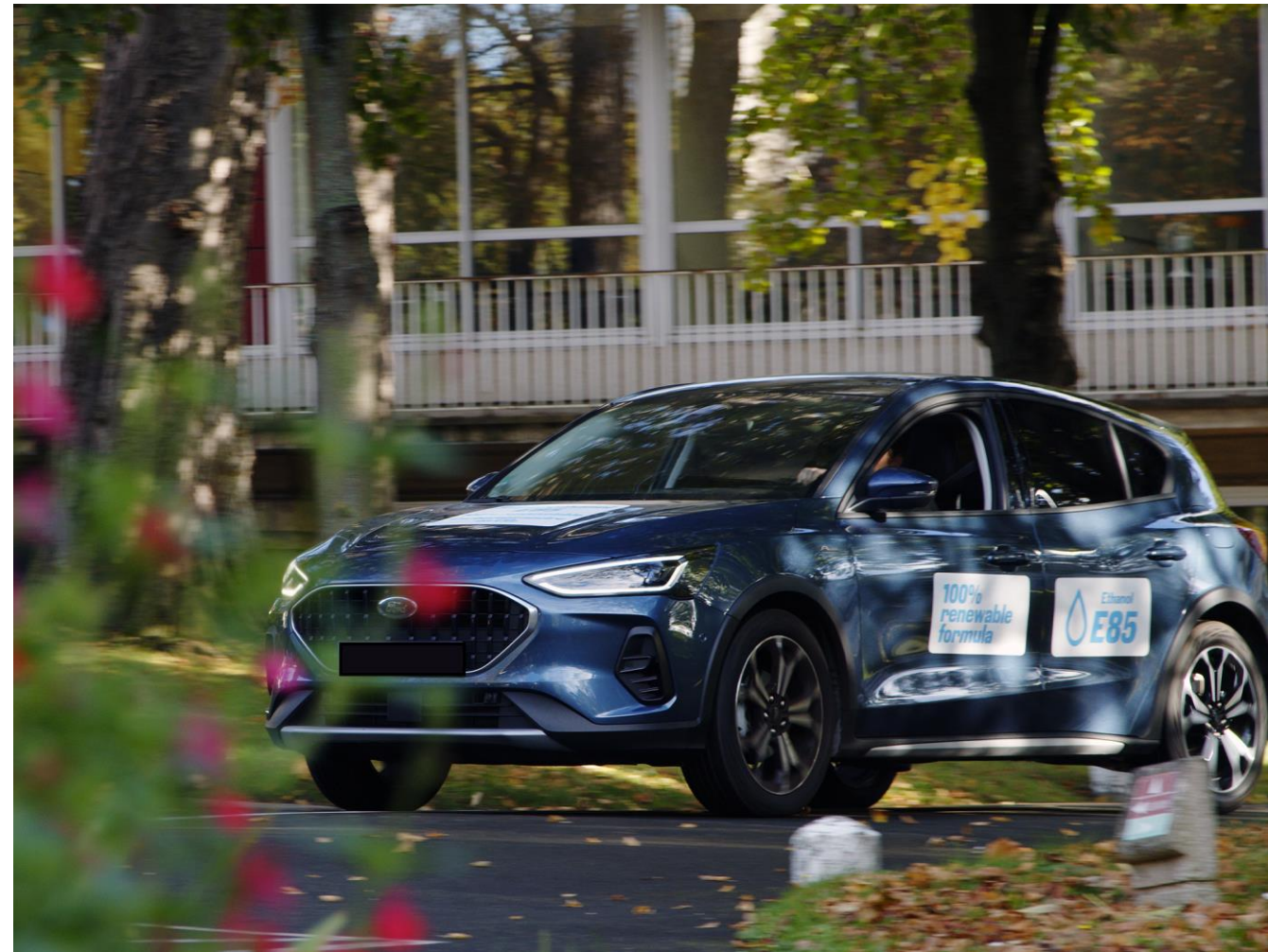


100% renewable E85 fuel for petrol cars after 2035

***Replacing the gasoline part of E85 with
a renewable component***





Why a fully renewable E85 fuel ?

2

Light Duty CO2 Regulation post 2035

**100% Battery
Electric Vehicles**

**Internal Combustion
Engine Vehicles
running exclusively on
Carbon neutral fuels**

E85



1) In recital 11 of CO₂ Regulation for light duty vehicles (UE) 2023/851 :

« Following consultation with stakeholders, the Commission will make a **proposal for registering after 2035 vehicles running exclusively on CO₂ neutral fuels** in conformity with Union law, outside the scope of the fleet standards, and in conformity with the Union's climate-neutrality objective. »

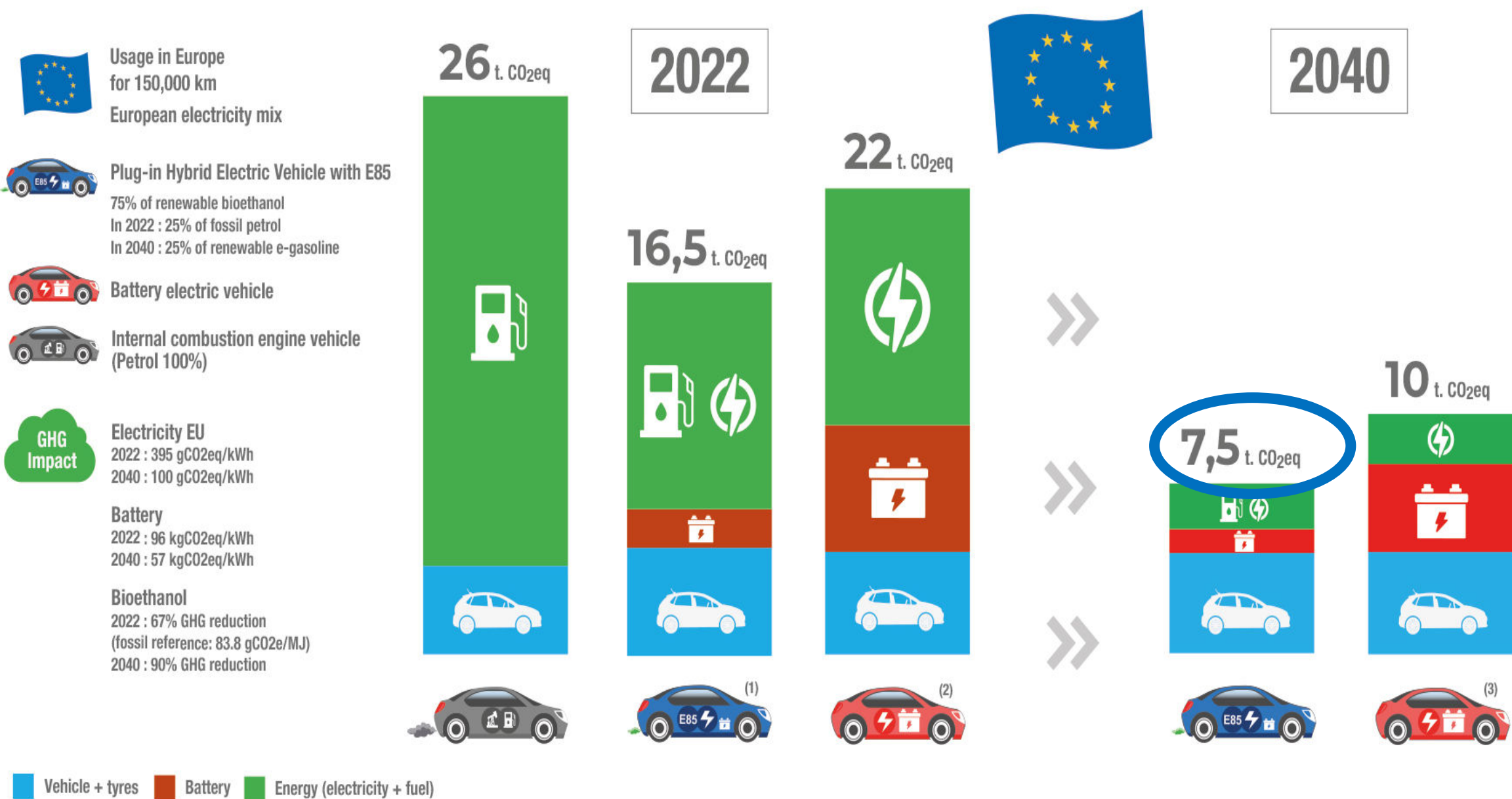
2) CO₂ neutral fuels = fuels that remove CO₂ from the atmosphere during its production phase and return CO₂ to the atmosphere during its combustion.

→ **Biofuels (biogenic CO₂) and synthetic fuels (captured CO₂)**

3) Political situation : 8 Member States (Italy, Czech Republic, Slovakia, Romania, Hungary, Finland, Bulgaria, and Poland) are in favour of a **definition which includes e-fuels and biofuels as defined in Renewable Energy Directive.**



What would be the CO₂ emissions of a PHEV running on fully renewable E85 compared to BEV in Europe ?



IFPen study (2022): CO₂ emissions in LCA

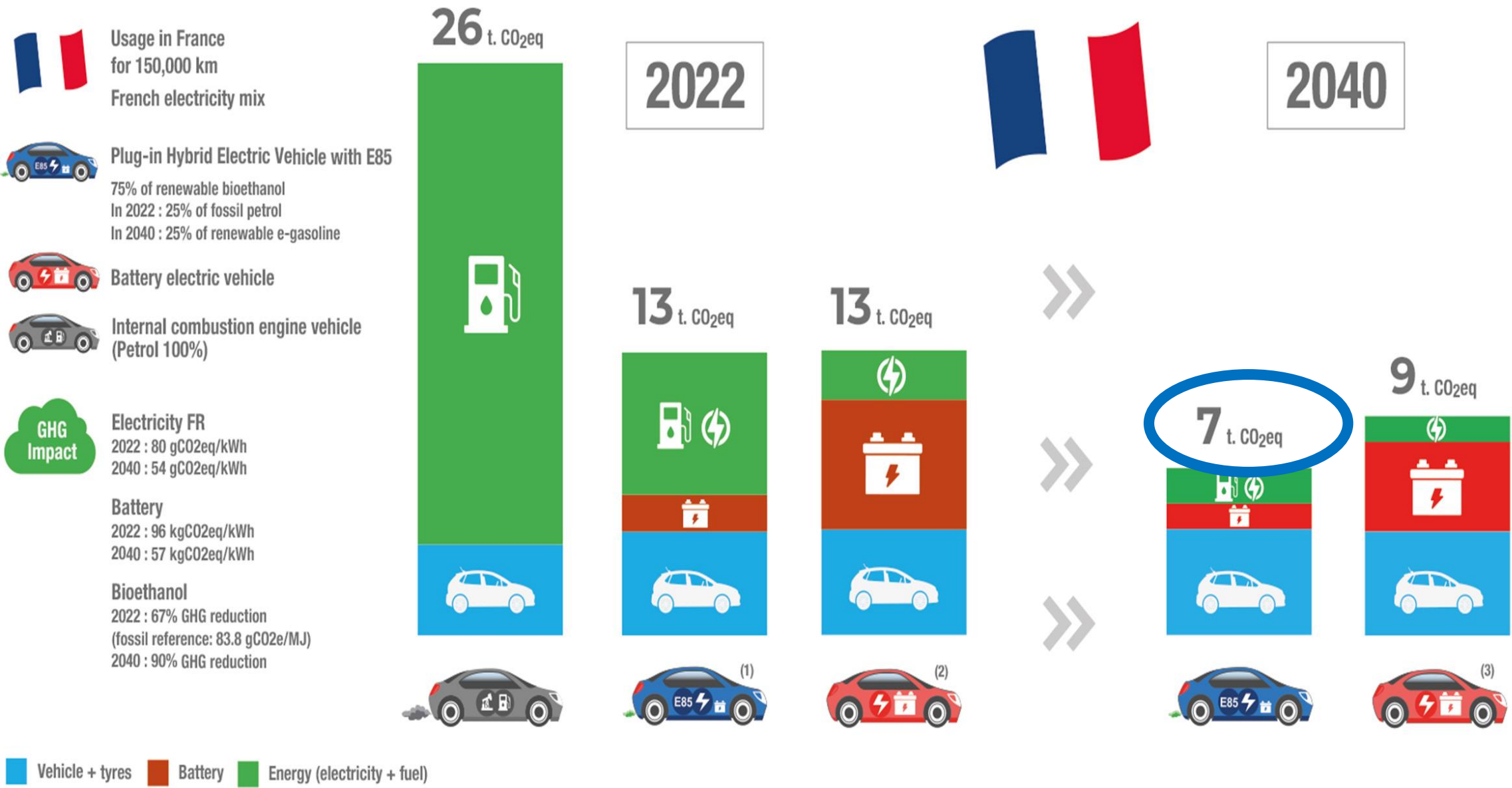
For C-segment, with **European electricity mix**, a Plug-in Hybrid Vehicle running on E85 has **lower CO₂ emissions** than a Battery Electric Vehicle on a life-cycle analysis both in 2022 and 2040.

