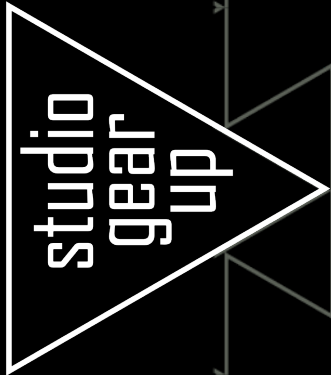


What's the future of HVO?

Presentation at the
Transport Energy Strategies
Webinar

Eric van den Heuvel

25 May 2021

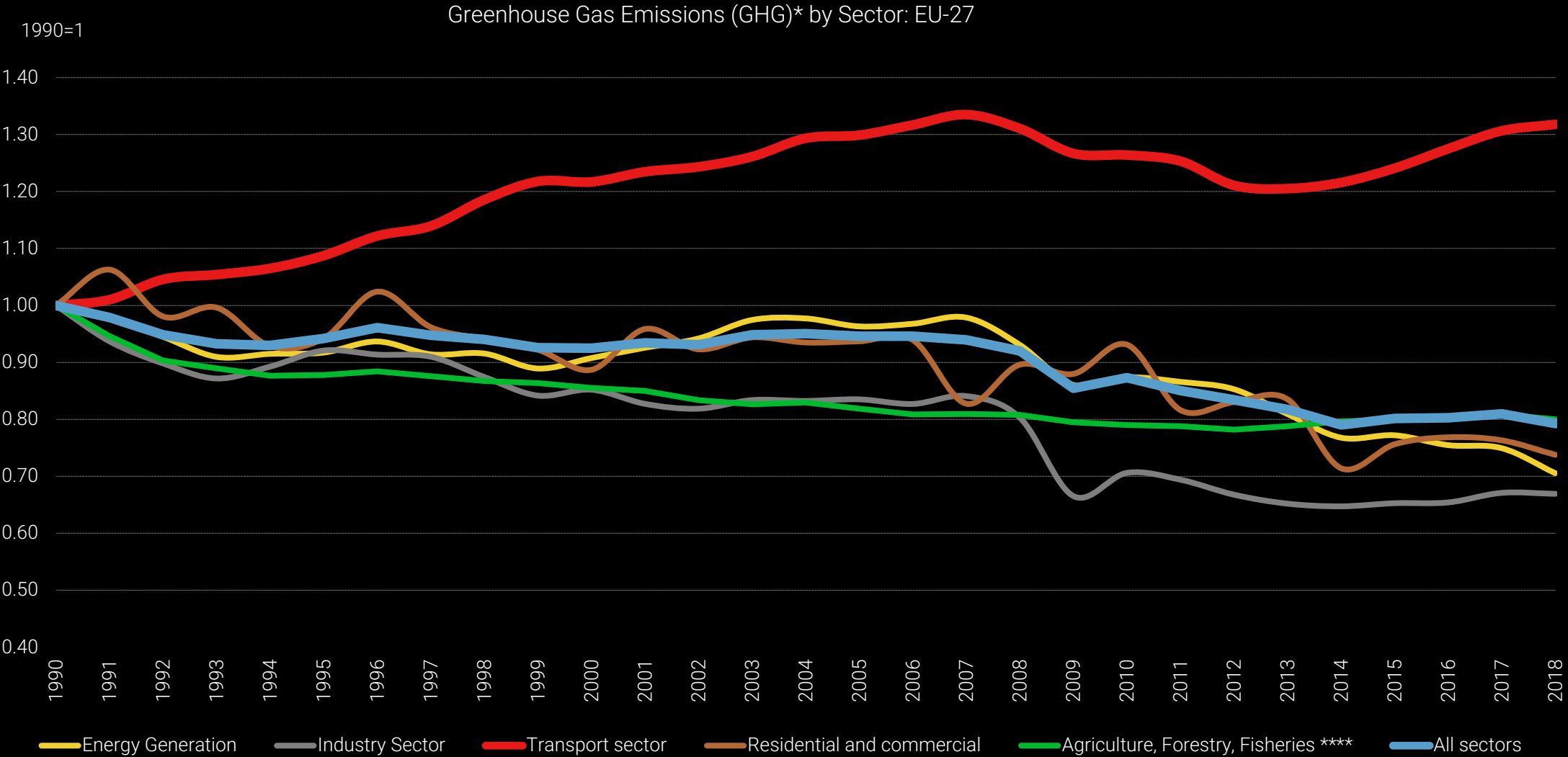


Main take-aways

- The future for renewable fuels, like HVO, is **full of opportunities**, and **challenging** at the same time
- From climate perspective point of view – companies should **prepare** already **now** for a foreseeable fossil free / climate neutral future by 2030
- **Securing** a sustainable and reliable **feedstock base** will be **essential**. This requires companies to maximise efforts for innovation and exploration to operate within **planetary boundaries**
- **All transport segments** will require renewable fuels, in particular for the replacement of fossil based diesel.
- **Current 2030 policies** and regulation plans still face a **gap** with **Paris Climate** targets

About the European Policy and Renewable Fuels market landscape

Background: to lower overall climate impact, efforts in transport key to reach EU climate targets



Source, EC, 2021, Transport in figures, Pocket book, 2020



Transport is the largest energy consumption sector

(2018, ktoe)

energy consumption of all sectors
1.061,6 Mtoe

Source: Eurostat

- Solid fossil fuels
- Manufactured gases
- Oil and petroleum products
- Natural gas
- Renewables (nearly all bio)
- Non-renewable waste
- Heat
- Electricity

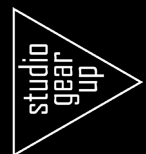
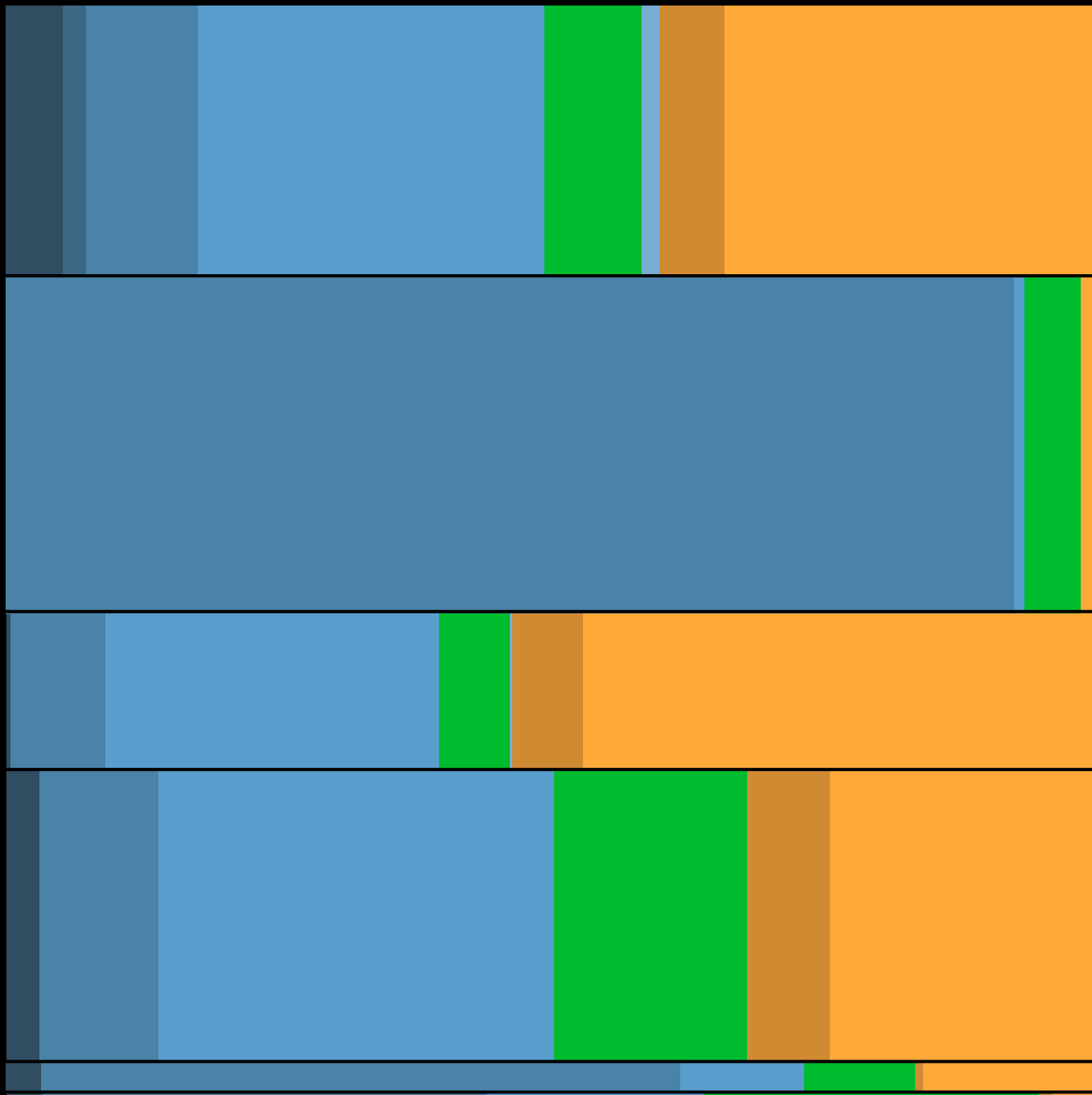
Industry

Transport

Commercial and public services

Households

Agriculture, Forestry, Fishery
Other



Share of dependency to fossil fuels of each sector

Share of renewables is higher in sectors where contribution electricity is high. Share of RE in electricity is 32%.

