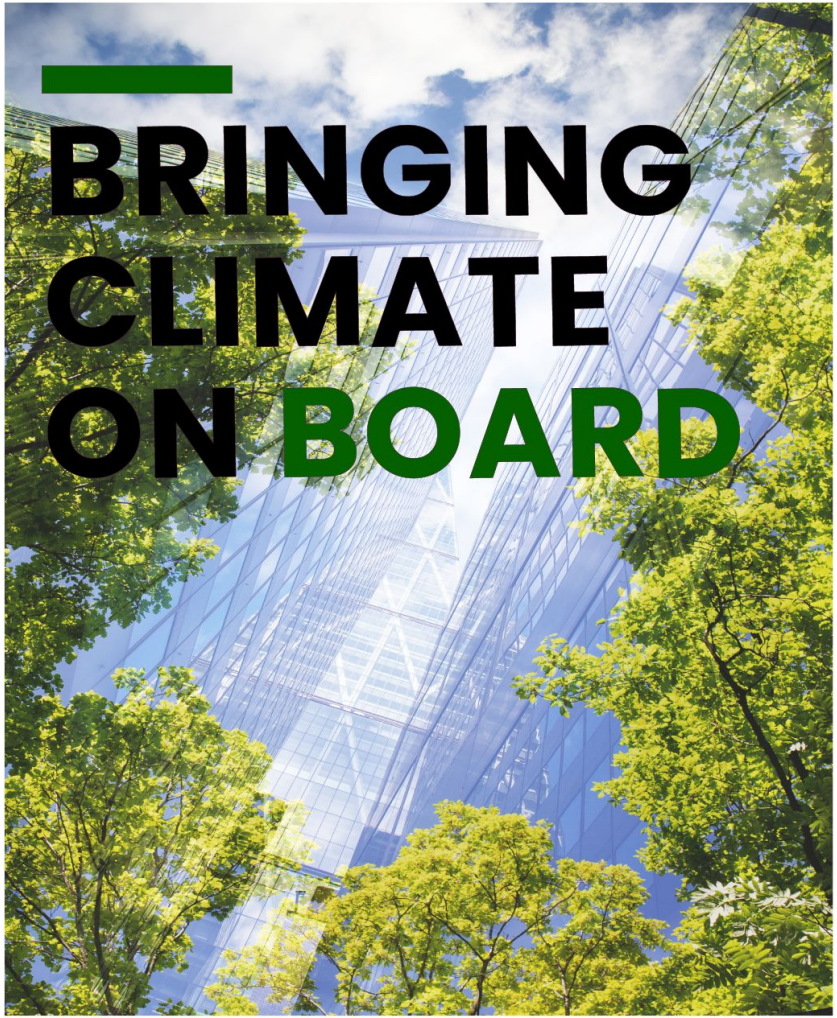


Chapter Zero Brussels
The Directors' Climate Forum

Thu, 20 Apr | Webinar

A Climate-Neutral Belgium by 2050
How will we get there?

Organised in collaboration with:

CLIMACT

Chapter Zero Brussels
The Directors' Climate Forum

Moderator

Stephanie Raymond
Association Manager
Chapter Zero Brussels

Speakers

Julien Pestiaux
Partner
Climact

Pierre-Henri D'haene
Head of Sustainability
Elia

Agenda

Chapter Zero Brussels
The Directors' Climate Forum

5 mins - Introduction

20 mins - Belgium's 2050 pathway - Julien Pestiaux (Climact)

10 mins - Sharing Elia's perspective - Pierre Henri D'haene (Elia)

20 mins -Q&A with the audience

5 mins - Wrap up & Closing

CLIMACT

A Climate-Neutral Belgium by 2050 – How will we get there?

20th of APRIL 2023

Climact Team

Benoît Martin, Charles Vander Linden, Jérôme Meessen, Julien Pestiaux, Maïté Jonas, Michel Cornet, Thomas Gilon, Quentin Jossen, Quentin Schobbens, Simon Lalieu, Olivier Squilbin, Pascal Vermeulen

CLIMACT

We provide

Energy & climate change **services**

Prospective Studies

Legal & Regulatory Advice

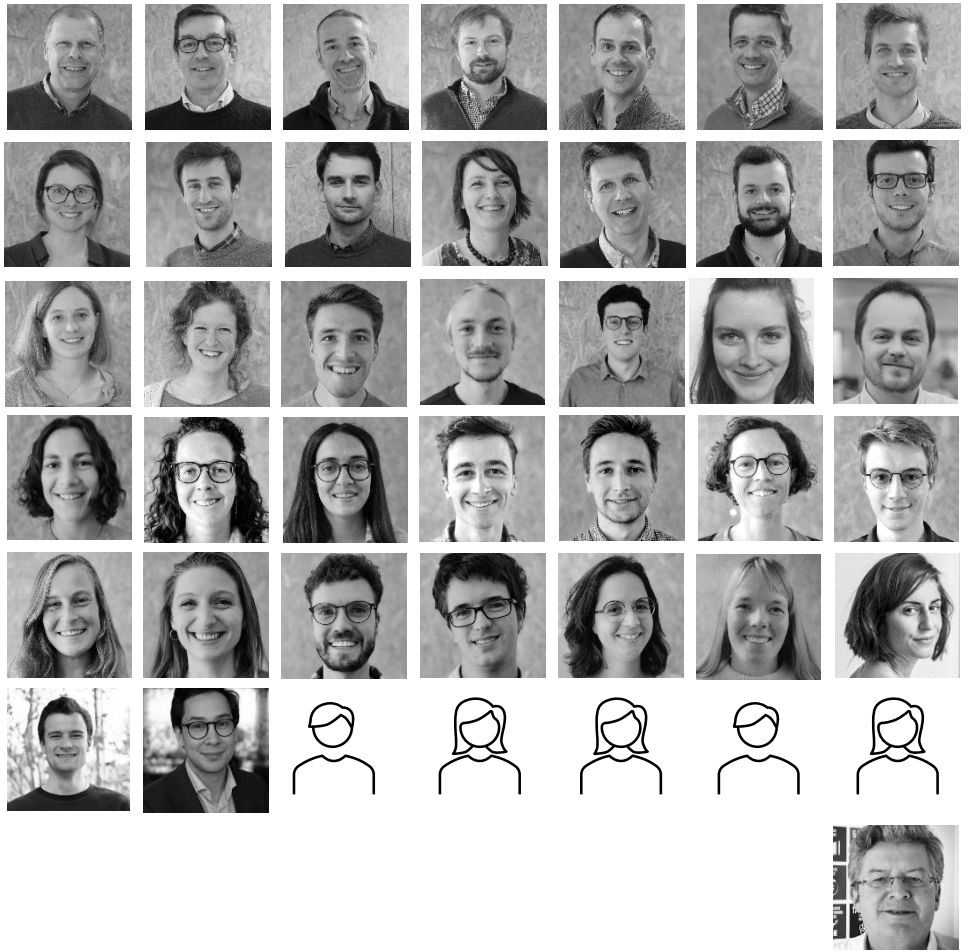
Strategy Consulting

Our team is

- **Multidisciplinary**
- **Engaged**
- **Dedicated**

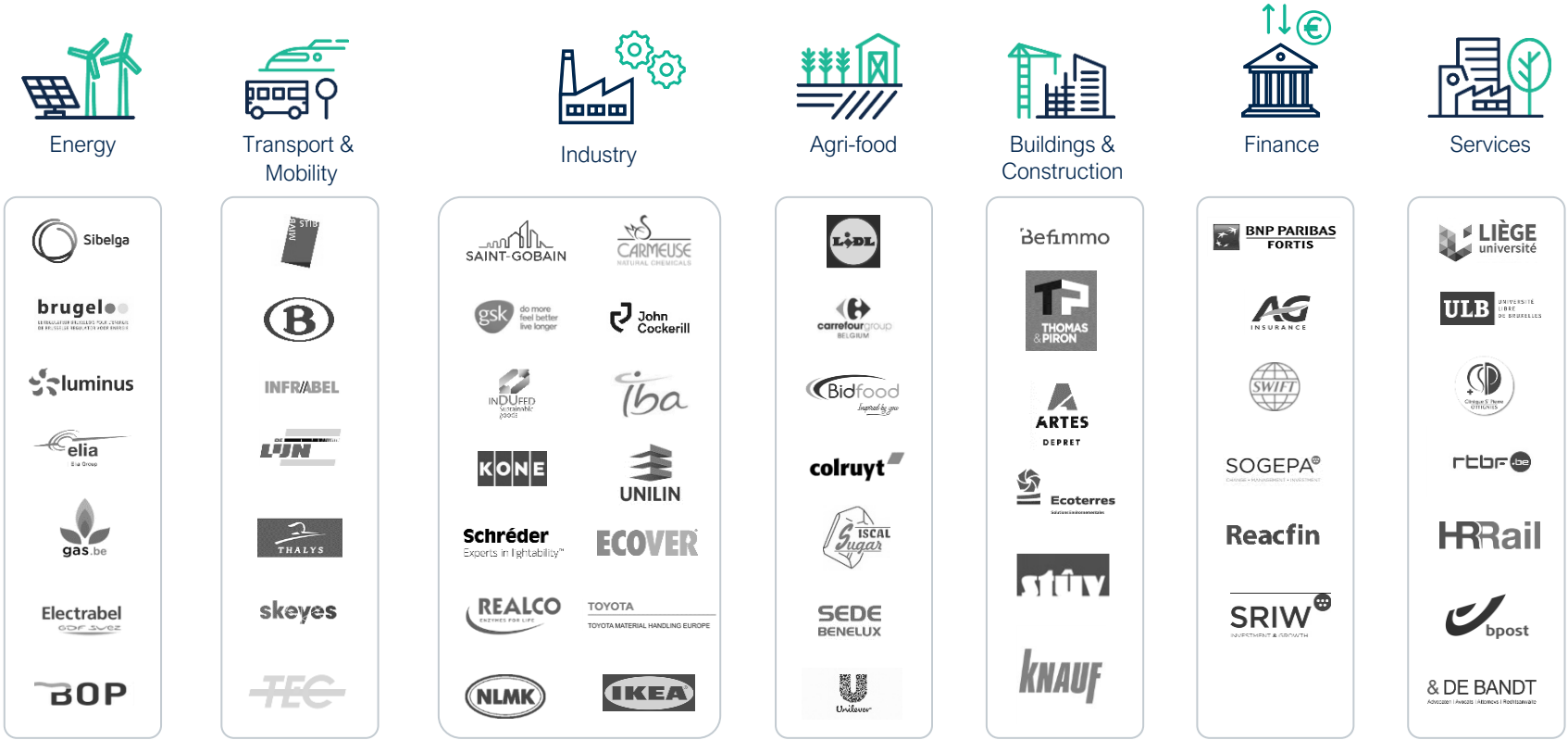
We value

- **Collaboration**
- **Impact**
- **Coherence**



We empower our clients to act on climate change

Private organisations of all sizes and sectors. More example on https://climact.com/en/case/



We empower our clients to act on climate change

Public organisations of all sizes. Other examples on https://climact.com/en/case/

Public Policies

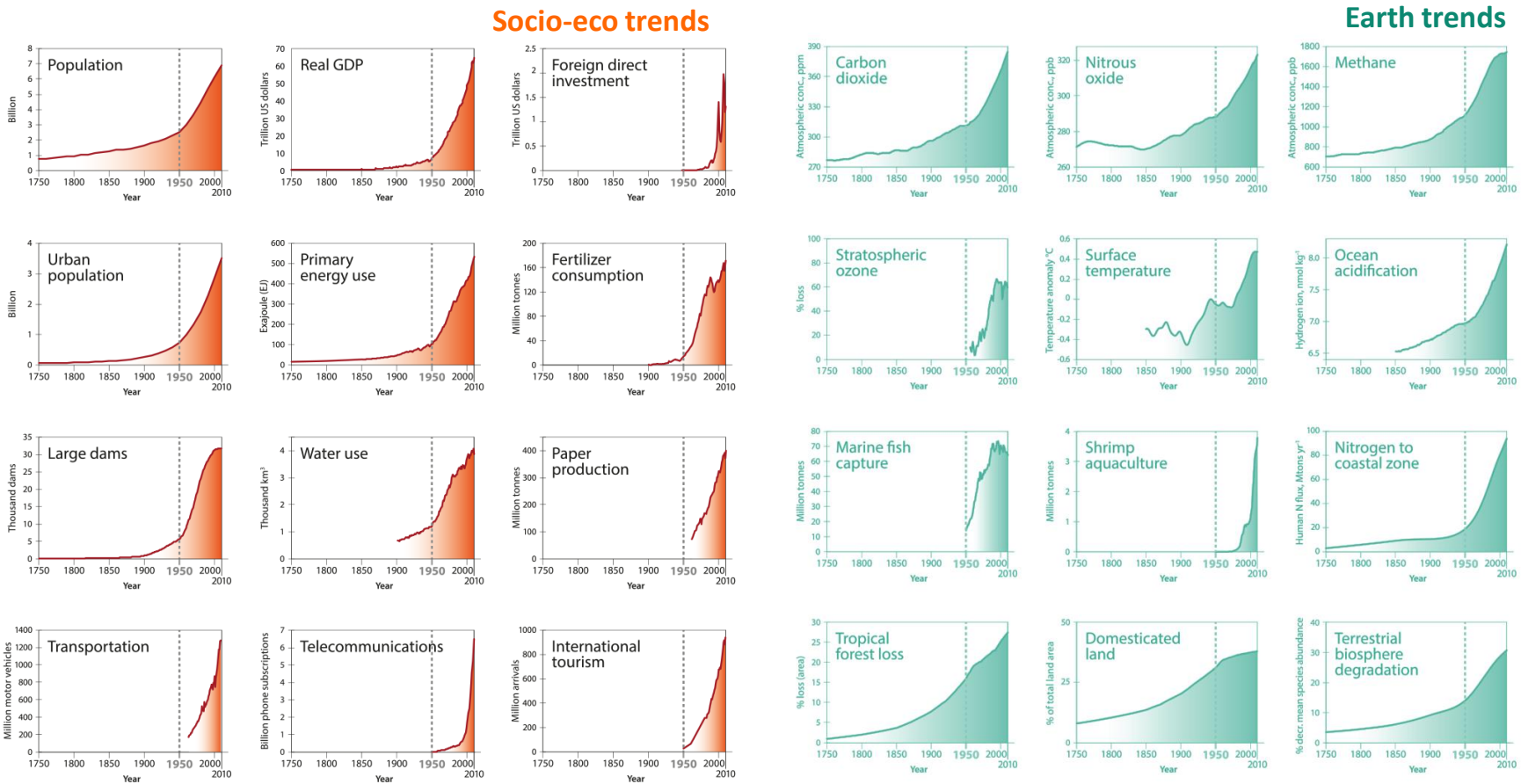
Content

The ambition is rising but current policies don’t add up

Our models are meant to support the required implementation

Can Belgium achieve net zero emissions by 2050 ?

