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ANNEX B: MUNICIPALITY OF VÄXJÖ DELIVERY AND SERVICING PLAN

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1 EXECUTIVE SUMMARY

The TRAILBLAZER project (Transport and Innovation Logistics by Local Authorities with a Zest for Efficiency and Realisation) has demonstrated significant reductions in energy used in urban freight transport. In two of the four PATHFINDER pilots, savings of 50% or more in fuel used (litres), and greater than two-thirds savings in greenhouse gases (CO2e/year) have, or will be delivered. These savings have been secured through the development and implementation of organisational and area-wide Delivery and Servicing Plans (DSPs).

DSPs are key strategy documents outlining how an organisation will deal with its need to generate freight transport efficiently, safely and in a sustainable way. A DSP focuses on a wide range of activities that support an organisation or businesses in a specific geographical area including deliveries and collections, waste and recycling, and servicing activities.

The primary objective of the TRAILBLAZER project was to implement the actions contained in the DSPs produced by the four PATHFINDER cities of Eskilstuna and Växjö (Sweden), Vercelli (Italy) and Zagreb (Croatia). During the three years of the project each PATHFINDER city was guided through the process of developing and implementing their DSP. The PATHFINDER DSPs are attached as annexes.

Two of the four PATHFINDERS in the TRAILBLAZER project, Eskilstuna and Växjö implemented organisational DSPs. The core DSPs measures were similar as they both focused on implementing a municipality consolidation centre for the delivery of municipality goods. The other two PATHFINDERS, the cities of Vercelli and Zagreb, implemented area-wide DSPs. The two areas covered by the DSP were materially different. The City of Vercelli DSP focuses on preserving the historic city centre and mitigating the effects of delivery and servicing activity. The City of Zagreb DSP focuses on increasing the efficiency of delivery and servicing activity around one of the main roads leading to the city centre.

Other outputs from the TRAILBLAZER project are:

- A report on the State of the Art in Delivery and Servicing Planning, supported by fifteen case studies
- A DSP Toolkit providing guidance on developing and implementing DSPs
- A Transferability Analysis of potential measures that could be implemented in a DSP
- The project final evaluation report

Given the demonstrable savings in energy and greenhouse gases that can be achieved, and the transferability of delivery and servicing planning to all forms of freight, delivery and servicing activity it is recommended that DSPs are promoted widely both within and outside the field of transport and at all levels of government in the EC. This will enable both public and private sector organisations across Europe to save energy and reduce harmful emissions in a cost effective way.

Full details of the TRAILBLAZER project and all the documents referenced above can be found on the TRAILBLAZER website at www.trailblazer.eu.
2 TRAILBLAZER PROJECT

The TRAILBLAZER project (Transport and Innovation Logistics by Local Authorities with a Zest for Efficiency and Realisation) has achieved a reduction in energy used in urban freight transport through public sector policy interventions across Europe by showcasing good practices and promoting Delivery and Servicing Plans (DSPs). DSPs are key strategy documents outlining how an organisation will deal with its need to generate freight transport efficiently, safely and in a sustainable way. The TRAILBLAZER project was awarded funding by Intelligent Energy Europe to:

- Reduce energy used in the supply chain
- Reduce transport related emissions
- Reduce vehicle movements

The TRAILBLAZER consortium comprised local authorities, private sector industry leaders and communications experts. The group of experienced organisations (TRAILBLAZERS), transferred knowledge and experience to a group of less experienced authorities (PATHFINDERS).

The specific objectives of TRAILBLAZER were:

1. Implement the actions contained in the DSPs produced by the four PATHFINDER cities.
2. Evidence reduced energy use as a result of DSPs.
3. Transfer knowledge and exchange experience between experienced and less experienced organisations.
4. Promote best practice in freight energy efficiency amongst local and regional authorities and the private sector in Europe.

TRAILBLAZER evaluated both the impacts of the measures implemented during the project, and the processes involved in planning and implementation. Specific attention was given to the impact of DSPs and the impact of the TRAILBLAZER project on energy saving. The full evaluation report is publically available on the TRAILBLAZER website (www.trailblazer.eu).
3 DELIVERY AND SERVICING PLANS

3.1 Introduction

Delivery and Servicing Plans (DSPs) are key strategy documents outlining how a public or private sector organisation deals with its need to generate freight transport efficiently, safely and in a sustainable way. A DSP focuses on a wide range of activities that support an organisation or businesses in a specific geographical area including:

- Goods deliveries
- Goods collections
- Waste and recycling
- Servicing activities e.g. office maintenance, window cleaning etc.

DSPs are specifically aimed at actively increasing the efficiency of the freight transport systems in urban areas. A DSP provides the opportunity to manage goods and commercial vehicle activity to and from both proposed developments and existing operating sites. It is a starting point for freight management, which directs the implementation of measures and initiatives aimed at reducing, retiming rerouting and remodelling deliveries. It provides an opportunity to redefine building operations and ensuring procurement activity also accounts for vehicle movement and emissions. A DSP has an organic impact on reducing CO2 emissions, congestion and improving air quality. It is effectively a Travel Plan for freight.

The DSP concept is scalable, so DSPs can be developed for a variety of levels. The scope of a DSP differs depending on the specific size of the organisation, on how many tenants or buildings are involved or on how many DSP measures are adopted. The scope of a DSP could be for:

- One building with sole occupancy.
- One organisation occupying part of a building of multiple tenants e.g. a single office in a multiple use premise.
- One building with multiple tenants e.g. Railway Station, Shopping Centre
- Across a number of buildings, with different tenants, but covered by the same landlord or facility Management Company
- A number of buildings, under the umbrella of an organisation who is not necessarily the landlord, e.g. a Municipality.
- A self-contained geographical area.

A DSP can consist of a range of tools, actions and interventions, including the promotion of specific solutions for urban logistics such as:

- Consolidation centres
- New methods of purchasing transport and goods
- Looking at where safe and legal loading can take place
- Using freight operators who can demonstrate their commitment to best practice
• Using more sustainable delivery methods - cycles rather than vans, for example, or requesting that your suppliers use electric vehicles

3.2 Organisational DSPs

In the United Kingdom, the adoption of Freight Travel Plans is already allowed for within the National Policy Guidance, for example within Planning Policy Guidance Note 13 (PPG13) which refers to “more environmentally friendly delivery and freight movements”\(^1\) in the context of delivering sustainable transport objectives.

Furthermore, the TfL publication ‘Guidance for Workplace Travel Planning for Development’ (2008), states that ‘All travel plans should include a provision for the development of Delivery and Servicing Plans, which incorporate a legal loading plan and where necessary, a Construction Logistics Plan to manage movements associated with a development’s construction phase.’\(^2\)

The value of a successful DSP is set in the aim to organically link the internal sustainable changes adopted within an organisation with the delivery, collection activities and servicing practices of its suppliers, contractors, goods and services providers. This will be achieved by involving staff from the procurement and sustainable policy departments in the development of the DSP.

The DSP can be incorporated in the organisations environmental policies or its travel plan and regarded as steps taken towards achieving its environmental commitments, to be more efficient and enhance the local residents’ quality of life. To integrate the benefits of a DSP with the organisations other environmental and sustainable policies and actions, employees from the policy and sustainability department need to be involved in the early stages of development of the DSP.

The DSPs’ environmental benefits could be also achieved with pressure from top to bottom e.g. from a municipality to its suppliers of goods, services and contractors. The purchasing organisation can communicate its DSP objectives to all its suppliers, service and goods providers, thus securing a good working relationship with them. This enables the persuasive power of an organisation’s procurement team, to consolidate deliveries and ensure suppliers’ contribution to the DSP can be a valuable asset.

An organisation will secure the benefits from implementing a DSP by addressing and reviewing their organisational policies. Typically this would commence with their procurement policies and processes by viewing procurement as a strategic tool to be used by an organisation, rather than just a financial processing function. Through negotiation of sustainable contract agreements with its suppliers, an organisation will achieve and embed change within their organisation, adopt greater environmental

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management of their facilities and take control over vehicle movements relating to delivery and servicing activity.

A DSP can be tailored to allow a municipality or an adopting site to pick and mix various measures that will produce the best results within the resources available for the organisation/town centre.

Finally, a DSP should include an Action Plan which is updated continually throughout the lifetime of the DSP as the DSP tools are implemented and change is achieved.

3.3 Area Wide DSPs

One of the strengths of the Delivery and Servicing Plan (DSP) concept is that it can be applied in varying scales and scopes. At one end of the spectrum a DSP can be created for a single small organisation, at the other end a DSP can be created for a discrete geographical area of mixed use i.e. an Area-wide DSP. The area chosen may also have specific issues affecting freight, delivery and servicing activity e.g. preserving the fabric of a historic city centre, poor air quality, modal conflicts e.g. trams, cycle lanes etc. An Area-wide DSP will have greater complexity than smaller scale DSPs, which reflect the defining characteristics of the location.

An Area-wide DSP will cover a wide range of organisations. These may include offices, retail – chain and independent, hotels, restaurants, service providers, residential etc. The mix of these activities will vary with each area, and so therefore will the DSP measures to be implemented.

3.4 Benefits of Delivery and servicing plans

Delivery and Servicing Plans (DSPs) can be implemented by an organisation for a wide variety of reasons e.g. environmental – to improve air quality, economic – to reduce costs, or societal – to be a better neighbour and meet corporate social responsibility objectives.

The main objectives of a DSP are to reduce the number of delivery, collection and servicing trips or to mitigate their impact e.g. by retiming activities outside of peak times or promoting safe and legal loading.

Implementing a DSP can have multi-facet benefits for a variety of stakeholders. These include municipalities – both organisationally and in meeting their public service obligations, businesses, delivery and servicing companies, and residents and visitors in an area.

Both immediate and long term improvements and benefits can be realised by organisations through improvements to operations and practices that increase their operational efficiency. These are set out below.
3.4.1 Benefits to municipalities implementing a DSP

There are two ways that the benefits of a DSP can accrue to municipalities. The first way is as an organisation in their own right. These benefits are set out in section 3.2.

The second way that municipalities gain the benefits of implementing a DSP is through the implementation of their statutory or discretionary public policies. The identified benefits for municipalities achieved by developing and implementing a DSP in furtherance of their public policies are:

- An improved urban environment and enhanced quality of life for residents
- Reduced congestion due to fewer deliveries, collections and reduced servicing activity
- Improved air quality with reductions in pollution and CO2 generation
- Reduced noise, vibration and nuisance generated by freight movements
- Lower risk of accidents involving freight vehicles.
- Less damage to the highways infrastructure due to reduced or more appropriate use by vehicles
- Increased compliance with parking, loading and unloading policies and legislation.

3.4.2 Benefits to organisations adopting a DSP

The aim for an organisation when developing its own DSP, either on its own or as part of an area wide DSP, is to educate its procurers about the transport implications of their purchasing activity. When developing a DSP the organisation focuses on the transport element of its sustainable procurement to minimise the freight transport impacts of their purchasing methods and decisions.

The main advantages that public and private sector organisations can benefit from developing and implementing a DSP are:

- Cost savings and operational efficiency improvements from reviewing internal procurement practices and through contract negotiation with suppliers
- Increased reliability of deliveries due to improved area accessibility and reduced congestion on the road network
- Deliveries, waste and servicing carried out outside peak hour times
- Staff time savings due to fewer deliveries at known times
- An improved working environment around the organisation’s premises due to reduced vehicle movements
- Reduced health and safety hazards and casualties/accidents due to reduced vehicle movements
- Efficient assistance regarding their Corporate Social Responsibility (CSR) Policy; the DSP helps organisations to fulfil their commitment to reduce CO2 emissions and meet the set CO2 targets as well as other CSR goals.
3.4.3 Benefits to Freight, Delivery and Servicing Companies

Becoming involved in the development of a DSP provides freight, delivery and servicing companies with an opportunity to review their operations and share and exchange best practice with their customers. Working together and completing the processes undertaken during the development of a DSP will assist them to find the best solutions to manage delivery and servicing activity.

