

# CHAIN REACTIONS

## THEMATIC BRIEF: ENERGY AND ENVIRONMENT

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*SMART SPECIALISATION & E-MOBILITY*

December 2020

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## About thematic briefs

CHAIN REACTIONS project addresses the challenge for industrial regions not benefitting from innovation activities from large leading corporations to increase regional capacity to absorb new knowledge and turn it into competitiveness edge and business value. The purpose of the project is to strengthen the regional ecosystems with the knowledge and tools for helping companies with overcoming the barriers and creating sustainable growth with the innovation of value chains.

CHAIN REACTIONS therefore focuses on modern approaches that considers value chains and their complex development, unlike the linear approaches of technology transfers. The innovation frame is based on Porter's model of five forces (new entrants, buyers, suppliers, product substitutes and rivalry) and in innovation drivers: key enabling technologies, effective use of sources, digital transformation and service innovations.

In line with individual priorities of smart specialization S3, partners are focusing on key industrial sectors: health, advance manufacturing, IKT, and electronics, energy and environment, as well as bioeconomy.

During the CHAIN REACTIONS implementation period the partners will regularly publish thematic short presentation that will present the basis for introducing certain innovation and at selected fields of business.

## Smart specialisation and e-mobility

The national development priorities and niches were determined through the Slovenian smart specialisation strategy (S4). In practice they are supported by targeted, complete and adopted measure packages. Smart specialisation is a platform for focusing the development investments into areas, where Slovenia has the critical mass of knowledge, capacities and competences, and where it has the innovation potential for positioning on global markets. S4 is a strategy for strengthening competitiveness of economy by strengthening its innovation capacity, diversification of existing industry and service activities, as well as growth of new and fast-growing industries and companies.

S4 defines 3 priority pillars and 9 areas of use, with focus areas and technologies:

- I. Digital:
  1. I.1 Smart cities and communities;
  2. I.2 Smart buildings and homes with wood chain;
- II. Circular:
  3. II.1 Networks for transformation into circular economy;
  4. II.2 Sustainable food;
  5. II.3 Sustainable tourism;
- III. SI\_industry 4.0:
  6. III.1 Smart factories;
  7. III.2 Health;
  8. III.3 Mobility;
  9. III.4. Materials as final product.

Based on S4, the national strategic development priorities were defined in areas, where Slovenia has the critical mass of knowledge, capacities and competences, and where it has the innovation potential for positioning on global markets. National strategic development priorities thus demand priority investments in the fields of research, development and innovation in Slovenia.

Implementation of S4 is based on a new model of development cooperation, stressing the institutional cooperation between the state and economy, knowledge institutions and other relevant stakeholders in the field of research, development and innovation.

E-mobility is not an independent field, but it is an important component of Smart cities and communities, and mobility also overlaps with other areas.

E-mobility is based mostly on vehicles on electric drives, used for personal transport. In these categories we find various vehicles, from scooters to light transport vehicles, that use electricity instead of fossil fuels. Due to short distances and great network of filling stations, Slovenia has a huge potential for expansion of electric vehicles.



### E-mobility and smart cities

Mobility is one of the key challenges in modern society, as transport accounts for a quarter of all greenhouse gas emissions in EU. If in the past the cities were designed for accessibility by car, today this has been replaced with care for people and environment. Traffic systems need smart changes. The growing urbanisation creates complex challenges in the sense of mobility. Research showed that urban areas contribute 80% of CO<sub>2</sub> emissions, with most of them originating from traffic.

The spread of electric vehicles brings positive effects for the users and environment. In the global sense it also contributes to reduction of dangerous emissions that cause global warming. Therefore, it decreases the pollution of the environment, in line with the guidelines of sustainable development that we have committed to. Therefore e-mobility is our future.

## E-mobility in Slovenia

Every citizen of Slovenia is hearing about e-mobility ever more often, however, they do not really know what it's all about and why e-mobility is so important. It is not a fashion statement or a passing fancy, it is a global trend. E-mobility (electromobility) introduces new concepts into the urban mobility, within the modern society. It is a concept that is based on green energy, reduction of carbon footprint, and reduction of emission of particles in traffic. Due to the presented facts, e-mobility presents the most efficient and socially acceptable form of



individual use of vehicles that companies use in their car-park to transport people and goods.



E-mobility is important to Slovenia, because it presents the concept of sustainable and environmentally friendly mobility. Our society is becoming increasingly aware about the mostly negative environmental changes that derive from our very own environment. Therefore, the desire is expressed to use energy efficiently, with the final result of reducing the carbon footprint. Also

keeping in mind, the depletion of the fossil fuel reserves, the developed world is conducting researches and development of smarter networks that would be based on energy from renewable sources. The EU is also supporting such development, which is observed by the legislative and goals to encourage the strategic development of infrastructure and networks of electric vehicles. All EU member states share this commitment. Thus, Slovenia also tries to become a low carbon society by 2050. Slovenia has favourable conditions for developing e-mobility, due to short distances between settlements. With its know-how and experts, Slovenia is increasing its presence in the international surroundings and has kept up to date with leading manufacturers of electric vehicles. For Slovenia and EU alike, the top priority is technological development. Therefore, investments in sustainable development is so important as it can rejuvenate the economy by creating new business opportunities.

