

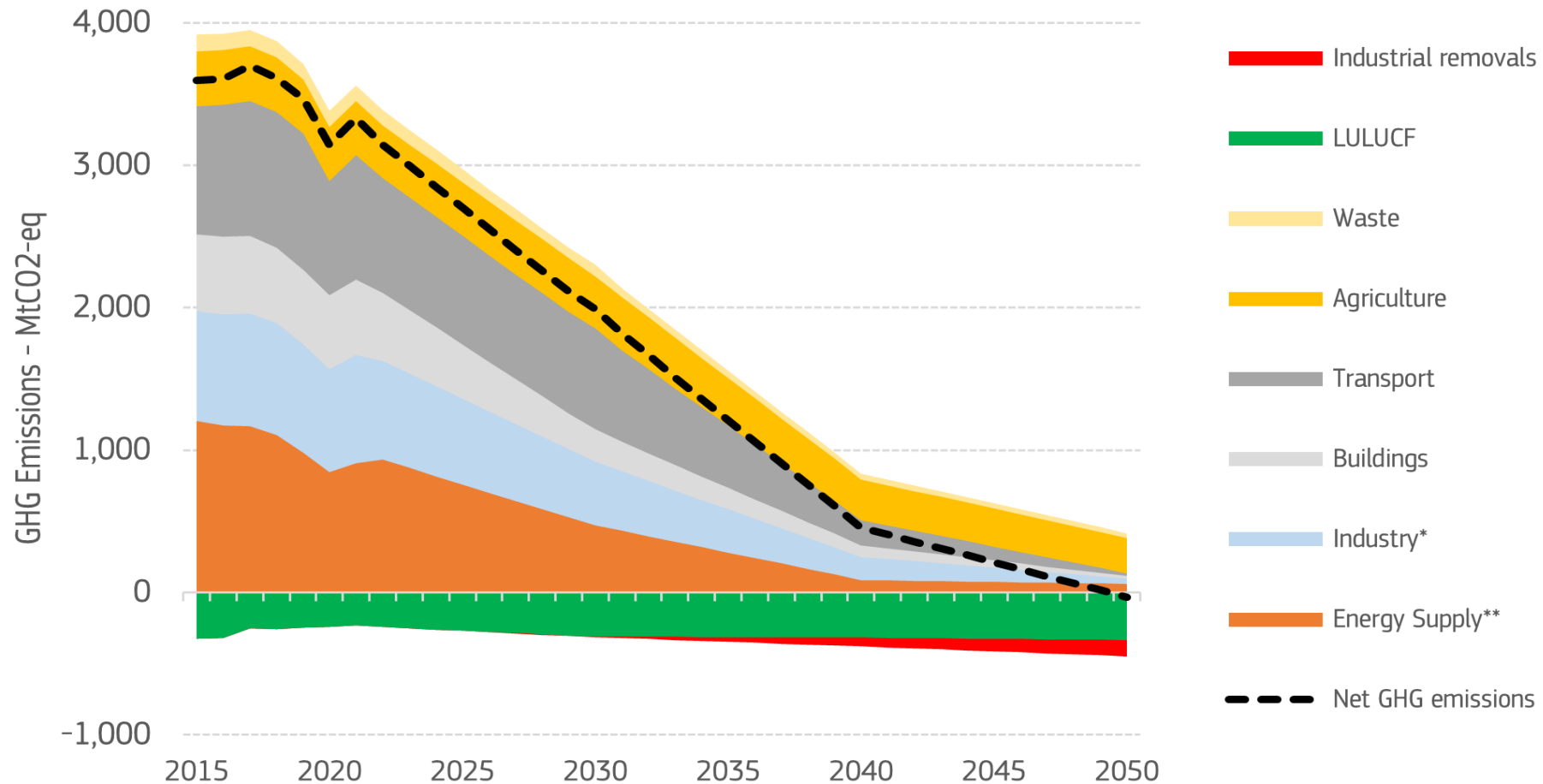


On track towards climate neutrality

14 February 2024

Pathway to climate neutrality

Historical and projected sectoral greenhouse gas emissions in the period 2015-2050

