

An ethanol blend to fuel Europe's clean mobility...

E10



E10 is a petrol grade containing up to 10% ethanol – a renewable fuel produced from sustainably grown crops, wastes and residues that significantly reduces transport greenhouse gas emissions. It is sold in many countries around the world and is compatible with nearly all petrol cars on the road today in Europe

Beyond its important benefits for the climate, E10 also:

- helps EU Member States meet their environmental and renewable energy targets
- boosts performance and efficiency in optimised engines
- requires little to no change to transport infrastructure
- is made from domestic feedstock rather than imported fossil fuel

Find out more about how E10 can drive Europe's clean mobility ambitions →



What is E10?

- E10 is a **petrol grade that contains up to 10% renewable ethanol** in volume, made from biomass feedstock such as crops, wastes and residues
- E10 is the European test fuel for type approval fuel consumption and emission testing of petrol cars. It is currently **available widely at petrol pumps in Belgium, Bulgaria, Finland, France, Germany, Luxembourg and Romania**, as well as sporadically in other European countries
- Other countries, including Lithuania, the Netherlands and the U.K. **are considering or in the process of adopting E10**

Why use E10?

- **Renewable ethanol reduces greenhouse gas emissions** – more than 70% on average compared to fossil fuels such as petrol. The more ethanol blended in, the better the results. **Widespread adoption of E10 across Europe will boost the EU's ability to meet its targets for transport decarbonisation and renewable energy incorporation**
- Ethanol can also have benefits for engine performance. It **boosts the octane rating when blended with petrol¹, allowing the development of more efficient engines**. While drivers may notice a slight increase (1-2%) in fuel consumption with the addition of ethanol to petrol, this is minor compared to other factors such as vehicle maintenance or driving style
- **Adoption of E10 delivers immediate climate-change mitigation with little to no change in transport infrastructure**: it can be used in today's cars and dispensed from most of today's pumps and fuel stations. The vast majority of cars built after the year 2000 are compatible with E10 and there is no need to adapt vehicles to obtain instant benefits. Nearly all of the petrol cars in Europe today could run on E10 – helping deliver greater emissions reduction now
- Because renewable EU ethanol is made from European feedstock, **E10 offers a distinctly domestic solution to diversifying our energy mix** and reducing our reliance on imported crude oil
- Ethanol blends (E10/E20/E85) are among the most effective tools for decarbonisation thanks to their very low carbon-abatement costs, which are **better than other transport solutions such as electric vehicles²**



What vehicles are compatible with E10?

- In Europe, most post-2000 petrol vehicles have been declared E10-compatible³. **More than 95% of the EU petrol vehicle fleet was projected to be compatible⁴** and all modern petrol vehicles have been optimised for E10
- Most of the vehicles that have not been declared E10-compatible in Europe are classic cars and old, highly polluting cars. Such compatibility issues do not exist in other regions of the world. In Europe, these cars represent a marginal percentage of the European fleet and fuel consumption (one U.K. report shows most are used for leisure or hobby activities rather than regular transport⁵). In any event, these cars can always use the protection grade E5
- In the main fuel ethanol consuming markets, vehicle compatibility issues have been overcome: in the US, E10 was approved for use in any conventional gasoline powered vehicle⁶ and E15 was approved for use in model years 2001 and newer cars⁷; in Brazil, the fleet includes flex fuel, E100 and gasoline vehicles, the latter being also certified to mid blend of ethanol⁸



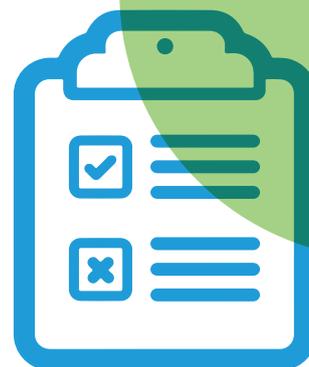
Europe needs a variety of transport decarbonisation solutions to achieve its climate ambitions, but right now E10 is a cost-effective and easy way to implement them

1. Meta-analysis for an E20/25 technical development study - Task 2, TU Wien and IFA (2014) 2. Integrated Fuels and Vehicles Roadmap to 2030+, Roland Berger (2016) 3. List of ACEA member company petrol vehicles compatible with using 'E10' petrol, ACEA (2018), List of ACEM member company petrol vehicles compatible with E10 petrol, ACEM 4. Bringing biofuels on the market: Options to increase EU biofuels volumes beyond the current blending limits, CE Delft and TNO (2013) 5. Successfully deploying E10, LowCVP (2017) 6. Alternative Fuels Data Center – Ethanol blends, U.S. Department of Energy 7. E15, RFA 8. Flex Fuel Vehicles in Brazil, ANFAVEA (2013)

How to successfully introduce E10

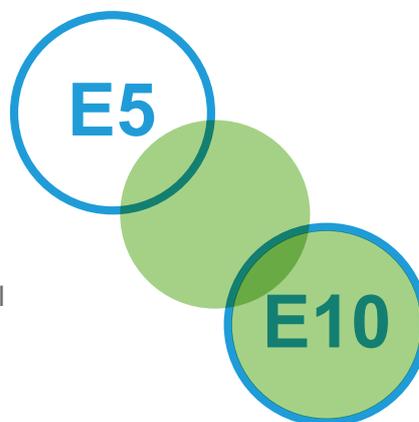
Understanding the fuel logistics chain

- In Europe, 18 Member States can distribute two grades of petrol, seven can distribute three grades and three distribute one grade (with a second grade in certain large service stations)⁹
- Usually, the highest selling grade has a 95 octane rating with up to 5% or 10% ethanol, the second grade is a higher-octane petrol. The potential third grade is either used to have an additional protection grade (e.g. 95-E5), or to have a lower/higher octane rating grade (e.g. 91 or 100)
- **E10 has been introduced in three-grade environments (France/Germany) and in two-grade environments (Belgium, Bulgaria, Finland, Luxembourg and Romania, where it replaced 95-E5)**
 - There is no legal requirement to maintain E5 on the market since 2013. However, should a Member State find it necessary to continue supplying E5, this could be done through the premium high-octane grade, considering that a high portion of classic or performance cars are already using it



