

UN Sustainable Development Goals Posters 14 to 18 years

Teacher Notes

The Institution of Chemical Engineers wants to provide teachers with access to educational and careers resources to showcase the range of career options in chemical engineering through DiscoverChemEng. Chemical engineers play a pivotal role in how we live, working across every industry, across the globe, linking sectors together to help address the United Nation's Sustainable Development Goals (UN SDGs).

Chemical engineers are committed to finding a more sustainable way of manufacturing the products and services we need to lead healthy, fulfilling and meaningful lives. To meet these goals, we need to encourage more young people to consider a career in chemical engineering.

The presentation is aimed at pupils aged 14-18 years. There are also versions for younger students, which may be helpful if a more accessible version is required.

Learning objectives

Pupils have the opportunity to:

- ✓ learn about some of the UN SDGs
- ✓ generate and share ideas about global challenges
- ✓ think about what the UN SDGs might mean for young people around the world

Curriculum links

Science
 Maths
 Personal, social, health and economic (PSHE)
 Citizenship and decision-making

You may be aware of students in your class affected by some of the challenges highlighted in this resource, so you can tailor discussions as needed.






All references accessed July 2024, and links are provided at the end.

Timing

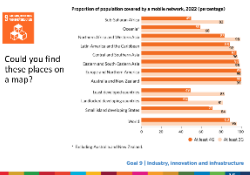


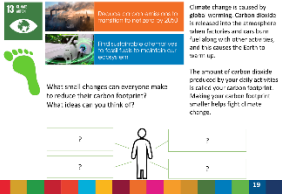
This can be run in one session taking around 60 to 90 minutes depending on your class, how many ideas and questions the students generate and if the additional challenges are used. It can also be run as an introduction followed by bite-sized sessions taking each SDG in turn, or setting the challenges for independent research.




Slide number		Presentation Notes
1		<p>Introduction for teacher to explain how the presentation supports the DiscoverChemEng poster 'Chemical engineers will...' about the United Nations Sustainable Development Goals (UN SDGs).</p>
2		<p>Contents</p> <p>If you want to explore resources for the UN SDGs, go to https://www.un.org/sustainabledevelopment/student-resources/</p> <p>For the 2023 report, go to https://sdgs.un.org/sites/default/files/2023-07/The-Sustainable-Development-Goals-Report-2023_0.pdf</p>

