

CiViTAS
Cleaner and better transport in cities

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Measure Evaluation Results

UTR 7.3 Flexible access for cleaner freight traffic

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Executive Summary

Freight traffic is one of the main causes of air pollution in city centres. Activities to reduce emissions from freight vehicles can thus be very effective to improve the overall air quality. In 2007, Utrecht introduced a low-emission zone in the city centre. Only freight vehicles with 'cleaner' engines can enter this zone. With cameras and license plate registration these restrictions are effectively enforced. This measure already resulted in a decrease in emissions. In cooperation with the transport businesses, Utrecht investigated additional possibilities to improve air quality in the city in the frame of the CIVITAS MIMOSA project and implemented the 'flexible access for cleaner freight traffic'. The measure aimed at reducing PM10 and NOx emissions from road freight traffic and improving the accessibility of the city centre for cleaner means of transport. This reduction was to be achieved through increased usage of more sustainable freight vehicles and more energy efficient freight distribution.

The measure was implemented through the following stages:

Stage 1: Implementation of Cargohopper (April 2009) – An electric mini-train called Cargohopper was introduced. This Cargohopper is operated by Hoek transport, a transport company which currently managed the existing Urban Distribution Centre. The electric Cargohopper is a multi-trailer, 16-metre long, 1.25-metre wide lorry which has been designed to fit into the small street network of the city centre. Thereby, the Cargohopper has a maximum speed of 25 kilometres per hour and has a capacity equivalent to 5 to 8 vans. The Cargohopper delivers freight from a City Distribution Centre to the inner-city.

Stage 2: Solar panels Cargohopper (August 2009) – In August 2009, solar panels were placed on the Cargohopper. This allows the vehicle to drive 8 to 9 months a year on solar power. In the other months it runs on green electricity. The Cargohopper is therefore a fully CO₂ neutral form of freight transport.

Stage 3: Elaboration of the Implementation Plan (IP) for flexible access for cleaner freight traffic (January 2010) – An implementation plan for flexible access for cleaner freight traffic was elaborated. The first step consisted in compiling an inventory of the fuels that can be labelled as 'super clean' and in identifying the incentives which can be applied for each fuel category.

Stage 4: Application of the Implementation Plan (January 2010- ongoing) – The two following measures have been implemented. The first measure consists on giving permission to clean and very quiet freight vehicles to deliver during the night. The second measure was to allow freight vehicles the use of bus lanes. For this later measure, the results of the evaluation led to the decision to extend the pilot project to a larger area (foreseen in Autumn 2012).

At this stage of the project, the measures identified in the Implementation Plan are still in the process of implementation. The results of the evaluation are therefore focused on the impacts which can be attributed to the implementation of the Cargohopper.

To conduct the evaluation, several indicators have been used to measure these impacts: a decrease of 4 080 freight vehicle trips can be observed during CIVITAS MIMOSA, which corresponds to the saving of 88 332 kilometres driven by diesel van or light truck. This in turn resulted in a reduction of 5,8 tonnes of CO₂ emission (-73%), of 0.005 tonnes NO_x emission (-27%) and 0.001 tonnes PM₁₀ emission (-56%).

In the frame of the impact evaluation of Cargohopper measure, a cost-benefit analysis was also conducted. The cost-benefit analysis showed that the Cargohopper yields an economic benefit of about €65,000, which means it is cost-neutral for its lifespan. Cost-benefit analysis showed

that the Cargohopper contributes to a reduction in emissions and noise pollution, and increase in safety and overall liveability in the city centre. Also the service seems to be financially rewarding for the operator of the service.

Freight transport regulations are sensible political issues. During the implementation of the Cargohopper and the measures defined in the Implementation Plan, one of the critical **barriers** encountered concerned the process of finding agreements between the several stakeholders involved. The decision-making processes are highly complex due to the large numbers of stakeholders involved and the multi-level dimension of the project (municipal, regional, and national).

However, strong political willingness has been expressed to promote and support clean freight traffic initiatives. These political commitments are **critical drivers** for the measure. On the national level, the former Minister for the Environment, Mrs. Cramer, committed to become the Ambassador for Cargohopper and to promote and develop the project. On the municipal level, the measures defined in the Implementation Plan have been integrated into the Utrecht Freight Traffic Action plan and a specific budget has been allocated for the implementation which ensures the long-term dimension of the clean freight traffic initiative.

The successes of the 'clean freight traffic' measures implemented in Utrecht have been recognized in 2009, when Cargohopper and the company GEPU together won the Dutch Award for Urban freight distribution, as well as in 2011, when Utrecht won the CIVITAS Award for best city and technical award for sustainable freight traffic. These recognitions highlight the high potential by following the clean freight transport strategies. Two main **factors of success** have been identified. Regarding the implementation strategy of the Cargohopper, it is recommended to work in collaboration with a well implemented transport provider which allows integrating the Cargohopper into the existing transport system: the previous vehicles can be replaced by the Cargohopper, the customers demand remains constant and existing Urban Distribution Centres can be further used. To overcome the complexity of political issue regarding freight transport regulations, it is recommended to elaborate a unique overall freight traffic action plan in order to provide a clear overview of the objectives and strategies, to guide the political discussion and to ensure the sustainability of the initiative. Giving incentives to the freight transport provider contributes to raise the acceptance of the measure and to support them to shift towards clean freight transport methods. To achieve this successfully, regional and national agreements are highly recommended. Finally, it is important to be aware that changes in freight transport issue take place in a long-term and step-by-step process which requires patience and perseverance in conducting the initiative.

This measure in the frame of CIVITAS MIMOSA was an essential support to follow the clean freight traffic initiative in the city of Utrecht. The measure had been elaborated and implemented with appropriate methods in the context of Utrecht and can be seen as **good practice** for municipalities which want to improve their freight traffic system. Bigger cities like Amsterdam, Enschede and Amersfoort have already taken the Cargohopper concept on board. The positive results of the measure support the initiative and strengthen the political willingness to carry on the clean freight traffic initiative in Utrecht in a long-term perspective.

A Introduction

A1 Objectives

The measure objectives are:

(A) High level/longer term objectives:

- Improvement of air quality.

(B) Strategic level objectives:

- Increase the usage of more sustainable freight vehicles
- Increase the use of more energy efficient freight distribution.

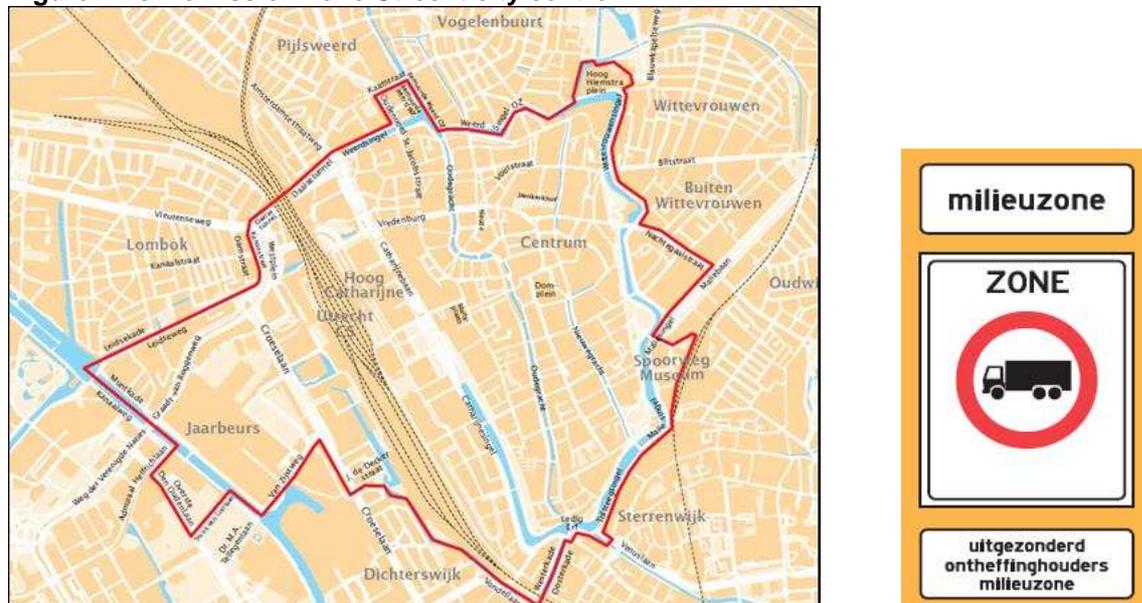
(C) Measure level specific objectives:

- To reduce the PM10 and NO_x emissions from road freight traffic.
- To improve the accessibility of Utrecht city centre for cleaner (and quiet) freight transport (i.e. cleaner than the minimum level required for entering the low emission zone).

A2 Description

Road freight traffic contributes to air quality problems, particularly on busy delivery routes. In the city of Utrecht there's a lot of road freight traffic into the city centre and Utrecht suffers from air pollution. Activities to reduce emissions from freight vehicles can thus be very effective to improve the overall air quality. By establishing a low-emission zone in July 2007, Utrecht has already limited access to the centre for trucks with 'dirty' engines. 'Dirty' engines in this respect means trucks with engines beneath the EURO5/EEV/EEV+ norm.

