MODEL REGIONS OF ELECTRIC MOBILITY IN AUSTRIA

Experiences from six years of pioneering work

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TABLE OF CONTENTS

ANDRÄ RUPPRECHTER

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My goal is a liveable future for Austria. To achieve this, we need a transition to renewable energy and green mobility.

The transport sector remains nearly completely dependent on fossil energy sources and expensive oil imports. Therefore, a transition in the mobility sector is not only essential for our greenhouse gas balance, but also for our economic performance and energy self-reliance. Electric mobility, particularly when powered by electricity from renewable energy sources, can contribute considerably to reducing carbon dioxide emissions in this sector quickly and permanently. Eco-friendly mobility is essential for climate protection in traffic and transport, reduces pollutant and carbon dioxide emissions and reliance on oil, and contributes to conserving resources and improving our trade balance.

Austria has great potential for expanding the use of renewable energy and promoting climate-friendly electricity production to enable a nearly zero-emission and zero-pollutant mobility. By expanding electric mobility, we are gradually becoming independent of expensive fossil energy imports and increasing Austria's supply security.

Therefore, the Federal Ministry of Agriculture, Forestry, Environment and Water Management has been promoting electric mobility powered by renewable energy sources for many years, e.g. with the programme "model regions of electric mobility" of the Climate and Energy Fund and the klima**aktiv** mobil promotion programme, our climate protection initiative for the transport sector.

The "model regions of electric mobility" have tested many new mobility approaches in practice and developed structures and business models, thus gaining a host of valuable experiences that are important for developing electric mobility further. They have shown that electric mobility can be integrated into everyday life, that it works in a variety of different conditions, and has many advantages.

Electric mobility is also a central element of sustainable mobility concepts, particularly when combined with public transport.

This report provides a summary of the results of the practical tests in the model regions. It will be useful for supporting the further introduction of electric mobility in Austria, for making the transition in the energy and mobility sectors a reality, and for shaping a liveable future for Austria.

Andrä Rupprechter
Federal Minister of Agriculture, Forestry, Environment and Water Management

INGMAR HÖBARTH

Individual transport is in the midst of its most profound change in decades. Electric mobility plays a major part in this.

Electric vehicles are quiet and produce no emissions, making them a crucial part of reducing greenhouse gas emissions. Internationally, much is being invested in the expansion of this forward-looking technology and its integration into the current system – and Austria is committed to this same courageous path.

An important driver in establishing electric mobility on the Austrian market are the seven "model regions of electric mobility": 1,500 vehicles, 1,600 charging stations, €16.2 million in subsidies – that is the impressive result of the Climate and Energy Fund so far. The programme is centred on purchasing charging stations and electric vehicles, providing renewable energy, and developing new business and mobility models.

Our goal is to establish electric mobility on a broad basis and get as many people excited about it as possible. To this end, the model regions are testing and implementing different electric mobility systems. This approach brings us a step closer to our goal every day. The model regions pave the way for innovation and are respected for their accumulated competence, but they also have a multiplying function. They get large parts of the regional population involved, reducing scepticism towards new mobility concepts.

But much remains to be done. Clean technologies need clean electricity, which makes the consistent integration of renewable energies essential. It is already feasible technologically, economically and in terms of resources, but we have to create the right conditions. User acceptance plays an important part in this. There are many interesting and forward-looking business models for companies, ranging from customer retention strategies to electric car sharing solutions. At the same time, charging infrastructure requires intelligent planning to avoid millions in stranded investments.

The Climate and Energy Fund is meeting these challenges head on. The model regions have a pioneering role not just in Austria but internationally: The solutions developed and tested there have an effect beyond the region and inspire new ideas. We aim to continue to provide as much impetus as possible to ensure electric mobility becomes a widely used technology.

Ingmar Höbarth
CEO, Climate and Energy Fund

MODEL REGIONS OF ELECTRIC MOBILITY IN AUSTRIA

The Climate and Energy Fund has been promoting and supporting the development and spread of electric mobility in Austria since 2008 with numerous tools, including the "model regions of electric mobility" programme.

Over the past six years, seven model regions of electric mobility were launched in Austria in order to develop new mobility models and test the everyday usability of electric vehicles using renewable energy sources. The result of these efforts is a comprehensive body of technical, organisational and economic know-how. The lessons learned, particularly in the areas

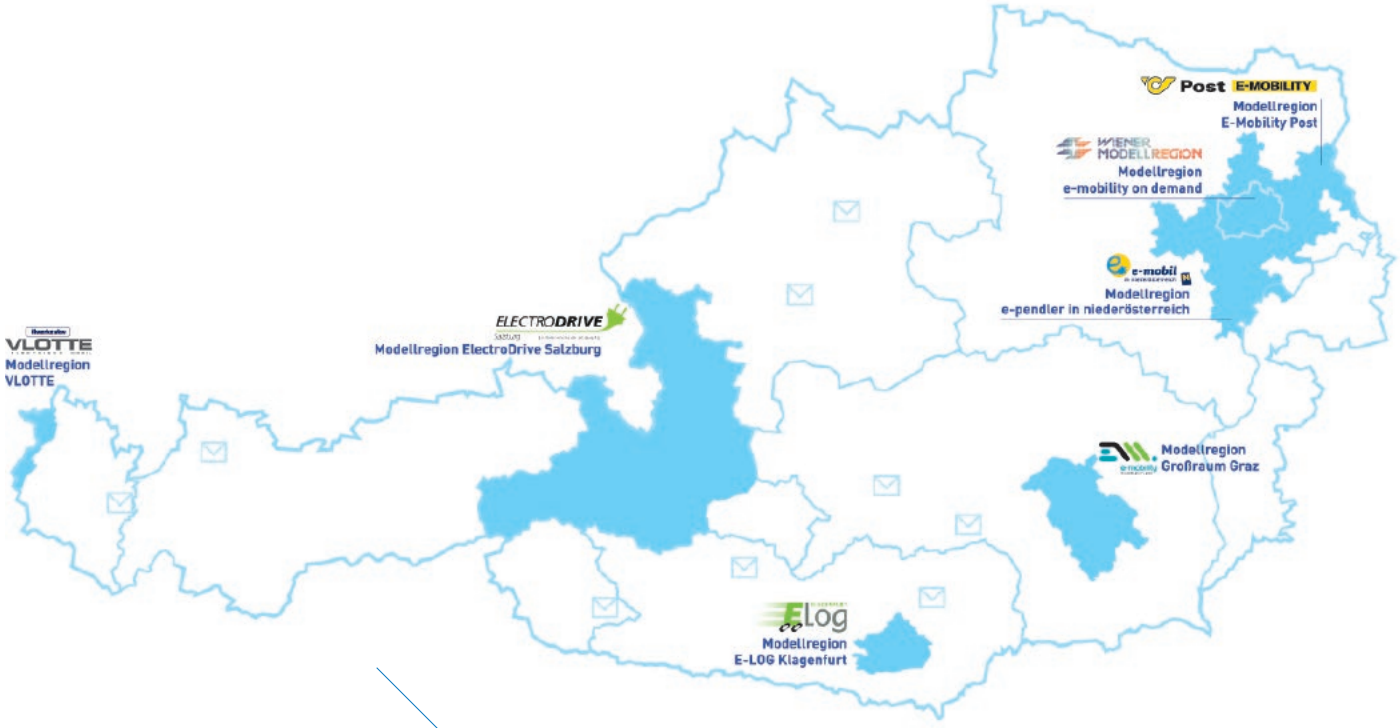
- use of electric cars by private users and in company fleets,
- development of charging infrastructure, and
- provision of renewable energy for electric mobility

have been assembled in this publication to make them available to the public.

Model regions of electric mobility in Austria:

- **Vorarlberg** (VLOTTE, calls 2008 and 2009)
- **Salzburg** (ElectroDrive Salzburg, call 2009)
- **Vienna** (e-mobility on demand, call 2010)
- **Graz** (e-mobility Graz, call 2010)
- **Lower Austria** (e-pendler in niederösterreich, call 2011)
- **Carinthia** (E-LOG Klagenfurt, call 2011)
- **Vienna** (E-Mobility Post, call 2011)

das klima hat zukunft



e-connected.at

Location of the model regions of electric mobility

The model region E-Mobility Post is active in many Austrian regions (only examples shown on map)

e-connected.at is the Internet portal of the Climate and Energy Fund on electric mobility and provides information on model regions and available funding as well as news about electric mobility.

Basic structure of the programme "model regions of electric mobility"

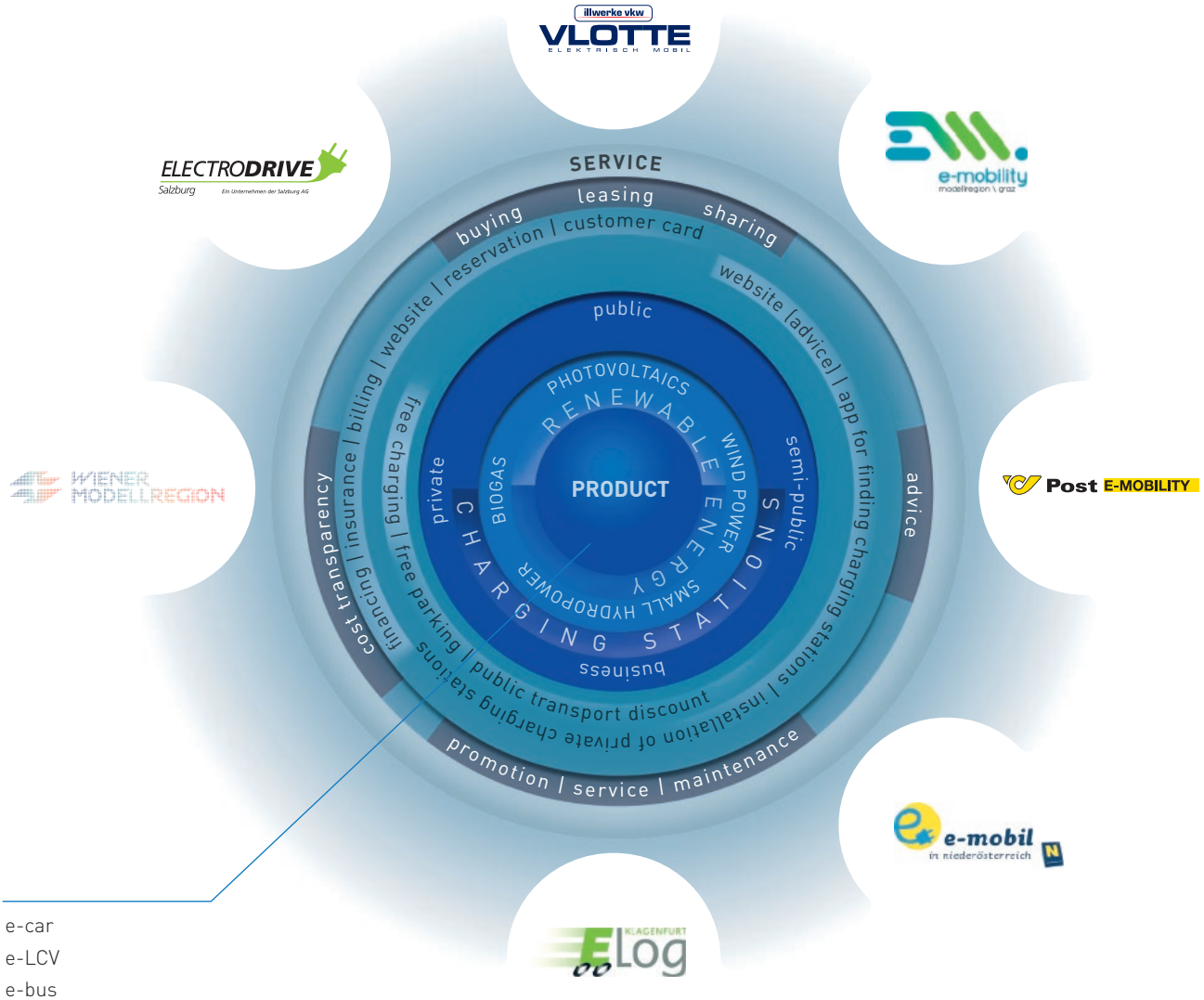
The promotion programme consists of three main phases:

- **Phase 1:** The search for different models of mobility began in 2008. Differences in terms of user groups and business approaches allowed small-scale testing of electric mobility and the development of different systems to be compared (e.g. combined with public transport, electric mobility for commuters, e-logistics, etc.).
- **Phase 2:** From 2012 on, the focus was on combining and connecting the activities.
- **Phase 3:** Since 2014, the programme has been working on disseminating the experiences across Austria.

What does it mean to be a "model region for electric mobility"?

At the start of the project, every model region develops a comprehensive mobility concept with an operating company set up for this purpose. The focus is on the use of electric vehicles; the necessary charging infrastructure must be developed. 100% of the electricity required must be provided from renewable sources and be generated in newly installed plants in the particular model region. Every model region must ensure transparency through regular monitoring of the development and accompanying research.