Transport sector may have to choose to renew the liquid fuels, next to increasing share of electricity

- Solid fossil fuels
- Manufactured gases
- Oil and petroleum products
- Natural gas
- Renewables (nearly all bio)
- Non-renewable waste
- Heat
- Electricity

Agriculture, Forestry, Fishery
Other

Transport

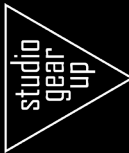
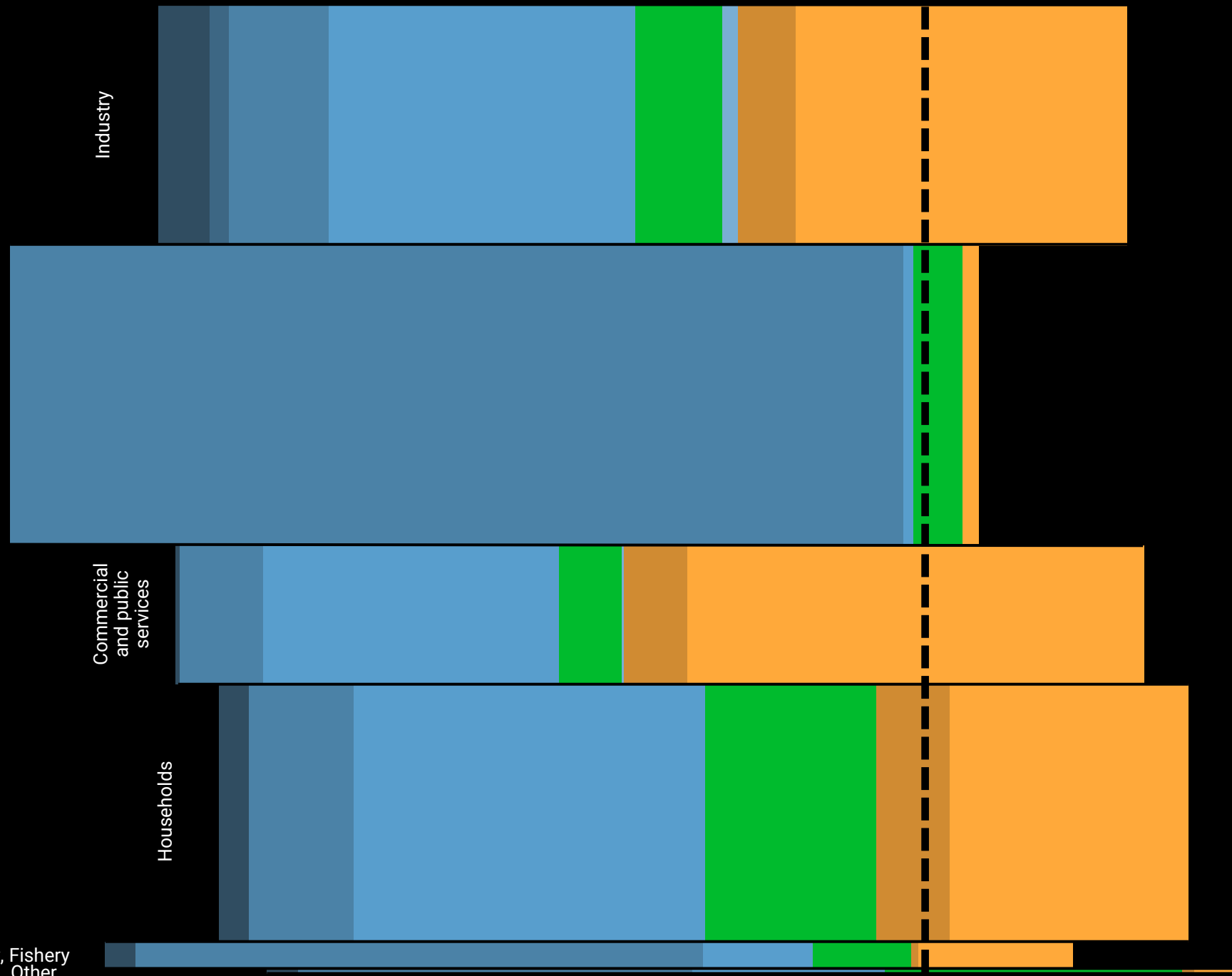
Commercial and public services

Households

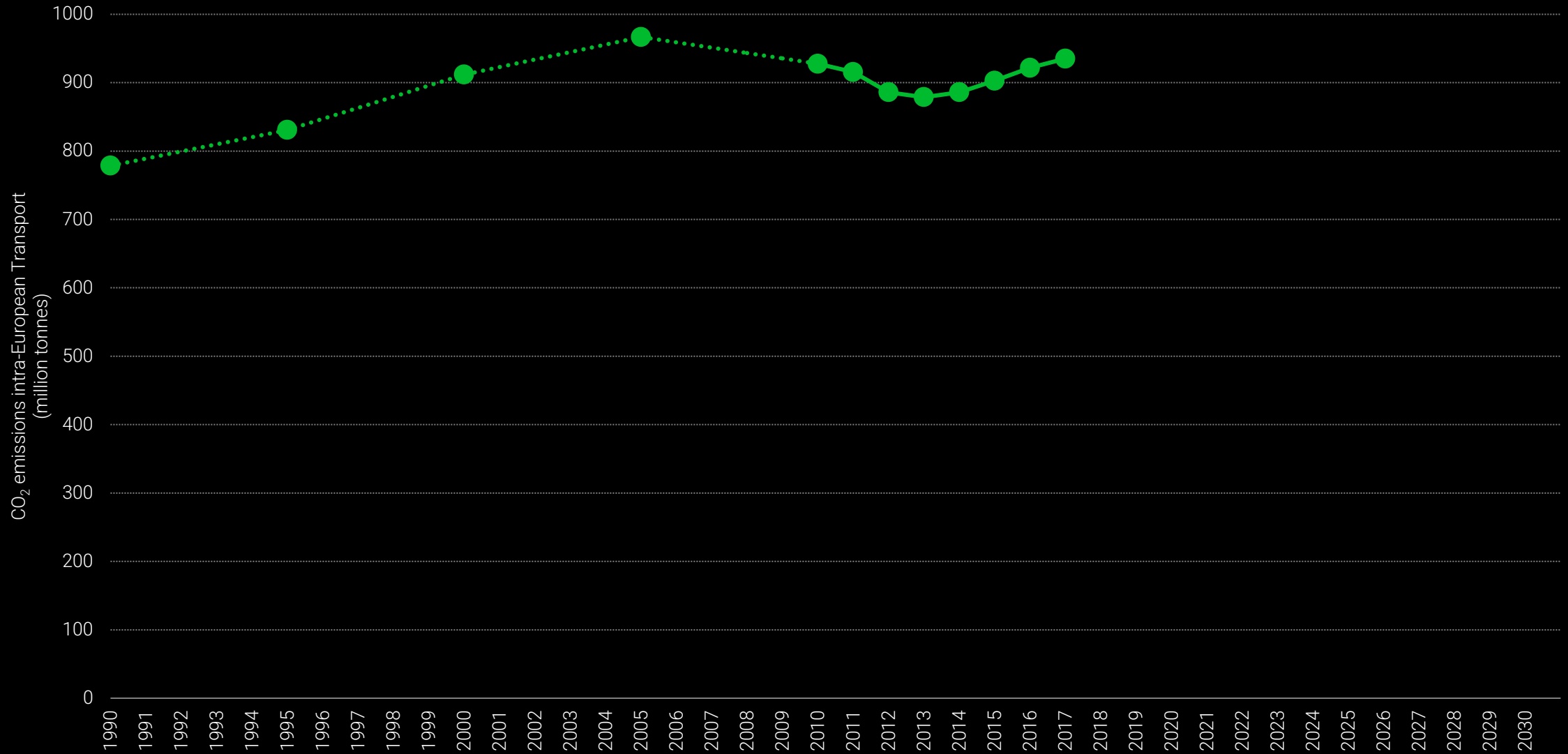
Industry

Share that the sector is still fossil fuel based

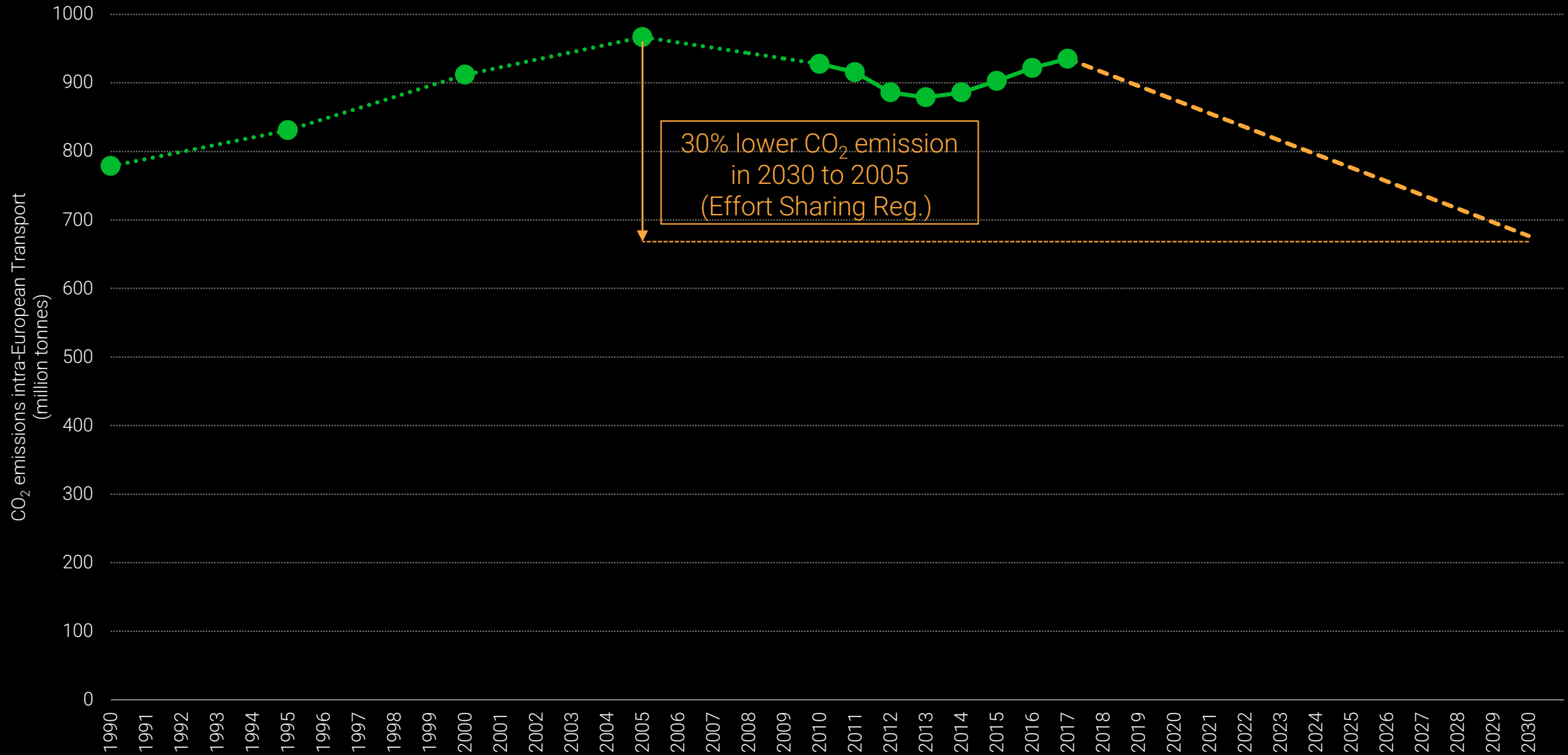
Share Renewable based



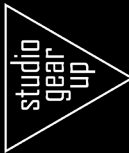
Development of CO₂ emissions in EU transport sector



