REZIPE

RENEWABLE ENERGIES FOR ZERO EMISSION TRANSPORT IN EUROPE

WWW.REZIPE.EU

SWOT Analyis

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1 ABOUT THE REZIPE PROJECT

1.1 Project Summary

REZIPE shows methods for reducing the emissions of carbon dioxide (CO_2), nitrogen oxides (NOx) and fine dust (PM10) by introducing zero emission vehicles (ZEV) in urban environments. The energy used in ZEV derives from renewable and clean energy sources. The vehicles are tested in pilot project implementations in six European cities.

Furthermore REZIPE will

- Create a momentum for zero emission vehicles fed by renewable energy
- Validate policy tools
- Test innovative approaches for public vehicles or joint Public-Private-Partnerships
- Show case pilot implementations in the field of electric mobility in five regions. The regions will demonstrate the setup of the whole system: from the production and usage of renewable energy, to the establishment of concepts for commercial infrastructure and the procurement of vehicles for privates and commercial fleets
- Produce guidelines, a toolbox and template for follower cities to help cities/regions implementing ZEV in various other locations

1.2 The REZIPE consortium

Coordinator	
Municipal Authority of the provincial capital Klagenfurt	(AT)

Project Partners	
Austrian Mobility Research, FGM-AMOR	(AT)
Province of Reggio Emilia	(IT)
Institute of Traffic and Transport Ljubljana l.l.c.	(SI)
Institute for Social-Ecologial Research ISOE	(DE)
Municipality of Bolzano	(IT)
Upper Austrian Academy for Environment and Nature	(AT)
Elaphe ltd.	(SI)
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2 SUMMARY

This document describes the Strengths, Weaknesses, Opportunities and Threats (SWOTs) of zero emission electric mobility regarding the local implementations and the situation in general. Various factors contributing to highlight the situation have been elaborated and commented by each region. The concluding part of each regional SWOT a combination of strengths and threats and weaknesses and opportunities have been looked at in detail to develop local strategies have been done.

The document is structured into three main chapters; the introduction and summarizing chapter (chapter 3), and chapter 4 which includes the SWOTs of all REZIPE pilot cities and regions (chapter 5) and other REZIPE cities and regions (chapter 0).

3 INTRODUCTION: FRAME AND METHOD

3.1 Aim of the SWOT analyses

The aim of the SWOTs in this document is to provide a background analysis for the pilot regions to investigate the regional potentials and framework of the local implementations in REZIPE. The document helps REZIPE and potential follower regions and cities who would like to implement zero emission mobility measures to conduct a revision of the local situation. Furthermore the SWOTs serve as a basis for local decisions and help to plan local pilots and strategies, attract the correct stakeholders and to identify gaps and potentials.

Originally a SWOT is a tool for auditing an organization and its environment. Within REZIPE we are using it for checking the conditions for the implementation of zero emission mobility with renewable sources. For regions which have a very limited or no implementation in your city/region the second step of the roll has been imagined. SWOT stands for strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are internal factors. Opportunities and threats are external factors. We want to remark that in some instances it was difficult to determine which factor is internal or external, meaning influencable or not by the actors. However a structured look at the osbtacles and hindrances as well as at the potential of ZEM in the implementation regions is helpful.

3.2 Method of the elaboration of the SWOTs in the REZIPE project

The following process has been applied for creating the SWOTs:

1. In a first step a template with potential contributing factors to the local situation and an according guideline for all partners who have to do a SWOT has been created.
2. The next step was for the partners to fill out the SWOT and discuss it with at least one or two colleagues from another department (environmental planning, transport &or urban planning, business development).
3. After a quality check through the work package leader (FGM-AMOR) and or the task leader (ISOE) the documents have been revised by the partners
4. The final SWOTs have been collected and summariesed in one document
5. The local SWOTs will be discussed by at least 5 local stakeholders in zero emission mobility during the start up workshops in WP 3.3 of the project

3.3 The structure of the SWOTs

According to the template elaborated, each SWOT analysis consists of the following different subpoints:

- Description of the local situation (e.g. topography, existing sustainable mobility projects or public transport)
  Modal split figures of the different cities/regions have been integrated in order to give a rough overview about the tendencies of the population. It has to be mentioned, that the presented modal split figures cannot be compared with each other due to the different evaluation methods and varying categories. However they give an overview about preferences of the local population.
- Description of local implementation, that the reader understands the aims of the local activities planned.
- Description of internal factors, e.g. technical skills and capacities of local industry and SME, knowledge and capacities of local politicians, stakeholders etc. that influence the local discussion and activities, R&D abilities, resources and capacities in the city/region, city/regional socio-culture, image or "market position" of the city/region (towards innovation, sustainable mobility etc.), political climate to develop innovative concepts and economic situation of the city/region.
- Description of external factors, e.g. political, economical, societal, technological, legal and environmental factors.
- Combination of factors to develop first steps in direction of strategic aims. Therefore it was looked at which strengths of regions and cities could reduce/diminish threads and which weaknesses could be turned into opportunities.

4 OVERVIEW OF SWOTS

Six regions will start pilot implementations during the project. The following table provides an overview about the intended implementations. For all these cities/regions a SWOT analysis has been made.

Pilot city or region	Description of the implementation
Reggio Emilia (region)	One station with photovoltaic (PV) panels to simultaneously charge two vehicles will be designed and installed. Five passenger vehicles will be purchased to test the station, additional vehicles will be provided for public rental.
Bolzano (city)	15 e-bikes will be procured and used by municipal employees for business trips. In order to charge them as well as the 3,000 citizens' e-bikes, two charging stations with PV panels will be set up.
Upper Austria (region)	A new e-charging point with PV-panels will be built at a vocational school to be used mainly by teachers and pupils. Furthermore one "Solar Rally" showcasing e-vehicles will take place each year.
Klagenfurt (city)	Five charging stations, one photovoltaic panel (5 kWp) and five electric vehicles will be available for citizens wanting to experience the possibilities of this new and environmentally friendly technology.
Ljubljana (city)	The launch of a rental system consisting of nine e-bikes and one car will target employees in a technology park. Also a charging station with photovoltaic panels and a mobile station will be introduced.
Györ (region)	E-mobility is not popular in Hungary yet. In order to increase awareness three electric vehicles and one portable charging facility will be arranged and presented to company employees.

Table 1: Overview on local implementations in REZIPE

Furthermore there are two cities/regions part of the project where the research partners are situated. In these cities/regions no implementation will be carried out in REZIPE. However there was conducted a local SWOT analysis, too. These cities/regions are:

- City of Graz, Austria
- Rhine-Main Region with Frankfurt, Germany

5 SWOTS OF CITIES / REGIONS IN WHICH LOCAL IMPLEMENTATIONS WITHIN REZIPE WILL TAKE PLACE

5.1 Reggio Emilia, Italy

5.1.1 Topography

- 2,291.67 km²
- 56% hills and mountains (1,283.34 km²)
- 44% plain (1,008.33 km²)

The province of Reggio Emilia covers 45 municipalities and is located in the central part of the region Emilia Romagna. It borders on the Province of Mantova (Lombardia) in the North, Parma in the West, Massa Carrara and Lucca (Tuscany) in the South and Modena in the East. The Southern territory is hilly and mountainous, while the Northern one is constituted by the Po Valley. The highlands are a big part of the provincial land extension and are part of the Apennines, a compact crest which extends along more than 100 kilometres. Distinguishing features of this crest is the average height of the peaks (more than 1,600 metres) and the maximum height (around 2,000 metres). Going from South to North, the mountains soften into the hills of the Sub-Apennines: In this area many rivers cut across wide valleys and go down towards the Po Plain. The Northern area is plain, fertile and rich in towns and villages, connected one to the other from a widespread road network and a railway line.

The Province of Reggio Emilia has over 500,000 inhabitants and plays administrative, political and coordinating competences related to well-balanced social, cultural, economic and environmental development. In particular, the province manages transport and infrastructural connections and improves policies and projects in the field of sustainable mobility.

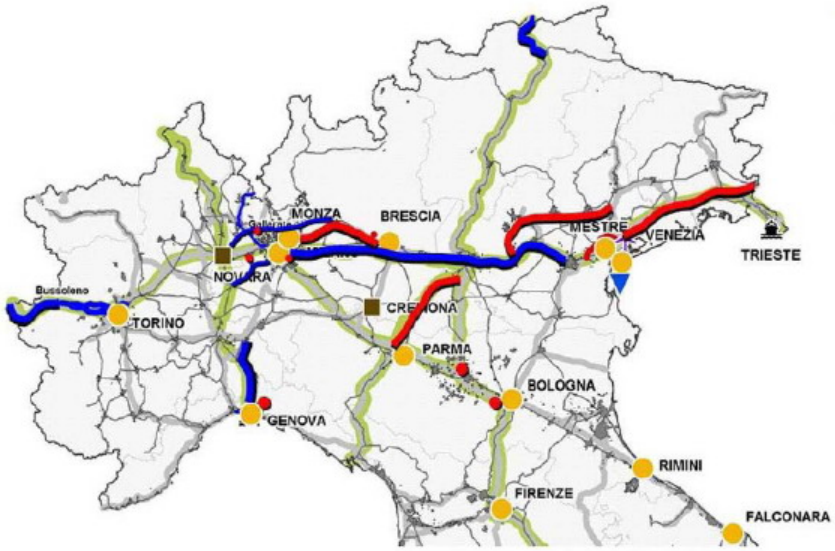
At regional level (Emilia-Romagna) the province is part of a FUA - Functional Urban Areas, identified by ESPON EU Programme - European Spatial Planning Observation Network.

5.1.2 Modal Split

The province is part of the main infrastructural system of Northern Italy (roads, rails - as a new high speed rail line has been launched on December 2008 - and an inland waterway on the axis of the river Po) crossing 2 of the main trans-European transport network (TEN-T) priority projects: 1 railway axis Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo and 6 railway axis Lyon-Trieste-Diva/Koper-Diva-Ljubljana-Budapest-Ukrainian border. Here below you can find 2 maps of the infra-structural system:

Corridoi transeuropei programmati sul territorio italiano

- Lisbona - Kiev (Corridoio V)
- Bari - Varna (Corridoio VIII)
- Rotterdam - Genova (Corridoio dei due mari)
- Berlino - Palermo (Corridoio I)
- Autostrade del mare sud Europa



Corridoi transeuropei

Programmazione Legge Obiettivo

- Interventi sulla rete ferroviaria AV/AC
- Interventi sulla rete ferroviaria
- Interventi sulla rete autostradale
- Interventi sulla rete stradale
- Interventi sui sistemi urbani
- Interventi sui sistemi portuali
- Interventi sui sistemi interportuali
- Interventi sui sistemi aeroportuali
- Sistema Mo.Se.

Below you can find a map of commuter (home-to-work) traffic of Emilia Romagna Region and a map of the mobility axis of commuting in the Reggio Emilia's province territory:

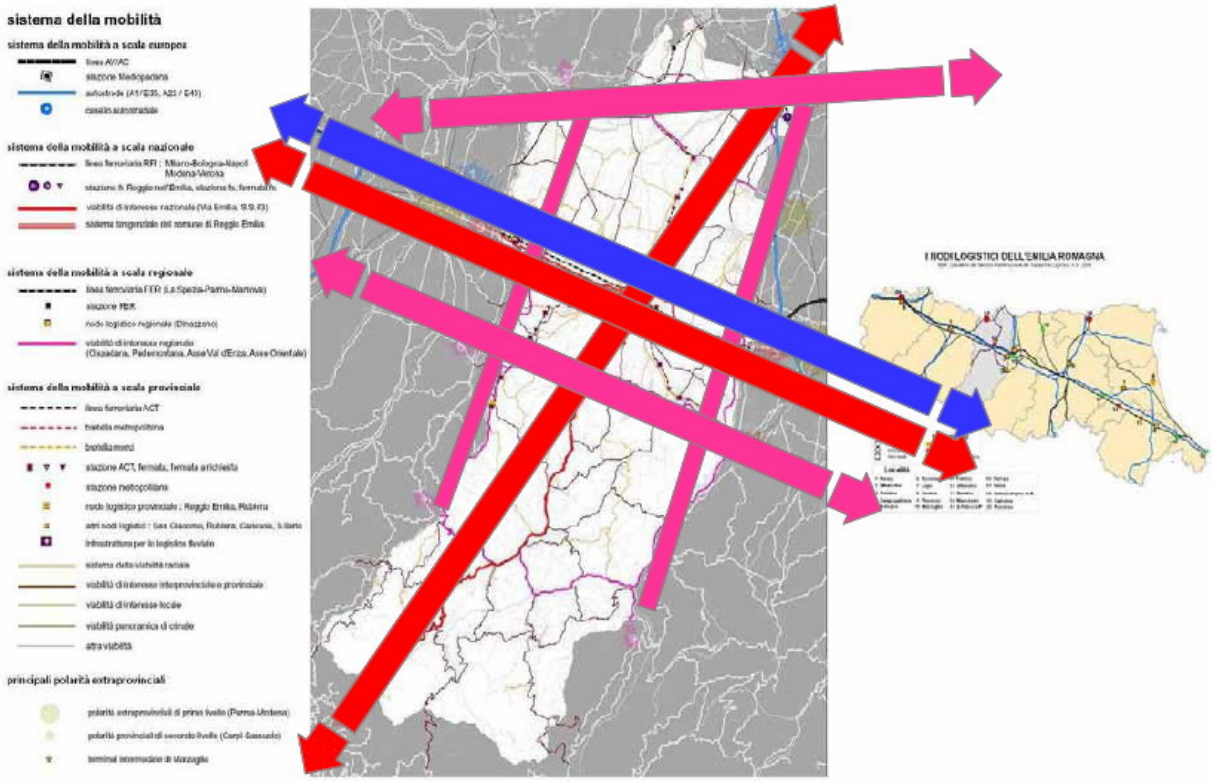


Figure 1: Commuter traffic in Reggio Emilia

Regarding the urban mobility field, Reggio Emilia is the Italian city with the highest number of electric car vehicles per inhabitant.

In the last years Reggio Emilia has received 2 very important international awards:

- "Global E-Visionary Award", in November 2003; awarded by WEVA World Electric Vehicle Association to Reggio Emilia as 1st City in Europe for the use and diffusion of electric vehicles in an urban environment -EVS 20 Long Beach (USA).
- "BEST PRACTICE Award", in April 2005; awarded by IEA International Electric and Hybrid Vehicles Agency to Reggio Emilia as first city in Europe for sustainable mobility achieved with electric vehicles in an urban environment – EVS 21 Montecarlo.

5.1.3 Existing public transport

Some financial capital of the Province of Reggio Emilia is invested in the local agency for mobility and public transit in the city and Province of Reggio Emilia, named ACT - Azienda Consorziale Trasporti. The Municipality and the Province of Reggio Emilia hold around 95% of the capital of TIL (Trasporti Integrati Locali, a Local subdivision of ACT dealing with the sustainable mobility topic) by controlling ACT. The Province has delegated the

responsibility for all public transit services in the province to ACT. Under the Provinces' cooperation, ACT is in charge for plans, organises and integrates public transit services. Furthermore ACT manages the business aspects of these services, sets fares, and develops the related marketing plans.

Regarding the sustainable mobility topic, ACT has taken a number of decisive steps to significantly lower the emission of pollutants, improving air quality and making commuter movements of citizens easier: for example with 12 hybrid electric buses, a free shuttle services between interchange parking (located in the periphery of the city of Reggio Emilia) and the old city centre (which is the work venue of a lot of workers) has developed. With this experience Reggio Emilia became the first city in Italy to provide users with an efficient free-of-charge connection service to the city centre.

Other relevant services concerning the sustainable mobility are:

- A web portal and journey planning system named "Create your own route" regarding the bus services in the whole territory of the province of Reggio Emilia.
- A web portal and journey planning system named "Railway Passenger Service", developed by FER – Emilia-Romagna Railways in co-operation with ACT, regarding the railways services in the territory of the Emilia Romagna Region.
- A web traffic information system named "A look at traffic", regarding the traffic's monitoring of the regional and national motorways.
- A very innovative service named "Discobus", promoted by the province together with ACT, which allows young people to have fun while travelling safely every Friday and Saturday night, from/to the main disco-pubs of the Reggio Emilia and Parma province's territory (about 50 km).
- A public bicycle rental service named "PedalaRE" that currently offers 54 bicycles in 5 Reggio Emilia city's locations (bike racks) - recognizable by their red information boards; the service can be used by anyone holding a special card, which can be purchased at participating ACT ticket offices of the city.

For more information about this and other experiences please refer to the website: http://www.actre.it/eng/main/index.php

5.1.4 Existing urban transport development plans

At local level the province has recently elaborated the Provincial Coordination of Territorial Planning (PTCP), a strategic instrument for the urban mobility planning integrated with the regional level. This tool will be implemented in cooperation with the Reggio Emilia Municipality's Authorities; they have planned specific Reggio Emilia Mobility Plan settings strategic guidelines for mobility management indicating the main infrastructural projects, up to 2015. The six main targets of the plan are:

- Developing the network and the security of bicycle paths;
- Implementing the public transport service, creating bus lanes on major roads outside the city centre;

- Strengthening the parking system, with new intermodal car parks and greater accessibility to the city centre;
- Enhancing road safety by introducing moderate traffic areas;
- Solving the main traffic junctions, completing the main traffic stream and lightening the most congested roads;
- Reorganising the timing of the city together with the private mobility.

5.1.5 Projects dealing with renewable energy production

Government incentives have been allocated for the implementation of solar panels in private houses. The Ministry for Industry issued a decree on 5 August 2005 that provides the legal framework for the system known as “Conto Energia”. The incentive tariffs are related to the system size (kWp to be produced) and the type of installation: at the moment incentives are from 0.36 Euro per kWp of power installed (20 or more kWp with a free-standing installation) to a maximum of 0.49 kWp (1 to 3 kWp with an integrated solar system). The contract duration is equal to 20 years and the remuneration is constant. In the next year (2011) the incentive will be reduced by 18%.

The municipality is trying to spread the door-to-door separate collection of rubbish: each house, in an experimental area of 30,000 inhabitants, has 3 different coloured bans: green, blue, brown where families collect the most part of the rubbish produced during the week.

5.1.6 Projects dealing with sustainable mobility

Reggio Emilia is the first city in Italy offering bicycle paths. Promenades, a widespread restricted traffic area, exchange parks and shuttles for entering the old town are being built and promoted.

For electric cars Reggio Emilia is offering incentives: for example free parking in the blue zones (24 hours a day, 7 days a week), free access to the restricted traffic area, free circulation during circulation blockages are offered.

5.1.7 EU level projects

The Province of Reggio Emilia has managed different kind of European projects within the mobility and transports topics: an INTERREG IIIC project named NEAC - Network of European Automotive aimed at building a sustainable network of communication, exchange and dis-semination of strategic and technological competence for Automotive Cluster partnerships across Europe. In this field Reggio Emilia is partner of the EASN - European Automotive Strategy Network Platform, deployed by the fusion of five previous EU projects promoting automotive sector. Recently the Province of Reggio Emilia co-operated with the Municipality of Reggio Emilia for an INTERREG IVC project, named M-MOVE, financed in the last call for proposals regarding the support to the public administrations in the implementation of mobility policies with a low environment impact.

Regarding the housing topic the Province of Reggio Emilia was partner of another INTERREG IIIC named ENABLe IMPACT aiming to improve the energy performance of public buildings and to reduce energy consumption.

5.1.8 Implementation directory

5.1.8.1 Main objective for the implementation

The main objective is to demonstrate that entering the old town with electric cars thanks to a real zero emission charging station, through the implementation of electric cars sharing, is possible. In fact, the charging station will be powered by PV panels and equipped with 2 plugs which will directly charge the electric vehicles; 3 more plugs will be connected to the power grid to charge the other vehicles, in order to make a comparative test.