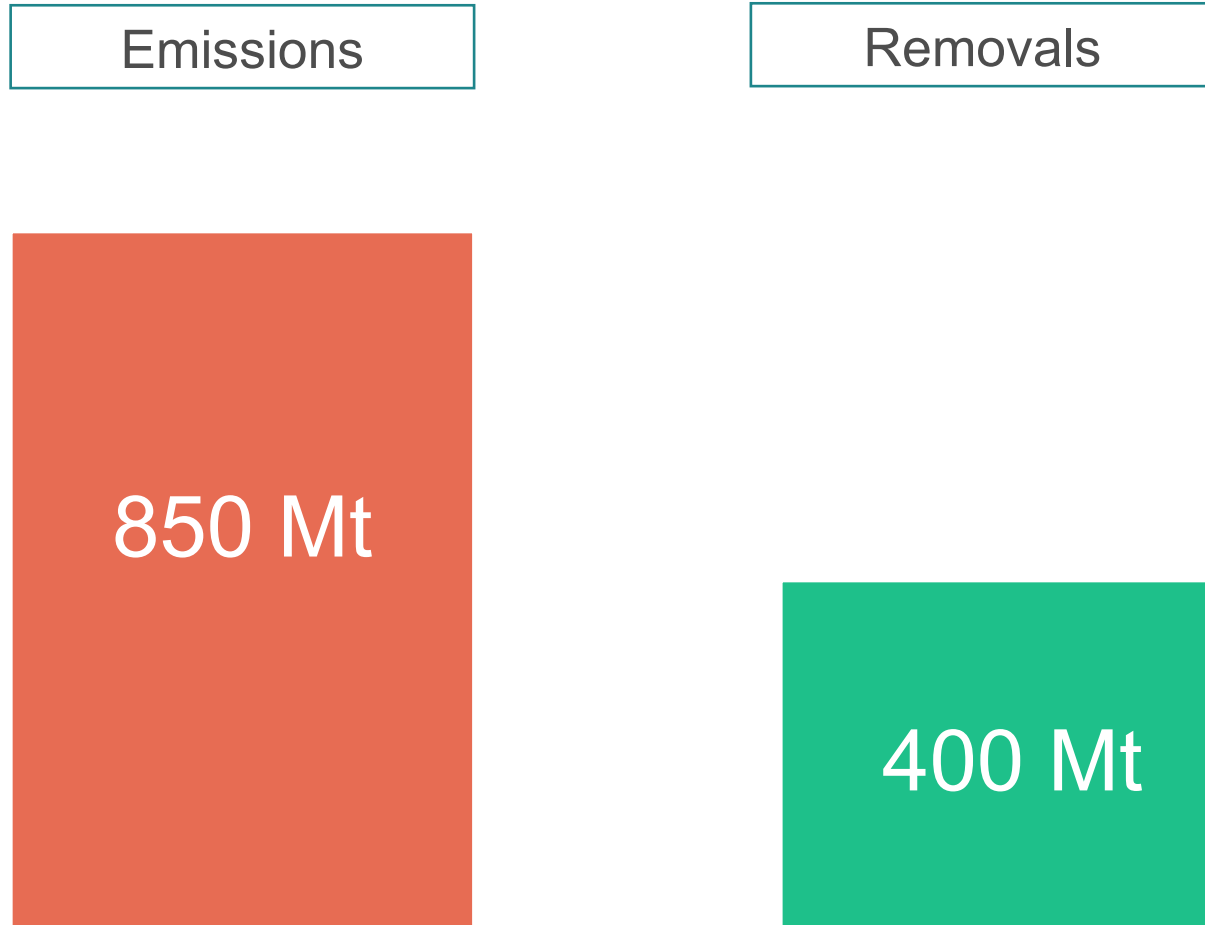


*Excluding non-BECCS industrial removals

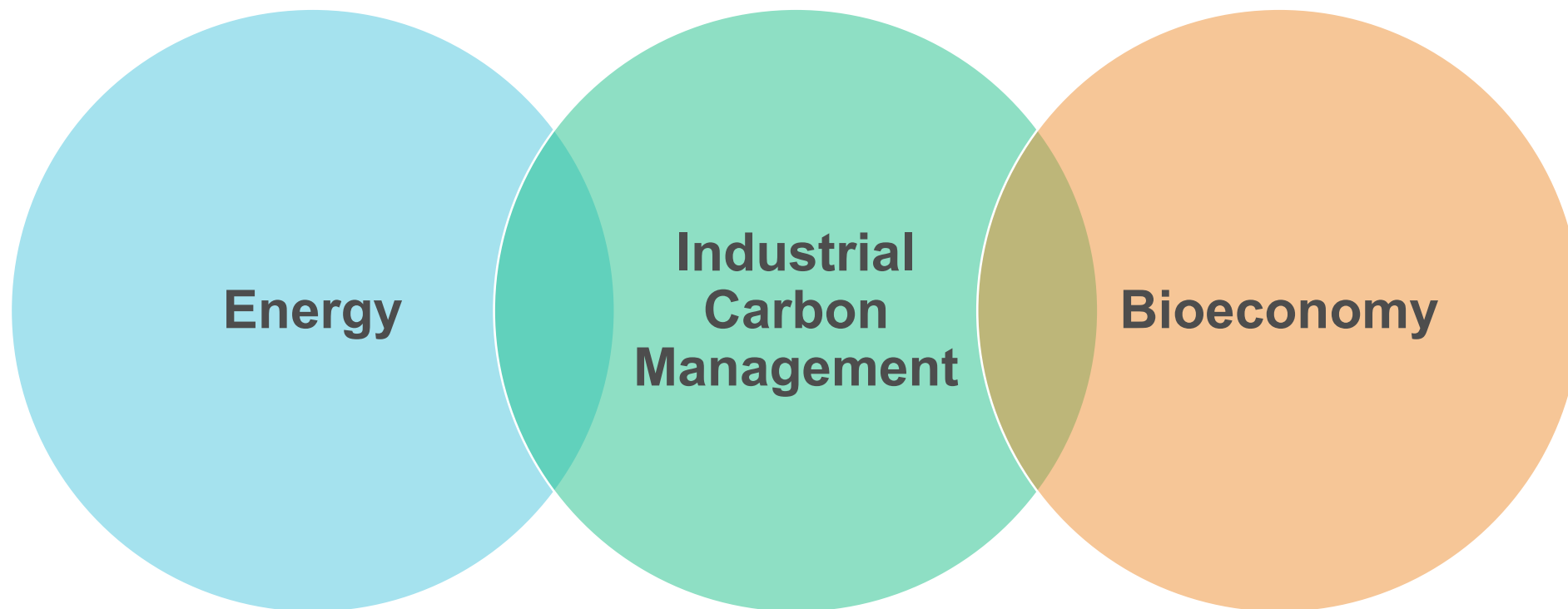
**Including bioenergy with carbon capture and storage (BECCS)

90 percent net emissions reductions in 2040

(compared to 1990)