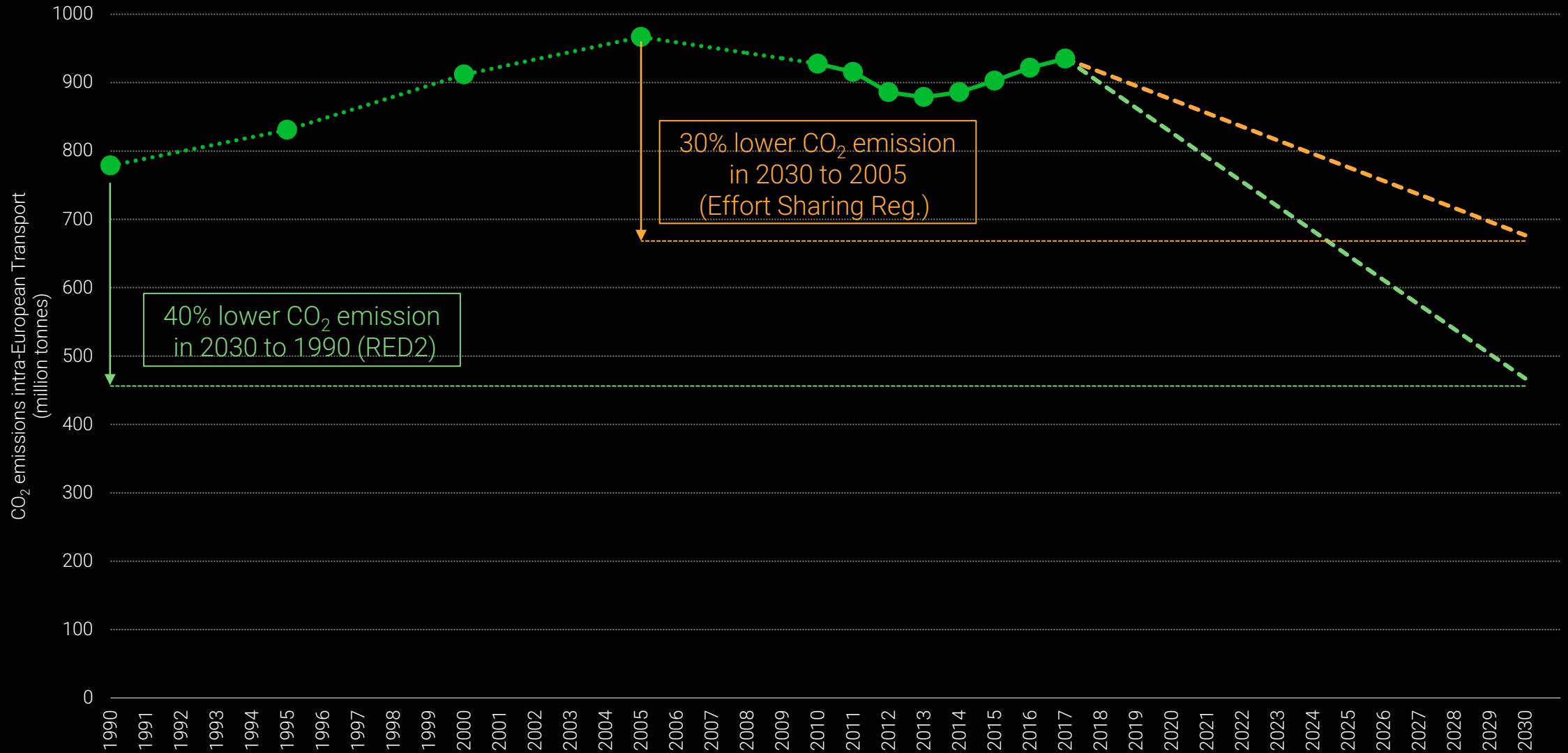
Required reduction of CO₂ emissions due to Effort Sharing Regulation (non-EU-ETS)



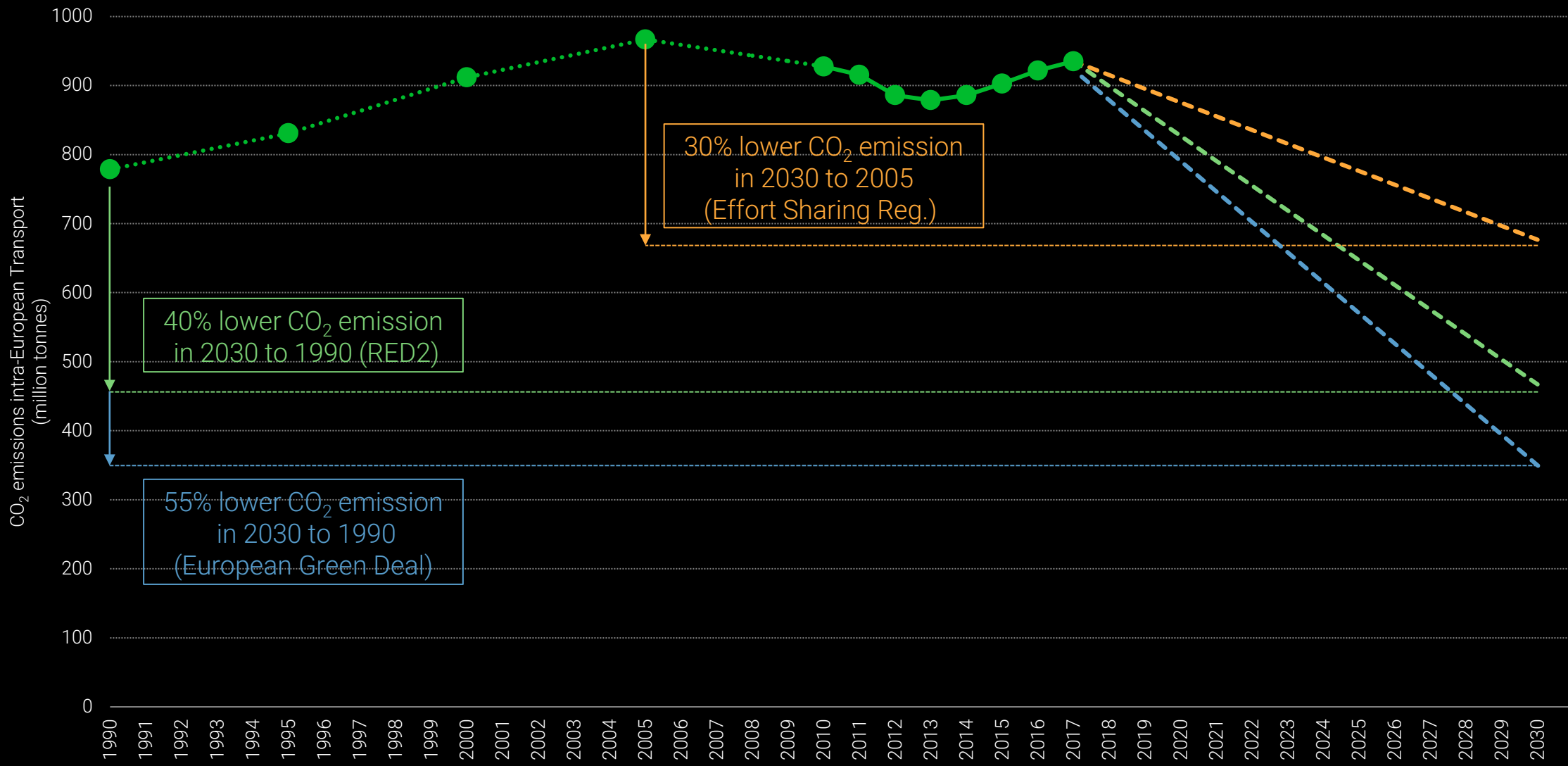
30% lower CO₂ emission
in 2030 to 2005
(Effort Sharing Reg.)



