Possibilities for optimizing the carbon footprint in the energy-intensive pulp/paper industry

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Content presentation

- The European pulp and paper industry
- Our journey to 2050
- Decarbonising in a changing world
- Challenges ahead

A circular bioeconomy role model

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The energy and climate dinmension

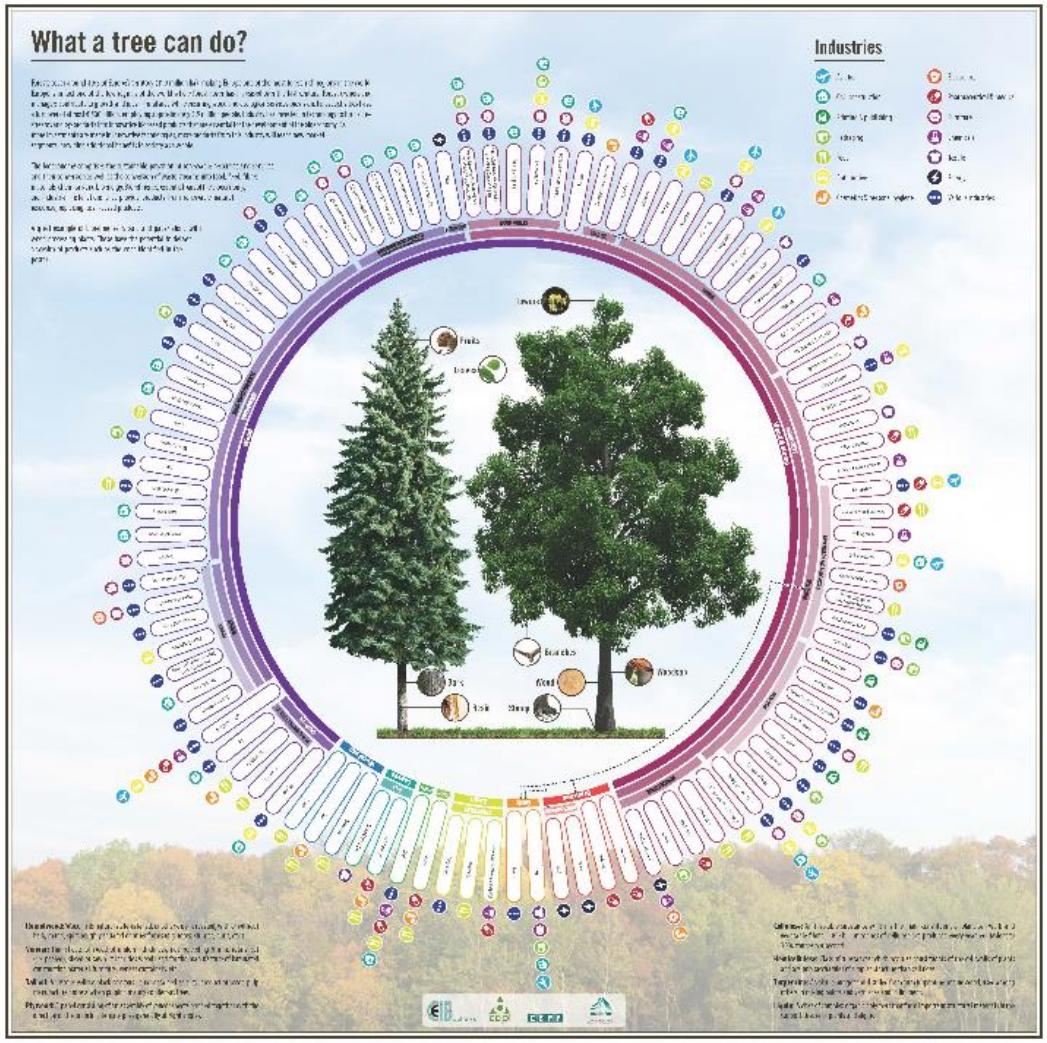
4th largest industrial energy user in Europe