Humanity is at the root of a wide range of environmental impacts



Source: ”The great acceleration”, Steffen, 2004, updated in 2015

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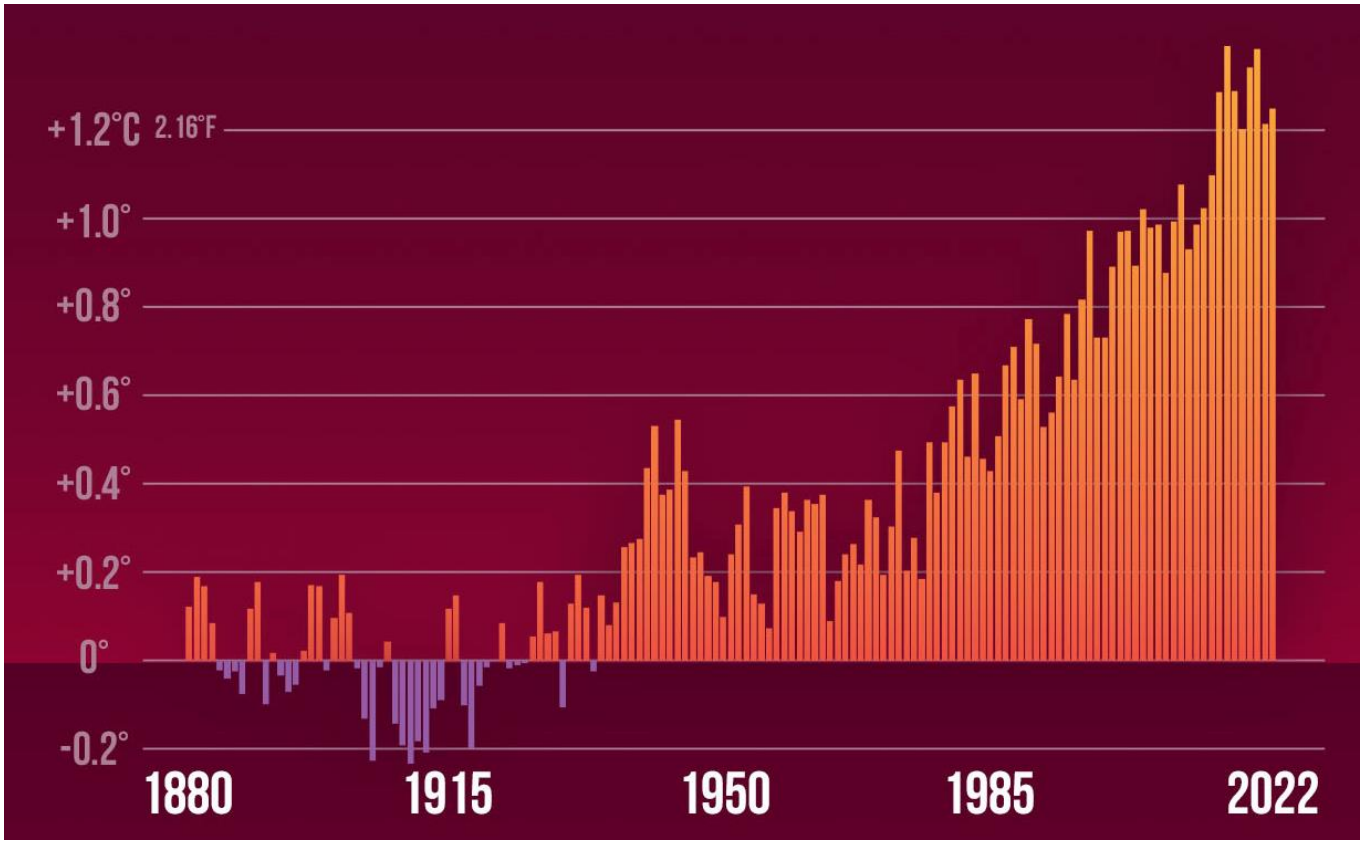
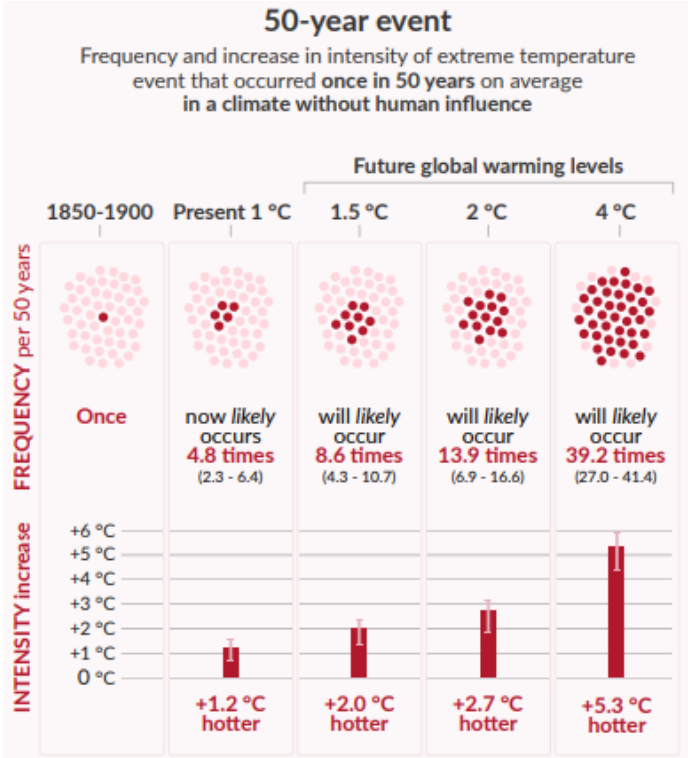
Global warming is already very real – but the average value hide extremes across geographies and over the year

Delta in global average temperature compared to the average in the period 1881-1910



Source: Climate change knowledge portal

Projected changes in extremes increase in frequency and intensity with every additional degree of global warming



- **We already experience "1 in 50-year events" every ~10 years** with the current 1°C increase
- **2°C increase means tripling the frequency**, and with **more intensity**
- Every tenth of degree makes a world of difference

Source: https://www.ipcc.ch/report/ar6/wg1/ Summary for Policy Makers

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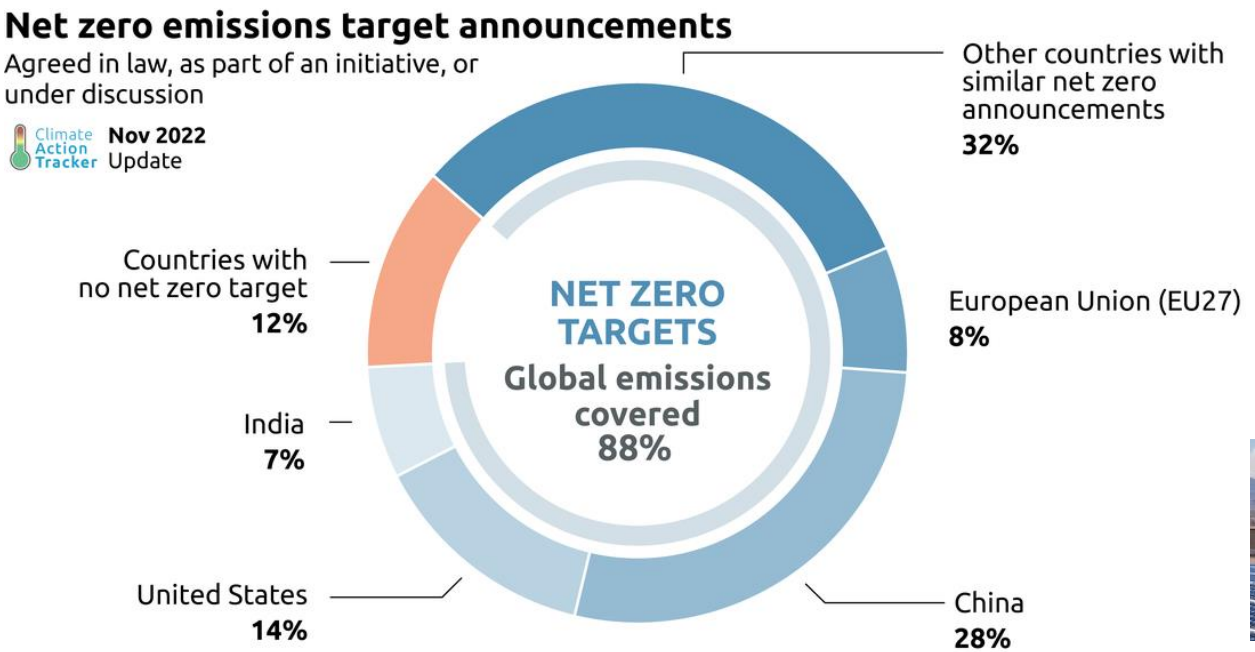
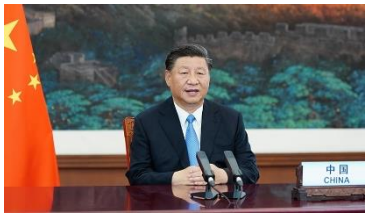
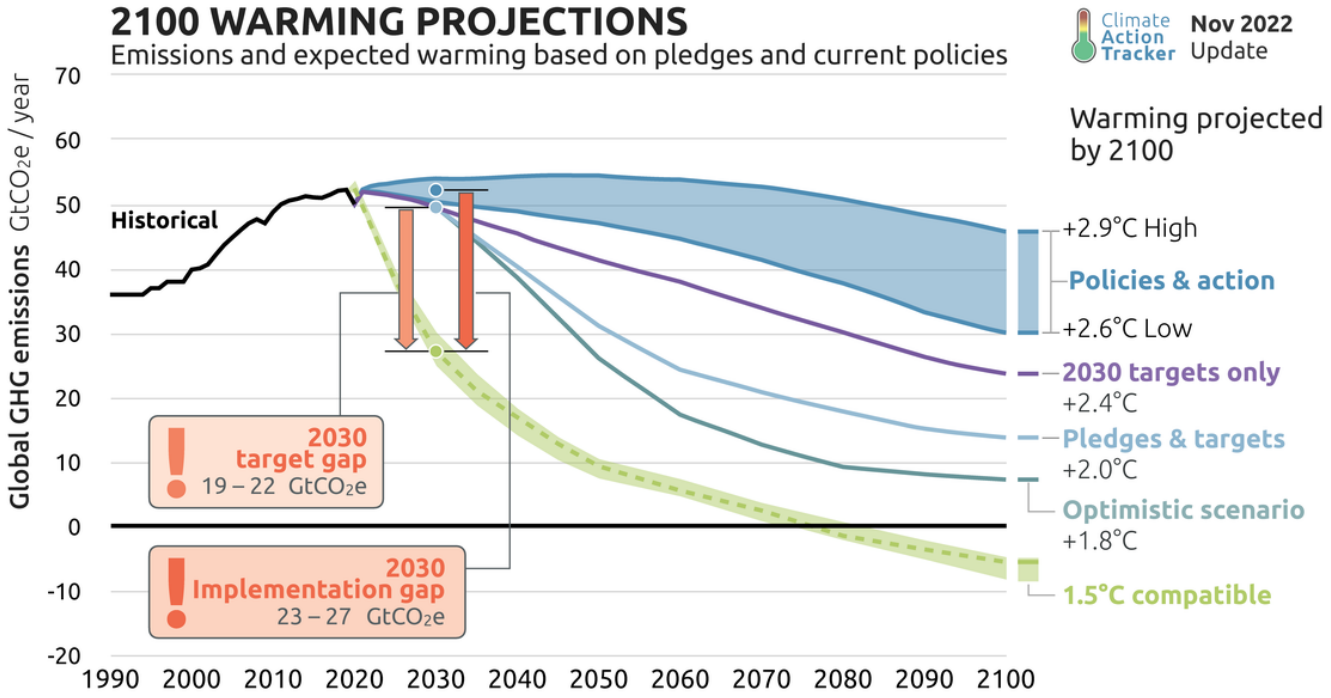
As of November 2022, over 140 countries had announced or are considering net zero targets, covering 90% of global emissions.

