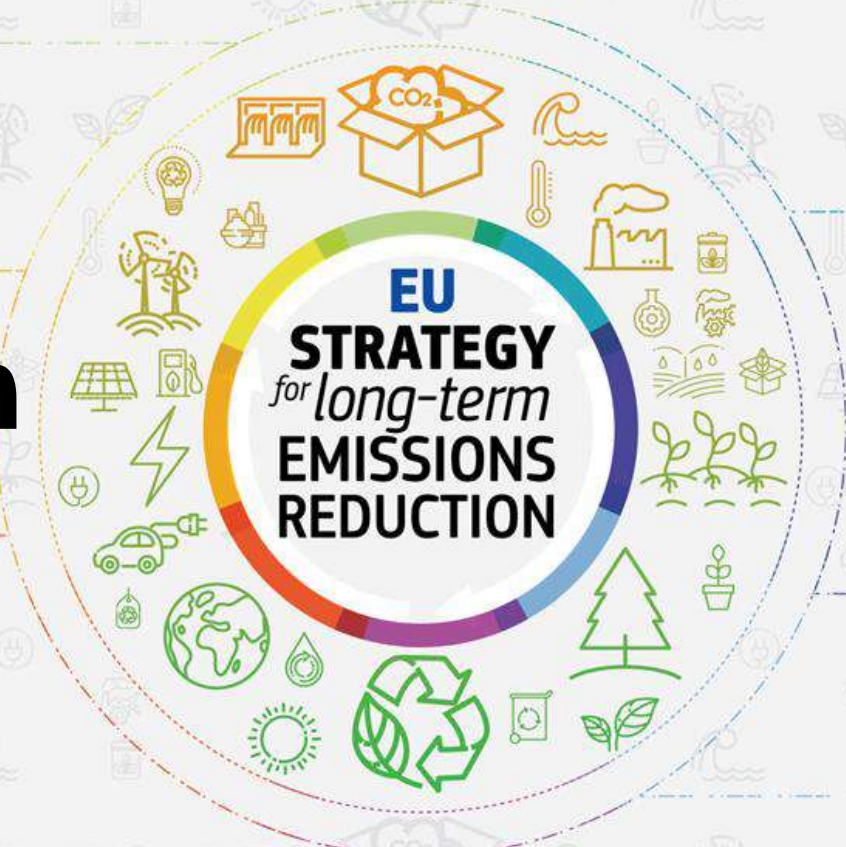


Towards an



Global and EU action to achieve the Paris Agreement

- Europe is already experiencing changes in weather and climate extremes
- Climate change will compound with other disruptive trends: digitalization; the emerging global middle class; demographic imbalances
- Europe needs to act leading the world in addressing the challenges