Three keys for climate neutrality

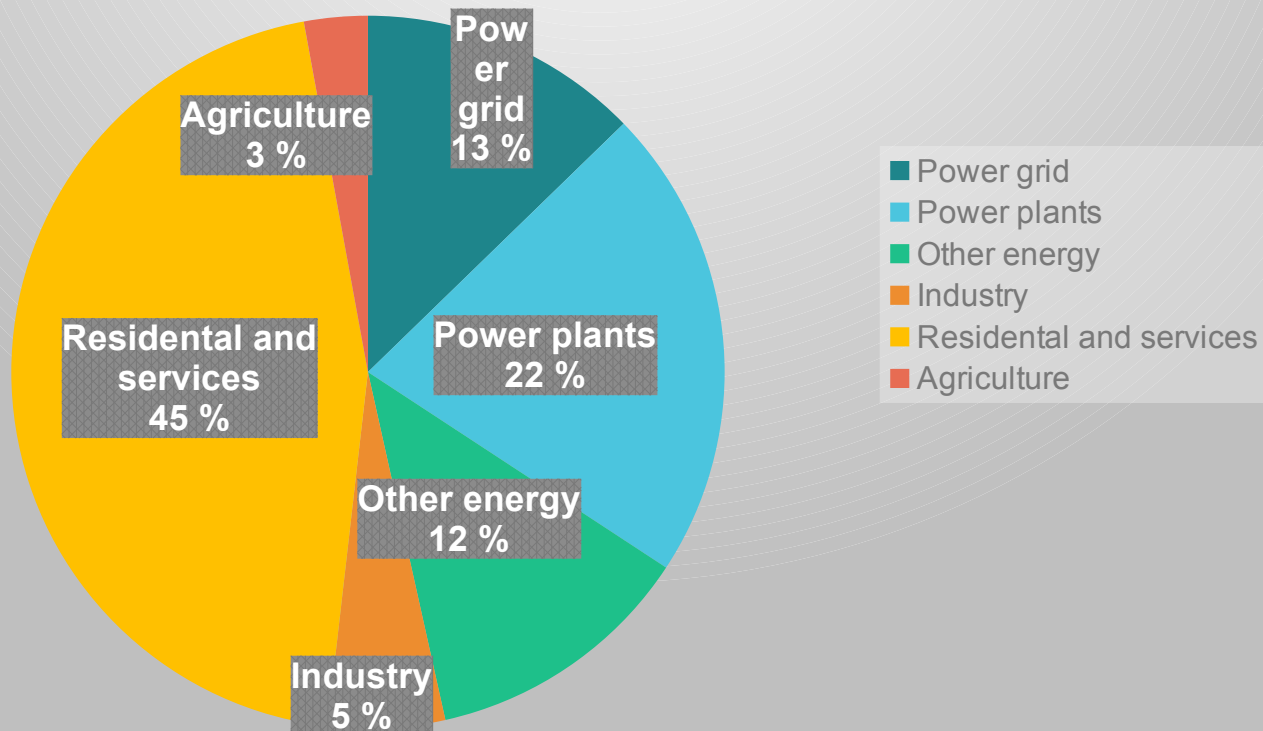


Renewables as dominant energy source

Key energy indicators	2030	2040	2050	Trend
Gross available Energy (Mtoe)	1160	1018	1032	
Renewables	328	613	691	
Nuclear	139	129	142	
Fossil fuels	663	275	150	
Import dependency (%)	50%	26%	15%	
Hydrogen production (Mtoe)	9	100	185	
e-Fuels production (Mtoe)	2	37	60	
Storage and flexibility options (GW)	172	275	238	

