

The EU long-term low emission strategy Denmark's response to the public consultation

Fulfilling the goals of the Paris Agreement will define our ability to maintain prosperity and security in Europe and the world. The EU must take the lead by setting a long-term direction towards net zero emissions by 2050 at the latest and show how this will go hand in hand with a competitive, modern economy that delivers benefits for all. The EU's long-term low emissions strategy should be a blueprint for the EU's efforts to reduce greenhouse gas emissions that will gather the strength, creativity and potential of the EU and its Member States, of businesses and civil society, of cities and citizens. It must show how to create political, scientific, technological and societal transformation and cooperation across sectors and borders. It must set out how the EU can develop new technologies and create industries of the future while securing a cost-effective and just transition.

Denmark's key priorities for the EU long-term low emission strategy

- **A clear direction towards net zero emissions by 2050 at the latest**
The EU long-term strategy must set the EU on a pathway to reduce emissions in line with the long-term objectives of the Paris Agreement. To provide direction, the EU strategy should set an ambitious target of reaching net zero emissions by 2050 at the latest.
- **Driving down the cost of climate action**
The EU must demonstrate that reaching net zero emissions is feasible through a dedicated effort to bring down the cost of climate action in all sectors of the economy. The strategy should explore how EU policies can best promote research, innovation, demonstration and cost reductions of climate solutions, supported by a substantial shift in finance flows towards low and zero emission technologies.
- **Mission-oriented research and innovation towards net zero emissions**
The EU long-term strategy must prioritise a targeted research and innovation agenda to develop new, transformative low and zero carbon technologies aligned with the objective of net zero emissions.
- **A policy framework adaptive to rapid change and disruptive innovation**
The EU long-term strategy should focus on how to ensure that the EU's policy framework and modelling is responsive to rapid technological change and the need to regularly review and update policies and instruments.
- **Towards a fully renewables-based energy system**
The EU long-term strategy should set a clear direction on the need for new generation capacity to be aligned with the Paris Agreement – and explore options for a more cost-effective market-driven transition.
- **A smarter energy system**
The EU long-term strategy should include a strategic focus towards making the best use of renewable energy by coupling sectors into a smarter and more integrated energy system.
- **A targeted effort to reduce industrial emissions**
The EU long-term strategy must provide the foundation for a focused effort to address emissions from industry through development of new technology as well as increased resource efficiency through circular economy.
- **Decarbonisation of transport**
The EU long-term strategy should focus on strong emissions standards at EU level for road transport, including a timetable for a phase-out of new petrol and diesel cars. It should focus on supporting development of technologies and research in emission reductions in aviation, shipping and heavy duty transport.
- **A common European framework and measures for emissions in agriculture**
The EU long-term strategy must explore how agriculture can contribute with emissions reductions while avoiding distortion of competition and taking into account the global market for agricultural products and environmental objectives. The regulatory framework must support innovation that can ensure reductions in mitigation cost.
- **A policy framework for increasing removal and storage of CO₂**
Reaching net zero emissions will require large scale removals and storage of CO₂. The EU long-term strategy must explore how to develop and incentivise both natural and technological solutions and analyse their potential effects on other objectives including food, land-use water and biodiversity.

A clear direction towards net zero emissions by 2050 at the latest

The Paris Agreement has set a goal of holding the increase in the global average temperature to well below 2°C and pursuing efforts to limit the temperature increase to 1.5°C and calls for reaching a balance between emissions and removals of greenhouse gasses at the global level by the second half of this century. Climate science indicates that the world will need to be at net zero emissions by mid-century if we are to have a chance of keeping global temperatures within the Paris Agreement goals. The EU must deliver a strong and credible response to this challenge. The EU needs to lead and encourage all parties to the Paris Agreement to follow by:

- Setting a long-term target of reaching net zero emissions by 2050 at the latest. The EU's long-term strategy must consider pathways for reducing emissions in line with the long-term objectives of the Paris Agreement, including a 1.5°C scenario and a pathway towards net zero emissions in the EU by 2050 at the latest, followed by negative emissions thereafter.

Driving down the cost of climate action

Reaching net zero emissions is a challenging objective. The EU has demonstrated that the low carbon transition can go hand in hand with a modern and competitive economy. It has created growth opportunities and jobs and spurred innovation in cost-effective green technologies and solutions. While significant progress has been made in developing technologies for emissions reductions in energy production, there is much to be done in sectors such as industry, transportation and agriculture as well as supporting this through shifting financial flows towards low and zero carbon technologies.