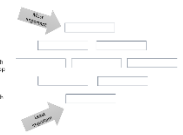





Slide number		Presentation Notes
3	 <p>Background</p> <p>Chemical engineering is a profession that has been around for over 100 years. It is a profession that is constantly evolving and growing. Chemical engineers are responsible for designing and developing processes that produce a wide range of products, from pharmaceuticals to plastics. They also play a key role in the development of sustainable technologies and processes.</p> <p>For more information about becoming a chemical engineer, go to https://www.icheme.org/education-career/discoverchemeng/school-students/</p>	<p>Background to chemical engineering and the UN SDGs. Video link to set the scene about chemical engineering. For more about becoming a chemical engineer, go to https://www.icheme.org/education-career/discoverchemeng/school-students/</p>
4	 <p>What are the UN Sustainable Development Goals (SDGs)?</p> <p>Sustainable development means giving people what they need now, without stopping people in the future having what they need.</p> <p>The United Nations Sustainable Development Goals (SDGs) are a collection of 17 global goals for better lives for all our future and these 17 goals are important for our people and planet earth.</p> <p>Remember that the fight for a sustainable world of food, shelter, health, jobs and energy will take time and work. Let's change for education and health.</p>	<p>There are 17 goals, and some of them link well to what chemical engineers are working towards.</p> <p>For the 2023 report, go to https://sdgs.un.org/sites/default/files/2023-07/The-Sustainable-Development-Goals-Report-2023_0.pdf</p>
5	 <p>Chemical engineers will...</p> <p>Design and develop processes that produce a wide range of products, from pharmaceuticals to plastics.</p> <p>Play a key role in the development of sustainable technologies and processes.</p> <p>Work with people and the world to improve the environment.</p> <p>Develop new products and processes that are better for the planet.</p> <p>Use their knowledge to create a sustainable world.</p> <p>Will you?</p>	<p>If you would like additional posters, go to</p> <p>If you need additional posters, please email DiscoverChemEng@icheme.org and ask for the 'I want to...' poster.</p>
6	 <p>Matching Chemical Engineering priorities and Sustainable Development Goals</p> <p>Activity: Which SDGs match the actions chemical engineers are taking to engineer a sustainable world? You may be able to match more than one.</p> <p>Chemical engineers will:</p> <ul style="list-style-type: none"> Design and develop processes that produce a wide range of products, from pharmaceuticals to plastics. Play a key role in the development of sustainable technologies and processes. Work with people and the world to improve the environment. Develop new products and processes that are better for the planet. Use their knowledge to create a sustainable world. 	<p>Additional copies of these two posters are included if you want to print and share paper copies in the class, however the activity can be completed by making notes on mini-whiteboards, or using pcs/tablets to view the posters.</p> <p>Students may make more connections than the suggested answers.</p>
7	 <p>THE GLOBAL GOALS For Sustainable Development</p> <p>1. No Poverty 2. Zero Hunger 3. Good Health and Well-being 4. Quality Education 5. Gender Equality 6. Clean Water and Sanitation 7. Affordable and Clean Energy 8. Decent Work and Economic Growth 9. Industry, Innovation and Infrastructure 10. Reduced Inequalities 11. Sustainable Cities and Communities 12. Responsible Consumption and Production 13. Climate Action 14. Life Below Water 15. Life on Land 16. Peace, Justice and Strong Institutions 17. Partnerships for Goal Achievement</p>	<p>Copy of UN SDGs</p>
8	 <p>Matching Chemical Engineering priorities and Sustainable Development Goals</p> <p>Activity: Which SDGs match the actions chemical engineers are taking to engineer a sustainable world? You may be able to match more than one.</p> <p>Chemical engineers will:</p> <ul style="list-style-type: none"> Design and develop processes that produce a wide range of products, from pharmaceuticals to plastics. Play a key role in the development of sustainable technologies and processes. Work with people and the world to improve the environment. Develop new products and processes that are better for the planet. Use their knowledge to create a sustainable world. 	<p>Copy of chemical engineer priorities</p>
9	 <p>Matching Chemical Engineering priorities and Sustainable Development Goals</p> <p>Activity: Which SDGs match the actions chemical engineers are taking to engineer a sustainable world? You may be able to match more than one.</p> <p>Chemical engineers will:</p> <ul style="list-style-type: none"> Design and develop processes that produce a wide range of products, from pharmaceuticals to plastics. Play a key role in the development of sustainable technologies and processes. Work with people and the world to improve the environment. Develop new products and processes that are better for the planet. Use their knowledge to create a sustainable world. 	<p>Additional copies of these two posters are included if you want to print and share paper copies in the class, but this activity can be completed by making notes on mini-whiteboards, or using pcs/tablets to view the posters.</p> <p>Suggested answers shown.</p> <p>Students may make more connections than the suggested answers.</p> <p>Shows how chemical engineering roles work towards engineering a sustainable world.</p>

Slide number		Presentation Notes
10	<p>Key facts and questions about Sustainable Development Goals</p> <p>The next few pages show one or more key facts about each of these SDGs and some prompt questions</p> 	How to use the next slides with prompt questions
11	  <p>Research solutions to produce more food using less land, water and energy</p> <p>Nearly 30% of the world's population cannot easily get enough food</p> <p>What are the effects of being hungry?</p> <p>What other problems does hunger cause?</p> <p>Is hunger only a problem in some countries?</p>	<p><u>Ideas for answers to questions.</u></p> <p><u>What are the effects of being hungry?</u></p> <p>Rumbling tummy Grumpy/'hangry' Difficult to learn Lack of concentration Tired Encourage students to share their thoughts This may be a sensitive topic for some families.</p> <p><u>What other problems does hunger cause?</u></p> <p>Difficult to enjoy school, sport Wider problems in a community</p> <p><u>Is hunger only a problem in some countries?</u></p> <p>There may be awareness of food banks or charity work locally or problems with food supplies elsewhere in the world</p>
12	  <p>Take medicine from a lab and produce it at scale</p> <p>Vaccines or other immunisation can prevent serious illness and save lives but access to these can depend which country you are in.</p> <p>In low-income countries, 34% of the population (around 20 children out of 30) were vaccinated with COVID-19 vaccines but in high-income countries 73% of the population (around 22 children out of 30) were vaccinated</p> <p>Where do you go for help when you are ill?</p> <p>Is it fair that access to vaccines, immunisation or medicines depends on which country you are in?</p> <p>Do people in different countries have different diseases?</p>	<p>There are many indicators that link to this SDG and some are more challenging depending where you live in the world: reduce and prevent maternal and neonatal deaths; end epidemics and diseases (including malaria); educate people about mental health, sex education; reduce accidents; ensure access to vaccines and medicines. For this SDG, the focus is about everyone enjoying a right to health and being able to get health care, vaccines and medicines when they need them. More equal health care should reduce the difference in life expectancy between countries.</p> <p><u>Ideas for answers to questions.</u></p> <p><u>Where do you go for help when you are ill?</u></p> <p>Doctor / Nurse / Pharmacist Hospital Dentist Optician Anyone else...?</p> <p><u>Is it fair that access to vaccines/immunisation or medicines depends on which country you are in?</u></p> <p>This is about availability of vaccines/immunisation rather than whether people want or don't want immunisation</p> <p><u>Do people in different countries have different diseases?</u></p> <p>Malaria – only in some countries Tuberculosis, Polio and other childhood diseases are more common in countries where fewer children are vaccinated.</p>

