E85

An ethanol blend to fuel Europe's clean mobility

E85 is a fuel containing up to 85% renewable ethanol in volume blended with petrol to run flex-fuel vehicles and petrol cars equipped with a simple conversion system.

It is widely available in France and Sweden and to a lesser degree in other EU countries.

- In addition to reducing greenhouse gas emissions compared to fossil fuels, E85 improves air quality.
- By helping increase the share of renewable energy in transport, E85 reduces overreliance on fossil fuels and imported crude oil.
- E85 provides consumers with a low-cost and low-carbon alternative to fossil fuels made from domestic agricultural feedstock.

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Discover how E85 made from renewable ethanol can help reduce emissions from petrol cars and give motorists a low-cost alternative to fossil fuels →

What is E85?

- **E85 is a fuel blend containing up to 85% renewable ethanol by volume**, completed by a petrol base[1]. Renewable ethanol is made from biomass feedstock such as sustainably grown crops, wastes and residues.
- **E85 is already widely distributed in France and Sweden and is available, to a lesser extent, in other European countries** such as Lithuania and Czech Republic. In 2018, Europe had around 4,000 filling stations selling E85[2].

Compared to fossil fuels, renewable ethanol produced by ePURE members delivers significant GHG savings: more than 72% on average in 2019[6].

The more ethanol is blended in, the higher the savings.

Why use E85?

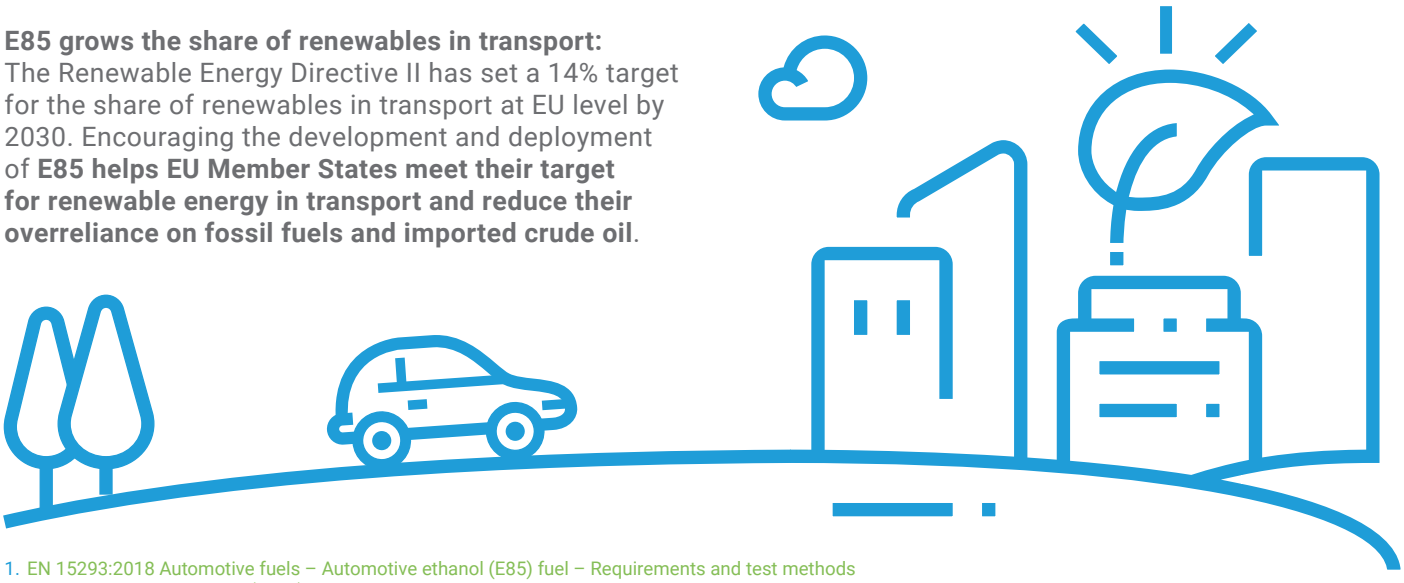
DRIVING THE GREEN DEAL

E85 helps the EU meet its long-term climate ambitions: European transport is still overreliant on fossil fuels[3]. Transport emissions are 19% higher than in 1990, accounting for 25% of the total greenhouse gases (GHG) emissions in the EU in 2018[4]. Road transport makes up more than 70% of that amount. But **using ethanol significantly reduces emissions: on a well-to-wheel basis, a car running on E85 saves around 50% of GHG emissions[5] compared to a car running on fossil petrol**. Renewable ethanol could therefore help the EU meet its ambitions of reducing the GHG intensities of fuels (Fuel Quality Directive) and to decarbonise the EU transport sector, a step toward the Green Deal's plan to achieve carbon neutrality by 2050.

