BEST
BioEthanol for Sustainable Transport
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Gustaf Landahl, Coordinator of the BEST project. (Photo: Helene Carlsson)

The European BEST project is testing how bioethanol as fuel for vehicles can be introduced in Europe. What are the opportunities and what are the threats?

Thousands of flexible fuel vehicles and hundreds of ethanol buses are now running in BEST partner countries around Europe, and in Brazil and China. Fuel pumps for bioethanol are gradually being installed in our partner cities. The goal of having thousands of vehicles running on bioethanol has soon been exceeded. Now it is time for data collection. Drivers are keeping careful logbooks and all service requirements are documented. Drivers' opinions are followed up, as is the public opinion on clean vehicles and biofuels. We now know that the cars and buses function well technically. We also know that our work is noted and appreciated by the community.
In the last year, BEST partners - such as Somerset, Rotterdam and Stockholm – have been awarded various national and international prizes for climate work and initiatives relating to clean vehicles. The Clinton Climate Initiative has selected Scania with its ethanol buses as "preferred supplier".

Getting so many vehicles and pumps into completely new markets is, however, difficult. We have met a number of obstacles:
- tax systems which make biofuels and clean vehicles a more expensive alternative compared to fossil varieties
- lack of standards for fuels
- presumed safety risks
- increasing media scepticism against the benefits of biofuels.

We have followed up the recent media attention regarding the impact of biofuels on Food supply. We have not found the link suggested by media, but we still treat the issue seriously. We are undertaking a careful sustainability study of bioethanol together with renowned researchers at Imperial College, UK.

We have largely overcome the problems we have encountered, thanks to intensive work in the BEST cities.

We will share our experience of how a market for bioethanol can be created. We will advise the European Commission, decision-makers in our cities and the biofuel and motor industries on what is required in order to efficiently move away from oil dependency, a dependency which today is both a threat to the climate and to Europe's security of supply.

We now face a year full of analysis and synthesis and we promise to regularly share results from this process.

Gustaf Landahl, Project Coordinator

Premiere for bioethanol buses in São Paulo, Brazil

First brazilian ethanolbus into service in Sao Pāulo. (Photo: Rainer Janssen)

Even though Brazil is world leader in use of bioethanol in vehicles, bioethanol buses were not introduced until recently. São Paulo took their first ethanol-powered buses into service in October 2007 as a result of work within the BEST project.

During the official launch of the BEST bioethanol bus fleet in Brazil, the Mayor of São Paulo announced the operation of 100 ethanol buses in the city of São Paulo. Furthermore, Scania do Brazil is in negotiations with other Brazilian cities such as Curitiba.

Only the beginning

It is envisaged that results from the BEST demonstration activities will provide the ground for a future large-scale implementation of ethanol buses in Brazil through the close involvement of a wide variety of major stakeholders such as Scania, Scania do Brazil, MARCOPOLO, UNICA, SEKAB, COPERSUCAR, PETROBRAS and EMTU.

Increasing prices of fossil fuels on the world market may improve the competitiveness of ethanol buses, and the Brazilian Government may introduce incentives such as tax reductions to support the environmental benefits of ethanol buses in heavily polluted large Brazilian cities. Thus, a significant market penetration of ethanol buses in the very large bus fleets of Brazilian cities seems possible in the next 5-10 years.

The buses will be operated by the transport company Empresa Metropolitana de Transportes Urbanos de São Paulo (EMTU/SP), and the trial will be co-ordinated by biofuel experts at the Brazilian Reference Centre on Biomass (Cenbio), which is linked to the University of São Paulo. The field trials of Scania's ethanol buses in São Paulo will occur as part of the BioEthanol for Sustainable Transport (BEST) project.

Brazilian industry and European stakeholders cooperate

Scania delivered the bus chassis and the E95 engine to Brazil. MARCOPOLO, one of the main Brazilian bus manufacturers, constructed the Brazilian version of the ethanol bus in close cooperation with Scania and Scania do Brazil. The ethanol fuel for the test fleet is supplied at discount price by the sugar/ethanol industry association UNICA, and the fuel additive for ignition improvement is supplied by the Swedish company SEKAB. The import of the additivated ethanol fuel E95 for the test fleet is managed by COPERSUCAR, one of the largest sugar and alcohol producers in the world, whereas the Brazilian national oil company PETROBRAS will be responsible for the long-term production and supply of the E95 fuel and the distribution to the bus operator.

