Who should read this document?

These Best Practice Guidelines have been produced to share the lessons learned through participation in the BIONIC project, and to provide guidance on how local and regional authorities can help to establish and influence the use of sustainable biofuels within the transport sector. These Guidelines should be of interest to local and regional authorities throughout the European Union, national governments that rely on Local Authorities to implement policy recommendations and meet national targets, and organisations involved or interested in biofuel production or distribution, or with an interest in using biofuels in their vehicles. The BIONIC project was established to help promote the development of local biofuel supply chains, with a focus on addressing biofuel supply and use in transport from the perspective of Local Authorities.
Introduction

The term biofuels is used to refer to any type of fuel that is made from organic matter. For use in transport, such fuels currently include:

- biodiesel, which can be made from plant material or waste cooking oil;
- bioethanol, which can be made from plant material; and
- biomethane, which can be made from sewage, animal waste cooking and biodegradable other biodegradable waste products.

Biofuels can be used as an alternative to conventional fuels, such as petrol and diesel, mixed (blended) to give part bio - part conventional fuel. There are a number of benefits to using biofuels in transport. These benefits vary depending on the type of biofuel, where it comes from and how it is produced. Such benefits may include reduced greenhouse gas emissions, reduced emissions of other pollutants, increased energy security, use of waste products and economic impacts.

Determining the exact impacts and benefits of the different types of biofuel is a matter of extensive research and debate.

The fuels described above are known as ‘first generation’ biofuels. Research currently underway focuses on ‘second generation’ and ‘third generation’ biofuels, which use more advanced technology to produce fuels from alternative sources, for example the residual parts of food crops (stems, husks etc) and algae. It is hoped that by using these alternative sources and methods the resulting biofuels will be more sustainable.

The BIONIC project was established to help promote the development of local biofuel supply chains in five partner regions across Europe. BIONIC has focussed on addressing the issues of sustainable biofuel supply and use in transport specifically from the perspective of Local Authorities and has aimed to promote developments in the regional production and use of transport biofuels.

A range of barriers exist which hinder the successful introduction of biofuels in the transport sector. These include:

- Bio fuel production capacity and availability.
- Availability of higher blends to recognised specifications.
- Vehicle technology compatibility.
- Supply network availability and organisation.
- Production cost and associated fiscal (taxation) regimes.
- Availability of reliable information and purchasing opportunities to both fleet managers and the wider population.

BIONIC has explored and developed the role that local and regional public authorities can play in overcoming these barriers.

Links


Biofuel Review - useful updates on the latest news on biofuels and policy debates - www.biofuelreview.com/
Project aims

The objectives of the project:

- To establish a series of regional biofuels networks involving stakeholders at all stages of the supply and end-use chain, aimed at increasing the uptake of biofuels in the transport sector within the partner regions.
- To set up and run a series of case studies addressing supply chain and market structure issues, market demand issues and biofuels promotion.
- To evaluate the processes and the impacts of the case studies using a common framework.
- To develop and circulate best practice guidance on how to stimulate the local biofuels market in practical terms.
- To meet local, national and European goals to increase the penetration of biofuels within local transport energy markets.

More information about the project can be found on the BIONIC website:
http://www.bionic-project.eu

Bionic partners

BIONIC is made up of 9 partners from across Europe.
Regional Partners

North West England, UK
The North West of England includes largely rural areas in the north and two large conurbations centred around Liverpool and Manchester in the south. The area covers more than 14,000 km² and includes England’s highest peak.

Värmland, Sweden
Värmland encompasses 16 communities and around 276,000 inhabitants. Around 2/3 of the region is covered with forest and 1/10 with lakes and rivers. The main industries are forestry, pulp and steel.

Prahova, Romania
Ploiesti city is the capital of Prahova County which is the most populated county in Romania. Ploiesti city is an important international, national, county and local railway and motorway junction.

Pazardjik, Bulgaria
Bulgaria’s Pazardjik district is situated in the central part of Southern Bulgaria and constitutes 4% of the total territory of the country. The region’s centre, Pazardjik, is 100 km away from the capital city Sofia, and 37 km away from the second largest Bulgarian city Plovdiv.

Cantabria, Spain
The region of Cantabria in the north of Spain covers an area of 5,289 km² between the mountains of the Cordillera Cantabrica and the Cantabrian Sea. It has a population of 562,390 inhabitants. It boasts a good transport network, by land, air and sea. Santander is the capital of the Cantabria Region.

Horizontal partners

TTR are project and evaluation managers for the BIONIC project.

FEDARENE are responsible for information dissemination and networking within the project.
The promotion of biofuels has received much greater attention in Europe in the last decade as the threat of climate change and the desire to diversify fuel supplies has grown. However the potential of biofuels to reduce oil imports was recognised by Brazil in the 1930’s with Government programmes to support biofuels introduced in the 1970’s. In short they are not new.

The challenge facing Europe is how to ensure that biofuels make their full contribution to climate change mitigation whilst simultaneously reducing the demand for imported oil as quickly as possible, and all at an acceptable economic and environmental cost. This creates a tension as the requirement to ensure that biofuels are produced sustainably will hold back production volumes.

