

# Trends in transport that facilitate or hinder decarbonisation

Thomas Earl  
25 November 2019



@transenv

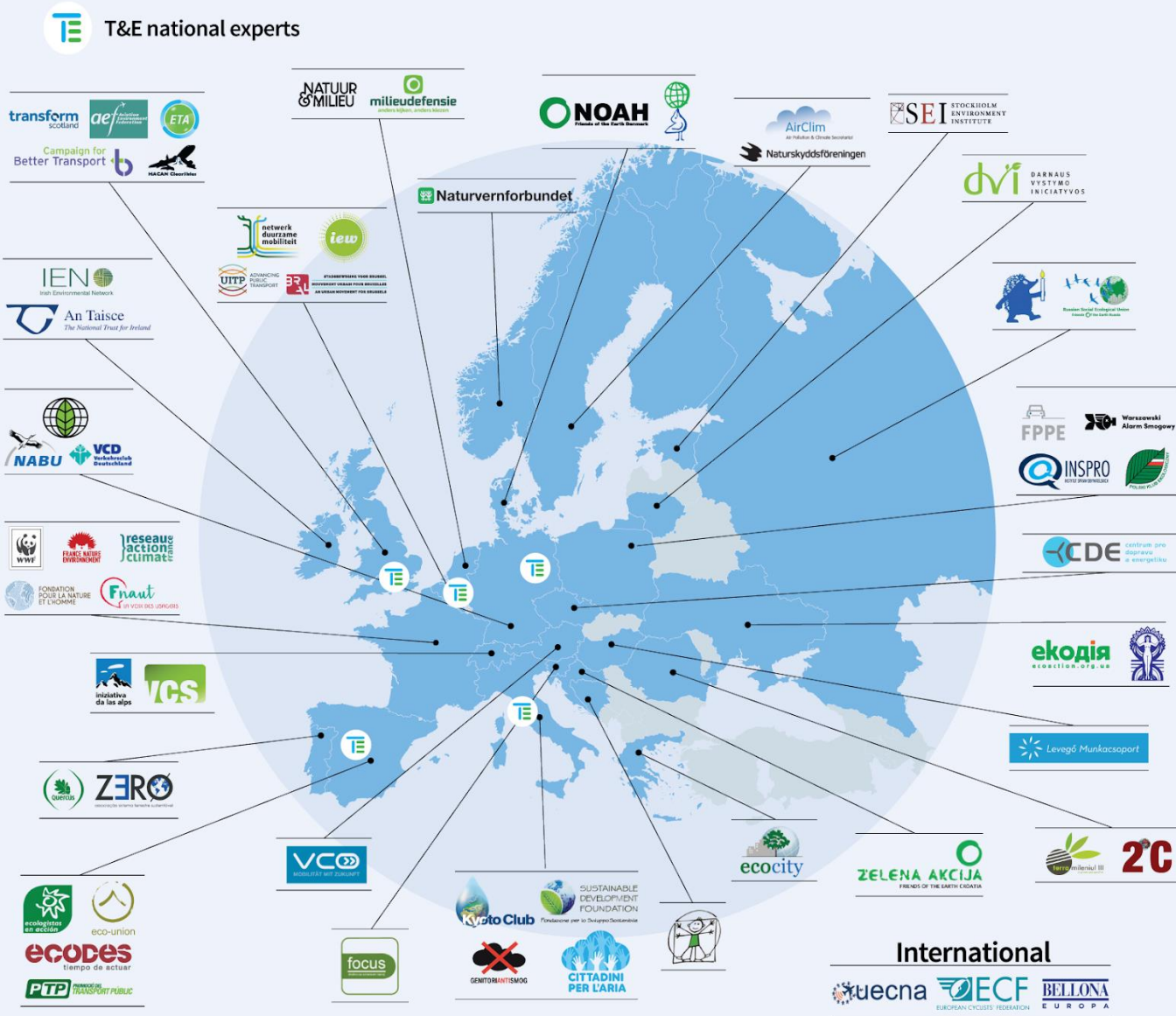


@transenv

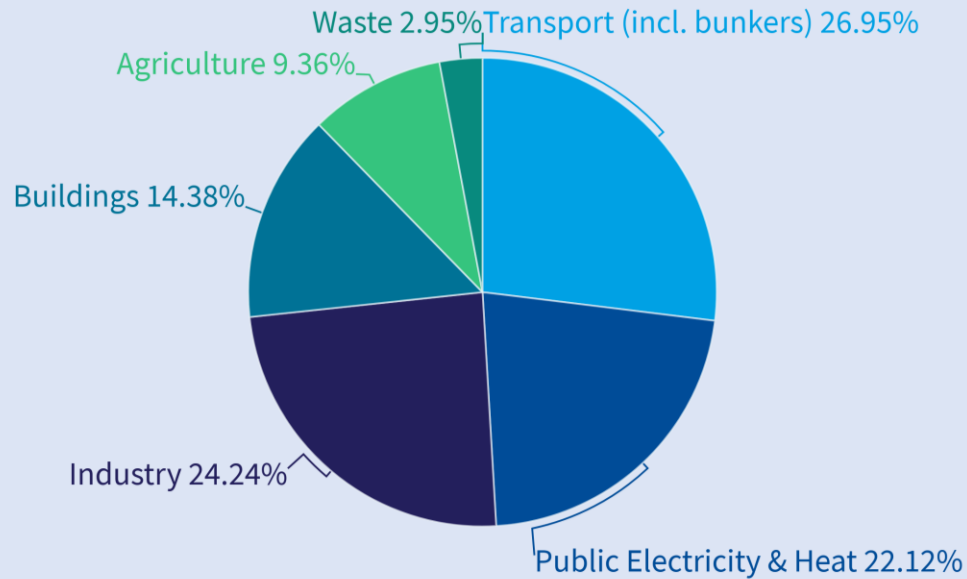


transportenvironment.org

# 60 members, 25 countries

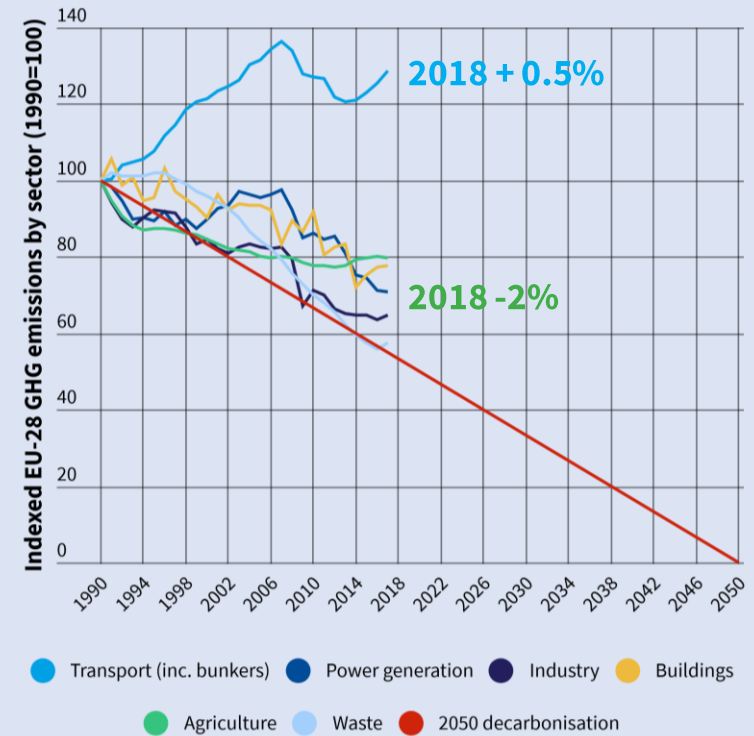


# GHG emissions in the EU



**Source:** Adapted by T&E from EEA, [Approximated EU greenhouse gas inventory 2017](#)

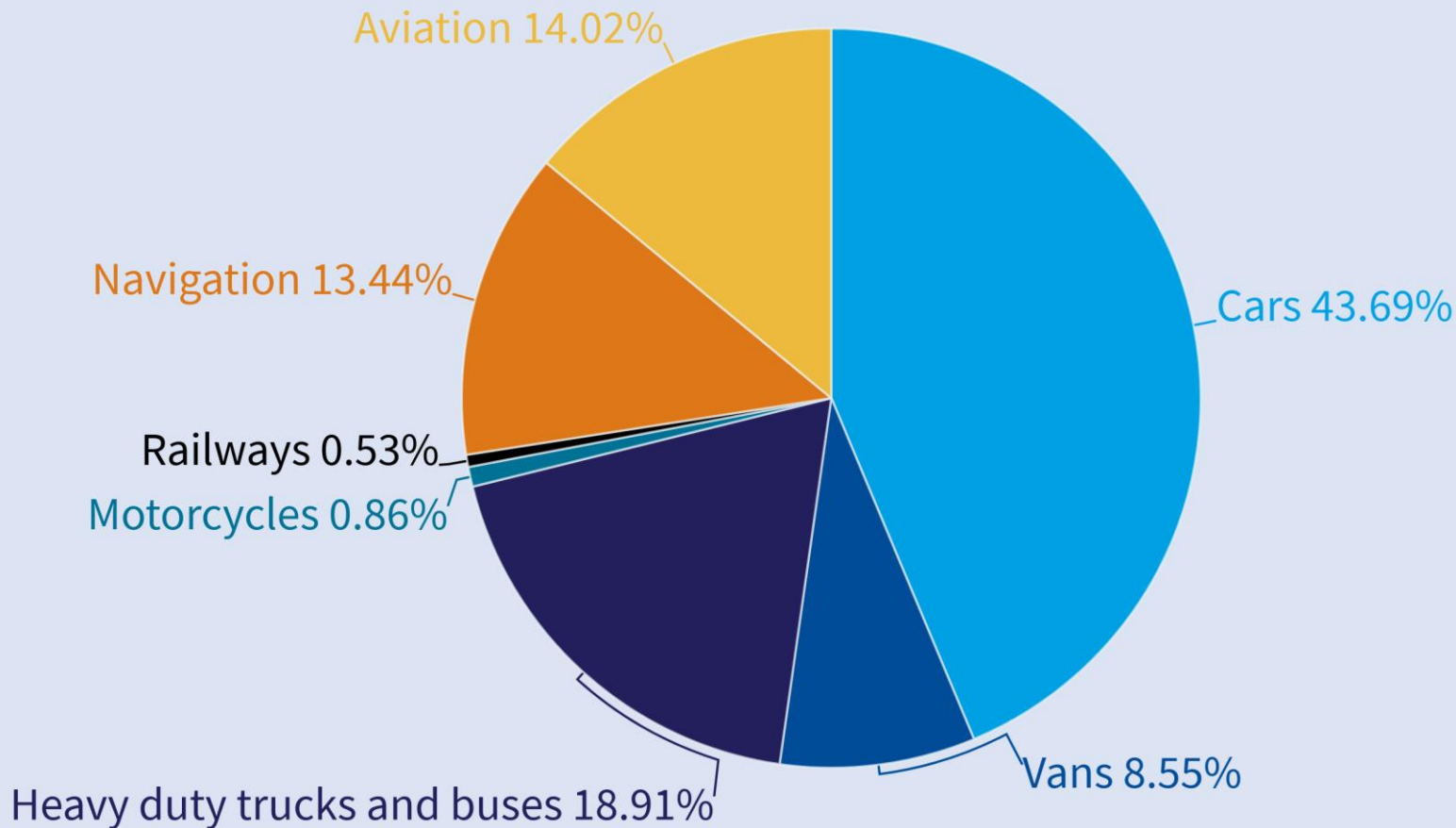
**Notes:** Sectors by IPCC codes: Public Electricity & Heat (1.A.1.a); Industry (1.A.1.b-c, 1.A.2, 1.B, 2); Transport incl. bunkers (1.A.3, 1.D.1), Buildings (1.A.4, 1.A.5), Agriculture (3), and Waste (5). Subsector splits for 1.A.1 use 2016 emission shares as a proxy.