Our Vision for a Clean Planet by

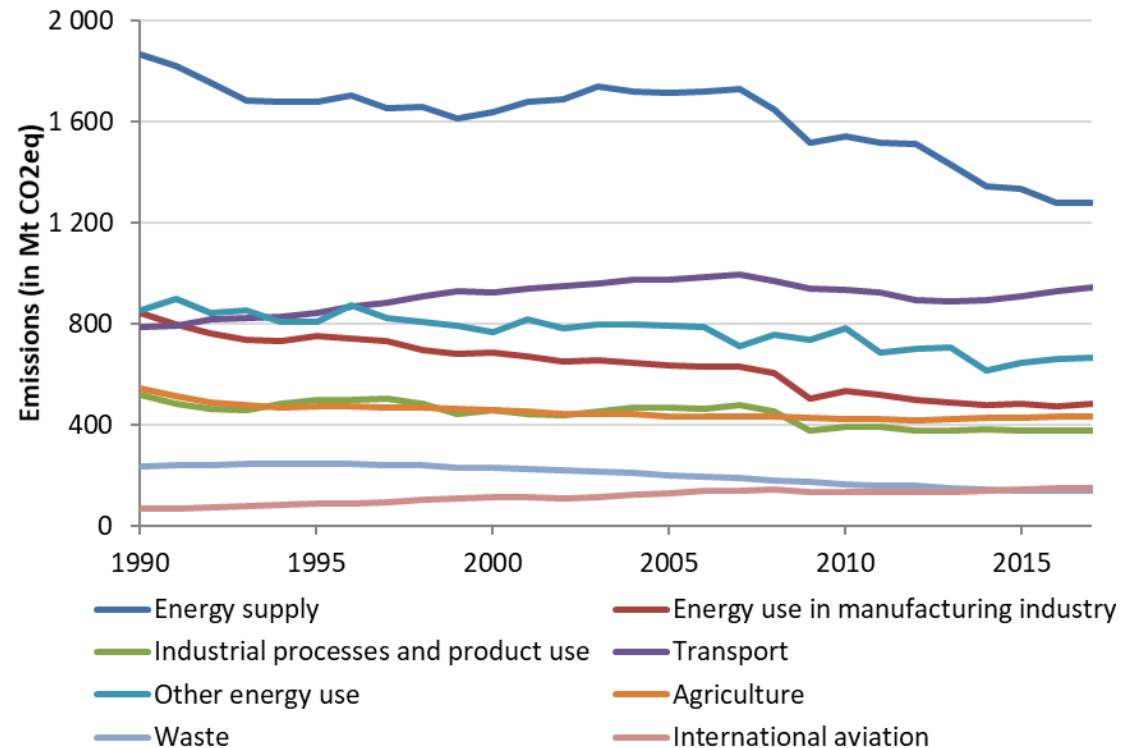
- The Paris Agreement, requires to reduce GHG emissions, with the objective to hold global temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C
- The IPCC report confirms that limiting climate change to 1.5°C is necessary to avoid these worst impacts. Climate change undermines security and prosperity in the broadest sense.
- For Europe, limiting temperature increase well below 2°C means 80% emissions reduction by 2050 compared to 1990.
- For Europe to lead the world in climate action, it means achieving net-zero greenhouse gas emissions by 2050.
- The Long Term Strategy shows that transforming our economy is possible and beneficial. It also highlights the challenges of the transformation, but the status quo is not an option.

Scenarios for Europe in 2050

- Scenarios are used for projection about demand and supply of energy (including land use) → compliant with Paris targets
- 8 scenarios analyse different technology pathways (high electrification, high energy efficiency, circular economy, etc.)
- Different levels of ambition: -80% emissions and net-zero by 2050 plus a Baseline (business as usual)

- The EU is about to achieve its 2020 targets
- Targets for 2030 are agreed in EU law
- Business as usual means -45% GHG emissions in 2030 (vs. 1990)
- Without increasing ambition: -60% emissions in 2050