Biofuel targets

All EU member states were required to supply 5.75% biocontent by energy in their transport fuel by 2010. The UK was the first country to mandate the supply of biofuel and attempt to link this to greenhouse gas and sustainability performance. The work undertaken in the UK to determine the sustainability of different feedstocks and resulting fuels has led to the UK biofuel blend targets being reduced from 5% of fuel by volume in 2010/11 to 5% by volume by 2013/14, well below the EU target, and this shortfall is compounded by the fact that the UK targets are volume rather than energy based. The increasing appreciation of the potentially significant negative impact that indirect land use change can have on greenhouse gas performance and the inability to accurately model this has been central to this reduction.

Concurrently the EU has developed the requirements of the Renewable Energy Directive (RED) which requires 10% of energy used in transport in each member state to be from renewable sources by 2020. This can include renewable electricity but practically the majority would need to be supplied by biofuels. The RED requires sustainability criteria to be met and a qualifying level of greenhouse gas saving, initially a 35% reduction rising to 50% from 2017 or 60% for new production plant from 2018. Assuming that there isn’t a significant reduction in the total energy required for transport by 2020, the UK example shows how stretching a 10% target is when sustainability is taken into account. In addition there is likely to be a significant requirement for certain sectors, such as fleets, to use high blends if the targets are to be met.

Sustainable fuels

BIONIC has sought to address these issues by examining the potential for the increased production of sustainable biofuels in local areas. This has led to a focus on biofuels from waste with biodiesel from Used Cooking Oil (UCO) and biomethane from waste water treatment works two good examples of biofuels that have excellent greenhouse gas performance (in excess of 80% reduction in life cycle greenhouse emissions) whilst also avoiding sustainability issues such as direct and indirect land use change. We believe that significant scope remains for the production of such sustainable biofuels to be increased and that there are also economic benefits both for producers and users.
Whilst sustainability is a core element of the RED we would endorse a greater focus on and support for fuels from wastes to ensure that the benefits of these biofuels are fully maximised. The examples within this document point towards their latent potential and the role that they can play especially when used in high blends by captive fleets. If these fuels are developed alongside 2nd generation fuels we believe that a truly sustainable biofuels sector is possible and that the volume potential of these truly sustainable fuels should influence blending targets.

Links
The development of Regional Biofuels Networks

Five biofuels networks have been formed within the BIONIC project representing five regional communities: North West England, UK; Region Värmland, Sweden; Cantabria, Spain; Ploiesti Municipality, Romania; Pazardjik, Bulgaria

Membership of the Network

The development of networks in each region involved stakeholders at all stages of the supply and end-use chain and aimed to increase the take up of biofuels in the transport sector. Each network is made up of representatives from a wide range of partner organisations from both public and private sectors.

Looking forward, the continuing aim within the networks is to increase representation amongst those sectors that are not well represented and to maintain the growth and regional activity of all five networks. Sectors typically represented within the networks include:

Potential users

Including public transport operators; local authorities/municipalities within the region; and private sector fleet operators; bus operators

North West England Network members include bus operators:

Stagecoach www.stagecoachbus.com/
Arriva www.arrivabus.co.uk/
Preston Bus. www.prestonbus.co.uk/

Region Värmland Network members include the local municipalities of:
Säffle www.saffle.se
Arvika www.arvika.se
Karlstad www.karlstad.se
Värmland County Administrative Board. www.lansstyrelsen.se/varmland

Prahova Network members include two major taxi companies:
Kontrax Taxi Company www.taximetre.ro/taxi-kontrax-ploiesti
Lodias Taxi Company taxi-lodias.ploiesti.taxiromania.tel

Academic and research organisations

Prohova, Romania Network members include:

The University of Petroleum and Gas in Ploiesti is a partner in the BIONIC project. www.upg-ploiesti.ro
National Agency for Agricultural Consultation www.consultantaagricola.ro
State Institute for Registration and Testing of the soil http://istis.ro
Food Bioresources Institute www.bioresource.ro
Cheminform Data Research Centre. http://chiminform.tripod.com

Biofuel producers and distributors

North West England Network includes:
Refuel Energy - a biodiesel producer using used cooking oil (UCO). www.refuelenergy.co.uk/
Convert2Green – a major national regional producer of biodiesel from used cooking oil (UCO). www.convert2green.co.uk

Biofuel producers and distributors

North West England Network includes:
Refuel Energy - a biodiesel producer using used cooking oil (UCO). www.refuelenergy.co.uk/
Convert2Green – a major national regional producer of biodiesel from used cooking oil (UCO). www.convert2green.co.uk

NGOs and business support organisations;

Cantabria Network members include:
SEO Birdlife www.seo.org/
Cantabria Nuestra www.cantabrianuestra.org

Feedstock producers and suppliers – including for example agriculture and waste water treatment operators.