Figure 1 Low emission zone Utrecht city centre



The low emission zone covers almost the whole city centre. About 5% of all inhabitants (which was 16,813 inhabitants on the 1st of January 2012) live in the city centre. Besides this the city centre is visited daily by about 48,000 people working in the area (more than 20% of all jobs in Utrecht are in the city centre) and about 163,000 people travel to and from Utrecht central station in the city centre everyday. Utrecht is visited 6.9 million times a year for leisure activities. Most important in this is shopping and most shops are in the city centre. The area has about 8,200 houses and 3,800 businesses. About 21% of all Utrecht wholesalers and retailers are in the city centre and more than a third of all catering businesses (2011: 390 catering businesses). So in addition to inhabitants a lot of visitors are affected by emissions in the city centre.

Utrecht inhabitants feel they suffer due to traffic nuisance. Each year the city of Utrecht questions about 7,000 residents in an annual survey about different topics like perceived safety, health, their activities, etcetera. From the questions about perceived traffic nuisance it was discovered that a lot of residents feel that they suffer as a result of traffic fumes and noise, especially in the city centre (see table 1). More efficient and cleaner freight traffic could be a solution for this too.

Table 1. Percentage of inhabitants who feel they suffer due to traffic nuisance in 2008

	city centre	Total Utrecht
% traffic fumes	14%	12%
% nuisance of due to traffic noise	26%	23%
% satisfaction about accessibility by car	34%	69%

Source: Annual questionnaire city of Utrecht, 2008 n= 8,870

A low-emission zone was implemented already, but the low-emission zone alone provides only a base level in decreased emissions. The city of Utrecht wanted to produce an effect above and beyond this and encourage the usage of vehicles even cleaner than those meeting the low emission zone regulations. This CIVITAS measure is about stimulating cleaner freight traffic by giving these cleaner vehicles exemptions on existing prohibitions for access of freight vehicles to the Utrecht city centre.

The deployment of cleaner vehicles was stimulated by offering companies using vehicles cleaner than the low emission zone norm, something extra, a benefit that the 'normal' vehicles do not get. Various measures are possible in this respect. Therefore the city of Utrecht determined, in co-operation with private companies, for this measure different actions, which would improve air quality in the low-emission zone. First an implementation plan was developed in which 'cleaner' vehicles were distinguished with possible exemptions and adequate measures. The next step was implementation of these adequate measures.

For instance one of these measures was the stimulation of the implementation of the Cargohopper I. This Cargohopper is an electric mini-train which delivers goods from a hub near the city centre to different delivery addresses within the city centre. The Cargohopper replaces the transport of goods to the city centre by vans. As it is a clean, small (1.25m wide) and quiet vehicle which doesn't disturb public shopping in the city centre, it is now allowed to deliver outside delivery time windows. In addition to the Cargohopper several other measures to stimulate cleaner freight traffic were considered and implemented. This resulted in the following activities for this CIVITAS measure: night deliveries for clean and quiet vehicles, a pilot with the usage of bus lanes by cleaner vehicles and Utrecht had taken part in a national project with the objective to develop nationally agreed criteria for cleaner freight vehicles to get delivery privileges.

B Measure Implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **Targeting specific user groups:** granting clean and/or quiet freight transport vehicles more flexible access to restricted areas or streets.
- **A new mode of transport in operation:** a pilot with electric mini-trains (by road) for goods distribution in the city centre.

B2 Research and Technology Development

The city of Utrecht wants to stimulate the usage of clean vehicles, preferably vehicles even cleaner than those meeting the minimum requirements for the low emission-zone. Various measures are possible in this respect. In the R&D phase of this measure, in co-operation with private companies, actions to improve air quality in the low-emission zone were selected. The results of this plan were reported in deliverable 7.3.2, which provides an overview of these measures, ratings for (fuel) type of vehicle, and the next steps to be taken.

The main objective of the measures is to reward transport companies that use 'super clean' vehicles to persuade them to purchase these types of vehicles. In this case, 'super clean' means vehicles that are cleaner than the EURO5/EEV/EEV+ norm. The following measures were identified:

- Exemption from the legally allowed time window for deliveries (possibly in combination with a minimum amount of packages to be delivered in the city centre);
- Allowing freight deliveries during the night (in this case the vehicle must be both 'super clean' and 'quiet');
- Exemption from the prohibition on the use of bus lanes;
- Subsidies when purchasing a new 'super clean' vehicle (possibly in combination with national subsidy schemes);
- Financially supporting or facilitating the purchase of a new 'super clean' vehicle;
- Offering parking benefits (e.g. a special (un)loading dock for companies that have an exemption);
- Provide 'charging stations' for certain types of fuels (such as electrics).

A first step was to put together an inventory of the fuels that can be labelled 'super clean'. This was done using information from the Dutch Sustainability Agency and internal documentation. It concerns technologies that are already available or will become available in the near future. In the figure below, the fuels are identified and matched with the possible stimulating measures. For each of the measures, an X indicates for which fuel types it could be suitable. The basic logic is: the cleaner the fuel (the fewer the emissions), the more benefits a transport company can receive.

The measure regarding exemption from the legally allowed time window for deliveries is considered particularly appealing by transport companies. This exemption, which allows them to deliver goods in the city centre outside of regular hours (for example night time or weekend), is already available in a limited form for companies who deliver supplies through an Urban Distribution Centre (SDC: StadsDistributieCentra). These suppliers need to deliver a certain minimum amount of packages to the city centre, to be eligible for the exemption. Both the city of Utrecht and the transport companies would be interested, for example, in lowering the mandatory minimum amount of packages when a company drives a 'super clean' vehicle.

Figure 2 Clean vehicle fuel –measure matrix

Type of vehicle	Hybride (diesel)	Hybride (gasoline)	Electric	CNG	LNG	Biodiesel 1st gen	Biodiesel 2nd gen	Air pressure	Bio CNG/LNG	Hydrogen	E85 (bio-ethanol)
Measure											
Exemption from legally allowed time window for delivery possibly in combination with minimum of x amount of packages in the centre		x	x	x	x		x				
Allowing freight supplies during the night (vehicle needs to be both 'clean' and 'quiet')		x	x	x	x			x	x	x	
Exemption from prohibition on use of bus lanes	x	x	x	x	x		x	x	x	x	x
Subsidies when purchasing new 'clean' vehicle (possibly in combination with national schemes)			x	x	x			x	x	x	x
Financially support or facilitate purchase 'clean' vehicle											
Offering parking benefits (e.g. special (un)loading dock for companies with an exemption)	x	x	x	x	x		x	x	x	x	x
Provide 'charging stations' available			x					x			
limited available/under development											

To implement these privileges the city of Utrecht is joining a regional and national project. This project entails a list of agreed criteria, used nationwide, which transport companies must meet in order to get privileges. This is important as nationwide criteria is more likely to push clean vehicles, as transport companies often work nationwide and probably won't adjust their vehicles for regulations which apply solely to Utrecht.

RTD on usage of bus lanes

One of the privileges considered is the usage of bus lanes by clean vehicles. For this specific measure travel time measurements were taken to find out how much time savings the usage of bus lanes would provide.

This research was done by Goudappel Coffeng (www.goudappel.nl) in November 2011. In autumn 2011, gps measurements were employed to assess the effect that the usage of bus lanes by freight traffic would have in terms of travel times. On the basis of these results it was decided to start a test with other companies. Travel time measures were taken over two weeks on a specific longer bus lane into the city centre (Vleutenseweg).

