

Energy and climate change



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Energy and climate change

Mitigating and adapting to climate change are key challenges of the 21st century. At the core of these challenges is the question of energy — more precisely, our overall energy consumption and our dependence on fossil fuels. To succeed in limiting global warming, the world urgently needs to use energy efficiently while embracing clean energy sources to make things move, heat up and cool down. The European Union policies play an important role in facilitating this energy transition.

The global climate is changing and that is posing increasingly severe risks for ecosystems, human health and the economy. The EEA's recent assessment 'Climate change, impacts and vulnerability in Europe 2016' shows that Europe's regions, too, are already facing impacts of a changing climate, including rising sea levels, more extreme weather, flooding, droughts and storms.

These changes are happening because large amounts of greenhouse gases are released into the atmosphere as a result of many human activities worldwide, including, most importantly, burning fossil fuels for electricity generation, heating and transport. Combustion of fossil fuels also releases air pollutants that harm the environment and human health.

Globally, the use of energy represents by far the largest source of greenhouse gas emissions from human activities. About  two thirds of global greenhouse gas emissions are linked to burning fossil fuels for energy to be used for heating, electricity, transport and industry. In Europe, too, the energy processes are the largest emitter of greenhouse gases, being responsible for 78 % of total EU emissions in 2015.

Our use and production of energy have a massive impact on the climate and the converse is also increasingly true. Climate change can alter our energy generation potential and energy needs. For example, changes to the water cycle have an impact on hydropower, and warmer temperatures increase the energy demand for cooling in the summer, while decreasing the demand for heating in the winter.

Global and European commitment to action

Global efforts so far to mitigate climate change culminated in the Paris Agreement in 2015. Through the agreement, 195 countries adopted the first-ever universal and legally binding, global climate deal. The target of the agreement — limiting the global average temperature rise to well below 2 °C, while aiming to limit the increase to 1.5 °C — is ambitious and cannot be achieved without a major overhaul of global energy production and consumption.

To support the global climate agenda, the EU has adopted binding climate and energy targets for 2020 and proposed targets for 2030 as part of its overall efforts to move to a low-carbon economy and to cut greenhouse gas emissions by 80-95 % by 2050. The first set of climate and energy targets for 2020 includes a 20 % cut in greenhouse gas emissions (compared with 1990 levels), 20 % of energy consumption coming from renewables and a 20 % improvement in energy efficiency. Based on the current proposals in discussion in EU institutions, the next milestone of 2030 pushes these targets to a 40 % cut in emissions, 27 % of energy coming from renewable sources and a 27 % improvement in energy efficiency (or 30 %, as recently proposed by the European Commission) compared with baseline.

Decline in overall emissions

The measures adopted to achieve these targets are contributing to reducing Europe's greenhouse gas emissions. In 2015, the EU's greenhouse gas emissions were about 22 % lower than their 1990 level. With the exception of the transport, and the refrigeration and cooling sectors, they had decreased in all main sectors. During this period, the largest portion of emission reductions was split almost equally between industry and energy supply sectors.

According to recent EEA assessments on greenhouse gas emissions and energy (*Trends and projections in Europe 2016*), the EU, collectively, is on track to achieve its 2020 targets. The pace of the reductions is expected to slow beyond 2020 and more efforts are needed to meet the long-term objectives. In particular, despite the better fuel efficiency of cars and the increasing use of biofuels, reducing overall emissions from transport in the EU has proved to be very difficult. Some technological solutions, such as second-generation biofuels and carbon capture and storage, are expected to contribute to overall climate efforts but it is unclear whether or not they can be implemented at the scale needed and be viable and truly sustainable in the long term.

Effort Sharing Decision and EU Emissions Trading System

With regard to greenhouse gas emission reductions, one of the cornerstones of the European Union's efforts is the Effort Sharing Decision, which sets binding annual greenhouse gas emission targets for all EU Member States for 2020. The decision covers sectors such as transport, buildings, agriculture and waste, which are responsible for around 55 % of the EU's overall emissions. The national emission targets have been set on the basis of Member States' relative wealth, meaning that wealthier countries are required to cut their emissions more than others, while some countries are allowed to increase their emissions from the sectors covered. By 2020, the national targets will collectively deliver a reduction of around 10 % in total EU emissions from the sectors covered compared with 2005 levels.

The remaining 45 % of the EU's emissions (mainly from power stations and industrial plants) are regulated by the EU Emissions Trading System (EU ETS). The EU ETS sets a cap on the total amount of greenhouse gases that can be emitted by more than 11 000 installations that are heavy energy users across 31 countries ([1]). It also includes emissions from airlines operating between these countries.