The benefits that freight, delivery and servicing companies can achieve through being involved in a DSP include:

- Fuel savings from fewer and quicker delivery trips
- Increased reliability over delivery times
- Increased driver and vehicle productivity
- Fewer accidents due to fewer journeys
- Fewer trip hazards due to not having to park illegally or in an unsafe location to unload
- Reduction in the Penalty Charge Notices (PCNs) issued to the company
- Reduced environmental impact

3.4.4 Benefits to residents and visitors

There are benefits to residents and visitors of an organisation developing its DSP. These are around an improved local environment achieved by mitigating the externalities of freight, delivery and servicing activity. Benefits include:

- An improved urban environment and enhanced quality of life
- Reduced congestion due to fewer deliveries, collections and reduced servicing activity
- Improved air quality with reductions in pollution and CO2 generation
- Reduced noise, vibration and nuisance generated by retimed or reduced freight movements
- Lower risk of accidents involving freight vehicles.
- Increased compliance with parking, loading and unloading policies and legislation.
4 PATHFINDERS

The first specific objective of the TRAILBLAZER project was to implement the actions contained in the DSPs produced by the four PATHFINDER cities of Eskilstuna (Sweden), Växjö (Sweden), Vercelli (Italy) and Zagreb (Croatia). Each PATHFINDER city was guided through the process of implementing their DSP. A brief description of each PATHFINDER is given below.

The PATHFINDER DSPs are contained in the annexes to this report.

4.1.1 Eskilstuna

Eskilstuna is situated close to Lake Mälaren about 100 kilometres west of Stockholm in Sweden (Figure 1). It is one of the major municipalities in Sweden. Eskilstuna is 1258 km² to the surface with 96100 inhabitants. The municipality consists of the cities of Eskilstuna and Torshälla and the localities Alberga, Bälgviken, Hällsta, Hällberga, Hällby Well, Kjulaäs, Kvicksund, Skogstorp, Eskilstuna, Tumbo and Wagtail. With several small towns scattered in the municipality there are transportation needs where the relative share of transport cost is about average from a Mälardalen perspective.

![Figure 1: Geographical situation of Eskilstuna](image)

Eskilstuna has, like most municipalities, no central supplies store. With the conditions that are on the market with fast delivery direct from the supplier to the purchaser, the need for self-storage business declined. There are two intermediate storages in the municipality, one of the service group and one of the Urban Street departments. The supply of the service group comprises mainly office supplies. Eskilstuna has 74 production kitchens and 10 smaller kitchens. Distributed to schools and nursing homes, it looks as follows:

- Kindergartens and schools: 63 production kitchens, 8 small kitchen
- Elderly Accommodation: 11 production kitchens and two small kitchen
- Additional approximately 700-750 servings to the old at home.
- All food, with a few exceptions for the pouch, delivered hot.
In the Trailblazer project, the municipality of Eskilstuna was interested in the coordination of all food deliveries to the municipal units.

**Measures**

The Municipality of Eskilstuna was seeking to implement a Delivery and Servicing Plan (DSP) focused on the deliveries of food to the municipal kitchen, as part of a reorganisation of their procurement process. The purpose of this project was to highlight the costs of goods and services from suppliers to end customer, and try new solutions / requirements for the organization of transport.

**Objectives**

The measure objectives are:

High level/longer term:

- **Objective 1**: Use of renewable fuels at least 50% within the project framework.
- **Objective 2**: Reduce the level of CO$_2$ by at least 50%
- **Objective 3**: Reduce the level of nitrogen oxide emissions by at least 25%
- **Objective 4**: Reduce traffic noise
- **Objective 5**: Increase the number of local suppliers.

Strategic level/ medium term:

- **Objective 1**: Reduce energy consumption and environmental impact.
- **Objective 2**: Increase road safety.
- **Objective 3**: Maintain delivery quality (the ordered goods are delivered within the agreed time).
- **Objective 4**: Limit the number of delivery times for ordering units.
- **Objective 5**: To create an incentive for practical environmental awareness among clients

Measure level/ short term:

- **Objective 1**: Design and implementation project
- **Objective 2**: Implement a transportation contract under certain specified conditions
- **Objective 3**: Plan, prepare and implement an operational situation
- **Objective 4**: Manage the urban goods deliveries following the ‘Just-in-Time’ principle

**4.1.2 Vaxjo**

Växjö is located in the south of Sweden (Figure 2). The area is 1,925 km$^2$ and consists mostly of forests and lakes, with a small proportion of agriculture. The municipality of Växjö has 85 000 inhabitants, of which 60 000 live in the city of Växjö. The rest live in the countryside or in the smaller adjacent urban areas.
Business life is rich and diverse – 8,000 companies in a dynamic mixture of sizes and industries. The service sector as well as commercial and educational sectors is the basis for local businesses. The municipality has good communications with six major roads, good railway connections and an international airport. The municipality has the highest employment level in Sweden. During the last decades, growth in the municipality has increased consumption, which also means increased transport of goods. This increased demand for freight transport has resulted in many environmental, social, economic and political problems.

In 2009, the total emissions from all activities within the Municipality of Växjö were approximately 247,000 tons, equivalent to 3 tons per capita. It is estimated that 68% of the emissions come from transport, 10% from machinery, 10% from households and 12% from business, industry and the public sector. The municipality has already carried out a number of climate and energy saving measures. The transportation sector (and especially freight transportation) is one of the sectors of interest for the Municipality of Växjö.

The DSP measure in Växjö concerns: the consolidation centre for deliveries to the municipality activities.

Measures

In the Municipality of Växjö, more than 400 homes for elderly people, schools, and day nurseries receive deliveries each week which amounts to over 20 tons of supplies. Prior to the TRAILBLAZER project, 2000 deliveries were made each week, so providing large potential for improved coordination of goods transports.

The Municipality of Växjö had implemented a consolidation centre for deliveries to its Social Care, Education and other municipality activities. This consolidation centre had decoupled the costs of ‘last mile’ transport of goods from the procurement and transport to the consolidation centre. The responsibility for the transport of goods from the centre to the final destination now belongs to the municipality. To simplify the delivery planning, the municipality has purchased a web-based support system which provides information to the consolidation centre when an order is placed with a supplier.
Objectives

The measure objectives were:

High level/long term:
  - **Objective 1**: All freight transport done by biogas vehicles
  - **Objective 2**: Coordination of whole countries goods

Strategic level/medium term:
  - **Objective 1**: Increase traffic safety in school yards and elderly homes
  - **Objective 2**: Reduced delivery costs
  - **Objective 3**: Possibilities for smaller companies to complete the public procurement
  - **Objective 4**: Less noise and intrusion

Measure level/ short term:
  - **Objective 1**: Reduce emissions
  - **Objective 2**: Save kilometres

4.1.3 Vercelli

Vercelli is a city and commune of about 47,000 inhabitants in the Province of Vercelli, Piedmont, northern Italy (Figure 3).

![Figure 3: Geographical situation of Vercelli](image-url)

The city is situated on the river Sesia in the plain of the river Po between Milan and Turin. It is an important centre in Europe for the cultivation of rice and is surrounded by paddy fields. Local rice production represents 50% of total rice production in the European Union.

Measures

The Municipality of Vercelli wishes to reduce the environmental impact of freight traffic through the implementation of different measures in the city and especially in the historical city centre. Their ultimate aim is to implement an Urban Consolidation
Centre to deliver and collect goods in the historic centre, using low emission vehicles. This would be implemented after the TRAILBLAZER project has finished using funding from Piedmont region.

The DSP measure had covered area of the historical town centre. In February 2011, 900 commercial establishments were located in this area which includes a 2.93 km² Limited Traffic Zone (LTZ) and some Pedestrian Zones (PZ) covering an area of 0.0097 km².

In Trailblazer project, the DSP measure of the Municipality of Vercelli has focused on: access and parking management in the historic city centre.

**Objectives**

The measure objectives were:

**High level/longer term:**
- **Objective 1:** Freight Consolidation/Distribution Centre
- **Objective 2:** Logistics culture’ at the local level

**Strategic level/medium term:**
- **Objective 1:** Involvement of stakeholders – creation of technical working groups
- **Objective 2:** Encourage the use of clean freight vehicles
- **Objective 3:** Improving the freight transport in the city without the compromising of the economic activities in the city centre area

**Measure level/short term:**
- **Objective 1:** New parking bays for delivery services and accessibility regulation in LTZ
- **Objective 2:** Automatic license plate recognition system

**4.1.4 Zagreb**

Zagreb, the capital of Croatia, is an old central European city. Located at the intersection of several important trade routes between the Adriatic coast and Central Europe (Figure 4), the city is the political, economic, scientific and cultural capital of Croatia. Having special status, it runs self-governing public functions at both the city and the county level. Its total population living within administrative boundaries (641 km²) is approximately 791,100 (2009), of which approximately 712,000 live in the city proper. The main manufacturing industries in the city include food and beverage processing, electrical machinery, broadcasting and communications equipment and the chemical industry. The City of Zagreb has a leading economic position in Croatia due to the transport connections, concentration of industry and trade, scientific and research institutions, industrial and craft traditions. A favourable geographic position provides an excellent connection for traffic between Central Europe and the Adriatic Sea.
As in other similar countries and cities undergoing transition, the number of personal vehicles has almost doubled since transition in the early 1990s. This brought large problems to the city's historic centre in which the main administrative, cultural, commercial and social institutions and buildings are located; and where the street grid was largely defined in the second half of 19th century.

The delivery of urban goods also contributes increasingly to urban traffic problems (e.g. obstacles for traffic flow, pollution, noise). This is clearly an issue in the City of Zagreb and needs to be addressed by a more efficient time and parking management of deliveries.

**Measures**

The DSP in the Municipality of Zagreb will cover an area along the Ilica Street of approximately 1.8 km of main access road to the city centre (Figure 5); premises in this area host a mix of retail and offices activities. Ilica Street is the main shopping drag with around 326 business units. The street is a mixture of one-way and two-way traffic. To further complicate freight, delivery and servicing activity there are tram lines at the side of each carriageway.

**Objectives**

The measure objectives were:
High level/long term:
  • **Objective 1**: Reduce the number of delivery vehicles in the city centre area

Strategic level/medium term:
  • **Objective 1**: Increase the regulation of freight delivery transportation
  • **Objective 2**: Active communication between urban freight stakeholders
  • **Objectives 3**: Increase the quality of life of the citizens living and working in the city centre.

Measure level/short term:
  • **Objective 1**: Reduce the number of the delivery vehicles in the Ilica street area
  • **Objective 2**: Implementation of new parking bays for delivery services and their time windows regulation
5 PATHFINDER CASE STUDIES

The actions that were implemented by each PATHFINDER as part of their individual DSPs have been recorded in a series of case studies. These are set out below.

5.1 Municipality of Eskilstuna Case Study

5.1.1 Introduction

Traffic is the major source of emissions of greenhouse gases (more than 75%) in the municipality of Eskilstuna and it is also the dominant source of health and environmental disturbances in Eskilstuna’s outdoor environment. Deliveries to the municipal units such as schools, pre-schools and adult social care etc. also cause safety risks and takes time from the personnel at the receiving units. The municipality of Eskilstuna therefore decided to separate out shipping and goods costs when procuring for the units of the municipality.

By procuring goods excluding shipping, the municipality has the opportunity to, through a separate procurement of supplies, set stringent environmental standards on them. A private transport contract for final delivery from the consolidation centre to the municipal units creates opportunities for the coordination of deliveries from different suppliers and facilitates the use of vehicles that are better adapted to the local needs. Furthermore, by using only one distribution centre, this improves the competitiveness on the market by making it easier for small local businesses and farmers to deliver goods to Eskilstuna municipality.

As a major purchaser of goods, Eskilstuna is an influential player in the market. This position should be used to influence providers to give an increased commitment to the environment. The municipal administrations and companies have a key role in this process. It is through the demands of the activities that the market may be affected.

City management conducted a feasibility study and presented the results to senior politicians. Procurement for the consolidation of supplies and their co-ordinated delivery has been completed and the project will be implemented within the framework of the TRAILBLAZER project in autumn 2013.

5.1.2 How will it work?

The co-ordinated delivery system starts with a consolidation centre in Eskilstuna, to which all suppliers deliver their goods. The goods are then consolidated and transported to the various units in the municipality. Food is delivered to multi-temperature storage facilities at the receiving units to which the delivery driver has keys, and all deliveries take place during the night or the early morning. With this
method, the goods have already been delivered when the unit personnel arrive at work in the morning.

The key to this system lies in having a consolidation centre. Instead of having all distributors driving directly to the respective units, the goods can be gathered and deliveries coordinated in order to reduce the total amount of deliveries, emissions and staff time spent dealing with deliveries.

Another important factor lies in placing stringent requirements on the delivery trucks and their fuel. It is important to transition to cleaner fuel, in order to reduce CO$_2$ emissions. At the moment, the fuel is made up of a mixture of biogas and natural gas, but the municipality plans to transition fully to 100% biogas, produced by the municipality as soon as more biogas can be produced.

