



Energy
Superhub
Oxford

Presentation
Delivery guide
KS3 KS4

This guide is designed to accompany and complement:

- Presentation: **Energy Superhub Oxford presentation**
- Case Study sheets: **ESO case study KS3 and ESO case study KS4**
- Single page lesson plan: **ESO KS3/ESO KS4**
- Worksheets and fieldwork/research record sheets: **ESO KS3/ESO KS4** (including activities and possible extension tasks or homework)

The guide goes into greater detail than the single page lesson plan and includes suggested resources and elaborates on each slide in the presentation.

Presentation Tips:

- When opening the PDF presentation, you can select how it is displayed. If you wish to **click through** as opposed to scrolling (which gives you more control as you progress and is more like a conventional ppt) it is best to show it in **'full screen mode'** (press 'escape' to exit).
- All associated documents are attached to the presentation. To find these, click on the **paperclip icon** in the left-hand toolbar.
- When viewing the presentation, presenter notes from this delivery guide are also available for reference if you hover the cursor over the small orange callout icon in the top left corner. **Fig.1**

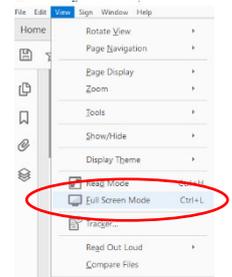


Fig.1



Fig.2

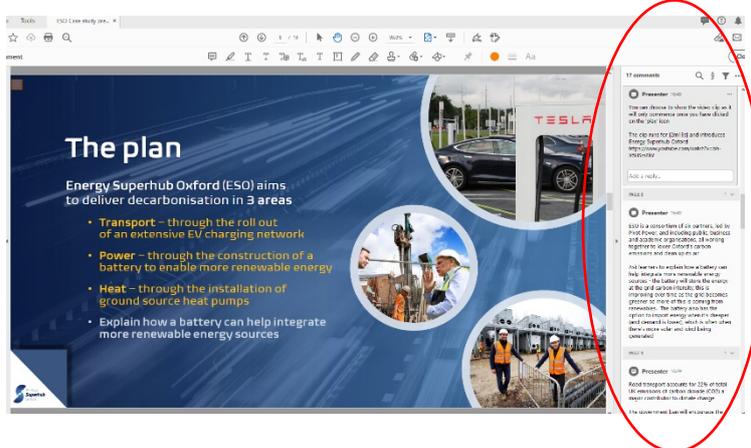


Fig.3

- If you **right click** on that icon it will open a small window showing presenter notes in the top right of the page. **Fig.2** If you right click and scroll down, you can also select **'show comment app'** which opens a panel on the right of the page showing all the presenter notes as you scroll through. **Fig.3**

20 minutes to fill?

You could show the video clip '**Greta Thunberg and George Monbiot make short film on the climate crisis**' [3m40s] which highlights '*the need to protect, restore and use nature to tackle the climate crisis*' and discuss the role that local government plays in this.

Slide 3

Slide number refer to the numbers on the slides themselves

This presentation is designed to allow the presenter/teacher to pitch it as appropriate to KS3 or KS4.

It can be used alone or in conjunction with either the **KS3 or KS4 case study** and the linked **worksheets** and **fieldwork/research record sheets** as appropriate.

Questions that are on the slides have been differentiated by colour in this guide, with **red** being most challenging.

☞ Points marked with this icon **may not appear on the slide** but can be used as a starting point for discussion, investigation and for extension where appropriate.

Advisory! All videos are linked to external players (usually YouTube) these have been chosen to complement and reinforce learning however, we would **advise that you watch them yourself prior to showing them** to ensure that you are happy that the content is right for your learners.

Suggested resources

ESO resources

2

Starter: Agree or disagree...

- **Start by asking learners to consider the two statements given on the slide and give each one a score on a scale of 1 to 10, 1 being strongly disagree and 10 being strongly agree, to denote much they agree with each statement**

*"The UK government ban of the sale of **new pure internal combustion engine vehicles** from 2030 will inevitably increase sales of electric vehicles".*

"Oxford City Council has created schemes that will ensure Oxford reaches its target of Net Zero by 2040".

Collate the scores to gauge feeling

- **Ask learners to volunteer why they feel the way they do to elicit understanding, and or knowledge of decarbonisation of the transport system and local government strategies towards net zero**

These topics will be addressed further later in the presentation however you might like to explain the difference between pure ICE vehicles and hybrid and fully electric vehicles.

