

e-Road Písek - Deggendorf

Analysis of the current e-mobility infrastructure state in the connected regions

Project #093

TSI Písek z.s.
25.10.2017



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Introduction

The main target is the analysis of the current e-mobility condition in Southern Bohemia. The beginning introduces the region - position, population, nature, priorities, and activities within the cross border cooperation. The paper will also provide an overview of the road and public transportation conditions in Southern Bohemia. The other significant part of this analysis is introduction of e-mobility projects in Southern Bohemia – a list with characteristics of the significant ones. Further the document lists placement of charging stations within Southern Bohemia.

Southern Bohemia

Basic Information

The region with its capital – Budweis - is located in the south of the Czech Republic close to the border with Austria and Germany. Its area of 10,057 km² represents 12.8% of the area of the whole country, which makes it the second largest region. It is defined by districts of Budweis, Cesky Krumlov, Jindrichuv Hradec, Pisek, Prachatice, Strakonice, and Tabor. The population is 638 782 inhabitants and that's why it is the region with the smallest density of population - 63.5 people per sq. km². Most of the population - almost 30%- lives in Budweis; other big cities are Tabor, Pisek, Strakonice, and Jindrichuv Hradec.



Picture 1 – Southern Bohemia map

The region also reports the largest area with altitude over 1000 m n. m. above mean sea level. Its diversity, preserved nature, and clean environment contribute to it being one of the regions with less disturbed environment. Therefore, it is often visited for free time activities. The priority of the region is the development of tourism – Bohemian Forest has a significant potential with its hiking, biking, and skiing routes. One of the most attractive places



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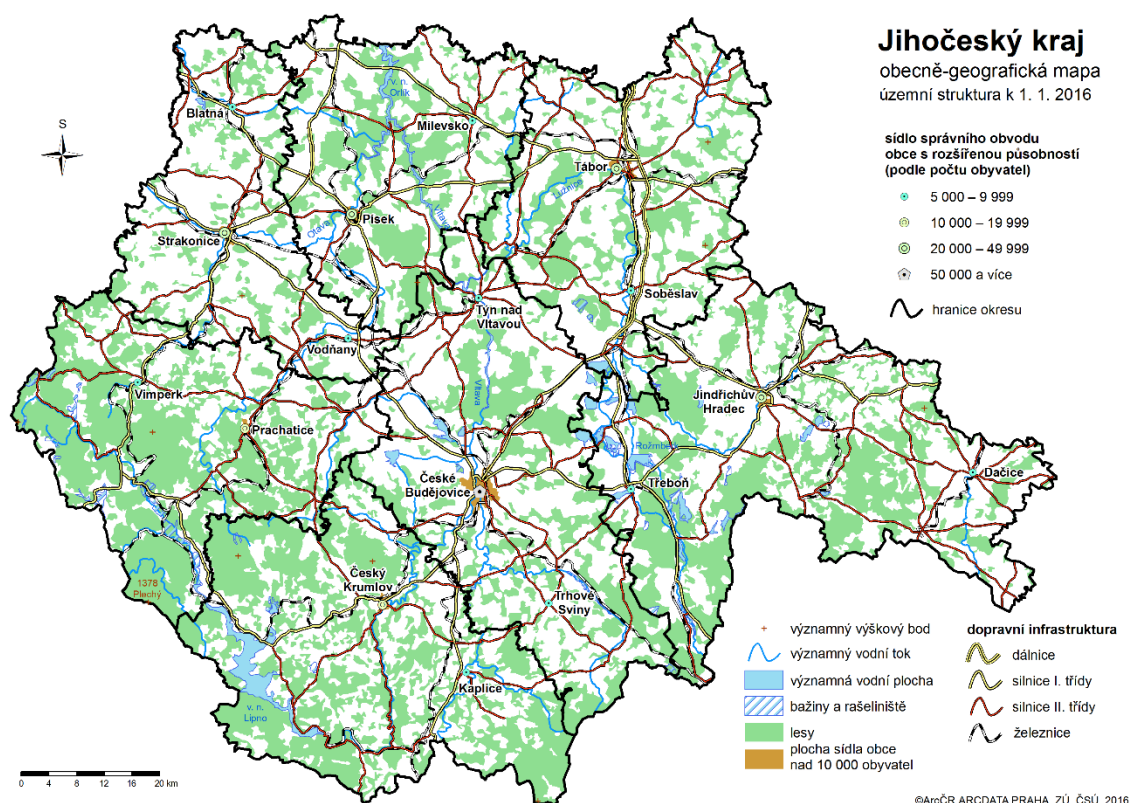
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regardless of the season are also the ponds in Southern Bohemia, Lipno and Orlik dam lakes, as well as the countryside on the border. Advantageous cross border placement, preserved environment, and development of modern technologies offers an interesting area for new investments and offers effective border collaboration in the area of operation and environment.

In the last years, there are many projects implemented within the cross border collaboration. Contributions can be seen especially in Euroregions – Bohemian Forest/Bayerischer Wald/Mühlviertel (municipalities – 110 Upper Austria, 80 Bavaria, 92 Czech Republic/52 from Southern Bohemia); Silva Nortica (Southern Bohemia - districts of Jindřichuv Hradec, Ceske Budejovice, Pisek, and Tabor, Lower Austria – Zwettl, Krems, Gmünd, Waidhofen an der Thaya, Horn); and Donau – Vltava (including Southern Bohemia). The aim of these initiatives is knowledge transfer, transportation development, and development of services and tourism.

Road and Public Transportation Conditions

Southern Bohemian road network includes 6,151 km of roads and highways, whose quality is, however, doubtful. The region only has 47 km of highways, 650 km of first level roads, and 1,635 km of second level roads. The length of the third level roads is 3,819 km due to the cross border position and higher altitude areas. The region lies on several important international routes and it is connected with Prague by the D3 highway.



Picture 2 – Southern Bohemia geography map



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The year 2017 brings a lot of changes in transportation – additional construction of 5 km and opening of 3 km of the D3 highway. CZK 500 mil. is also prepared from the State fund of transportation infrastructure and European subsidies for the repairs on regional routes. Budweis will see the opening of a bypass – its construction should start this year. Rail roads will also be modernized (JIKORD s.r.o., 2016).