● Transport (inc. bunkers) ● Power generation ● Industry ● Buildings  
● Agriculture ● Waste ● 2050 decarbonisation

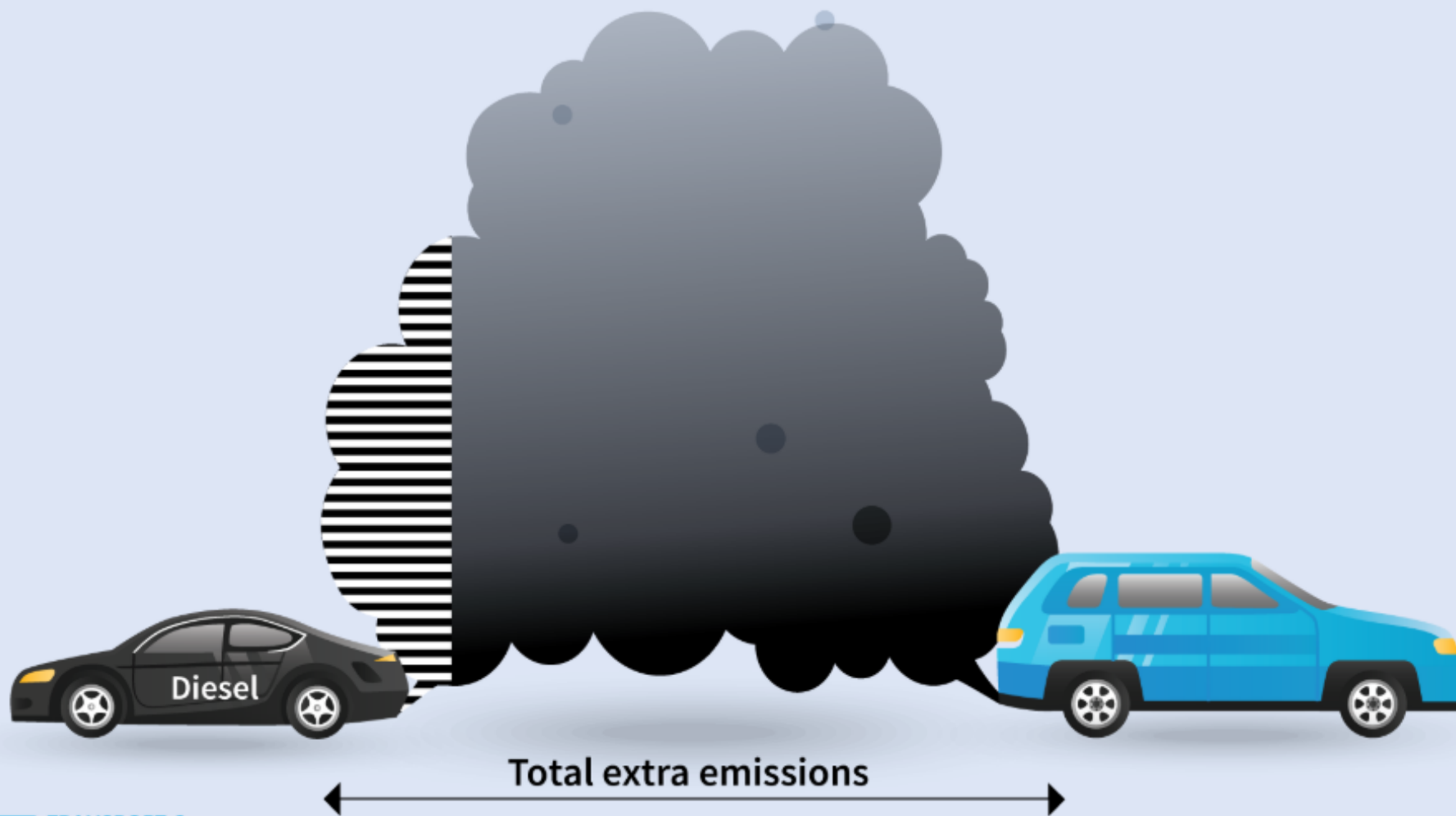
**Source:** Transport & Environment from Member States' reporting to the UNFCCC (1990-2016 data) and EEA's approximated EU greenhouse gas inventory (2017 data)

# Emissions of transport modes in the EU



# Higher SUV sales (not diesel decline) is to blame for the surge in CO<sub>2</sub> emissions from new cars

Since 2013 SUV sales surge has resulted in 2.6g/km CO<sub>2</sub> increase, 10 times more than the emissions attributed to diesel decline (0.25g/km)





# Are electric vehicles really so climate friendly?

**EVs produce more CO<sub>2</sub> than say diesel - it's just they emit via the power plant not the exhaust pipe**



▲ A parking sign for electric vehicles in Grüheide, Germany. Photograph: Hannibal Hanschke/Reuters







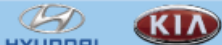








# EU palm oil consumption by end use



# EU CO<sub>2</sub> Standards drive EV market

- 2021 target can and must be achieved
- EV sales needed depend on company strategy
- 2025 target (15% ZEVs) within reach
- Last ICE sold at latest 2035

How many electric cars carmakers need to sell in 2021 to avoid fines  
% of total vehicle sales

Carmaker	EV shares needed to meet 2021 EU CO <sub>2</sub> targets		
	Scenario 1 More combustion engine improvement	Scenario 2 1 + lower CO <sub>2</sub> variants	Scenario 3 1 + 2 + stop sales of highest emitters
 TOYOTA MAZDA	<b>Business as usual scenario is enough with 1%</b>		
 PSA	8%	3%	2%
 GROUPE RENAULT	10%	5%	3%
 Ford	13%	5%	3%
 FCA	13%	8%	5%
 VW	13%	8%	5%
 HYUNDAI KIA	13%	7%	5%
 <b>EU average</b>	<b>12%</b>	<b>7%</b>	<b>5%</b>
 HONDA	16%	12%	11%
 NISSAN	16%	9%	6%
 BMW GROUP	16%	11%	8%
 DAIMLER	18%	12%	10%
 JAGUAR LAND ROVER	19%	13%	10%
 MITSUBISHI	24%	18%	16%
 VOLVO	23%	19%	16%




