BUDAPEST MOBILITY PLAN 2030

BMT

Volume II
Transport Development and Investment Programme

BUDAPEST

BKK BUDAPESTI KÖZLEKEDÉSI KÖZPONT

CONTENTS

1

INTRODUCTION

1.1. PURPOSE AND STRUCTURE OF THE BMT TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

The 2014–2030 transport development strategy of Budapest, the Balázs Mór Plan, Objectives and Measures volume was approved by the Budapest General Assembly in 2015. This document determines the strategic goals and actions in the spirit of Sustainable Urban Mobility Planning (SUMP). Its overarching goal is to improve the competitiveness of Budapest and its metropolitan area and to contribute to the realisation of a sustainable, liveable, attractive and healthy urban environment. As a result of a wide-ranging institutional and social consultation process, the Objectives and Measures volume had incorporated 59 measures to support the implementation of the Strategy, in line with the three strategic objectives set.

As a second step in the SUMP process, the BMT Transport Development and Investment Programme was completed. As part of the workflow, the Objectives and Measures volume, containing 57 measures, has been revised and updated. Instead of the former title of "Balázs Mór Plan", all related documents are referred to as the Budapest Mobility Plan (abbreviated as BMT). As part of the programme, strategic guidelines that could be deduced from the objectives and possible development ideas (projects) to facilitate the implementation of the measures were determined. Based on these, a proposal for a transport development and investment programme for the period of 2019–2030 was prepared by means of a complex evaluation, programming methodology, taking into account both the social and environmental impacts and strategic environmental assessment (SEA) derived from the domestic and EU SUMP guidelines. The programme is consistent with the relevant sector and territory strategies and takes into account the financing resources available. In addition, the BMT documentation includes the Project Sheets summarising the projects examined

during programme development, the Institutional Analysis of Budapest Transport applying SUMP aspects, the Monitoring and Evaluation Manual that makes possible to monitor and evaluate the implementation of the Strategy and the aforementioned Strategic Environmental Assessment.

With the previous planning steps, accompanied by extensive institutional, professional and social consultation, the Budapest SUMP process will be a complex, methodologically sound, unified system based on professional and social consensus. The most important steps in this process and the relationship of these to the earlier and later stages of work sections are outlined in Figure 1.

In order to integrate different professional and social aspects into the programming process equally, consultation forums have facilitated all stages of the planning process. Thus, a participation-based planning and programming process was implemented, facilitating the development of a result based on professional and social consensus. The Balázs Mór Committee (BMB) set up for this purpose was the main forum for the institutional and professional reconciliation of the plan. Its members are delegated by the Municipality of Budapest Capital, the Centre for Budapest Transport (BKK) and the administrative and professional actors involved in the planning process, as well as independent experts. In addition to the narrower circle, BMB professional consultations, workshop-style professional consultation forums were held at the major milestones of the design process for further stakeholders. The inclusion of social comments is ensured through consultation as part of the SEA process.

The present document is divided into four main sections:

- a summary of governance considerations and strategic guidelines (Sections 1.2. and 1.3.),
- methodological description of transport development and investment programme implementation (Chapter 2),
- presentation of the Transport Development and Investment Programme for the period of 2019–2030 resulting from the programming process (Chapter 3),
- plans and preliminary proposals related to the implementation of the programme (Chapter 4).

The Budapest Mobility Plan is the SUMP framework document for transport development in the coming decade (2020–2030), dynamically aligned with sustainable urban development. The range of projects evaluated therein may change based on the laid down BMT methodology in line with the objectives.

