



Our planet, our future

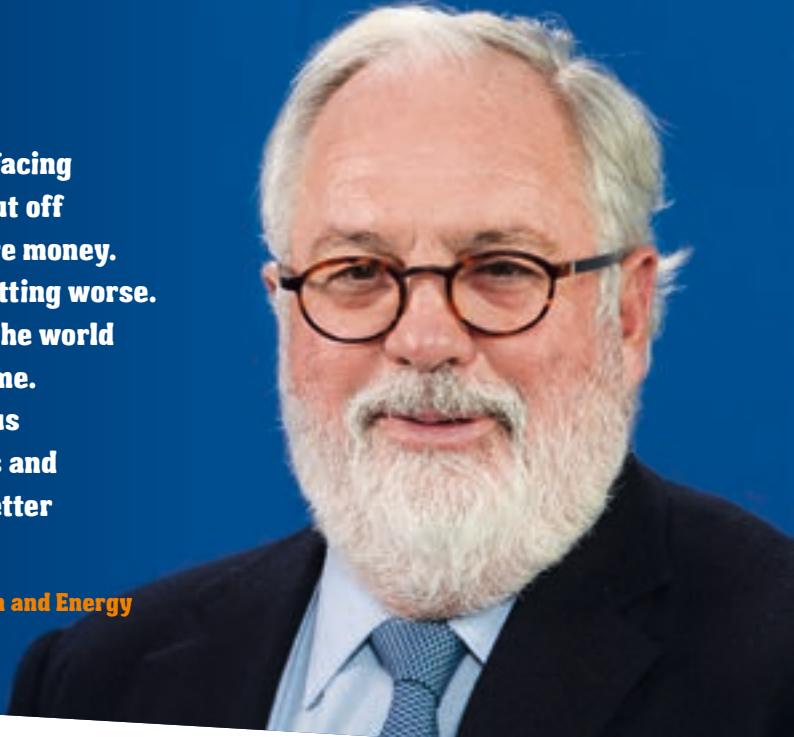
Fighting
climate change
together



“

Climate change is one of the greatest threats facing humankind today. It is not a problem we can put off and deal with when we have more time, or more money. We all have a duty to act to stop the climate getting worse. The actions we take now will determine what the world we live in will look like in 10, 20 or 50 years' time. And it's going to need huge efforts from all of us individuals, governments, businesses, schools and other organisations, working together for a better climate and a better future.”

Miguel Arias Cañete, EU Commissioner for Climate Action and Energy



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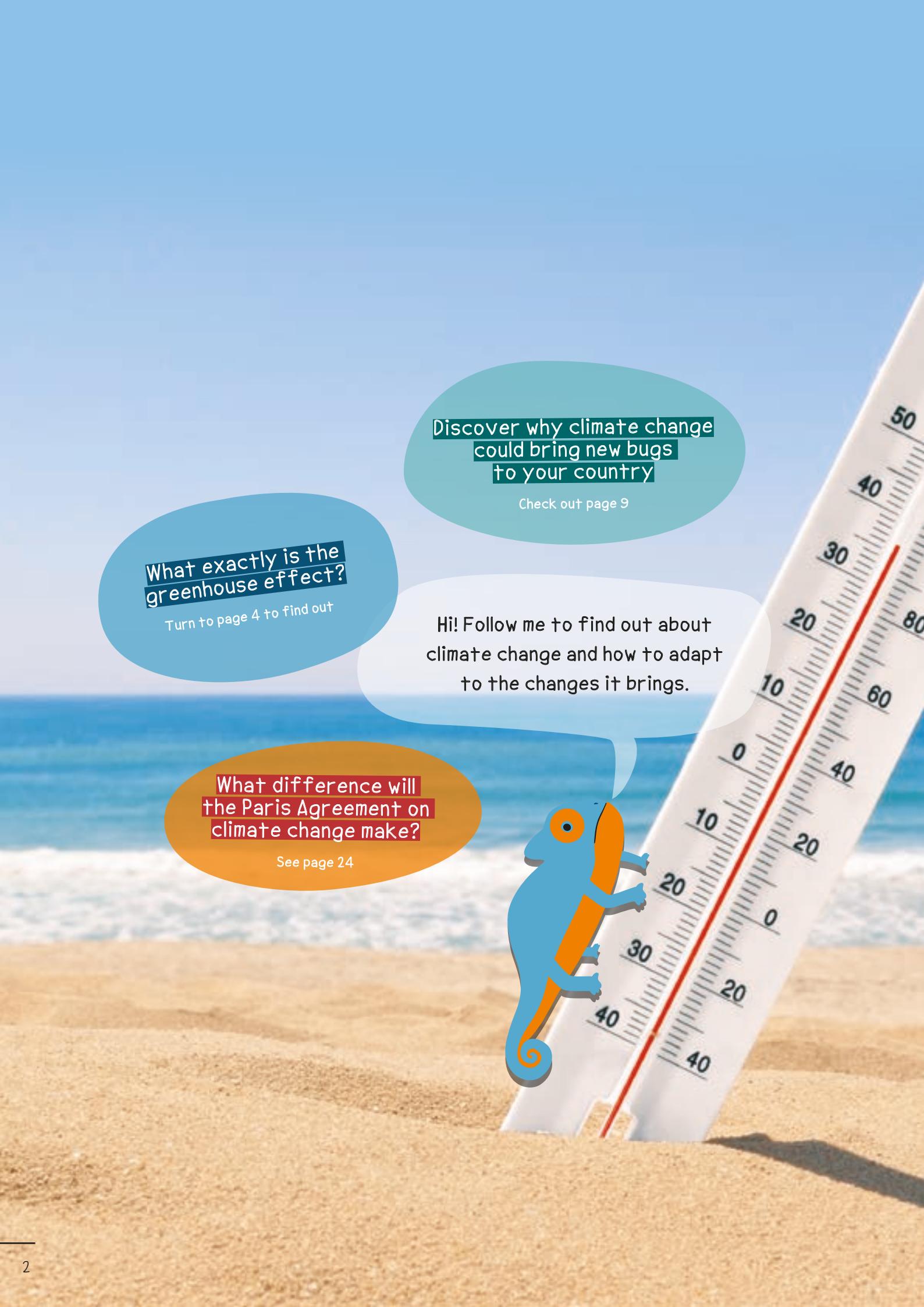
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What exactly is the
greenhouse effect?

Turn to page 4 to find out

Discover why climate change
could bring new bugs
to your country

Check out page 9

Hi! Follow me to find out about
climate change and how to adapt
to the changes it brings.

What difference will
the Paris Agreement on
climate change make?

See page 24



Hot topic



Climate change is one of the most serious challenges facing our world today. Our planet is experiencing significant and accelerated climate change that began over a century ago.