The biggest bus transportation companies in the region are CSAD AUTOBUSY Ceske Budejovice a.s. (Busem), GW BUS a.s. (former CSAD JIHOTRANS), and CSAD Jindrichuv Hradec a.s. Other is COMETT PLUS spol. s.r.o. Tabor, CSAD STTRANS a.s. Strakonice, JOSEF STEFL-tour (district of Dacice), ICOM transport a.s., and ARRIVA Praha s.r.o.

Southern Bohemia E-Mobility

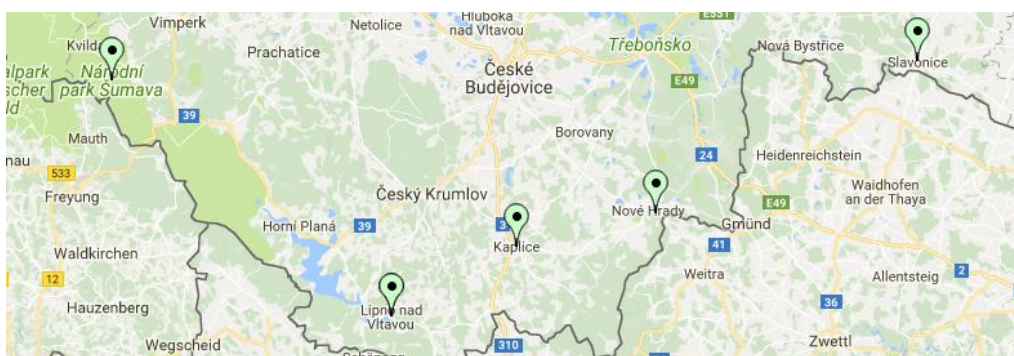
Energy Companies

E.ON

The spread of electric power in transportation of Southern Bohemia is currently most supported by Energetická společnost E.ON.

It collaborates with professionals, vehicle manufacturers, charging infrastructure manufacturers, and end users within the pilot projects. Along with Mercedes-Benz the company operates the biggest fleet of Smart ForTwo electric drive vehicles in Central Europe. Smart Ed! Is the first serially manufactured electric car meant for everyday use – it provides a suitable solution for city streets and outskirt areas.

Their vehicles have been utilized by several institutions within a marketing collaboration. Municipal police in eight cities (Budweis, Cesky Krumlov, Tabor, Ceske Velenice, Slavonice, Kaplice, Velesin, and Trhove Sviny) had a chance to try out mainly electric mopeds. Thanks to a new project by the company Fast-E, fast charging stations should be implemented in the following months on the most frequented spots of highways – the charging time should be only 30 minutes. E.ON also operates 9 electric rental places – five of them can be found in Southern Bohemia (Bohemian Forest, Lipno nad Vltavou, Slavonicko, Novohradsko, and Kaplicko).



Picture 3 - E.ON e-rentals



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CEZ

Another specific example of energy company collaboration with municipalities in the area of alternative-fuel vehicles is CEZ. It collaborates with 50 partners all around the republic – car manufacturers, municipalities, shopping centers, commercial subjects, and city halls – within the project *Elektromobilita*.

The company has rented its electric cars to the units of the integrated rescue system. Southern Bohemia police and fire fighters have already joined this testing. A three-year testing period of Nissan Leaf vehicles was also offered to the management of the National park of the Bohemian Forest. The Elektromobilita CEZ project currently operates the vastest network of charging stations for electric vehicles in the Czech Republic. The company has 30 vehicles in its electric fleet and it is planning to build 42 more public fast charging stations in the period 2016-2018. These stations will charge regular-capacity batteries in less than 30 minutes. The project also includes a place, where the company can try out the integration of charging stations, systems for energy storage, and renewable resources. This shows that having charging stations powered by renewable resources is currently more of a rarity than regular approach.

Projects Supporting Electric Mobility

E-Sumava

Probably the most famous e-mobility project in the south of Bohemia is the E-Sumava project, which has emerged from the initiative and partnerships of private companies. Several spots in the Bohemian Forest have been connected by a network of places renting electric bikes, mopeds, and cars – west part of the country has 9 places, south 2. The fleet of electric cars is ever growing and the near future is expected to bring additional cars, light utility e-vehicles, and e-minibuses. Bikes can be charged at any of the 30 charging stations.

This network also includes a charging station for electric vehicles that utilizes energy from renewable resources and energy accumulation. It is part of the E-WALD network, which has enabled the connection to the Bavarian side of the forest – people are able to travel cross the border. Other electric bike and moped rental shop can be found in Lipno nad Vltavou, which also offers eco-friendly e-boats and houseboats with solar panels.

Elektrokola nejen pro seniory

Another project implemented in the Southern Bohemia region, which was managed by the Southern Bohemia center for tourism and financially supported by CEZ is called Elektrokola nejen pro seniory.

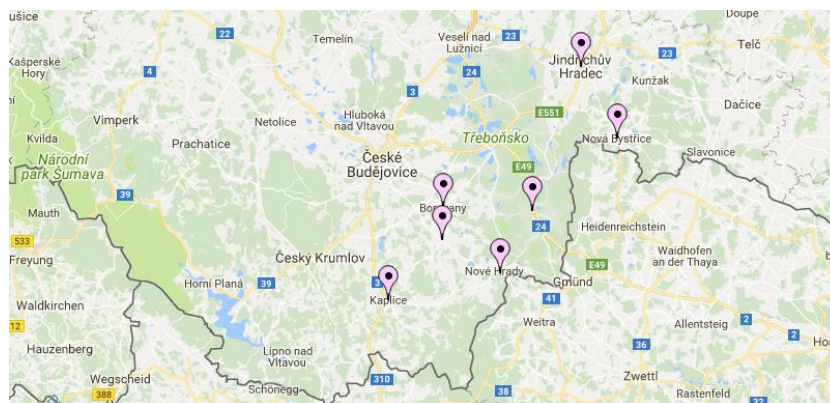
The project is focused on active seniors within the 55+ age range, who enjoy bike rides, but are not able to afford them due to health problems. The project supports healthy life style and tourism. Electric bikes can be rented in Nove Hradky, Suchdol nad Luznici, Nova Bystrice, Borovany, Jindřichuv Hradec, and Trhove Sviny. Kaplice also offers electric mopeds. The bikes have a driving range of 40-70 km depending on the complexity of the terrain. Electric mopeds can last for approximately 40-60 km.



