [TCH 2-07a](#)

I can identify the costs and benefits of using technologies to reduce the impact of our activities on the environment and business. [TCH 3-07a](#)

Craft, Design, Engineering and Graphics

I can extend and enhance my design skills to solve problems and can construct models. [TCH 2-09a](#)

I can create solutions in 3D and 2D and can justify the construction/graphic methods and the design features. [TCH 3-09a](#)

I can recognise basic properties and uses for a variety of materials and can discuss which ones are most suitable for a given task. [TCH 2-10a](#)

I can explore the properties and performance of materials before justifying the most appropriate materials for a task. [TCH 3-10a](#)

I can use a range of graphic techniques, manually and digitally, to communicate ideas, concepts or products, experimenting with the use of shape, colour and texture to enhance my work. [TCH 2-11a](#)

I can extend my knowledge & understanding of engineering disciplines to create solutions. [TCH 2-12a](#)

Apply knowledge & understanding of engineering disciplines & can develop/ build solutions [TCH 3-12a](#)

Computing Science

I can explain core programming language concepts in appropriate technical language. [TCH 2-14a](#)

I can create, develop and evaluate computing solutions in response to a design challenge. [TCH 2-15a](#)

I can select appropriate development tools to design, build, evaluate and refine computing solutions based on requirements. [TCH 3-15a](#)

Health and wellbeing across learning

Social wellbeing

Representing my class, school and/or community encourages my self-worth and confidence and allows me to contribute to and participate in society. [HWB 2-12a / HWB 3-12a](#)

Through contributing my views, time and talents, I play a part in bringing about positive change in my school and the wider community [HWB 2-13a / HWB 3-13a](#)

I value the opportunities I am given to make friends and be part of a group in a range of situations. [HWB 2-14a / HWB 3-14a](#)