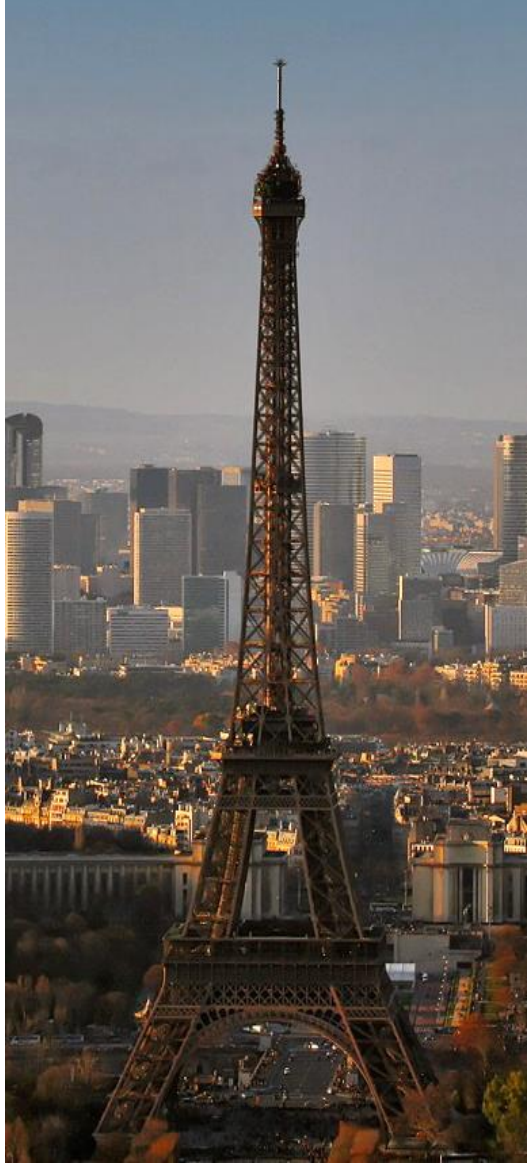




Source: Climate Action Tracker, November 2022, targets are agreed in law, as part of an initiative, or under discussion

But the 2030 ambition needs to be increased to be consistent with 2DS, let alone 1.5DS

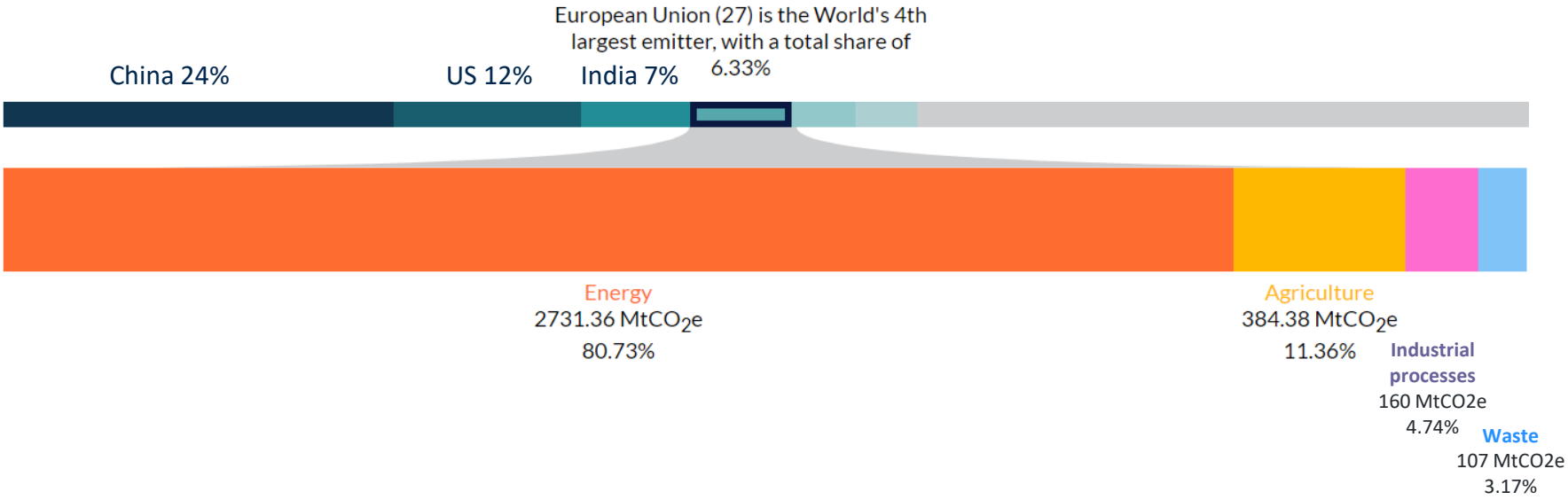




Source: Climate Action Tracker, November 2022

The EU is world's 4th largest emitter
Energy covers 80% of emissions

Greenhouse gas emissions in 2019 in the EU27



Source : Climate Analysis Indicators Tool (CAIT), Climate Watch data

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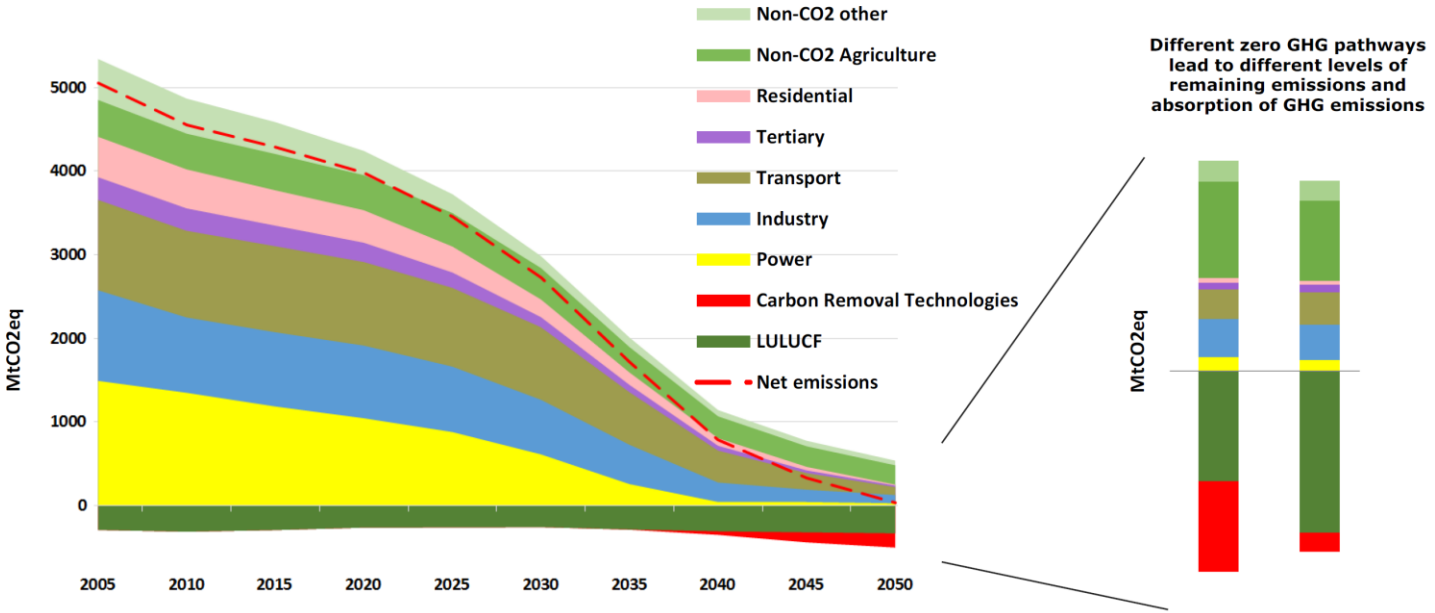
Climate neutrality has been agreed and put into law at EU level

"In the light of the latest available science and of the need to step up global climate action, the European Council endorses the objective of achieving a climate-neutral EU by 2050, in line with the objectives of the Paris Agreement." European Council, Dec. 2019



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In 2020, the European Union set the tone and presented the Green Deal

"We are acting today to make the EU the world's first climate neutral continent by 2050. The Climate Law is the legal translation of our political commitment and sets us irreversibly on the path to a more sustainable future. It is the heart of the European Green Deal. It offers predictability and transparency for European industry and investors. And it gives direction to our green growth strategy and guarantees that the transition will be gradual and fair."

Ursula von der Leyen
President EC

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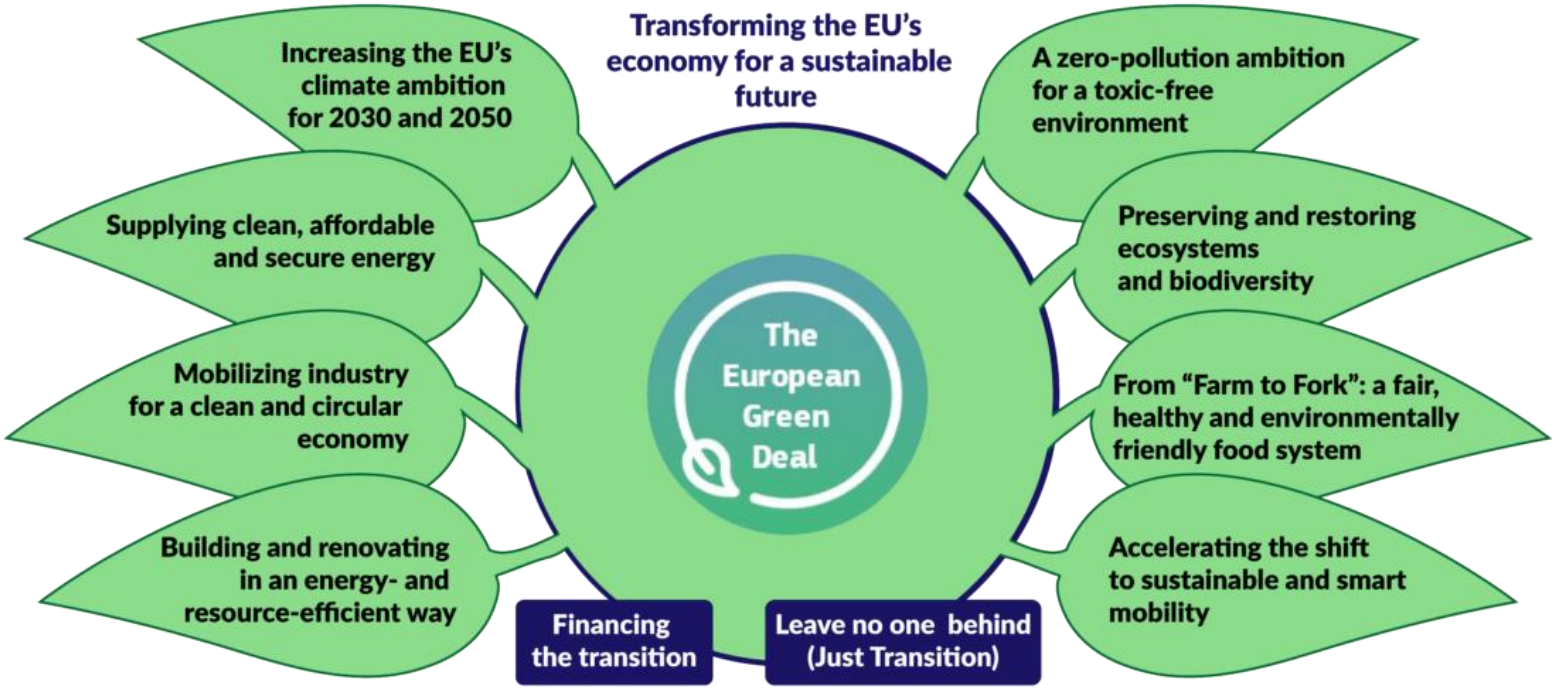
With the Green Deal, the EU has set strong ambitions



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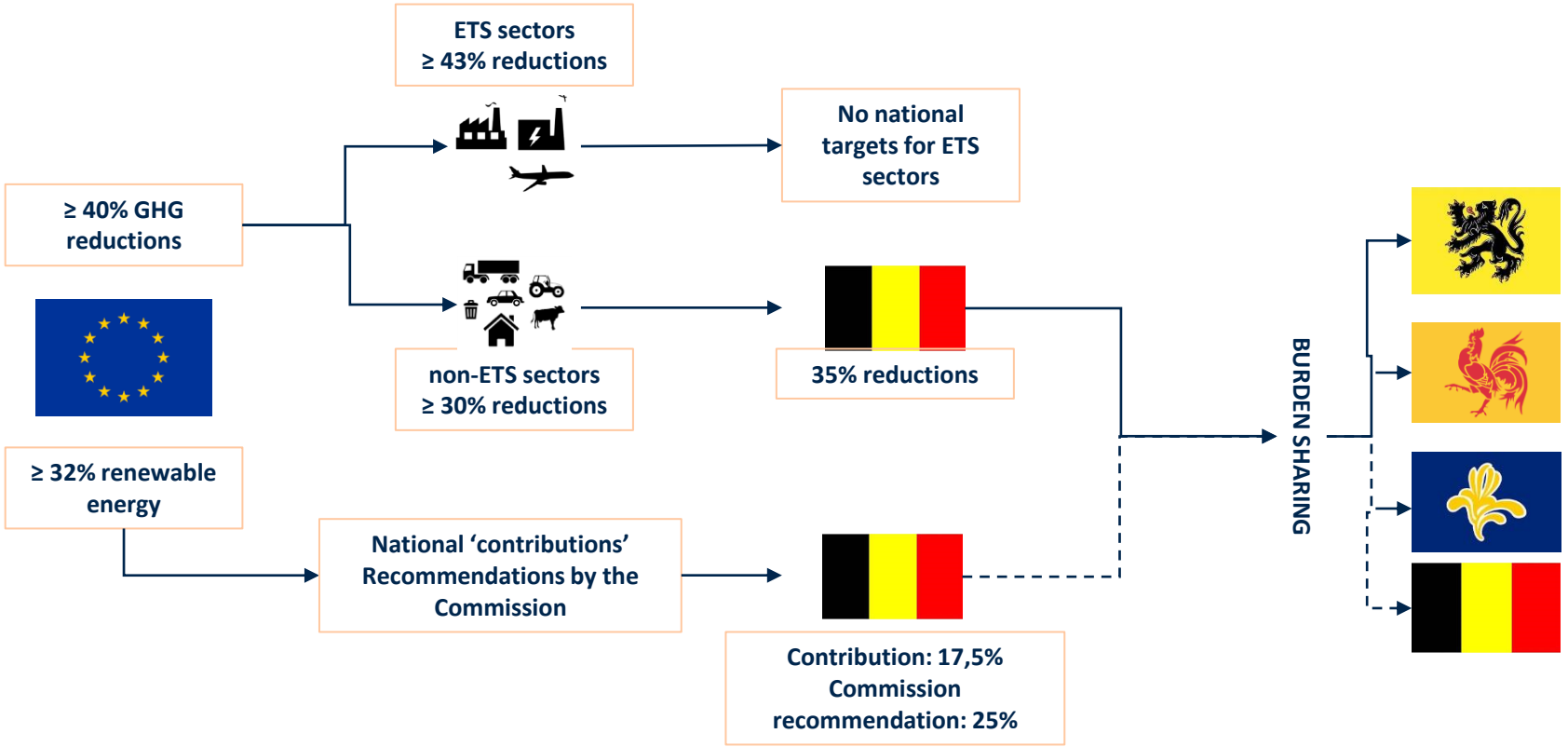
FIT FOR 55

