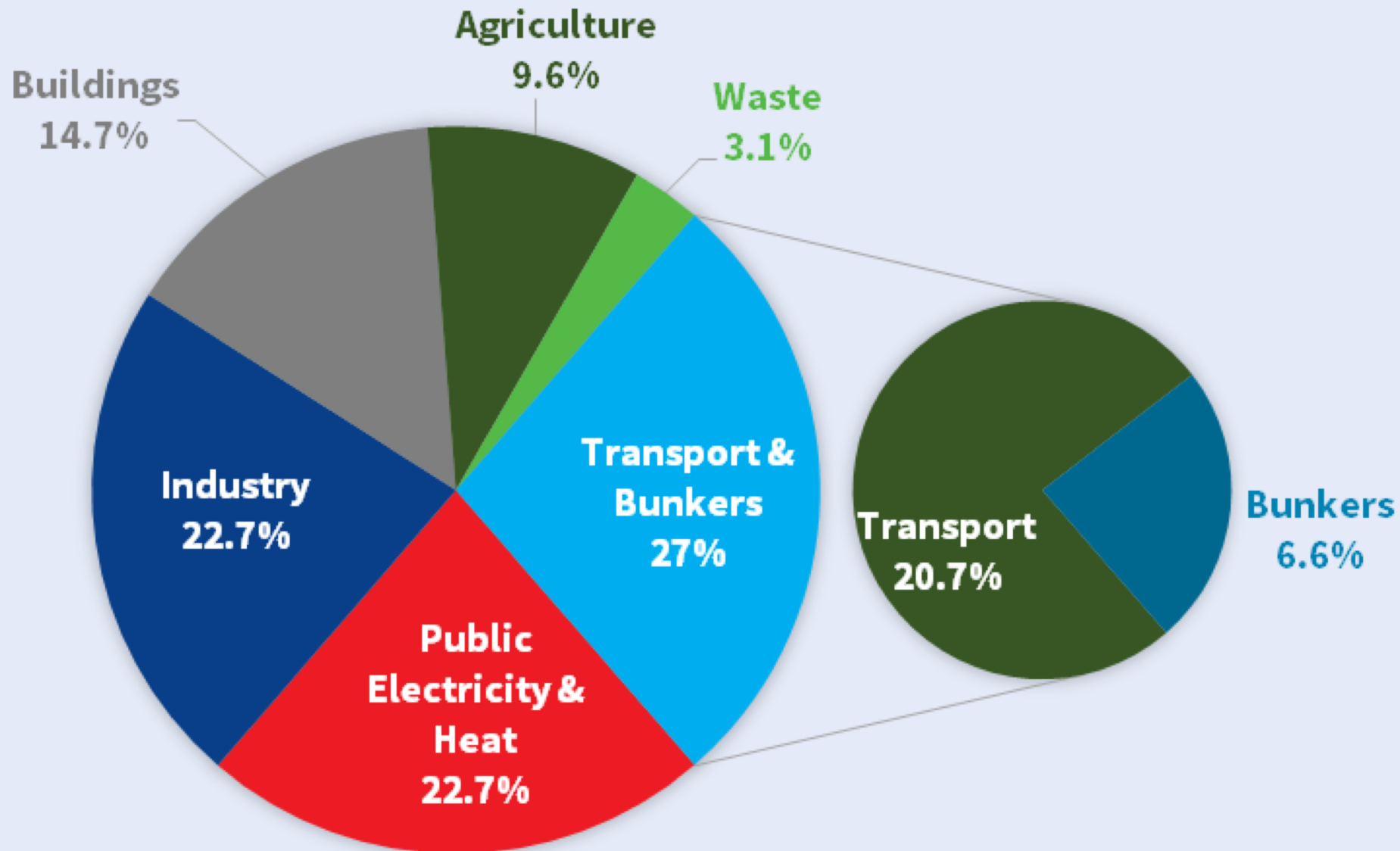


2050 AVIATION DECARBONISATION

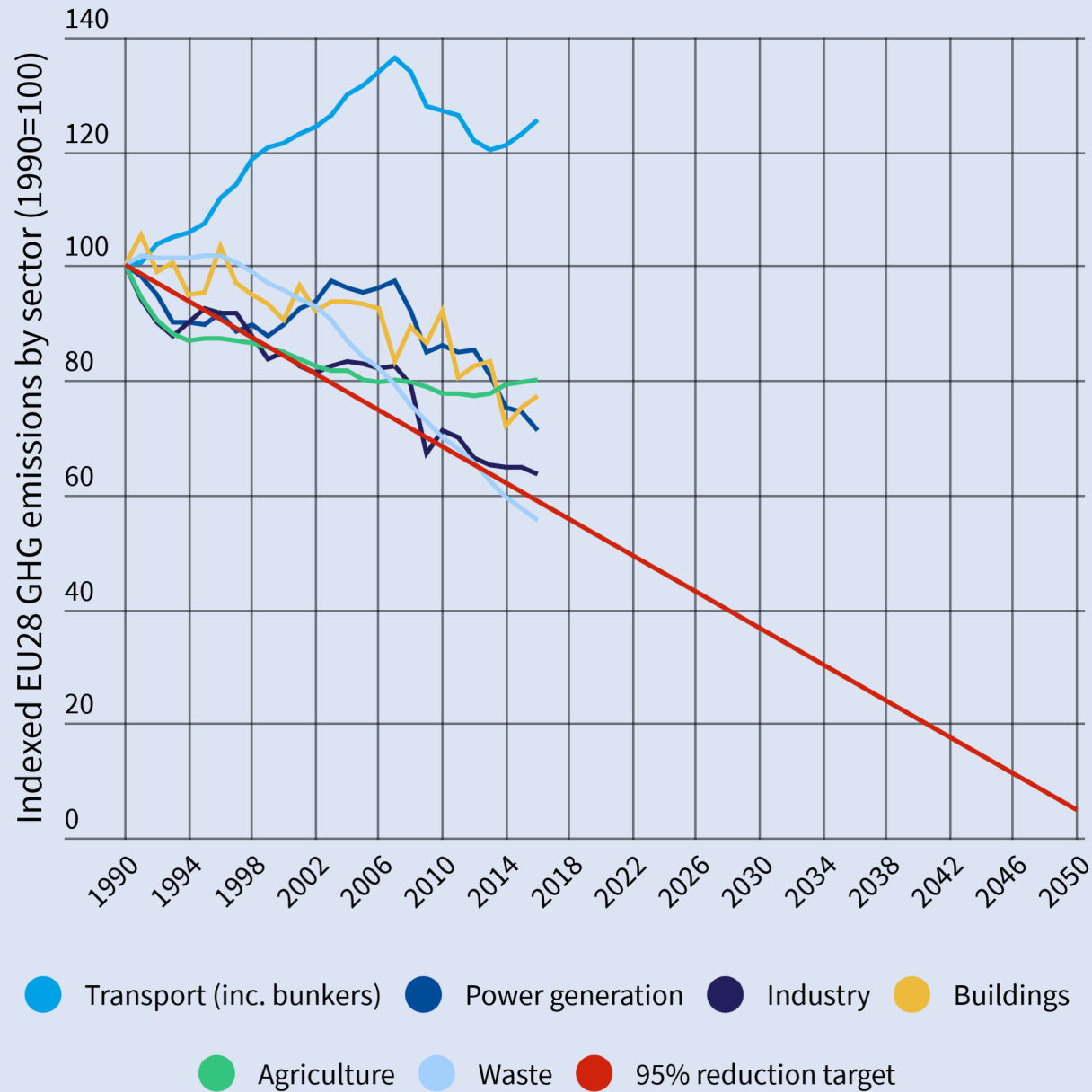
**04 DECEMBER, 2018
KATOWICE, COP24**

CARLOS CALVO AMBEL
(carlos@transportenvironment.org /  @transenv)

