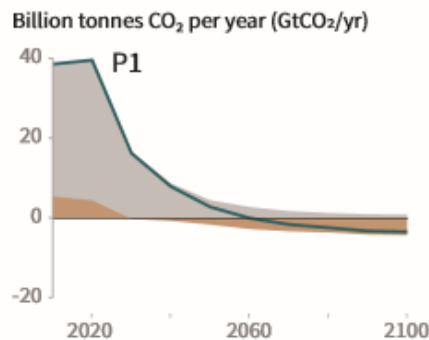


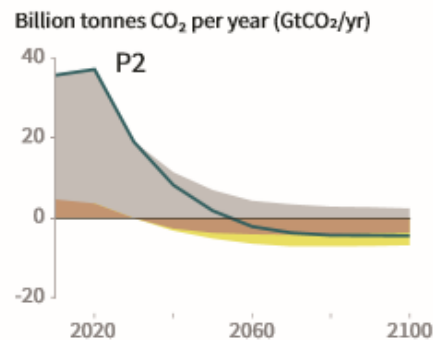
Vision 2050: IPCC pathways to global net zero CO₂ by 2050

Breakdown of contributions to global net CO₂ emissions in four illustrative model pathways

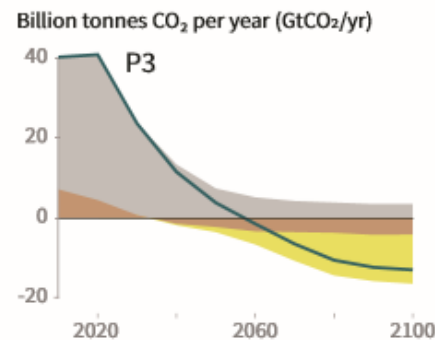
● Fossil fuel and industry ● AFOLU ● BECCS



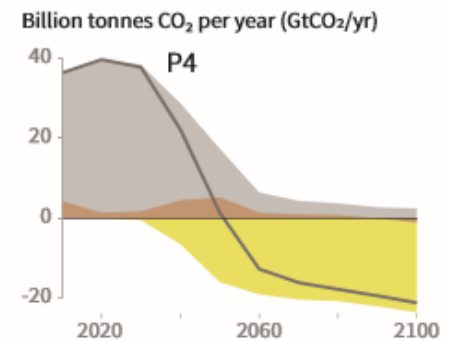
P1: A scenario in which social, business and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A downsized energy system enables rapid decarbonization of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.



P2: A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS.



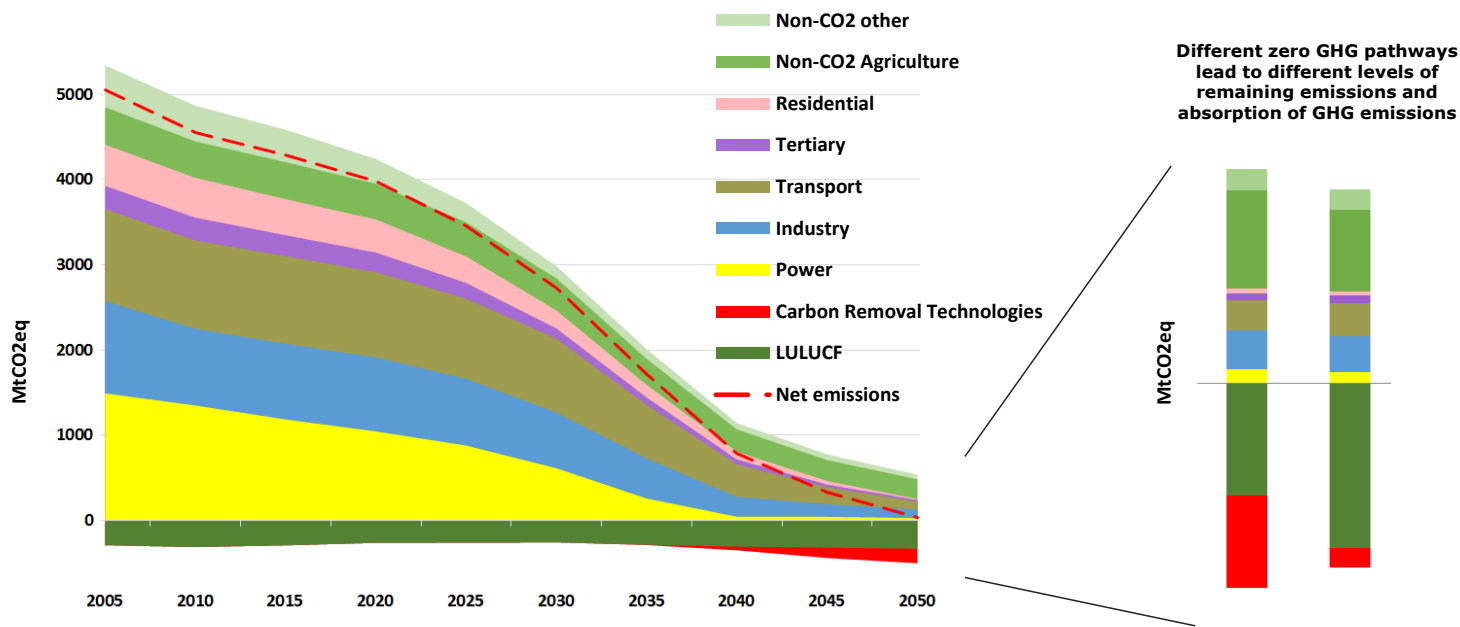
P3: A middle-of-the-road scenario in which societal as well as technological development follows historical patterns. Emissions reductions are mainly achieved by changing the way in which energy and products are produced, and to a lesser degree by reductions in demand.