Overview of the model regions –
a wide range of products and mobility services



Source: Spirit Design Innovation and Brand GmbH (2013) (Graphic design floorfour)

Sources of experience and multipliers for the development of electric mobility in Austria

The seven model regions differ in terms of target groups, business models and geographical conditions. This results in a solid body of findings that are indispensable as a foundation for the wide-spread introduction of electric mobility. This includes measures such as providing mobility passes that allow users to travel intermodally by combining electric vehicles and public transport, the development of charging infrastructure, and the use of electricity from renewable sources.

The objective of the programme is to develop real-world examples of electric mobility, test them for feasibility in everyday use, and to increase the market share of electric mobility through targeted awareness-building and qualification measures. The model regions are a source of experience for development in Austria.

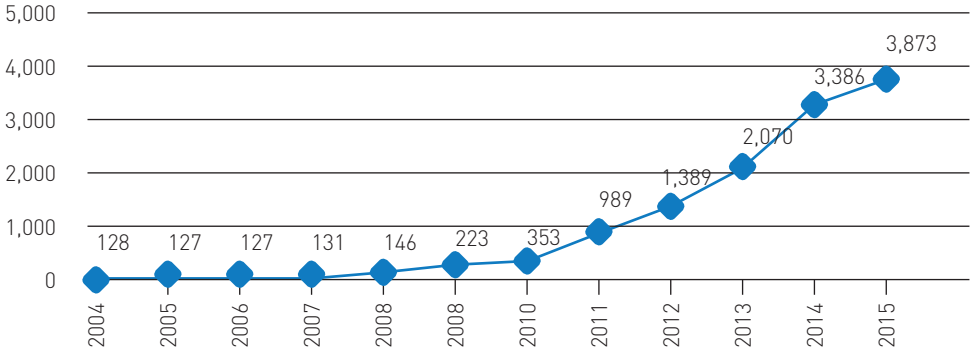
Overview of the development of the electric vehicle stock in Austria

When the programme "model regions of electric mobility" was launched, there were no series-production vehicles by large automobile manufacturers available on the market. The model regions had to use cars from small-batch series or converted conventional vehicles.

In October 2009, Tesla Motors demonstrated that a traction battery assembled from several thousand laptop batteries could provide enough power and range for a sports car (Tesla Roadster).

The first battery-operated mass-produced cars entered the market in 2010, with identical models by Mitsubishi (i-MiEV), Citroen (C-Zero) and Peugeot (I-On). Today, nearly all large automobile manufacturers have at least one electric vehicle in their range of products. The share of electric vehicles of the overall vehicle stock in Austria is still very low. According to Statistics Austria, the total in April 2015 was 3,873 electric cars[1] – approx. 0.1 percent of all cars in Austria.

Number of electric passenger cars in Austria



Source: Statistics Austria (2015)

1 Statistik Austria (2015)

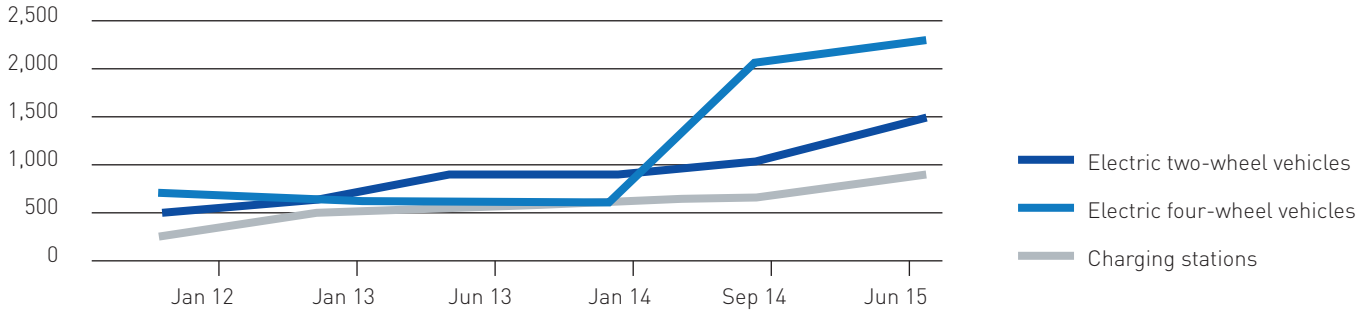
Model regions of electric mobility: Development of the electric vehicles stock and charging stations

The "model regions of electric mobility" have contributed significantly to the increase in electric vehicles in the last years. The figure "Number of electric vehicles and charging stations in the model regions" shows how the situation has developed in the model regions. Some 1,500 electric cars on Austria's roads, or approximately 40 percent of all electric cars in the country, were purchased as part of the model regions.

	Interim result	Target
Electric two-wheel vehicles	2,314	2,117
Electric four-wheel vehicles	1,429	1,771
Charging stations	836	897

Source: Status reports of the model regions of electric mobility

Number of electric vehicles and charging stations in the model regions



Source: Status reports of the model regions of electric mobility

The model regions are well on track to reaching their targets for two- and four-wheel electric vehicles and charging stations within the first project duration (six of seven model regions are in the initial project period). The table shows that the target number of electric two-wheel vehicles (predominantly e-bikes) has already been exceeded, while the target for four-wheel vehicles will soon be met.

ELECTRIC MOBILITY: A CENTRAL APPROACH FOR MEETING CLIMATE TARGETS

THE CLIMATE PROTECTION POTENTIAL OF ELECTRIC VEHICLES

- Electric engines have a considerably higher degree of efficiency than combustion engines (3- to 4-fold).
- Power from renewable energy sources can easily be used to charge them.
- The total carbon dioxide emissions of an electric vehicle including vehicle production and electricity generation (life cycle analysis) can be 80 percent lower than for a conventional petrol or diesel vehicle.

Transportation generates over a quarter of all greenhouse gas (GHG) emissions in Austria and is therefore one of the key areas that have to be addressed in order to reach the national climate goals. From 1990, the Kyoto Protocol base year, to 2005, emissions from the transport sector increased by 79 percent. This is due to the steep increase in the consumption of fossil fuels and the transport sector's extremely high dependence on petroleum (93 percent). Since then, emissions from traffic and transport have been reduced to some extent, but in 2013, they were still 61 percent above the reference value of the base year 1990.[2]

In order to stabilise global warming at a maximum of 2°C above base year levels, the industrialised countries will have to reduce their CO_2 emissions by 80 to 95 percent by 2050.[3] In the transport sector, this objective can only be met by mass electrification of vehicles, which would permit a nearly zero-carbon mobility. Due to its high energy efficiency, the use of renewable energy for electric mobility can be a good way of reducing dependence on fossil fuel imports.

In the 2012 "Implementation plan: Electromobility in and from Austria"[4], the Austrian Federal Government defined 65 concrete measures for speeding up the market penetration of electric vehicles.

2 Umweltbundesamt (2015)
3 Umweltbundesamt (2014a)
4 BMLFUW, BMVIT, BMWFW (2012)

MEASURES AT EU LEVEL

EU Roadmap for Moving to a Low Carbon Economy in 2050

The European Commission has defined target values for the reduction of greenhouse gas emissions caused by transport: Greenhouse gas emissions must be reduced by 54 to 67% below 1990 levels.[5]

White Paper on Transport

Halve the number of conventionally-fuelled cars in urban transport by 2030 and phase them out in cities by 2050; achieve CO_2-free city logistics in major urban centres by 2030. This should reduce greenhouse gas emissions from transport by 60 percent below 1990 levels by 2050.[6]

Climate and energy targets 2020/2030

In 2008, the EU set targets for 2020 – the so-called 20-20-20 targets: [7]

- 20 percent reduction in greenhouse gas emissions (compared to 1990 levels)
- 20 percent increase in energy efficiency (compared to a "business as usual" scenario)
- 20 percent of the energy coming from renewables and 10 percent market share of renewable energy sources in transport

At the EU summit on the European climate and energy strategy in October 2014, the targets for 2030 were set at 40-27-27: [8]

- 40 percent cuts in greenhouse gas emissions (from 1990 levels) and 30 percent reduction in transport
- 27 percent increase in energy efficiency (compared to a "business as usual" scenario)
- 27 percent share for renewable energy

Directives for deployment of alternative fuels infrastructure

The EU package "Clean Power for Transport" and Directive 2014/94/EC on the deployment of alternative fuels infrastructure call for measures for the development of charging infrastructure for electric vehicles by 2020. Austria has to develop a national strategy framework for this by November 2016.[9]

Reduction of CO_2 emissions in new cars

EU Regulation 443/2009 demands that automobile manufacturers limit the average CO_2 emissions for new passenger cars sold in Europe to 130 g CO_2/km by 2015, and 95 g CO_2/km by 2021. Cars with emissions of less than 50 g CO_2/km (PHEV, REEV, EV) receive super-credits (i.e. efficient vehicles can be counted as several cars to reach the target average).[10]

5 KOM (2011)
6 KOM (2011a)
7 KOM (2008)
8 Europäische Kommission (2015)
9 RL 2014/94/EU
10 Regulation 443/2009/EC

COMPARISON OF VEHICLES BY ENVIRONMENTAL PERFORMANCE

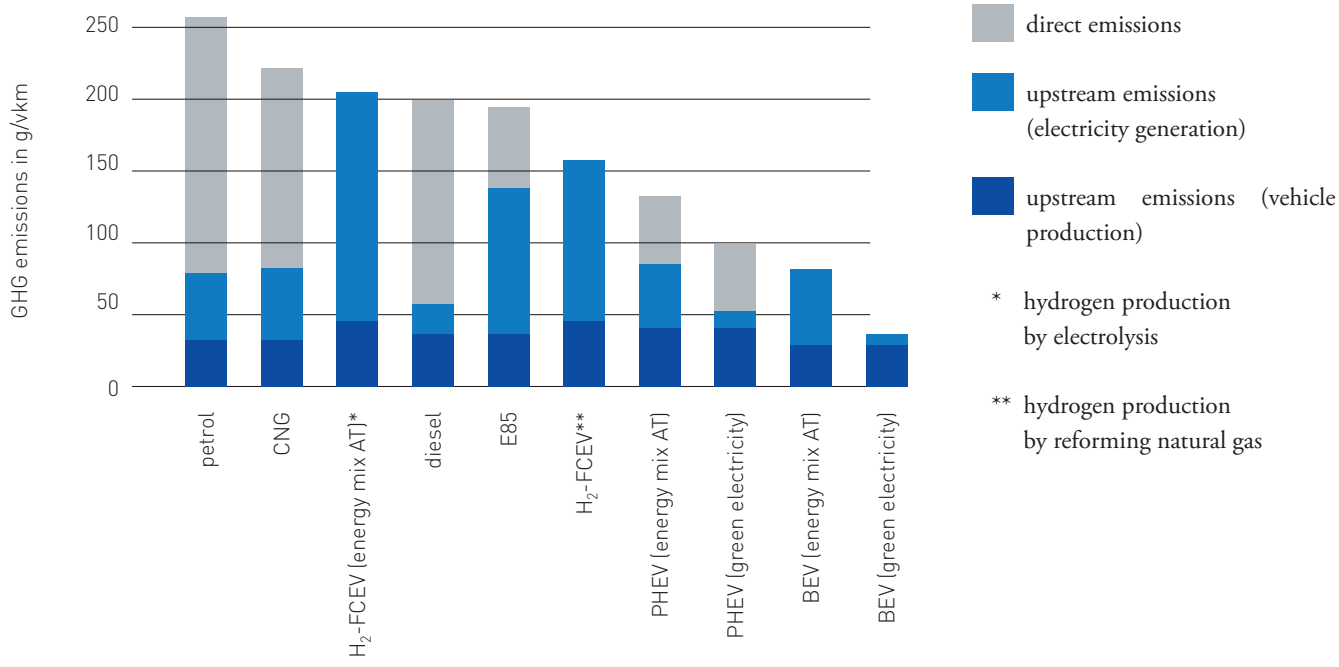
A life cycle analysis (LCA) is a systematic analysis of the total environmental impact caused during the life cycle of a product, from the production of raw materials and the manufacturing of the product to its use and disposal.
In vehicles, the total CO_2 emissions include the following aspects: direct emissions at operation, energy generation or fuel production, production of the vehicle, and disposal.
The life cycle analysis of the Environment Agency Austria for the electricity provided for electric vehicles distinguishes the following types of electricity:

- Austrian electricity mix: Assumes the average electricity mix in Austria.
- Green electricity: The vehicle is charged with the average Austrian green electricity mix of hydropower, wind power, biomass and photovoltaics.

While conventional propulsion systems emit ≥ 200g CO_2 per vehicle kilometre in total, electric vehicles using green electricity can reduce CO_2 emissions by up to 80 percent.

Life cycle analysis for cars: total GHG emissions

QSource: Umweltbundesamt (2014b)



ADVANTAGES OF ELECTRIC MOBILITY – AN OVERVIEW

Electric mobility powered by renewable energy sources reduces emissions of carbon dioxide and pollutants as well as the dependence of transport on petroleum imports, supports the domestic economy and has many other benefits.