Evaluation within BEST project

The regular ethanol bus operation by the transport company EMTU, serving the bus route São Mateus – Jabaquara in São Paulo State, started in December 2007. The tests with ethanol buses in Brazil will evaluate fuel consumption, maintenance and involved costs during an operation period of one year. In order to gain objective outcomes, results of the test will be compared with tests on an equivalent reference diesel bus.

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Professor Moreia explains the advantages of the ethanolbuses for the Mayor of Sao Pāulo, Gilberto Kassab. (Photo: Rainer Janssen)

Learning starts with children

Brandenburg´s BEST partners have started approaching teachers and their pupils. Training teachers is a prerequisite for making new knowledge on innovative technologies available to young people and as a follow up, to their families.

Lusatia declared itself "Innovative Energy Region Lausitz-Spreewald" in April 2007. Now, public acceptance and awareness of renewables needs to be promoted.

In the Highschool in Peitz near Cottbus already four training sessions have taken place. During four hours teachers were informed on renewable energy to enable them to transfer knowledge to their pupils. Pupils then gathered in different working groups to learn about various aspects of renewable energy sources. Pupils as well as teachers are the target groups of the initiative. Transfer of knowledge, gaining emotional access, learning in groups and information on sustainable energy carriers form the content.

Visits to enterprises dealing with renewable sources have also been a focus. New knowledge is best transferred by practical examples, e.g. a visit to a rural distillery demonstrated the production of alcohol from agricultural resources.

Klaus Schwarz, Brandenburg's project manager for Bioenergy Lusatia talking with pupils in Peitz. (Photo Klaus Schwarz, CEBra GmbH)

New professional profiles

The regional planning office Lausitz-Spreewald follows a similar approach. Teachers for various age groups are invited to common training and information events. Excursions to local companies are an integrated part. Not only new technologies are presented during these visits but also new types of professional profiles.Teachers will gain insight into educational needs for meeting these new professional roles. The teaching activities will also be transferred to other parts of Brandenburg.

Special education profiles to support Highschools are developed in collaboration with the Brandenburg Ministry of Education. CEBra – Centre for Energy Technology GmbH – is a leading stakeholder in

Dr. Georg Wagener-Lohse talking with representatives from Cottbus schools at the environmental week June 2006. (Photo: Klaus Schwarz, CEBra GmbH)

transferring knowledge of renewable energies, especially BioEthanol as transport fuel.

Biofuel region inspired

Lusatia realised the importance of working with schools during the first study tour to BEST partners in Sweden. BiofuelRegion carries out extensive work together with schools in the region and has contributed both inspiration and experience as well as educational material.

Klaus Schwarz, bioethanol expert from CEBra GmbH, teaching children at Paul Gerhard Gymnasium, Lübbenau, about bioenergy. (Photo: Klaus Schwarz, CEBra GmbH)

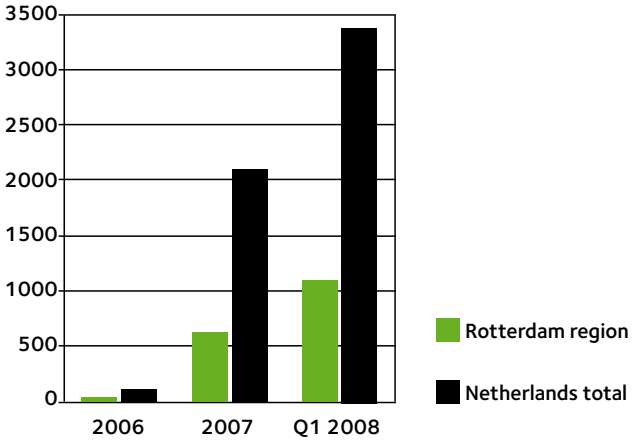
For more information please contact BEST site manager in Brandenburg: Georg Wagener-Lohse, gewalo@yahoo.de

Rotterdam struggle results in rising FFV sales

Even with a very unfavourable tax situation for E85 it is possible to introduce and sell FFV cars. But it is very heavy work, and the real breakthrough will not come until incentives are more favourable or petrol prices much higher than today.

