



Energy generation or conservation? Which method is the future for Morecambe Bay?

KS3 Geography

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Specialist knowledge for teachers

The possibility of a tidal barrage across Morecambe Bay has been a hot topic of discussion for generations. With an operating life of over 120 years, it is considered to be a longer-term solution than nuclear, solar or wind farm energy, which could potentially power up to 2 million homes. This vision would see the creation of sustainable, green jobs in the area, as well as a clear way of addressing the complex issue of fuel poverty. The Morecambe Bay Tidal Barrage is described as a 'vital step in getting us closer to a greener, safer, fairer future' but is it the best solution for our community? The tidal barrage works on the principle that an embankment, which can include a road, could be built across the Bay, which can 'capture' potential energy. As the tide ebbs and flows, generators within the barrage can use this to produce electricity. As the tide is a constant source of energy in the Bay, it is very efficient and would not be weather dependent.

This resource comprises a decision-making exercise which is designed to be taught to Year 9 students as part of a wider unit of work on Energy and Sustainability. The rationale for this is to give students practice at issues analysis they may come across at GCSE (AQA Specification: Paper 3 Pre-release material). It is a series of 3 lessons, taught across a two-week period. Students will work in two groups within the class, one group to investigate the viability of a tidal barrage across Morecambe Bay to increase energy supply, the other to look at retro fitting homes in Morecambe Bay to reduce energy demand.

The class will need to understand the concept of renewable and non-renewable energy sources, and the government commitment to Net Zero. The issue of a tidal barrage as a solution has been raised in parliament, with Westmorland MP Tim Farron championing the project. You can read more about it on his [website](#) and in local

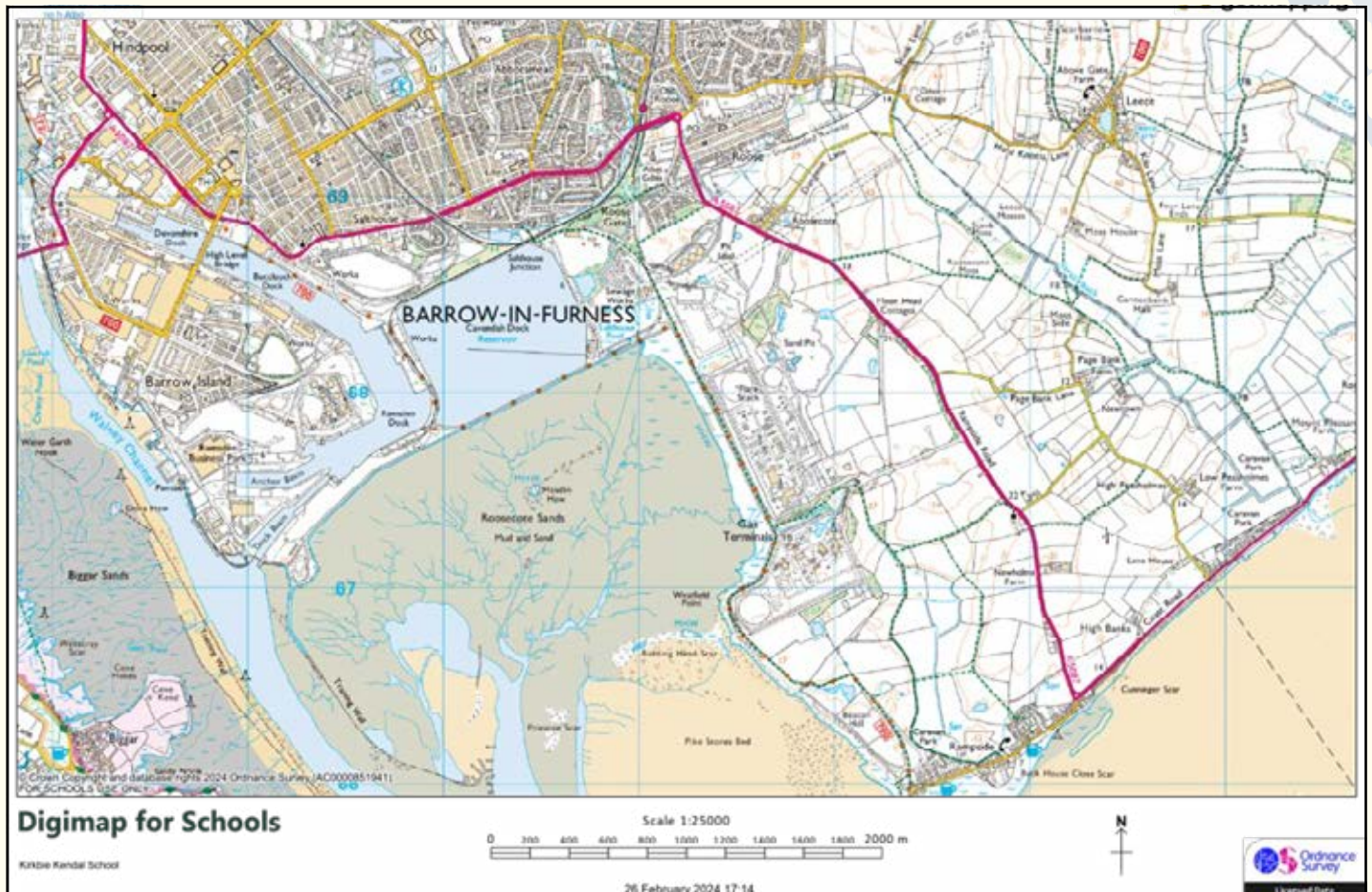
press reports. Teacher knowledge of the North West Energy Coast would be an advantage – what other sources of energy generation are within the Morecambe Bay area and how do these compare? These include Heysham Nuclear power stations, Morecambe Wind Array, Morecambe Bay Gas fields and the development of solar capacity.