Within the system, companies receive or buy emission allowances, which they can trade with others. Heavy fines are imposed on companies emitting more than their allowances. The system-wide cap is reduced over time so that the total emissions fall. By putting a monetary value on carbon, the EU ETS creates incentives for companies to find the most cost-effective emission cuts and to invest in clean, low-carbon technologies.

The European Environment Agency monitors the progress of cutting greenhouse gas emissions covered by the EU ETS. According to the latest data and assessment, these emissions decreased by 24 % between 2005 and 2015 and are already below the cap set for 2020. The decrease was driven mainly by using less hard coal and lignite fuels and more renewables for power generation. Emissions from the other industrial activities covered by the EU ETS have also decreased since 2005, but have remained stable in recent years.

The European Commission has recently proposed to increase the pace of cuts in emissions from 2021 onwards, so that by 2030 the sectors covered by the ETS will have reduced their emissions by 43 % compared with 2005. In the longer term, looking beyond the 2030 targets, EU Member States can achieve greater reductions in greenhouse gas emissions from the sectors covered by the Effort Sharing Decision. Without substantial efforts targeting these sectors, the EU would fall short of reaching its 2050 goal of cutting its emissions to 80 % below 1990 levels.

Targeting sectors and ensuring long-term coherence

The EU's emission reduction efforts linked to the Effort Sharing Decision and the EU ETS are supported by a wide range of policies and long-term strategies. For example, changes in land use, such as deforestation or afforestation, can also affect carbon dioxide concentrations in the atmosphere. To this end, the European Commission presented a legislative proposal in July 2016 to include greenhouse gas emissions and removals from the atmosphere arising from land use, land-use change and forestry in the EU's 2030 climate and energy framework.

Similarly, the growing demand for transport has made it quite difficult to reduce emissions from this sector. To tackle this, the EU has put forward various policy packages for transport, including the European Strategy for Low-Emission Mobility and initiatives such as Europe on the Move. Other challenges, such as boosting the energy efficiency in buildings or renewable energy, were also recently strengthened by a comprehensive package proposed in November 2016.

The EU's long-term climate targets are embedded in and supported by broader policy frameworks, such as the Energy Union Strategy, which aims to ensure long-term policy coherence. Without a clear policy vision and a strong political commitment over time, investors, producers and consumers would be reluctant to adopt solutions that they may perceive as risky investments.

Investment decisions shape the future

In essence, greenhouse gas emissions related to energy can be cut in two ways: by opting for cleaner energy sources, for example by replacing fossil fuels with non-combustible renewable sources, and/or by reducing the overall consumption of energy through energy savings and energy efficiency gains, for example by improving home insulation or using greener transport modes.

To avoid the worst impacts of climate change, however, this switch needs to happen very soon, well before the fossil fuel reserves are exhausted. The more we release greenhouse gases into the atmosphere, the less likely we are to limit the harmful effects of climate change.

Given the urgency of the task at hand, the question then becomes whether or not we are still investing and planning to invest in fossil-fuel-based energy. Policy decisions to subsidise an energy source can influence investment decisions. In that respect, subsidies and tax incentives have been instrumental in boosting renewable energy generation from solar and wind power. This is also true for investments in fossil fuels, which continue to be subsidised in many countries.

In recent years, many investors announced their **decisions to divest** — move their investments away — from activities linked to fossil fuels. Some of these announcements were based on ethical concerns, while others indicated doubts regarding the business sense of such investments when a cap has been set on the total amount of greenhouse gases that could be released (often

referred to as the ‘carbon budget’) to limit global warming to 2 °C by the end of the century.

Power generation often requires large investments, and a power plant, once operational, is expected to remain in service for decades. Current and planned investments in conventional polluting technologies can actually slow down the transition towards clean energy sources. Such investment decisions can lock energy options and resources for decades, making it harder for new solutions to be adopted.

To highlight this type of risk, the EEA analysed Europe’s existing and planned power plants that run on fossil fuels. The analysis shows that, if we extend the life of existing plants and construct new fossil-fuel-based plants in the next decades, the EU risks having far more fossil-fuel-based power generation capacity than it will need. In other words, to achieve the EU’s climate targets, some of these power plants would have to lie idle.

There are similar risks of lock-in, for example in transport, where our mobility is highly dependent on the fossil-fuel-powered internal combustion engine, which is coupled with continued investments in traditional road transport infrastructure. Together, these form a barrier to shifting to more sustainable modes of transport, which are desperately needed to mitigate climate change, reduce air and noise pollution and, ultimately, improve people’s quality of life.