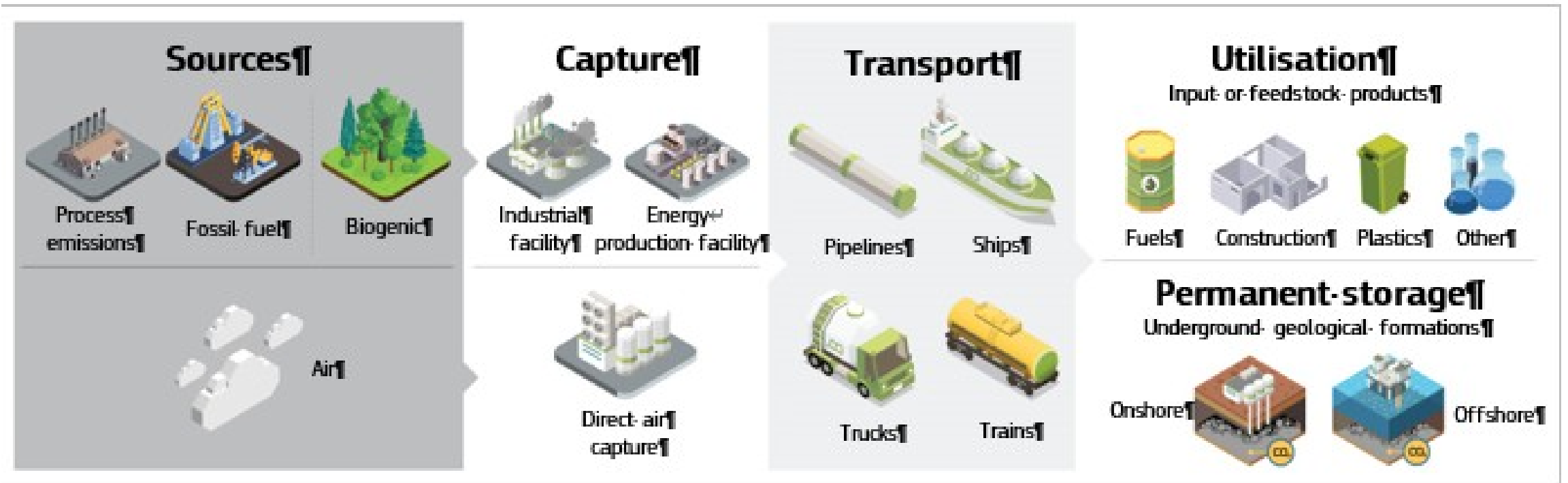
Investments in energy efficiency and clean tech

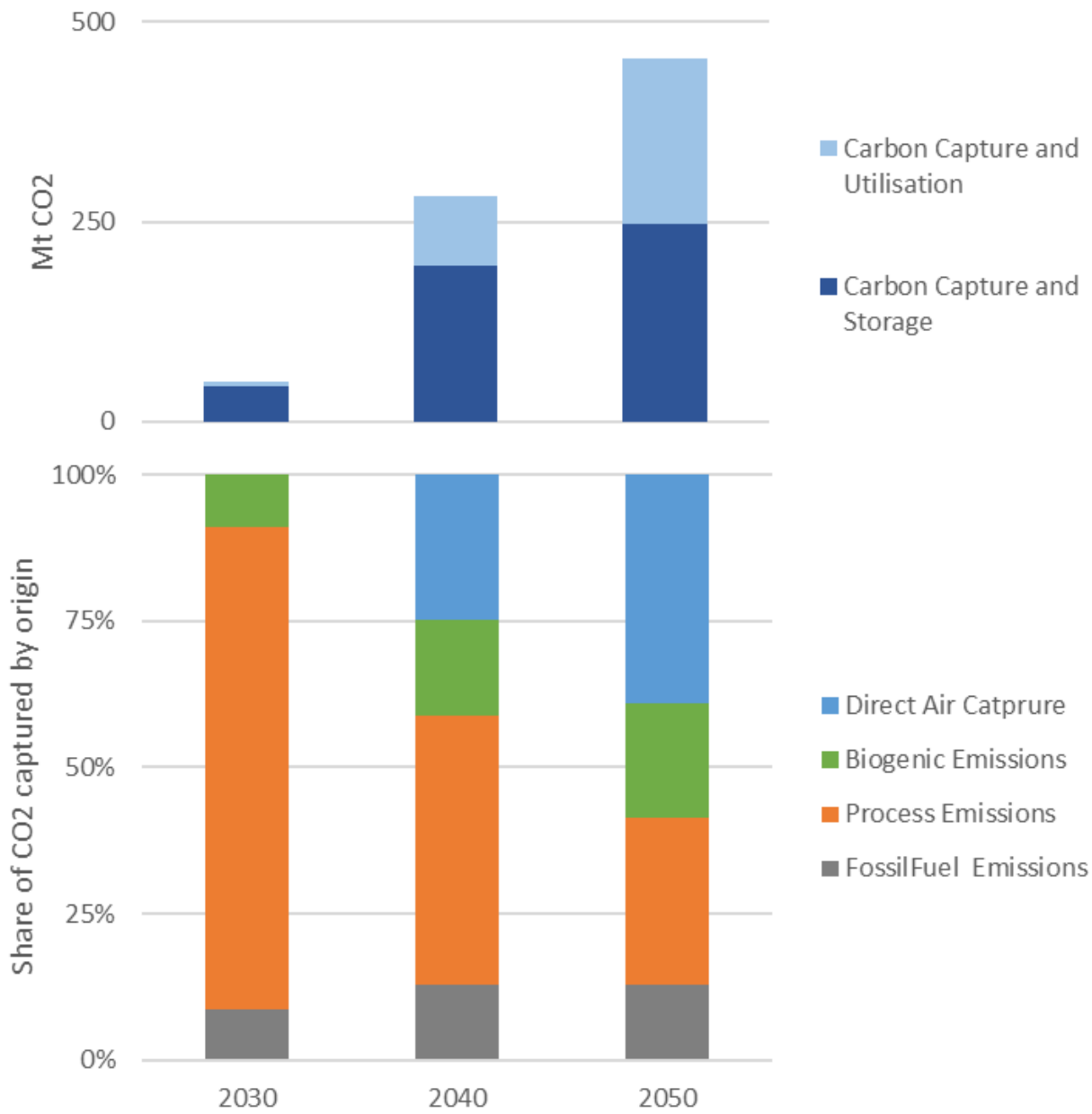
Average annual energy investments of EUR 661 billion from 2031 to 2050