The increased trend of using electric vehicles brings several direct positive effects and positive impacts on the quality of life of the population. E-vehicles have a far better usage of energy (up to 90%), while engines with internal combustions reach between 20-40%. There are also lesser CO<sub>2</sub> emissions, and no particles (PM10, NHX), if compared to fossil fuels. This reduces the strains on health, such as stress of the respiratory systems or increased chance of cancer.

In Slovenia, the national post – Pošta Slovenia and the group GEN-I are the leaders that are making headway in the field of e-mobility. They combined their knowledge and signed an agreement about mutual cooperation in the field of industrial e-mobility and green delivery solutions of next generation. The citizens of cities will receive their deliveries by environmentally friendly e-vehicles. They want to become the leading actor in the field within the region.

Fossil fuels are a substantial contributor to air pollution in the cities. Therefore, most city centres are closing to vehicles powered by fossil fuels, that pollute the streets with noise, emissions and dust particles. This process is being implemented in Slovenia as well. At the same time the demands for delivery in the city centres is constantly growing.

### **Conditions for faster transition to e-mobility is a vast charging network**

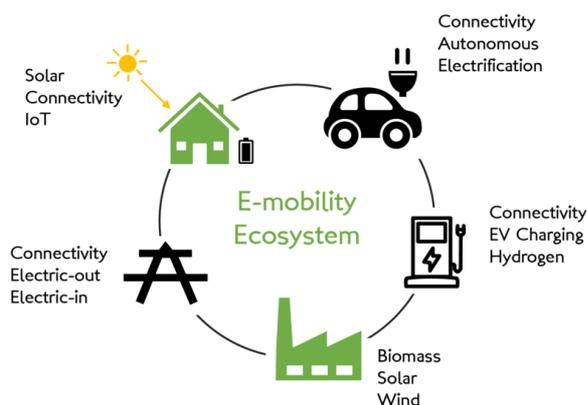
The national ministry estimates, there are some 700 charging points for electrical busses. The COVID-19 pandemic has changed many contemporary findings, the strategy for transition to sustainable mobility remains unchanged. The future of cargo transport will be electric, until it becomes based on hydrogen. The first and key reason why electric drive is needed is protection of environment, reduction of greenhouse gasses, lowering the carbon imprint, but the economic and technological-development motives shouldn't be overlooked.

Last year the European green deal was accepted as the commitment of EU for sustainable



growth. Slovenia also supports it and in the field of sustainable mobility this presents the reduction of greenhouse gas emissions of traffic by 90% by 2050. Estimating the development of vehicles with alternative power sources, by 2025 the number of e-vehicles on European roads will increase to 13 million (currently 975,000), and there will be a need for some 1 million charging points (currently 140,000).

And how does Slovenia measure up? As the ministry for infrastructure claimed, there were 3310 registered e-vehicles in Slovenia by end of 2019. For comparison, there are 1.2 million all registered personal vehicles.



The estimates for the following years are still based on the strategy for market development for suitable infrastructure for provision of alternative fuels in Slovenia. It predicts the number of e-vehicles will present 20% of all vehicles in Slovenia by 2030. Every second newly registered car in Slovenia should be either electric or a hybrid (just above 140,000). This could be achieved by the optimal (really achievable) scenario. If we would try to overachieve the EU environmental

commitment, we should follow the intensive scenario that predicts a 37% share by 2030, of cars using alternative fuel. And among the newly registered e-vehicles it would be 79%, with 2% of hydrogen vehicles.

### Public charging stations

Public electric charging stations provide a wholistic solution for charging vehicles in public places. We can set them at various locations, depending the demands of the client. They are suitable for outside use in public parking lots, bus stops in front of business objects, shopping centres, at fuel stations and in garages.

At charging stations that demand the identification of users, the user must register beforehand with the provider of service. A national network of charging stations is being developed. The foundation for smarter and more reliable e-mobility without emissions, available to everybody, everywhere, is in preparation.

### House and business charging stations

Electric, domestic charging stations provide the complete solution of charging stations for electric vehicles at your home or a business building. Such charging stations are an ideal solution for everybody, who wants to have a secure charging point for e-vehicles at home or in the office. They allow changing and managing the consumption through the smart app or online app and is integrated into your smart home. The domestic charging station is very user friendly, flexible and priceworthy.

Not considering that the electric vehicles in current phase are suitable for large cities, which Slovenia doesn't really have, while in the field of intercity travel e-vehicles still cannot compete with vehicles using fossil fuels. One of the questions Slovenian owners of electric vehicles



constantly keep asking is when the quick charging station network will be in place?

Upgrading the charging stations is not a problem, the challenge is how to provide suitable charging? Quick charging is a strain on the existing power network. To provide a comparison, what kind of energy consumption we are talking about, let's say that all the charging station at hotel Mons would be in use, they would consume more power than the hotel itself.



Without investments into the power network, we cannot expect the development of e-mobility. Therefore, the electricity providers are stressing that the energy concept of Slovenia should include the projection of the effect the development of the distribution network for charging stations will have on the power network, along with the expected increase of e-mobility. We cannot strengthen e-mobility with the current infrastructure and the

future upgrades are anything but cheap.

The energy providers are trying to keep the planned dynamic of investments and upgrades, but they realize that the full growth of e-mobility will demand much more. The prices in electric industry are already not favourable, as they are too low across EU (although the average monthly bill does not make the average consumer share that sentiment).

Introducing total e-mobility will not be easy. There are several ways to support the increase of e-mobility. Elektro Ljubljana, for example, offers help in developing and installing charging stations for domestic use in garages or other suitable places, that allow owners of e-vehicles as much autonomy, when using their own vehicles.

An important information is also, that e-mobility will not happen on its own, especially with the current energy infrastructure, no matter how big the hype for e-vehicles is. Therefore, there has to be an insured power supply, which again brings forth further environmental, economic and political questions.

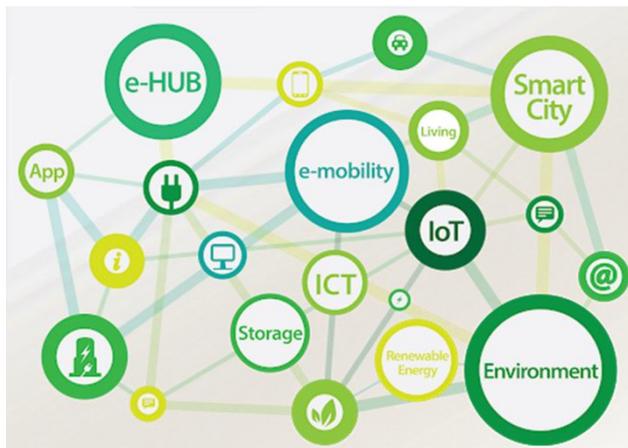
The path to mass usage of complete e-mobility is certainly not an easy one.



# Overlapping and connections with areas of circular economy and digitalisation

Circular economy brings forth new challenges for economy and state: the active, green and healthy orientation, which is the basis of sustainable development with an equal role of environmental protection, business efficiency and social responsibility. The goals e-mobility is achieving are therefore very similar with the goals of circular economy.

Circular economy is based on the concept of the positive circle of materials, that is being reused, repaired and recycled (either materials or products). The working concept of »Closing the loop« allows for the waste of one industry to become a resource of another, thus reducing the number of deposited or burned waste. The concept and midframe of the circular economy start with the very first step of the life cycle of the product. Smart design and choice of production processes can contribute to resource preservation, allow for efficient management with the waste, and also creating new business opportunities. However, the transition to circular economy is very complex, for it demand the transformation of systems and development of new knowledge in the broader fields of planning (Eco Design), marketing and ICT, not just environment protection.



Recycling is a perquisition of a functioning circular economy – sources and materials are recycled, returned into production and used again. If we want to fully use the potential of the secondary resources, we need to set up an efficient system of waste management and release the barriers in trading with waste, for which we need to ensure a quality standard. Only in such an environment we can use the secondary resources in our own production processes and at

the same time ensure their reliable delivery. The basic step in recycling within the concept of circular economy is the collection, taking apart and recycling used products. The integration of these materials into the start of the product life cycle directly reflects in the reduction of negative effects on the environment as well as production costs.

There are three areas of circular economy:

- Technology for production of biomass and developing new bio materials,
- Technology for the use of secondary resources and reuse of waste,
- Production of energy from alternative sources.

Above all, the direct link between circular economy and e-mobility and their goals are intertwined in the field of Green energy.

E-mobility is mostly dependent on Smart Grids (power networks), smart electrical systems, that have to be automatic, intertwined with ICT technology are included in the digitalisation. Therefore, these systems demand a large-scale overhaul of the existing infrastructure to provide the conditions for the Digital transformation.



## Good practice examples of e-mobility in Slovenia

- Avant2Go (car sharing of e-vehicles – Sharengo)
- e-mobilni (charging stations)
- EMSISO (electric engine for first certificated completely electric airplane)
- GEN-I (e-mobility)
- MAHLE Electric Drives Slovenia
- Petrol (e-mobility)
- Tushek Supercars (lightest super-sport vehicle with a hybrid heart)
- Project “Next-e” (Czechia, Slovakia, Slovenia, Hungary, Romania)
- Project “Urban-E” (Slovenia, Croatia, Slovakia)

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