5.1.8.2 How many vehicles will be piloted?

5 vehicles (Piaggio Porter passenger cars) will be implemented.

5.1.8.3 How many renewable Power Units will be installed?

1 photovoltaic charging station (total kWp: 3.7) equipped with 5 charging spots (2 directly connected to the PV panels and 3 connected to the power grid).

5.1.8.4 Users of the vehicles

Mostly traders, craftsmen and inhabitants of the city

5.1.8.5 How are vehicles embedded?

The e-cars will be leased by the province and will be available to users for a daily and free-of-charge ecorental.

5.1.8.6 Preconditions

The location of the charging station, a parking near the centre of the city, has already been identified. It has been decided that the 5 vehicles that will be rented to run the pilot will be free of charge for the local test users throughout the project.

5.1.8.7 Other measures

Press releases and press conferences have already been and will be carried out, presenting the project and the local implementation. The local population will be informed, involved and stimulated to participate in the testing phase of the implementation. The implementation will be furthermore presented and promoted during local and national events in which the Province of Reggio Emilia will take part.

5.1.9 SWOT Analysis

5.1.9.1 Strengths

Former experiences with e-mobility implementations	As regards the town of Reggio Emilia long implementation experience exists, e.g.: Year 2001: Progetto Farmacie Comunali Riunite (car sharing system): 46 electric cars on hire. Year 2002: Car sharing system in the municipality of Reggio Emilia: 76 electric cars on hire. Year 2003: Ariamia Project: 30 electric cars hired to traders. Year 2005: Via Libera project with the Province of Reggio Emilia: 20 electric cars to traders and private subjects.
Academic knowledge and research in automotive and engineering faculties	More than 10 years of experience of electric cars hiring have made our activity unique in Italy. Our activity started in 2002 and we now manage the greates electric fleet in Italy. There are few organizations involved in the R&D in the automotive sector: in particular in Reggio Emilia REI - Reggio Emilia Innovation and the University of Modena and Reggio Emilia. The Province of Reggio Emilia and other public authorities have a quota of their balance involved in the REI and are linked to the University activities.
Local cooperation culture – creating enterprise clusters	All projects of the province are searching to involve the municipality, Crafts associations, Chamber of Commerce, private sponsors. Only at the level of the enterprises we have noticed a lack of co-operation among them, probably due to competitive reasons.
Green/sustainable city image (tourism and city marketing)	There are a lot of information and awareness campaigns about the green and sustainable policies. The Reggio Emilias' citizens are generally well informed and interested in these topics. There are moreover promotional touristic activates mainly focused in the food typical production and relevant historical features of the city.
(Local) politicians/stakeholders/multipliers favouring E-mobility	Each part of the territory contributes to the electric car spreading. A part of the citizenship, few politicians in Reggio Emilia are favouring the promotion of a new kind of mobility.
National importance of your city/region to have	Reggio Emilia had the first city in Italy offering bicycle paths having the highest percentage of EVs (8% of the national quota) in Italy. Reggio Emila has received international awards related to the promotion of the EVs.

Noise emission reduction measures (motorcycle/moped, night traffic etc.)	There are a lot of measures implemented and promoted: Noise maps, action plans aiming to reduce the speed of the vehicles in the pedestrian area, campaigns promoting the reduction of the traffic density (in particular of heavy vehicles).
Potential for improving air quality significantly / Emission reduction potential	Widespread restricted traffic area has been implemented in the city centre and moreover there is a specific pedestrian area. There are 5 cars parking located in suburban area served by free of charge shuttle buses for entering the old town. For the electric cars incentives such as free park in the blue zones 24/7, free access to the restricted traffic area, free circulation during circulation blockages. These policies should increase the potential of improving the air quality of the city.
High quality bicycle parking facilities at central commuter stations	There is a public bicycle rental service – close to the public racks - named "PedalaRE" that currently offers 54 bicycles in 5 Reggio Emilia city's locations (bike racks). Racks are located in the key commuters' places, recognizable by their red information boards; the service can be used by anyone holding a special card.
Car sharing offers and publicity of them	Car sharing with internal combustion enginge cars is in place in the city of Reggio Emilia since 2001. The REZIPE project will offer electric car sharing to the citizens beginning with 2011.
Residential areas with private property parking (for charging possibilities)	We have not residential area with charging possibilities. There is only a public park at the rail station which is 300 metres from the city centre and can be reached by any public and private mean of transport. Further information

5.1.9.2 Weaknesses

Academic knowledge and research in automotive and engineering faculties	There is a need to stronger co-operate between the private and public sector. Sometimes the research activities regarding e-mobility are developed with a strong focus and therefore not usable for the public sector.
Local experiences in small scale/de-	The city of Reggio Emilia has planned and are studying projects regarding the de-central energy production. There are few

central renewable energy production	interesting experiences already implemented in the city of Correggio (still in the province of Reggio Emilia) where is built a central energy production realized by a public enterprise financed by the local municipality (www.nuke.en-cor.it).
Local utility offers in renewable energy	Not yet available
PM 10 and/or CO_2 targets in local transport policy	There is a law restricting PM10 emissions: 50 ug/m^3 not for more than 35 days/year). The city of Reggio Emilia has exceeded this limit with 42 days in 2009.
Number of public parking (multi-storey park decks and underground garages)	In the city of Reggio Emilia there are 7,340 parking places which are subject to charge and 2,320 for free (connected with free buses to the city centre).
Offers and marketing for multi-modal mobility patterns	In the 2010 there was a marketing campaign named “Play Porter” aiming to promote the renting of an EV (a Piaggio Porter) with a special offer of 150 Euro (all inclusive).
Bicycle transport in public transport (incl. pedelec/e-bikes)	Reggio at the moment does not allow bringing bikes on the bus.

5.1.9.3 Opportunities

Automotive industry and SME in proximity Is there R&D on E-Mobility?	Yes, the staff of the Province of Reggio Emilia constantly cooperates with the University of Reggio Emilia for R&D of electric mobility.
Existing OEM in car/automotive production in the region	Yes, the greatest one is called ZAPI (www.zapiinc.com). Its headquarters are in Reggio Emilia (in the city of Poviglio).
Experience of local industry in the globalised economy	Large experiences available; 80% of ZAPI turnover is generated by exporting. The electric car builder Microvett generates 50% of his turnover by exporting to Europe.
Penetration of (plug-	The“not plug in” electric cars diffusion percentage is slightly superior

in) hybrid cars/ community	to the national average.
Attitudes towards imported BEVs and batteries	Positive attitude towards everything that suggests pollution reduction.
Alternative development paths, keeping internal combustion engines	Reggio Emilia has a high CNG (methane) fuel engine vehicles diffusion.
Adequate qualified mechantronic personnel for BEV repairs	The town of Reggio Emilia offers a satisfying number of qualified staff (balanced with the market demand).
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	The existence of a lobby against two-wheeled ZEV is not known.
Parking at companies (for charging vehicles at work)	There are charge centres inside public and private companies which hire electric vehicles form TIL – the ACT in house organisation dealing with the mobility topic in the city of Reggio Emilia.
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	It is one of the main topics of discussion in all the local media.
Adequate local/regional test field for e-vehicles	The experience of the city of Reggio Emilia in managing 630 electric vehicles in a rental scheme is the biggest test field in Italy.
Topography of city/region (e.g. steepness)	The towns' area is plain on 44% of its area.

5.1.9.4 Threats

Automotive industry and SME in proximity Does the municipality/region have an automotive cluster? Do other SME exist, who construct (light) e-vehicles?	- A part from another electric automotive company there are no other clusters of this kind in Italy. - There are many builders of small electric cars and some builders of medium/big electric cars in Emilia Romagna, but not in Reggio Emilia.
Percentage of imported vehicles	Data not yet available
Use of motorized vehicles	The provincial motorization rate (611 cars/1,000 citizens) is higher than the average national rate (580). The use of the local public means of transport has to be improved.
Home-work traffic	High percentage (72%) of cars used for home-to-work traffic during rush hour (7.30 a.m. -8.30 a.m.). Most of these vehicles are occupied by only one person.
Freight transport	Freight transport is mainly presented by light trucking transport. Most of the times the load factor of these vehicles is lower than 50%. Moreover there is little use of rail and river transport for goods.

5.1.10 Combinations to develop strategies

5.1.10.1 Strengths – Threats combinations

- In taking advantage by local implementation experiences that have involved public actors - an unmatched best practise of Reggio Emilia - (S.1), in co-operation with academic and research stakeholders (S.2) and thanks to the local co-operation culture (S.3), the Province of Reggio Emilia should invest in a new Reggio Emilia cluster (unique in the Emilia-Romagna Region), specialized in the promotion of EV vehicles and a new kind of mobility, aiming to enable the uptake of zero emission. This objective might boost SMEs to mainly invest in the EV (i.e. production). This aim will be encouraged by the green/sustainable image of the city.
- The high provincial motorization rate (611 cars/1,000 citizens) might find a drop with an increasing of the EVs users, promoting car sharing facilities/public

transports or in affecting the use of new means of transport (i.e. bicycles). A part of the citizenship, few politicians in Reggio Emilia are favouring the promotion of a new kind of mobility (S.5) and are stimulating by car sharing / EVs offers (S.10) - i.e. a new initiative that offers an EV car with a monthly fee of 150 Euro (all inclusive). Other factors are the car public parking with charging possibilities (S.11) (i.e. in the rail station park) or the high quality bicycle parking facilities (S.9) and rents (associated to the high number of cycle lanes - Reggio Emilia is the first city in Italy with the high cycle lanes km / per habitant).

- Car vehicles movement in Reggio Emilia is concentrated in 7-9 a.m. and 5-7 p.m.; all people need to use vehicles in these rush time and, in the great part, a car counts only one person on board. New policies promoted by the local authorities and the potential of the emission reductions (people are concerned about the high level of the emissions in the Reggio Emilia's territory) probably will stimulate other kinds of behaviours more safe for the emissions. Moreover the green image of the city of Reggio Emilia will facilitate this changing (S.4).

5.1.10.2 Weakness – Opportunity combinations

- In order to guarantee a strong co-operation between private and public sector we could take advantage by the expertise of the R&D organisation (in Reggio for example REI - Reggio Emilia Innovation) and by the universities (as the University of Modena and Reggio Emilia) - O.1-2. The Province of Reggio Emilia and other public authorities have a quota of their balance involved in the REI and are linked to the University activities. These kinds of relations will give the opportunity to make easier the investments in the EV mobility sector. Moreover the absence of stronger lobbies against the EV vehicles will facilitate this changing.
- In the next years the demand of new kinds of vehicles - even cleaner and more environmental friendly - might increase. Due to the existing high level of penetration of EVs (O.4) and thanks to the territorial good availability (citizens, politicians, SMEs,...) to invest in this field (O.8), Reggio Emilia probably will become one of the first cities in Italy where to realize local best experiences in renewable energies
- Reggio Emilia has recently invested in the promotion of new policies in order to decrease the high level of the emissions (in particular PM10). The opportunities underlines might allow reaching this important result.
- The good attitude of Reggio Emilia (well explained above) might assure an increasing of the offers, from the number of public parking to the marketing for multi-modal mobility patterns.

5.1.11 Resume

Reggio Emilia has already a good level in terms of sustainable transport. The set targets will further improve the zero-emission idea and will help to overcome future inner-city traffic problems and will make the city centre worth living/visiting. The population's awareness has been raised and will be given a further boost.

Reggio Emilia has set clear and achieveable targets in terms of zero emission transport and has already shown in the past that they put emphasis on achieving the set targets.

5.2 Bolzano, Italy

5.2.1 Topography

Although most of Bolzano is located in a flat alluvial plain where three different rivers join, the major of whose is the Adige, some parts of the town are on slightly steep hillsides.

5.2.2 Modal Split

The last survey in 2009, based on a representative sample of the population, showed a very impressive modal share: 29% of trips by bicycle, 29.5% walking, 7.6% public transport, 6.7% motorbikes and 27.2 % private cars.

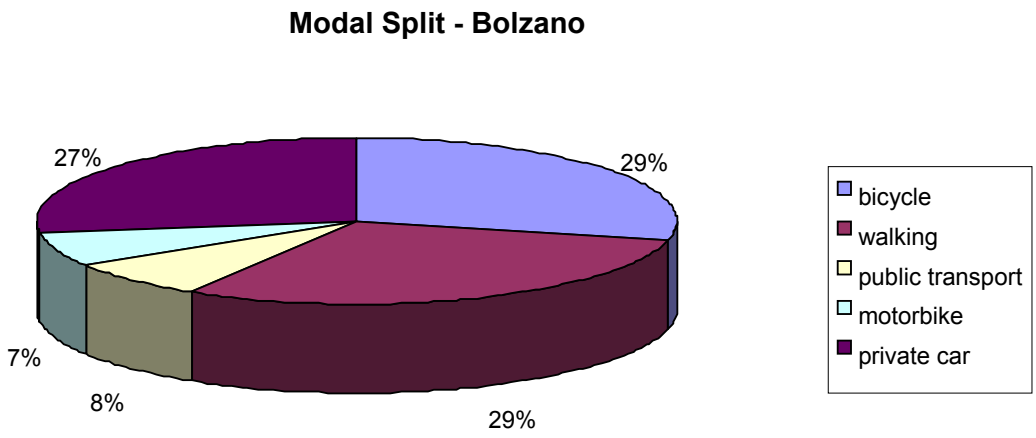


Figure 2: Modal Split - Bolzano

5.2.3 Existing public transport

The urban transport company SASA operates 21 urban bus lines covering all parts of the city. A capillary bus network is centred in Bolzano, rail lines running along the main valleys. Frequent regional train services and approximately 10 pairs of national and international long-distance trains stop at Bozano.

5.2.4 Existing urban transport development plans

An Urban Mobility Plan (PUM) has been published in 2009 and will be valid until 2020. Its main targets are:

- Requalification of public spaces in town,
- Enhance the safety on bike paths and extend the cycle path network,
- Introduce a new tramway to reduce commuter car traffic on the densely populated Bolzano-Caldaro route.
- Build an additional station on the rail line in order to serve newly developed urban areas in the South of the city
- Enhance the city's access roads and traffic management in order to reduce traffic.

5.2.5 Projects dealing with renewable energy production

The climate house agency (http://www.agenziacasaclima.it/) promotes energy-saving measures applied to buildings and awards energy efficiency certificates.

Each year the innovation office of the Province Südtirol/Alto Adige presents a call for the realisation of research and development projects focused on technology connected to sustainable resources and mobility.

Bolzano has also signed the Covenant of Majors. 90% of buses are propelled with natural gas and 20 cars belonging to the municipal fleet have been converted to bi-power.

5.2.6 Projects dealing with sustainable mobility

- Vianova (INTERREG III B - Alpine Space), a project promoting sustainable mobility using a cross-sectoral approach (land-use planning, mobility, health).
- Gemeinden Mobil and Schulen mobil (Mobiel municipalities and mobile schools, Interreg IV): approx. 45 municipalities of North and South Tyrol are consulting themselves over finding solutions to traffic problems. More information: www.gemeindenmobil.at. Similar is the aim of Schulen Mobil; schools adopt measures to reduce traffic on adjacent roads and win school kids over to sustainable mobility.
- Collective taxi (INTERREG III A),
- BYPAD - Bicycle Policy Auditing tool, to constantly improve local and regional cyclability. http://www.bypad.org
- OBIS - Optimising Bike Sharing in the EU, current bike sharing systems are reviewed and a manual of best practise is developed. www.obisproject.com
- Trendy Travel (Intelligent Energy Europe): Sustainable mobility is promoted by using an emotional approach. Details at www.trendy-travel.eu

5.2.7 Implementation directory

5.2.7.1 Main objective for the implementation

Since Bolzano is an Italian model-city for bicycle usage and the share of e-bikes is growing (approximately 2,000-3,000 people in town own one of these), with this project the use of pedelecs propelled with electricity from renewable energy will be promoted. The process of diffusing electric charging points around the town in a network pattern will encourage drivers of cars, mopeds and motorcycles (around 7,000 people) to use pedelecs instead, taking advantage of the extensive bicycle path network.

5.2.7.2 How many vehicles will be piloted?

15 pedelecs will be available for the municipality's employees.

5.2.7.3 How many renewable power units will be installed?

It is planned to introduce two new renewable power units. The first one will be located on the car park of a decentralised office of the municipality in order to facilitate the shifts with the main office located in town centre. The second one will be built on the city's main square - a major hub for multimodality (interchange with trains, buses and the rental bike system). Each of the power units will have a capacity of 1.92 kW peak and both will be connected to the grid, allowing the recharging of 5 vehicles simultaneously.

5.2.7.4 Users of the vehicles

The users of the vehicles will be on the one hand the employees of the municipality, on the other hand all the citizens using an electric bike.

5.2.7.5 How vehicles are embedded

The system will be owned by the municipality which will offer to the citizens a free "centred infrastructure" in town, and a decentred service will be dedicated to the municipality's employees.

5.2.7.6 Preconditions and activities

A press conference related to a prototype E-Move charging station took place in April 2009 in Bolzano.

5.2.7.7 Other measures

In Italy, when a photovoltaic implementation is carried out it is possible to apply for the "energy account" in order to recover the money for the investment relatively quickly (between 0.35 and 0.50€ per kWh of electricity produced).

5.2.8 SWOT Analysis

5.2.8.1 Strengths

Local cooperation culture – creating enterprise clusters	Each year the Province Innovation Sector of the Province of Bolzano publishes a call for innovation on clean energy and sustainable mobility aimed at promoting cooperation between research centres and local enterprises. In Italy, since 2005 a new code has been introduced ("D'Elise code"). It regulates calls for tenders related to the delivery of projects and works on public sector and facilitates the cooperation between enterprises.
Local experiences in small scale/decentral renewable energy production	SEL (the local energy supplier) and the Institute for Innovation and Technology of Bolzano "IIT Bolzano S.c.a.r.l." have created a consortium where the main activities are related to the following sectors: * renewable energy * environmental safety * environmental quality * climate protection
Local utility offers in renewable energy	SEL has got a 20% share in a project connected to the realisation of a hydrogen production station near Bolzano, using renewable resources (water and clean electricity). See www.h2-suedtirol.com for details. Electricity in the Province of Bolzano is mainly provided by hydroelectric power plants. SEL offers its customers "green energy", which carries the RECS certificates (Renewable Energy Certificates System). http://www.greenenergy.bz.it/
Green/sustainable city image (tourism and city marketing)	The "Südtirol" label marks quality products and services; several brands and initiatives promote green images: "BiciBolzano" bike rental system for tourists; Energy Tours; the "Bolzanoinbici" day (the 16th edition took place during the European Mobility Week on September 19, 2010); "Bimbimbici" day; facilitated bike rental system during sports (Fina Gran Prix divers 2010) and cultural events (Bolzano Danza 2010).
(Local) politicians / stakeholders / multipliers favouring e-mobility	Councilors Mr. Laimer and Mr. Widmann are open to issues of e-mobility and have recently appeared on the media over these issues. See video online at: http://www.provinz.bz.it/lpa/1536.asp?redas=yes&vid_guid=8f5b75d2-a09c-4048-8187-cfe432a710da

	Article: http://www.stol.it/Artikel/Wirtschaft/Nord-und-Suedtirol-setzen-auf-E-Mobilitaet
National importance of your city/region to have multiplier function (general/city size)	The climate house agency is promoting new policies and creating new standards related to energy efficiency in the building sector, low percentage of car use (27,2% share versus 29% of bike use). Furthermore, in Italy Bolzano and South Tyrol are considered as laboratories for the experimentation of innovation and technology.
PM10 and/or CO_2 targets in local transport policy	The Department for Noise and Air quality of the Province of Bolzano published a study in 2010 related to the PM10 pollution provoked by biomass boilers in South Tyrol. The PUM (Urban Mobility Plan) has been presented last year and is valid until 2020. In the current year an action plan for the reduction of CO_2 emissions for the municipality of Bolzano has been published.
Environmental zones (private and commercial transport)	In the Reduced Traffic Zones (ZTL) access is not allowed for private vehicles, with an exception for commercial ones (still excluding emission classes E0 and E1) for delivery during particular times of the day.
Potential for improving air quality significantly / Emission reduction potential	The PSS (Strategic Development Plan) issued by the municipality aims at enabling more liveability and quality of life on the streets. Again, the action plan for the reduction of CO_2 emissions for the municipality of Bolzano is respecting the IPPC EU directive and the Covenant of Mayors guidelines. Description of the PSS: http://www.re-set.it/sfide2007/cdrom/home/progetto/17.html Information about the European IPPC directive: http://ec.europa.eu/environment/air/pollutants/stationary/ippc/summary.htm Covenant of Mayors guidelines: http://www.eumayors.eu/mm/staging/library/seap_gl/docs/001_Complete_version.pdf
Number of public parking (multi-storey park decks and underground garages)	Each parking space overground is being substituted by another one underground. In total there are 12 public garages in Bolzano.