Some of the contract requirements are:

- Transition to biogas
- Trucks that meet a high environmental standard
- Tyres are new and follow stringent environmental standards
- The truck repair workshops handle hazardous waste appropriately
- All detergents are eco-labelled

5.1.3 Results

The anticipated results are presented under subheadings corresponding to the areas used as indicators: energy, economy, environment, society and transport.

The total mileage of coordination is estimated to be 50,600 km/year. With the coordination of deliveries the assumed amount of emitted CO$_2$ can be reduced from 179 tonnes to 102 tonnes or 43% simply by reducing the number of deliveries and using smaller, more appropriate vehicles. New vehicles with higher emissions standards, replacing old ones will lead to a further decrease in emissions. As a new transport system provides new opportunities for the calculation of journeys, it is only after a transport simulation that the exact mileage can be developed. We recommend a follow-up feasibility study after a period of operation (March 2014).

5.1.0.1 Energy

Fewer deliveries are made utilising smaller vehicles (8 tonnes rather than 14 tonnes).

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</thead>
<tbody>
<tr>
<td>Fuel consumption</td>
<td>3,200 litres of diesel per week</td>
<td>3,200 litres of diesel per week</td>
<td>1,600 litres (equivalent) of automotive gas</td>
<td>1,600 litres per week</td>
<td>1,600 litres per week</td>
<td>-50%</td>
</tr>
</tbody>
</table>
### 5.1.0.2 Economy

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping costs, total</td>
<td>17,6 MSEK*</td>
<td>18,1 MSEK +3%</td>
<td>15,6 MSEK</td>
<td>-2,0 MSEK</td>
<td>-2,5 MSEK</td>
<td>-14%</td>
</tr>
</tbody>
</table>

* 1 EUR ≈ 8,7 SEK

**Conditions for economic calculations**

The conditions described below are well known general facts in the Swedish logistics and transport sector. The data calculations are as accurate as they are known today.

The transport price in the contract is compared with the estimated cost of the supplier. For in-house transport, the cost of distribution is approximately 3% of the total value of the goods. However, one should be aware that the suppliers require a premium of approximately 5.5% of the value of the goods for direct delivery. This difference between in-house cost and supplier mark-up is about 2.5% of the value of the goods, in favour of in-house transport.

Many municipalities in Sweden are planning or implementing coordinated deliveries. Several municipalities, such as Borlänge, Halmstad and Sandviken have come so far in their development that previous assumptions about the economic and environmental effects can be demonstrated. All existing projects in Sweden show the profit or cost and with greater positive impact on the environment than was assumed at the start of the project.

Shipments will be reduced by limiting the number of deliveries compared to today. This will be achieved not only by coordination among different supply-chains, but also by planning purchases. An average municipal unit has several deliveries a day, while surveys showed that you only require two food deliveries per week. Despite the activities and limited local storage, there is no need for more than one delivery per day. Each delivery requires a minimum of 5-10 minutes of staff time. A calculation of Norrtälje with 200 workplaces showed a time savings of 17 hours worked each week. With an hourly rate including holiday pay and employer contributions of 195 SEK x 17 hours x 52 weeks gives the municipality 172,000 SEK, or nearly 900 hours annually for staff to complete more important tasks. This is a conservative estimate. With night deliveries, additional time is released.

The majority of the responses indicate a need for daily deliveries to production kitchens (units that supply more than one location). This also applies to the receiving kitchens where the need for daily deliveries is not as obvious. The reason is that the supply of hot food dictates deliveries. Durability is another factor, where experience shows that two deliveries per week are sufficient. When starting a new delivery system it is reasonable to retain the transitional daily deliveries. In order to achieve any positive effects with the daily delivery method, it is important that other deliveries are made with the same vehicle e.g. dairy products, beverages, vegetables, etc.
Approximately 5-8% of deliveries are called empty deliveries where no one is able to receive the goods. The goods are then taken back to the supplier for a new attempt the next day, and the resulting costs of these unnecessary actions are significant. This can be counteracted with timed deliveries, where any additional cost is weighed against the cost of redelivery. The goal of the project is to achieve 70-80% fill rate in every delivery vehicle.

Estimated transport volumes in SEK are based on data from the purchase ledger for the year 2010 and the groups that can be considered for loading. Additional municipality goods, besides food supplies can be added to the system at a future date. A review of the administrations’ internal transportation requirements is recommended.

The calculation does not take into account the type of vehicle used today and in the future. Vehicles and new engines are now developed in different sizes and can be purchased for roughly the same price as traditional diesel-powered vehicles. It is therefore quite possible to set tough environmental requirements on vehicles in a contract. Price need not be higher with eco-friendly supplies.

5.1.0.3 Transport

Fewer deliveries and better vehicle load factors reduces ‘food miles’ dramatically

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Kilometres</td>
<td>88,600 km/year</td>
<td>88,600 km/year</td>
<td>50,600 km/year</td>
<td>-38,000 km/year</td>
<td>-38,000 km/year</td>
<td>-43%</td>
</tr>
</tbody>
</table>

5.1.0.4 Environment

This project is considered by the municipality to be an environmental project. Environmental savings are accrued through reduced mileage within the municipality, use of smaller vehicles, improved fuel consumption and a shift to non-fossil fuels (biogas). The calculation below is based on the assumption that the automotive gas (methane) is 50% biogas and 50% natural gas. However, the composition varies, and the municipality is continuously working to increase the percentage share of biogas. The goal is for 100% biogas to be used in deliveries.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>179 ton/year</td>
<td>143 ton/year</td>
<td>44 ton/year</td>
<td>-135 ton/year</td>
<td>-99 ton/year</td>
<td>-75%</td>
</tr>
</tbody>
</table>

5.1.4 Future plans

From the Eskilstuna perspective, there are three parallel tracks:
- Establish liaisons with interested municipalities in the surrounding area to see if they wish to join the project.
• Establish collaboration on plans regarding Eskilstuna Logistics Park, a project for all types of goods and transportation needs from local to global.
• Establish liaisons with local businesses.

Future development will be more dedicated to cooperation in various forms. Conceptually, the new transport system is fully developed and will be implemented in autumn 2013. New synergies are the possibilities of cooperation with neighbouring municipalities and other municipalities in the ongoing project logistics focus.

Over time, Eskilstuna municipality sees the need to reduce traffic in central Eskilstuna. For example, today each kitchen receives approximately 3.5 deliveries each week, and the municipality hopes to reduce this to once a week after a couple of years of the new system.

Restrictions on freight, delivery and servicing activity must be balanced by offers of alternative solutions where a public co-ordinated freight transport system can be one solution.

5.1.5 Transferability

The solution that has been chosen is of a general nature. All businesses can streamline their deliveries through interaction with others. The solution is to create an engagement with stakeholder organizations and individuals. With that, we want to say that the practical solution is already available. The project's success would depend on how successfully we are communicating. A specially designed communication plan is the key to success. The need for more efficient delivery of goods is a global fact. Since the Swedish municipalities have the explicit responsibility for the environment, public health and road safety it is natural that it is our communities that pursue these issues.

This model has previously been tried in other municipalities, such as Borlänge, Halmstad and Sandviken, with good results. The transition to coordinated shipping in Eskilstuna municipality has been delayed due to appeals during the procurement process, so all results in this document should be considered preliminary. The earliest results based on actual studies can be expected in March 2013, but the preliminary results have been calculated carefully based on the situation in Eskilstuna municipality and in comparison with similar efforts in other municipalities and can therefore be considered reliable.

5.1.6 Conclusions

5.1.0.5 Barriers

Overall barriers
Delivery included in the order is a system failure. In addition to the hidden costs, it also creates a monopoly to benefit larger wholesalers. Small suppliers are dependent on wholesalers to reach out with their goods to local many businesses.
Preparation phase
Public procurement is unpredictable. Appeals can delay the project and the final prices could result in higher costs than before.

Implementation phase
Successful implementation requires that all personnel in the municipality affected by the change have knowledge and a positive attitude. In a municipality of Eskilstuna's size, several hundred employees require knowledge of the new system.

Operation phase
To achieve environmental goals is not a problem. For the project to be successful, the contracted carrier has to perform the daily work cost effectively and to a higher quality than the previous suppliers did. Positive attitudes among the municipalities own staff are crucial.

5.1.0.6 Drivers

Overall drivers
The trend towards more efficient and environmentally friendly deliveries to municipalities is primarily driven by the political initiative, which prioritizes the environmental benefits. Cost control is essential, but the overall cost is subordinated to the environmental value of the project.

Implementation phase
All responsibility for preparation and implementation lies with the contracted carrier. It is therefore important that the carrier has deep theoretical and practical knowledge of the system solution. At the same time the carrier needs an economically sound basis for investment in vehicles and buildings.

Operation phase
The carrier will need a well-proven system for quality assurance and systematic approach in the work of optimizing costs and environmental effects.

5.2 Municipality of Växjö Case Study

5.2.1 Introduction

The City of Växjö decided unanimously in 1996 to become a fossil fuel free city, meaning that energy use and transportation shall not use any fossil energy sources. As the environmental programme was revised in 2010, it was specified that the fossil fuel free target shall be reached by the year 2030 (and the city administration by year 2020). The overarching targets in the environmental programme show the direction towards a fossil fuel free community, and are also the basis for the energy plan:

- We shall cease the use of fossil fuels
- We shall use energy efficiently
These targets are then broken down into goals to achieve by year 2015, and one of the main targets is “The emissions of fossil carbon dioxide from the city administration’s transports shall be reduced by 30 per cent between 1999 and 2015”.

As a result of this, Växjö municipality has procured a function for coordinated goods distribution. A third party transport supplier, Alwex Transport Ltd., is responsible for the coordination and distribution of supplies from their freight consolidation centre. The municipality's suppliers need only to deliver their goods to one address. The total cost per year is at the moment SEK 4.5m (€520,000).

5.2.2 History

The project started with a political exercise from the centre/right wing politicians to examine if the coordination of goods deliveries can be implemented in the municipality. A report “Coordinated municipal logistics in Växjö municipality” was made by the logistics consultant Logivia (http://www.logivia.se/).

The report presented a simulation of the coordination of deliveries to Växjö municipality units. Transport coordination gives the municipality greater opportunity to improve the vehicles’ environmental standard. The separate procurement of the transport makes it possible to set environmental standards on the vehicles in a way that is not possible when the transport is included in the price of the goods.

Before the simulation, the municipality's 108 units responded to a questionnaire for a limited time period when they completed questionnaires regarding their deliveries. The time period for data collection was February and March 2009. Since the response rate was not one hundred percent, they had to make a minor adjustment in the analysis of the simulations, to compensate the percent that did not fill in the questionnaire.

The factors that the simulation focused on were the economy, environment and working environment. The results of the investigation show that there are significant synergies in these areas, especially in the area of environmental and occupational health. It was expected that with the coordination, the problem of the many deliveries and collections at the municipality's units would be reduced significantly.

Other expected outcomes not included in the measurement are increased opportunities for local suppliers of goods, providing greater competition and thus being able to lower prices and / or improve quality. Less traffic in the inner city reduces congestion, which has positive effects on the urban environment. If we also consider and use coordination of deliveries, we can gain even more. A small unit should not receive deliveries every day, especially in the suburban areas. Municipality procurement of transport provides the opportunity to place enhanced environmental and quality standards on the transport.
5.2.3 Measures taken

Växjö municipality has procured a function for coordinated goods distribution. This means that a third party is responsible for the coordination and distribution of supplies from a freight consolidation centre, and the suppliers of the municipalities only need to deliver their goods to one address. Moreover, a new e-purchasing system has been implemented and deliveries for the 450 municipality units are made through the FCC. The municipality procured this from Alwex Transport Ltd., who in turn purchased the FCC services from Scandinavian Supply Chain.