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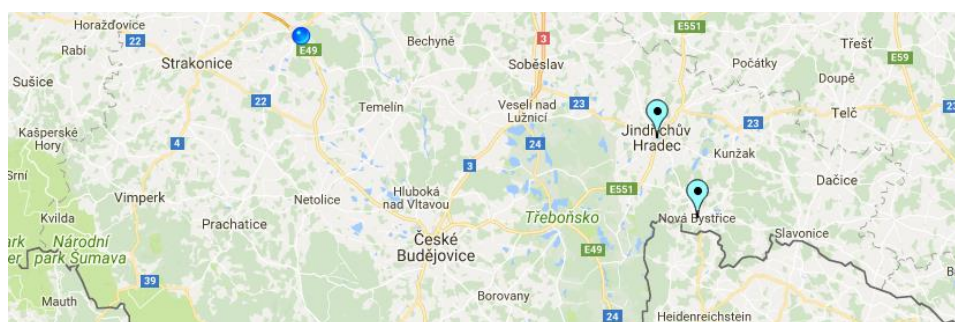
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Picture 4 - E-rentals within the "Not only for retirees" project

Case Studies

The trend of electric bikes has also spread to other parts of the region. They can be rented on three stops – Jindřichův Hradec, Kamenice nad Lipou, and Nova Bystrice – along the *narrow gauge railway* in Jindřichův Hradec.



Picture 5 - E-rentals by the Southern Bohemian narrow railway

National Park of the Bohemian Forest has a lot of experience with electric mobility as well, as was already briefly mentioned. The hilly terrain thoroughly tests the rented electric vehicles – two Nissan Leafs, a BMW i3, a Volkswagen e-Up, a Smart ForTwo Electric Drive, and three electric mopeds. The park would like to utilize only electric vehicles in the future and aims to become the most accessible national park for the electric vehicle drivers in the Czech Republic. Five new charging stations should be installed since August 2017 – in Vimperk, Stozec, Kvilda, Srní, and Kasperske Hory.

Donau-Vltava Euroregion – Oberpfalz, Niederbayern, Oberösterreich, Southern Bohemia, Pilsen region, Vysocina - also bets on electric mobility. Individual experiences and strategies support and strengthen electric mobility in individual regions. The main target audience is the youth, which is reached out to while receiving their driving licenses. Namely the younger generation approaches vehicles differently and prefer car sharing to owning a vehicle. Foreign lands have already seen several successful e-car sharing projects in cities, as well as rural areas.

In Southern Bohemia the *Energy Center* in Budweis actively promotes electric mobility and it hosted a project Cista mobilita a Elektromobil live, which occurred in 2016 in 13 grammar



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and high schools. The goal of the project was to pass information and allow for personal experiences with electric mobility to the future generation of drivers. Another project called Ceske Budejovice a cista mobilita ran up to July 2017. The goal was promotion of clean mobility in Budweis.

TÜV SÜD Czech is another service provides in this area, because it actively supports the e-mobility concept and aims to secure a safe and problem-free advent of this concept. It provides professional consulting, tests and certifies e-mobility products. It implemented a project called Bezpecnost kabeloveho a bezkabeloveho dobijeni elektromobilu along with E-ON, where it focused on the safety of various types of electric vehicle charging.

Dentamechanik, a seller of healthcare equipment, also included the innovative technologies of clean mobility to its operation – installed a charging station and uses two electric cars.

Synlab, a company ensuring collection of material from hospitals and outpatient department, has also begun the update of its fleet. It operates within the whole republic and in Southern Bohemia it has several stations – Budweis, Strakonice, Pisek, Vimperk, Tabor, Trhove Sviny, and Cesky Krumlov. Outside of CNG fuel it also has four electric vehicles dedicated to blood and other sample transportation. Until 2020 the company would like to have a fleet mainly made up of eco-friendly vehicles.

Another e-mobility company is *TERMS*, which currently works on Smart Grids – e-vehicle charging system using solar panels, energy accumulation, and delayed consumption. This network is able to charge a car and at the same time provide energy for a household without being dependent on distribution companies. It also builds CARPORTs, covered parking spots with solar panels on the roof – renewable energy charging enabled.

A great success in the field of electric mobility was recorded by the *students of vocational school in Dacice* who build their own electric tractor and received a list of awards. Fully-functional prototype is tested for various uses in agriculture; for example, great interest comes from huge greenhouses thanks to its quiet and emission-free operation.

The Ministry of Environment organizes since 2002 an annual campaign called *Evropsky tyden mobility*. The target of this project is influencing the public transportation and improving of health and lifestyle. Budweis, Prachatice, and Strakonice take part on this project within Southern Bohemia. Strakonice host city rides on vehicles powered by own energy. This event is supported by the municipal office, whose employees ride a bike to work within this week.

On the electrical wave is also a competition called *New Energies Rally Cesky Krumlov 2017*. Outside of the traditional rally, 2017 will see already the 6th year of the emission-free race. Single-track vehicles will see the 2nd year of electric bike race – *E.ON like-bike tour*.

Electric Public Transportation

The Ministry for Regional Development approved in its 20th call of the Integrated Regional Operation Program (IROP) - dedicated to the support of purchasing of low emission and



emission-free vehicles for public transportation - 6 projects focused solely on electric vehicles. One of the successful applicants was also the city of Budweis. The city is preparing a major change and by 2018 eleven small buses with electric engine should be a part of the public transportation system. Two charging stations should be installed for electric buses. The city also plans to provide incentives for the owners of electric cars while parking (Marek, 2016).

Emission-free electric buses in the Czech Republic increasingly gain popularity. From the technological point of view, they are already developed to the extent of being full-fledged substitute for diesel vehicles and becoming the future of public transportation. Transportation enterprises have already begun to search for suppliers; in the Czech Republic there are currently e-buses manufacturers- – Iveco, SOR, and Skoda Electric.

Electric buses are almost three times more expensive than diesel ones; the price of one minibus is around 11-13 million Czech crowns. The price is the reason for such a low expansion of these vehicles. Serial production should decrease the costs as with the electric cars. With the state support, however, which can currently reach up to 85%, electric vehicles become less expensive than regular vehicles. Subsequent operation costs are significantly lower and, according to business director of Skoda Electric, they are more reliable than regular buses. Interest in subsidies within the 20 IROP call was big. The Ministry of Regional Development divided more than 1.75 billion crowns in the current period on low emissions, third of which was meant for electric buses (Sůra, 2017).