P4: A resource- and energy-intensive scenario in which economic growth and globalization lead to widespread adoption of greenhouse-gas-intensive lifestyles, including high demand for transportation fuels and livestock products. Emissions reductions are mainly achieved through technological means, making strong use of CDR through the deployment of BECCS.

Vision for a Clean Planet by 2050

There are a number of pathways for achieving a climate neutral EU, challenging but feasible from a technological, economic, environmental and social perspectives.



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

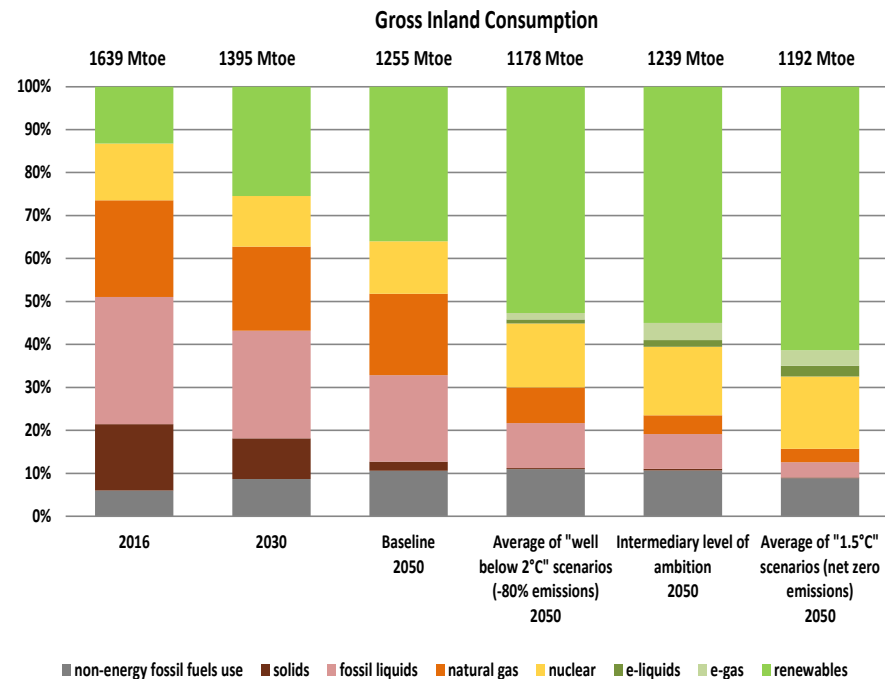
Building blocks 1 & 2 Energy transition

Changes in sectoral final energy consumption (% change vs 2005)