Offers and marketing for multi-modal mobility patterns	Over 70s and students travel for free with all public transport since the introduction of ABO+. Over 60s pay 100€ per year. There are several offers aimed at promoting public transport use for leisure; 7-day, 3-day and daily travelcards (Mobilcards / Museumobilcards / Bikepass Alto Adige) allow unlimited use of public transport, combined with access to museums or bike hire schemes in the major towns and the Venosta and Pusteria valleys. These offers have proven quite successful, which has however resulted in some capacity constraints, especially regarding bike transport during the summer months.
Municipal measures in mobility management	The person responsible for the mobility sector is also the local Mobility Manager. Since 1999, in cooperation with the urban police, in order to mitigate traffic jams at the entrances to primary and secondary schools the "School streets" have been in operation, which means that shortly before and shortly after school access by car to roads in proximity to schools is temporarily denied. Public planning participation is taking place on a sustainable mobility promotion campaign in the industrial area of Bolzano, and Mobility Managers training for private sector is being organised.

5.2.8.2 Weaknesses

Former experiences with e-mobility implementations	FRISBEE is a popular electric bicycle manufactured by the local company TC Mobility, one of the Italian market leaders in the segment of pedelecs since 1999. It is sold throughout Italy and in the rest of the EU; only in Bolzano around 2-3,000 pedelecs of this type are in circulation.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	In 2008 an acoustic web map of the province of Bolzano (excluding the city itself) and an action plan against noise pollution was published. No analysis is available for the city of Bolzano though. For details about the noise pollution map and the action plan: http://www.provinz.bz.it/umweltagentur/laerm/strassenverkehr.asp

Academic knowledge and research in automotive and engineering faculties	At the Free University of Bolzano there are two new courses: the BSc in Logistics and Production Engineering and the MSc in Innovation Engineering. The TIS innovation centre (EURAC) and the FIAT research centre of Trento are developing a telematic platform ("info mobility") for Bolzano, aimed at advising and diverting car drivers in case of traffic jams
High-quality bicycle parking facilities at central commuter stations	The bike parking facilities at the local train station are not in the correct proportion (lack of space) and not safeguarded against thefts. An agreement with RFI (the national rail infrastructure and station management company) has not been reached in order to install new bike racks in front of the train station, even though the municipality has been keen on building more facilities (money for this installation was available).
Residential areas with private property parking (for charging possibilities)	New national regulations and tariffs for the recharge of electric vehicles are being discussed, but they have not been approved yet.
Bicycle transport in public transport (incl. pedelec/e-bikes)	In order to carry a bike on a train an extra charge of approx. 4 Euro is applied. Urban buses cannot offer this service since Bolzano is a compact city (7 km diameter) and usually citizens do not use more than 1 bus per trip.
Car sharing offers and publicity of them	Bolzano Carsharing is one of the first services of this kind introduced in Italy. It has been conceived as a cooperative and has about 200 users. Sometimes the service cannot allocate all the demand since there are only three cars available. An extension of the service is foreseen for the future. Carsharing Homepage: www.carsharing.bz.it
Congestion charging	A few years ago there was a feasibility study, but it has not been followed through.

5.2.8.3 Opportunities

Automotive industry and SME in proximity	The following relevant companies exist in the area: IVECO (FIAT group) defense and cargo

- Does the municipality/region have an automotive cluster? - Is there R&D on e-mobility? - Do other SME exist, who construct (light) e-vehicles?	TC Mobility, company specialised in electric vehicles (FRISBEE electric bike). VELOTSCHI (manufacturer of e-bikes and e-scooters).
Experience of local industry in the globalised economy	Several companies are active on the global market: IVECO, TC Mobility, MEMC in Merano (the second largest city in the province of Bolzano) dealing with components for photovoltaic panels.
Percentage of imported vehicles	
Rural/suburban commuters (<70km)	Based on the 2001 census it is estimated that every day approx. 50,000 commuters (incl. school kids and students) enter the city.
Parking at companies (for charging vehicles at work)	None in Bolzano at the moment, a new installation of photovoltaic recharging for employees on the MEMC parking lot in Merano.
Exploiting local brands and positive images in bicycle industry	FRISBEE is very famous in Europe, VELOTSCHI a young local brand for e-mobility and REVEL an expensive brand for professional racing bicycles.
Responsible and reflexive reporting of media concerning discussion of transformation from combustion	A couple of articles dedicated to electric mobility have appeared, and press conference has taken place for the presentation of e-mobility charging stations and PV charging spots for e-vehicles. http://www.stol.it/Artikel/Wirtschaft/Nord-und-Suedtirol-setzen-auf-E-Mobilitaet

mobility to ZEM	
Adequate local/regional test field for E-vehicles	The “Safety park” (drivers training centre) would be ideal for the test of vehicles and training. The mountains nearby Bolzano are also suitable. FRISBEE is testing pedelecs already around the world (Patagonia, Alps…)
Topography of city/region (e.g. steepness)	Overall, Bolzano has not a steep topography, only a couple of adjacent villages and parts of the periphery are a bit steep.
Environmental zone in commitment with rural/suburban municipalities/policies	In Traffic-Limited Zones (ZTL) acccess is not allowed for vehicles, with an exception for commercial ones (excluding emission classes E0 and E1) for delivery at particular times. ZTLs only exist in the city centre. Some roads in town are closed to private cars of non-residents. In the rural surroundings, no particular regulations are in existence.
Alternative development paths, keeping internal combustion engines	Among citizens the alternatives to petrol and diesel engines are uncommon, but some vehicles of the local authorities and public buses are fuelled with natural gas. A grid of methane refuelling stations is being developed in the province (currently 8 in operation).

5.2.8.4 Threats

Adequate qualified mechantronic personnel for BEV repairs	Lack of qualified personnel (with the exception of FRISBEE employees).
Residential areas with private property parking (charging possibilities) (further region)	New national regulations and tariffs for the recharge of electric vehicles are being discussed, but have not been approved yet.

Penetration of (plug-in) hybrid cars/community	Currently not relevant

5.2.9 Combinations to develop strategies

5.2.9.1 Strengths – Threats combinations

- The lack of qualified personnel on BEV could be covered by the strong local culture of enterprise cooperation with the research sector (EURAC, TIS, FIAT research). In particular it will be possible in the next future to create local knowledge for the development of new batteries, being Bolzano and the surrounding towns very advanced on photovoltaic technology.
- The local suppliers of renewable energy are already playing an important role as investor on hydrogen mobility development. In future there might be chance for them to cooperate with small companies in order to create a real OEM in the automotive sector based on renewable energy.
- Some local politicians and entrepreneurs are very enthusiastic about e-mobility and are keen on creating the right culture of zero-impact mobility in Bolzano and in South Tyrol.
- Being Bolzano a good example for sustainable mobility in Italy, the local municipality will take the advantage of the new Italian EEG Regulatory Order ARG/elt 56/10 in order to develop innovative policies and incentives in order to support e-mobility in the public, private and housing sectors.
- The ZTL (limited traffic zone) introduced in Bolzano are a way to reduce traffic in the town centre to commercial delivery vehicles. These rules could be used to facilitate the introduction of new ecological logistic concepts (using plug-in vehicles for instance). In fact in 2004 and 2007 the municipality together with two private companies presented a couple of projects connected to the ra-tionalisation of goods logistics in Bolzano.

5.2.9.2 Weakness – Opportunity combinations

- Even though a real implementation on e-vehicles is new in Bolzano, the three main manufacturers (IVECO, FRISBEE and VELOTSCHI) could give an important contribution using their marketing strategies to promote products.
- The new graduates in Logistic and Innovation Engineering at the University of Bolzano could give a contribution to research and development for the local multinational companies (IVECO, MEMC and FRISBEE).
- Since every day around 50,000 people commute to Bolzano (of which a large portion, especially but not only students and school kids, arrive by train and bus), a requalification of the bicycle parking spaces at the train station will be very important. An agreement between the local municipality and the infrastructure manager RFI is needed.

- MEMC, the biggest company in the area (situated in Merano, 30km distance), is planning to convert its parking spaces to photovoltaic charging facilities for employees (more than 450 people). This is the first attempt to develop new strategies for the introduction of photovoltaic charging stations on parking spaces that could become a standard in residential areas too (taking advantage of the new Italian EEG Regulatory Order ARG/elt 56/10).
- The presence of a manufacturer of e-scooters (VELOTSCHI) can boost the sale of these vehicles and the municipality will benefit by an increment in the number of reduced-noise scooters.
- The FRISBEE, being very advanced on producing customised Pedelecs, could create a new concept of folding e-bikes, which can easily be carried on board of local trains and buses.
- The lack of a congestion charge initiative is based on the reduced surface of Bolzano. On the other hand a lot of steps have been made in order to create a fleet of natural-gas-propelled urban buses (the aim is to cover 100% of the vehicles in use) and a bi-power municipality car fleet.
- The Carsharing service in Bolzano is not yet recognised as a form of public transport. However, after reviewing the national street policies it could be possible to modify the order forbidding the entrance of Carsharing vehicles into the ZTL zone. In this way the popularity of the service and the number of new users would grow.

5.2.10 Resume

Bolzano, even being a small city shows a lot of activities that focus on enhancing sustainable mobility and innovative schemes which are observed internationally. It seems that it is possible to establish a political and societal positive environment for introducing e-mobility infrastructure and vehicles there. Because of the city's size concepts focusing on pedelecs and electric inner-city goods transport seem to start at the most promising point.

5.3 Upper Austria, Austria

5.3.1 Topography

Mountainous and flat areas; 15 districts; 444 municipalities; 1.4 mio inhabitants; 11,981.74 km²)

5.3.2 Modal Split

In Upper Austria, the majority of the population is using the private car (60%), 16% is walking, 13% is using public transportation and only 6% is going by bicycle. The rest (5%) is mixed and unknown. (The figures are based on the Upper Austrian Environmental Report 2006 giving an overview for the modal share of the year 2001, source: http://www.land-oberoesterreich.gv.at/files/publikationen/Uak_umweltbericht06_Ke.pdf)

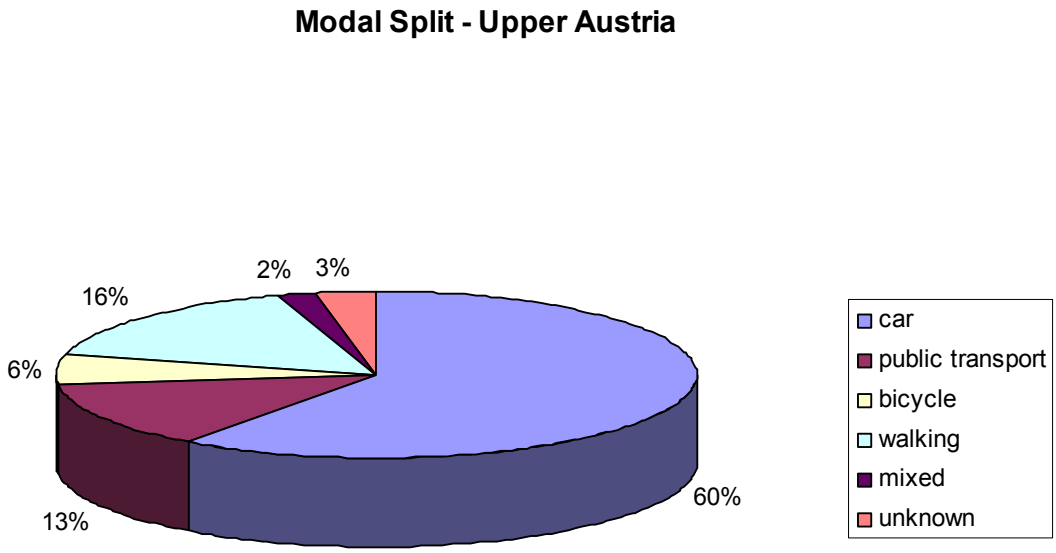


Figure 3: Modal Split – Upper Austria

5.3.3 Existing public transport

Railways, trams (Linz (3 lines), Gmunden (one line)), buses

5.3.4 Existing urban transport development plans

Portation concept available

(Source: http://www1.land-oberoesterreich.gv.at/ltgbeilagen/blgtexte/20081411a.pdf); stabilisation of CO_2-emissions

5.3.5 Projects dealing with renewable energy production

Energy Concept 21 (http://www.esv.or.at/fileadmin/redakteure/ESV/Info_und_Service/Energie_in_OOe/Energy_21.pdf);

Programme Energy-autonomy 2030 (http://www.esv.or.at/fileadmin/redakteure/ESV/Info_und_Service/Publikationen/Broschuere_Energiezukunft_2030_fin.pdf)

5.3.6 Projects dealing with sustainable mobility

- Bicycle strategy;
- Projects under the regional association of public transport ("Oberösterreichischer Verkehrsverbund"; for instance cheaper prices for youngsters being younger than 21 years);
- Mobility management project to promote sustainable transport modes in the Upper Austrian administration;
- Financial support schemes for e-bicycles and e-cars (2009, 2010, not planned for 2011)

5.3.7 Implementation directory

5.3.7.1 Main objective for the implementation

- Establishment of a network for e-mobility based on renewable energy sources;
- Public relation activities to inform people and stakeholders about e-mobility; organisation of "solar rallies"
- Pilot projects for solar based power station

5.3.7.2 How many vehicles will be piloted?

- None in the project REZIPE;
- For citizens there is a support scheme which offers higher grants if renewable electricity is used (2009, 2010);
- For the employees of the administration in 2010 a tender for e-bicycles will be organised

5.3.7.3 How many renewable Power Units will be installed?

- Plan to have one photovoltaic unit with 3 kWp under REZIPE in Attnang-Puchheim at a vocational school building in autumn 2010;
- In Linz a 200 m² installation of PV is planned placed as roof over the existing bicycle stand in front of the main railway station in Linz

5.3.7.4 Users of the vehicles

See answer above; pupils and teachers in Attnang-Puchheim and the general public in Linz (mainly commuters)

5.3.7.5 How are vehicles embedded?

Ownership

5.3.7.6 Preconditions

- Working groups including all local stakeholders have been established;
- Financial resources are prepared

5.3.7.7 Other measures

- Networks for e-mobility and e-bicycles will be established in the year 2010

5.3.8 SWOT Analysis

5.3.8.1 Strengths

Academic knowledge and research in automotive and engineering faculties	Expert knowledge in technical schools for battery systems (University of Applied Science Wels)
Local cooperation culture – creating enterprise clusters	Upper Austrian Automobile Cluster (http://www.automobilcluster.at/1233_DEU_HTML.php) including manufacturing companies specialised for e-cars
Local experiences in small scale/decentral renewable energy production	Organised in the Upper Austrian Renewable Energy Cluster (www.oec.at)
Local utility offers in renewable energy	Special tariffs for green electricity
Green/sustainable city image (tourism and city marketing)	Regions offer e-bicycles for special routes in Upper Austria; electricity companies are promoting special offers of e-scooters and e-bikes for their clients
(Local) politicians/stakeholders/multipliers favouring e-mobility	e-mobility is embedded as a main issue in the political program of the region (conservative and green party); networks to promote e-mobility are in preparation
National importance of your city/region to have multiplier function (general/city size)	Compared to other Austrian regions Upper Austria have the best conditions to develop technologies as the region with the highest proportion of industry
PM 10 and/or CO_2 targets in local transport policy	PM10 targets are EU-wide and national fixed – thresholds are exceeded; for CO_2 there is the goal to keep the emissions to

	a constant level in the Regional Transport Concept
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	Municipalities very often ban motorcycles in certain streets during night-time
Potential for improving air quality significantly / Emission reduction potential	NOx –level is determined by automobiles; in long term high emission reduction potential
Number of public parking (multi-storey park decks and underground garages)	Unknown for Upper Austria, but common and more than sufficient
Offers and marketing for multi-modal mobility patterns	Park&ride at railway and bus stations; bike&ride at railway and bus stations but demand for better quality (roofs, quality of bicycle stands)
Car sharing offers and publicity of them	Services of specialised companies who are active in most cities in Austria
Municipal measures in mobility management	Regional public transport (associations of municipalities); in bigger cities incentive programs for environmental friendly transport modes in the administration and for employees
Residential areas with private property parking (for charging possibilities)	Usual for house blocks (appartment buildings)

5.3.8.2 Weaknesses

Former experiences with e-mobility implementations	15 years ago the first e-car and e-bicycle was bought and tested in the administration of the region and in electricity companies; the technology could not be seen as success story
PM 10 and/or CO_2 targets in local transport policy	PM10 targets are EU-wide and national fixed – thresholds are exceeded; for CO_2 there is the goal to keep the emissions to a constant level in the Regional Transport Concept
Environmental zones (private and commercial transport)	Not foreseen in the national immission act for air pollutants; amendment is under preparation
Congestion charging	no

High quality bicycle parking facilities at central commuter stations	demand for better quality (roofs, quality of bicycle stands)
Bicycle transport in public transport (incl. pedelecs/e-bikes)	Possible in regional trains and certain other trains – extra tariff; in busses no services are offered

5.3.8.3 Opportunities

Automotive industry and SME in proximity Does the region have an automotive cluster? Is there R&D on e-mobility? Do other SME exist, who construct (light) e-vehicles?	Upper Austrian Automobile Cluster including R&D in e-mobility (http://www.automobilcluster.at/1233_DEU_HTML.php)
Existing OEM in car/automotive production in the region	BMW in Steyr (diesel motors)
Experience of local industry in the globalised economy	Export oriented region (industrialised centres but also rural areas with local economy)
Percentage of imported vehicles	Nearly 100%; but Upper Austria's companies are specialised to produce certain parts of the car construction (spoilers, car-frames, motors)
Attitudes towards imported BEVs and batteries	No problem, because those vehicles help to lower mineral oil consumption
Alternative development paths, keeping internal combustion engines	Indeed strong power by some companies like BMW; on the other hand all automobile companies are active in developing e-mobiles too
Rural/suburban commuters (<70km)	High proportion, because of concentration of labour in cities especially Linz (more employees than inhabitants!)
Residential areas with private property parking (charging possibilities) (further region)	Usual for house blocks.
Parking at companies (for charging vehicles at work)	Usual (number fixed by regional building legislation)

Exploiting local brands and positive images in bicycle industry	KTM in Mattighofen is the best known Austrian bicycle manufactory
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	In general positive reporting, but breakthrough in numbers are not seen for the next years
Adequate local/regional test field for e-vehicles	More and more local activities
Topography of city/region (e.g. steepness)	In the biggest cities of Linz and Wels there are no steep areas, but in other cities and municipalities very steep areas are very common

5.3.8.4 Threats

Percentage of imported vehicles	Nearly 100%; but Upper Austria's companies are specialised to produce certain parts of the car construction (spoilers, car-frames, motors)
Penetration of (plug-in) hybrid cars/ community	No statistic available; but very low penetration
Adequate qualified mechantronic personnel for BEV repairs	General problem of missing technical experts in the future. No specified fields – industry and universities are general active.
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	Is not the case at the moment
Environmental zone in commitment with rural/suburban municipalities/policies	Legal base is foreseen in the new national clean air act since July 2010. Potential unclear
Topography of city/region (e.g. steepness)	In the biggest cities of Linz and Wels there are no steep areas, but in other cities and municipalities very steep areas are very common

5.3.9 Combinations to develop strategies

5.3.9.1 Strengths – Threats combinations

- The main two electricity supplier companies "Energie AG" and "Linz AG" boost e-bicycles and e-scooters but are more restrictive in e-cars. High power for charging

cars can cause problems in the grids. Because of high power the grids can be too weak. Technical solution by smart grids. Secondly tariff problems: If the power used is too high you have to pay for higher power supply. A problem, if fast charging should apply.