(1) 10 kWh battery for an electric range of 50km. Total range > 500 km. Mixed use 40% electric / 60% internal combustion engine.
(2) 60 kWh battery for a maximum range of 320 km in 2022.
(3) 60 kWh battery for a maximum range of 400 km in 2040.

Source: IFPEN study for SNPAA, AIBS and Interc  reales (September 2022)



What would be the CO2 emissions of a PHEV running on fully renewable E85 compared to BEV in France ?



For C-segment, with **French electricity mix (low carbon)**, a Plug-in Hybrid Vehicle running on E85 has **equivalent CO2 emissions** than a Battery Electric Vehicle on a life-cycle analysis **in 2022 and lower in 2040.**

(1) 10 kWh battery for an electric range of 50km. Total range > 500 km. Mixed use 40% electric / 60% internal combustion engine.
(2) 60 kWh battery for a maximum range of 320 km in 2022.
(3) 60 kWh battery for a maximum range of 400 km in 2040.

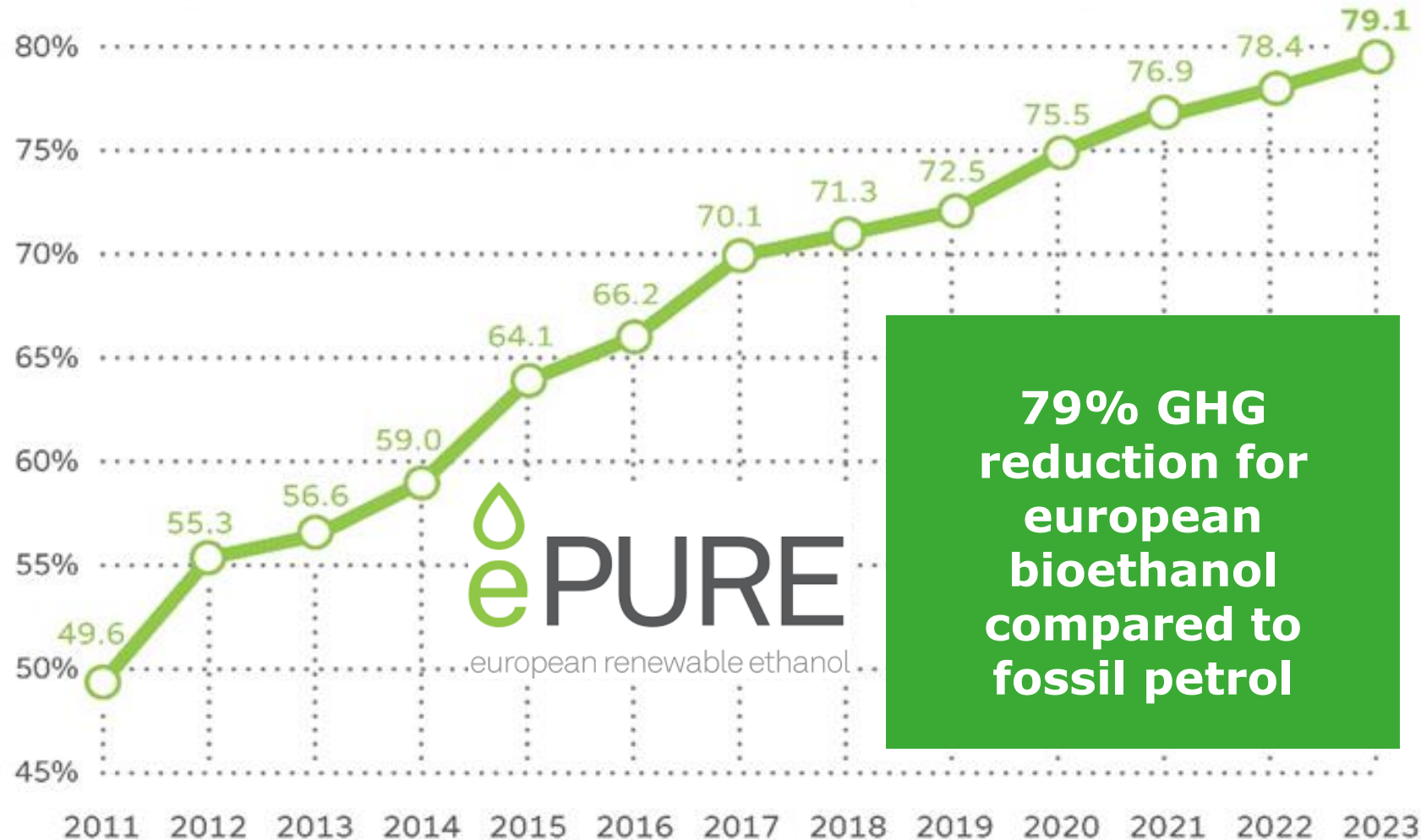
Source: IFPEN study for SNPAA, AIBS and Intercéreales (September 2022)



Average European bioethanol GHG emissions savings keep improving

Average certified GHG emission savings in %

Since 2011 the average certified greenhouse gas emission savings of renewable ethanol against fossil fuel have increased continuously, reaching 79.1% in 2023.

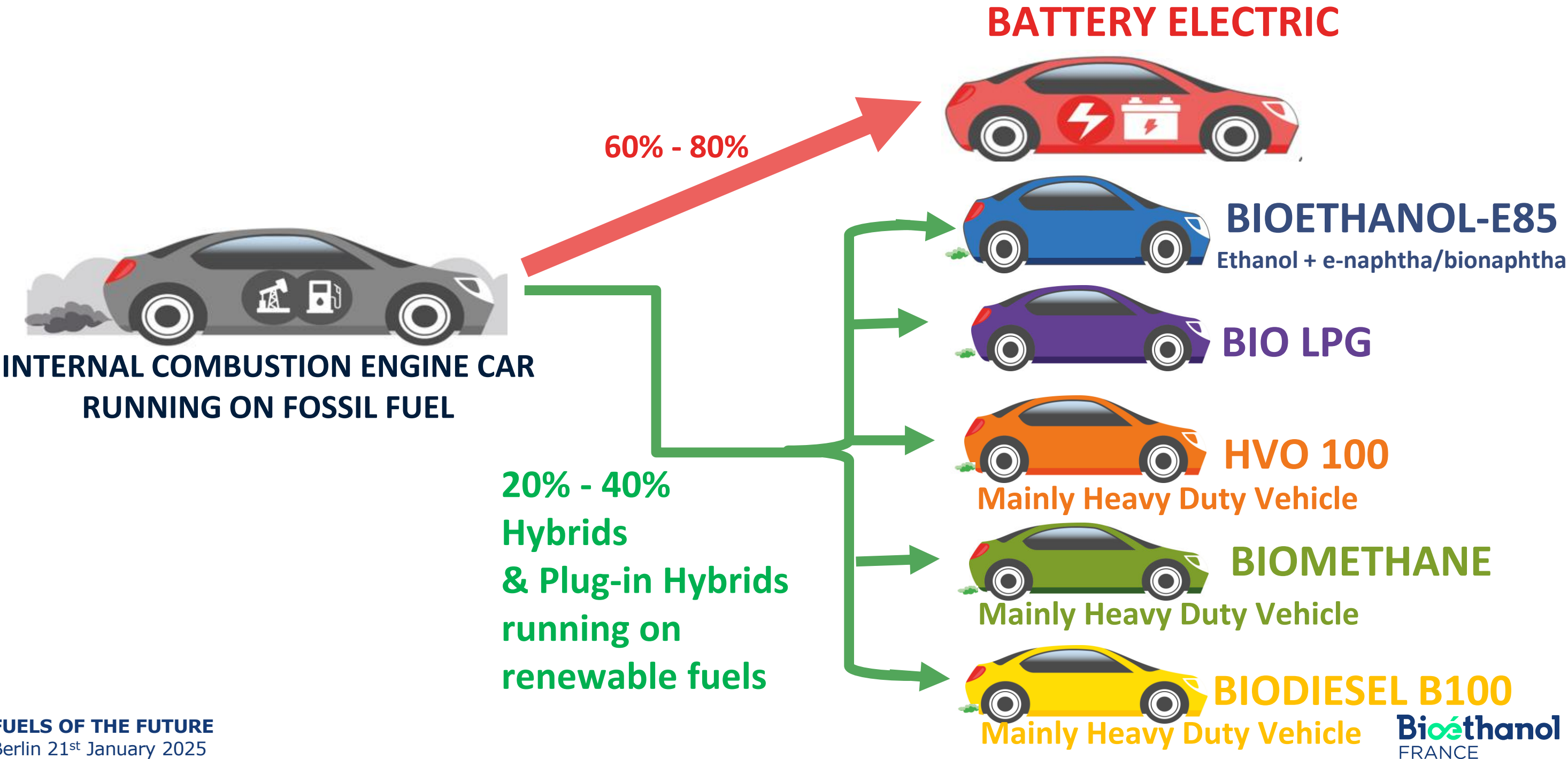


- Decarbonizing the boilers (biomass)
- Methanisation of effluents
- Capturing fermentation CO2 from ethanol production and replacing fossil CO2 in other sectors

Source: Aggregated and audited data of ePURE members for volumes certified under RED I or RED II methodology