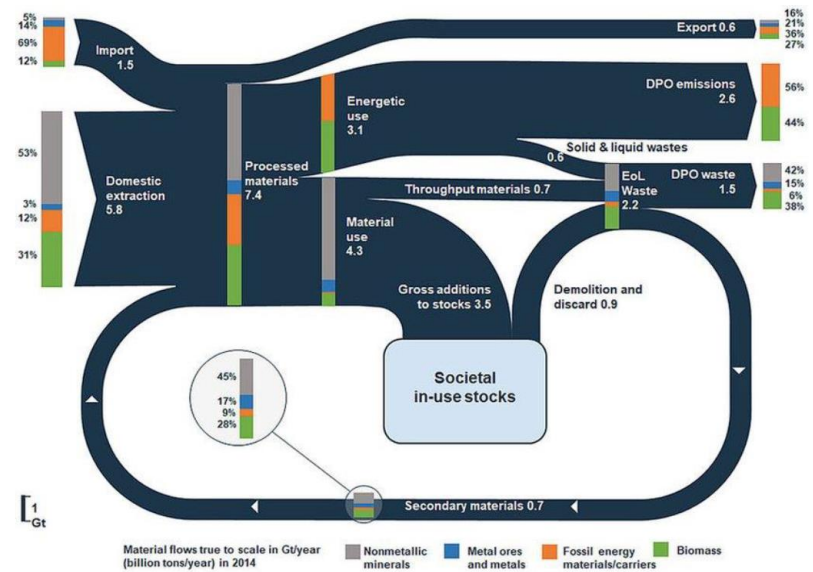
Note: "Services" includes here the agriculture sector.

Source: Eurostat (2005), PRIMES.



Building Block 4 - Competitive industry

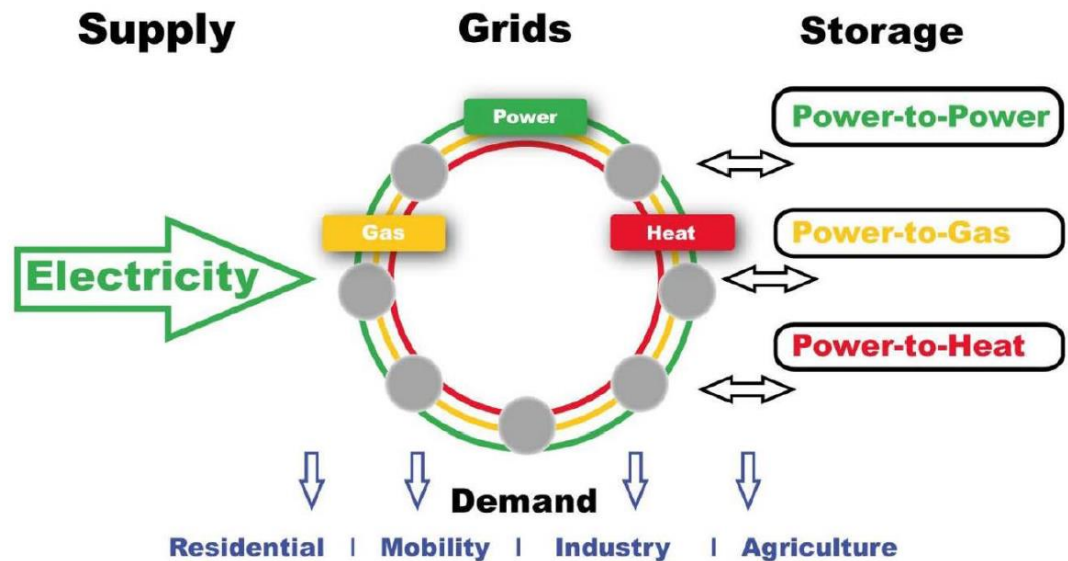
- Competitive resource-efficient industry and circular economy, increased recovery and recycling of raw materials (including critical materials), new materials and business concepts.
- Electrification, energy efficiency, hydrogen, biomass and renewable synthetic gas to reduce energy emissions in the 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.



Source: Mayer et al (2018)⁸³⁰.