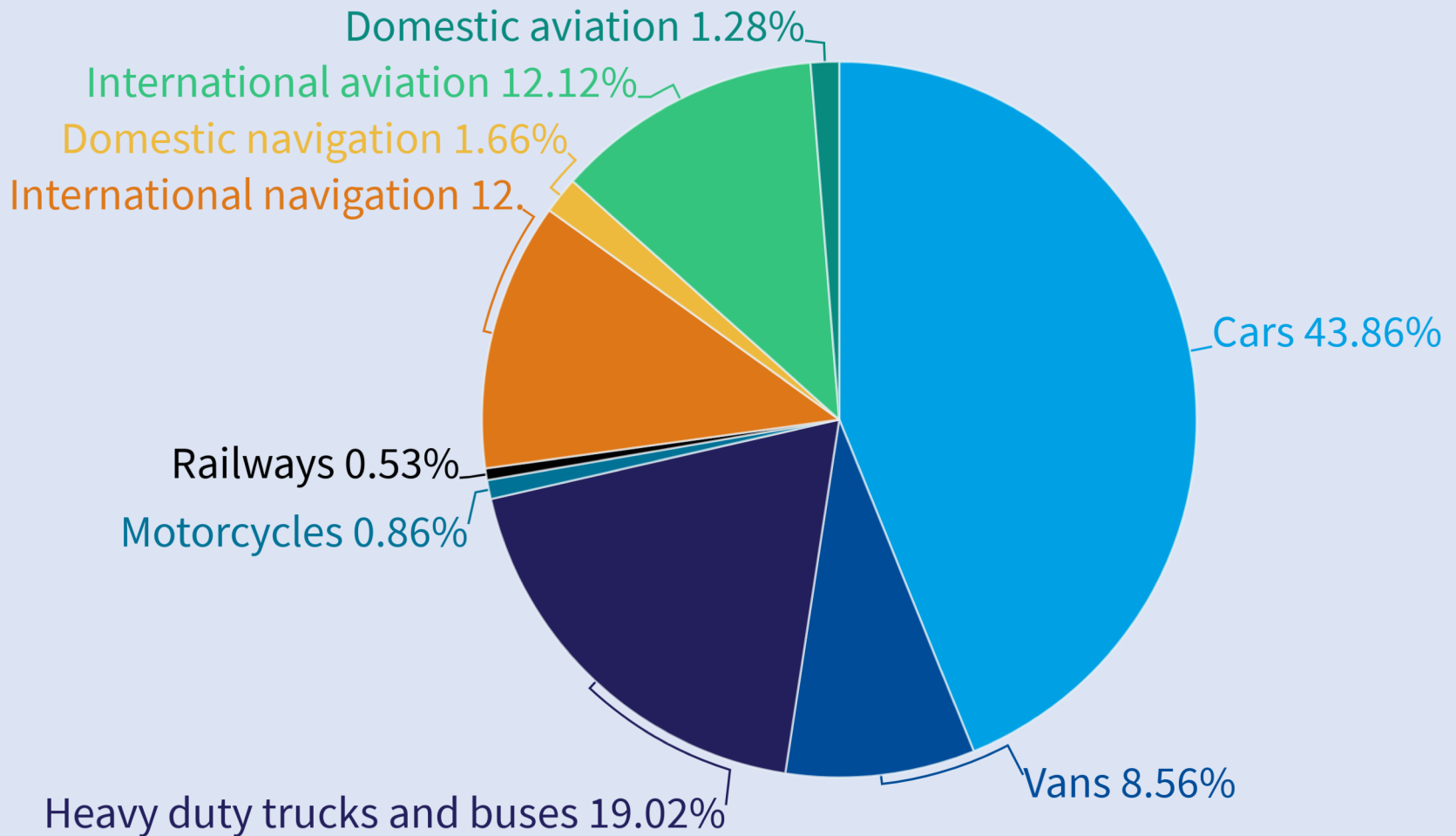
LARGEST CLIMATE PROBLEM IN THE EU...



