CiViTAS
Cleaner and better transport in cities

02

POLICY ADVICE NOTES

Cleaner vehicles and alternative fuels

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The CIVITAS Initiative is a European action that supports cities in the implementation of an integrated sustainable, clean and energy efficient transport policy. Lessons learned during the planning, implementation and operation phases of the activities are summarised in twelve Policy Advice Notes and give an idea on how to cope with urban transport problems which cities of the European Union have to face in the future.

Cleaner vehicles and alternative fuels

Reduction of pollutant emission of road traffic

Within CIVITAS II (2005–2009) several measures were implemented aiming at introducing clean vehicles and fuels in European cities. Important information about the implementation of the measures and experiences made by the cities are summarised in this Policy Advice Note in order to support and inform local politicians interested in these actions.

Overview

DESCRIPTION OF THE MEASURES

Road traffic is responsible for adverse impacts on air quality in European cities. This affects the quality of life as well as the health of residents. Therefore, the reduction of pollution caused by emissions from road traffic should be a goal of each city. Several technical options, related to the cars, trucks and buses we use, are suitable:

1. To use cleaner fuels like biodiesel, biogas, Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG)
2. To equip vehicles with the latest generation filters or engines (e.g., introduce Enhanced Environmentally Friendly Vehicles (EEV) with emission standards equivalent to the EURO emission standards level V to VI). These measures are less effective than introducing new and clean vehicles and fuels however also less expensive.

Measure introducing clean vehicles (CIVITAS II city)	Caused a reduction of emissions in %				
	CO_2	CO	NOx	PM_{10}	HC
Introduction of biodiesel buses replacing EURO 0 / EURO I buses (Toulouse)	55%	20%	30%	85%	40%
Introduction of biodiesel buses replacing EURO II buses (Ljubljana)	-	49%	13%	46%	68%
Introduction of CNG buses replacing EURO II buses (Potenza)	12,5%	-	-	-	-
Introduction of CNG buses replacing diesel buses (Toulouse, Ploiesti)	83,5%	75%	-1%	91%	61%
Introduction of LPG buses replacing EURO III diesel buses (Ploiesti)	21%	5 %	31%	96%	-
Introduction of LPG taxis replacing diesel and petrol vehicles (Suceava)	10%	7%	3%	33%	-
Introduction of EEV buses with EURO IV engines and particulate filters, AdBlue aqueous urea system replacing EURO III buses (La Rochelle)	2%	98%	68%	89%	98%

TARGET GROUPS

The main target groups of the measure are car drivers, as well as managers/owners of captive fleets (e.g., public transport operators, local administrations, commercial fleet managers) who should be induced to procure cleaner vehicles for commercial or private use.

IMPACTS AND BENEFITS

For the public

The implementation of cleaner vehicles decreases air pollution in the city. The harmful effects from vehicle emissions can be reduced and the quality of life for the citizens will be improved. The following reductions in emissions were made within the CIVITAS II cities (see table above).

On a long-term perspective, the implementation of biodiesel or biogas vehicles can lead to greater independence from fossil fuels and relief from unstable oil prices.

Nevertheless, it should be assured that the biofuel is produced and transported according an internationally accepted set of sustainability criteria. Therefore, a set of clear rules was developed by all EU Member States in combination with the common target of a 10% use of biofuels in transport in the EU by 2020. Information on the topic can also be found in the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources[1].

1 European Commission (2008): Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, Brussels (Belgium)

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For individuals

Although the purchase of cleaner vehicles is more cost intensive than buying a conventional diesel or petrol vehicle, private persons are stimulated to buy these new technologies by different incentives available in many European countries. For example, individuals can save fuel costs due to the lower taxes on the fuel prices. Furthermore, they can benefit from lower taxes offered as another incentive to purchase a new car.