The positive consequences of this are:

- Minimizing the transporting kilometres
- Minimizing the CO$_2$ emissions
- Minimizing noise and emissions of particles and other pollutants
- Increasing traffic safety in school yards and retirement homes
- Staff spend less time receiving goods
- Possibilities for smaller companies to compete in public procurement
- Possible to impose environmental requirements on the transport when it is procured separately

5.2.4 Results

One thing that must be taken into account when reading these results is that they are the result totals for all of the four actions (energy consumption, CO$_2$ emissions, number of movements and the number of reduced kilometres), and not separate results for every single action. These actions were carried out simultaneously, which made it easier to calculate the result total for all actions instead of attempting to distinguish them. The actions involved, more practically, that Växjö council mixed loading of the shipments from all vendors, the distributor switched to new vehicles and new fuel, as well as limiting the amount of delivery times for units. These actions have made deliveries both more and less effective. The fuel has also been changed to biodiesel in the new trucks, which has improved the air quality and lowered the CO$_2$ emissions significantly.
Before UCC | After UCC | % change
--- | --- | ---
Delivered goods/day (tons) | 15.6 | 15.6 | 0
weeks/year | 45 | 45 | 0
Total goods per year (tons) | 3,500 | 3,500 | 0
office supplies | 875 | 875 | 0
food supplies | 2,625 | 2,625 | 0
Amount of fuel per ton goods (litres) | 23.96 | 6.28 | -74%
Amount of CO₂ per ton goods (kg) with diesel. | 61 | 16 | -74%
Number of stops per week | 1,900 | 350 | -82%
Fuel consumption per year | 84 m³ | 22 m³ | -74%
Amount of fossil fuel (%) | 95% | 19% | -80%
Amount of renewable fuel (%) | 5% | 81% | +94%
CO₂-emission per year including 85% of delivered ton with RME | 214 ton | 11 ton | -95%
Time spent loading/unloading per week (7 min/stop) | 222 hrs | 41 hrs | -81% (-181 hours = 4.5 full time employees)

UCC= urban consolidation centre

Today Växjö municipality has 22 suppliers in the system. Every new agreement that the procurement department signs, means almost every time that one more supplier is added to the system. There is therefore always a need to introduce the newly signed supplier to the municipality’s way of handling goods.

We believe that we have covered the product areas that are possible to have in the coordination below, and what happens in the future is that suppliers are replaced in connection with the new agreement. Medicine, blood samples, drug samples etc is a separate flow.
5.2.5 Future plans

Over the last ten year period, the municipality of Växjö has received many international awards for our highly successful climate activities. This has led to Växjö being declared the greenest City in Europe by international media. This is an appellation that entails an obligation and demands a continued, patient climate activity.

With the vision of a fossil fuel free Växjö, where our energy consumption does not lead to any climate effect, we are continuing the reduction and development of our municipality’s goods transport by the use of a coordinated distribution centre.

We are also, within our county, making a situation analysis to see how the surrounding municipalities can contribute to this vision.

(UCC= urban consolidation centre)
5.2.6 Transferability

This business process fits well when the buyer has many delivery locations where the delivery is made from a variety of vendors.

By coordinating deliveries from multiple vendors, the parties can more effectively utilize the vehicles used for delivery. It can mean an obvious improvement of the environment in the form of reduced emissions due to fewer vehicles used to distribute goods.

5.2.7 Conclusion

To conclude, some of the benefits for Växjö Municipality with coordinated goods transports, have led to significant effects on the environment, general safety and increased opportunities for vendors and citizens in Växjö municipality.

5.2.0.1 The environment

Since introducing the UCC, emissions from the distribution of goods have decreased by more than 70%, partly from reducing the number of trips but also by choosing better fuelling options. Moreover, the truck refrigerators can also be run with biodiesel. These measurements have together contributed to furthering Växjö municipality’s goal of becoming a fossil fuel free city by the year 2030.

5.2.0.2 Safety

Besides improving the environment by reducing emissions, the project has also improved traffic safety by reducing the number of vehicles on the road, as well as reducing the number of stops. This has led to increased safety around schools and retirement homes, when efficiency increases and a smaller number of vehicles spend less time on the road and around delivery units. The average size of vehicles has also been reduced.

5.2.0.3 Financial benefits for the municipality and companies

First and foremost, the UCC and its accompanying measurements have helped lower the costs and thereby allowing the taxpayer’s money to be spent more efficiently. The UCC also makes it easier for smaller and local companies by its single delivery central, as opposed to having to deliver to a large number of units in the municipality. This improves competition and gives the citizens of Växjö an increased selection when it comes to purchasing goods. Overall efficiency for the units in the municipality has also increased due to the reduced number of deliveries, thus minimizing the number of interruptions to the daily operations. Moreover, less time is spent loading and unloading, resulting in a logistics situation that is time-efficient and requires less work hours to perform, and thus more cost-effective.
5.3 Municipality of Vercelli Case Study

5.3.1 Introduction

The City of Vercelli has tried to optimize the economic resources and available technologies in a synergistic way to use them through new tools, measures and activities aimed at achieving the goal.

In particular, reduction of traffic in the centre and in the Limited Traffic Zone (LTZ), as well as congestion and illegal and irregular parking has worked on the infrastructural aspect, increasing the supply of parking places reserved for loading/unloading through:

- better distribution of parking spaces, more concentrated near the LTZ (Figure 6);
- parking disc regulation of parking bays for loading and unloading goods;
- doubling the amount of reserved areas for loading and unloading.

The same attention has been applied to the system of permission for entering in the LTZ reviewing schedules, types of permission and restricting access to high polluting vehicles (Figure 7).

Finally, the recent use of video surveillance and camera systems to detect incoming license plates of credited vehicles entering the LTZ helped to achieve the project objectives.

5.3.2 How does it work?

The following activities have formed the framework for freight deliveries in the project area, the historic centre included in the circle of avenues:

- Relief of goods traffic flows in the project area;
- Census of local economic activities;
- Relief and analysis of parking areas for loading and unloading goods;
Study of the state of permission of vehicles entering the LTZ;
• Establishment and freight operator surveys;
• Participatory decisional process of "selected citizens’ Jury", in collaboration with the University of Oriental Piedmont in Vercelli.

5.3.0.1 Survey of goods traffic flows in the project area (LTZ included)

The survey of goods traffic flows, carried out in March 2011, not market days, from 7:00 to 19:00 in 8 main points of entry into the identified area showed the following:

• the total freight traffic is equal to 1,145 vehicles daily, before the project implementation;
• the average frequency of passage is equal to 1.6 vehicles per minute, for a total of 95.4 vehicles per hour;
• 497 cars and 635 vans, the last ones with a rate of 55%;
• the majority of the vehicles enter into the project area in certain window times to access the LTZ between 7:00 and 10:00 and from 15:00 to 16:00.

Map 1: Passages of goods traffic flows

Map 1 shows daily passages per location in 2011. The main access to the identified area is from the West, which includes flows from cities of Turin and Biella – 333 passages daily (29%).

5.3.0.2 Survey of local economic activities

In February 2011, 900 local economic activities, trade and businesses (of which 81 closed) were registered. Table 1 represents the comparison between the local census surveyed in 2011 and 2013 for activities and category according to the classification of the Chamber of Commerce Ateco 2007 Code / NST 2007. To meet the ever-increasing demands of consumers, the owners of the actual activities demand the timely reception of their goods with a high frequency of delivery, even for the lack of space used for storage and the high cost of stocks.
To respond adequately to the demand, logistics operators (express mail service, and owner-producers) offer a service, sometimes “just in time”, causing an increase in the number and frequency of delivery and, accordingly, an increase in traffic flows.

5.3.0.3 Parking areas for loading and unloading goods

In February 2011, the census and the analysis revealed the following critical problems:

- 25 parking areas, equal to 39 individual stalls, are considered insufficient to meet the demand of 881 surveyed locals (on average 33 locals per parking place) see Map 2 (below);
- 600 establishments/locals (73%) are not currently served by parking areas within a radius of 30 meters, covering an average of 5-6 establishments/locals;
- 4 parking areas are overlapped for coverage, with a radius of influence from 30 to 50 meters;
- interviews with owners showed that 74% of drivers stopped illegally on the street for loading/unloading goods, because the areas were often occupied (46%), missing (34%) or uncomfortable / too far from the establishments (20%) see Figure 8.
The constant illegal occupation of dedicated parking areas (average 20 out of 25), causes an increase of time, mileage and irregular parking.

5.3.0.4 Entering vehicles in the LTZ

The permission of type “Commercial Operator (CO)” allows the circulation and parking in the LTZ for a maximum duration of 30 minutes, from 07:00 to 10:00 and from 15:00 to 16:00. A database study managed by the Municipal Police showed that the total number of permits were 1987 of which 1368 were valid.

The performed analysis on permits type OC revealed the following:

- significant presence (77%) of polluting vehicles (pre-Euro, Euro 1-3);
- frequent violation of the time window restrictions to the LTZ due to limited controls as assigned exclusively to the Municipal Police officers;
- need to review the existing permits and their derogations;
- need to introduce automated monitoring systems and a more efficient access control in the LTZ.

5.3.0.5 The decision process

An innovative local participatory decisional process was completed in collaboration with the University of Oriental Piedmont in Vercelli, through an informative method by a “selected citizens’ Jury”. This was shared with local stakeholders (trade associations and local entrepreneurs, freight operators and their customers, consumers, local agencies, authorities and environmental organizations). The process was as follows:

- 8 citizens met together for one day to discuss on the measures to optimize the delivery of goods in the city centre;
- during the week before the event, the chosen citizens received an informative document arranged by the research team concerning the goods mobility and the possible scenarios of solution from which the discussion had to start;
- during the morning the jurors listened to some experts who presented information and answered the questions of the jurors, introducing all the possible points of view on the matter;
• the 8 jurors had private discussions followed by proposed recommendations to the administration on the treated subject;
• a questionnaire was submitted to the jurors, before and after the two work days, with the aim to point out possible changes in the preferences decided by the discussion.

5.3.3 Results

5.3.0.6 Reduction of the number of vehicles entering the LTZ

DSP – provided permits

The DSP provides a review and reduction of the maximum number of permits to be issued equal to 49% of commercial vehicles used in the distribution of goods (1368 vehicles). The proposed number of 670 releasable permissions of vehicles, strictly necessary for delivery of goods into the project area is detailed in Table 2.

<table>
<thead>
<tr>
<th>CATEGORY PERMISSIONS CO.</th>
<th>MAX PERMISSIONS</th>
<th>PERMISSIONS EQUIVALENT PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS - OWNERS OF ESTABLISHMENTS</td>
<td>222</td>
<td>133</td>
</tr>
<tr>
<td>CD - HOME DELIVERY OF OWN PRODUCTS</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>IAC - ARTISANS AND COMMERCIAL ENTERPRISE, COMMERCIAL AGENTS</td>
<td>75</td>
<td>63</td>
</tr>
<tr>
<td>CT - LOGISTICS OPERATORS IN THIRD PARTY</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td>336</td>
<td>223</td>
</tr>
<tr>
<td>10% UNIDENTIFIED</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>TOTAL</td>
<td>370</td>
<td>257</td>
</tr>
<tr>
<td>SV - AGENTS OF VARIOUS SERVICES</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>TOTAL PERMISSIONS CO</td>
<td>670</td>
<td>557</td>
</tr>
</tbody>
</table>

Table 2: Estimate maximum number of releasable permissions per category CO

The results show that the measures of the DSP adopted by the Town of Vercelli have contributed to a reduction of 12% in the number of vehicles entering in LTZ, and, consequently, a similar reduction of fuel consumption and emissions of CO2. This is due to a decrease in the maximum number of realizable permits (670) from the previous census (year 2011) where it resulted in 714 vehicles. It was decided to display the results based on permits equivalent per day because some permits only allowed access on a set amount of days per week and not the entire week.