- The Upper Austrian Automobile Cluster (developers and manufactories) together with other stakeholders could team up in a planned e-mobility network. This can boost the issue but the lobbies of gas and mineral oil energy sources will opposite when the number of e-cars sold rises. Therefore an agreement on environmental framework conditions for boosting e-mobility should be established as soon as possible.
- The regional Upper Austrian administration provides services and pilot projects to enable quick starts. Because of the economic crises such activities are insecure for the future.
- The last two years Upper Austria launched a financial support program for e-mobility. Because of economic crisis the activities can be stopped for the next time.
- A lot of small specialised companies are now on the market dealing with e-bicycles and e-scooters. There is a hope that the technologies are welcome although financial support schemes could be stopped in the future.
- E-bicycles are currently seen as an environmental alternative product also compared with normal bikes. For a long term sustainable success the prices and function of batteries should be acceptable for the buyers.
- A network for energy autonomous regions will be established in the next months. e-mobility has to be a major part of the technologies to be focused.

5.3.9.2 Weakness – Opportunity combinations

- There is no pressure from the environmental side linked to air quality or noise but energy autonomy is a chance to find a better bridge to the citizens.
- The infrastructure for charging facilities is increasing slow but for e-cars and e-scooters not a precondition. Therefore e-cars can penetrate more successful after a first boom for one-wheeler technologies.
- The currently limited offers regarding e-mobility technologies is a chance to increase interests of consumers (something special) and remaining time to develop local regional products & services. In addition the quality should be better without a super-hype.
- The lack of legal based incentives for e-mobility may be solved when regional platforms are launched and lobbying is possible.

5.3.10 Resume

With the public oriented vision of energy autonomy the region tries to establish a way towards zero emission mobility paths. There exists already a network of stakeholders involved in this process, which can be a basis for further strategies. Also the promotion of two wheeler electric mobility seems to fit the inhabitants' mobility needs in a hilly region

and in an agglomeration where public transport can be a backbone and ZEM mobility a good supplement for commuter concepts.

5.4 Klagenfurt, Austria

5.4.1 Topography

Klagenfurt is the capital of the federal state of Carinthia in Austria. With a population of over 90,000 it is the sixth largest city in the country.

Klagenfurt is located 446 metres above sea level and covers an area of 120.11 km^2 (46.37 sq mi). The city is situated at lake Wörthersee and on the Glan River. The city is surrounded by several forest-covered hills and mountains with heights of up to 1,000 m, e.g. Ulrichsberg. To the South is the Karawanken mountain range, which separates Carinthia from Slovenia and Italy.

5.4.2 Modal Split

The volume of traffic in Klagenfurt is high (motorisation level: 572 cars/100 inhabitants in 2007). The modal split for Carinthia is illustrated in Figure 4.

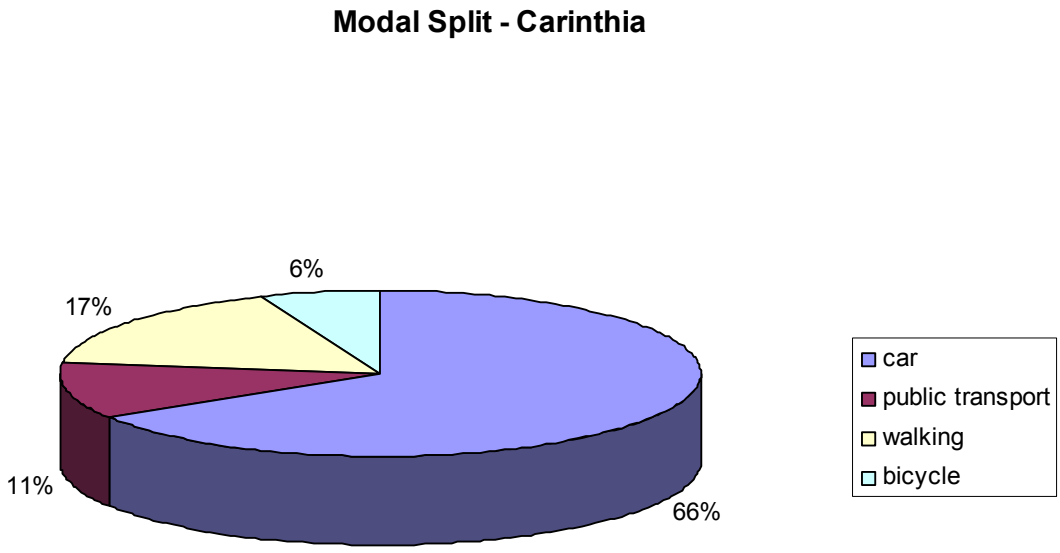


Figure 4: Modal Split - Carinthia

Users of private cars amount with 66% (car drivers 55% and co-drivers 11%). Far behind with 17% is walking, followed by public transport users (11%). The minority (only 6%) of the population are using the bicycle. Traffic jams are less frequent nowadays as in most cities of similar size.

5.4.3 Existing public transport

The Stadtwerke Klagenfurt is responsible for the public transport. Klagenfurt has an extensive bus network, there are 55 buses (28 bus lines) carrying some 21 million passengers per year and cover between three million kilometers. In use are enabling modern low floor buses, the convenient entry and exit. “Park and Ride” stations are available.

The Park & Ride offer was arranged in November 2006 by the Department of Environmental of the Municipality of Klagenfurt, together with the municipal utility in the context of the EU project KAPA GS (Klagenfurt's Anti PM 10 Action Programme with Graz and the South Tyrol).

Due to the high acceptance two reception parking spaces were created - one in Minimundus (PR West), another collective parking with shuttle service to the East (CineCity).

Shuttle buses run from Monday to Friday from 6.20 a.m. to 8.30 p.m. During peak period from 6.20 a.m. to 9 a.m., the bus departs every 20 minutes. On Saturdays you can go from 6.20 a.m. to 1 p.m. with the shuttle to downtown. During the week it should be noted that the last chance to ride to the city is at 6.50 p.m. - afterwards the shuttle buses only go from the city to the park and ride areas. Sundays and holidays there is no Park&Ride Services.

The shuttle and parking are free of charge. When entering the parking lot you get a ticket - this has to be shown to the shuttle driver - then you get an exit ticket for the parking lot. Parking without the use of the shuttle bus is not available.

5.4.4 Existing urban transport development plans

A new transportation concept for Klagenfurt is aiming at rethinking the population development, a stabilisation of CO_2 emissions and at an improvement of air quality was launched in 1996 (RETZKO and TOPP, Verkehrsentwicklungsplan Klagenfurt, 1996), but never agreed as a whole. Parts of this concept are implemented in the urban development plan (2000), traffic calming concepts in single districts (Waidmannsdorf2009, Mobility Plan for the Inner City 2010) , the new busline concept (2010) and the Air Quality Plan for Klagenfurt (since 2003 yearly updated).

5.4.5 Projects dealing with renewable energy production and use

EU-Life project CEMOBIL:

This project demonstrates that electrical mobility works in Klagenfurt, and thus an effective and sustainable improvement of environmental quality, especially of air pollutants, but also for noise it is cost effective, without having to restrict individual mobility seriously.

At the same time a valuable contribution to climate protection and achieving the Kyoto target is made by adding the needed electricity for the electric vehicles entirely from renewable energy sources.

A total of 64 electric vehicles (44 cars, 10 pedelecs, 10 scooters), an e-bus and a solar boat for the Lendkanal will be tested and procured. In addition the necessary infrastructure will be built. 50 electric charging stations will be built by the project land area in Carinthia Klagenfurt.

The project objective is to significantly reduce air pollutant and CO_2 emissions in the city center of Klagenfurt, by raising the share of electric cars at 10% of all listings. The aim is having by 2015 at least 1,500 electric vehicles on the roads of Klagenfurt.

5.4.6 Projects dealing with sustainable mobility

Advancement of environmentally compatible mobility; information for e-bicycles and e-cars, enlargement of the bicycle path, possibility for the public to test the “new” mobility.

5.4.7 Implementation directory

5.4.7.1 Main objectives of the implementation

- To establish a new way of multimodal transport
- Awareness raising of the population in terms of zero emission transport
- A change for a better environment

5.4.7.2 How many vehicles will be piloted?

5 passenger BEV will be implemented in Klagenfurt.

5.4.7.3 How many renewable Power Units will be installed?

Klagenfurt will set up 5 grid connected solar charging stations with 5kWp for each in the city area for the public zero emission vehicle scheme.

5.4.7.4 Users of the vehicles

Local test users - individulas, companies and institutions can test the vehicle for a certain period. The test period for individuals is 1 to 2 weeks, for companies it will be up to 2 months.

5.4.7.5 How will vehicles be embedded?

The vehicles will be available for short-term rental (hours/days) throughout the duration of the project REZIPE.

5.4.7.6 Preconditions

- Implementation and branding of the grid solar charging stations

- Branding of the test vehicles
- Press conference for the public

5.4.7.7 Other measures

Articles in local press (Klagenfurt Zeitung), website, actions during the mobility day 2010.

5.4.8 SWOT Analysis

5.4.8.1 Strengths

Former experiences with e-mobility implementations	Eurosolar Austria is since 20 years very active in Carinthia and converted conventionally propelled vehicles to e-vehicles (www.eurosolar.at), there also exist an informal collaboration with the Muncipality of Klagenfurt http://www.austriasolar.at
Academic knowledge and research in automotive and engineering faculties	Expert knowledge: Carinthia University of Applied Sciences – electrotechnic
Local experiences in small scale/decentral renewable energy production	A focus on usage of solar-energy, both thermal and power generation exists. In Klagenfurt a biomass power station with district heating exists; a second one is in preparation (http://www.biomasse-energie.at)
Local utility offers in renewable energy	Special tariffs for green electricity
(Local) politicians/stakeholders/multipliers favouring e-mobility	E-mobility is a main issue in the political program of the region; networks to promote e-mobility are still active; on the government side there are many activities and events coordinated by the project “Lebensland Kärnten” (http://www.lebensland.com/)
National importance of your city/region to have multiplier function (general/city size)	Carinthia has a very important function in this case because of the leadership in implementation of electromobility in Europe

PM 10 and/or CO_2 targets in local transport policy	PM 10 und NO_2 targets are still exceeded and there is a local air quality plan with a strong focus on traffic related measures in order to foster/push public transport. Those measures are also effective for CO_2 reduction
Environmental zones (private and commercial transport)	One traffic ban is implemented at one inner city trough road based on the national immission act for air pollutants; amendment for extensions for this environmental zone is under preparation. Burggasse/Neuer Platz. Only the public transport can pass this zone.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	Strategic noise cadastre are in preparation, noise barriers on busy streets and subsidies for noise protection windows exist
Potential for improving air quality significantly/emission reduction potential	NO_x level is determined by automobiles; in long term high emission reduction potential
Number of public parking (multi-storey park decks and underground garages)	Parkspaces Park & Ride: - WEST Villacher Straße – opposite to the Minimundus 250 - EAST Gärtnergasse (Cine City) 270 - Parkspaces Inner city 4,908 - Inside the ring: 3,888 - Along the ring: 1,020 - Outside of the ring: 1,553 - Underground garages Inner city: 3,891
Offers and marketing for multi-modal mobility patterns	Park&Ride at railway and bus stations; Park&Ride ➔ West and East Bike&Ride station in the city (public rental)

High quality bicycle parking facilities at central commuter stations	The Park&Ride facilities were established in November 2006 by the Environmental Protection Department of the City Council, together with the Klagenfurt city stations under the EU project KAPA GS (Klagenfurt's Anti PM 10 Action Programme with Graz and the South Tyrol). Demand for better quality
Municipal measures in mobility management	New busline concept for the local /urban buses with bus lanes was recently implemented, Call a Ride / “Anruf-Sammeltaxi” in preparation, renewal of the municipal bus fleet Regional public transport: S-Bahn in preparation, city bus Klagenfurt to Feldkirchen, Klagenfurt to Ferlach City bus ➔ because there are a lot of commuters who prefer this way of mobilty
Residential areas with private property parking (for charging possibilities)	The following measures are being considered for charging electric vehicles: Townhouses: charging via the standard socket in the associated garage (accounting with the counter) Outside: 20% of parking spaces be provided for recharging electric vehicles, with 2 chargers (= gas stations, a loading station has 4 sockets) on the project CEMOBIL could be realized. The first charging station should be installed simultaneously with the first 100 apartments. The most suitable location would be the visitors' area with free parking. This would thus be a public charging station. 20% of all parking spaces (262 spaces) will be prepared for the charging of

	electric vehicles (piping, etc. is to be scheduled).
EU-project	CEMOBIL (description see above) is approved within the LIFEplus programme, implementation starts on the 1st of September 2010 and further projects are in preparation

5.4.8.2 Weaknesses

Local cooperation culture – creating enterprise clusters	no
Local utility offers in renewable energy	Promotion of e-vehicles (has been stopped in the municipality – because no budget was decided for 2010, but on the regional government side there is a promotion for e-bikes and e-scooters)
Green/sustainable city image (tourism and city marketing)	Inexistent
Congestion charging	no
High quality bicycle parking facilities at central commuter stations	The Park&Ride facilities were established in November 2006 by the Environmental Protection Department of the City Council, together with the Klagenfurt city stations under the EU project KAPA GS (Klagenfurt's Anti PM 10 Action Programme with Graz and the South Tyrol). Demand for better quality
Bicycle transport in public transport (incl. pedelec/e-bikes)	Possible in regional trains and certain other trains – extra tariff; in urban busses no possibility exists to take the bike but in Rural/post buses there is a possibility to take the bike
Car sharing offers and publicity of them	Services of specialised companies who are active in most cities in Austria are existing, but not very popular in Klagenfurt Denzel Drive offers car sharing at the

	airport of Klagenfurt
Modal split	Is very low for public transport and bicycles High potential for increasing those transport modes by increasing the offers of public transport for bicycle transport and implementing environmental zone

5.4.8.3 Opportunities

Experience of local industry in the globalised economy	Many enterprises are selling world wide - internet access
Alternative development paths, keeping internal combustion engines	Indeed strong power by some companies like Mitsubishi, Reva and Th!nk; on the other hand all automobile companies are active in developing e-mobiles too
Residential areas with private property parking (charging possibilities) (further region)	In preparation ➔ gemeinnuetzige Wohnbaugesellschaft
Parking at companies (for charging vehicles at work)	In preparation, will be implemented by: • Alpen Adria Univerity • Carinthia University • Bella Flora Klagenfurt • All Merkur markets in Carinthia • All OEAMTC service points in Carinthia
Exploiting local brands and positive images in bicycle industry	KTM produced an Carinthian e-bike for the project Lebensland of the government of Carinthia, as a limited edition
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	At present positive reporting
Adequate local/regional test field for	Local activities are planned

e-vehicles	

5.4.8.4 Threats

Automotive industry and SME in proximity - Does the region have an automotive cluster? - Is there R&D on e-mobility? - Do other SME exist, who construct (light) e-vehicles?	Carinthia has no own automotive cluster R&D➔ Carinthia University of Applied Sciences and the Alpen-Adria University of Klagenfurt and www.k-ai.at SME ➔ only one manufactory for high speed e-boats and Eurosolar know-how for convertables , Constructors: Mazda Nusser(car) Feldkirchen, SCS-Consult (car) and Acquavat (boat) und Schmalzl (boat)
Existing OEM in car/automotive production in the region	Only sub-supplier for OEM's
Percentage of imported vehicles	Unknown
Penetration of (plug-in) hybrid cars/ community	Very low penetration (240 hybrid cars currently)
Attitudes towards imported BEVs and batteries	Not known
Adequate qualified mechantronic personnel for BEV repairs	Problem of missing technical experts in the future
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	Not at the moment
Environmental zone in commitment with rural/suburban municipalities/policies	Commitment is difficult, the local shop owners are against any restriction for private cars
Rural/suburban commuters (<70km)	Klagenfurt has a daily population of 160,000, that means 70,000 people come to Klagenfurt each day
Topography of city/region (e.g. steepness)	In the biggest cities of Carinthia (Klagenfurt and Villach) no steep areas in contrary to the surroundings (residential

	area of the commuters)

5.4.9 Combinations to develop strategies

5.4.9.1 Strengths – Threats combinations and Weakness – Opportunity combinations

S ▪ Eurosolar ▪ University of applied science ▪ High political commitment ▪ EU Projects ▪ Biomassplant	S-O ▪ Research cluster ▪ Carinthian research and University of applied science ▪ Lakeside Science Park and University of Klagenfurt	S-T ▪ No automotive cluster ▪ No own existing car-manufacturing in carinthia ▪ Education in regard to development of car manufacturing exist – but there no adequate place ➔ brain drain ▪ Setting up an own car manufacturing in carinthia could be a chance ▪ The company MAGNA is already existing - a small production plant ▪ Good preparatory work ➔ but the capitalisation of result takes place at the region
W ▪ Activities for better air quality control will be Improved ▪ Bad modal split	W-O ▪ With appart of the eu-projects ➔ improvement of the green city image ▪ Science knowledge	W-T ▪ Within EU projects a lot of input and development is going on ➔ but there is nothing

▪ No manufacture ▪ No green city image	should be more integrated into the projects ▪ Better cooperation between inter-national companies within the lakeside science and technology park should be more integrate	sustainability ▪ End of the project = End of the initiative ▪ Association Eurosolar are producing only niche products (convertables)➔ no further development

5.4.10 Resume

At present, the modal split shows a definite tendency for the use of private cars. In order to convince the inhabitants to purchase zero emission vehicles for their private use, the public awareness has to be raised. This will be done by implementing a green city image and also presenting zero emission vehicles to the public. The existing plans in Klagenfurt are very ambitious, but will have to be implemented on a broad level in order to be successful.

5.5 Ljubljana, Slovenia

5.5.1 Topography

Ljubljana is the capital city of Slovenia with 279,000 inhabitants, covering the area of 285 km^2. The city is located at an altitude of 298 metres along the rivers Sava and Ljubljanica. With a location in the Ljubljana Basin the city is circular shaped with 15 km diameter, flat ground and only a few moderate steep slopes.

5.5.2 Modal Split

There are approximately 1.2 mio trips made in Ljubljana a day by all means of transport. The share of public transport is between 10-13 %. The majority of public transport trips within the city is made by bus transport and a small part by train. The share of bicycle trips varies according to the season: Whilst in summer 15 % of all trips are made by bicycle, in winter the bicycle is used only by a few percent.

60 % of all trips in Ljubljana are made by motorised personal transport (cars 99 %, motorbikes around 1 %).