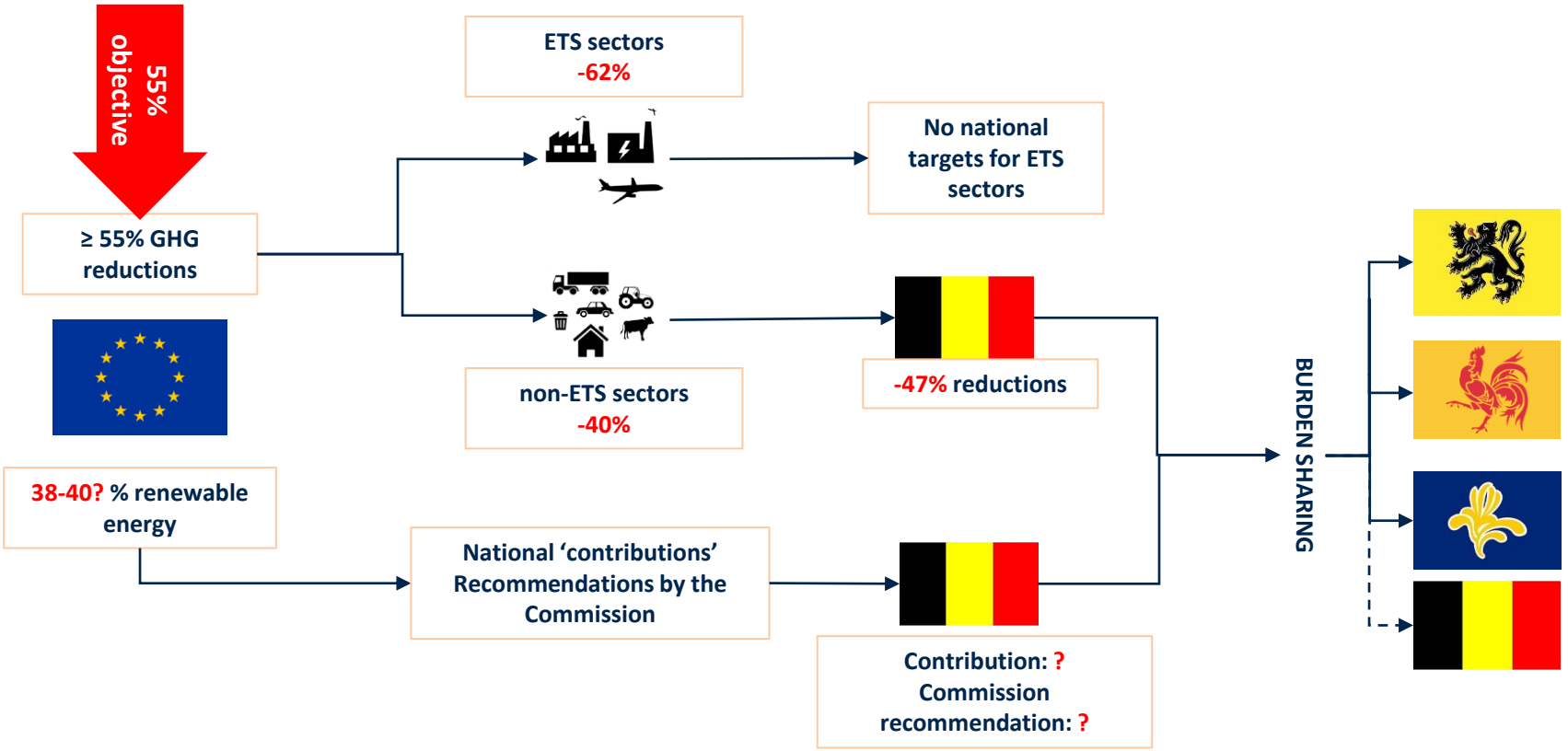
A broad legislative package to align existing EU policy with the new emissions reduction goal of 55% by 2030.

What are the implications of this ambition at the Belgian level?



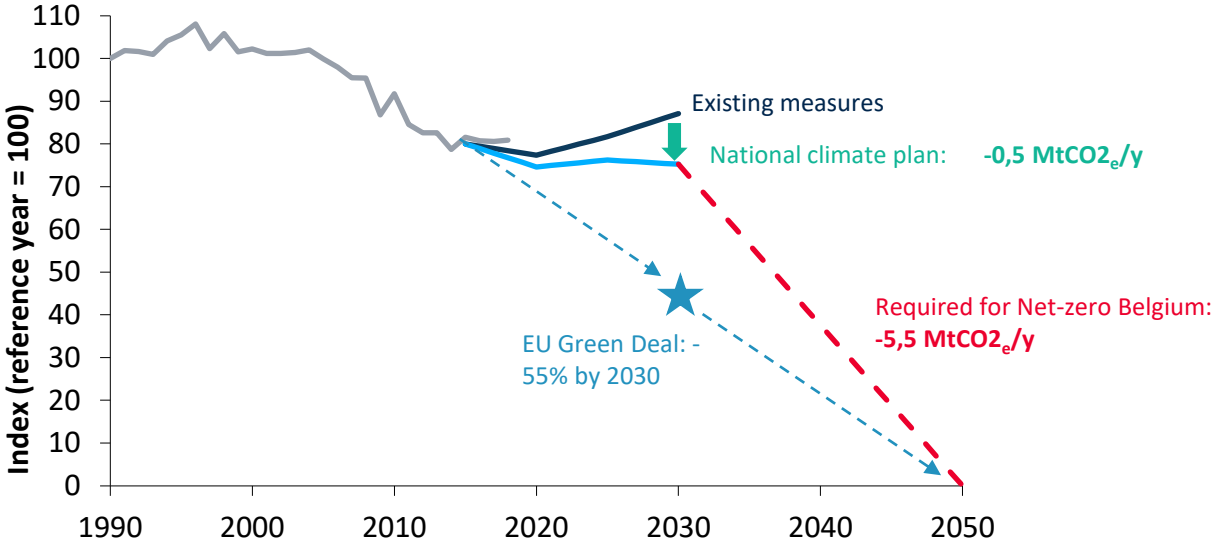
Source: Climact based on various sources

Increased ambition with the 55% target



Source: Climact based on various sources

CLIMACT



- The Federal Government and 2 of the regions have **committed to a -55% emissions reduction by 2030** (vs1990)
- **New NECP coming**
- Annual reduction **should be 10x larger** than current plans

Source: SPF Environnement & Climact

Several low carbon scenarios are discussed at the Belgian level with the various administrations and many stakeholders involved

BEH

- **Major societal changes**
- Examples: support the reduction of demand for products and transport, the shift to public transport, shared mobility, a strong shift to active modes (walking and bikes)

CORE 95

- **Balance between TECH and BEH**
- A mix of strong societal and technological ambitions
- 5% of removals

TECH

- **Major ambition in technological deployments**
- Examples: energy efficiency, electrification, innovative energy carriers (hydrogen, synthetic fuels), autonomous vehicle fleet

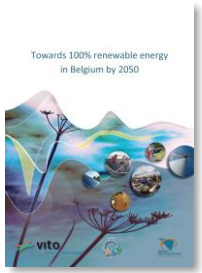
Source: Analysis SPF & CLIMACT

Complementary to various other analyses

Recent …

…

… and less recent studies



Content

The ambition is rising but current policies don’t add up

Our models are meant to support the required implementation

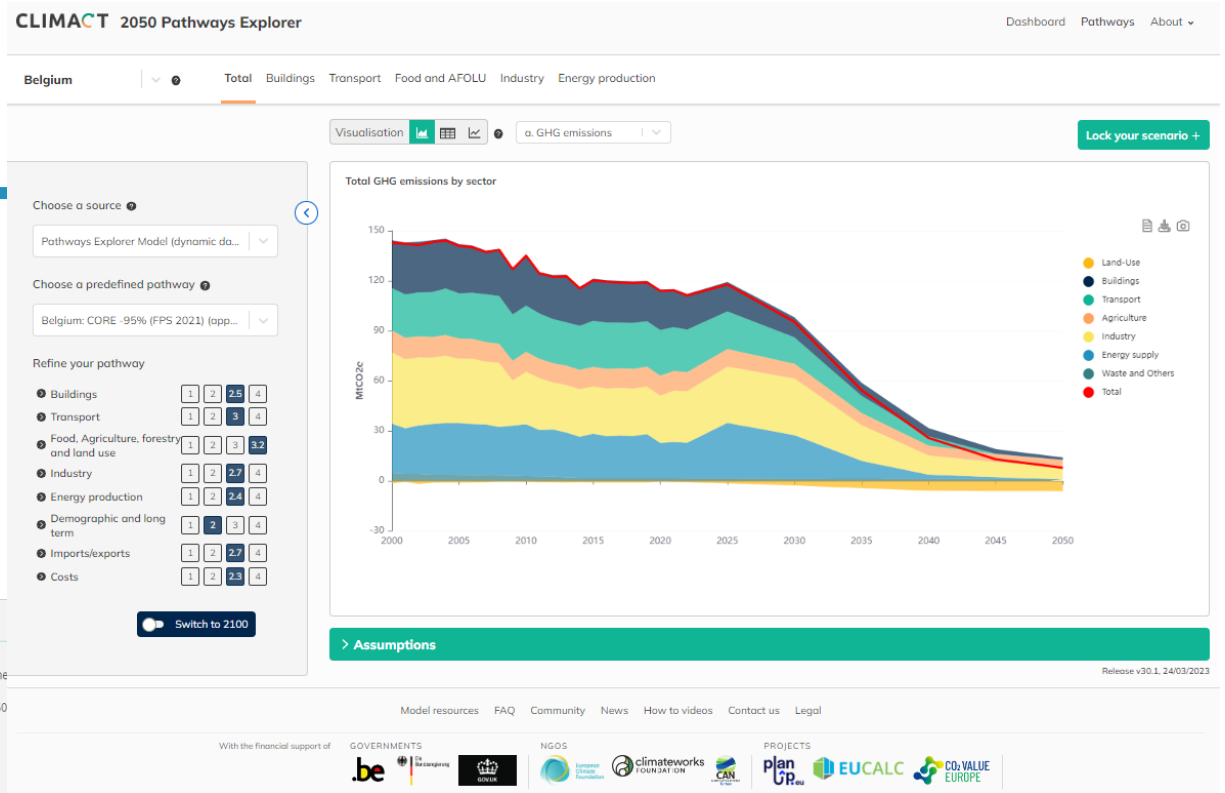
Can Belgium achieve net zero emissions by 2050 ?

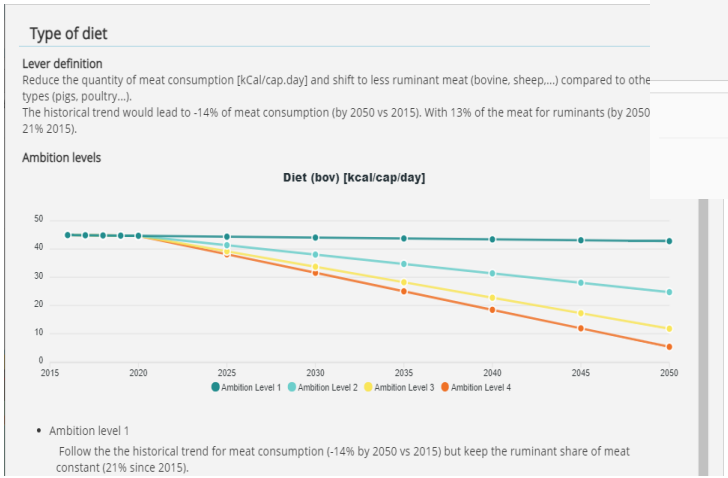
Climact has been developing tools at global, European, national, regional levels for the past 10 years

CLIMACT

Project	Subproject or content
Global Calculator (for DECC)	• **Model** energy, emissions & resources
Climate Transparency Initiative (CW Foundation)	• Regional models for **EU**, India, China, Americas, Brazil
Science Based Targets	• Technical Board advisory
Climate Transparency Initiative (for ECF)	• Net zero scenarios by 2050 • Focus on policy angle
Low Carbon group (Bruegel)	• Net zero by 2050 analysis
EUCalc (for commission)	• **Model** of energy, emissions, socio economic and resources
2050 Calculators / Pathways Explorer	• Now covering the full EU28+1
National analysis (SPF, BE.FIN, Heinrich Böll Stiftung, Greenpeace)	• Carbon pricing, circular economy strategy, macro economic impact, nuclear phase-out impact, Energy efficiency impacts
2050 Calculators & analysis	• **Federal ,**Wallonia, Flanders, Brussels
Sector roadmaps	• Walloon Buildings renovation strategy • Example of federations: Agoria, Cobelpa, FIV, Fedustria, GSV, Fetra, Febelgra
Regional analysis (AWAC, DGO4, IBGE)	• Socioeconomic impact of low carbon plans • Regional energy balance
City roadmaps **EU-City-Calc** **Neighbourhood engagement**	• Various cities supported • Energy Cities network, various cities involved • Supporting cities to prioritize work at the neighbourhood level