<1% of total EU GHG emissions

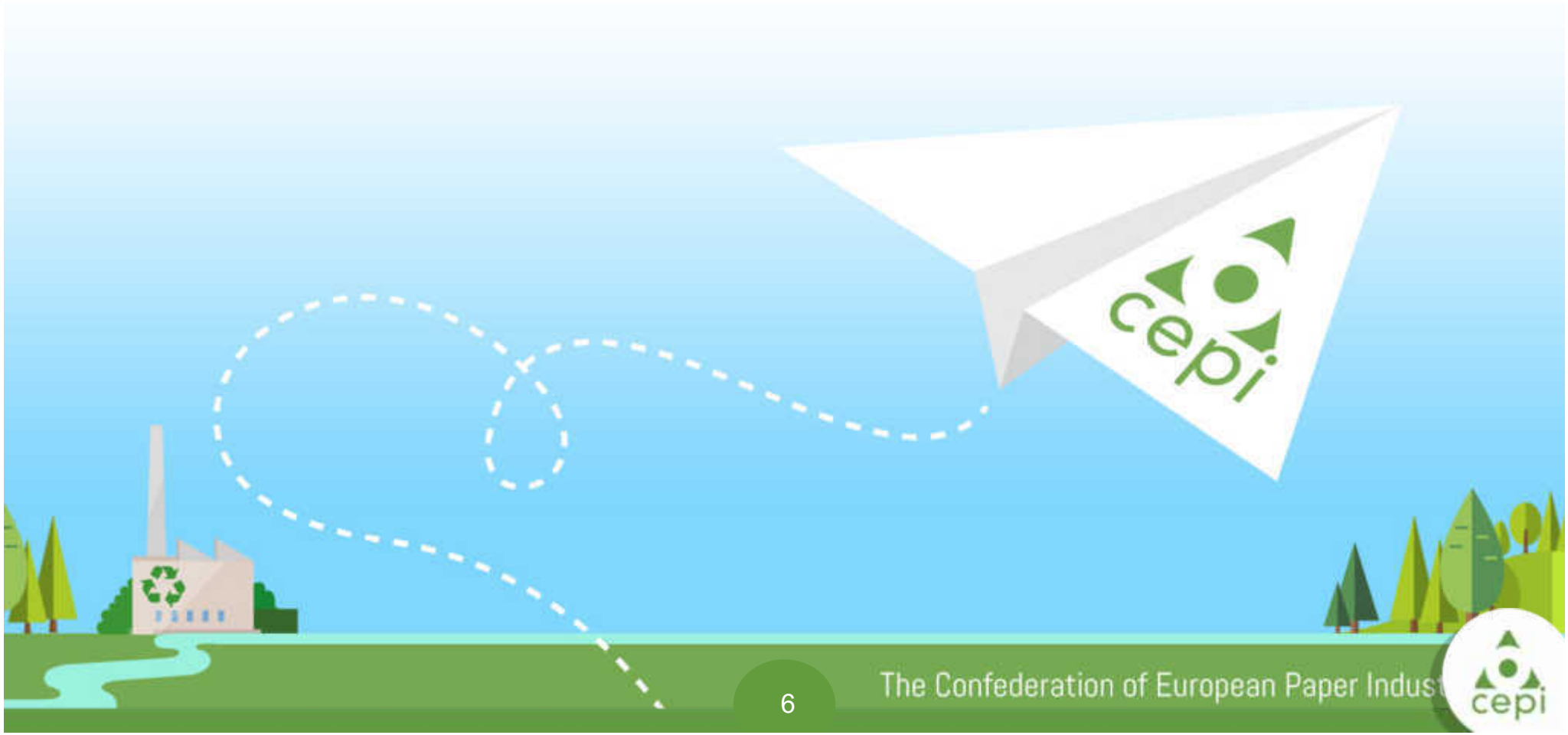
-26% CO_2 emission reduction since 2005

Core value of our products

- Competitive
- Renewable
- Recyclable
- Innovative
- Bio-based
- Made in Europe



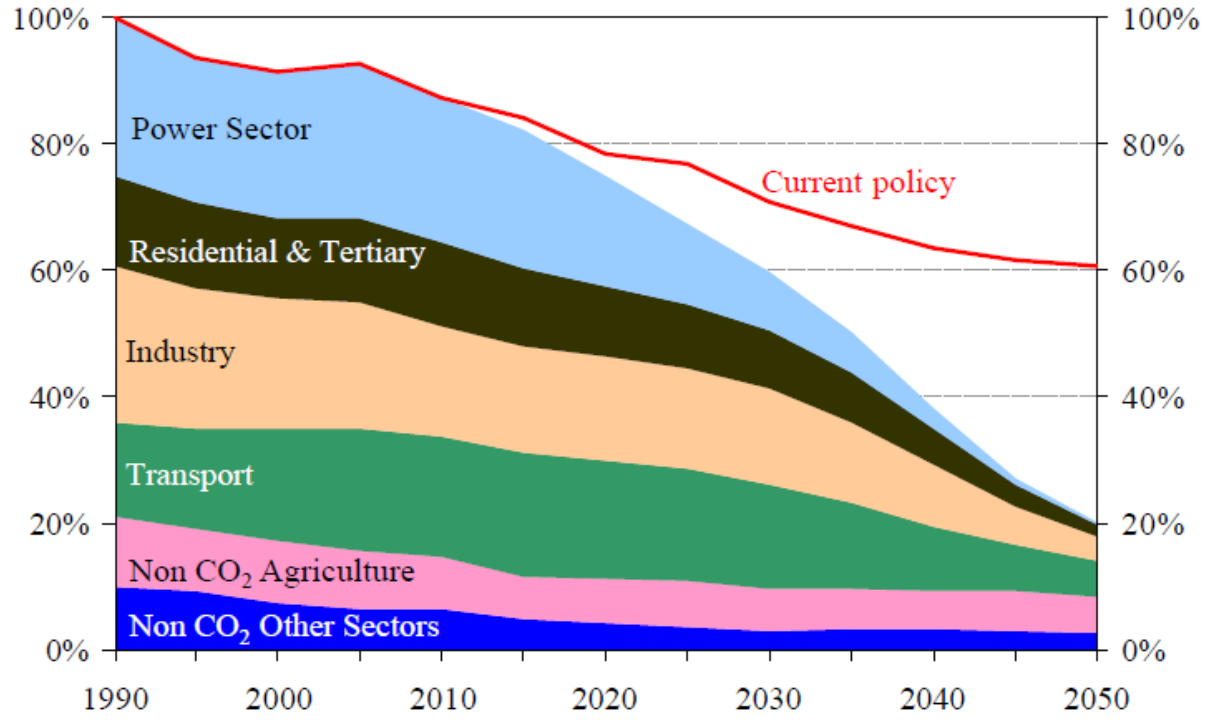
Our journey towards 2050



The 2010 EU Roadmap for moving to a competitive low carbon economy in 2050

" The transition towards a competitive low carbon economy means that the EU should prepare for reductions in its domestic emissions by 80% by 2050 compared to 1990 "

Figure 1: EU GHG emissions towards an 80% domestic reduction (100% =1990)



"As solutions are sector-specific, the Commission sees a need to develop specific roadmaps in cooperation with the sectors concerned".

The challenge

50% more value, 80% less fossil CO2,

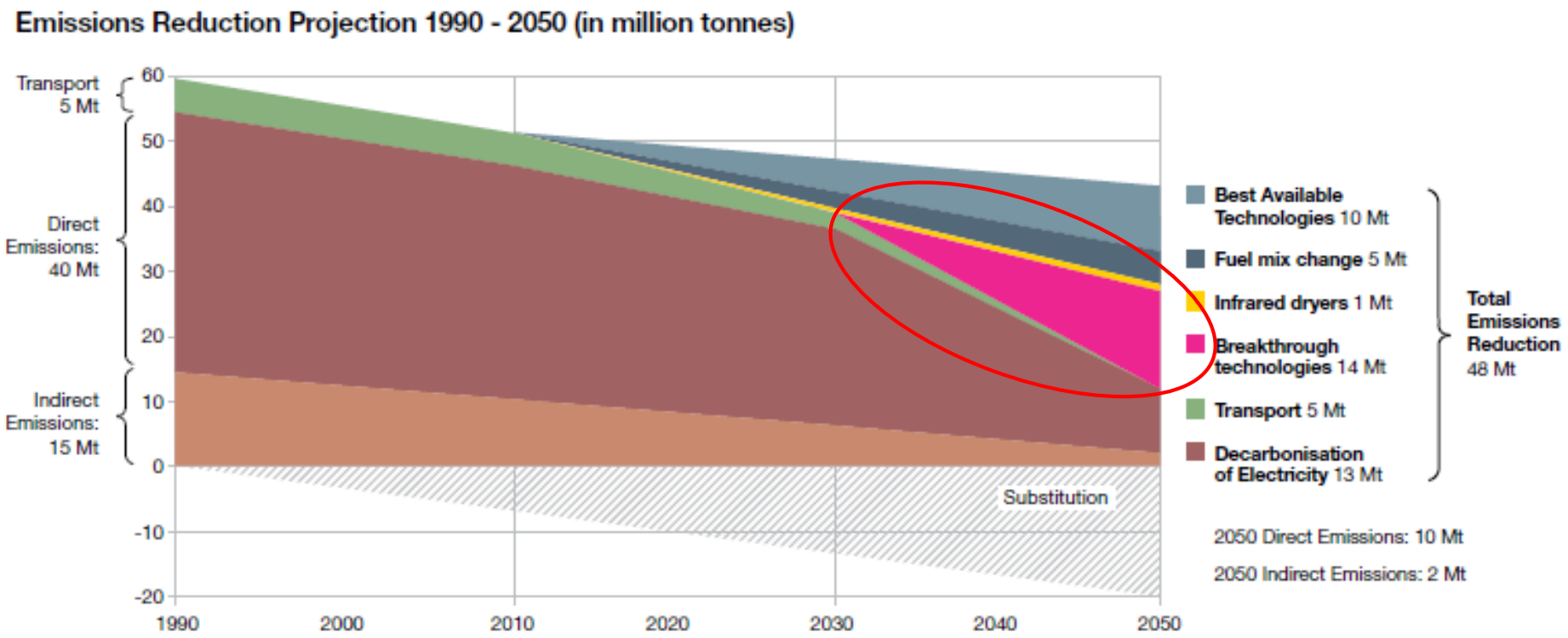
40 years to go

(in two investment cycles)

In a broad sector scope – the forest fibre sector

The first CEPI 2050 Roadmap (2011)

-80% carbon – How ?



The exploration shows that a reduction of 50 to 60% of CO_2 emissions is possible given the right circumstances. To achieve a minus 80% reduction, however, the sector will need breakthrough technologies.

Pulp and paper tomorrow

Breakthrough technologies for the 2050 world

Deep Eutectic Solvents

WINNER

A ground-breaking discovery: Deep Eutectic Solvents (DES), produced by plants, open the way to produce pulp at low temperatures and at atmospheric pressure. Using DES, any type of biomass could be dissolved into lignin, cellulose and hemicellulose with minimal energy, emissions and residues. They could also be used to recover cellulose from waste and dissolve ink residues in recovered paper.

Flash condensing with Steam

FINALIST

Waterless paper production? Very nearly. Largely dry fibres would be blasted into a forming zone with agitated steam and condensed into a web using one-thousandth the volume of water used today.

Steam

FINALIST

Using more energy to use less? You read it right. Using the full power of pure steam for superheated steam drying would save energy as most heat could be recovered and recycled. Steam will then be used as fibre carrier for making and forming paper.

DryPulp for cure-formed paper

FINALIST

Imagine a papermaking process that uses no water. This is it. Fibres are treated to protect them from shear, and then suspended in a viscous solution at up to 40% concentration. The solution is then pressed out and the thin sheet cured with a choice of additives to deliver the end-product required.

Supercritical CO_2

FINALIST

Neither gas nor liquid but somewhere in between, Supercritical CO_2 ($scCO_2$) is widely used in many applications, to dry vegetable, fruits and flowers, extract essential oils or spices. Suppliers for NIKE, Adidas and IKEA use it to dye textile. Coffee and tea have been decaffeinated with scCO2 since the early 80s. We could use it to dry pulp and paper without the need for heat and steam, and why not dye paper or remove contaminants too, while we're at it?