PDF presentation, case study, worksheet and lesson plan

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| <p>3</p> | <p>The IPCC special report focussed on the impacts of global warming of 1.5 °C above pre-industrial levels</p> <p><i>“At 1.5 °C warming, the report projects that climate-related risks to human health, livelihoods, food security, human security, water supply and economic growth will all increase, and will increase even more at 2 degrees warming”.</i></p> <p>https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/</p> <ul style="list-style-type: none"> • Ask learners to identify 3 natural systems that are at risk due to a rise in average global temperatures – answers may include but are not limited to: arctic ecosystems, coral reefs, mangroves, grasslands, savannas, deserts <p><i>GR</i> The video clip (right) could be used to start a discussion about the action that those in power (national government and local government) and we as individuals need to take to curb rises in global warming [3m40s]</p> | <p>https://www.youtube.com/watch?v=-Q0xUXo2zEY [3m40s]</p> <p>Greta Thunberg and George Monbiot make short film on the climate crisis</p> | |
| <p>4</p> | <p>In the same year as OCC declared a climate emergency (2019) they were the first council in the UK to hold a Citizens’ Assembly on climate change where they asked the gathering of randomly selected residents and academics the following question: <i>‘The UK Government has legislation to reach ‘net zero’ carbon by 2050. Should Oxford be more proactive and seek to achieve ‘net zero’ sooner than 2050 and what trade-offs are we prepared to make?’</i></p> <p>They used the evidence based recommendations from this discussion to guide their strategic approach to climate change</p> <ul style="list-style-type: none"> • Ask learners to suggest reasons why Oxford City was amongst the first districts to respond – answers may include but are not limited to: the city having a history of activism, OCC having already had carbon management strategies in place, the proactivity of OCC councillors in this area as well as proactive Mayors – Colin Cook (2018-2019) and Craig Simmons Lord (2019-2020) who is well known for his environmental campaigning, Oxford having had its own challenges with flooding (notable recent flood events in 2007, 2014 and 2020) | <p>https://www.oxford.gov.uk/news/article/1918/roadmap-outlines-oxford-s-journey-to-net-zero-carbon-emissions-by-2040 OCC Roadmap</p> | |

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| 5 | <p>You can choose to show the video clip as it will only commence once you have clicked on the 'play' icon.</p> <p>The clip runs for [3m18s] and looks at Schools' Climate Strike Oxford</p> | <p>https://www.youtube.com/watch?v=A59g43YRMPw [3m18s]</p> | <p>Embedded clip in ppt</p> |
| 6 | <p><i>✍</i> It may be worth asking and clarifying what net zero means – a basic definition being that net zero comes about when the amount of CO₂ we emit is no more than the amount that can be removed</p> <ul style="list-style-type: none"> Ask learners to explain how the use of renewables contributes towards decarbonisation – answers may include but are not limited to: reduce reliance on and ultimately replace the need for dirty fossil fuel power stations lowering greenhouse gas emissions from, renewables are 'cleaner' in terms of how energy is harvested (although there is a footprint in their manufacture, this is offset in use) | | |
| 7 | <p>You can choose to show the video clip as it will only commence once you have clicked on the 'play' icon</p> <p>The clip runs for [2m13s] and introduces Energy Superhub Oxford</p> | <p>https://www.youtube.com/watch?v=bh-X5HSm8hY [2m13s]</p> | <p>Embedded clip in ppt</p> |
| 8 | <p>ESO is a consortium of six partners, led by Pivot Power, and including public, business and academic organisations, all working together to lower Oxford's carbon emissions and clean up its air</p> <ul style="list-style-type: none"> Ask learners to explain how a battery can help integrate more renewable energy sources - the battery will store the energy at the grid carbon intensity, this is improving over time as the grid becomes greener so more of this is coming from renewables. The battery also has the option to import energy when it's cheaper (and demand is lower), which is often when there's more solar and wind being generated | | |

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| 9 | <p>Road transport accounts for 22% of total UK emissions of carbon dioxide (CO₂) a major contributor to climate change The government ban will encourage the transition away from fossil fuel polluting vehicles to clean, efficient electric vehicles (EVs)</p> <ul style="list-style-type: none"> • Ask learners to outline the challenges we may face as the number of EVs on the road rises - as the number of EVs increases, today's electricity infrastructure will not always provide the levels of power necessary in the right places for charging up EVs <p><i>It may be interesting to discuss the other challenges that will be faced if we are to meet this commitment</i> - an increased need for public transport infrastructure, the mass disposal of obsolete vehicles (disassembly, recycling), EV affordability etc</p> | | |
| 10 | <p>ESO will deliver the EV charging network by connecting directly to the main transmission network, thus bypassing the constrained local distribution network</p> <p>The network will have access to multi-megawatts of power, enough to charge hundreds of vehicles quickly at once</p> <ul style="list-style-type: none"> • Ask learners to discuss the value of choosing the Park and Ride as a location – answers may include but are not limited to: the park and ride is conveniently located outside the city and provides transport into the city, there is plenty of parking and room for facilities onsite including a café and toilets, meaning that drivers can stop for refreshments and charge even if not going into the city <p>At Redbridge Park & Ride those visiting or driving through Oxford, as well as local drivers, can charge up their EV in just 10 minutes</p> | | |
| 11 | <p>You can choose to show the video clip as it will only commence once you have clicked on the 'play' icon</p> <p>The clip runs for [1m24s] and introduces Redbridge Park & Ride electric vehicle charging hub</p> | <p>https://www.youtube.com/watch?v=Bn6nIU16GQ [1m24s]</p> | <p>Embedded clip in ppt</p> |