Most scientists agree that the planet is warming up faster than ever because of the vast amount of greenhouse gases that humans are pumping into the atmosphere. This includes activities such as burning fossil fuels (coal, oil and gas), driving cars and cutting down forests.

Many of us have seen – and even experienced – the effects of climate change. But it is not just about extreme weather like floods, droughts and hurricanes. Slower and less noticeable changes in our climate have the potential to completely alter the way we live.

The good news is that in Paris in December 2015, 195 countries (practically the whole world) agreed the first ever legally-binding global deal to tackle climate change. In the EU and around the world, governments, companies and individuals are already working to tackle its causes and adapt to the changes it brings. We all have a part to play because climate change is a global problem which can affect each one of us.

We all share one planet and the changes we make in one place can affect others far away. You could say our behaviour makes a lasting impression, like a footprint. So, through our actions and choices, each one of us can take steps to leave smaller footprints and help tackle climate change.

The science bit

Earth's climate has changed throughout history, gradually getting hotter or colder for long periods of time. In the last million years there have been about 10 ice ages, with much warmer periods in between. These changes were the result of natural causes, such as changes in the tilt of the planet, the sun's activity and ocean currents. But the changes we are seeing today are different – and we are responsible! By releasing more of the gases that trap heat into the atmosphere, we are causing the temperature on Earth to rise very quickly.

The greenhouse effect

When sunlight hits the Earth's surface, some of this energy is absorbed and warms the ground and the oceans. The rest of the energy can escape back into space, but some of it is trapped in the atmosphere and warms the Earth. This is called the 'greenhouse effect', because the atmosphere acts like the glass in a greenhouse – warming the inside. This greenhouse effect happens because the Earth's atmosphere contains gases such as water vapour, carbon dioxide, methane and nitrous oxide (these are called greenhouse gases). The greenhouse effect is what normally keeps our planet at a comfortable temperature. However, human activities are increasing the amount of greenhouse gases in the atmosphere which makes the greenhouse effect stronger and increases the temperature of the Earth.

What's causing climate change?

Climate change is caused by the increase in the Earth's temperature (global warming) which comes from adding more greenhouse gases to the atmosphere than those occurring naturally. These extra greenhouse gases mainly come from burning fossil fuels to produce energy, as well as from other human activities like cutting down rainforests, agriculture, farming livestock and the production of chemicals.

Weather vs. climate

Weather and climate are different but related things. Weather describes the day-to-day conditions in a particular place – for example, it can be cloudy and wet one day and sunny the next. 'Climate' describes the average weather conditions in a place over relatively long periods of time (e.g. 30 years). Deserts, for example, have a hot and dry climate, while the Arctic and Antarctic regions are cold and dry.

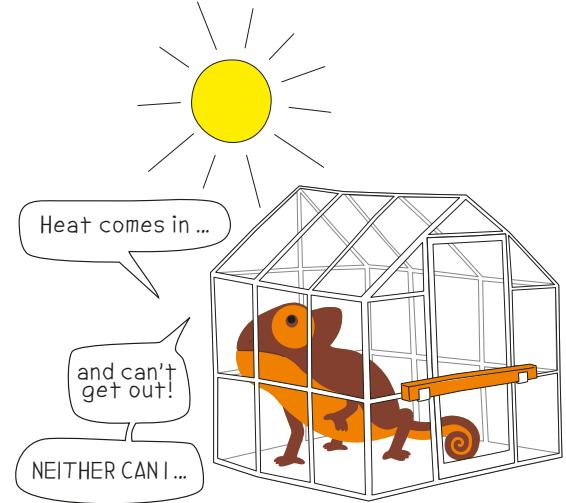
Getting warmer

In 2016, the Earth was around 1.1 °C hotter than it was in the late 19th century – and the average global temperature is set to rise even more over the next century. 1.1 °C may not sound like much, but consider this:

- Most of the warming so far happened in the past few decades, so the temperature rise is speeding up.
- Don't forget, this is an average increase: some places have become much warmer and others colder. For example, the Arctic has become substantially warmer over the last 60 years and could be ice-free in summer by 2040. Europe is warming faster than other areas of the world.
- According to some studies, Earth's temperature during the last ice age was only around 4 °C colder than in the late 19th century.

Did you know?

Levels of carbon dioxide (CO₂) in the atmosphere are higher today than at any time during the last 800,000 years.



The carbon cycle: always on the move

Carbon is everywhere and in all living things – including you! But carbon does not stay in one place – it is constantly moving from one part of the planet to another and changing form. For example, carbon exists in the air mainly as a gas (carbon dioxide, or CO₂) which is absorbed by plants, including trees, and the oceans.

On land, animals, including us, take in carbon when they eat plants and breathe it out during respiration. When plants and animals die, their remains decay and decompose, creating carbon which is absorbed back into the Earth. The carbon cycle has kept the proportion of the gas in the atmosphere more or less stable for thousands of years.

However, this fine balance is being upset by human activities that either release CO₂ faster than it can be removed naturally, or reduce natural stores of carbon such as through deforestation of tropical rainforests. This increases the amount of CO₂ in the atmosphere, and because CO₂ is a greenhouse gas, this causes the Earth's temperature to increase.

Is the hole in the ozone layer responsible for climate change?

No! Ozone is a very useful gas high up in the Earth's atmosphere that absorbs harmful ultraviolet radiation from the sun. When scientists realised that man-made gases used in fridges and aerosols were making a hole in the ozone layer, the international community set about phasing them out. An agreement called the Montreal Protocol was drawn up to gradually reduce the use of these dangerous substances called chlorofluorocarbons (CFCs).

Efforts have been so successful that the ozone layer is on track to recover by the middle of the 21st century. Unfortunately, the CFCs – and their successor substances – were eventually replaced by fluorinated gases, known as F-gases. These have no effect on the ozone layer but are powerful greenhouse gases. Once again, the world is taking action: in October 2016, the 195 countries that signed the Montreal Protocol agreed to limit their use of these harmful gases. The EU is now leading the world in restricting their use and finding alternatives to them. By 2030, EU emissions of F-gases will be cut by two-thirds compared to 2014 levels.



Did you know?

Without the greenhouse effect, the average temperature on Earth would be a chilly -18 °C instead of the comfortable 15 °C it is today – far too cold for plants and animals, including us, to survive!

Fossil fuels – like coal – are the remains of ancient plants and animals buried deep in the ground for millions of years that have turned into substances that can be used as fuels.



Did you know?

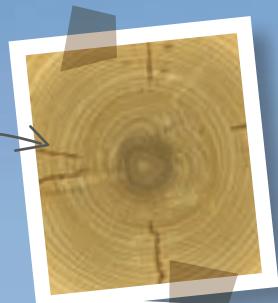
Did you know that the European Union has its own satellite programme for observing the Earth? It's called Copernicus and it's the most advanced system in the world for monitoring the planet. Copernicus is made up of six families of satellites – 'Sentinels' – which beam down high-definition images of land and sea. The images can be used by anyone, for free, for many purposes including tracking changes in the climate and environment.