Higher energy efficiency

The standard consumption of modern electric vehicles is approx. 15 kWh per 100 kilometres. In contrast, the average standard consumption of all passenger cars newly registered in Austria in 2013 was 52 kWh per 100 kilometres.[11] Considering this data, electric passenger cars are three times as efficient as new petrol and diesel models.

Standard consumption of currently available electric passenger cars (selection)


© BMW Group


© Nissan


© Renault Marketing - 3D Commerce


© Daimler


© Volkswagen

Model	*kWh/100km*
BMW i3	12.9
Mercedes B-Class Electric Drive	16.6
Nissan e-NV200	16.5
Nissan Leaf	15.0
Renault Kangoo ZE	15.5
Renault Zoe	14.6
Smart ForTwo electric	15.1
VW e-Golf	12.7
VW e-up	11.7
Tesla	15.8
Average [12]	14.7

The average energy consumption of an electric passenger car per 100 km of 14.7 kWh equals the energy content of just 1.5 litres of diesel!


© Daimler


© Nissan


© Renault Marketing - 3D Commerce


© Daimler


© Tesla

Low operating costs

The higher energy efficiency of the engine and the resulting lower electricity demand reduces energy costs per 100 km to approx. €3. Electric engines have no moveable pieces except for the rotor and the reduction gear unit and therefore require nearly no maintenance.

Energy recuperation

When electric vehicles brake, they can utilise the kinetic energy by using the engine as a generator and storing the electrical energy produced in the battery.

Full range for daily use

Electric vehicles can currently drive distances of up to 200 km with one battery charge; the Tesla Model S can even manage up to 500 km. If the car can be charged overnight, it can drive the full distance again the next morning.

This makes electric vehicles well suited for short and medium distances, particularly for commuters. For longer distances, fast charging for electric vehicles is ideal: Just a short stop and the journey can continue.

Support for higher purchase costs

The purchase cost of an electric vehicle is higher than that of a comparable car with a combustion engine. To absorb part of the cost difference, the electric mobility model region programme of the Climate and Energy Fund, the klima**aktiv** mobil promotion pro-

11 BMLFUW (2014)
12 Österreichische Energieagentur (2015)

gramme of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, as well as some Austrian provinces and municipalities offer support schemes. Some electric vehicle suppliers have also developed attractive leasing models.

Less fees

Electric vehicles are exempt from the standard fuel consumption tax (NoVA) and the insurance tax for motor vehicles. As part of the tax reform, from 2016 on, companies that buy electric vehicles get a VAT refund and, furthermore, the private use of electric company vehicles will not count as remuneration in kind.

Quiet engine

Electric motors are nearly silent and their use in urban areas can contribute significantly to reducing traffic noise.

Renewable energy can be used

Ideally, the power for electric mobility is generated from renewable energy sources. In Austria, approximately 70 percent of electricity is generated from renewables.[13]

Less greenhouse gas and pollutant emissions

The total emissions of a vehicle are calculated based on both its operation and the energy required to produce it (life cycle analysis). If the energy demand of an electric car is met with renewable energy, it is considerably greener than a conventional car: Depending on the energy source, it produces up to 80 percent less greenhouse gases (CO_2) and pollutants (fine particulate matter, CO, NOx, SO_2).

Reducing dependence on oil

The generation of energy from renewable energy sources results in a broad development of different energy sources, making energy supply more flexible and less vulnerable to disruptions. Dependence on fossil resources, in particular oil, is reduced.

Creating green jobs

Electric mobility has a positive impact on the domestic economy and increases the number of green jobs in Austria.

13 e-control (2015)

© Hans Ringhofer

ANALYSIS: CHRISTOPH WOLFSEGGER ON THE MODEL REGIONS

The model regions have advanced electric mobility enormously in just a few years. Electric mobility is a global development that is also relevant for Austria. The experiences gained from the model regions will help prevent stranded investments when electric mobility is introduced on a large scale. This makes the large-scale rollout affordable, innovative and fast. Since the launch of the model regions, some 1,500 electric vehicles have come onto Austria's streets and over 1,600 charging stations have been installed. In the model regions, we made the conscious decision to focus on different target groups and business models. The model regions have prepared Austria for the wide-spread use of electric mobility. As we have seen in the market development of photovoltaics technology in the last four years, such a change can happen quite fast. Technologically speaking, 100 percent electric mobility is already possible today – at only 16 percent more electricity consumption.

Christoph Wolfsegger,
programme manager model regions of
electric mobility, Climate and Energy Fund

THE FUTURE OF ELECTRIC MOBILITY – OPPORTUNITIES AND VISIONS

Ingmar Höbarth, CEO, Climate and Energy Fund

© Hans Ringhofer

The transport sector is responsible for a considerable part (approx. 28 percent) of Austria's greenhouse gas emissions. The ongoing expansion of electric mobility therefore harbours enormous savings potential. In the last years, a comprehensive body of technical, organisational and business know-how has been developed in the seven model regions.

We now have real-life examples to show how regions can end their reliance on fossil energy in the transport sector as well.
There are hardly any technological and economic obstacles, and there is a large variety of target groups, from commuters to municipalities to businesses and associations. However, there remains much to be done with regard to framework conditions. In future, the model regions must work together even closer so that we can reach as many people as possible with the experience they have gained.
One of the core challenges of the future is interoperability. The expansion of infrastructure and accessibility for everyone must go hand in hand with increasing use. The Climate and Energy Fund will be emphasising the seamless interplay of systems, services and players.
Our vision is to expand electric mobility as fast as possible and ensure that as many people as possible start using it. With their rich store of experiences gained and their position as an international role model, the model regions play a key role in this development. We want the implemented projects to remain inspiring and motivating in the future.


BIOMASSE
HEIZWERK
ZÜRS

ELECTRIC MOBILITY WITH ELECTRICITY FROM RENEWABLE ENERGY SOURCES

FINDINGS

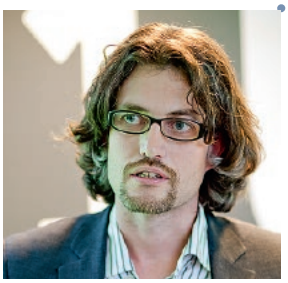
- Electric cars can easily be operated with 100 percent renewable energy, as tests from the model regions show.
- The expansion of renewable energy plants was not a problem in any of the model regions.
- E-mobility with renewable energy must contribute to Austria's 10 percent goal for energy efficiency in transport 2020 – this corresponds to approx. 250,000 electric vehicles. According to the Austrian Energy Strategy, they would consume 0.7 TWh electricity per year – just one percent of Austria's current electricity consumption.
- 30 m^2 panel surface on a photovoltaic installation with an output of 5 kWp would be enough to drive an electric car 33,000 km a year.
- The total carbon dioxide emissions of an electric vehicle including manufacturing of the vehicle and electricity generation (life cycle analysis) can be up to 80 lower than for a conventional petrol or diesel vehicle.
- Electric mobility combined with energy from renewable sources increases acceptance among potential customers.

The long-term vision for transport is sustainable, green mobility, particularly electric mobility with electricity from renewable energy sources. Only then can a positive greenhouse gas balance be achieved with electric mobility. Additionally, the use of renewable energy is an important factor for the acceptance of electric mobility, as a survey conducted in the VLOTTE model region clearly showed. The respondents said that eco-friendliness was the central USP (unique selling proposition) of electric vehicles.

The subsidies of the Climate and Energy Fund for the model regions of electric mobility are tied to the condition that the entire electricity for the electric vehicles is generated from renewable energy sources in newly installed plants. The model regions generally provide the electricity for charging the vehicles as attractive packages that include the purchase or lease and maintenance of the charging infrastructure. There was no problem expanding the electricity production capacity to reach sufficient coverage to match the increased use in any of the model regions.

14 BMWFW, BMLFUW (2010)
15 Reis M. (2011)

STATEMENT



CHRISTIAN EUGSTER

"Thanks to VLOTTE and the support of the Climate and Energy Fund, electric mobility has become part of everyday life in Vorarlberg. Austria's first model region shines with excellent know-how and diverse products and services – fully interoperable infrastructure coverage with electricity from renewable energy sources included."

Christian Eugster
Project manager VLOTTE
illwerke vkw

Electricity from renewable energy sources for vehicle fleets

Businesses with vehicle fleets have good prerequisites to produce the electricity for their electric vehicles. Rooftops of service buildings, garages, etc. can be used for photovoltaic installations. Alternatively, energy supply companies provide green electricity. Information on energy suppliers and green electricity offers are available at the energy price calculator e-control.at

Performance level of renewable energy sources

20,000	3,350	33,000 km	900
HYDROPOWER	WIND ENERGY	PHOTOVOLTAICS	BIOMASS
A medium-sized hydroelectric plant with a capacity of 10 MW generates approx. 40 to 45 million kWh electrical energy. At a consumption of 15 kWh per 100 km and 14,000 km annual range, this can supply 20,000 electric cars a year.	In Austria, a wind turbine with a capacity of 3 MW produces 6.6 to 7.5 million kWh electricity. At a consumption of 15 kWh per 100 km, 3,350 cars annually could drive 14,000 km each with no emissions.	The majority of model regions installed PV plants to supply the cars with electricity. A PV installation with a panel surface area of 30 m^2 and a capacity of 5 kWp produces some 5,000 kWh per year. That is enough to allow one electric car to drive over 33,000 km annually.	A biogas plant with a capacity of 0.25 MW produces approx. 1.9 million kWh per year, enough for 900 electric vehicles.

E-Mobility Post

The entire electricity needed for the electric vehicle fleet of the Austrian Post is generated with their own PV installations. In autumn 2013, an 882 kWp installation was set up on the roof of the letter sorting centre Vienna. In autumn 2014, a second plant with a capacity of 496 kWp was installed on the roof of the new logistics centre in Allhaming (Upper Austria).
Together, both installations in their final state in 2016 provide over 1.4 million kWh energy for the 1,300 electric vehicles.

Photovoltaics installation on the roof of the Vienna letter sorting centre

e-mobility Graz: "Solar-Shareholder" investment product

In Graz, the regional energy service company Energie Graz developed an innovative participation model for all citizens as part of the model region "e-mobility Graz". The "Solar-Shareholder" product was an offer for existing and new green electricity customers to become partners in the creation and operation of large PV installations. The citizens invest in PV modules and receive an annual bonus of 3.3 percent of the invested capital, deducted from their green electricity bill. Energie Graz is in charge of the installation's operation and maintenance. Investment opportunities start at just one module, with an investment of €650.

Number	Investment	Green electricity bonus	Refund at cancellation
1 module	€ 650	€ 21.45/year	€ 650
3 modules	€ 1,950	€ 64.35/year	€ 1,950
5 modules	€ 3,250	€ 107.25/year	€ 3,250
10 modules	€ 6,500	€ 214.50/year	€ 6,500

Product "Solar-Shareholder" – Investment opportunity and electricity bonuses. Source: Energie Graz GmbH & Co KG (2015)

CHARGING INFRASTRUCTURE – BETTER INFRASTRUCTURE FOR ELECTRIC MOBILITY

FINDINGS

- Sufficient availability of charging infrastructure is a prerequisite for a switch to electric vehicles.
- Users prefer to charge their vehicles at work or at home.
- However, the visibility of charging stations in the public or semi-public space is still important, as it promotes awareness of electric mobility and increases acceptance.
- When charging in the public space, users must have easy access to the infrastructure.
- By providing charging infrastructure, energy suppliers, the tourism and retail industry, operators of parking garages and many other sectors can build customer loyalty.
- Fast charging is particularly useful in the public space.
- The different charging systems have to be coordinated better; currently, they still require many technical adjustments in the background (interoperability).

A needs-oriented charging infrastructure plays a key role when it comes to switching over to electric vehicles. In the last years, the model regions have gained important findings with regard to the ideal number and preferred locations of charging stations. If this knowledge is used for the development of charging infrastructure in the future, savings could be achieved both for public and private investments.

Charging infrastructure and charging behaviour

The technical installation of the charging stations must be checked by experts before use. A standard plug used in households, for example, is not suitable for providing high power over a long period. Therefore, wall box charging units with the necessary protection should be installed for home charging.

The experiences of the model regions show people prefer to charge their vehicles where they have to spend a longer period time for other reasons, i.e. at home, at work or at shopping malls. Public charging stations are not used as frequently. The exception to this are fast charging stations (over 22 kW), as a survey of 140 electric vehicle users and 37 electric vehicle managers of the VLOTTE project showed.[16] The availability of public charging stations, however, is currently an important factor in deciding whether to purchase an electric vehicle – the knowledge of being able to charge their car anywhere gives users a sense of security. Users of electric vehicles charge in the public space only if they are planning to stay somewhere for at least an hour[17]. Therefore, public charging stations should be installed primarily in locations where people spend more time (train stations, park&ride facilities, service areas along motorways, restaurants, hotels, municipal services such as administrative offices and hospitals, recreational facilities, shopping centres, etc.).