Slide number		Presentation Notes
13	 <p>6 Clean Water and Sanitation Treat water sources and deliver it to our taps</p> <p>57% of the world's population do not have safe sanitation</p> <p>Safe sanitation includes having somewhere to go to for healthy toilet facilities, toilets and showers for everyone and that waste is managed safely</p> <p>What happens to waste water, from toilets and showers and the kitchen sink? What do people need clean water for? Apart from drinking water? What happens to our environment if there is not enough water?</p>	<p>Safe sanitation is a broad description including waste water facilities, it may be helpful to focus on one aspect; water for washing.</p> <p>If pupils have been on a camping holiday, residential trip or a camp with Scouts, Guides or another youth group, they may have an awareness of the need to fetch and carry water.</p> <p><u>Ideas for answers to questions.</u></p> <p><u>What happens to waste water, from toilets and showers and the kitchen sink?</u> Goes down the drain, into a pipe, after that...? Sewage works Rivers and the sea</p> <p><u>How can we reduce the amount of water we use?</u> Don't let taps run when you are brushing your teeth Shorter showers Showers instead of baths Don't water the lawn in Summer</p> <p><u>What happens to our environment if there is not enough water?</u> No water for people or animals No water for crops, so a lack of food No water for factories making products</p>
14	 <p>7 Affordable and Clean Energy Develop ways to store clean energy sustainably</p> <p>25% of the world's population use polluting fuels and technologies for cooking.</p> <p>Where does a energy come from for cooking food? Can people choose what type of energy they use for cooking? What types of energy cause more, or less, pollution?</p>	<p>Ideas for answers to questions.</p> <p><u>Where does energy come from for cooking?</u> Electricity or gas BBQ, or wood/coal</p> <p><u>Can people choose what type of energy they use for cooking?</u> Yes/No/Don't know. In the UK people often choose electricity or gas and variations eg electric air-fryer or slow cooker Sometimes a BBQ or outdoor pizza oven, and students probably know they can be smokey</p> <p><u>What types of energy cause more or less pollution?</u> Students may be aware of burning oil, gas and coal being more polluting Renewable fuels can be less polluting such as solar, wind, tidal to make electricity which is then used for cooking.</p>
15	 <p>9 Industry, Innovation and Infrastructure Work with other organisations to create new products or services</p> <p>There is a pay-to-link between internet access using a mobile phone and how much money countries take (their economy)</p> <p>40% of adults in developing economies own a smartphone More than 95% of the world has mobile broadband access, at least 36, but not everyone has a mobile phone. Is it fair that access to the internet depends on which country you are in? Can you name a country that has a developing economy?</p>	<p><u>Ideas for answers to questions.</u></p> <p><u>Is it fair that access to the internet depends on which country you are in?</u></p> <p>Students may also talk about whether they should or should not have smartphones</p> <p><u>Can you name a country that has a developing economy?</u></p> <p>The following pages have links to interactive UN online materials that show the globe divided into different areas according to regional groups and economies</p>

Slide number		Presentation Notes
16	 <p>Proportion of population covered by a mobile network, 2022 (per cent)</p> <p>Could you find these places on a map?</p> <p>Goal 9 Industry, Innovation and Infrastructure</p>	<p>If you want to show students a world divided into areas described in the UN SDG report, go to: https://unstats.un.org/sdgs/indicators/regional-groups/</p>
17	 <p>Where are advanced and developing economies?</p> <p>https://hbs.unctad.org/classifications/</p> <p>Goal 8 Industry, Innovation and Infrastructure</p>	<p>If you want to show students a world divided into economies described in the UN SDG report, go to: https://hbs.unctad.org/classifications/</p>
18	 <p>Optimise processes and recycling to reduce waste products</p> <p>Simple methods to recycle plastic efficiently</p> <p>The Big Plastic Count 2020 found that UK households discard an estimated 50 billion plastic pieces annually, with 17% being recycled in the UK.</p> <p>What would your day look like without plastic?</p> <p>How can you reduce waste?</p> <p>How can you recycle more?</p> <p>If there are 68 million people in the UK, how many pieces of plastic is that for each person and in one year?</p> <p>Goal 12 Responsible Consumption and Production</p>	<p><u>Ideas for answers to questions.</u></p> <p><u>What would your day look like without plastic?</u></p> <p>What are plastic bottles use for? Food and drink storage because they are lightweight and keep food and drink in good condition</p> <p>Lots of things around the home like kettles, tools, toiletries</p> <p><u>How can you reduce waste?</u></p> <p>Buy less. Re-use more for example have a reusable drinks bottle rather than buying single-use plastic bottles</p> <p><u>How can you recycle more?</u></p> <p>Use recycling bins and throwing materials into landfill that could be recycled. What happens to our waste? Waste is sometimes exported or burned as well as being recycled</p> <p>90 billion pieces of plastic divided by 68 million people = 1,323.5 pieces of plastic per person per year, so 3.6 pieces of plastic per day. 1 billion = 1 thousand million</p> <p>There are many different ways of measuring waste and recycling, so it can be difficult to compare difference pieces of research.</p>
19	 <p>Climate change is caused by global warming. Carbon dioxide is trapped in the atmosphere where it warms the planet. There are many different ways of measuring waste and recycling, so it can be difficult to compare difference pieces of research.</p> <p>The amount of carbon dioxide produced by your daily activities is 1.5 tonnes - carbon dioxide. Making your carbon footprint smaller helps fight climate change.</p> <p>What small changes can everyone make to reduce their carbon footprint? What ideas can you think of?</p> <p>Goal 13 Climate Action</p>	<p>Understanding of global warming and climate change will vary for students although many will have met some of these topics broadly through science or geography.</p> <p>If you want to explore this topic further with your students, especially if this is outside of your subject specialism, there are many resources available online including at BBC Bitesize, National Geographic and World Wildlife Fund suitable for a range of ages.</p> <p>Empty boxes shown, so students can generate ideas.</p>

