Bioethanol for Sustainable Transport

Funding: European (6th RTD Framework Programme)
Duration: Jan 2006 - Dec 2009
Status: Complete with results
Total project cost: €17,435,973
EU contribution: €8,000,000

Call for proposal: FP6-2004-TREN-3
CORDIS RCN : 85625

Background & policy context:

In recent years, it has become perfectly clear that the world's reliance on fossil fuels for transport is unsustainable. To begin with, the days of cheap and easily available oil are numbered. In addition, fossil fuels are the main reason for global warming, a process that practically all climate scientists say we have to deal with - not soon, not tomorrow, but now. Fortunately, there are alternatives: hydrogen, electricity, and a number of others. But only a few can start making a difference right away. One of the most promising of these is bioethanol.

Most of us are familiar with ethanol as the 'alcohol' ingredient of alcoholic drinks. And precisely in the same way that grapes can be made into wine, or sugarcane into rum, these and many other crops and plants can be made into bioethanol to fuel cars, buses and trucks (when used as a vehicle fuel, it is usually known as E85 or E95). Bioethanol comes from plants and is a renewable resource. This means that, in the making and using of bioethanol, as much carbon dioxide is taken up by the growing plants as is produced when it is burnt.

Bioethanol is also biodegradable, less explosive, less poisonous and easier to extinguish if burning, compared to petrol and diesel. In addition, wherever crops can be grown, bioethanol can be made.

This means that Europe, which today is completely dependent on foreign oil imports, can become a major source of its own fuel. Bioethanol also works in the traditional internal combustion engine that almost all cars use, albeit with some minor adjustments. And it is a liquid, which means it can be handled in the modern fuel supply infrastructure. Vehicles fueled by bioethanol have been in use for many years in North and South America. Many big car manufacturers are today making these vehicles as a part of their normal production lines. And many countries have begun mandating that the regular petrol being sold is mixed with five, ten or even fifteen percent ethanol.

Bioethanol will, however, not replace fossil fuels simply by its own merits. Even if bioethanol has proved itself to be a viable alternative, more and more players - governments, industry representatives, consumers - agree that something needs to be done. It now is clear that bioethanol only needs a slight nudge to begin replacing fossil fuels for real.

Objectives:

The BEST project demonstrated an extensive substitution of petrol and diesel to bioethanol. Furthermore, the project initiated a lasting and accelerating development of bioethanol-fuel all over Europe through efficient ways of marketing and training and paved the way for a market breakthrough for ethanol fuelled vehicles.

For bioethanol-fueled vehicles to become valid, convenient alternatives for regular consumers, an infrastructure supporting these vehicles - car-makers selling the cars, fuel-producers making the fuel, and fueling stations providing it - has to be in place. BEST's goal was to help such an infrastructure emerge on a very practical, local level, by stimulating the market for bioethanol-fueled vehicles. In concrete terms, BEST helped the participating markets to develop, so that a market breakthrough
occurs and the market could become self-supporting.

According to plan the BEST project introduced:

- 10 500 Flexifuel cars;
- 160 bioethanolbuses;
- 13 E95 fuelstations for buses; and
- 135 E85 fuelpumps.

**Methodology:**

BEST worked across several fields and with a great number of projects. Demonstration vehicles were introduced in bus and car fleets for services such as taxi, city and regional fleets, public transportation, etc. Evaluation and monitoring was carried out to prove the energy efficiency of bioethanol. Communication campaigns spread the message of the advantages of bioethanol. Studies on the possibilities and advantages of bioethanol were produced. Finally, BEST provided recommendations for environmental labelling, for standards and policies for local and national politicians, as well as the European Commission.

Not the car makers, not the filling stations, not even governments, municipalities or public bodies can make the bioethanol market share grow by its own. But if all these stakeholders come together, and do so in several countries at once, a breakthrough will happen. This is exactly what the BEST project aimed at. Apart from ten different cities and regions in Europe, South America and Asia, BEST participants included some of the world's largest car makers (Saab and Ford) as well as bioethanol manufacturers and leading universities.