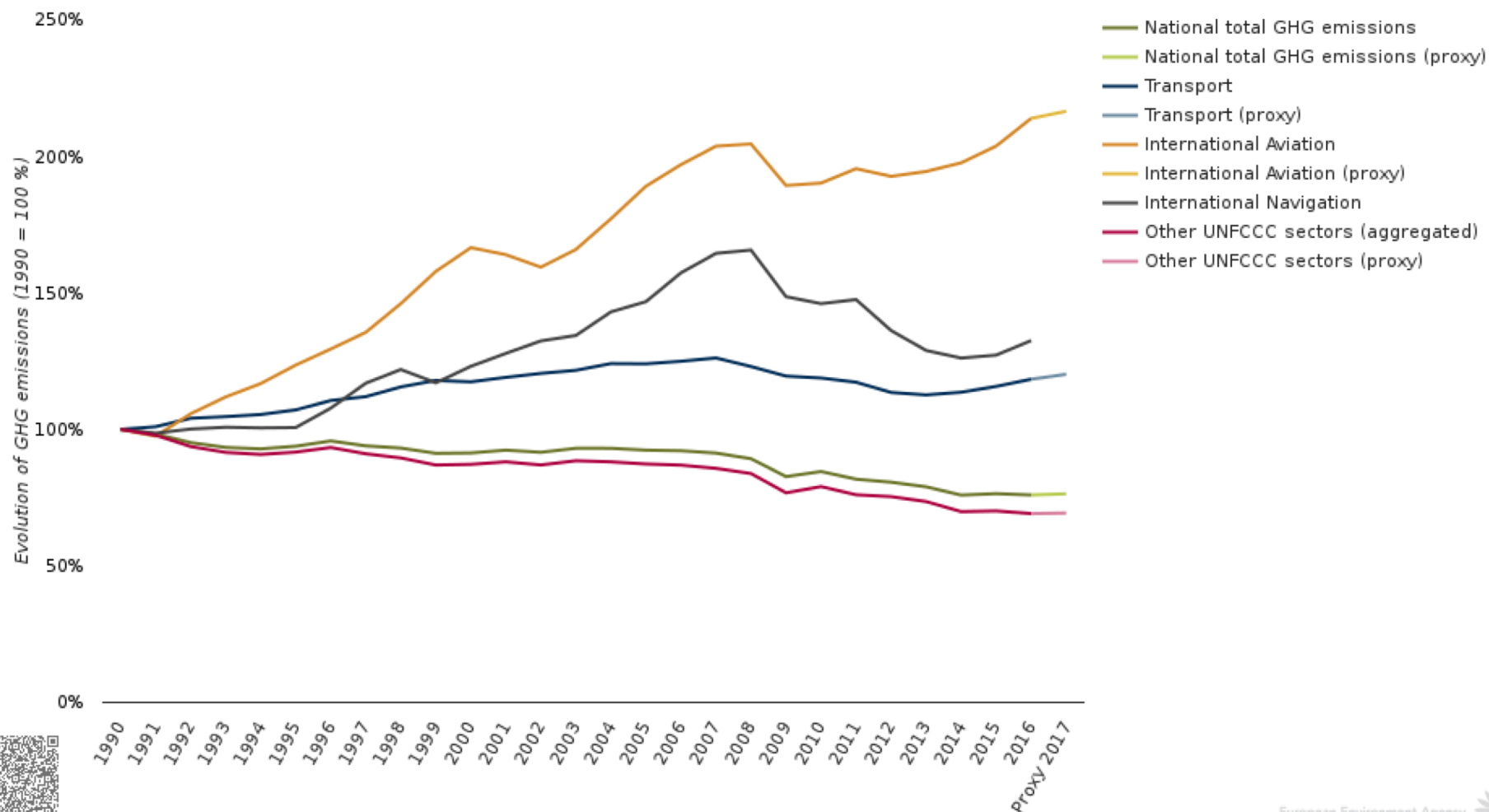
...AND GETTING WORSE



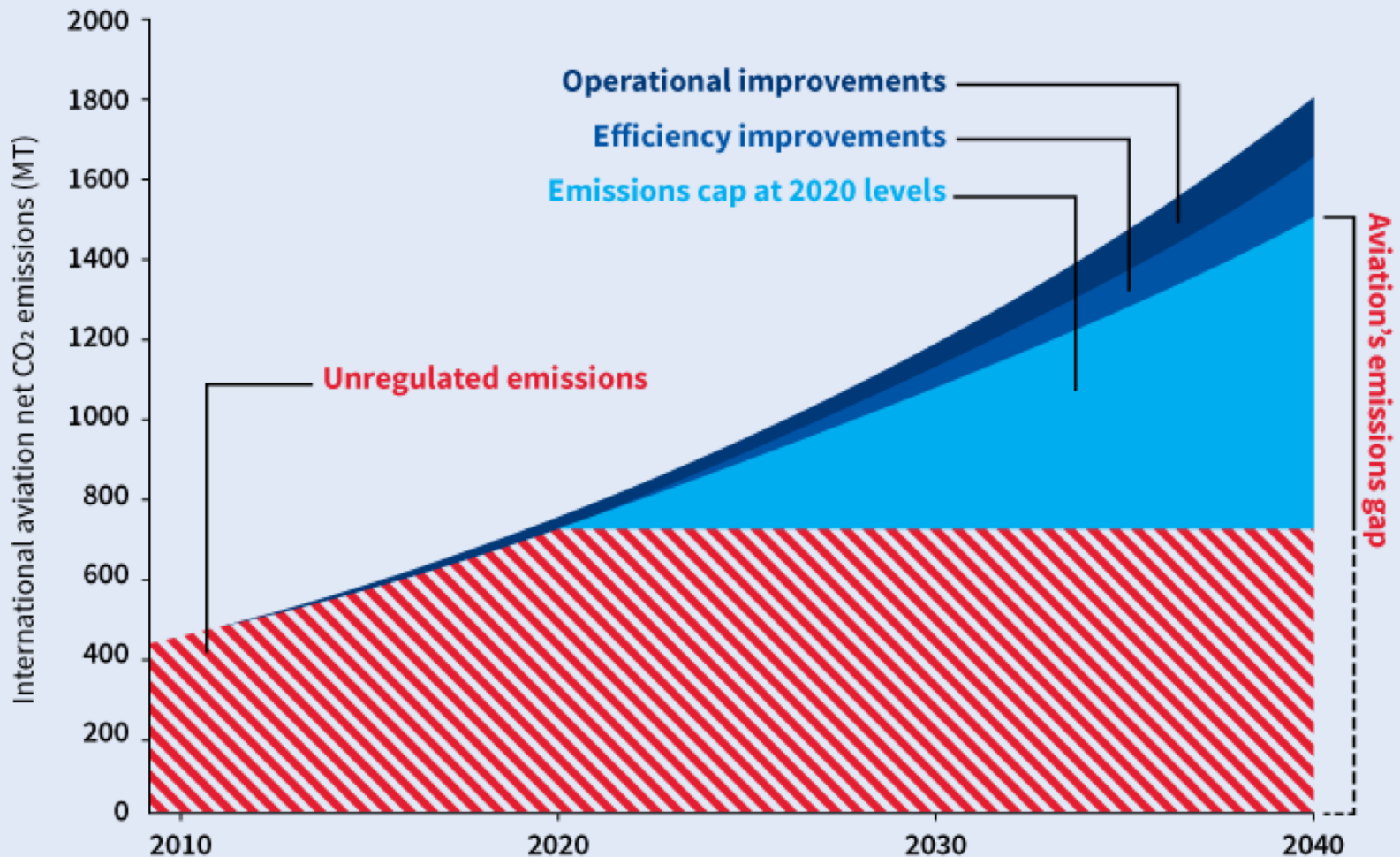
TRANSPORT SPLIT



AVIATION OUT OF CONTROL



How big is aviation's emission gap?



