Towards a new age of Green energy

1. Introduction to the subject

"Energy" is the driving force of civilisation as we know it. Electricity powers the homes where we live and the places we work. We travel in vehicles that largely run on petrol. Our hospitals require energy to care for the sick. The production & supply chains of food and water are dependent on sources of energy to function. With such a vital role in our lives, energy is something we simply can't live without – but many forms of energy are finite. The processes used to extract "fossil fuels" (also known as hydrocarbons) can greatly harm our natural environment. Other sources of energy are renewable, and cause considerably less environmental damage. The materials in this lesson will give students a chance to assess the impact of fossil fuels versus renewable energy, and encourage them to believe that an advanced civilisation can coexist with a greener society.

2. Key objectives

a) Give students a clear understanding of what sustainable and non-sustainable energies are – and how we rely on them

b) Identify the environmental & economic implications of both hydrocarbon & renewable energies

c) Show that an eventual shift to renewable energy is vital to easing the industrial burden on our planet.

3. Video presentation

- **Humans and Energy: Crash Course World History.** https://www.youtube.com/watch?v=EM1IyIyr-Zc&t=72s Runtime 7:20. *Stan Muller guides us through humanity's relationship with energy use, and how contemporary technologies like nuclear energy present as many dangers as opportunities.*
- **What's the deal with fossil fuels?** https://www.youtube.com/watch?v=poHN_kUWPtw Runtime 3:56. *A student-led presentation on what fossil fuels are, and how their use impacts on our environment.*
- **Renewable energy 101.** https://www.youtube.com/watch?v=1kUE0BZtTRc Runtime 3:16. *A succinct and balanced look at renewable energies from the National Geographic.*
- **Can renewable energy power the world?** https://www.youtube.com/watch?v=RnvCbquYeIM Runtime 5:54. *Federico and Renzo Rosei explore the challenges of shifting to a renewable energy infrastructure.*

4. Questions.

	In School	Online Classroom	Independent Online Learning
Discussion	Break off discussion questions. Split the class into 5 groups, each group to discuss one of the following questions *(20 mins)*	Using a virtual classroom or conference style video calls, each group to discuss one of the following questions *(20 mins)*	Read each of the questions below. Make notes on each question and submit them to your teacher via email *(20 mins)*
Presentation	Each group to present to the class the findings of their discussions *(5 mins per group)*	Each group to submit a presentation of their discussions findings to the teacher *(5 mins per group)*	Film a short video clip outlining your key points for each question. Submit to your teacher *(5 mins per question)*

a) Which kinds of energy do students use at home on a daily basis?

b) Can they identify any examples of renewable energy which are used in their local area or region? (solar panels & wind farms are 2 likely candidates)

c) Do students believe that the environmental benefit of renewable energy technologies is worth any loss in reliability? – tailor this question as to give real-world examples of how this might impact their lives; less time on their computer at home?

d) It is unlikely we will be able to stop using fossil fuels altogether in the short term. Identify some ways that we could reduce our consumption of hydrocarbons?

e) Do any students have a favourite kind of renewable (or even fossil) energy source e.g. solar, hydroelectric, wind, oil, tidal? No reason is too trivial – do they like how the technology or installations look?

f) Some people have raised complaints about structures such as wind farms being built in their areas – would students have a problem with this happening in the vicinity of where they live? Would they welcome it?

g) Do students feel like renewable energy will make the world a better place to live?

h) Consider the different between "renewable" and "green" - biofuels are renewable but their production is carbon-intensive. Should we make allowances for these technologies? Should we ultimately look to develop greener alternatives?

5. Workshop, Activity

In School

This activity follows the C.S.I (Colour, Symbol, Image) model. Ask small groups of students to think of a colour, image and symbol that best defines their thoughts from this lesson. Do any patterns emerge in their answers? Do different groups follow any particular trend? Ask students to give some context for their answers

Online Classroom

Ask students to think of a colour, image and symbol that best defines their thoughts from this lesson. Do any patterns emerge in their answers? Do different students follow any particular trend? Ask students to give some context for their answers – this can be a useful gauge for how well they have engaged with the lesson

Independent Online Learning

This activity follows the C.S.I (Colour, Symbol, Image) model. Think of a colour, image and symbol that best defines your thoughts from this lesson. Explain why you chose that colour and what it could represent.

6. Action plan/ fund-raiser

a) Engaging local or regional providers of renewable energy – are there any hydroelectric stations nearby that could facilitate a school visit? Would any representatives from the solar power industry be willing to engage with educational institutions to give further insight into how their technology works?

7. Take home assignment

a) .Encourage students to express themselves with topical short stories, poetry, banners, paintings (or some combination of any) that highlight the impacts and benefits of renewable energy in our society.