Locations for charging stations in the public and semi-public space should be chosen so that their utilisation balances the high installation costs. If these charging stations are placed in visible positions, they increase the awareness and acceptance of electric mobility.

16 Reis, M. (2011)
17 Reis, M. (2011)

VLOTTE MEET & CHARGE

The project "VLOTTE MEET & CHARGE" facilitates a dense network of semi-public charging infrastructure in a rural area. The objective is to promote electric mobility in the service sector (e.g. tourism). Businesses like local restaurants and hotels install wall boxes that allow their guests to charge their vehicles while parking. The first locations were chosen based on user expectations for combined parking lots and charging stations and an analysis of potential user behaviour. Currently, 20 wall boxes are planned, ten each in the climate model regions Lech Warth and Leiblachtal. The response of the service sector has been overwhelmingly positive. Currently, the model region VLOTTE is developing special packages and products that can be offered to businesses.

Billing: Automatic recognition and billing

The payment method with the highest rate of acceptance is billing via bank card or customer card. Billing via mobile phone, credit card or coin payment are far less popular.[18]

The role of energy supply companies

The regional energy supply companies play a crucial role in setting up charging infrastructure. They plan, build and operate a network of public stations and can expand their range of services by providing electricity for cars, which can be a useful element for customer retention.

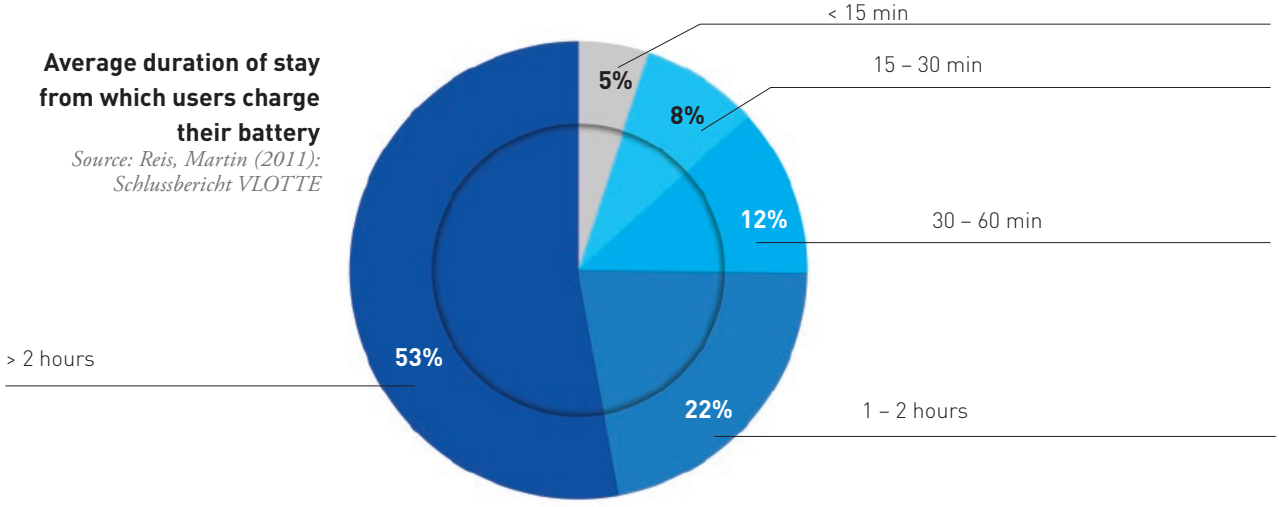
Cooperation between different suppliers – interoperability

Electric mobility can only be successful if services and participating parties cooperate. This requires charging infrastructure of different suppliers to be compatible and easy to use for customers of different services. This starts with easy access to infrastructure use and ends with billing and payment of the electricity used.

For a long time, public charging stations were not standardised with regard to charging plugs, current, payment system and charging process. Users had to meet various requirements, such as membership cards, to gain access to charging stations in the first place. In some cases, there were even several different energy supply compa-

Average duration of stay from which users charge their battery

Source: Reis, Martin (2011): Schlussbericht VLOTTE

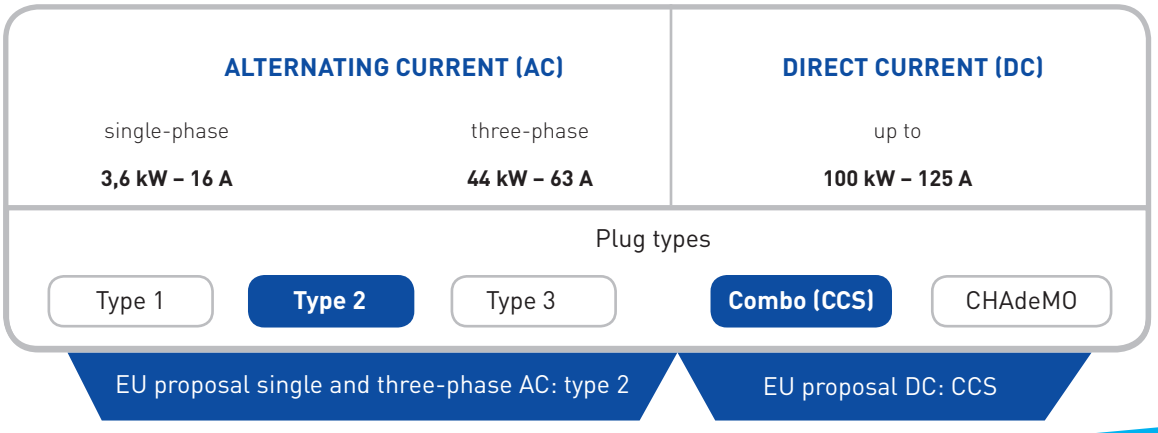


18 Reis, M. (2011)

nies in a single model region, with different access requirements for their charging stations.
The situation was simplified when the 7-pin type 2 plug was defined as the EU standard for charging alternating current up to 44 kW (Directive 2014/94/EU). However, different plug systems are still being built into cars particularly in Asia, usually the type 1 plug. An adapter cable can solve this problem.

The problem is similar for fast charging with direct current from 50 kW upwards. European manufacturers favour the Combined Charging System (CCS), which is also defined in the relevant EU Directive (Dir 2014/94/EU). However, many Asian electric vehicles come equipped with a CHAdeMO system. Here, an adapter cable is of no help. If the vehicle and the charging station use different fast charging systems, the car cannot be charged.

Charging systems for electric passenger cars [19]



Typical characteristics	wallbox	charging station	fast charging station
Location	garage, house wall, company parking lot	car port, company or public parking lot/parking space	petrol station, motorway service area
Charging power	AC: 3.7 – 22kW	AC: 3.7 – 22kW	AC/DC: up to 100kW
Activation	key / RFID	RFID / text message / PIN code / PayPal / EC	RFID / text message / PIN code / PayPal / EC
Installation	wall-mounted, cables inside the house	set in foundation	set in foundation requires excavations
Special features	compact	protection against vehicle collision, vandalism	separate grid connection
Price	from approx. €1,000	from approx. €1,500	from approx. €30,000

19 ecoplus. Niederösterreichs Wirtschaftsagentur GmbH (2015A)

Interoperable fast charging across model regions: the MISch project

The objective of the project MISch, which stands for interoperable fast charging across model regions, is to increase the range of electric vehicles beyond the core area of the model regions of electric mobility Vienna (e-mobility on demand), Graz (e-mobility Graz) and Lower Austria (e-pendler niederösterreich). To this end, four fast charging stations are being set up along the Vienna – Lower Austria – Styria – Graz route. The stations cover all usual fast charging methods with direct and alternating current. Direct current allows the battery to be charged to 80 percent in just 20 minutes.
The advantage of the project is that it allows cars to drive from Vienna to Graz thanks to the interoperable charging of electric vehicles. The project allows users to access the charging systems of all participating operators with the normal charging card from their own model region. A mobile app offers additional functions (status information, reservation).

EVN charging card (Lower Austria) for external users

Users outside the model region can get a card for Lower Austria's EVN charging network. It is valid for ten days and can be used immediately. If no contract is made with energy supplier EVN within ten days, the card is deactivated. The card is available at partner businesses in the model region, such as bakeries, tourist offices, etc.

STATEMENT

© Stadt Klagenfurt am Wörthersee

WOLFGANG HAFNER

"The public charging infrastructure in Klagenfurt and environs has been expanded very successfully – even fast charging stations are available. The charging options are well accepted. The next step should be a countrywide access and billing system so that electric cars from Klagenfurt can be charged easily in other parts of Austria."

Wolfgang Hafner, project manager E-LOG Klagenfurt, City Administration of the Provincial Capital of Klagenfurt am Wörthersee

COST OF ELECTRIC VEHICLES

FINDINGS

- The cost-benefit ratio of electric vehicles has improved enormously over the last years. Electric vehicles are generally still more expensive to buy than conventional petrol or diesel cars, but they are considerably cheaper to use.
- The main reason for the higher cost of electric vehicles used to be battery prices. Therefore, some electric vehicle suppliers have introduced attractive battery leasing schemes.
- Before buying an electric vehicle, the purchasing price and the expected operating costs (total cost of ownership = TCO) should be compared.
- Looking at the TCO over several years, electric vehicles are often considerably cheaper than conventional cars after just a few years of use.

Purchase costs have developed dynamically since the launch of the model regions of electric mobility. Initially, the large price difference for purchasing an electric vehicle compared to a conventional petrol or diesel vehicle was a considerable obstacle. In 2009, the first available electric car from a small batch series of Think City cost approximately €45,000 – more than four times the price of a comparable car with a combustion engine. The high price was initially mainly caused by the small production batches and the high battery costs.

This has changed dramatically over the last five years. The Nissan Leaf, for example, is the world's bestselling electric car at over 180,000 vehicles sold, and has a considerably better performance and lots of features while costing a third less than the Think City in 2009.

Technological advances and larger production series will further reduce the price for battery capacity (€/kWh). The number of models and different features of electric vehicles have increased annually.

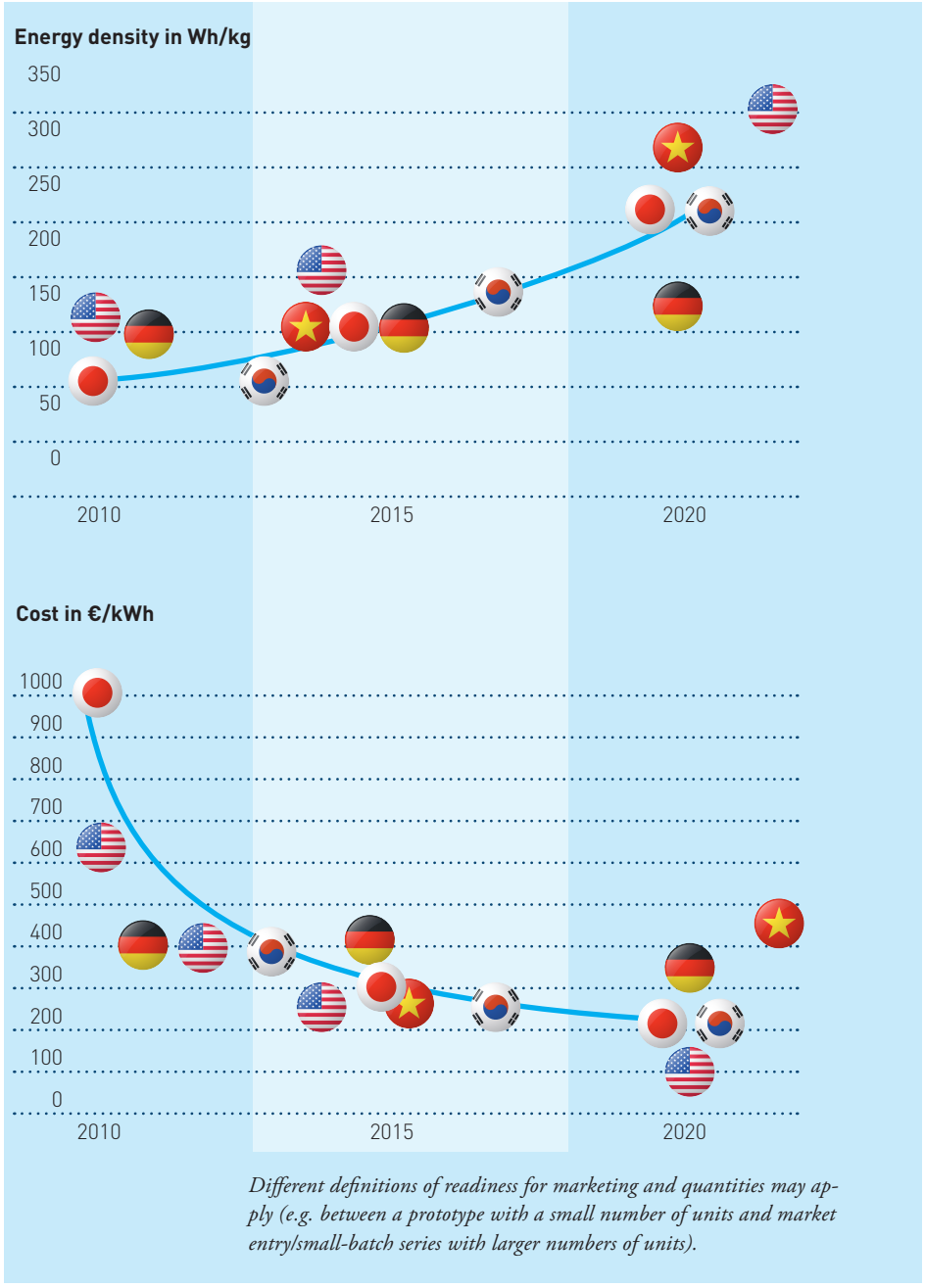
Based on the technology roadmap, we can expect a significant improvement of battery technology by 2020 (see figure on page 27), which has the potential to increase competitiveness of electric mobility considerably. We can expect a 70 percent increase in energy density by 2020 with an accompanying cost reduction of about half.[20]