CORSIA's weak plan to reduce global emissions

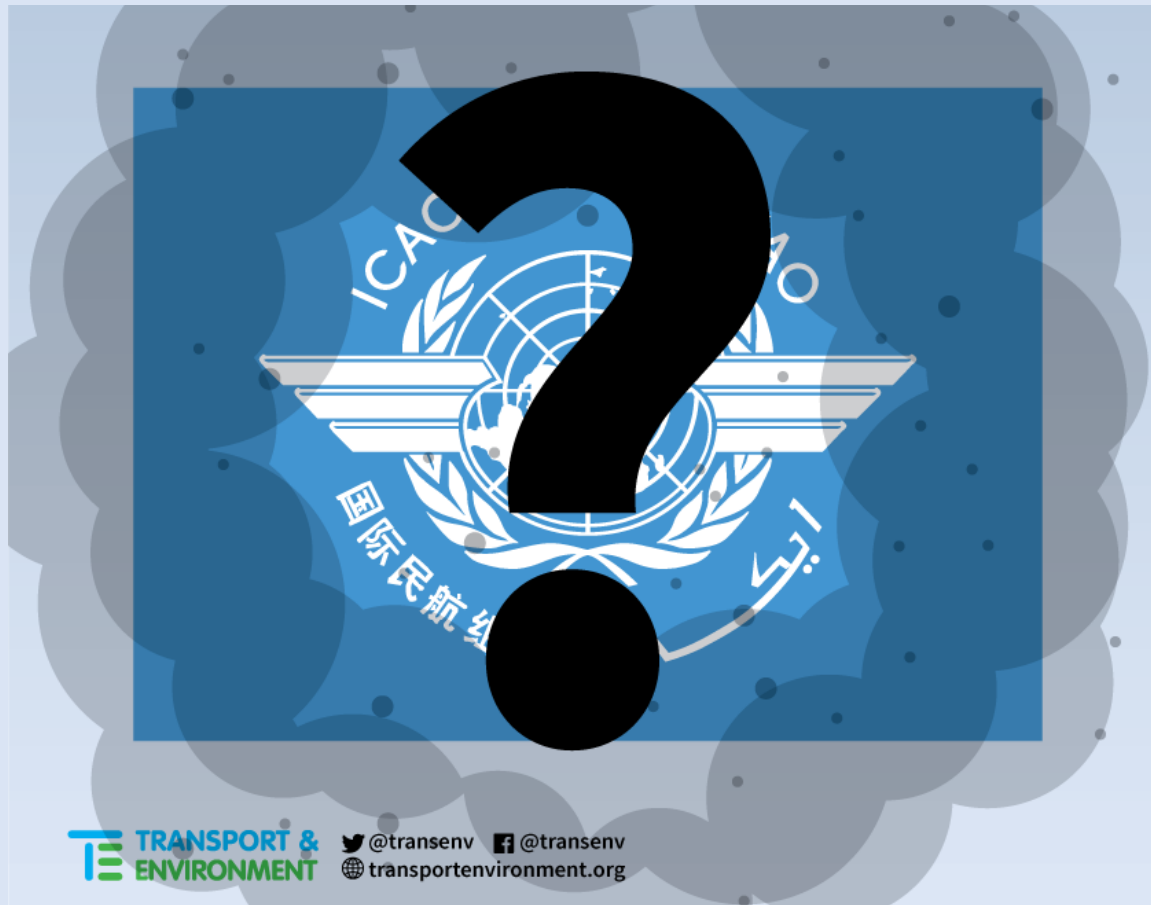


21.6%

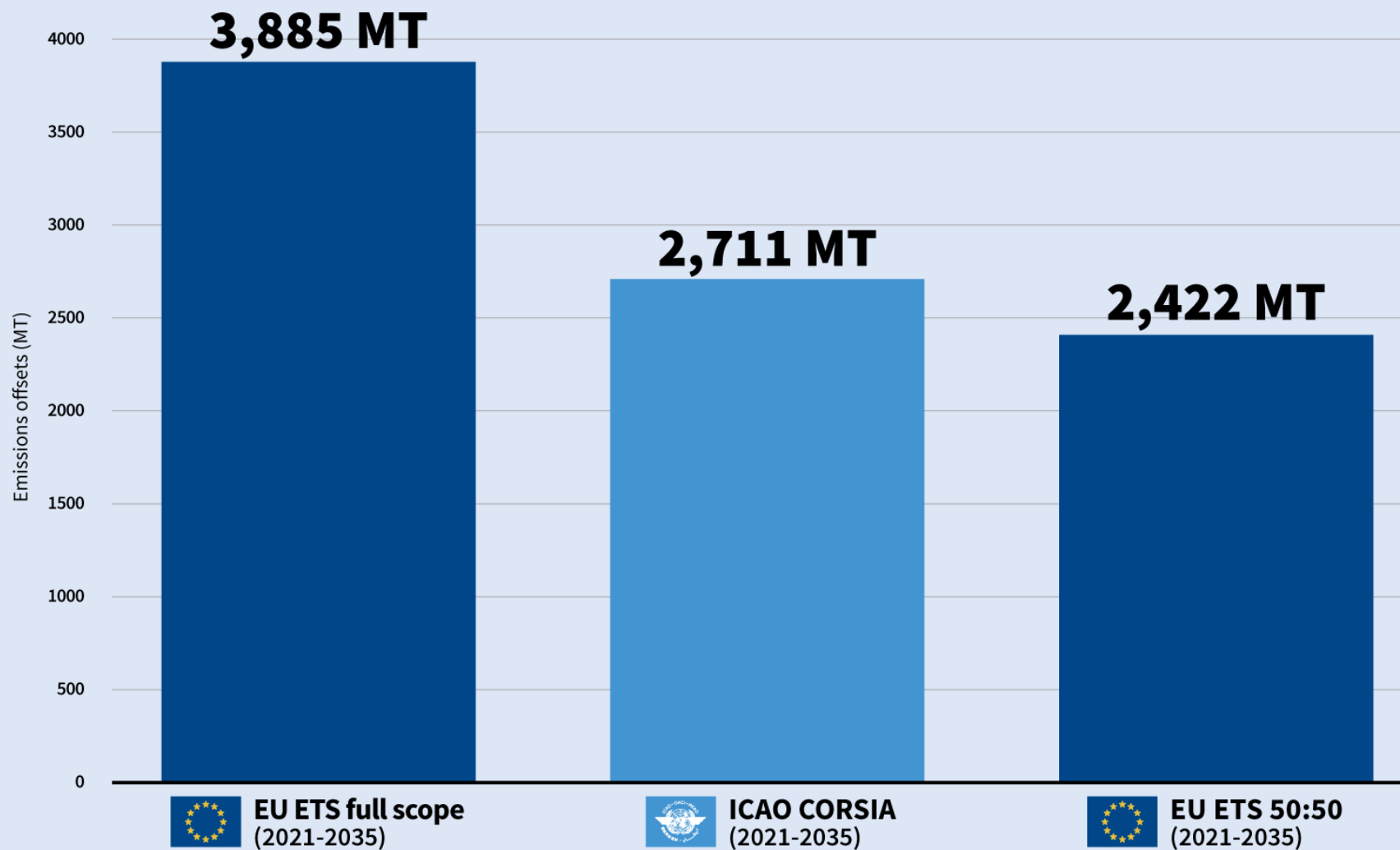
CORSIA's weak plan will offset only 21.6% of global emissions between 2021-2035