Pathways Explorer





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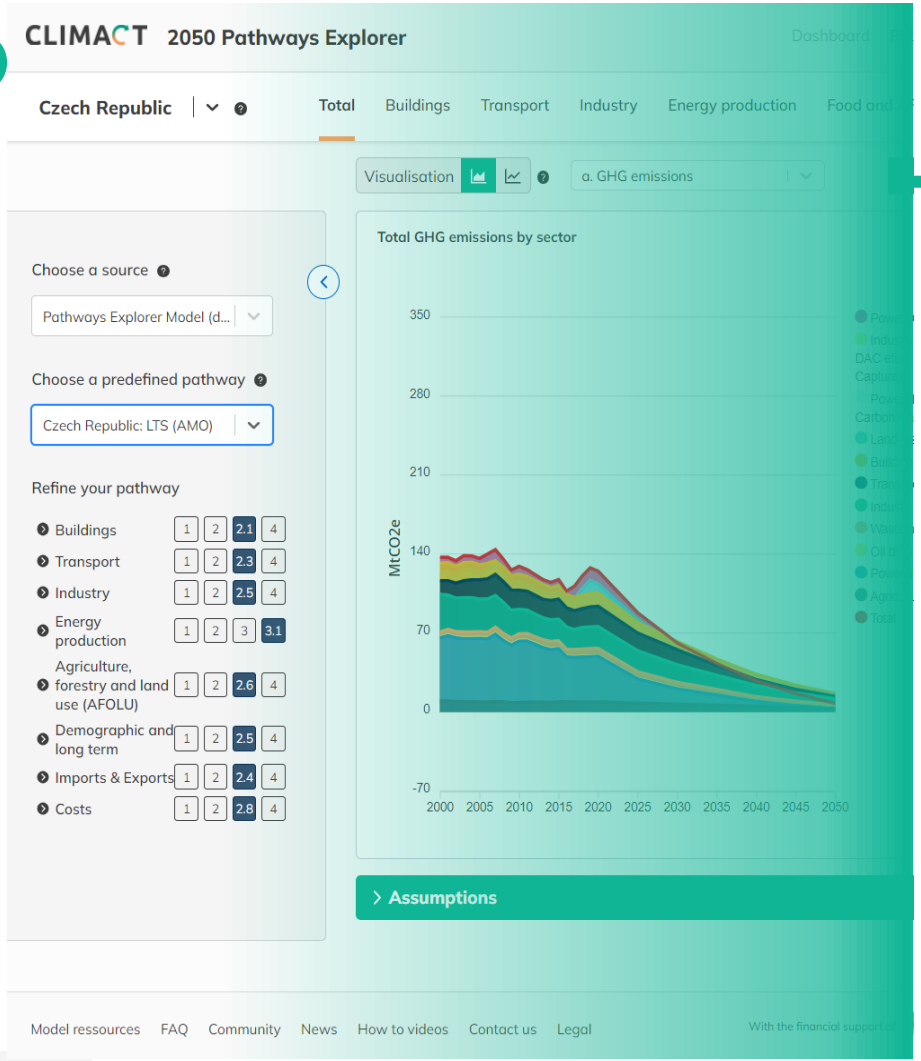

www.PathwaysExplorer.org

- The Pathways Explorer is a **step-by-step solution** supporting organisations, and **equipping them with a robust analytical foundation**, enabling the development of **country energy transition scenarios** based on credible and transparent assumptions.
- Behind the process is **a web-based tool** which enables to explore possible futures and assess the implications and trade-offs of their choices.
- Simulations can be **performed in real time**, offering a direct understanding of the key levers of the low carbon transition.
- The exploration scope encompasses **the energy system and its dynamics, all GHG emissions**, and the associated resources and socio-economic impacts.

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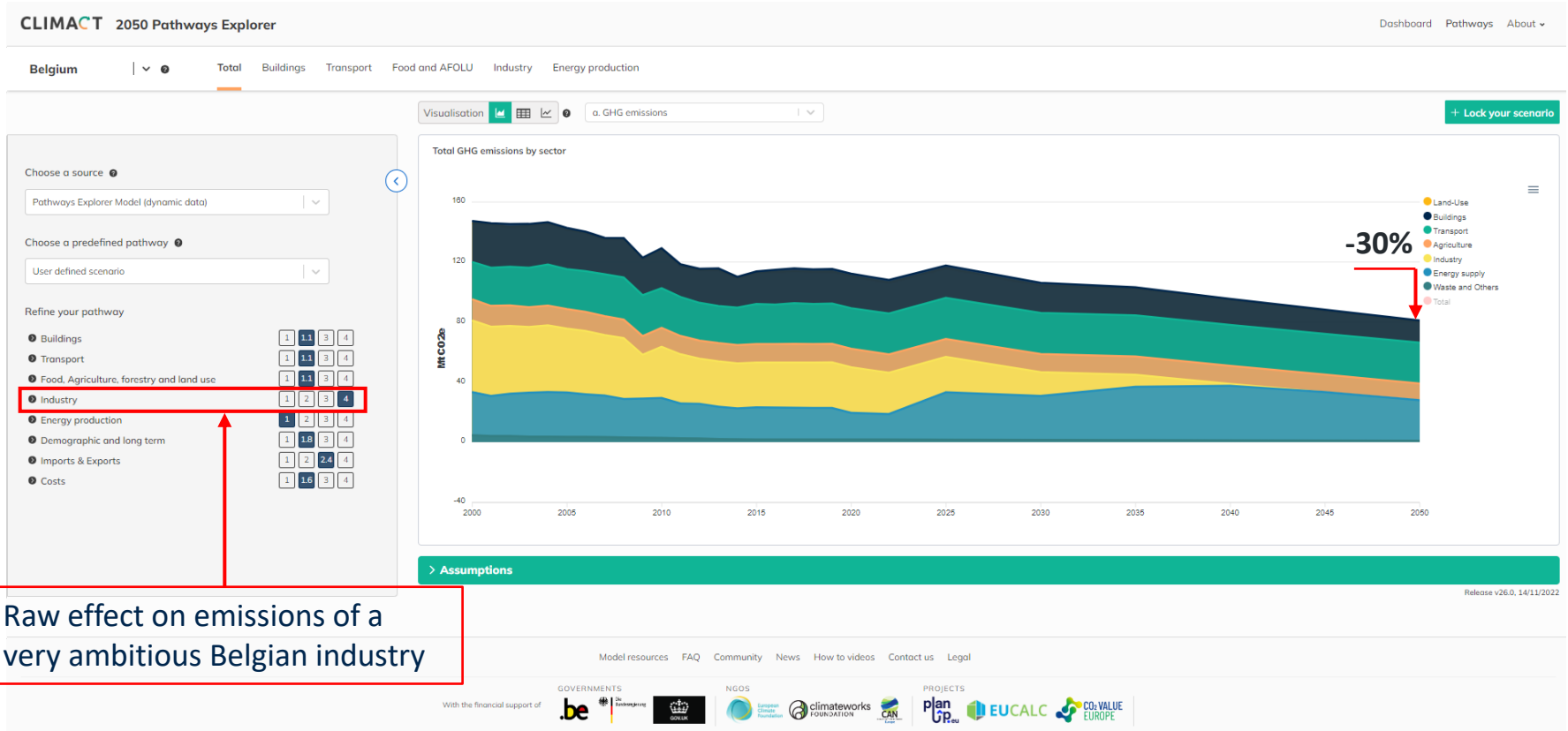
How does it work ? Simplified example



Raw effect on emissions of a very ambitious Belgian industry

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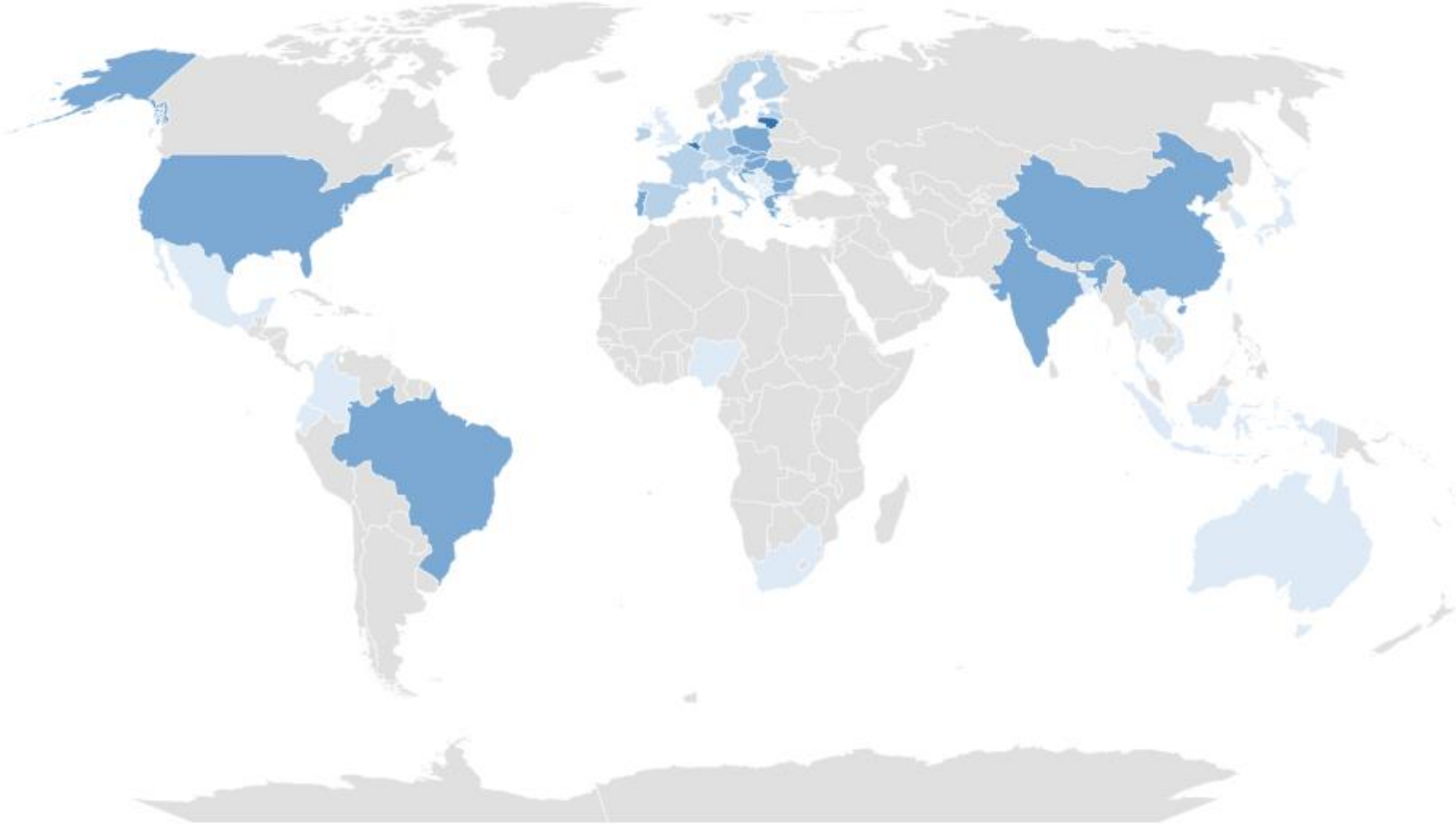
The Pathways Explorer covers all member states and is being used outside of Europe as well



Legend

- Use and QA by administration
- Use and QA by NGOs
- Modelled in Pathways Explorer
- Use and QA in other MacKay calculators
- Not modelled yet

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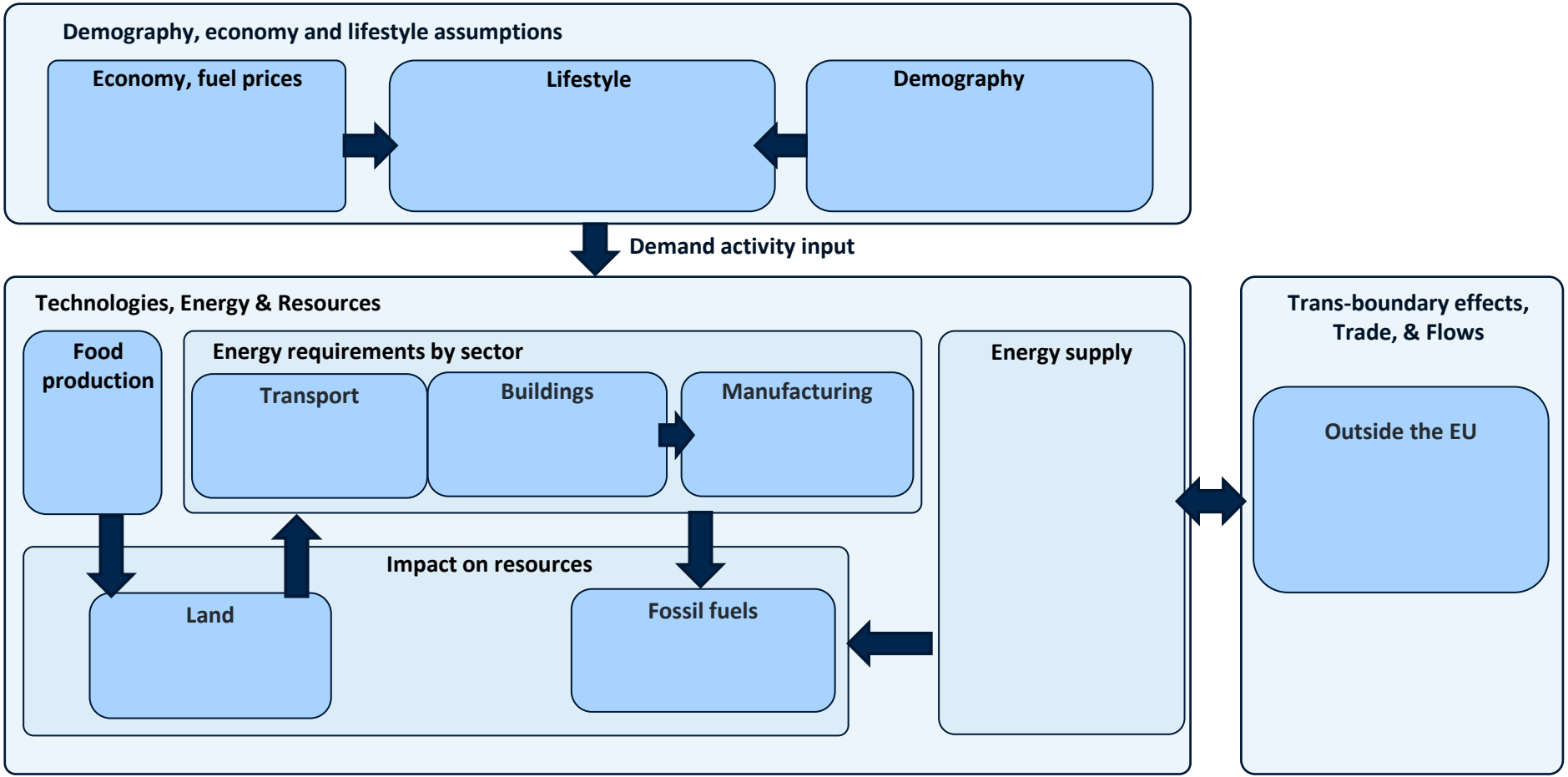
Structure of the 2050 Roadmap model