Pazardjik, Bulgaria Network members include:
Bulgarian Farmers Association www.baf-bg.org/
Professional Farmers High School www.pgss-pz.com
Regional Forestry Administration www.pazardjik.iag.bg/
Regional Biofuels Network activities

The networks meet regularly to discuss regional issues and to provide support to the case studies. The activities of each network vary, but have included organising seminars, providing access to expert speakers and presentations and hosting trips and study tours. Network meetings also provide an informal setting for members of the network to exchange information and develop relationships and partnerships. They also act as channels for dissemination and awareness raising, and generally contribute to the debate and aid the growth of biofuels in the market.

- **Black Liquor Gasification technology - Region Värmland**
  The Chemrec Plant hosted a seminar to demonstrate a black liquor gasification technology that can be used at pulp and paper mills.

- **Liverpool ONE shopping, leisure and residential development - North West England, UK**
  Collects waste cooking oil from on-site catering outlets, produces biodiesel for fleet use - saving money, reducing CO₂ emissions and recycling waste oil.

- **Study Tour to sewage plant “Sjöstad” in January 2009. Karlstad, region Värmland.**
  Biogas from sewage water is upgraded to vehicle quality at an up-grading plant to be built and brought into operation during 2010.

- **First Biogas filling station opens - Region Värmland**
  BIONIC invited to attend the opening of the region’s 1st Biogas filling station by their regional network.

- **Awareness raising Prahova, Romania**
  The debating club from a local High School in Ploiesti were invited to the Prahova local network meeting in November 2009, to involve the next generation in the biofuels debate.

- **Liverpool ONE shopping, leisure and residential development - North West England, UK**
  Collects waste cooking oil from on-site catering outlets, produces biodiesel for fleet use - saving money, reducing CO₂ emissions and recycling waste oil.

- **Study Tour to sewage plant “Sjöstad” in January 2009. Karlstad, region Värmland.**
  Biogas from sewage water is upgraded to vehicle quality at an up-grading plant to be built and brought into operation during 2010.

- **First Biogas filling station opens - Region Värmland**
  BIONIC invited to attend the opening of the region’s 1st Biogas filling station by their regional network.

- **Awareness raising Prahova, Romania**
  The debating club from a local High School in Ploiesti were invited to the Prahova local network meeting in November 2009, to involve the next generation in the biofuels debate.

- **Liverpool ONE shopping, leisure and residential development - North West England, UK**
  Collects waste cooking oil from on-site catering outlets, produces biodiesel for fleet use - saving money, reducing CO₂ emissions and recycling waste oil.

- **Study Tour to sewage plant “Sjöstad” in January 2009. Karlstad, region Värmland.**
  Biogas from sewage water is upgraded to vehicle quality at an up-grading plant to be built and brought into operation during 2010.

- **First Biogas filling station opens - Region Värmland**
  BIONIC invited to attend the opening of the region’s 1st Biogas filling station by their regional network.

- **Awareness raising Prahova, Romania**
  The debating club from a local High School in Ploiesti were invited to the Prahova local network meeting in November 2009, to involve the next generation in the biofuels debate.

- **Liverpool ONE shopping, leisure and residential development - North West England, UK**
  Collects waste cooking oil from on-site catering outlets, produces biodiesel for fleet use - saving money, reducing CO₂ emissions and recycling waste oil.

- **Study Tour to sewage plant “Sjöstad” in January 2009. Karlstad, region Värmland.**
  Biogas from sewage water is upgraded to vehicle quality at an up-grading plant to be built and brought into operation during 2010.

- **First Biogas filling station opens - Region Värmland**
  BIONIC invited to attend the opening of the region’s 1st Biogas filling station by their regional network.

- **Awareness raising Prahova, Romania**
  The debating club from a local High School in Ploiesti were invited to the Prahova local network meeting in November 2009, to involve the next generation in the biofuels debate.

- **Liverpool ONE shopping, leisure and residential development - North West England, UK**
  Collects waste cooking oil from on-site catering outlets, produces biodiesel for fleet use - saving money, reducing CO₂ emissions and recycling waste oil.

- **Study Tour to sewage plant “Sjöstad” in January 2009. Karlstad, region Värmland.**
  Biogas from sewage water is upgraded to vehicle quality at an up-grading plant to be built and brought into operation during 2010.

- **First Biogas filling station opens - Region Värmland**
  BIONIC invited to attend the opening of the region’s 1st Biogas filling station by their regional network.

- **Awareness raising Prahova, Romania**
  The debating club from a local High School in Ploiesti were invited to the Prahova local network meeting in November 2009, to involve the next generation in the biofuels debate.
Network barriers and success factors

The networks in the regions have been very successful, and the intention is that the networks will continue to meet after the BIONIC project is completed. There are many factors that have had an impact on setting up and running the regional networks, including economic, environmental, social, political and technical influences.

**Economic factors:**
These include limited or no funding for running the network, the impacts of the global economic crisis, financial incentives and taxes.

**North West England**
Lack of funding makes it difficult to operate and limits the scope of the work that can be undertaken. This issue has been overcome in part by contribution of facilities and resources from network members.

