

Platform **Hernieuwbare** **Brandstoffen.**

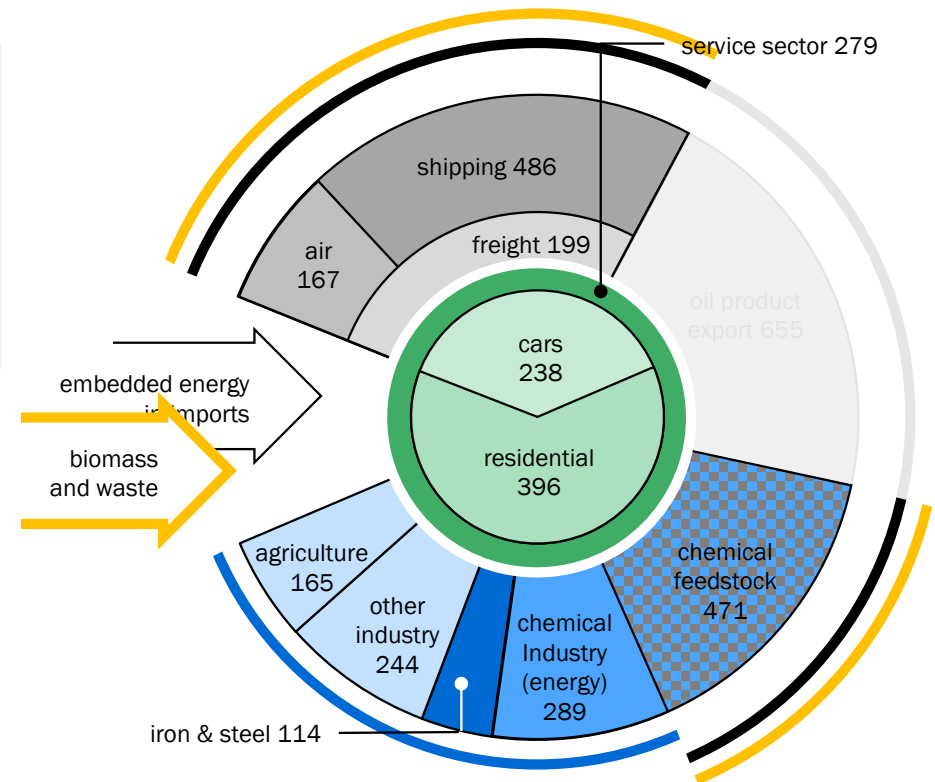
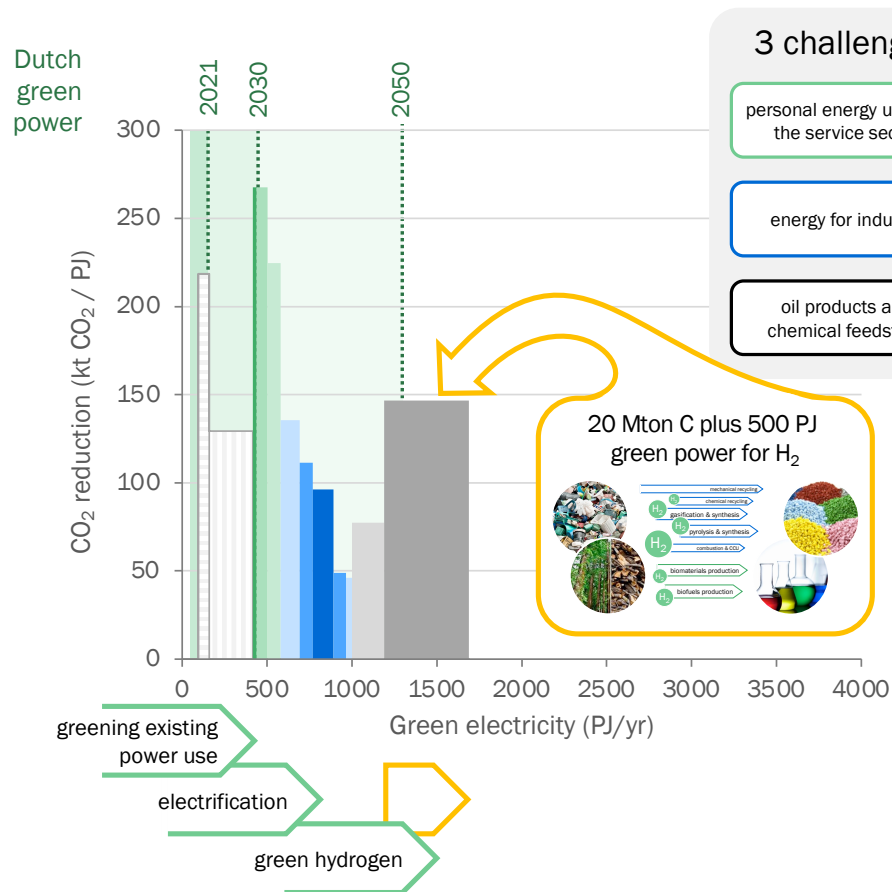
EU & Dutch Policy
Overview” A briefing of
where we are heading to

19 May 2022 – Workshop with UU

Loes Knotter



Green power, green hydrogen & 'circular' carbon



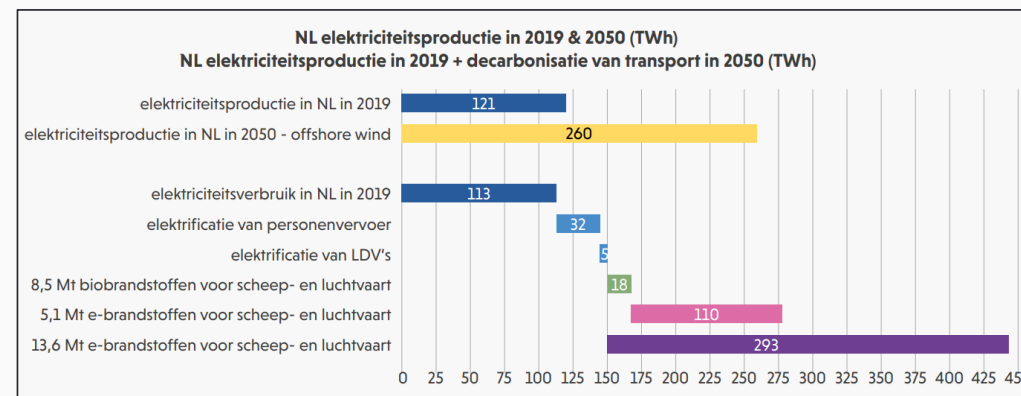
* e-fuels and e-chemical are synthesized from CO₂ and green hydrogen

Different ways to provide 20 Mt C in 2050:

Feedstock contribution	biomass/ waste	atmospheric CO ₂
100% biomass/waste	40 Mt	0 Mt
100% atmospheric CO ₂	0 Mt	73 Mt
50% biomass/waste, 50% atmospheric CO ₂	20 Mt	36,5 Mt

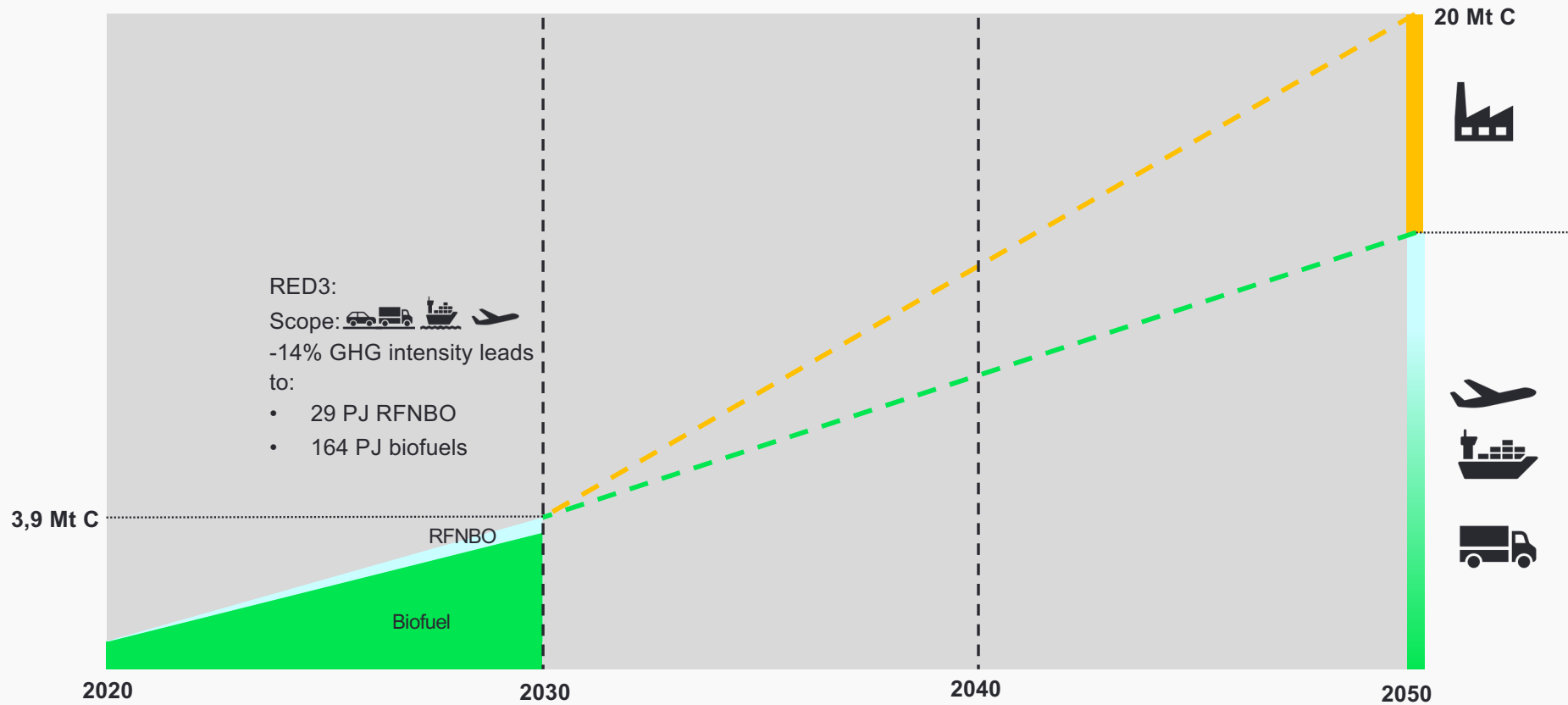
The amount of H₂ (and required renewable electricity) needed depends on the ratio between biogenic carbon and atmospheric CO₂ for the production of fuels and feedstock for chemical industry, as recent VNPI study shows.