The difference between the permits provided by the DSP (equivalent per day 557) and those before Trailblazer (714 permits per day) show a reduction of 22% of the number of vehicles entering daily in LTZ. It is estimated that temporary accreditations, for different needs unpredictable by regulations, will constitute the 10% of the total of 22%.
Categories of vehicles and accredited users with a license plate without permission (Table 3):

**SP** - Total weight when fully loaded less than 3.5 tonnes and used for loading/unloading goods at the following times: from 6:30 to 10:30 and from 15:30 to 16:30;

**FU** - Transport and delivery of urgent drugs;

**SPU** - Vehicles of Poste Italian and other authorities operating in public utilities

Main categories of vehicles and users that need permission:

- **AE 1** - Owners of public establishments
- **AE 2** - Installers and/or maintainers
- **AE 3** - Commercial enterprises and agents of Commerce

**DSP – issued permits**

Table 4 shows the new and existing permits issued during the period from November 2012 to April 2013.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>n°DAY ALLOWED</th>
<th>DAYS OF ACCESS</th>
<th>TIME WINDOWS</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>6</td>
<td>mon, wen, thu</td>
<td>6.30-10.30, 15.30-16.30</td>
<td>15 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tue, fra</td>
<td>15.30-16.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>sat</td>
<td>6.30-10.30</td>
<td></td>
</tr>
<tr>
<td>FU/SPU</td>
<td>7</td>
<td>free circulation</td>
<td>0-24</td>
<td>15 min</td>
</tr>
<tr>
<td>AE 1</td>
<td>3</td>
<td>mon, wen, thu</td>
<td>7-9; 9-11; 11-13; 13-15; 15-17</td>
<td>15 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tue, fra</td>
<td>15-17</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>sat</td>
<td>7-9; 9-11; 11-13</td>
<td></td>
</tr>
<tr>
<td>AE 2</td>
<td>6</td>
<td>free circulation</td>
<td>0-24</td>
<td>15 min / 2 h</td>
</tr>
<tr>
<td>AE 3</td>
<td>6</td>
<td>free circulation</td>
<td>0-24</td>
<td>15 min</td>
</tr>
</tbody>
</table>

**Table 3: Category of permissions**

The total of issued permits (500) is equal to 75% of the limit (670) planned by the DSP to achieve the project goal and equal to 70% in comparison of the old permits (714).
The number of vehicles entering the LTZ each day was 550 (after DSP) and 714 (before DSP). The difference shows a reduction of 23% of the vehicles entered into the LTZ.

In conclusion, the DSP provided a 22% reduction of the vehicles, from which it is estimated that 10% is for temporary accreditations and the rest of 12% represents the real decrease of the vehicles.

The current state of the reduction after the end of the issuance of new permits is 13% because the reduction after DSP is 23% of which 10% reserved to temporary permissions.

5.3.0.7 Regulation of parking places

The DSP identified 39 parking places and 4 areas defined as “proximity/closeness”. From the total of 43 parking places (equivalent to 48 individual stalls) 19 were new, 20 existing and 4 were relocated, compared to the previous state (Map 2).

In addition, the DSP has planned interventions on road signs (vertical and horizontal; see Figure 9) for each parking place and additional interventions (as adjustment and relocation).
5.3.4 Future plans

The participatory process and their Jurors decided to introduce an innovative environmentally sustainable transport service, with “last mile” distribution and delivery services, as van-sharing (shared vans) and cargo-bike with assisted electric motor cycling, as well as indicating the need to develop a peripheral logistics platform (the Urban Distribution Centre, UDC).

This decision represented a commitment for the Town Council that would have to be made officially by a public act.

5.3.0.8 Cargo-bike with pedal assistance

Future plans include an innovative last mile service with lightweight cargo-bikes (electric tricycles equipped for transportation and delivery of goods). This service will transport packages with easy mobility and a green “power”, and reconcile the needs of users with the goals of liveability and environmental protection of historic centres.

This service (see the good practices of Bordeaux France, and in Padova, Italy) needs a platform close to the centre (a place of interchange / urban distribution centre of goods) to be identified, in order to deliver goods directed towards the centre, and the LTZ pedestrian areas with environmentally friendly vehicles / cargo-bikes.

All parties involved, directly or indirectly, can benefit from the project. The city experiences a reduction in traffic and an improved image through local consensus and best practice. Reduced congestion and pollution leads to an improvement in green space which benefits citizens. Moreover, dealers can use just-in-time deliveries to customer’s homes and freight operators (especially global couriers and third party ground operators) and have no need to enter the LTZ at all consequently both dealers and operators can enjoy the advantages of image (logo membership).

5.3.0.9 Van sharing

Van-sharing is a concept of a shared van for the transport of goods. This is a new sustainable goods distribution method promoted by the Ministry of the Environment in order to reduce impact on the environment. The method involves the possibility to
lease a vehicle for a defined period (from one hour to longer periods) to circulate in and out of town. For periods over a few days, the operating costs become more significant.

To access the service requires the user to subscribe and receive a card with which it will be possible to book a van to the nearest parking, based on simple rules and conditions. The costs include an annual subscription fee: a charge for use of formulas for particular uses. It will be possible also to save up to 50% of the total cost of ownership in the first year.

Van-sharing offers many benefits: free parking in the blue zones, free access to the LTZ and private streets and free movement in the event of restrictions / traffic blocks. With the same subscription, it will also be possible to access all of the network national circuit organization of car-sharing named “Io guido” using at the time, the technologies ICS in Turin, Rome, Milan, Genoa, Florence, Bologna, Savona, Brescia, Parma, Venice and Palermo, etc.

The vehicle fleets meet European standards in terms of emissions, with consequent reduction in mileage and CO2 emissions of PM10.

5.3.5 Conclusions for a future of sustainability

The future of Trailblazer concerns an intervention called SECOMEUS (Sustainable Urban Goods Delivery Service), included in a regional and local Integrated Urban Development Project. This project promotes a range of proposals for urban regeneration in a depleting Hospital area, through new interventions and actions of a socio-economic, commercial, cultural, and aggregating, nature, and new services for the urban and economic development of the territory.

SECOMEUS will implement the plan of goods delivery through direct and remote management (drivers, warehouse, call centre operators, ecological fleet, dedicated computing platforms, structures and warehouses) and all necessary resources to new “last mile services” organized on models and types mentioned. Finally, all of the recommendations of the selected jury will be considered and possibly implemented by the municipal administration.

Common goals of TRAILBLAZER and SECOMEUS:

- optimize the delivery of goods through more effective and efficient services in terms of space-time and economic sustainability;
- seek harmony in composing and incorporating a mix of differentiated logistic systems, to diversify the supply of services in relation to the exigencies of users, variability and limiting load breaks;
- create advantages for dealers, builders, craftsmen etc. and other activities in the city centre;
- achieve cost savings (lower transportation costs and less fuel consumption);
- reduce emissions and air pollution, noise and inconvenience to all citizens and workers who use or live in the city centre;
• decrease the amount of waste logistics, such as packaging, wrappers, containers etc., contributing to a greater order of separate waste collection;
• the new logistics services will help to create new jobs.

5.3.6 Transferability

The example of Vercelli can be transferred to other urban realities applying it to a historic context and especially considering a mix of the following success factors:

• sharing of participated processes aimed at the future of logistics;
• use of systems already available such as cameras, without further investment;
• method of review of access and types of permissions in LTZ areas;
• surveys and investigations made for a better knowledge of the application context;
• satisfaction of demand of parking places for delivery of goods through infrastructural interventions;
• restrictions adopted for the most polluting vehicles and facilities for those less polluting;
• controls and sanctions to restrict and protect authorised access.

The obstacles to avoid involving expansion of deadlines may derive from:

• imposition of a process without making it participated;
• absence or lack of synergy between the operators of the process;
• lack of information / communication of the taken measures;
• lack of control.

5.3.7 Conclusion

The implementation of the measures has produced the following benefits for transport operator, local owners, users and citizens:

The new regulation of parking places for loading/unloading goods produces:

• more parking places for loading and unloading goods, better distribution of spaces compared to the previous allocation;
• safety and easier delivery operations;
• an improved efficiency of operators, reducing the time spent on searching for available parking places;
• shorter distances between parking places and delivery points;
• more timely deliveries and streamlining traffic, making the road traffic easier;
• a reduction of illegal and irregular parking, discouraging direct parking on the street;
• greater vehicular rotation on parking places for loading/unloading goods, with the obligation of horary disk and the general reduction of the maximum allowed parking time.
The new LTZ system for freight operators contributes to:

- limit the most polluting vehicles, facilitating access to less-polluting ones;
- reduce unauthorized/illegal access to the LTZ with different time slots and different types of accreditation.

Access control in LTZ and parking places of loading and unloading goods to enforce the introduced measures through:

- a camera system to detect incoming license plates of vehicles entering the LTZ, which recognizes those authorized/accredited and non-accredited. Non-accredited ones are punishable by sanctions;
- monitoring of some parking places through security cameras;
- scheduled systematic controls in the area by the Municipal Police.

5.4 City of Zagreb Case Study

5.4.1 Introduction

The goal of the project was to propose and implement regulatory measures for optimization of freight delivery through a Delivery and Servicing Plan – DSP. Delivery and servicing plans are key strategic documents in present European practices that can help to improve organization of freight delivery.

Benefits that can be achieved by their application and implementation are the following:

- Reducing energy consumption;
- Reducing noise and exhaust emissions;
- Reducing traffic congestion;
- Increasing traffic safety;
- Reducing the cost of freight distribution;
- Time savings, for both distributors and users of services;
- Improving the quality of delivery service by increasing freight reliability.

The project activities are divided into several phases. The goal of the project is to reduce the negative impact of traffic delivery on the environment, especially regarding exhaust emissions and fuel consumption, through the implementation of the proposed “Plan”.

The project activities can be divided into two major phases: the phase before proposing the measures and the phase after introducing the new measures. The research and analysis of the traffic delivery structure in the demonstration zone before the proposition of the freight delivery regulation measures has been carried out in two phases. In the first phase, the goal was to gain insight into the traffic delivery structure at the start of the project. In the second phase, one year after the first phase, traffic deliveries were recorded according to the same methodology.
A Delivery and Servicing Plan which included the proposed regulatory measures of the selected demonstration zone was drafted based on the analysed results of the number and structure of delivery vehicles in both phases.

The final stage of the project involved collecting the data on freight delivery after the implementation of new regulation measures and comparing of those results with previous stages.

5.4.2 City freight distribution in the city of Zagreb

5.4.0.1 City Of Zagreb

The city of Zagreb is the capital of the Republic of Croatia and its biggest economic, administrative and cultural centre.

The Zagreb region and the city of Zagreb are situated in the most economically developed regions of Croatia. Around 792,000 inhabitants live in the city according to the last population census.

Given the concentration of population and intensive economic activity in the city of Zagreb, the dominant form of transportation is the passenger car. This contributes to a high level of motorization in the city of Zagreb with about 320 cars per 1000 inhabitants. Of these, the largest numbers are privately owned cars.

As a consequence of such a high concentration of vehicles and other factors, the level of service of traffic flow in the city area is unsatisfactory, with an average vehicle speed of about 20 km/h. The presence of heavy vehicles and heavy delivery vehicles in periods of intense traffic puts additional pressure on the traffic network and slows the speed of traffic.

In the city population is mainly employed in various forms of services, industry and government and municipal administration. Industry is concentrated mainly in industrial zones or small businesses.

Service and administrative agencies are scattered throughout the metropolitan area. The most important activities of busy transportation service providers are in the road and rail traffic, where most of the freight is transported by road. Transhipment of freight is dispersed and takes place according to the needs of each individual company. This makes it difficult to control the delivery vehicle traffic in the metropolitan area and, practically, their use of city roads without restrictions.

5.4.0.2 General characteristics of delivery vehicle traffic flows in the city of Zagreb

The transportation system of the city of Zagreb is extremely complex. A large number of different vehicles, from passenger cars to heavy trucks, run daily in the metropolitan area. Freight traffic is characterized by different forms of freight delivery which are mostly run using light and medium trucks. Heavy trucks are also used which supply large freight quantities for various economic operators or are headed for other destinations.
The relatively high level of motorization and the use of motor vehicles for the freight transport consequently manifests primarily in a great number of vehicles on the city roads.

Problems that occur at the same time are as follows:

- Intensive traffic flows on the road network, especially in the central city area;
- Traffic congestion at intersections located on the main corridor;
- Lower travel speeds, especially during peak hours;
- High levels of noise;
- High levels of exhaust gases and particles;
- The index of fear and fearfulness of pedestrians (this especially applies for delivery vehicles).

Finally, for the city of Zagreb, the situation can be described as follows:

- Freight traffic is carried by the city roads which is primarily located near or along the edge of the urban settlements;
- Generators of delivery traffic are scattered throughout the metropolitan area;
- On the busiest city roads (Avenue Dubrovnik, Ljubljanska /Slavonska Avenue) there are no time restrictions for the movement of heavy delivery vehicles.

Increase of traffic on a number of city roads is expected according to Traffic Study of the City of Zagreb. Analysis shows that the largest increase in traffic is expected on the roads where the majority of freight traffic flows. Therefore, it is important to implement a number of measures to regulate delivery traffic flows and thus relieve the pressure on the city roads. The existing freight delivery regulation refers to a wider area of the city centre, where the freight delivery is time limited. In practice, the existing regulatory measures provide no significant effect even in the segment of reducing emissions or reducing the level of traffic congestion in the wider metropolitan area.

The most important reason for this situation is insufficiently developed technical details (for example, the question of working hours of shops and business compliance with time-controlled delivery), and lack of systematic implementation of the prohibition of delivery in the zones where the prohibition rules apply.