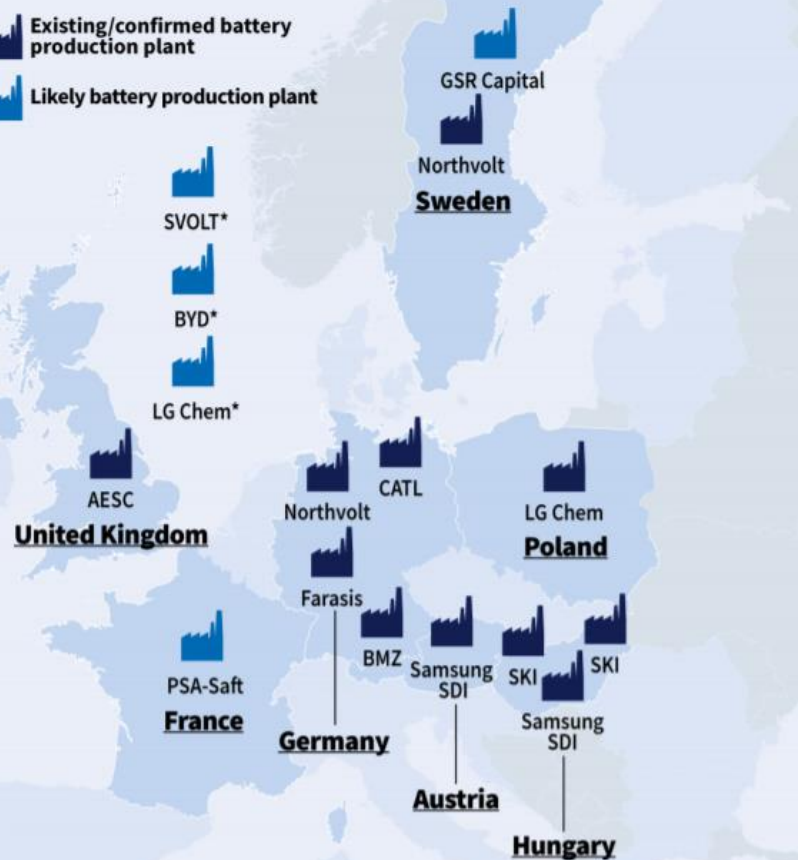


# Batteries

**131 GWh of batteries ready to be produced in Europe from 2023**

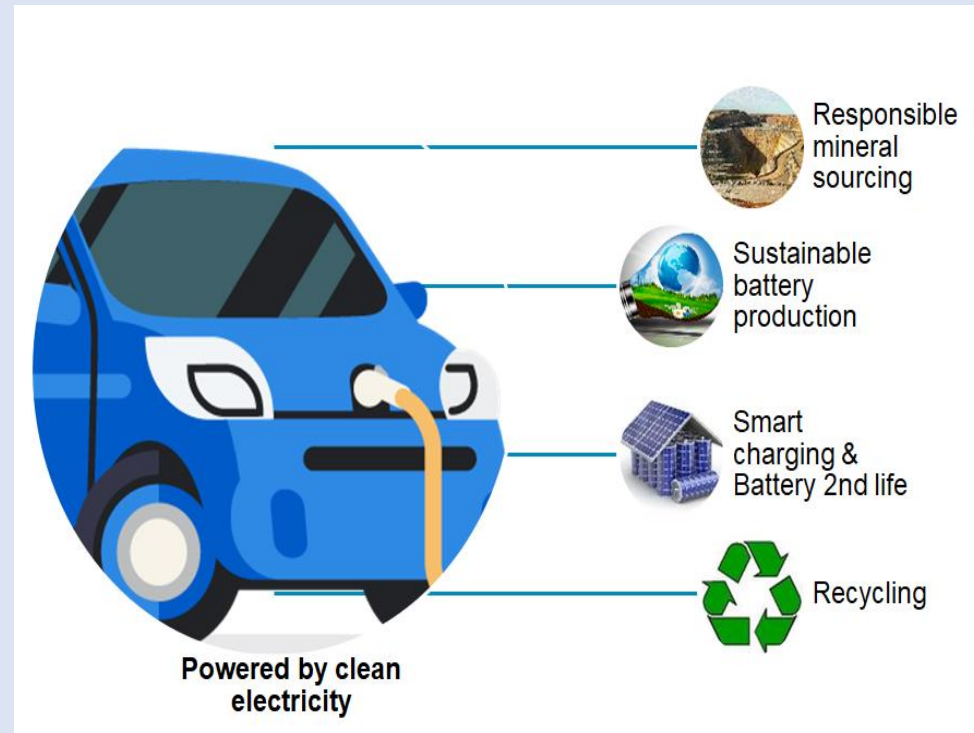
 Existing/confirmed battery production plant

 Likely battery production plant



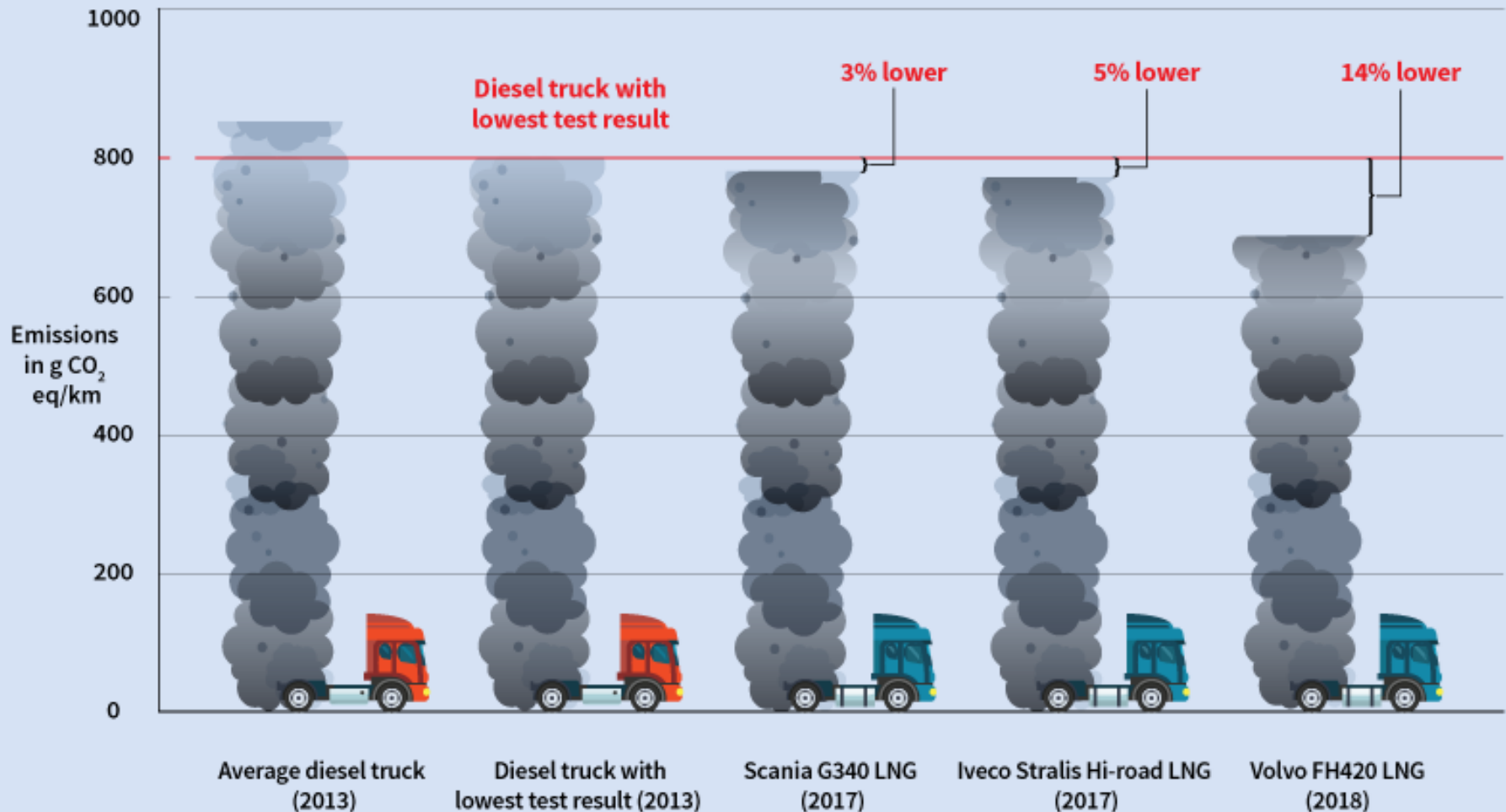
\*location to be decided

Source: T&E analysis of public announcements and Benchmark Minerals' Lithium Ion Battery Megafactory Assessment, February 2019



# LNG trucks will not decarbonise transport

Gas vehicles deliver negligible GHG benefits compared to diesel



# Zero emission trucks are just around the corner



**Battery Electric:** Daimler, Tesla, MAN and others to start series production in 2022.



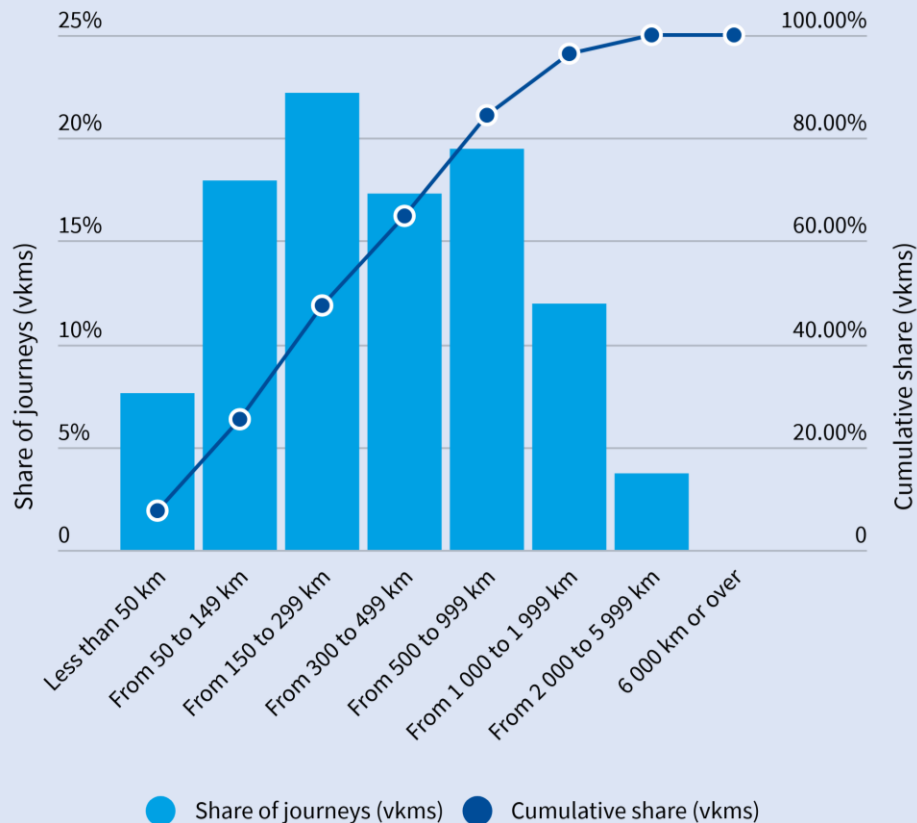
**Hydrogen:** Remains option for long haul trucks. EU strategy should focus on ports.