E-fuels-only option will require substantially more electricity:

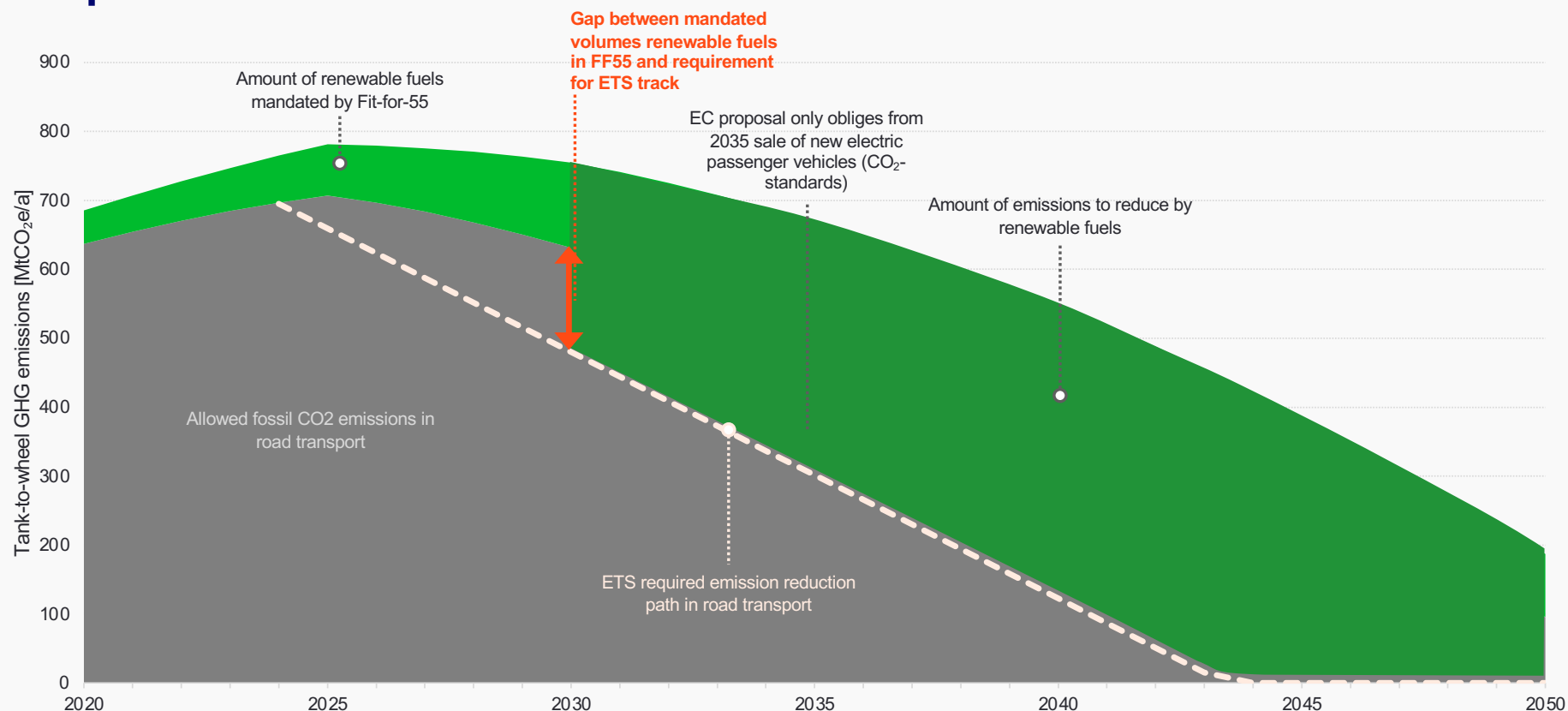


VNPI (2022), Het potentieel van low carbon liquid fuels in de Nederlandse raffinage in 2050

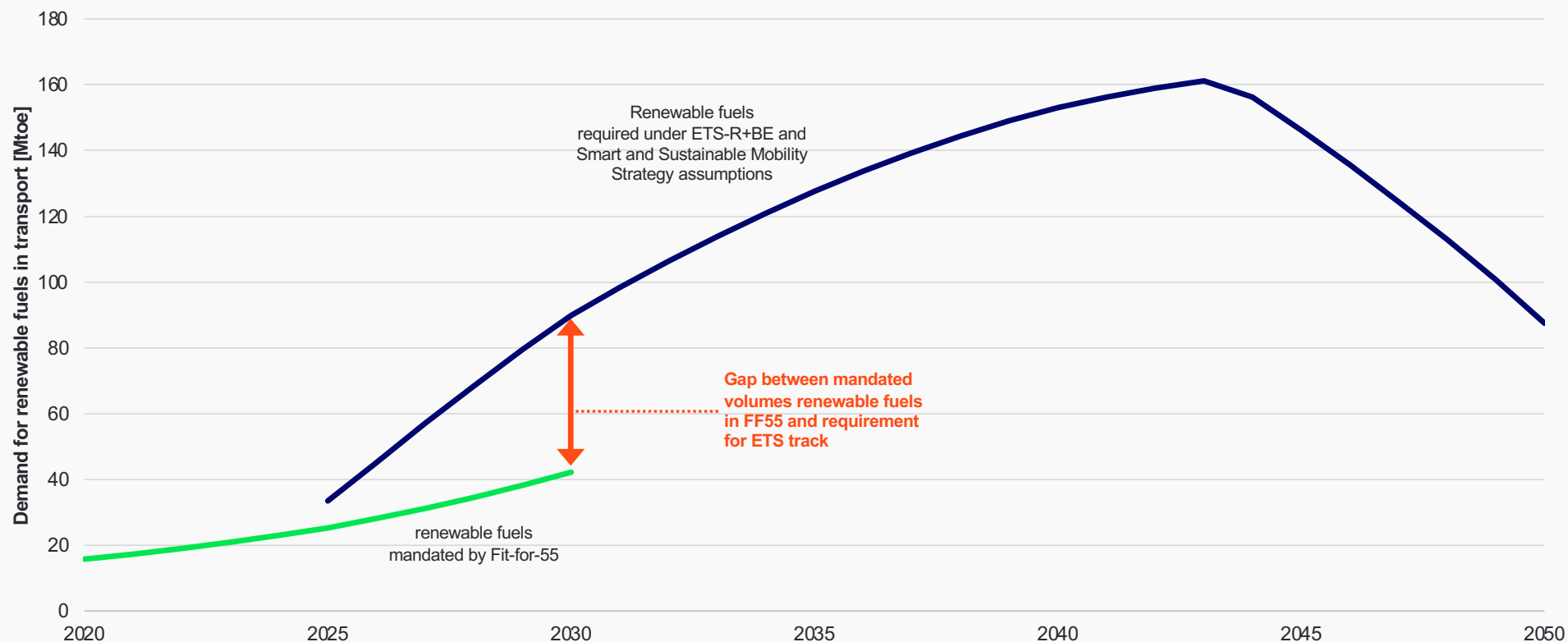
2030-targets RED3 in NL in relation to 2050 carbon volumes (work in progress)



For EU27: our analysis shows that ETS-R+BE requires more renewable fuels than anticipated in review RED

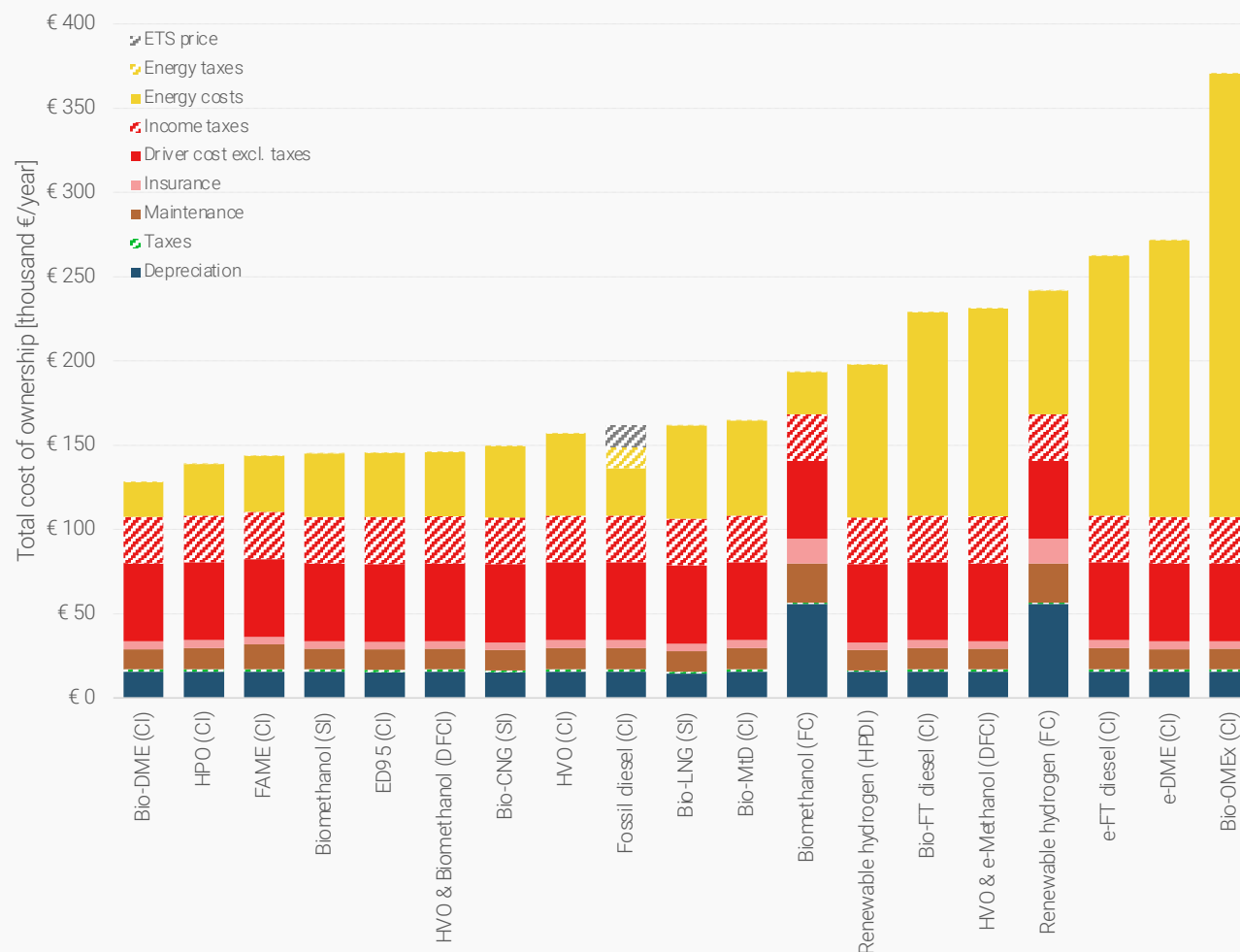


In the ETS-Road+Building renewable fuels volumes will peak around 2040-45 under the assumption of 'full speed' electrification



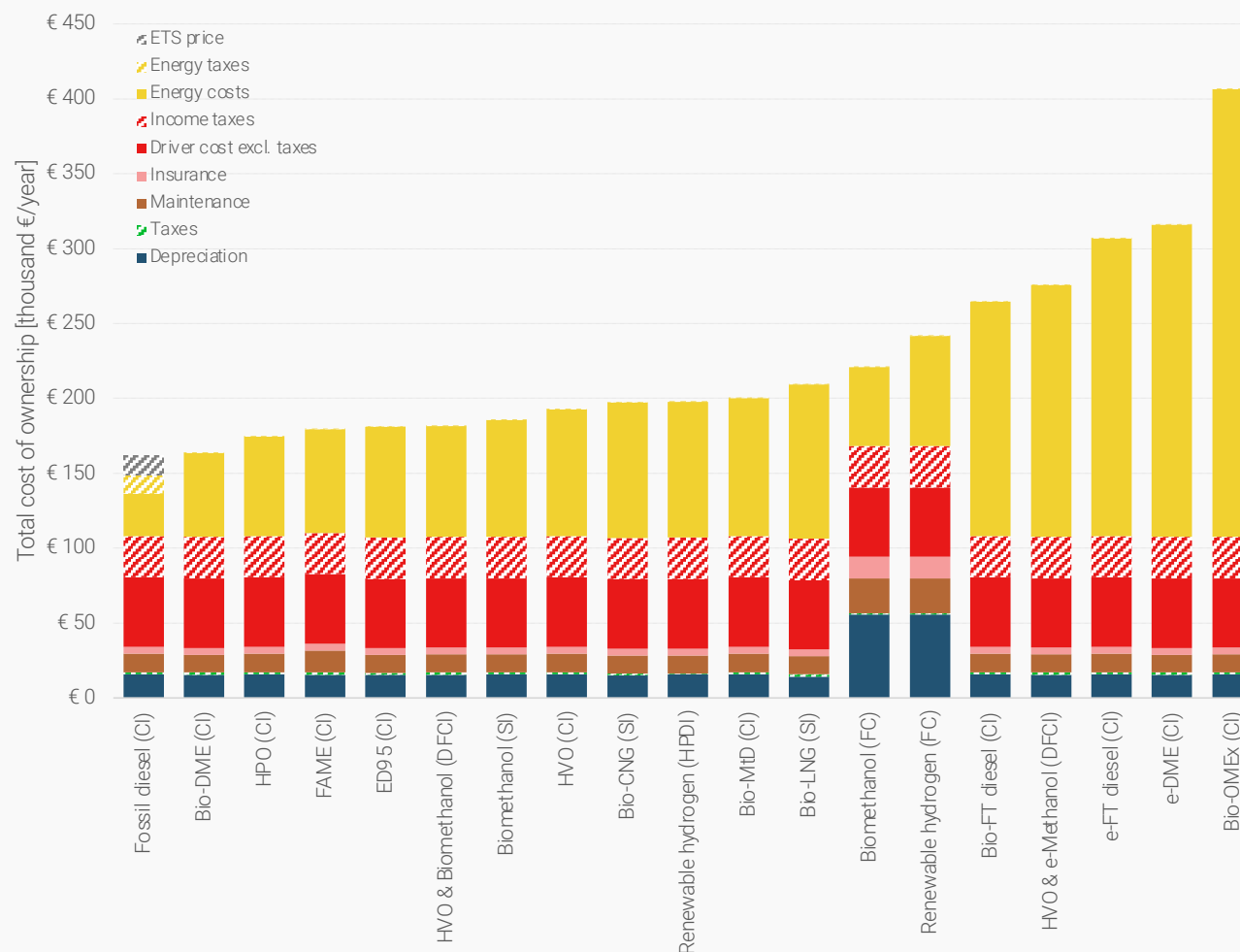
Impact of ETD

- Impact ETS and ETD in 2023 (including HBE): could make a range of renewable fuel options could reach cost competitiveness
- Here we have used an ETS price of 150 € could be lower or higher.
- Especially, the new proposals for the energy taxation directive (ETD) is expected to have a significant impact on the relative position of renewable fuel options compared to fossil diesel. On basis of Total Cost of Ownership for a 40.000 ton trucks on the Dutch market several renewable fuel options are price competitive or cheaper than the fossil diesel reference.



