



FORD FLEXIFUEL VEHICLES IN EUROPE

1. FLEXIFUEL VEHICLES: PART OF FORD'S BROAD PORTFOLIO OF ENVIRONMENTALLY ADVANCED VEHICLE TECHNOLOGIES

Ford is the European market leader in bio-ethanol powered flexible fuel vehicles (FFVs). FFVs are part of Ford's portfolio of environmentally advanced vehicle technologies which Ford is committed to offer at affordable prices to its customers. The portfolio includes further optimized conventional technologies (i.e. high tech clean diesel and advanced direct injection gasoline engines), alternative fuel vehicles (including FFVs), hybrid power packs (including research into diesel micro-hybrids in Europe and research into plug-in hybrid technology), and in the long term hydrogen powered internal combustion engines and fuel cells. Some of those technologies are already available for today's customers (including FFVs); others are coming soon or are still in the phase of intensive research.

2. FLEXIFUEL MODELS AND TECHNOLOGY

- Ford's current flexifuel models: Focus and Focus C-MAX flexifuel
- Run on E85 (85 per cent bio-ethanol; 15 per cent petrol), petrol only, or any mix of both in one fuel tank (making them flexible in terms of choice of fuel and operation)
- Three key alterations made to the standard 1,8 litre petrol engine to run on E85:
 - valve seats of the 16-valve gasoline engine made of especially hardened material (bio-ethanol is more corrosive)
 - variable ignition control, automatically adapting to the ratio of bio-ethanol and petrol present in the fuel tank
 - cylinder block pre-heating for temperatures below minus15° C (because bio-ethanol fuel has different cold starting characteristics than petrol)

3. FFV EUROPEAN MARKET AVAILABILITY AND SALES DATA

- Available in 11 European markets now, incl. Sweden, Germany, the UK, the Netherlands, Ireland, Austria, France, Spain, Switzerland, Norway and Belgium.
- Other markets will follow, such as Italy where Ford announced to make the two models available for sale starting in early 2007.
- Affordable: Prices for FFV versions in the same region of (or only marginally above) petrol technology.

- Sweden: the first European market where Ford first introduced its FFVs in 2001; more than 80 per cent of Focus and Focus C-MAX sales and nearly 50 per cent of all Ford sales in Sweden are FFVs today (*year 2006 data*).
- More than 26,000 Ford flexifuels sold in Europe since introduction in Sweden in 2001.
- In the past decade, Ford has sold more than 2 million FFVs worldwide. *See also section 10, "Global commitment".*

4. PILOT PROJECTS ACROSS EUROPE

- Pilot projects (BEST; PROCURA) with Ford FFVs and external partners under way in Europe, to test potential large scale introduction of E85 fuel and FFVs.
- BEST (BioEthanol for Sustainable Transport) focuses on bio-ethanol; pilot projects planned or underway in the UK, Spain, Italy, and the Netherlands.
- PROCURA looks at bio-ethanol, bio-diesel and natural gas, and is establishing test programs in Italy, Portugal, Poland, Spain and the Netherlands.

5. GOVERNMENTS' ROLE / CONCERTED SOCIETAL ACTION

- There is no single solution to address the challenge of climate change: neither in society in general, nor in the transport sector. Climate change can only be properly addressed by integrated approaches; through concerted efforts embracing a wide range of societal stakeholders. For the automotive sector, this includes the auto industry, the fuel industry, government and consumers.
- Within the automotive sector, bio-fuels such as E85 and FFV technology can make an important contribution to further reduce CO₂ emissions from vehicles.
- Governmental assistance including tax incentives is crucial to stimulate introduction and drive initial growth of a bio-ethanol fuel infrastructure and pick up of FFV technology. (Tax incentives keep cost of ownership for bio-ethanol-using FFV drivers competitive. Reason: Due to lower energy content of bio-ethanol – approximately 30 per cent less energy compared to petrol – fuel consumption of a FFV is approximately 30 per cent higher when operated on E85.)