Our carbon footprint measures the impact we have on the planet in terms of the amount of greenhouse gases we produce in our daily lives, for example, how much fuel and power we use or is needed to make the things we use. Check out some tips for making your carbon footprint smaller on page 26.

Measuring change

Samples of ice taken from deep below Antarctica contain bubbles of air from 650,000 years ago. They tell us about greenhouse gas levels in the past, and reveal that concentrations of CO₂ and methane in the atmosphere were much lower than they are today.

Tree rings are a record of a year's growth. Scientists study rings in very old trees to find out how the climate has changed over time. For example, rings are thinner when the weather is cold or dry.



The Mauna Loa Observatory in Hawaii, USA, has been measuring CO₂ levels in the atmosphere since 1958. Measurements taken from this remote location, where the air is undisturbed, are a good indicator of global CO₂ levels.



Satellite images can be used to show changes in Arctic sea ice cover over a period of time.



Well below 2 °C

Governments have agreed that to prevent the most severe impacts of climate change, the increase in the global temperature must be limited to well below 2 °C compared to the level in pre-industrial times (before the Industrial Revolution). This is because scientists believe that beyond this point the risk of irreversible large-scale changes increases dramatically. Countries have also agreed to try to limit warming to 1.5 °C, as this would significantly reduce the risks and the impacts of climate change. These objectives were agreed under the United Nations Framework Convention on Climate Change (UNFCCC) – the international agreement to address the climate challenge (see page 24).

Sorting the science

Every 6 or 7 years, an important scientific body called the Intergovernmental Panel on Climate Change (IPCC) releases a report on scientific evidence on climate change. The world's most influential and respected climate scientists contribute to this. They assess tens of thousands of scientific papers to update the world on the state of the climate plus options to tackle global warming and the changes it brings.

The IPCC's most recent assessment report, published in stages in 2013 and 2014, involved thousands of authors and editors from more than 80 countries. The report shows there is at least a 95% certainty that human activities are the main cause of climate change. However, it also says that it is not too late to prevent dangerous climate change but the world must act fast to cut greenhouse gas emissions.

TOP TIP

Get your parents to check the labels when they buy a new fridge or air-conditioning unit, to make sure they are energy efficient and are not harmful to the ozone layer.

Ask the scientist



Did you know?

The Intergovernmental Panel on Climate Change and former US Vice-President Al Gore were jointly awarded the Nobel Peace Prize in 2007 for their work on climate change.



WHAT'S THE DIFFERENCE?

Global warming describes the current rise in the Earth's temperature. It is just one feature of climate change.

Climate change refers to the many different effects of global warming on the Earth's climate system. These include rising sea levels, melting glaciers, changing rainfall patterns, increased frequency of extreme weather (such as flash floods and heatwaves), changing lengths of seasons and changing crop yields.



Dr Jolene Cook climate scientist



How serious is climate change?

Our planet is warming fast. Human activities are causing this change and we are beginning to see the consequences all over the world.

The more we disturb the climate, the greater the risks of dangerous changes and the harder and more expensive it will be to limit future changes and adapt to the unavoidable impacts. The average temperature of the Earth's surface could rise by 4°C or more above pre-industrial levels before the end of this century if we don't take urgent action to reduce greenhouse gas emissions.

How does science help in the fight against climate change?

Science is where it all starts. It helps us understand the changes we're experiencing now and those that could happen in the future, depending on our actions today and over the coming decades. Science provides the solid evidence that guides policy-makers and enables them to make informed decisions on the best course of action.

What can we do about climate change?

Unfortunately, there will be some impacts of climate change that we won't be able to avoid and we will have to adapt to those, but it's still important that we limit the scale of future impacts. The good news is that there is a lot we can do. It's not just up to politicians to take action. Businesses and industry, communities and individuals also have a responsibility to act. As individual citizens, we can all do our part by making smart choices like eating less meat and more locally-grown fruit and vegetables, saving energy and cycling or walking instead of travelling by car (especially for short journeys). The great thing is that many of these actions are also good for our health and our wallets.

A changing world

The effects of climate change are being felt on all continents across the world and are predicted to become more frequent and more intense in the coming decades. Different countries and regions face different problems. These changes have the power to transform our world, affecting food and water supplies and our health. The bigger the problems, the more difficult and expensive it will be to solve them – which is why taking early action to deal with climate change is the best option.



In August 2017 an intense heatwave hit Europe, with temperatures rising above 40 °C in several countries, causing wildfires and droughts as well as a number of deaths.

Feeling the heat

The world is experiencing more hot days and fewer cold days, with heatwaves predicted to become more frequent and last longer. Long periods of unusually hot weather can be dangerous, causing health problems such as heatstroke, and even death. A warmer planet can also lead to water shortages and droughts. We are already experiencing this in Europe, particularly in southern parts. A lack of rain means trees and other plants become very dry and can catch fire easily, resulting in destructive wildfires.

Food for thought

Searing heat and a lack of water are a disastrous mix for crops and for world food supplies. Plants need water to survive and, without plants to eat, livestock such as cattle starve too. When the top layer of soil in a farmer's field dries out it becomes dusty and blows away, taking with it vital nutrients the plants need. The result is less food, which is a big problem because the world's population is set to increase from around 7.5 billion today to 9 billion by 2050 – so we will need more food, not less.

Our food supplies are also threatened by negative effects of climate change on bees and other pollinators. All of this means that we need to prevent climate change as much as we can, while adapting our agriculture to deal with a changing climate.



Did you know?

The United Nations Food and Agriculture Organisation estimates that of the 100 or so types of crops that provide 90 % of food worldwide, 71 are pollinated by bees!

Examples of extreme weather events in 2016



Wild storms

Global warming is being linked to wilder, more damaging storms. Hurricanes, typhoons and cyclones are different names for the violent storms that form over warm bodies of water, like the Pacific Ocean or Caribbean Sea, when there is a lot of warm, wet air in the atmosphere. On land, the fast, spiralling winds can uproot trees, destroy buildings and overturn vehicles.

The map above shows some examples of extreme weather events in 2016. In the future, we can expect these kinds of events to become more frequent as a result of climate change.

Did you know?

Between 1900 and 2015, over 30,000 natural disasters occurred worldwide, causing around €6 trillion worth of damage.

Flood alert!

Heavy rain causes floods when it runs off land and swells rivers and reservoirs so they burst their banks. The impact can be extreme in cities, where water cannot soak into concrete and tarmac. After the flood waters have subsided, the clean-up is time consuming and expensive.

In 2017, severe flooding in South Asia killed more than 1,000 people and forced millions from their homes.