**WHAT
OFFSETS
WILL ICAO
USE?**

**SUSTAINABILITY
CRITERIA
ALMOST
INEXISTENT**

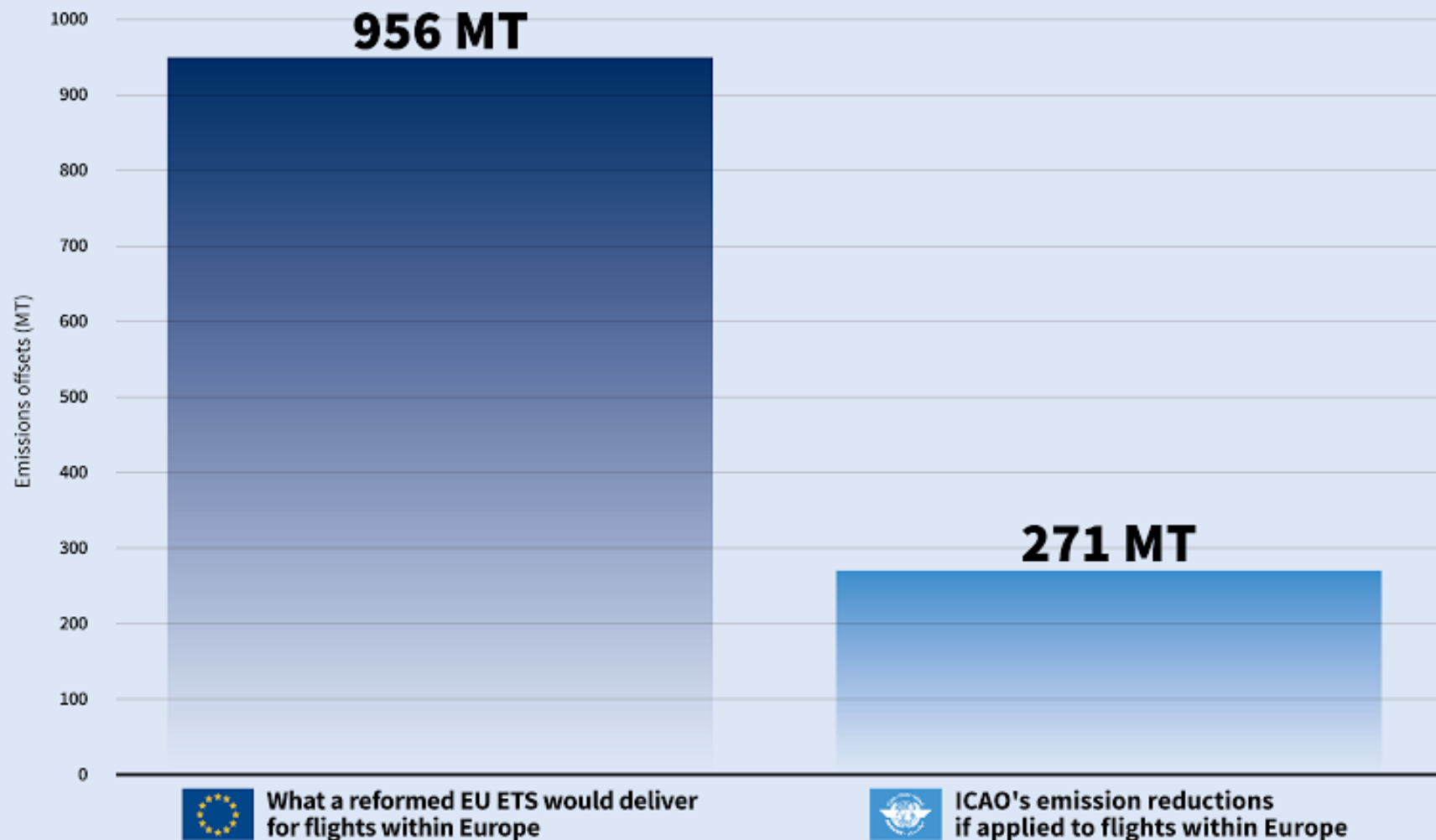


ICAO and EU systems compared

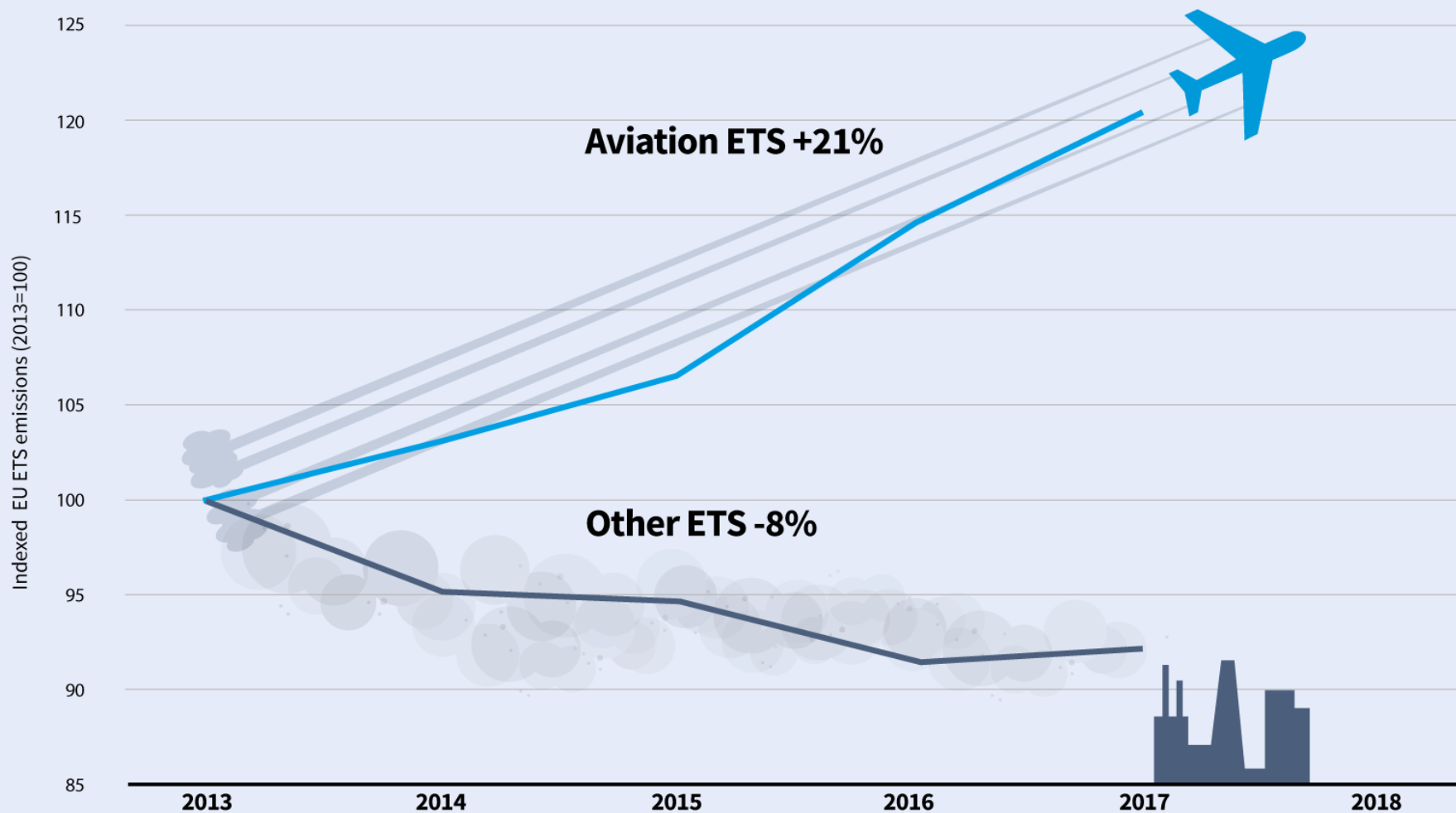


ICAO vs. ETS

Which one really mitigates aviation's climate impact?