6. THE SWEDISH EXAMPLE

- The Swedish success story of E85 and Ford's FFV models is a prime example of what can be accomplished through co-operation and partnership between companies from different industries. Ford played a major and pioneering role, together with government and non-governmental organisations.
- Incentives for environmentally friendly vehicles in Sweden embrace reduced company car tax, free parking in selected cities, reduced vehicle insurance, exemption from congestion

charges in Stockholm and lower annual registration taxes. In addition, bio-ethanol is exempt from mineral oil tax.

- The Swedish Government has also mandated that 75 per cent of Government vehicle purchases (excl police, fire and ambulance vehicles) must be Alternative Fuel Vehicles; and that all petrol stations with an annual volume of more than 1000m³ must have an Alternative Fuel pump by Dec. 31, 2009, and all new filling stations must offer Alternative Fuels.

7. THE FRENCH EXAMPLE

- Another example that demonstrates the need for - and potential of - integrated approaches is a bio-fuel charter that has been signed by a broad range of different stakeholders in France, including Ford.
- The French charter foresees far-reaching tax incentives for both the fuel and FFV's, the installation of up to 600 E85 (85 per cent bio-ethanol; 15 per cent petrol) pumps by year end 2007 and 1,500 by year end 2008, and the commitment of the French administration to purchase 15 per cent FFVs within its overall 2007 vehicle purchases and 30 per cent in 2008 respectively.

8. RISING NUMBER OF FUELLING STATIONS ACROSS EUROPE

- Due to the strong dynamics in the bio-fuel/FFV sector, more and more fuelling stations across Europe are starting to offer E85. In Sweden, the number has risen from almost none to more than 600 filling sites since 2001 and it is projected that by 2009 nearly 60 per cent of Sweden's 4,000 filling stations will be retailing E85.
- Outside of Sweden, there are at least 138 filling stations that offer E85. (Germany: 86; France: 15; UK: 13; Ireland: 13; Switzerland: 5; Netherlands: 3; Norway: 1; Hungary: 1; Spain: 1 – *all data status January 2007*)
- E85 price examples (*Jan 2007*): Germany: € 0,89–0,99 (vs € 1,22-1,26 for petrol RON 95); France: € 0,78-0,80 (vs € 1,13-1,20 for petrol RON 95) – *see also last bullet point in section 5 (FFV E85 fuel consumption), and section 6 and 7*

9. THE ENVIRONMENTAL BENEFIT

- Main environmental benefit: the 'well-to-wheel' CO₂ reduction potential (carbon dioxide; main greenhouse gas responsible for global warming).
- Bio-ethanol is a renewable fuel derived from plants (e.g sugar beet) or biomass (incl. waste wood). CO₂ emitted by the vehicles is extracted from the atmosphere through new plant growth (photosynthesis). These plants are used to produce bio-ethanol. By this, the CO₂ circle can be closed to a large degree.

- Studies show – the latest one conducted on behalf of the Spanish Government¹ - that the combined use of bio-ethanol and FFV technology can lead to a reduction of up to 80 per cent of well-to-wheel CO₂ emissions (compared to petrol burned in conventional vehicle technology).
- Bio-ethanol can also contribute to reducing the EU's dependency on oil and creating new job opportunities in the agricultural sector.

10. FORD'S GLOBAL COMMITMENT

- Ford Motor Company is committed to FFVs throughout its global operations. Four new FFV models were introduced to the North American market in 2006. In Thailand, Ford introduced a version of its successful Focus model running on regular petrol as well as on a specific bio-ethanol/petrol blend offered in that market. In Brazil, bio-ethanol technology is already long established and FFVs are now the dominant vehicle technology. In the past decade, Ford has delivered more than 2 million ethanol-powered vehicles worldwide.
- In 2006, Ford Motor Company announced a £1 billion (approx. €1.5 billion) investment to develop a range of environmental technologies for Ford, Jaguar, Land Rover and Volvo cars. Over 100 models and derivatives with improved emissions or fuel economy will be introduced over the next five years, including a regular Ford Focus consuming less than 4 l/100km and emitting less than 100 gCO₂/km (tailpipe).

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¹ Análisis del Ciclo de Vida de Combustibles alternativos para el Transporte; Fase 1. Editor: Ministerio de Medio Ambiente y Ministerio de Educación y Ciencia et al.