Required reduction of CO₂ emissions in EU transport sector when applying overall RED-2 target of -40%

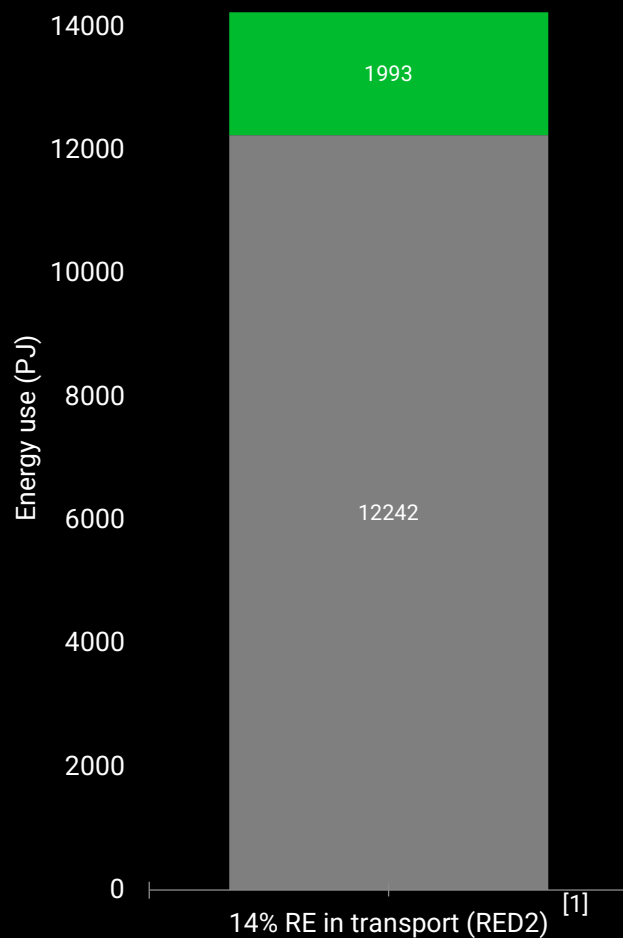


Required reduction of CO₂ emissions in EU transport sector when applying overall European Green Deal target of -55%



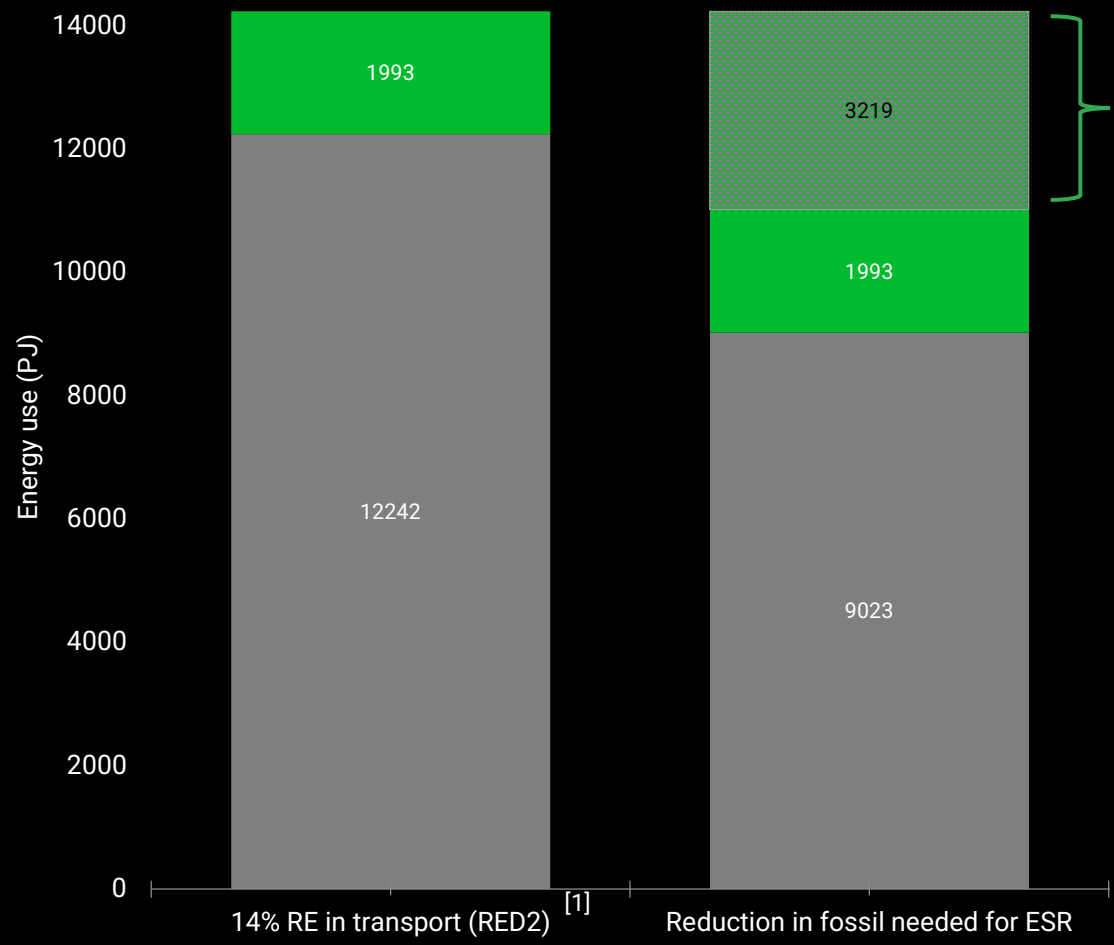
How would this work out for the energy sources used in transport in EU in 2030?

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[1] RED2-review target of 24% transport equals 14% physical volume including double counting

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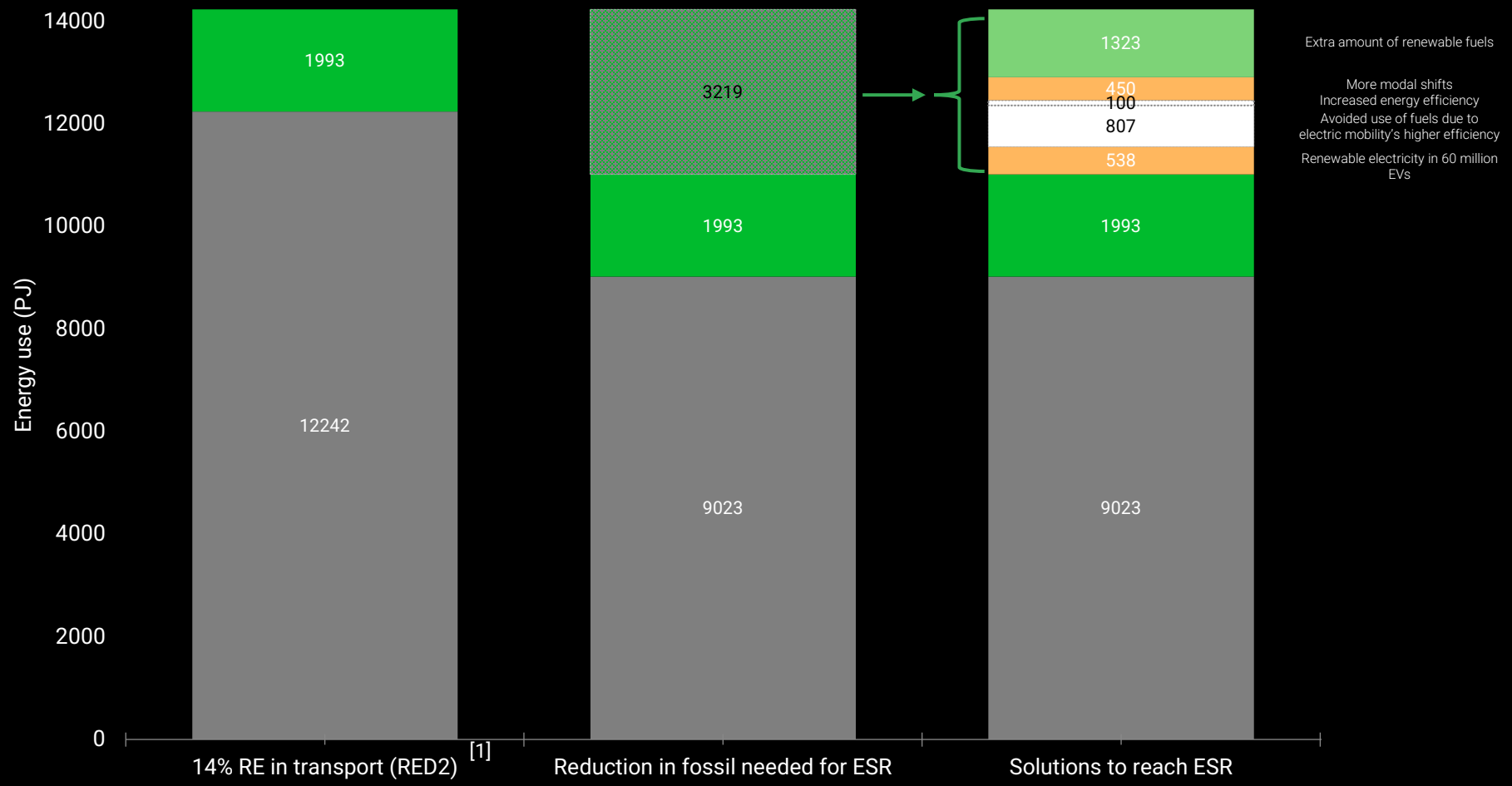


Which solutions for this volume of fossil to be replaced to reach ESR?