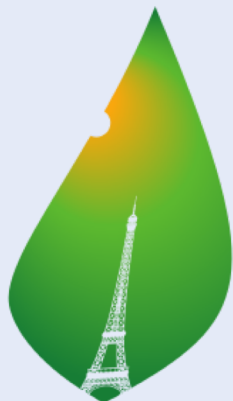
Aviation emissions growth since 2013 in the EU



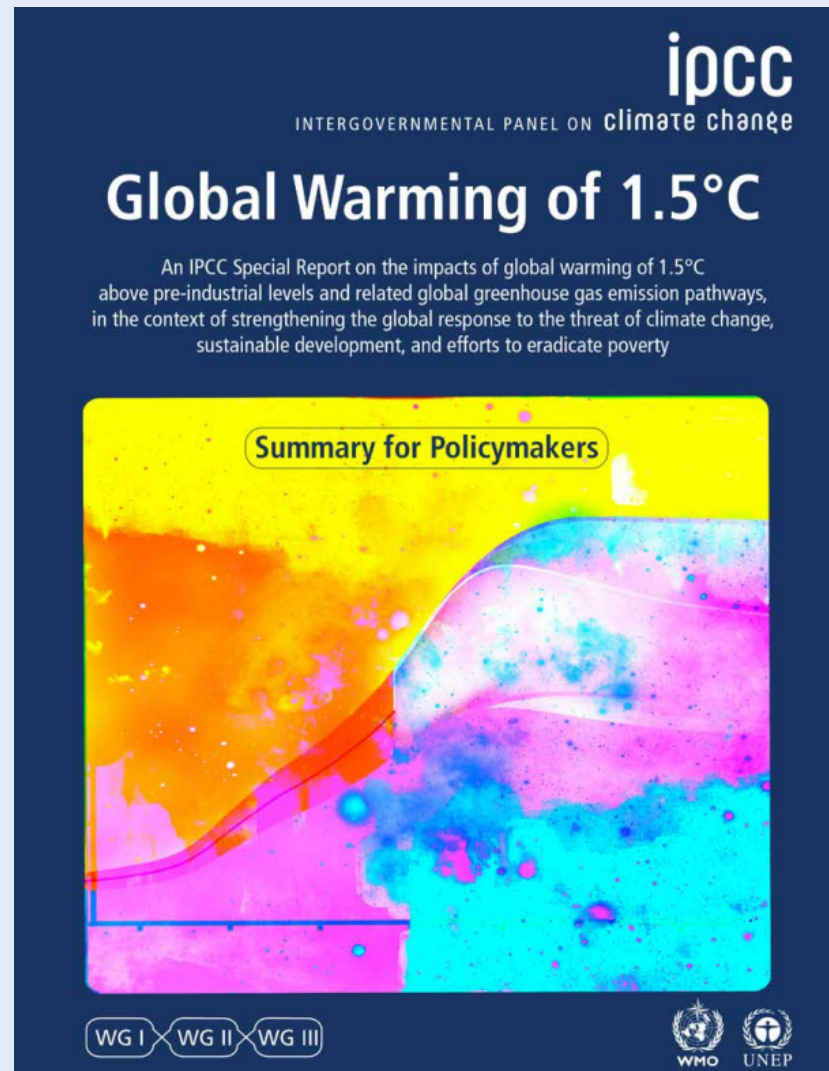
Note: For active ETS accounts in 2017 where no verified emissions were reported, 2016 were used. Coverage of verified emissions in 2017 was greater than 90%.