Europe Today



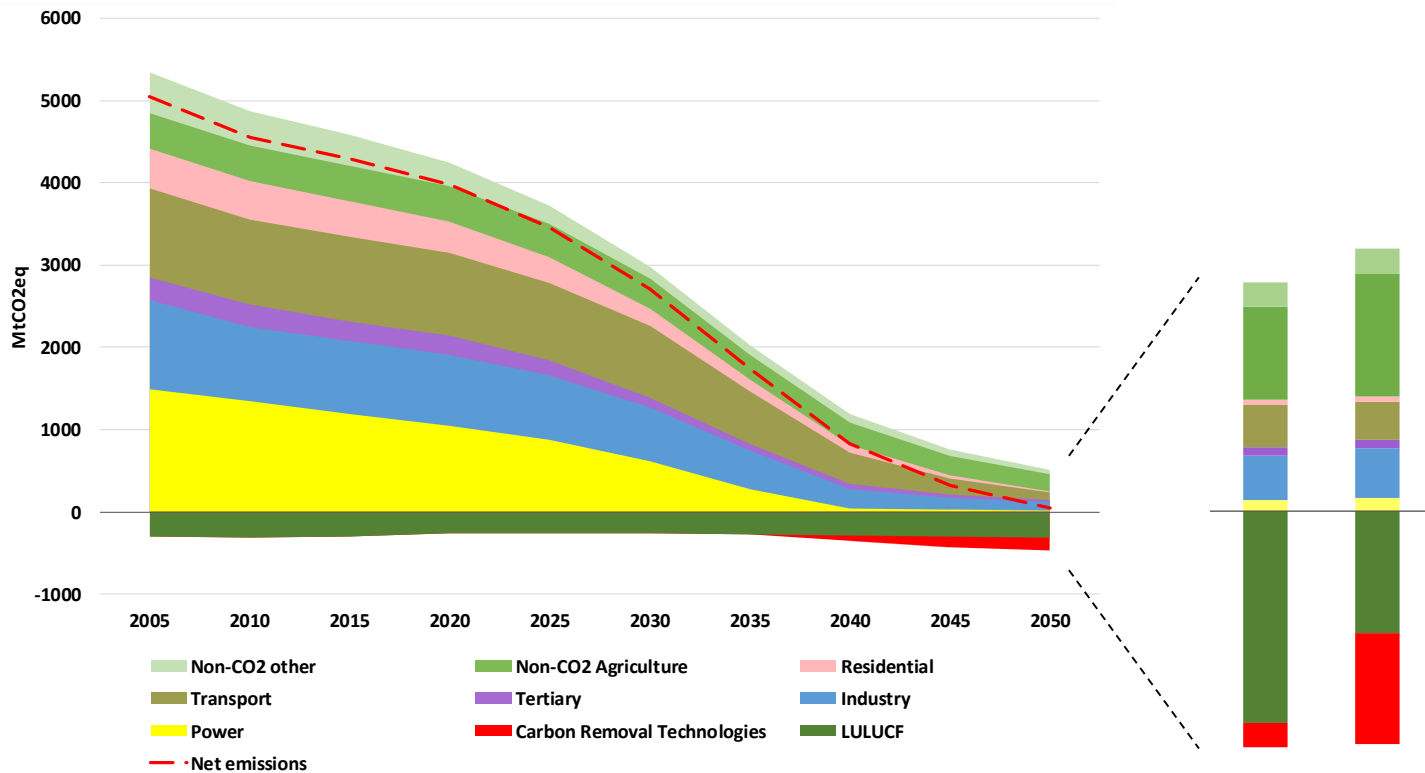
Analysed scenarios in line with Paris Agreement

Long Term Strategy Options

	Electrification (ELEC)	Hydrogen (H2)	Power-to-X (P2X)	Energy Efficiency (EE)	Circular Economy (CIRC)	Combination (COMBO)	1.5°C Technical (1.5TECH)	1.5°C Sustainable Lifestyles (1.5LIFE)
Main Drivers	Electrification in all sectors	Hydrogen in industry, transport and buildings	E-fuels in industry, transport and buildings	Pursuing deep energy efficiency in all sectors	Increased resource and material efficiency	Cost-efficient combination of options from 2°C scenarios	Based on COMBO with more BECCS, CCS	Based on COMBO and CIRC with lifestyle changes
GHG target in 2050	-80% GHG (excluding sinks) ["well below 2°C" ambition]					-90% GHG (incl. sinks)	-100% GHG (incl. sinks) ["1.5°C" ambition]	
Major Common Assumptions	<ul style="list-style-type: none"> Higher energy efficiency post 2030 Deployment of sustainable, advanced biofuels Moderate circular economy measures Digitilisation 				<ul style="list-style-type: none"> Market coordination for infrastructure deployment BECCS present only post-2050 in 2°C scenarios Significant learning by doing for low carbon technologies Significant improvements in the efficiency of the transport system. 			
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
Buildings	Increased deployment of heat pumps	Deployment of H2 for heating	Deployment of e-gas for heating	Increased renovation rates and depth	Sustainable buildings			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	<ul style="list-style-type: none"> Increased modal shift Electrification as in ELEC 	Mobility as a service			<ul style="list-style-type: none"> CIRC+COMBO but stronger Alternatives to air travel
Other Drivers		H2 in gas distribution grid	E-gas in gas distribution grid				Limited enhancement natural sink	<ul style="list-style-type: none"> Dietary changes Enhancement natural sink