– Still, it's worth it. By working to get the cars on the roads you create a future market for the E85 fuel and a base for establishing a net of fuelling stations, says Ton Vermie, BEST site coordinator in Rotterdam.

In January 2006, when BEST started, there where no E85 pump and no FFVs on the market in the Netherlands. Today, there are 5 pumps in the country and a number of FFV models to choose from. During 2007,



No of FFVs in Rotterdam and the Netherlands.

over 2000 FFVs were sold in the Netherlands, approximately 1/3 of them in the Rotterdam Region. Public and private companies as well as private individuals are among the new FFV owners. And, of course, the municipality itself.

The sale of E85 is not as successful. The reason is that E85 is more expensive than petrol for the end user. Considering also the higher consumption of E85 in the FFVs, this results in at least 50% higher fuel costs per km. So, Ton Vermie and his colleagues at Rotterdam Public Works face tough conditions when marketing the FFVs and E85.

– We argue that it is smart to buy cars today that are adapted to the future, but of course it would have been much more successful if E85 hade been more price competitive.

– One of our main goals is to achieve some national incentives to make driving on E85 competitive. Thus, we work hard to influence our government. Until now they haven't listened, so we will introduce some sort of local incentive, explains Ton Vermie and continues:

– We plan to offer fuel grants for FFV-drivers in the Rotterdam region, making E85 price competitive. We hope to launch this incentive in mid-2008.

For more information contact Rotterdam BEST Site Coordinator Ton Vermie; a.vermie@gw.rotterdam.nl

It is smart to buy a FFV today since it is adapted to the future says Ton Vermie in Rotterdam. (Photo: Helene Carlsson)

Madrid municipality 100% clean fleet 2011

Mayor of Madrid, Alberto Ruiz Gallardon, announced that the whole public fleet would be "ecological" before 2011. (Photo: City of Madrid.)

In February 2008, the Mayor of Madrid, Alberto Ruiz Gallardon, presented officially the "Green Fleet" of Madrid City Council. the Mayor also announced the municipal commitment of gradually increase the role of clean vehicles in such a way that the whole public fleet (official local administration) would be "ecological" before 2011. Today the share is approximately 20 percent.

Nowadays, the municipal fleets count with more than 1800 vehicles powered by electricity or alternative fuels, like natural gas, biodiesel or bioethanol, most of them have started commissioning during the period 2004–2008 as urban buses and trucks in charge of waste collection. This effort of introducing sustainability criteria in urban mobility contributes to a better environment in terms of local air quality and reduction of greenhouse emissions.

One of the main protagonists of the event was the municipal bioethanol vehicles. Today, Madrid has a "Green Bioethanol Fleet" composed by 40 Flexi-fuel cars, 1 official car for the Environment Councillor and 5 Bioethanol buses. This fleet is the result of the participation of Madrid in the European Project BEST (Bioethanol for a Sustainable Transport).

For more information please contact BEST Site Coordinator in Madrid: Javier Rubio, proyectobest@munimadrid.es

Alberto Ruiz Gallardon, Mayor of Madrid, inspects Madrid Green Fleet together with Pedro Calvo, Councillor of Mobility (in the back), Ana Botella, Councillor of Environment and Javier Rubio, General Director of Sustainability and also Madrids BEST Site Coordinator (ahead). (Photo: City of Madrid).

China will test E100 buses

Nanyang BEST-partners test a different concept for bioethanol buses, E100 (hydrous) in a bus with a modified otto (petrol) engine. The first bus was delivered in December 2007.

BEST partners in Nanyang have decided to go for a Chinese bus manufactured by DongFeng. The first bus was delivered in December 2007 to Nanyang. The bus has a petrol engine modified to run on hydrous E100. Thus, China goes for a different bioethanol bus concept than the other BEST sites, which all test the Scania Omnibus with a diesel engine using E95.