Wildlife on the move

Many land and sea species have already moved to new locations. Some will be at greater risk of extinction without action to limit climate change. Changes in the climate also mean that some insects that previously lived in one region are now invading new places. Some mosquitoes transmit diseases such as yellow fever, dengue fever, chikungunya and malaria when they bite. Originally, these insects lived only in tropical places, but some live and breed in southern Europe today because the climate is warmer.





Did you know?

Scientists believe that oceans are acidifying faster today than at any time in the last 300 million years.

Warmer oceans

Climate change is also having a big impact on the world's oceans. Oceans have absorbed more than 90% of the additional heat from atmospheric changes caused by our activities over the past 40 years. While this means that the atmosphere is not warming as much as it could, it is warming the oceans. Species like fish, shrimp, whales and plankton (tiny organisms eaten by fish) respond to the warmer water by migrating towards the poles where it is cooler. However, tiny shrimp-like krill, eaten by fish and whales, breed best in cold water. Warmer water means fewer krill and fewer fish. Coral reefs, which are home to over 25% of all marine life and where many fish breed, also struggle to survive when the water gets too warm.

The oceans absorb around a quarter of the carbon dioxide we release every year, and rising levels of CO₂ mean greater amounts of the gas being stored in the seas. This helps to regulate the climate but is changing the chemical balance in the oceans. The waters are becoming more acidic, which is harmful to marine life, in particular to shell-building sea creatures like lobsters, oysters and corals. This is of particular concern as they are at the beginning of the food chain for a number of species.



Did you know?

Oceans absorb about 4 kg of CO₂ per person per day.

Rising sea levels

Between 1901 and 2010, the average sea level across the world rose by 19 cm. There are two main reasons for this: the first is that as water gets warmer it expands and takes up more space. The second is that global warming is causing glaciers and the giant ice sheets in Greenland and Antarctica to melt faster, adding more water to the oceans. The resulting rise in sea levels causes floods on low-lying coastlines and is threatening to submerge some islands completely. Higher sea levels can

also harm important coastal ecosystems like mangrove forests, which are safe havens for young fish and other wildlife, protecting them from storms that erode coasts. And when salt water soaks into land, it ruins drinking water supplies and spoils soils, making it impossible to grow crops.



Did you know?

The city of Venice sank by more than 20 cm in the 20th century.



Did you know?

Only 2.5% of water on the Earth is fresh water. Of this, over two-thirds are frozen in glaciers and polar ice caps.

So, use water wisely!



Sinking city

The wooden piles on which Venice is built are disappearing into the mud in the shallow lagoon in the Adriatic Sea. With the lagoon waters rising by about 2 mm each year, the combined effect is a 4-mm-a-year rise in the sea level. Frequent floods damage the historic buildings, cover paths and affect tourism. However, a project is underway to install 78 huge steel gates to protect the city from floods up to 3 m. It should be completed in 2018. In addition to the gates, Venice will receive extra protection via the restoration of salt marshes, which act as natural barriers against sea level rise.

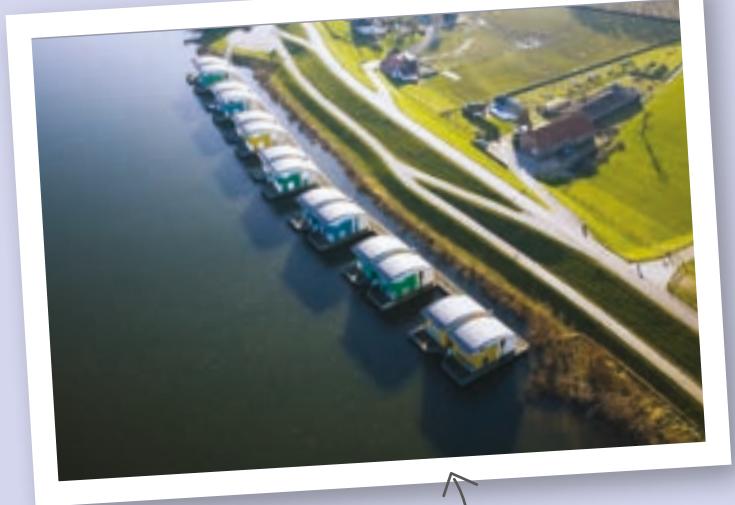
Polar food threat

The largest polar predators, like leopard seals and polar bears, need tiny algae that grow on the underside of ice to survive. These algae are the start of almost all polar food chains. Plankton eat the algae, small fish and krill and other creatures eat the plankton, and so on up the food chain to fish, penguins and seals. With less Antarctic and Arctic sea ice, these food chains are breaking down.



Changing with the climate

Whether we like it or not, climate change is a part of our lives. Even if we could eliminate all our emissions tomorrow, the planet would still have to recover from the greenhouse gases that are already in the atmosphere. This means we need to adapt to the changes happening now and plan for the future to prevent or limit the damage that climate change can cause.



Adapting to rising waters

Floating houses: in Maasbommel, in the low-lying Netherlands, some residents are preparing for more frequent floods by living in amphibious homes that are anchored to the land but designed to rise when the water rises.

Building barriers: constructing manmade sea walls and dykes helps keep the water out, as do sand dunes. These can be planted with tough grasses whose roots help stop the dunes being washed away.

Green sponges: flood plains (natural areas that drain into rivers) can act as sponges, absorbing excess rainwater. Countries along the Danube and Elbe rivers are restoring former plains by giving rivers more room.

Water wise

Water conservation: some people are finding novel ways to save water, for example by installing 'grey-water' systems in homes and businesses (such as hotels) that reuse water from washing to flush toilets. And innovative farmers are using trickle irrigation at night so that plants get water straight to their roots without it evaporating in the heat of the day.





Taking action to prevent floods can save lives and money: each euro spent on flood protection could save six euros in repair costs!

Tackling the heat

Smart planting: some farmers are planting more crops among trees for shade to cope with the hotter, drier climate. In cities, landscapers are introducing drought-tolerant flowers and shrubs in parks and along roadsides that can cope with warm, dry conditions.

Green walls and roofs: a number of cities are growing plants on walls and roofs to absorb heat and help control the temperature inside buildings when it is hot. They also absorb water and reduce run-off during storms. In some countries, such as France and Denmark, the law requires all new buildings to have green roofs!

Plans to tackle climate change

Many EU countries have already prepared national plans to address the impacts of climate change. As different regions will face different problems, these plans have to be adapted to regional and local situations. In agricultural areas, for example, this might include investing in storage facilities to water crops in a drought, while in cities it may mean creating more parks to keep people cool during heatwaves.

Preparing for extreme weather in Copenhagen

In July 2011, it rained in Copenhagen... but this was no ordinary shower. Around 15 cm of rain fell in just 2 hours. The city's drains could not cope with the volume of water and buildings and roads were soon flooded. Two of Copenhagen's major hospitals were threatened with closure because of flooding and power cuts. The event made the city's leaders think about drawing up a plan to protect the city from future extreme weather events.