**Prahova**
The economic crisis and no perceived economic benefits inhibited membership. Transport operators have no cost incentives to switch from conventional fuels. The lack of subsidies, incentives and high taxes inhibits Producers and Suppliers from engaging.

**Technical factors**
These include the technical aspects of biofuel use, including issues around the vehicle warranties.

**Prahova**
There is no infrastructure, legislation or facilities in place to systemise the collection and use of waste vegetable oil.

**Cantabria**
Some manufacturers have stated that vehicle warranties will be invalidated if biofuels are used. This sends a negative message about biofuel use.

**Political/Legislative factors**
These include the level of political support available, and the impacts of legislation.

**Pazardjik**
Some of the members of the network are municipal administrations represented by mayors. Regional Energy Agency of Pazardjik (REAP) experts visited the administrative towns and held a number of bilateral meetings with mayors and other experts from the local administrations.

**Prahova**
The Romanian Fiscal Code is a barrier for local initiatives of biofuels production and has significantly reduced the number of manufacturers and distributors of biofuels and therefore the default network size – this Code asks for all producers and distributors to have a tax warehouse in order to trade, regardless of the quantity of biofuel produced or distributed.

**North West England**
The North West Network has maintained a strong presence through changing political support for biofuels thanks to the focus on sustainability and the interest of members.

**Region Värmland**
The country has a national goal that the share of renewable energy in the transportation sector should be at least 10% by the year 2020.
Social and logistical factors
Social factors include public awareness and public opinion, and regional priorities. Logistical factors include establishing and contacting the relevant persons, and the day-to-day process of running and maintaining the network.

North West England
It is essential to attract and retain a core group, dedicated to the agenda that are able to maintain the momentum as a vibrant, active body of interest. This momentum, topical and relevant agendas, high calibre speakers, good leadership and realistic objectives enables new members to be recruited and the network to maintain credibility.

Region Värmland
Existing policies of purchasing clean cars for business journeys creates a large number of customers for biofuels. Environmental issues are high on both regional and personal agendas and this has created an atmosphere of cooperation and a great deal of interest in biofuels.

Progress on biofuels is going very fast in Värmland compared to establishing the network when it was difficult to bring together the key players and to allow time for new people to become familiar, involved and engaged in the network.

Pazardjik
Network member organisations from public and private sectors understood the positive effect of establishing the biofuel network. Visits to local authorities and private organisations are being performed in order to disseminate project results and to obtain feedback, thereby maintaining the momentum of the network.

Cantabria
A range of key figures in the biofuel supply chain are represented in the network which makes the experience of sharing and the contrast of opinions very enriching.

Environmental factors
These include environmental awareness, the sustainability issues surrounding biofuels, and the food versus fuel debate.

Region Värmland
There is a high level of environmental awareness and support for environmental progress and initiatives. A national website exists to spread knowledge and information about clean vehicles and clean fuels which have helped to create a supportive culture.

Cantabria
Scepticism and doubts about the environmental advantages of biofuels and the food versus fuel debate have limited participation. Crop derived biofuels have not been very successful in Spain but this has led to the trend to investigate 2nd and 3rd generation biofuels.
The outcomes of the Case Studies demonstrate the results and experiences of each region in implementing often very ambitious activities which reflect a number of different biofuels and geographical regions across Europe.

Each of the partners developed case studies under one or more of the following categories:

- Agricultural / Feedstock Supply
- Waste Recycling / Collection and Biogas
- Production Facilities
- End Use
- Promotion / Awareness Campaigns

Karaby Gård is a farm in the south-east of Värmland where the family-owned company Karaby Bioenergi produces biodiesel oil. The raw material is mainly of local origin, and most of the customers of both the biodiesel oil and the rape cake (a by-product of the process that must also be sold in order for the business to be profitable) are situated in the region of Värmland.

The company started in 2006 and has grown successfully from then on. Biodiesel oil has been produced from rapeseed from the beginning; today used cooking oil is also used. The used cooking oil is delivered from a crisps producer located in the east of Värmland.

The Karaby Bioenergi case study is interesting because it demonstrates success in: the use of rape seed for biofuel production in a forest region such as Värmland; the change from cattle-farming to biodiesel production; and running a company with a growing number of satisfied customers.

Energikontor Värmland has focused on the technical issues associated with using a heterogeneous raw material such as rape-seed and how this influences the characteristics of the product, as well as the strong regional connection of the business and how this has contributed to success. One example of this that can be applied to all transitions to new types of fuels, is that by having a close relationship to customers and providing them with good information about the differences to fossil fuels, the customers have been able to avoid beginners mistakes and thereby get a more positive first experience of biodiesel oil.

Karaby Bioenergi is an active member of the BIONIC network and has hosted a study visit to members from other organisations within the BIONIC network. During the BIONIC project period new contacts have been made between the producer and representatives of fleet owners via the network.
In spite of previous awareness and promotion campaigns, research revealed scarce knowledge and use of biofuels by Cantabrian Citizens. So, as a primary step of the BIONIC Project, the Government of Cantabria (CTL and General Directorate of Transport and Communication with the collaboration of GENERCAN (Cantabria Energy Agency) and the General Directorate of Environment– administrative partners of the Local Network) decided to implement an awareness campaign to spread information about biofuels and public transport.