The EU should take the lead in the research, development and demonstration of new, cost-effective technologies and solutions that will allow the world to follow in the EU's footsteps. Research and innovation must be underpinned by European policies to encourage innovation, industrialisation and competition that can bring down the cost of climate action. The EU long-term strategy should:

- Explore how to develop cost-effective instruments to move towards net zero emissions.
- Identify synergies with economic and environmental objectives and measures.
- Provide direction for a major shift in investments towards low and zero emission technologies in line with the Paris Agreement through innovative business and financing models.

Mission-oriented research and innovation towards net zero emissions

While the objective of net zero emissions is clear, it is also clear that there will be no single development path or technology to take us there. Rapid progress has been achieved in the fields of renewable energy, energy efficiency and zero emission road transport technologies. However, to release the potential of this, further research and development in integrated energy systems and energy storage is needed. Furthermore, to reach net zero emissions, new cost-effective solutions will be needed to enable emission reductions in industrial processes, agriculture, shipping, aviation and heavy duty transport as well as new technologies for capturing, utilising and storing CO₂ both directly from the emission sources and from the atmosphere. This requires looking beyond linear technological development towards fostering transformative technological breakthroughs. The EU long-term strategy should:

- Set a bold and inspirational research and innovation mission towards net zero emissions in Horizon Europe. The Commission's proposal for the Horizon Europe programme calls for new EU-wide missions with ambitious, bold goals for tackling the major challenges facing Europe. Reaching net zero emissions by 2050 represents exactly such a challenge. Therefore, the EU's long-term strategy should establish the link between the objective of net zero emissions and the mis-

sion-oriented approach of the Horizon Europe programme to ensure a targeted EU research and innovation effort to foster scientific breakthroughs of innovative climate solutions in all sectors of the economy.

- Show how innovation will bring growth and prosperity. An EU at the forefront of new technology innovation will not only enable the transition to net zero emissions. It can also unlock new opportunities for growth, jobs and building a clean, modern and competitive economy.

A policy framework adaptive to rapid change and disruptive innovation

The 2050 Low Carbon Roadmap from 2011 demonstrates how difficult it is to predict future developments. For example, the Roadmap forecasted a decrease in the cost of offshore wind deployment by 10 per cent by 2050, while the actual cost has gone down by more than 60 per cent since 2014.

Therefore, EU's long-term strategy must set a blueprint for how the EU can better navigate an unpredictable future characterised by rapid technological change, disruptive innovations and unforeseeable macro-economic developments and climate change scenarios. The EU's long-term strategy should therefore focus on:

- A responsive and agile policy framework that will enable the EU to continuously align its policies with the Paris Agreement. The EU long-term strategy should analyse how best to align the EU's future contributions to the Paris Agreement beyond 2030 with the five-year ambition cycle of the Paris Agreement.
- Modelling based on open, transparent and regularly updated data and assumptions. Economic modelling forms the foundation for assessing consequences of new policy initiatives. Data and assumptions should be better aligned with technological developments and changes in costs to better capture the opportunities of disruptive innovation. The EU long-term strategy should explore new methods for an open and transparent data-driven approach for gathering and applying the newest and most reliable data available. Regularly updated economic modelling based on updated input from market actors could allow for an assessment of whether model assumptions and parameters remain valid and better capture non-linear effects and disruptive innovation.
- Modelling of socioeconomic costs. To identify the most cost-effective pathways towards net zero emissions, the EU long-term strategy must analyse and address socioeconomic costs using a social discount rate along the lines used by most Member States and recommended by academia to evaluate and prioritise public investments.
- Including the costs of inaction. The potential impacts and costs of climate change itself should be addressed in order to better weigh the cost of climate efforts with the cost of inaction. The EU long-term strategy must provide informed assessments to policy makers on both the costs of climate mitigation efforts and the costs of adapting to climate change.
- Analysing potential synergies and conflicts with other global and EU goals and targets.