Figure 3: Location test bus lane usage, Vleutenseweg

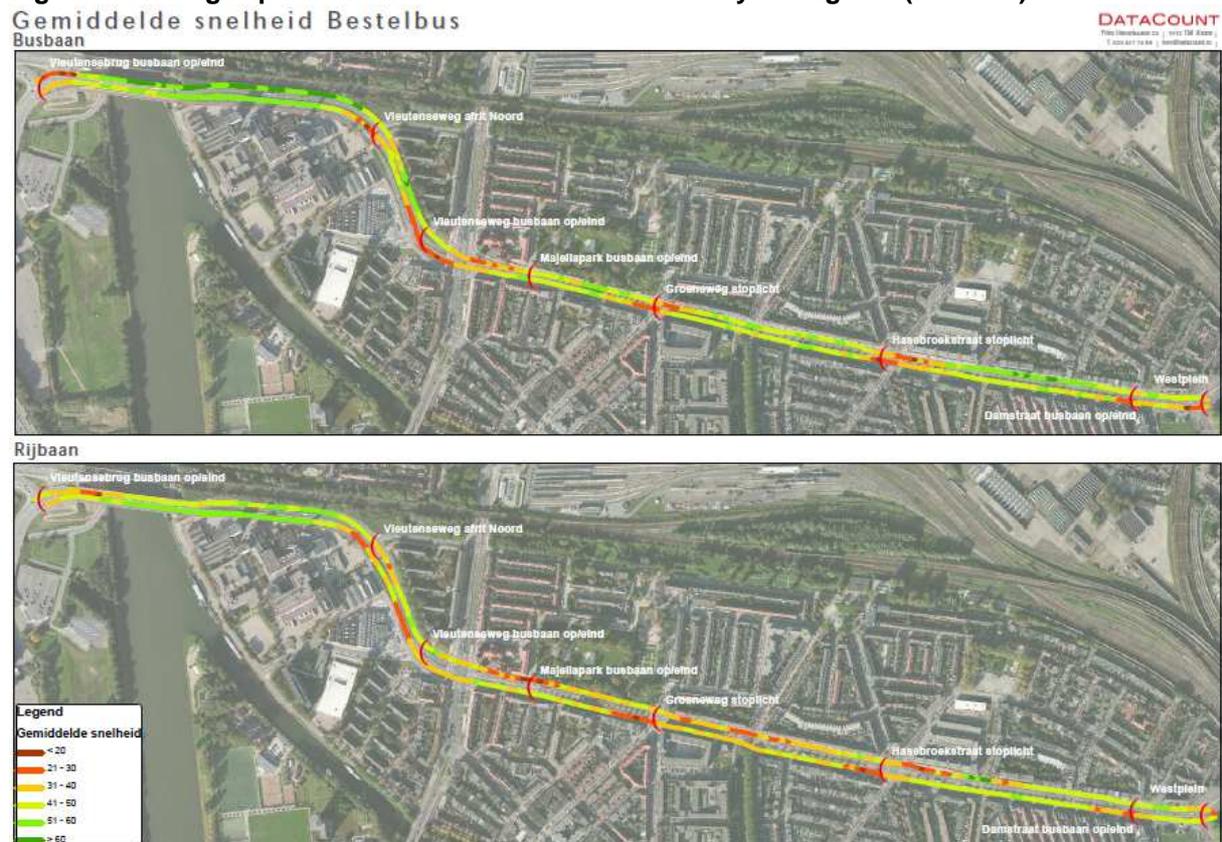


Source: Reistijden meting Vleutenseweg, Goudappel Coffeng, November 2012

For the measurements Urban Distribution Centre (SDC: Stadsdistributiecentra) Trucks were used as they are already allowed to use bus lanes. Both travel times of trucks using bus lanes and trucks on the road were compared. In total 25 trips into the city centre and 23 trips outside the city were measured. The public transport company (GVU) was also consulted about their experiences with freight traffic on bus lanes. The results were as follows:

Travel time savings for vans using the bus lanes were approximately 30 seconds on a total travel time of 6 minutes (-8%). For light trucks we see the same savings driving into the city centre. Driving away from the city centre time savings for trucks were greater, approximately 60 seconds (-17%). Travel times on bus lanes were also more reliable as there were fewer diversions.

Figure 4: Average speed of vans on bus lane and roadway during test (km/hour)



The public transport company doesn't have a clear picture of the situation on the Vleutenseweg. They think freight traffic on bus lanes in general can disturb public transport.

Overall we concluded:

- the usage of bus lanes provides time savings for freight traffic
- the usage of bus lanes provides more reliable travel times for freight traffic

These travel time savings could be an incentive for transporters to use cleaner vehicles.

It is necessary to know more about the effects of increasing shared usage of bus lanes for both freight traffic and public transport, before implementation. Therefore a test with more transport companies is planned and likely to take place in autumn 2012.

B3 Situation before CIVITAS

Road freight traffic had a relatively large impact on the air quality problem, particularly on roads with relatively high freight transport volumes. Measures to reduce freight vehicle emissions can be very effective there. By establishing a low-emission zone in July 2007, Utrecht has limited access for trucks with 'dirty' engines. The following trucks are allowed in the low-emission zone:

- Until 1st of July 2013: Diesel Euro III with certified filter and less than 8 years old at first admission
- Diesel Euro IV and higher (no older than October 2005 at first admission)
- Fuels other than diesel
- Diesel special vehicles (not more than 13 years old)

After July 2013 regulations for the low-emission zone will become stricter and probably also be applied to vans (for more information: www.utrecht.nl/milieuzone).

In addition the following regulations apply to freight traffic deliveries in Utrecht city centre:

- Special routes are assigned to freight traffic entering the city centre and within the city centre. On these routes there are no special prohibitions for freight traffic and obstacles are removed.
- Special loading and unloading sites. There are special places for the loading and unloading of freight traffic.
- There are special regulations for noise, especially during the evening and night.
- Delivery time windows for the pedestrian area in the city centre:
 - Monday to Saturday 6 -11 am and 6-7 pm
 - Thursday 6-11 am and 9-10 pm
- For freight traffic vehicles longer than 9 metres or heavier than 2.5 and 8 tonnes there are special routes as they are prohibited on some routes in the city centre (see: www.utrecht.nl/goederenvervoer).

In addition to this, transport companies or suppliers have the possibility to use Urban Distribution Centres of the Beer Boat to avoid all special regulations, as these have exemptions on delivery time windows and are adapted to delivery regulations in the city centre.

These different regulations provide improvements in air quality and noise, but as air quality is a major concern in Utrecht, more improvements were necessary. CIVITAS MIMOSA measure UTR 7.3 contributed to this.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Implementation of Cargohopper (April 2009) – An electric mini-train called the Cargohopper had officially come into service as a first example of the sustainable urban logistics that Utrecht aims to stimulate. This Cargohopper is operated by Hoek transport, a transport company that has an Urban Distribution Centre at the edges of the city near the highway (A2). From that Urban Distribution Centre (SDC: Stadsdistributiecentrum) they transport smaller good deliveries from different suppliers and different customers bundled to the city centre with the Cargohopper (www.cargohopper.nl). As the Cargohopper is smaller than normal transport vehicles (1.25 metres wide) the congestion

of other traffic in the city centre due to freight transport is less (streets in Utrecht city centre are small and loading and unloading of freight vehicles hinders other traffic).

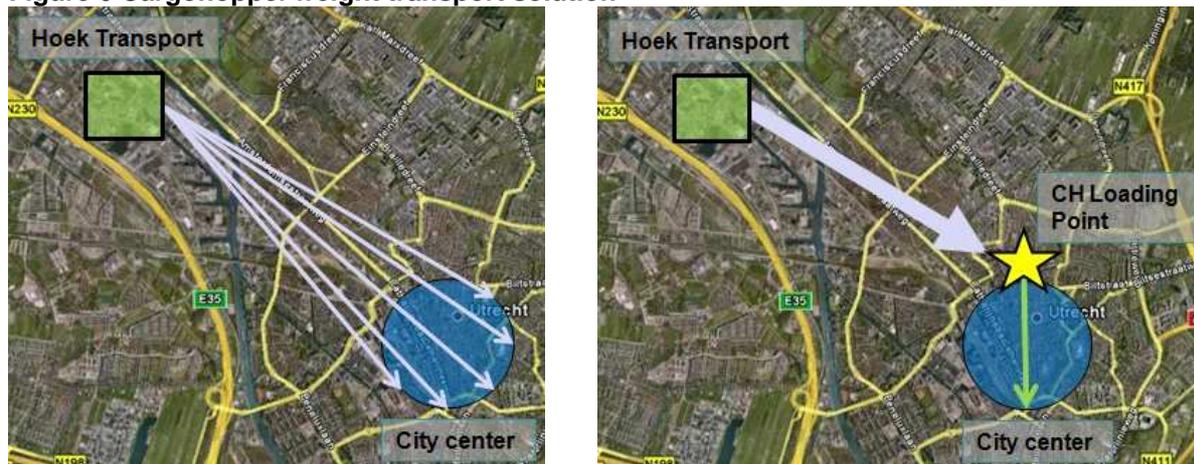
The electric Cargohopper is a multi-trailer, 16-metre long, 1.25-metre wide, and, since August 2009, solar powered train. It rides on pneumatic tyres and is used to deliver parcels in the city centre. The Cargohopper has a maximum speed of 25 kilometres per hour and can transport the freight of 5 to 8 vans (depends on how efficiently deliveries can be packed). The Cargohopper trailers are developed in such a way that they can easily be transported on a large truck from the SDC to a Cargohopper loading area closer to the city centre (300 metres from the city centre). Transport companies bring their freight to this SDC and Hoek transport drives the freight in Cargohopper containers from the city borders to the Cargohopper loading site (Zeedijk). This makes Cargohopper not just an electric train, but part of a complete (existing) transport system.

Figure 5 Cargohopper



According to Hoek Transport, the Cargohopper replaces 5 delivery vans on a daily basis. Before its implementation, the company used small delivery vans because of length- and weight restrictions for vehicles. With Cargohopper, Hoek sends a light truck to a loading point, 300 meters outside the city centre where goods are transferred onto the Cargohopper. From there, the Cargohopper drives into the city centre and makes deliveries. Goods can also be stored at the loading point making it possible for the Cargohopper to make more trips per day, while the light truck only has to make one trip. This saves delivery time, van kilometres, personnel and van emissions. It's not necessary to have a driving licence to drive the Cargohopper and therefore it is also used to train potential truck drivers.

There was no need to locate SDC customers to use the Cargohopper. For logistics companies that already used the services of Hoek Transport, a switch to the Cargohopper did not impose any changes, either in costs or logistic schemes. This means that Hoek Transport already had a large customer base when they started with the Cargohopper in 2008. Although Hoek Transport works collectively with the city of Utrecht, the Cargohopper-project is solely financed by Hoek and no costs or revenues are imposed on the city. Purchase costs for the Cargohopper were €65,000.