– The E95 Scania bus was too expensive for Nanyang, approximately 10 times as expensive as the DongFeng alternative. By going for hydrous E100 instead of E95, import of fuel additives as well as drying of the ethanol is avoided. This gives a much cheaper solution suitable for Nanyang's needs, claims professor Dehua Liu, BEST Site Coordinator in Nanyang.

Similar solutions have been tested in the US

The Dongfeng bus is used by the Tianguan Group (the ethanol provider) to take the staff to work and home. Nanyang has ordered three more buses from DongFeng, which will be delivered during 2008.

Dongfeng delivers buses intended to use E100 (hydrous) for Nanyang.

A local E100 standard and regulation has been set up, and an E100 pump was installed near the ethanol plant to supply the buses with fuel.

For more information please contact BEST Site Coordinator Nanyang, Professor Dehua Liu, dhliu@tsinghua.edu.cn

First italian E85 pump opened

In January 2008, the first E85 pump was opened in La Spezia. It is operated by ACAM SpA (Azienda Consortile Acqua Metano). The first E85 batch will be ethanol from Sicily. Six flexi-fuel cars are already running in La Spezia and with the newly opened pump they can now also tank E85.

La Spezia partners are happy to have the first E85 pump in Italy. (Photo: Stefano Capaccioli)

The goal for La Spezia, 100 FFVs in the region by 2008, is very ambitious and will be difficult to reach due to the very high price of bioethanol compared to petrol in Italy. A strong effort has been and will be necessary.

A big step forward is the 50% excise reduction from January 2008. This was achieved after BEST partners were involved for almost two years in intense discussions with national and governmental decision makers in Italy and also in the EU parliament.

Comune della Spezia and Provincia della Spezia will contact oil companies with fuel pumps in strategic locations for the project, in order to get one of them to install a second E85 pump.

La Spezia has worked hard with local, regional and national authorities to overcome barriers at almost every level. Regulations regarding imports, fire safety, storage and use of the new bioethanol fuels had to be adapted and in place. Already existing standards and experience from other BEST partners eased this heavy process somewhat.

For more information please contact BEST Site Coordinator in La Spezia: Stefano Capaccioli, ETA Renewable Energies, stefano.capaccioli@etaflorence.it

Biofuels impact on food prices – a myth?

These days we hear alarming reports about rising food prices and food riots in poor countries. The media blames biofuels. Ministers and Commissioners question the use and call for a ban. But the connection between rising food prices and today's biofuel use is actually very weak.

BEST partners are, of course, also worried about the current hunger situation and have asked Imperial College to dig into the subject and provide guidance on how to act.

Rising oilprices are the most important factor for higher food-prices states Frank Rosillo Calle. (Photo: Helene Carlsson)

BEST News asked Frank Rosillo Calle for some comments to this ongoing work:

– Price increases are exaggerated by the popular press, a strategy often used by critics to scare off consumers. The greatest impacts are caused by oil price increases, as oil is used in the whole production and distribution chain, rather than by biofuels. Biofuels are part of the problem, not the "problem". Current debate is driven mostly by policy rather than science.

Frank sees complex reasons for food price increases that often have little to do with the expansion of biofuels:

– Price increases due to direct land competition is a myth rather than a reality. Merely around 1% of the global land area is currently dedicated to biofuels.

Frank lists several factors that are, in addition to the high oil prices, much more connected the rapid increase in food prices:

- Changed consumption patterns. Improved living conditions with growing wealth have led to an increasing number of people eating an increasing amount of meat, particularly in China and India. The more meat we consume, the more land we need to produce this meat since it takes 8 to 10 kg of e.g. wheat to produce 1 kg of meat.
- Distorted agricultural sector in many countries, especially in the south, caused by rich countries dumping heavily subsidised surplus production on the world market to very low prices.
- Lack of investment in the agricultural sector. For example, in the 1980s around 17% of international development aid went to agriculture, but in 2005 this was just 3%.
- This has been exacerbated in the last decade by low commodity prices. Farmers are struggling to survive.
- Bad harvests in 2007 in some countries, e.g. Australia.
- Many countries have cut their reserves, making them much more vulnerable to temporary market fluctuations and shortages.
- The increased interest from investors and traders in commodities makes price development much more sensitive. Speculation; the tortillas in Mexico is a good example. Everybody is blaming the price of corn for the increase but often forget many other underlying reasons such as the monopolistic control of tortilla flour, an important factor in the price increase.
- Unequal income distribution. Most people do not abstain from buying food because there is a shortage of food, but because they cannot afford to buy food. In fact, a recent publication clearly stated that "as a result of agricultural intensification, more food is produced today than needed to feed the entire world population and at prices that have never been so low".[1]

70% of the world's poor live in rural areas and could therefore benefit directly from price increases. (Photo: Magnus Kristenson)

Higher agricultural prices have both positive and negative impacts, e.g. higher incomes will allow farmers to invest more in agriculture and bring under cultivation new land previously abandoned as uneconomic due to lack of markets.

70% of the world's poor live in rural areas and could therefore benefit more directly from price increases. But the urban poor face a grim future if prices are high, something which requires policy action. On the whole, farmers are not necessarily the main beneficiaries as they are often squeezed-out by traders.

Frank also concludes that, at least in the industrialised part of the world, the cost of raw material plays a comparatively small role in the retail of food, since price increases are largely determined by commercial and other issues rather than by the raw materials. For example, a 50% increase in the cost of raw materials in the US leads to approx a 5% increase in the commercial price of bread and breakfast cereals, while other corn-based products (processing, packaging and distribution) account for 90%.

However, if we expand the use of biofuels significantly, there might be a risk of future competition. So what does recent research conclude about the future production potential for biofuels? This is another subject that Frank is digging into right now. We will come back on that.

[1]Hazel P & Woods S (2007) Drivers of change in global agriculture, Philosophical Transactions of The Royal Society B.

African representatives are positive

The development agency Swedish Cooperative Centre asked representatives from African farmers' organisations about their views. They paint a positive picture.

Many other actors are strongly critical of investments in biofuel. They claim, amongst other things, that growing crops for biofuel is a threat to poor people's food supply. The producers' (i.e. the farmers) voices are seldom heard in the debate about whether investment in biofuel is positive or negative for Africa.

Harvesting Sugarcane in Malawi. (Photo: David Dahmen)

The majority of Africa's poor are farmers who have progressively received less and less for their crops. The biofuel boom means that they are now getting more money for their crops. Prices are increasing for agricultural crops used for biofuel, as well as for other crops. Investment in ethanol production can also lead to new jobs, technological developments and a decreased dependency on oil.

– Sustainable investments in biofuel give Africa a chance to reduce poverty and famine, says Camilla Lundberg Ney, communications officer at the Swedish Cooperative Centre.

The scale of biofuel production in Africa is small at present, but ethanol and biodiesel production is rapidly increasing. Today, South Africa is the largest producer. But now several companies are investing in biofuel production in Tanzania and Mozambique among others.

The Swedish Cooperative Centre maintains that investments in biofuel are also risky. If production is concentrated in the hands of companies from the rich West, monocrops will be cultivated and all crops will be exported. History will be repeated and Africa will once again be the loser.

– African people must be allowed to reap the benefits of profits, research and technological developments from bioenergy. Cultivation must be sustainable and working conditions must be reasonable. What happens will predominantly be decided by governments, energy companies and consumers in the rich West. We have to be better at putting demands on the fuels we buy – irrespective of whether it is fossil fuels or renewables, says Camilla Lundberg Ney.

The report shows that ethanol and biofuel production can be a way out of poverty. Higher prices for food and bioenergy crops and the creation of new job opportunities are changes that can improve the living conditions for African farmers.

For more information:
http://www.utangranser.se/Default.aspx?AreaID=3

World's first ethanol powered diesel car

The Swedish company BSR, specialised in professional tuning services for a large number of European cars, has optimised a diesel-powered Saab 9-3 for the fuel E95 (95% ethanol). The result is reduced fuel consumption, high performance and minimised exhaust emissions.