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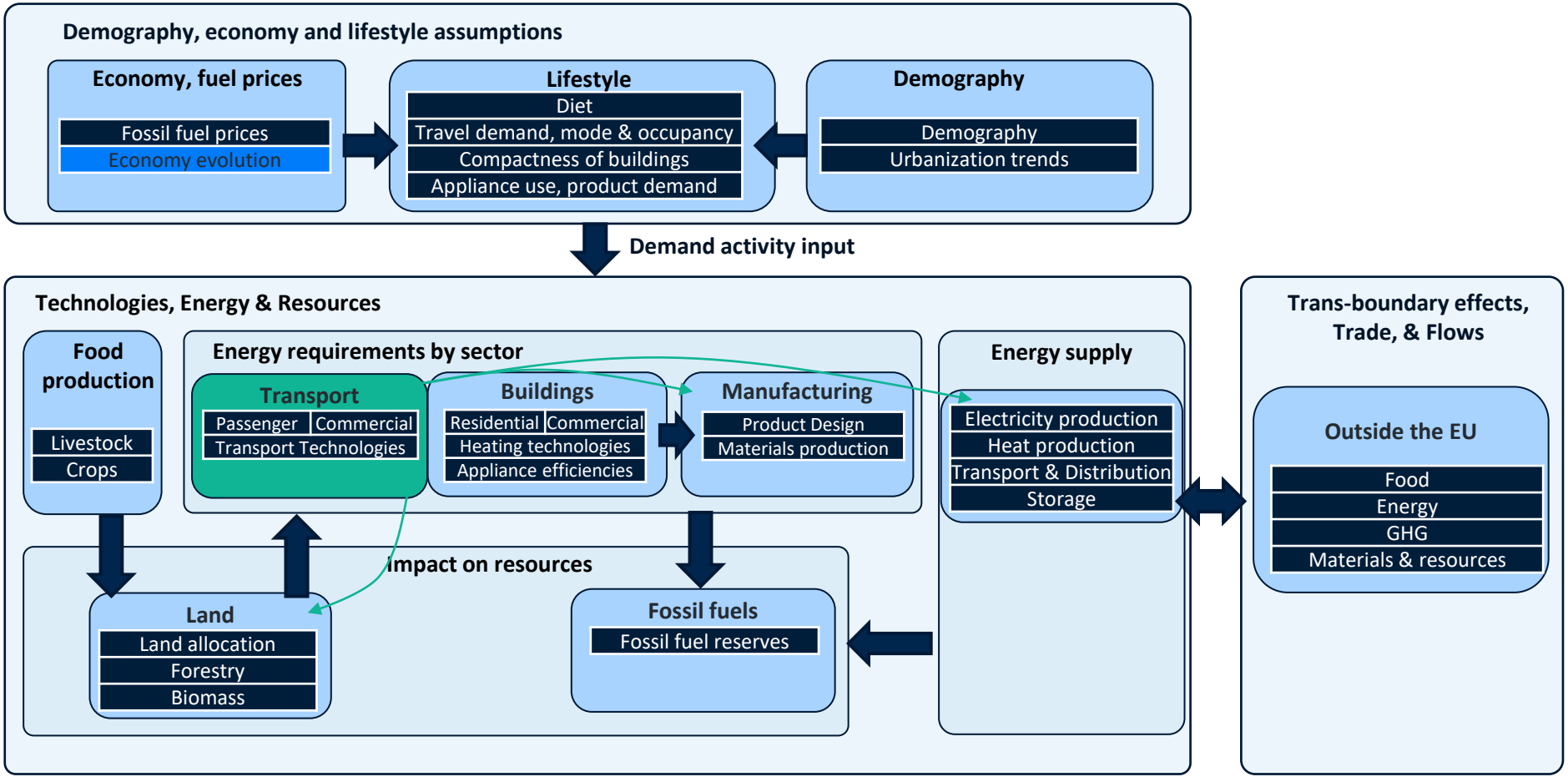
Structure of the 2050 Roadmap model



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The model resolution supports the simulation of scenarios

Energy carriers

- **Electricity**
- **Fossil fuels** (solid, liquid, gas)
- **Hydrogen**
- **Biofuels** (solid, liquid, gas)
- **Synfuels** (liquid, gas)

Multi-energy model

Demand sectors

- **Buildings**
- **Industry**
- **Transport**
- **Agriculture**
- **Energy supply**

Projection in all **sectors & sub-sectors** is quantified

Geography

- **National**
  - Brussels region
  - Flemish region
  - Wallonia

Calculation at **national level**. **Possbile** to derive consumption for Belgian **regions** in future version

Time horizon

- **Projections**
  - Yearly from 1990 to 2050
    Extension to 2100
  - 15 minutes resolution

Calculation at yearly level. Possible to derive higher resolution for energy supply, demand and DSM

Legend

- Current outputs of Pathways Explorer
- Future other outputs

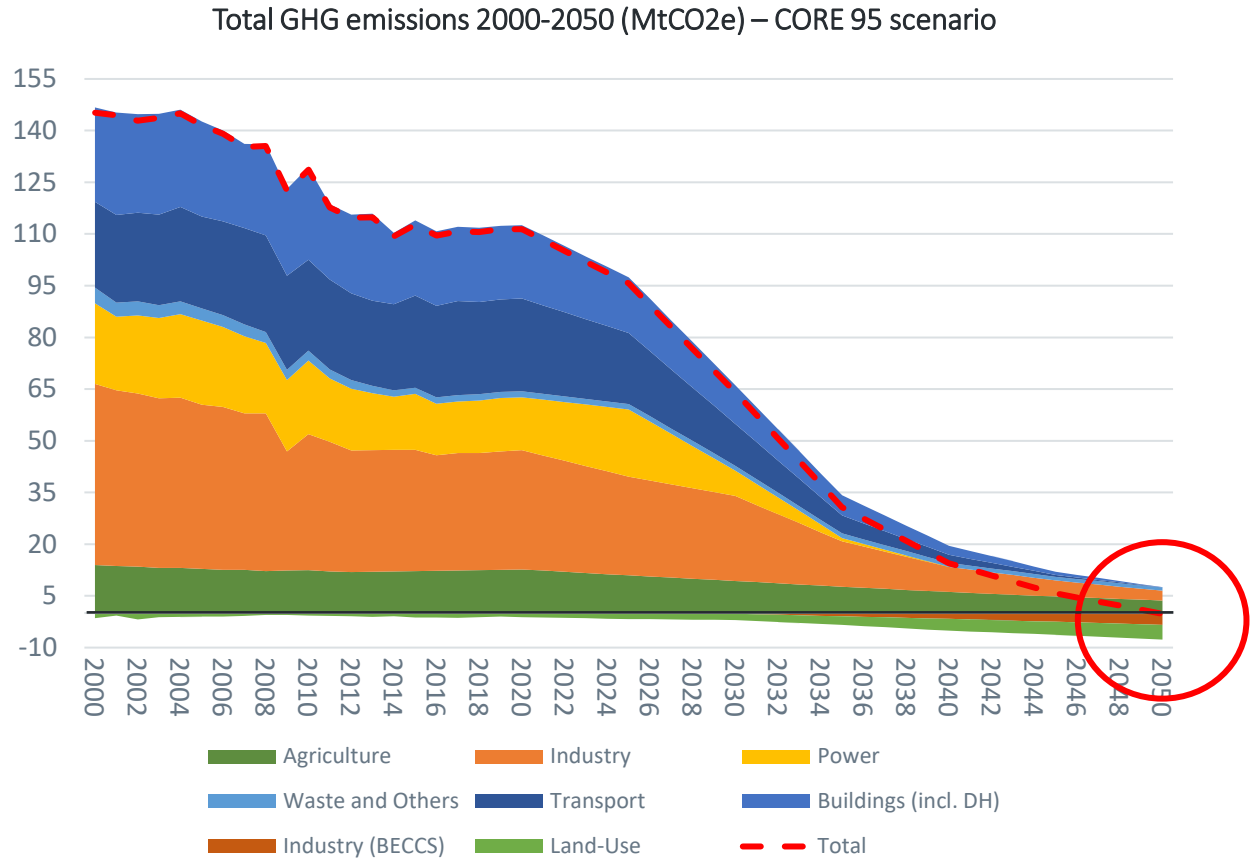
Content

The ambition is rising but current policies don’t add up

Our models are meant to support the required implementation

Can Belgium achieve net zero emissions by 2050 ?

It is technically feasible to reach climate neutrality by 2050 in Belgium and several trajectories can be pursued (but time is running out)



- Climate neutral scenarios lead to a **reduction of GHG emissions of about 95%** in 2050, and **5% sinks** capturing remaining emissions
- **All sectors contribute** to the reduction
- **Structural changes are required** not only in the energy system but also in consumption, transport and diet patterns
- **Societal and technological changes** are both necessary

Source: Climact, SPF Environment (Climate Change Service)

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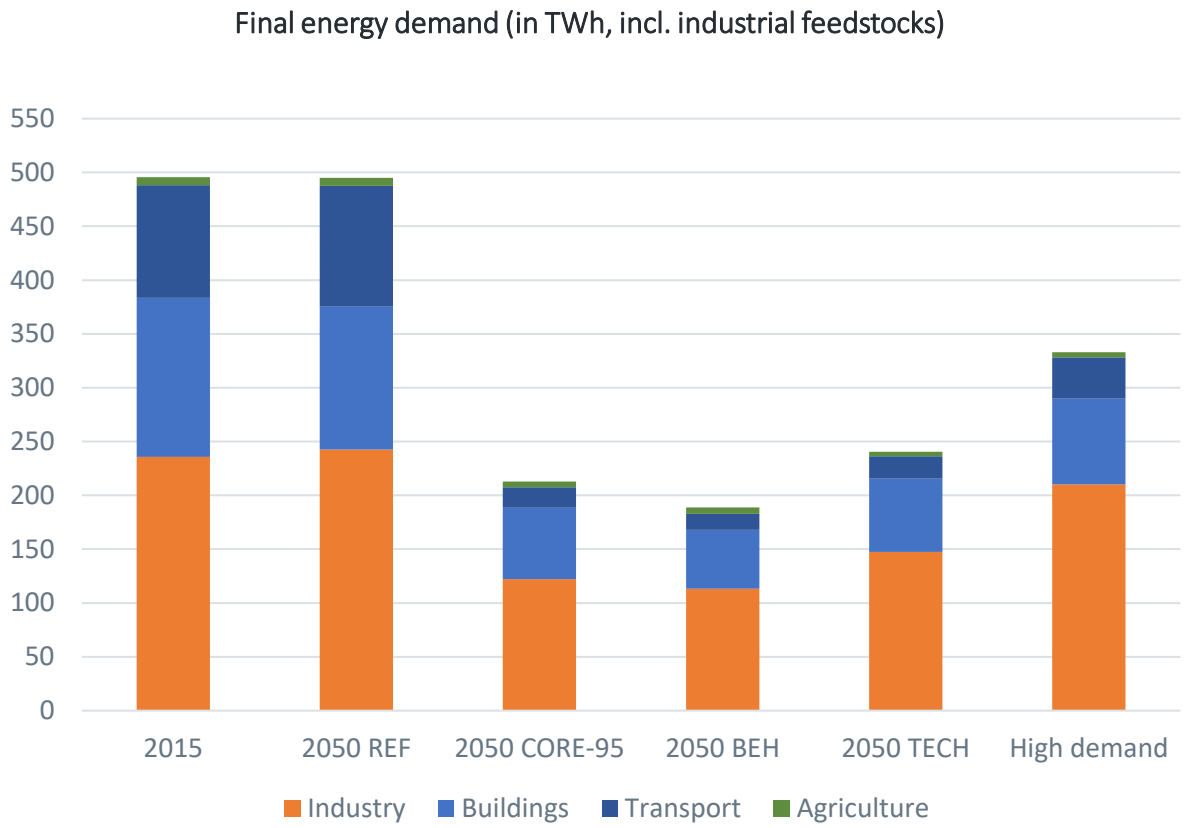
Energy demand decreases significantly in all sectors



- Significant reductions in all decarbonization scenarios and even drastic reductions in some sectors
- Both through changes in **activity levels** resulting from strong societal changes and through **technological switches** and breakthroughs

Source: Climact, SPF Environment (Climate Change Service)