By combining the wide-ranging knowledge, influence and experience of all these stakeholders, BEST aimed to help put more than 10 000 ethanol cars and 160 ethanol buses in operation, as well as contribute to the opening of numerous bioethanol fuel stations.

**Parent Programmes:**

FP6-SUSTDEV-1 - Sustainable Energy Systems

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Other funding sources:** FP6, PTA6 'Sustainable development, global change and ecosystems'; Action line: SUSTDEV-1

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**EU Contribution:** €0

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**Saab Automobile Ab**

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| Umeå Universitet / Umeå School Of Business And Economics | Petrus Laestadius St  
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Key Results:

BEST initiated a large-scale introduction of vehicles and infrastructure for low and high blends of bioethanol. The project studied market developments with reference to issues such as incentives, regulations and standards, pricing and awareness, and tested a range of new technologies, including conversion of conventional vehicles to run on bioethanol, and hybrid electric cars.

BEST disseminated information about bioethanol to stakeholders across the EU and awareness of bioethanol increased rapidly during the project. BEST provided insights, shared results and offered guidance on a wide range of issues, including technical issues, sustainability and emissions of greenhouse gases and local air pollutants.

BEST demonstrated that bioethanol can be reliably used as a vehicle fuel and, when compared with fossil fuels and produced sustainably, offers benefits in terms of energy efficiency, reduced impact on the climate and the environment, and other socio-economic benefits.

Demonstration of clean vehicles and fuels enabled BEST to:

- Create capacity (such as fuel infrastructure) for a lasting and accelerated transition to clean vehicles and fuels in the EU.
- Validate the functionality and performance of the technologies from technical and environmental perspectives.
- Raise levels of knowledge, awareness and experience of bioethanol amongst key stakeholders.
- Assess and analyse the market development of bioethanol and document the BEST experience, enabling a transfer of experience regarding incentives, safety, regulations etc., to other locations in the EU.

Important work conducted within the BEST project included:

- Demonstration of over 77,000 flexifuel cars and 310 E85 pumps at nine sites.
- Demonstration of over 190 bioethanol buses and 12 ED95 pumps at five sites.
- Conversion of four conventional petrol and diesel vehicles to run on bioethanol.
- Testing of three hybrid electric vehicles running on an E25 blend.
- Testing and demonstration of low blends, including two standard diesel buses to run on ED-diesel, 1 ED-diesel pump and 14 E10 pumps.
- Guiding followers on issues linked to the distribution of vehicles and fuels, such as fuel standards, fuel handling regulations, tariff information, and clean vehicle definitions.
- Research to identify incentives and disincentives for market development.
- A sustainability assessment for a scaling-up of bioethanol produc

Policy implications

BEST demonstrated that bioethanol is a functional alternative. It can be quickly introduced to large numbers of vehicles via petrol or diesel low blends or conversion of existing petrol vehicles to FFVs running on E85. Bioethanol buses and trucks running on ED95 can also be used. BEST showed that, when produced sustainably, bioethanol can deliver substantial reductions of greenhouse gases from a lifecycle perspective.

Thus, bioethanol can help the EU achieve its '20-20-20 by 2020' strategy. BEST Project formulates recommendations to local and national governments, as well as to the EU. Some of the BEST recommendations to the EU required for the bioethanol market development are:

- A uniform and coherent regulatory framework to be established.
- Flexifuel vehicles should become the standard for all petrol cars in the EU.
- Provision of low and high blends of renewables at filling stations should be mandatory.
- The EU should facilitate processes and identify solutions.
- Fuel standards in Europe should be harmonised.
- Certification processes for sustainable transport fuels (including fossil fuels) should be finalised and implemented and a single EU standard established.
Fuel taxation should reflect energy content and well-to-wheel CO2 emissions.
The EU should not limit the ability of national governments to use taxation as a tool.

Documents:
- Results and Recommendations from the European BEST Project (Final report)

**STRIA Roadmaps:** Low-emission alternative energy for transport

**Transport mode:** Road transport

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Decarbonisation, Environmental/Emissions aspects

**Geo-spatial type:** Other