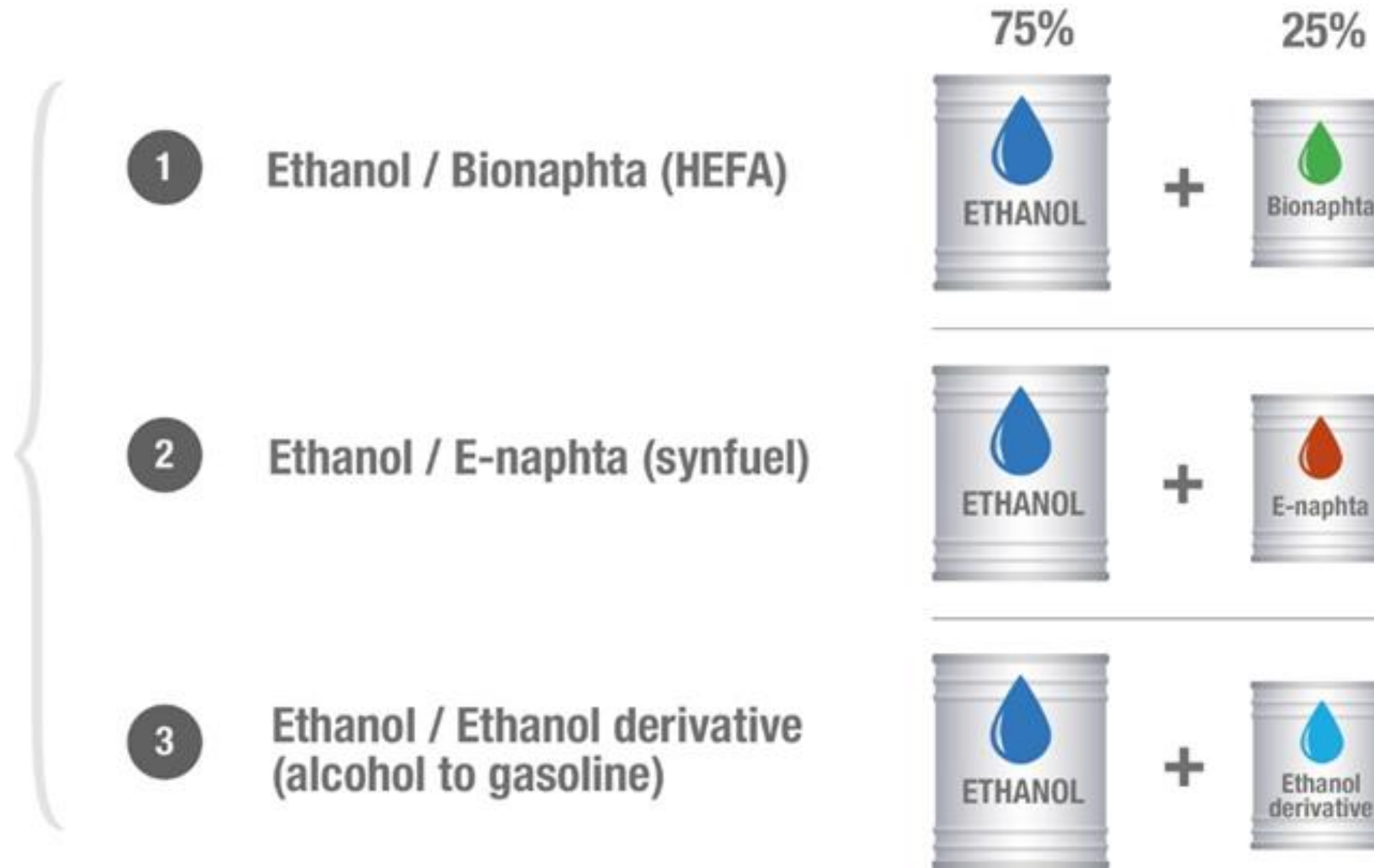
Technological neutrality: several technologies can help to achieve EU climate targets





Replacing the gasoline part of E85 with a renewable component: 3 formulas of 100% renewable E85 fuels

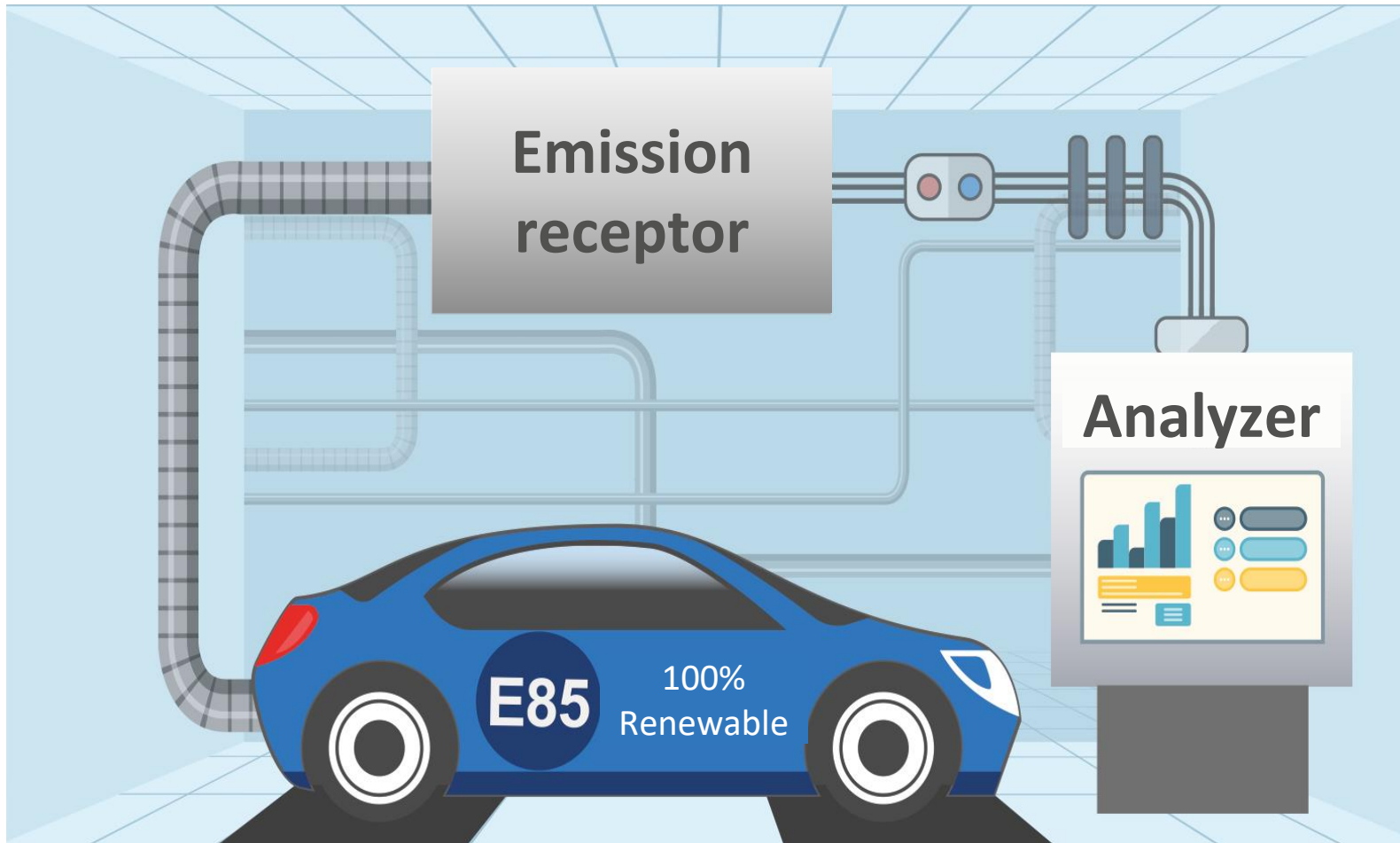
8





What would be the pollutant emissions of a car running on a fully renewable E85 fuel ?

9



IFPen study (2024): pollutants emissions

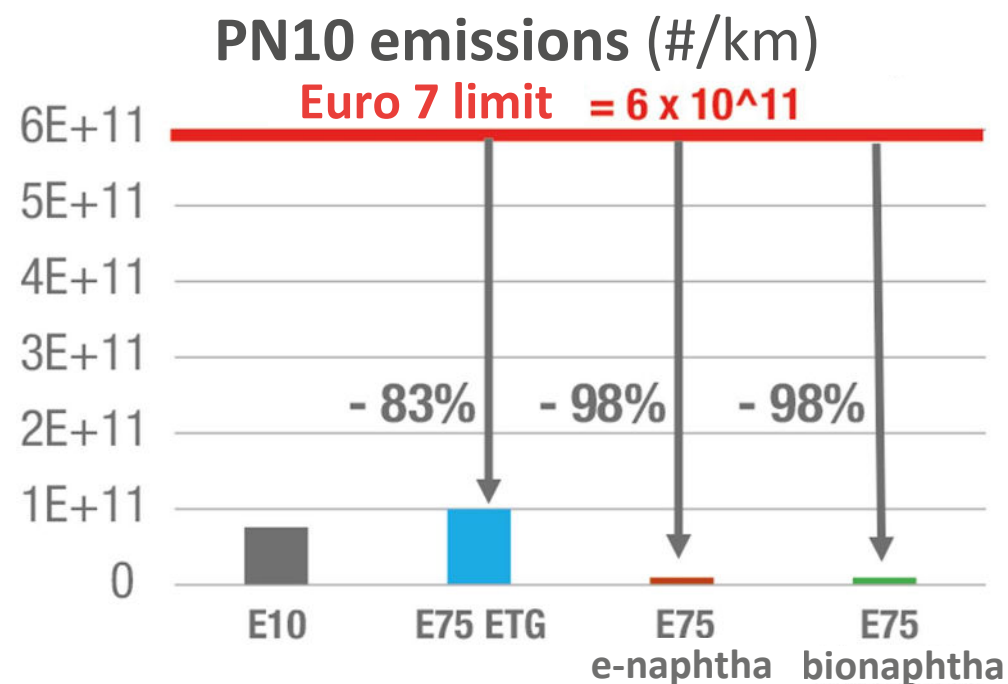
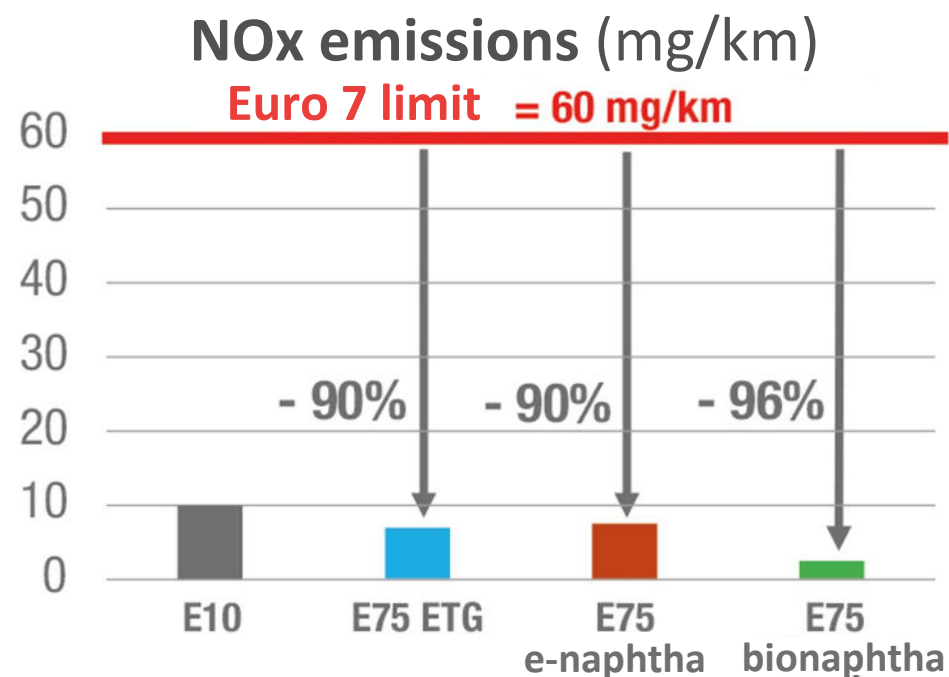
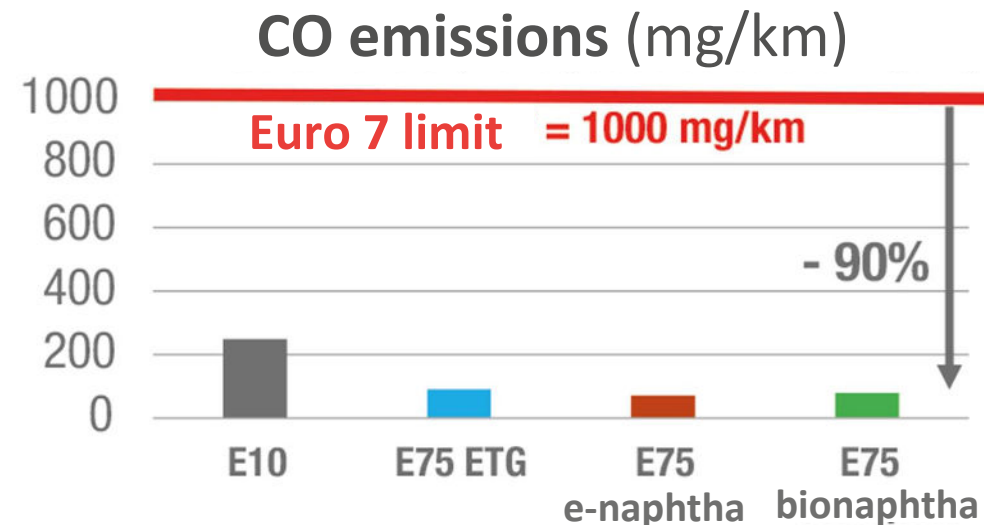
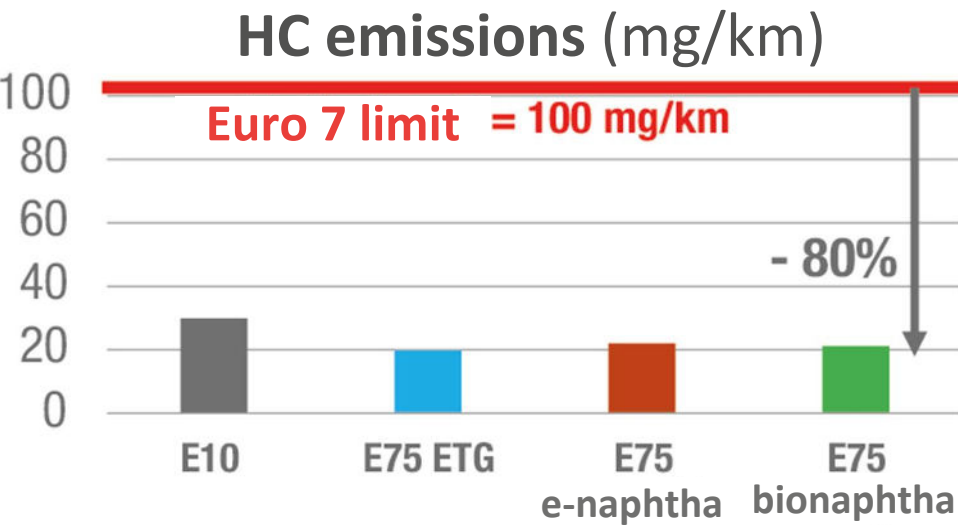
Laboratory test