Towards a fully renewables-based energy system

A fully renewables-based energy system will be essential for reaching net zero emissions. In coming years, a significant amount of the EU's electricity and heat generation capacity is to be replaced. It is essential that coal is phased out of the energy mix and that investments in new capacity are consistent with reaching net zero emissions by latest 2050. With investment horizons of 20-30 years and more, the EU long-term strategy must send an unambiguous political signal on the direction towards net zero emissions to guide investors.

The EU long-term strategy must set out how to make the transition to a fully renewables-based energy system affordable and cost-effective. Key elements should be:

- An effective price on carbon emissions that can spur investments as the central driver for a market-driven deployment of renewable energy and phase-out of fossil fuels across Europe. The EU long-term strategy should therefore explore how to ensure that the EU Emissions Trading System (ETS) delivers a strong price signal in the short and the long run.
- A more effective internal energy market. Integrating an increasing share of fluctuating renewable energy into the energy system while still ensuring security of supply requires a market that allows for electricity and gas to flow freely across borders. The revision of the EU's electricity market design as part of the Clean Energy Package is a step in the right direction, but more will be needed to ensure that all generation technologies are allowed to participate in the market on an equal footing and that the right incentives are provided for market actors to respond to price signals.
- An integrated energy infrastructure. Improved infrastructure and hardware such as reinforced grids will increase transmission capacity both across and within borders in line with the Commission's proposal for the future Connecting Europe Facility. Additionally, large scale storage capacity can complement infrastructure by providing flexibility to e.g. bottlenecks in the system.
- Regional cooperation and integration of markets across the EU. A regional approach to energy generation, system operation and security of supply can provide cheaper and more secure energy for Europe. An example is the offshore wind resources in the North Seas. Regional forums such as the North Seas Energy Cooperation provide a platform for facilitating cooperation on renewable energy projects, grid development and environmental impact assessment that could help drive down the cost of offshore energy and spur further investments in renewable energy capacity and interconnection between countries in the region. Another example is further regional cooperation between the TSO's that will optimise the system operation and remove barriers and distortions beyond and across national borders which could reduce the cost for the consumers.
- A continued focus on energy efficiency in buildings, transportation and industry by improving and developing European measures such as higher requirements to the consumption of energy in products. Energy efficiency solutions can provide an alternative to installing new renewable capacity by reducing the need for energy.

A smarter energy system

Through the expansion of for example wind and solar power, electricity is set to play the central role in the European renewables-based energy system. This will require a strategic shift towards making the best use of renewable electricity by coupling sectors into a smarter and more integrated energy system. However, to accommodate the fluctuating nature of most renewables and the current lack of large scale storage options, the EU long-term strategy should explore options for:

- Promoting electrification in the energy production and in heating, transportation and industry.
- Increased sector coupling to provide flexibility. Coupling the electricity, heating and gas sectors as well as new technologies into the energy system is a way of providing the necessary flexibility into the renewables-based energy system. Heat pumps can convert electricity into heating of buildings, and gas can supplement electricity in the transition phase towards a fully renewables-based energy system. In some areas such as heavy duty transport, biogas and other green gases could become more efficient in integrating renewable energy in the long run.
- Improving demand response in the market through data and digitalisation. Knowledge about how to manage energy consumption during peak loads with high prices can improve energy efficiency.

- Integrating new technologies into the energy system. New technologies such as hydrogen and storage possibilities from power-to-gas, different types of energy and new energy sources could provide a sustainable, cost efficient and flexible supplement to the energy system in addition to solar and wind in the long run.
- Increasing the scope of the EU's Emissions Trading System (ETS). Increased electrification of transport and heating will lead to gradual migration of emissions currently regulated outside of the EU ETS into the ETS. The long-term strategy should explore how to expand the scope of the ETS to cover fossil energy consumption from road transport and heating. This would create a uniform price signal across sectors and improve the overall cost-effectiveness of the EU climate effort.

A targeted effort to reduce industrial emissions

Industrial emissions make up a large share of the EU's greenhouse gas emissions. The EU long-term strategy should set the EU on a path to cut emissions from industry in a manner that delivers growth and does not shift industrial emissions to third countries with less stringent climate regulation. The EU long-term strategy should focus on:

- Scaling up research and innovation into new technologies significantly for reducing emissions from industrial processes such as cement and steel, including carbon capture, utilisation and storage as well as new sustainable alternative materials.
- Improving the circular economy. Recycling and reuse of products and materials as well as developing alternatives to conventional building materials and designing products that are easy to re-use or recycle could deliver a boost to both resource efficiency and the EU's climate effort.