NEED OF LONG-TERM STRATEGY

12



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21•CMP11

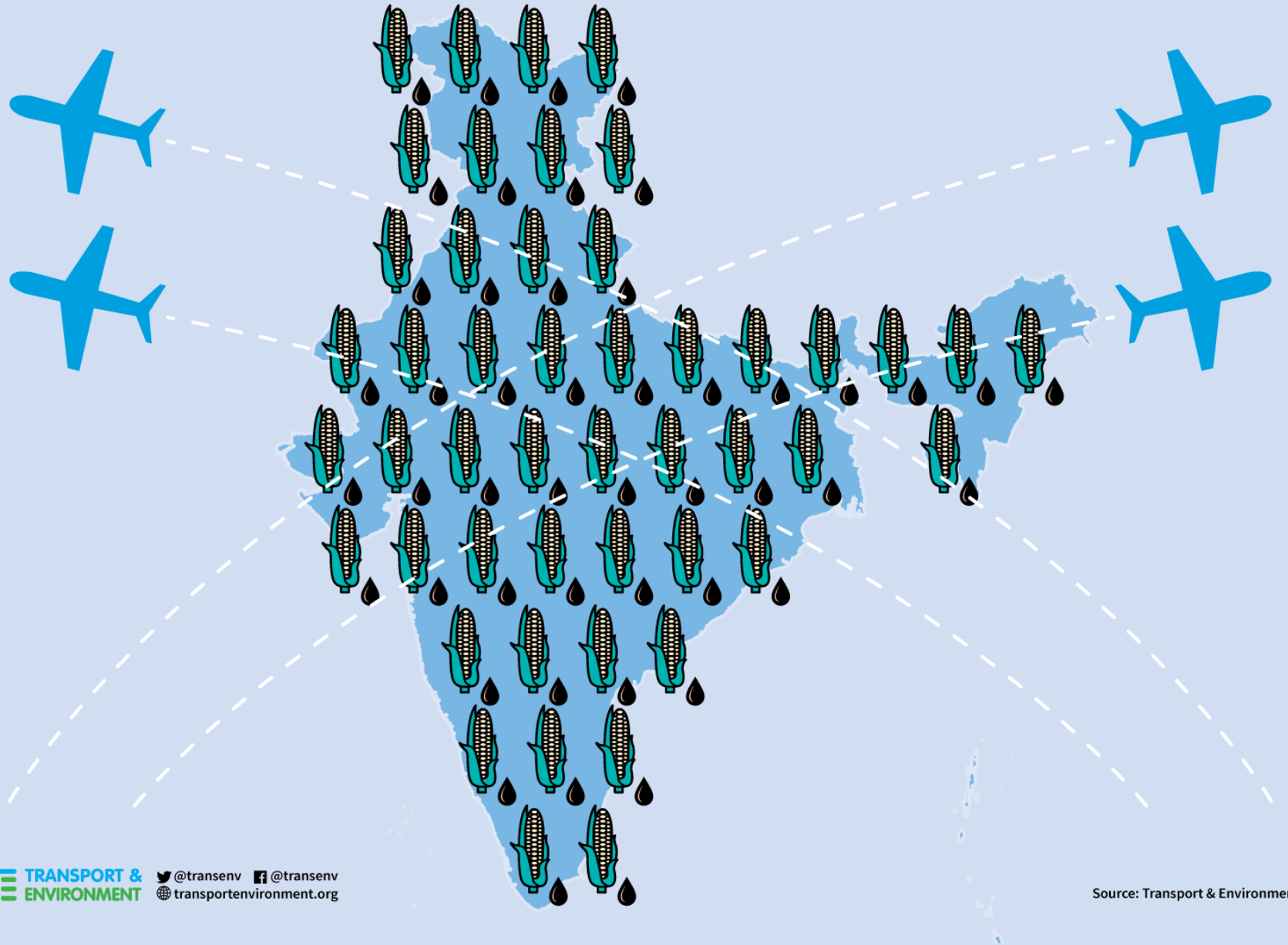


STUDIES PUBLISHED

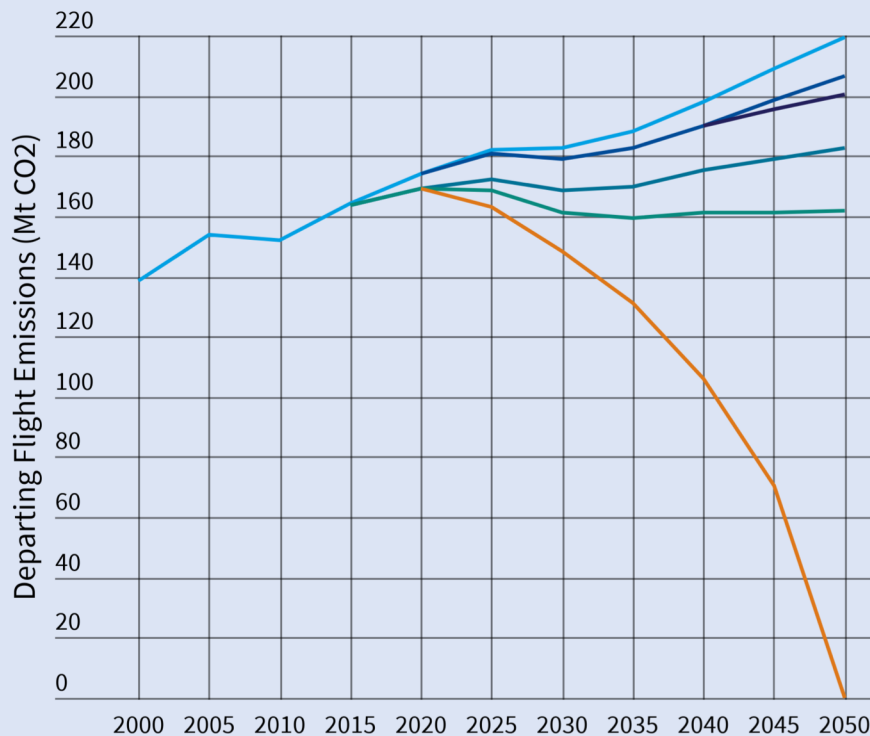
13



Area the size of India required to fuel aviation with biofuels



How electrofuels can reduce CO2 emissions of European departing flights



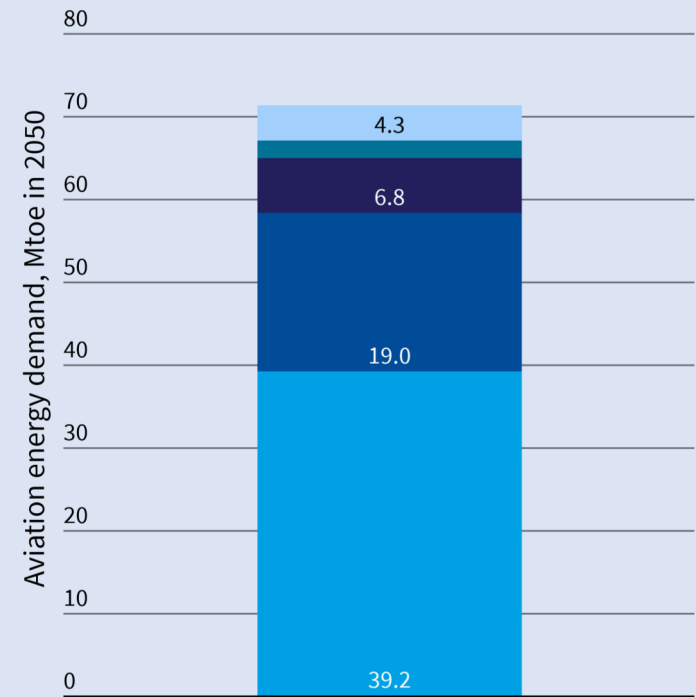
BaU (1% p.a. fleet fuel efficiency gain)

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

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

Electrofuels

Electrofuel consumption by European departing flights



Remaining Energy demand, covered by PtL

Reduction from electrofuel uptake

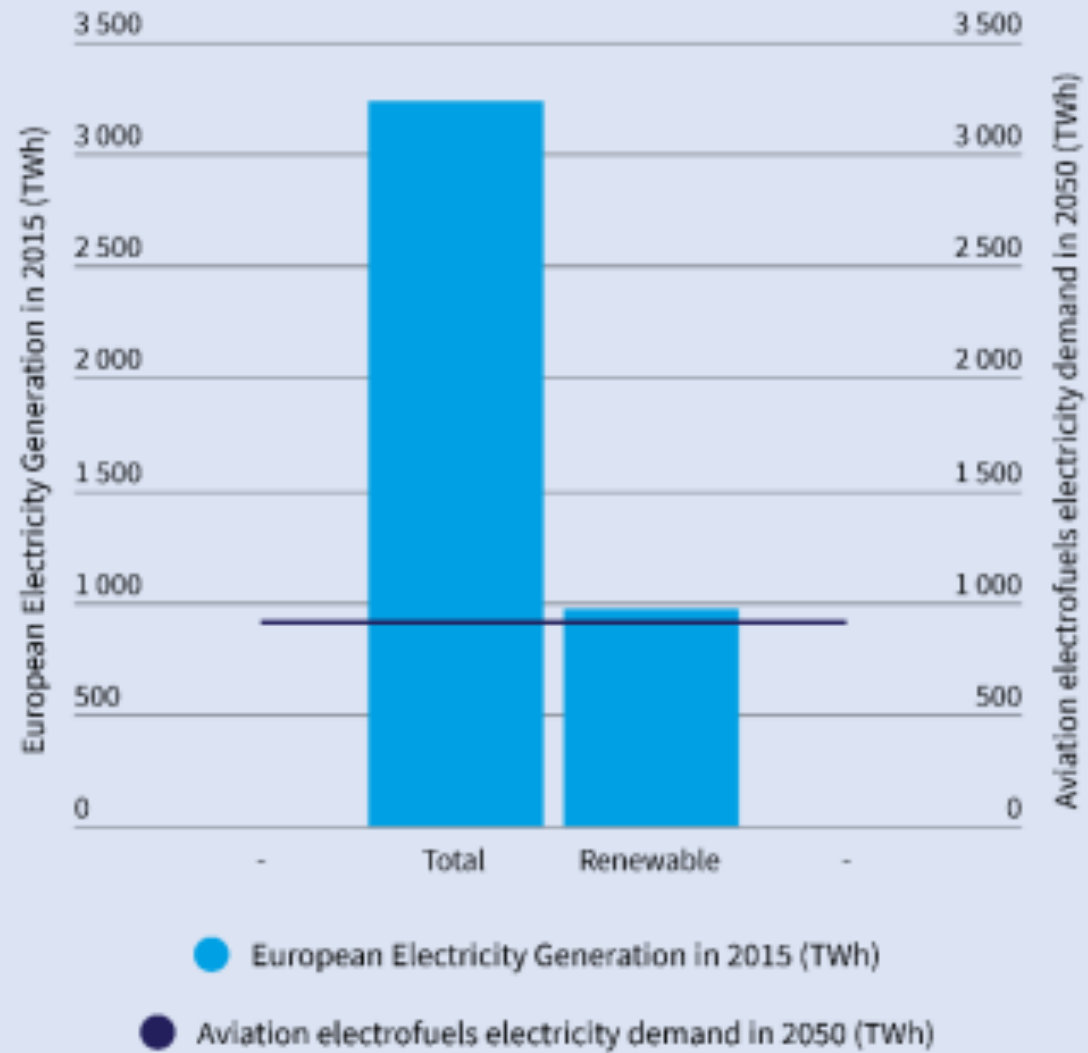
Reduction from advanced biofuels uptake (7500 ktoe)