- On roller bench
- mHEV Euro 6d flexfuel car (Ford Focus)
- **WLTP homologation test at 23°C**
- Ethanol-E85 100% renewable fuel
(75% bioethanol + 25% renewable gasoline)
- Pollutants measured : **HC, CO, NOx, PN10**



Pollutants emissions are well below Euro 7 limits

10



E75 bionaphtha
Very low PN10 and
NOx emissions

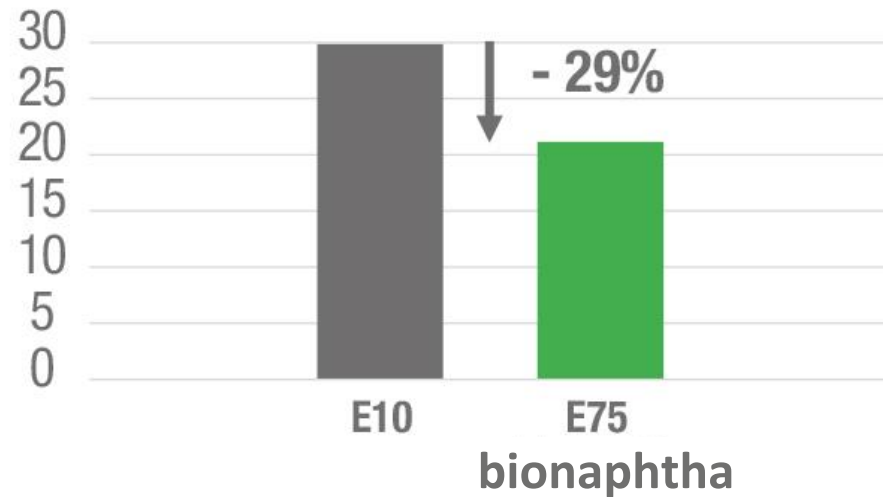
E75 e-naphtha
Very low PN10
emissions



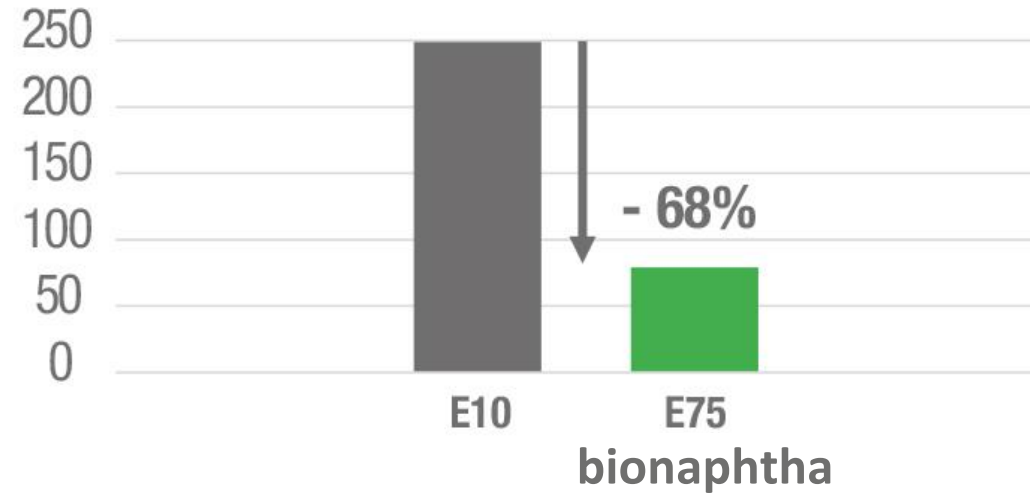
E75 with bionaphtha: Very low emissions compared to E10 fuel

11

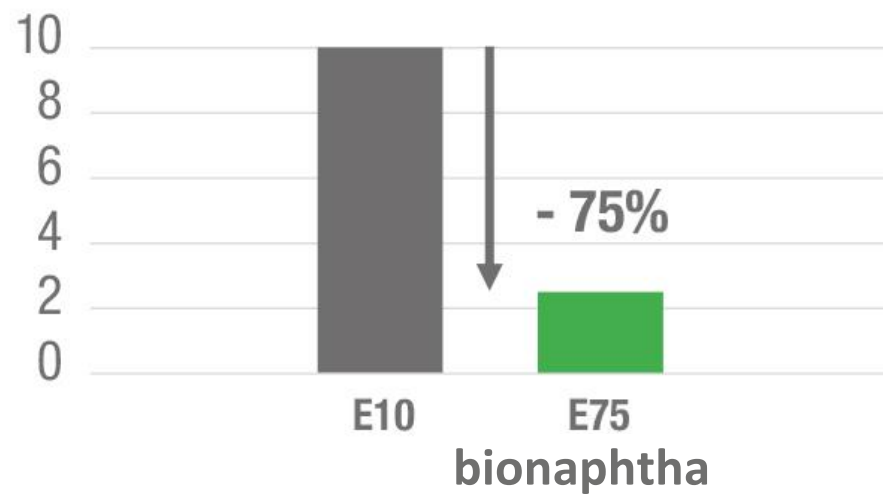
HC emissions (HydroCarbons in mg/km)



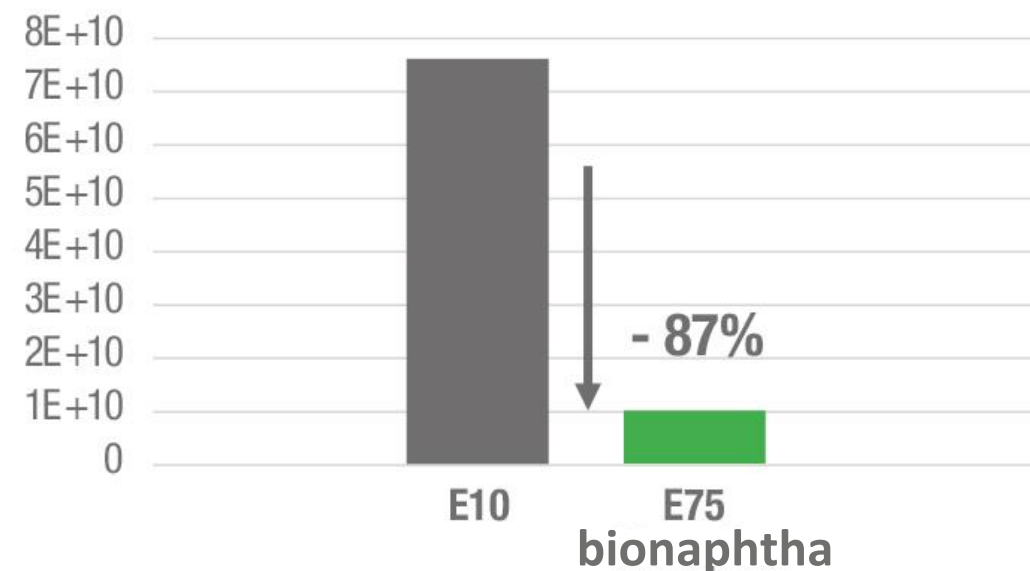
CO emissions (Carbon monoxide in mg/km)



NOx emissions (Nitrogen oxide in mg/km)



PN 10 emissions (Particulates /km)