Fuel labelling

- The European cars and motorcycle manufacturers' associations regularly update their **lists of E10-compatible vehicles**³
- As of 12 October 2018, labels are being placed on EU fuel pumps, new vehicle fuel flaps/caps, new vehicle owner's manuals and at dealerships¹⁰. These labels will help to identify the fuel and their compatibility with new vehicles. **Introduction of E10 will be easier thanks to these clear visual identifiers**



Energy taxation

- **Taxes represent more than 50% of the fuel price at the pump.** The only factors that may increase the price at the pump of E10 compared to E5 are taxes, which could be accommodated to **reward the better environmental performance of ethanol compared to fossil fuels**
- Finland, Belgium and France have adopted a taxation system in support of more environmentally friendly energy. Experience in these countries reveals that a price difference of 4-5 eurocents/litres between E10 and E5 can effectively stimulate the uptake by motorists and ensure a swift switch





Ethanol blends around the world

EU petrol market today: E5, some E10

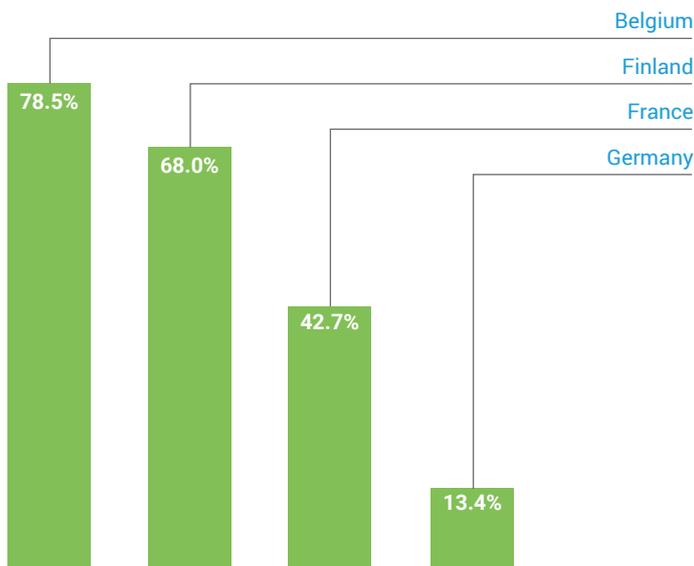
- The vast majority (75%) of the EU petrol market already contains up to 5% of ethanol in volume (E5)
- Blends with up to 10% of ethanol in volume represented 9.5% of the petrol market in 2016⁹

E10 success stories in France, Finland, Belgium¹¹

- In France, E10 was introduced in 2009 in addition to 95-E5 and 98-E5 and is the main petrol grade sold at the pump – **42.7% of the petrol market in September 2018**
- In Finland, E10 was introduced in 2011 to replace 95-E5 and reached a petrol market share of **68% in 2017**
- In Belgium, E10 was introduced in 2017 to replace 95-E5, reaching a petrol market share of **78.5%** at the end of the year 2017



E10 petrol market share across Europe:



Ethanol uptake around the world

- Brazil: Since 2015, the minimum ethanol content has been set at 27% (E27)¹². Lower ethanol blends do not exist in Brazil
- US: In 2017, the average ethanol content of petrol was 10.07%¹³. The US administration is now moving toward year-round sales of E15
- China intends to introduce a nationwide E10 mandate¹⁴
- India decided in 2017 on the implementation of an E10 mandate by 2022¹⁵
- Argentina has an E12 mandate¹⁶
- Canada has a minimum federal mandate of 5% ethanol in petrol, up to 10% in certain provinces¹⁷
- The Philippines intends to move to E20 in 2020¹⁸
- Thailand distributes E10 and E20¹⁹

While the rest of the world is moving to higher ethanol blends, Europe is still struggling to implement E10 EU-wide, even though E10 is the European reference fuel

This is just the beginning. Higher ethanol blends (E20/25, E85, ED95) can help to increase efficiency and decrease emissions of CO₂ and harmful pollutants^{20,21,22}

11. FPB (Belgium), e10bensini (Finland), SNPAA (France) and BDBE (Germany) data 12. Brazil Biofuels Annual, USDA (2017) 13. Ethanol strong, 2018 ethanol industry outlook, RFA (2018) 14. Factbox: China's proposed new ethanol plants to meet E10 push, Reuters (2018) 15. India to triple ethanol production by 2022, The Hindu (2018) 16. Argentina Biofuels Annual, USDA (2018) 17. Carburant de remplacement, Association canadienne des carburants (2018) 18. Philippines Biofuels Annual, USDA (2017) 19. Thailand Biofuels Annual, USDA (2017) 20. Meta-analysis for an E20/25 technical development study - Task 2, TU Wien and IFA (2014) 21. 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, Munoz et al. (2016) 22. Mesures des émissions de polluants des autocars Euro 6 au gaz naturel, à l'éthanol et au diesel, ADEME, CRMT and Scania (2018)