All sectors have to contribute

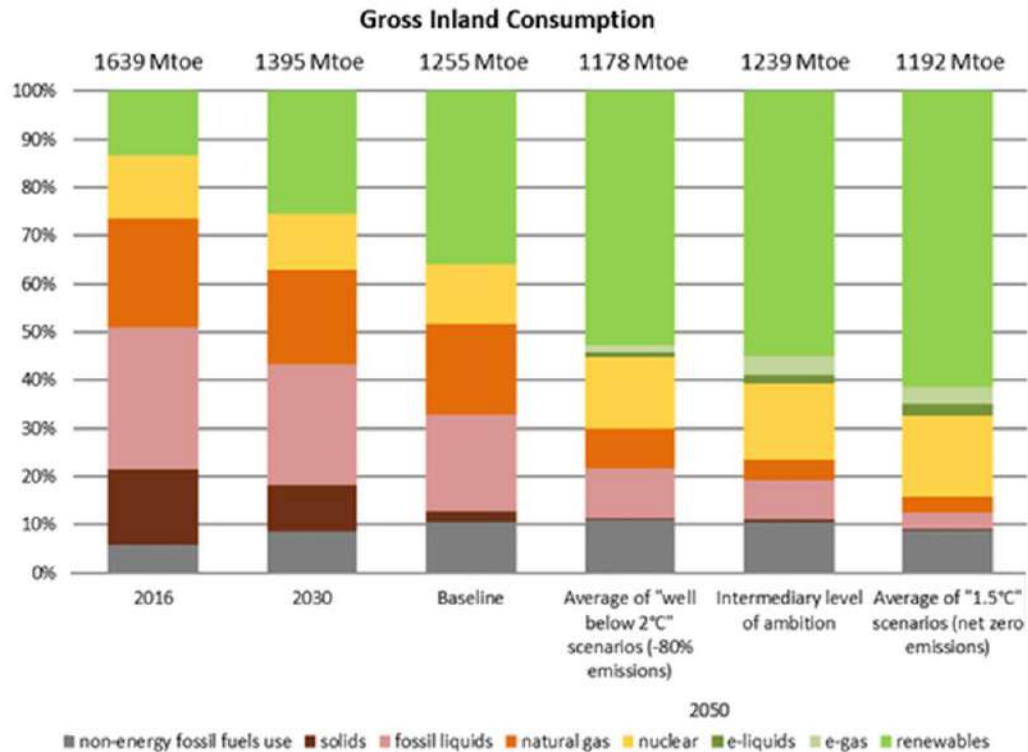
GHG emissions trajectory in a 1.5°C scenario





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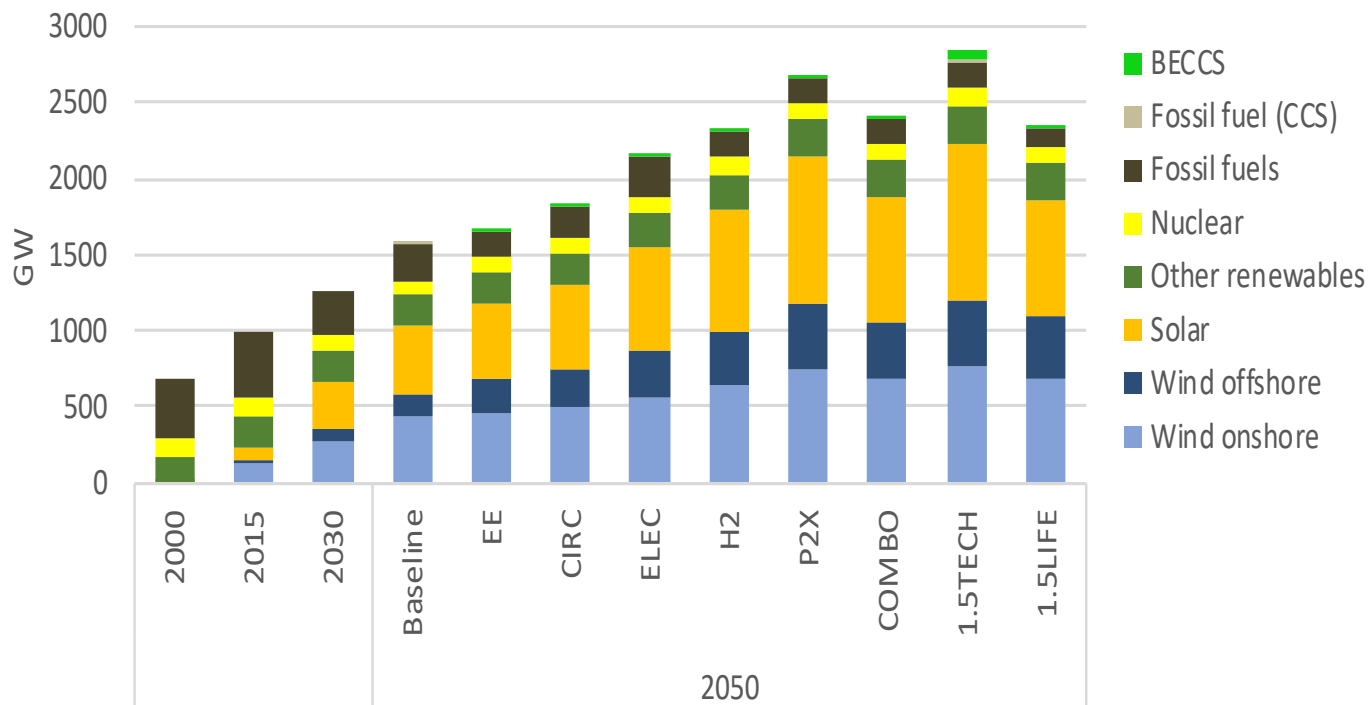
Renewable energy supply in 2050