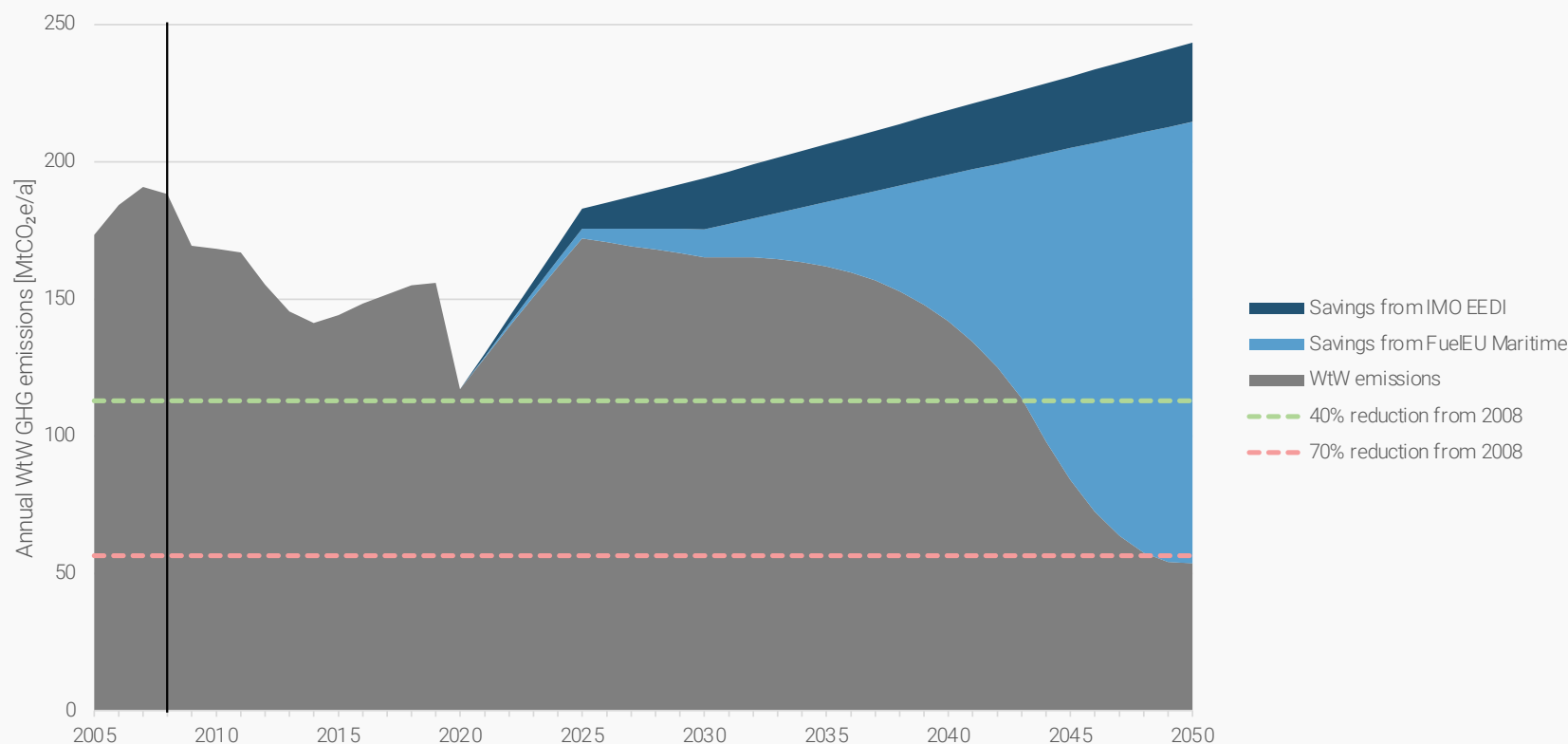
Impact ETD, excluding HBE (additional volumes to the market)

- Excluding the (HBE) value of the bio ticket for mandated volumes,) discount still shows the significant impact of ETD and ETS in 2023
- When excluding the HBE discount, ETD and ETS still bridge the gap from fossil to the first renewable fuel option (bio-DME).
- Also HPO, FAME, ED95 and biomethanol in a dual-fuel CI with HVO are in the close vicinity of the fossil fuel price.
- In general, the ETS and ETD are expected to provide fleet operators with more cost-competitive renewable options from 2023 onwards (with or without HBE discount). If! available in large supplies.,



FuelEU Maritime improves GHG intensity, IMO improves energy efficiency

- Ships calling in at EU ports need to meet both the energy efficiency target of IMO (EEDI) and the energy input target FuelEU Maritime (EU27) from 2025. This figure shows volumes towards 2050 assuming that 40% efficiency gains are maximally achievable for maritime freight transport.



The background features a light green field with scattered stylized trees in various shades of green and grey. A large, light blue circular arrow with a thick stroke is centered on the page, pointing clockwise. The text "2025 compliance: -2% GHG-intensity reduction" is centered within this arrow.

2025 compliance: -2% GHG-intensity reduction

Case 1 – All ships use liquid fuel

- 1 out of 9 ships needs **22 % renewable liquid fuel** in 2025



Case 1 – All ships use liquid fuel

- All ships run on a 2.5 % blend of renewable fuel in 2025



Case 2 – Retrofitting of the fleet:

- 1 out of 9 ships uses 12 % of advanced bio-LNG in 2025



Case 2 – Retrofitting of the fleet

- Over 2 ships have to run on fossil LNG in 2025



The background features a light green field with scattered stylized trees in various shades of green and grey. In the center, there is a large, light blue target symbol consisting of three concentric circles and a curved arrow pointing towards the center.

2030 compliance: -6% GHG-intensity reduction

Case 1 – All ships use liquid fuel

- 1 out of 9 ships uses 60 % renewable liquid fuel in 2030



Case 1 – All ships use liquid fuel

- All ships run on a 7 % blend of renewable fuel in 2030



Case 2 – Retrofitting of the fleet

- 1 out of 9 ships uses 60 % of advanced bio-LNG in 2030



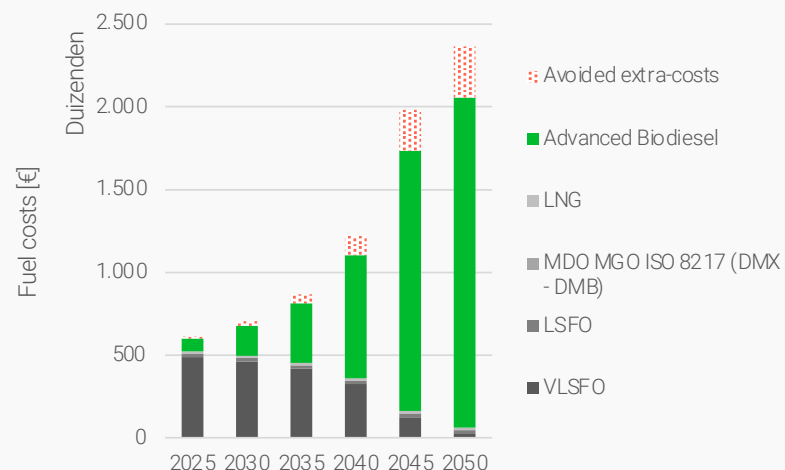
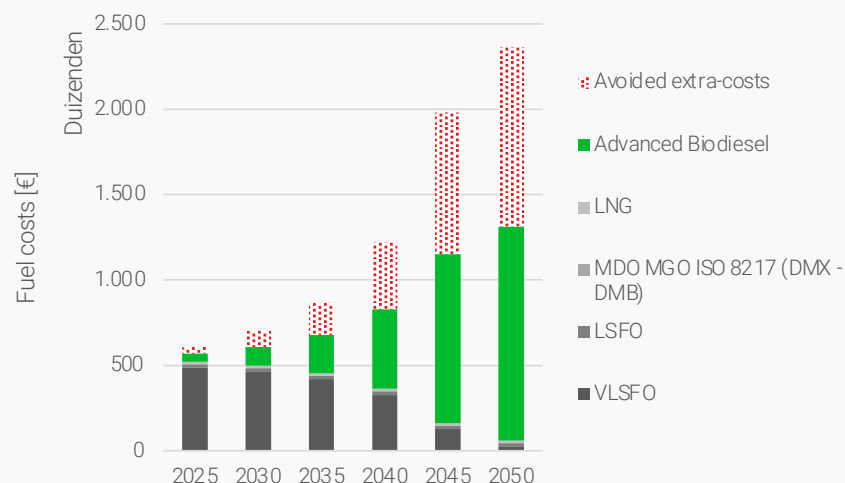
Case 2 – Retrofitting of the fleet

- Over 6 ships have to run on fossil LNG



Increase penalisation of fossil fuel use in the FuelEU Maritime

- As the amount of uncompliant fuel increases, the penalty increases too
- Benefits of choosing a renewable fuel outweigh the penalty costs (prices in August 2021)



- However, prices are increasing due to market disruptions
 - Sector and offtakers will **need to act and invest now** to keep renewable prices low

The overview of the legislations shows the differences between obligated parties, scope and goals

* and: warships, naval auxiliaries, fish-catching or fish-processing ships, wooden ships of a primitive build, ships not propelled by mechanical means, or government ships used for non-commercial purpose

	FuelEU Maritime	ETS	ETD	REDIII
Obligated party	Shipowner	Shipowner	Fuel supplier	Fuel supplier
Scope	<ul style="list-style-type: none"> Intra EU & 50% Extra EU Energy consumption at berth Ships above 5000 Gross tonnage (inland vessels* are excluded) WtW emissions 	<ul style="list-style-type: none"> Intra EU & 50% Extra EU 100% of emissions at berth Same scope of ships as FuelEU Maritime TtW emissions 	<ul style="list-style-type: none"> Intra EU including inland shipping Optional for MS: Extra EU 	<ul style="list-style-type: none"> All transport segments Including inland shipping, international aviation and maritime
Goals	<ul style="list-style-type: none"> Focus on GHG intensity Reference year: 2020 1. -2% by 2025 2. -6% by 2030 3. -13% by 2035 4. -26% by 2040 5. -59% by 2045 6. -75% by 2050 	<ul style="list-style-type: none"> Focus on GHG emissions Reference year: 2005 By 2030: -61% (over all sectors included in the ETS) 	<ul style="list-style-type: none"> Focus on fuel consumption No goals set 	<ul style="list-style-type: none"> -13% GHG intensity in 2030
Associated costs non-compliance	About 2,400 €/tonne non-compliant fuel	<p>Current ETS price is around 180 €/tonne fossil fuel</p> <p>Expected: ETS price 90 €/tonne fossil fuel in 2030 and 450 €/tonne fossil fuel in 2050</p>	Fossil: 0.9 €/GJ → € 36/tonne	Determined per MS

Differences legislations create complexity and risk for unintended undercompliance

	FuelEU Maritime	ETS	RED	ETD 2023	ETD 2033
Fossil fuel	X	X	X	0.9 €/GJ	0.9 €/GJ
Fossil LNG	—	—	X	0.6 €/GJ	0.9 €/GJ
Food and Feed Crop	X	✓	Limit +1% 2020	0	0
Annex IXA	✓	✓	✓ *1.2x	0	0
Annex IXB	✓	✓	Limit 1.7%	0	0
RFNBO	✓	✓	✓ *1.2x	0	0
Electricity (fossil)	✓	✓	X	0	0
Electricity (renewable)	✓	✓	✓	0	0

Amended REDII: Annex IX B fuels are not incentivised anymore for aviation and maritime