One of the first cities to choose the Smart City route is *Písek*. Clean mobility pillar includes operation planning of an electric Nissan minibus for city services including a charging station provided by Schneider Electric. A priority is the e-mobility support, including bikes and motorcycles; there are negotiations regarding the e-bike rental on the bus station. CSAD, ensuring the city public transportation, should operate it but the cost should also partially go behind the city. New parking lots with charging stations are also planned – one on the main square, one by the post office (multilevel), and one by the Albert shopping center. The city has also requested subsidies for two electric cars for the municipal office and House and apartment management; CSAD has requested subsidy for the purchase of new vehicles (Volný, 2017).

Charging Stations in Southern Bohemia

Place	Address	Stands	Type	Fast
Dentamechanik	U pily 581. 370 01 České Budějovice	3	Mennekes Typ 2	N
			Chademo 1	Y
			Chademo 2	Y
Technologické centrum Písek	Vladislavova 287, 397 01 Písek	2	Mennekes Typ2	N
			Mennekes Typ 2	N
P1 parking	Na Vystavisti, 397 01 Písek	3	CHAdEMO	Y
			CSS	Y
			Mennekes Typ 2	N
Střední průmyslová škola	Komenského 1670 / 4, 390 02 Tábor	1	16A 230V 16A 400V	N



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			32A 400V	
Technické služby	Jordánská 3112, 390 03 Tábor	2	Mennekes Typ 2	N
			Mennekes Typ 2	
Krumlovský mlýn	Široká 80, 381 01 Český Krumlov	1	Schuko 3x 230V 16A 400V 32A	N
Terms	Planá 67, 370 01 České Budějovice	1	Mennekes 32A 400V	N
U Kákonů	U Jatek 19, 392 01 Soběslav	1	230 V 10A	N
Sauron	Zlatá Stezka 138, 38301 Prachatice	2	230 V 16A	N
			Mennekes Typ 2	
ELSUN	Budiškovice 8	4	3p 230V 10A	N
			3p 230V 16A	
			5p 32A 400V	
			4p 32A 400V	
Náměstí Dačice	Třída 9. května 1 Dačice	1	230V 16A	N
Marina Orlik	Chrast Kovářov , okres Písek	4	7p 32A 400V	N
			5p 16A 400V	
			3p 16A 230V	
			3p 16A 230V	
Jiří Čech	Sedlice	1	230V 10A	N
Lipno Servis	Lipno nad Vltavou	1	230V 16A	N
Franko's	B.Smetany 27, 37010, České Budějovice	1	230V 13A	N
Pivovar Kněžíněk	Nové Dvory 2235, České Budějovice	1	EV Plug J1772 220V 16A	N
U tří hrušek	Česká 236/23, České Budějovice	1	230V 16A	N
Hotel Rychta	Staré Město 131, Netolice	1	240V 13A	N
JE Temelín Infocentrum	373 05 Temelín	4	EV Plug K1772	N
			230V 16A	
			230V 16A	
			230V 16A	
OC Mercury	Nádražní 1759, České Budějovice	2	230V 16A	N
			Mennekes Typ 2	

Table 1 – Charging station overview – Southern Bohemia

Conclusion

E-mobility development in Southern Bohemia is currently stemming from activities implemented by individual companies without any interconnection. These companies offer public institutions, such as municipal police, etc., testing vehicles. There are several subprojects, whose outputs have been most noticeable in Písek and Budweis.

The charging station infrastructure is not well-developed. Namely energy companies, such as E.ON and CEZ, have the ambitions to install these stations. Based on available data, there are roughly twenty stations in the region with only one being a fast charging one. These stations are predominantly placed by the large company buildings or near restaurants and



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hotels. Charging stations are also placed by gas stations or provided by private subjects that often require only a symbolic payment.

A more significant expansion in the area of electric mobility is electric bike rental. In the last few years, more and more places are emerging with the option to borrow these bikes; the biggest advantages are comfort, low stamina requirements, and no need for a driving license. This alternative vehicle has obvious disadvantages though. For example, there are

Due to the expectation of a big expansion of e-mobility, it is necessary to build a sufficient infrastructure of charging stations. At the same time it is crucial to achieve mutual interdependence among individual subprojects and plans of private and public institutions and organs in a way that their activities have the most extensive impact. It is also relevant to consider incentives for owners of electric cars, such as free parking lots, special price of highway stamps, etc. The key of course is the education for public in the area of harmful effects of emissions from transportation to health and advantages of e-mobility.

Lower Bavaria

Analysis of the Current E-Mobility Infrastructure Conditions

In the last few years, e-mobility in Germany has been developed and included in different areas of everyday life. This document and related links provide an overview of the current condition of electromobility in general and also focus on Bavaria. Finding documents or web links which provide information about Germany or Bavaria in English is very hard which is why the following sources and documents are in German.

Electric Mobility in General

Statistics Data

The following information comes from *Statista*, a statistics portal which publishes data from various public offices and organizations. According to a 2016 statistic there were around 1080 of charging stations in Bavaria which are used by roughly 5760 electric vehicles (Statista, n.d.).

These charging stations aren't placed monotonously only by POIs but can be found in various places. Most favorite ones are parking lots but charging stations can also be found near hotels, town halls, or restaurants (Statista, 2017).

Parking lots	24,5	Schools	0,8
Car dealerships	10,8	Museums	0,8
Companies	10	Associations	0,5
Public streets	9,3	Parks	0,4
Stores	6,3	Airports	0,3
Hotels	6	Hospitals	0,3
Town halls	4	Camps	0,2



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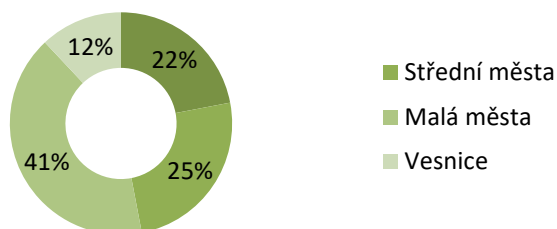
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Gas stations	2,7	Churches	0,2
Private	2,4	Others	4,6
Restaurants	2,2	Unknown	11,7
Railway stations	2		

Table 2 - Placement of charging stations in % (May 2017)

German market with electric vehicles is in the private sector defined by an owner living rather in a small town or a mid-sized city.