As a result, a 'Cloudburst Management Plan' was developed which not only helps manage rainwater better but is also improving the quality of city life. The scheme even includes new bicycle routes that also serve as storm-water channels.

Making a difference

The most important challenge we face today is to stop climate change getting worse. There is a lot we can – and must – do to make our world less energy-consuming and more climate-friendly. This means finding solutions that help us cut greenhouse gas emissions. As well as being good for the planet, it is also good for our health (less pollution), the security of our energy supplies and the economy, as it creates new jobs.

Renewable energy

One way to cut greenhouse gas emissions is by using more renewable energy, such as wind and solar power. These provide endless supplies of energy, unlike fossil fuels which will run out one day. And unlike burning fossil fuels in power stations, generating electricity from renewables produces little to no greenhouse gases.

The EU is a world leader in renewable energy technologies, and many EU countries are already generating a lot of their electricity from renewables. Getting more of our energy from renewable sources not only cuts emissions but also means spending less on coal, oil and gas imports from outside the EU. In 2015, nearly 17 % of the EU's energy came from renewables. The plan is to raise this to 20 % by 2020 and at least 27 % by 2030.

Reduce subsidies to fossil fuels

There is considerable public financial support for the production and use of fossil fuels, which receive almost twice as many subsidies as renewables. Renewable energy would be even more competitive if fossil fuels received less support.

New ideas on the horizon

Finding sustainable solutions to tackle climate change requires new scientific research and discoveries. Horizon 2020, the EU's biggest ever research and innovation programme, has nearly €80 billion of funding available between 2014 and 2020 to help researchers and innovators develop ideas that could be applied in the real world. A large chunk of the funds (at least 35 %) will be spent on climate-related projects. The EU is also supporting the development of innovative low-carbon power plants (see page 20).



Did you know?

More than 4 million people in work in the EU's green sector.



Did you know?

The EU imports more than half its energy – at a cost of around €700 million a day!

EU countries are working hard to cut greenhouse gas emissions, to help the EU meet its overall reduction targets:
-20 % by 2020 and -40 % by 2030 compared to 1990, with a long-term goal of at least -80 % by 2050.

Sustainable shopping

In 2016, the city of Modena in Italy teamed up with environmental technology consultants to renovate a large supermarket, under an EU-funded project to modernise the area and make it more environmentally sustainable. Thanks to innovative solutions such as solar tubes that channel direct (free!) sunlight into the supermarket, the building now uses much less energy and has lower operating costs.



Did you know?

Between 2014 and 2020, 20 % of the EU budget – as much as €180 billion – will be spent on climate-related action.

Solar cycle path

In 2014, an unusual cycle path was built in the Netherlands: one that generates solar power. The 72-metre path in Krommenie, near Amsterdam, has built-in solar cells that convert sunlight into electricity. In the first year, more than 300,000 cyclists rode along this trial cycle path, which generated enough electricity to power three homes for a year!

Hot spot

Geothermal energy is hot stuff! Some countries can use energy stored below the Earth's surface to warm pipes that heat homes and water, or to drive a generator to produce electricity. Many spas in Hungary use geothermal energy to heat water for leisure activities, and the EU is supporting innovative geothermal power projects there, too.



Did you know?

Renewable energy now provides nearly a quarter of all the world's electricity.



Did you know?

Greenhouse gas emissions in the EU were reduced by 23 % between 1990 and 2016.

The green sector: jobs connected to protecting and preserving the environment, for example in water and waste management, recycling and renewable energy.

Driving change

What kinds of transport do you use? Cars, trains, buses, boats and planes that burn oil-based fuels are responsible for around a quarter of EU greenhouse gas emissions. Fortunately, new technologies are helping to make transport more climate-friendly. By reducing traffic and pollution, they are making our cities cleaner, too.

Emissions from the global shipping industry amount to around 1 billion tonnes of CO₂ a year, accounting for roughly 3% of the world's total greenhouse gas emissions.

The EU has adopted laws for monitoring emissions from large ships using EU ports.



Did you know?

Cooking oil, fruit peelings and vegetable scraps can be converted into car fuel.

On the road to cleaner transport

Over 70% of transport emissions in Europe come from road transport, but thanks to EU CO₂ emission standards, vehicles are becoming less polluting. The EU has some of the toughest standards in the world and is continuously working to strengthen them. For example, in 2021, CO₂ emission standards for new cars in the EU will be more than 20% stricter than in 2015. Many countries including the US, Canada, Japan and China have also introduced CO₂ standards.



Hybrid cars have a fuel engine for long trips and a battery-powered electric one that kicks in on short, stop-start journeys.

Battery electric vehicles do not have a fuel engine at all – and when powered by renewable electricity they do not emit any CO₂.



Did you know?

Over 90% of Europeans think climate change is a serious problem. What do people in your country think? Find out here: https://ec.europa.eu/clima/citizens/support_en



Aviation is one of the fastest-growing sources of greenhouse gas emissions. The EU has laws in place to reduce aviation emissions from all flights within Europe and is working with the international community to develop measures that cover the whole world.

Climate change and the city

Cities are big contributors to climate change – not so surprising, since that is where around 75 % of Europeans live today. As hubs of activity, they are a big source of emissions. Urban areas account for 60-80% of global energy use and around the same share of CO₂ emissions, so they have a large carbon footprint. Urban areas are also particularly vulnerable to the inevitable and increasing adverse impacts of climate change, such as floods, heat waves, coastal erosion and forest fires. For instance, the higher proportion of artificial and impervious surfaces in urban areas prevents excess rainwater from draining and storing heat. But as well as being part of the problem, cities can also be part of the solution. Cities across the EU are changing for the better, thanks to the innovation and vision of local leaders who are helping reduce emissions and adapt to climate change impacts through smart planning and clever schemes.



Did you know?

The EU aims to cut emissions from transport by at least 60 % by 2050.

TOP TIP

New cars sold in EU countries have a label showing their fuel efficiency and CO₂ emissions, so help your family choose a car with low fuel consumption.

Accessible cities

Car-free days are a great way of exploring alternative ways of getting around town. This is one of the events that take place in many cities during European Mobility Week, a campaign supported by the European Commission which is organised every September. In 2016, more than 2,400 cities from over 50 countries took part. And despite the title, cities outside the EU also participated – including some in Japan, Argentina, Mali and Mexico. Mobility Week gives people the chance to try out alternative forms of transport and encourages cities to introduce practical measures. More than 8,000 permanent measures, such as carpooling and bicycle-sharing schemes, have been introduced thanks to the campaign.



Did you know?

Cities cover around 2 % of the Earth's surface but are home to more than half the world's population.

