

Energy poses one of the greatest challenges of the 21st Century

By 2030, the world's energy needs are expected to be 50% greater than 2010. At the same time, scientists are calling for massive, immediate reductions in greenhouse gas emissions that arise from our use of energy and cause climate change. These two conflicting facts create a huge global challenge. All life on earth is sustained by energy from the sun. Humans have developed many ways of transforming the sun's energy for our needs.

Since the industrial revolution 200 years ago, more and more of our energy has come from non-renewable fossil fuels, like oil and coal from the remains of ancient animals and plants. With rising global demand for energy, these finite resources are running out, and scientists are exploring other potential sources of energy; but there is also pressure to extract from less accessible locations, such as under the oceans.

Burning fossil fuels is unsustainable because they are a finite resource, predicted to end within current lifetimes, and because of the resulting generation of greenhouse gases. Renewable sources of energy such as sun, wind or wave power offer hope for the future but only if we reduce energy demand. Our current energy system is wasteful and polluting and is dominated by a few powerful companies, with serious implications for world development and social and global justice.

Here are just a few of the issues:

Who will climate change affect?

Climate change will affect everyone, but not equally. The world's poorest people, who have the lowest energy or carbon footprint, use least energy, and create the least greenhouse gases will suffer most from climate change. Those from countries of the richer 'north', whose lifestyles are most responsible for exacerbating climate change, will be least affected, simply because of the part of the world they live in.

Is electricity clean?

Whilst the efficiency and cleanliness of coal-fired power stations is improving, coal remains one of the dirtiest of all fossil fuels. The main environmental problems are emissions of pollutants, consisting of mercury, nitrogen oxide and sulphur oxide; burning any fuel at a high temperature results in the formation of nitrogen oxide, which can aggravate asthmatic conditions, react with oxygen in the air to produce ozone, an irritant, and eventually contribute to acid rain when dissolved in water.

Suffering to fuel our power stations?

Coalmining is a risky occupation usually undertaken deep underground. In China alone over 4,000 people were killed in coalmining accidents in 2006. Of the thousands of miners who die annually, the vast majority in many countries are migrants from rural areas, among the poorest and most vulnerable social groups.

Have we reached Peak Oil?

Global consumption of conventional oil has been growing steadily since the mid-1980s but it is predicted that supplies of conventional oil will start to fall within a few years. Two conflicting conditions – constantly growing demand and declining supplies – feed the 'perfect storm' that has been coined Peak Oil. Many believe that if the key point has not already been passed it will be soon.

Can nuclear energy ever be the answer?

This question challenges some of the key thinking around climate change. Many governments are turning to nuclear power for a variety of reasons: to meet energy demand, secure supply, or reduce greenhouse gas emissions. Few energy debates are as divisive or emotive as the one in favour of / against Nuclear Power. Some say it has been unjustly stigmatised and is part of the solution to fill the gap in our future energy needs, especially if the technology advances. Others, including The Campaign for Nuclear Disarmament, warn of an unrealistic focus on nuclear power as a solution to climate change. They say that doubling nuclear power production in the UK would only

reduce carbon emissions by 8%; existing nuclear power production is polluting and expensive with potentially catastrophic consequences. Most new power stations planned by the government would not provide additional power, but replace ageing stock and take more than a decade to be productive.

Renewable energy sources and energy efficiency measures are already making a difference, despite significantly less investment than nuclear power and the technology is advancing rapidly.

How does energy relate to poverty?

In 2010 Practical Action produced a report, *Poor People Energy Outlook*, which assessed energy needs of people living in poverty as energy for light, cooking, water heating, heating living spaces, cooling, earning a living and information and communication. One third of the world's population who are without access to modern energy services, have to find their own sources to survive, with the result that:

- children, especially girls, may miss out on school because they have to work for the family carrying wood and water
- women spend much time collecting wood and water instead of productive activities which could generate income
- lung disease can be caused by breathing in smoke from fuels such as wood and dung
- fuel may be lacking to boil water which is essential in preventing disease
- lack of electricity in clinics prevents people being properly treated; electricity is necessary for lighting, refrigeration, and sterilisation in order to deliver effective health services.

Eating or heating?

In the UK fuel poverty applies to anyone who spends more than 10% of their income on just keeping themselves warm. However, fuel poverty is part of a complex picture linked to multiple deprivations, including low incomes, unaffordable fuel prices, massive price hikes, and poor housing stock characterised by inadequate insulation and inefficient heating systems. The social implications of fuel poverty can be immense, especially for the most vulnerable members of society: children, the elderly and those with disabilities or long-term

illness. The effects of fuel poverty on children can lead to educational under-achievement, social exclusion, and physical and psychological ill health. It is estimated that over 560,000 households in London are in fuel poverty, with over 126,000 of those in severe, fuel poverty where over 20% of a household's income is spent on heating. Low incomes mean that it is difficult to balance the costs of daily life and people have to make tough choices. Households often face a choice of being cold in order to prioritise other areas of spending or go without essentials, including food, to keep warm. Research in 2013 showed that 43% of households cut back on their weekly food shop to make sure they could pay their heating bills.

Does insulating homes make a difference?