5.5.3 Existing public transport

City and suburban buses (centrally organized by public own LPP company), which already have electronic payment system based on contact smart card called Urbana. There are biofuel propulsion and hybrid busses in experimental phase. The system of unified payment and ticketing in city rail transport has also been implemented. In the city centre a project of public bicycles to rent (free or paid) is in the implementing phase (sources: www.ljubljana.si, www.lpp.si).

5.5.4 Existing urban transport development plans

There were few unsuccessful attempts of preparation sustainable urban transport plans in Ljubljana city. The transport plans are partly included in Ljubljana's Spatial Plan - the last was published in year 1986, but in the adoption phase is now the new spatial plan (2010-2027).

At the time Ljubljana has some transport development projects, but they are not united under coherent development plan. Among the others the main targets of sustainable city transport plans are:

- Extension of city bus covered area with implementation of new lines (partially implemented with success)
- An idea for the construction of city tram lines (the idea is now moved to far future because of lack of financial sources and spatial constraints)
- Improved level of intermodality in the city (P+R partly implemented, new areas for P+R planned within Civitas ELAN project, parking spaces for bicycles near the bus

stations, regional intermodality of city and suburban public transport services); raising the level of cycling in the city by promoting healthy way of life, public awareness of cycling, promoting road safety and enable bicycle rentals (the measures are included in Civitas ELAN project)

- Creating a corridor with more sustainable transport means on the main Ljubljana's radial road (Barjanska, Slovenska and Dunajska road) which represents very important part of Ljubljana's urban traffic. On this corridor above mentioned measures will be tested (new yellow lane dedicated to public transport only

5.5.5 Projects dealing with renewable energy production

Yes, there have been projects but more on a national level. For example the Eco Skald (Eco Found) offers co-financing of better insulation in houses, solar thermal power for water heating and solar photovoltaic systems. Currently the scheme for co-financing of electric vehicle is discussed in the parlament. The first decision to go with this further has already been decided.

Some minor attempts with bicycle renting have also been implemented, but with enough traction to measure the results.

A lot of promotion has been done for EVs and sustainable transportation. The four main events were ČEVELJ 1, 2, 3 from 2007-2009 and event Eco meet in 2010 (links on Elaphe NEWS www.elaphe.si)

5.5.6 Projects dealing with sustainable mobility

Yes, there were some successful examples of bicycle use and electric vehicle technology promotion The main project of sustainable Ljubljana city transport was Civitas Mobilis, START (freight transport only) and some other projects, but for now the project Civitas ELAN is the leading transport project in the city (http://www.civitas-initiative.org, http://www.civitasljubljana.si , http://www.start-project.org).

5.5.7 Implementation directory

5.5.7.1 Main objective of the implementation

Increasing the awareness regarding zero emission transport. In the long term: more green and sustainable transport and less pollution in the city.

5.5.7.2 How many vehicles will be piloted?

10 EVs

5.5.7.3 How many renewable Power Units will be installed?

One unit for renewable charging EVs

5.5.7.4 Users of the vehicles

Interest people/citizens, a strong promotion will be made during the project and also employees of high tech companies in the Technology park of Ljubljana (over 100 companies)

5.5.7.5 How will the vehicles be embedded?

A short time rental will be implemented. The vehicles will be rented for free on hour-to-hour base. Should there will be a need to extend the renting time, this will be considered as an alternative for a special case.

5.5.7.6 Preconditions

- Technology already promoted
- Agreement with director of the Technology park reached
- Test drives already in place once a week

5.5.7.7 Other measures

Yes, a necessary promotion and campaign will be made during the project in order to increase awareness of zero emission mobility.

5.5.8 SWOT Analysis

5.5.8.1 Strengths

Academic knowledge and research in automotive and engineering faculties	Academic knowledge and research in automotive and engineering faculties is on a very high level since company ELAPHE and some of the targeted users are near R&D. There is also a strong cooperation with University of Ljubljana on this topic
Green/sustainable city image (tourism and city marketing)	Ljubljana has an image of clean, green city, which refers especially for settlement structure or density of parks
National importance of your city/region to have multiplier function (general/city size)	Ljubljana is the capital of Slovenia with 279,000 inhabitants
Residential areas with private property parking (for charging possibilities)	Residential areas with parking are able to offer charging possibilities
Former experiences with E-mobility implementations	Some promotions and pilot implementations concerning E-mobility

	have been made from 2006 to today (e.g. testing and promotion of electric bicycles - EcoMeet http://www.elaphe.si/EcoMeetENG.pdf)
Number of public parking (multi-storey park decks and underground garages)	The number of public parking spaces is growing which brings new possibilities to offer charging stations
Potential for improving air quality significantly / Emission reduction potential	There is a large potential for improving air quality or emission reduction by different measures (environmental zones, congestion charging - Ljubljana has more than 100,000 daily commuters …),
Local co-operation culture – creating enterprise clusters	On a very high level, since it will be done at the Technology park in Ljubljana

5.5.8.2 Weaknesses

(Local) politicians/stakeholders/multipliers favouring E-mobility	For now, e-mobility is not a priority of local politicians, other measures are more important (road construction, construction of sport facilities, parking facilities) Some stakeholders (delivery and other companies) have shown positive attitude concerning e-mobility with implementing electric vehicles
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	Noise emission reduction measures are not implemented
Municipal measures in mobility management	Participation in some mobility projects, but a lot has to be done in order to improve a sustainable mobility and improve a share of public transport in modal split.
Local experiences in small scale/de-central renewable energy production	Experiences in small scale renewable energy production is more developed outside the city in rural area and it is also very limited energy production
Local utility offers in renewable energy	There is no local utility offer in renewable electric energy production, but there are

	some solar cells producers and researchers (opportunity for installation charging facilities in future). On the other hand, there are a lot of households with renewable solar thermal energy sources and efficient energy systems, such as excellent thermal insulation of houses, such as passive and low energy houses. Approximately one percent of the houses is using solar thermal power for water heating. This is mainly a consequence of the Eco fund activities and the fact that these technologies are also already economically beneficial to its owners.
Bicycle transport in public transport (incl. Pedelec/E-bikes)	Bicycle transport as a public transport is not developed yet. Bicycle public transport is in implementing phase. The public bikes implementation (for rent) is planned in the near future (short-term rental will be free).
Car sharing offers and publicity of them	There are no car sharing and publicity of them
High quality bicycle parking facilities at central commuter stations	There are no high quality bicycle parking facilities at central commuter stations
Offers and marketing for multi-modal mobility patterns	There is not a lot of offer and marketing for multi-modal mobility patterns (P+R has been partly implemented and some bike rentals are available)
PM 10 and/or CO_2 targets in local transport policy	There is no clear PM10 and/or CO_2 targets in local transport policy
Congestion charging	There is no congesting charging in Ljubljana
Environmental zones (private and commercial transport)	Environmental zones for transport are not established yet, but there is a large area reserved just for pedestrians in the city centre.

5.5.8.3 Opportunities

Exploiting local brands and positive images	There are many recognizable brands:

in bicycle industry	Rog, Elan bikes, Krpan bikes, Tomos motorbikes. Rog was a large bike manufacturer for former Yugoslavia region and also export, Elan bike was a high end bike manufacturer, Krpan bike is involved in post office bike production and Tomos is a large moped manufacturer. The revitalization of these brands is an opportunity also for electric mobility where light vehicles have huge potential due to technological reasons.
Environmental zone in commitment with rural/suburban municipalities/policies	Ljubljana has a big share of individual car traffic and congested roads and low share of public transport. Environmental zones could improve the situation significantly, but now there are only under discussion.
Penetration of (plug-in) hybrid cars/ community	Around 2% in new vehicle sales and it is still growing
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	Because of the existing efforts in this direction and good relations to the press
Topography of city/region (e.g. steepness)	Due to reasonable distances (Ljubljana is not a big city so travel distances in the city can be reached by bicycles) and slopes.
Rural/suburban commuters (<70km)	High amount of commuters every day (Ljubljana has more than 100,000 daily commuters)
Parking at companies (for charging vehicles at work)	High possibility of success. Employees and visitors could charge their vehicles at work.
Attitudes towards imported BEVs and batteries	Positive but slow market entrance.
Automotive industry and SME in proximity Does the municipality/region have an automotive cluster? Is there R&D on e-mobility? Do other SME exist, who construct (light) e-	Our municipality has an automotive cluster (Automotive Cluster of Slovenia, http://www.acs-giz.si/slo/domov.asp). There is also some R&D on e-mobility. Some companies developing EV outside

vehicles?	Ljubljana as well. DEVS, Andrej Pečjak and his tema, Stoja d.o.o., Piktronik, all the electric motor manufacturers like Domel, Iskra avtoelektrika, Hidria, Kolektor and others...
Residential areas with private property parking (charging possibilities) (further region)	Residential areas with private property parking are able to offer charging possibilities (also already predicted in national energy plan that has been prepared last year and will be approved soon.)
Adequate local/regional test field for E-vehicles	There are some test fields existing for vehicles mainly outside Ljubljana. These fields could be used for e-vehicle testing as well.
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	There are no lobbies against ZEM vehicles
Existing OEM in car/automotive production in the region	Very good opportunity, many existing in the region. These are mainly electric motor manufacturers like Iskra avtoelektrika, Kolektor and Hidra.

5.5.8.4 Threats

Percentage of imported vehicles	Approx. 95%
Adequate qualified mechantronic personnel for BEV repairs	Lack of qualified mechantronic personnel to be able to repair BEVs. But there are attempts to promote, inform and teach car repair expert about EV technologies which can also be an opportunity in the future
Alternative development paths, keeping internal combustion engines	Serious threat due to existing industry developing diesel engines and other non-electric technologies
Experience of local industry in the globalised economy	Some successful niche projects, but local industry is not important in global economy
Responsible and reflexive reporting of media	Some media connected with automotive

concerning discussion of transformation from combustion mobility to ZEM	business may turn to negative if they recognize the E-Mobility as an alternative which threatens existing automotive business.

5.5.9 Combinations to develop strategies

5.5.9.1 Strengths – Threats combinations

- With good academic knowledge and research in the field of electric vehicles and zero emission mobility in Ljubljana (STRENGTH) we could improve lack of knowledge of mechantronic personnel (THREAT) with new educational programmes and trainings (support of local government and chamber of craft and small business). This can satisfy growing needs for repairing battery electric vehicles.
- The improved cooperation between small innovative companies developing EV and automotive cluster (STRENGTH) including support of government can strengthen the position of Slovenian companies on global market which is currently very weak (THREAT).

5.5.9.2 Weakness – Opportunity combinations

- For now, bicycle transport is not very common way of transport (WEAKNESS). But topography of Ljubljana is very appropriate for cycling. Travel distances are short and they can be easily reached by bicycles. Also, in Ljubljana there are no significant height differences and slopes. This is an opportunity to improve cycling (also PEDELEC) in the city and to combine bicycles and public transport.
- Number of public parking (multi-storey park decks and underground garages) is growing. New public parking can offer charging possibilities. New charging possibilities could motivate people to use electric cars, bicycles,…
- Environmental zones for transport (private and commercial transport) are not established yet in Ljubljana. This weakness can be turned into strength since Ljubljana has a big share of individual cars and congested roads and low share of public transport. Implementation of environmental zones as well as congestion charging could improve the situation significantly (OPPORTUNITY). There are political discussions about implementation of congestion charging but there have been no concrete decisions yet.
- For now, e-mobility is not a priority of local politicians; other measures are more important (WEAKNESS). There is not a lot of offer and marketing for multi-modal mobility patterns (WEAKNESS). Municipal measures in mobility management - not sufficient enough (WEAKNESS). All these weaknesses can be turned into strengths with promotion and testing EVs (during the REZIPE project) and present all advantages and benefits to politicians and stakeholders. Further implementation of EVs (public bicycles) will contribute to an improved zero emission mobility, sustainable transport and improved multimodality.

- At the time in the city centre there is no experience even in small scale renewable energy production which is in limited scale and for personal purposes more developed in the city outskirts and rural areas (WEAKNESS). With local knowledge in production of photovoltaic panels (STRENGTH) and with green city image of Ljubljana (STRENGTH) there are good possibilities to implement and test solar power facilities in Ljubljana that would provide energy for tested EV.
- Ljubljana can, as a capital city (STRENGHT), influence the development and use of sustainable electric mobility also to other parts of Slovenia. As the most developed country in Former Yugoslavia, Ljubljana and Slovenia can also bring those advanced technologies to other parts of former Yugoslavia. These activities will also need stronger support of the government and by showing such influential potential our policymakers could improve also their attitude towards sustainable electric transportation (WEAKNESS).
- By positive example of REZIPE pilot project for renewable energy and EVs, also the STRONG local manufacturers can become more active in the electric mobility technologies research, development and manufacturing. This exploits the OPPORTUNITIES also for revitalization of old companies and trademarks.

5.5.10 Resume

Ljubljana seems to be a cluster for electric engines and additional parts OEMs. It has a green city image and a flat topography which seems adequate to promote cycling and to enhance possibilities of pedelec/e-bike use. On the other hand the mobility culture of the city seems to be very car oriented even if there are visible attempts by EU projects to develop public transport and sustainable transport planning. A strategy in Lubljana could be to focus on the promotion and implementation of ZEV in specific surroundings like it is tried in the REZIPE implementation in the Techno Park. Here a special target group, i.e. innovation and technically oriented people can make experiences with ZEV. And by this they work as multipliers and customers in future.

5.6 West Transdanubian Region/Győr, Hungary

5.6.1 Topography

The West-Transdanubian region is almost everywhere flat. There are about 1,000,000 inhabitants. The region consists of 3 counties: Győr-Moson-Sopron, Vas and Zala. With about 130,000 inhabitants Győr is the largest city. The West-Transdanubian region is bordering on Slovakia, Austria, Slovenia and Croatia, thus the international transport is very essential. Both, the road and the rail network of Hungary are centralised on Budapest, so the region is burdened heavily by through traffic.

5.6.2 Modal Split

The majority of trips are made by car (around 60%), the rate of the public transport is 40%. In Hungary approximately 2% of all the trips are made by bicycle, as usual this number is higher in the summer season and lower in winter. In the modal split figure the small amount of bicycle users has been omitted. There are approximately 188,000 commuters in Győr.

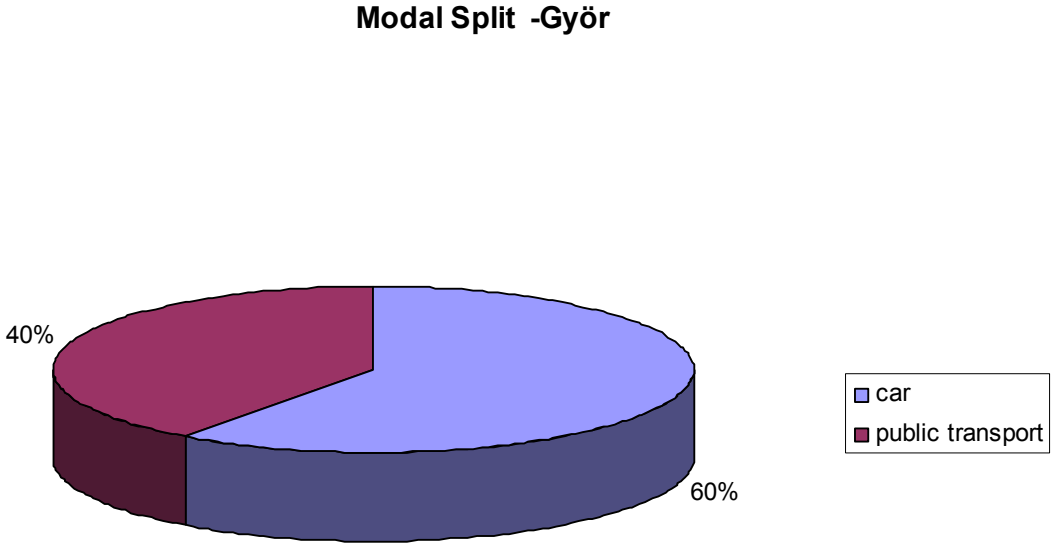


Figure 5: Modal Split - Györ

5.6.3 Existing public transport

The backbone of public transport is in the city, suburban and rural buses. In the West-Transdanubian region no trams or metros are in use. There are only buses in the cities and trains in the long-distance transports. In Győr, there is a very good bus network, the buses operate in intervals of 5-10 minutes.

5.6.4 Existing urban transport development plans

The common aim of the city and the contractor is to retain passengers and provide a higher level service. The city worked out a new public transport system and network in 2009, because the former network had been in operation for more than 20 years. The local transport company would like to implement a new and modern passenger information system showing the timetable and the remaining time to the next bus arrival. In every European Mobility Week, the local transport company tries a new method for the public transport. In the last years the company has launched night bus services, citybuses between the free parking places among the city and the city centre, another plan for the next year is the water bus plan, because Győr has a lot of rivers which are suitable for transport. Due to the fact that Győr has a lot of primary and secondary schools and also a university, the public transport for the educational institutes is very important. The city government aims at a reduction of traffic jams and air pollution in order to improve the cycling facilities and ensure more and safer cycle roads for the people, especially for the students. Parents forbid their children going to school by bicycle when the roads are not safety.

5.6.5 Projects dealing with renewable energy production

There is a project dealing with renewable energy - ESPAN. The aim of the ESPAN project is to create bilateral and interregional cooperation for Austrian and Hungarian regions on regional, communal and SME level, for the sustainable use and development of energy. Besides climate protection, attention is paid to put the extant legal and regional sources to use for the regional value creation. It is planned to involve local development bodies, research and economy institutes into the ESPAN project. This way the border region competence of regional development will be expanded and new interregional business places will be created. ESPAN will contribute to the creation or the maintenance of workplaces in sectors which can be directly or indirectly linked to the energy sector. Within the ESPAN project a strategy for the border region will be created with the aim of increasing the use of renewable energies in households, municipalities and companies. Another aim is the installment of a network of companies dealing with renewable energies. During the project public events and publications are planned in order to foster the awareness raising.

5.6.6 Projects dealing with sustainable mobility

Within the European Mobility Week ‘Car Free Days’ have been organised, and there are some public transport and bicycle tracks development projects. In the European Mobility Week the passengers do not have to pay for the public transport, and there are some events for the public, which are dealing with the environment safety in terms of transport. In every year the local transport company (Kisalföld Volán Zrt.) launches new pilot plans - like citybus, night buses and water buses. When the road network is extended or has to

be renovated, the city government is integrating new bicycle roads and modernises already existing ones.

5.6.7 Implementation directory

5.6.7.1 Main objective for the implementation

Main objective is to increase the awareness of zero emission transport and renewable energies usage. Aim is to draw the people and the leaders' attention to the importance of eco-transport. In Hungary people do know little about zero emission transport and the possibilities for the use of renewable energies in transport.

5.6.7.2 How many vehicles will be piloted?

3 BEVs

5.6.7.3 How many renewable Power Units will be installed?

One portable pedelec charging station with 2 charging spots and 3 kWh power

5.6.7.4 Users of the vehicles

The vehicles will be presented in a workshop, so the users of vehicles will be the employees of the external partner as well as interested people.

5.6.7.5 How are vehicles embedded?

The vehicles will be rented and presented to the public in a one day workshop. The external partner will present the operation of the vehicles in the workshop. The public event will show new and important environmental friendly technologies to the public.

5.6.7.6 Other measures

The project will be promoted during the whole project period in order to increase the awareness of zero emission mobility.

5.6.8 SWOT Analysis

5.6.8.1 Strengths

Academic knowledge and research in automotive and engineering faculties	Technological and engineering education is very important in the region. Secondary education and universities are well developped.
	Research and development institutions are focused on automotive – e.g. AutoPolis
Local cooperation culture – creating enterprise clusters	Presence of a vehicle cluster in the region, which deal with e-cars as well.