Slide number		Presentation Notes
20		<p>Suggested answers, students will have others.</p> <p><u>Ideas for reduce, reuse and recycle:</u></p> <p>Bring a re-usable water bottle to school Recycle plastics and other materials (cardboard, paper, metal, glass, plastic bags and so on) Only buy what you need</p> <p><u>Ideas for using less energy at home or school:</u> Turn the thermostat down Turn off lights and devices off when not being used Don't leave phones charging or screens switched on overnight</p> <p><u>Ideas to reduce food waste or grow your own:</u> Try to buy food produced locally (to reduce the amount it travels) Reduce food waste, only take what you need Try growing your own vegetables or fruit</p> <p><u>Ideas for change the way you travel:</u> Take a bus, cycle or walk if you can Using electric cars</p>
21		<p>What do you think all of us could do to work towards the Sustainable Development Goals?</p> <p>Use as a prompt to think about differences that individuals or larger groups of people could make.</p> <p>You can expand this activity to produce a poster, collage or other artwork to present their ideas.</p>
22		<p>Challenge 1</p> <p><u>What do you think each of these young people need from the Sustainable Development Goals?</u></p> <p>Use as a prompt to think about differences around the world.</p> <p>Top left: living in a dry, remote, farming community: water and food security, access to health services. (Ethiopia)</p> <p>Top right: living in an arctic region, effects of global warming, food security, access to health services. (Nadym, Russian Arctic)</p> <p>Bottom left: living in a region where waste is imported or dumped, reduce, reuse, recycle. (Thailand)</p> <p>Bottom right: living in a crowded city with poor air quality, clean energy.</p>

Slide number		Presentation Notes
23	<p>Challenge 2 Diamond ranking</p> <p>1. Discuss in small groups which of the priorities of chemical engineers is the most important.</p> <p>2. Rank the priorities into a 'Diamond' shape, with the most important at the top and least important at the bottom.</p> <p>3. Compare with each other, taking on the role of the other. Why or why not?</p>  	<p>Challenge 2</p> <ol style="list-style-type: none"> 1. Diamond ranking activities help students think about the importance they place on different values. 2. Cut out the rectangle on the rectangles on the next page. 3. Students discuss in small groups which of the priorities of chemical engineers is the most important. 4. Then rearrange the rectangles into a 'Diamond' shape, with the most important at the top and least important at the bottom. 5. Groups compare with each other. Did each group put the same values at the top and bottom? Why or why not? <p>Students are likely to find it difficult to prioritise as they are all important. It may be helpful to go back to the photographs in Challenge 1 and ask students to do the same activity but thinking about one of the young people featured in the photographs and where they live.</p>
24	<p>Challenge 2 Diamond ranking. Cut into 8 rectangles</p>  	Copy for cutting out
25	<p>Challenge 3 Can you reach net zero by 2050?</p> <p>Help The Climate Game to the end and reduce the impact of climate change.</p> <p>This game was created by the Financial Times and is based on real science. It is a game rather than an exact simulation, but it does help you to see the scale of the challenge.</p>  	<p>Challenge 3</p> <p>Can be completed independently by students.</p>

Please send any comments about this resource to DiscoverChemEng@icheme.org

Bibliography and Sources of information

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17	If you want to show students a world divided into economies described in the UN SDG report, go to: https://hbs.unctad.org/classifications/
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