Decarbonisation of transport

To reach net zero emissions, rapid action is needed to reduce transport emissions. The EU needs to accelerate the deployment of zero emission technology in road transport. Furthermore, all modes of transport must decarbonise as much as possible. The EU long-term strategy should focus on:

- Strong CO₂ emissions standards for vehicles as the key instrument to accelerate the development towards zero emission road transport. This should include options for a timetable for the phase-out of new petrol and diesel cars.
- Promoting more energy efficient modes of transport.
- Developing low and zero carbon technologies for heavy duty transport, shipping and aviation through electrification and fully sustainable renewable fuels.
- Ensuring an effective international framework for reducing emissions from aviation in the ICAO.
- Encouraging the IMO to follow up on its ambition of peaking GHG emissions from international shipping as soon as possible and reducing the total annual GHG emissions by at least 50 % by 2050 compared to 2008. Due to the global character of the shipping sector it is important that decarbonisation of international shipping is led by the IMO.

A common European framework and measures for emissions in agriculture

Agriculture will account for an increasing share of EU emissions as the rest of the economy decarbonises. The EU long-term strategy must explore how agriculture can contribute with emissions reductions and carbon sequestration and storage while avoiding distortion of competition and taking into account the global market for agricultural products. The regulatory framework must support innovation that can ensure reductions in mitigation cost. The EU long-term strategy should focus on:

- Research, innovation and demonstration of mitigation technologies. To ensure the long-term cost-efficiency of mitigation in the agricultural sector, a much stronger focus on innovation is needed. This requires research, development and demonstration of mitigation technologies, complemented by a policy framework to ensure demand for mitigation technologies for agricultural emissions.
- Incentives for effective, climate-friendly and competitive agricultural production across the EU. Towards 2030, the EU's agriculture's greenhouse gas emissions are regulated through national reduction targets in the Effort Sharing Regulation. Efforts to reduce emissions from land-use sectors will vary considerably from Member State to Member State due to different national reduction targets and differences in the share of agricultural emissions in each Member State. The EU long-term strategy should include a stronger focus on incentives and measures for climate mitigation in agriculture at the EU level to ensure a level playing field across the EU. This would drive a market for innovation and cost reduction in mitigation technologies. It is important that the strategy takes a comprehensive view to ensure that targets and policy instruments are aligned across other objectives including climate, water and air quality and food security.

A policy framework for increasing removal and storage of CO₂

If the EU is to reach net zero emissions, even rapid and deep emissions reductions will not alone be sufficient. A stronger focus on removing and storing CO₂ and creating negative emissions through both natural processes and technological solutions will be required. The EU long-term strategy should:

- Set out the need for CO₂ removal and negative emission solutions in pathways to net zero emissions in the EU and analyse potential synergies and consequences for objectives such as food, land-use water and biodiversity.
- Develop an effective system of accounting, supported by measurement, reporting and verification to track carbon and financial flows for CO₂ removal.
- Develop policies capable of incentivising business models for large-scale CO₂ removal.
- Explore how to create long-term incentives for increased CO₂ uptake and sequestration in soils, forests and wood products. Increased uptake and storage of CO₂ in forests and wood products is one of the few options for large-scale CO₂ extraction from the atmosphere available. Wood products can substitute use of more energy intensive materials. Changing land use and cultivation methods in agriculture can also lead to increased CO₂ removals. The EU's LULUCF regulation aims to ensure that a balance between CO₂ emissions and removals in soils and forests is maintained. Long-term incentives to increase removals and enhance sinks of CO₂ through afforestation, reforestation and increasing carbon pools in soil and forests will be required.
- Incentives for a climate-friendly use of biomass. The long-term strategy must analyse the link between carbon uptake and storage and the use of biomass with a view to ensuring incentives for a climate-friendly use of biomass compatible with reaching net zero emissions.
- Support research, development and demonstration of CO₂ removal and negative emission solutions. The EU long-term strategy should prioritise this as reaching net zero is likely to require removal of CO₂ from the atmosphere at a scale beyond possible through natural processes alone.

Denmark looks forward to the Commission's proposal for the EU long-term strategy and the coming discussions among the EU's institutions, Member States, businesses, civil society, cities and citizens.