**E75 with
bionaphtha**
Very low PN10 and
NOx emissions



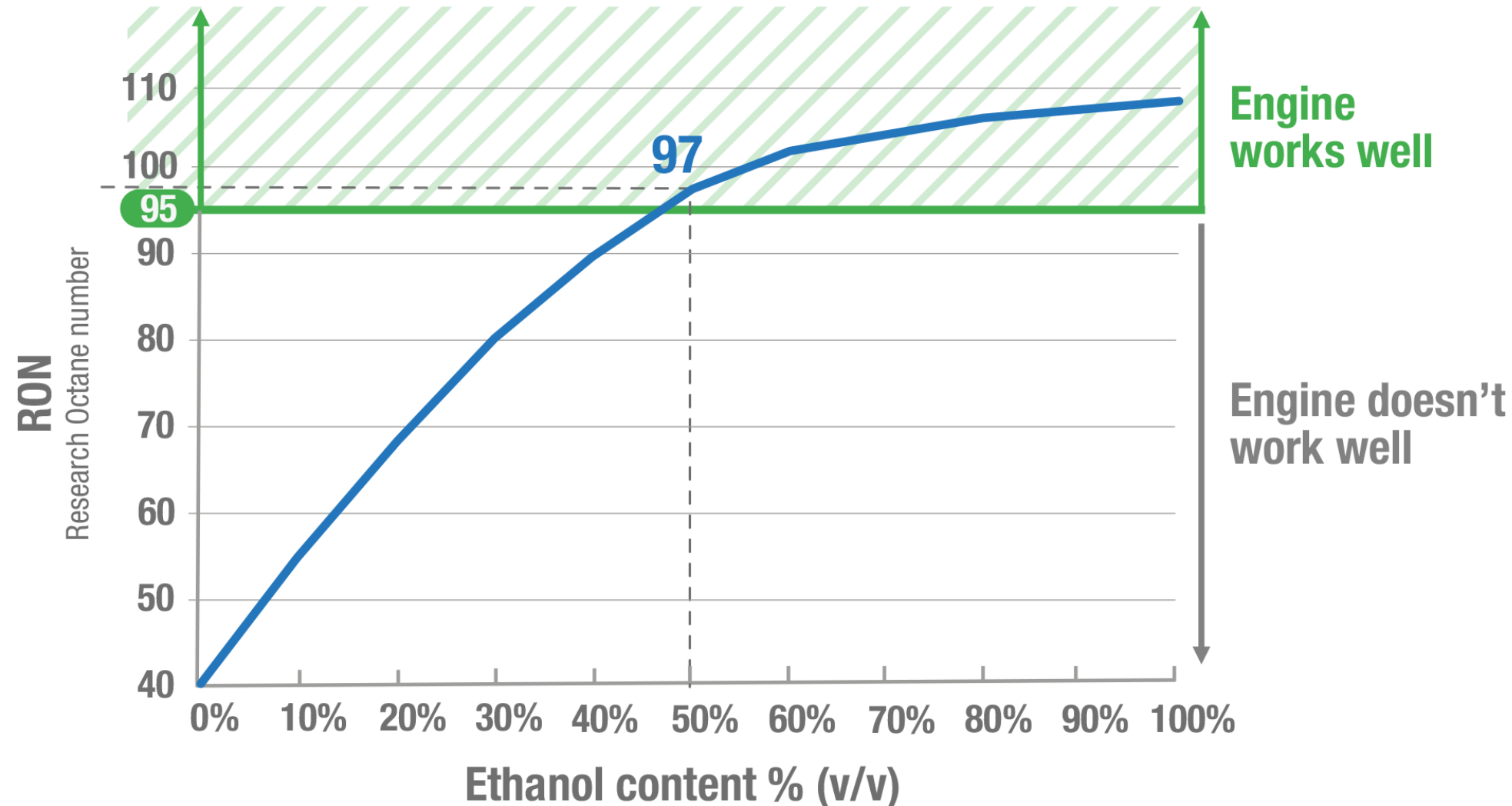
Renewable gasoline needs an octane booster like bioethanol to burn well in the engine

12

e-naphtha and bionaphtha cannot work alone in a petrol engine because of their too low octane (RON around 40)

In Europe, the ethanol content of E85 is between 50% (winter period) and 85% (summer period).

A fully renewable E85 (blend of bioethanol and e-naphtha or bionaphtha) has always a RON above 95.





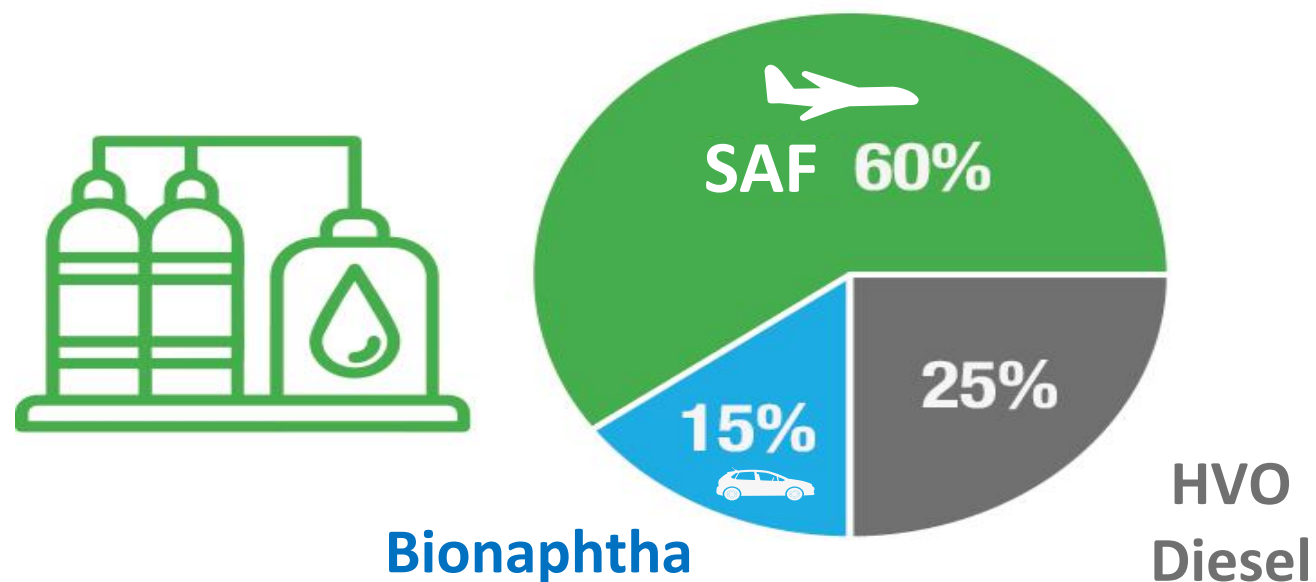
Bionaphtha/e-naphtha: co-products of SAF production

13

The outlet of road transport for bionaphtha and e-naphtha is crucial to the economic viability and future development of Sustainable Aviation Fuels.

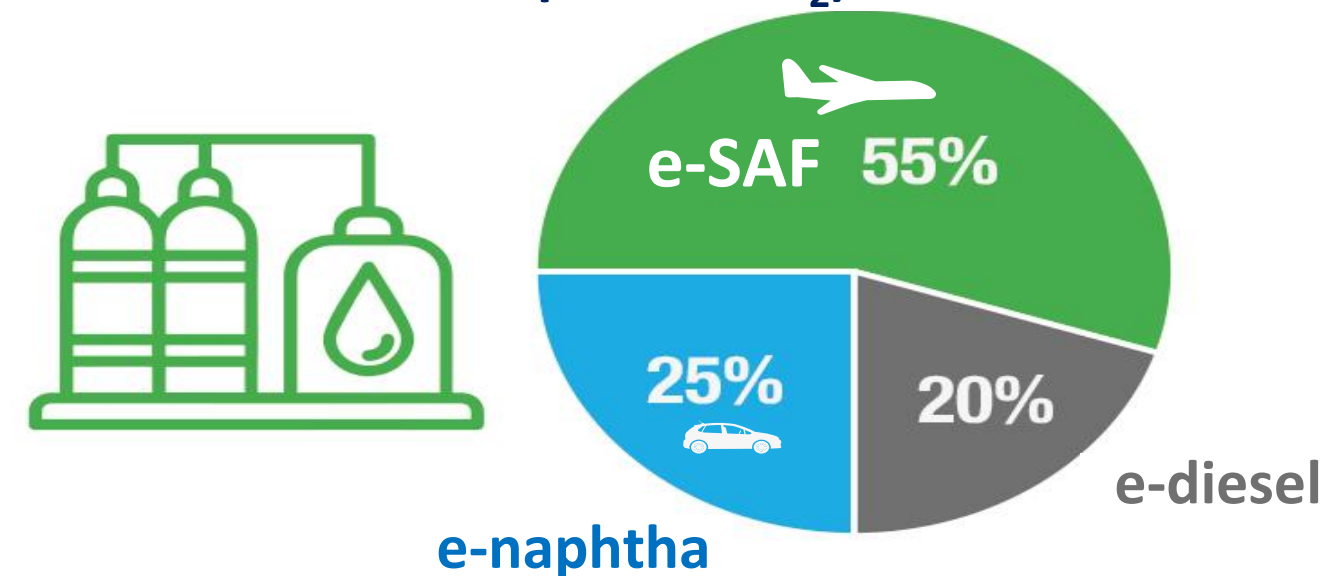
Already available

Hydrotreated Vegetable Oil pathway



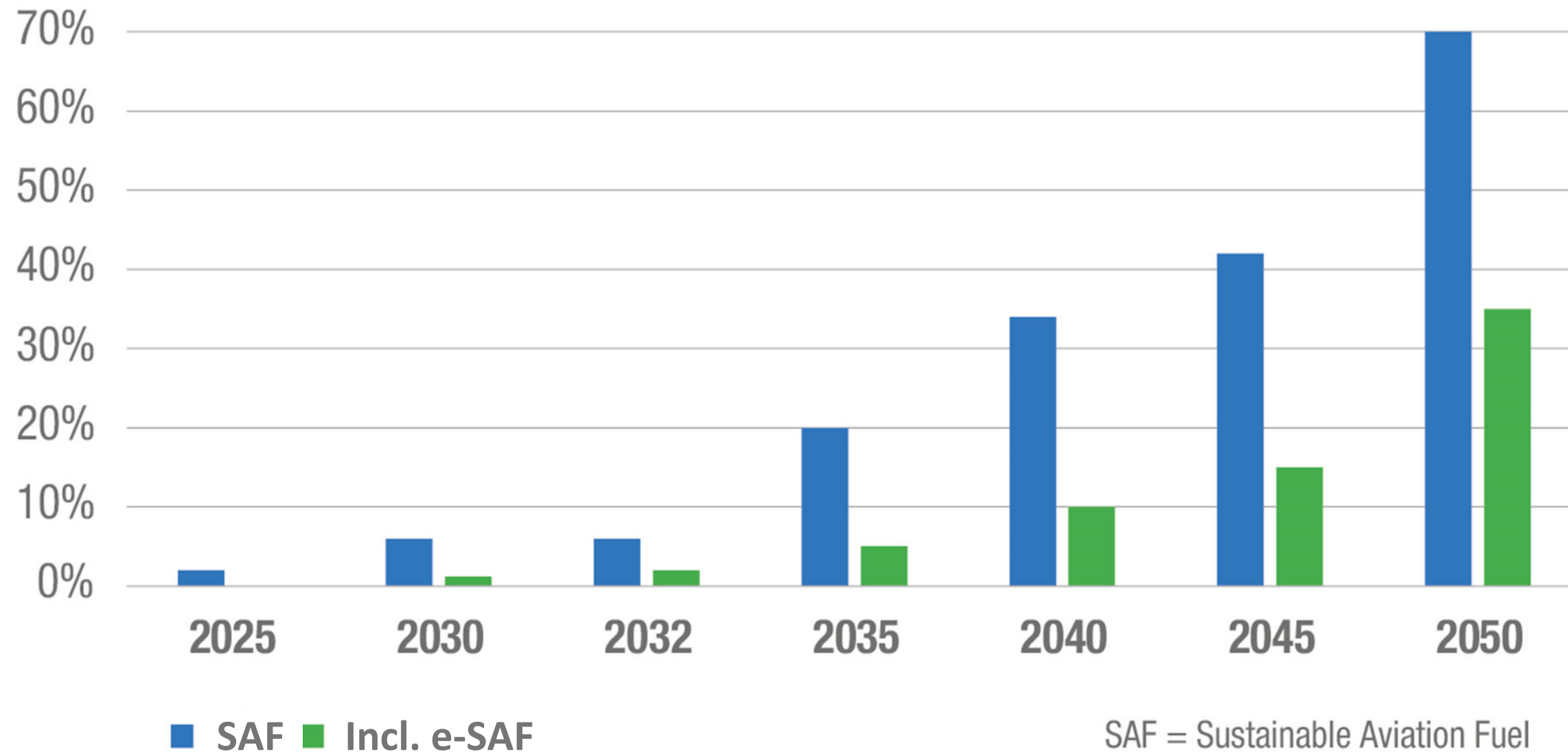
Available tomorrow

e-fuel pathway (H₂ from water electrolysis and from captured CO₂)