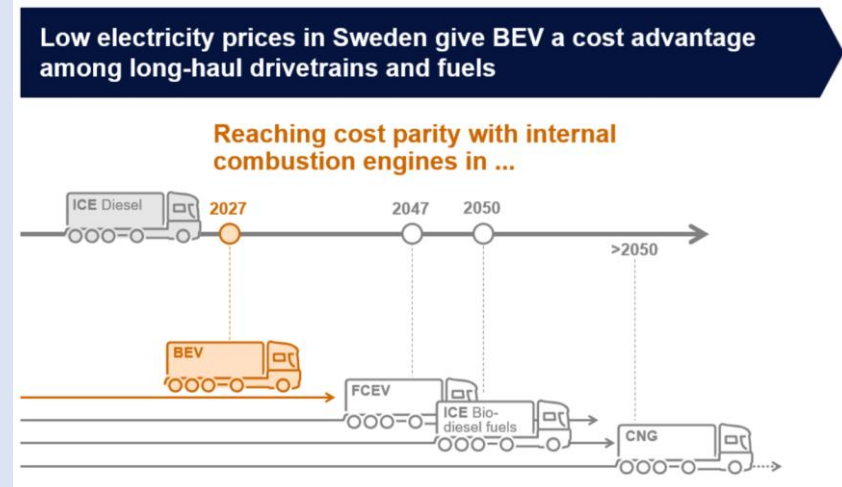
**E-highway:** Siemens-Scania enables technically proven and economically viable ZE trucking.

# Long haul road freight

European operations and total cost of ownership



Source: Eurostat table road\_go\_ta\_dc, accessed June 2018



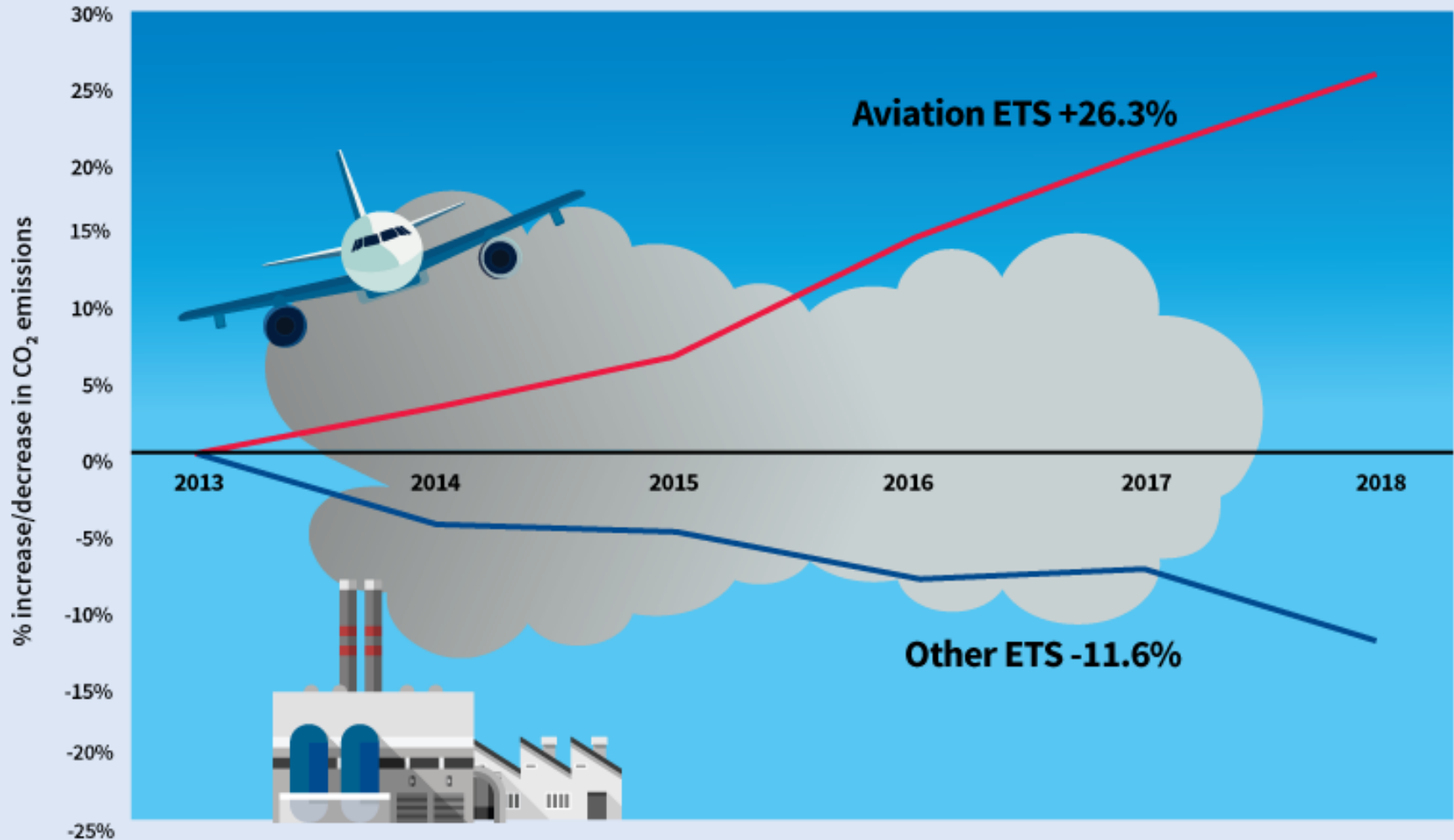
Scania (2018): THE PATHWAYS STUDY: Achieving fossil-free commercial transport by 2050

See also:

Analysis of long haul battery electric trucks in EU  
[www.transportenvironment.org/publications/analysis-long-haul-battery-electric-trucks-eu](http://www.transportenvironment.org/publications/analysis-long-haul-battery-electric-trucks-eu)



# ETS insufficient



Note: For emissions that were not lodged on time, 2018 emissions have been set to 2017. For aviation, this assumption amounts to approximately 8% of the verified reported emissions.

# CORSIA's weak plan to reduce global emissions



# 21.6%

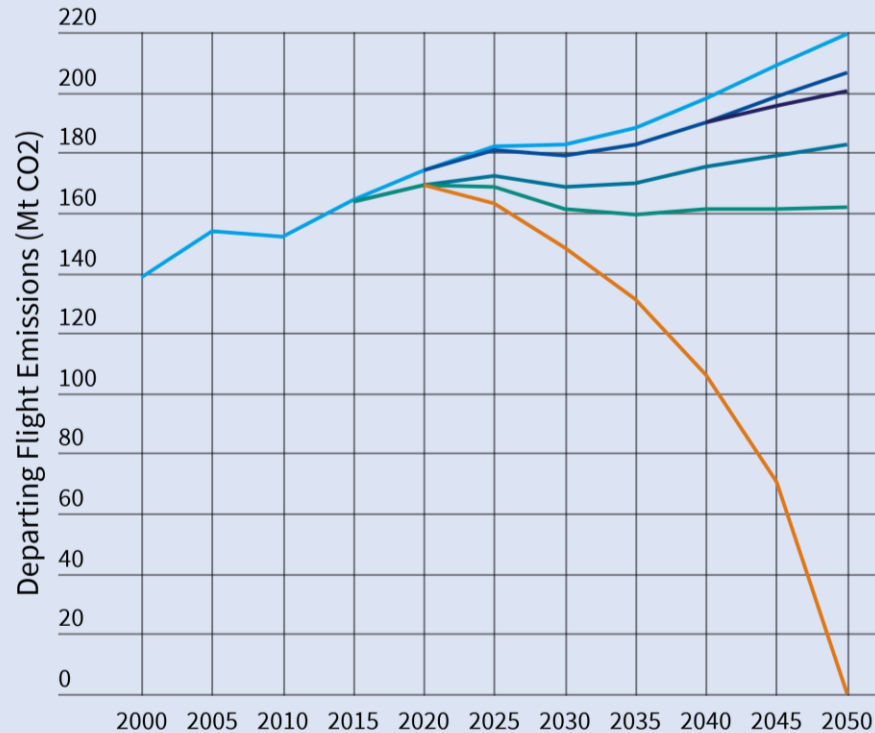
CORSIA's weak plan will offset only 21.6% of global emissions between 2021-2035