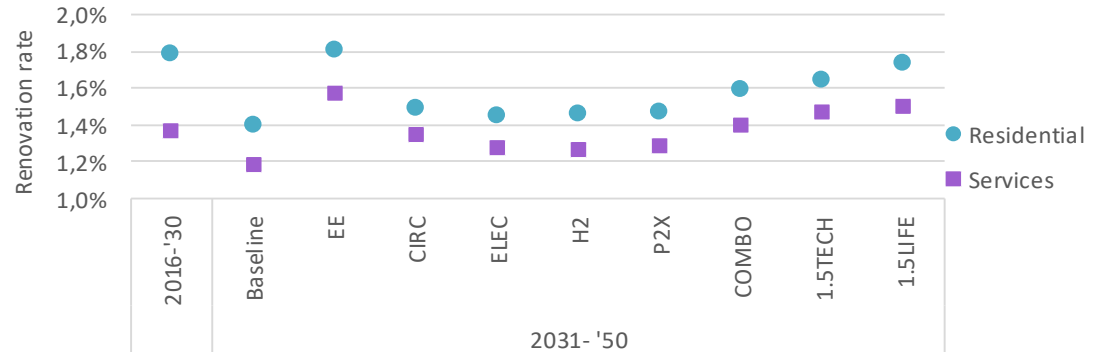
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Power generation capacity in 2050



Renovation rate in buildings

- Energy use to halve between 2005 and 2050
- New buildings only 10-25% 2050 stock
- Energy performance largely determined by renovation rate
- Renovation rate (1-1,5% today) will more than double