SAF = Sustainable Aviation Fuel

ReFuel EU Aviation : increasing SAF and e-SAF targets until 2050¹⁴

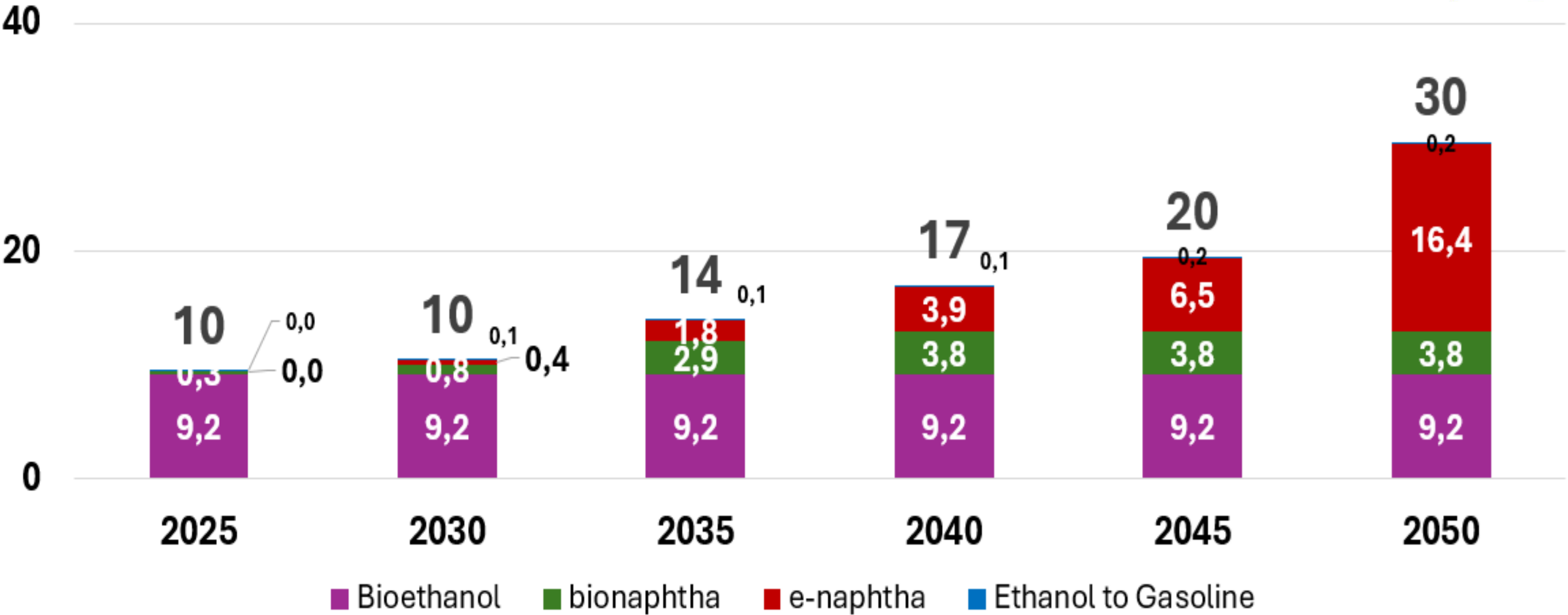




Increasing availability forecast of renewable gasoline in Europe



Availibility of renewable gasoline in Europe (in Million m3)



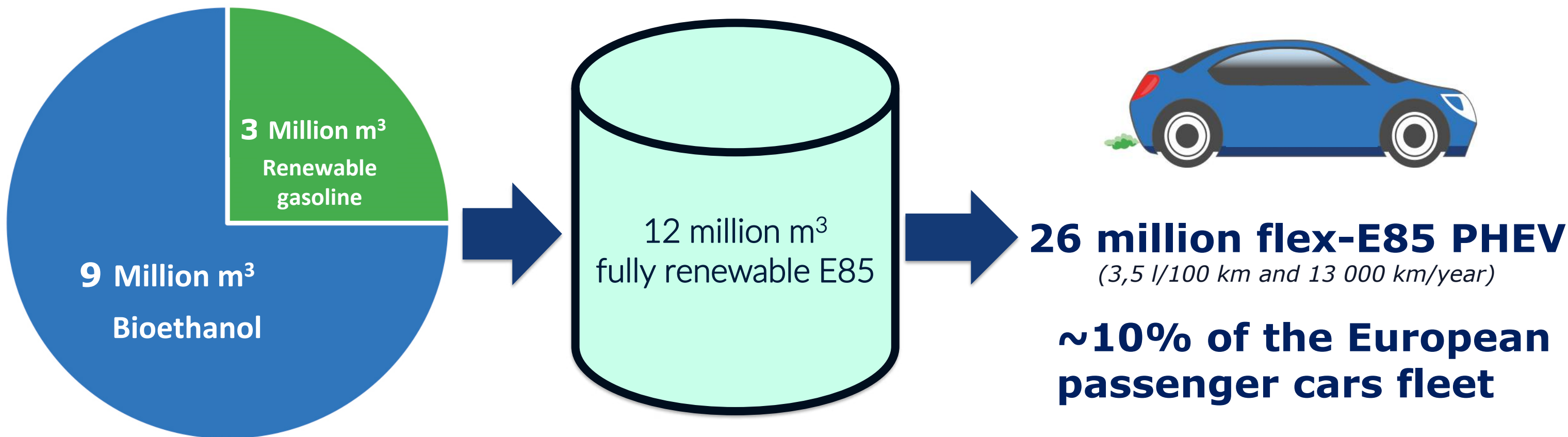
**based on OACI forecast for world aviation fuel consumption (from 300 Million tonnes in 2025 to 500 Million tonnes in 2050); EU share of 16,5% of global aviation fuel consumption; Targets of SAF and e-SAF from ReFuel EU Aviation; Share of bionaphtha and e-naphtha co-products when producing SAF and e-SAF.*



Potentially 26 million Plug-in Hybrid Vehicles running on fully renewable E85 in 2035 in Europe



16



EU ethanol production capacity in 2024



100% renewable E85 fuel exists today in California

17



100% renewable E85 fuel in California:

- For 1/3 of volumes of E85 in 2022
- Blend of 83%v/v of **bioethanol** and 17%v/v of **bionaphtha**.

→ The 100% renewable E85 fuel works in practice.

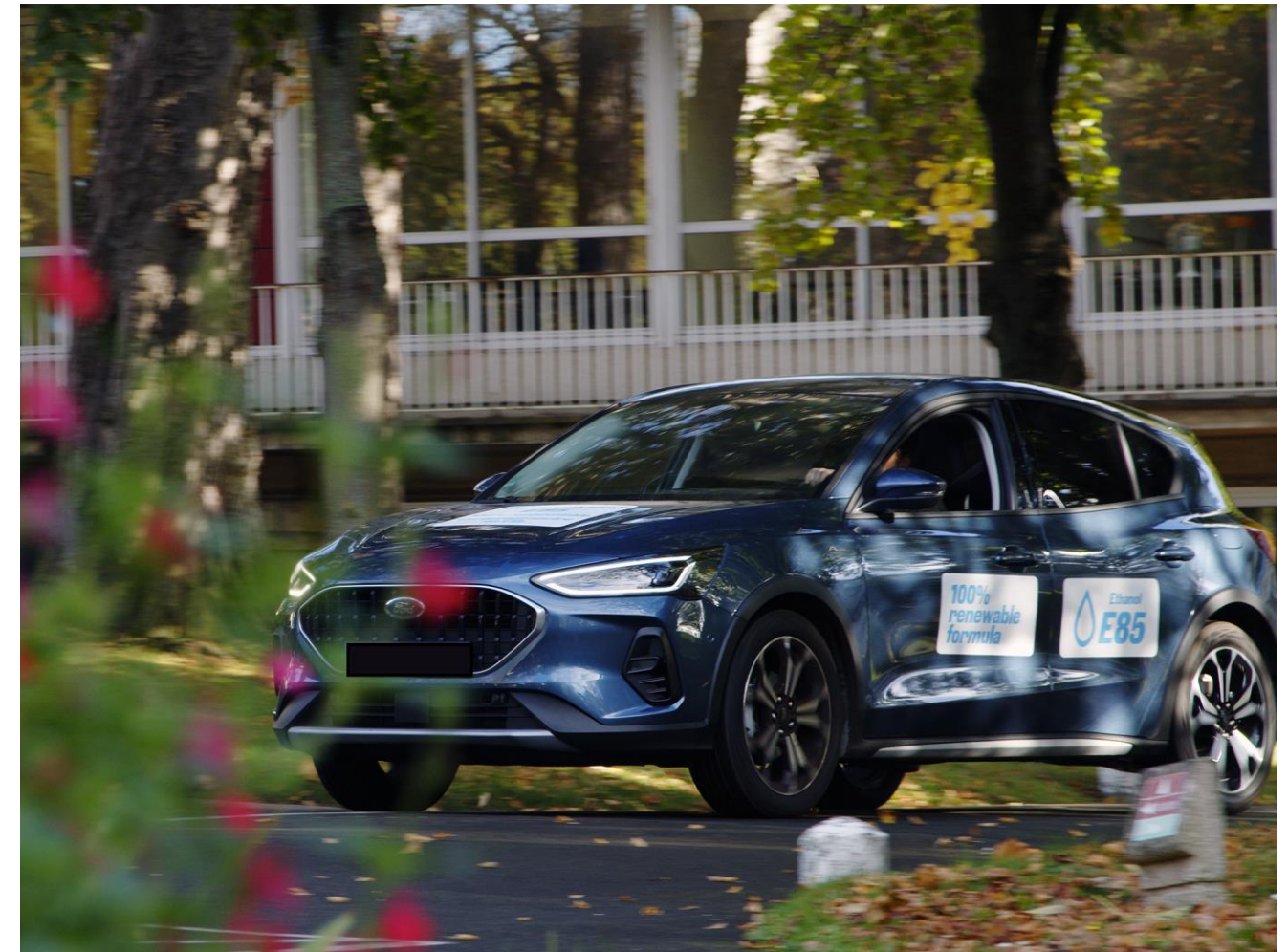
→ In Europe, logistics to be developed and E85 standard to be adapted.