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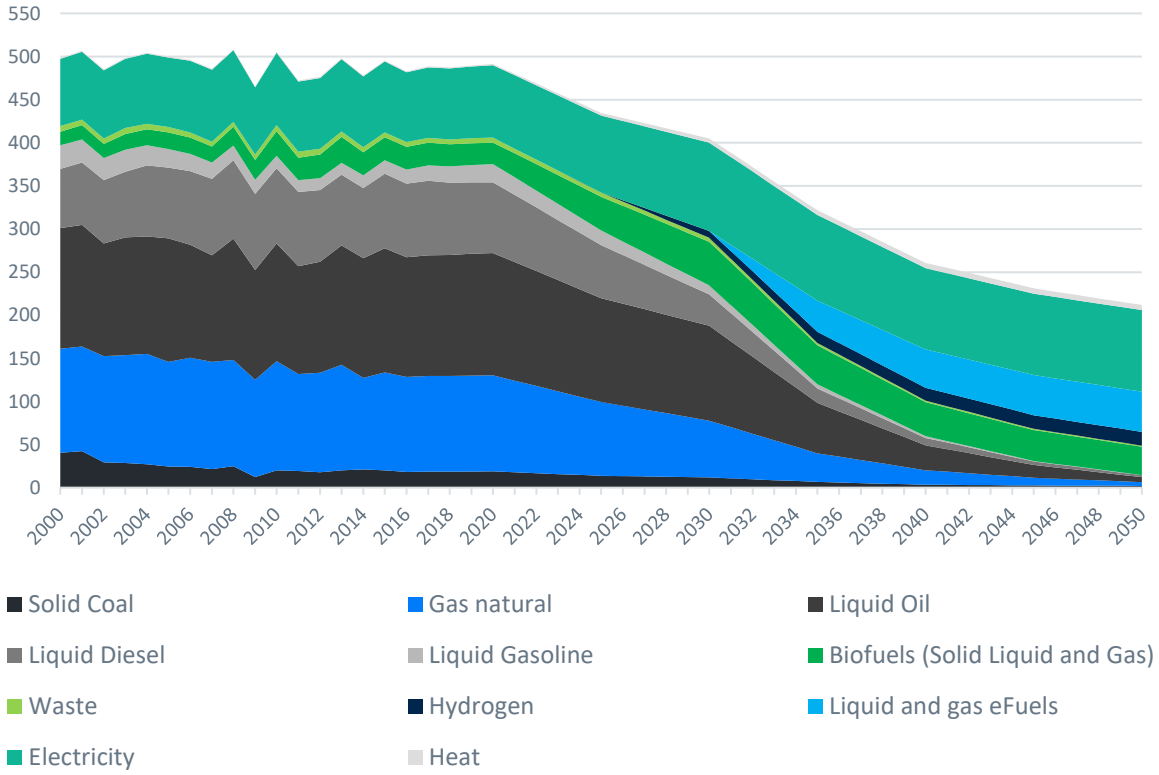
Fossil fuels are gradually being phased out and replaced by carbon-free or carbon neutral energy sources

Evolution of final energy demand per vector CORE-95 scenario
(in TWh, incl. feedstocks)

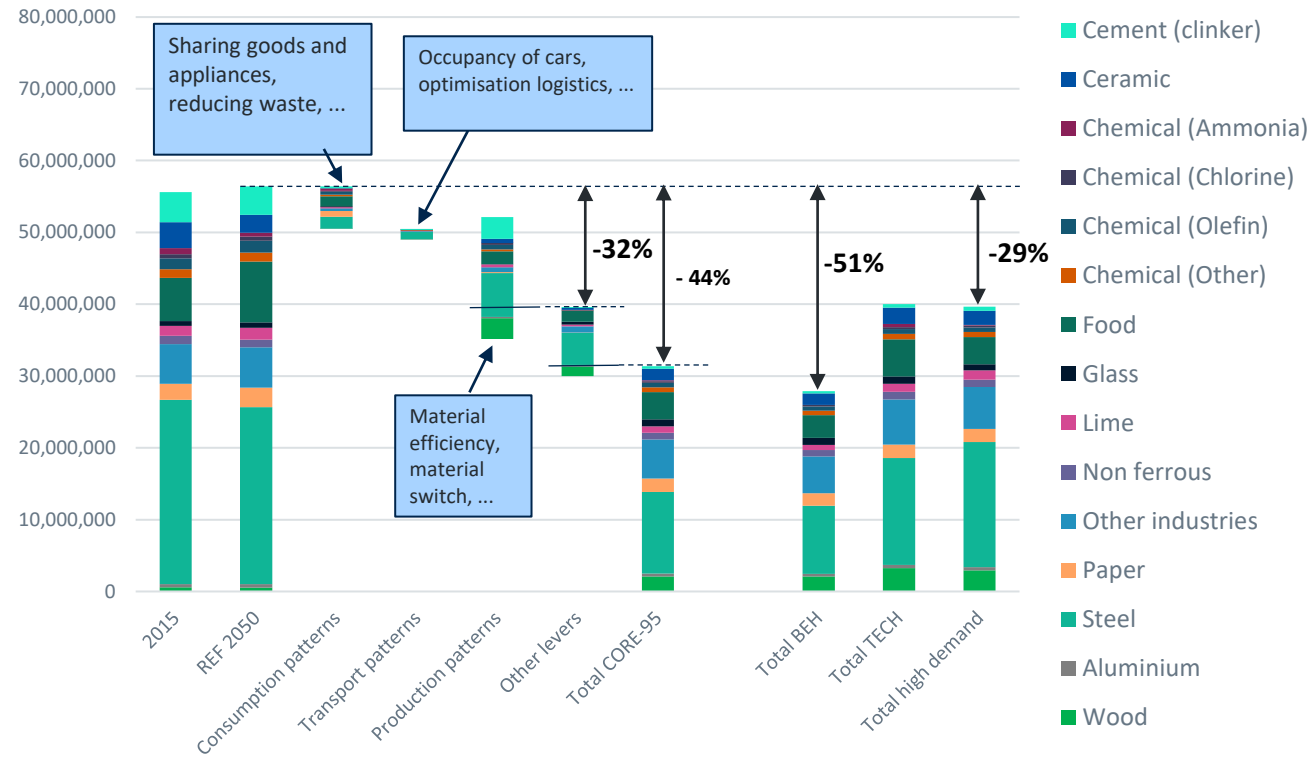


- From 77% in 2015, **fossil fuels fall to 7% of final energy**
- **Electricity's share becomes dominant**
- Biomass and synthetic fuels complement electricity in hard-to-electrify sectors

Source: Climact, SPF Environment (Climate Change Service)

New production and consumption patterns have the potential to drastically reduce materials demand, and thereby energy use and greenhouse gas emissions

Material demand: impact of groups of circular economy related levers in 2050 (t)

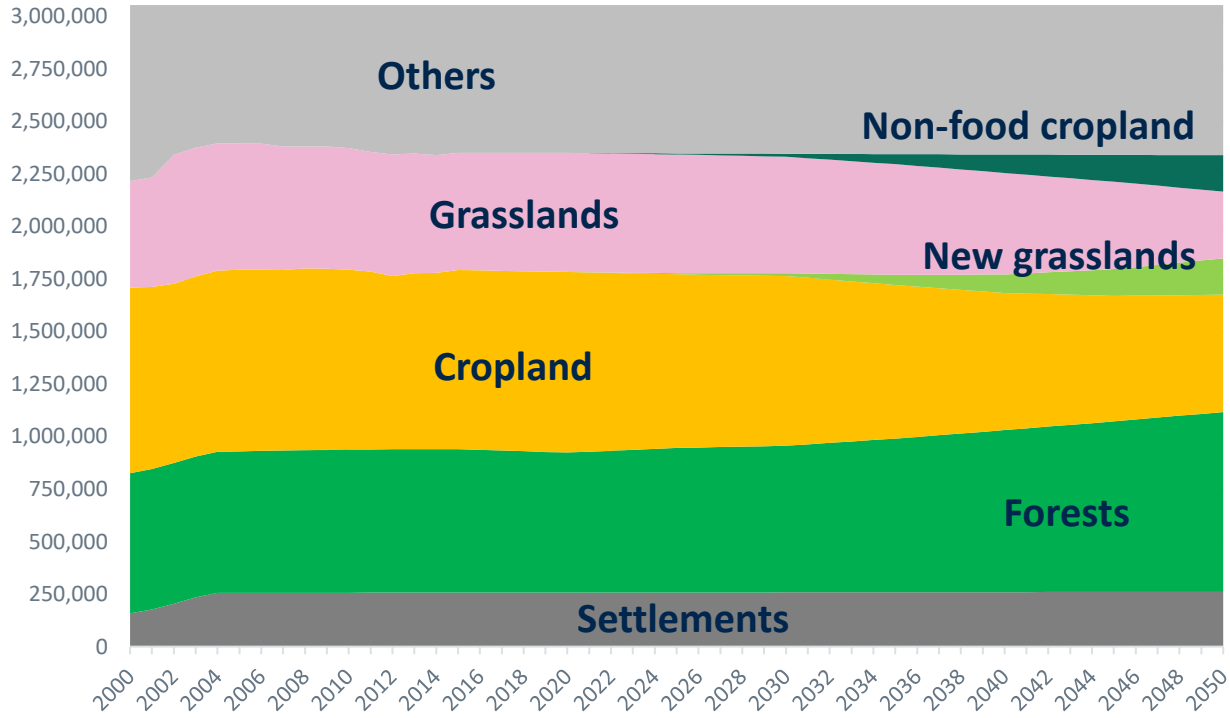


- The circular economy (as well as other levers) can help **reduce the demand for materials by between 30% and 50%**
- Changing transport patterns include sharing cars, extending their lifetime and better organizing travel demand, improvements in logistics

Source: Climact, SPF Environment (Climate Change Service)

Changes in the agricultural model can have a strong impact on land-use and thereby on carbon sequestration possibilities.

Land allocation in Belgium (in ha) - CORE-95

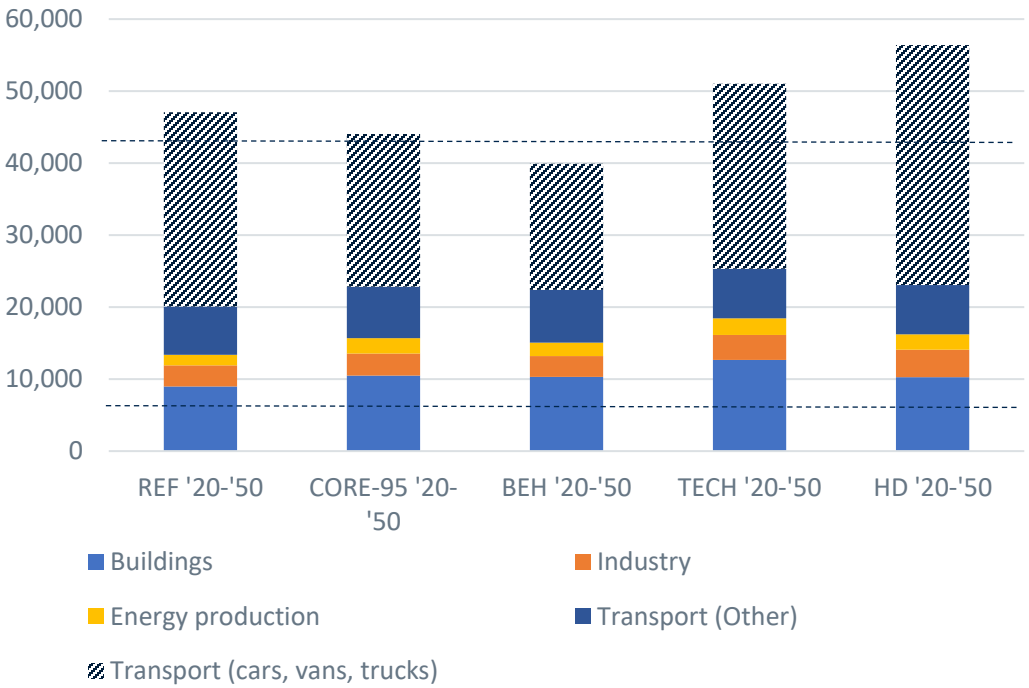


- Different levels of sequestration through land use, with more forests and grasslands needed
- Healthier diets allow reducing livestock considerably thereby reducing land and feed requirements

Source: Climact, SPF Environment (Climate Change Service)

Decarbonisation requires additional carbon-friendly investments in infrastructure in all sectors

Average annual CAPEX 2020-2050 (undiscounted, in M€)



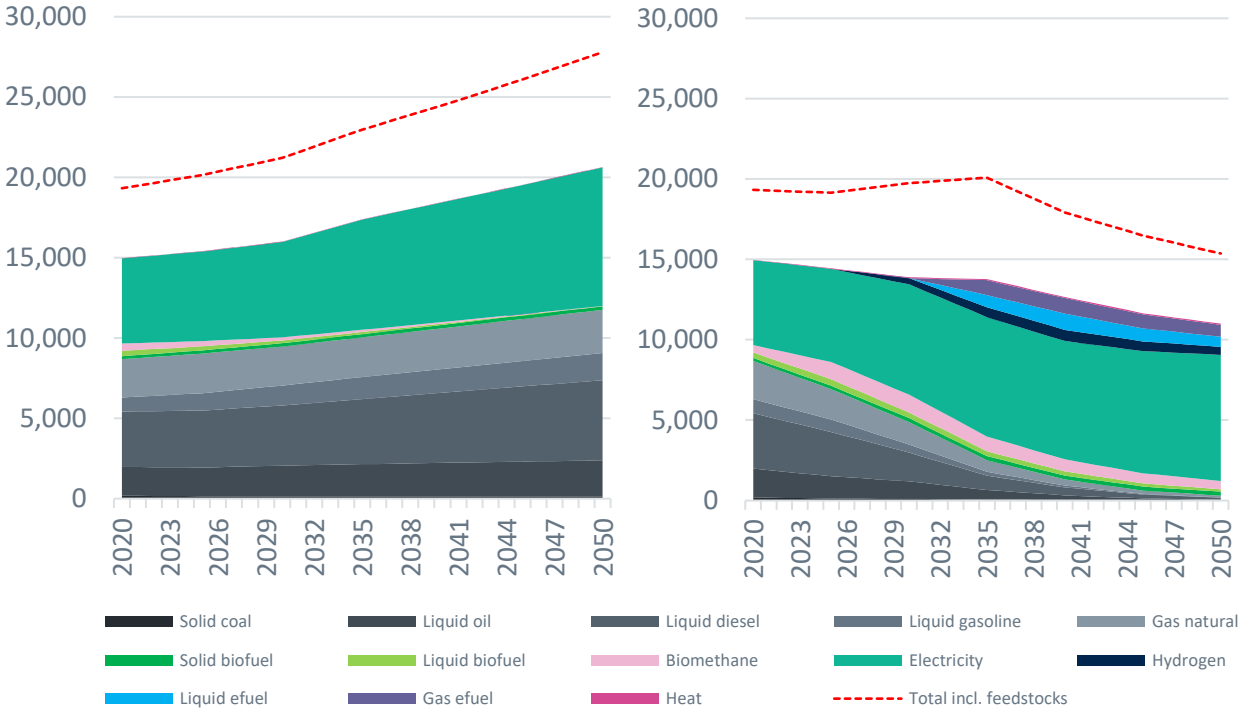
- When the road vehicles are NOT taken into account, **CAPEX increase in all scenarios** compared to the REF scenario (between 12 to 26%).
- When capex for road vehicle ARE taken into account, CAPEX are lower in some scenarios, due to the **drastically lower amount of vehicles** required in these scenarios