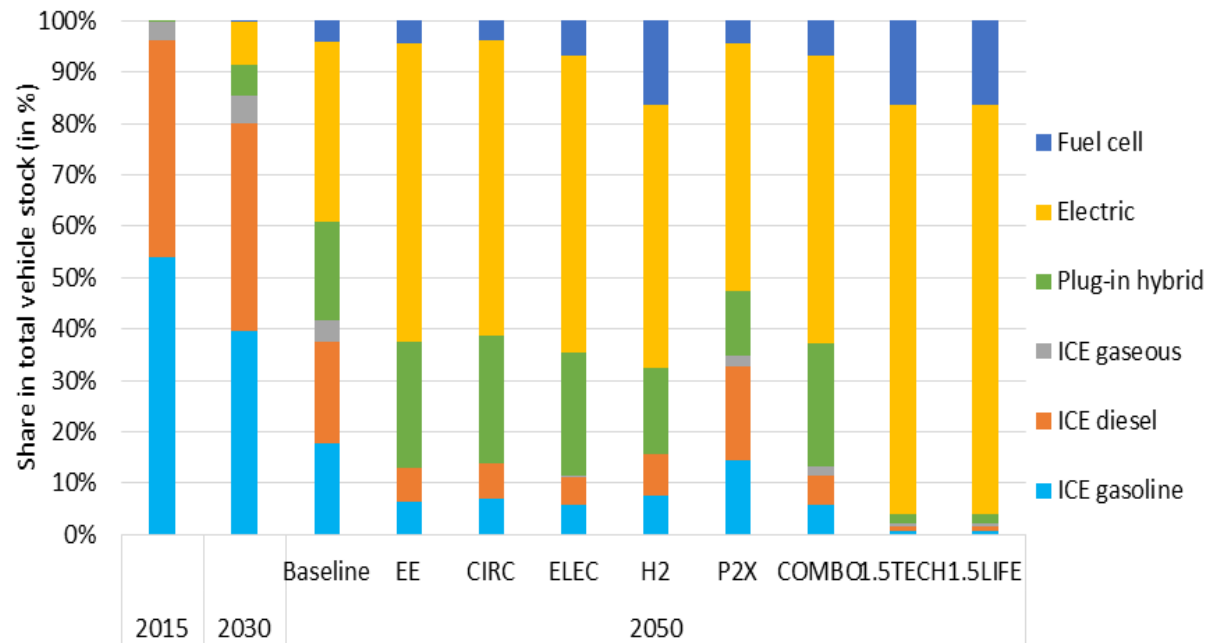




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A clean, safe and connected mobility