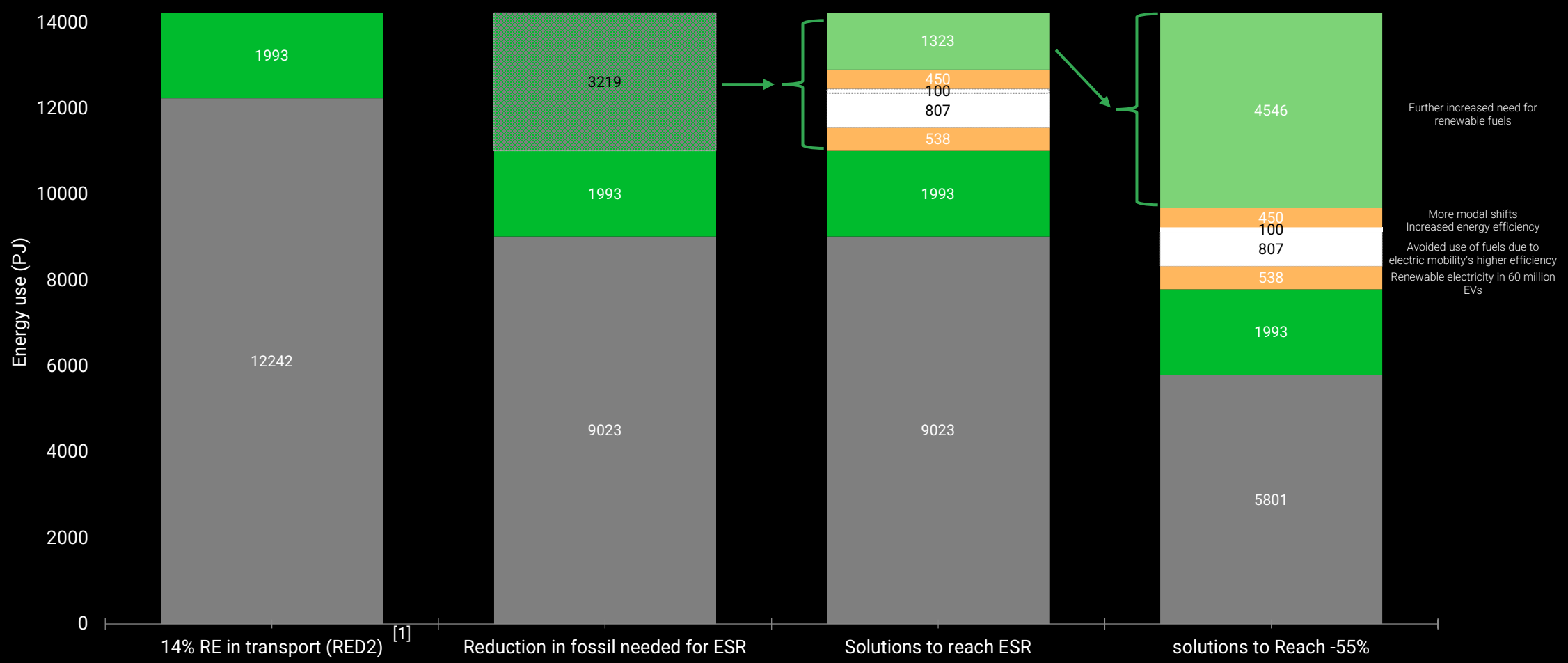
[1] RED2-review target of 24% transport equals 14% physical volume including double counting

How would this work out for the energy sources used in transport in EU in 2030?



[1] RED2-review target of 24% transport equals 14% physical volume including double counting

For the EU 'Fit for 55' targets even more renewable fuels would be needed



[1] RED2-review target of 24% transport equals 14% physical volume including double counting

Source: studio Gear Up, 2020, CO₂ emission reductions in the transport sector in the EU28, with extra column for -55% target

The contribution of renewable fuels is evident

Overview of existing and planned HVO production facilities in Europe

Company	Status	City	Country	Start-up year	Installed capacity (Tons/year)*
Neste	operational	Kilpilahti, Porvoo	Finlande	2007 and 2019	380 000
Neste	operational	Rotterdam	Netherlands	2011	1 000 000
CEPSA	operationnal, co processing HVO	Huelva Algeciras-San Roque, Tennerife	Spain	2011	n.a.
REPSOL	operationnal, co processing HVO	La Coruña, Tarragona, Bilbao and Cartagena	Spain	2013	n.a.
ENI	operationnal	Porto Marghera, Venice	Italy	2014 (ext 2021)	253 500 (ext 420 000)**
UPM Lappeenranta ***	operational	Lappeenranta	Finlande	2015	100 000
Preem	operationnal, co processing HVO	Gothenburg	Sweden	2015 (ext 2023)	170 000 (ext 1 000 000)
Galp	operationnal, co processing HVO	Sine	Portugal	2017	40 000
ENI	operationnal	Gela	Italy	2019	600 000
TOTAL	operationnal	La Mède	France	2019	500 000
ST1	Planned	Gothenburg	Sweden	2022-2023	200 000
REPSOL Valle de Escombreras	Planned	Cartagena	Spain	2023	250 000
SCA Östrand***	Planned	Östrand	Sweden	2024	280 000
UPM Kotka***	Planned	Kotka	Finland	2024	500 000

* Estimation, EurObserv'ER research. For certain capacity data expressed in liters, EurObserv'ER used an equivalence ratio of 1 ton HVO = 1,282 liters HVO.
 ** Processing capacity of 360,000 tonnes increased to 600,000 tonnes in 2021. *** Large-scale plants for hydrotreatment of up-graded lignocellulosic materials.
 Source: EurObserv'ER 2020

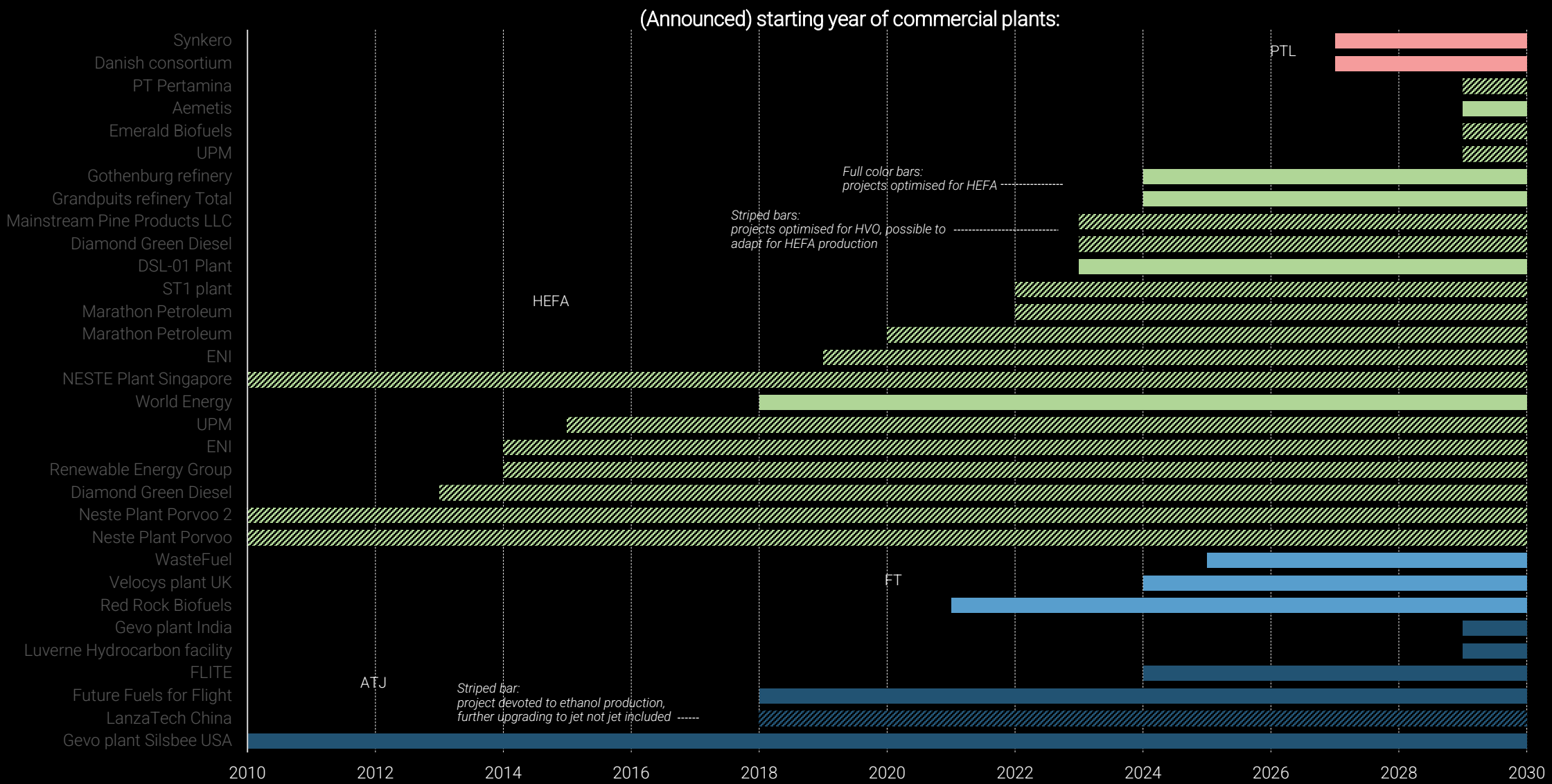
- Total production capacity when all in list in operation:

at least 5.2 million tonnes/year

New announcements:

- Neste decided for location Rotterdam of new plant of 1 million tonnes (with flexibility to produce up to 500 thousand tons SAF)
- UPM is still deciding about location Kotka or Rotterdam

Worldwide many announcements on HVO plants, for link with co-production jet fuel



Source: studio Gear Up project review, based on publicly available sources and information



EU policy on renewable energy in transport – RED2 and info on review

	RED2: 14%			RED2 review (Fit for 55): 26%
Food and feed crop based biofuels	Limited to: max 7%, of share 2020 + 1%pt (whichever is lowest) 14% target can be adjusted accordingly			
Advanced biofuels (Annex IX-A)	2022	2025	2030	At least 5,5% (incl. double counting)
	At least 0,2% (incl. double counting)	At least 1% (incl. double counting)	At least 3,5% (incl. double counting)	
Biofuels from used cooking oil and animals fats (Annex IX-B)	Limited to max 1,7% (3,4% with double counting)			
Biofuels from feedstocks with high ILUC-risk	Delegated Regulation COM (2019) 2055 of March 2019: Palm oil earmarked as feedstock with high ILUC risk Impact: max. share: level 2019. Phase out in 2030 from 2023 onwards, except when certified as low iLUC risk biofuel			

EU policy on renewable energy in transport – RED2 and info on review

	RED2: 14%	RED2 review (Fit for 55)
Renewable Fuels of Non-Biological Origin	No max or min mentioned Abbreviation: RFNBOs Delegated Act under development	At least 4%
Recycled Carbon Fuels	Member States can include this category of fuels Abbreviation: RCFs	
Renewable electricity	Supply to Road and Rail multipliers apply	
	ReFuelEU Aviation	FuelEU Maritime
Policy focus	Blending mandate in preparation: Increasing share of SAF to 5% in 2030, 20% in 2035 reaching 62% in 2050 sub-target for RFNBO's: 0,7% in 2030	Expected: Focus on lower carbon intensity of fuels used in ships

