**Chapter 3 – People and power**

***Who uses power?***

**Lesson overview**:

In this lesson, students will learn about the history between people and their use of energy. They compare how energy was used centuries ago vs how we use it today. We will follow up with a discussion about energy distribution and how we have access to power.

This lesson is mostly about building knowledge.

To engage: You could introduce a person into the industrial revolution section. A story about someone who invented the calculator and how and what this impacted? Or you could talk about the mathematician Ada Lovelace and her impact on modern computing?

**Topics:** history, physics, geography, math, art and design

**Essential Questions:**

* How do people use power, and why do they need it?
* How long have people been using power?
* How is power distributed across the world?
* How does power impact your lifestyle?

**Enduring Understandings:**

* The extent of time that people have been using energy to alter/improve their living conditions
* Industrial Revolution
* What uses electricity today?
* The basics of the modern power grid distribution system
* Maps are models used to describe places and how they are connected.

**Vocabulary:**

Power, energy, industry, electricity, distribution

**Chapter 3a outline (total run time = 55 min)**

**Review/intro (30 min)**

**Review:** Take a few minutes to review the first sessions with them. What is energy, power, how does it affect the planet, what are people doing to help etc. Make sure they have a good handle on the subject and quickly review the activity work sheet that was handed out in the previous Chapter (*What is Energy*). (5 min)

What’s the difference between energy and power?

**energy:** a property that is transferred from one object to another but is never created or destroyed – it can take on many different forms

**power:** amount of energy used / time (energy/sec, energy/hour...)

**Introduction**:*When was power first harnessed by humankind?* (25 min)

Supplies needed: blank timeline to be filled out (*at the end of slide deck*)

* Make a list of what the students thoughts are on the whiteboard. Note the years they guess, and what the purpose of energy usage was.
* Give an introduction to what the answer actually is (fire) and what humans used it for (cooking). Ask them what they think of this.
* Teach the other milestones of power, note how technology changed or evolved. Allowing time for questions.

Print out a timeline for the student to fill in along with the teacher, so each of them have it for their own reference.

Stick timeline in **eco-diary**

**Activity (15 min)**: Upon reaching the Industrial Revolution, discuss how this historical event completely changed society. Demonstrate impact of the industrial revolution on society; a few examples: (15 min)

Our theme: *Access to electricity is an advantage (e.g. making more money); more people will want electricity otherwise, will be left behind.*

Activity example: split up into groups (each table/group is at a different station):

Supplies needed\*: calculators, encyclopaedias, paper, laptop/computer, pencils/pens, stopwatch

\*these are just examples and will be based on classroom resources

Station 1: Calculator vs. Human: Set out a few math problems, give one student access to a calculator, the others need to perform the problems by hand.

It should be clear how much faster the student with the machine is and the disadvantage everyone else has.

Emphasise that technology they use is powered either indirectly or directly, by **electricity**!

**References:**

1. <https://interestingengineering.com/industrial-revolution-the-ultimate-guide-to-this-game-changing-period>

Optional worksheet references: <https://schoolhistory.co.uk/industrial/industrial-revolution/>

**Chapter 3b outline (total run time = 45 min)**

**Review (20 min):**

**Review:** Go back to the timeline that each of them from previous Lesson, zooming in from the Industrial Revolution to today. Noting the important changes in energy usage post-Industrial revolution (coal à gas à hydro à wind à nuclear à solar). *Use powerpoint slides* (10 min)

Show a plot of CO2 emission, and how it correlates with our inventions and energy usage.

*Why* were the people not worried about pollution at the start of the industrial revolution?

(Answers: (i) they were not aware what pollution was and did not consider the consequences (ii) they enjoyed the new technologies, jobs, opportunities, and ability to move around more). (5-10 min)

How do you feel about these CO2 emissions? Make some notes in your eco-diaries about your feelings and how you can reduce energy/emissions use yourself. Make a note of just one thing you can do to help.

Refocus the discussion on *how* people were obtaining access to power.

**Activity (20 min) :** The electric grid and energy distribution.

From the previous lesson the students should understand the concept that people with electricity get ahead. This explains why electricity was rapidly adopted in many parts of the world, leading to the design of an energy grid. We need to try and give *all* people access to electricity. *Use powerpoint slides which discuss more about energy distribution*.



**Grid drawing activity (to work on in groups):** Hand out a map of East Anglia (bird’s eye view). Let them be the designers and figure out how to distribute power to all the neighbourhoods/cities. What is the best way to do this safely? Make sure to let them know the roads are indicated on the map and this might help with their design ideas.

Once they finish mapping out the energy grid for their region, have them present their plan to the rest of the classroom (time permitting).

Pose the following question (linking back to the different types of power sources and innovations (from the timeline)), what if the types of power sources were actually on your roof (aka, solar panels)? How does power need to be distributed then?

To segue into the next chapter (about power units), as the students: *now that everyone has access to the grid,* ***how much*** *energy does each person need*. Write a guess in your **eco-diary**.

This answer will be discussed in the next lesson 😊

Then, introduce the next Sustain/Ed Changemaker: a young Shropshire businesswoman who developed a **solar-powered car port for electric cars**, she is hailed as one of Europe's most influential movers and shakers in the manufacturing sector: **Parveen Begum;** included in the prestigious Forbes 30 Under 30 (Europe) list for manufacturing and industry.

**https://startupsmagazine.co.uk/article-paving-way-ev-adoption**

https://www.shropshirestar.com/news/business/2020/07/18/electric-car-ports-power-parveen-into-forbes-list/

https://www.forbes.com/profile/parveen-begum/?sh=59a318751512

A podcast interview with Parveen: https://www.iamphilmichaels.com/podcast/033

**Complete quiz 1**

**Teacher survey:** [FORM HERE](https://forms.office.com/r/weLJL91zi9)

**References:**

1. <http://geosci.uchicago.edu/~moyer/GEOS24705/Notes/Lecture6Slides.pdf>
2. <https://www.instituteforenergyresearch.org/history-electricity/#Politicized>
3. <https://ourworldindata.org/contributed-most-global-co2>
4. openstreetmap.org/#map=9/52.3655/-0.1071&layers=O