This conversion is carried out together with SEKAB in Örnsköldsvik, a producer and distributor of Bioethanol, and with the EU project BEST (Bioethanol for Sustainable Transport).

Facts about the car

Saab 9-3 with an original Saab diesel engine, where combustion chamber, fuel system and engine software have been modified.

BSR claims the following performance on the converted car:

- Max power 195 h.p., torque 410 Nm
- Low fuel consumption, road tests show approx. 5 lit/100 km
- 95 % less fossil CO2, minimal dangerous hydrocarbons and nitric oxide exhaust emission and basically complete elimination of particle emission.

The car will be emission tested according to EU norms (or US norms). The engine will also be examined for possible corrosion. Evaluation of the conversion project will be done to decide whether conversion is a relevant method for increasing the number of bioethanol vehicles.

For more information please contact: Rolf Linde at BEST partner Svenska BSR; rolf@bsr.se

Upcoming conferences and seminars organized by BEST partners

The role of bioethanol in reducing carbon emissions from public sector transport, 10 june 2008 in Bridgewater, UK.
Organized by Somerset County Council.
More information:
Donna Walker, biofuel@somerset.gov.uk

16th European Biomass Conference & Exhibition, 2–6 june 2008, Valencia, Spain.
Organized by ETA Renewable Energy and WIP Renewable Energy.
More information:
www.conference-biomass.com/index.htm

Related projects

Bioenergy in Africa
The Competence Platform on Energy Crop and Agroforestry Systems for Arid and Semi-arid Ecosystems – Africa (COMPETE) will provide strategic and practical guidance and tools on the provision of modern bioenergy for the sustainable and optimal usage of these special ecosystems.

Involved are world-leading scientists, researchers, funders and practitioners from different fields and across the world to create a platform for discussion, knowledge exchange, policy and methodology development.
More information, newsletter etc:
www.compete-bioafrica.net

Biogas production and its use in transport.
Biogasmax, a sister-project to BEST, deals with production and use of Biogas in transport. Have a look at the strategies and technical experiments carried out by the partners in the project: trials from Stockholm, Gothenburg, Turin, Rome, Lombardy, Lille and Berne. You can also download technical data and a Decision Guide that helps cities and regions which are interested to evaluate their overall potential for biogas and for using biomethane fuel.
More information: www.biogasmax.eu/en/

Bioethanol bus in Madrid. (Photo: City of Madrid)

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BEST News

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About BEST

The project Bioethanol for Sustainable Transport deals with the introduction and market penetration of bioethanol as a vehicle fuel, the establishment of infrastructure for supply and fuelling of bioethanol, the introduction and wider use of ethanol cars and flexible fuel vehicles on the market.

During the project
– more than 10 000 ethanol cars and 160 ethanol buses will be put in operation,
– E85 and E95 fuel stations will be opened,
– low blends with petrol and diesel will be developed and tested.

Through this the participating cities and regions aim to prepare a market breakthrough for ethanol vehicles and for bioethanol and also to inspire and obtain followers. Participating cities/regions are:

- Biofuel Region (SE)
- Brandenburg (DE)
- Somerset (UK)
- Rotterdam (NL)
- Basque Country and Madrid (ES)
- La Spezia (IT)
- Nanyang (China)
- Sao Paolo (Brazil)
- Co-ordinating City: Stockholm (SE)

The project is co-financed within the 6th framework; Sustainable Energy Systems/Alternative Motor Fuels: Biofuel Cities.

LOCAL/NATIONAL INFORMATION ABOUT BEST, BIOETHANOL AND BIOETHANOL VEHICLES:
Spain *www.bioetanolmadrid.es*
Basque *www.eve.es/ecomovil*
Rotterdam *www.schonevoertuigenadviseur.nl*
Italy *www.etaflorence.it/best-italia*
China *www.chinabestproject.com*
Stockholm *www.miljobilar.stockholm.se*
Biofuelregion *www.biofuelregion.se*
Sweden *www.miljofordon.se*