The UK Green Building Council which campaigns for a sustainable built environment notes that the majority of existing stock in the UK requires some level of retrofit to enable us to live and work more sustainably. They state that homes and non-domestic buildings are, together, responsible for around 37% of UK's greenhouse gas emissions. The majority will still be standing in 2050, so a massive programme of green retrofit and energy demand reduction needs to be undertaken to:

- Meet our climate change goals
- Improve energy security
- Tackle fuel poverty
- Create green jobs

Micro-generation

Micro-generation is small scale production of heat and/or electricity from low-carbon sources. This can be carried out by individuals, small businesses and communities to meet their own needs, with any surplus electricity exported to the national grid. A wide array of micro-generation technologies exists, all holding the potential to reduce climate change, improve reliable energy and tackle fuel poverty. The Friends of the Peak District have done a feasibility study to bring mills and weirs back into production in the form of a micro-hydro 21st Century 'green revolution', all in the constraints of an environmentally sensitive National Park.



Learning in a global context

Children are entitled to learning in a global context. They encounter world views from their families, cultures and communities, and a school curriculum, set in a global context, deepens their understanding and engagement with the complexities of that world. Teaching about **Energy** requires teachers to be familiar with global issues that affect all our lives and to impart knowledge, skills and values to equip children to live and be active in an interdependent, globalised world.

Real, relevant and current issues

The global topic of **Energy** is integral to pupils' lives. Issues contained within universal energy provision require us all to develop new ways of thinking, acting and living for a sustainable, equitable future. Individual action, such as switching off lights may reduce waste but the challenge lies in understanding our use of diminishing fossil fuel and the need to generate energy from renewable sources. It gives purpose to work across the curriculum with rich data and real-life scenarios around universal themes of consumerism and current issues. It opens debate around alternative ways to tackle extreme poverty and inequality and offers differing perspectives on poverty and wealth.

Social justice, not charity

Fundraising campaigns that aim to evoke sympathy may instil feelings of guilt, with limited educational value. Encouraging children to research and question global issues helps them understand that there are more effective ways for governments and people to achieve a more sustainable and equitable world than charity.

Broaden perceptions, counter stereotypes

No country is uniformly rich or poor: inequality exists within, as well as between countries, including the UK. There is much to be learnt from others, whatever their situation. Media coverage of people and places may reinforce common stereotypes. Adverts and images can imply dependency and uniform poverty in southern countries, especially in the diverse continent of Africa.

Thinking critically about Energy

United Nations Secretary General Ban Ki Moon argues that ensuring the world's poor people have safe and reliable access to energy is essential if we hope to meet the Millennium Development Goals (MDGs):

'Universal energy access is a foundation for the MDGs...without energy services the poor are cut off from basic amenities'

As countries develop economically there is clear indication that energy use per capita increases significantly. Practical solutions to meet this demand offer an array of renewable energy initiatives. Humankind is highly inventive and has many solutions to getting things powered up: Treadle pumps in India, Solar power schemes in Nicaragua, Bio-fuel for cars in Borneo, Biogas from pigs in China and micro hydro power in Peru.

With this in mind work through these questions:

Self-reflective questions:

Focus - what do I think about this?

Why do I think like that? To what extent am I open to changing my point of view?

~ Do you think about the energy you use?

~ Which aspect do you think about? The cost?

The convenience? How it is produced?

The things it allows you to do each day?

Group Dialogue questions:

Focus - what do other people think about this?

How can I find different perspectives?

Analyse assumptions, implications and contradictions? And how can I engage with complexity, conflict, uncertainty and difference?

Discuss these questions with others:

~ How would you conduct your day without modern energy services?

~ How much time would it take to address basic needs without this?

~ Should basic energy provision be a human right in the 21st century?

~ What does the existence of people in fuel poverty, here and elsewhere say about a society?

~ Is universal energy access an achievable aim?

~ How can sustainable energy technologies help humanity achieve this?

Curriculum planning

Literacy, Language and Communication

- ~ investigate non-fiction texts on renewable energy initiatives such as solar and wind power as cross curricular study on energy;
- ~ Through visual literacy, pupils debate and discuss energy and how it is sourced, eg photographs of oilfields, miners in China, wind turbines, hydro-electric power in Europe;
- ~ Pupils talk and write about their opinions and explain their views on energy, e.g. energy production, consumption and access.

Physical

- ~ Pupils know that their choices have consequences on physical health as well as the environment, e.g. they learn that by walking to school they can reduce energy use and carbon footprint and improve their health and fitness levels;
- ~ investigate how traffic emissions aggravate common childhood conditions such as asthma.

Personal, Social, Health, Citizenship and Economic Education

- ~ Pupils learn about the wider world and the interdependence of communities within it. They develop their sense of social justice and moral responsibility and begin to understand that their own choices and behaviour can affect local, national or global issues;
- ~ Pupils learn how to make more confident and informed choices about the environment; to take more responsibility, individually and as part of a greater whole;

Knowledge and Understanding of the World

- ~ Pupils learn that our non-renewable energy sources are finite and that we need to lower our energy uses and find greener alternatives;
- ~ look at future timelines to consider when non-renewables will run out (i.e. within 50-75 years- during their lifetimes),
- ~ Pupils understand that energy is unfairly distributed and what that might mean for families here and overseas e.g. an inability to boil water, lack of power in health clinics.

Creative

- ~ Linking to the expressive arts, pupils develop their own imaginative and creative ways of expressing some of their own commitments to the environment, helping others locally, nationally and globally.

Mathematical, Scientific and Technical

- ~ Pupils explore examples of human impact (both positive and negative) on the planet, for example, the negative effects of fuel extraction in the Arctic;
- ~ Pupils learn safe ways to use electricity and that we need to consume less of it, as with all energy;
- ~ Pupils collect, analyse and present data using a range of sources that compare energy statistics or carbon emissions, e.g. investigating what percentage of UK energy is sourced from renewables, number of households living in fuel poverty in the UK

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