**BIOBUS campaign**

The campaign, called BIOBUS, includes two branded vehicles dedicated to the promotion of public transport and biofuels. The public contest was awarded by the Regional Government on 24th June 2008 to the bus company Astibus, which belongs to the National Express Group, one of the partners of the local network. The project has been running for 24 months finishing in August 2010 and it is estimated that about 2,000,000 passengers will have used these vehicles.

**Public awareness**

The BIOBUS buses running on a 10-30% blend of biodiesel display placards and video tapes related to climate change, global warming, private transport effects and biofuel benefits, and operate on the most used public transport routes that connect Santander (the capital city of Cantabria) with its suburban area. In addition to these public transport services, the campaign offers free leisure routes to environmental strategic places in order to promote the environmental benefits of public transport and biofuels.

In April 2010 new data was collected to evaluate the impact of the campaign on the target audience. Results were presented in May 2010 showing that public awareness and knowledge on biofuels are at an acceptable level in Cantabria in comparison to the previous poll. The percentage of public transport users who were unaware of biofuels has now decreased from 31% to 11.30%. It is remarkable that the general image of biofuels is still positive especially amongst the public transport users. In addition to this there is a general opinion that biofuel must be promoted and that their viability depends directly on public initiatives (regulation, information, promotion).

This type of campaign is especially recommended for implementation in other regions or areas where there is scarce knowledge on biofuels or where the general perception and public opinion are not favourable to the development and use of biofuels. It is also suitable for reinforcing and supporting previous campaigns.
Merseytravel are working with Stagecoach Bus to undertake a B30 biodiesel trial with six vehicles on fare paying routes. Stagecoach approached Merseytravel with a view to purchasing six buses from Merseytravel that had previously been used to trial hybrid technology. Their aim was to extend a biofuel trial they had undertaken in Scotland into their wider operations across the UK. The vehicles were converted to conventional Euro 3 diesel engines for the biodiesel trial.

Supporting Stagecoach Buses
Merseytravel are financially supporting the trial so as to provide the necessary refuelling infrastructure and to ensure that the operator isn’t disadvantaged by the current UK taxation system, which can result in a bus operators that uses high blend biodiesel losing revenue.

The trials Stagecoach had previously undertaken in Scotland had used a two tank system on the vehicles, which requires significant vehicle modifications. The BIONIC trial will be undertaken with a standard single tank configuration and a compatible but standard engine, which will make the results applicable to a much wider number of buses.

Biodiesel trial
The biodiesel for the trial will be supplied by a local producer using a 100% waste vegetable oil feedstock with a track record of producing high quality fuel to relevant quality standards (EN14214). The waste vegetable oil feedstock guarantees that all of the biodiesel used in the trial will be from a fully sustainable source - a key aspiration of the BIONIC project. In addition the use of a waste source results in an 80% reduction in CO₂ emissions. Both the operator and fuel supplier are members of the North West Biofuels Network demonstrating the strength of the network in forming partnerships.

During the trial fuel consumption and reliability will be monitored. Initial results will be available by the end of the BIONIC project but the trial won’t stop there - thanks to the strong partnership that has been built through BIONIC, Merseytravel are funding the trial for a maximum of two years so that the learning can continue.

If the trial proves to be successful in terms of vehicle reliability and fuel consumption, the lessons learnt will be used to support other bus operators who want to use sustainable biofuels. The trial is crucial to providing confidence in biofuels as UK bus operators rely on UK examples of best practice to inform fuel choices. Our hope is that this trial will lead to the wider uptake of sustainably produced biofuels in the public transport network.
A combined heat and power (CHP) cogeneration system has been constructed within Kubratovo Wastewater Treatment Plant in Sofia to produce electrical and heat energy from biogas obtained in the sludge treatment process. Before this plant was built the biogas was burnt without being utilised.

Sofiyska Voda AD (Sofia water utility company) has invested around 2.55 million euros for the installation, including the design, purchase, delivery and installation of the co-generators. The project began in 2008, and was the second stage of a project for the modernisation of the sludge and gas line at Kubratovo. The CHP installation was officially launched on the 2nd December 2009.

Three JENBACHER co-generators have been installed at Kubratovo, with an option for the installation of a further unit in the future. Two engines work simultaneously and one remains on standby, with the possibility for simultaneous operation of all machines. Each engine has a daily biogas consumption of 8000 m³/day. The plant produces 20-25,000 m³/day; enough to ensure the operation of two or three engines. The energy generated from each engine is equal to 1063 kW/h power energy, and 1088 kW/h heat energy, and this will be used at the plant. The total power of the three co-generators is a little over six megawatts, which is sufficient to meet the needs of the plant.

The co-generation transforms about 82% of the energy contents of the fuels into useful energy; about twice that compared to the conventional plants. This means higher efficiency at a lower price and with less pollution.