Mayors with a mission

Cities across Europe have made a voluntary commitment to take measures to reduce greenhouse gas emissions and prepare for the impacts of climate change. They have joined the Covenant of Mayors, a European Commission scheme to encourage cities to cut emissions and adapt to climate change. Cities are increasing energy efficiency and the use of renewable energy sources and sustainable transport, as well as 'climate-proofing' infrastructure, developing urban green areas and adapting civil protection, amongst other initiatives. In 2016, the Global Covenant of Mayors for Climate and Energy was launched to accelerate climate action at local level all over the world. Now over 7,000 cities from 119 countries and 6 continents are working together for the climate. Is your city – or the city closest to you – on board?

Save energy, save money

More efficient buildings and appliances can save huge amounts of energy, emissions and money. A large amount of energy used by households in the EU goes on heating homes. Triple-glazed windows, good insulation, and roofs covered with plants that help to keep buildings cool are just some of the ways to reduce the carbon footprint of our homes, schools and offices. More efficient appliances, like refrigerators and washing machines, are expected to save European households around €465 a year on their energy bills by 2020.



The EU has pledged to improve energy efficiency by 20% by 2020 and is aiming for at least 30% by 2030.



Did you know?

By the end of 2020, all new buildings in the EU will have to be nearly zero-energy buildings.

European Green Capitals

The European Green Capital award is given to cities that are committed to becoming more sustainable. Essen in Germany took the honours for 2017, while Nijmegen in the Netherlands holds the title in 2018. The aim is to reward cities that have been achieving high environmental standards in the long-term, to encourage cities to commit to ambitious goals and to motivate other cities by creating a space for cities to inspire each other to share ideas and experiences.



Essen

Sustainable: able to ensure we have and continue to have the basic resources needed to survive, such as water, food and energy. Living sustainably means taking care of the planet and living within the limits of what it can provide.



Did you know?

Today, new buildings use half the energy they did in the 1980s.

Be wise about waste

The next time you put something in the bin, think about it. On average, each of the 500 million people living in the EU throws away around half a tonne of household rubbish each year! Even though the amount of waste being recycled is rising, a lot still ends up in landfill sites. As waste rots, it releases huge amounts of methane – a powerful greenhouse gas – into the air, contributing to climate change. Today, better waste management means more energy is being recovered, and EU legislation on landfilling is making a big difference. Preventing waste is becoming more important as the global population increases and we are eating away at our finite supply of natural resources.

What a waste!

Imagine returning from the supermarket and throwing a third of your shopping straight into the bin. That is roughly the proportion of food produced globally that is lost or wasted every year. The European Commission is working to help spread the word about shopping wisely, the meaning of dates on food labels, and using leftovers. EU guidelines were adopted in October 2017 to make it easier – where safe to do so – for surplus food to be donated to food banks or used for animal feed. Let's all work together to reduce the estimated 90 million tonnes of food currently wasted each year in the EU!

Think twice before upgrading gadgets

Waste electrical and electronic equipment (WEEE) is the fastest growing category of waste in the EU. WEEE is full of plastics and metals, including harmful ones like mercury and valuable ones like gold used in circuit boards. The EU has set targets for recycling electronics to save resources and restrict the hazardous materials manufacturers can put into electronics, protecting recyclers and the environment.



Cleaner industries

Factories that make the products we use and power stations that produce the electricity we need to power our homes, schools and offices release CO₂ and other greenhouse gases (GHGs).

To reduce these emissions, the EU created the world's first and biggest system to limit the amount of GHGs that can be emitted and make companies pay for the emissions they release into the atmosphere.

The EU Emissions Trading System (EU ETS) was launched in 2005 and is a key part of the EU's climate policy. It covers over 11,000 power stations and factories – and also includes emissions from flights within the EU.

The system limits the annual amount of GHGs that European companies can emit. This limit goes down every year and, because

companies must report their emissions, we can be sure that the system is reducing pollution. The more GHGs companies emit, the more they have to pay, so it is in their interest to emit as little as possible – for example by investing in cleaner technologies which produce less CO₂.

Today, similar systems are being set up around the world, for example in China, South Korea and California.

For sectors that are not covered by the EU Emission Trading System, like road transport, construction, agriculture and waste, GHG emissions must still be reduced, as all EU countries have a national target for cutting emissions in these sectors.

Supporting new technology

The EU is helping to develop innovative low-carbon technologies through a special fund raised through the EU Emissions Trading System. A total €2.1 billion has been allocated to support 38 projects across Europe. Some of the projects are focused on renewable energy, such as offshore wind turbines, geothermal energy and biofuels, others on new technology that captures carbon and stores it underground.

The EU and its Member States will continue to support research and development for low-carbon innovations through the Innovation Fund and EU research Framework Programme. The key objective is to turn low-carbon ideas into practical solutions in many areas of our life. Just imagine buildings or cars in the future using zero-carbon steel, or cars functioning as mobile batteries that could help power houses!

Storing carbon underground

Carbon capture and storage is a technique which traps carbon dioxide emitted by power plants and industrial factories, compresses it and then transports it to a suitable storage site deep under the ground. This has significant potential to help the fight against climate change in Europe and around the world: underground sites can store virtually all of the carbon dioxide for hundreds, even thousands of years. However, the technology is currently very expensive and there are only two commercial projects operating in Europe. Therefore, the EU is providing seed funding to support carbon capture and storage projects and has created rules to ensure the technique is used in an environmentally-friendly way.



100 % renewable energy by 2030?



In Sweden's Kalmar county, local authorities and energy companies are working together to try to make the area totally fossil fuel-free by 2030. Doing this will also ensure sustainable development and create jobs. Actions include buses that run on 100% renewable energy, car-sharing initiatives (some already using electric cars), producing fuel from food waste and getting energy from solar and wind farms.



Concrete action on CO₂ emissions

Concrete is essential for making buildings, roads and bridges but producing its basic ingredient, cement, also generates large amounts of CO₂. Making one tonne of cement releases one tonne of CO₂ as most cement is made by heating limestone to high temperatures. The cement industry is now starting to make more sustainable concrete by investing in modern technology and using material that emits less CO₂.

Jobs in the pipeline

Fancy an exciting career working with the latest cutting-edge technologies? Today, there are many jobs in areas like renewables that did not exist 10 years ago. Some EU countries have even set up special training centres for the operation and maintenance of offshore wind turbines. Imagine climbing up an 85 m tall wind turbine tower to fix an electrical fault or service the oil filter – a long way from the shore and working in stormy seas and gusting winds!

Forests: our climate protectors



Did you know?

An area of tropical forest about the same size as Greece is cut down every year.

Forests play a unique role in climate change. On one hand, they release greenhouse gases when trees are cut down or decay or when the soil underneath is disturbed, contributing to global warming. On the other hand, forests capture greenhouse gases through photosynthesis and they also help to cool the planet. This makes them crucial in the fight against climate change.

How can we ensure forests have a positive effect? Sustainable management of forests, whereby new trees are planted to replace old ones or those that have been cut down, can be an effective solution. EU countries are working together to improve the role of forests in EU action against climate change.