**Thank you !
Any questions ?**

Nicolas KURTSOGLOU

nkurtsoglou@bioethanolfrance.fr



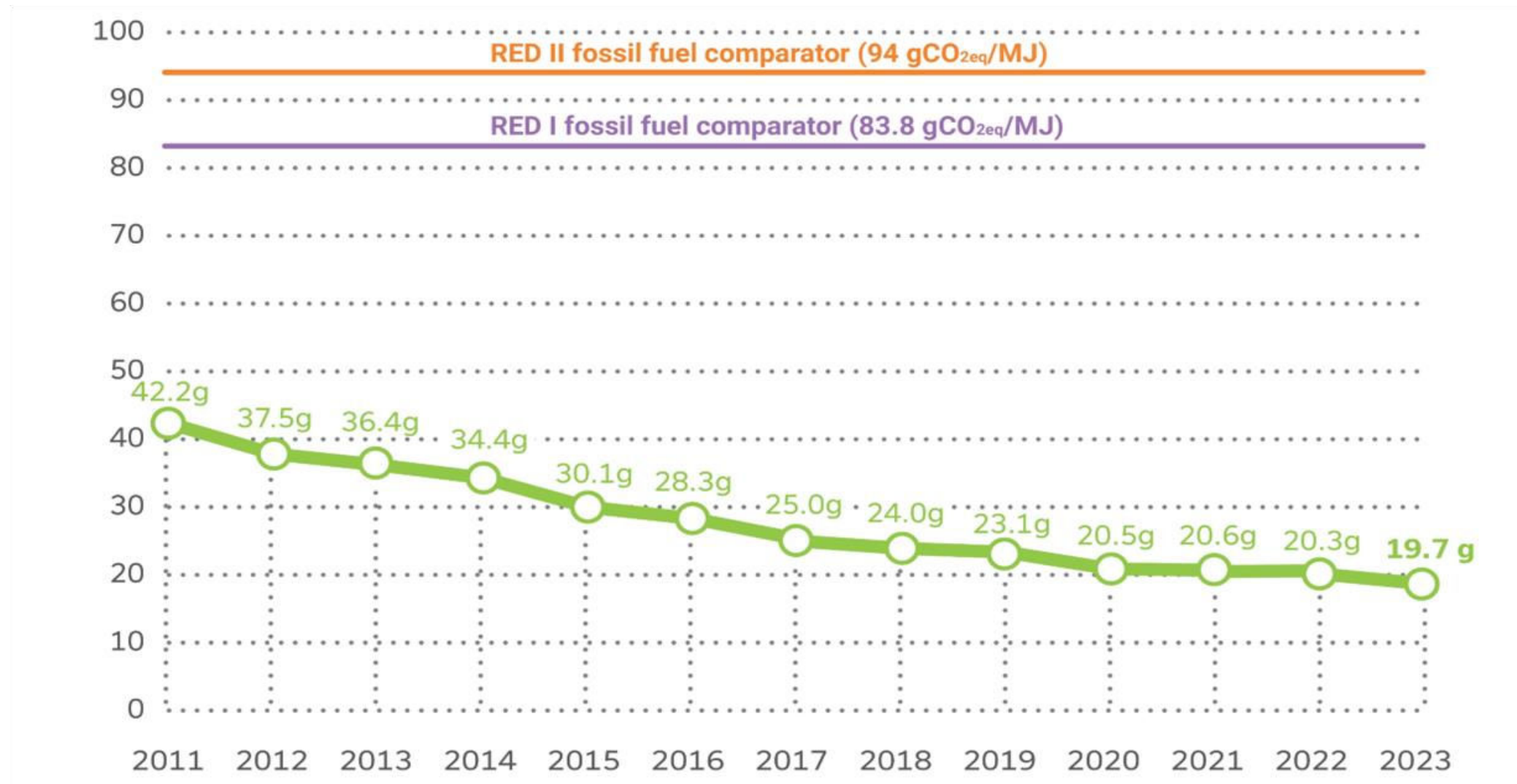
Bioéthanol
FRANCE Activer les synergies
du végétal

Annex



CO₂ emissions below 20gCO₂eq/MJ for European bioethanol²⁰

Average certified emissions from the production
and use of fuel ethanol in gCO₂eq/MJ



Source: Aggregated and audited data of ePURE members and other bioethanol producers for 2023 for volumes certified under RED I or RED II methodology

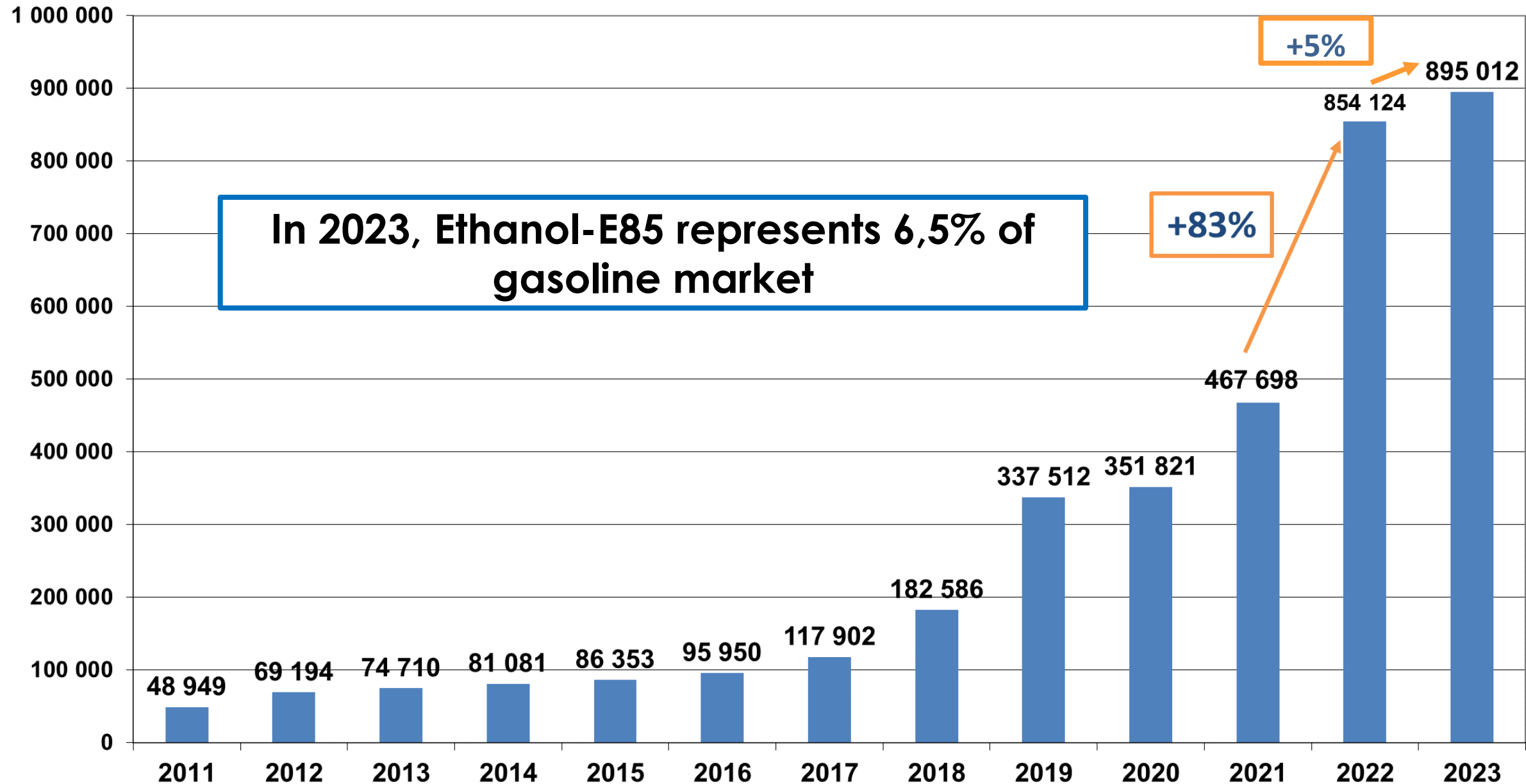


Annual Ethanol-E85 consumption in France

21



Volumes (m3)