Annual energy investments estimated at 3% of GDP (compared to 1.5% in 2011 to 2020)

A circular carbon economy





Estimated CO2 market volumes

Innovation Fund projects

Carbon Capture and Storage

- CCS from chemicals and hydrogen (BE)
- Bioenergy with CCS in Stockholm
- 10 CCS projects in cement industry (FR, DE, PL, BG, HR, BE, EL)
- Carbon storage in IS

Carbon Capture and Use

- Seven renewable chemical and fibre projects (ES, SE, FI, FR)
- Four refinery projects (BE, ES)
- Two waste-to-fuel plants (NO, SE)
- Two chemical recycling projects for polymer and plastic waste (DE, IT)

Hydrogen

- Two hydrogen-steel plants (SE)
- Eight electrolyser plants (NL, DE, ES, PT)
- Hydrogen from solid waste (NL)
- Two green ammonia plants (AT, NO)
- Transport of liquified hydrogen by ship (PT – NL)
- **EUR 800 million auction with 132 bids received**

Renewables and energy storage

- Geothermal (DE)
- Wave energy (IE)
- Offshore wind (FR, DK, ES)
- Seven production facilities for PV and batteries (IT, NO, FR, DK, DE, FI)
- Four production facilities for hydrogen components (BE, DK, DE, ES)

Innovation Fund projects in Austria

Green Ammonia plant in Linz (Verbund, Borealis)

Production of renewable ammonia

The project will integrate a PEM-electrolyser with ammonia production facilities

To use more electricity when the share of renewable electricity is high in the grid

To supply melamine, fertilisers, and technical nitrogen products.

Intra-day electricity storage (EVN)

To integrate remotely controlled home optimization devices into one entity (a virtual power plant - VPP)

This potential will then be aggregated and used to provide grid stability services

Theoretical peak power of more than 6 MW available to the energy system or 4.4 GWh per year of load shift potential

Carbon farming



Use of **conservation tillage, catch crops, cover crops** and increasing **landscape features**



Restoration, rewetting and conservation of **peatlands and wetlands**



Afforestation and reforestation according to ecological principles



Biochar



Agroforestry and other forms of mixed



Biogas feeding and breeding

Sustainable bioeconomy - examples



Use of **wood-based construction products** and other carbon-storing building materials



Fibre crops (applications: clothes, cosmetics, particle boards, bio-composites, bio-plastics...)



Bioenergy with carbon capture and storage (BECCS) e.g. Stockholm Exergi's project financed by EU Innovation Fund

Outlook for next EU Commission

Investments

Implementation