Fair Earth's Gateway to Global Citizenship

https://www.fairearthfoundation.org/ https://www.whalenation.org/

Towards a new age of Green energy

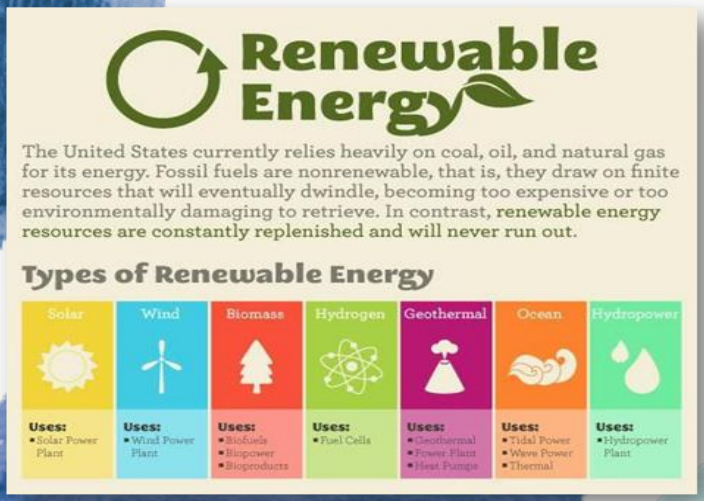
Renewable energy sources are expected to account for 50% of global energy consumption by 2050

As of 2018, fossil fuels account of **85% of primary energy consumption worldwide.**

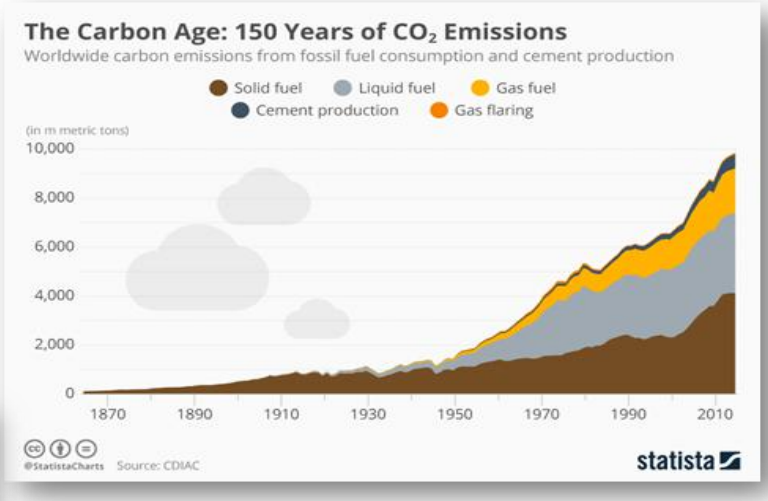
Phasing out fossil fuels would save up to **3.6 million human deaths from pollution** per year.

The use of fossil fuels produces **carbon dioxide**, which is a **greenhouse gas**.

Greenhouse gases contribute to critical environmental phenomena like **global warming** and **ocean acidification** – which in turn leads to **loss of sea ice** and **rising sea levels.**



Fossil fuels can include:
Coal, Petroleum, Natural gas, Peat.



Renewable energies are **low carbon**, and have **less environmental impact.**

Renewable energy is getting **cheaper**, solar power costs **dropping** by a whopping **73%** since 2010!

Biofuels are renewable, but not necessarily **green!** Production of biofuel crops is **carbon** and **water intensive**.

Renewable energies can include:

- **Wind farms** – Excellent for generating electricity but can be visually intrusive
- **Marine energy** – Tidal energy is plentiful, possible impact on wildlife and fauna?
- **Geothermal** – Draws heat from the Earth to convert into energy, clean electricity – but a water-intensive form of energy extraction.
- **Biofuels** – Converting crops into ethanol for fuel. Easy to implement, good for local economies, but causes industrial pollution & has a high initial expense.
- **Hydroelectric** – Converting energy from moving water into electricity. Clean and reliable, but may disrupt natural ecosystems like rivers and lakes.

Iceland and Norway produce 100% of their electricity from renewable energy sources!

Renewable energies don't just help the climate – they provide increased energy security and economic benefits

Fair Earth's Gateway to Global Citizenship. A series of lessons that aim to make students aware and understand the wider world and their place in it. Every lesson has an 'In school,' 'Online Classroom' and 'Independent Online Learning' option.

WE CANNOT DO EVERYTHING BUT WE CAN ALL DO SOMETHING, IF EVERYBODY DOES SOMETHING EVERYTHING GETS DONE

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Teacher Guide (1 X 50 minute lesson)

1. Introduce the subject to the students with a short summary on the topic, provided in the lesson plan. (5 minutes)
2. State the key objectives with the students so that they know what the lesson will achieve. (2 minutes)
3. Show the students the three video presentations on Renewable Energy, shown in the lesson plan. Ask the students to take notes on the three different videos, to fully take in the information. (20 minutes).
4. Bring the students into groups to discuss the questions stated in the lesson plan. Once they have discussed questions, they should prepare a 5 minute presentation on their answers (to be presented in the next lesson) (20 minutes). If the lesson is in the format of an online classroom they can use programmes such as google hang out to participate in a virtual classroom. Alternatively the students can complete the above task at home and submit the task to you on completion of the session.

Break

5. Summarise what the previous lesson was about, a quick mention of the video presentations. (5 minutes).
6. Each group of students will come up and present their answers on the questions, and the discussion results. (5 minutes each)
7. Carry out the workshop/activities as described in the lesson plan, relative to the type of learning you have chosen. (20 minutes)
8. Do a short plenary, summarising what has been learnt in the session. Then make the point of TAKING ACTION about what we have learnt in these sessions. Present the ideas of the action plan/fundraiser and work together as a class to achieve them (10 minutes)
9. Finally there is the option to present take home assignments. There are two options to choose from or both could be set to be submitted by the following week's lesson. This can be a virtual hand in online or a in class hand in depending on the situation.