**What  
offsets will  
ICAO use?**

**Sustainability  
criteria almost  
non existant**



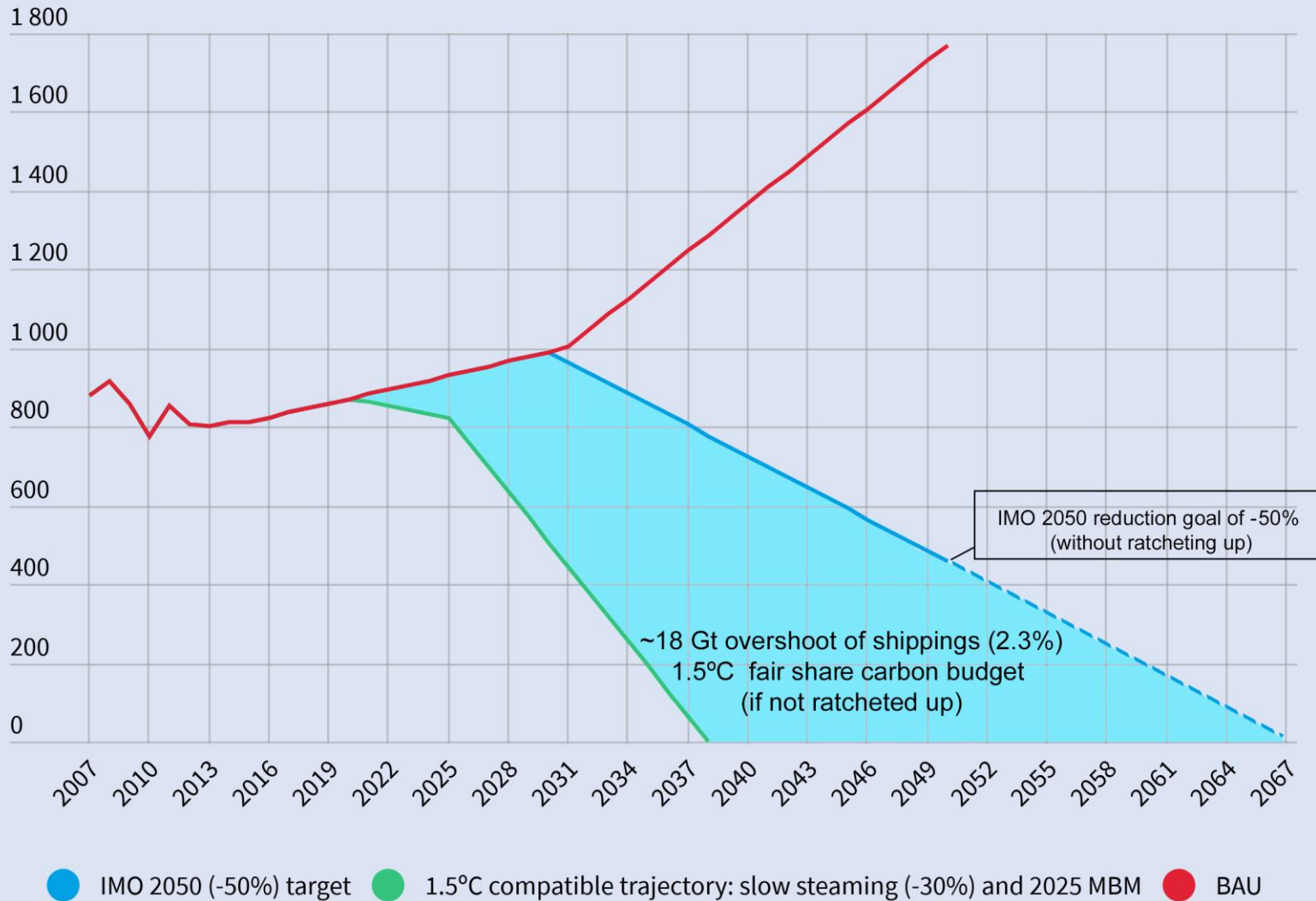
# Decarbonising EU aviation



- BaU (1% p.a. fleet fuel efficiency gain)
- 0.2% p.a. improvement conventional fleet ● Gen II aircraft from 2040
- €150/tCO2 carbon price ● Advanced biofuels uptake (7500 ktoe)
- Electrofuels

	2020	2025	2030	2035	2040	2045	2050		
PtL in the fuel mix	0.0%	1.7%	4.7%	12.1%	27.0%	50.1%	100.0%	39.2 Mtoe	912 TWh (28.2%)

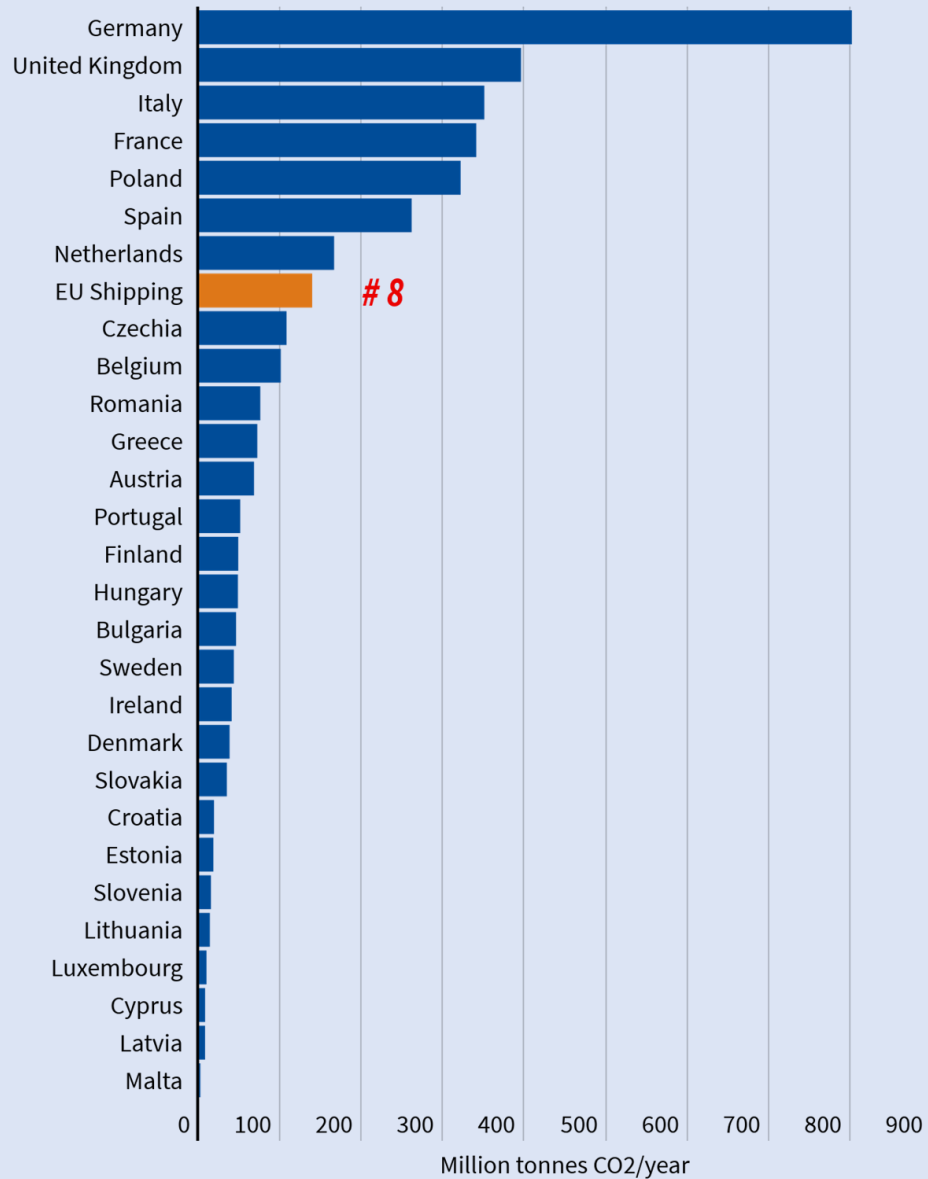
# IMO 2050 target vs. 1.5°C compatible trajectory



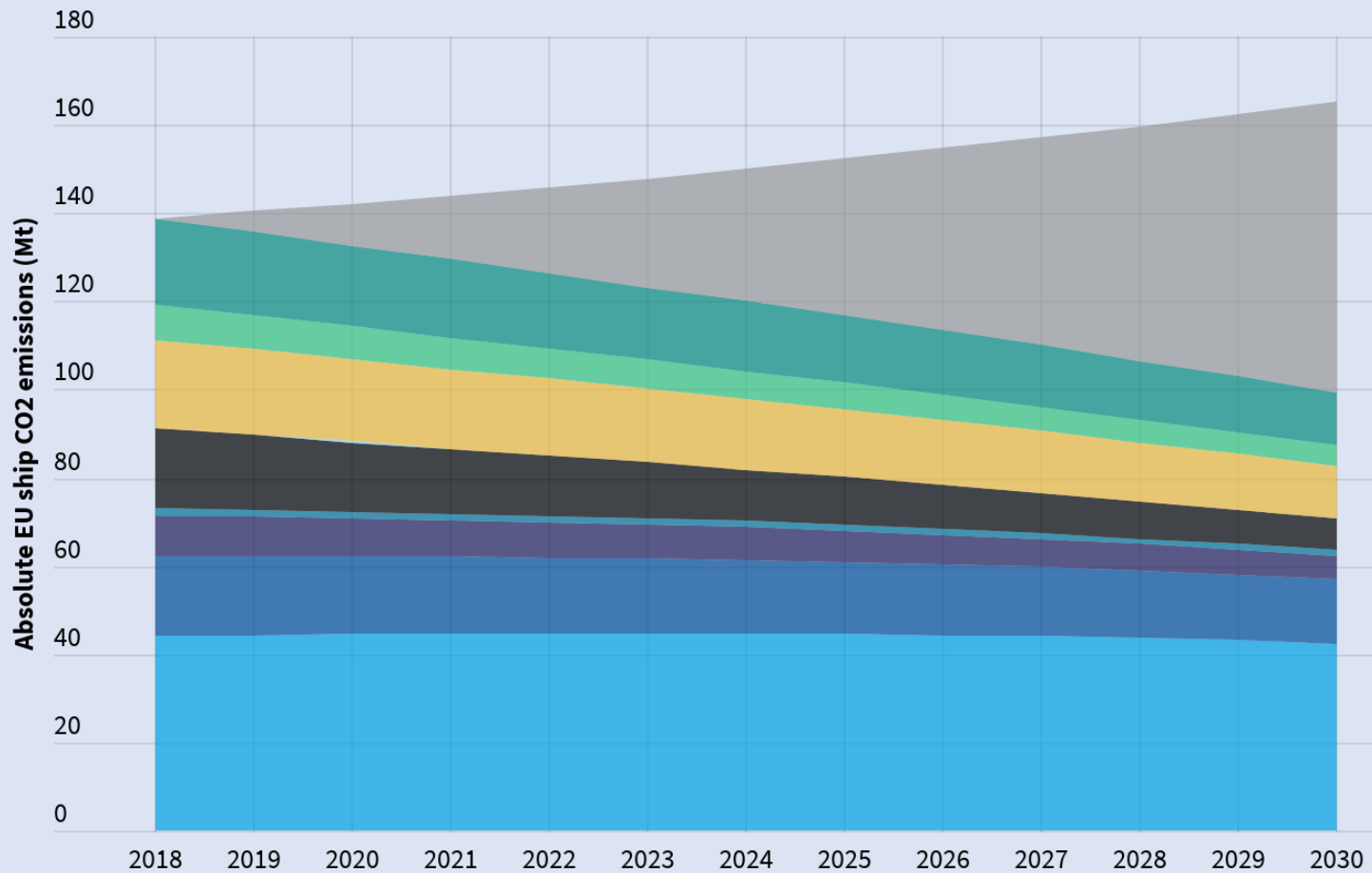
Source: 3rd IMO GHG Study (2014), UMAS (2016), CE Delft (2017), ICCT (2017)