For companies

- The use of cleaner vehicles improves the image of the company (e.g. public transport company or commercial fleet) and, as such, might lead to an increase in demand for its services and products
- Companies can save fuel costs and benefit from different incentives given by the state (e.g. lower taxation or financial support for purchasing cleaner vehicles)
- Supporting the implementation of cleaner fuels can also influence the development of local or national economies for the production and distribution of alternative fuels

FRAMEWORK CONDITIONS FOR SUCCESS

It is advisable, and perhaps easiest, to first initiate the use of cleaner fuels in captive vehicle fleets (public transport, taxis, car-sharing companies) as technical or logistical problems of supplying vehicles with alternative fuels are easier to solve. Fleet managers normally have the capacity to develop a purchasing policy and having a captive fleet can provide the critical mass to command better prices. The implementation of cleaner vehicles by public bodies creates the initial demand for fuelling facilities which are pre-conditions for making cleaner vehicles more popular among individual car users and private fleet managers. This is the first step to establish the wide-spread use of cleaner vehicles.

Sometimes it might be necessary to re-organise the structure of the public transport company, overcoming the financial constraints and barriers, in order to allow an active involvement and close cooperation with all the institutions and organisations relevant to the measure (e.g. Traffic Police, Local Transport Company, consultants etc.). Furthermore, it must be ensured that the legal context promotes the implementation of cleaner vehicles and fuels in a city (e.g. national laws concerning compulsory blending of biodiesel with fossil fuels, obligation of cities to renew different fleets in order to achieve EU targets in reducing air pollution).

Implementation steps and timeline

When implementing a program to encourage or require cleaner fuels, the following considerations must be taken into account, as well as supportive measures and a reasonable timeline for implementation.

WORKING STEPS

1. Designing the concept

- Feasibility study on the state of the art and the availability of techniques and their applicability to the fleets in the city
- Detailed analysis on the situation of the supply market and specific suppliers of cleaner fuels
- Analysis of the legal and institutional framework (e.g. processes for public tendering to buy equipment and new buses, possibilities of joint procurement for cost reduction, access restrictions for specific vehicles for indoor garages or tunnels, directives concerning blending fuels with biodiesel, etc.)
- Establishing a project team (see also "Partners and stakeholders")
- Establishing a suitable financial plan (analysis of the operation considering the lifecycle costs are important for the public procurement, analysis of the equipment needed)

2. Tendering for vehicle providers and fuel suppliers

3. Ordering of the vehicles and the fuel supply

4. Installing fuelling stations with adequate equipment

5. Developing information campaigns about the benefits of the measures for commercial fleet managers and car owners as well as for other municipalities interested in such measures

ACCOMPANYING MEASURES TO AMPLIFY POSITIVE EFFECTS

- Establishment of green environmental zones, where only vehicles of a defined emission standard are allowed to enter
- Incentives like offering lower parking prices for users of cleaner vehicles and providing tax incentives
- Improvement of public transport supply (e.g. new lines, expanded timetables, higher frequencies) to achieve a positive overall result
- Marketing events (promotions or "free" days of public transport use, when new cleaner fuel vehicles are introduced, etc.)
- Organising eco-driving courses for all users of cleaner vehicles

TIMEFRAME

Experiences have shown that introducing cleaner vehicles and fuels in a city can require up to 4 years. This may seem a long time, but after implementation of the measure the benefits can be seen immediately (better air quality, enhanced image of public transport, etc.). As a long-term benefit, more private users will purchase cleaner vehicles as well caused by the supply of the necessary infrastructure and the positive experiences which should be promoted by the administrators or operators.

What are the investments involved?

Investment costs: At the moment, the average price of vehicles with Compressed Natural Gas or Liquefied Petroleum Gas is about 15–25% higher than that of conventional ones. For example, a bus with Compressed Natural Gas in the CIVITAS II city Venice cost EUR 42,500 more than a standard diesel bus. Cars using CNG can cost about EUR 1,500 to 3,500 more and smaller commercial vehicles (transporters) cost about EUR 3,500 to 5,500 more than petrol vehicles. A hybrid bus costs between EUR 100,000 and 170,000 more than a conventional diesel bus (examples from Germany).
Further costs can accumulate for the construction, operation and maintenance of filling stations, offering the alternative fuels.