Humans are cutting down the world's forests at an alarming rate: up to 80% of tropical deforestation is done to clear land for farms, but trees are also being cut down to make products such as timber and paper or to build roads and mines. As well as speeding up climate change, deforestation destroys the habitats of forest animals and changes rainfall patterns, causing droughts.



Protecting global forests

A scheme called REDD+ (Reducing Emissions from Deforestation and Forest Degradation plus conservation) helps tropical countries adopt more sustainable practices by paying people in developing countries to preserve their forests. It does this by calculating the value of carbon prevented from entering the atmosphere by not cutting them down, and converts this into funds for climate-smart use of forest land. REDD+ money has been used in more than 40 countries, for example, on forest monitoring (measuring trees), improving

fire-service response to forest fires, and developing the agro-forestry industry (a mix of farming and forestry). It is a careful balancing act between conservation and protecting the interests of those who live in and rely on the forest for food, water and other resources. EU member states and institutions have so far contributed over €1 billion to activities related to REDD+ in Africa, Asia and Latin America.

Soil's super carbon store

Most of us consider the soil beneath our feet as just dirt, but it plays an essential role in regulating the world's climate. Soil stores carbon, mainly in the form of organic matter, and is the second largest carbon pool on Earth, after the oceans. It is estimated that 0.1 % of the carbon currently stored in European soils is the equivalent of the annual emissions from as many as 100 million cars. The ability of soil to keep hold of the huge amounts of carbon it stores has been weakened in recent decades, largely due to unsustainable land management practices and changes in land use. However, good forestry practices and good land management can help maintain or even increase the amount of carbon held in the ground.



Did you know?

Soils are home to over a quarter of all living species on Earth.



Fighting climate change around the world



“Our planet cannot be saved unless we leave fossil fuels in the ground where they belong. An upheaval and massive change is required, now. One that leads to a new collective consciousness. A new collective evolution of the human race, inspired and enabled by a sense of urgency from all of you. We all know that reversing the course of climate change will not be easy, but the tools are in our hands – if we apply them before it is too late.”

UN Messenger of Peace Leonardo DiCaprio addressing world leaders at the Paris Agreement signing ceremony, New York, April 2016

Global efforts to fight climate change really began in 1992, when countries around the world signed an international treaty called the United Nations Framework Convention on Climate Change (UNFCCC).

World unites for climate action

Some countries, including all EU Member States, adopted legally-binding targets to limit greenhouse gas emissions in the years up to 2020, under an agreement called the Kyoto Protocol. But even with pledges from other countries to take voluntary action, this was not going to be enough to avoid dangerous climate change.

So negotiations were held on a new agreement that would require action by all countries round the world – and on 12 December 2015 in Paris, France, almost 200 governments agreed on the first ever universal, legally-binding deal on climate change.

The historic **Paris Agreement** sets out an action plan to limit global warming to less than 2 °C above the temperature of pre-industrial times. Governments also agreed to try to limit the global temperature rise to maximum 1.5 °C, as scientists around the world agreed that this



Did you know?

Almost all countries in the world are members of the United Nations Framework Convention on Climate Change – that's 197, including all EU Member States and the EU as an organisation.

would significantly reduce risks and impacts of climate change. The Agreement's other key point is to strengthen the ability of countries, especially less developed ones, to deal with impacts that do occur.

But citizens and businesses have an important role to play, too. All round the world, cities and towns, companies, investors and individuals are already taking action to help keep our climate safe and predictable.



Did you know?

In 2016, the EU was responsible for less than 10 % of global CO₂ emissions, while China accounted for around 29 % and the US 14 %.

A sign of global commitment

On 22 April 2016, 174 countries formally signed the Paris Agreement in New York – by far the largest number of countries ever to sign an international treaty on a single day. For the Paris Agreement to become law, at least 55 countries representing at least 55 % of global emissions had to formally ratify it. The EU formally ratified the deal on 5 October 2016, triggering its entry into force on 4 November, less than a year after it was adopted.

Milestones

1988

The Intergovernmental Panel on Climate Change (IPCC) is created, bringing together thousands of scientists to assess scientific evidence on climate change and its impacts

1992

Almost all countries in the world join the United Nations Framework Convention on Climate Change (UNFCCC), the main international treaty for fighting climate change

1997

The UNFCCC adopts the Kyoto Protocol, the world's first greenhouse gas emissions treaty

2005

The EU launches its Emissions Trading System (see page 20)

2007

The EU adopts its 2020 climate and energy package, with three key targets: reduce EU greenhouse gas emissions by 20 % compared to 1990; increase the share of renewables to 20 % of EU energy use; and improve energy efficiency by 20 %

2009

A UN climate change conference in Copenhagen ends without an overall agreement on binding emissions cuts

2014

100 world leaders meet for a UN climate summit in New York; the IPCC's 5th Assessment Report on climate change declares that the below 2 °C objective is still within reach; the EU adopts its 2030 climate and energy package, including a target to reduce EU greenhouse gas emissions by at least 40 % compared to 1990

2015

A new global climate treaty – the Paris Agreement – is agreed. 195 countries commit to reducing greenhouse gas emissions, to limit the increase in global temperature to well below 2 °C above pre-industrial levels

2016

The Paris Agreement enters into force on 4 November 2016

Funding change

Poorer and more vulnerable nations need help cutting their emissions and adapting to the impacts of climate change. The EU provides the largest amount of public money to developing countries to fund climate projects. In 2016, for example, the EU and its member countries collectively provided €20.2 billion to help them tackle climate change. EU Member States also contributed almost half of the \$10 billion pledged to the UN's new Green Climate Fund, which is also supporting developing countries.

Over to you!

Make smart choices

One way you can make a difference is by making smart choices.

» Cleaner transport: Walk, cycle or use public transport whenever possible. Try to avoid flying if you can.

» Smarter energy use: Don't heat rooms more than necessary. Use energy-efficient light bulbs.

» A green diet: Eating plenty of fruit and vegetables and less meat is climate-friendly and healthy too. Avoid eating too much beef. Try not to waste food.

» Be picky about packaging: plastic packaging creates a lot of waste and is often difficult to recycle. Try to avoid packaged products and take a reusable bag to carry your shopping home.

What about you? Do you feel concerned about the threats from climate change?

Are you passionate about the need to reduce carbon emissions? A good place to start is by making changes in everyday actions that reduce your carbon footprint. No action you take is too small.



Did you know?

The average carbon footprint of a European is nearly 7 tonnes of CO₂ a year.



TOP TIPS

- » Leaving a TV or computer on standby mode still uses up some energy. So does plugging in your mobile phone overnight – and even when your charger isn't connected to your phone, it is draining electricity! Switching off and unplugging devices can reduce your house's annual energy costs by as much as 10%.
- » Turning down the thermostat by 1 °C could reduce your family's energy bill by 10% – and setting a lower temperature at night and when you are out of the house will lower the bill even more.
- » Turn off the tap while brushing your teeth – this will save many litres of water. Also, did you know that taking a shower instead of a bath uses up to four times less energy as well as much less water?