About feedstocks in EU-RED – challenges ahead:

Annex IX

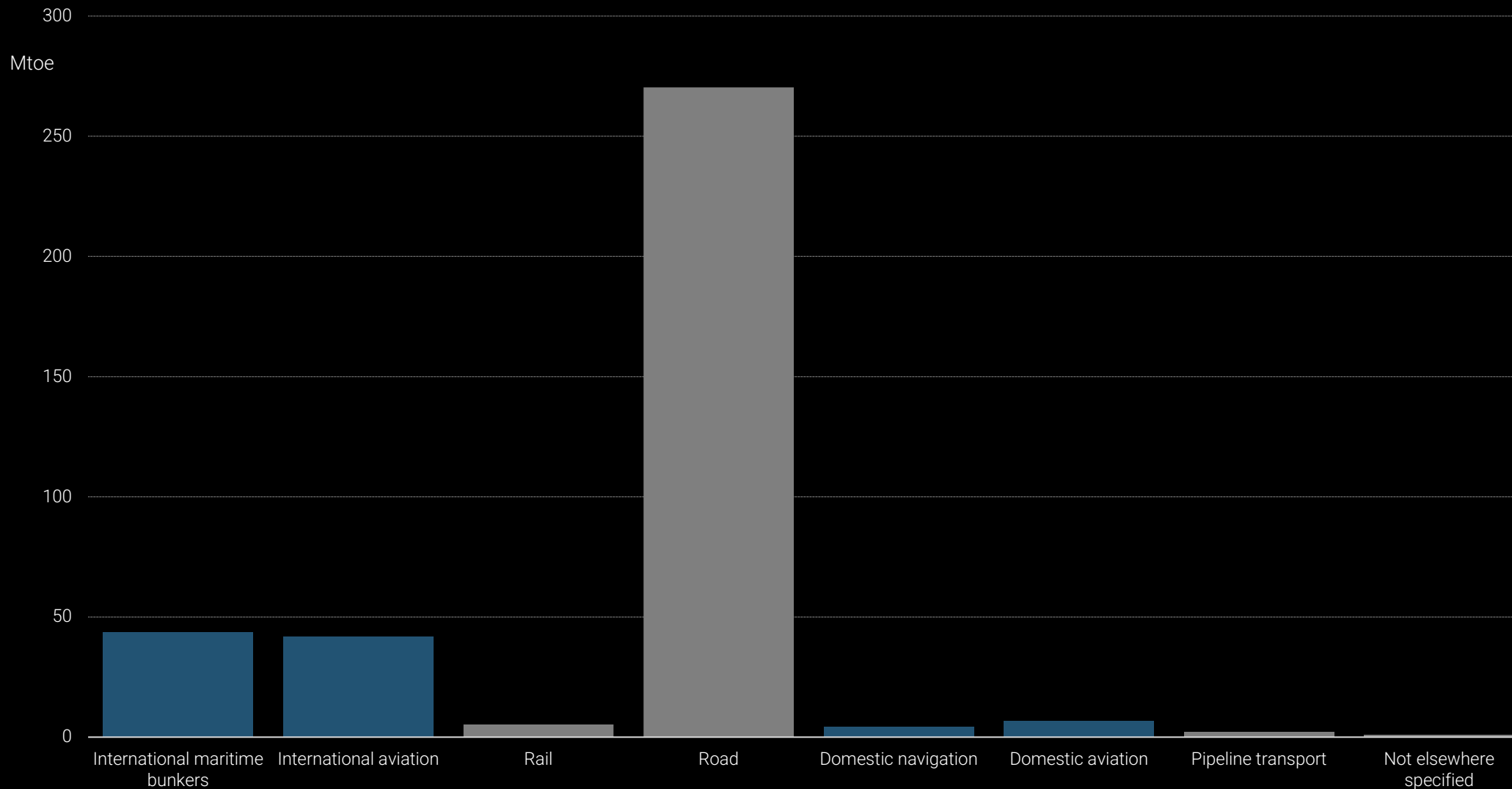
Part A (“Advanced”) targets: at least 0,2% in 2022, 1% in 2025 and 3,5% in 2030

- Algae if cultivated on land in ponds or photobioreactors
- Biomass fraction of mixed municipal waste but not separated household waste subject to recycling targets
- Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection
- Biomass fraction of industrial waste not fit for use in the food/feed chain, including material from retail/wholesale and the agro-food and fish and aquaculture industry, excluding feedstocks listed in part B.
- Straw
- Animal manure and sewage sludge
- Palm oil mill effluent and empty palm fruit bunches
- Tall oil pitch
- Crude glycerin
- Bagasse
- Grape marcs and wine lees
- Nut shells
- Husks
- Cobs cleaned of kernels of corn
- Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fiber sludge, lignin and tall oil
- Other non-food cellulosic material
- Other ligno-cellulosic material [...] except saw logs and veneer logs

Part B (not considered as “advanced”) capped to 1,7 % but exemption possible

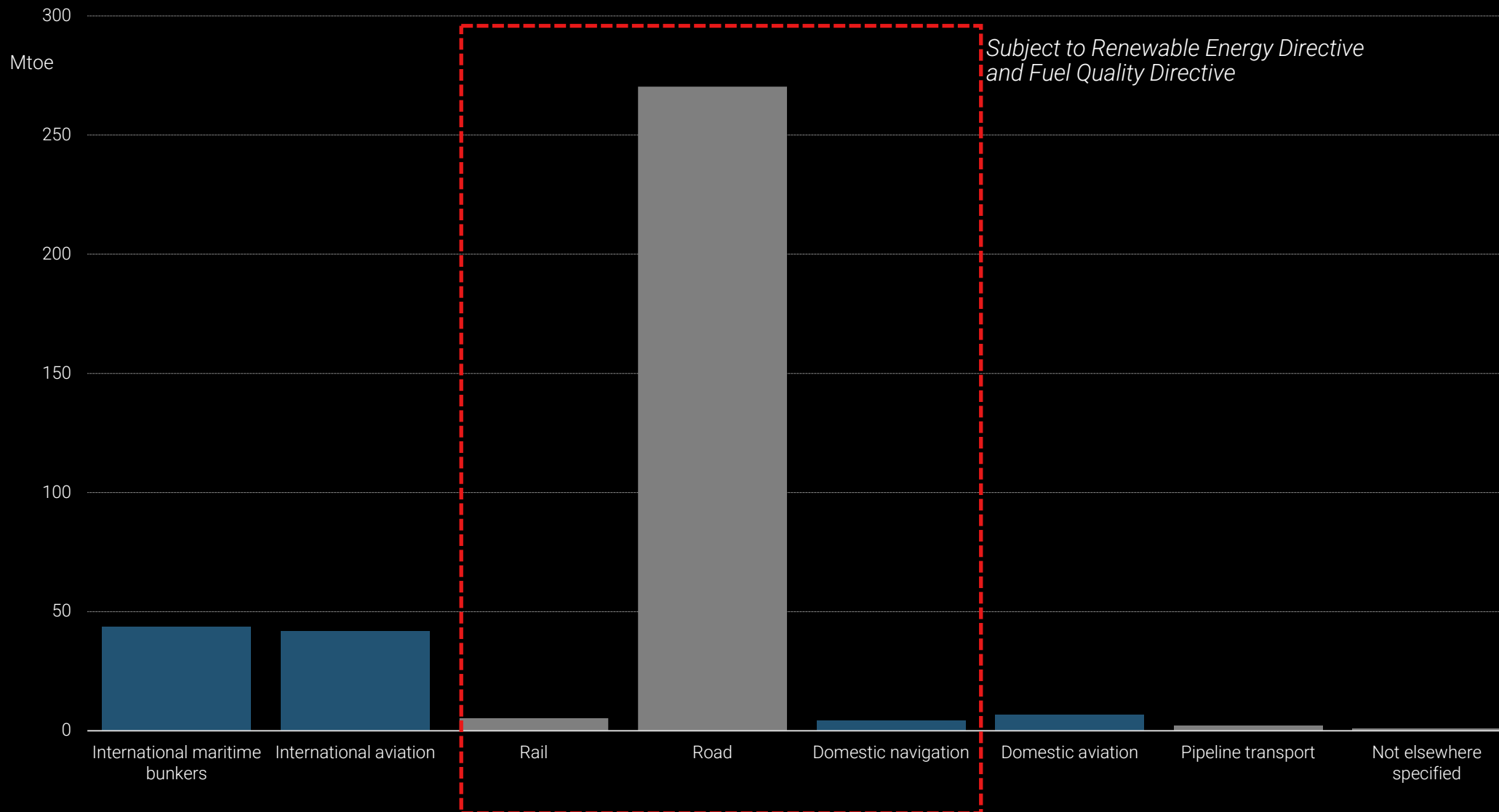
- Used Cooking Oil (UCO)
- Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009

Share of aviation and maritime energy consumption is relative small in total transport energy consumption (EU27, 2019)