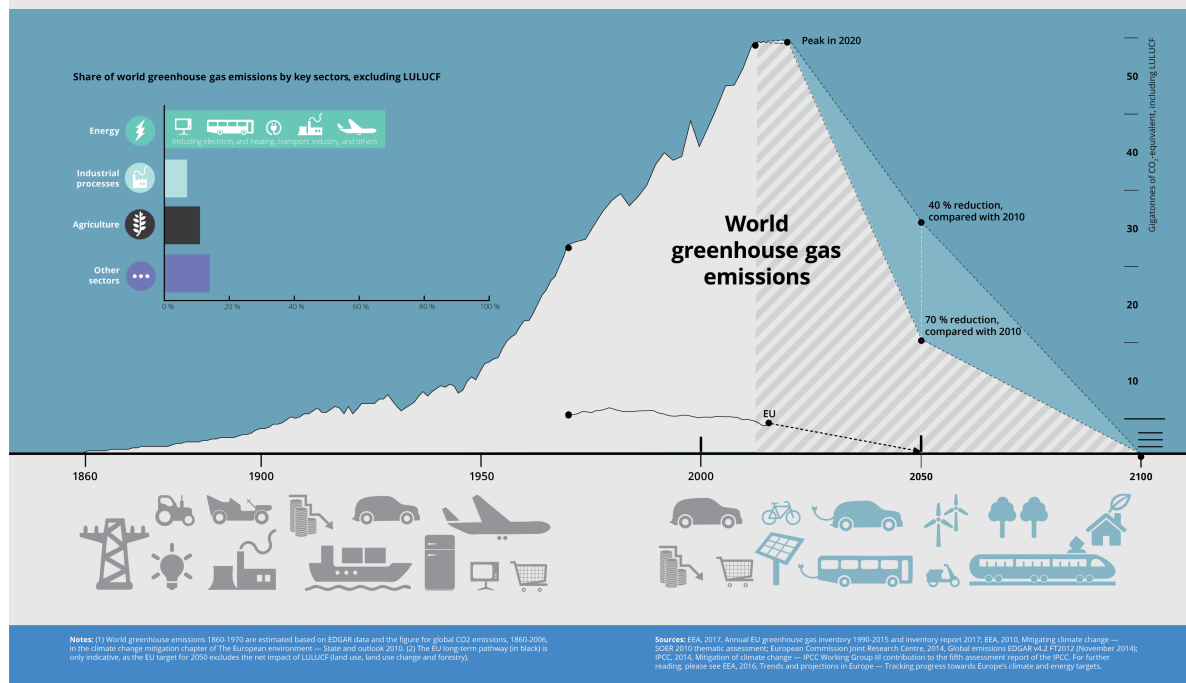
Tackling the dilemma of energy and climate is not easy but many promising innovations are already taking shape. A recent report, ‘Sustainability transitions: Now for the long term’, by the EEA and the European Environment Information and Observation Network (Eionet) showcases some of the innovations in multiple sectors that all have the potential to reduce energy-related greenhouse gas emissions. Reducing food waste, urban gardening, better supply chains and solar-powered air travel are perhaps small pieces in a big puzzle, but, together, they showcase how innovative technologies and practices can emerge and pave the way for a wider change in sustainability.

([1]) EU-28, Iceland, Liechtenstein and Norway.

Energy and mitigating climate change

Globally, the use of energy represents by far the largest source of greenhouse gas emissions arising from human activities. About two thirds of global greenhouse gas emissions are linked to burning fossil fuels for energy to be used for heating, electricity, transport and industry.

The Paris agreement sets a long-term goal of limiting the increase in global average temperature to well below 2 °C above pre-industrial levels, while aiming to limit the increase to 1.5 °C. Scientific studies show that, to increase our chances of limiting the average temperature increase to 2 °C, global emissions will have to peak in 2020 and then start declining. Global emissions in 2050 will have to be 40-70 % lower than in 2010 and they will have to fall to near zero — or below — by 2100.



Related content

News and articles

Decommissioning fossil fuel power plants between now and 2030 essential for Europe's low carbon future [<https://www.eea.europa.eu/highlights/decommissioning-fossil-fuel-power-plants>]

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Related publications

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Trends and projections in Europe 2016 - Tracking progress towards Europe's climate and energy targets [<https://www.eea.europa.eu/publications/trends-and-projections-in-europe>]

Trends and projections in the EU ETS in 2016 — The EU Emissions Trading System in numbers
[<https://www.eea.europa.eu/publications/trends-and-projections-EU-ETS-2016>]

EEA Signals 2015 - Living in a changing climate [<https://www.eea.europa.eu/publications/signals-2015>]

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EEA Signals 2010 - Biodiversity, climate change and you
[<https://www.eea.europa.eu/publications/signals-2010>]

EEA Signals 2009 - Key environmental issues facing Europe
[<https://www.eea.europa.eu/publications/signals-2009>]

See also

Signals 2017 – Shaping the future of energy in Europe: Clean, smart and renewable
[<https://www.eea.europa.eu/signals/signals-2017-index>]

Temporal coverage

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