Carbon offsetting

Carbon offsetting is when you calculate the amount of carbon an activity – for example a long-distance plane ride – releases and then pay an organisation to reduce emissions elsewhere, or in some cases plant trees. It sounds good, but some people say it is better to try harder to create less carbon in the first place. What do you think?

Reusing, repairing and recycling waste saves scarce natural resources, energy and CO₂ emissions.



Young Europeans lead the way

Why not turn the climate challenge into a fun competition at school? Ask your teachers about organising a league, in which the most climate-friendly class or group wins a prize.

Here are a few ideas: planting a school garden, litterless lunches, a 'cycle to school' campaign, a book swap.

Did you know that you can recreate the greenhouse effect with just a glass jar and two thermometers?



Speak up!

Why not get involved yourself?

You might come up with an idea that could change the future!

Get your arguments ready and join the debate on climate change at school and at home. And if you feel passionate enough, why not start campaigning for climate action?

➤ Talk about the issues with friends and family and get them involved. You will be able to explain the topics to them in a way that really makes an impact – and showing them how much you care may make them care more, too.

➤ Encourage your family to make changes at home and in their daily lives.

➤ Find out what climate actions your school is taking.

➤ Write to mayors, politicians and business leaders to encourage them to take action.

And remember these two things:

1.

It is not too late to fix the climate

2.

You can make a difference – we all can!



Tell us what you think about climate change and what you're doing about it at:

ec.europa.eu/clima/citizens/youth/

For more climate-friendly tips, visit:
ec.europa.eu/clima/citizens/tips/

Check out our latest films at:
youtube.com/EUClimateAction



ERIK – 11 – Danish/Spanish

What needs to be done to combat climate change?

We need to stop cutting down trees and start replanting them. Not only in the Amazon but also in Europe and Asia, Africa – everywhere. Because trees give us oxygen.

What are you doing to fight climate change?

I don't turn on the light if I don't need to. Saving water is also very important, so I take showers instead of baths. I try to use as little energy as possible. One person doesn't change anything, but if everyone contributes, we can change everything. We need people to understand that, and once everyone does, we can fight climate change together.

MAJA – 13 – Slovak/Slovene

How is climate change affecting our planet?

Temperatures are changing very rapidly, and now the four seasons are blending. Summer, winter, spring and autumn are all mixed up. We never know what the temperature will be, and there are a number of terrible floods, disasters and droughts.



What are you doing to fight climate change?

I personally walk to school every day, and I try to go by car as little as possible. I travel on foot, by tram, and so on. I also separate my waste, such as plastic and paper, for recycling. In my opinion, if everyone did this, the situation would change and improve.



PAOLO – 16 – Italian

How is climate change affecting your life?

I have a responsibility, or rather, I feel that it is my duty to react now, and do something to ensure I can live my life in the future.

What needs to be done to combat climate change?

There are minor things that everyone can do. However, the major things, the important decisions, have to be made on a political level, and that's not up to us. Or rather, it is up to us, because we vote for the politicians. We have to vote for those who will change the current situation.

RAPHAEL – 11 – German

How is climate change affecting our planet?

The problems with climate change are that the polar caps melt, oceans get warmer, and hurricanes and storms can form.

What are you doing to fight climate change?

I myself tell my parents that we should use the car less and ride our bikes more. We also try to save energy by not leaving the lights on.





CAROLINA – 15 – Portuguese

How is climate change affecting your country?

Last year, Portugal endured scores of wildfires caused by climate change. The whole country was affected, and the population lost a lot – not only personally but also culturally speaking. For instance, the Leiria Pine Forest was completely burned down. It had been there for 400 years.

What are you doing to fight climate change?

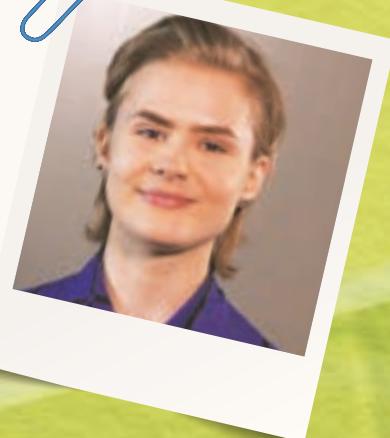
I try to do my best in my daily life. I also take part in a group at school that is raising awareness of climate change, mainly among people in our school. We are working on a video project.

VAPPU – 16 – Finnish

How is climate change affecting your life?

One does not necessarily notice climate change, because it is not a concrete thing – one cannot hold it in their hand and say, "Here is climate change".

Climate change affects my life very much indeed. I think about it every day, especially how much energy I consume. Whenever I see an extra light on somewhere or bad rush hour traffic, I just wonder how all this could affect the future.



JONATHAN – 13 – Austrian

What do you know about the causes of climate change?

Climate change happens because cars, planes and other means of transport emit CO₂, and this CO₂ enters the Earth's atmosphere.

How is climate change affecting our planet?

The ice caps in the North and South Poles are melting because the planet is getting warmer. This brings fresh water into circulation, meaning small islands can be flooded.



- 1 A 2 B 3 A 4 B 5 C
6 C 7 B 8 C 9 B 10 B

Answers to the quiz:



Are you a climate change expert?

1 By how much has the EU committed to cut its greenhouse gas emissions by 2020?

- A 20 % below the 1990 level B 12 % below the 1990 level C 17 % below the 2005 level
-

2 Which of these gases contribute to global warming?

- A Oxygen B Methane C Argon
-

3 Which of the following are causing sea levels to rise?

- A Warming oceans B Heavy ships C Erosion of beaches
-

4 If you are going to visit family at the other end of the country, which is the 'greenest' way to travel there?

- A By car B By train C By plane
-

5 Which of these is not a renewable energy?

- A Geothermal power B Solar power C Coal power
-

6 Through what instrument does the EU limit greenhouse gas emissions from power stations and heavy industrial sites?

- A The Montreal Protocol B The European Timber Regulation C The EU Emissions Trading System
-

7 To reduce risks and the impacts of climate change, the international community has agreed to limit the increase in global temperature to below a certain level. What is this level?

- A 3 °C above the temperature before the Industrial Revolution B 2 °C above the temperature before the Industrial Revolution C 4 °C below the temperature when Leonardo da Vinci was born
-

8 Which of the following does not release carbon dioxide into the atmosphere?

- A Forest fires B Deforestation C Carbon capture and storage
-

9 What proportion of food produced globally is wasted every year?

- A 1/4 B 1/3 C 1/5
-

10 Which of the following is true?

- A It is too late to fix the climate B Everyone can do their bit to fight climate change C Climate change has entirely natural causes
-

