A Clean Planet for all

A European strategic long term vision for a prosperous, modern, competitive and climate neutral economy
Political context

• Parties of the Paris Agreement to present long-term low greenhouse gas emission development strategies by 2020

• In October 2017 the European Parliament also invited the Commission "to prepare by COP24 a mid-century zero emissions strategy for the EU"

• In March 2018, European Council invited the Commission "to present by the first quarter of 2019 a proposal for a Strategy for long-term EU greenhouse gas emissions reduction".

• Regulation on Governance of the Energy Union calls on the Commission to present an EU long-term strategy by April 2019, including pathways that achieve net zero GHG emissions by 2050 and negative emissions thereafter
Climate challenges

- Global warming already reached at 1°C
- 18 of the warmest years in the last 2 decades and extreme heat waves in EU for 4 of the last 5 years
- Real impact on EU economy & environment
- IPCC warns about global eco-systems in danger already at 2°C
- Climate change undermines security and prosperity in the broadest sense
Our Vision for a Clean Planet by 2050

- The Paris Agreement objective is to keep temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C.
- But the IPCC report confirms that limiting climate change to 1.5°C has to be pursued to avoid these worst impacts.
- For the EU to lead the world in climate action, it means achieving net-zero greenhouse gas emissions by 2050.
- The EU with this vision can inform others how we can deliver collectively a clean planet.
- The Long Term Strategy shows transforming our economy is possible and beneficial.
- It sets the direction of travel. No intention to revise the 2030 targets.
Our Vision for a Clean Planet by 2050

- EU leads in clean energy transition and GHG emissions reduction. Ambitious 2030 targets. 60% reductions in 2050 with current policies – not in line with the Paris Agreement.

- Radical transformations necessary: central role of energy system, buildings, transport, industry, agriculture.

- There are a number of pathways for achieving a climate neutral EU, challenging but feasible from a technological, economic, environmental and social perspective.
**Detailed assessment supported by scenario analysis**

### Long Term Strategy Options

<table>
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<tr>
<th>Main Drivers</th>
<th>Electrification (ELEC)</th>
<th>Hydrogen (H2)</th>
<th>Power-to-X (P2X)</th>
<th>Energy Efficiency (EE)</th>
<th>Circular Economy (CIRC)</th>
<th>Combination (COMBO)</th>
<th>1.5°C Technical (1.5TECH)</th>
<th>1.5°C Sustainable Lifestyles (1.5LIFE)</th>
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<tr>
<td><strong>GHG target in 2050</strong></td>
<td>-80% GHG (excluding sinks) [“well below 2°C” ambition]</td>
<td>-90% GHG (incl. sinks)</td>
<td>-100% GHG (incl. sinks) [“1.5°C” ambition]</td>
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| **Major Common Assumptions** | • Higher energy efficiency post 2030  
  • Deployment of sustainable, advanced biofuels  
  • Moderate circular economy measures  
  • Digitisation  |  
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| **Power sector**             | Power is nearly decarbonised by 2050. Strong penetration of RES facilitated by system optimization (demand-side response, storage, interconnections, role of prosumers). Nuclear still plays a role in the power sector and CCS deployment faces limitations. |
| **Industry**                 | Electrification of processes  
  Use of H2 in targeted applications  
  Use of e-gas in targeted applications  
  Reducing energy demand via Energy Efficiency  
  Higher recycling rates, material substitution, circular measures  
  Combination of most Cost-efficient options from “well below 2°C” scenarios with targeted application (excluding CIRC)  
  COMBO but stronger  
  CIRC+COMBO but stronger  |  
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  | **Buildings**               | Increased deployment of heat pumps  
  Deployment of H2 for heating  
  Deployment of e-gas for heating  
  Increased renovation rates and depth  
  Sustainable buildings  
  COMBO but stronger  
  CIRC+COMBO but stronger  |  
  |  |  |  |  |  |  |  |  
  | **Transport sector**        | Faster electrification for all transport modes  
  H2 deployment for HDVs and some for LDVs  
  E-fuels deployment for all modes  
  Increased modal shift  
  Mobility as a service  
  COMBO but stronger  
  CIRC+COMBO but stronger  |  
  |  |  |  |  |  |  |  |  
  | **Other Drivers**           | H2 in gas distribution grid  
  E-gas in gas distribution grid  
  Limited enhancement natural sink  
  • Dietary changes  
  • Enhancement natural sink  |  
  |  |  |  |  |  |  |  |  |
7 Building Blocks