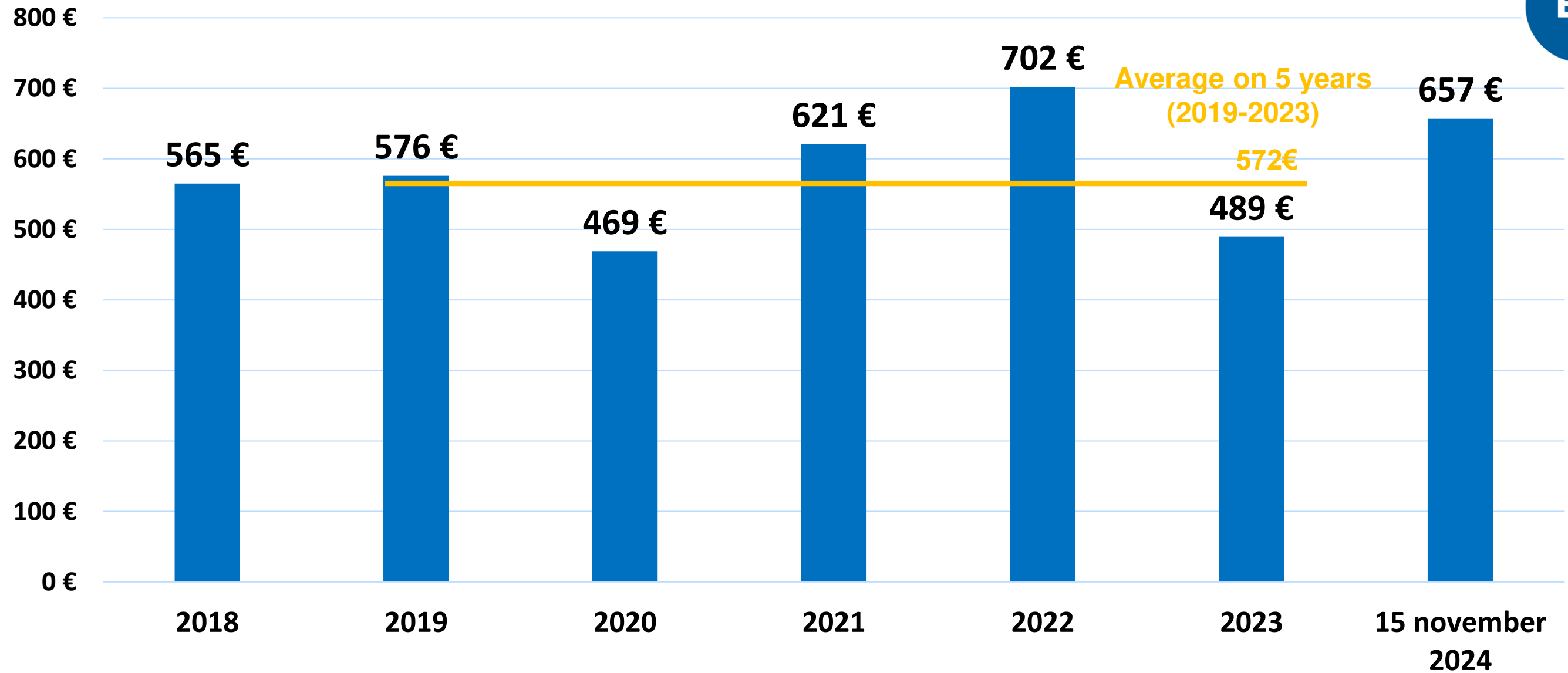




E85 : Around 0,80€/litre in France

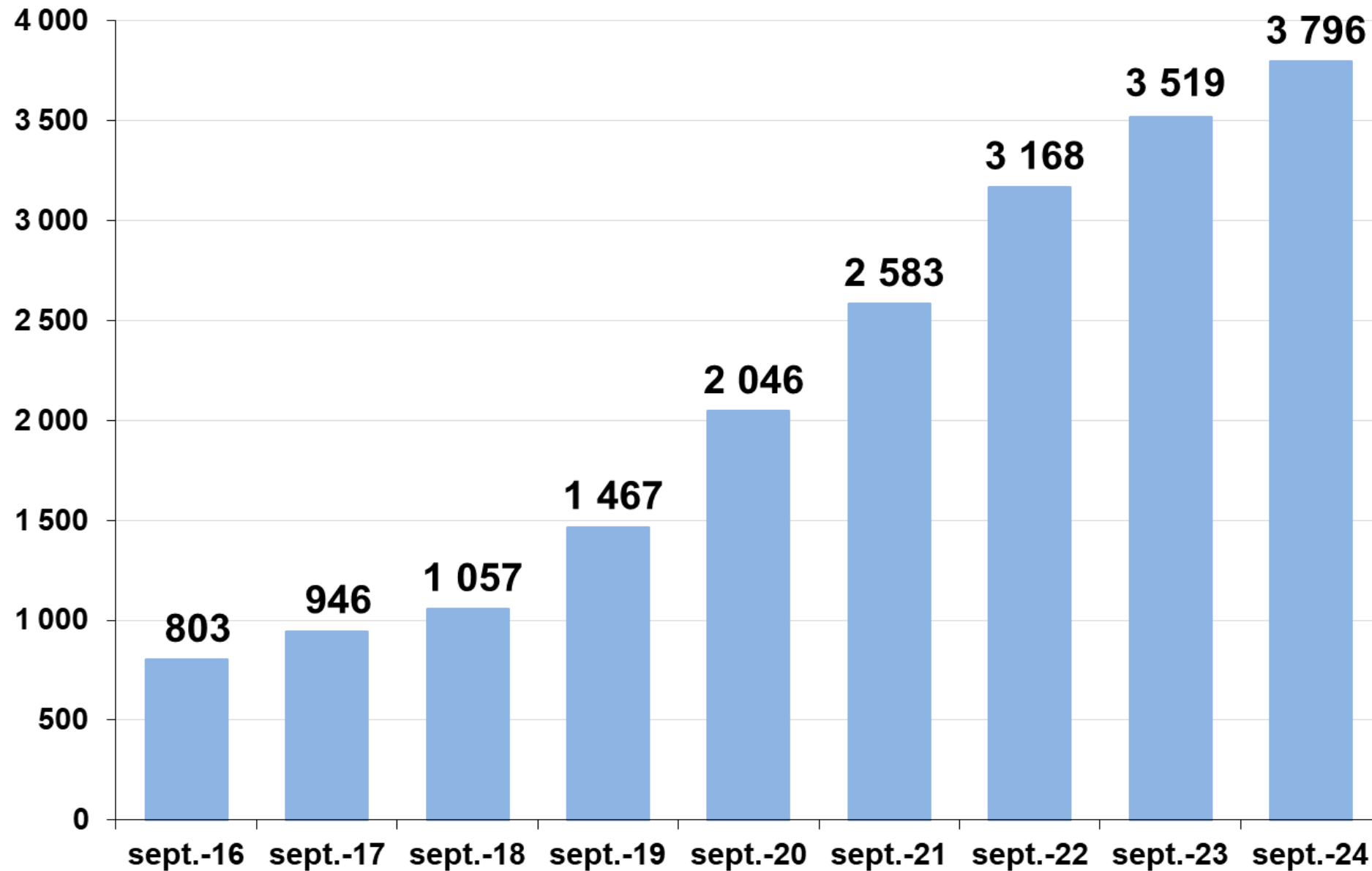
22

Savings with E85 compare to E10*

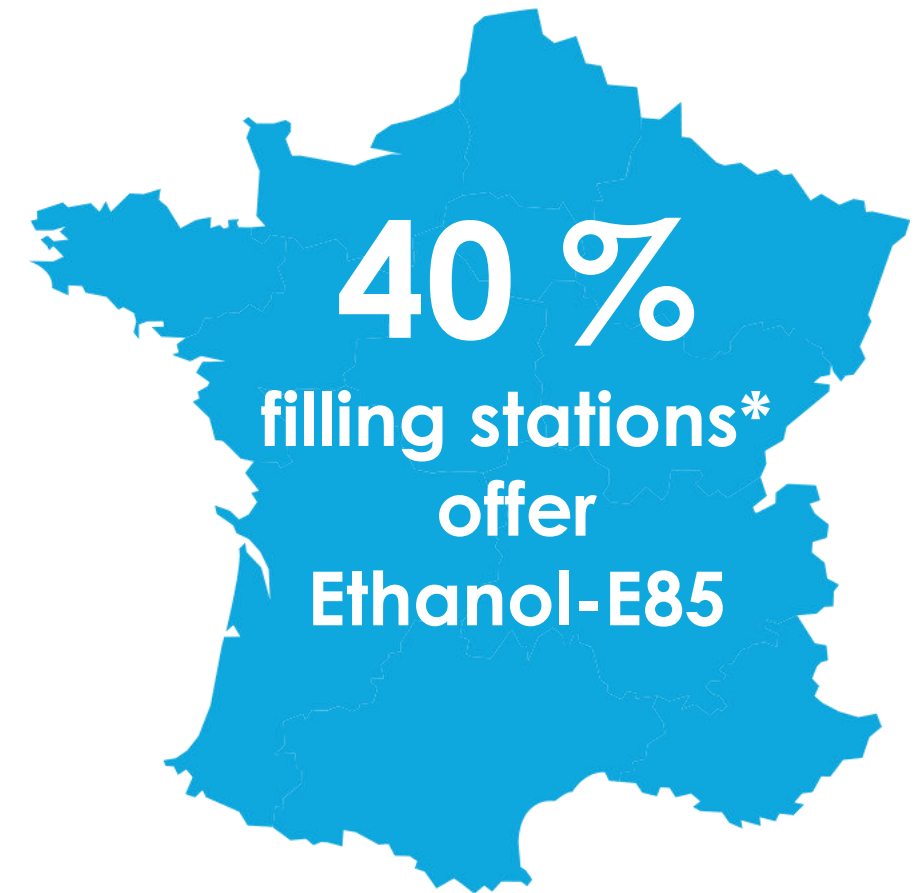


Sources : French Ministry (DGEC) and Bioéthanol France

Increasing number of filling stations offering E85 in France²³



E85



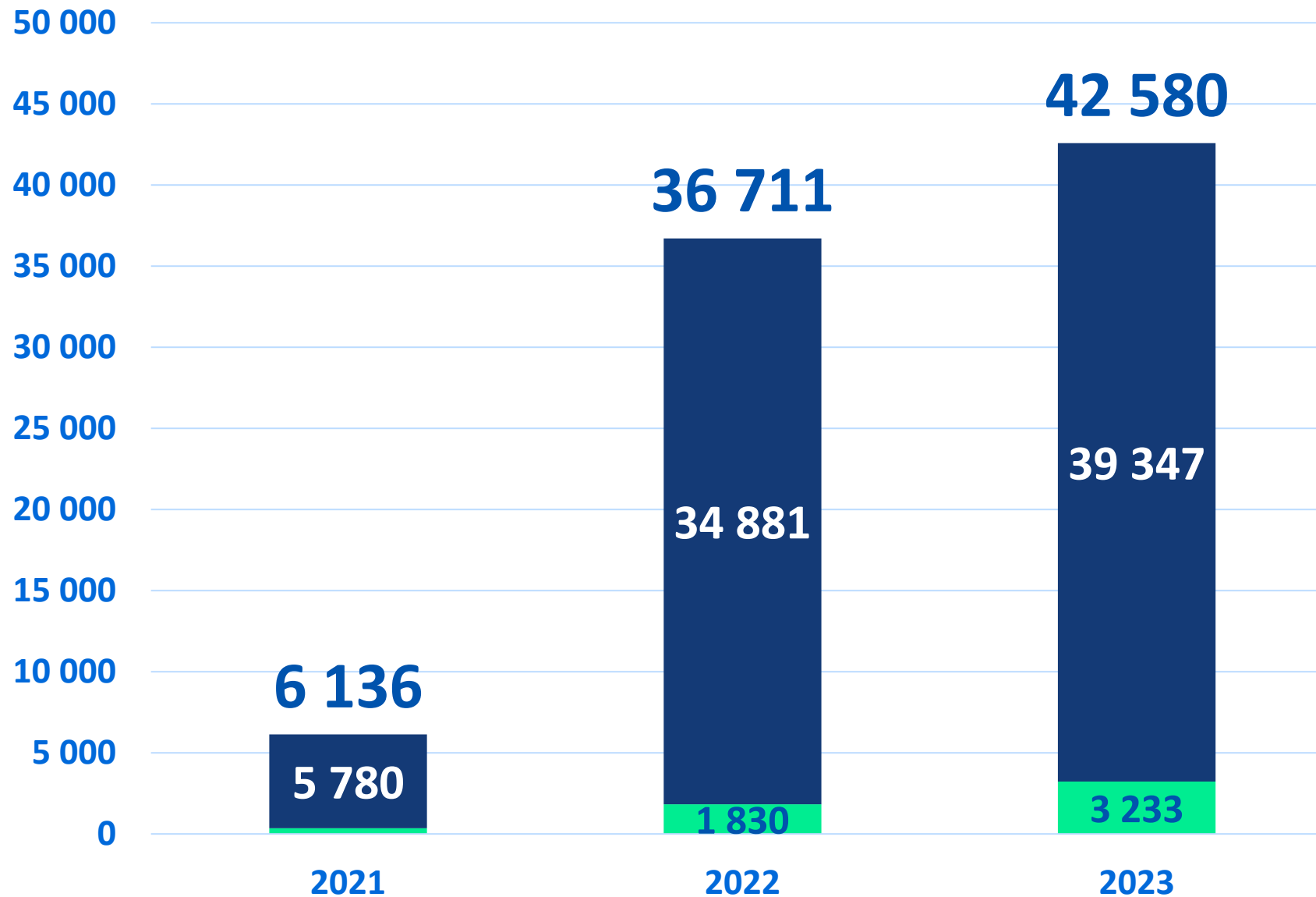
* Among 9 500 stations selling more than 500 m3 of petroleum product.



More than 40 000 flexfuel vehicles registered in 2023

24

■ LCV flex-E85 ■ LDV flex-E85



E85