Figure 6 Cargohopper freight transport solution

Source: CBA UTR 7.3 Hogenberg and Riedel (2012)

From April 2009- April 2011 the Cargohopper made approximately 18,500 deliveries comprising 85,185 parcels in total. This can be translated into savings of about 200,000 van kilometres in two years.

In addition to making deliveries, the Cargohopper has become even more efficient as in 2009 an agreement was signed between Cargohopper and a waste company (Van Gansewinkel) regarding waste collection and transport on Cargohopper return trips. Cargohopper collects paper and other clean waste from customers in the city centre after delivering parcels to these customers. So the Cargohopper won't return with empty trailers and trucks for this kind of waste collection in the city centre are no longer necessary.

Stage 2: Solar panels Cargohopper (August 2009) – In August 2009, solar panels were placed on the roof of the Cargohopper. This allows the vehicle to drive 8 to 9 months a year on solar power. In the other months it drives on green electricity, making it a fully CO₂ neutral form of freight transport. Utrecht and the company producing the Cargohopper (Hoek Transport) have won national and international awards for this.

In August 2009, the Cargohopper supplied 40 to 50 delivery addresses a day in the city centre, and this expansion was continuing.

Experience with the Cargohopper demonstrated that more can be achieved in terms of out of town material bundling centres and 'just in time' deliveries. It was so successful that in autumn 2011 the Cargohopper II was launched, a vehicle capable of loading up to 10 euro pallets. It can go up to 50 km/h and can travel 250 km without recharging. Bigger cities like Amsterdam, Enschede and Amersfoort have already taken the Cargohopper concept on board. In September 2012 total Cargohopper I and II deliveries were about 37,200 with more than 150.000 packages. Transported with partial self produced solar energy and delivered within the low emission zone. Cargohopper I and II have travelled more than 19,450 kilometres and were in action for 5,660 hours. Calculated to average per year this is about 10,600 deliveries a year in 5,500 kilometres.

Stage 3: Implementation plan flexible access cleaner freight traffic (January 2010) – An implementation plan for flexible access for cleaner freight traffic was drawn up. The results of this plan were reported in deliverable 7.3.2, which provides an overview of these measures, rated per (fuel) type of vehicle, and the next steps to be taken.

The main objective of this measure was to give benefits to transport companies that use 'super clean' vehicles to persuade them to purchase these types of vehicles. In this case, 'super clean' means vehicles that are cleaner than the EURO5/EEV/EEV+ norm. A first step was establishing an inventory of the fuels that can be labelled 'super clean'. This was done with information from producers, the Dutch Sustainability Agency and internal documentation. It concerns technologies that are already available or will become available in the near future. This resulted in a matrix with the fuels identified matched with the possible stimulating measures. The basic assumption is: the cleaner the fuel (the fewer the emissions), the more benefits a transport company can receive. The complete results of this research and development are reported in part B2 of this report. With this results an implementation plan was written.

Stage 4: Implementing the measures of the implementation plan (*January 2010-ongoing*) – measures other than Cargohopper that were identified and implemented to stimulate cleaner freight traffic were:

- The measure to allow freight deliveries during the night is combined with the demand for very quiet vehicles that as a minimum meet EURO 5 standards. 'Night distribution' in practice comes down to distribution "on the edges of the day": between 6-9 am and 6-9 pm. In September 2010, a declaration was signed by an organisation of 40 supermarkets in Utrecht that they support this measure and thereby the stimulation of quiet EURO 5 vehicles. Until now however the possibility to make night deliveries hasn't been capitalised upon. In September 2012 we were still waiting for the first supermarket to request night deliveries based on this agreement.
- Exemption from the prohibition on the use of bus lanes; A study was carried out with the Urban Distribution Centres that are already allowed to use specific bus lanes. In this study the travel times and time savings using bus lanes were researched. The results were reported in November 2011 and can be found in part B2 of this REPORT. As a result of this study it was decided that a larger pilot with more companies would be conducted to see the effect when bus lanes are used by more freight traffic (for example to see the effects on public transport time schedules). The BRU (part of the province: Bestuur Regio Utrecht) had to approve this as they are responsible for public transport. In the beginning BRU were against a larger test on bus lanes, as they feared public transport delays. In the end they decided that a test was allowed but only if at least 10 extra companies (for each route/bus lane) would join the test. The BRU will be involved in monitoring during the test and if it turns out that public transport is hindered by the freight traffic the test will be stopped. At first there weren't enough participants, but only now (September 2012) does there seem to be enough participating companies to start a test. A test will likely start in autumn 2012.
- Utrecht was taking part in a national project "Privilege approach for cleaner, quieter vehicles", coordinated by the national government. The goal was to agree a list of criteria, to be used nationwide, that a transport company must meet to get some advantages like night deliveries or use of bus lanes. Unfortunately this project was stopped in the first part of 2011 as there was a lack of interest and urgency in different municipalities. The participating municipalities were not willing to change their legislation.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure 7.2 City distribution by boat** – Both measures have the same objective: To decrease road freight transport and the resulting PM10, NO_x and CO₂ emissions

in the city centre. However allocation of results is not by measurements, only by calculation per measure.

There would have been a relation with measure UTR 7.4 Distribution Centre for Fresh and Perishable Goods as this had the same objective: to decrease road freight transport and resulting emissions. But no implementation of this measure has taken place and therefore results don't affect each other.

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and Indicators

This measure aims at increasing the use of more energy efficient freight distribution, decreasing the resulting PM10 and NO_x emissions in the city centre and improving the accessibility of Utrecht city centre for cleaner and quieter freight transport, hence impacts on environment and transport will be taken into account. Verifiable results are improved air quality, in terms of PM10 and NO_x emission reduction. The low emission zone gives a reduction in concentrations of NO_x and PM10 down to 1 µg/m³ at road sections level; the stimulating measures of this project should make the effects slightly stronger in the low emission zone (calculation based on logistic impacts as provided by the companies) and increase the share of clean freight vehicles (including mini trains) in the inner city, compared to the situation with a low emission zone and no stimulating measures.

Although this measure is not a focused measure a Cost-Benefit Analysis (CBA) was conducted on the Cargohopper part of the measure. As the Cargohopper was implemented and successful we think a CBA will provide interesting information for other cities considering a Cargohopper concept.

From the moment the Cargohopper was implemented the Cargohopper I capacity was completely used. For the impact results and the CBA we assume that the Cargohopper replaces according to Hoek transport, 5 delivery vans on a daily basis. If the Cargohopper is loaded efficiently this can be more and in these 5 delivery vans we don't take the return trip load (waste) into account. So our calculations give minimum impact estimations.

As Cargohopper I was a success in autumn 2011 a new vehicle, Cargohopper II, was implemented. This means that clean transported freight has grown since then. However since Cargohopper II is not part of this CIVITAS MIMOSA measure, this growth isn't taken into account in the results part of this measure.

In this chapter we reported the direct impact results of the measure for the city of Utrecht. For the impact evaluation the indicators in table 2 were used.

Utrecht no.	Pointer no.	Category	Impact	Evaluation Indicator	Source
1	8	Environment	Emissions	CO ₂ emissions of road freight vehicles in the city centre and of the freight involved in the measure	City of Utrecht, department of traffic
2	10	Environment	Emissions	NO _x emissions of road freight vehicles in the city centre and of the freight involved in the measure	City of Utrecht, department of traffic
3	11	Environment	Emissions	PM10 emissions of road freight vehicles in the city centre and of the freight involved in the measure	City of Utrecht, department of traffic
4	25	Transport	Freight movements	The number of goods vehicles per year in the city centre for the freight involved in the measure	Hoek Transport

Detailed description of the indicator methodologies:

- **PM10, NO_x, CO₂ emissions** – This measure aims to reduce PM10 and NO_x emissions in the city centre. Although it is not a direct objective of the measure, we also take CO₂ emissions into account, as this is important in terms of sustainable transport. Therefore the emissions of PM10, CO₂ and NO_x of the freight involved in the measure are reported:
 - The emissions of the transported freight involved in this measure (Cargohopper, night deliveries, cleaner freight vehicles on bus lanes) were calculated. With the freight movements (indicator freight movements) involved and the characteristics of these vehicles, the emissions of the involved freight were calculated. Freight traffic emissions are calculated to kg/year. For Cargohopper we assume that each vehicle makes an average roundtrip of 20.6 kilometres (based on Hoek transport trip distance information).
- **Freight movements** – Number of freight vehicle trips of freight involved in the measure. The involved transport companies registering the freight vehicles brought into action for the measure (in the low emission zone), for at least one week before and after the implementation of each of the selected measures. This indicator was followed, depending on the implementation of the measures, by the department of traffic of the city of Utrecht. It is presented in number of vehicle trips and vehicle kilometres/week.

In addition to the freight involved in the measure the total freight development in the city centre was also estimated. For the development of total freight movements in the city centre estimation was made on the basis of national freight transport numbers in the past and the Utrecht city growth model which predicts that transport growth in Utrecht between 2005 and 2030 will be 100%. An exponential regression function

was used to estimate freight development (Hogenberg 2012). The freight load development is converted into delivery van trips a year.

Some indicators used in the evaluation are different or changed compared to the original local evaluation plan; in part C5 'Appraisal of evaluation approach' these changes are explained.