Putting the CHP plant into operation has environmental, economic and social effects:

- Considerable fuel and energy cost reduction.
- Utilisation of a waste product – the biogas released in the sludge treatment process.
- Limiting the release of methane and carbon dioxide in the atmosphere.
- Emissions reduction benefits not only for Sofia citizens, but also nationally and globally.
- Contributing towards meeting Bulgaria’s emission reduction obligations under the Kyoto Protocol.

The pay-back period of the existing installation will be less than 4 years. The company intend to expand their investment in the next year through installing another co-generator and increasing the production of ‘green’ electricity. Once the necessary licenses have been obtained the excess electricity will be sold to the national electricity grid.
The challenge for Ploiesti was to convince the local community of the benefits of using biofuels in a region with a tradition in oil processing. The key aim was to demonstrate that biofuels produce ‘clean energy’: reducing greenhouse gas emissions and produce very low exhaust emissions.

RATP (Metropolitan Transportation Company) ran a bus fuelled with B25 (25% biodiesel and 75% diesel by volume), which was monitored over a period of 50 days and covering a distance of around 2000 km. Technical tests observed the mechanical and environmental impact of the bus engine.

The regional network created through BIONIC contributed greatly to the management of the case study:

- RATP provided a modern bus, which was technically monitored throughout the test;
- S.C. Prio Biocombustibili sponsored this project by providing 100 liters of Biodiesel;
- S.C. Petrotel Lukoil made the physico-chemical analysis for B25, diesel fuel and biodiesel;
- Petroleum-Gas University organised and led all the activities regarding this case study; and
- Ploiesti City Hall disseminated the case study results to local and national media.

The BIOBUS displays the BIONIC logo, together with City Hall, University and sponsor’s badges and text to explain what biodiesel is and what the advantages are to using it.

In addition, 500 booklets provide Ploiesti citizens with more information about the project and the advantages of biodiesel.

The engine exhaust emissions were analysed when running on B25 and on ULSD. The testing procedure for the bus, which runs only in the city, included two driving cycles:

1. idle running;
2. accelerated (2000 rpm) running.

The results showed that there were changes to the exhaust emissions of CO (Carbon Monoxide), Nitrogen oxides - NOx, Particulate matters.
NOx (Nitrogen Oxides) and PM (Particulate Matter) when B25 is used. Other analysed compounds, including CO₂, O₂ and SOx, were found to be almost the same for both fuels for both driving cycles.

The figures on the facing page show the differences in exhaust emissions for CO, NOx and PM.

The following observations were made regarding the environmental impact:

- The total carbon balance (CO₂ + CO + Particulate Matter) for B25 is similar to ULSD, but it must be noted that almost 25% of the CO₂ emissions from biodiesel are in a biological closed circle and do not contribute to additional greenhouse gas emissions;
- CO emissions are lower for B25, especially when the engine is idle;
- The higher level of NOx emissions for B25 could be reduced to below the critical level if the bus were equipped with an anti-NOx catalyst, placed on the exhaust line;
- Emissions of PM are reduced by almost 28% for B25 when the engine is accelerated to 2000 rpm;
- Sulphur oxides (SOx) are very low in any driving conditions;
- B25 decreases the mutagenic effect of the exhaust gas, even though the NOx content is higher.

We conclude that there are some very positive benefits to biodiesel use because this fuel can be a real factor in the reduction of exhaust gas emissions, in order to ensure improved air quality for the community.
When the BIONIC programme began in 2007, it coincided with a Green Fleet Review carried out by the Energy Saving Trust. The key driver was to help reduce Lancashire County Council’s (LCC) carbon emissions. One of the recommended actions, amongst many others, was to explore biofuels. As a result, all Lancashire County Engineering Services depots with fuel tanks began using a 5% biodiesel blend. The bio content was UK sourced to minimise wider environmental impacts.

Gallagher review
‘Review of the Indirect Effects of Biofuels’ commissioned in the UK, known as the Gallagher report (2008), brought to the fore political issues on sustainability and land use and halted BIONIC plans in place at that time. LCC therefore amended the case study submission for a less comprehensive but potentially significant trial of Countryside Ranger Vehicles. These Ford Transit Connect vehicles are used in a variety of rural, deep rural and upland situations, with varying and sometimes extreme climatic conditions, which would enable the testing of the effectiveness of a B30 blend of biodiesel. Should the trial prove a success any benefits could quickly be rolled out across the fleet, subject to the availability of B30 fuel. Warranty issues meant the County Council agreed to underwrite the repairs to any vehicle taking part in the trial.

In order to meet the two main aims of BIONIC - to bring forward the production and use of good quality, sustainable biofuels - the intention was to use a new product which hopefully would provide a high blend ‘drop-in’ alternative which was lacking in the UK market. It was hoped that the fuel would tackle quality issues with biodiesel blends such as separation of constituent parts, quality control and low temperature performance, and have very good sustainability characteristics.