Maintenance costs for Enhanced Environmentally Friendly buses equipped with the last generation filters might be between 7% and 23% lower than for Euro III buses (e.g. estimates are 0.77 EUR/km compared to 1.00 EUR/km). Converting the bus fleet from conventional diesel buses into cleaner LPG buses might result in an augmentation of maintenance and operating costs. Operating costs for buses with Compressed Natural Gas are higher (up to 15–23%) than for an equivalent diesel bus as well. The maintenance costs for methane buses are about 65% higher than for diesel buses.
Furthermore, it has to be considered that the staff has to be trained in maintaining and repairing the vehicles with the new technology.
Due to the lower taxation of alternative fuels in many European countries, fuel costs are usually lower for the users of cleaner vehicles. The Enhanced Environmentally Friendly vehicles can generate a gain of about 2% in fuel consumption per kilometre, in comparison to the Euro III buses. Fuel costs for methane buses are about 40% lower than for equivalent diesel buses and for CNG vehicles fuel costs are about 19% less than for EURO I diesel buses. The higher investment costs and energy consumption of buses with Compressed Natural Gas can partly be compensated by the lower prices of natural gas.

Joint procurement: The costs for buying and operating cleaner vehicles are higher than for conventional vehicles with an internal combustion engine. However, by organising cooperation between cities, regions, states and the producers of the vehicles the market can be influenced. By creating a win-win-situation for all stakeholders, the car and bus industry can produce and sell the vehicles cheaper on a common European standard.

Main drivers that serve as precursors to success

The following factors listed below are the main drivers for the initiation as well as for an efficient and successful implementation of the measures described above:

- Commitment of the local politicians and administration as well as the operators/users
- Political willingness to implement measures improving environment and the citizens' lives on a long-term perspective

- Fixed policy target (e.g. CO_2 reduction targets) for improving the environmental situation at a local level including a concrete timeframe
- Visionary and high-quality management in the city responsible for the implementation of sustainable transport measures
- A clear delegation by the city authority to fulfil the transportation and environmental goals that are established
- Guaranteed financial resources including the availability of funds for purchasing the vehicles, the maintenance costs and the fuel supply
- Opportunity to use already existing infrastructure (e.g. filling stations and pipelines of natural gas for biogas)
- Awareness campaigns achieving a general understanding of traffic problems and their negative impacts on the environment
- Availability of studies on the overall costs (including environmental impacts) of cleaner vehicles in comparison to conventional diesel vehicles
- Local business interest for production and/or distribution of cleaner fuels, adaption to local strengths
- Supportive role of trade unions which are strong and well organized in public transport sector, especially in Central and Eastern European Countries

Strategies for a successful implementation

All innovative and new public policies experience significant barriers to their adoption and acceptance. Here are a few tips for ways to overcome some of the more common barriers:

Political support

Lack of political support can be tackled at the national level by convincing decision-makers of the benefits of the measures. Politicians at the local level can stimulate this process at higher levels by showing a high interest for cleaner vehicles and asking for clear framework conditions.

All politicians have to be convinced of the positive long-term benefits as well as by the importance of their supportive actions. Cleaner vehicle initiatives should be included in the long-term transport plans of cities which are approved by local and regional politicians. It has to be pointed out that the implementation of the measures is a good strategy to achieve the goal set by all EU member states to cut the greenhouse gas emissions by 20% by 2020 compared to 1990.

Another goal of the EU Member States is to increase the share of renewable energy to 20% across the EU.

Financial management

Joint procurement should be organised as a tool for cost savings. If local financial resources are not sufficient, national funds for environmental protection or European funds could be applied for (e.g. EU Structural and Cohesion Funds in eligible regions for investments in infrastructure, vehicles and modernisation; CIVITAS Initiative and EU's RTD Framework Programme, Intelligent Energy Europe Programme (STEER)). Furthermore, loans from the European Investment Bank (EIB) could be sought. In particular cases private companies like gas or fuel providers may have an interest to co-finance the provision of cleaner fuels.

Before applying for external funding of the measures, a professional concept and implementation plan has to be developed to prove the feasibility.

Technical aspects

Development of a comprehensive state of the art analysis at the beginning of efforts to stimulate cleaner vehicles is necessary to make sure that the most sustainable and promising technologies are used. However, in order to find a technique that does work as expected, a close cooperation with all actors involved is required. Large scale biodiesel production may not have the greenhouse gas benefits that small scale waste oil based biodiesel producers can achieve. In order to deliver biodiesel with a required quality standard even from small farmers or companies on site, training is needed in the basics of the production process and information provided about the return rate of the investment in the equipment (e.g. between 5 and 7 years for equipment for the esterification for the production of biodiesel).