# EU shipping emits more CO<sub>2</sub> than entire economies of 20 member states



# Operational CO<sub>2</sub> standard could reduce EU ship GHG by 40%

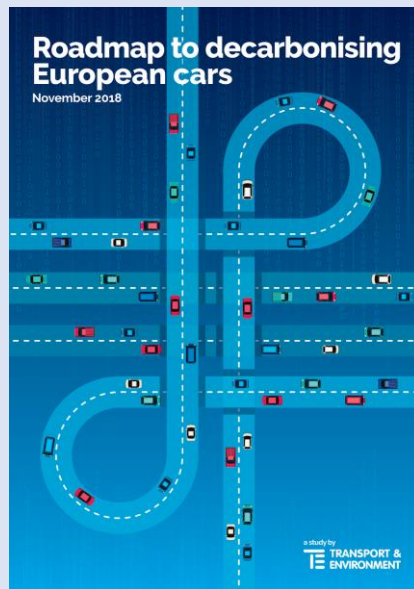
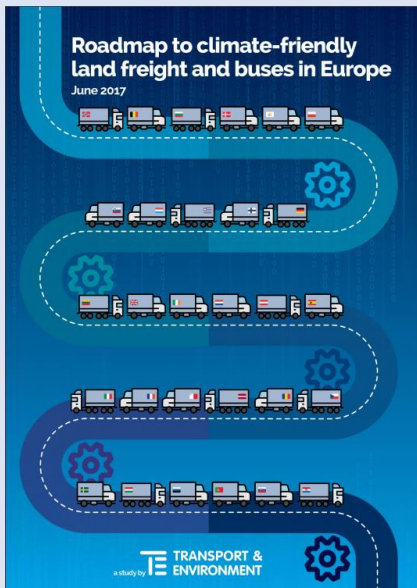


- Container ship ● Bulk carrier ● Chemical tanker ● Refrigerated cargo carrier
- Oil tanker ● Combination carrier ● Passenger ships (cruise/ferry)
- Gas/LNG carriers ● Other cargo ships ● Saved CO<sub>2</sub> compared to BAU

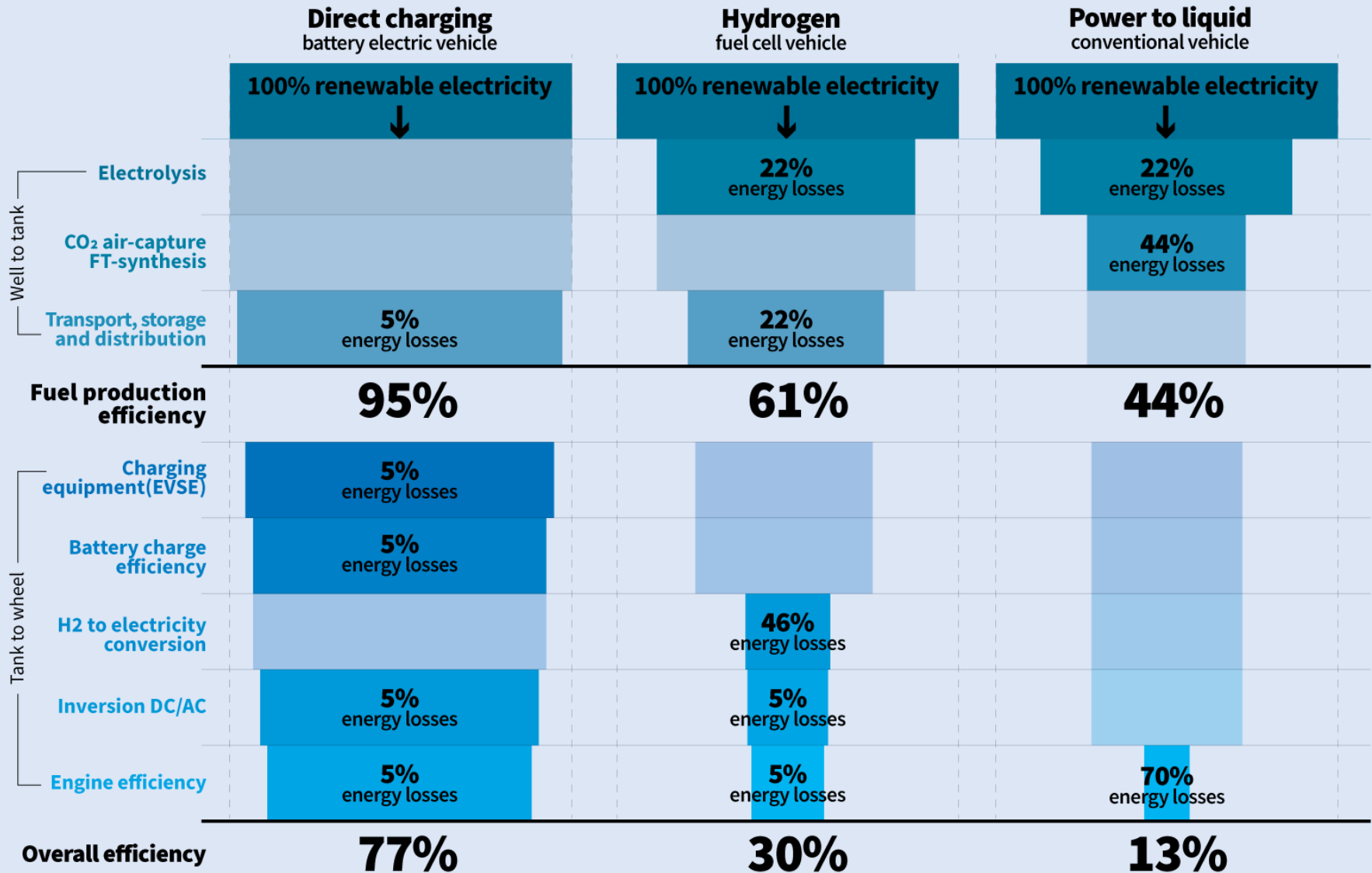
# Zero emission shipping



# Decarbonisation roadmaps



# Final thoughts: Efficiency





# Final thoughts: CO<sub>2</sub> budget

Transport mode	Share of EU emissions in 2016	Carbon Budget from 2018 (Mt CO <sub>2</sub> eq.; 66% probability)		Cumulative emissions 2018 to 2050 (Mt CO <sub>2</sub> eq)
		1.5°C	2°C	
Motorbikes	0.23%	89	227	439
Cars	11.90%	4564	11628	9225
Vans	2.32%	891	2269	1721
Trucks & buses	5.16%	1979	5041	4976
Trains	0.14%	55	139	112
Aviation	3.64%	1395	3553	3861
<b>Total<sup>§</sup></b>	<b>23.39%</b>	<b>8972</b>	<b>22857</b>	<b>20310</b>

# **Additional slides**

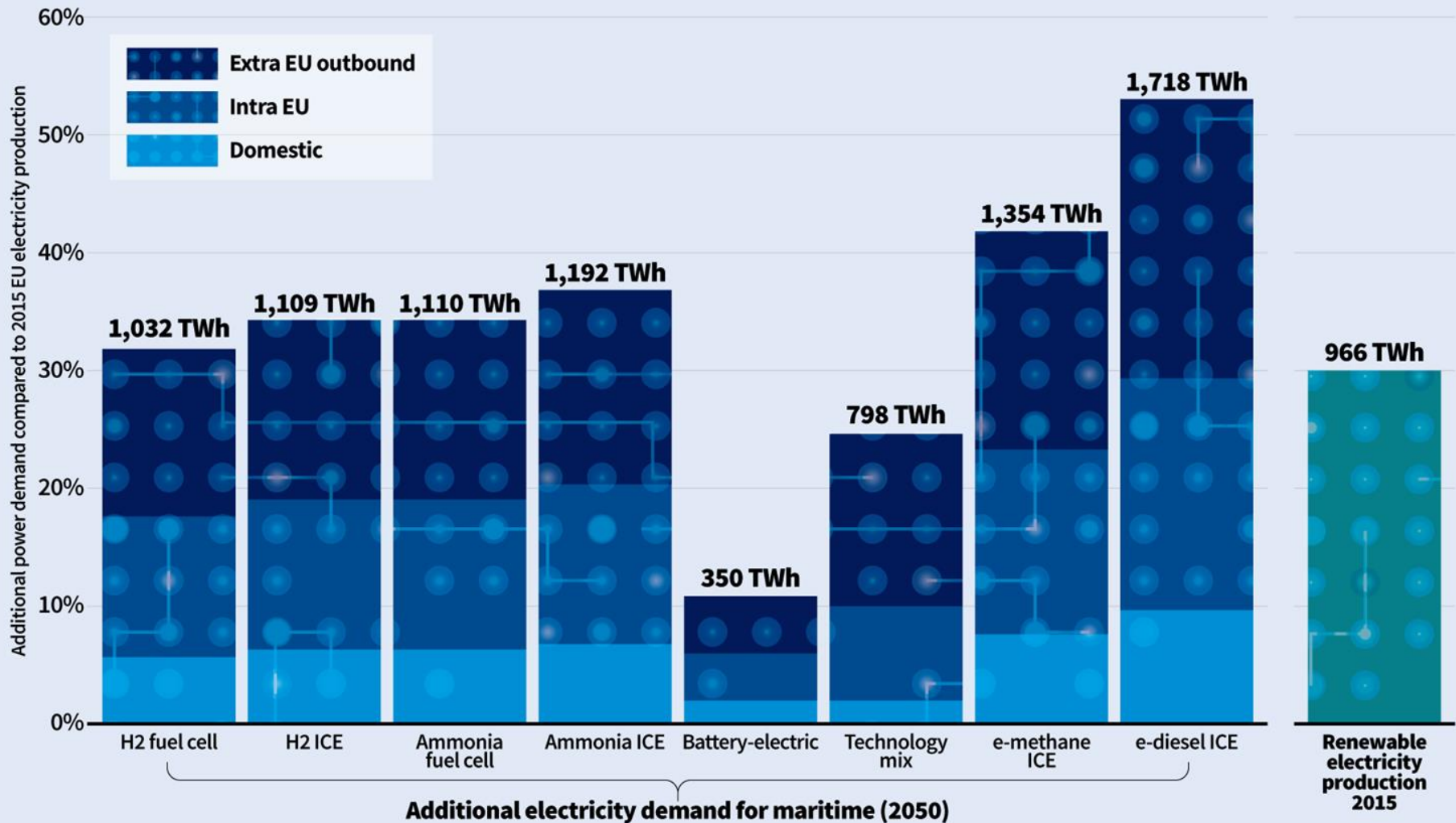
# Insignificant impact of shipping ETS on consumer goods