Thus, already in the late nineties of the twentieth century there were several initiatives to implement the system of regulation in which the freight delivery could affect the level of exhaust emissions and reduction in traffic congestion.

5.4.3 The trailblazer project in city of Zagreb

The EU project TRAILBLAZER in the city of Zagreb is one of the first projects of its kind to be conducted on the Croatian territory. The goal of the project is, through the application of regulatory measures for a certain metropolitan area, to reduce the total exhaust emissions by delivery vehicles and increase traffic flow, without affecting the
quality of distribution services. The goal is also to examine the impact of new regulatory measures on increasing citizens’ quality of life.

The technical implementation of the project involved previous research from scientific institutions and NGOs, who have the theoretical knowledge and previous experience of through the various phases of the project.

The benefits that can be achieved by implementing new regulatory measures of freight delivery are as follows:

- Reducing energy consumption and lower noise emissions and exhaust emissions;
- Reducing traffic congestion and increasing traffic safety;
- Lower distribution costs;
- Reliable freight delivery.

Previous project activities, as shown in previous documents comprised of:

- Insight into the current situation of regulation in the field of freight delivery in the city of Zagreb;
- Defining the scope of the project area;
- Analysing the existing situation and the number of vehicles that are moving in the observed zone during peak hours;
- Identifying social groups that are interested in or affected by the implementation of regulatory freight delivery measures;
- Analysing the existing situation and the number of vehicles that are moving in the observed zone during peak hours, phase II (2012);
- Developing a Delivery and Servicing Plan – DSP for freight transportation, which includes the proposed regulatory measures.

5.4.4 Results

For the purposes of the project the authors selected a coverage area that includes the inner city centre. The area includes 15 intersections along Ilica – from Britanski Square to the intersection with Selska Street.

Delivery vehicles were divided into four categories, where the most important criterion was the total weight of delivery vehicles:

- Category I - small delivery vehicles with a total weight up to 1.3 tonnes;
- Category II - delivery vehicles with a total weight from 1.3 to 1.74 tonnes;
- Category III - delivery vehicles with a total weight from 1.74 to 3.5 tonnes;
- Category IV - delivery vehicles with total weight greater than 3.5 tones.
Counting of delivery vehicles was carried out by video recording at a total of fifteen intersections within the coverage area. The coverage area (also the project demonstration area), included the section of Ilica street from Britanski Square on the east comprising of the first intersection, to the fifteenth intersection Ilica – Selska Street – Sveti Duh Street with a total length of approximately 1.7 km (Figure 10).

Every intersection represented one counting location; the count was conducted during peak hours for three sessions (7am – 10am) over six days (Monday-Saturday) in June 2011, May and October 2012. By photographing delivery vehicles, in addition to counting the total number of delivery vehicles at intersections, the project team collected data on the itinerary of delivery vehicles, locations and durations of retention for the delivery of goods. Information was also collected on the characteristics of delivery vehicles and traffic flow in Ilica and the intercepting streets (Figure 11).

The research was conducted in three phases: the initial phase was realised in June 2011, the next phase in May 2012, and the last phase of research in November 2012. Research in the first and second phase were carried out before the proposed allocation of delivery regulation, and the third phase of the research was carried out after the introduction of proposed delivery regulatory measures.

Results of conducted research show that the number of vehicles reduced in the third stage of research, compared with previous ones. In general, the number of vehicles decreased by 10%. Most common delivery vehicles belong to the medium category – van vehicles with a capacity of up to 2-3 tonnes. The following are delivery vehicles up to 2 tonnes, while the least common category are light and heavy delivery vehicles (category I and IV). According to research conducted in this project, about
13% of the intersection allows the use of dedicated parking for delivery vehicles. Research showed that on a number of the intersections parking was on the sidewalk, however the remaining 73% of vehicles observed parked on the pavement.

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012 (May/June)</th>
<th>2012 (November)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of fuel [%]</td>
<td>diesel</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>gasoline</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Type of vehicle [%]</td>
<td>a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>7.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>63.2</td>
<td>42.0</td>
</tr>
<tr>
<td></td>
<td>e</td>
<td>29.8</td>
<td>56</td>
</tr>
<tr>
<td>Average vehicle capacity [t]</td>
<td></td>
<td>3</td>
<td>2.94</td>
</tr>
<tr>
<td>Total distance travelled [km]</td>
<td></td>
<td>84.93</td>
<td>63.9</td>
</tr>
<tr>
<td>Empty distance travelled [km]</td>
<td></td>
<td>24.21</td>
<td>20.1</td>
</tr>
<tr>
<td>Fuel consumption [l/100 km]</td>
<td></td>
<td>14.85</td>
<td>15.2</td>
</tr>
<tr>
<td>The total amount of goods [t]</td>
<td></td>
<td>1.71</td>
<td>1.6</td>
</tr>
<tr>
<td>Average utilization of the vehicle volume [%]</td>
<td></td>
<td>47.13</td>
<td>55.98</td>
</tr>
<tr>
<td>Delivery/Collecting [%]</td>
<td>94.6/5.4</td>
<td>91/9</td>
<td>99/1</td>
</tr>
<tr>
<td>Type of packaging [pieces]</td>
<td>pallet</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>chest</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>crate</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>box</td>
<td>60</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>envelope</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>other</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>Number of deliveries up to 15 min</td>
<td>69</td>
<td>77</td>
<td>118</td>
</tr>
<tr>
<td>Number of deliveries from 15-30 min</td>
<td>42</td>
<td>27</td>
<td>40</td>
</tr>
<tr>
<td>Number of deliveries more then 30 min</td>
<td>2</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Average [min]</td>
<td>15.65</td>
<td>13.22</td>
<td>14.26</td>
</tr>
</tbody>
</table>

Table 5: Comparison of delivery parameters in all phases of the project
Results of the survey conducted among business entities and distributors indicate that the most important features of goods are prioritised by type of goods, quantity of goods, the frequency of delivery, the average duration of delivery and the average vehicle mile for each delivery.

Table 5 shows the delivery features in various phases of research. According to the table the most common fuel for delivery vehicles is diesel fuel at all phases of research. Regarding categorization, i.e. capacity of delivery vehicles, there is a certain shift to higher capacity delivery vehicles, which implies rationalization of the distribution organization, i.e. the use of a single vehicle with slightly larger capacity instead of several smaller vehicles. Due to the growing share of larger vehicles, in the third phase the average capacity increased to 3.22 tonnes, which is 7% more than in the initial phase of research.

Total distance travelled per delivery increased by 19% compared to the second phase.

Utilization of the vehicle volume increased to 63.5%, which is also a significant increase compared to the previous phases of research (47% in the first phase and 55% in the second phase of research). This data indicates a trend of more rational organisation of the system of goods distribution in the demonstration zone.

The average duration of delivery is a little shorter, structure and delivery time (delivery) are generally equal in 2011 and in the two research phases during 2012.

Proposed delivery regulation measures were related to respecting the specified delivery time in the observed demo zone (up to 7 am) and on creating additional parking locations for delivery vehicles (on six locations in the most congested intersections, Figure 12). The distributors realized the advantages of these designated delivery locations early on, thereby further increasing transport efficiency. Also, in the implementation of all activities, the most important road carriers in the city of Zagreb have actively participated. They were regularly informed about activities and problems which were registered during the project realization and they participate on forums and meetings about implementation of freight distribution in the city of Zagreb.
5.4.5 Future plans

The time regulation system is the easiest applicable, but systematic efforts and perseverance is necessary for its sustainability. Thereby, the effects from the application of this system are generally limited to the number and concentration of delivery vehicles and less on the organisation of goods distribution or delivery features. In addition, the application of such a regulation system is not limited to certain vehicle categories (e.g. delivery vehicles of category IV) or to certain distributors who may abuse the system.

An efficient regulation delivery system implies definition of critical points of delivery systems based on the criterion of emissions or traffic congestion, as well as the selection of vehicles depending on their impact on the environment. Some European cities tried to develop regulation delivery systems based on these criteria (e.g. Paris, London). Also, coordination between business subjects, distributors and city government is required in the implementation process of urban logistics in the Zagreb area.

In future phases of the development of urban logistics systems and based on past experiences, it would be attempted to achieve the following objectives:

- Reducing the total number of delivery vehicles in the very town centre using the measures of centralized distribution, which includes public institutions as well;
- Introducing monitoring systems for identification of delivery vehicles for more efficient data collection regarding freight delivery;
- Administrative and infrastructural measures to reduce transit freight traffic through the city.

The implementation of the proposed measures will enable development of city logistics regulation systems in Zagreb. For successful implementation of new freight delivery regulation measures, it is necessary to establish a continuous monitoring system using modern technical solutions. Also, the cooperation of stakeholders-citizens, businesses subjects and distributors is required for successful implementation of innovative concepts in the city’s logistics system.

5.4.6 Transferability

The system of delivery regulation that is applied to the City of Zagreb is possible to apply in cities with a smaller or equal number of inhabitants, taking into account the specifics of each case.

Proposed delivery regulation measures are based on the conducted research on the number and structure of delivery vehicles and on delivery features for the selected area of research.
Those measures represent results of the evaluation of several models of possible delivery regulation systems, where the possibility of application, sustainability and measures efficiency were key criteria in this case. Because those criteria are not at the same level in all areas, the measurement system that can be applied will be specific to each individual case.

The proposed system of city logistics can also be applied in the cities that have a problem with delivering goods into business entities that are located in the historic parts of the city.

5.4.7 Conclusion

The results of the conducted research show that the systematic implementations of delivery regulation measures can have a significant impact on reducing the number of delivery vehicles.

On the basis of the collected data and conducted analyses, a proposal of delivery regulation measures in a demonstration zone was made based on the principle of specified delivery time. This was because this set of measures is evaluated as the most suitable and efficient system that can be used at the present time. The implementation of new regulation measures resulted in a reduction in the number of vehicles and some characteristics of delivery, and should be considered as successful regarding the general aims of the project. The important link, Monitoring system for the project, was organised in collaboration with the municipal constabulary of the city of Zagreb.

The proposed set of freight delivery regulation measures in the TRAILBLAZER Zagreb project were relatively simple, it should be considered as a first step in implementing more sophisticated and efficient freight delivery regulation systems in the future.
6 EVALUATION AND RESULTS

6.1 Introduction

The TRAILBLAZER project has succeeded in implementing a range of DSP actions directed to urban freight delivery in Växjö, Vercelli, Zagreb and Eskilstuna. The evaluation task has been divided into three aspects as illustrated in Figure 13: impact evaluation, process evaluation and cross-site evaluation.

![Evaluation framework diagram](image)

**Figure 13: Evaluation framework**

The **impact evaluation** includes the evaluation of a wide range of technical, social, economic and other impacts of the actions undertaken by the partners.

The **process evaluation** concerns the evaluation of the processes of planning and implementation including the roles of information, communication and participation. The aims of the process evaluation are to identify the strengths and weaknesses, the barriers and facilitators which have been encountered during the planning and the implementation of the actions.

Both aspects of the evaluation, impact and process, are being built upon a common framework approach to ensure a consistent high quality of cross-site outputs. There are four main tasks for evaluation:

- Review evaluation objectives of Pathfinder cities and setting up a framework for cross-site evaluation.
- Impact evaluation e.g. defining scenarios, common indicators and methods of measurement, data collection, evaluation.
- Process evaluation e.g. planning and implementation.
Integration and interpretation of the results for cross-site evaluation.

- In the **cross-site evaluation** of DSPs, different intervention models e.g. services offered and intervention modes will compare the effectiveness of the cities in achieving the strategic objective of TRAILBLAZER: a reduction in energy used in urban freight transport.

The results of the impacts evaluation and the process evaluation are set out below for each PATHFINDER. The details of the cross-site evaluation can be found in the Final Evaluation Report which can be found at [www.trailblazer.eu](http://www.trailblazer.eu).

### 6.2 Vercelli

#### 6.2.1 Impacts Evaluation

With the Trailblazer project, Vercelli had implemented and developed a more orderly and rigorous first delivery system in the city centre, without the use of heavy invasive technologies and structures. The new system of controlled access in the project area combined with the camera control reduced the number of vehicles in the area by about 19%.

The management of the delivery bays, the creation of new ones, and the reorganisation of others improve the delivery process in the target zone.

The results from fuel consumption and emission calculation show the positive impacts of the DSP measures on the environment. This resulted in energy saving and reduction of pollutant emissions by about 13%.