Shares in total cars stock by drivetrain technology in 2050

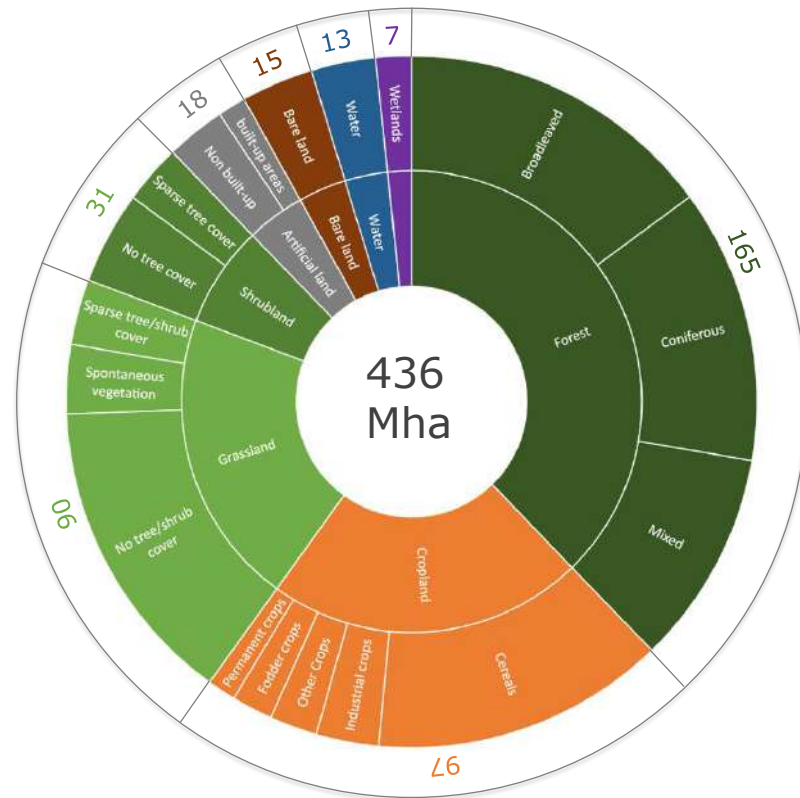




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Land use and agriculture

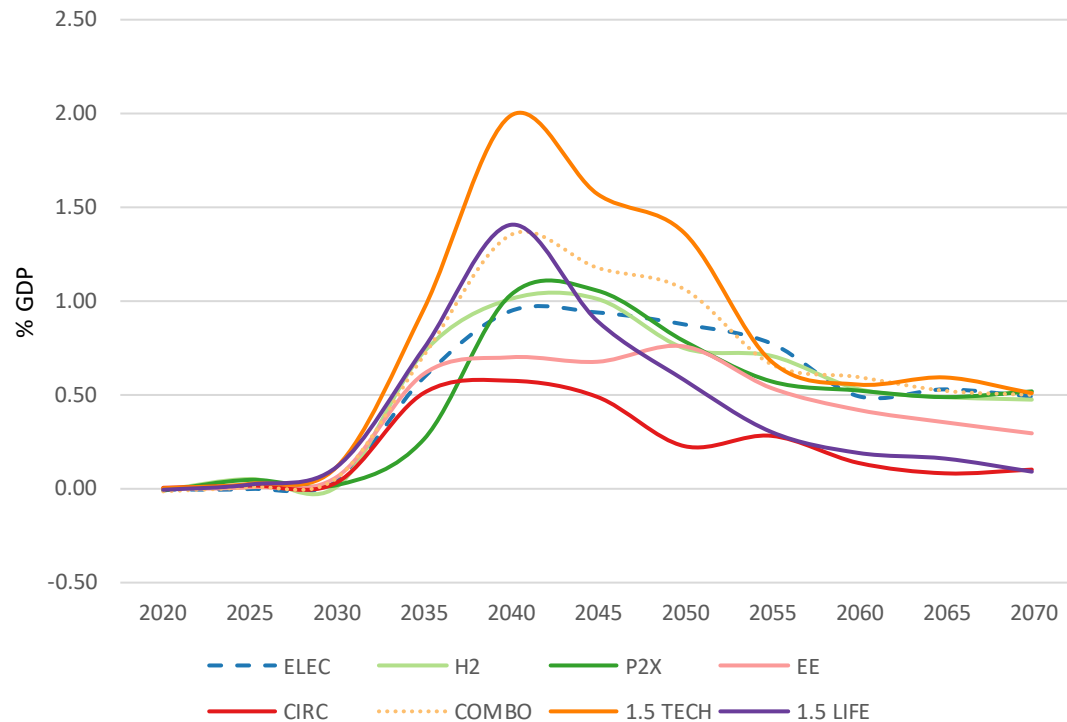
- Land provides goods and services
- Crops, materials (timber, pulp&paper, bio-plastics) and energy (solid and liquid biofuels) compete for scarce resources
- The LULUCF sector in the EU today is a net carbon sink



Investing in the future of Europe

additional investments in % of GDP

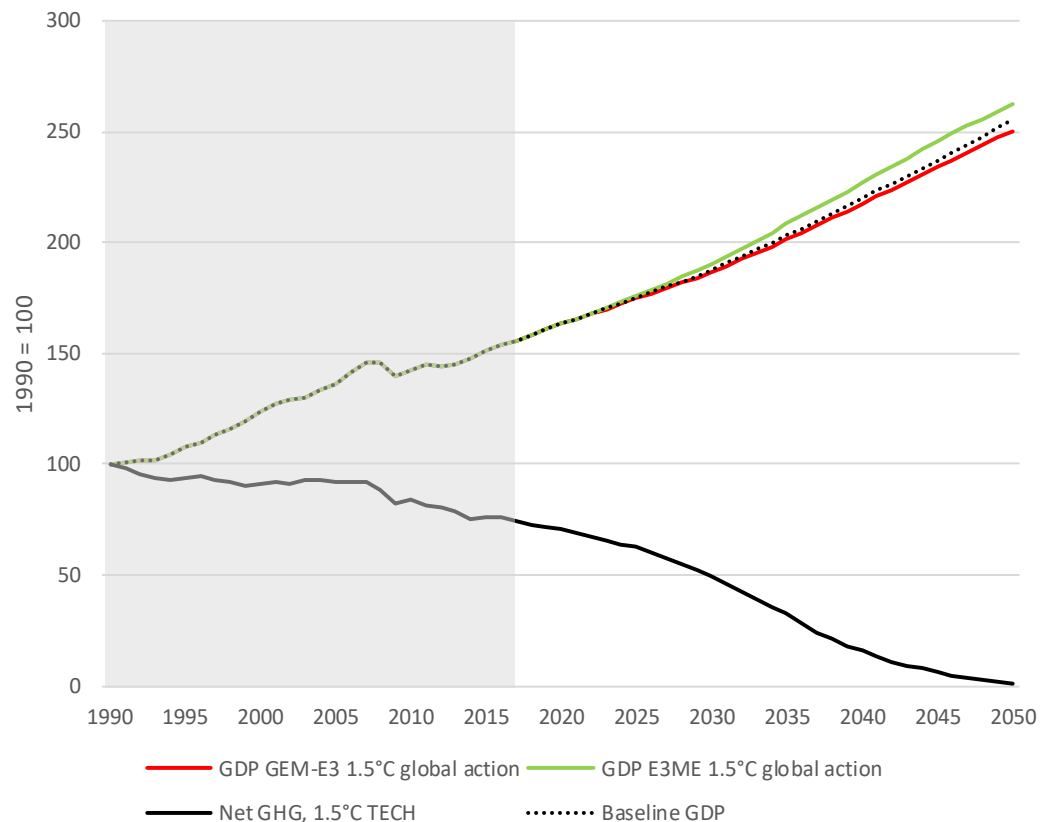
- Additional investment: 150-290 billion EUR/year (2030-2050)
- Higher investments for higher ambition
- Behaviors matters!