E85 grows the share of renewables in transport: The Renewable Energy Directive II has set a 14% target for the share of renewables in transport at EU level by 2030. Encouraging the development and deployment of **E85 helps EU Member States meet their target for renewable energy in transport and reduce their overreliance on fossil fuels and imported crude oil**.

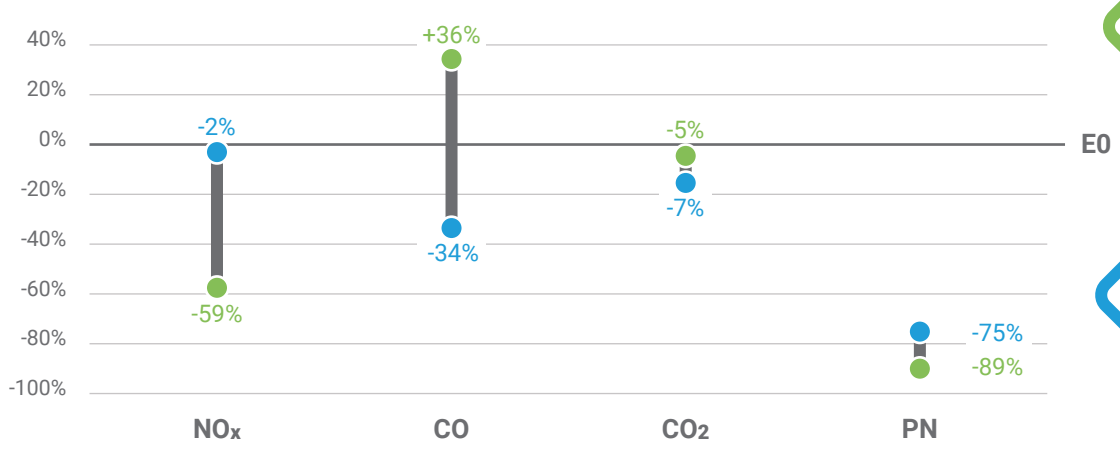
REDUCING URBAN POLLUTION

E85 helps improve air quality: E85 helps improve air quality as its combustion leads to significantly less pollutants and particles than conventional fossil petrol. In a 2017 study, two flex-fuel vehicles were tested[7] with E85 and ethanol-free petrol fuel E0, using the worldwide harmonised light-duty vehicle test cycle (WLTC) and the real driving emissions test (RDE).
Compared to E0, **using E85 reduced the emissions of nitrogen oxides (NO_x) and the number of particulates (PN) in both vehicles and in all driving conditions**. Carbon dioxide (CO_2) tailpipe emissions are reduced as well. Carbon monoxide (CO) emissions results were found to be inconclusive. E85 also achieves further CO_2, CO and PN emissions reduction[8] compared to E10[9], another petrol fuel with a lower renewable ethanol content.