- The RED III scope is broadened comprising road and rail and, this is new, including international aviation and maritime
- Transport subtarget changed from minimum Renewable Energy Share (RES, 14%) to minimum GHG intensity reduction (13%)
- No more double counting of certain feedstock types (Annex IX) and renewable electricity
- Waste biogenic oils and fats (Annex IX B) are not longer incentivised for aviation and maritime:
 - Not included in the 1.2x stimulation factor, which do apply for RFNBO's and Annex 9A

Emission Trading System: Be aware of a steep decrease after 2030

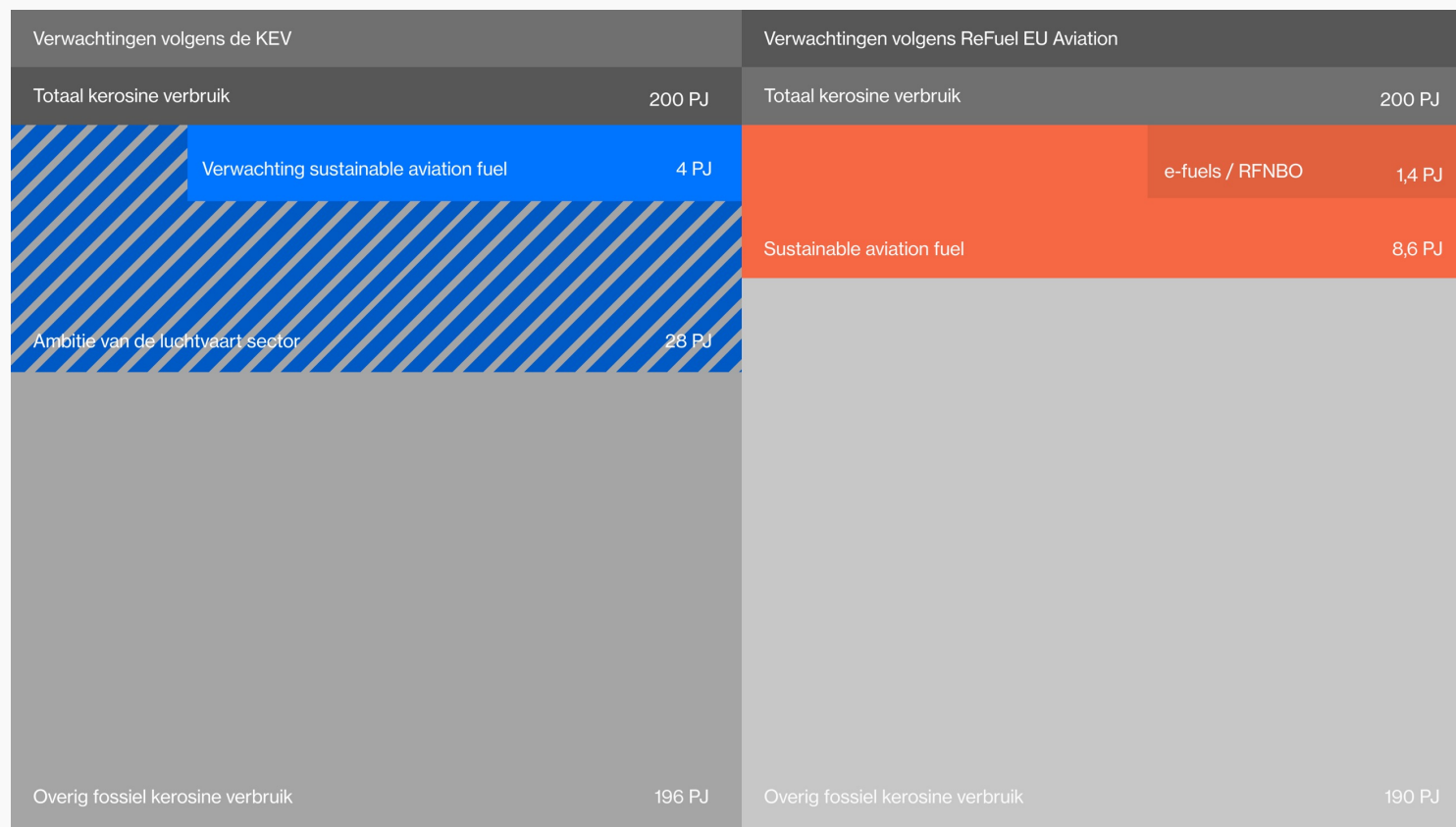
- International shipping is proposed to be included in the general ETS with: aviation, manufacturing industry, power sector
- Complicated to quantify the impact of the ETS as all sectors can contribute
- Maritime sector will be included through a phase-in (Article 3ga):
 1. 20% by 2023
 2. 45% by 2024
 3. 70% by 2025
 4. 100% by 2026
- Amended Article 9 explains the changes made to the current ETS:
 - The maritime sector will be given 79 million allowances (= 79 MtCO₂eq)
 - Linear reduction factor is set at: -4.2% over all sectors
- TtW Emissions of renewable fuels are set to zero

ETD: does not do much to improve the position of renewable fuels in the maritime sector

- Obligated party: fuel supplier
- ETD tariffs are set until 2033, after that there will be a revision
- Maritime will have the following tax tariffs (Article 15):
 - Lower tariffs for commercial transport
 - High tariffs for non-commercial transport
 - Commercial transport extra EU could be taxed with high tariffs. This is optional for Member States.
- Sustainable biofuels and biogas (including sustainable food and feed crop), LCFs, RFNBOs advanced sustainable biofuels and biogas and electricity, are exempt for tax until 2033 (Article 15)

REFuel aviation

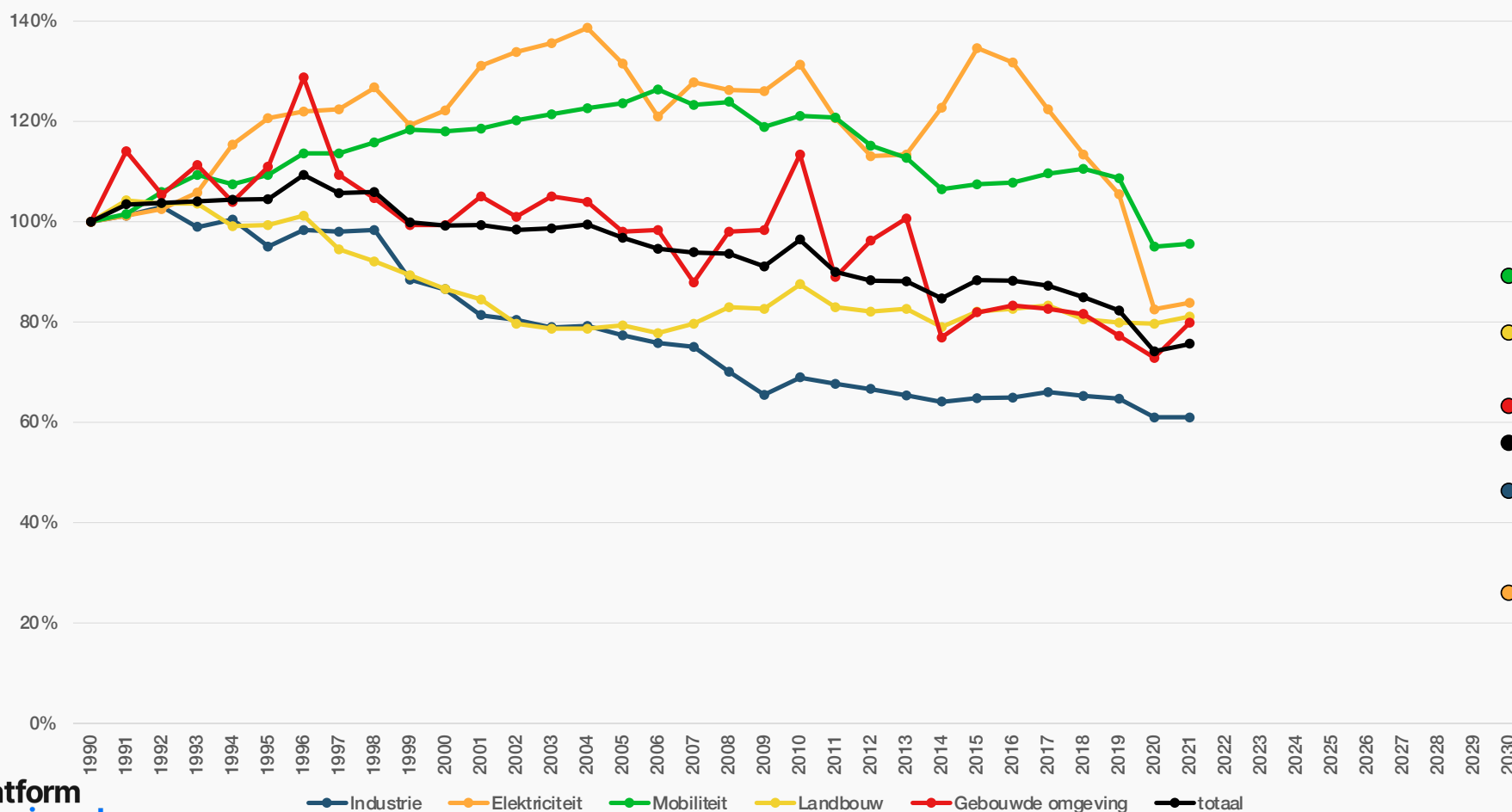
2025	2% SAF
2030	5% SAF, of which a minimum share of 0.7% of synthetic aviation fuels
2035	20% SAF, of which a minimum share of 5% of synthetic aviation fuels.
2040	32% SAF, of which a minimum share of 8% of synthetic aviation fuels.
2045	38% SAF, of which a minimum share of 11% of synthetic aviation fuels.
2050	63% SAF, of which a minimum share of 28% of synthetic aviation fuels.



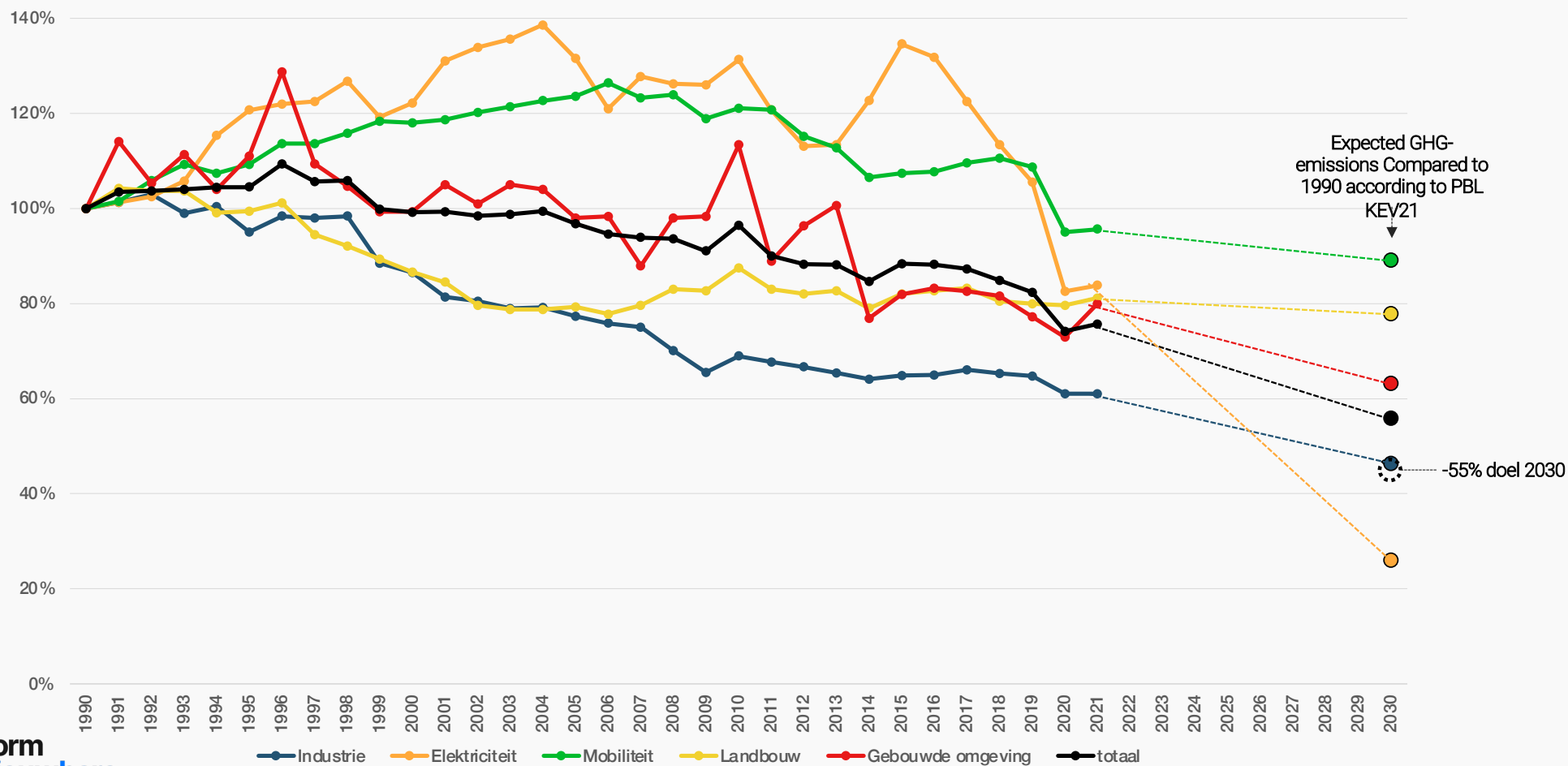
Overview of proposed EU legislations for GHG-reductions in aviation