1. Energy efficiency
2. Deployments of renewables
3. Clean, safe & connected mobility
4. Competitive industry and circular economy
5. Infrastructure and inter-connections
6. Bio-economy and natural carbon sinks
7. Tackle remaining emissions with carbon capture and storage
Building Block 1 Energy efficiency

Central role, energy consumption reduced by as much as half in 2050 compared to 2005

Buildings key, most of the housing stock of 2050 existing already today, higher renovation rates, fuel switching

Requires adequate financial instruments and skilled workforce, integrated policy approach and consumer engagement to sustain higher renovation rates
Building Block 2 Deployment of renewables

Primary energy in 2050 largely coming from renewable sources

Gross Inland Consumption

- 1639 Mtoe (2016)
- 1395 Mtoe (2030)
- 1255 Mtoe (Baseline 2050)
- 1178 Mtoe (Average of "well below 2°C" scenarios (-80% emissions) 2050)
- 1239 Mtoe (Intermediary level of ambition 2050)
- 1192 Mtoe (Average of "1.5°C" scenarios (net zero emissions) 2050)

Legend:
- Non-energy fossil fuels use
- Solids
- Fossil liquids
- Natural gas
- Nuclear
- E-liquids
- E-gas
- Renewables
The share of electricity in final energy demand will at least double, more than 80% of it will be renewable.

Renewable electricity allows production and deployment of carbon-free energy carriers such as hydrogen and e-fuels to decarbonize heating, transport and industry.

Decentralized, smart and flexible power system.

Reduction of energy import dependence, cumulative savings from reduced import bill of € 2-3 trillion over the period 2031-2050.
Building Block3 Clean, safe & connected mobility

Carbon-free power, cheaper and efficient batteries, highly efficient electric powertrains, connectivity and autonomous driving offers prospects to decarbonise road transport.

No single silver bullet for all transport modes with alternative fuels having a role in heavy duty or long distance transport modes (advanced biofuels, carbon-free e-fuels, hydrogen).

Digitalisation, data sharing and interoperable standards leading to a more efficient mobility system.

Innovative mobility for urban areas and smart cities, underpinned by changing behaviour, leading to improvement of quality of life.
Building Block 4 Competitive industry

Competitive resource-efficient industry and circular economy, increased recovery and recycling of raw materials (including critical materials), new materials and business concepts.

Electrification, energy efficiency, hydrogen, biomass and renewable synthetic gas to reduce energy emissions in the production of industrial goods.

Process-related reductions more difficult. Biomass and hydrogen can reduce certain emissions (steel production, some chemicals), others will require CO2 to be captured and stored or used.

In the next 10 to 15 years, technologies that are already known will need to demonstrate that they can work at scale.
Building Block 5 Network infrastructure

Integrated and interconnected smart infrastructure, spurring sectoral integration.

Completion of the Trans-European Energy and Transport Networks.

Smart electricity and data/information grids, hydrogen pipelines.

Smart charging or refuelling stations for transport. Increased synergy between transport and energy systems.

Retrofitting existing infrastructure and assets and timely replacement of ageing infrastructure compatible with the deep decarbonisation objective.
Building Block 6
Agriculture, forest and bio-economy

Agriculture to provide sufficient food, feed and fibre. Agricultural non-CO2 emissions can be reduced (but not to zero) and soil carbon can be increased through improved farming techniques.

Biomass is multipurpose: supply direct heat, biogas, biofuels, alternative to carbon intensive materials and generate negative emissions when coupled with carbon capture and storage; therefore increased demand (up to 80%).

Key role of energy crops to avoid unsustainable use of forests, maintain the natural carbon sink while preserving ecosystems.

Natural carbon sink can be enhanced through afforestation and restoration of degraded forest lands and other ecosystems (benefiting biodiversity, soils and water resources and increase biomass availability over time).
Building Block 7 Carbon Capture and Storage

Rapid deployment of renewable energy and new options to decarbonize industry reduced the need for CCS.

But to achieve net-zero greenhouse gas emissions, CCS still required for certain energy-intensive industries and eventually to generate negative emissions.

CCS today is facing barriers: lack of demonstration plant and proof of economic viability, regulatory barriers in some MS, public acceptance.