C1.2 Establishing a baseline

The baseline is the situation with the low emission zone, but without the Cargohopper and without the extra measures to stimulate the use of extra clean vehicles in the low emission zone. The extra measures didn't result in a decrease in traffic or an increase in cleaner traffic as they have yet to be implemented or have yet to be used (as in the case of night deliveries). That's why the baseline is the situation before implementation of the Cargohopper in 2009. As the Cargohopper replaced an average of 5 delivery vans a day right from the start the baseline consists of deliveries with these 5 vans a day. The Cargohopper is operational 5 days a week, and an average of 51 weeks a year.

Freight movements

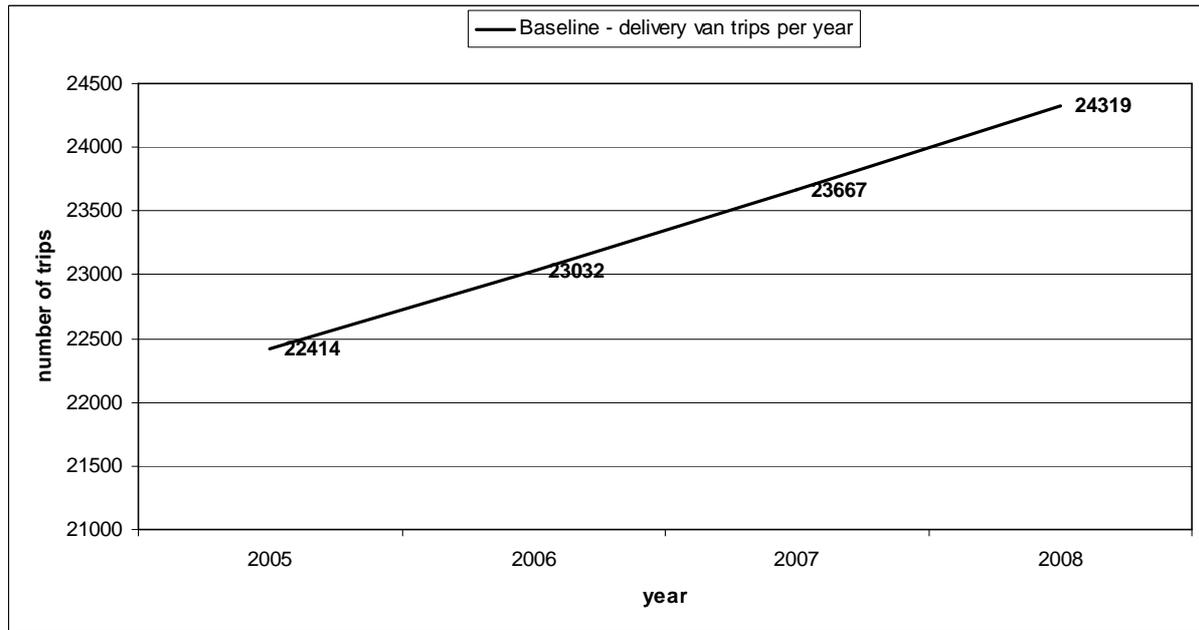
The baseline of freight movements is the number of freight movements for the freight transported with the Cargohopper before the Cargohopper was implemented. As stated above, the Cargohopper transports the freight of at least 5 delivery vans a day, 5 days a week, 51 weeks a year. Before the implementation of the Cargohopper 1,275 delivery van trips were necessary to deliver the 'Cargohopper' freight.

Utrecht no.	Pointer no.	Indicator	Freight movements for Cargohopper freight before implementation	Total freight movements city centre 2008
4	25	Number of trips	1275	24319

Source: Hoek transport and Utrecht delivery profile 2009, city of Utrecht and Hogenberg (2012)

For the development of total freight movements in the city centre estimation was made on the basis of national freight transport numbers in the past and the Utrecht city growth model which predicts that transport growth in Utrecht between 2005 and 2030 will be 100%. An exponential regression function was used to estimate the freight development (Hogenberg 2012). Freight loads are calculated for delivery van trips, assuming that all city centre freight is transported with delivery vans. Figure 7 shows the freight trips development in Utrecht city centre between 2005 and 2008.

Figure 7 – Baseline freight movements in delivery vans per year in Utrecht city centre



Source: Utrecht delivery profile 2009 and J. Hogenberg 2012

Emissions

The baseline emissions consists of the emissions of 5 delivery vans a day driving in and out of Utrecht city centre. The average roundtrip distance from the SDC to the city centre and back (the Cargohopper freight trips) was estimated as 20.6 kilometres (Hogenberg and Riedel 2012). For emission calculation the factors in the table below were used.

Table 4. Emission factors freight transport

Emission	Delivery van (g/km)*
CO2	301
NOx	0,5*1,29
PM10	0,5*0,13

* we assume all vans have the emissions of a Mercedes sprinter, source: traffic department Utrecht

In 2008, prior to the introduction of the Cargohopper, the freight was transported by delivery vans. Baseline emissions are calculated based on 5 delivery vans a week for 51 weeks a year. This makes an emissions baseline of 1275 delivery vans a year. Table 5 shows emissions in kg/year.

Table 5. Baseline emissions (kg/year)

Utrecht no.	Pointer no.	Indicator	Emissions delivery vans Cargohopper freight load in the city centre 2008
1	8	CO ₂ emissions	7906
2	10	NO _x emissions	17
3	11	PM ₁₀ emissions	1.7

Source: own calculation

C1.3 Building the business-as-usual scenario

The expectation is that freight traffic will continue growing and with that emissions. The only thing that could temper this growth is the current economic crisis, but we don't yet know what quantitative impacts the crisis will have. Therefore for total freight traffic in the city centre we used an exponential regression function to estimate the freight developments (Hogenberg 2012) with no measures implemented.

For the Cargohopper we assume Cargohopper transported freight would have been transported by vans according to the information from Hoek transport.

As the other extra measure didn't have any impact (yet) they didn't affect the situation. We can assume that changing vehicle types to cleaner vehicles wasn't affected by Utrecht measures other than the existing low emission zone.

Both the Business as Usual (BaU) and after situation are calculated for each indicator and reported in the measure results in part C2.

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, transport and society. The results are illustrated using graphs showing baseline, BaU and the after situation. In the tables the total impact during CIVITAS MIMOSA is reported. In the appendix of this report the results per year can be found.

The most important and direct results of this measure were the implementation of the Cargohopper. Other aspects of the measure have yet to be implemented or used (night deliveries) so measure results consist solely of Cargohopper results.

As mentioned before the reported Cargohopper results are a minimum calculation as we didn't include the return waste transport trips. Furthermore due to the success of Cargohopper I, in 2011 Cargohopper II was introduced. The freight transported by this second Cargohopper is not taken into account, as this is not part of this CIVITAS measure. Therefore for both baseline and BaU freight loads and trips stay the same during the CIVITAS MIMOSA period as the growing transport loads were other vehicles than Cargohopper I (for instance Cargohopper II) as Cargohopper I capacity was completely used.

C2.1 Economy

Not applicable

C2.2 Energy

Not applicable

C2.3 Environment

The direct environmental benefits of this measure came from implementation of the Cargohopper. Implementation of the Cargohopper meant a daily reduction of 5 delivery van trips from the City Distribution Centre (Stadsdistributiecentrum: SDC) into the city centre and back. This is a trip with an average distance of 20.6 kilometres. A part of this route is replaced by the Cargohopper trip; however the Cargohopper has to be loaded. Loading the Cargohopper is done with a light truck. The distance this light truck travels from the SDC to the Cargohopper loading point is 16.4 kilometres. The emission factors of each vehicle are reported in the table below.