Building Block 5 - Network infrastructure

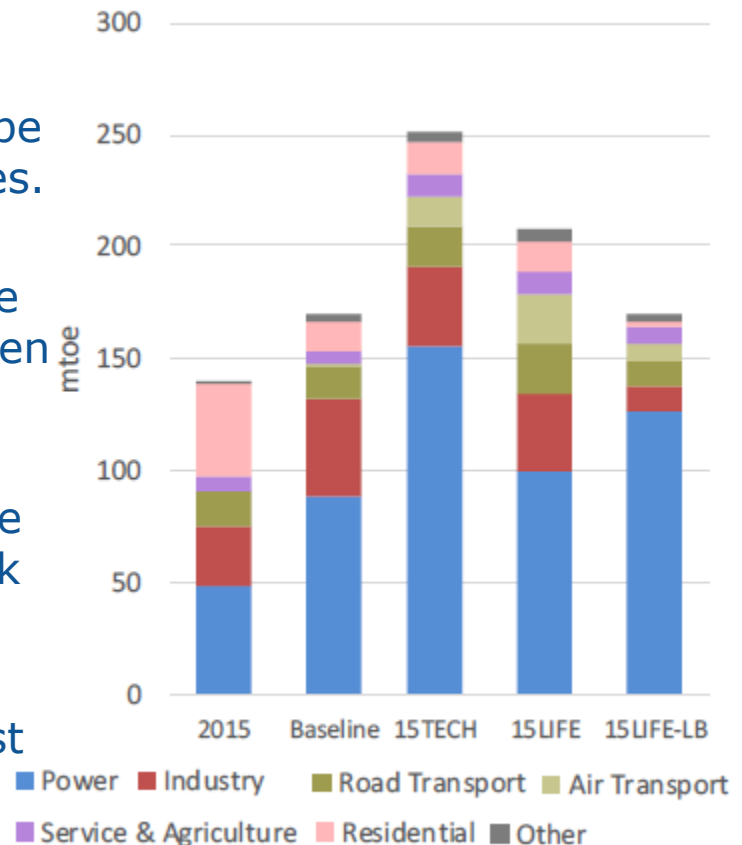
- Integrated and interconnected smart infrastructure.
- Completion of the Trans-European Transport and Energy Networks.
- Smart electricity and data/information grids, hydrogen pipelines, further sector integration.
- Smart charging or refuelling stations for transport. Increased synergy between transport and energy systems.
- Retrofitting existing infrastructure and assets and timely replacement of ageing infrastructure compatible with the deep decarbonisation objective.



Building Block 6 - 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).

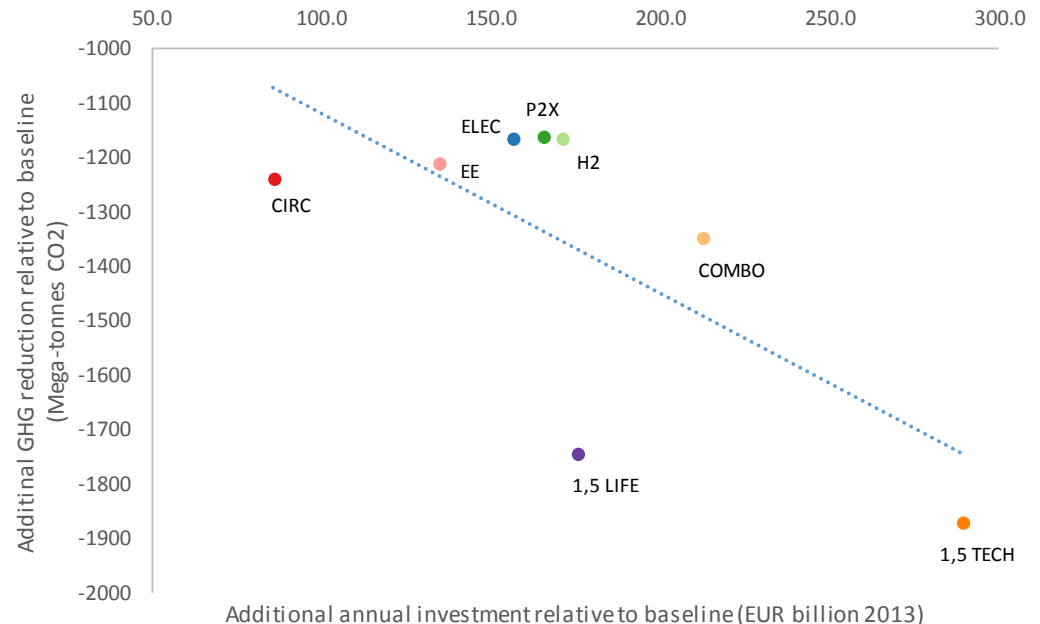
Use of bioenergy by sectors and by scenario in 2050



