

Budapest



Local context

City size and context

Budapest is the capital and the largest city of Hungary and the country's main political, cultural, commercial, industrial, and transportation centre. The city is situated along the Danube, in the heart of the Carpathian basin and is home to 1,736 million people.

Budapest consists of twenty-three districts. The Hungarian capital city has a peculiar dual self-government system. This means that in addition to the Budapest municipality, the local government of Budapest, each of the twenty-three districts has their own government, the so-called district governments, with elected mayors and a body of representatives. Both the city and the districts are local governments, not subordinated to one another, each having specific duties and powers, specified by law.

Budapest is not developing in the European regional space as a stand-alone entity, but

together with its surrounding urban agglomeration. The latter almost extends to the entire area of Hungary. Owing to Budapest's role as a capital, the city has quite a powerful impact in this region. Budapest's economic area and functional

KEY FIGURES

Population: 1,753,000 (2017)

Area: 525 km²

Density: 3,339 people/km²

Average density in urban areas:

NUTS level: NUTS-2

TEN-T corridor(s): Budapest is an urban node at the intersection of the Orient/East-Med and Baltic-Adriatic corridors.

USER-CHI role: demonstrator city

municipal area are larger than its urban political agglomeration, where the city has an established day-to-day task division.

Geography

Budapest is at the crossroads of the European continent. Thanks to its location, Budapest benefits from several unique features that are decisive elements of the city’s macro-regional role. The Carpathian Basin lies at the border of different landscapes and cultures, where transportation roads of structural significance meet. In Budapest, the waterways of the Danube cross the traditional transportation routes leading from Western Europe eastbound (towards Asia) to the Southeast (towards the Balkans). These routes are “market corridors” connecting the economies and potential energy flows of the European Union with the Middle Eastern markets. This position is strengthened by the development of the TEN-T network, where Budapest is located at the intersection of the Orient/East-Med and Baltic-Adriatic corridors.

With slight extension, we can say that the London–Budapest– Istanbul–Baghdad (M1-M5) and Moscow–Kiev– Budapest–Trieste (M3-M7) motorways cross each other in Budapest. The former motorway connects the member states of the European Union with Middle Eastern markets and its large

population, while the latter connects the former Soviet Union states and the significant markets along the Adriatic.

In a geographical sense, the basin enables Hungary and the Budapest area to fulfil additional organisational roles. A plain surrounded by mountain ridges is a feature that Budapest and the urban agglomeration can convert into an excellent organisational opportunity, thanks to their hub position. These characteristics both constitute serious challenges and offer development opportunities for the city and its urban agglomeration.

Although Budapest is divided into two parts (Buda and Pest), where one part is hilly (Buda) and the other is flat (Pest) the charging infrastructure deployment is even on both sides

Modal split

Figure 5 below shows the modal split -trip based- for Budapest in 2014 and the modal split objective for 2030.

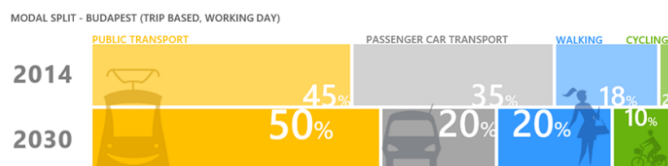


FIGURE 1: BUDAPEST MODAL SPLIT. SOURCE: BKK

Table 1 below shows the approximate share of electric vehicles currently in Budapest.

Electric vehicles

TABLE 1: BUDAPEST EVS SPLIT. SOURCE: BKK

	Total	Light Electric Vehicles (LEVs)	Light duty vehicles (LDV)	Heavy duty vehicles (HDVs)
BEVs		Cars: ~7,500 fully electric in Hungary (~50%, 4,000 in Budapest) Cars: ~5,300 range extension e-cars ¹ (~50%, 2,700 in Budapest) E-kick scooter: ~2,000 shared e-motorbike: ~200 shared	~200 BEV, 0 plugin	~less than 5, experimental BEV
PHEVs		~4,100 Plug-in hybrid in Hungary (~50%, 2,100 in Budapest)		

Charge point characteristics

Payment options

Budapest's charging infrastructure is both public and private. On the state-owned public charging points charging is for free. On private charging points fees are applied. The payment of private chargers on public ground are done via a mobile application. Prices are determined in three ways: either

HUF/kW or HUF/minute or a combination of both.

Total RES supplied

Only general data is available on the energy production sources in Hungary (51,4% hydrocarbon, 13,1% coal, 22,7% nuclear, 4,3% biomass, 3,8% wind, 3,8% solar, 0,6% hydro, 0,4% waste). No further data on RES

¹ A range-extended electric vehicle (REEV), or an extended-range electric vehicle (E-REV), is a battery electric vehicle that runs on electricity but includes an auxiliary power unit known as a 'range extender'. The range extender (usually a small petrol engine) drives an electric generator which charges a battery that supplies the vehicle's electric motor rather than driving the wheels. This allows for an increased range from the vehicle. Source: <https://www.greencarguide.co.uk/>

supplied in the charging system is available at this stage.

Electromobility strategies and initiatives

State of play

Budapest Mobility Plan -BMT- (2015)

The Budapest Mobility Plan also known as *Balázs Mór Plan* (BMT)², is the city's transport development strategy for 2014-2030 and the first overall SUMP of Budapest. The plan underwent public consultation and was then approved by the General Assembly of Budapest in 2014. The results of the wide institutional and public consultation that followed were integrated into the final version of the plan's objectives that was finalised in 2015.

The BMT lays down the strategy of short- and medium-term transport development in Budapest for the period between 2014 and 2030. In that vision transport must serve the implementation of the wider future vision laid down in the Budapest urban development concept.

The BMT supports environmentally friendly, zero emission transport. Measures directly address the topics of procurement of zero emission vehicles, support of environmentally friendly public transport technologies, support of environmentally friendly public transport technologies, environmentally friendly technologies in freight transport.

For electromobility and environmentally friendly public transport and taxis, the BMT foresees their deployment and promotion

through the introduction of tax and fee discounts together with the mitigation of the access restrictions imposed for environmental protection reasons, and the wide development of electric charging stations. The BMT acknowledges that electric vehicles may not become widespread without the required infrastructure, thus the installation of integrated electric charging stations at further taxi stations is set as objective. Finally, according to the BMT, freight traffic in the city should be operated by low emissions freight vehicles. The application of electric, hydrogen, and hybrid technologies or the use of human-powered transport are the options considered to decrease not only pollutant emissions, but also noise pollution.

Integrated e-mobility concept (2017)

The integrated e-mobility concept was prepared in 2016-2017 and includes strategic and legal background, good practices, analysis of the demand and supply side, and forecasts. The municipality of Budapest is committed to give priority to sustainable mobility including electric drive and zero/low emission vehicles to curb the use of internal combustion engine cars that are responsible for air pollution.

The integrated e-mobility concept sets e-mobility goals at societal level, based on the basic sustainability principles, and at transport system level. The concept foresees

² http://www.sump-challenges.eu/sites/www.sump-challenges.eu/files/bmt2016_eng_v3.pdf

a three-phased intervention starting with the introduction phase, followed by the growth phase, and the dominance phase. The concept is used as an internal document; therefore, it has not been published. During the USER-CHI project Budapest aims at reviewing this document.

Climate strategy of Budapest (2018-2030)

The municipality of Budapest published the Budapest climate strategy in April 2018, which focuses on objectives in terms of climate mitigation, adaptation and awareness raising. The mitigation objective aims to foster the usage of electric or low emission vehicles both on public and private sides.

Supporting policies for zero emission vehicles

Regional or national frameworks

National e-mobility laws set the legal framework of intervention. The law on e-mobility service (243/2019. (X. 22.) Korm. rendelet az elektromobilitás szolgáltatás egyes kérdéseiről³) sets the basic rules and conditions of public charging service and defines terms to be used. The general tasks and role of the state in spreading e-mobility, as well as appointing a public owned company for those tasks, are defined in the law on spreading e-mobility in Hungary (443/2017. (XII. 27.) Korm. rendelet az

³<https://net.jogtar.hu/jogszabaly?docid=A1900243.KOR>

⁴<https://net.jogtar.hu/jogszabaly?docid=A1700443.KOR>

⁵<https://net.jogtar.hu/jogszabaly?docid=a0700086.tv>

elektromobilitás hazai elterjesztésével kapcsolatos egyes állami feladatokról⁴).

For what regards electricity, the law on electricity (2007. évi LXXXVI. Törvény (VET.) a villamos energiáról⁵) sets the general rules of the use of electric power and provided public service in Hungary. It is complemented by the law on actions in connection with the electricity law (273/2007. (X.19.) Korm. rendelet (Vhr.) a villamos energiáról szóló 2007. évi LXXXVI. Törvény egyes rendelkezéseinek végrehajtásáról⁶).

The Hungarian e-mobility strategy (Hazai Elektromobilitási Stratégia Jedlik Ányos Terv 2.0⁷) is the comprehensive background document on the circumstances, aims, plans and actions in connections with e-mobility.

Deployment approaches

According to the Hungarian electromobility strategy, e-charging points are to be deployed where people spend typically more time (home, workplace, P+R parking, mall, touristic areas, and in areas with special needs: highways, main roads). At the local level, the Budapest's integrated e-mobility concept (2017) is the key planning tool for the deployment of e-mobility infrastructure.

Charging infrastructure is currently deployed with financial support from the state. Yet, there is unclarity on the temporality of this support as well as on

⁶<https://net.jogtar.hu/jogszabaly?docid=a0700273.kor>

⁷<https://www.kormany.hu/download/f/a9/a1000/Hazai%20elektromobilit%C3%A1si%20strat%C3%A9gia.pdf>

potentially altered procedures depending on changing economic priorities. Hence, both political situation and financial support have a major impact on the deployment. Areas which experience active political support and benefit from professional transport expertise to take informed decisions may see a greater deployment.

Currently the deployment approach adopted by the municipality must be coordinated with the regional grid operators (DSOs) and sees private companies (e.g. MOL, ELMŰ, MVM, EON, ÖMV) as best placed to further expand the network.

As mentioned above, despite being Budapest divided in two parts, geographically different, the charging infrastructure deployment is even on both sides. An interactive map, the Villanyautósok map (see further below), shows the current availability of charging points in Budapest⁸.

Good practices

Big Buyers Initiative

In terms of procurement Budapest is improving its strategic public procurement practices in the frame of the Big Buyers Initiative. This last is a European funded platform for promoting collaboration between big public buyers in implementing strategic public procurement. The initiative aims to work together with existing networks and organisations active in this area. Budapest is part of the working group on e-vehicles, focusing on electric duty vehicles.

Villanyautósok map

⁸<https://villanyautosok.hu/elektromos-toaltoallasok-magyarorszagon/>

As abovementioned, to strengthen the user-friendliness a charging point map has been developed, which allows a straightforward provision of information on the location of the different charging points⁹. To further facilitate the payment on private charging points located on public space, a mobile application can be downloaded by the users.

Cities-4-people project

More generally, the Cities-4-People project - which looks at electric mobility among the different types of shared mobility- promotes a people-oriented transport and mobility (POTM) approach, which provides new ways to deliver innovative, sustainable and targeted solutions that address the needs of the public. Budapest co-created the mobility points with its key stakeholders, including citizens.

Smart poles on the Lechner Fásor street

Finally, Budapest is testing smart poles on the Lechner Fásor street, in the 9th district of the city, in cooperation with BDK, the Budapest public lighting company, and the Budapest's electricity network operator ELMŰ-ÉMÁSZ. The chosen location combines commercial, institutional, and residential zones. The project was initiated to gather different functions (lighting post, electric vehicle charger, parking ticket machine, public transport ticket machine) in one spot to increase accessibility and functionality of the public space.

The test project features five different smart poles with varying functions including EV-charging, Wi-Fi, security cameras, LED

⁹<https://villanyautosok.hu/elektromos-toaltoallasok-magyarorszagon/>

display, environmental sensors, and an emergency button¹⁰.

Challenges and barriers

Budapest faces some challenges and barriers that prevent the full deployment of e-mobility in the city and its functional urban area. Currently there are no municipal e-bike sharing or e-scooter/motorbikes system, yet a boost of private e-bike sharing services is expected in the upcoming months as well as an e-scooter boom.

In terms of governance, public space usage is managed on two levels, namely on the districts and the municipal level which makes the implementation more challenging.

From a legal perspective, several legal gaps around e-mobility must still be determined and addressed. These include, for instance,

USER-CHI solution

In Budapest, seven USER-CHI products will be demonstrated. The USER-CHI products that will be demonstrated in Budapest are the following:

- **CLICK- Charging location and holistic planning kit:** An online tool for the location planning of new charging infrastructure in cities and TEN-T corridors.
- **Stations of the future handbook:** Guidelines and recommendations to design the perfect user-centric charging station of the future.

energy supply, parking, grid integration, RES, public space.

The lack of standardized charging solutions and payment systems for LEVs constitutes another challenging aspect together with the complex stakeholder group.

1.1.1. Learning needs

In line with the open issues mentioned above, there are some topics where further learning and knowledge sharing is needed:

- local, regional, and national legislation on e-charging, RES integration, parking, etc.
- system integration
- user acceptance
- technical integration of renewables
- public space use optimisation and public space legislation

- **eMoBest – e-Mobility replication and best practice cluster:** A collaboration platform to facilitate the transfer of best practices among the demonstration and replication cities.
- **INFRA – Interoperability framework:** A package of rules, guidelines and recommendations that will support highly interoperable processes among the electromobility stakeholders.

¹⁰<https://www.youtube.com/watch?v=sLLI1khOB48>

- **INCAR – Interoperability, charging and parking platform:** A platform providing roaming and barrier-free
- access to EV charging points and offering related innovative integrated services for the EV drivers.
- **SMAC – Smart Charging tool:** A tool providing smart grid integration and demand management services for slow, medium, fast and ultrafast charging.
- **INSOC – Integrated solar DC charging for Light Electric Vehicles (LEVs):** A solution combining charging, onsite production of renewable energy and theft-proof parking for Light Electric Vehicles.

At this stage, 1 main area of intervention has been identified in Budapest as USER-CHI demonstration city:

Demo site solution: e-mobility stations

The solution foresees the setup of e-mobility points (e-mobility stations) in order to concentrate services related to e-mobility and provide better use of public spaces.

Objectives

The main objective is creating a more liveable and multifunctional public space where different e-mobility functions (such as e-car, e-scooter, e-bike chargers) and other services (tablet charger, public lighting with sensors, car sharing docking station) are available and complement (interoperability) each other in terms of a smart city system. Budapest would like to develop urban e-mobility charging packages where real-life solutions for slow charging in densely populated areas in cities are provided.

Regarding the e-mobility station, the city would like to test different types in different urban context. The functions to be tested are:

- smart posts with e-charging facilities and other services
- integration of renewables
- billing system
- street furniture
- car-sharing docking stations

The solution should address the following city challenges:

- air pollution issues from transport
- increased light electric vehicles usage
- urban parking issues in densely populated areas
- RES integration
- user involvement, community engagement
- promote e-micro mobility solutions

Besides this, the city's aim is to develop a common e-mobility regulation for the city of Budapest, where the followings must be defined:

- e-charging infrastructures development, installation and operation
- LEV regulation (incl. operation, public space usage etc.)
- sharing service regulation (car, bike, e-scooter, motorbike, Segway etc.)

Stakeholders to be involved

- BKK Budapest Transport Centre
- BKV Budapest Transport Company
- Budapest Közút (Road operator of Budapest)
- BDK Budapest Public Lighting Company
- Budapest's electricity network operator ELMŰ-ÉMÁSZ
- E-mobility service providers (sharing services)
- District municipalities
- TEN-T actors (Budapest Airport, Magyar Közút, NIF Zrt.)
- NGOs
- Academic partners

Timing

The preparation phase will kick off from mid-2021, while the implementation will start in early 2022.