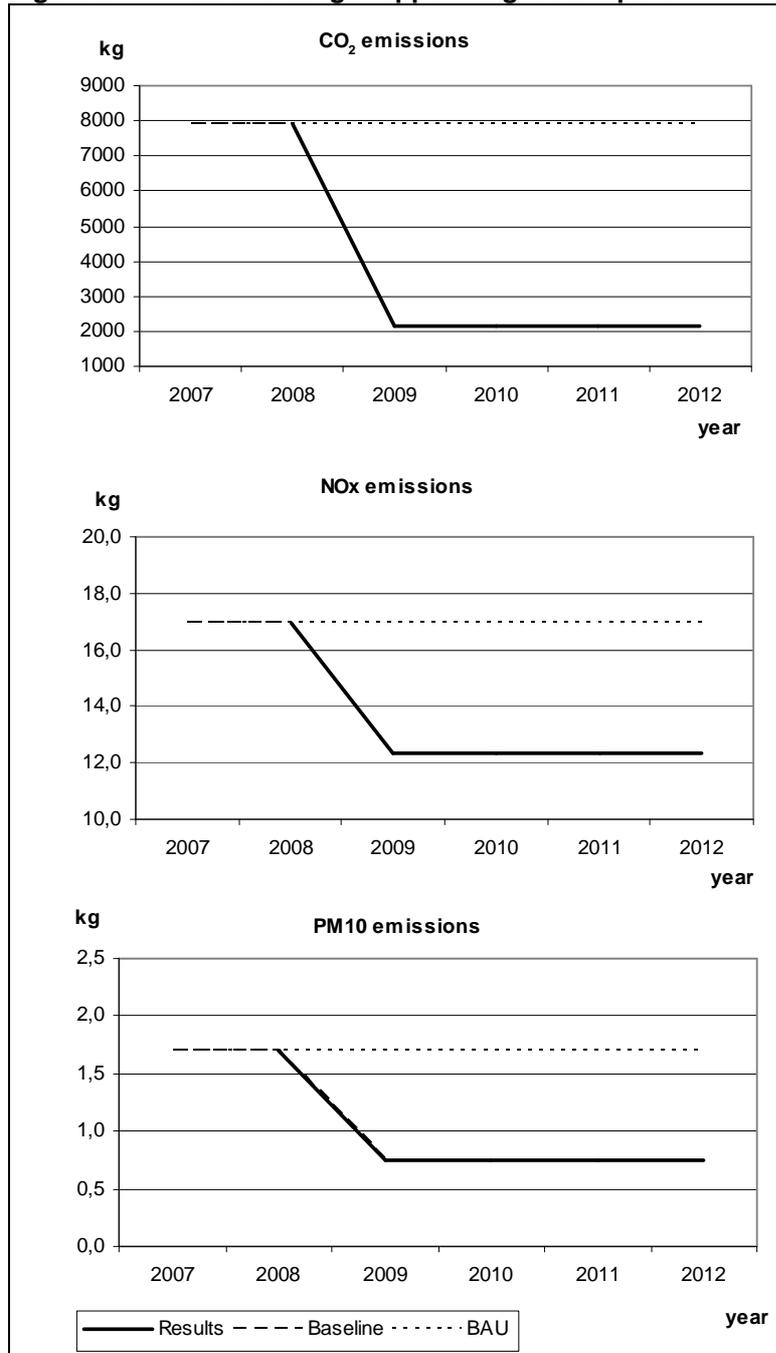
Table 6. Emission factors delivery van and light truck

Emission factors	Delivery van (g/km)	light truck (g/km)
CO ₂	301	511
NO _x	0.645	2.95
PM10	0.065	0.18

*source traffic department Utrecht

As the Cargohopper drives completely on green electric power and a large part of all yearly trips on solar power, the emissions of Cargohopper itself are zero. For each Cargohopper trip we have however the light truck emissions. Cargohopper makes one delivery a day, 5 days a week. If we take an average of 51 operational weeks a year, this makes 255 trips each year. Emissions are calculated for each year and added for 2009-2012. For each year emissions for 1275 delivery van trips with an average distance of 20.6 kilometres were saved. To load the Cargohopper 255 light truck trips of 16.4 kilometres were made. The total results for CO₂, NO_x and PM10 emission savings are reported in the table and graphs below.

Figure 8 – Emissions Cargohopper freight transport



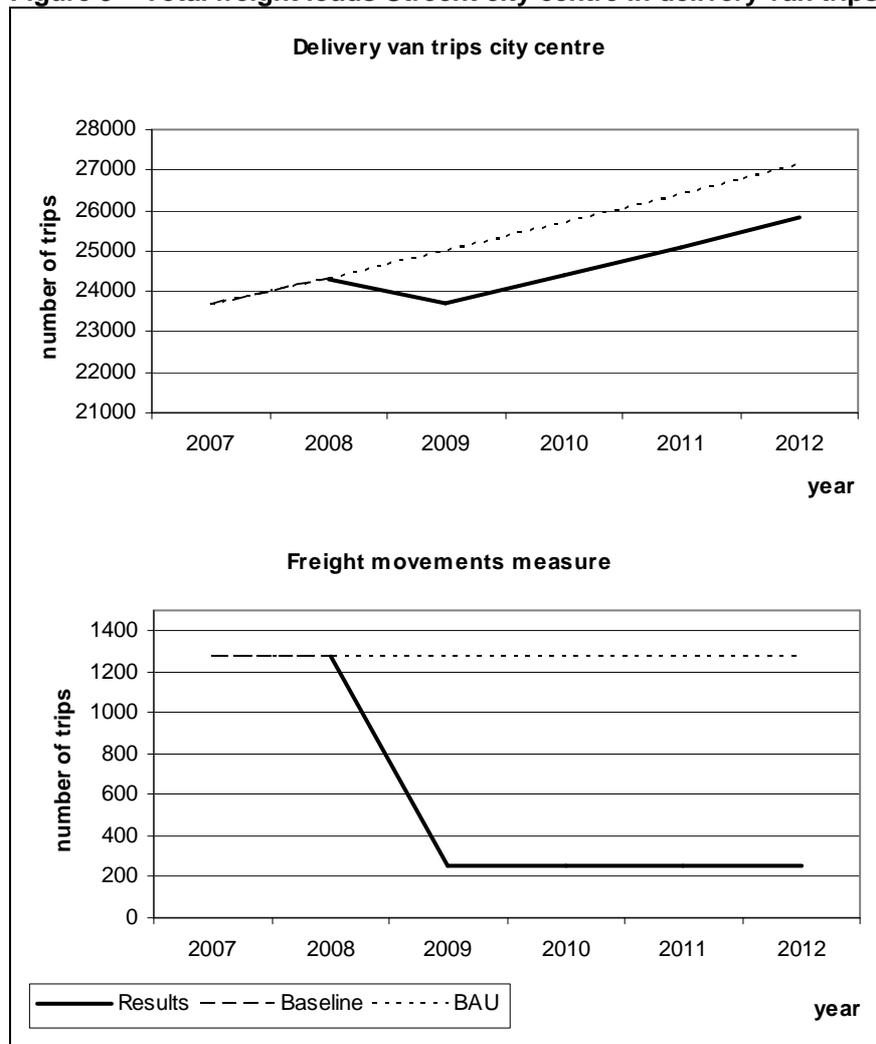
Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
1	8	CO ₂ emissions	31623 kg	8548 kg	-23075 kg	- 73%
2	10	NO _x emissions	67.8 kg	49.3kg	-18.5 kg	- 27%
3	11	PM ₁₀ emissions	6.8 kg	3.0 kg	-3.8 kg	- 56%

Source: own calculation

C2.4 Transport

As Cargohopper replaced existing transport from Hoek, its capacity has been fully used since its introduction in 2009. This means each Cargohopper trip replaces freight of 5 delivery vans. Cargohopper made 255 deliveries a year. To load the Cargohopper 255 light truck trips of 16.4 kilometres were made. So Cargohopper saved 1275 delivery van trips a year. According to Hoek transport the average delivery van trip distance is 20.6 kilometres. Figure 9 shows the estimated freight loads in the Utrecht city centre in delivery van trips per year and the freight movements in Cargohopper trips each year. Introduction of the Cargohopper gave immediate decreased freight movements.

Figure 9 – Total freight loads Utrecht city centre in delivery van trips and Cargohopper trips



Total transport results are a decrease of 5,100 delivery van trips and taken into account the light truck trips a decrease of 4,080 freight movements in four years. This makes a saving of 5% on delivery van trips in the city centre and 88,332 km diesel vehicle trips saved.

Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
4	25	Total delivery van trips in the city centre	104171	99071	-5100	-5%
		Total freight movements Cargohopper measure	5100	1020	-4080	-80%
		Total diesel freight vehicle kilometres Cargohopper measure	105060 km	16728 km	-88332 km	-84%

Source: Utrecht delivery profile 2009 and estimation freight load development Hogenberg (2012) and Hoek transport

C2.5 Society

Not applicable

C2.6 Cost-benefit Analysis

For the implementation and operation of the Cargohopper I a cost benefit analysis was conducted (for complete CBA see appendix). This cost benefit analysis is mainly focused on environmental and financial benefits. There are several other benefits from a mode shift from delivery vans to the Cargohopper. However, these benefits are difficult to measure because of the small scale of the measure and thus they cannot be estimated properly. They are therefore not included in this cost-benefit analysis. Those discarded benefits are for instance:

- Noise: Cargohopper is an electric vehicle which makes it quieter than delivery vans.
- Safety: A reduction in motorised traffic in the city centre will most likely reduce accidents. Also the Cargohopper is a narrow vehicle which makes it more manoeuvrable and therefore safer, because the driver has a better view of their surroundings.
- Congestion levels: A reduction of delivery vans in- and around the city centre will lead to a reduction in congestion levels and faster delivery times.
- Overall liveability: The city centre may become a nicer place to visit and to live. This may lead to increased economic activity.

Finally an additional benefit lies at an operating element of the Cargohopper. Since the Cargohopper is an electric vehicle with a maximum speed of 25 km/h it can be operated by drivers from the age of 16. The Cargohopper project therefore allows the training of young potential drivers.

The Cargohopper is amortized in 5 years, therefore the evaluation will run from 2008 until 2012. Operational costs and environmental benefits of the Cargohopper are calculated over this time period. In accordance with the MIMOSA guidelines, the net present value with an interest rate of 3.5% is calculated for the economic evaluation of this service. The Dutch government did however advise in 2007 to lower the interest rate to 2.5% for social cost-benefit analysis and business-cases (Divisie Economisch beleid & Onderzoek, 2007). The net present value presented in this document would be slightly higher with this lower discount rate.

The net present value, calculated with a 3.5% discount rate, is roughly €65,000 and illustrates that the Cargohopper project is economically efficient over its lifespan. The calculation of the net present value distribution is presented in the table below.