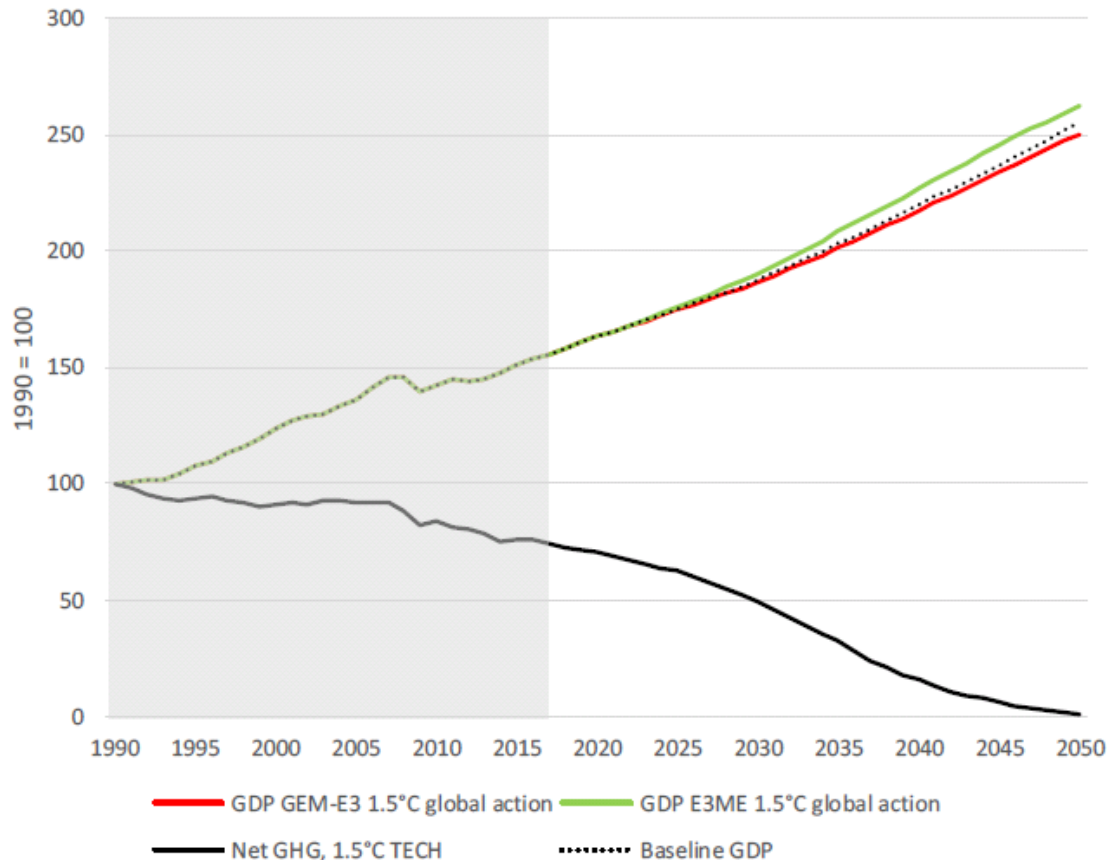
Source: PRIMES.

Stimulating clean investment into 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