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| 12 | <p>In November 2020, the UK Government announced its 10 Point Plan for a Green Industrial Revolution</p> <p>While renewable energy is now the cheapest source of electricity globally, significant investment is needed to upgrade the network to cope with its intermittent nature, and these changes take time. Intermittent generation needs to be managed to avoid blackouts particularly at peak times</p> <ul style="list-style-type: none"> • Ask learners to identify possible issues with upgrading the existing network – answers may include but are not limited to: energy storage, particularly energy from renewable sources as peak generation times may not coincide with peak demand. Infrastructure, upgrading will be costly and time consuming | | |
| 13 | <p>For the first time, the ESO battery energy storage system is connected directly to the main UK transmission network</p> <ul style="list-style-type: none"> • Reinforcing the question and discussion from slide 8, ask learners to explain why it is important to be able to store energy from renewable sources – energy generation from renewables is intermittent and does not necessarily coincide with peak demand. The battery can help to store surplus renewable energy when supply exceeds demand and push this stored energy onto the grid when demand is high therefore reducing the risk of blackouts <p>Since the price of energy is linked to demand, the battery will also generate revenue by buying and storing energy when it is cheaper, and selling it back to National Grid when it's more expensive</p> <p>Flexible energy assets like this will help to reduce the cost of the transition and alleviate concerns about intermittent renewable energy generation</p> <p>This is the first grid-scale battery to directly connect to the transmission network in the UK!</p> | | |
| 14 | <p>You can choose to show the video clip as it will only commence once you have clicked on the 'play' icon</p> <p>The clip runs for [1m56s] and talks about the 50MW lithium-ion battery going live</p> | <p>https://www.youtube.com/watch?v=WACJ3PEJRq8 [1m56s]</p> | <p>Embedded clip in ppt</p> |

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| 15 | <p>Heat, in domestic, industrial and commercial settings, currently accounts for over a third of the UK's greenhouse gas emissions</p> <p>In November 2020, the UK Government announced its 10 Point Plan for a Green Industrial revolution. In this plan, the Government announced plans for 600,000 heat pumps to be installed every year in the UK by 2028</p> <ul style="list-style-type: none"> • Unfortunately, current heat pump uptake is low, ask learners to suggest why this is – answers may include but are not limited to: installation can be very costly, many homes and businesses have functioning boilers and reluctant to pay to upgrade, installation can be disruptive | | |
| 16 | <p>Linked to smart meters and smart thermostats on agile tariffs, the heat pumps know when to heat at the cheapest and greenest times of day thanks to an AI algorithm</p> <p>The costs of installing the systems are kept down by sharing ground heat collectors between groups of buildings</p> <ul style="list-style-type: none"> • Ask learners to give reasons why energy may be cheaper as well as greener at certain times of day – demand varies depending on the time of day, energy will be cheaper when demand is lower, these times may also coincide with increased availability of renewables | | |
| 17 | <p>You can choose to show the video clip as it will only commence once you have clicked on the 'play' icon</p> <p>The clip runs for [3m07s] and looks at how a Ground Source Heat Pump works</p> | <p>https://www.youtube.com/watch?v=KE3SVNRmwcQ [3m07s]</p> | <p>Embedded clip in ppt</p> |

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| 18 | <p>Plenary task</p> <ul style="list-style-type: none"> • Ask learners to select one of the three main areas of Energy Superhub Oxford: transport, power and heat, and list as many key words or terms related to your chosen topic. • Once they have done this, ask them to compare and discuss how much crossover there is with the other two areas. This task may be done independently, in pairs or in groups - answers may include but are not limited to: <i>Transport</i> – internal combustion engine (ICE), fossil fuels, CO₂ emissions, air quality, infrastructure, EVs/electric vehicles, charging, network, rapid, ultra-fast etc <p><i>Power</i> – National Grid, fossil fuels, infrastructure, renewables, wind, solar, intermittent generation, peak demand, blackouts, Green industrial revolution, upgrading, network, battery, storage, energy, hybrid battery, lithium-ion, vanadium redox flow, high voltage, grid-scale, flexible energy assets etc</p> <p><i>Heat</i> – domestic, commercial, industrial, greenhouse gas emissions, gas boiler ban, heat pumps, uptake, installation, infrastructure, efficient, smart, agile tariff, AI algorithm, ground heat, geothermal etc other general key words and phrases – decarbonisation, carbon neutral, zero carbon, net zero, emissions, resource management, climate emergency etc</p> | | |
| 19 | <p>All images used are royalty free, 'Creative Commons' and free to use for non-commercial purposes.</p> <p>Sources include: https://www.freeimages.com https://pixabay.com https://energysuperhuboxford.org Microsoft online pictures search (Creative Commons only)</p> <p>To arrange get involved, please go to https://energysuperhuboxford.org/get-involved/</p> <p>These materials are free to use and reproduce however we respectfully ask that you do not edit them.</p> | | |