	Well-developped automotive sector
Local experiences in small scale/decentral renewable energy production	No experiences
National importance of your city/region to have multiplier function (general/city size)	Győr is the 6th biggest city in Hungary, and the region has 5 other medium sized cities.
PM 10 and/or CO2 targets in local transport policy	The current CO_2 emission in the region is lower then the level in 1990. According to the Kyoto protocoll the basis year is 1990. In Hungary, before 1990 in the socialism were lot of industrial companies (so we evolve lot of CO_2). After the system change in the end of 1989, Hungary gradually reduced the heavy industry, and thus the CO_2 emission is reduced. The PM10 is almost always within the limit value.
Number of public parking (multi-storey park decks and underground garages)	In the region there are enough parking places, and Győr has public garage able to offer charging possibilities.
Offers and marketing for multi-modal mobility patterns	Győr has some initiative and there is an international project dealing with multimodal transport in South-East Europe. The name of the project is WATERMODE, and the main objective is to connect the ports to the land not only with public roads, but also with water roads. Near to Győr there is a port in Gönyű, which can be suitable to induce the public roads. The project homepage is www.watermode.eu
High quality bicycle parking facilities at central commuter stations	Bicycling culture in the region, more and more number of bicycle paths are built and there are lot of bicycle parking facilities as well.1 In the city center there are a lot of bicycle parking facilities, for example near to the bus and train station.

[1] Bicycle road development plan of Győr: http://www.gyor.hu/adatok/tomoritett_halozati_ml_0706.pdf

Further macro-level strengths	Regional Operative Program Strategy is focused on green and renewable, sustainable elements2. The aim of Regional Operative Program is to increase the competitiveness of the Hungarian companies. This support derives from the EU and has a horizontal level, the sustainable development level. Non-existence of fossil energy resources, therefore not 'traditional' support for such resources. Proximity of Austria and Slovenia as good examples for green energy.

5.6.8.2 Weaknesses

Former experiences with e-mobility implementations	No former experiences with e-mobility
Local utility offers in renewable energy	There are no local offers in renewable energy. The sales and integration of produced renewable energy is not regulated.
Green/sustainable city image (tourism and city marketing)	Green policy is not in practice – e.g. environmental zones, support of green technology products. The ratio of renewable energy in production, usage, consumption is far below the international standard3. Before the EU accession, there has not been much regulation for the renewable energies and the environment protection. These questions have become important after the accession, so Hungary has a lack of experience. Nowadays the environmental protection and the sustainable development are becoming more and more important because of the

[2] Hungarian ROP, with sustainable development focus: http://www.nfu.hu/rop_ertekelesek

[3] Hungary and the renewable energies: http://www.energiaklub.hu/dl/sajtoreggeli/EK_sajto_hatter_%20megujulok.pdf

	rules of the EU.
(Local) politicians/stakeholders/multipliers favouring e-mobility	Not really, we are before election, and we have other problems with financial and economic crisis.
	Green technology companies are not present in the region. Providers of education are not well informed and updated about the green technology opportunities.
Environmental zones (private and commercial transport)	No environmental zones. No environmental parking for commercial transport.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	No nightly ban
Congestion charging	No congestion charging
Bicycle transport in public transport (incl. pedelec/e-bikes)	No bicycles roll on-roll off with trams
Car sharing offers and publicity of them	Low penetration of car sharing
Municipal measures in mobility management	None
Further social weaknesses	Inhabitants are not well-informed about the green technologies, their role, importance and subsidy opportunities.

5.6.8.3 Opportunities

Automotive industry and SME in proximity - Does the municipality/region have an automotive cluster? - Is there R&D on e-Mobility? Do other SME exist, who construct (light)e-vehicles?	There is a Vehicle Cluster in the region and Hungary has some green technology manufacturer, and new ones can come to the region. There are places in the industrial parks for new companies and from the University continously come good professionals.
Experience of local industry in the globalised economy	The presence of Audi in Győr and GM in Szentgotthárd brings big experiences in

	automotive industry.
Alternative development paths, keeping internal combustion engines	Initiatives in the region, e.g. Széchenyi Race, with zero emission vehicles4.
Rural/suburban commuters (<70km)	High amount of commuters (with limited trip distances and charge while you sleep possibility).
Parking at companies (for charging vehicles at work)	High amount of private company parking usable for charge at work.
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	Good relationship with the local media.
Adequate local/regional test field for e-vehicles	There are some places where the vehicles could be tested.
Topography of city/region (e.g. steepness)	The most part of the region is flat ground.
Other opportunities	Synergetic effect on renewable energy production could be achieved via combination of existing thermal, biomass energy usage with solar energy for automotives – e.g. Green Region. In the region, there are a lot of possible sources like wind, solar, biomass and thermal energy sources. In case the existing sources are deployed, the region could become a Green Region.

5.6.8.4 Threats

Existing OEM in car/automotive production in the region	No electric OEMs in the region.
Percentage of imported vehicles	High percentage of imported vehicles.
Penetration of (plug-in) hybrid cars/ community	No PHEV community.
Adequate qualified mechantronic personnel for BEV repairs	Lack of qualified mechatronic personnel, unable to attract relevant investors.

[4] www.szechenyifutam.hu

Environmental zone in commitment with rural/suburban municipalities/policies	Political disinterest.
Financial problems	Limited financial capacity of the inhabitants to invest into alternative resource.
Other threats	The economical and financial crisis may reduce the interest in environmental technologies. Austrian hegemony may endanger the Hungarian development. Due to unregulated market environment such players enter this segment, which decreases the quality perception of the entire category.

5.6.9 Combinations to develop strategies

5.6.9.1 Strengths – Threats combinations

The education sector, more precisely teachers and students, will be invited to the major dissemination events in order to promote green energy and increase the attractiveness of professions concerntrating on a healthy environment. The education sector is very important for the renewable energy and zero emission mobility spread, because the students can choose their career. Their choice can help the environment and increase the use and technologies of renewable energies and the zero emission mobility.

The high amount of workers laid off because of the automotive crisis is a potential target group to create a pool of highly skilled technicians who need new challenges and jobs.

Increasing awareness of available European and national funds can contribute to better acceptance of the policy makers and higher usage probability of the inhabitants

Media shall be integrated into the campaigns creating turnover with promoting clean mobility.

There are no electric OEMs in the region, but the technological and engineering education is very important and highly qualified in the region. This fact we can utilize, and the students can create OEMs in the region.

The high number of parking places is suitable for charging places and this can be useful for the form of PHEV community.

The ROP sources can help in the financing problems.

The Austrian and Slovenian good example can help to spread the zero emission mobility in Hungary, and through the REZIPE project the Austrian professionals can help to the Hungarian people.

The well-developed automotive sector can offset the high percentage of imported vehicles. If Audi or GM considered a production of electric cars in Hungary, the zero emission mobility could even spread better.

5.6.9.2 Weakness – Opportunity combinations

The lack of this industry can be a basis for attracting the best new producers, as a 'green-field' investment.

Equipment purchase support could significantly contribute to the acceleration of sales, such as financial support for setting up charging station for employers.

Local municipalities could be a first and spectacular starting point for usage of alternative vehicles.

Regulation best practice examples could be started from a municipality level, and disseminated to higher levels.

The region has not gained any experiences with e-mobility yet. The Audi and GM have great experiences in the car production. Nowadays the tendency seems that the big car producers started to deal with the environmental friendly technologies. Maybe in the near future Audi and GM will start some electric or hybrid car project.

With the help of the Vehicle Cluster and the other initiatives in Győr, like Széchenyi Race, the decision makers can be reached and results can be achieved in the environmental zones and in the congestion charging.

There are no local offers in renewable energy, but the region is suitable for producing renewable energy. The region is suitable for wind power stations, for solar and photovoltaik stations and for geothermal energy production.

5.6.10 Resume

In terms of zero emission transport, Hungary is in its infancy. Due to the lack of interest of policy makers, it will be difficult to raise the public awareness for such vehicles.

First of all a basis for zero emission transport has to be established; convince policy makers have to be convinced of the necessity.

Thus the target group in Hungary differs from the other countries – the educational sector will be addressed in order to gain a basis in skilled personnel.

SWOTs of additional cities / regions

5.7 Graz, Austria

5.7.1 Topography

Graz is the capital of the federal state of Styria one of the Southern regions in Austria, approximately 50 km north of the border to Slovenia. On the hills around Graz plenty wineries exist, who benefit a lot of the slightly Mediterranean climate. The basin shaped valley in which Graz is sitting results in a lack of rainfall and wind which directly shows it´s results in the amount of high volumes of fine dust in the air.

5.7.2 Modal Split

The last survey on the mobility behaviour of Graz´s inhabitants has been done in 2008. It is based on a representative sample of the population and showed the following modal split: Motorized individual transport is leading with 45.2%, followed by public transport (19.9%), walking (18.8%) and cycling (16.1%).

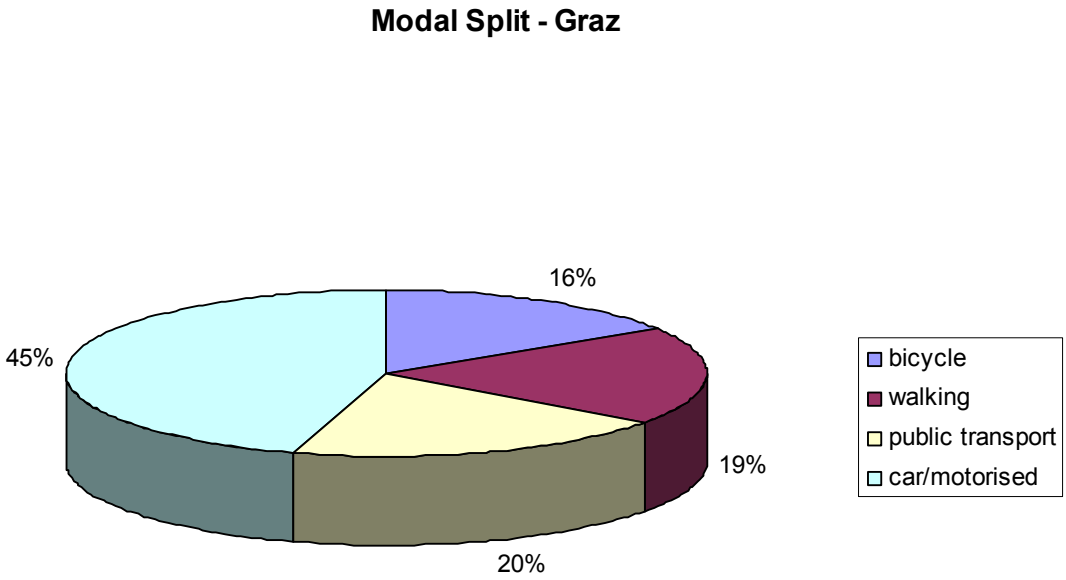


Figure 6: Modal Split - Graz

5.7.3 Existing public transport

With about 810 employees and a fleet of 69 trams and 136 buses the Municipal Transport Service in Graz (GVB) operates 8 tramlines and 27 bus- and night-bus-lines. Aside from the Municipal Transport Service there are several other transport companies who cover suburban, national and international transport needs such as the national railway operator

(OEBB) and the the Styrian Transport Association (Verkehrsverbund) whose members provide several urban and rural bus and train lines in Styria.

5.7.4 Existing urban transport development plans

The last publicly available mobility plan of the City of Graz, called GIVE[i] dates back to 1992 (first part with general measures). A second part has been added in 1994 which contains concrete measures. The first part (1992) mainly focuses on soft mobility measures and has the following aims:

- Provide good accessibility to the transport network
- Create a city of short ways
- Aim to offer balanced means of transport
- Foster social and ecological mobility
- Support / create a community policing

The additional part from 1994 specifies the measures to be taken and describes the 215 measures in detail. The measures can be categorised into the following fields:

- Non-motorized individual transport
- Public transport
- Motorized individual transport

5.7.5 Projects dealing with renewable energy production and sustainable mobility

Due to the special topographical situation of Graz, the city has already focussed on sustainable measures regarding transport since decades, e.g. bicycle parking facilities, serviceboxes for bicycles (with a air conditioning compressor, oil, standard-repair tools, puncture kits to attract more people to use their bikes. Although there was a positive change in the modal split, comparing the one from 1982 to the one from 2008 in Graz there is no possibility to allot the change in the modal split to concrete measures. 1982 the percentage of of bikes was at 8.3% compared to an increase to 14% in 2008.

But also in European projects the city has participated very actively. A good example is the CIVITAS Trendsetter project (Setting Trends for Sustainable Urban Mobility, 2002-2006) in which Graz has introduced a B100 fleet for public transport for all 130 buses.

5.7.6 Projects promoting renewable energy production and use (housing etc.)

Neither the city of Graz nor the government of Styria issued concrete directives for building and renovating apartment buildings regarding the production or use of reneweable energy. Despite of the fact that apartement buildings are the majority of all building projects, there are only a few cases where a tender officially includes a endorsement for a passiv-house or zero-energy-building[ii].

Although there are rather strict regulations for the construction of a building and speciallly for insulations[iii], installing and renewing heating devices which operate on renewable energies is funded by the Styrian government.[iv]

The following mentioned projects are very good examples for local implementations:

Gemini-House-Weiz[v]:

It is a worldwide unique and well rewarded house. The Latin word Gemini stands for twin which results from the double function of the house. The plus-energy-house not only makes a comfortable habitat it produces energy as well. It is a plus-energy house which turns around with the sun to optimize it´s energy-production.

Figure 7: Gemini-House Weiz

Energy Innovation Centre (W.E.I.Z.)[vi]:

It is the first Passiv-Office-Building in Middle-Europe and the highest timber frame construction in Austria. The use of thermal-energy, heat recovery and controlled air verntilation results in a low energy demand of 15 kW per year and m^2.

Figure 8: W.E.I.Z. Office-Building

Two worldwide recognized Research institutes of Joanneum research are based along some innovative companies in this first Building. The second Building (W.E.I.Z.II) was opened in May 2007 and the third, W.E.I.Z.III will open in 2010.

Plus-Housing-Estate:[vii]

In conjunction with the climate-project cc.alps[viii] was this estate built. It was the first time in Europe that a project of this size was realised, where was shown that all the needed energy (heating, hot water and alle the electric power) could be produzed by solar-energy, on and in the house. By gaining experience and clever adjusting the energymanagement there is already an anual energy overproduce of each house of 1,200 kWh.

Figure 9: Plus Housing-Estate

5.7.7 Projects promoting more sustainable mobility (e.g. cycling, walking, public transport promotion)

Over the last 10 years there have been a lot of different projects dealing with sustainable mobility.

European projects:

In addition to the CIVITAS Trendsetter project ix mentioned above, other projects have been organised. Some projects are: BIOSIRE x which aims to establish a shift towards bio-diesel and electric propulsion in tourist areas. CESLAxi, a project concentrating on cross-border implementations of environmentally friendly ultra-light vehicles in Slovenia and Austria were made.

CO2-Neutralpxii tries to implement the use of alternative propulsion technologies in the Alpine Region to reduce the consumption of external energy resources. Partners of Graz also participate in the »Go pedelec project«xiii in which pedelecs and recharging stations are introduced. Also information for communal decission carriers is provided about Pedelecs. Furthermore public roadshows to demonstrate the use of Pedelecs are done.

But also several other projects dealing with mobility management, cycling, walking, education or logistics have been organised and conducted.

A good example is the BYPADxiv project. A bike policy auditing tool, to screen the present bicycle policies in European cities and to enable the European Commission to implement new actions based on the assessment of existing policies has also been conducted in the city.

The »Trendy Travel project« (www.trendy-travel.eu) is to make sustainable transport more emotionally appealing, to affect a modal shift from the car to healthier, more ecofriendly transport modes. This will be achieved by utilizing emotional approaches like: Storytelling, rituals that provide structure, raising the image of cycling, pleasing the eye and children guide parents.

Projects organised by local stakeholders

Some local stakeholders like big companies are also actively supporting sustainable mobility in their companies. A good example is »Anton Paar GmbH« who puchased Pedelecs for their employees and also introduced a rewarding scheme for their employess coming to work by a sustainable transport mean.

There are some hotels offering their visitors segways to explore the city. A nearby recreation centre at a lake gives the possibility to rent segways, too. The municipality of Graz uses EV´s for their workers who clean the parks. The utility company of Graz offers their customers a half prize off e-bike to support the dissemination of Pedelecs.

Additional projects organised in the region:

- A private company operates pedal-electric rikshaws taxis in the inner city of Graz
- A utility providerxv offers public charging stations for electric vehicles at strategic points (e.g. hospital, shopping malls)

5.7.8 SWOT Analysis

5.7.8.1 Strengths

Automotive industry and SME in proximity Does the municipality/region have an automotive cluster? Is there R&D on e-mobility? Do other SME exist, who construct (light e-vehicles)	Presence of an Automotive Cluster and nearness to a manufacturing company (e.g Magna) with an ecar division. SMEs which were producing electric quads, are producing electric push carts. E.g. TCM International produces the e-funjet.
Academic knowledge and research in automotive and engineering faculties	Much private and university competencies in power train engineering, vehicle simulation and emission control.e.g. TU-Graz (Institute of automotive engeneering, Institute of thermodynamics...) FH Joanneum, company Virtuelles Fahrzeug
PM 10 and CO_2 targets in local transport policy	Pressure from the regional bad air quality, leading to exceeding the thresholds for PM10
(local) politicians/stakeholders/multipliers favoring e-mobility	Local political leaders (top ranked) infavour of e-mobility.
Bicycle transport in public transport allowed	Bicycle (e.g .pedelec) roll on roll of possibility with the S-Bahn.
High quality bicycle parking facilities at central commuter stations	Ongoing attempts in the city to improve the parking facilities for cycles; e.g. at the central station of Graz an indoor and security controlled parking station for bicycles is available. Although lacks regarding the amount of available parking spaces (too many cycles).
Residential areas with private property parking (charging possibilities)	Private companies offer services (e.g. charging stations) but we are not aware of plans of the energy provider to install such facilities in residental areas – they plan to install many but till now no project is available.
Experience in small scale/decentral	Residental and private houses are funded

renewable energy production	if they install decentralised energy production sites. Research on the technical university of Graz is done on this topic.xvi
Experience of local industry in the globalised economy	Experience with off-shore production and engineering(outsourcing) , e.g. local biogas- and electricityproduction and the feed in the public net

5.7.8.2 Weaknesses

Existing OEM in car/automotive production in the region	No OEMs (cars) with brands present in the region.
National importance of your city/region to have multiplier function (general/city size)	City to small to be recognised as player in eMobility, rather medium sized follower.
Former experiences in e-mobility (negative?)	Bad experience from the first e-mobility hype ten years ago, because of the underdeveloped technology and the lack of acceptabllity of politicians and possible users
No environmental zones (private and commercial transport)	No environmental zones. There were lots of discussions about it, but no decisions made in this legislation period.
	No environmental parking for commercial transport.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	No nightly ban for mopeds
Congestion charging	No congestion charging. The so-called «City Maut«, there were lots of discussions about it but no decissions made in this legislation period.
Bicycle transport in public transport allowed	No bicycle roll on - roll off within urban transport, allowed in rural transport (rail) – but sometimes difficulties in usage. The rural transport (rail) is a train which connects Graz with its subburbs and close regional centres and is not an innercity public transport. There is no guarantee to take your bicycle with you during rush hours

	because of storage shortage.
Local utility offers in renewable energy	Low commitment of the biggest local utility with regards to expensive renewables.
Car sharing offers and publicity	Low penetration of car sharing., e.g Denzel Mobility provide round about 25 cars in Graz
Municipal measures in mobility management	Graz has a long tradition in mobility management and was the first city to operate a mobility centre. Since 20 years Graz offers cycling training on the streets for pupils and children. Graz also has a long tradition in campaigns and was the first city to install a city wide 30 km/h speed limit zone.
Penetration of (plug-in) hybrid cars/ community	No PHEV community, some hybrid taxis are available but they do not get extra attention.
vehicle imports	Distance to harbours increasing total shipment costs for vehicle imports.
Local cooperation culture – creating enterprise clusters	No history with cooperatives, collaboration and thus failure of the weakest eQuad producers. There is an existing Automotive Cluster (atc) with an ongoing and crowing cooperation .There are local innovation centres which try to merge them into cooprating clusters.
Topography of city/region (steepness requires high power)	Steep road stretches requiring high power per vehicle mass.