An understanding of fuel poverty is also important, 'where a household may not have access or cannot afford access to basic energy or energy services to achieve day to day living requirements'. In Morecambe and Lunesdale 15.2% of households live in fuel poverty. 51% of households in the North West are rated EPC D or below. Teachers should lead a discussion of what an EPC rating shows – what is the EPC rating of their own homes or school? Given the high price of fuel, there is a lack of social equity of households not being able to afford energy prices, yet those households are typically those that have the worst performing energy efficiency. In the first lesson students will work through a guided reading resource to understand the UK energy mix, and the need to generate low carbon energy as an introduction to the topic. The Energy Dashboard is a useful resource to look at real time energy demand and supply across the UK and should be used to stimulate discussion. There are 4,000 jobs in the energy sector alone in Morecambe and Lancaster, making it one of the largest local employment sectors. If a tidal barrage were to go ahead, this figure would significantly increase. Many of our students may pursue jobs in the energy sector, meaning that knowledge of this issue can be relevant for their future careers. This is a fully resourced unit including map skills linked to [Digimapsforschools](#). All electronic resources are able to be printed in black and white or accessed via laptops. Student output is intended to be in their own exercise books. Many of the resources could be adapted for other areas of the UK with similar tidal barrage potential.



Examples in practice

Lesson 1	<p>Starter: Look at the online Energy Dashboard and discuss how energy is being generated in the UK in real time.</p> <p>Main: Retrieval: Renewable/non-renewable energy sources. Guided reading activity. Discussion of climate change and the need to reduce our CO2 emissions. Introduce the concept of fuel poverty – what is it? Define and watch a video which shares people's experience of this phenomenon.</p> <p>Plenary: Students write on post-its ideas of how fuel poverty can be tackled. Organise ideas on board into Local/Regional/National scale.</p> <p>Homework: Students to look online at Rightmove to find examples of best and worst energy EPC ratings – bring into class</p>
Lesson 2	<p>Starter: Discuss homework, what makes a home more or less energy efficient?</p> <p>Main: Divide class into two groups. Use PPT to introduce the idea of the Morecambe Bay tidal barrage and small scale micro-energy projects/retro fitting. Hand out resources to each group. All students to complete the questions and map skills tasks based on their area. Students then work collaboratively as a group to prepare to 'teach' the other half of the group in the following lesson about the issue they have investigated.</p> <p>Plenary: Look at La Rance barrage in Brittany and Lancaster co-housing project as examples of existing projects.</p>
Lesson 3	<p>Starter: Retrieval of renewable/non-renewable/enhanced greenhouse effect on mini-whiteboards.</p> <p>Main: Students present their findings on the project and teach to the other half of the class. Students take notes whilst listening on worksheet.</p> <p>Plenary: class to decide whether the Morecambe Bay Tidal Barrage should go ahead – vote.</p> <p>Homework: What micro energy scheme could be suitable in your school setting?</p>