Coordinated action needed on demonstration and commercial facilities to overcome the obstacles
Enabling framework crucial to deliver transformation

- **Taxation**: Ensuring an effective pricing of externalities and a fair distribution of transition costs
- **Energy Union and Climate Action**: Making the commercial rules fit for the deployment of new technologies in energy, building and mobility
- **EU Budget and Sustainable Finance**: Preparing the rollout of key infrastructure and incentivising investments in sustainable business models
- **Local Action**: Accompanying the transformation of regions and economic sectors
- **Research and Innovation**: Identifying key technologies for the transition and accelerating demonstration
- **Industrial Strategy and Circular Economy**: Roll out of technologies, strategic value chains and increased circularity
- **Free but Fair Trade**: Working towards a global level playing field for competitiveness
- **The Social Pillar**: Empowering citizens with skills for new business models
- **Digital Single Market**: Creating the digital “operating system” to enable system integration and new business models
- **Competition Policy and State Aid**: Ensure coherence with EU climate and environment goals
Increased Investment in the EU economy

- Modernising and decarbonising the EU's economy will stimulate significant additional investment
- From 2% of EU GDP invested in the energy system today to 2.8% (up to €575 bn per annum) to achieve a net-zero greenhouse gas emissions economy
- Positive for growth and jobs, with GDP higher by up to 2% in 2050
- Co-benefits: energy imports down, public health, etc.
Overall economic impacts of the deep transformation are positive.

The transition will spur growth in new sectors. 'Green jobs' already represent 4 million jobs in the EU.

But some sectors will face challenges (e.g. coal mining and fuel extraction) and others will transform (e.g. energy-intensive industries and automotive sector).

This will affect some regions often in lower income MS, more than others.

Modernisation process has to be managed, no-one left behind, relevant policies must be deployed to the fullest. EU budget, employment and cohesion policies have a role.

E.g. Platform and pilots for coal and carbon-intensive regions to be reinforced.

Skill training is key
Global dimension

• Open markets, a globalised world and multilateralism are a precondition to benefit from this transition domestically and globally.

• The EU's long-term strategy cannot be pursued in isolation. Role of energy and climate diplomacy but also other political dialogues, security and development cooperation.

• EU's position will change, prepare for geopolitical and geo-economic shifts with new and changed dependencies.

• Trade policy to promote uptake new technologies while defending our right to fair access to markets and critical raw materials.

• EU must take all necessary measures to safeguard and boost its own prospects for economic and social development.

• As the world's largest single market, EU's standards on products affect global markets, putting European companies at the forefront.
Role of citizens and local authorities

• Moving towards a net-zero greenhouse gas economy can only be successful with citizens that embrace change, get engaged and experience it as beneficial for their lives and that of their children.

• Increasing willingness of consumers to engage in sustainable activities. Personal lifestyle choices can make a real difference, while improving quality of life.

• Cities are already the laboratories for transformative and sustainable solutions with 75% of our population living in urban areas. City refurbishment and better spatial planning are drivers to renovate houses, improving living conditions, reducing travel time.

• Improved planning and public infrastructure to withstand more extreme weather events will be imperative.

• The EU should capitalise on and expand the role of regions, cities and towns.
Overriding priorities for action

• Accelerate the clean energy transition
• Strengthen the central role of citizens and consumers
• Roll out carbon-free, connected and automated mobility
• Boost industrial competitiveness, ensure competitive markets
• Promote a sustainable bio-economy, safeguard our natural resources
• Strengthen infrastructure and make it climate proof
• Accelerate R&I and entrepreneurship on zero-carbon solutions
• Promote sustainable finance and investment
• Invest in human capital, education and training skills
• Align growth-enhancing policies (competition, labour, skills, cohesion, taxation, etc.) with energy and climate policies
• Fair transition, coordinate with Member States and regions
• Continue international collaboration, bring all on board, share knowledge
Next steps

- National Climate and Energy Plans under development. Together with stakeholders vision on 2050 will enrich the debate.

- Invitation to all the EU institutions to consider the EU vision.

- EU leaders to reflect on this in Sibiu summit, all relevant Council formations should hold policy debates in preparation.

- Societal debate in 2019 is key! In an open and inclusive manner with National Parliaments, business, non-governmental organisations, trade unions, cities and communities, as well as citizens and the youth.

- EU to adopt and submit an ambitious strategy by early 2020 to the UNFCCC as requested under the Paris Agreement.

- Show leadership and work with other parties to do the same.