

Facing global issues



Hi there! This is Earth speaking. Will you spare a moment to listen to me? I have some very important things to discuss.

We must face up to some urgent environmental problems! All living things depend on my environment, but the way you humans are living at the moment, I will not be able to keep looking after you.

The issues I am worried about are:

- the effects of **global warming**
- the health of natural environments
- the use of **non-renewable** energy supplies
- the environmental impact of unsustainable cities
- the build-up of toxic waste in the environment
- a reliable water supply for all.

My global challenge to you is to find a sustainable way of living. Read on to find out what people around the world are doing to try to help.

Fast fact

Sustainable development is a form of growth that lets us meet our present needs while leaving resources for future generations to meet their needs too.

What's the issue?

Developing renewable energy

Today, supplies of fossil fuels such as oil, gas and coal are running low. Fossil fuels are a non-renewable resource that will soon be used up. People need to develop clean, **renewable** energy supplies that will not run out.

Problems with fossil fuels

Supplies of fossil fuels, such as coal, are declining across the world. Coal is a non-renewable resource that is used to **generate** most of the world's electricity. Oil is another non-renewable resource, and it is used as fuel for transport. When these fossil fuels are burnt, a type of **greenhouse gas** called carbon dioxide is produced. Carbon dioxide is adding to global warming.

The need for renewable energy

As Earth's population grows, more energy will need to be produced. Renewable energy is energy that comes from sources that cannot be used up, such as the wind or the Sun. Sources of renewable energy, such as wind power and **solar power**, need to be developed into reliable power supplies.

Coal is a fossil fuel used to generate electricity for many homes, offices and schools.



Fast fact

In 2010, only 11.14 per cent of electricity in the United States was generated from renewable sources.

Making renewable energy reliable

Many sources of renewable energy are unreliable because they depend on changeable elements in the environment, such as water, sunlight and wind.

Unreliable supplies of wind power

Wind power is an unreliable source of renewable energy, because wind turbines only generate energy when the wind blows. If the weather is calm, wind turbines will not turn, and no energy will be generated. If the weather is too stormy, wind turbines may produce more energy than can be captured. Therefore, much of the energy generated in very windy periods may be lost. Wind power is often only used to supplement reliable forms of power, such as nuclear energy or coal-fired power.

Unreliable supplies of solar power

Solar power can be another unreliable source of renewable energy, as solar panels only collect sunlight when the Sun is shining. If the weather is cloudy, solar systems may need to be boosted by energy from other sources, or by a backup battery.

Power stored in batteries can be used to back up solar systems when there is no sunlight, such as at night or on cloudy days.

Fast fact

In the past, it has proved difficult to create large, reliable battery systems to store power from renewable energy sources such as wind power and solar power.



Many workers still work in Finland's coal-fired power stations, which generate much of Finland's electricity.

CASE STUDY

Unreliable energy supplies in Finland

Finland is a cold country that needs large amounts of energy to heat homes and offices. While Finland uses energy from renewable sources, it still depends on energy from non-renewable sources because they are reliable.

Using fossil fuels

Finland brings in fossil fuels from other countries to supplement its energy supply. Burning fossil fuels releases greenhouse gas emissions and contributes to global warming. Many people in Finland would like to see more energy come from clean, renewable sources, such as hydroelectricity, wind power and solar power.

Using nuclear power

Finland also uses nuclear power to supplement its energy supply. Finland currently has four nuclear power plants, and a fifth is currently under construction. Today, there is less opposition to nuclear power in Finland than there once was, as the population is becoming more aware of the need to reduce the country's dependence on fossil fuels.

Fast fact

Finland is now importing more natural gas and less coal, because natural gas releases less carbon emissions than coal for each unit of energy produced.

Towards a sustainable future: Storing excess energy

Many types of batteries and storage systems can store excess energy for later use. This makes many sources of renewable energy more reliable.

More reliable energy supplies

Batteries and storage systems can store electricity and make electricity supplies more reliable. Electricity demand is uneven, as more electricity is used at certain times of the day or at different times of the year. When it is very hot or cold, large amounts of electricity are used for heating or cooling. These times are called peak periods. Periods when little electricity is used are called off-peak periods. In off-peak periods, energy could be stored in order to create a reliable supply for peak periods.

Different types of storage

There are many different types of batteries and storage systems available. Some of these technologies are listed in the table below.

Name of storage technology	How it works
pumped hydro-storage	pumps water into hydroelectricity storage dams
flow batteries	huge tanks of chemicals store electricity as chemical energy
magnetic energy storage	coils held at very low temperatures store high-energy magnetic fields
hydrogen storage	water is split into hydrogen and oxygen, and the hydrogen is burnt when electricity is needed

Fast fact

Geothermal power is a reliable source of energy. Heat from rocks is always available beneath Earth's surface.



Wind power is stored in underground air chambers at the Iowa Stored Energy Park.

CASE STUDY

Iowa Stored Energy Park

Iowa Stored Energy Park in the United States is creating an energy storage system for its large wind power station. During peak periods, wind can be released and used in power stations.

Making wind energy reliable

At Iowa Stored Energy Park, wind energy can be stored to provide a reliable electricity supply on demand. The park will be environmentally friendly and cost-efficient. It has been designed to use some of the latest technologies, such as:

- modern wind turbines
- air combustion turbines
- underground air batteries.

Underground air batteries

Iowa has many underground chambers that can be used to store **compressed air**. These underground chambers can be used to create an 'underground air battery' to store excess wind energy generated in Iowa.

Fast fact

In Utah, windmills were once used to pump water from beneath the ground. Extra water was stored to use at a later time, when the wind would not blow.