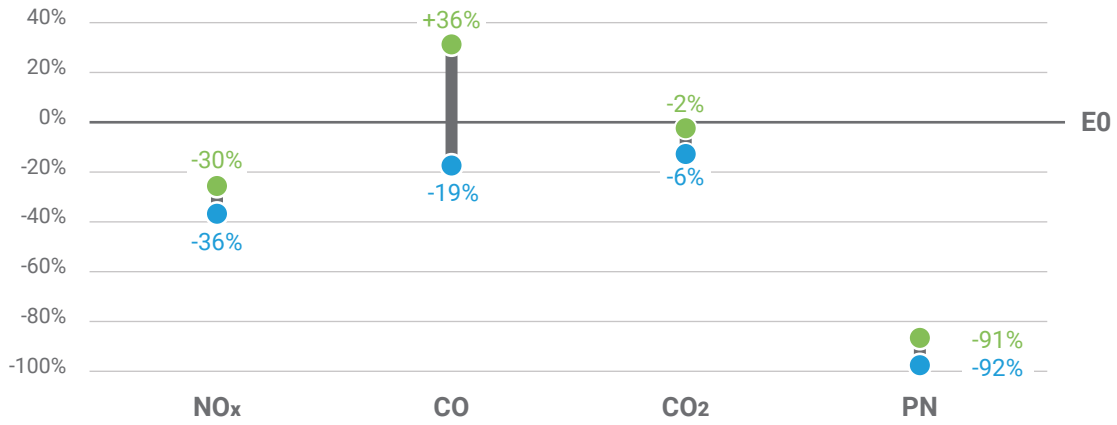


1. EN 15293:2018 Automotive fuels – Automotive ethanol (E85) fuel – Requirements and test methods
2. Miljö Fordon – Etanol, E85 (2018)
3. IRENA – Global Renewables Outlook: Energy Transformation 2050 (2020)
4. EEA – Briefing: National action across all sectors needed to reach greenhouse gas Effort Sharing targets (2020)
5. ePURE calculations with a basis of 25% fuel overconsumption with E85 and based on WTW data from Miljö Fordon – Etanol, E85 (2018)
6. Aggregated and audited 2019 data of ePURE members (2020). Compared to a fossil fuel comparator of 83.8 gCO_{2eq}/MJ on the total lifecycle of the fuels, from the production of the ethanol feedstock to its combustion in the engine (well-to-wheel approach)
7. Czerwinski et al. – Research of Real Driving Emissions (RDE) with E85 and Two Flex Fuel Vehicles (2017)
8. Munoz et al. – Bioethanol Blending Reduces Nanoparticle, PAH, and Alkyl- and Nitro-PAH Emissions and the Genotoxic Potential of Exhaust from a Gasoline Direct Injection Flex-Fuel Vehicle (2016)
9. For more information on E10, please consult ePURE E10 leaflet

Emissions performance of E85 compared to E0 in two flex-fuel vehicles (WLTC)



Emissions performance of E85 compared to E0 in two flex-fuel vehicles (RDE)



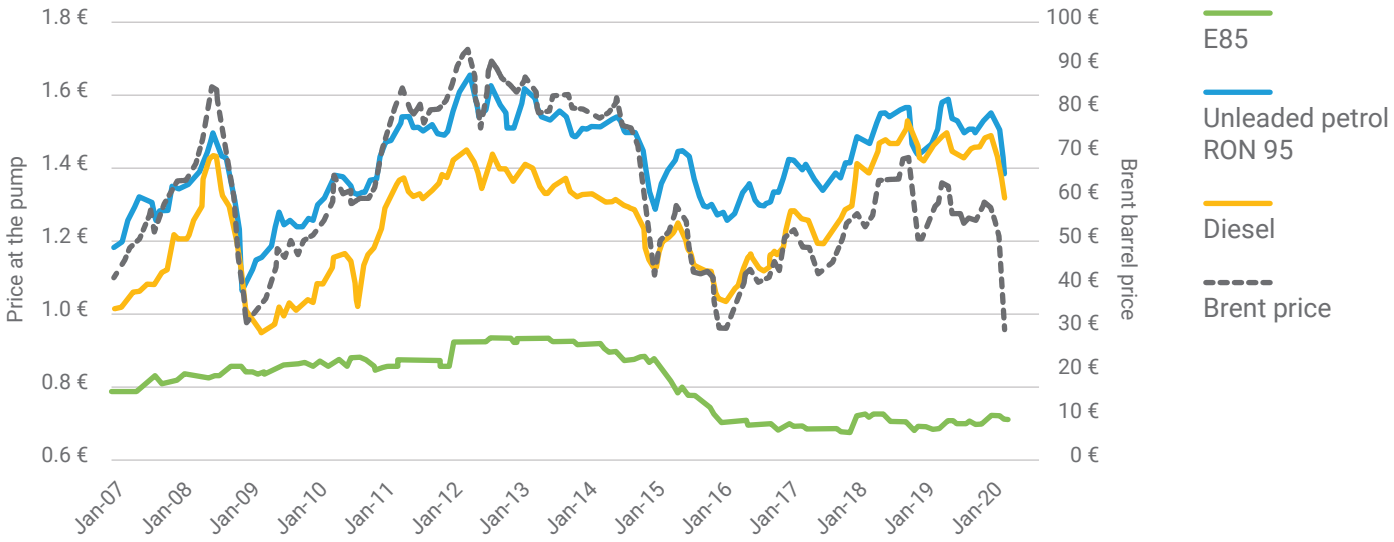
Vehicle 1

Vehicle 2

EMPOWERING CONSUMERS

E85 supports price stability: The price of E85 at the pump is less sensitive to crude oil price variations than other fuels, allowing a lower and more stable cost for motorists. For example, French motorists could save around €400 per year[10] by using E85, even with low petrol prices.