Product	Origin	Destination	Distance	Ship CO2 emitted per item	Additional costs with shipping in the ETS with €50/tonne CO2	Old Price in Belgium* without ETS	New price in Belgium* with ETS	Price increase due to ETS
 Banana (single)	Ecuador	Netherlands	10464 km	22 g	0.11000 € Cents	1.200	1.207 € /kg of banana	0.5500%
 iPad (single)	China	Denmark	19327 km	55 g	0.27500 € Cents	550	550.003 € /iPad	0.0005%
 Grain (1 kg)	Brazil	Holland	10416 km	21 g	0.10500 € Cents	0.16	0.161 € /kg of grain	0.6562%
 Diesel (1 litre)	USA	Italy	8575 km	24 g	0.12000 € Cents	1.4	1.401 € /litre of diesel	0.0857%

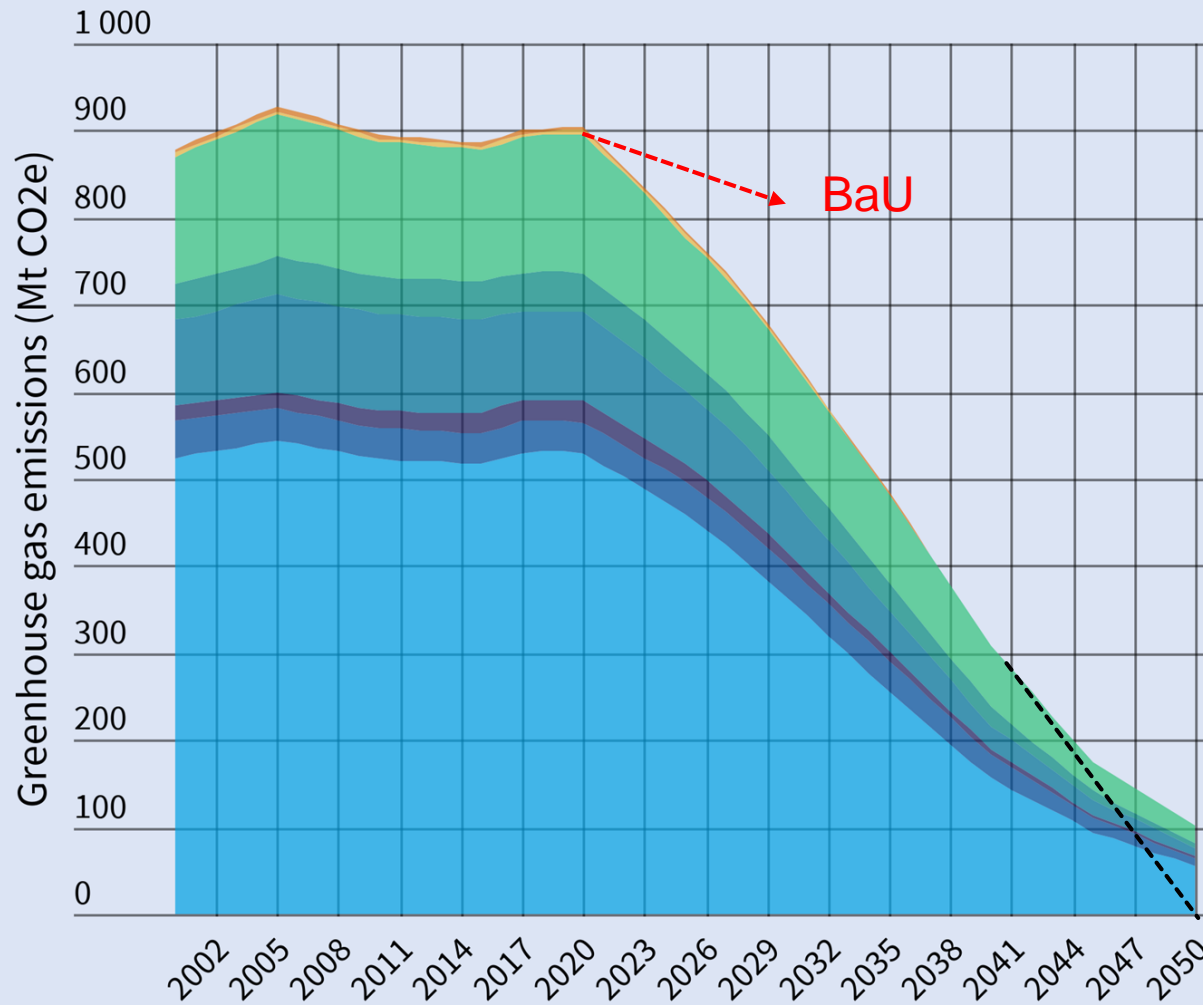
Source: Estimates by T&E based on the product emissions data from Danish Shipping, <http://www.navigatingresponsibly.dk/>

\* Product prices in Belgium were found based on desk research.

# Shipping's additional electricity demand under different technology pathways in 2050



# Road Transport Emissions



743 Mt  
in 1990

648 Mt  
in 2030

**-30%**  
**vs**  
**2005**

**-13%**  
**vs**  
**1990**



# T&E Philosophy

**DEMAND  
MANAGEMENT**

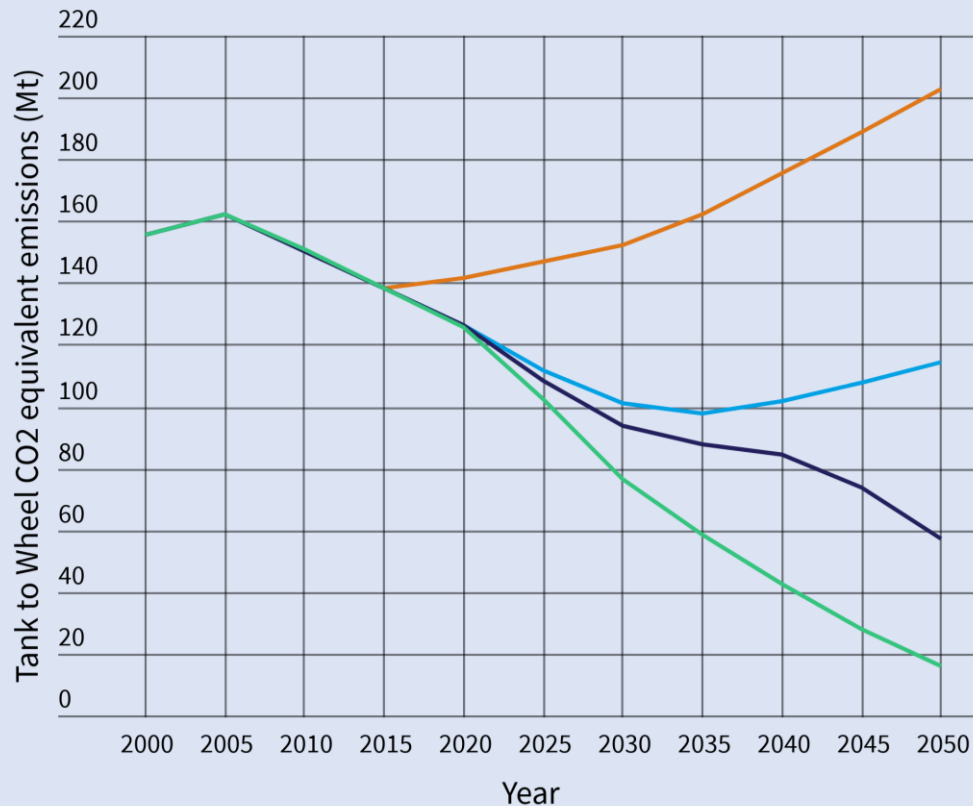
**MODAL  
SHIFT**



<b>Sales of Zero Emission Vehicles</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2050</b>
Motorcycles & mopeds	50%	100%	100%	100%
Passenger cars	15%	40%	100%	100%
Vans	20%	50%	100%	100%
Urban buses	50%	100%	100%	100%
Coaches	10%	25%	50%	100%
HGVs (<16t) <sup>3</sup>	10%	30%	80%	100%
HGVs (>16t) <sup>4</sup>	5%	30%	80%	100%
Rail (passenger and freight) <sup>5</sup>	70%	80%	90%	100%