100% electricity

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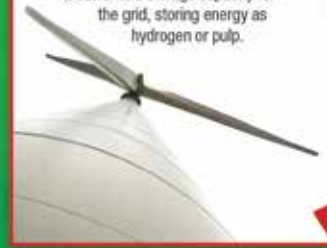
Shifting pulp and paper production to energy-efficient technologies using electricity rather than fossil fuel power to generate heat will cut all CO_2 emissions as the power sector shifts to renewable energy. The sector would also provide a buffer and storage capacity for the grid, storing energy as hydrogen or pulp.



Functional Surface

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The key to unlocking greater added value from fewer resources depends on a shift to producing more lightweight products, and selling surface area and functionality rather than weight. Advances in sheet formation and new cocktails of raw materials will lead the way to the lightweight future.

The Toolbox to replicate

FINALIST

What about the great ideas that never make it? Put together a combination of process, material and equipment innovations as a toolbox of stepping stones to 2050 and the pathway becomes clearer, boosting sector and investor confidence.

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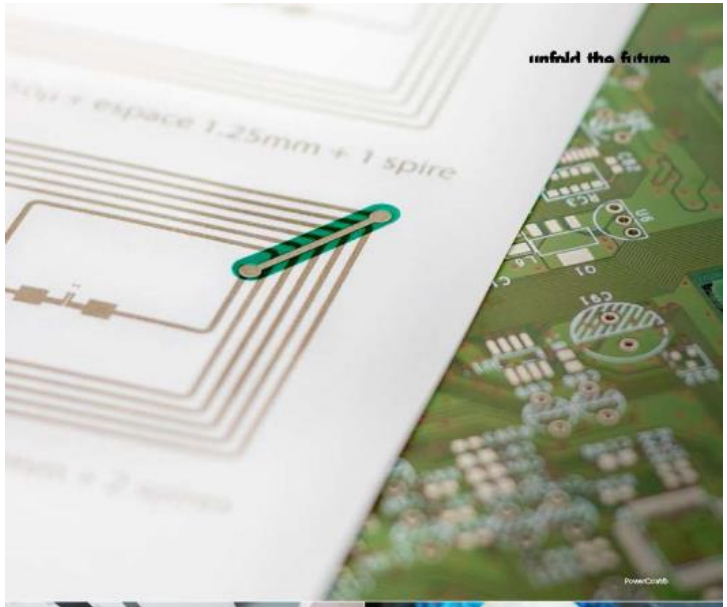
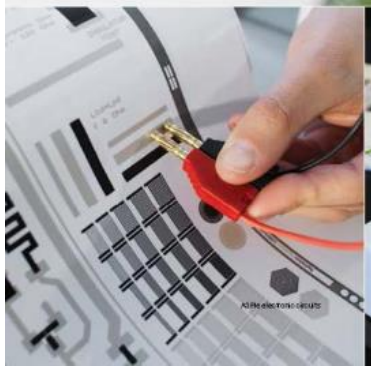
Creating added value out of fibre





Fibre from everywhere

Fibre takes on plastic

Fibre on a mission

Designer fibre

Fibre for creativity

Sci-fibre

Fibre for everyday

Just a Midsummer Night's Dream?

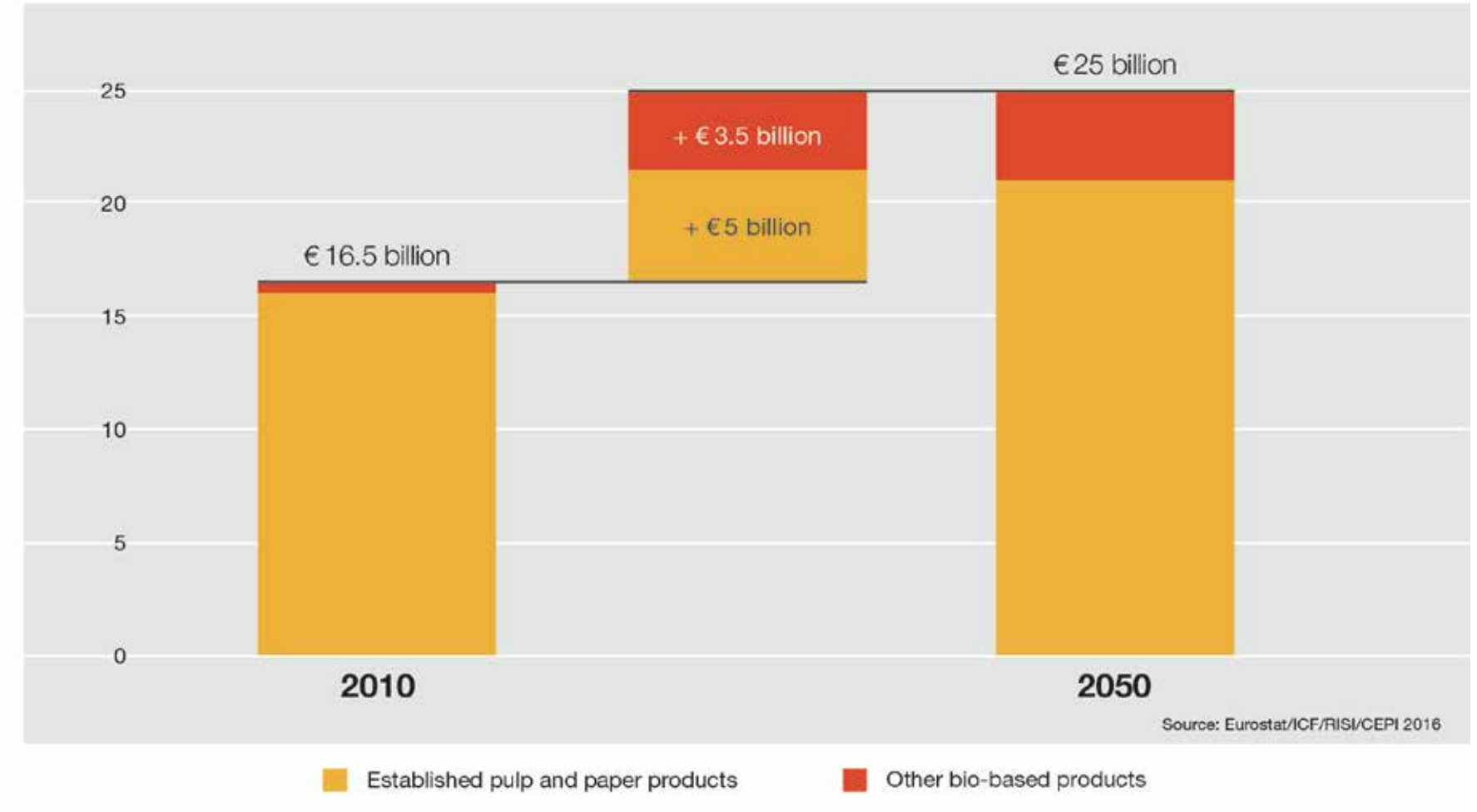
After 5 years since the CEPI roadmap, we asked ourselves:

- Where are we in our journey?
- Can we still deliver? How?
- What financing is needed to drive the low-carbon industrial transformation?