Reduction from Gen II aircraft from 2040

Reduction from 0.2% p.a. improvement conventional fleet

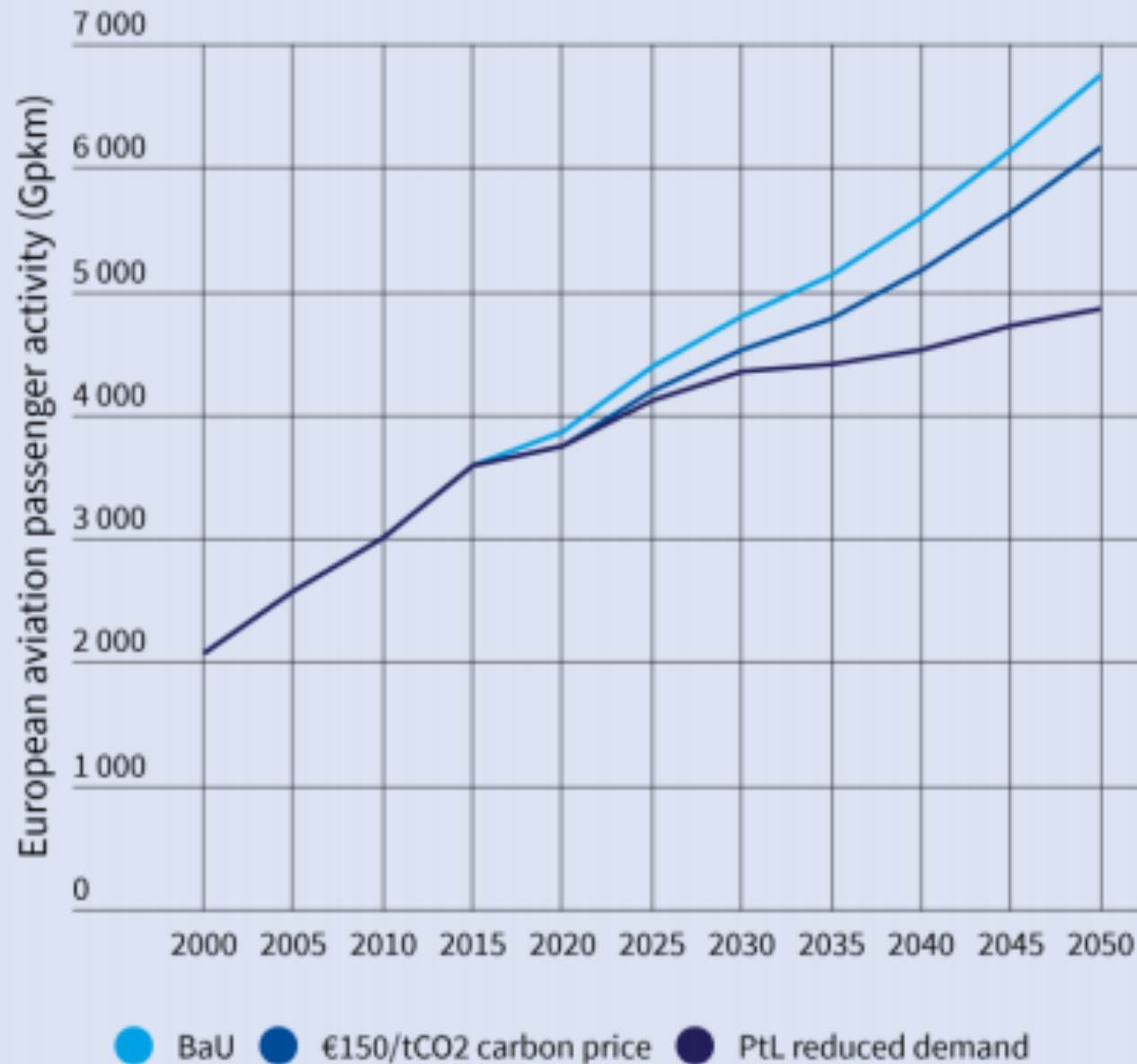
ADDITIONAL CLEAN ELECTRICITY NEEDED

Transport mode	Electricity Generation for electric vehicles (TWh)	Electrofuels		Optimal pathway (TWh)
		Hydrogen/Ammonia ⁵ (TWh)	Synthetic fuels (diesel, petrol, gas and kerosene) (TWh)	
Motorbikes	34 (1.1%)	90 (2.8%)	203 (6.3%)	34 (1.1%)
Cars	475 (14.7%)	1236 (38.3%)	2187 (67.6%)	475 (14.7%)
Vans	146 (4.5%)	381 (11.8%)	672 (20.8%)	146 (4.5%)
Buses	119 (3.7%)	310 (9.6%)	547 (16.9%)	119 (3.7%)
Trucks (<16t)	112 (3.5%)	292 (9.0%)	515 (15.9%)	112 (3.5%)
Trucks (>16t)	364 (11.2%)	949 (29.4%)	1676 (51.8%)	364 (11.2%)
Trains	145 (4.5%)	219 (6.8%) [§]	NA	145 (4.5%)
Total land transport:	1395 (43.1%)	3479 (107.6%)	5799 (179.3%)	1395 (43.1%)
Shipping	350 (11%)	1032-1192 (32-37%)	1718 (53%)	798 (25%)
Aviation	N/A	N/A	912 (28.2%)	912 (28.2%)



	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%

PASSENGER DEMAND



CARBON BUDGET?

Transport mode	Share of EU emissions in 2016	Carbon Budget from 2018 (Mt CO ₂ eq.; 66% probability)		Cumulative emissions 2018 to 2050 (Gt CO ₂ 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
Total [§]	23.39%	8972	22857	20310

HOW TO GET THERE?