# Long haul road freight

Emissions reduction through demand management and technology



## Comprehensive Reform Package

- Vehicle fuel efficiency
- Logistics improvements
- Modal shift

## Partial Electrification

- Electric highways

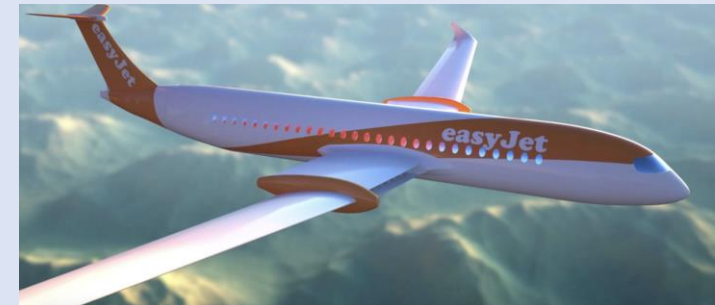
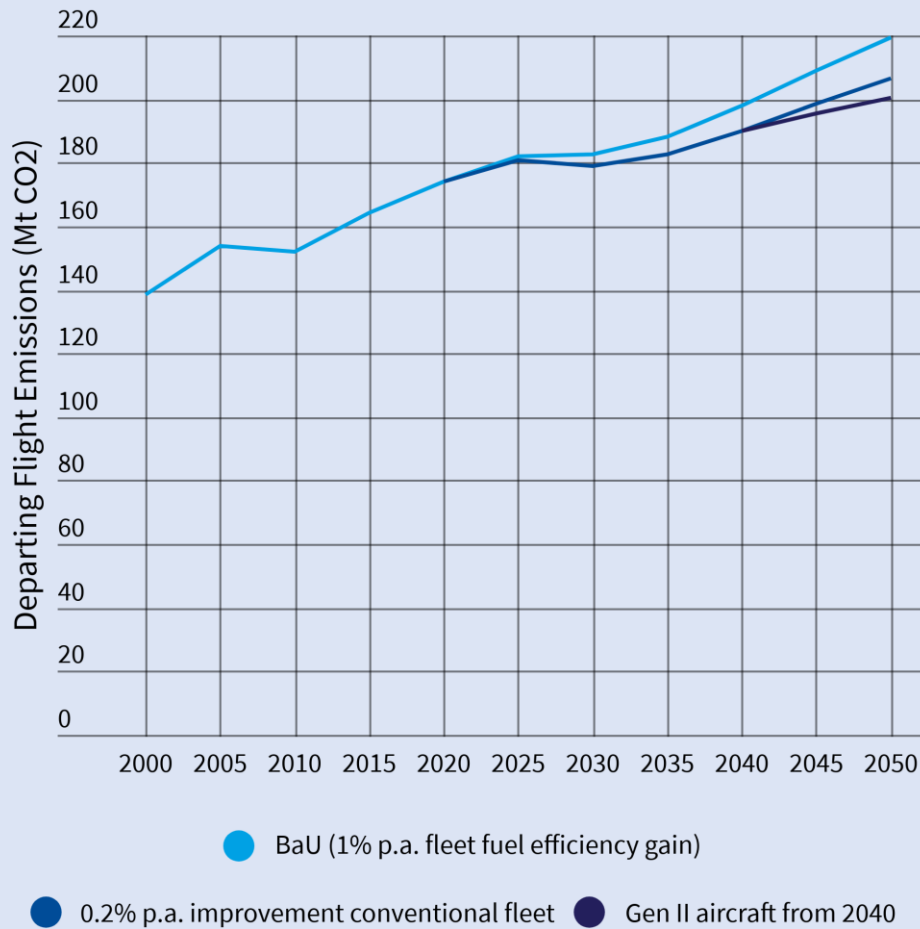
## Full Electrification

- Battery electric

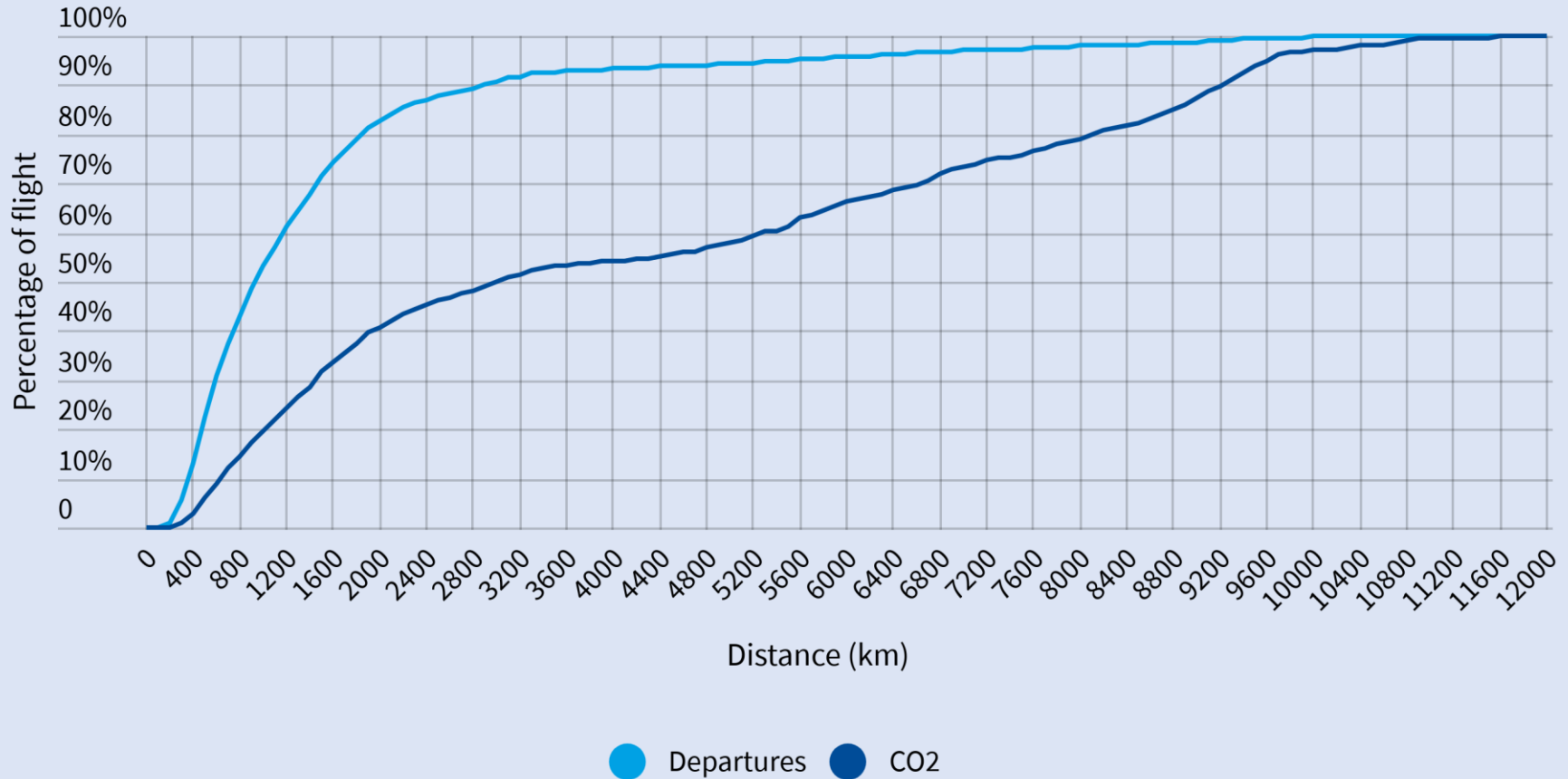


# Technological Measures

## Gen II and electric aircraft

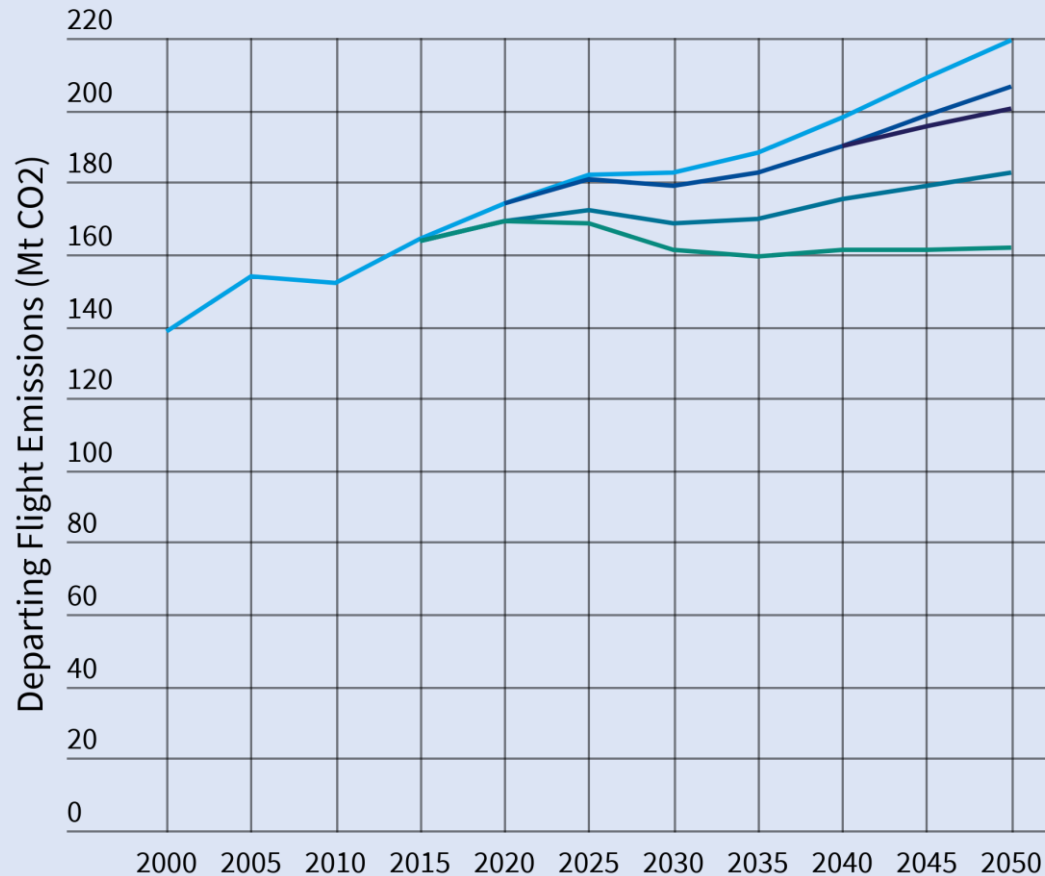


# Aircraft departures and CO2 in the EU



**Notes:** Based on aircraft transponder data for 2 weeks in 2016, the first week of February and first week of July of single legs only.

# Biofuels and pricing



● BaU (1% p.a. fleet fuel efficiency gain)

● 0.2% p.a. improvement conventional fleet ● Gen II aircraft from 2040

● €150/tCO2 carbon price ● Advanced biofuels uptake (7500 ktOE)



# Clean gas? LNG trucks emit up to 5 times more NOx pollution than diesel