Table 9. Distribution of costs for the net present value

Indicator		2008	2009	2010	2011	2012
Operational costs	BaU	145,053 €	145,053 €	145,053 €	145,053 €	145,053€
	CH scenario	131,715 €	131,715 €	131,715 €	131,715 €	131,715 €
	BaU - CH	13,338 €	13,338 €	13,338 €	13,338 €	13,338€
Emission costs	BaU	1,146 €	1,146 €	1,146 €	1,146 €	1,146 €
	CH scenario	485 €	485 €	485 €	485 €	485 €
	BaU - CH	661 €	661 €	661 €	661 €	661 €
Sum		13,998 €	13,998 €	13,998 €	13,998 €	13,998 €
Net present value		13,998 €	27,523 €	40,590 €	53,216 €	65,415 €

The calculation shows that the net present value is mostly dependent on overall operational cost reductions due to the use of the Cargohopper. This reduction is dependent on a quantification of vehicle trips, delivery times and the hourly operating costs. The number of vehicle trips and the delivery times for modes in the business-as-usual and the Cargohopper scenario was measured, but it was assumed that the operating costs per hour would be equal for all modes of transport. This assumption is speculative. It relies on different variables as certain developments can have different impacts for both scenarios. If for instance a government decides to impose taxes on electrical vehicles, or electricity prices rise, the operating costs per hour for the Cargohopper will rise. If on the other hand diesel prices rise then this will most likely have a larger effect on the business-as-usual scenario.

For these reasons a sensitivity analysis was performed for this variable, varying the operating costs per hour in the Cargohopper scenario with +/- 10%. Only values for this scenario are varied because the change in net present value is mainly dependent on the relative difference between both scenarios.

Table 10. Sensitivity Analysis

operating costs per hour in CH scenario	Net present value
-10%	126,966 €
No change	65,415 €
+10%	3,863 €

Sensitivity analysis shows that a potential difference in operating costs per hour between the business-as-usual and Cargohopper-scenario has a large impact on the net present value. However, even with a potential increase in operational costs per hour for the Cargohopper-scenario the measure would still be favourable over business-as-usual. The break-even point lies around an 11% increase in the operating costs per hour. Current developments in fuel prices however, suggest that the operational costs per hour will grow faster in the business-as-usual scenario, which will favour the Cargohopper-scenario.

The impact of a different social discount rate is small because of the short measure lifespan and is therefore not considered in this analysis. However, the lower social discount rate of 2.5% that is suggested in Dutch projects, instead of the 3.5% that is used in MIMOSA, would have a positive effect on the net present value.

From cost benefit analysis we can conclude that the Cargohopper is a transport mode that can help reduce motorized traffic in and around the city centre. It contributes to a reduction in emissions, noise pollution, and an increase in safety and overall liveability in the city centre. Also the service seems to be financially rewarding for the operator of the service. However the quantification of the financial reward is very sensitive towards the differences in operating costs per hour and travel times between the business-as-usual and the Cargohopper scenario. It has been demonstrated that the Cargohopper can make quicker deliveries and it can be expected that delivery times for trucks will increase more than delivery times for the Cargohopper. This is because the Cargohopper can use bus-lanes, bicycle paths and can deliver outside of the delivery time windows, which makes the service less sensitive to an increase in congestion

levels. Also, it is likely that the operating costs per hour for truck delivery will rise faster in the future than the operating costs per hour for clean freight transport such as the Cargohopper, because the city of Utrecht is aiming to relax conditions for clean transport. It can therefore be concluded that the Cargohopper is a business opportunity that is already favourable from a societal point of view and will most likely remain so in the future.

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	Improved air quality, in terms of PM10 and NOx emission reduction. The low emission zone gives a reduction of concentrations of NOx and PM10 down to 1 µg/m ³ at road sections level; the stimulating measures of this project should make the effects slightly larger in the low emission zone (calculation based on logistic impacts as provided by the companies).	*
2	Increase in the share of clean freight vehicles (including mini trains) in the inner city, compared to the situation with low emission zone but without stimulating measures	*
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded		

The most important achievement of this measure is the implementation of Cargohopper I. Implementation of the Cargohopper gave immediate emission reduction, increase in clean vehicles and also provided a lot of other benefits such as less congestion and noise. Utrecht and Hoek transport (the company exploiting the Cargohopper) have won national and international awards which made Cargohopper a role model for other cities. The introduction of Cargohopper II in 2011 showed that the Cargohopper concept is a success and is still growing.

If we take the complete package of different measures that should have increased the reduction of emissions in the low emission zone, results could have been better. National cooperation between municipalities to establish standard qualifications and rules for cleaner vehicles to profit from advantages in inner city freight deliveries didn't succeed and more time is needed. Night deliveries do not seem to be attractive for transporters (of customers) and the test on the usage of bus lanes was delayed because the BRU had doubts and concerns regarding public transport delays. Nevertheless the Cargohopper was successful and gave immediate emission and delivery van trips savings and therefore the measure contributed to a decrease in emissions and as different measures continue in the future, more progress is expected.

C4 Up-scaling of results

As the Cargohopper turned out to be successful up-scaling already took place during the CIVITAS MIMOSA period with the introduction of the Cargohopper II. With Cargohopper II more freight can be delivered and as this vehicle has a faster maximum speed and a bigger battery, it can deliver freight in a larger area.

Other possible ways of up scaling are:

- **Expanding the market** by transporting other goods on the Cargohopper: there are different ideas for the future in which Cargohopper as a concept could be interesting, like transport of building materials or transport of fresh produce in the city centre. There are already serious plans for a pilot with fresh and perishable goods for catering businesses in the city centre.
- **Cooperation with other freight transport modes:** Cargohopper could also have other loading points than the one used now. For example loading points from waterborne transport to Cargohopper.
- **Introducing Cargohopper in other cities:** Cargohopper is interesting for any city that has a dense city centre and suffers with air pollution (or traffic noise). Cargohopper received different national and international rewards and got a lot of attention. Other cities in the Netherlands are already interested in the Cargohopper and bigger cities like Amsterdam, Enschede and Amersfoort have already taken the Cargohopper concept on board.

C5 Appraisal of evaluation approach

At first it was planned to measure emissions by counting the traffic in the low emission zone with a scan car, finding the vehicle characteristics and using these to calculate emissions in the low emission zone. However it turned out to be difficult to get all these data as scan car data is not a continuous flow. To overcome this we decided to use the information from Hoek transport about the Cargohopper and alternative transport. To give an idea of the impact of the measure at city centre level we used the 2009 freight delivery profile and an estimation of the freight development until 2012. This approach turned out to be a good one as it is easy to understand and gives a good idea of the impact of the Cargohopper on emissions and freight traffic numbers.

Although this was not a focused measure it was decided to conduct a cost-benefit analysis on the Cargohopper part of the measure. This was thought to be a good idea as the Cargohopper is an interesting concept for other cities as it gives immediate emission reduction and is very easily transferable. Extra information about costs and benefits provides a complete picture to consider. Before conducting the evaluation we thought two more indicators would be interesting: the counting of total traffic flow and total emissions in the city centre. The counting of total traffic flow in the city was left out as we didn't expect to see much difference in freight transport due to the implementation of the Cargohopper alone and there are a lot of other factors that influence freight traffic numbers. Furthermore we only had one year with traffic counting data in which vans were also counted separately (2010). To use this for the impact evaluation we would have had to estimate van traffic numbers for the past and the future. As we had already estimated the total freight traffic in the city centre it was decided that more estimation would not increase the quality of the impact evaluation and results. For total emissions in the city centre we needed data on vehicle numbers and characteristics or measurements of air quality. In both cases we didn't expect to see effects of the implementation of the Cargohopper, as there are many other factors that influence traffic flow and emission. To report the impact this would be of no use and therefore we decided to measure impact with the freight involved in the measure.

C6 Summary of evaluation results

The key results are as follows:

- **Cargohopper successful low emission bundling concept** – The Cargohopper concept contributes to better air quality by less emissions per trip and bundling trips, besides this it is a profitable investment and has even more benefits such as noise reduction, delivering outside delivery time windows, pedestrians are less hindered by freight traffic and for instance the possibility to teach future drivers. Implementation of the Cargohopper resulted in a decrease of 4,080 vehicle trips and 88,332 kilometres by diesel van or light truck during CIVITAS MIMOSA. This also means saved emissions of 5.8 tonnes of CO₂ (-73%), 0.005 tonnes NO_x (-27%) and 0.001 tonnes PM₁₀ (-56%). The net present value is roughly €65,000 and illustrates that the Cargohopper project is economically efficient over its lifespan.
- **Agreements on standards for cleaner freight and exemptions are difficult** – It turned out to be difficult to agree standard characteristics for cleaner freight traffic and corresponding exemptions. Local, regional or even national regulations are necessary to motivate the purchase of cleaner vehicles. Freight regulations are often political issues which makes it difficult to come to an agreement across different municipalities.

C7 Future activities relating to the measure

Experience with the Cargohopper has demonstrated that more can be achieved in terms of material bundling centres out of town and “just in time” deliveries. It has been so successful that the Cargohopper II was launched, a vehicle capable of loading up to 10 euro pallets. It can go up to 50 km/h and can travel 250 km without recharging. Bigger cities like Amsterdam, Enschede and Amersfoort have already taken the Cargohopper concept on board.