5.7.8.3 Opportunities

Rural/suburban commuters (<70km)	High amount of commuters (with limited trip distances and charge while you sleep possibility).
Residential areas with private property parking (charging possibilities) (commuters)	See above, potential as energy provider is interested to forster this topic.
Parking at companies (for charging vehicles at work)	High amount of private company parking usable for charge at work.
High number of public parking (multistory park decks and underground garages)	High amount of public garages able to offer charging possibilities.

Green/sustainable city image (tourism and city marketing)	Emobility provides the opportunity to promote a clean city image (for tourists)
Offers and marketing for multi-modal mobility patterns (evtl auch zu strengths)	Triggering new multi-modal and downsized mobility schemes consuming less urban space and reducing public expenses
Potential for improving air quality significantly	Reducing emissions nearby heavily polluted streets.
Exploiting local brands and positive images in bicycle industry	Exploiting customer affinity to local bicycle industry heroes such as Steiererbike, Vulkanbike, Bauers ebike.
Adequate local/regional test field for e-vehicles	Endurance testing in the nearby mountains.

5.7.8.4 Threats

Environmental zone in commitment with rural/suburban municipalities/policies	Discussion about environmental zone may create collateral damages regarding the disincentives for non zero emission vehicles.
Alternative development paths, keeping internal combustion engines	Policy, driven by industry/experts might shift to CNG and other low emission technologies
Emission reduction potential	Inefficency of the measure regarding lowering emissions may damage the initiative
Positive attitudes towards imported BEVs and batteries	Low quality vehicle imports (because of the prices for domestically build battery packs) may create a negative attitude towards BEVs.
Adequate qualified mechantronic personell for BEV repairs	Lack of qualified mechatronic personnel able to repair BEVs.
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	Automotive industry owning pedelec manufacturing facilities might be reluctant to position this as an alternative to the car, increasing the hurdle for the introduction of multi-purpose BEVs because they will be derived from ordinary cars.

Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	The media depends on the automotive business and may turn negative if the e-hype will damage existing businesses.

5.7.9 Combinations to develop strategies

5.7.9.1 Strengths – Threats combinations

- Discussion about environmental zones may show their ineffectiveness may advance the need for zero emission mobility.
- The existing industrial interest for additional engineering is supportive for medium term solutions like BEVs and EREVs.
- Inefficacy on behalf of the reduction of noise and PM when changing the power trains of cars only may benefit cycling and pedelec support.
- Existing mobility patterns of commuters are less demanding compared to the US thus the bad figures with regards to modal share might help to transit to zero emission mobility even with cheaper low range vehicles.
- The existing local engineering skills may be used to improve quality of the vehicles after having imported them. Due to the University and different colleges specialised in the automotive engeneering there is no lack of local engeneers, maybe just in small special segments.
- The high amount of workers laid off because of the automotive crisis is a potential to create a group of highly skilled technicians by retrainig them to specialists in the emobility segment.
- The producers of electric vehicles may be offered a pilot market and helped to head for larger vehicles.
- Media shall be integrated into the campaigns creating turnover with promoting clean mobility.

5.7.9.2 Weakness – Opportunity combinations

- The political support and the absence of OEMs may allow for a variety of tested vehicles and not only a test from one brand.
- Whilst the city is too small and late for an e-car beacon the near pedelec development industry may create an attractive tech Pedelec image. Also the planned battery pack production may attract Original Equipement Manufacturers (OEMs) to outsource the assembling of their BEVs near to the battery pack assembly profiting from the packaging competencies of the domestic assembling industry and modeling skills of the local RTD entities.
- The absence of incentives favouring zero emission vehicles is a chance to implement a step wise approach creating optimised regulations from the start.
- The existing biogas initiative may create awareness for the CO_2 footprint of individual mobility and serve as intermediary step, eventually using it for range

extenders. More may be expected from the local biofuel industry developing clean liquid biofuels for EREVs in the long term.

- The absence of fast cycling connections may not be held back for a long time since bicycle transport in trams is not an option because of the small trams (on most lines).
- There are hardly any local companies specialised in producing and selling BEVs or PHEVs. Due to this fact the focus of advertising and understanding should lie on the broad public.
- The bad experience from the first eHype may be used to avoid boot traps in the current initiative.The past experience was baised on underdeveloped imported technology and the lack of acceptabllity of politicians and population.
- The lacking local OEM brand may be created with Pedelecs instead of cars.
- The absence of collaboration and economic misfortune of BEV producers may facilitate the creation of a new more successful company.
- The distance to harbors increases the chance of local production slightly. It is common, due to high import costs of good developed equipement, to buy cheaper local products or even someone starts to produce local.

5.7.10 Resume

The city of Graz is very ambitious in terms of sustainable transport. The bicycle paths have been enhanced and continuously improved. The inner-city public transport is using B100 and the fleet is now going to be further improved by the implementation of zero-emission buses. Even polititians are very ambitious concerning the implementation of zero-emission vehicles, but the implementation and further development of facilities would need a legal boost as well. Unfortunately a change of laws is a complicated procedure in Austria and is thus one of the biggest obstacles for the broad public use of zero-emission vehicles.

5.8 Rhine-Main region, Germany

5.8.1 Topography

The whole Rhine-Main-Region has around 5 million inhabitants. It is a very polycentric settlement structure and is including parts of the federal states of Hessen, Bavaria and Rhineland-Palatinate. The Region is the second largest metropolitan area in Germany and is said to be the economic power-house of the whole country. Although the small size of the main city Frankfurt (650,000 inhabitants) its national and international importance tops its size many times over. The region is a global hub (traffic) and important financial place.

The topography of the region is mainly even as it is situated between Rhine and Main rivers. Only some parts (Taunus, Odenwald) are hilly due to be low mountain ranges.

5.8.2 Modal Split

In the following the modal shift for four different cities in the region are shown: Darmstadt, Frankfurt, Wiesbaden and Mainz.

Wiesbaden has the highest share of motorized individual transport whilst Mainz is leading with its share of non-motorized transport. The highest share in terms of public transport can be found in Frankfurt.

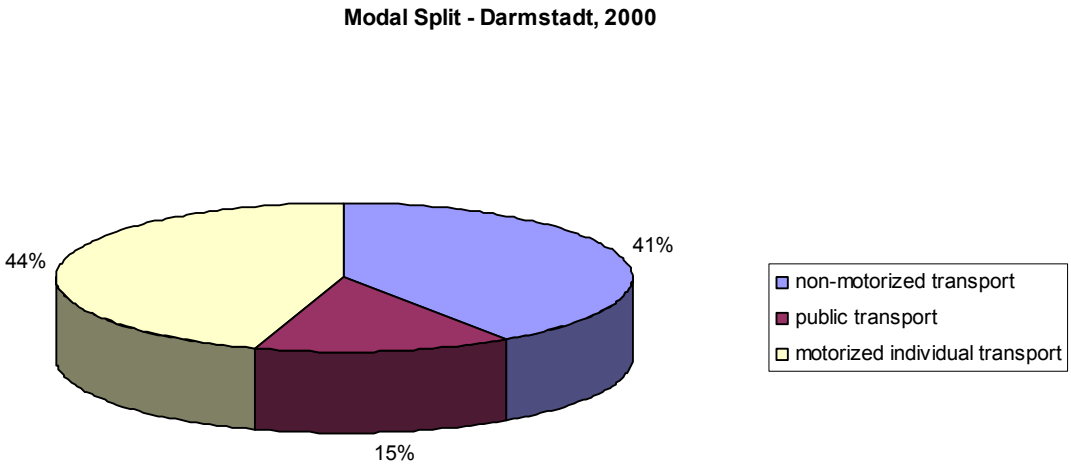


Figure 10: Modal Split – Darmstadt (year 2000)

In Darmstadt, the modal split shows a share of 15% for the use of public transport whilst non-motorized and motorized individual transport is almost equal with a share of a bit more than 40% each.

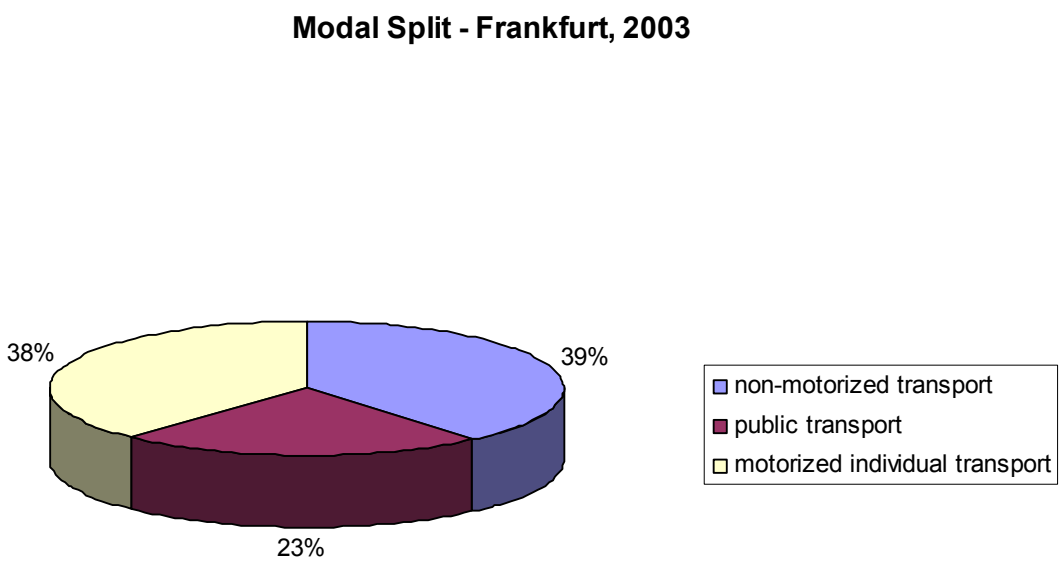


Figure 11: Modal Split – Frankfurt (year 2003)

The modal split for Frankfurt also shows an almost equal part for non-motorized and motorized individual transport, but the share of public transport (23%) is higher than in Darmstadt.

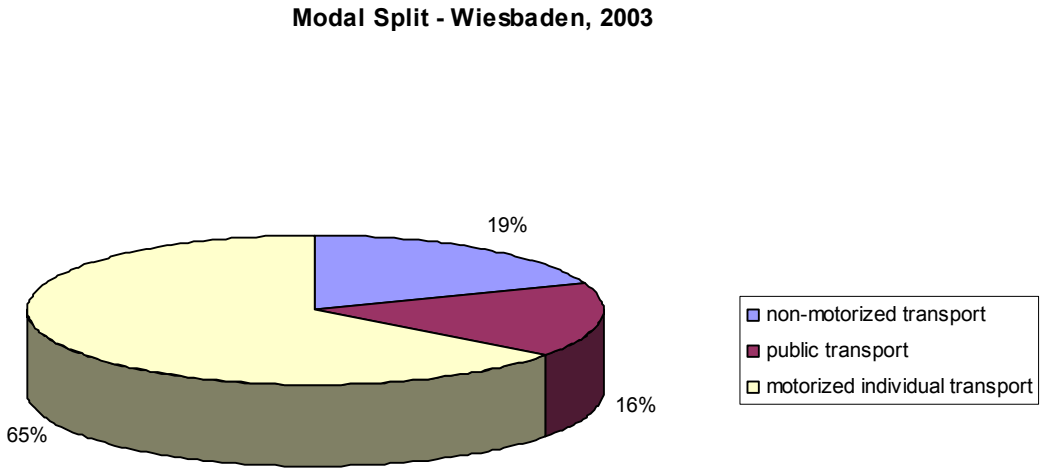


Figure 12: Modal Split – Wiesbaden (year 2003)

In Wiesbaden the modal split shows a big part of motorized individual transport, it amounts to 65% of the total, whilst public transport (16%) and non-motorized transport (19%) are almost equal.

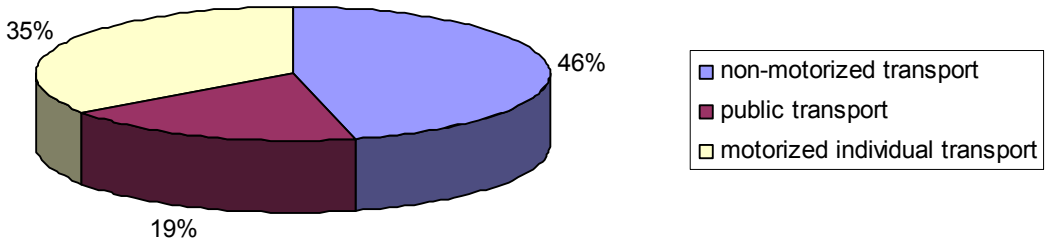


Figure 13: Modal Split – Mainz (year 2008)

The modal split of the city of Mainz is similar to the one of Frankfurt. In Mainz the part of non-motorized transport is – with about 46% - even higher than in Frankfurt. Motorized individual transport comes in Mainz a close second with 35%. On third place ranges public transport with a share of 19%.

5.8.3 Existing public transport

The whole region is supplied by a rapid transit system (S-Bahn) and regional trains operated by Deutsche Bahn, RMV and some local operators. The main cities have in addition tramways, bus systems and for Frankfurt also underground/city trains. All bigger cities are also connected with the long distance trains ICE and IC.

5.8.4 Existing urban transport development plans

To a part of the region exists the regional plan which includes a spatial and transport development plan (Regionaler FNP[xvii]). The bigger cities, like Frankfurt, Darmstadt and Wiesbaden have a transport development plan (see Table 2).

City	Frankfurt	Darmstadt	Mainz	Wiesbaden
Year	2004	2005	2006	2000
General aims	Enhancing the share of PT in urban-suburban traffic (tangential light rail lines, rapid transit system,)	Enhancing Darmstadt as regional metropolis Improving the accessibility of urban quarters	none	Compatibility of traffic with urban functions Environmental compatibility Social

City	Frankfurt	Darmstadt	Mainz	Wiesbaden
	Increasing the share of bicycle Reducing transport emissions	and aims Enhancing passenger and freight traffic Enhancing equal mobility chances for all parts of the population Improving the compatibility of traffic in urban structures Improving traffic safety Reducing the use of resources and emissions in the transport sector		Compatibility Functional Compatibility Traffic safety

Table 2: Overview on transport development plans in the Rhine-Main Region

5.8.5 SWOT Analysis

5.8.5.1 Strengths

Former experiences with e-mobility implementations	No significant evidence for former experiences in e-mobility implementations in the Rhine-Main-Region. If ever no area-wide integrated approaches for the whole region until the year 2009. Since then establishment of the model region project where several implementations are planned or already realised (e-cars for car sharing operator). Projects from the model region Rhine-Main includexviii: • E-car sharing opportunities (DB Car share) at all Stations of bigger cities (Frankfurt, Darmstadt, Offenbach, etc., partially realised for now) • Fully e-operated line of busses in Frankfurt

	(Line 103, partially realised for now) • E-car and e-transporter fleet for the Frankfurt International Airport (Fraport, partially realised for now) • Medium-sized delivery trucks (UPS) for the inner city (e.g. Frankfurt, partially realised for now) • Solar charging stations (Frankfurt, Offenbach,...) • Pedelecs as office-bikes for the city administration (i.a. Frankfurt, Offenbach) • Charging stations in multi-storey car parks (partially realised for now) • Hybrid bin-lorries (Offenbach, Darmstadt) • The concept of bike & business 2.0 • Hybrid-buses (e.g. in Darmstadt) • Hybrid-rail buses Over all, the detailed concepts and tasks of the model region include: Busses, light trucks for transport, utility vehicles, Pedelecs, e-cars for commercial fleets and car-sharing, hybrid-rail busses, e-scooters and e-bikes, connecting mobility (rail, bus...) including multi-modal mobility, and the establishment of e-infrastructure. Most of it is currently in progress in will be fully established until 2011.
Academic knowledge and research in automotive and engineering faculties	Due to the high concentration of automotive manufacturers and especially suppliers there is an automotive cluster, i.a. formed by the “Automotive Cluster Rhine Main Neckarxix”. Beside this there is a dense network of research facilities and faculties with a strong characteristic in mechanical, electrical and industrial engineering with business studies. This network includes majorly the Max-Planck-Association, several Fraunhofer-Institutes, the Technical University Darmstadt and the Polytechnics in Wiesbaden-Rüsselsheim and Darmstadt. They all foster strong contacts to the

	regional automotive industry.
Local experiences in small scale/decentral renewable energy production	Especially in Frankfurt there have been several measures to implement small scale and de-central renewable energy production sites in the city (esp. solar roofs, biomass). More important were large-scaled implementations of passive and low-energy-houses. The city fosters programmes like "Green Building Frankfurtxx", electricity-saving programmes and a climate protection mapxxi. There are several initiatives from housing enterprises in the region to encourage the set up of solar thermal and photovoltaic power for use in housing (ABG Frankfurt Holding, GeWobau Pfungstadt etc.xxii)
(Local) politicians/ stakeholders/ multipliers favouring e-mobility	Since 2009 exists the German-wide national development plan for e-mobility. This plan includes eight model regions for the implementation of e-mobility; one is the Rhine-Main-Region (see 3.2 #1). Moreover there is a Hessian initiative for the fostering of e-mobility, but out of this information it can not be clearly said that (local) politicians/stakeholders/multipliers are favouring E-mobility. It is clear, there is a tendency, but it would be hard to generalize this. As already said, there exists a large automotive cluster still aligned to the ICE-technology path (see 3.3 # 1).
National importance of your city/region to have multiplier function (general/city size)	Because of its national and international importance the Rhine-Main-Region it can be expected, that regional pioneering will have important multiplier functions for the whole country, especially because of the major hub function (traffic) of the Region.
PM 10 reduction target in local transport policy	According to the clean air plan of the Rhine-Main-Region from 2005 the PM10 and No2 targets were defined. In 2005 the limit value for PM 10 and No2 were exceeded in Frankfurt and Darmstadt. Therefore Hessen laid out an action plan for Frankfurt in 2008 where several measures for reduction were described.

Environmental zones (private and commercial transport)	Since October 2008 Frankfurt has an environmental zone (110km²). It foresees a stepwise stricter regime for PM 10 polluting vehicles (2010 and 2012). The regulations affect private and commercial transport. Currently it is discussed to expand the environmental zone to the whole inner region.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	The major noise problem in the Rhine-Main-Region is the airport. But beside that the city of Frankfurt pursues noise reduction plannings, but no clear and strict city-wide measurements. It contains more noise mapping, a complaints-hotline and pre-measurements in new city planning.
Potential for improving air quality significantly / Emission reduction potential	The air quaility is contigent on the high motorised traffic not the best, the main contribution to improve the quality was the establishment of the environmental zone. It is an open question high big the potential for the improvement of the air quality still is.
Number of public parking (multi-storey park decks and underground garages) able to offer charging possibilities	The main cities like Frankfurt, offer a lot of public parking manly in underground parking garages or multi-storey garages. Especially public parking in the inner city of Frankfurt is organized under one company and quite good networked within one parking guidance system. Some public car parks starting offering public EV charging stations.xxiii
Bicycle transport in public transport (incl. pedelec/e-bikes)	Bicycle transport in S-Bahn (whole Rhine-Main-Region) is always allowed and included in the ticket fare. In the underground and tram trains (Frankfurt) it is the same. There transport with bike is not allowed during peak hours in the morning and the late afternoon.
Car sharing offers and publicity of them	Since the early years of this decade there is a good network of car sharing options in the Rhine-Main-Region, especially splendidly constructed in Frankfurt. There are three operators "Stadtmobil Rhein-Main" and "book'n'drive" and DB CarSharing. The two latter are represented in the whole region. With "Stadtmobil ", operated by the

	regional public transport operator VGF, public transport und car sharing are combined. It includes cheaper car sharing fares for holders of monthly oder yearly passes. The usage is strongly growing, esp. in the cities.
Residential areas with private property parking (for charging possibilities)	In all bigger municipalities are existing high rise residential areas that offer res. Parking facilities (surface/subsurface) How many parking lots are existing there is not verifiable.