Summary of findings
- Morrison’s Supermarket Petrol Forecourt had the B30 fuel available for the trial but ceased sales in January 2010, following the government’s withdrawal of the 20p per litre duty differential from 1st April 2010.
- There are no other convenient suppliers in the Lancashire area.
- Noting that this was a relatively small sample - comparing fuel consumption for the same period (June to December) for 2007-2009 shows no major differences.
- The driver noticed no significant changes in performance of the vehicle during the trial period and there were no additional repair or maintenance requirements.

Conclusions
There were no issues in using this fuel in Ranger vehicles in terms of consumption and engine performance. However, warranties and availability of fuel still remain issues.
In Cantabria a workshop was held to debate and summarise future actions which might influence policy and contribute to the development of biofuels for transport. Many of these conclusions are common to other partner regions.

**Context description**
- Local organisations throughout the chain are increasingly losing their interest in biofuels and their development in Cantabria.
- Private network members are being affected by the current recession and are looking for more profitable investments and businesses.
- Public bodies are applying expenditure control policy which does not help to create a scenario of confidence to launch or implement new projects.
- Nevertheless, some research institutions (in collaboration with biofuel production companies), included recently in the network, are managing projects aimed at developing second generation biofuels.

**Key Barriers detected**
Most of the barriers detected during the workshops, meetings and seminars held with the members of the network are so important that only huge investments or changes in current policies could help to overcome them.

As a brief reminder these barriers were:
- Vehicle manufacturers do not recommend the use of biofuels.
- The biofuel production sector in Spain is on the edge of collapsing due to the economic situation and imports from non EU countries.
- The main oil companies continue to be reluctant to install biofuel pumps in their stations. As a result biofuel supply is not easy.
- Mass media continuously provides information on biofuels negative impact on third world countries due to growing energy crops (destruction of food crops and forests).
- Cantabria Public Administrations (National regulation) force producers to include minimum quantities of biofuels in commercialized blends but are increasingly orientated to promoting other types of renewable energies. (wind energy, electric vehicles, etc).
- Biofuel is not cheaper than ordinary fuels. Transport operators did not find a financial reason for using biofuels, especially in a difficult economic situation.

**Response strategies**
As a result of this analysis, the Government of Cantabria (CTL and General Directorate of Transports & Communications) has designed different strategies in order to respond to these external barriers and influence both network members and final users by:
- Continuing with the incentive program to promote biofuel in captive fleet of public transport.
- Continuing to organise meetings and seminars to exchange opinions about biofuel impact on engines and vehicles.
- Exchanging information and participating in meetings and events to keep information updated (Climate change interdepartmental Commission, CO2 strategy).
- Getting updated information on biofuel perceptions from final users (private transport users).
- Collaborating with research institutions and public bodies in order to promote small-scale projects on sustainable biofuels and transport (2nd generation).
- Positive Biobus and public transport campaigns.
BIONIC has been conducted during a time when biofuels have been under intense scrutiny and the western economies have been hit by the worst economic conditions for a generation. Despite this the project has made significant progress in developing sustainable biofuels in the project areas, and some of these achievements are described in this document.

We are pleased that the issues of sustainability have risen rapidly up the political agenda. Much research has been conducted into the effects of nitrogen based fertilisers, direct land use change, deforestation, mono cropping, tensions with food production and most recently indirect land use change. The lack of attention given to these issues was one of the main drivers behind the development of BIONIC. However it is regrettable that the majority of mainstream media coverage has failed to differentiate between sustainable and unsustainable biofuels and the fact that sustainable biofuels are already available. In addition, on the whole environmental pressure groups have focused more attention on highlighting the issues with unsustainable biofuels than actively promoting the production and use of sustainable ones.

In general this has led to the industry as a whole suffering as potential users of sustainable biofuels are fearful that they will receive adverse publicity. This effect has been most acutely felt in Spain and in the UK. By contrast a more comprehensive debate has taken place in Sweden where users and the general public are more likely to know that not all biofuels have associated sustainability issues. Likewise in Romania the local citizens have been supportive of actions to promote the use of locally produced fuels due to the work undertaken by the Ploiesti University of Petroleum and Gas to demonstrate the local air quality benefits as well as climate change benefits of the fuels that they are promoting.

We are proud of the work that has been undertaken through BIONIC to advance the production and use of sustainable biofuels. This document contains examples of the initiatives undertaken to support their production, promotion and use. We believe that there is still great scope to increase production especially Used Cooking Oil (UCO) derived biodiesel and biomethane both of which have excellent sustainability and greenhouse gas performance.

This document is intended to inspire others who want to promote, produce or use sustainable biofuels by providing examples of real world activities. The fact that they have been undertaken against a very challenging backdrop indicates that such initiatives can be successful anywhere if the desire is there to drive them forward.

**Successful interventions**

BIONIC clearly shows the positive impact that local authorities can have both through undertaking fuel trials in their own fleets, and enabling partners to use biofuels. Local authority fleet trials can be particularly effective as they allow local authorities to reduce the carbon footprint of their fleets, whilst also supporting local fuel producers and providing confidence to private sector fleets. In some cases there can be wider benefits too such as improving local air quality which can be an increasingly significant driver for local authorities with air quality issues. Biomethane is one biofuel which has very low regulated emissions (those that contribute to poor local air quality) as well as greenhouse gas emissions.