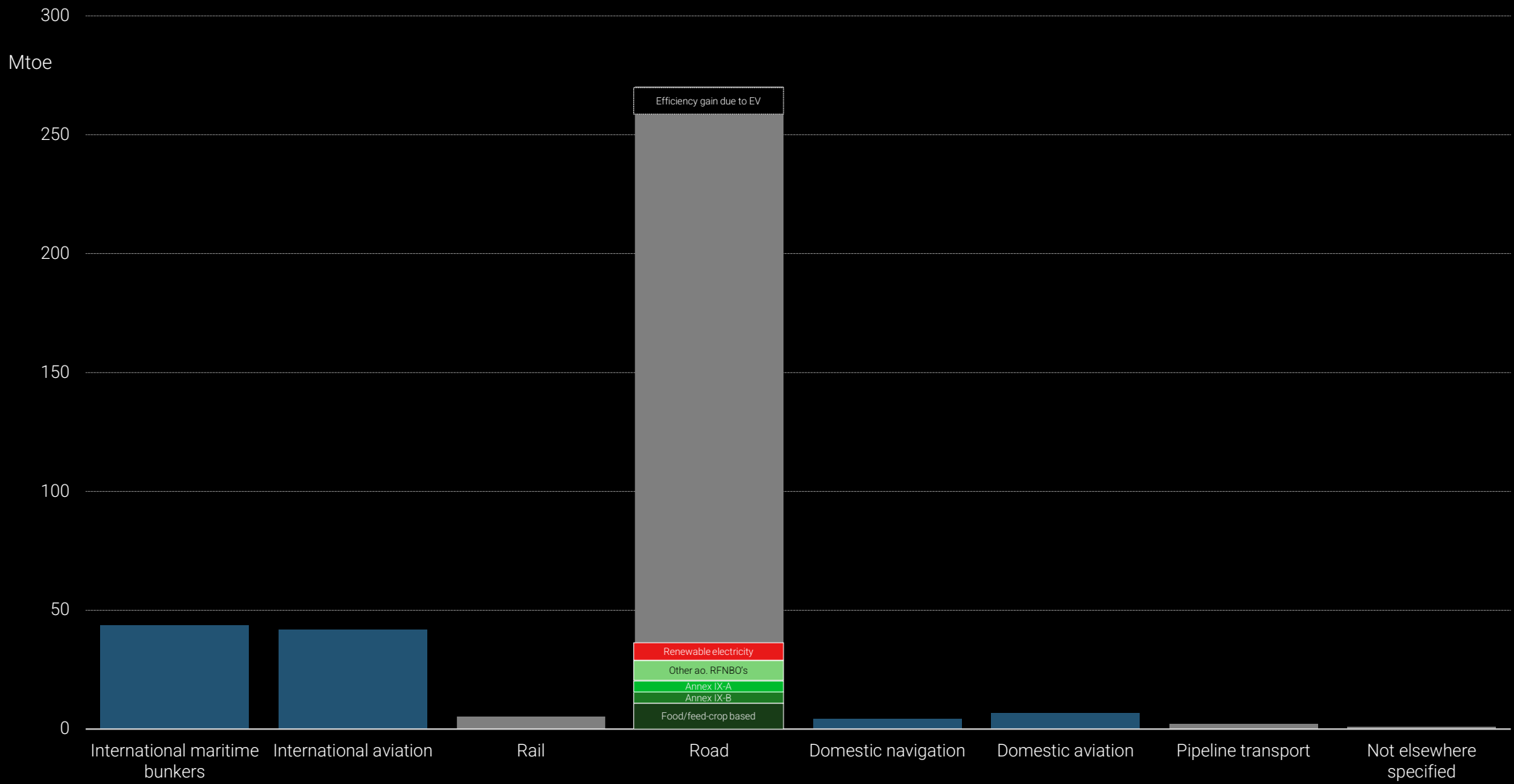
Based on Eurostat data, complete energy balances [NRG_BAL_C]

Only inland consumption is regulated by policy, yet .. (though REFuelEU Aviation is upcoming)



Based on Eurostat data, complete energy balances [NRG_BAL_C],
RED, 2018

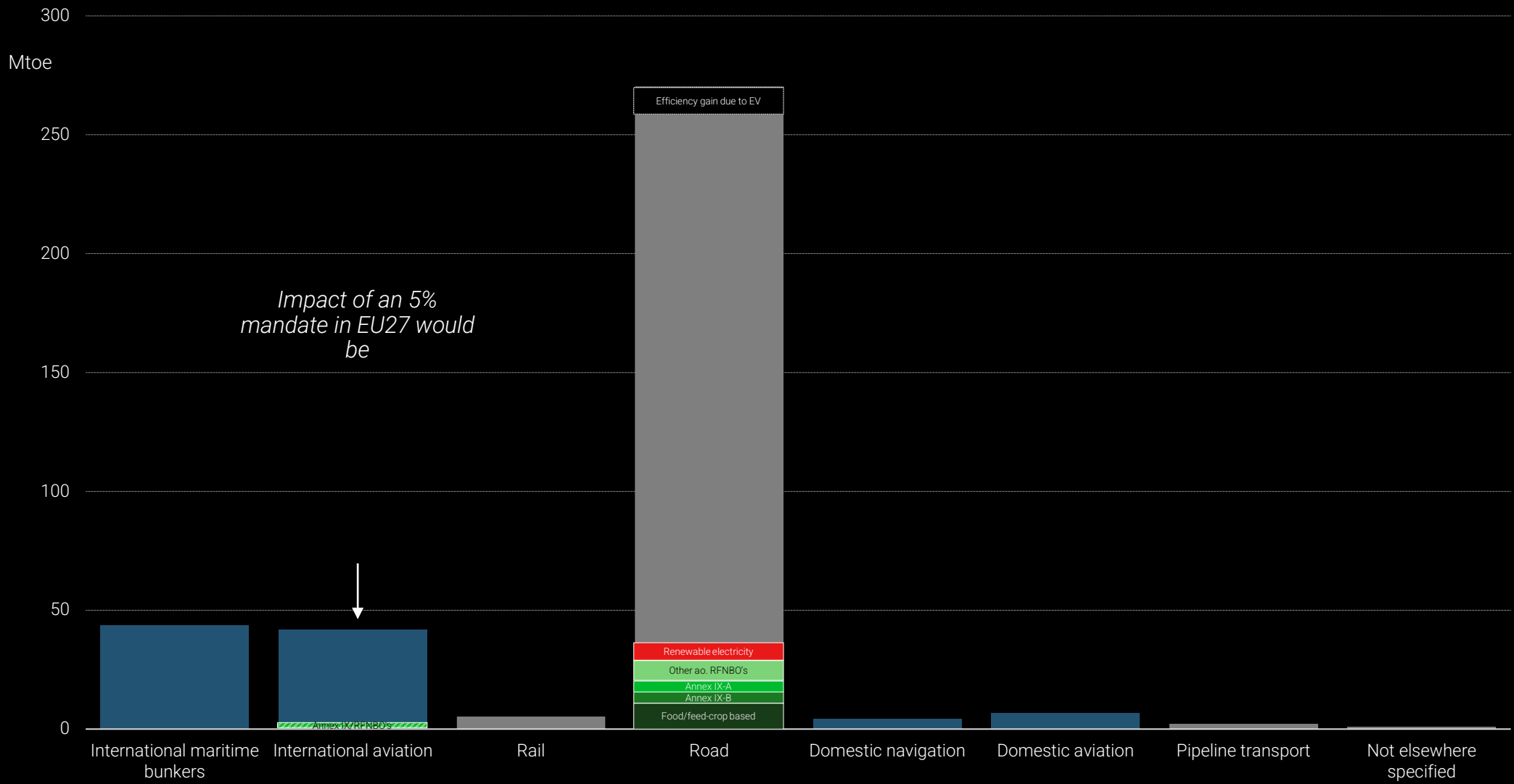
'Rumoured' 24-26% share renewable energy in transport in RED, how would that look like?



Based on Eurostat data, complete energy balances [NRG_BAL_C], RED, 2018



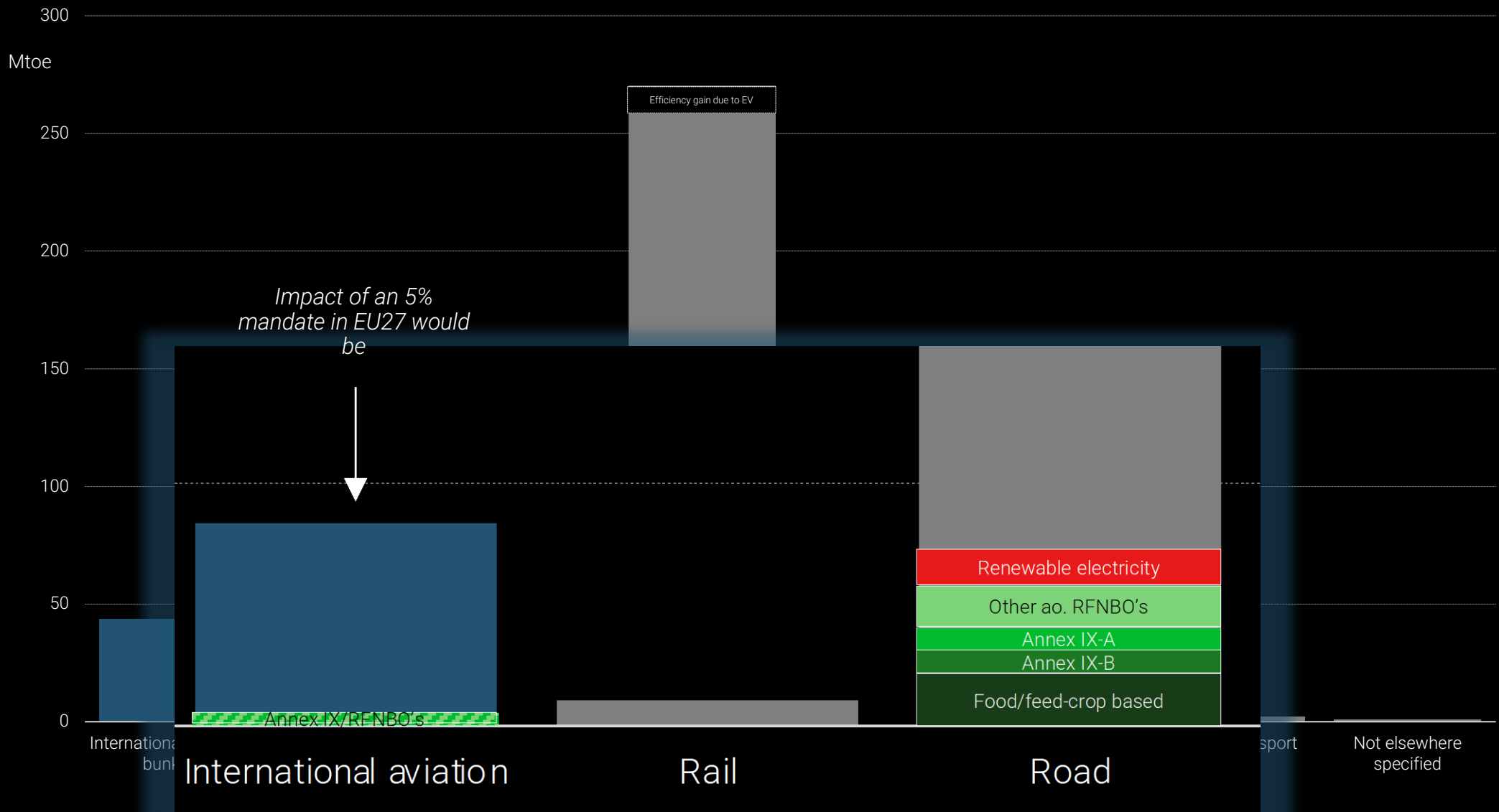
Mandate for aviation sector small volume compared to RED-road volumes