Curriculum aims and objectives

Aims of the resource and work

The resources are aimed at KS3, Year 9 students pre-GCSE, and contain three 1hr lessons.

It sits within a scheme of work on 'Energy and sustainability', which examines climate change, the enhanced greenhouse effect, the carbon cycle, renewable/non-renewable forms of energy, fracking, and carbon footprints. Students may also have previously calculated the carbon footprint of their home or school and suggested ways in which this could be reduced.

Head

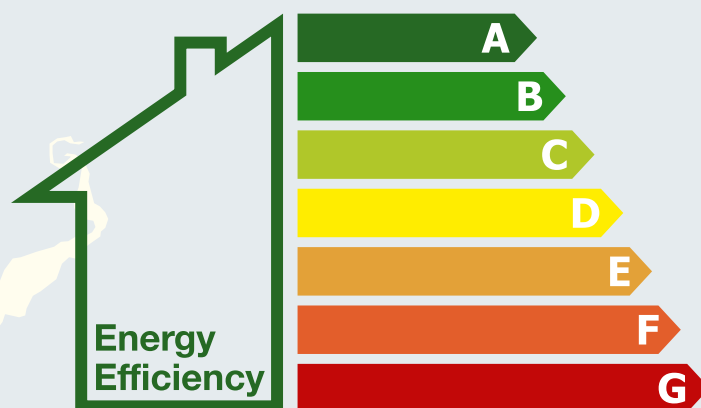
Students are being challenged to absorb and synthesise research on the two pathways – the tidal barrage proposal and retro-fitting energy saving solutions to homes alongside micro-renewable projects.

Heart

Students are encouraged to engage with the topic through their values and personal experiences. For example, reflecting on fairness and equity in relation to energy transitions.

Hands

There is bountiful opportunity for fieldwork to visit a local renewable energy scheme e.g. Lancaster Co-Housing and Hydro-electricity project. A more ambitious fieldtrip could be to participate in the Cross Bay walk.



Learning outcomes

Students will have experienced a decision-making exercise and will have participated in discussion, improving oracy. Literacy and comprehension skills are tested by the guided reading resource and by using the resource booklet to answer questions that seek to replicate the style of AQA Paper 3 pre-release questions.

Students will be working in small groups and will present their findings to the other half of the class – teamwork skills are therefore required.

Map skills are also tested by using map extracts generated through [Digimapsforschools](#).

Students will understand that a combination of large-scale projects, small micro-renewable schemes and retro-fitting energy saving solutions are all needed to move the UK forward in the push towards Net Zero.



Adaptations to extend impact

- Consider Mersey Barrage/Severn Barrage as other locations with tidal prospects within the UK
- Could be used at GCSE Geography for the delivery of sustainable resource management
- Consider fieldtrip options - Bay walk across Morecambe Bay



▲ Sihwa Tidal Power Plant, largest tidal power plant in the world (Screenshot/Source: YouTube)



▲ Aerial views on Barrage de la Rance in Brittany close to Saint Malo, Tidal energy ▼



◀ Morecambe Bay / UK - July 21 2011: Cedric Robinson MBE (17.02.33 - 19.11.21), Queen's guide to the sands, crossing the River Kent whilst leading a cross-bay walk from Far Arnside to Grange-over-sands.

▼ View of the Bay