	REFuel aviation	ETS	ETD	REDIII
Obligated party	fuel suppliers, airlines and aircraft operator providing the necessary fuel infrastructure	Airlines	Fuel supplier	Fuel supplier
Scope	<ul style="list-style-type: none"> All fuels consumed on European airports (minimum of 1 million passengers or 100000 tons of goods) Aircraft operator: minimum of 729 commercial flights from a Union airport 	<ul style="list-style-type: none"> Only intra-EU Extra-EU will be covered by the ICAO / Corsia 	<ul style="list-style-type: none"> Intra-EU (excluding business and pleasure flights) Cargo flights are optional Extra-EU is optional 	<ul style="list-style-type: none"> All transport segments Including non-road, all road, inland shipping, international aviation and maritime
Goals	<ul style="list-style-type: none"> Fuel suppliers (see table) Airlines 90% uplift obligation: 90% of the fuel for the next flight used when departing of an EU airport should be tanked there (on basis of total yearly fuel volumes) 	<ul style="list-style-type: none"> Focus on GHG emissions Reference year: 2005 By 2030: -61% (over all sectors included in the ETS) Until 2025 a -2,2% linear reduction Linear reduction of -4,2% from 2025 onwards 	<ul style="list-style-type: none"> Focus on fuel consumption No goals set 	<ul style="list-style-type: none"> -13% GHG intensity in 2030
Associated costs non-compliance	Aircraft operator: at least 2x multiplication of yearly average price of aviation fuel per tonne Fuel supplier: at least 2x multiplication of the difference between the yearly average price of conventional aviation fuel and sustainable aviation fuel per tonne and of the quantity of aviation fuels not complying with the minimum share	Current ETS price is around 50 -80 €/tonne / 180 €/tonne fossil fuel Expected: ETS price 90 €/tonne fossil fuel in 2030 and 450 €/tonne fossil fuel in 2050	Kerosene: 10,75 €/GJ	Determined per MS

CO₂-emissions in the Netherlands from 1990 per national sector (without international bunkers) compared to estimated performance in 2030

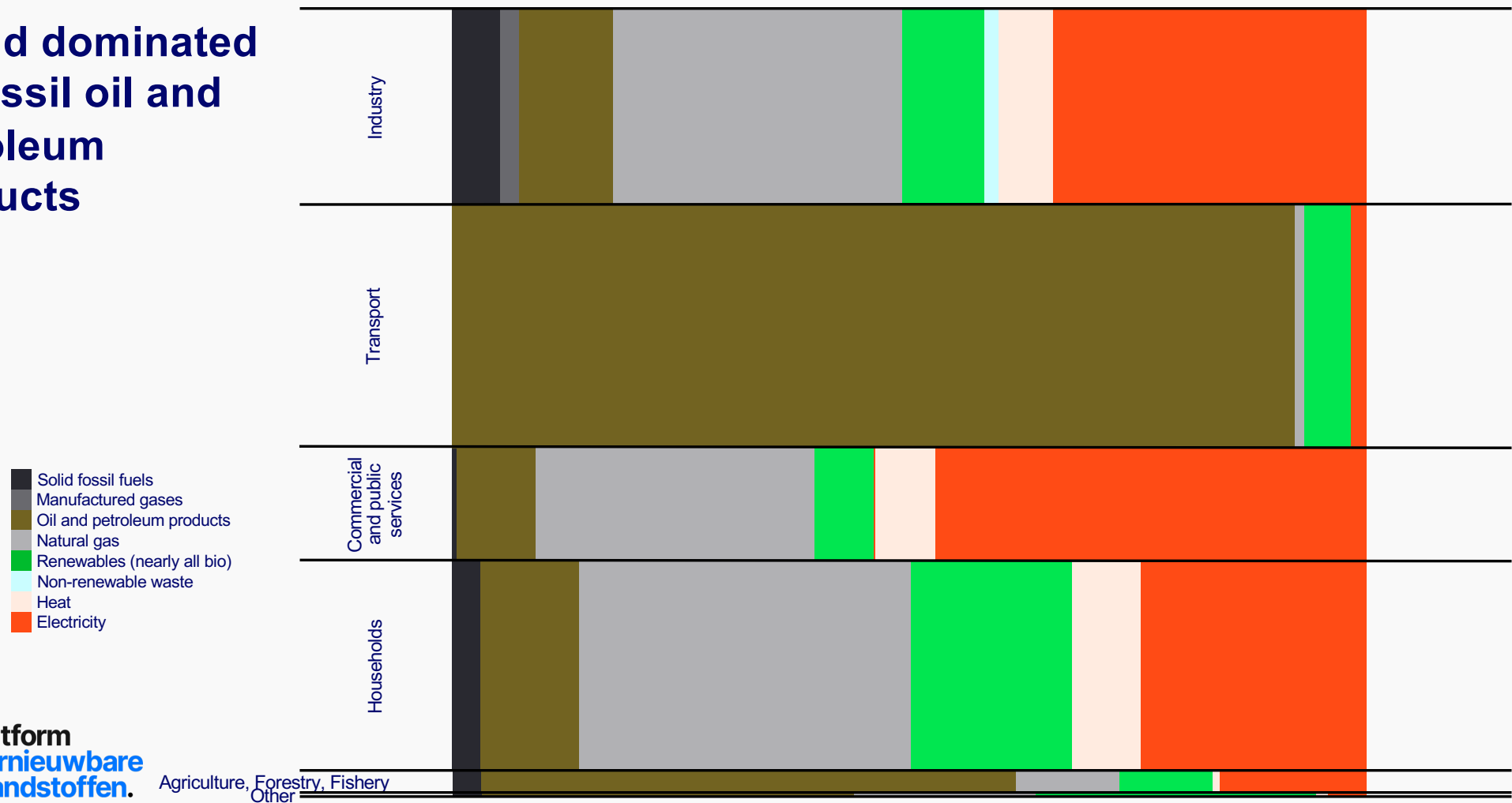


Transport is lagging behind and that will increasingly become problematic for reaching obliged targets in Effort Sharing Regulation



Transport is the largest energy consumption sector in Europe...

... and dominated by fossil oil and petroleum products



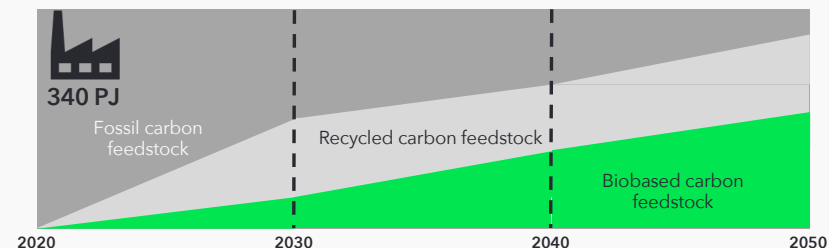
Source: Eurostat, Energy Balance, 2018 data. Data are excluding international aviation and maritime bunkering

To Recap

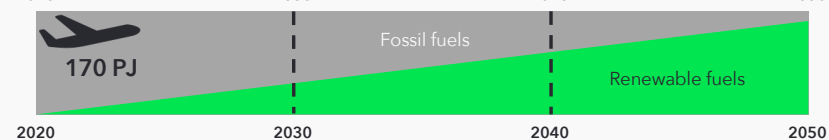
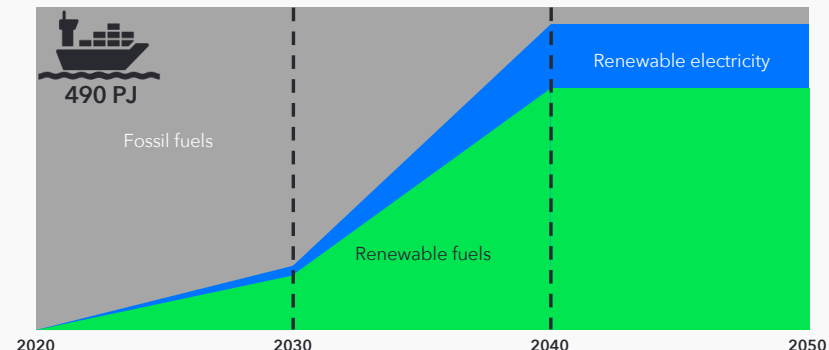
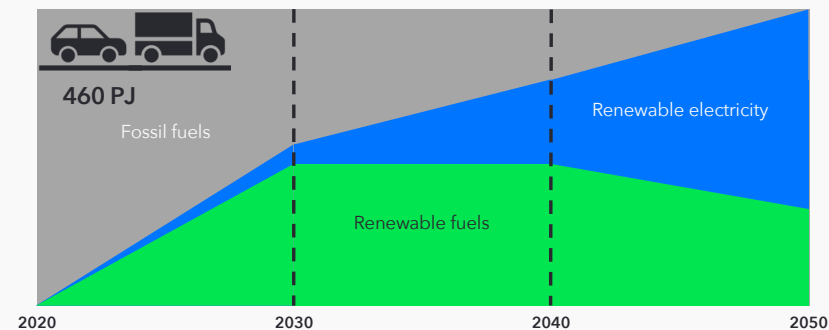
(the estimated numbers in figure are illustrative pathways to net zero 2050)

- From push:
- 13% GHG-intensity reduction of RED is by far not sufficient. Countries like NL/DE/SE do more
- FuelEU Maritime en REFuel Aviation targets start with very low targets (due to lack of international coordination)
- CO₂-standards support the electrification: e.g. all new sales electric in passenger segment as from 2025 (Europe) 2030 (NL)
- To pull:
- ETS will cap emissions in an ambitious way, but may in the short run not impact the relative position of alternatives for fossil fuels.
- ETD could have a substantial impact for road as from 2023 under the condition that member state translate this to substantial differences in duties between fossil and non-fossil energy carriers.
- Rising ambition in ESR up to 2030