Full decoupling of EU GDP growth and emissions by 2050



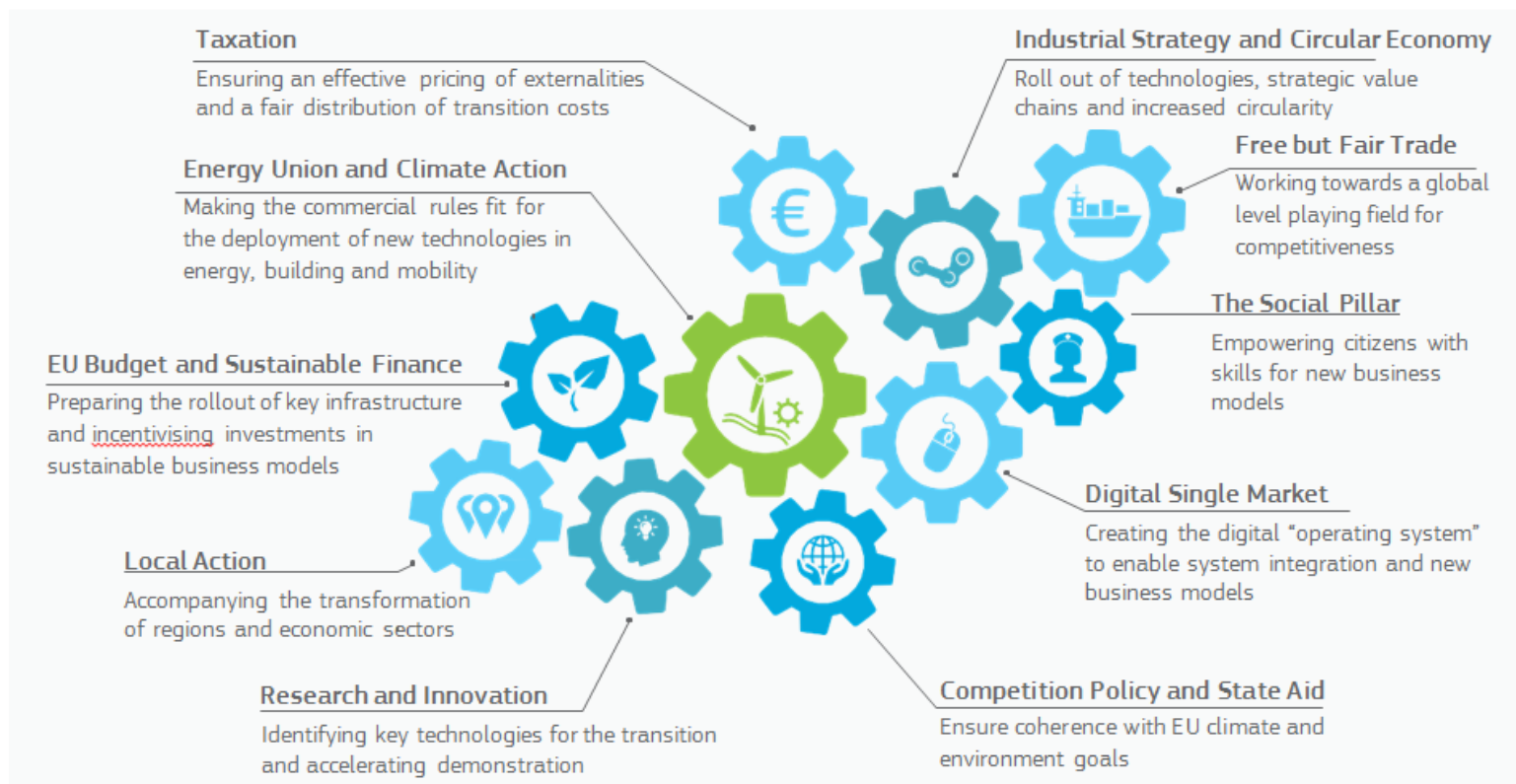
Sources: PRIMES, ESTAT, JRC-GEM-E3 and E3ME.

- Positive for growth and jobs, with GDP impact up to +2%
- Co-benefits: energy imports down, public health, etc.
- Caveat: This calculation does not take the damages caused by the adverse effects of climate change into account, nor the adaptation costs between baseline and 1.5° C as well as co-benefits of climate action.



European
Commission

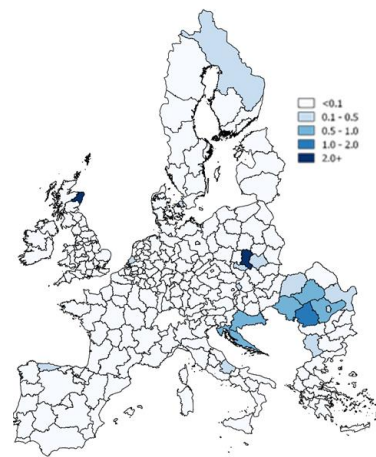
Enabling framework crucial to deliver transformation



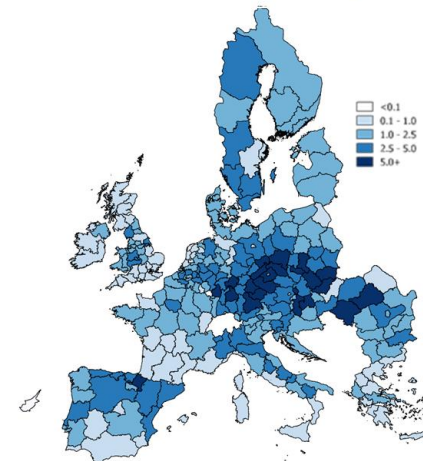
Just transition

- 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 more than others.
- Modernisation process has to be managed, no-one left behind, EU budget, employment and cohesion policies have a role
- Skill training is key

Share of employment
fossil fuel extraction and mining



Share of employment
Energy Intensive Industries &
Automotive Manufacturing



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 and other political dialogues, security and development cooperation
- EU to prepare for geopolitical and geo-economic shifts with new and changed dependencies



- Trade policy to promote uptake of new technologies while defending the 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 standards on products affect global markets



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.
- All relevant Council formations 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.

#EU2050



<https://ec.europa.eu/clima/news/commission-calls-climate-neutral-Europe-2050.en>