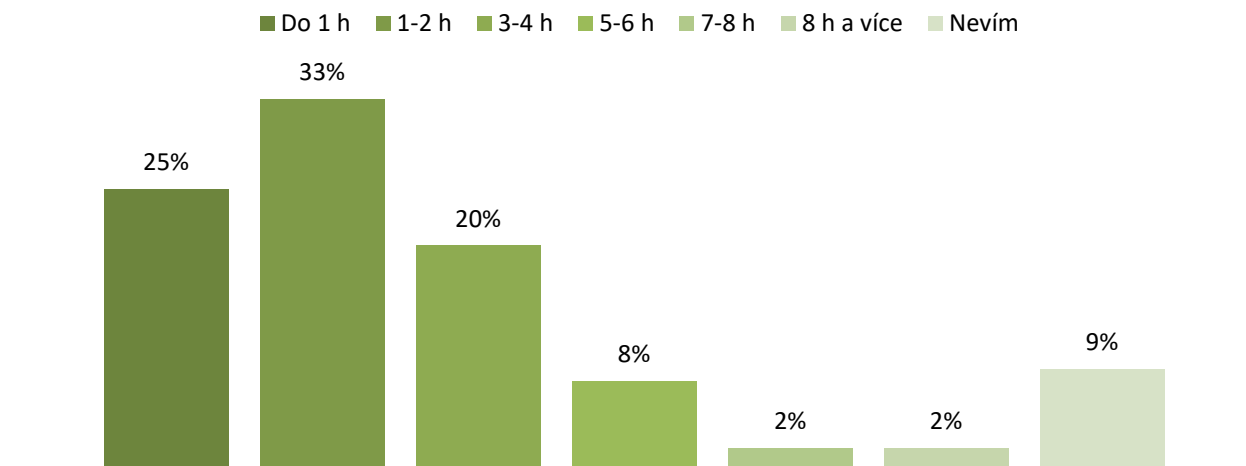
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Picture 6 - Number of private EV users depending on city size

According to the results of the acceptable charging time survey, 50 % of electric vehicles users would want to be able to fully charge within 2 hours. However 2% of respondents answered that they would not mind charging their cars for 8 hours (Statista, 2017).

Currently one of the main questions is the charging time although results show that longer charging time does not have to be perceived as necessarily wrong - still the charging time can be expected to be one of the main determinants of e-vehicle purchase.



Picture 7 - Acceptable charging period

Initiatives and Programs

Modellregionen Elektromobilität

In Bavaria there are a lot of activities that are focused on electromobility. This initiative is connected to the Bavarian Ministry of Economy and Media, Energy and Technology.



Promotion of e-mobility comes from the support of the charging infrastructure, incentives for electric vehicle purchases, to an electric mobility law which favors these vehicles compared

E-WALD

Partners: Technische Hochschule Deggendorf, E-WALD GmbH, IBEKOR GmbH

Mission: Better environment conditions in Lower Bavaria using the tools of electromobility (Technische Hochschule Deggendorf, n.d.).

eGAP

Partners: Fraunhofer IAO, Garmisch-Partenkirchen

Mission: Analysis of the current condition and solution to the problems of electromobility

m-e-nes

Partners: Bad Neustadt a. d. Saale, Siemens AG, Bosch-Siemens-Hausgeräte, Preh GmbH, Jopp GmbH, Reich GmbH, LISI Automotive

Mission: Development of electromobility in the area of Bad Neustadt (M-E-NES, n.d.)

M.O.V.E. projekt

Partners: E-WALD GmbH, Cham, Deggendorf, Freyung-Grafenau, Passau, Regen a Straubing-Bogen

Mission: Acquisition of 200 electric vehicles for the needs of administrative units involved in the project and car sharing options for tourists within the E-WALD app (Starterset Elektromobilität, n.d.)

Projects E-WALD, eGAP, and M-E-NES were parts of the **Modellregionen Elektromobilität** initiative within which electromobility development was strengthened in three main areas – the Bavarian forest, Garmisch-Partenkirchen, and Bad Neustadt a.d. Saale. Thanks to the variety of the chosen areas it was possible to show that electromobility can be applied in industrial areas, busy tourist towns as well as rural areas (Projektträger Jülich, n.d.).

Schaufenster Elektromobilität Verbindet

This program was chosen within the all-German concept and combines the strength of Bavaria and Saxony. Together these lands aim to develop electromobility on a crossborder level. The program includes 40 projects.

Main project focus areas:

- reinforcement of the fast charging infrastructure (mainly on routes Munich - Leipzig and Berlin - Vienna)
- preparation of concept for city land planning with regards to electromobility



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- electromobility in rural areas
- establishment of international cooperation with Austria and the Canadian province of Quebec (Sächsische Energieagentur GmbH, n.d.)

Education

With fast development of the charging infrastructure it is also needed to keep up with educating specialists on electromobility to not only develop the infrastructure on the concept level, but also be able to implement the outputs of individual projects and activities.

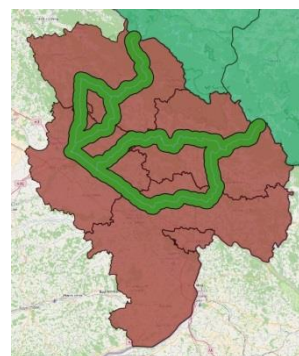
Bavaria has specialist schools which are focused on the education of technicians and professionals in the area of electromobility. Programs are tailored to the topic because they connect technical approach with social studies. Such institutions are for example Städtische Fachschule für Fahrzeugtechnik und Elektromobilität – Technikerschule in Munich (TSKFZ, n.d.) or Staatliche Fachschule für Fahrzeugtechnik und Elektromobilität Roth near Nuremberg (BSZ, n.d.).

The University of Passau focuses on electric mobility from a different angle. It collaborates with several commercial partners on the projects PREMIUM and BeEmobil, which focus on research in the area of electric vehicle user behavior and alternative fuel transportation systems (Centrum für Marktforschung, n.d.).