20 ISI Fraunhofer (2012), Umweltbundesamt (2014)

Roadmap for the development of energy density and costs for traction batteries

Targets of leading countries in battery production for energy density (Wh/kg) of third-generation large lithium-ion cells (use in BEV/PHEV)

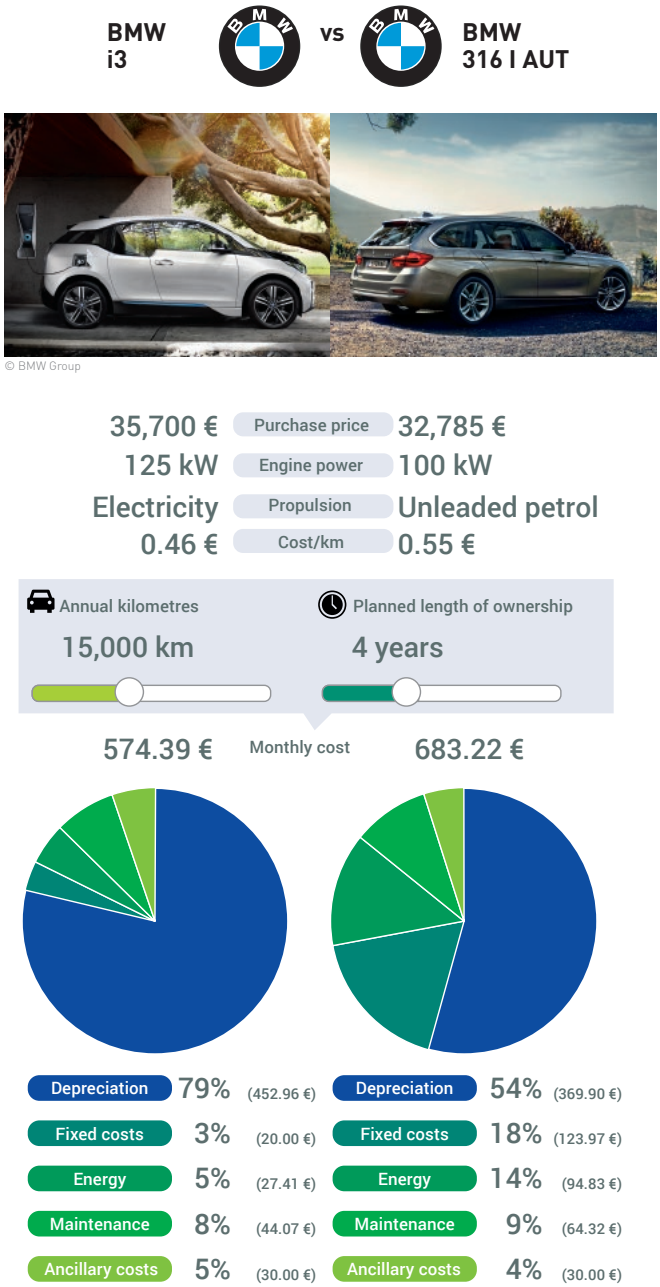
Targets of leading countries for costs (€/kWh) of third-generation large lithium-ion cells (use in BEV/PHEV)



Different definitions of readiness for marketing and quantities may apply (e.g. between a prototype with a small number of units and market entry/small-batch series with larger numbers of units).

Source: ISI Fraunhofer (2012), Umweltbundesamt (2014)

The lower energy consumption of electric vehicles makes them considerably cheaper to run than conventional vehicles. The electricity needed for 100 km with an electric car that has an average consumption of 15 kWh/100km costs only €3 (at an assumed cost of €0.20/kWh). At 15,000 km annually, the entire fuel cost is €450 – about half of what an efficient car with a combustion engine needs.
Electric engines have no moveable pieces except for the rotor and the reduction gear unit. Energy recuperation (engine braking) does not wear the brakes out as much. Overall, this lowers the maintenance costs compared to conventional vehicles.



This TCO calculator was commissioned by the Climate and Energy Fund and developed by the model region VLOTTE in cooperation with ÖAMTC.

Cost aspects when buying and operating electric vehicles:

- No standard fuel consumption tax (NoVA)
- Refund of the value-added tax for companies that buy electric vehicles
- No insurance tax for motor vehicles
- Private use of electric company cars is not counted as remuneration in kind
- Low maintenance costs
- Subsidies available

In addition to the tax benefits, the klima**aktiv** mobil promotion programme of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management provides financial subsidies for the purchase of electric vehicles. This subsidy can be combined with the subsidies some federal provinces grant. More information is available at klimaaktivmobil.at/foerderungen.

To determine whether the purchase of an electric vehicle is economical, the calculation should include both the initial purchase cost and the operating costs over the projected time of use. The result is the total cost of ownership (TCO). TCO calculators can help users compare the costs of an electric vehicle quite easily with the costs of a vehicle with a combustion engine, as the TCO calculator of VLOTTE shows.

TCO comparison e-pendler niederösterreich

The TCO comparison in the model region e-pendler niederösterreich spans a period of eight years and shows the considerable financial benefits (see column "Delta") of electric vehicles compared to similar conventional vehicles. The TCO comparison considers the cost of purchase, fuel and operation.


© BMW Group


© Volkswagen


© Nissan


© Renault Marketing - 3D Commerce


© Kia

Electric passenger car total cost of ownership (TCO) cost comparison after 8 years[21]

TCO after 8 years	Cost of electric car	Cost of conventional car	Delta
BMW i3 (125kW) vs. 118i (125kW)	€ 33,486	€ 46,682	ca. € 13,000
VW e-Golf (85kW) vs. Golf 1,4 TSI (90kW)	€ 33,673	€ 37,128	ca. € 3,500
VW e-up! (60kW) vs. Up! (55kW)	€ 23,157	€ 23,150	ca. € 0
Nissan Leaf Visia (80kW) vs. Pulsar 1.5dCi (81kW)	€ 27,530	€ 32,346	ca. € 5,000
Renault ZOE Life (65kW) vs. Clio TCe (66kW)	€ 26,544	€ 27,480	ca. € 1,000
Kia soul EV (81kW) vs. Soul Silber 1.6 GDi (97kW)	€ 30,165	€ 38,458	ca. € 8,000

Assumptions

- *15,000 km/year*
- *€5,000 subsidy (more information at www.e-mobil-noe.at/foerderung)*
- *€0.18 /kWh*
- *€1.2/litre*
- *no insurance tax for motor vehicles applies to electric cars (€230 to 780)*
- *€200 less maintenance costs per year for electric cars as compared to conventional cars*

21 ecoplus. Niederösterreichs Wirtschaftsagentur GmbH (2015)

INFORMATION AND ADVICE ON ELECTRIC MOBILITY

FINDINGS

- Providing information and advice has become one of the core services provided by the model regions.
- Testing opportunities are important to reduce reservations with regard to electric mobility and increase acceptance.
- The mobility centres support car dealerships (with marketing and consulting) and offer these services for free in the model regions.
- The model of a mobility centre can be easily transferred to other regions.

People are generally interested in new propulsion systems, but there is a high demand for information and advice on electric mobility. Initially, this was not included in the project concept of the model regions, but has now become one of the central factors for their success.

Centre of excellence for electric mobility

The operating companies in the model regions set up mobility centres as points of contact to offer current and independent information on electric mobility for potential users of electric vehicles.

STATEMENT

© Sissi Furgler

ROBERT SCHMIED

"With the support of the Climate and Energy Fund, we have not only achieved, but in some cases even considerably exceeded our goals. Being able to experience things personally is a key factor – only if people are able to test electric vehicles can they realise that their fear of a loss of comfort are unfounded."

Robert Schmied
Project manager, model region e-mobility Graz
e-mobility Graz GmbH

The model regions have developed different concepts for providing advice and information:


© Shutterstock

Online tool for initial information of the model region e-pendler in niederösterreich

e-pendler in niederösterreich developed a platform that provides information and allows users to register for the service: herry.at/index.php/ependler. This tool answers many typical initial questions, thus reducing the time needed for providing advice individually.

FAQs on websites

Several model regions have collected frequently asked questions about electric mobility on their websites.

vlotte.at
elog-klagenfurt.at
e-pendler-noe.at

Mobility centres

Independent mobility centres provide information and advice. They provide facts and figures, various types of information and services connected to electric mobility to the interested public. In the model region VLOTTE, holders of the mobility card of VKW (Vorarlberg energy supplier Vorarlberger Kraftwerke AG) can borrow an electric car for three days. Potential users can also record and analyse their personal mobility behaviour with a GPS tracker. The evaluation of the data shows whether an electric vehicle would be suitable for their mobility behaviour.

The model of a mobility centre can be easily expanded and transferred to other regions.

© Vlotte

Cooperation with car dealerships

Users consider car dealers the primary authority when it comes to leasing or purchasing a car. Mobility centres and energy suppliers are not generally considered competent in this area. However, synergies are possible.

The majority of car dealers do not actively market electric vehicles. Selling an electric vehicle requires considerable consulting, approx. a day per vehicle sold, but dealers often lack the necessary specialised knowledge. The profit margin as well as the need for service and maintenance are rather low for electric cars, reducing the motivation to sell one. Mobility centres now provide advice for free. In some model regions, car dealers are actively involved in this.

Scepticism with regard to practical use

In practice, the model regions have shown that the opportunity to test electric vehicles can quickly reduce reservations of both private and commercial users. This works particularly well at events or if people can book an electric test vehicle via the mobility centre. In some regions, the automobile clubs ÖAMTC and ARBÖ support these campaigns in their driving safety centres.

Model region E-LOG Klagenfurt – test driving opportunities for private users, companies and taxis

Test vehicles were made available for private users, taxi drivers and driving schools (electric vehicles are used for the feedback drives that take place several months after the driving test). Over 1,300 people tested the cars.

The charging infrastructure was expanded as part of these activities and now benefits all users of electric mobility.

© Lunghammer

ELECTRIC MOBILITY AS PART OF MULTIMODAL TRANSPORT

FINDINGS

- Electric mobility with electricity from renewable sources is a central element of a sustainable transport system.
- Experience has shown that when it comes to mobility cards, users prefer individually customisable solutions to all-inclusive solutions.
- First battery electric buses that are charged using trolley wires are being successfully used in public transport.
- Electric taxis are an important part of of a sustainable transport system and link users to the public transport network.

The biggest challenge in the transport sector is lowering emissions by reducing individual motorised transport. Electric vehicles are an important element of multimodal mobility. Different services allow the model regions to offer multimodal routes, with a particular emphasis on commuter traffic. Electric mobility is not an alternative to public transport, but rather complements it, resulting in a reduction of CO_2 emissions and of the total number of vehicles on the street.

STATEMENT

© Wiener Stadtwerke

HARALD WAKOLBINGER

"The model region Vienna supports and promotes the use of electric cars and the installation of charging stations to complement public transport in the larger metropolitan area. Additionally, the model region acts as an initiator and catalyst for various projects on multimodal systems – from the Vienna Mobility Card to the SMILE project."

Harald Wakolbinger
Model region e-mobility on demand
Vienna Public Utilities

Services in the model regions

Mobility card: Some model regions developed mobility cards for their users to give them access to different services. The services differ: In some model regions, the cards provide access to public charging infrastructure and regional public transport. Other regions have incorporated additional services, such as electric car sharing, use of electric vehicles, rental or test drives. Customisable solutions were more successful than full packages.

Interconnected transport systems: The model regions were the catalyst for the development of attractive mobility offers such as the Vienna Mobility Card (WienMobil) respectively the SMILE project. The mobility card allows holders to use different mobility services, from public transport to the WIPARK parking garages and the public bike rental system. In the research project "SMILE", Vienna Public Utilities, together with public transport provider Wiener Linien and the Austrian Federal Railways, are developing an app that calculates the ideal route for users in real time. The tickets for all means of transport can be purchased and paid for with one click.