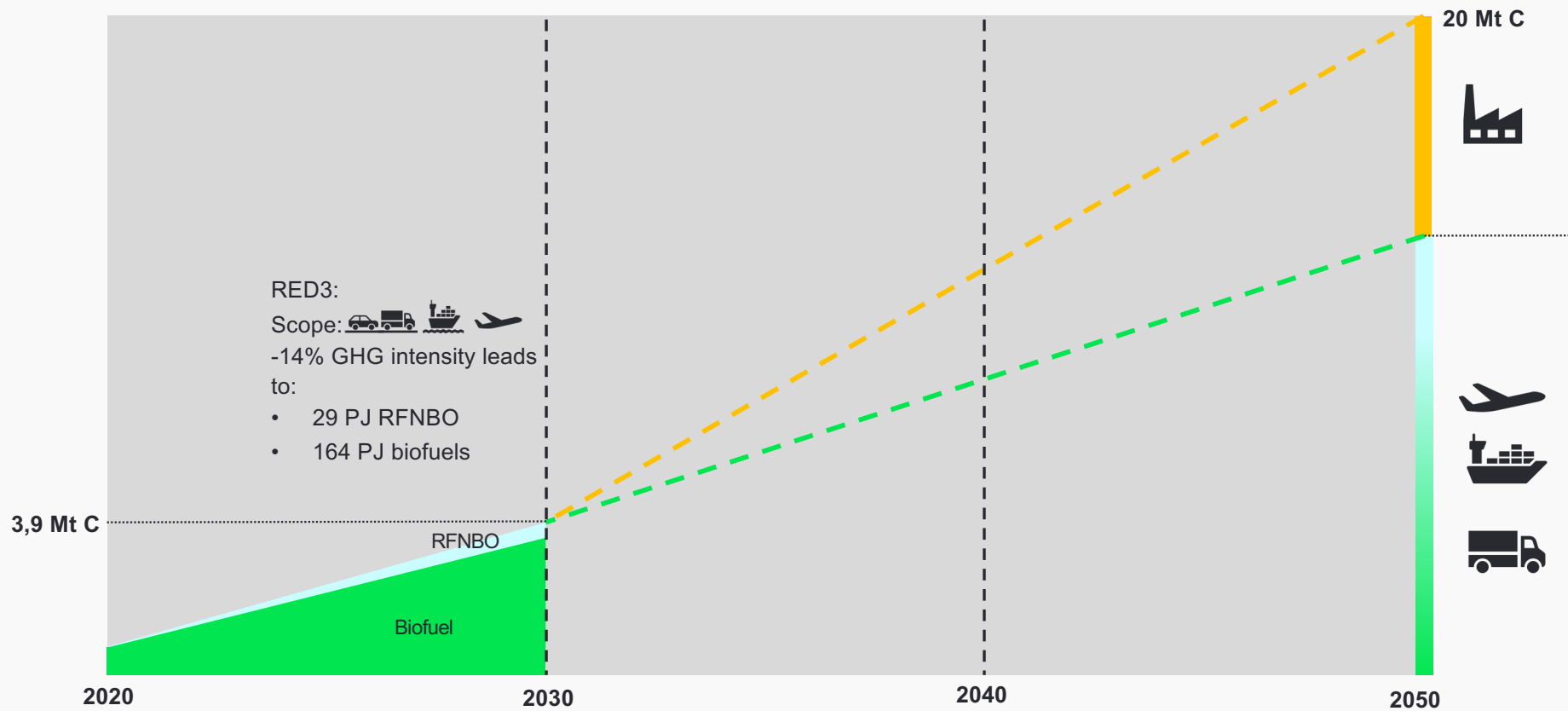
Non-energy use of carbon feedstock



Carbon and renewable electricity transport



Policy innovation required for the carbon transition



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www.hernieuwbarebrandstoffen.nl



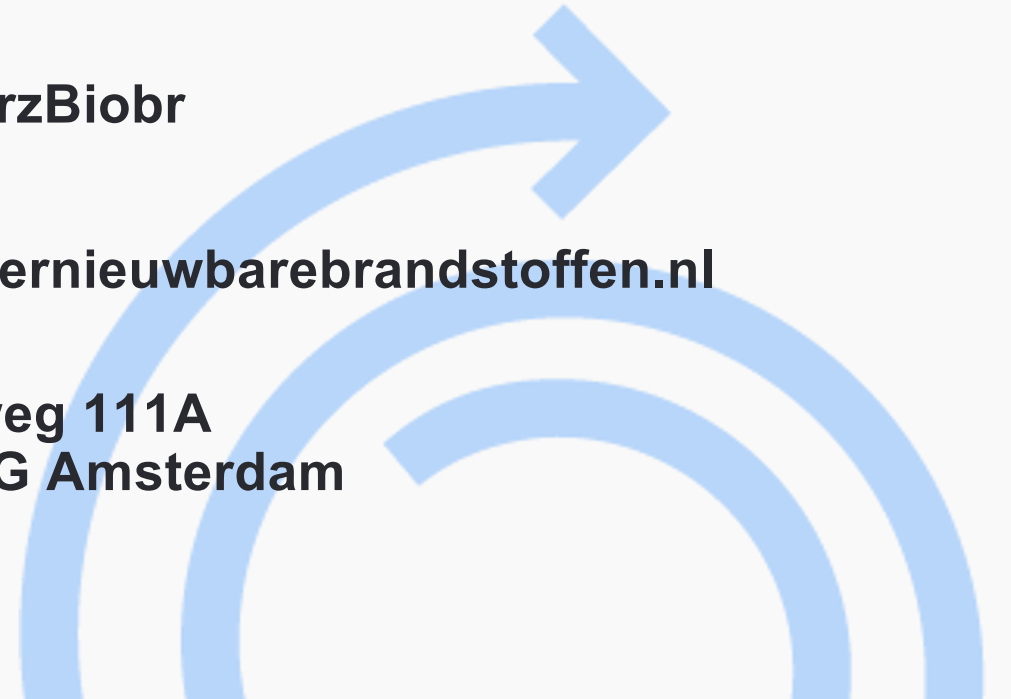
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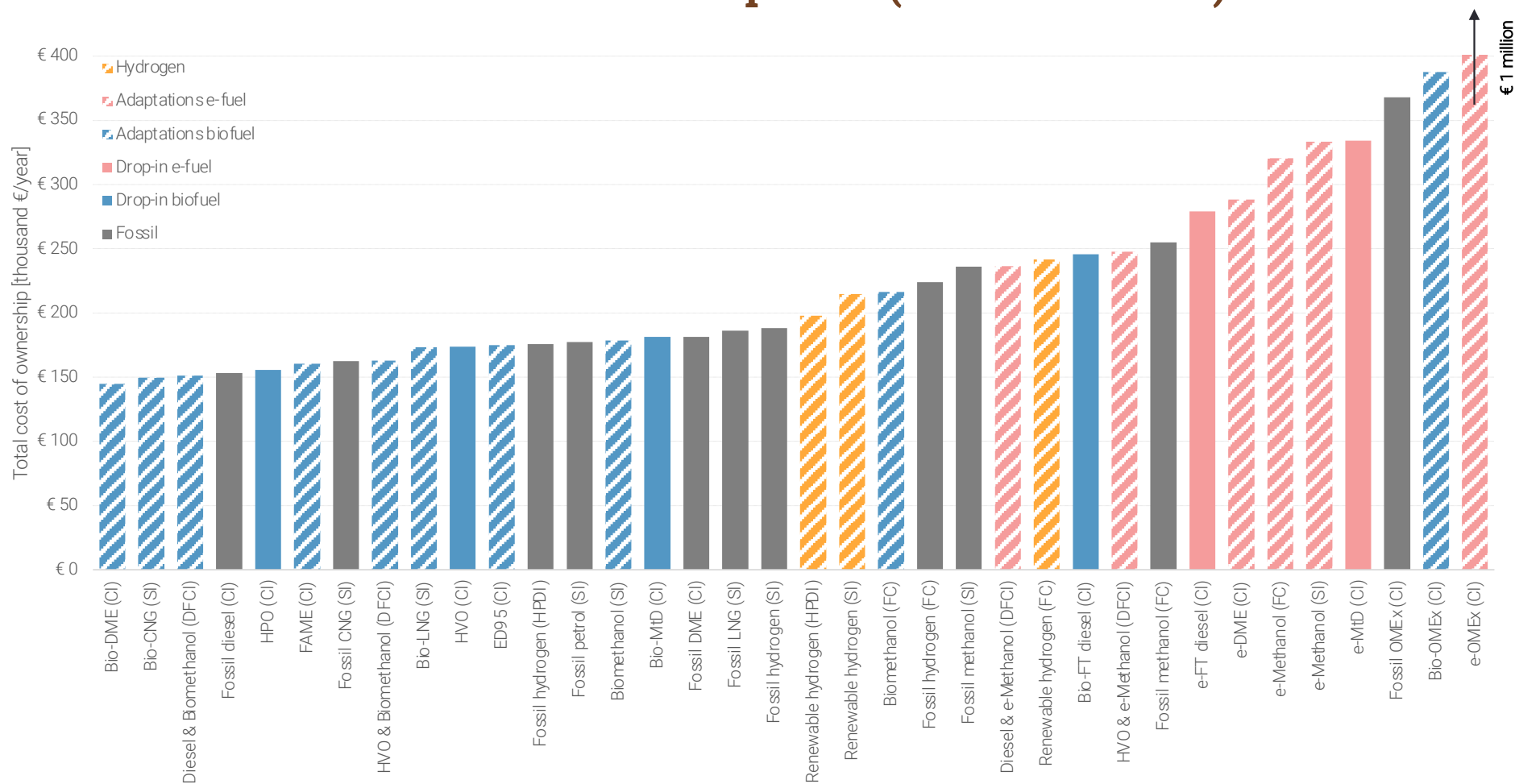


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Extra slides



Overview of all considered options (not exhaustive)

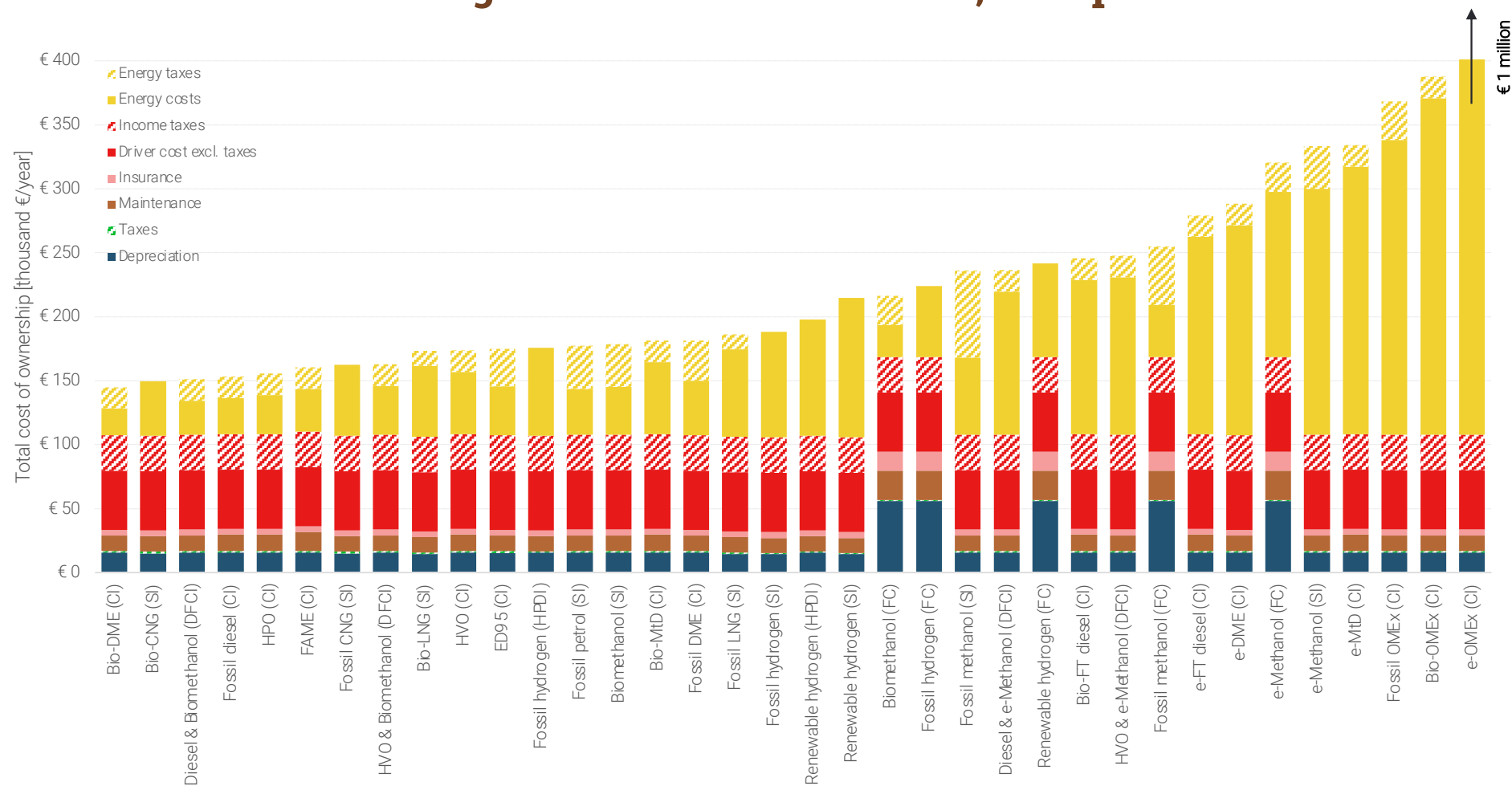


* e-OMEx has been calculated with an assumed fuel price

CI = Compression ignition, DFCI = Dual fuel compression ignition, SI = Spark ignition, HPDI = High pressure direct injection, FC = Fuel cell.