Table 6 summarises the impact (After – BAU) for the years 2010 to 2013 in the area of the fuel used, CO2 emissions and primary energy savings.

#### Fuel used

<table>
<thead>
<tr>
<th></th>
<th>Vercelli</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before 2010</strong></td>
<td><strong>183,170</strong></td>
</tr>
<tr>
<td><strong>Fuel used litre by year</strong></td>
<td><strong>During the project</strong></td>
</tr>
</tbody>
</table>

#### Greenhouse gas emissions

<table>
<thead>
<tr>
<th></th>
<th>Vercelli</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before 2010</strong></td>
<td><strong>473</strong></td>
</tr>
<tr>
<td><strong>tCO₂e emissions/year</strong></td>
<td><strong>During the project</strong></td>
</tr>
</tbody>
</table>

#### Primary energy savings (toe/year)

<table>
<thead>
<tr>
<th></th>
<th>Before 2010</th>
<th>BAU</th>
<th>After evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy (toe/year)</strong></td>
<td><strong>156</strong></td>
<td><strong>134</strong></td>
<td><strong>117</strong></td>
</tr>
</tbody>
</table>
Table 6: Summary of IEE common indicators evaluation in Vercelli

6.2.2 Process evaluation

The following barriers and drivers were underlined during the evaluation of the implementation process of the DSP in Vercelli. They were completed according to a template which was distributed to main stakeholders in Vercelli.

6.2.0.1 Barriers

- **Lack of knowledge on logistics in shop owners and public administrations**: These barriers delayed the DSP measure implementation.
- **Lack of funding and appropriate infrastructures**: In the context of Vercelli, this barrier contributed to non-achievement of the “last-mile” Freight Distribution/Consolidation Centre and reduces the impact of the measure.
- **Timing problem for the implementation of the measure**: Vercelli has planned the implementation of the measure concerning the creation and the organisation of the new parking places in autumn season. This is rainy period and the implementation of the measure was halted within a few weeks.
- **Difficult to collect data directly with freight drivers**: Generally the drivers don’t have much time for the delivery process in the shops: inappropriate parking place, congestion.

6.2.0.2 Drivers

- **Political interest** in efficient freight measures, to reduce freight traffic in city centre and their support to introduce new rules and access control in LTZ.
- **European and national legislation** to limit pollution related to the freight traffic and to reduce the traffic congestion in the cities.
- **Use of new technologies** for the automatic control for the penalties in case of the illegal parking, identification of non-authorised entered vehicles and the monitoring the traffic in the LTZ.

6.2.0.3 Planned actions

The barriers and drivers lead to the following actions which will be also used in the future activities concerning the city logistics.

Actions during the project

- **Involvement of local trade associations** in the development of the project in order to learn more about city logistics and participate in improving them.
• **Involvement of AICAI (Italian Association of International Couriers Aircraft)** for the collection of data relating to deliveries and to agree future implementations of new logistics services with low environmental impact.

• **Collaboration with the University of Oriental Piedmont** to create a citizens group which will participate in the municipality decision process in order to increase their interests and knowledge in the city logistics and the environmental and economic impacts of the new measures.

**Action after the project**

With the assistance of the University of Eastern Piedmont and local stakeholders, Vercelli discussed the forthcoming introduction of these new “last mile” services such as van-sharing and bike-cargo, agreeing with the idea of implementing a consolidation centre and expanding the first Delivery Parking Plan all over the town, providing further improvements in the delivery operations.

The expansion of the limited traffic zone and pedestrian areas and the upgrading of road infrastructure dedicated to Sustainable Mobility remain hot topics to discuss and seek solutions for a more responsible and sustainable future in Vercelli.

### 6.3 Växjö

#### 6.3.1 Impacts evaluation

The impacts of the Trailblazer project on food consolidation were increased in Växjö by introducing the e-purchasing system which allows a better coordination of goods. The Municipality was able to decrease the number of deliveries by about 50% per week and as a result to reduce the number of kilometres travelled. Dry goods are now delivered only once a week and fresh food three to four times a week, whereas previously there were more than five deliveries each day. There is an optimised delivery plan with predetermined routes, so the units know in advance when to expect deliveries and can plan their work and resources, and also save a lot of staff time.

The project has demonstrated 53% saving in energy used to make Municipality deliveries and 87% saving of CO2 emissions. Those figures were amplified with the utilisation of green fuel and less polluting freight vehicles.

The results concerning the fuel consumption and CO2 emissions are summarised in the Table 7.

**Fuel used**

<table>
<thead>
<tr>
<th></th>
<th>Växjö</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
</tr>
<tr>
<td>Fuel used litres by year</td>
<td>68,390 litres</td>
</tr>
<tr>
<td></td>
<td>During the project</td>
</tr>
<tr>
<td>Total Fuel</td>
<td>23,205 litres (51%)</td>
</tr>
</tbody>
</table>
Greenhouse gas emissions

<table>
<thead>
<tr>
<th></th>
<th>Växjö</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>BAU</td>
<td>After evaluation</td>
</tr>
<tr>
<td>kgCO₂ emissions/year</td>
<td>174,121 kgCO₂</td>
<td>87,153 kgCO₂</td>
<td>11,339 kgCO₂</td>
</tr>
</tbody>
</table>

During the project

Reduction GHG emissions (t CO₂e/year) 75.814 t CO₂e/year (87 %)

Primary energy savings (toe/year)

<table>
<thead>
<tr>
<th></th>
<th>Växjö</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BAU</td>
<td></td>
<td>After</td>
</tr>
<tr>
<td></td>
<td>During the project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td>Litres</td>
<td>Energy</td>
<td>Litres</td>
</tr>
<tr>
<td>Diesel (9,889 kWh/l)</td>
<td>32,520</td>
<td>321,590 kWh</td>
<td>4,231</td>
</tr>
<tr>
<td>RME (9,34 kWh/l)</td>
<td>12,116</td>
<td>113,163 kWh</td>
<td>16,870</td>
</tr>
<tr>
<td>HVO (10,82 kWh/l)</td>
<td>550</td>
<td>5,951 kWh</td>
<td>879</td>
</tr>
<tr>
<td>Total</td>
<td>45,185</td>
<td>440,704 kWh</td>
<td>21,980</td>
</tr>
</tbody>
</table>

Primary energy savings (toe/year) 231,787 kWh* or 19.92 toe/ year (53%)

* 1KWh = 85.96*10⁻⁶ toe

Table 7: Summary of IEE common indicators evaluation in Växjö

6.3.2 Process evaluation

The following barriers and drivers were underlined during the evaluation of the implementation process of the DSP in Växjö. They were completed according to a template which was distributed to main stakeholders in Växjö.

6.3.0.1 Barriers

- **Incompatible suppliers purchasing system:** The suppliers are used to a certain way of handling transports and certain ways of purchasing. Their business system is not often built to be compatible with other purchasing systems.
- **Labelling from the suppliers:** Another issue is the labelling from the suppliers which is crucial for the distributors. If it is not good enough, it could be a great problem when delivering the items. Many suppliers have a specific way of the labelling compatible with only their own system and not with a third party.
• Lack of knowledge in the Municipality organisation especially about the delivery plan which can reduce the impact of the DSP actions and even to contribute to its failure.

6.3.0.2 Drivers

• Revised environmental programme: the Municipality of Växjö aims to be fossil fuel free by 2030.
• Strong political implication: politicians came up with the idea of the goods consolidation in Växjö.
• The strategic planning office commitment which wished to participate in the Trailblazer project and to develop their own DSP.
• Purchase network: all Växjö administrations had the task to choose responsible persons for the purchase who also were a natural information channel out into the work units (offices).
• Enthusiastic staff: Växjö staff were very sensitive to the environmental problems and enthusiastic about implementing goods consolidation and to evaluate it by the implementation of the e-purchasing system.
• Interaction between different stakeholders and especially with the retailer's organization "Växjö Citysamverkan".

6.3.0.3 Planned actions

The barriers and drivers lead to the following actions:

Actions during the project

• Education of the municipal employees: There are about 2000 purchasers in the organisation. To be a "certified purchaser", they all had to go through the education about how to use the e-purchasing system.
• System Integration between about 400 units of suppliers, distributors and customers. The distributors can see the orders and also register the arrival in the e-purchasing system.
• Integration of the delivery plan into e-purchasing system which contributes to a better organisation of the deliveries. At the beginning of the project the purchaser could not see in the system their delivery day. This disturbed the purchaser work. Today, there is an optimised delivery plan with predetermined routes and days, so the units know in advance when to expect deliveries and can plan their work and resources, and also save a lot of staff time.

Action after the project

The Municipality of Växjö is looking for further integration and development of the system within the Municipality, with city centre retailers and also with adjacent counties.

• Växjö has therefore made a survey in the city centre of Växjö in collaboration with retailer’s organisation. The aim was to see how increased coordination of freight transport to Växjö City can give more efficient flow of goods and
improved environmental and road safety. Växjö City locates approximately 150 different activities. Of these, it's about 120 activities that receive goods in any significant way. The simulation model which has used the data collected, showed a reduction in both delivery time and emissions and less heavy vehicle in the city centre.

- Växjö has also an ambitious plan to include adjacent counties to Växjö’s system in order to better coordinate the deliveries and to get an optimal delivery flow around the counties.

### 6.4 Zagreb

#### 6.4.1 Impacts Evaluation

The following targets have been set for the Trailblazer project in Zagreb:

- 10% reduction in the fuel used by freight transport in Zagreb DSP zone
- Reduced emissions for freight flows involved
- Less freight traffic in the road
- Improving parking and accessibility regulation
- Improving the delivery of goods
- Increase the satisfaction of the citizens

By the observation, it was possible to evaluate and to demonstrate the reduction in traffic flow in target area.

Using the survey, Zagreb has calculated the fuel consumption, CO₂ emissions and primary energy usage.

**Fuel used**

Total fuel consumption has been determined using fuel consumption per delivery (collected by questionnaires), multiplied by the total number of vehicles in the DSP area (collected by observation).

The fuel saving is calculated in a time window of 6 working days. The total fuel saving by year has been calculated under the assumption of 260 working days. The results concerning the fuel consumption and CO₂ emissions are summarized in the Table 8.

<table>
<thead>
<tr>
<th></th>
<th>Zagreb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before 2010</td>
</tr>
<tr>
<td>Fuel consumption per delivery (Litres)</td>
<td>12.6</td>
</tr>
<tr>
<td>Fuel used in a time window of 6 working days (Litres)</td>
<td>282,000</td>
</tr>
<tr>
<td>Fuel saving during the measure implementation (Litres)</td>
<td>139,000 litres (27%)</td>
</tr>
</tbody>
</table>
TOTAL, year (Litres) 5,977,000 litres

Table 8: Fuel Savings in Zagreb

The table highlights the follow observation: the average fuel consumption per delivery increased, the total number of observed vehicles decreased significantly, thereby leading to the overall improvement.

**Greenhouse gas emissions**

The CO\(_2\) emissions during the project and the savings achieved have been estimated in the following way (Table 9):

- The CO\(_2\) emissions are calculated for each vehicle making delivery in the DSP zone, based on the data collected through the questionnaires (the fuel consumed per delivery)
- The total CO\(_2\) emission has been calculated by multiplying the average CO\(_2\) emission per delivery with the total number of vehicles observed in the DSP zone.

<table>
<thead>
<tr>
<th></th>
<th>Zagreb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Before 2010</strong></td>
</tr>
<tr>
<td>CO(_2) per delivery [kg]</td>
<td>45.15</td>
</tr>
<tr>
<td>CO(_2) emission per day [t]</td>
<td>142.99</td>
</tr>
<tr>
<td><strong>During the project</strong></td>
<td></td>
</tr>
<tr>
<td>CO(_2) saving day [t]</td>
<td></td>
</tr>
<tr>
<td>Reduction GHG emissions (t CO2e/year)</td>
<td></td>
</tr>
</tbody>
</table>

Table 9: CO2 savings in Zagreb

**Primary energy savings (toe/year)**

The fuel saved on the annual level (5,977,000 litres) has been translated into toe/year (Table 10).

<table>
<thead>
<tr>
<th></th>
<th><strong>During the project</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary energy savings (toe/year)</td>
<td>5,080</td>
</tr>
</tbody>
</table>

Table 10: Energy saving in Zagreb

The evaluation in Zagreb demonstrates a 27% reduction in fuel used for the whole journey of transit freight vehicles. This calculation concerns all the vehicles which are going through the target area. The data presented by the city is not sufficient to say that all this reduction is achieved by Trailblazer measure.