Park & ride facilities: A park & ride facility with connection to the public transport network was built in Vienna for people commuting to the city from Lower Austria. Electric vehicles are used for individual trips, but they are connected to the public transport network via the park & ride facility. The reservation of parking spots and charging stations is an issue that still needs to be solved.

STATEMENT

© Kristine Veit

KATHARINA OLBRICH

"With the subsidies of the Climate and Energy Fund and the Province of Lower Austria, we were able to test for the first time in a model region how electric mobility can be used for commuting in an efficient and climate-friendly way. The model region is an important milestone towards making electric mobility tangible for people."

Katharina Olbrich
Project manager e-pendler in niederösterreich
EVN AG

© EVN AG Rücker

E-commuters: Charging at the train station

Model region e-pendler in niederösterreich

Lower Austria is one of the regions with the most commuters in Austria. With the model region e-pendler in niederösterreich ("e-commuters in Lower Austria"), it sets a clear signal for an energy-efficient and climate-friendly future of transport. One of the main goals is to test and disseminate new approaches to multimodal electric mobility in commuter and business traffic. Several models were developed.

Users have several ways of using electric vehicles for commuting: Car sharing, by combining them with public transport, or in organised commuter transport (sharing of public taxis). E-bikes can also be used for commuting. These models are very successful.

The most difficult thing to implement was the electrification of existing mobility offers, such as hailed shared taxis and local buses in municipalities and small towns. The reason for this is a lack of suitable electric vehicles: The largest have seven seats, while operators generally need at least nine-seaters. There are also no fast charging stations for the vehicles that would be suitable. The purchase cost for electric buses is high.

Electric buses in Vienna

In May 2013, two bus lines in the city centre were converted to purely electric vehicles on initiative of the Vienna model region. The buses use the tram network's power lines for charging. At the terminuses, the buses are charged via a pantograph, which ensures that the batteries are well charged during operation. This measure increases the lifespan of the batteries from two to four years. Charging takes 10 to 15 minutes and one charge gives a range of 120 to 150 km. Overnight, the batteries are charged slowly at the bus depot. The use of electric buses on other routes in the city is currently being discussed.

Electric bus of Vienna Pubic Transport

In Austria, taxis are considered part of the public transport network and are an important element of multimodal transport. As taxi rides tend to be short, taxi fleets are well suited for electric mobility. Combined with fast charging stations, the daily range can be quite large. A taxi drives between 40,000 and 60,000 kilometres a year.

Electric taxis in the model regions

The use of fully electric taxis is an interesting model for taxi companies.

e-mobility Graz: Since mid-2014, three electric taxis have been operating in Graz.

e-mobility on demand: There are already some pioneers using e-taxis as part of the model region in Vienna. A wider application of the model, however, would require suitable charging infrastructure.

e-LOG Klagenfurt: As part of the EU project CEMOBIL, five electric taxis (Nissan Leaf) are being provided for use by taxi companies for €300 per month including free charging at fast charging stations.

ELECTRIC CAR SHARING – USE IT WHEN YOU NEED IT

FINDINGS

- Car sharing is the ideal model for electric cars. The cost of purchase, which is currently still higher than for cars with combustion engines, is shared among many users, who benefit from the lower operating costs.
- Successful sharing concepts were implemented in the model regions.
- Electric car sharing is an attractive model both for local users and for commuters.
- To further expand open electric car sharing systems, suitable charging infrastructure is needed.

Mobility for eco-conscious cities, municipalities and companies

As part of the model regions of electric mobility, different new electric car sharing concepts were tested and valuable experiences gained. Car sharing ensures comprehensive mobility that sees the car as a complement to public transport, walking and cycling. Private cars are stationary 23 hours a day on average – usually in the public space. However, many residential areas in cities do not have enough parking spaces for all cars. Car sharing can help alleviate the strain.

Benefits of car sharing:
Car sharing is cheaper than owning a car as long as the annual distances travelled are not too long.
Nearly no fixed costs.
Car sharing allows users to choose the suitable car for every occasion from a wide range of vehicles.
The vehicles are new, modern and safe.
Users do not have to worry about maintenance and care.
Good environmental performance: Car sharing is sustainable as all trips are planned and reserved in advance.

Electric car sharing EMIL in Salzburg

The electric car sharing service EMIL is a successful product developed in Salzburg. While EMIL is not directly a part of the model region, the car sharing service would not have been implemented without it.
The annual average use of EMIL for all stations is 16.7 percent. The best locations have up to 45 percent use. The users are mostly aged between 25 and 55 years and predominantly male. The youngest user is 19, the oldest is 84 years old. There have been requests to transfer the EMIL concept to other regions.
Experiences show that it takes a certain time – at least a year – for users to start planning their mobility around a new service station and thus for demand to rise.

More information: *fahre-emil.at*

© Kolarik

STATEMENT


© ElectroDrive Salzburg

DIETMAR EMICH

"We are very proud as the model region Salzburg to be contributing to environmental protection. With nearly 400 subsidised electric cars and our electric car sharing system EMIL, we have succeeded in bringing electric mobility to the streets and have generated enormous CO_2 savings over the years. A wonderful result – and we reached it earlier than expected! "

Dietmar Emich
Model region ElectroDrive Salzburg
CEO ElectroDrive Salzburg GmbH

Electric car sharing in rural areas

Car sharing has great potential in rural areas. The key component for success is that someone initiates it. There are already many successful projects in Austria. The following are just two examples.

© DI Andreas Zibral

"Gaubitscher Stromgleiter"

The innovative model of the municipality of Gaubitsch is based on shared use of an electric car by the municipal administration, associations and private users. Low costs and a good concept resulted in a successful project implementation.

More information: *gaubitsch.at/stromgleiter*

© Christian Dusek

bea – electric car sharing in Baden

Another flagship project was implemented as part of the model region for electric mobility e-pendler in niederösterreich in Lower Austria. The electric car "bea" is shared by the residents of the small town of Baden and three partner companies. Bea is parked in the town centre next to a charging station. Booking and billing takes place via the reservation and billing platform caruso (carusocarsharing.com). There are also other companies providing professional car sharing tools in Austria, such as carsharing24/7 (carsharing247.com). These platforms offer reservation and billing software as well as help with insurance and electronic vehicle logs.

More information: *drive-bea.at*

Corporate Car sharing

e-mobility Graz GmbH offers an innovative reservation and administration system for vehicle fleet management and car sharing, which makes it possible to make e-vehicles available to a wide audience. This "corporate car sharing" is provided ready to use for municipalities and residential areas, where residents are offered a comprehensive mobility package for all their mobility needs.

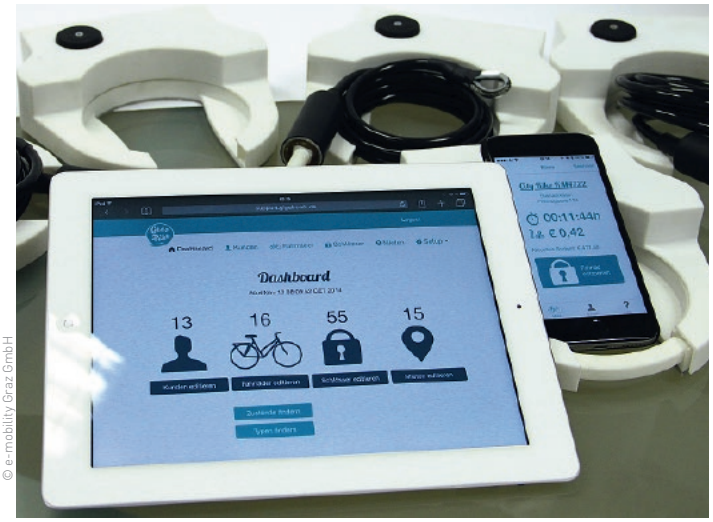
Electric vehicles in business fleets – acceptance and attractiveness

For businesses, the total cost of ownership (cf. TCO calculation on pp. 28 and 29) is particularly interesting, as it shows that electric vehicles are cheaper than cars with conventional combustion engines. Their initial purchase cost may be higher, but their operation and maintenance is cheap, and furthermore, they are eco-friendly, energy efficient and quiet. For large companies it is easier to integrate an electric vehicle into the existing vehicle fleet.

ElectroDrive Salzburg: Using electric vehicle fleets across companies

ELECTRODRIVE Salzburg

The combined business and private use of electric vehicles will be tested in a joint project of Austrian Post, EMIL and the model region Salzburg. The idea is that an electric vehicle owned by the post office is made available to EMIL users after the daily deliveries are done (from approx. 4 pm). To make sure that the mail can be delivered the next morning, the car is charged at a fast charging unit in the morning, which will be installed on the post office premises. The unit will be available to all other users of the e-vehicle as well. The project is currently in development. Should it be successful, this usage model could be applied at other companies as well.



Bluetooth lock

e-mobility Graz: Bike rental system with Bluetooth lock

To improve the usability and attractiveness of the e-bike rental system of the model region e-mobility Graz (www.grazbike.at) for potential users, the project "Floating Fleet - Bluetooth Schloss" was created. This project aims to make a floating fleet system for the Graz Bike rental bikes possible by retrofitting them with an electronic Bluetooth lock. The special feature of the project is a simple to use smartphone app for reserving and using the bikes, which will be tested in the pilot phase for practical usability and transferability to other model regions.

More information: *emobility-graz.at*

ELECTRIC VEHICLES IN DELIVERY

FINDINGS

- Many deliveries could be made with electric vehicles.
- In the case of regular delivery routes, the maximum daily distance is known, which makes planning for electric vehicles easier.
- The length and topography of the route as well as the weather have a direct impact on the energy consumption of the vehicles. These factors must be considered when planning tours to ensure a high quality of service and timely deliveries.
- Drivers are more motivated to use electric vehicles if their use is voluntary.

The Austrian Post, the country's largest fleet operator in the delivery sector, has used electric vehicles for over 100 years for letter and parcel delivery. In 1983, the electric mobility programme of the Austrian Post was halted due to a lack of suitable vehicles. Since winning the call for a model region for electric mobility, the fleet has been gradually electrified since 2012.

STATEMENT

PETER NAGORZANSKI

"The Austrian Post is committed to carbon-neutral logistics. As our slogan says, "there's a lot of green in our yellow". This is only possible by using electric vehicles. The subsidies of the Climate and Energy Fund and the klima**aktiv** mobil programme are an important help. "

Peter Nagorzanski,
Project manager model region E-Mobility Post
Österreichische Post AG – Austrian Post

The post office employees accumulate some 240,000 km a day on foot, by bike, moped, passenger car and delivery vehicle. The company's 9,200 vehicles use approx. 15 million litres of fuel a year. In order to reduce the emissions of the vehicle fleet, the company is increasingly using electric passenger cars, scooters and bicycles. The experiences can be summarised as follows:

Delivery areas

The staff must be able to deliver the mail on time along their delivery route in any weather (low temperatures reduce the range of electric vehicles) and topographical conditions. This means that not all delivery areas are suited for the use of electric vehicles. The range of electric vehicles is a central issue.

Charging infrastructure

The electric vehicles must be charged at the delivery centres. Both electric mopeds and electric cars require technical charging infrastructure: The charging stations for electric cars need high-voltage current, the power supply cables must be secured and the electric lines must be able to cope with heavy current.

Electric vehicles at the delivery centres

With conventional vehicles, deliverers can get permission to drive them home under certain conditions, meaning that they do not have to return them to the delivery centre at the end of the day. This permission cannot be granted for electric vehicles, as the necessary charging infrastructure is generally not available at the homes of the deliverers. This aspect is also considered when choosing the delivery districts.

Electric vehicles of Austrian Post

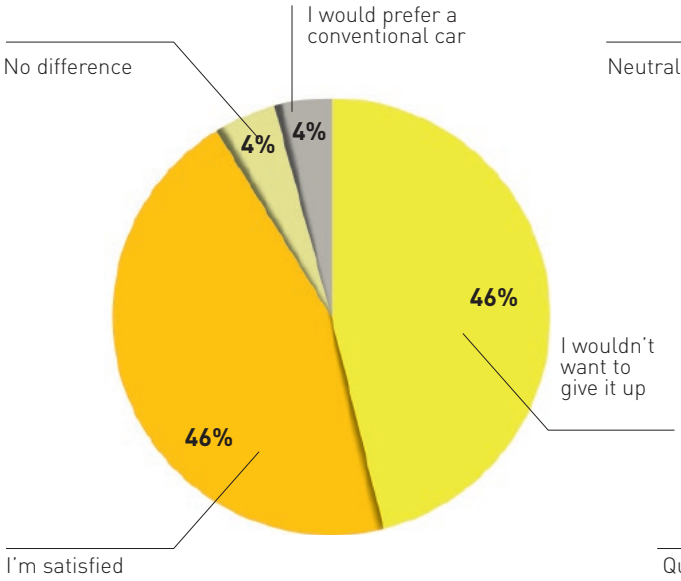
Topography of the delivery areas

Electric vehicles currently on the market can handle slopes only to a certain degree. The problems are the lack of a four-wheel drive and the higher energy demand required when driving uphill and starting up more frequently. This reduces the range of the vehicles.

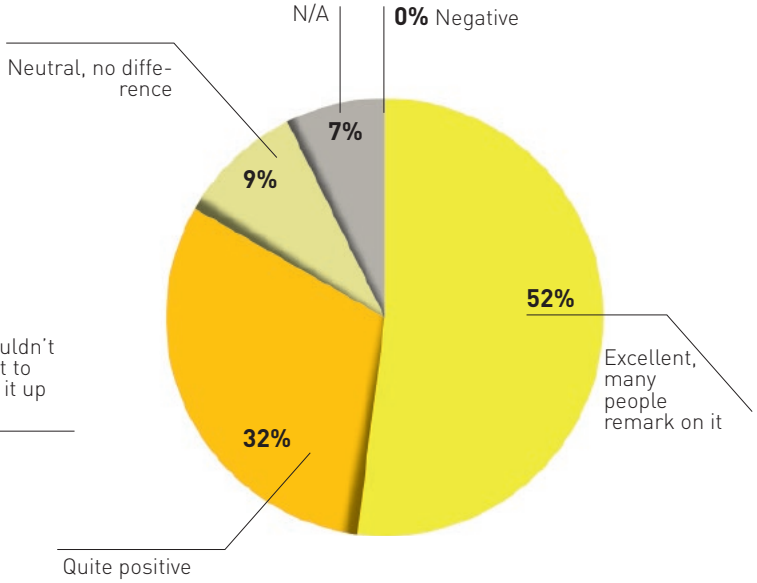
Exchange of experiences

When selecting delivery centres for the project, the company makes sure that several electric vehicles are assigned to one centre. This way, the deliverers can exchange experiences. It has the added effect of reducing costs for charging stations required.

How satisfied are you with your electric vehicle in general?



What is the reaction of customers to the use of electric vehicles?



Survey of post deliverers on the use of electric vehicles for delivery (Source: Statusbericht Post 2014)

Unresolved challenges for vehicles in operation

Pedelecs

E-bikes have potential for improvement: As their electric motor makes them heavier than conventional bicycles, their braking efficiency is problematic, particularly when the road is wet (longer braking distance). The performance of the batteries over their life cycle has room for improvement. The duration of repairs and availability of replacement parts should also be improved to reduce the downtime of e-bikes and increase their annual kilometres travelled.

Electric scooters

Deliverers commented favourably on the driveability and braking efficiency of electric mopeds. The dimension of the kick stand could be improved.

Electric cars

Electric cars performed well in terms of load capacity and driveability. Improvements could be made in steering, suspension and ground clearance. The range needs to be improved for all vehicle types, as it is very limited at low temperatures between +10 °C and -10 °C. The overall findings of the test phase are positive, as a survey of the 243 deliverers already using electric vehicles showed.

WE NEED PIONEERS!

Pioneers don't always have it easy. They do not stick to the beaten and well-known path, they seek something better than the old status quo. Like the first settlers in the United States of America who travelled west in their covered wagons despite the unknown dangers and exertion. Those of them who, after a long and arduous journey, finally reached the Pacific coast in California – the end of the road – passed some of their pioneering spirit on to their descendants. It is no accident that that region has the highest density of innovators, who still believe that things could be better and that the best has not yet been found. The Austrian model regions for electric mobility also have people who are filled with that same spirit: As pioneers, you know the obstacles, the struggle and the courage needed to go forth into the unknown, despite the sceptics who today say "that will never work". But in just a few years we will hear many of these same people say, almost arrogantly: "I always knew electric mobility was the way of the future." And you will think, "Yes, but we were the pioneers who cleared the way." We need pioneers like you! Whether in California or in the model regions in Austria – we need pioneers who are courageous, visionary and clever enough to recognise changes and opportunities ahead of the masses. See you in the future!

Lars Thomsen
Futurist

POTENTIAL BUSINESS MODELS

FINDINGS

- Charging infrastructure has the potential to build customer and employee loyalty.
- At the current number of electric vehicles, charging stations in the public space are not yet a profitable business.
- If the market share of electric vehicles increases, a new electricity market is created – one million electric cars would consume approx. 3.5 percent of the current domestic electricity consumption.
- Electric car sharing is already a relevant business model.
- "Vehicle to grid" could become a business model of the future.

One of the main objectives of the model regions is the development and testing of business models that are fit for the future. As the electric mobility market is only emerging, we can expect that the economic success of specific business models will only become apparent in the medium to long term.

Reorganising existing fleets – integration into commercial fleets

The comparison of the TCO calculator of VLOTTE shows that electric vehicles have considerable benefits over conventional cars with combustion engines. Their initial purchase cost may be higher, but their operation and maintenance is cheap and they are eco-friendly, energy efficient and quiet. The use of electric cars in commercial vehicle fleets is already economically feasible. When looking at the overall cost, electric mobility is particularly interesting for businesses.

EMIL[22] – electric car sharing is a relevant business model

The traditional model of a business transaction between manufacturers and users of vehicles for individual transport, where a vehicle is purchased and its title passes completely to the user, is increasingly being supplemented by alternative models.[23] Car sharing is becoming a successful new business model. Car sharing is a system where a car (electric or not) is used optimally: The purchase costs are distributed among many users. At the same time, the cost of vehicle ownership sinks with every driven kilometre.

Experiences from the model regions for electric mobility have shown that an (electric) car sharing station outside a building can increase the value of the property and contribute to the decision to buy or rent a place. Experiences show that it can take some time (up to 2 years) for potential users to plan their mobility around the service – a car sharing station is therefore not necessarily profitable immediately.

22 See chapter "Electric car sharing – use it when you need it"
23 ISI Fraunhofer (2012a)

Business models for charging infrastructure

The development of charging infrastructure in the public and semi-public space is time and cost intensive. For such business models to be economically successful, the market penetration of electric vehicles has to increase considerably. The driving forces active in the model regions, however, have increased the speed at which this point will be reached considerably.

Battery electric vehicles consume electricity. If we assume that the number of electric vehicles will continue to grow in Austria, that is a considerable potential market for energy suppliers. The following example may serve to illustrate the potential market for electricity for electric vehicles:

At an average consumption of 15 kWh/100 km, an annual average of 14,000 kilometres and a wholesale price of €-cent 6.81/kWh on the market, one million electric vehicles would need electricity worth approx. €143 million.[24] That is approximately 3.5 percent of Austria's current electricity consumption.

In addition to the potential it harbours for energy suppliers, the expansion of electric mobility and the necessary charging infrastructure is also desirable for the national economy: It reduces the dependence on oil imports for the transport sector, and if renewable energy from Austria is used to charge the vehicles, it benefits the Austrian economy and secures jobs.

Charging infrastructure for electric vehicles, however, also has the potential to inspire customer and employee loyalty. The question is which business model is the best for whom, depending on whether they provide infrastructure service, only act as the operator, or offer complete service packages.

Private charging stations

These are charging stations on private property that are not open to the public. However, some owners of private charging stations allow "visitors" to charge their vehicles. In the model regions, charging infrastructure for private individuals and businesses is generally provided as a one-stop service: Installation, installation check, maintenance and energy supply are usually offered by the local energy supply company, making it an interesting tool for customer retention with the potential to increase turnover.

Semi-public charging stations

These are charging stations at parking garages, shopping malls, restaurants and in other semi-public locations. Semi-public charging stations are located on private property that is publicly accessible (sometimes only during certain hours of the day). In the semi-public area, Lower Austrian energy supplier EVN, for example, acts only as operator and sells semi-public charging stations. This allows a quick reflux of investment capital and limits its responsibility to operating the station and billing for the electricity used. The owner of the charging station benefits from the simple one-stop solution that allows the use of a single customer card to charge the car in all of Lower Austria.

Fast charging stations, in particular, could be a lucrative business model for operators of shopping centres or supermarkets. In addition to the revenue from selling electricity, they can also generate more income in their core business, as drivers spend the time they wait for their battery to charge by doing their shopping.[25]

Public charging stations

Public charging stations are located in the public space and are available to anyone (e.g. on the roadside or public parking lots). They require permission from the local authorities. Charging stations in the public space are usually also operated by electricity supply companies. The choice of location and a traffic analysis are important for reaching a good rate of utilisation. The charging stations can also be used as an advertising area (like the ones in the semi-public space) to generate more revenue.[26]

24 Wholesale price of base load electricity (40 percent households and 60 percent industry) based on data from e-control (2015a) and Wirtschaftsblatt (2015)
25 PWC 2012
26 NPE (2014)

Energy generation – vehicle to grid

Electric cars have promising potential as temporary storage for excess energy from renewable energy plants. After charging the car, the electricity can be used to run the vehicle or extracted from the car battery by other energy consumers. This allows an optimum use of generated energy.

This is currently being tested in the smart grid model municipality Köstendorf in the Flachgau area of the Province of Salzburg as part of a flagship project in cooperation with the Salzburg model region for electric mobility. One in two households in one part of the town will receive a photovoltaic installation and an electric car. Smart grid components such as charging stations, inverters and a local grid transformer will help balance supply and demand in a way that ensures smooth operation. Users can use the electricity generated by their own photovoltaic installation or feed it into the grid. This means they can both consume and produce energy – "prosumers" become part of the energy supply system.

A mobility model with electric car sharing, e-bikes and attractive public transport services as well as a social concept (intergenerational living) complement the project.

CONDITIONS FOR SUCCESSFUL ELECTRIC MOBILITY

For electric mobility to be introduced successfully, certain conditions must be met. Generally speaking, the use of efficient electric vehicles in Austria must become more attractive. The model region managers say the implementation could be done in a cost-neutral way.
Surveys of (potential) users[27], however, show quite clearly where they see room for improvement when it comes to making electric mobility attractive. The main areas mentioned were:[28]

- costs
- range
- infrastructure

Drivers for a higher market penetration of electric mobility

Tax cuts as a direct subsidy for buying a vehicle are more visible than good conditions or subsidies for other services (e.g. public transport tickets). In the current taxation reform, a tax refund for companies buying electric vehicles will be granted from 1 January 2016 on.

Regulation of remuneration in kind for employees: As part of the tax reform, the private use of company vehicles will not count as remuneration in kind for electric vehicles from 1 January 2016 on.

More delivery zones and times for electric commercial vehicles – e.g. exceptions for the quiet electric vehicles in areas and at times where conventional vehicles are not allowed due to noise.

The implementation plan "Electromobility in and from Austria" was developed by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, the Federal Ministry of Transport, Innovation and Technology, and the Federal Ministry of Science, Research and Economy together with external experts and adopted by the Federal Government in July 2012. It defines 65 concrete measures to be initiated by the ministries individually or together.[29]

27 ISI Fraunhofer (2012b)
28 Umweltbundesamt (2014)
29 BMLFUW, BMVIT, BMWFW (2012)

Parking management: The road traffic regulations do not include rules regarding the reservation of parking spaces for electric vehicles. There are no uniform traffic and information signs.

Charging stations are often misused as parking spots by people who are not charging their car. At public petrol stations in Klagenfurt, parking and stopping is prohibited except for electric vehicles being charged for a maximum of three hours. Since the reserved parking spots were marked green, drivers respect them. Another problem are plug-in hybrid cars that pretend to be charging. The model regions believe the traffic code should be adapted, intelligent charging systems installed, and parking enforcement for public charging parking spots should be implemented by the municipality. Currently, fast charging stations are often set up on private property, as users of conventional cars abusing them may be charged with trespassing, which has a deterring effect.
In Graz and Klagenfurt, electric vehicles are exempted from short-term parking fees (requirements: Klagenfurt – green sticker, Graz – exemption certificate).

Electric mobility in housing estates: An important factor for changing over to electric vehicles is the availability of parking spots with charging stations in housing estates. There are no legal regulations concerning this yet.
In order to promote electric mobility in a holistic way, mobility aspects must be considered in every construction project. With an increase in the number of electric vehicles, the demand for suitable parking spaces grows as well. The availability of suitable infrastructure in the residential area or estate is a deciding factor for the purchase and use of electric vehicles. In the model region Graz, a manual was created to help property developers in this matter.

Changes to the parking space requirement for buildings: All construction projects should include measures that make it easy to retrofit the building later (e.g. laying empty cable conduits for future charging stations).
An overarching strategy, such as concrete goals laid out in strategy papers with a longer timeframe (like in the energy-autonomy programme of the Province of Vorarlberg), is important for the success of electric mobility.

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ABBREVIATIONS

BEV	*battery electric vehicle*
BMLFUW	*Federal Ministry of Agriculture, Forestry, Environment and Water Management*
BMWFW	*Federal Ministry of Science, Research and Economy*
BMVIT	*Federal Ministry for Transport, Innovation and Technology*
CNG	*compressed natural gas*
CO	*carbon monoxide*
CO_2	*carbon dioxide*
EV	*electric vehicle*
EVN	*Energieversorgung Niederösterreich (energy supplier)*
GHG	*greenhouse gas*
H_2-FCEV	*hydrogen fuel cell electric vehicle*
km/h	*kilometres per hour*
kWh	*kilowatt hour*
kWp	*kilowatt peak*
LCV	*light commercial vehicle*
MW	*megawatt*
NO_x	*nitrogen oxide*
NOVA	*standard fuel consumption tax*
PHEV	*plug-in hybrid electric vehicle*
PV	*photovoltaic*
REEV	*range extended electric vehicle*
SO_2	*sulphur dioxide*
TCO	*total cost of ownership*
TWh	*terawatt hours*
Vkm	*vehicle kilometre*

ANNEX I: "MODEL REGIONS OF ELECTRIC MOBILITY" – OVERVIEW

illwerke vkw VLOTTE ELEKTRISCH MOBIL

Model region VLOTTE, Vorarlberg

The successful VLOTTE project – headed by energy company illwerke vkw and operating in cooperation with numerous partners in Vorarlberg – is a pioneer of the practical use of electric mobility and has demonstrated its feasibility in everyday use. In 2009, VLOTTE started the first model region for electric mobility, bringing 357 electric cars onto Vorarlberg's roads within three years. 159 public charging stations, including three fast charging stations, were installed. The aim of the VLOTTE project was to provide affordable and sustainable electric mobility to users directly. This was implemented with the business model of a mobility card, which customers can use for a flat monthly fee. The cost of the mobility card includes the rental fee for an electric car, charging, all maintenance fees for the vehicle and an annual ticket of the Vorarlberg public transport association.

The results of the VLOTTE project after 6 years:

- 459 electric cars in everyday use
- 10 million kilometres travelled
- 159 charging stations installed, three of them fast charging stations
- Successful follow-up projects have been launched

Size of the area: 260 km^2

Project start: 2008

Project end: 2011

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ElectroDrive Salzburg

The project ElectroDrive Salzburg has been a pioneer in creating and managing the infrastructure for electric mobility in an urban area. In 2010, the main focus of the service was on rental electric vehicles. Later, the core competence of the company ElectroDrive shifted to expanding and developing the charging infrastructure.

Interim results of the project ElectroDrive Salzburg:
- 703 two-wheel and 348 four-wheel vehicles in use (project goal: 703 two-wheel and 370 four-wheel)
- 221 charging stations installed (project goal: 192)
- 3 new renewable energy power plants

Size of the area: 6,100 km²

Project start: 2010

Project status: in progress

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e-mobility on demand, Vienna

The model region Vienna has set itself the goal of creating an integrated transport system in which public transport, electric mobility and electric car sharing complement each other perfectly. The focus is on multimodal transport centred on public transport, setting up locations with a wide range of services with electric vehicles, retrofitting company fleets and developing a multimodal mobility card for users. NeuMo (Neue urbane Mobilität Wien GmbH) was set up as a central point of contact for commercial users to connect them with electric mobility services. Green electricity for electric mobility is provided by new photovoltaic plants and and wind turbines.

Interim results of the project e-mobility on demand:
- 146 four-wheel electric vehicles in use (project goal: 175)
- 350 charging stations installed (project goal: 440)
- Use of electric buses on public transport routes

Size of the area: 2,000 km²

Project start: 2012

Project status: in progress

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e-mobility Graz, Styria

The project e-mobility Graz has made an important contribution to successfully implementing sustainable mobility in metropolitan areas. Its vision is for people to be mobile in Graz without owning a car. It aims to provide sustainable mobility offers for business and private customers in the model region of the metropolitan area Graz with leasing, cars haring and car rental offers. This approach of combined mobility focuses on a wide range of offers and aims to integrate both public and individual transport. The public transport holding company Graz Linien is complemented by cars haring and electric taxis to balance peak loads at rush hour and connect the periphery to the rest of the region.

Results of the project e-mobility Graz:

- 1065 two-wheel and 331 four-wheel vehicles in everyday use (project goal: 480 two-wheel and 250 four-wheel vehicles)
- 454 charging stations installed (project goal: 468 charging stations)
- Combination of public transport, car sharing and electric taxis
- Balancing of peak loads and integration of the peripheral regions
- Integration of electric vehicles into vehicle fleets
- Creation and expansion of car and bike sharing platforms

Size of the area: 1,584 km^2

Project start: 2012

Project status: in progress

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e-mobil in niederösterreich

e-pendler in niederösterreich, Lower Austria

The project e-pendler in niederösterreich generates valuable findings on the design of public transport in regions with high commuter traffic. The model region includes 49 municipalities in Lower Austria located between Vienna and Wiener Neustadt with over 15,000 places of employment and over 126,000 employees. The concept of the project is based on the integration of electric vehicles into individual transport and shifting commuter traffic to public transport. In order to make the implementation as efficient as possible, all aspects of electric mobility (vehicle and components, charging station and green electricity supply) should come from one provider. This model project will be a valuable example particularly for rural areas close to large urban agglomerations.

Interim results of the project e-pendler in niederösterreich:

- 60 two-wheel and 105 four-wheel electric vehicles in everyday use by commuters (project goal: 86 two-wheel and 105 four-wheel vehicles)
- 150 charging stations installed (project goal: 161)
- Combination of public transport and electric mobility
- Integration of the peripheral regions around Vienna and Wiener Neustadt
- Multiplying function for electric mobility in Lower Austria's municipalities

Size of the area: 740 km²

Project start: 2012

Project status: in progress

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E-LOG Klagenfurt, Carinthia

The objective of this model region is the use of a decentralised logistics centre and a commercial building on the outskirts of Klagenfurt for managing a fleet of 200 electric commercial vehicles. The vehicles are made available to companies including the necessary charging infrastructure. Additionally, an electric shuttle operated with fuel cell technology will run between the logistics centre and the city centre of Klagenfurt to deliver goods to the inner city. For electricity generation, photovoltaic installations with a surface area of approx. 6,300 m^2 will be built.

Interim results of the project E-LOG Klagenfurt:

- 45 two-wheel electric vehicles in everyday use by companies (project goal: 200)
- 104 charging stations installed (project goal: 300)
- 550 kWp photovoltaic installation set up on the roof of the city hospital

Size of the area: 700 km^2

Project start: 2012

Project status: in progress

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e-Mobility Post, Austria

This project is unique among the model regions as it is the strategic conversion of the vehicle fleet of a major Austrian company. Although the main focus of the project is on Vienna and its surroundings, the structure of the company means that the effects are visible across Austria. The objective is to deliver at least part of the mail using electric mobility. The long-term vision is a carbon n-neutral postal delivery system for all of Austria. In addition to procuring electric vehicles, the company also offers classes that teach postal workers energy-efficient driving in an electric vehicle, which are carried out by the automobile club ÖAMTC and driving schools across Austria.

Interim results of the project e-Mobility Post:

- 463 two-wheel and 125 four-wheel electric vehicles in use (project goal: 848 two-wheel and 309 four-wheel vehicles)
- 119 charging stations installed (project goal: 309)
- The only nationwide model-region project
- Special training for drivers
- Large photovoltaic installations in Vienna and Upper Austria

Size of the area: all of Austria

Project start: 2011

Project status: in progress

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ANNEX II: OVERVIEW OF THE NETWORKING PROJECTS OF THE MODEL REGIONS 2012 – 2014

The seven model regions are implementing numerous projects to promote further development and better networking.
The table below shows the projects started or completed in the model regions since 2012. More information on the projects is available at e-connected.at.

Projects from the 2012 call	Project content
eXchange – Vernetzungsplattform der Modellregionen	The requirements for a networking platform were developed together with the existing model regions of electric mobility.
Interoperable E-Fahrzeug Verleihplattform	Development of an intelligent web/app-based user-friendly booking platform and gradual integration of different mobility options, e.g. payment functions, better internal and external networking, etc.
Interoperables Ladestellenmanagement	Development of an operating software for charging stations that allows uniform payment.
Testaktion, Trainings, Bewusstseinsbildung	Carrying out electric vehicle testing campaigns for municipalities and companies, workshops with representatives of municipalities and tourism associations, e-bike road shows and training for vendors.
Elektromobilität für Wohnbausiedlungen	Establishing electric mobility (vehicles, charging infrastructure, etc.) directly in residential estates.
Urbane E-Lieferservices	Evaluation of potentials for the introduction of urban electric delivery services and development of business models.
VLOTTE EMOTIONS Mobilitätszentrale	Well-presented and up-to-date information on electric mobility is supplemented by competent advice on the vehicle models available on the market.
VLOTTE EMOTIONS Wirkungsanalyse	Effect analysis based on everyday experiences of users.
VLOTTE EMOTIONS Dissemination	Analysis and visualisation of impacts on electric mobility to provide a qualified and quantifiable basis for decision-makers in politics and business.
Konsistentes Usability Design	Development of recommendations for a consistent design of electric mobility systems; catalogue of measures for coordinated cross-regional implementation and schematic visualisation of selected system elements.

Projects from the 2013 call	Project content
Floating Fleet – Bluetooth Schloss	Floating fleet for Graz Bike with an add-on electronic bicycle lock with smartphone app for booking and using bikes: Testing suitability for daily use and transferability to other model regions.
LLEM (Lokales Last- und Energiemanagement)	Local load and energy management to contribute to mitigating supply risks for users, charging stations operators and energy suppliers.
MISch (Modellregionsüber-greifendes Interoperables Schnellladen)	Expanding the range of electric vehicles beyond the core area of the model regions for electric mobility Vienna (e-mobility on demand), e-mobility Graz and e-pendler niederösterreich with interoperable fast charging infrastructure.
Elektromobilität für den Berufsverkehr testen	Although the journeys to and from work or place of education are the most important reason for travel, electric mobility is scarcely used in this segment. The aim of the project is to develop affordable, needs-oriented and environmentally friendly e-mobility packages for work and education trips.
bewusst e-mobil sein	Implementation support of electric mobility services with strong awareness-building measures to speed up the process and (possibly) exceed the ambitious goals.
e-park & drive	Initiate a new mobility alternative for commuters: Integration of electric bikes and bicycle storage boxes into park & ride strategies.
Stromsparende Fahrweise bei der Österreichischen Post AG	EcoDriving training with electric vehicles, monitoring of the effects and development of a training handbook.
VLOTTE MEET & CHARGE	Creating a denser semi-public charging infrastructure in a rural environment.

Projects from the 2014 call	Project content
E-Mob 2.0 in der Modellregion Salzburg	Combination of electric car sharing for private and commercial use with a non-discriminatory fast charging infrastructure (DC).
SOCIAL e-DRIVE – Elektromobilität im sozialen Praxistest	Mobile social services test electric vehicles in their daily work and share their experiences on an online platform and in regional media.
E-Mobilität Vorau(s)	Information and awareness-raising measures in the climate and energy model region EnergieIMpuls Vorau.
Informations- und Bewusstseinsbildungsmaßnahmen in der Klima- und Energie-Modellregion EnergieIMpuls Vorau.	Computer-supported expert system with initial information and interactive advice on the use of electric mobility.
„IdEE": „Infotag der Elektromobilität, das Event"	Development and implementation of a concept for a large information event on electric mobility.
E-Fahrzeuge für den Kommunaleinsatz	The Province of Vorarlberg and the environmental association of municipalities Umweltverband Vorarlberg want to work with VLOTTE to utilise the potential of electric delivery vans and small lorries up to 3.5 tonnes.
e-Contest – Elektromobilität im ländlichen Raum	Getting people living and working in rural areas who have had little or no contact with electric mobility so far involved through a competitive approach between municipalities and businesses.
Open E-Mobility	Increasing acceptance of electric mobility in rural areas.
E-Mob-Train – E-Mobilitäts-Training	Development of low-threshold training measures that are easily accessible, flexible and allow participation for people in full-time employment.
e-Gastro – Entscheidungshilfe für Hotellerie und Gastronomie	Planning, implementation and testing of a practical web-based decision-making tool with personal contact for hostelry and restaurant businesses.
Automatische Pedelec Verleihplattform Wr. Neustadt	Fully automated bike rental systems with 15 electric bicycle stands each will be set up at the main station and the university of applied sciences in Wiener Neustadt.
Modellregion Elektromobilität Perchtoldsdorf	Setting up three electric bike rental stations in Perchtoldsdorf.
e-Nutzfahrzeuge-Datenbank	Web database of electric commercial vehicles as a decision-making tool for companies. The website will provide up-to-date information on technical features, load capacity, range, battery, warranty, cost, subsidies, etc.
office center eMobility b2b solution	B2B sharing solutions for mobility and logistics requirements of business and office centres in the centres of urban agglomerations.
emobil bringt´s – Leitfaden für Lieferservices	Development of well-founded decision-making tools for the use of electric vehicles for new or existing delivery services.
E-Mobility in der Fahrschule: Pilotprojekt zur Fahrausbildung auf Elektrofahrzeugen	Testing a new training course that should reduce the extreme neglect of electric vehicles in driving schools if successful.

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