Based on Eurostat data, complete energy balances [NRG_BAL_C], RED, 2018



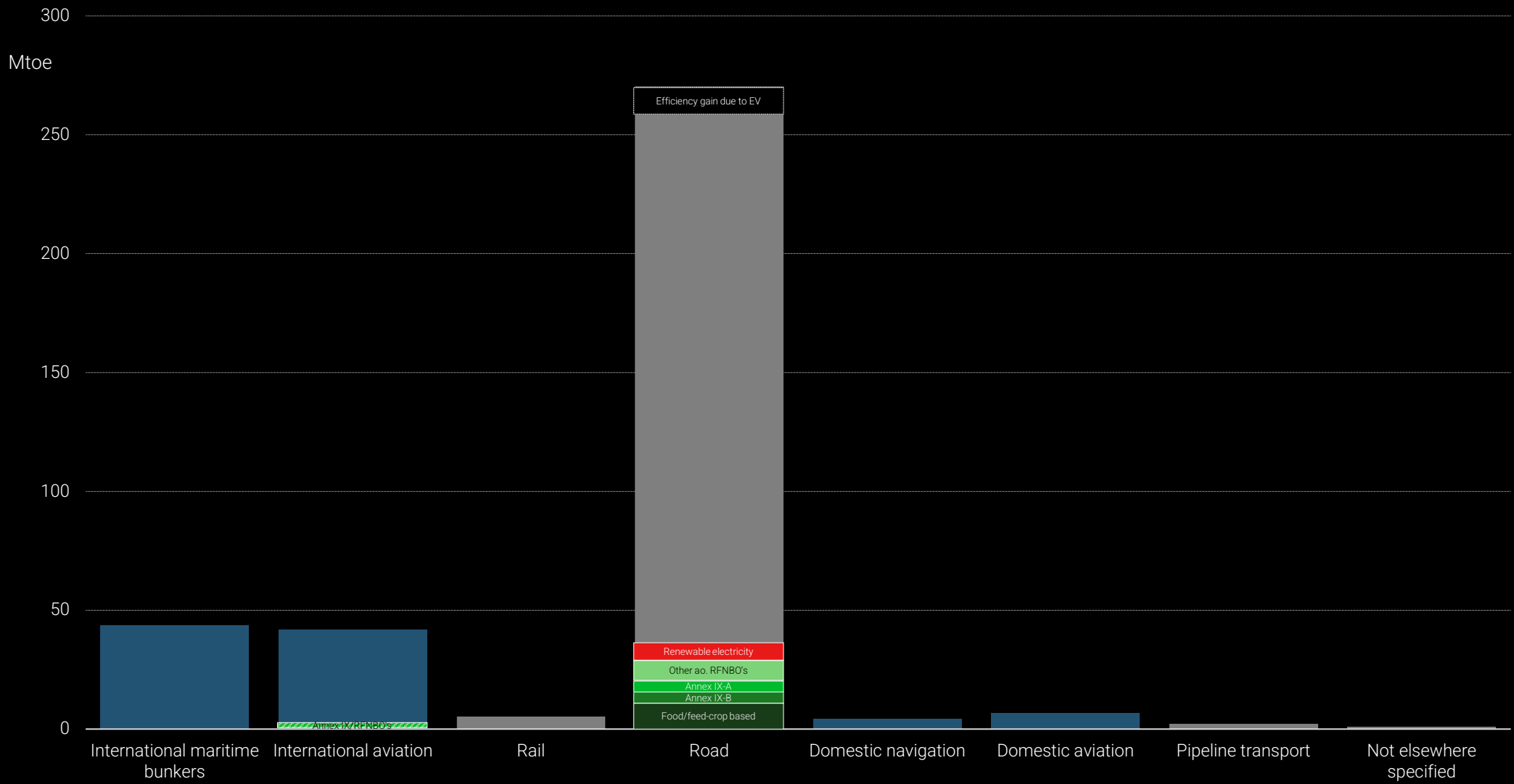
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Based on Eurostat data, complete energy balances [NRG_BAL_C], RED, 2018

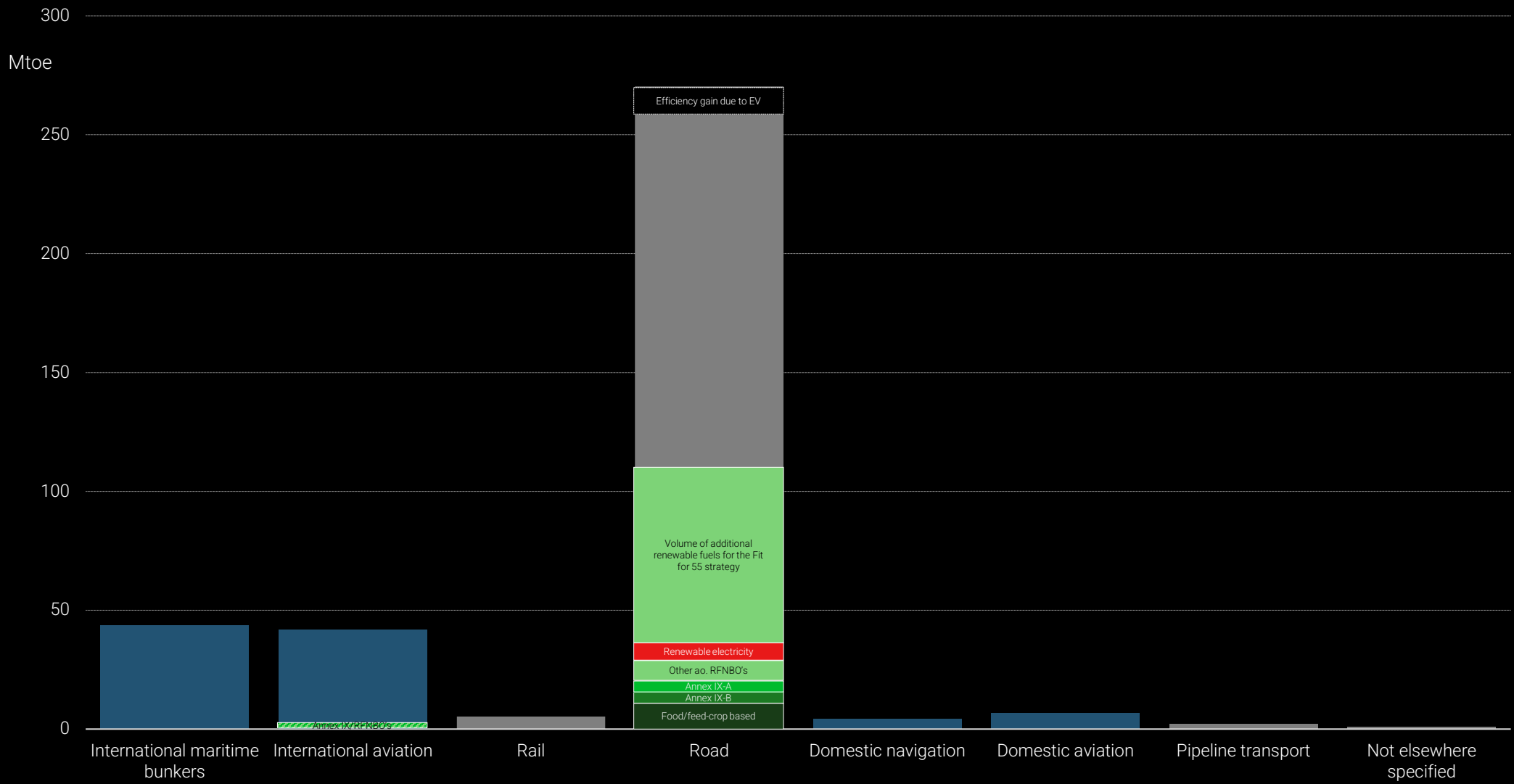


Mandate for aviation sector small volume compared to RED-road volumes



Based on Eurostat data, complete energy balances [NRG_BAL_C], RED, 2018

Fit for 55 would require far more volumes of renewable fuels



Based on Eurostat data, complete energy balances [NRG_BAL_C], RED, 2018

Main take-aways

- So, the future for renewable fuels, like HVO, is **full of opportunities**, based on the necessary volumes, but **challenging** at the same time, considering the feedstock base limitations
- **Securing** a sustainable and reliable **feedstock base** will be **essential**. This requires companies to maximise efforts for innovation and exploration to operate within **planetary boundaries**
- **All transport segments** will require renewable fuels, in particular for the replacement of fossil based diesel.
- Current 2030 policies and regulation plans still face a **gap** with Paris Climate targets
- From climate perspective point of view – companies should **prepare** already **now** for a foreseeable fossil free / climate neutral future by 2030

Questions?

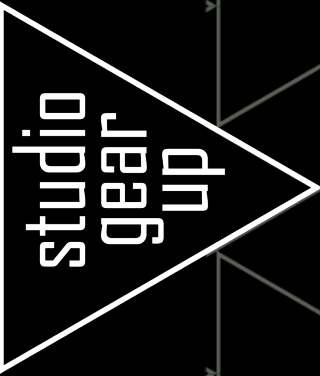
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