Details of the E-Road Project Area in Regards to E-Mobility

There are four possible route options within the administrative units:

- Freyung-Grafenau
- Passau
- Regen
- Deggendorf



Picture 8 - e-Road project area in Bavaria

Routes are:

- Bayerisch Eisenstein – Zwiesel – Regen – Patersdorf – Deggendorf
- Bayerisch Eisenstein – Zwiesel – Regen – Bischofsmais – Deggendorf
- **Phillipsreut – Freyung – Innernzell – Lalling – Schaufling – Deggendorf**
- **Phillipsreut – Freyung – Hutthurm – Aicha vorm Wald – Deggendorf**



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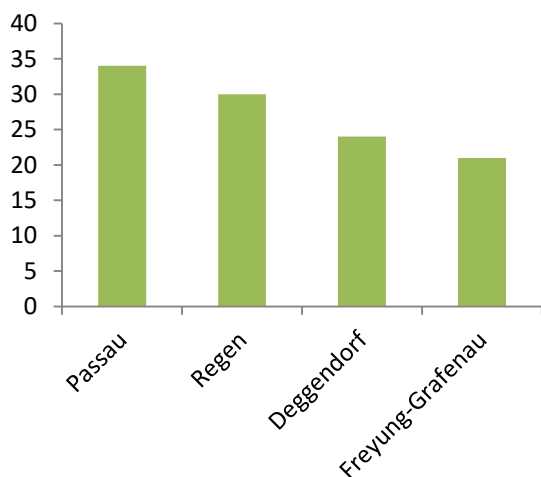
Project E-WALD is the most similar in regards to area and focus to the project e-Road Písek-Deggendorf. The e-fleet of E-Wald GmbH includes more than 200 electric vehicles. There are about 45 e-vehicles driving in 43 across 4 administration units of the e-Road project area. It is possible to find there charging stations with the option of car sharing. Short-term or long-term car rental is also possible.

	Deggendorf	Regen	Passau	Freyung-Grafenau
Cars	12	12	11	10
Municipalities	10	12	11	10

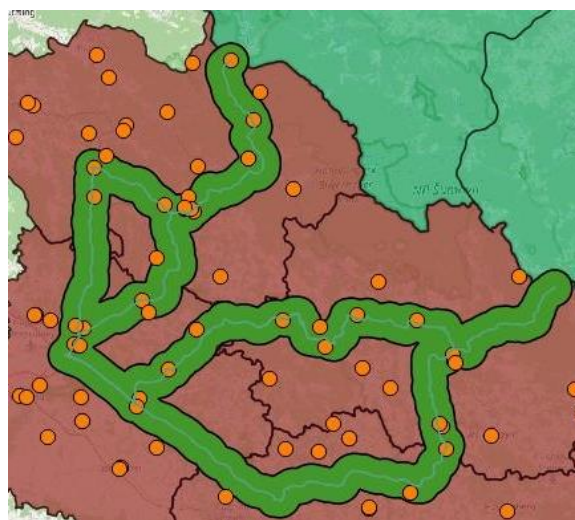
Table 3- EV count in the Lower Bavaria regions

Charging Stations in the Project Area

The Bavarian side is densely covered with charging stations. Taking into consideration charging stations of E-Wald GmbH, other organizations, and public providers, they are placed as follows:



Picture 9 – Number of charging stations in the project area



Picture 10 – Charging stations in the project area

Due to a high number of charging stations in the project area, each station could have different demand. Charging time and the required power depend on the specific method of charging (for example, Tesla Supercharger). The following table shows the options of all relevant stations displayed on related maps- Picture 5 for the whole project area and Picture 8 close to the routes.



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	Tesla SuperCharger	CHAdEMO	CCS Typ2	CEE (32A)	CEE ((16A)	Schuko
	6x Tesla SuperCharger (120kW)	1x CHAdEMO (13.5kW)	1x CCS Typ2 (13.5kW)	1x CEE rot 400V/32A (32A, 3ph)	1x CEE blau 230V/16A (16A)	2x Schuko (16A)
		1x CHAdEMO (20kW)	1x CCS Typ2 (22.08kW)		1x CEE rot 400V/16A (16A, 3ph)	13x Schuko (16A)
		1x CHAdEMO (44kW)	1x CCS Typ2 (44kW)		2x CEE rot 400V/16A (16A, 3ph)	2x Schuko (16A)
		1x CHAdEMO (50kW)	1x CCS Typ2 (50kW)		1x CEE blau 230V/16A (16A)	3x Schuko (16A)
		1x CHAdEMO (50kW)	1x CCS Typ2 (50kW)		1x CEE rot 400V/16A (16A, 3ph)	3x Schuko (16A)
		1x CHAdEMO (50kW)	1x CCS Typ2 (50kW)			1x Schuko (16A)
		1x CHAdEMO (18kW)				1x Schuko (16A)
		1x CHAdEMO (20kW)				1x Schuko (16A)
		1x CHAdEMO (20kW)				1x Schuko (16A)
		1x CHAdEMO (44.16kW)				2x Schuko (16A)
		1x CHAdEMO (50kW)				2x Typ2 (16A, 3ph)
						2x Schuko (16A)
						3x Schuko (16A)
						2x Schuko (16A)
						3x Schuko (16A)
						3x Schuko (16A)
						3x Schuko (16A)
						4x Typ2 (16A, 3ph)
						4x Schuko (16A)
						5x Schuko (16A)
						4x Schuko (16A)
						6x Schuko (16A)
sum	6	11	6	1	6	70

Picture 11 - Charging access points in the admin areas, part 1

Typ2 (63A)	Typ2 (32A)	Typ2 (20A)	Typ2 (16A)
1 x Typ2 (63A, 3ph)	1x Typ2 (32A, 3ph)	1x Typ2 (20A, 1ph)	9x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		1x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		1x Typ2 (16A, 1ph)
	2x Typ2 (32A, 3ph)		1x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		1x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		2x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		2x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		2x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		3x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		4x Typ2 (16A, 3ph)
	1x Typ2 (32A, 3ph)		
	2x Typ2 (32A, 3ph)		
	2x Typ2 (32A, 3ph)		
	3x Typ2 (32A, 3ph)		
	4x Typ2 (32A, 3ph)		
1	24	1	26