Fuel prices in French filling stations between Jan. 2007 and Mar. 2020[11]



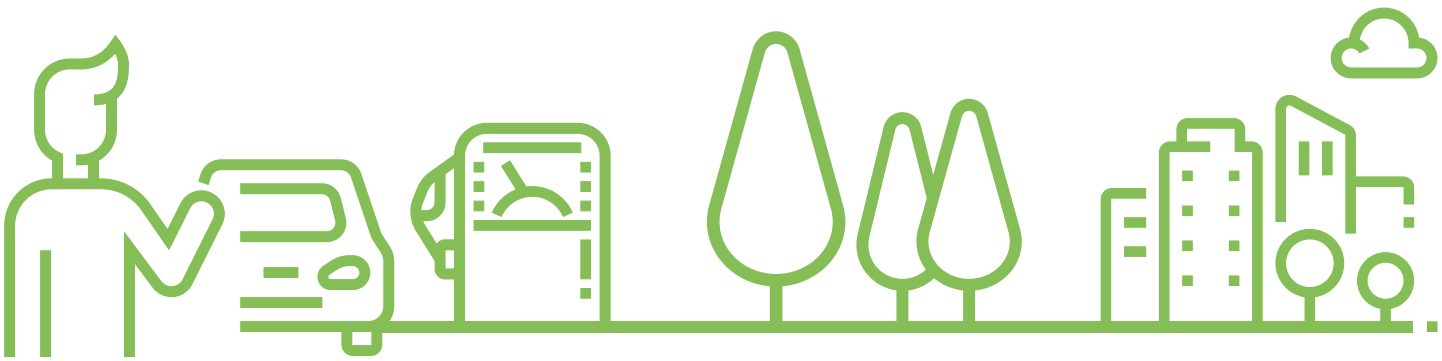
10. Running 13,000 km per year on E85 with a car consuming 7l/100km
11. Data from French Government, Bloomberg, Energy Intelligence Group, Organisation of Petroleum Exporting Countries, World Bank

Ethanol and your engine

- **Flex-fuel vehicles and E85 conversion systems:** E85 can be used in flex-fuel vehicles that have been specifically designed to run on petrol, E85 or any mix of the two in the same tank; it can also be used in petrol vehicles equipped with an easily installed E85 conversion system:
  - Flex-fuel vehicles are a variation of conventional petrol vehicles, with changes in the calibration of the engine and the materials used in order to achieve compatibility and efficiency with any petrol-ethanol blends, up to 85% ethanol.
  - An E85 conversion system allows for modification of certain parameters of a regular petrol car. It measures in real time the ethanol content of the fuel blend and adapts the injection system to ensure optimal combustion of the petrol-ethanol blend. This system has proven especially popular in France.
  - Flex-fuel vehicles cost only marginally more than standard petrol vehicles[12], with a premium ranging between €110 and €220. Retrofitting a regular petrol car with an E85 conversion system costs between €560 and €900. The overall cost-effectiveness of E85 consumption quickly writes off these additional costs.
- **Fuel consumption:** Ethanol has a lower energy content than petrol fuel, leading to higher volumetric fuel consumption depending on driving conditions and temperature. Increased energy efficiency when using E85 compared to fossil petrol helps bring down the overconsumption[13] to around 20%[14]. Even when factoring the overconsumption in, E85 remains a more cost-effective option for consumers in countries such as France thanks to its lower pump prices.

Success story: E85 in France

- **Compatibility of the fleet:** E85 was introduced in France in 2007 and its volumes have grown steadily since then. France has one of the largest fleets of compatible vehicles, with more than 129,000 cars[15] running on E85, of which 39,000 are original flex-fuel vehicles and 90,000 are conventional petrol cars equipped with E85 conversion systems. E85 conversion systems have been homologated by the French government[16] to guarantee motorists that their vehicle will run on E85.
- **Availability at service stations:** France has a wide distribution network with over 19% of its largest filling stations delivering E85[17]. E85 sales grew 85% in 2019[15], reaching a share of 3.9% of all petrol grades in February 2020.
- **Government support:** The main reason behind the success of E85 in France is its low price at the pump, enabled by government support[18], including:
  - Regular increases to the renewables mandate for petrol grades, incentivising fuel suppliers to sell E85.
  - Reduced fuel tax on E85.
  - No registration fees for new flex-fuel cars and cars fitted with a homologated E85 conversion system in most regions.
  - Reduced CO_2 tax on new flex-fuel vehicles (malus) thanks to a 40% discount on CO_2 values measured with petrol.



12. IRENA report – Advanced fuels – What holds them back? (2019). ePURE conversion based on the 2019 Euro/US dollar exchange rate
13. Delavarrafiee et al. – Real-World fuel use and gaseous emission rates for flex fuel vehicles operated on E85 versus gasoline, Journal of the Air & Waste Management Association (2017)
14. ADEME – Consommation conventionnelles de carburant et émissions de CO_2 (2018)
15. SNPAA – E85 in France (Feb. 2020)
16. Arrêté du 30 novembre 2017 relatif aux conditions d'homologation et d'installation des dispositifs de conversion des véhicules à motorisation essence en motorisation à carburant modulable essence-superéthanol E85
17. Among the 9,000 French filling stations delivering more than 500 m^3 of fossil fuel per year (around 1,800 stations deliver E85 in France)
18. French National Assembly – Information report on agrofuels (2020)

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