In Cantabria the creation of two ‘biobuses’ has been particularly successful. The buses with their memorable livery are instantly recognisable and once aboard there is lots of information about biofuels both through printed literature and through television screens which show a purpose made DVD. This has proven to be a particularly popular way of promoting sustainable biofuels and has been very effective too with an estimated two million people using the buses throughout the project.
A central element to the success of the project has been the formation of regional biofuel networks. By bringing together users, potential users and producers of sustainably produced biofuels these groups have played a key role in forming partnerships and providing access to impartial information.

We would advocate the formation of networks in areas where they don’t already exist as one of the best methods of supporting new users and therefore increasing usage. These groups do require leadership but they don’t always require funding as the UK group has proved. In areas where networks are already operating we would urge you to join them and add your weight to good work that is already being done.

**Way forward**

This document addresses what we have done, but what happens next? We want you to build on the momentum that we have created. If you are interested in sustainable biofuels we would ask that you pursue that interest as vigorously as possible. For our part we remain committed to this agenda and aim to maintain the regional user groups after the end of the project. In addition the UK bus trial will continue for up to two years after the project to maximise the opportunity for learning. We hope that the work that we have done will inspire others to continue to develop the industry and proves that truly sustainable biofuels, produced locally from local feedstocks are available and viable now.
Policy recommendations

The following recommendations have been drawn from the experience gained during the BIONIC project:

- European level legislation encourages the use of biofuels but does little to encourage the use of high blends or local biofuel production. It is therefore essential that such measures be incorporated into national and/or regional policies (unless EU policy changes).

- Setting targets for biofuel use within existing national and regional level policy structures can help to drive progress.

- Developing an integrated and focussed approach can help to target resources. Identify the best focus for your resources and the corresponding target audience, and ensure that your policies support this focus. For example, which fuels do you specifically wish to encourage? Which end users are your main targets?

- A key motivation in the current economic climate is financial. Without either financial incentives or penalties it is difficult to make anything happen.

- National taxation regimes can have a huge impact on incentivising the take-up of fuels. However, lack of long term taxation commitments reduces confidence among users and producers and therefore policy should be set on a long term basis, with a clear indication of how policy may develop in the future if possible.

- Concerns around the sustainability of biofuels have had a lot of media coverage and are therefore of great public concern. To counter this, policies should include sustainability criteria and a clear way to account for these criteria and efforts should be made to publicise these elements.

- Developing networks on a regional level can be a very effective way to form regional strategies and facilitate the formation of partnerships covering the full production & use chain.

- Publicity campaigns that engage with and inform the public can be effective in creating a positive atmosphere and providing a platform within which local regional organisations can ‘trial’ working partnerships before embarking on projects together.

- Use in local authority fleets can be an effective way to both increase and promote biofuel use. Such trials provide testing of fuels and thereby increase local confidence, reduce the carbon footprint of the local authority fleet and support local producers.

- Steps should be taken to ensure integration of high blends with other low carbon transport technologies to ensure compatibility and enable a future low carbon transport future that captures the maximum benefit – e.g. biofuel – hybrid vehicles, rather than relying on the benefits that come from hybrid technology alone.
Steps should be taken to identify opportunities to combine sustainable biofuels with other policy areas, such as waste and energy security which provide strong support for the use of biomethane in transport.

Sharing of best practice of examples of local biofuel production and use can be very effective in encouraging other local organisations to consider such actions themselves. Study tours in particular enable other regional partners to see that this is not just something that ‘happens elsewhere’.
Further information, contacts and links

If you would like to know more about the BIONIC project you can visit our website [www.bionic-project.eu](http://www.bionic-project.eu) or contact one of the project partners.

| **Project Co-ordinator:** | stephen.littler@merseytravel.gov.uk  
Merseytravel | www.merseytravel.gov.uk |
|--------------------------|-----------------------------|
| **Project Manager:**     | sofiagimnary@ttr-ltd.com     
Transport & Travel Research Ltd (TTR) | www.ttr-ltd.com |
| **Project Partners:**    |                             |
| CTL Cantabria            | bionic@cantabria.org        
www.ctlcantabria.com      |
| Regional Energy Agency   | reapazar@mbox.contact.bg    
of Pazardjik (REAP)       | www.reap-save.org          |
| Region Värmland          | energikontoret@regionvarmland.se  
www.regionvarmland.se      |
| Lancashire County Council| moira.mortimer@Lancashire.gov.uk  
www.lancashire.gov.uk      |
| Ploiesti City Hall       | al21@ploiesti.ro            
(Primaria Municipiul Ploiesti) | www.ploiesti.ro          |
| Petroleum Gas University | dorsta@mail.upg-ploiesti.ro  
of Ploiesti                | www.upg-ploiesti.ro        |
| F.E.D.A.R.E.N.E           | fedarene@fedarene.org.uk    
www.fedarene.org           |

www.bionic-project.eu

Disclaimers
The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein.