

Implementation plan

# Electromobility **in and from** Austria

The common path!

Federal Ministry of Agriculture, Forestry,  
Environment and Water Management (BMLFUW)

Federal Ministry for Transport,  
Innovation and Technology (BMVIT)

Federal Ministry of Economy,  
Family and Youth (BMWFI)

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## Imprint

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## Foreword

Everyone is talking of electromobility. Austria is pushing it. That is the declared objective of our common initiative for the implementation plan for electromobility in and from Austria. That plan, drafted following wide consultations involving some 200 experts, has now been completed for presentation. We would like to most cordially thank all those who that have contributed their expertise.

The targeted development of electromobility in Austria is meant to be vital in making our mobility and transport system more sustainable, more environment-friendly, and more efficient.

Electromobility can contribute significantly to the protection of the environment and climate protection as it reduces our dependence on imports of fossil energy sources owing to its greater use of renewable energies and its enhanced energy efficiency.

We understand electromobility to be an intermodal mobility system of railway, e-commercial vehicles, e-busses, and e-passenger cars, e-scooters, and e-bicycles. The set-up of intelligent power supply grids and charging infrastructures is to be an important prerequisite. Attractive combinations with public transport are to offer tailor-made electromobility facilities. Mobility must be affordable for the Austrian citizens also in the future. Any motivation of individuals as well as fleet operators to use clean and low-emission vehicles for the transport of persons and cargo needs to be intensified.

Electromobility from Austria is an enormous opportunity, mainly for the technology and business location Austria, so as to successfully position itself, with innovative state-of-the-art technology in, say, the automotive and automotive components industries, and with intelligent energy and mobility services, on international markets. These opportunities need to be taken advantage of, and must be actively supported. Electromobility, therefore, is now at the centre of research, development and production, so that innovation power and ranking of Austria is enhanced, as well as added value and employment are sustainably secured.

Electromobility may finally also establish promising future-oriented options in education and training, as well as job profiles, and also create jobs and new employment opportunities, especially for young people.

The promotion of electromobility will need the commitment of all parties active in that field, such as the regional authorities and entities, businesses, institutions, platforms, and associations. A good start are successful activities and initiatives, research and support programmes, model regions, and lighthouse projects, the already high share of renewable energy, the extensive know-how of Austrian enterprises, and also the keen interest of the public. We want to make use of that dynamism, develop and enhance it. The present implementation plan is, in that sense, to be a pronounced impulse as it is a wide implementation platform on behalf of the Federal Government.

We would like to invite all those interested to support electromobility in and from Austria, and also actively participate in its development. Let's seize the big opportunities generated by electromobility for the citizens of Austria, for environment, mobility and technology, energy and economy!



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# 1 Executive summary

## **„Electromobility in and from Austria“**

*State-of-the-art technology developed and produced in the „innovation country“ Austria contributes vitally to the gradual implementation of electromobility in domestic, European, and international transport systems, it strengthens the business location, creates new jobs, and helps to reduce, by the growing use of renewable energies, as well as an increased energy efficiency, emissions generated in transport, and thus to protect climate and environment.*

In the sense of the above vision, the issue of electromobility is understood to be an interdisciplinary issue of the innovation fields transport, environment, and energy. The implementation of electromobility in Austria addresses mainly transport and energy systems so as to contribute to an affordable, demand-oriented mobility, and to the protection of the environment. Research, development, and innovation up to the production of structural components, and system-integrated solutions from Austria open potentials of added value and employment for the relative sectors, such as the automotive industry, or the electric and electronic industries.

Here, Austria has a highly favourable starting position owing to the commitment that is well reflected in well-established research and support programmes, initiatives, and large demonstration projects, high technological know-how in enterprises, a well-developed transport system, as well as an efficient energy system featuring 70 per cent renewable energy in the power supply mix. These competences have to be further upgraded.

In the sense of a common road, the federal ministries BMLFUW, BMVIT, and BMWFJ have worked out, at the request of the Federal Government, the present implementation plan for electromobility IN and FROM Austria, with measures to be initiated short-term based on a broad consultation process. The activities, to be harmonised interactively, aim at establishing optimum conditions paving the way for electromobility in everyday performance quickly, on the one hand, and on the other, to use the opportunities entailed for Austria as best as possible.

So as to implement electromobility in the transport and energy systems in Austria, steps have to be consistently taken to launch and establish intelligent incentives systems on the market, raise awareness for new mobility solutions, and maximise positive impacts on the environment.

The objectives of the measures for the electromobility IN Austria are the integration into the entire transport system, the creation of an intelligent incentives system complying with the requirements when preparing for, and launching it on the market, safeguarding the development of an inter-operable, demand-oriented infrastructure, the supply of electromobility with cost-efficient renewable energy in the long term, as well as the stimulation and evaluation of positive impacts on the environment.

Electromobility from Austria involves the fields research, development, and innovation up to the production of parts, components and system-integrated approaches to solutions. Here, the technology and business location must be secured on an international platform, and further established, and also education and training, qualification, and professional skills must be strengthened.

The measures for electromobility FROM Austria focus on an active business location policy. Research and development competence of the Austrian industry must be strengthened, the innovation process must be supported as far as the industrial production process. Competitiveness must be stabilised in the long term as an open economy on the international platform, and the business location Austria in the field of electromobility must be promoted by enhancing qualification and competence in a targeted manner.

With the present implementation plan, the federal ministries will take the further steps to successfully implement electromobility IN and FROM Austria. The ministries as quoted will assume the responsibility to initiate and implement these measures; they will take the lead to kick off any further cooperation between politics, administration, research, and industry, in the sense of pursuing a common path.

It is their objective to make use of, and prioritise the pursuit of, any opportunities, as best as possible, for the citizens of Austria, also with the environment, mobility and technology, energy and economy in mind.

## 2 Motivation

Electromobility is a technology that will, in the future, affect, more and more, the everyday lives of those participating in traffic and the use transport. Electromobility, as an interdisciplinary issue of the fields transport, infrastructure, technology, energy and environment, is a central issue of the economy and also the business location for Austria. Highly promising innovative technologies and pilot applications already show today the potential of hybrid-electrically and purely electrically powered vehicles, and also clearly point to the immediate demand to bundle the numerous forces active in that field so as to successfully implement electromobility.

**>> Electromobility is an issue of the future world-wide!**

**>> Electromobility has potential for the technology and business location, as well as for the protection of climate and environment in Austria**

- ▶ to demonstrate Austrian innovations and technological competence,
- ▶ to enhance the competitiveness of the Austrian production location and increase the number of jobs,
- ▶ for an efficient mobility, embedded in an inter-modal optimum overall transport system, in the integrated public transport,
- ▶ to make the mobility of the future affordable,
- ▶ to safeguard a clean and environment-friendly mobility, with the market supplying cost-efficient renewable energy.

The Federal Government as represented by the ministries BMVIT, BMWFJ, BMLFUW, has made it their objective to make use of these big potentials for electromobility in and from Austria as best as possible. Therefore, the focus will be, in the long term, on that interdisciplinary issue.

As a common initiative of the Federal Government, a coordination process for electromobility was created, to encompass the activities already under way. The interministerial steering group, supported by an advisory board, will be in charge of that continuous harmonisation and coordination. This process is to be continued further on, so that the implementation of electromobility is supported and the business location secured.

In a broadly conceived consultation process, some 200 experts from research, industry and economy, administration, business and interest groups were involved to identify action fields and to draft proposals for measures. We would like to cordially thank all institutions, experts, as well as the members of the advisory board.

On the basis of the available implementation plan, drafted during a broad consultation process, any optimum prerequisites for electromobility in and from Austria to be further intensified are to be established. The federal ministries involved in the measures are taking the lead initiating any further cooperation.

### 3 Austria's way towards electromobility

As all forces are bundled the opportunities and potentials of electromobility are utilised as best as possible. The Austria Federal Government, aligning to joined efforts, orients itself at the following vision:

#### **„Electromobility in and from Austria“**

*The state-of-the-art technology developed and produced in the “innovation country” Austria contributes considerably to the gradual implementation of electromobility in domestic, European, and international transport systems, strengthens the business location, creates new jobs, and helps, by increasingly using renewable energies, and also an improved energy efficiency, to reduce the emissions caused by transport, and thus protect climate and environment.*

Austria considers, in the system electromobility, the user-friendly development and integration of vehicles and demand-oriented infrastructures, their enhanced energy efficiency, as well as the increased use of cost-efficient renewable energies as contributing to the reduction of emissions caused by transport.

It is the overall system electromobility, from research and development, marketable products and services, the generation of energy, automotive technology and components, energy storage, customer-oriented charging infrastructure, ICT systems, and smart-grid integration, to the national inclusion in intelligent transport and energy concepts, the performance of public transport and the energy supply that is taken into consideration here, with international alignment being fundamental.

Electromobility is uncontestedly more than the substitution of conventionally powered vehicles. Electromobility, therefore, calls for the systemic integration of components, vehicles, communication, control electronics, and technical infrastructure, as well as organisational and user-oriented concepts. Vehicles will be gradually introduced in different applications and for different purposes, with respective vehicle models adequately powered by electricity made available.

Austria, therefore, pushes the development of clean, at least partly electrified vehicles for individual and commercial motorised transport, as well as smart integration in innovative mobility features and services. All partly or fully electrically powered means of transport, such as passenger cars, commercial vehicles, busses and trains, especially battery electric vehicles (BEV), range-extended electric vehicles (REX/REEV), plug-in hybrid electric vehicles (PHEV), and also fuel cell hybrid electric vehicles (FCHEV) come in here. Additionally, there are pedelecs, e-bicycles, e-scooters, and e-motorbikes, also off-road and niche vehicles.

In the short and medium term, it is the issue of hybrid vehicles, and also range extender solutions that pose unique challenges and opportunities.



In Austria, already a multitude of activities and initiatives on behalf of the Federal Government, the federal provinces, the cities and municipalities, has been triggered by projects in the fields of research, development, demonstration and model projects, as well as support initiatives, all of which have generated most valuable experience, knowledge, and a positive attitude vis-à-vis electromobility. Numerous enterprises in Austria have been investing innovative projects in that field. Following that, a favourable starting point was created that is to be further elaborated and developed, so as to safeguard planning and investment security. The high share of approximately 70 per cent of renewable energy in the Austrian power mix underlines that favourable starting position.

All those measures create an important momentum. Together with the contributions from the consultation process important activity areas could be identified to be materialised by the respective responsible and competent federal ministry in line with the medium- and long-term effective measures for electromobility in and from Austria set forth in the present implementation plan.

Research, development, production, and services related to electromobility FROM Austria are a good basis to further develop the transport and energy system IN Austria, and can sustainably achieve positive effects for the environment.

The measures, coordinated and harmonised, for the individual fields of activity as laid out in the present implementation plan, contribute to the future-oriented configuration of positive requirements and of innovation-promoting political instruments of Austria, thus securing the transition of technology developed in Austria for series production and market launch.

## 4 Electromobility IN Austria

In Austria, an affordable and intelligent future mobility system must contain, as a central component, approaches to an environment-friendly, resources-saving individual mobility, a well-developed public transport system, as well as an optimised and inter-modal overall transport system. By using electromobility, the energy efficiency can be significantly increased. Using more cost-efficient renewable energy sources moreover contributes to the reduction of greenhouse gases. The reductions of greenhouse gases and air pollutants achieved are an important contribution to an environment-friendly mobility in Austria.

Suitable prerequisites in the fields of energy generation up to the supply of energy are to contribute to the creation of an intelligent energy system (smart grid). Here, also innovative businesses and business fields for end-users are to be developed so that electromobility can be launched on the market on a broad basis. Harmonised programmes and measures are to safeguard the transition of technology developed in Austria to its launching on the market.

The Federal Government sets measures for electromobility IN Austria in the following fields:

- ▶ Electromobility in the overall transport system
- ▶ energy system and charging infrastructure
- ▶ preparation of the market and incentives system
- ▶ raising awareness and information
- ▶ effects on the environment and monitoring

### 4.1 ELECTROMOBILITY IN THE OVERALL TRANSPORT SYSTEM

Electromobility stands for technical and organisational solutions for passenger and freight traffic, and is thus an important contribution, when it comes to establishing clean and affordable mobility options in the future transport system. In the long term, the use of energy and the traffic emissions will be reduced.

Measures, harmonised time-wise, for the gradual use of such innovative technologies, from planning, adaptation, procurement and operation of transport areas and infrastructures, as well as their optimum use to secure the living space in the interest of the public welfare, are central to that end.

Electromobility in the overall transport system is to be viewed according to its use so that its advantages, drawbacks, and potentials become clear.

Here, the use of electromobility must be differentiated as to space (in disperse regions or urban areas), and, on the other hand, as to its application (delivery services, or novel mobility services), and to be set against its embedding in inter-modal transport systems, public transport connections, or any changes of user mobility demand.

**Electromobility as a solution component in the transport system**

**Differentiation according to use and applications**

The largest potential of electromobility with a view to the overall transport is, in addition to the three-fold energy efficiency of the electrical drive system in the vehicle itself, clearly in those applications that can induce a change of behaviour. That primarily means a more conscientious attitude towards mobility, and the choice of suitable mobility tools, such as the bicycle, the passenger car, and the interconnected inclusion of the services of public transport in the daily travel chains.

The prerequisite for an efficient passenger transport or freight traffic is, on the one hand, the availability of user-friendly electric vehicle models – with different electrical drive system solutions – and an adequate infrastructure (charging, filling, communication), as well as, on the other hand, an adequate network of information, service and maintenance facilities. Any inclusion and use of public means of (mass)transport is to be pushed here.

One- and two-track vehicles in different models are already available on the market such as purely battery electric vehicles (BEV), range-extended electric vehicles (REX/REEV), plug-in hybrid electric vehicles (PHEV), and hybrid electric vehicles (HEV). Moreover, pilot test are being made in smallest series of hydrogen and fuel-cell electric vehicles (FCHEV).

Infrastructures for electromobility are important both for moving traffic, and for stationary traffic, as well as the connection with other means of transport or systems. Charging infrastructures for the stationary individual motorised traffic are considered to be relevant. It is recommended that the demand in public charging stations is identified before they are set up, as vehicles will be charged primarily at the place of departure and that of destination of any journey, thus more than 90 per cent of the stations will be needed at home and at the workplace. For longer distances, also with non-range-extended electric vehicles, targeted installations of fast-charging stations at mobility intersections and at major roads are to be identified and planned. For freight traffic, any non-cable-dependent e-vehicles can only be used for the (inner-city) fine distribution of goods for the time being. For that purpose, charging stations will be needed at certain logistic terminals.

Infrastructures for new mobility services, as well as services to find and reserve free charging stations, and also inter-modal mobility options are to be developed as quickly as possible and to be integrated in already available mobility services. By proceeding that way, the charging stations will be, on the one hand, well used to capacity, and, on the other hand, new station sites can be planned more efficiently. Since, in the future, the demand in the use of vehicles in addition to owning a vehicle, will rise, infrastructure solutions will have to be developed to meet that demand. Here, the challenges are the technical feasibility of compatible systems as well as the creation of a competitive environment.

The implementation of internationally inter-operable electromobility options is to be prepared. Lighthouse projects in Austria and Europe are already working at functional and marketable systems solutions, with any experience from model regions and application regions taken into account and vice versa. Inter-operability is paramount, especially in the still young field of electromobility to enable seamless cooperation of different systems, technologies, and organisations. Common rules and standards are necessary to translate attractive inter-modal electromobility options and functional connection corridors into real terms. This does not only apply to purely technical aspects (such as charging plugs), but encompasses also functional regulative, or organisational aspects (such as e.g. accessibility or roaming). In that context, ICT solutions can play a vital role so that the exchange of information and data via open interfaces are guaranteed. Interoperability offers advantages not only for users but also for the industry. The rational integration of electromobility services without regional restrictions augments the usefulness for passengers and road users, and reduces, due to the extensive potential, the risks of the industry when investing in new business lines.

**Contribution to a conscientious and energy-efficient mobility**

**User-friendly vehicle models and infrastructure**

**Electromobility as a part of integrated mobility services**

### Cooperation as the key to electromobility in Austria

An important contribution to the establishment of electromobility in Austria is the enhanced development of supporting prerequisites, planning standards, regulations, and procedures with the respective stakeholders from administration, industry, electricity sectors, and mobility providers, on the basis of data collection, evaluations, and good-practice solutions.

### Measures

#### Integration of electromobility options in the transport system

So as to secure in the long term multi-modal mobility in compliance with any target group and actual individual demand, the use of electromobility options in combination with available public transport (ÖPNV) for passengers and road users must be simple and easy.

The steps are:

- ▶ the specification of functionalities and systemic requirements for supra-regional inter-operable mobility tickets, with regard to, say, identification, booking, payment and billing for electromobility options, as well as the integration into the clearing point for mobility services. (BMVIT, 2013)
- ▶ the definition of uniform open system interfaces in (traffic) information and reservation systems for any information relative to electromobility as the basis for the development of user-oriented inter-modal electromobility applications. (BMVIT, 2013)
- ▶ the drafting of recommendations and directives for the set-up of public and semi-public charging stations with a focus on user-friendly mobility requirements (supplementary to the catalogue specifying the requirements for the charging infrastructure). (BMVIT, 2012)
- ▶ the drafting of recommendations for fast charging points in Austria with highly-frequented and user-friendly locations. (BMVIT, 2012)

#### Parking facilities for vehicles

Areas dedicated to stationary traffic are to be constructed and adapted, especially at traffic nodes, according to basic national minimum factors, functionalities and design relevant to electromobility.

- ▶ Drafting of national recommendations and planning basics for garages on the basis of technical requirements specifying the adaptation of construction and design regulations for user-friendly parking facilities (P+R, garages, garages in residential houses) with regard to access, authorisation, and billing systems for e-vehicles (RVS et al.). (BMVIT, 2012)
- ▶ Drafting planning basics and construction regulations for secured and unsecured parking facilities for one-track e-vehicles (e-bikes, e-mopeds, and similar vehicles), as well as recommendations for features relevant to electromobility (charging stations, bicycle boxing) for an interconnected use of ÖPNV facilities (especially when in return for payment (box/energy)). (BMVIT, 2012)

### Legislative and organisational framework conditions

The legislation for electromobility-relevant features of areas of moving and stationary traffic are drafted in anticipation, with regard to the integration of electromobility applications, the organisation of inter-modal nodes, the signalling of charging stations, as well that of one- and two-track e-vehicles authorised to enter and make use of the charging stations.

- ▶ Review and adaptation of federal matters such as the Road Traffic Code (StVO), the Motor Vehicles Act (KFG), as well as respective regulations. (BMVIT, 2012)
- ▶ Drafting requirements and recommendations of electromobility for the traffic and area planning. (BMVIT, 2013)

### Special impetus for user-friendly, clean e-vehicles for goods and passengers

- ▶ Making the traffic framework conditions attractive for low-emission fully and partly electrified vehicles (BEV, REX/REEV, PHEV, HEV, FCHEV), thus contributing to an intelligent incentives system. (BMVIT, 2012)
- ▶ Special focus on, and monitoring of, incentives relative to road performance for low-emission passenger and goods transport as well as any sensitive fields of use and application (fleet vehicles, delivery and commercial vehicles, especially in the inner cities). (BMVIT, 2013)

## 4.2 ENERGY SYSTEM AND CHARGING INFRASTRUCTURE

On account of the high share of approximately 70 per cent of renewable energies in the electrical power mix, Austria is most excellently positioned to introduce electromobility. With its ambitious development plans outlined in the “Ökostromgesetz” (Green Electricity Act), Austria will continue to increase that share of renewable energy sources for the generation of electricity. By doing so, the supply of electromobility with cost-efficient renewable energy will be secured, thus contributing materially to tackle the challenge of securing an affordable mobility with the protection of the climate and the energy supply secured.

The charging infrastructure for electric vehicles, tailored to consumption behaviour, plays a key role, as its development is oriented above all at the such user behaviour. Here, also the growing requirements of the electricity grid and the transport system following the increasing number of vehicles are taken into account by integrated system approaches.

### High share of renewable energy is an excellent basis for electromobility in Austria

The utilisation of renewable energy sources for electromobility, and the enhancement of the efficiency of energy and transport systems serve to reduce the emission of greenhouse gases and air pollutants, as well as the dependency on any imports of fossil energy sources. The objective here is the supply of electromobility from a broad spectrum of cost-efficient renewable energy sources.

**Austria is in an outstanding position when it comes to generating electricity from renewable energy sources**

The Austrian electricity mix already consists of a high share of renewable energy. The additional demand of electricity caused by electromobility is already met by the development plans until 2020 for the generation of electricity from renewable energy sources. That provides for an excellent situation for electromobility in Austria.

Any attribution is recorded in the balance sheet according to the EU directive 2009/28/EC laying down the promotion of any use of energy from renewable sources. The Federal Ministry of Economy, Family and Youth is responsible for relevant reports.

Decreasing the demand for energy through wise use and improved efficiency of its use is, beside focussing on renewable energy sources, the second main strategy of the Austrian energy policy. In the international comparison, the successful improvement of energy efficiency in Austria is remarkable. Austria is among those countries that are particularly economical – measured in terms of the economic performance – when using energy. Since the transport sector has a high share in the total energy consumption, electromobility may well contribute to enhance the energy efficiency.

#### **Securing the development of an inter-operable infrastructure in compliance with the demand**

##### **User-oriented roll-out of the charging infrastructure**

The demand in any charging infrastructure dovetails with the spreading of electromobility. Efforts must be made to achieve a positive effect with a sufficient number of charging stations at mobility-relevant locations (starting point and destination), which eventually supports spreading electromobility quickly.

##### **Minimum standards to prevent “stranded investments”, and framework conditions for free competition**

Charging stations are already set up by enterprises, organisations, and regional authorities. In the future, the infrastructure must, however, be rolled out in compliance with the demand, enabling inter-operable solutions both nationally and internationally. In the introductory stage of electromobility, any charging infrastructure will be mainly required in the private sector (households and workplace more than 90 per cent), and semi-public sector (mobility nodes, garages, semi-public parking lots). A catalogue specifying technical minimum standards (safety and technical design) is of vital significance, so as to prevent “stranded investments”, and secure suitable framework conditions for a free competition. It is the responsibility of the provider for the net to comply with the quality requirements as regards stability. Costs as may accrue following the development of the net and/or its enlargement are, however, to be borne by those who instigate them.

##### **A competition model for infrastructure is preferred**

As regards the development of the charging infrastructure, all in all, an open competition model is preferred, which permits any set-up of charging stations provided the respective regulations are complied with. Any roll-out must be oriented, in any case, at demand, cost-efficiency, and its interoperability. Roaming and clearing regulations permitting different billing models, as well as any electricity declarations and pricing will be regulated more precisely if necessary.

##### **Harmonisation of administrative practice and faster handling**

Possible barriers and obstacles arising for any authorisation, and set-up, of charging stations are to be identified. Following that, legal and regulatory measures are to be harmonised for a uniform administrative practice.

To enable any flexible response to future specific requirements relative to electromobility, it is basically deemed expedient that charging stations are connected to the public grid by their own metering points. That mainly applies to publicly accessible charging stations, with several charging stations using one metering point.

The rising number of electrically powered vehicles on the roads of Austria may cause varying loads in the low-voltage grid leading to voltage fluctuations and interruptions. If controlled charging should be necessary in the medium and long term, it is to be considered in the planning procedures and set-up of charging points. It must, though, be taken into account that any control system agrees with customer interests (smart meters/grids).

The issue “vehicle-to-grid (V2G)” is yet one of the future, since it will be of interest economically and technically only following an adequate market penetration, and thus a large number of e-vehicles with a respective storage capacity on the road. However, the respective industry takes the issue into consideration. When implementing smart-grid technologies, the requirements of electromobility have to be accordingly taken into account as regards time, technology, and legislation.

A further challenge for electric power supply grid is the system of fast charging, which is cost-intensive and also a safety challenge, and owing to the high power required (> 20 kW per charging point), it is also demanding for the grid. Such charging stations should primarily be installed wherever they are compatible with the grid, and wherever they are economically beneficial. Therefore, a cost-benefit assessment is to be recommended before fast charging stations are set up.

**Controlled charging**

**Issue of the future V2G**

**The challenge of fast charging**

## Measures

### Catalogue specifying the requirements for the charging infrastructure

The catalogue has been drafted to serve as a checklist and/or basic information for such individuals in the private, semi-public and public sector setting up and maintaining charging infrastructure, and preparing a uniform administrative practice:

- ▶ Drafting a catalogue specifying relative necessary minimum standards with regard to safety regulations of the charging infrastructure with the relevant legislation in mind (e.g. electro-technology regulations, smart metering regulations, etc.). Especially electrotechnical safety regulations, relative standards for the charging stations according to their location, as well as minimum standards securing national and, further on, international inter-operability with regard to charging, communication and interfaces, as well as any other functional standards, were to be taken into account.  
(BMWFJ, 2012)

### Recommendations for the set-up of the charging infrastructure

Legal requirements are to be harmonised on the basis of any knowledge already gained, so that, if possible, the same prerequisites and a uniform administrative practice can be developed for the set-up and the operation of charging stations in Austria.

- ▶ Drafting recommendations for the harmonisation of the framework conditions and procedures for the set-up and the operation of charging stations jointly with all federal provinces, for instance for the building regulations, garages regulations, etc.  
(BMWFJ, 2012)

### System solutions for roaming and clearing for charging stations

For a feasible open competition system, the framework conditions for roaming and clearing are to be clarified, with the mobility requirements in mind.

- ▶ Analysis and presentation of systems solutions and billing models for charging stations in cooperation with providers and users of charging stations, as well as reflections relative to future requirements of the data and consumer protection. (BMWfJ, 2012)

### Source of energy hydrogen

In the long term, hydrogen offers great potentials. Therefore, it is necessary to study the existing options of producing hydrogen, and also of the filling station infrastructure.

- ▶ Analysis of long-term potentials of hydrogen and identification of obstacles related to eco-efficient hydrogen production and hydrogen infrastructure, as well as the development of approaches for solutions in agreement with the technological solutions as may be expected for vehicles, and also any potentials of added value in Austria. (BMWfJ, 2012)

## 4.3 MARKET PREPARATION AND INCENTIVES SYSTEMS

### Market preparation and forcing market introduction

Austria is implementing intelligent technology- and user-oriented incentives systems strengthening Austrian technological leadership, and safeguarding the domestic business location, as well as any added value, and achieving positive effects on the environment. Existing support on the demand side will be examined accordingly, to be continued, and further developed in line with the requirements of the preparation of the market, and launching on the market in the sense of a common Austrian path. Support for any purchases focus, in the phase of the preparation of the market, especially on the enhancement of functional systems applications, so as to make systems solutions visible in every-day-life situations, and to further develop them.

### Good starting position for electromobility in Austria to be used and developed

Electromobility is perceived in Austria today as a dynamic, positive issue of the future holding great opportunities. The starting point for its launch on the Austrian market is highly favourable, following successful support programmes, a positive tax framework, as well as successful projects already instigated, and initiatives at the federal and at the provincial levels. That has been especially demonstrated by the first large-scale projects, for example, the so-called model regions and lighthouse projects, demonstrating technological solutions and regional pilots that have generated, since the year 2008, practical experience and knowledge in Austria. Furthermore, the present share of approximately 70 per cent of renewable energies in the production of electricity in Austria is an excellent starting position.

### Intelligent incentives system for the market launching phase

Owing to these positive starting conditions the Federal Government has made it their objective to further develop and direct these successful policy instruments for the preparation of the market for electromobility in the sense of an intelligent incentives system, so that the transition from the market preparation phase to that of launching electromobility on the market is accelerated. By doing so, the competence of Austria will become even more visible.



Existing support for the use of e-vehicles are therefore to be further developed. The taxation framework is considered to be crucial for first users' acceptance. In addition, innovation-supporting regulatory frameworks are to be developed and established. New vehicle types that, for example, have so far not been accordingly classified, as the range-extended vehicles, are to be integrated in an intelligent incentive system. By that combination, and making available means for financial and non-financial incentives, a significant number of vehicles can be registered up to the year 2020.

Due to users and any applications, as well as the logistic and technical options, fleets run by businesses and public fleets will be particularly suitable first users of electromobility, incentives are particularly vital in the transition phase. Using e-vehicles in fleets may stimulate the e-vehicle market, which again benefits to the environment.

**Fleets are market-stimulating  
first users**

## Measures

### Implementation of an intelligent incentives system

Harmonised direct and indirect instruments make the application of innovative e-mobility packages as well as e-vehicles more attractive, and thus accelerate the establishment of a domestic market for electromobility.

- ▶ Examination and drafting of a national vehicle classification for “range-extended vehicles” (REX/REEV) as a contribution to a nationally focussed/intelligent incentives system. (BMVIT, 2012)
- ▶ Direct support is to be examined, further developed, and continued with regard to the present e-vehicle categories. Moreover, new vehicle classes such as the REX/REEV, and PHEV will be included in the support measures. Incentives to use e-vehicles in combination with increased amount of cost-efficient renewable energies can be set, especially for the enhancement of functional system applications and to achieve strong, positive effects on the environment.
- ▶ Any attribution of renewable energy is recorded on the balance sheet according to the EU-directive, which waives the requirement of a direct coupling in the sense of a mandatory use of renewable energies for each individual vehicle. (BMLFUW, 2012)
- ▶ Further development of the support of business and community charging stations following the criteria catalogue specifying charging infrastructure requirements, focussing especially on enhanced system effects. (BMLFUW, 2012)
- ▶ If feasible, retaining the exemption of the standard fuel-based vehicle consumption tax (NoVA) and the engine power-related vehicle insurance tax, as well as the review of the general taxation framework for electrified vehicles. (Federal Government, 2013)

### The correlation of implementation projects for Austria

It is necessary to prepare, for Austria, the implementation of an internationally inter-operable e-mobility structure. Existing and future demonstration projects and application regions are to be correlated.

- ▶ Any support of nationwide technically and organisationally functional and marketable systems solutions for the implementation of internationally inter-operable electromobility options will be continued within the framework of the lighthouses. (BMVIT, 2012)
- ▶ Existing and developing model regions are correlated to make use of knowledge gained relative to regionally and ecologically focused applications to support any implementation in the whole country. (BMLFUW, 2012)

### Public procurement

A rational and fast changeover to electrically driven vehicles in public fleets will serve as a model, and contributes to making electromobility visible in the public. Public procurement can also contribute to stimulate early markets for e-vehicles.

- ▶ Existing structures for the purchase of innovative products by the public sector, as the Austrian federal procurement agency (BBG), are used increasingly. (Federal Government, 2012)

## 4.4 RAISING AWARENESS AND INFORMATION

### Users are positive vis-à-vis electromobility

Market surveys and analyses among potential users show that Austrians are, in principle, open-minded towards any electromobility. However, despite the positive presentation of the issue, the public is not much aware of electromobility in an optimised and affordable integrated transport and traffic system.

It is, indeed, difficult for users to assess the system electromobility, as traditional mobility patterns still shape the decision-making processes. Potential users compare, when assessing and evaluating, the features of e-cars with purely conventionally powered vehicles, rather unaware of their own mobility requirements.

### Communication of the advantages and options of integrated electromobility

New technologies are enormously attractive and fascinating for potential users, and may, therefore, motivate changes in behaviour in the sense of environment-friendly and inter-modal mobility behaviour.

It is, therefore, essential for private users when it comes to raising awareness, to develop a communication strategy that presents and communicates electromobility as an opportunity for understanding the new, environment-friendly, mobility with all its advantages and opportunities, and that focuses on the integration of the system electromobility in the transport system as a whole.

So far, potential users of electromobility have been interviewed in several surveys. A targeted market research, and also a basic research will reveal more precise data defining the various target groups and their requirements.

## Measures

### Developing communication strategies

- ▶ Working out a joint communication strategy so as to foster electromobility in and from Austria in time, and, step by step.  
(Federal Government, 2012)
- ▶ Analyses of target group specific requirements in order to enhance user acceptance of a system-integrated electromobility.  
(BMLFUW, 2013)
- ▶ Awareness-raising campaigns for electromobility are to be initiated simultaneously with measures for the market introduction of electromobility and to extend them, specifically to target groups, in the long term. An important aspect is the demonstration of electromobility as the new, contemporary multi-modality.  
(BMLFUW, 2013)
- ▶ Enhanced integration of electromobility into awareness-raising measures regarding the issue of energy efficiency (intelligent and economical use of energy).  
(BMWfJ, 2012)
- ▶ Integration of electromobility when implementing tourism strategies and concepts within a study in the tourism strategy process at national level.  
(BMWfJ, 2012)
- ▶ Also tourism communities can, for instance by renting out e-vehicles for users so that they can be tested, signal that public transport means are available for incoming and outgoing travel, and that electromobility is locally available.  
(BMLFUW, 2013)

### Expanding information packages for electromobility

- ▶ Enhanced information on e-vehicles available on the market, for instance by using existing structures, such as the internet platform [www.autoverbrauch.at](http://www.autoverbrauch.at).  
(BMLFUW, 2012)

**Electromobility contributes to reduce negative impacts on the environment**

#### 4.5 ENVIRONMENTAL IMPACTS AND MONITORING

Electromobility and the variety of relative products – from hybrid vehicles to battery-powered vehicles, motorbikes, e-bicycles, and e-scooters, as well as electrified public transport systems – are excellent prerequisites to reduce the negative impacts of transport on the environment, mainly to reduce greenhouse gases and local pollutant emissions. Electromobility can, by its high share of cost-efficient renewable energies contribute to achieve the 10-per-cent EU objective for renewable energy in the transport system by 2020, as well as to the long-term vision of the EU Transport White Paper in the year 2050.

Furthermore, electromobility will reduce, in the long term, the dependency on oil imports provided renewable energy sources are used, and also contribute to the broadening of the resource base for energy provision.

**Environmental advantages by cost-efficient renewable energy**

The impacts of electromobility on the environment are determined by various factors. The energy mix used, especially for e-vehicles, is decisive for the overall environmental balance of the electromobility. The higher the share of renewable energy in the electricity mix, the higher the savings in the overall greenhouse gas emissions. The high potential for the generation of electricity from renewable energy in Austria is a very good prerequisite for meeting the electricity demand of electromobility in an environmentally friendly way. Linking electromobility and cost-efficient renewable energy can optimally exploit the climate-protection potential of that technology.

##### The most vital advantages of the electromobility for the environment are:

- ▶ No emissions locally
- ▶ Reduction of the greenhouse gas emissions. The CO<sub>2</sub> emissions can be reduced, depending on the share of renewable electricity, by up to two thirds as compared to conventional propulsion systems
- ▶ Fewer noise emissions
- ▶ The energy efficiency of the e-motor, which is at least three times higher, leads to a reduction of the entire energy consumption and to a reduction of the dependency on oil imports for the mobility.

With a higher degree of the electrification of vehicles, and the changes in mobility behaviour, the positive impacts on the environment will be enhanced. The use of electrified systems is to be accompanied by continuous monitoring.

**Assessing environmental effects**

There is a high degree of professional knowledge in Austria of effects on the environment and their assessment. For a successful development of electromobility, with increasing positive impacts on the environment, inter-modality is, furthermore, crucial; the creation of optimum links with public transport in the sense of an overall transport system for electromobility must be at the centre of attention (see chapter 4.1 Electromobility in the overall transport system).

Beside the effects on emission of greenhouse gases, air pollutants, and noise, further environmentally relevant aspects are of importance. Among these are issues such as the use of materials and recycling, especially with in the area of battery systems (see chapter 5.1 Technology and business location).

Many models conceived for the launching of electromobility focus on multi-modality, which is, partly, significantly different from current transport behaviour. In the long term, this will directly affect the impacts on the environment. In the sense of an overall balance it is important to also include aspects such as impacts on land use when assessing the effects on the environment.

## Measures

### Environmental data and monitoring of electromobility

- ▶ Expanding transport-related data and models in the area of electromobility. (BMVIT, 2013)
- ▶ To quantify and monitor the effects of electromobility on the environment, the necessary basic data will have to be compiled. For that purpose, especially data of vehicles, transport modes, as well as mobility behaviour, and user profiles, are required. (BMLFUW, 2012)

### Analyses on electromobility

- ▶ For the new vehicles technologies, respective life-cycle analyses and eco-balances are to be elaborated. (BMLFUW, 2013)
- ▶ Estimate of long-term potentials and scenarios for electromobility. (BMLFUW, 2013)

### Environmental effects of of multi-modal electromobility packages and behaviour

- ▶ Preparation and presentation of positive effects on the environment when multi-modal electromobility options are used within various transport modes by different user groups. (BMLFUW, 2013)

### Fundamentals for environmental information for e-vehicle users

- ▶ Examination of options for the provision of information and labelling of the positive effects on the environment and climate before and when vehicles are purchased. (BMLFUW, 2013)

## 5 Electromobility FROM Austria

Electromobility is an issue of the future across all sectors, and opens up, for the Austrian research and technology location, as well as the industry, vital opportunities of positioning themselves on that new market.

Research, development, and innovation secure the technological progress of Austria and significantly strengthen the competitiveness of the domestic industry, and thus the business location Austria.

A location-oriented technology and industry policy actively accompanies the structural changes of the sectors concerned, especially the automotive and automotive suppliers industries, as well as the electrical and electronic engineering industries.

The proactive defence of national interests and positions on the European and international levels is of great importance for Austria's research and economy.

Along with the above activities, a targeted and flexible education, training, and qualification system for electromobility will be established, so as to further push the Austrian innovation and technology competence at the business location Austria, to secure jobs, and to establish new skills as Austria's strong points.

The Federal Government will set measures for electromobility FROM Austria in the following areas:

- ▶ technology and business location
- ▶ internationalisation
- ▶ education, training and qualification

### 5.1 TECHNOLOGY AND BUSINESS LOCATION

The gradual electrification of mobility and new technologies for vehicles and infrastructures entailed do not only lead to changes in the automotive industry also open up fields of activities and new opportunities for many other sectors. Electromobility is understood as an overall system. From various vehicle concepts to the charging infrastructure as an interface to the power grid and the transport system up to information technology links, new added value chains and added value potentials for Austria are created.

National political instruments support the cooperation between research and economy to promote competence and innovations from Austria. They are to contribute, in compliance with the RTI strategy of the Federal Government "Becoming an Innovation Leader", to increase the research rate by one per cent point to 3.76 per cent by 2020.

Research-intensive Austrian key industries, especially the automotive, electronic engineering, and ICT sector, will, following the technological changes in mobility, play an important role in the pursuit of the RTI strategy. Both technological and organisational, as well as systemic innovations will be taken into account. Here, the entire innovation process of components and products is addressed – from the generation of ideas, the research and development, trial, industrialisation, production, and transition into the market.

**The overall electromobility system opens up new opportunities for the Austrian technology and economy**

**Research, technology, and Austria's innovation power**

For any successful industrialisation, investments into production capacities and their restructuring and building, as well as the founding of enterprises are necessary. The economy and the industry need, to be on the safe side when planning their investments, and for managerial decisions, stable framework conditions in the long term, so as to have sufficient time for their development activities.

Following the leading principle “to strengthen strengths”, the potentials of electromobility in Austria with regard to development and business location for electromobility, are to be utilised as best as possible for the involved sectors, viz. transport, energy and environment. The automotive industry and the automotive suppliers industry, for instance, generate, with approximately 175,000 employees, an annually sold product volume of approximately 22 billion euro. The direct additional potentials of electromobility in the vehicle sector are estimated to be at least 14,800 full-time equivalents as well as a gross added value of at least 1.2 billion euro in the year 2030. Optimum framework conditions make, beyond that figure, for the forecast of even larger potentials.

Austria’s know-how and state-of-the-art technology are in high demand world-wide. That is to be supported further on. New technological developments as well as the production of systems, modules and components for vehicles and the infrastructure contribute to secure domestic added value.

The electrification of drive systems in combination with efficient internal combustion engines are, beside vehicle manufacturing, and lightweight construction, particularly strong points. Control electronics, as well as power electronics, ICT, telematic applications, and smart-grid solutions complete the scope of competences of the domestic industry.

Supporting the sectors concerned as best as possible, promotions for the development, integration, and production of components, parts and systems must be continued on a high level. In addition thereto, the funding instruments for electromobility-relevant research and production infrastructure must increasingly be made available, so that existing promotion and funding gaps, especially between prototypes and market preparation, can be bridged. In view of the high level of technological heterogeneity, and the enormous risk of “stranded investments”, these instruments must be configured in a technologically neutral manner.

The raw material as well as the constituent material used for electromobility must be high-grade. To guarantee long-term supply security, and to enhance the eco-efficiency, strategies and organisational concepts must be developed and implemented. Procedures for an economical material recovery, especially that of rare earths and constituent materials, are, in combination with innovative recycling and substitution technologies, a high potential for added value for the enterprises.

## Measures

The measures listed in the following mainly address the above technologies and subject areas.

### Instruments for research, development, and implementation of innovations from Austria

Austria has a vast array of direct and indirect instruments to advance competence building and, over and above, technological innovations in Austria’s research and development, and to further guarantee stable conditions for the business location.

**Securing stable  
framework conditions**

**Development of strengths  
and capacities at the  
business location Austria**

**Maintaining the promotion  
for research and  
development – bridge  
funding gaps**

**Strengthening recycling and  
substitution technologies**

That commitment must be enhanced and further developed, and also the instruments portfolio must be moulded accordingly.

- ▶ Strengthen und further develop the focal promotion points for research, development, as well as the demonstration of components, systems, and serial production with all the thematic programmes and basic programmes, especially for all battery powered, hybrid-electric and fuel cell-driven vehicles.  
(BMVIT, 2013)
- ▶ Supporting investments, production and new industrial settlement in the field of electromobility from Austria focussing on established funding and support instruments.  
(BMWFJ, 2012)
- ▶ Pushing the focal point electromobility in already present instruments to promote research between universities and non-university research institutions with the industry.  
(BMWFJ, 2012)
- ▶ Further development of investment-promoting framework conditions for electromobility projects within already existing instruments with regard to business location and instruments of entrepreneurial policy.  
(BMWFJ, 2012)
- ▶ Setting up a coordination group of the ministries and the research funding agencies for the technical orientation, optimisation, and simplification of electromobility-related programmes and procedures. Here information gained by experience so far is exchanged, and future developments of the electromobility-relevant stakeholders are discussed.  
(Federal Government, 2012)
- ▶ Support to develop skills for intelligent production technologies and processes, especially for the flexible and competitive production of small, medium and large numbers of e-vehicles and e-infrastructures.  
(BMVIT, 2013)
- ▶ Pushing electromobility as a future field within the state-of-the-art technology sectors automotive industry, mechanical engineering, electronics, and electronic technology, ICT, as well as the plastics industry bundled in the Austrian Business Agency (ABA – Invest in Austria), to attract new establishment of supplementary industrial competence.  
(BMWFJ, 2012)

#### **Field of competence raw materials**

- ▶ Development of technology competence for recycling procedures and the recovery of materials in Austria.  
(BMWFJ, 2012)
- ▶ Extending competence for substitution technologies and appropriate organisational concepts.  
(BMWFJ, 2013)
- ▶ Supporting the establishment of business locations focussing on material recovery, for instance rare earths and other materials in Austria.  
(BMWFJ, 2013)



## 5.2 INTERNATIONALISATION

World-wide, the production of passenger cars in 2010 grew, as compared to 2009, by 22.4 per cent to 58.3 million vehicles, the EU, with a share of 26 per cent, being the world's largest producer. In 2010, approximately 81 per cent – that is approximately 11 billion euro – of the total exports of the Austrian automotive industry flew into Europe. At the same time it should be noted that the automotive industry is facing considerable challenges, on the one hand, with relation to the current economic forecasts and sales figures in Europe, and, on the other hand, following the changing mobility behaviour. The demand for more efficient and thus fuel-efficient and clean vehicles is rising, not least due to price trends of fossil fuels. The development and production of efficient vehicles is, therefore, a potential key to solutions, where the increasing electrification of drive trains will play an important role.

The issue electromobility spans from energy generation via charging infrastructure, the vehicle, and new recycling and substitution approaches, to new, multi-modal solution approaches in the transport system, and is, also for the Austrian economy, a wide field of potential opportunities. In all sectors, the Austrian enterprises have a globally competitive know-how. That must be positioned in a targeted way on the international level.

For that reason, international cooperations are to be developed and the integration of Austria in international roadmaps and testbeds needs to be focussed on. The integration of international partners in strategic alliances is important for Austria's research and industry. Austrian know-how and domestic technologies could be completely integrated and presented as best as possible. The authorities support that objective by:

- ▶ the intensification of bi-lateral and transnational cooperation,
- ▶ the targeted exchange of information and harmonisation of international positions and roadmaps,
- ▶ the targeted opening-up of RTI instruments for foreign partners in cooperation with Austrian enterprises. Owing to the wide range of services and know-how offered by the Austrian enterprises on site, valuable experience and further developments may be integrated.

National ordinances, regulations and laws are partly based on European and international directives. Therefore, participating in the drafting process of supra-national provisions is of great importance, so that impetus can be given to other economies by Austrian developments. Here, the creation of pro-competitive framework conditions for the Austrian economy within the pan-European strategies is vital.

The field standardisation, serving as a basis for a targeted roll-out, plays a central role. Many international panels and committees are ongoingly working out standardisation provisions both for vehicles, transport, and energy infrastructures. Proactive participation of Austrian institutions in these processes strengthens the domestic innovations.

**Active role and positioning  
of the Austrian automotive  
sector**

**Presentation of Austrian  
know-how and focussing on  
international cooperation**

**Accompanying  
the standardisation**

## Measures

### Vehicle standardisation

- ▶ Enhanced preparation of national positions and definitions for innovation promoting national and European provisions as well as their implementation (for instance, single REX/REEV definition).  
(BMVIT, 2013)
- ▶ Participation in international panels and committees in the preparation of normative standards for the construction, measuring, and registration regulations of vehicles.  
(BMVIT, 2012)

### Electrotechnology standardisation

- ▶ Collating and drafting of national positions vis-à-vis the energy and charging infrastructure by the ÖVE (Austrian Electrotechnical Association)/ASI joint working group (JWG), with electromobility on the agenda.  
(BMWfJ, 2012)

### Internationalisation offensive

- ▶ Pushing electromobility within the “go-international” internationalisation offensive to strategically support SMEs and industrial enterprises.  
(BMWfJ, 2012)

### Strategies, roadmaps as well as international R&D and demonstration cooperation

- ▶ Positioning of the Austrian economy in European political competition strategies.  
(BMWfJ, 2012)
- ▶ Regular updating of the Austrian electromobility roadmap in cooperation with the domestic research institutions and the industry.  
(BMVIT, 2013)
- ▶ Supporting the international cooperation of Austrian institutions and enterprises in the fields research and development, as well as the enhanced integration of any electromobility activities and projects in European and international demonstrations, as for instance within the framework of bi- and multi-national ERA-Net invitations to tenders.  
(BMVIT, 2013)

### 5.3 EDUCATION, QUALIFICATION AND TRAINING

Developments in electromobility create new opportunities for new business fields of the domestic automotive industry and the automotive parts suppliers as well as other sectors in demand of skilled labour in Austria. Qualification and further training necessary for the development, and to secure the Austrian technology competence must, therefore, be strengthened on a broad basis. Approximately 2,500 skilled workers qualified as engineers, scientists, master craftsmen and master craftswomen, and technicians in research, development, production, and services will be needed in the next six years. The skills most needed are going to be mechanical engineering, materials science, electrotechnology, metallurgy, and process engineering, chemistry, and physics.

Thus:

- ▶ The implementation of qualifying options must be started at once for skilled labour to be available in the next 3 to 4 years.
- ▶ The adaptation and intelligent linkage of existing training programmes must be prioritised against specified job descriptions and university studies or studies at technical colleges.
- ▶ All in all, there is more demand in increased interdisciplinary in electromobility-related training programmes.
- ▶ A modular training programme makes for permeability between the specialist fields and any job patterns (also technical and economic patterns).
- ▶ The cooperation between industry, schools, and research institutions must be intensified, and the existing research infrastructure must be used as best as possible.

Developing skills and building up expertise is therefore, required, from the training of apprentices in the dual education and training system, in the relevant full-time vocational schools as far as in tertiary education at universities, technical colleges and post-school training courses. For that purpose, the curricula and provisions must be adapted and drafted accordingly.

Within the framework of the dual education and training system, the implementation of a special module “electromobility” qualifies well within the modular structure of the apprenticeship training in automobile technology. As apprentice training in Austria is strongly practice-oriented, internationally seen as a best-practice example, duly authorised trainers will be required in the enterprises training apprentices. The challenge is to make available professional staff for the enterprises, and create adequate training resources and facilities.

It is, therefore, necessary, to use existing resources as best as possible, and strengthen, even more, cooperation between industry, schools, and training centres more intensively: due to the short-term demand in qualified staff, vocational re-training and in-service further education and interdisciplinary training in the field of electromobility are a priority for the enterprises (especially also for the workshops) – training opportunities are to be quickly further developed in the dialogue with research and economy, centring on the respective requirements.

Existing competences of Austrian enterprises must be further strengthened. By targeted structural support measures, which support the enterprises in their systematic development and with regard to their employees upgrading their qualifications in the field of research and development, especially also in small and medium-sized enterprises (SMEs), the competitiveness of Austrian enterprises can be promoted.

**Urgent need of qualification and further education and training**

**Development of the curricula and creation of apprenticeship places**

**Potentials by qualification**

### Development of university competences

At university level, a pronounced demand in the fields of electrochemistry, power electronics, and battery research is evident. Activities are to be reviewed and developed along these and further future cutting-edge fields of electromobility.

### Electromobility enthusiasm of young people

Counteracting the foreseeable general shortage of engineers and technicians, already children and young people must be introduced, in the course of their education and training, to existing opportunities, and to become interested in technical job profiles. Important multipliers for the subject electromobility in the workshops and training institutions are the teachers, who actively work in small teams and dedicate themselves to the subject, and they, too undergo adequate further training. Specific awareness, also making the public aware, especially by competitions, are successful tools to raise and continue promoting the interest and enthusiasm of students and young people for technical disciplines.

## Measures

### Education and training

Building up and developing competence can be supported quickly within the framework of the existing educational and training structures.

- ▶ Implementation of a training module “e-vehicle” in the apprenticeship automobile technology. The preliminary work preparing for the contents of that subject is to be done by experts in the relative enterprises and the vocational schools. (BMWFJ, 2013)
- ▶ Adaptation and upgrading of existing curricula, as well as education and training of small teacher teams in electromobility at schools of all levels, so as to establish the subject electromobility. (Federal Government, 2013)
- ▶ Drafting a “train-the-trainer” concept for the qualification of teachers in schools at all levels. (Federal Government, 2013)
- ▶ Promotion of talents, and establishing practical research trainings for young researchers in the field of electromobility. (BMVIT, 2013)
- ▶ Strengthening international cooperation in education and research with leading universities and research institutions in Europe, the USA, and Asia. (Federal Government, 2013)

### Qualification and certification

- ▶ Implementation of a course system to promote trainers so that a sufficient number of apprentice jobs can be created. (BMWFJ, 2013)
- ▶ Development of existing support for enterprises training apprentices, especially training alliances in the field of electromobility, as well as initiating inter-company learning platforms. (BMWFJ, 2013)

- ▶ Promotion of systematic staff development and upgraded qualifications of skilled workers as well as the workforce in enterprises within the framework of qualification cooperation between enterprises and research institutions of their choice.  
(BMWfJ, 2012)
- ▶ Training programmes are to be set up-up to for staff in trading and selling, operation and maintenance of e-vehicles in order to make them familiar with the requirements of electromobility.  
(BMLFUW, 2012)
- ▶ Learning to drive e-vehicles is to become an integral part in driving schools. For that purpose, appropriate further training programmes are to be developed for driving instructors.  
(BMLFUW, 2013)
- ▶ Raising awareness of engineers and technicians for attractive career options (“technical career ladder”) in the field of electromobility.  
(Federal Government, 2012)

### **Traffic and mobility training**

Aspects of electromobility are to be integrated in education and training relative to electromobility, and the following measures are to be taken:

- ▶ Raising awareness within the framework of traffic education of children, also when young people take their voluntary bicycle test, especially with a view to inter-modality and school mobility.  
(BMVIT, 2012)
- ▶ Adaptation of teaching materials and test catalogues for the driving licence tests of all categories and subcategories.  
(BMVIT, 2013)
- ▶ Raising awareness and making available of information relative to e-vehicles in residential areas to improve road safety.  
(BMVIT, 2013)

## 6 Outlook

Based on a decision of the Austrian Council of Ministers as of October 5<sup>th</sup>, 2010, the federal ministers Nikolaus Berlakovich, Doris Bures, and Reinhold Mitterlehner have introduced, a coordination structure for electromobility, consisting of panels, and committees (steering committee, advisory board).

Electromobility is of high significance for Austria. The federal ministries responsible for

- ▶ agriculture and forestry, environment and water management (BMLFUW)
- ▶ transport , innovation and technology (BMVIT)
- ▶ economy, family and youth (BMWFJ)

have already started numerous initiatives and concrete measures to strengthen electromobility.

Joining all forces, the three ministries have set up a steering committee on the secretaries general and directors general level to generate harmonised common objectives and guidelines, aided by an advisory board consisting of experts from the fields of economy, administration, and research.

The federal ministries BMLFUW, BMVIT, and BMWFJ have, on behalf of the Federal Government, drafted, following a broad consultation process, the present implementation plan for the use of electromobility IN and FROM Austria with measures to be initiated shortly.

In the sense of a path to be taken jointly, the initiation and implementation of the measures will be pursued, in the period as stated, by the ministries, as initiators of the further cooperation between the political entities, the administration, research institutions, the economy and industry, in their leadership function.

The federal ministries will, on that basis, take further steps towards a successful implementation of the electromobility IN and FROM Austria.

*It is their objective to use, as best as possible, the opportunities inherent in electromobility for Austria's citizens, as well as for the environment, mobility, energy and economy, and making the pursuit thereof their priority.*

Special thanks are extended to all participants that have contributed to the drafting of the present implementation plan, especially the advisory board, and the some 200 persons participating in the working groups.

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