5.8.5.2 Weaknesses

Former experiences with e-mobility implementations	No significant evidence for former experiences in e-mobility implementations in the Rhine-Main-Region. If ever no area-wide integrated approaches for the whole region until the year 2009. Since then establishment of the model region project where several implementations are planned or already realised (e-cars for car sharing operator). Projects from the model region Rhine-Main includexxiv: • E-car sharing opportunities (DB Car share) at all Stations of bigger cities (Frankfurt, Darmstadt, Offenbach, etc., partially realised for now) • Fully e-operated line of busses in Frankfurt (Line 103, partially realised for now) • E-car and e-transporter fleet for the Frankfurt International Airport (Fraport, partially realised for now) • Medium-sized delivery trucks (UPS) for the inner city (e.g. Frankfurt, partially realised for now) • Solar charging stations (Frankfurt, Offenbach,...) • Pedelecs as office-bikes for the city administration (i.a. Frankfurt, Offenbach) • Charging stations in multi-storey car parks

	(partially realised for now) • Hybrid bin-lorries (Offenbach, Darmstadt) • The concept of bike & business 2.0 • Hybrid-buses (e.g. in Darmstadt) • Hybrid-rail buses Over all, the detailed concepts and tasks of the model region include: Busses, light trucks for transport, utility vehicles, Pedelecs, e-cars for commercial fleets and car-sharing, hybrid-rail busses, e-scooters and e-bikes, connecting mobility (rail, bus...) including multi-modal mobility, and the establishment of e-infrastructure. Most of it is currently in progress in will be fully established until 2011.
Local utility offers in renewable energy	The main local utilities of the region (Mainova, EVO, Entega) offer supply in renewable energy for electric power, so-called "Ökostrom/Eco-Power". It is only known that Mainova offers renewable energy produced out of regional energy (using two hydroelectricity stations in the river Main)[xxv].
Green/sustainable city image (tourism and city marketing)	Because of the high density of population, transport infrastructure (esp. Airport), economies and resulting commuter flows in the whole Rhine-Main-Region it is quite difficult to establish a green or sustainable city image. Since the 1980s the city of Frankfurt and its surrounding municipalities did a lot for getting ecological functions and local recreation into the urban areas. Today a network of green spaces exist (Greenbelt). Currently the city of Frankfurt prepares its application for the European green capital award. But it cannot be said that Frankfurt and its region carries a real sustainable image (like e.g. Freiburg would do).
(Local) politicians/ stakeholders/ multipliers favouring e-mobility	Since 2009 exists the German-wide national development plan for e-mobility. This plan includes eight model regions for the implementation of e-mobility; one is the Rhine-Main-Region (see 3.2 #1). Moreover there is a Hessian initiative for the

	fostering of e-mobility, but out of this information it can not be clearly said that (local) politicians/stakeholders/multipliers are favouring E-mobility. It is clear, there is a tendency, but it would be hard to generalize this. As already said, there exists a large automotive cluster still aligned to the ICE-technology path (see 3.3 # 1).
CO_2 targets in local transport policy	As founder member of the climate alliance the city of Frankfurt committed itself to reduce the climate relevant emissions of 50% until 2010 (basing on the year 1987). That this goal cannot be achieved was clear since 2000. Since then the overall goal is to reduce the CO_2 emissions of 10% every 5 years and by this to reduce them until 2030 of 50%.xxvi Unfortunately the climate protection concept worked out in 2008 did not include explicit measures in the transport sector. It focuses on housing, buildings and capacity development in industry and enterprises.xxvii Nevertheless the cycling strategy (15% bike share by 2012) focuses on the climate protection goals as well. Also there is a discussion in the magistrate that all electric public transport vehicles shall be run by renewable energy, earliest from 2011 on. Included are also objectives to make the city to a national test field for e-Mobility. Darmstadt has since 2002 a climate protection concept. The city wants to reduce 36% of its CO_2 emissions (baseline 1990) until 2010. The main focus lies on strengthening non motorised traffic, enhancing low emission vehicles (gas) and improving the public transport. Mainz developed in 2007 scenarios for climate protection goals in the transport sector. The climate scenario foresees a reduction of 12% of CO_2 emissions until 2015 (baseline 2007). Main measures focus mobility/travel demand management, optimisation of the municipal vehicle pool, energy efficient driving courses, promotion of cycling and enhancing the use of public transport

	for commuter trips. The city of Wiesbaden decided in 2007 on a climate protection plan. Aim is to reduce until 2020 20% of the energy consumption (baseline 1990). One action field is environmental friendly mobility. The plan does not give further details on measures.
Noise emission reduction measures (motorcycle/moped, night traffic etc.)	The major noise problem in the Rhine-Main-Region is the airport. But beside that the city of Frankfurt pursues noise reduction plannings, but no clear and strict city-wide measurements. It contains more noise mapping, a complaints-hotline and pre-measurements in new city planning.
Potential for improving air quality significantly / Emission reduction potential	The air quaility is contigent on the high motorised traffic not the best, the main contribution to improve the quality was the establishment of the environmental zone. It is an open question high big the potential for the improvement of the air quality still is.
Congestion charging	While the introduction of the congestion charging in London in 2003 there has been a discussion about congestion charging in Frankfurt, but until today it has never been introduced, especially because of missing capacities in public transport to compensate lower car traffic in the inner city. Other cities in the region have also no congestion charge.
Offers and marketing for multi-modal mobility patterns	The extremly high share of commuters in the Rhine-Main-Region, especially Frankfurt with daily around 300.000 commuters, requires a complex multi-modal system. There are several P+R facilities, a dense public transport network with good connections in the hinterland, several initiatives and marketing to encourage the combination of public transport and biking/walking and programmes to foster ZEM. Despite these efforts it is not to forget that still only 1/3 of all commuter trips to Frankfurt are done by public transport or non-motorised transport.
High quality bicycle parking	The transport plan of Frankfurt and the region laid

facilities at central commuter stations	out quality standards for bicycle parking at central public transport stops. They are only partially realised. Also the city of Frankfurt extended and refurbished bicycle parking at central points in the city. Nevertheless there are still too few adequate parking facilities and cycling is still clouded by a rising theft rate.xxviii The theft rate is lower in the suburban areas.
Municipal mobility management	No information to treat this topic.

5.8.5.3 Opportunities

Is there R&D on e-mobility? Do other SME exist, who construct (light) e-vehicles?	Beside this e.g. Opel follows a e-mobility program with the Opel Ampera series. Several SMEs to foster e-mobility and especially the implementation (eBikes, light-transportcars, etc.) in the region.
Existing OEM in car/automotive production in the region	Opel (recent project series Opel Ampera) is the leading local OEM. Several other OEMs have there european or german central (including research and design labs) in the Rhine-Main-Region like Fiat, Honda, Jaguar, Kia, Mazda, Mitsubishi, Hyundai and Seat.
Experience of local industry in the globalised economy	Mostly very high, especially Frankfut used to be a global city with dense worldwide networks in all sectors of industry and economy.
Local cooperation culture – creating enterprise clusters	It is quite difficult to rate this topic, but on the strength of several regional initiatives according the support of the automotive cluster and several related sectors there might be a positive assessment concerning a local or regional co-operation culture. The above mentioned initiatives are business-driven or top-down from the Hessian government (i.a. programmes from the Hessen Agenturxxix). In the bordercrossing self-conception of the Rhine-Main-Region non-governmental initiatives might engage in a better way.
Penetration of (plug-in) hybrid cars/ community	According to the Federal Motor Transport Authority (Kraftfahrtbundesamt KBA) since 2005 there is a rising share of plug-in/e-cars and hybrid cars in

	Germany (in matters of car registrations). In 2009 there have been 162 e-cars and 8374 hybrid cars newly registrated (as share of roundabout 3.8 million new registrations overall). According to the asset of all registrated cars in Germany of nearly 41 millions cars there is a share of 1588 e-cars and 28.862 hybrid cars in 2010 (in both cases far below 1 per mill). Despite everything the asset of e-cars and hybrid cars between 2009 and 2010 were strongly rising (+9.4 and +29.3 per cent). In Hesse there was a disproportional high increase in both (e-cars and hybrid-cars) around +14 and +29 per centxxx.
Adequate qualified mechantronic personnel for BEV repairs	Yes becaus of strong automotive cluster, especially in the field of SME there will be enough adequate qualified mechantronic personnel for the future. (Even more when it might come to a break down of Opel.)
Local/regional automotive industry lobbies against two-wheeler ZEM vehicles	At present lobbying against 2-wheelers is not perceptible.
Environmental zone in commitment with rural/suburban municipalities/policies	Especially in the summer of 2010 there are attempts (led by the Frankfurt local govenment) to expand the environmental zone over the whole Rhine-Main-Region. This would be a growth from 110 km² to 15,000 km² and in its form and size unique in Europe.
Rural/suburban commuters (<70km)	About 75% of all commuters come from a radius of 70 km to Frankfurt.
Parking at companies (for charging vehicles at work)	In Frankfurt a lot of the big companies offer parking, mostly underground parking.
Exploiting local brands and positive images in bicycle industry	Especially the local pedelec and full suspension bike manufacturer riese and müller from Darmstadt is marketing offensively its products. Also regional services like “Lautlos durch Rhein-Main” are introducing e-mobility in the field of 2-wheelers (e-bikes, scooters) but also e-cars from several manufacturers. The service offers testing an, hire and buying of e-vehicles as well as charging

	stations.xxxi
Responsible and reflexive reporting of media concerning discussion of transformation from combustion mobility to ZEM	Depends on the political orientation of the particular media. A lot of them adorn themself with reports about new and green transport possibilities, but often there is the view for the whole thing missing (the transformation towards ZEM). Some local and regional groups (e.g. ADFC, the Greens), but also the local daily press (e.g. the Frankfurter Rundschau) report responsible and reflexive about this transformation process and its possibilities.
Adequate local/regional test field for e-vehicles	For e-cars surely the test fields of the OEMs (e.g. the Opel test field in Rodgau) and field test with future users. For e-bikes the streets of the city. For light transporters the inner city (as it is done by UPS already xxxii).
Topography of city/region (e.g. steepness)	Quite low (Rhine-Main-Plain), except the hilly area of the Taunus and the Odenwald (low mountain ranges), which requires not especially high power per vehicle mass.

5.8.5.4 Threats

Automotive industry and SME in proximity Does the municipality/region have an automotive cluster?	A high concentration of automotive manufacturers and especially suppliers form an automotive cluster, especially with the OEM Opel. Beside this there is a dense network of research facilities and faculties (see strengths/weaknesses 1). R&D on e-mobility exists in several research facilities in the region.
Existing OEM in car/automotive production in the region	Opel (recent project series Opel Ampera) is the leading local OEM. Several other OEMs have there european or german central (including research and design labs) in the Rhine-Main-Region like Fiat, Honda, Jaguar, Kia, Mazda, Mitsubishi, Hyundai and Seat.
Percentage of imported vehicles	No information to treat this topic.
Attitudes towards imported BEVs and batteries	No information to treat this topic.
Alternative development paths,	Several approaches (OEM, SMEs, R&D) in Hybrid-

keeping internal combustion engines	cars. Questionable is their influence.
Residential areas with private property parking (charging possibilities) (further region)	In rural areas the parking on own plots is still common. The house owners or landlords might install charging facilities over the time. As the area is highly suburbanised there exists also private property parking in housing areas. It is not known how engaged private house owners will be to make installations.

5.8.6 Combinations to develop strategies

5.8.6.1 Strengths – Threats combinations

- Automotive industry and SME in proximity → Former experiences with e-mobility implementations
  The project of the model region Rhine-Main gives ideas, incentives and offers first experiences with e-mobility implementation for rethinking processes in the regional Rhine-Main automotive cluster. Based on this experiences and the potential market in the region a future development of the regional industry and the sustainability of mobility in Rhine-Main can be expected.
- Existing OEM in car/automotive production in the region → Academic knowledge and research in automotive and engineering faculties)
  The knowledge of the regional R&D divisions of car manufacturers can quite well cooperate with regional research institutions of universities, colleges and free research institutes. In addition the model region project can also stimulate this process in developing alternative paths for mobility.
- Residential areas with private property parking (charging possibilities) in further region→ Residential areas with private property parking (for charging possibilities)
  One aim could be to use the bandwagon effect to transfer the urban knowledge in transferring the experiences with residential parking into the more rural region. This process is especially supported by the high amount of commuters from the region to the bigger cities.

5.8.6.2 Weakness – Opportunity combinations

- Former experiences with e-mobility implementations → automotive industry and SME in proximity
  There is the chance to incorporate regional OEMs and manufacturers into the positive awareness of e-mobility in the model region. An example would be Opel's

e-car model Ampera. The amended regional awareness and willingness according e-mobility will also help marketing processes for e-cars.

- Local utility offers in renewable energy
  There is no appropriate opportunity in this analysis, but there is obviously a chance in another way. A higher local demand for renewable energy based on the increasing usage of ZEM forces local energy utilities and producers to provide (locally produced) energy out of renewable energy sources.
- Green/sustainable city image → Environmental zone in commitment with rural/suburban municipalities/policies; Exploiting local brands and positive images in bicycle industry; Responsible and reflexive reporting of media; Adequate local/regional test field for e-vehicles
  The inchoate image of a green/sustainable city finds a lot of opportunities to improve. So for example in an enlarged environmental zone (spill over effects in environmental awareness into the region), a sharper image of the region using the exploit of regional sustainable vehicle brands, a green image carried also by local media and the chance to test e-mobility in regional test fields/real areas like the inner cities.
- (Local) politicians/ stakeholders/ multipliers favouring e-mobility → Automotive industry and SME in proximity ; Adequate qualified mechantronic personnel for BEV repairs ; Environmental zone in commitment with rural/suburban municipalities/policies; Responsible and reflexive reporting of media
  According to problematic issues mentioned above there are also opportunities to handle the dense and complex network of interests of local stakeholders, politicians, multipliers and the general public. Most of it lays in a positive and honest reporting on advantages of ZEM that this influences the public awareness.
- CO2 targets in local transport policy → Environmental zone in commitment with rural/suburban municipalities/policies
  The weaknesses that the CO2 targets in local transport policy are very soft can e.g. be addressed by enlarging the environmental zone to the whole region and widen the zone to C02 efficient vehicles (not only PM10 reduction).
- Offers and marketing for multi-modal mobility patterns → Exploiting local brands and positive images in bicycle industry; Responsible and reflexive reporting of media concerning discussion of transformation; Adequate local/regional test field for e-vehicles;
  The problem especially that still a small share of inhabitants and commuters fulfil their mobility needs in a multimodal way can be addressed by a sharper image of the region which is one where sustainable brands are at home. Another contribution to enhance multimodal mobility behaviour can be transported by reflective reporting of the local media on this topic. The chance to have an

e-mobility test field quite in the vicinity can also contribute to make the benefit of e-mobility embedded in a multimodal mobility concept visible and experience able. The distinct topography of the region is further nearly perfect for ZEM and e-mobility as it does not require high power per vehicle mass to be moved.

- High quality bicycle parking facilities at central commuter stations → Environmental zone in commitment with rural/suburban municipalities/policies ; Adequate local/regional test field for e-vehicles
  The weakness of still insufficient high quality bicycle parking facilities can be addressed by the necessities rising from a higher diffusion of e-bike in the region. By the presence of more and more e-bikes, users, local planners and politicians as well as responsible in transport operators offices may see the demand for area wide high quality bicycle parking. Also the expansion of the environmental zone would increase the demand as more and more commuters would use the bike to get to the rapid transit lines in the region. Therefore they would also need high quality bicycle parking.

5.8.7 _Resume

Over all there seem to be reasonable model projects and attempts to promote and establish electric mobility in the Rhine Main Region. It seems also to be an advantage that the big companies and also OEMs of the region take steps in direction of electric mobility. On the other hand at this stage of development it is a big risk that it is more an e-hype than a real sustainable implementation of these projects. Many uncertainties and restricted effects already get visible when looking closer at the planned model implementations. All stakeholders should take care if the new system approach considers elements like how new offers can be embedded in existing traffic information and management systems, how they are marketed and understandable for the users and is the zero emission aspect of electric mobility really taken serious to be able to reach decarbonisation objectives.

6 LIST OF FIGURES

7 LIST OF TABLES

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[xvi].http://portal.tugraz.at/portal/page/portal/TU_Graz/Einrichtungen/Institute/Homepages/i3070/forschung/AG_Heizung(22.08.2010)

xvii http://www.planungsverband.de/index.phtml?mNavID=1.100&sNavID=1169.91&La=1

xviii Above all, see: http://www.offenbach.de/stadtwerke-offenbach-holding/holding/leitstelle-elektromobilitaet-der-modellregion-rhein-main/

xix See: http://www.automotive-cluster.org/

xx See: http://www.greenbuilding-frankfurt.de/c/start

xxi See: http://stadtplan.frankfurt.de/klimaschutz/html/de/index.html

xxii See: http://www.abg-fh.de/home/homepage.htm and http://www.gewobau-pfungstadt.de/index.php?id=70&tx_ttnews[tt_news]=95&tx_ttnews[backPid]=21&cHash=27fc659192

xxiii The first site in Frankfurt was the multi-storey car park »Börse« with a free charging possibility for the first six months. See: http://www.parkhausfrankfurt.de/76-0-Startseite.html

xxiv Above all, see: http://www.offenbach.de/stadtwerke-offenbach-holding/holding/leitstelle-elektromobilitaet-der-modellregion-rhein-main/

xxv See: http://www.entega.de/de/home/#/de/produkte-und-service/strom/ http://www.evo-ag.de/index.php?id=478 | http://www.mainova.de/privatkunden/21950.jsp

xxvi See: https://www.frankfurt.de/sixcms/media.php/738/klimaschutz_in_frankfurt.pdf

xxvii See: http://www.frankfurt.de/sixcms/media.php/738/IFEU_KSK_Frankfurt_Endbericht_Aug09_1.pdf and http://www.frankfurt.de/sixcms/media.php/738/Klimaschutz-Beschl%C3%BCsse-2009-08_bf.pdf

xxviii Polizeipräsidium Frankfurt am Main: Polizeiliche Kriminalstatistik 2008

xxix »The main goal of the Hessen Agentur, is to increase the confidence of the citizens, investors and attract tourists into the state of Hessen and raise the awareness of its' advantages locally as well as Internationally.« See: http://www.hessen-agentur.de/

xxx See: http://www.kba.de/cln_007/nn_191064/DE/Statistik/Fahrzeuge/Neuzulassungen/EmissionenKraftstoffe/n__emi__z__teil__2.html http://www.kba.de/cln_007/nn_269000/DE/Statistik/Fahrzeuge/Bestand/EmissionenKraftstoffe/2010__b__emi__eckdaten__prozent.html

xxxi See: http://www.en.r-m.de/company/r-m-story and http://www.lautlos-durch-rhein-main.de

xxxii See: http://www.fr-online.de/frankfurt_und_hessen/nachrichten/frankfurt/2426606_UPS-faehrt-ersten-Elektrotransporter.html