At this moment a plan has been made to do a pilot with fresh and perishable deliveries in Utrecht city centre with Cargohopper as transporter and distribution centre. With this activity the goods market for the Cargohopper is expanded and the earlier planned pilot for CIVITAS measure UTR 7.4 Distribution centres for fresh and perishable goods with goods bundling for catering businesses in the city centre will take place.

Besides Cargohopper activities (national) collaboration to determine freight vehicle criteria for cleaner vehicles to receive delivery advantages will continue and in autumn 2012 the preparations for a test with freight vehicles on bus lanes will start. After July 2013 regulations for the low emission zone will become stricter.

D Process Evaluation Findings

D.1 Deviations from the original plan

The deviations from the original plan comprised:

- **No pilot with exemption from the legally allowed time window for deliveries-** An experiment together with the city of Amersfoort and financial support from the Ministry of Economic Affairs was started to see if expanding the time window for deliveries could improve the efficiency of freight transport in the city. In Utrecht, this would mean that transport companies indicate to the city which retailers in the centre they would like to deliver to before 9 AM. The city would then help the transport companies to persuade these shopkeepers and retailers to participate in this test and arrive earlier to their shop to receive the goods. The city would take the role of mediator. No legal procedures needed to be amended. This measure was not implemented because in Amersfoort the experiment did not have enough (political) support to allow the expansion of the time window. There was no interest from other municipalities. For that reason the Ministry of Economic Affairs discontinued its contribution. This measure would only be interesting if more cities joined, as transport companies and retailers won't change their delivery time schedule for just one city.
- **Delayed test on using bus lanes-** A test with the usage of bus lanes by freight traffic was planned during the Mimosa period. Before planning this test a first study was conducted to measure travel time savings with gps measurements on traffic already using bus lanes. After this study the test was delayed as the regional authority (BRU) that is responsible for public transport had serious doubts about public transport delays. Finally it was decided that the test could only take place if there were at least 10 transport companies joining the test and with the condition that if public transport is hindered, the test can be stopped immediately. At the moment there are enough participating transport companies and at the end of 2012 the test will probably start.
- **No list of criteria of clean freight vehicles was agreed –** Both national and regional discussions took place to come to an agreement about criteria for cleaner vehicles to get exemptions of advantages in freight delivery. This didn't succeed into an agreement yet. It has turned out to be very difficult to reach a common agreement. Discussions are however ongoing.

D.2 Barriers and drivers

In this chapter barriers and drivers are described for each measure phase (between brackets the barrier/driver field number as described in the process evaluation guideline).

D.2.1 Barriers

Preparation phase

- **No (national) agreement between cities about vehicle characteristics (2)** – Exemption from the legally allowed time window for deliveries by clean vehicles. The experiment together with the city of Amersfoort did not work out: Amersfoort City Council did not support the pilot and cancelled it, making Utrecht's share of the pilot redundant. Utrecht will continue with this measure in its own way, but the link with clean vehicles will be lost so it will no longer fit into the MIMOSA framework.

Implementation phase

- **Few useful stretches of bus lanes (11)** - Possibilities to implement the use of bus lanes as a stimulating measure are limited: there are few useful stretches of bus lanes available, which make time savings and gains for transporters likely to be small.
- **No availability of personnel for receiving night deliveries (8)** - Night time deliveries with clean vehicles are limited by the availability of personnel at receiving shops and by noise regulations.
- **Difficult cooperation between municipalities (5)** - Freight regulations are often political issues which makes it difficult to come to an agreement between different municipalities.

D.2.2 Drivers

Preparation phase

- **Development of national scheme for exemptions for cleaner freight (2)** – A recognition scheme is under development nationally to exempt clean freight vehicles from the legally allowed time window for deliveries.

Implementation phase

- **National award for Cargohopper (5)** - In November 2009, Utrecht, Cargohopper and the company GEPU together won the Dutch Award for Urban freight distribution, allowing Cargohopper to invest in a second clean vehicle.
- **Signed declaration by large retailer for night deliveries (5)** - A declaration has been signed by an organization of 40 supermarkets in Utrecht in support of the measure to allow freight deliveries during the night combined with the demand for very quiet vehicles that are at least EURO 5 standard.
- **Former Minister for the Environment became Ambassador for Cargohopper (5)** - Former Minister for the Environment, Mrs. Cramer, now works at the University of Utrecht. She will act as the Ambassador for Cargohopper and will, where possible, help to promote and develop the project.
- **Measure part of Utrecht Freight Traffic Action plan (6)** - This measure is part of the Utrecht Freight Traffic Action plan with appurtenant budget that was formally approved in February 2011. This guarantees continuation for a longer time.

D.2.3 Activities

Overall activities

- **Participation in national project (6)** - Utrecht participated in a national project to come to a common approach for “privileges” for (cleaner) freight vehicles. The aim is to agree uniform criteria throughout the country that (trucks from) transport companies need to fulfil to be eligible for exemptions such as implemented and studied in this measure. The advantage is that these criteria, or standards, will be stricter than the existing individual local criteria and will really lead to the purchase of cleaner vehicles by transport companies. Next to Utrecht, the other 3 large cities are involved, as well as several stakeholder organisations. A concrete proposal was being finalised during CIVITAS MIMOSA, which is now open for comments by municipalities, stakeholders and private companies in the transport sector. A final agreement has not yet been reached.

Preparation phase

- **Extra study and judgement of measures (5)** – Stimulating measures such as dedicated parking places and the use of bus lanes have been examined further and judged by municipalities and transporters.
- **Exemptions are combined with strict regulations (2)** -The allowance for freight deliveries during the night is combined with the demand for very quiet vehicles that are at least EURO 5 standards.
- **Study on exemption from the prohibition on the use of bus lanes (4)** - Certain transport companies that are recognised as ‘city distributors’ are allowed to drive (some of their clean) vans on bus lanes to and from the city centre. This is not the case for clean(er) trucks yet. Utrecht is considering allowing this exemption. A SWOT analysis that was carried out led to the conclusion that additional measurements were needed. Subsequently, a test was done to measure the effect on the driving time of trucks on bus lanes. A qualitative analysis and a pilot will be conducted to evaluate results and the opinion of bus drivers on the measure.

Implementation phase

- **Opening an extra urban distribution centre (4)** - A fourth urban distribution centre has been recognised under the new ‘clean’ regulations introduced in 2009.

Operation phase

- **Introduction of Cargohopper II (4)** – Introduction of the new Cargohopper is a boost and further promotes clean freight transport. It offers more transporters and retailers the opportunity to use the Cargohopper concept.

D.3 Participation

D.3.1. Measure Partners

- **City of Utrecht** – department of traffic, responsible for freight traffic policy and delivery regulations in the city.
- **Hoek transport** – owner and operator of Cargohopper.
- **Bestuur Regio Utrecht (BRU)** - regional authority responsible for regional accessibility and public transport.

D.3.2 Stakeholders

Identifying all the different stakeholders that are affected by the measures would result in a very long list. The following groups can be distinguished:

- **Transport companies** – transport companies, delivering in the city centre or using the urban distribution centre and/or clients of Cargohopper, need to adapt to freight transport regulations in the city centre.
- **Involved suppliers** – suppliers with customers in Utrecht city centre, potential customers of Cargohopper, need to take freight transport and delivery regulations into account when organising transport.
- **Catering businesses** – catering businesses in Utrecht city centre need to take delivery regulations into account and can use Cargohopper (see also part C7 future activities of this report). There were about 490 catering businesses in Utrecht in 2011.
- **Shop owners**- shop owners in Utrecht city centre need to take delivery regulations into account and can use Cargohopper. There are about 750 shops in Utrecht city centre.
- **GVU (public transport bus company)** - have to deal with freight traffic using the bus lanes.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- **Introduction of Cargohopper by an existing transport company** – Introduction of the Cargohopper by an existing transport company is very attractive as it can immediately replace existing delivery van transport and it is not necessary to search for customers. Most favourable is a transport company with an urban distribution centre as this can be used to collect freight, bundle this and load the Cargohopper.
- **The local government is only facilitator** – When the local government tries to persuade private companies to purchase clean vehicles, it's important for a successful and healthy business case that the government only creates the legal framework like exemptions and some local assistance and publicity rather than supplying subsidy.
- **Make a freight traffic action plan to get political support** – As freight transport regulations and delivery regulations stimulate a lot of political discussion an overall plan in which the different measures are included gives more continuity and consistency.

D.4.2 Recommendations: process (related to barrier-, driver- and action fields)

- **Develop a freight traffic action plan** – Develop a freight traffic action plan in which more measures are included, to gain political support and overcome political discussions for each measure on its own.
- **Try to develop national or regional common approach on cleaner vehicles** – A common approach for 'privileges' for (cleaner) freight vehicles gives more pressure and urgency for companies to purchase cleaner vehicles.
- **Be patient and content with small steps** – It is very difficult to agree common characteristics, regulations and privileges for cleaner freight vehicles. This involves a lot of political discussions and a lot of stakeholders. We recommend that you continue discussing national and regional projects and in the meantime try to implement small measures or pilot projects. Changing existing schemes and habits takes time.

E References

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