Picture 12 - Charging access points in the admin areas, part 2

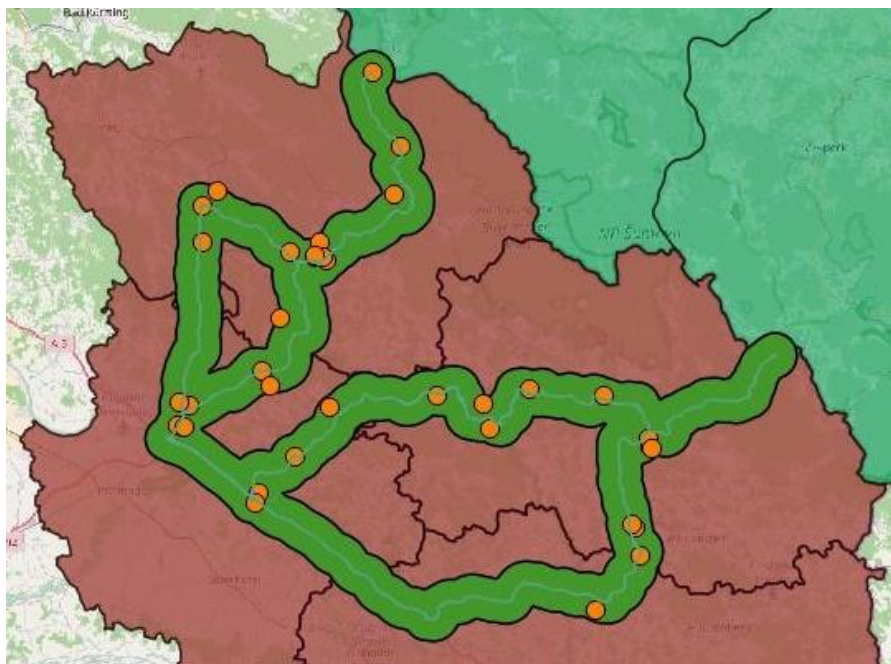


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There are 39 charging stations within a 2 km radius from the routes.



Picture 13 - Charging stations – 2 km route radius

CHAdEMO	CCS Typ2	Typ2 (32A)	Typ2 (16A)	CEE (16A)	Schuko
1x CHAdEMO (13.5kW)	1x CCS Typ2 (13.5kW)	1x Typ2 (32A, 3ph)	9x Typ2 (16A, 3ph)	1x CEE rot 400V/16A (16A, 3ph)	2x Schuko (16A)
1x CHAdEMO (20kW)	1x CCS Typ2 (22.08kW)	1x Typ2 (32A, 3ph)	1x Typ2 (16A, 1ph)		13x Schuko (16A)
1x CHAdEMO (44kW)	1x CCS Typ2 (44kW)	1x Typ2 (32A, 3ph)	1x Typ2 (16A, 3ph)		1x Schuko (16A)
1x CHAdEMO (50kW)	1x CCS Typ2 (50kW)	1x Typ2 (32A, 3ph)	2x Typ2 (16A, 3ph)		2x Schuko (16A)
1x CHAdEMO (18kW)		1x Typ2 (32A, 3ph)	2x Typ2 (16A, 3ph)		3x Schuko (16A)
		1x Typ2 (32A, 3ph)	3x Typ2 (16A, 3ph)		2x Schuko (16A)
		2x Typ2 (32A, 3ph)	4x Typ2 (16A, 3ph)		3x Schuko (16A)
		2x Typ2 (32A, 3ph)	4x Typ2 (16A, 3ph)		3x Schuko (16A)
		3x Typ2 (32A, 3ph)			3x Schuko (16A)
		4x Typ2 (32A, 3ph)			4x Schuko (16A)
					5x Schuko (16A)
					4x Schuko (16A)
					6x Schuko (16A)
sum	5	4	17	1	51

Picture 14 - Charging access points – 2 km radius

Renewable Sources of Energy in the Project Area

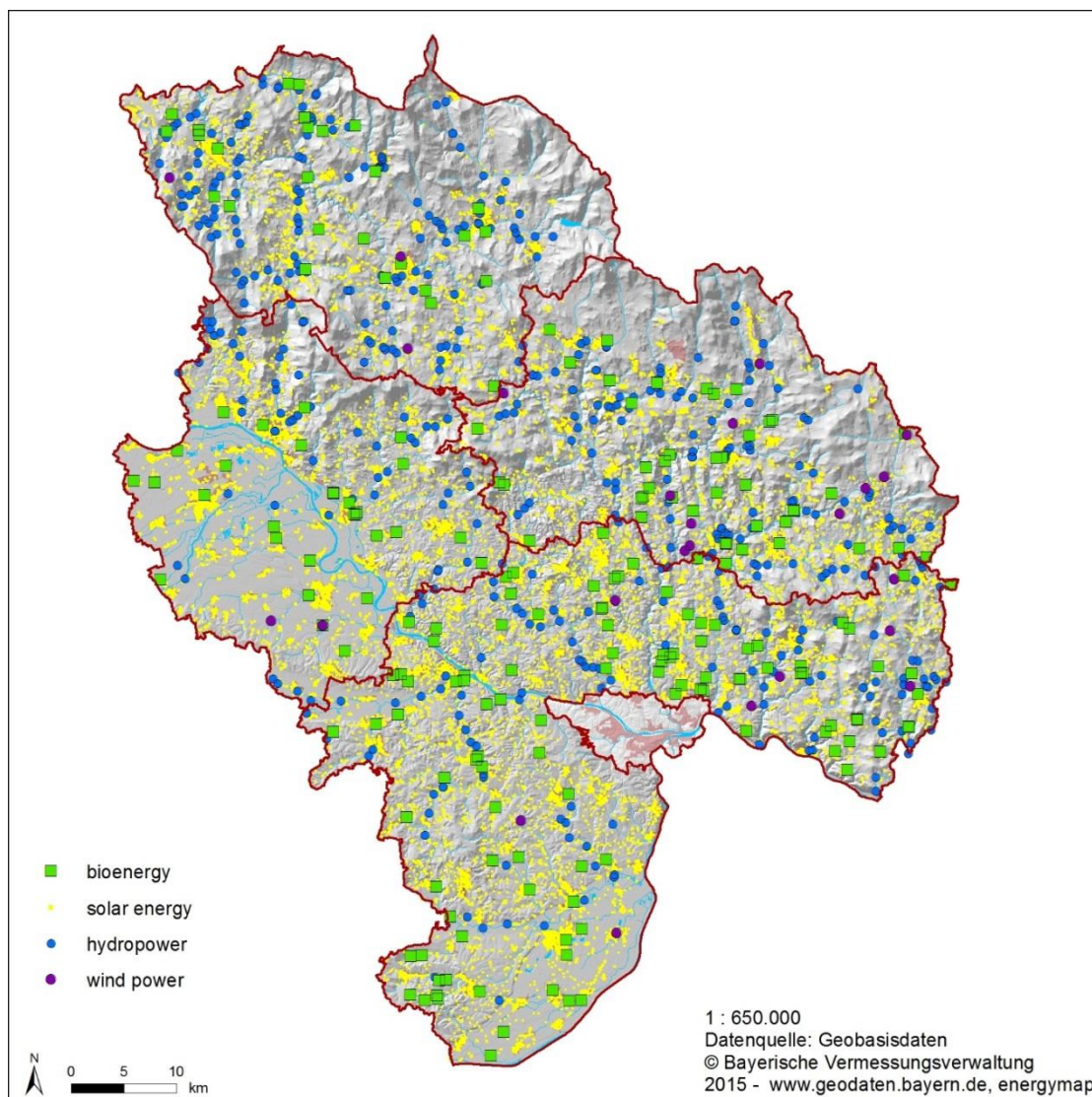
The foundation for the description of the current energy state is the data from energymap 2015 with average infeed data regarding renewable energy. Data of energy consumption are determined by statistic data based on the population. The following project area map shows real renewable energy plants (bio, solar, hydro, wind) in four regions- Deggendorf, Regen, Freyung-Grafenau, and Passau. Complete plant list (approx. 41 000) is accessible digitally.