The data from the questionnaires characterises the freight vehicles activities in the target area. The analysis of before and after data underlines the follow changes:

- Reduction by about 9% in km travel for delivery
• Increase by 3% in fuel consumption per 100 km
• Reduction by 6% in total fuel consumption per day and respectively CO₂ emissions.

It is possible to say that the implementation of freight delivery measures, including the restricted periods during the 07.00 and 10.00 contribute to the rationalization of deliveries. The freight vehicles capacity is increased by about 35% comparing to before situation. The empty distance is decreased by 9%. Those figures can explain the increase in fuel consumption per 100 km.

The 6% reduction of total fuel consumption is explained by the reduction of total distance travelled. The existing and new implemented delivery bays contribute to less congestion and less fuel consumption.

19% of drivers are using delivery bays comparing to 8% in before situation with an average of 14 minutes per delivery stop.

6.4.2 Process evaluation

From the questionnaire about the process evaluation barriers and drivers were underlined.

6.4.0.1 Barriers

• Data missing about freight transport activities at the beginning of the project: this barrier has reduced the possibilities of the local project team to implement a measure with higher environmental impacts. No global approaches to the freight problems in Zagreb.
• Low interest from local business in DSP measures: At the project beginning, relatively low interest in establishing measures for delivery improvements was observed within small businesses. Their economic priorities at the time were to stabilise the level of their core business. This low interest was also explained by the lack of knowledge about city logistics measures and their benefits.
• Low interest for participation in the survey, especially in the collection of the before situation, about 20% of business subjects registered in the area. This was recognised as a barrier because the project team was prevented from collecting a more relevant sample of questionnaires. The survey data were completed with the observation data. The answers to the questionnaires for “after evaluation”, was 18% higher than in “before evaluation.”
• Specificity of the DSP area: The presence of trams in the demonstration zone and trains (nearby) as part of delivery chain also narrowed the choice of the possible DSP measures, with a larger potential impact.

6.4.0.2 Drivers

• Participation of City Office for Strategic Planning and Development as a local project coordinator which contributes to increasing interest in the project,
readiness for participation and creates a higher level of trust of all important stakeholders in project.

- **Excellent communication, mutual trust and good coordination of all local project partners:** enabling the project activities to be conducted with no delays and with a coordinated support of both project partners and subcontractors.
- **Political support:** the support offered by the Mayor and the Sector for transport enabled the DSP measures to be implemented in Ilica Street.

### 6.4.0.3 Planned actions

The barriers and drivers lead to the following activities.

#### Actions during the project

- **Implication of local freight companies** in the User group of the Trailblazer project which increased the cooperation between local freight companies and City of Zagreb in order to implement a collaborative DSP.
- **Dialog between the freight delivery stakeholders and the city of Zagreb** has been established on the higher and more direct level.

#### Actions after the project

- The city of Zagreb will continue the **more participative dialog** with the city logistics actors in order to improve knowledge about the freight activities and to encourage the actors to a common distribution system.
- **Improve the control system** in target area by the implementation of automatic recognition and counting of delivery vehicles.
- **Continuous data collection:** The City of Zagreb considers that the mechanism for systematic and continuous data collection and interpretation is a basis for all further activities related to freight transport improvements. Zagreb will continue to collect the specific urban Freight data not only in Ilica Street (Trailblazer target zone) but also in a large area of the city.
- **Implementation of a new system of delivery by electric, hybrid vehicles or bicycles.**

### 6.5 Eskilstuna

#### 6.5.1 Impacts evaluation

The coordination of supplies assumed that the amount of released CO₂ will decrease from 178 972 tons to 102 212 tons or 43% simply by reducing the number of deliveries. If the requirements in contracts placed on vehicles with EURO 5 will reduce CO₂ by another 20% to 81 770 tons. Total reducing emissions will be 54%. With the introduction of biogas, the CO₂ emissions will reduce by 50%. Globally, the estimated reduction is about 69% in CO₂ emissions with the coordinated system.

With the implementation of coordination system, the number of deliveries to the kitchens will be reduced to 2 deliveries per week. The reduction in fuel used consist
of shorter distances overall, smaller vehicles with lower fuel consumption and shift to non-fossil fuels (gas).

The results concerning fuel consumption and CO₂ emissions are summarised in the Table 11.

**Fuel used**

<table>
<thead>
<tr>
<th></th>
<th>Eskilstuna (estimated)</th>
<th>Before 2010</th>
<th>BAU</th>
<th>After evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel used litres by year</td>
<td></td>
<td>32,000</td>
<td>32,000</td>
<td>16,000</td>
</tr>
<tr>
<td>Fuel saving (Litres)</td>
<td></td>
<td></td>
<td></td>
<td>16,000 litres (50%)</td>
</tr>
</tbody>
</table>

**Greenhouse gas emissions**

<table>
<thead>
<tr>
<th></th>
<th>Eskilstuna (estimated)</th>
<th>Before 2010</th>
<th>BAU</th>
<th>After evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>tCO₂e emissions/year</td>
<td></td>
<td>178,972</td>
<td>143,178</td>
<td>44,022</td>
</tr>
<tr>
<td>Reduction GHG emissions (t CO₂e/year)</td>
<td></td>
<td>99,156 t CO₂e/year (69%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Primary energy savings (toe/year)**

<table>
<thead>
<tr>
<th></th>
<th>Eskilstuna (estimated)</th>
<th>Before 2010</th>
<th>BAU</th>
<th>After evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (toe/year)</td>
<td></td>
<td>27.2</td>
<td>27.2</td>
<td>13.6</td>
</tr>
<tr>
<td>Primary energy savings (toe/year)</td>
<td></td>
<td>13.6 toe/year (50%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11: Summary of IEE common indicators evaluation in Eskilstuna

6.5.2 Process evaluation

The process evaluation in Eskilstuna underlines the barriers in the DSP implementation and the drivers in the current and for the future activities.

6.5.0.1 Barriers

- **Procurement of logistic partners:** Problems have arisen in Eskilstuna in the procurement of logistic partners for municipality food delivery. Five tenders were received at the beginning of the project. The conclusion was made in June 2011, which was appealed by either party. The court has rejected the contract and Eskilstuna has launched a new tender in November 2012. This situation has produced a 7 months delay in the planned actions.
• **Public procurement specificity:** Public procurement in Sweden has, over time, become increasingly difficult to reschedule. The appeals occur on a routine basis, leading to significant delays. The appeals lead often to higher costs without added value created.

• **Lack of knowledge concerning the delivery system:** In the municipality of Eskilstuna’s size there are several hundred employees who need appropriate education in this matter. A successful implementation requires that all personnel in the municipalities affected by the change have knowledge and a positive attitude.

• **Lack of data:** Eskilstuna has had difficulty getting transport data from hauliers. Some data are missing completely. Other data are considered as trade secrets.

• **Environmental requirements imposed on transport:** Specific environmental requirements are imposed to transport logisticians (e.g. the introduction of clean vehicles). The contracted supplier in Eskilstuna should therefore undertake to procure vehicles that meet the requirements of the city before the mission begins. The delivery time for custom vehicles may, however, affect the start date for the use of alternative fuel vehicles.

### 6.5.0.2 Drivers

• **Political support at the national and local level:** The trend towards more efficient and environmentally friendly supplies to municipalities is primarily supported by the politicians. This political support has contributed to the progress of the action and also to change the previous negative attitudes of providers, increased the credibility in the project’s achievement and its benefits.

• **Technological changes:** The technological development of vehicles and infrastructure for renewable fuels has enabled tougher environmental requirements on vehicles. By consequences, the targets for the reduction of CO2 emissions will be surpassed.

• **Participation of stakeholders during the DSP development:** Municipal and county associations, universities and industries.

### 6.5.0.3 Planned actions

The barriers and drivers in Eskilstuna lead to different actions during the project and after the project.

#### Action during the project

• **Communication meetings.** The municipality of Eskilstuna organised several meetings which attracted a large attendance:
  - More than 50 Project meetings which have mostly focused on the procurement of logistics partners;
  - 10 Management Meetings which have focused on information about the project.
  - 10 External meetings which have been with suppliers and trucking companies and some conferences.

• **Direct contact with stakeholders.** Around 50 suppliers have been contacted by telephone and email. About 10 of them have come to the meetings.
• Internal and external trainings for the municipality employees and the external stakeholders.
• Distribution of the information materials. For the communication about the project and about the new delivery system, Municipality of Eskilstuna has used brochures, slideshows in PowerPoint, and information on the TV monitors for the municipality’s citizens.

Actions after the project

From Eskilstuna perspective, there are three parallel tracks.

• Coordination of all municipal purchases: Trailblazer Eskilstuna will go ahead to develop coordination of goods delivery to include all municipal.
• Investigation of the coordination of purchases between neighbouring municipalities.
• A city logistics project is planned to start in autumn 2013 in Eskilstuna, as a pilot project within the framework of a national network with the participation of municipal and county associations, universities and industry.

Eskilstuna has in recent years also successfully built up an efficient transhipment terminal for long distance rail freight, a “dry port”. Furthermore, on-going construction of a new logistics centre, “Eskilstuna Logistics Park” with direct connection to highway, rail and airport. The next coming actions will be the following:

• Establish liaison with interested municipalities in the surrounding area
• Establish collaboration on plans Eskilstuna logistics park, a project for all types of goods and transportation needs.
• Establish liaison with industry representatives locally.

The future development will be more dedicated to cooperation in various forms. Conceptually, the new transport system is fully developed. New synergies are, however, to pick out the possibilities of cooperation with neighbouring municipalities and other municipalities in the on-going project logistics focus.

Over time, Eskilstuna saw the need to reduce traffic in central Eskilstuna which must be followed by implementations of alternative solutions, of which the public transport system can be one.

6.6 Results, Conclusions and Recommendations

6.6.1 Results

The results of the DSP implementation by the four PATHFINDERS is summarised in the below table 12. The methodology and calculations behind these figures can be found in the Final Evaluation Report (www.trailblazer.eu). These figures show the annual savings in primary energy and greenhouse gases following from the implementation of the DSP measures.
### Table 12: Annual savings in primary energy and greenhouse gases

<table>
<thead>
<tr>
<th>Common Performance Indicator</th>
<th>Planned Target</th>
<th>Actual Achievement</th>
<th>Comment on Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary energy savings</td>
<td>10% fuel saving</td>
<td>5,130.52</td>
<td>Target achieved overall</td>
</tr>
<tr>
<td>Reduction GHG emissions</td>
<td>10%</td>
<td>100,779.81</td>
<td>Target achieved overall</td>
</tr>
</tbody>
</table>

The results clearly show that the implementation of a DSP will lead to primary energy savings and reductions in greenhouse gas emissions. The experience of the four PATHFINDERS indicates that the level of savings is dependent on the DSP measures that are implemented.

### 6.6.2 Conclusions

It is clear from the actual and estimated results from the Swedish PATHFINDERS of Eskilstuna and Växjö organisational DSPs that the implementation of goods consolidation will lead to significant savings in primary energy and greenhouse gas emissions within the municipality area. The study didn’t take into account changes in their supplier’s secondary distribution systems, but given that they are now delivering larger loads to a single consolidation centre it is more than a reasonable assumption that they will make fuel savings along with the commensurate reduction in greenhouse gases.

The primary energy and greenhouse gas emission savings achieved in Vercelli and Zagreb are of a more modest level. However, these savings have been achieved purely through the actions of the municipalities themselves. The next stage of implementing an area-wide DSP is to engage with the businesses and residents in...
the DSP locations to see how through working together further savings can be achieved.

6.6.3 Recommendations

Following the experience of implementation of the three year TRAILBLAZER project the following recommendations are made to assist with the further development of delivery and servicing plans across Europe and their take-up by both public and private sector organisations.

Recommendation 1

That EACI Continues to promote the use of delivery and servicing plans to secure ongoing savings in fuel used in freight, delivery and servicing activity; reductions in greenhouse gas emissions; and primary energy savings.

Recommendation 2

That EACI gives consideration to future projects that investigate the wider savings that can be achieved through the use of consolidation centres i.e. those made by suppliers.

Recommendation 3

That EACI gives consideration to future projects that investigate the wider savings that can be achieved through the implementation of area-wide DSPs and their transferability across the EU.

Recommendation 4

That consideration is given to in-depth longitudinal study of the Swedish municipality consolidation experience to understand the wider effects of the increasing take-up of the concept and its transferability across the EU.