Source: Climact, SPF Environment (Climate Change Service)

Note: CAPEX absolute levels strongly depend on their scope in each sector

Fuel cost reductions tend to offset CAPEX increases

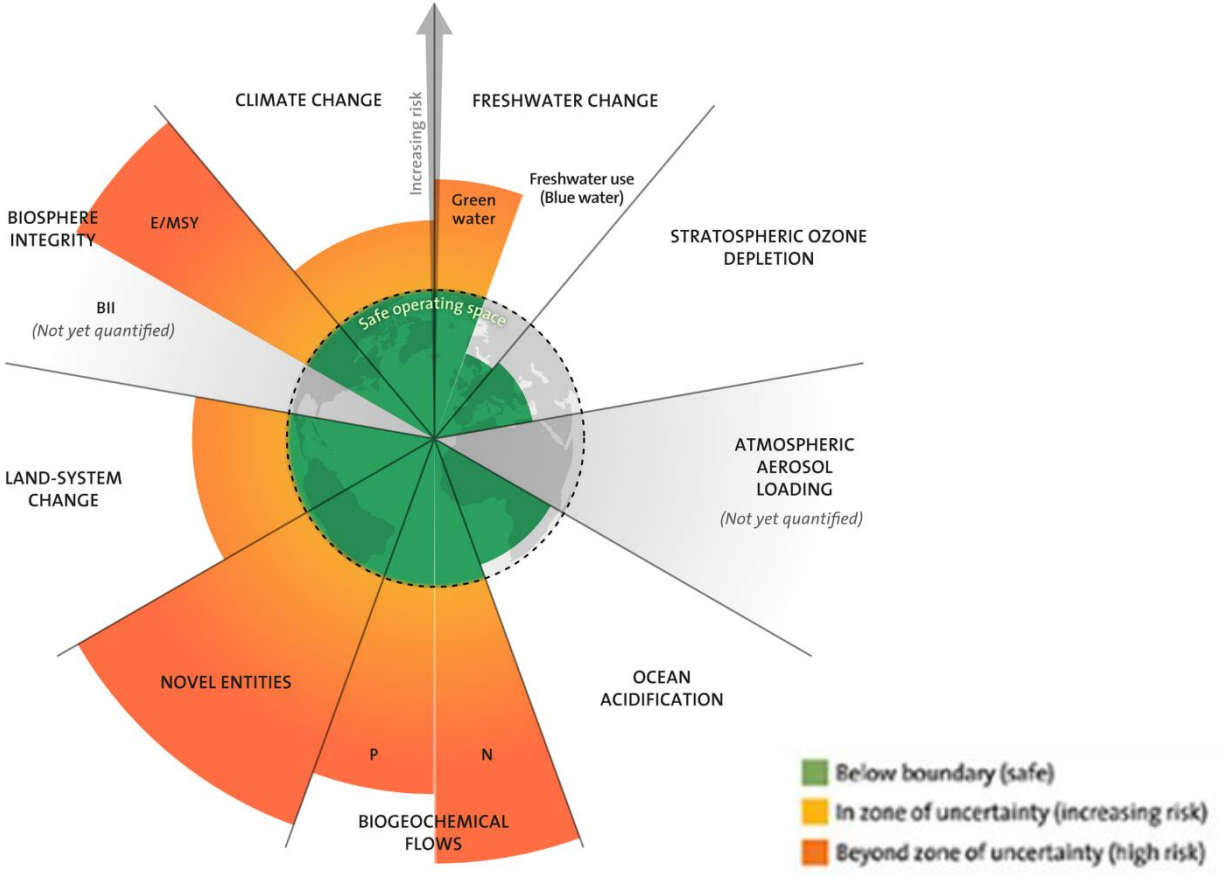
Evolution of fuel costs in the REF (left) and CORE (right) scenario (2020-2050, in M€)



- Fuel costs tend to be lower in all illustrative scenarios compared with the REF scenario
- Overall, total energy system costs tend to be lower under climate-neutral scenarios compared with the REF scenario
- Key for the evolution of energy costs:
  - The role of behavioural, cultural changes and the sharing/circular economy
  - H2 & e-fuel consumption levels and prices

Source: Climact, SPF Environment (Climate Change Service)

There are other reasons to encourage societal changes
Six out of nine planetary boundaries for safe living conditions are already crossed



Source: Stockholm Resilience Center (Stockholm University), Steffen et al. 2022, see more info at LINK

CONCLUSIONS

- Achieving **climate neutrality by 2050 in Belgium**, even though particularly challenging, is technically feasible and the necessary **levers have been identified**
- The transition requires **additional capital expenditures** in low-carbon infrastructures in all sectors but these can be reduced by societal changes and **fuel cost reductions** tend to compensate them
- **Electrification** of the demand sectors together with a power production system that is almost entirely based on renewable energy sources is crucial to phase-out fossil fuels together with **carbon-neutral fuels** (biomass, hydrogen, e-fuels) where electrification is not possible/feasible
- Looking beyond the energy system in order to encompass key aspects related to the use of other **resources and land** is necessary as they critically impact the chosen pathways
- In order to enable the transition, **systemic changes** are required in terms of technological developments, but also at the **societal and cultural** levels

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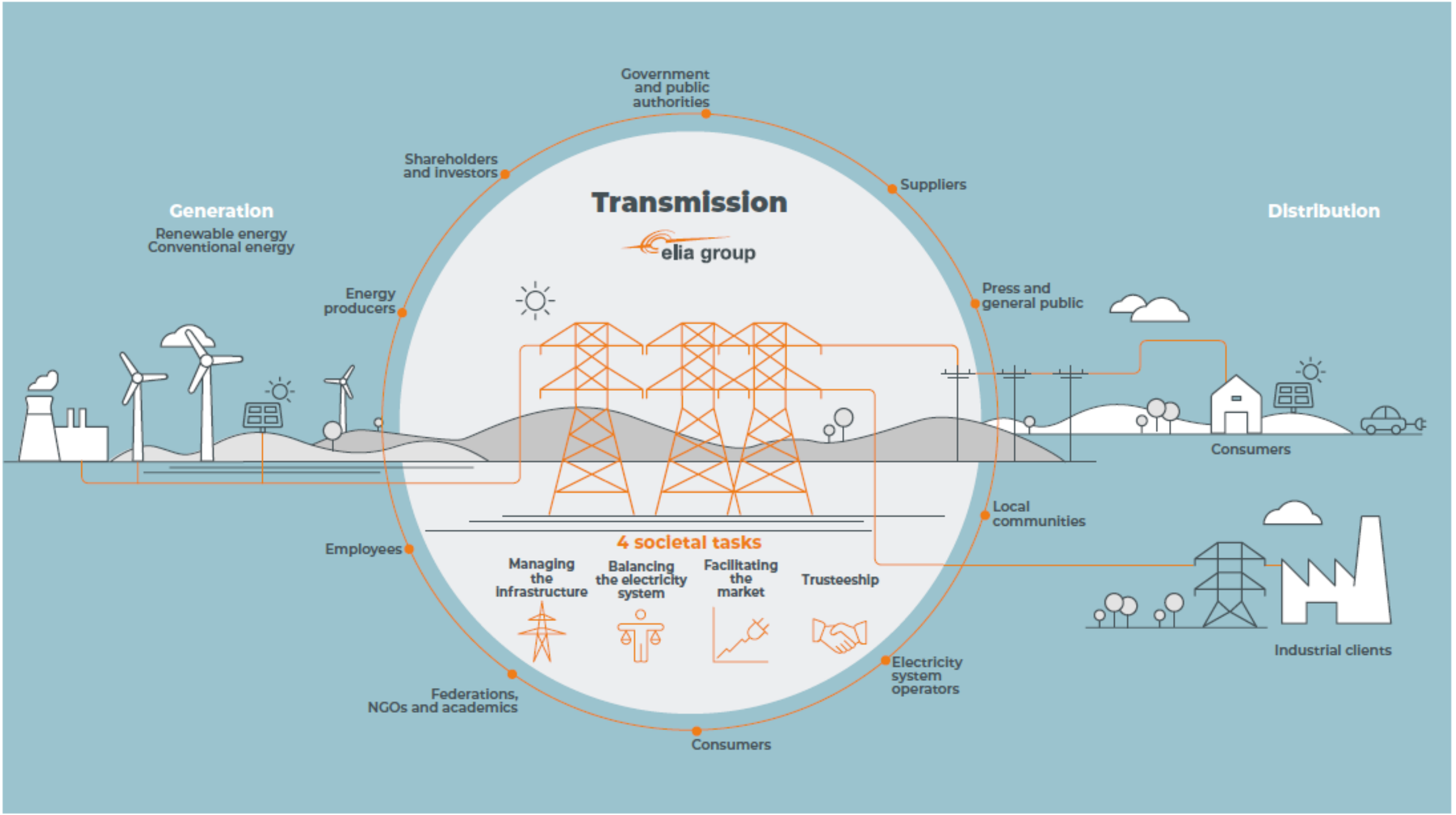

Government and public authorities
Shareholders and investors
Suppliers
Generation
Renewable energy
Conventional energy
Transmission
elia group
Distribution
Energy producers
Press and general public
Consumers
Local communities
4 societal tasks
Managing the infrastructure
Balancing the electricity system
Facilitating the market
Trusteeship
Employees
Industrial clients
Electricity system operators
Federations, NGOs and academics
Consumers

And a rapidly changing energy landscape …

RES integration

Electrification / increasing consumption

Adequacy

Import & Flexibility

01. EU climate targets

Decarbonisation

-55%

GHG emissions by 2030

Renewable electricity

65%

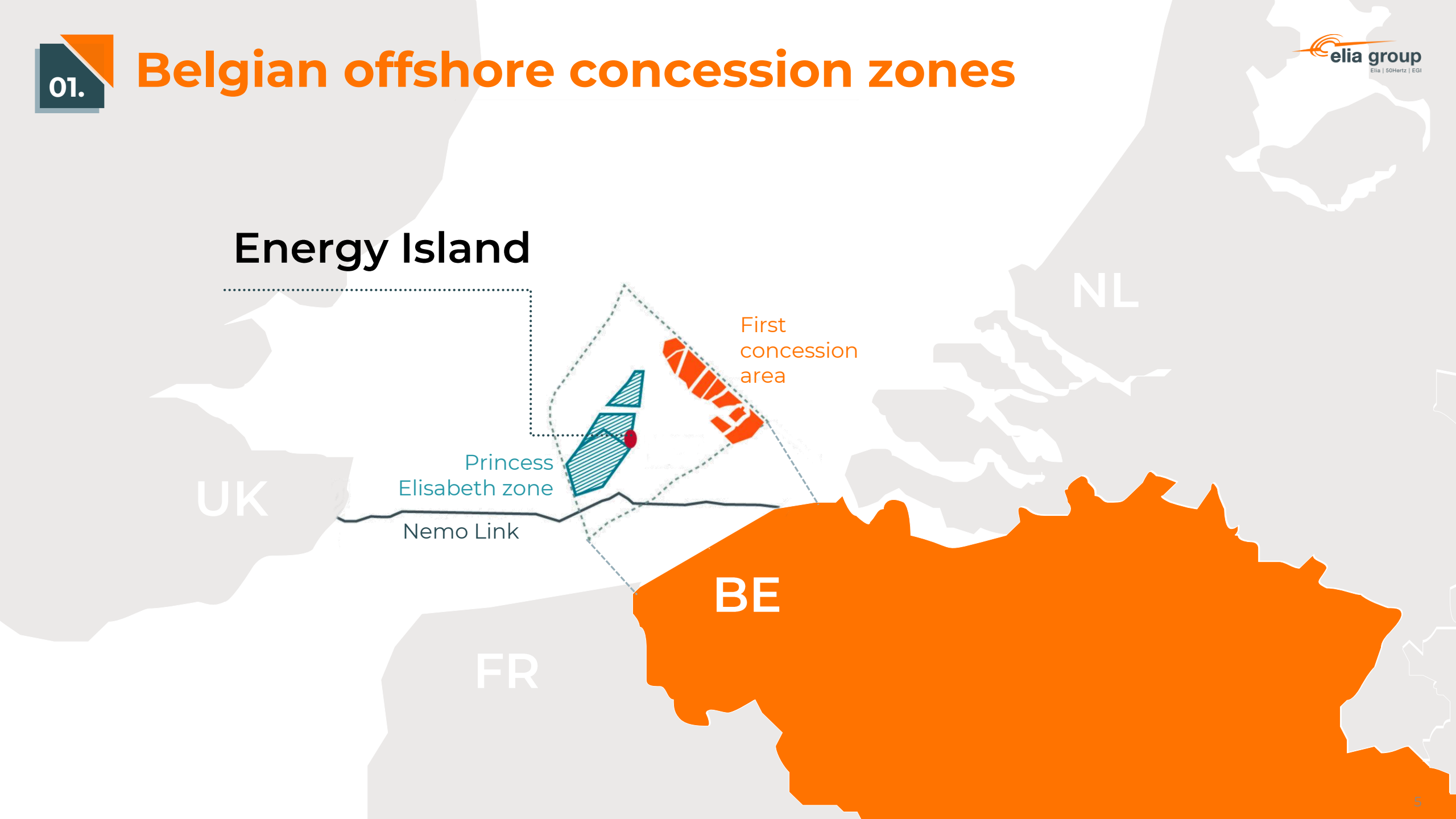
of total electricity production by 2030

Offshore wind

60GW

by 2030

01. Belgian offshore concession zones



02.

ActNow Program

Connecting our activities to the UN Sustainability Development Goals through 5 dimensions

ACT NOW FOR A SUSTAINABLE WORLD

UN SDGs		ESG
7 AFFORDABLE AND CLEAN ENERGY; 13 CLIMATE ACTION	1 Climate Action	Environment
15 LIFE ON LAND; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	2 Environment & Circular Economy	
8 DECENT WORK AND ECONOMIC GROWTH	3 Health & Safety	Social
10 REDUCED INEQUALITIES	4 Diversity, Equity & Inclusion	
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	5 Governance, Ethics & Compliance	Governance