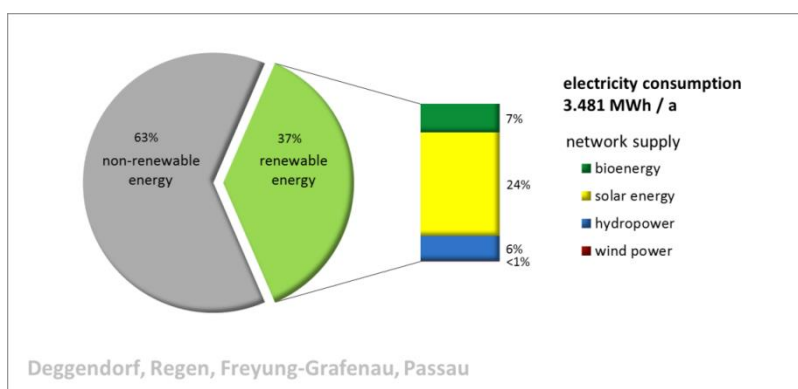
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Picture 15 – Placement of renewable resources plants



Picture 16 – Energy consumption



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total	[%]	[MWh]	[kW]	plants
bioenergy	7%	232.080	39.292	203
solar energy	24,5%	853.220	733.790	38.557
hydropower	6%	203.080	33.987	468
wind power	0%	820	975	20
share of renewable energy	37,0%	1.289.200	808.044	39.248
electricity consumption*		3.481.026		

[reference: energymap 2015/*statistical value]

Table 4- Total renewable energy consumption

Deggendorf	[%]	[MWh]	[kW]	plants
bioenergy	5%	41.520	6.367	28
solar energy	29,6%	257.890	203.610	9.337
hydropower	1%	12.850	3.000	65
wind power	0%	0	18	1
share of renewable energy	35,8%	312.260	212.994	9.431
electricity consumption*		872.719		

[reference: energymap 2015/*statistical value]

Table 5 - Deggendorf - total renewable energy consumption

Freyung-Grafenau	[%]	[MWh]	[kW]	plants
bioenergy	5%	32.610	6.561	43
solar energy	17,3%	104.320	104.001	6.703
hydropower	16%	93.760	12.325	124
wind power	0%	90	247	10
share of renewable energy	38,2%	230.780	123.134	6.880
electricity consumption*		604.720		

[reference: energymap 2015/*statistical value]

Table 6 - Freyung-Grafenau - total renewable energy consumption

Landkreis Passau	[%]	[MWh]	[kW]	plants
bioenergy	10%	143.170	21.248	106
solar energy	28,0%	392.710	321.021	16.627
hydropower	2%	32.170	8.206	131
wind power	0%	720	627	7
share of renewable energy	40,6%	568.770	351.102	16.871
electricity consumption*		1.400.302		

[reference: energymap 2015/*statistical value]

Table 7 - Passau - total renewable energy consumption


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Regen	[%]	[MWh]	[kW]	plants
bioenergy	2%	14.770	5.116	26
solar energy	16,3%	98.310	105.157	5.890
hydropower	11%	64.290	10.457	148
wind power	0%	10	85	2
share of renewable energy	29,4%	177.380	120.815	6.066
electricity consumption*		603.285		

[reference: energymap 2015/*statistical value]

Table 8 - Regen - total renewable energy consumption

Comparison

Basic Information

	Lower Bavaria	Southern Bohemia
Area	10 329 sq. km (Europaregion Donau Moldau, n.d.)	10 057 sq. km (Business Info, 2011)
Population	1 212 119 (Europaregion Donau Moldau, n.d.)	639 119 (Business Info, 2011)
GDP per capita (2014)	CZK 545 506 (Bayerisches Landesamt für Statistik, 2016)	CZK 340 000 (Cesky statistický úrad, n.d.)
Mean salary	CZK 95 602 (Bayerisches Landesamt für Statistik, 2016)	CZK 25 528 (Cesky statistický úrad, n.d.)
Road length (km)	6 120 (Oberste Baubehörde im Bayerischen Staatsministerium des Innern, für Bau und Verkehr, n.d.)	6 151 (Cesky statistický úrad, 2016)
Number of EVs	5 760 (Bavaria)	1 200 (CZ) (Asociace elektromobilového průmyslu, 2017)

Table 9 – Basic information regarding regions

Current Infrastructure State

Charging Stations

	Lower Bavaria	Southern Bohemia
Number of plugs	109	35
Fast charging	18	1
Fast charging (%)	16,5 %	2,8 %
Stations per km	0,02	0,003
EV per charging station	53	35

Table 10 - Number of charging stations in regions

By the end of 2018, there should be at least 5 more charging station in Southern Bohemia

- Písek – 1x on parking lot P1
- Strakonice – 3x charging station (one within this project)
- Horní Vltavice – 1x charging station (one within this project)



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Projects and Programs

Both areas focus on the development of the infrastructure for electric engine vehicles. Both the regional administration units and other subjects participate on the development and educate the public within the project activities regarding the use and advantages of e-mobility.

Whereas education in Southern Bohemia focuses on the broad public and students are more so invited to general events, Lower Bavaria has college degrees that specialize on the development of future e-mobility engineers.

Lower Bavaria	Southern Bohemia
E-WALD	Fast-E
eGAP	Elektromobilität
M-E-NES	E-Šumava
M.O.V.E.	Elektrokola nejen pro seniory
Schaufenster Elektromobilität	Čistá mobilita a Elektromobil Live
	Bezpečnost kabelového a bezkabelového dobíjení elektromobilů

Table 11 - Projects and programs



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