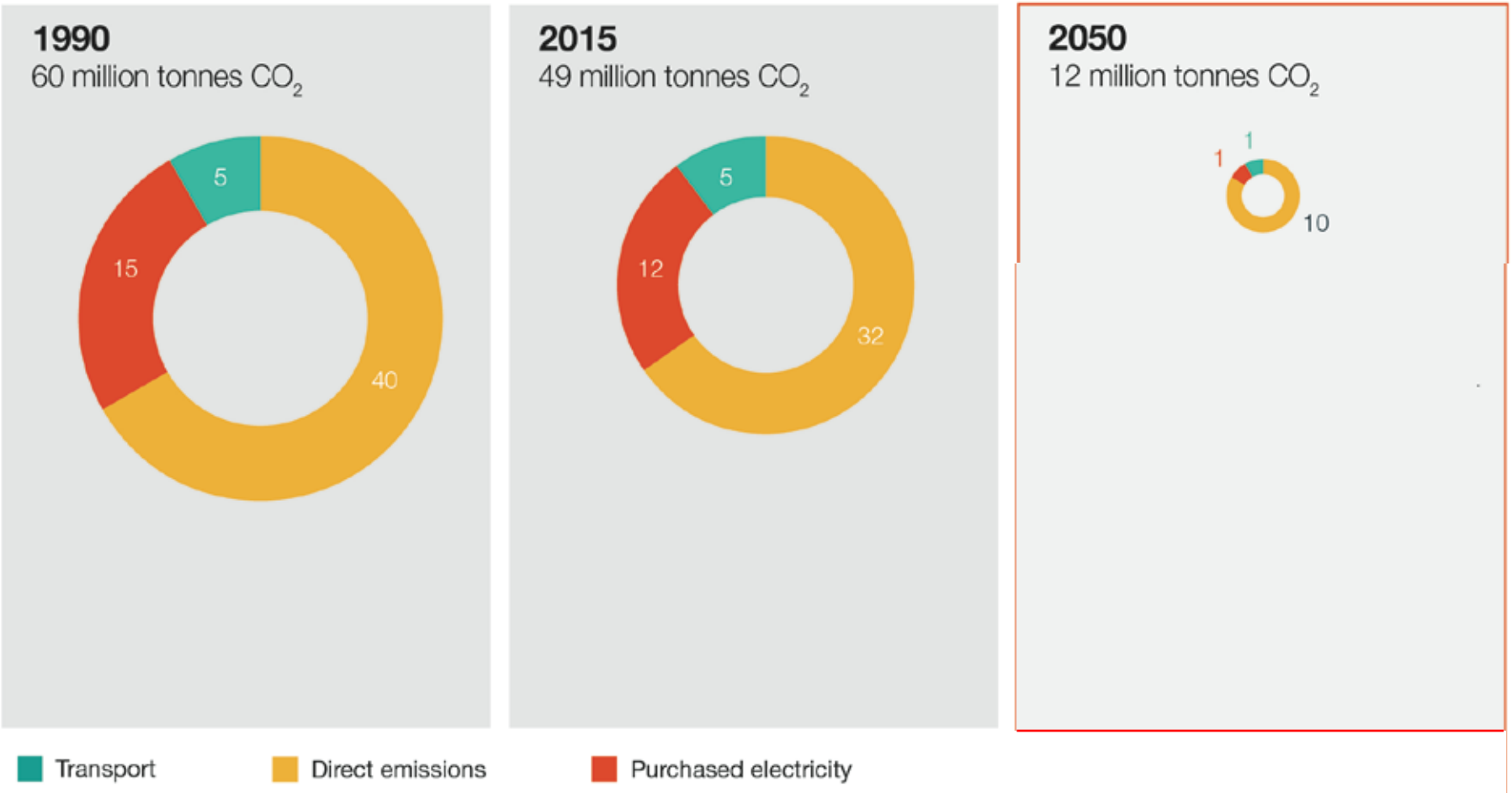
The new 2050 Roadmap (2017)

Growing added-value by 50%

€20 bn cumulative investments in new bio-based products

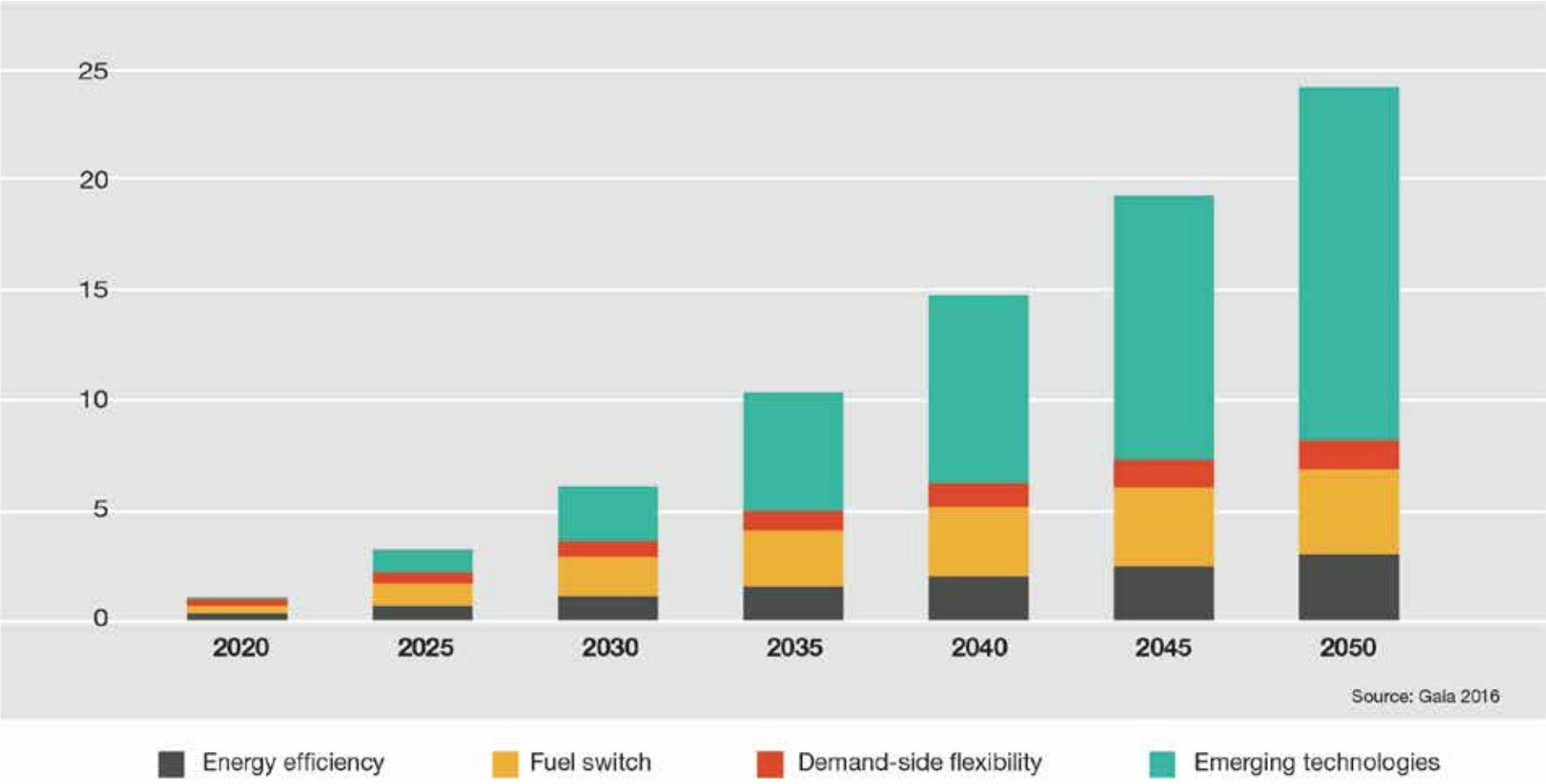


Decarbonising by 80%...

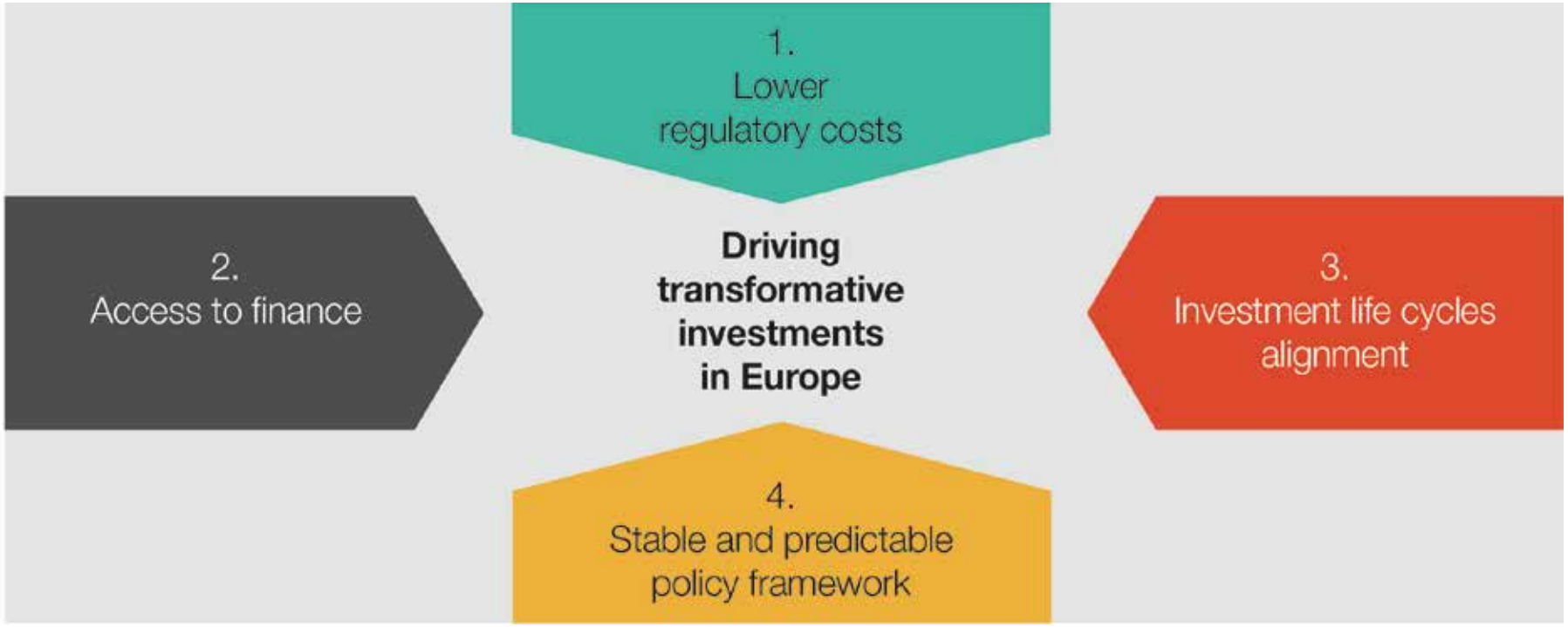


Investments needed to decarbonise

€24 billion cumulative investments for direct emissions reduction pathways by 2050



Fostering a conducive environment



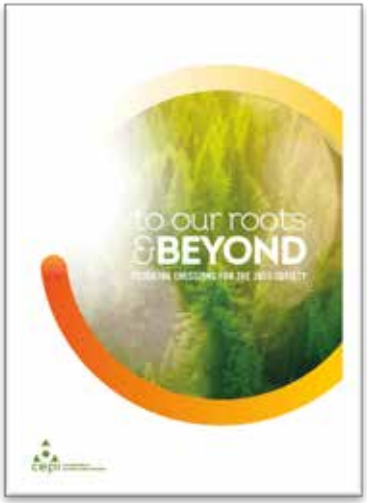
The journey continues…

2011

2013

2015

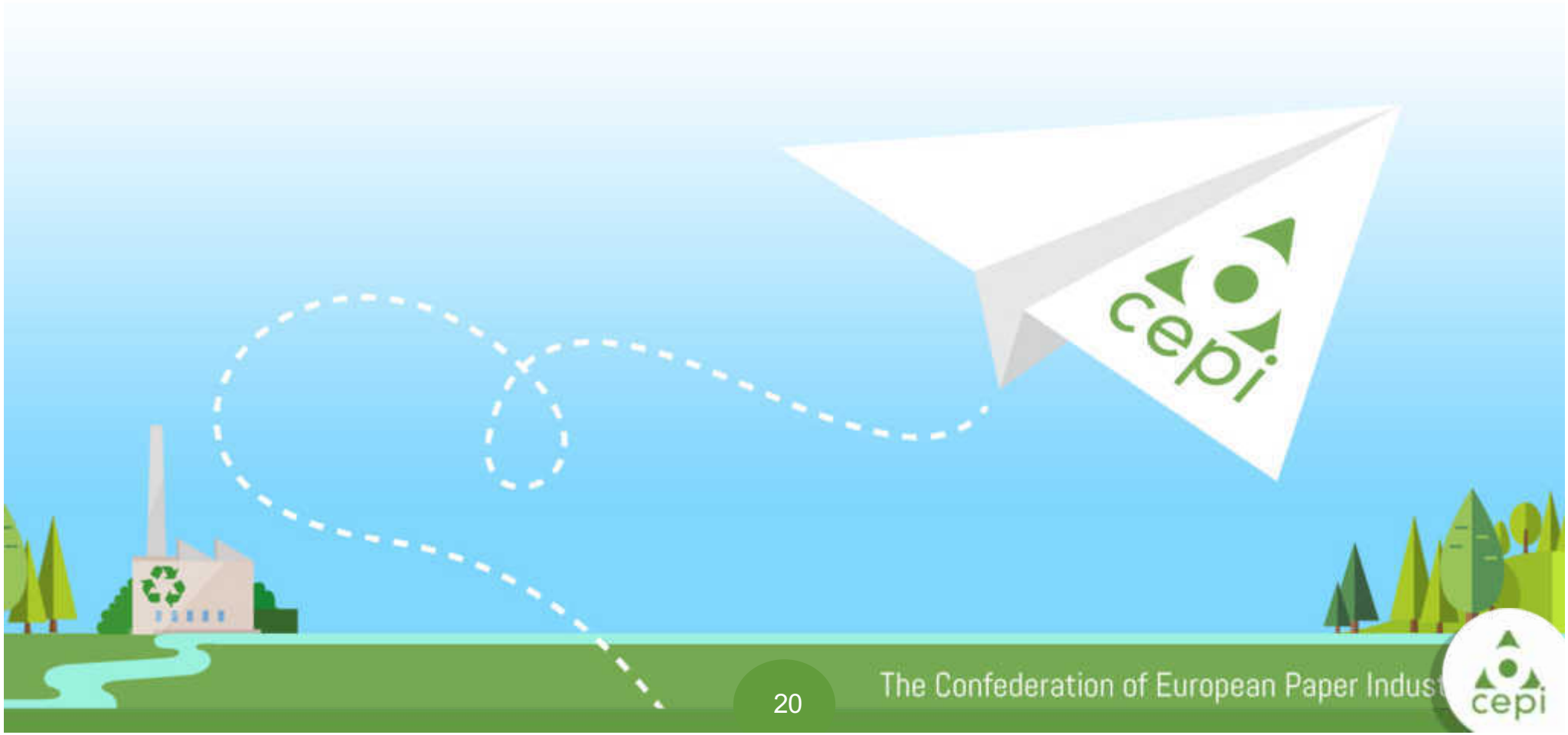
2017



2017

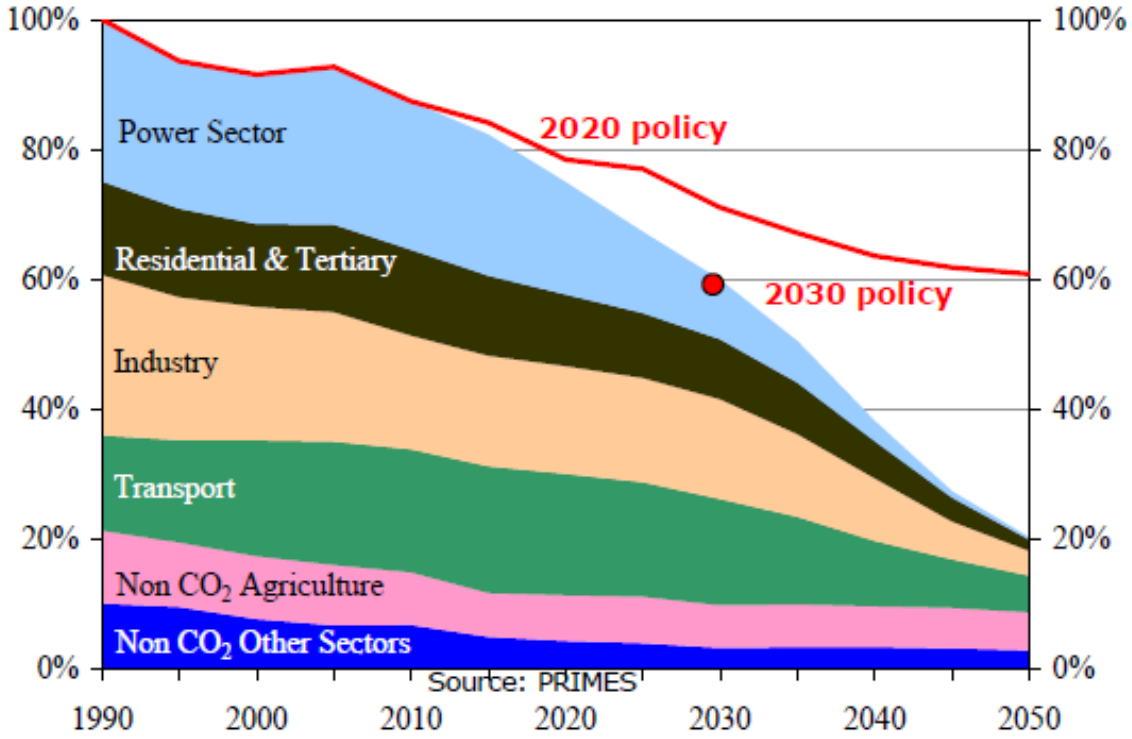
…

Decarbonising in a changing world

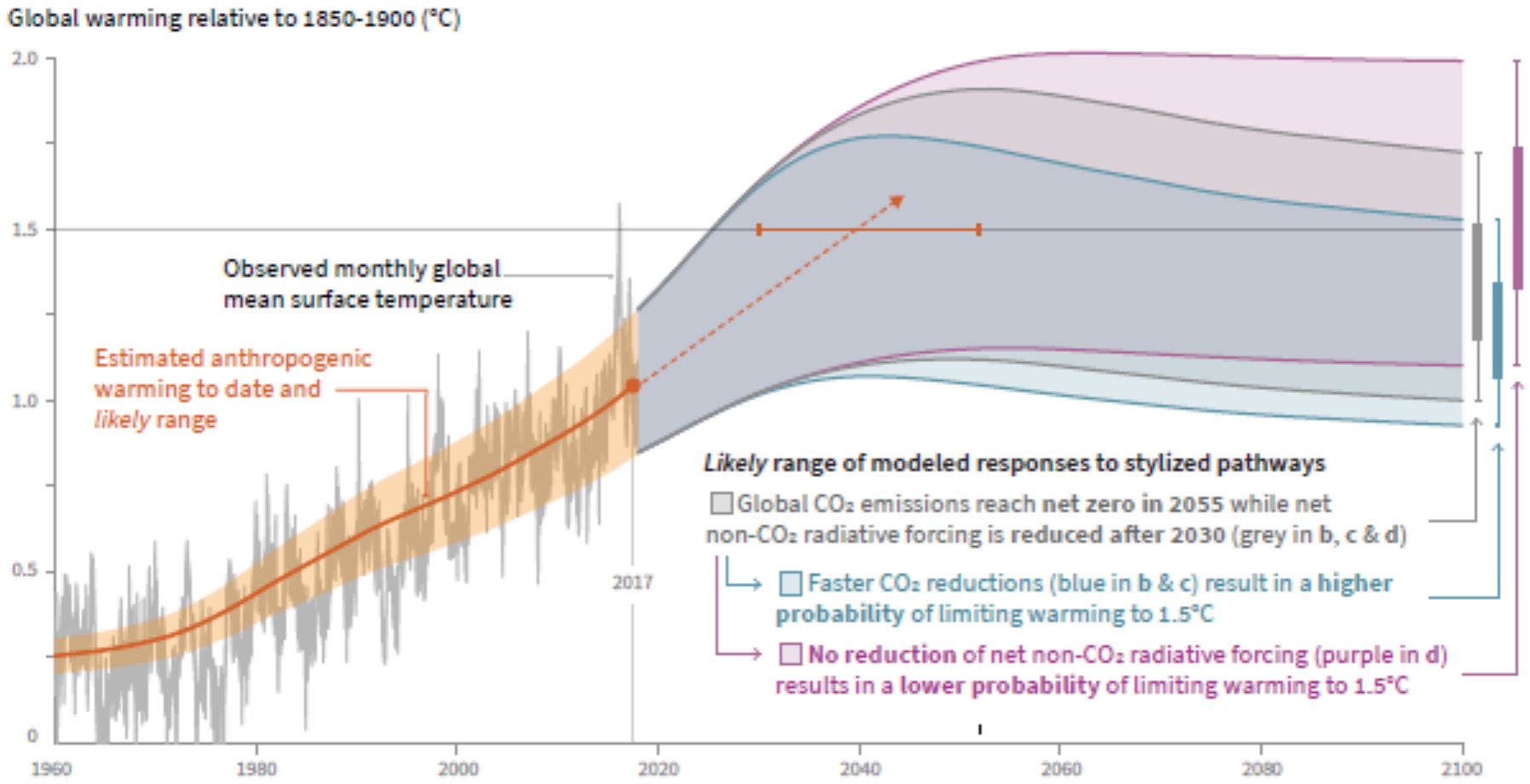


Evolution of EU climate policies

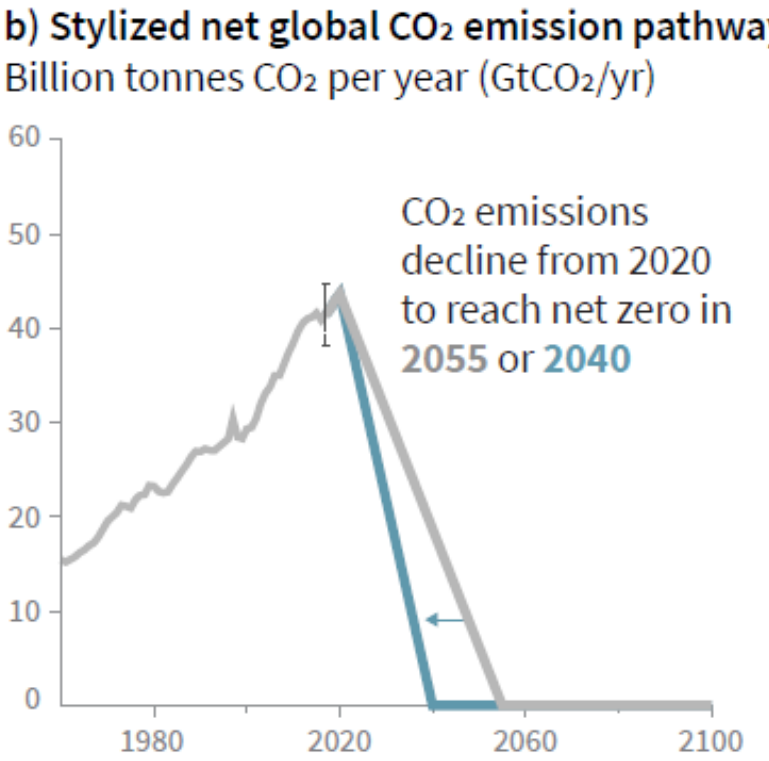
- 2011: Commission 2050 Roadmap
- June 2018: agreement on 2030 targets
- 28 November 2018: revised 2050 roadmap



IPCC Special Report on Global Warming of 1.5ºC

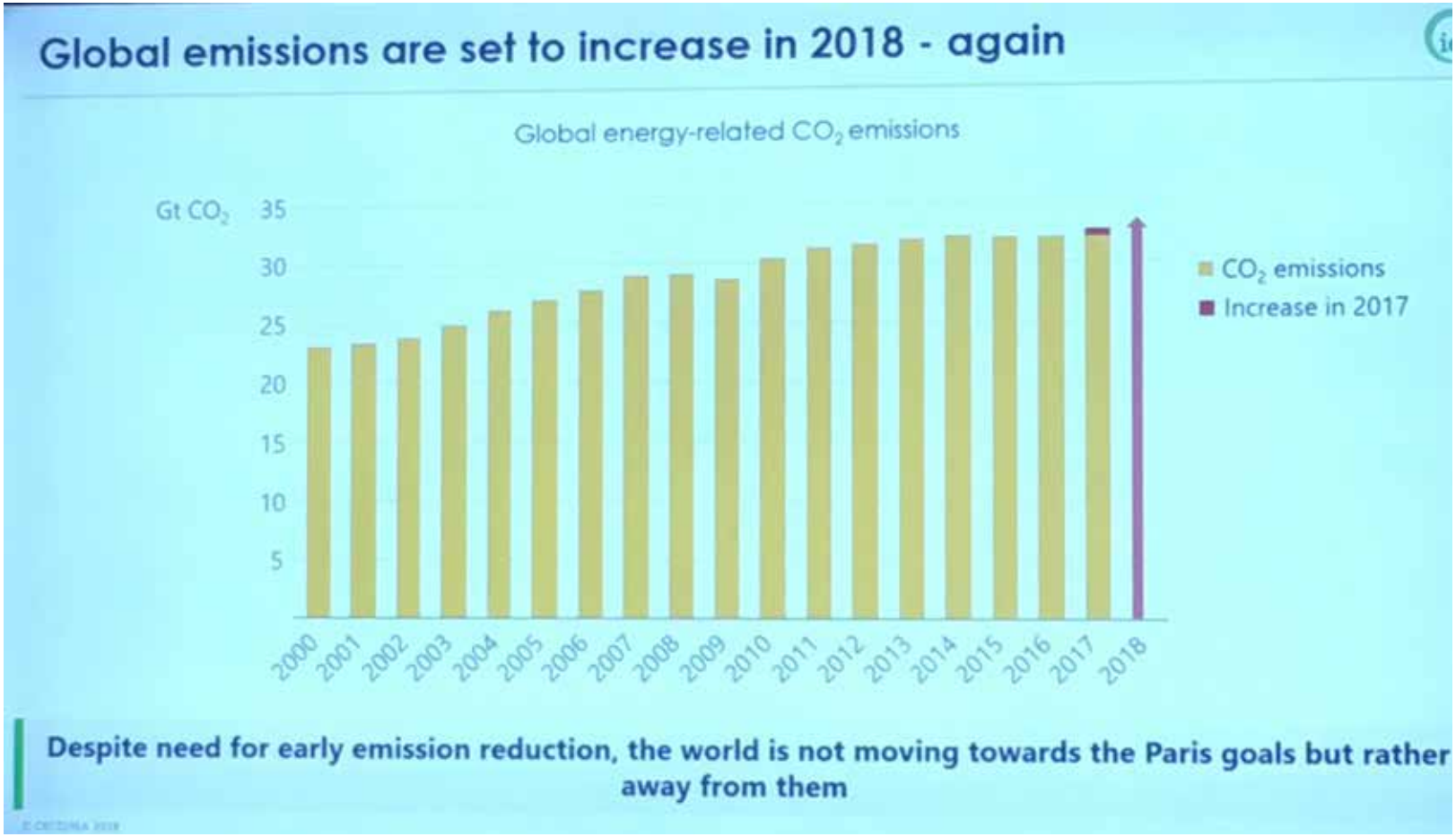


Where are we… and where we need to be



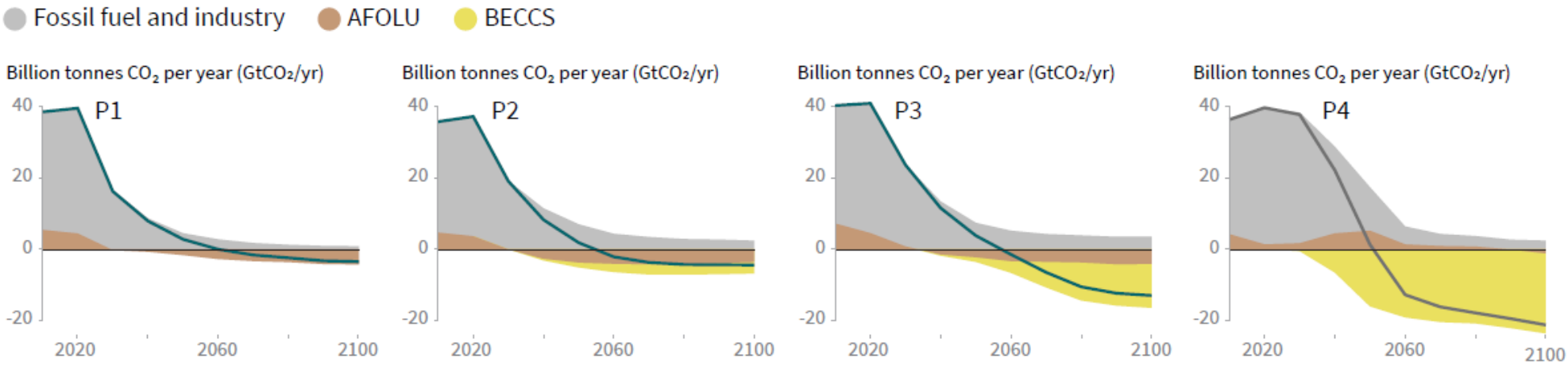
Temperature increase	Intermediate target for **2030**	Final target: **net zero**
Limit to **1.5°C**	**-45%** [40-60% range]	Around 2050
Limit to **2°C**	**-20%** [10-30% range]	Around 2075

The world is not on track



IPCC selected pathways

Breakdown of contributions to global net CO_2 emissions in four illustrative model pathways



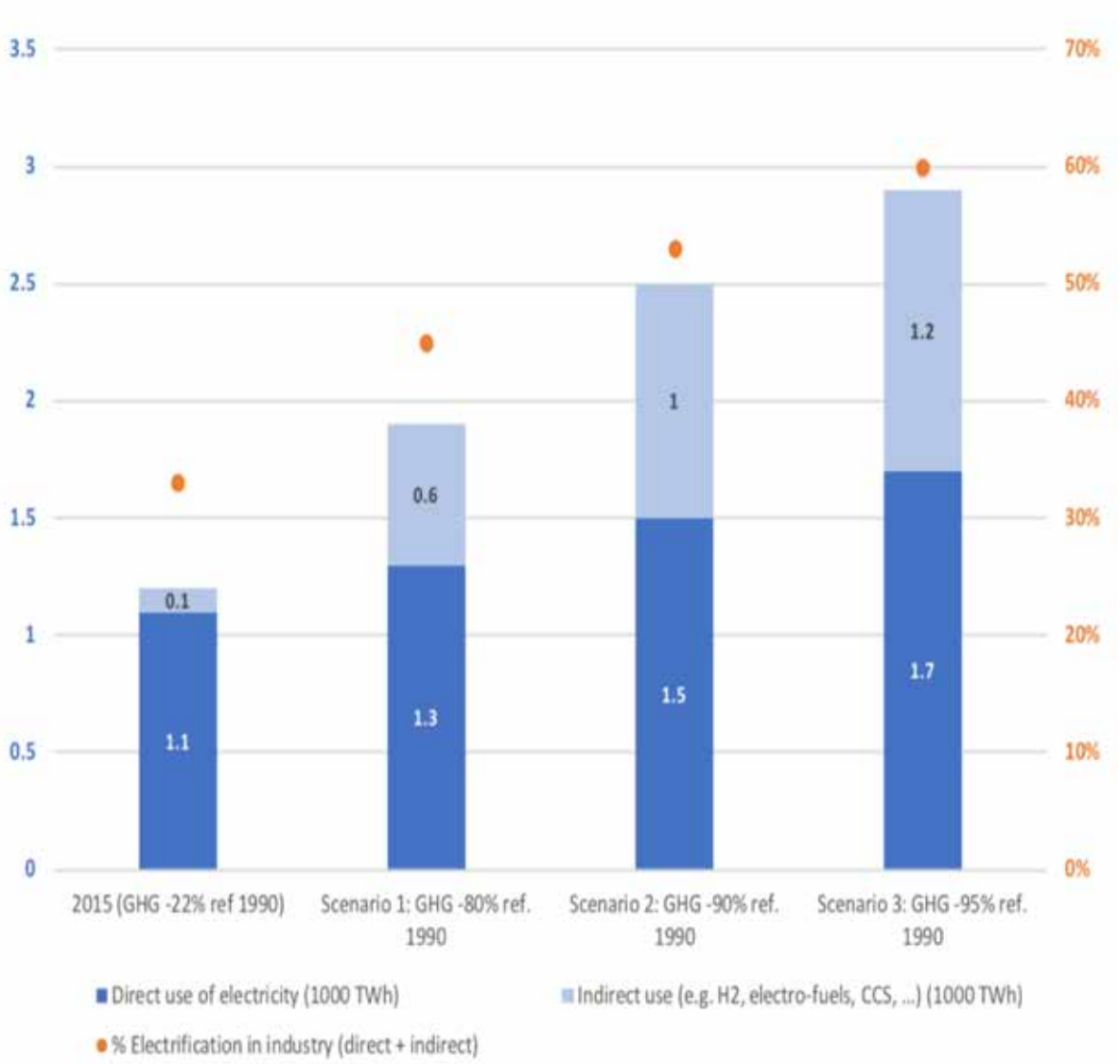
P1: A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither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

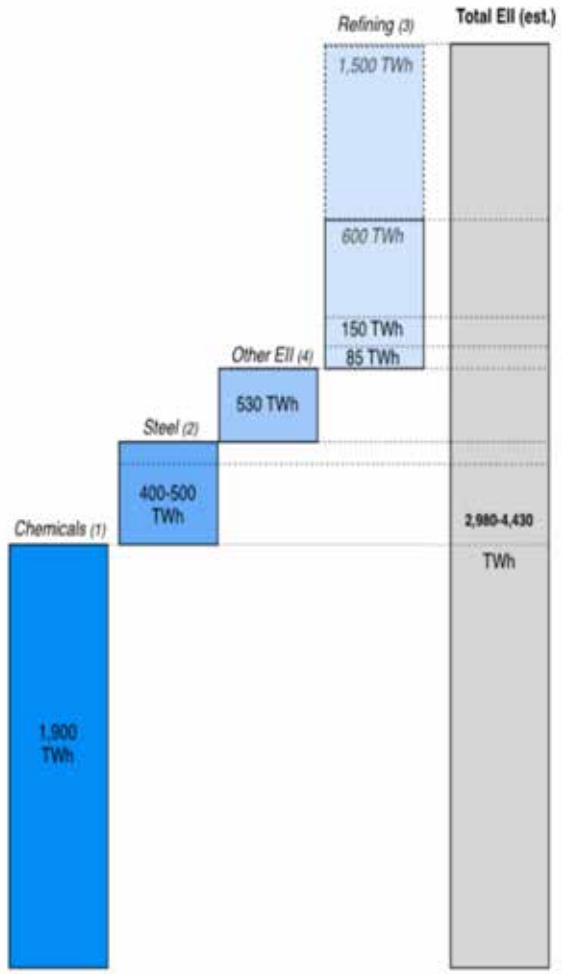
P2: A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal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

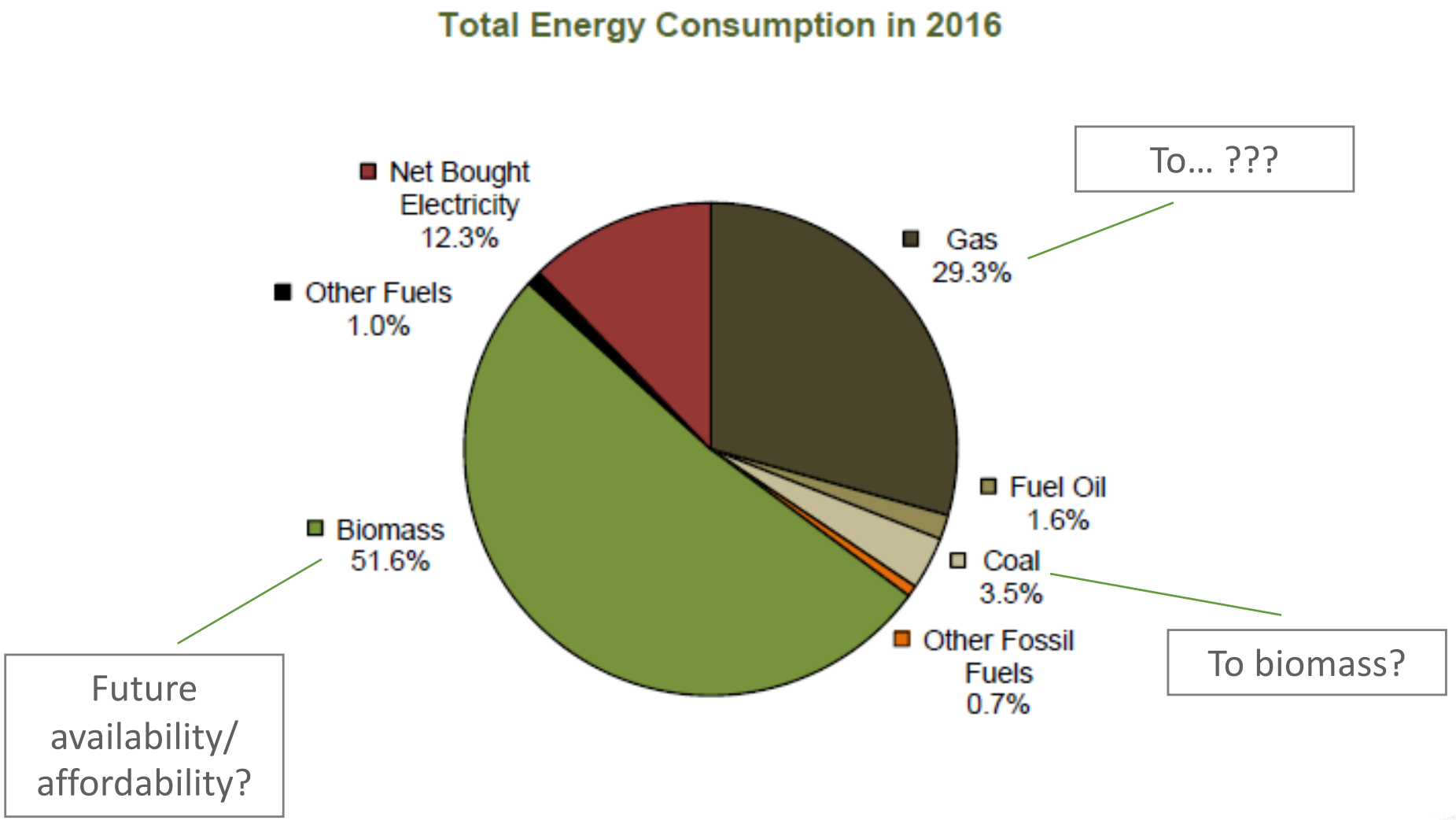
Future access to cost-competitive, decarbonised electricity?





Estimates on future electricity demand by industry (left: Eurelectric, right: aggregation of EII sectoral inputs/roadmaps)

CEPI energy mix & decarbonisation



Source: CEPI Environment Statistics 2016

Challenges ahead

- **Decarbonisation = higher compliance costs**
  - Continue investing in carbon footprint reduction
- **Decarbonisation = more energy demand**
  - Energy savings remains a top priority
- **Decarbonisation = potential market pull for our products**
  - Need to fully exploit this potential
- **Decarbonisation = higher competition for our raw materials**
  - The least society decarbonises, the more emissions to be offset – carbon sinks, carbon capture and storage from bioenergy (BECCS)

Thank you

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