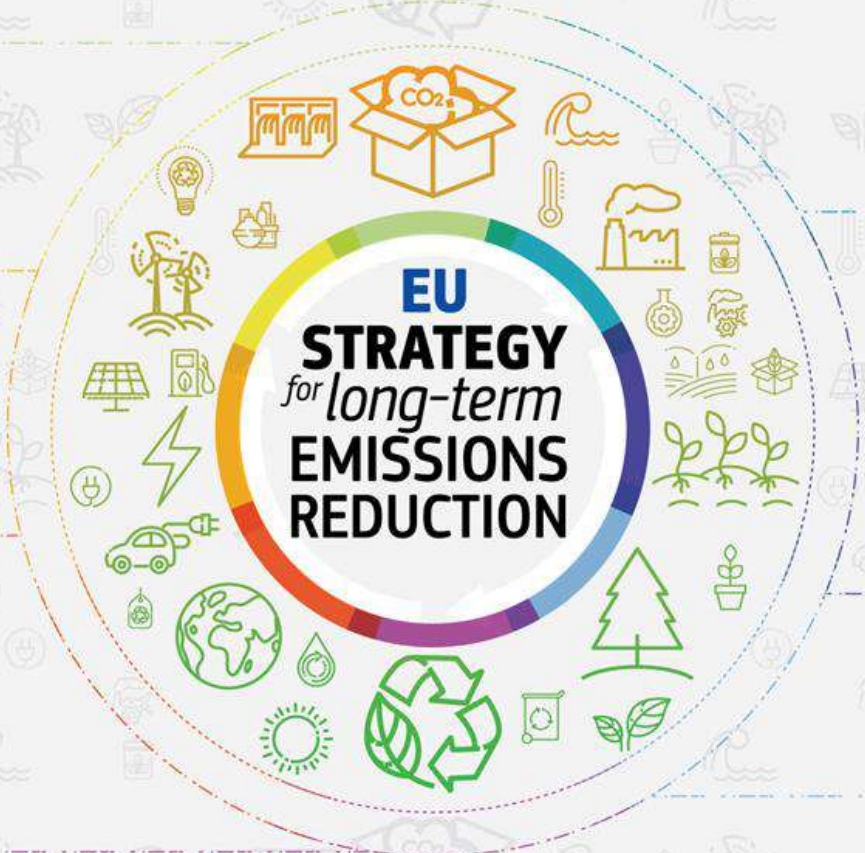


The economic impact of the energy transition

Estimated changes in GDP

- GHG emissions and GDP growth decouples in the last 40 years
- Decarbonisation impacts on GDP estimated with macroeconomic models
- Very small impact on GDP (small positive impact on employment)





Thank you

European Enabling Framework