Legal framework condition

As national laws and statutes are different among European countries there might be the need to lobby at the state legislative body for changes in or introduction of new legislation to support cleaner vehicles and fuels. Some engines and other technical solutions even are not lawful in some countries and bureaucracy and special authorization procedures can hamper the implementation of clean urban transport measures. In some countries (like the United Kingdom) the subsidy structures needs to be changed as it hampers the use of biodiesel for publicly-funded bus services due the method of payment which is based on a fuel duty rebate and makes the use of cleaner vehicles for companies less attractive.

KEY ELEMENTS TO BE CONSIDERED

- Stimulate managers/owners of captive fleets to introduce clean technologies. The infrastructure created will also encourage private persons to purchase clean vehicles.
- Purchase and maintenance of clean vehicles requires higher investments, but due to lower taxation of clean fuels the costs will be recovered in the longer term
- By implementing joint procurement, prices for clean vehicles can be decreased significantly
- The measures are suitable to reduce greenhouse gas emissions by 20%, which is the goal set by the European Union for 2020

Who are the key people to be involved?

STAKEHOLDERS

These persons or organisations should be involved as informal advisors or supporters:

- Local politicians and municipal employees
- Different organisations (e.g. environmental groups concerning adequate vehicles and emission rates, groups of disabled and elderly persons concerning accessibility of vehicles, NGOs)
- General public (car drivers, car-sharing users, public transport users etc.) should be informed or actively involved in public consultations, events or workshops to raise awareness
- Private businesses (e.g. distributers, delivery companies, food companies) should be informed about changes and their possible advantages
- Operators of petrol stations, car producers/ retailers and engine providers should be involved to inform potential customers
- Media (e.g. journalists who specialise in public transport or environmental matters)

MAIN PROJECT PARTNERS

These types of people are critical to the success of the cleaner vehicle and fuel initiative:

Decision makers:

- administrations, e.g. departments responsible for public transport, environment or transport
- parliamentarians and politicians at the national level who could lobby for cleaner solutions in public transport

Operators:

- the transport operators of the public transport fleets
- the city administration of municipal fleets
- lease companies
- private companies and fuel providers for the production and distribution of cleaner fuels

Other partners:

- Consultants and research institutions and experts to find the best technical and organisational solutions for different cities, to test the efficiencies and to evaluate the measure

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Enumeration of practical examples from CIVITAS II

Within CIVITAS II 13 cities implemented measures dealing with cleaner vehicles and the use of alternative fuels:

Burgos (Spain): Support for clean fuels and introduction of clean public and private fleets

Debrecen (Hungary): Operation of biofuel and Compressed Natural Gas vehicles and framework conditions for alternative fuel use

Genoa (Italy): Transition towards clean vehicle fleets

Krakow (Poland): Transition towards clean vehicle fleets

La Rochelle (France): Development of clean collective transport

Ljubljana (Slovenia): Implementation and large-scale deployment of biodiesel and Compressed Natural Gas fleets, set-up of information points on clean vehicles and alternative fuels

Malmo (Sweden): Biogas on the net, clean heavy vehicles with CO_2 cooler, clean municipal fleet, environmentally adopted cars, marketing of clean vehicles by subsidized parking

Norwich (United Kingdom): Clean vehicle trails

Potenza (Italy): Clean vehicles

Preston (United Kingdom): Introduction of clean buses

Suceava (Romania): Alternative fuel bus fleet, Marketing of alternative fuels in the public and private sector

Toulouse (France): Large-scale operation of clean bus fleets, solutions for alternative fuels

Venice (Italy): Deployment of Compressed Natural Gas buses and Liquefied Petroleum Gas boats

CIVITAS Policy Advise Notes – All topics at one glance

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The CIVITAS website contains information about CIVITAS-related **news and events.** It provides an overview of all **CIVITAS projects, CIVITAS cities** and maintains **contact details** of over 600 people working within CIVITAS.

In addition, you get in-depth knowledge of **more than 650 innovative showcases** from the CIVITAS demonstration cities.

Visit the CIVITAS website and search for **prime examples of experiences** in sustainable urban transport currently being undertaken in cities. If any of the ideas suit your city, or you are just interested in learning more, you may then contact the relevant person responsible for this measure.

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