* Note that all renewable fuels in the study are subject to energy content compensation for excise duties (Handboek Accijns 4.7.2)

Fuel costs cause the largest differences in costs, except for fuel cells



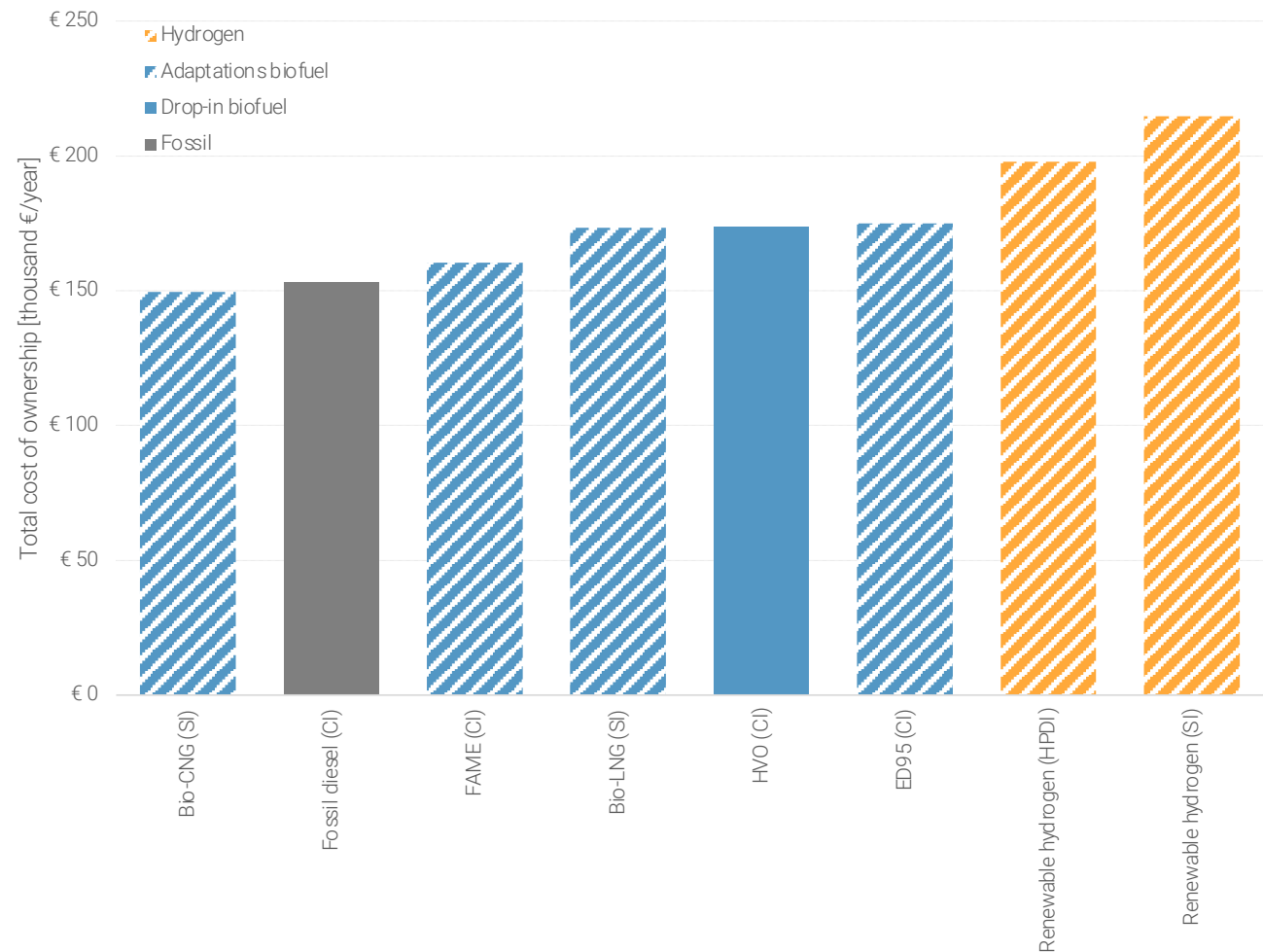
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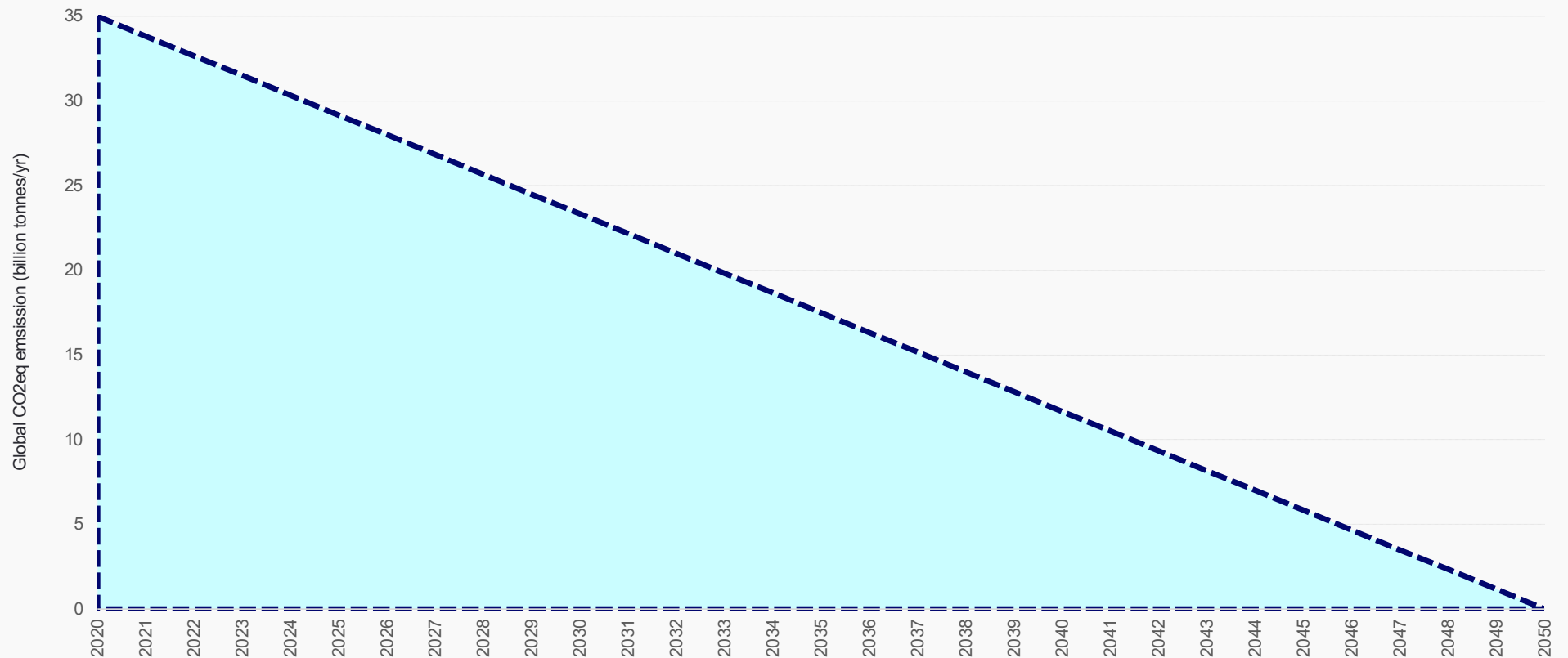
Comparison of currently marketed fuel-engine combinations in the EU

- Bio-CNG shows cost competitiveness with conventional diesel.
- Bio-LNG and FAME (B100) close in costs to conventional diesel.
- For bio-CNG and bio-LNG prices were provided by platform members.
- For diesel, HVO and hydrogen pump prices of February 2022 have been taken into account. For HVO a premium was added to make the price Annex IXA.
- For FAME a production price was taken and again a premium was added to make the price applicable for an Annex IXA fuel.
- ED95 was also derived from a production price. And again, an assumption was taken to arrive to a fuel price.
- Renewable hydrogen options are shown in a spark ignition and a high pressure direct injection system (variation spark ignition). Fuel cells are expected to enter the market soon.



SI = Spark ignition, CI = Compression ignition, HPDI = High pressure direct injection

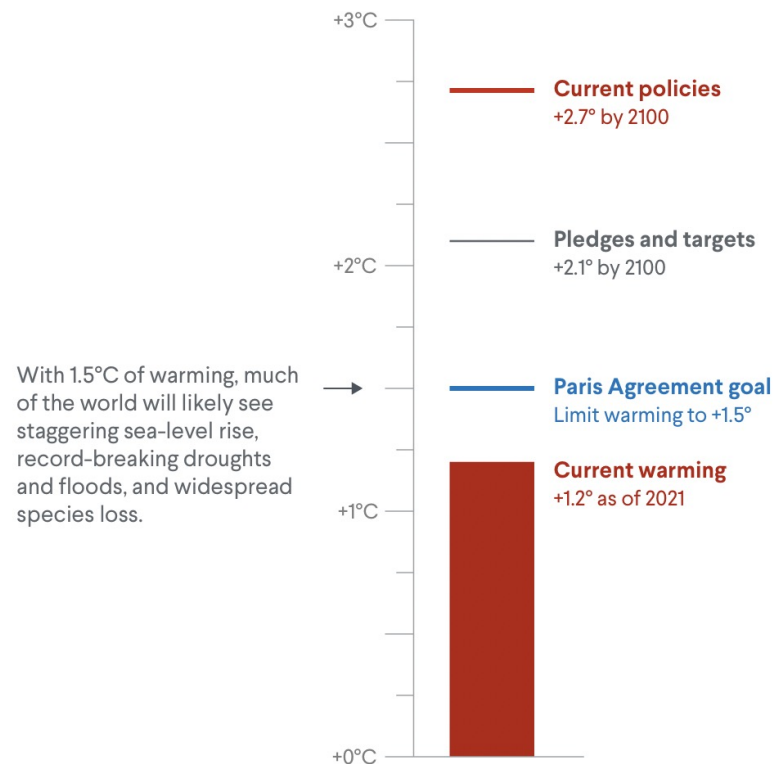
EU focusses on 'net zero by 2050'



Where do we stand after Glasgow: country pledges not on track for Paris

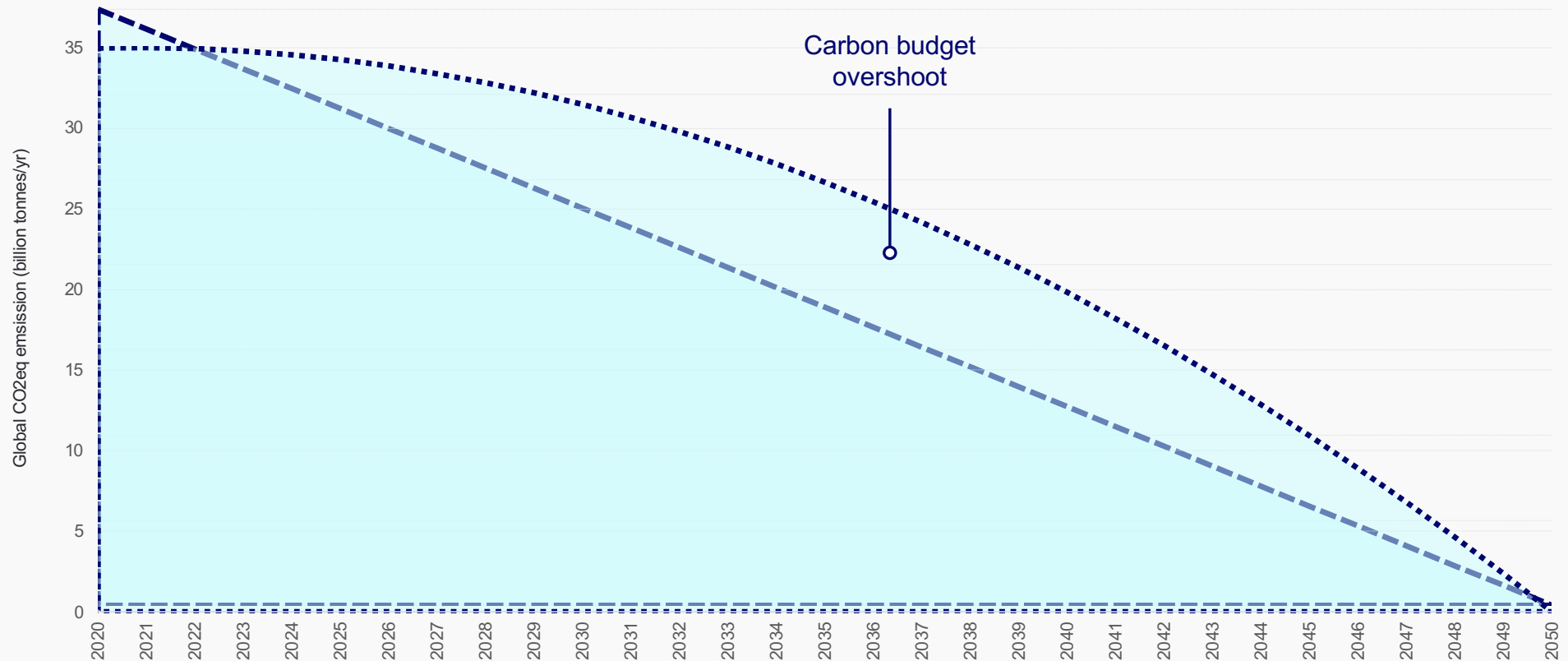
Even With COP26 Pledges, World Not on Track to Meet Paris Agreement's Goal

Global temperature rise over preindustrial average

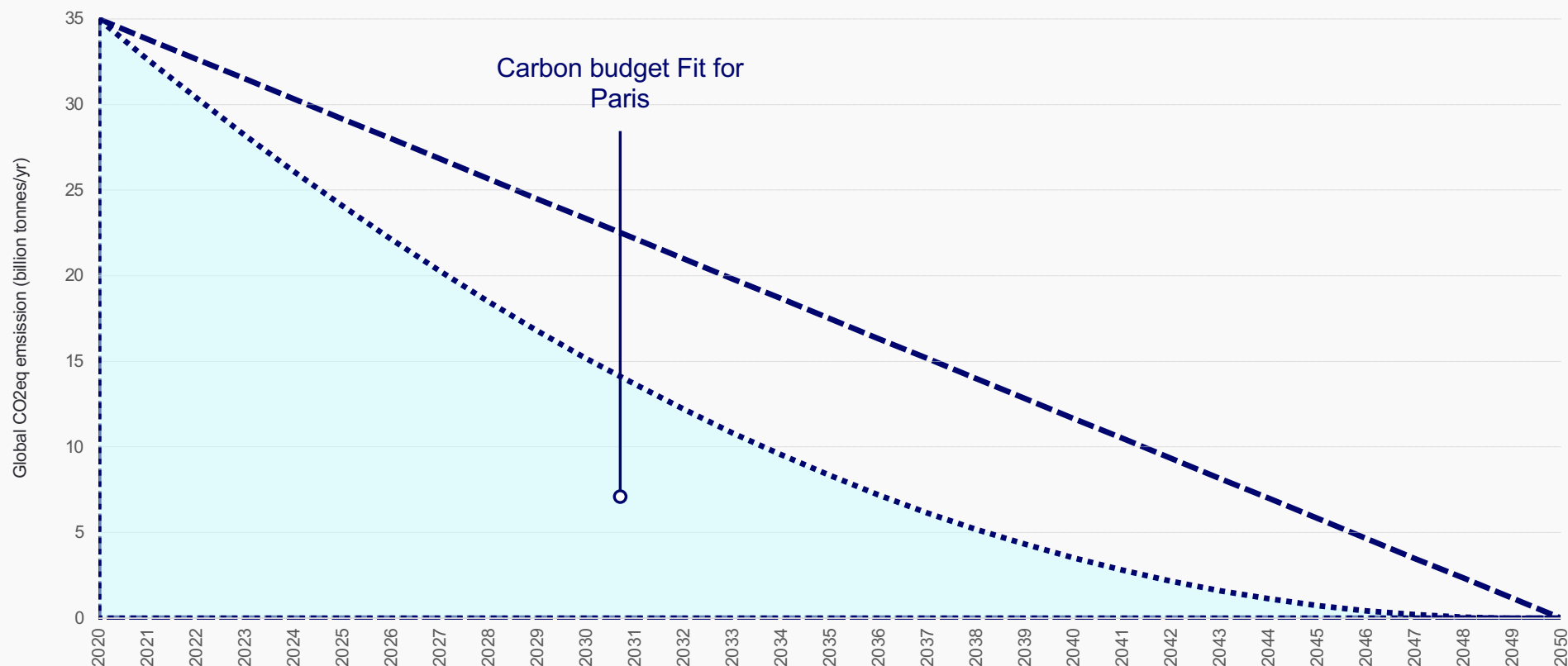


Note: Current policies and pledges and targets are projections. In each scenario, the temperature shown is the most likely of a range of possible outcomes. Pledges and targets include submitted and binding commitments for 2030 and beyond.

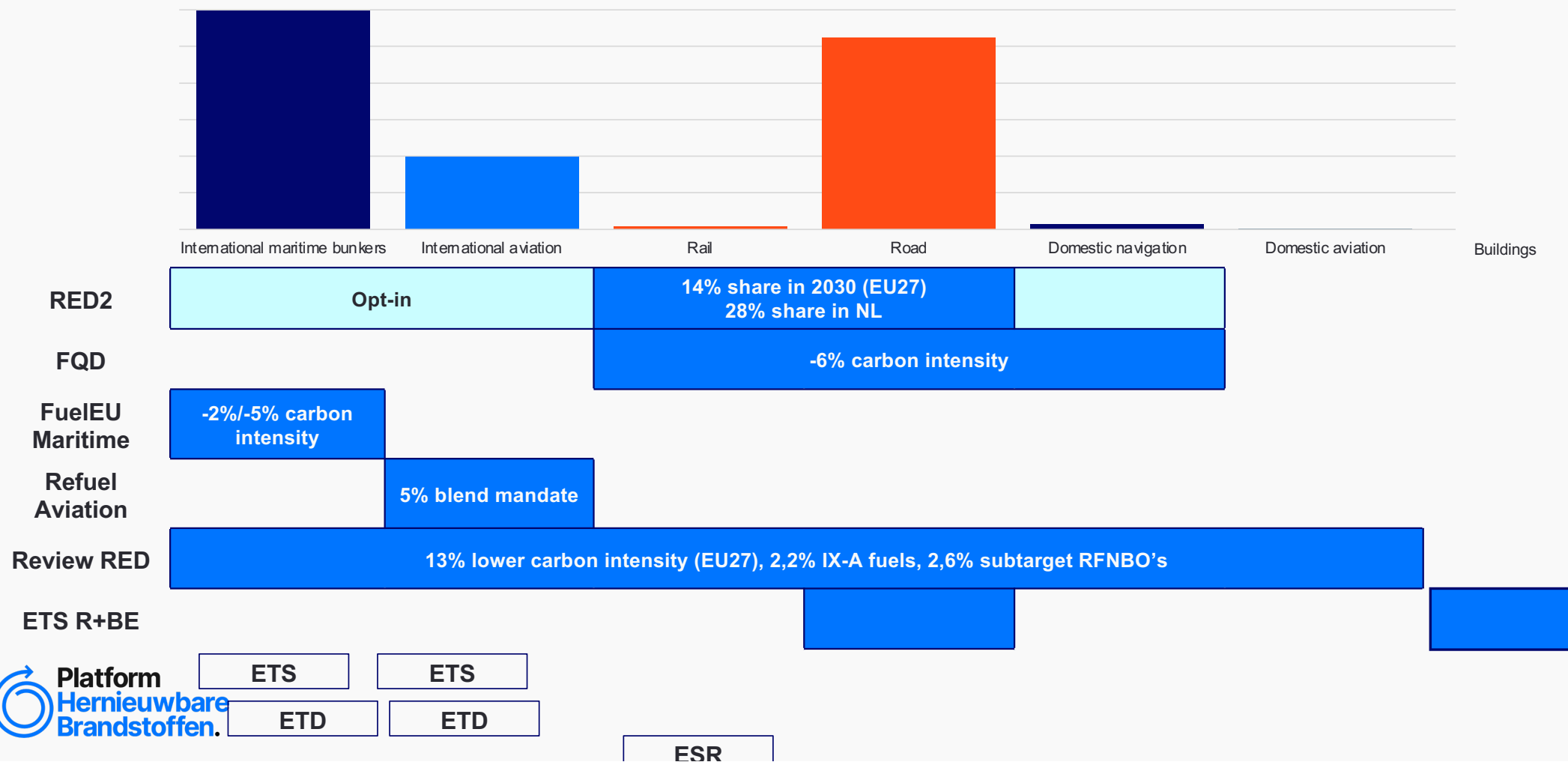
The slow rate of cutting fossil emissions in the transport sector contributes to a carbon budget overshoot: Glasgow has shown policies are not on track.



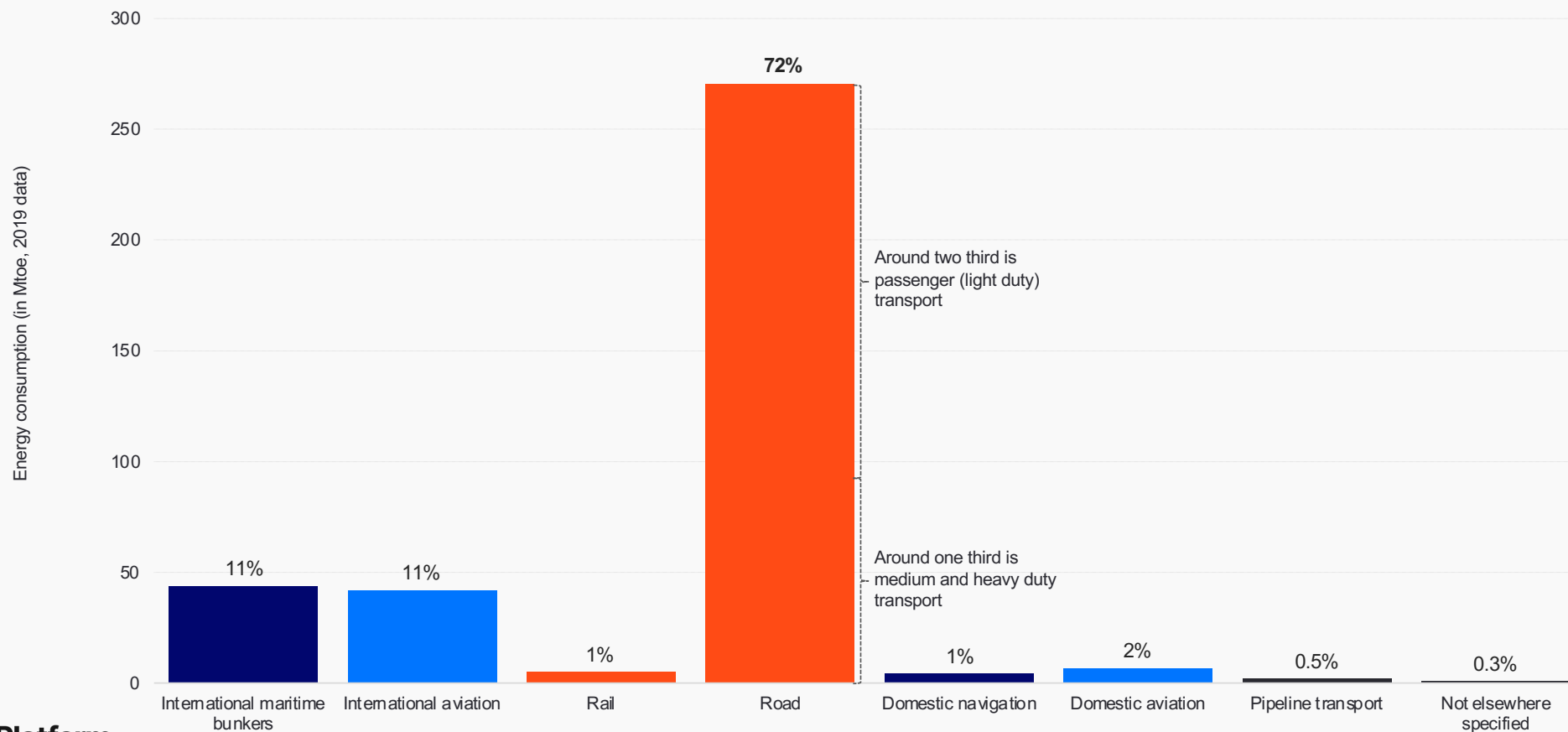
Fast decline in CO₂-emissions needed to keep track of Paris target of 1,5C



Summary Fit-for-55 for transport



Energy consumption in the EU transport sector – road dominates



Energy consumption in the Netherlands: quite different profile