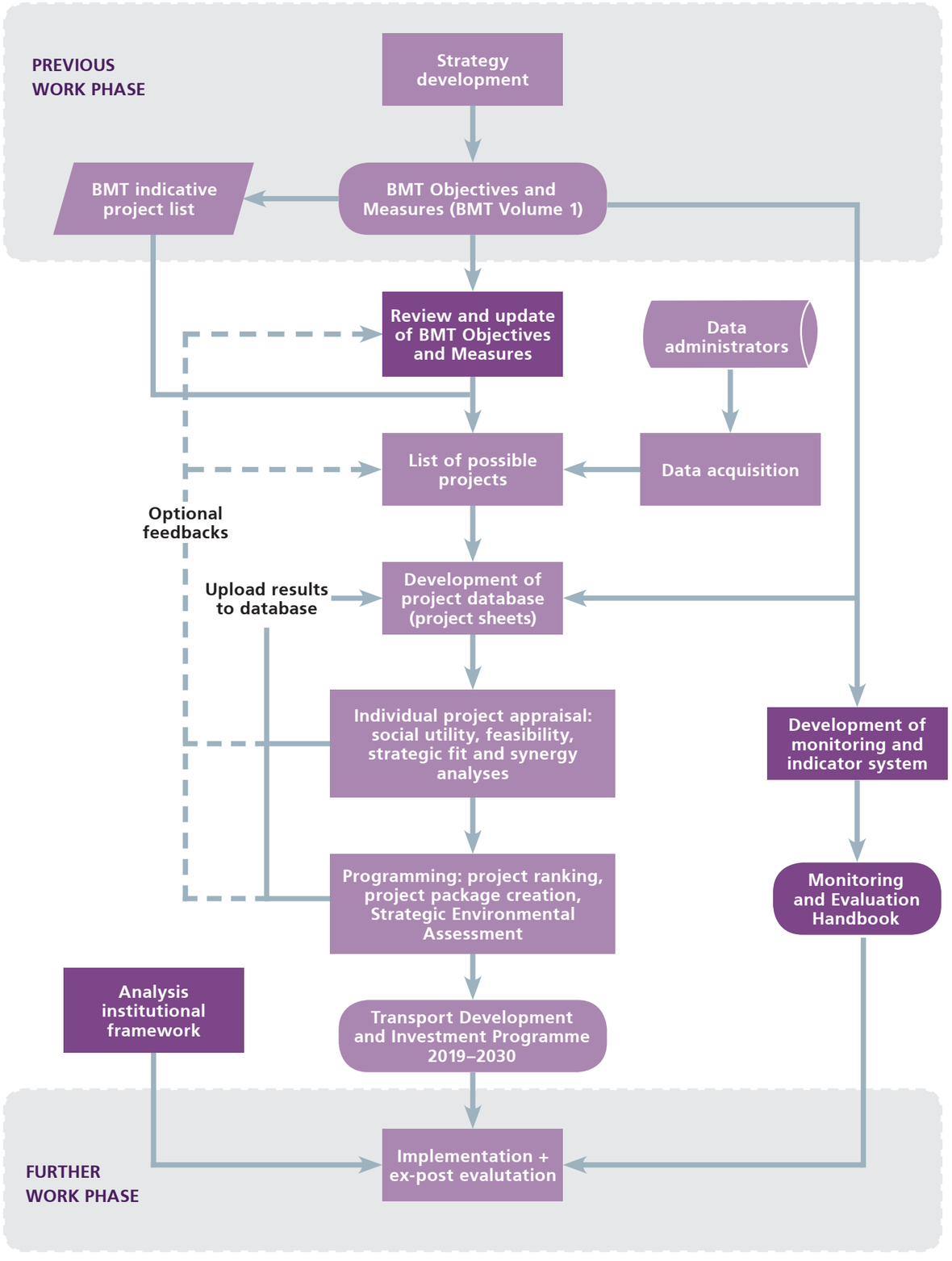


Figure 1: *PROCESS OF THE ELABORATION OF TASKS RELATED TO THE BMT TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME*

1.2. INSTITUTIONAL ENVIRONMENT

The Institutional Analysis related to the BMT, prepared based on the Sustainable Urban Mobility Planning (SUMP) Process Guidelines, presents the status and problems of the institutional system of transport in the capital, evaluating the relation of the operational background to the physical components of transport and to the objectives of the BMT itself as of 31 December 2018. The present chapter summarises the findings of the institutional analysis.

The development of the current transport governance system dates back to some 30 years. After 20 years of the change of political regime, the central, departmental operating environment of the Municipality of Budapest Capital has shown that the fulfilment of the tasks related to transport in the capital exceeds the competence and capacities of the municipal apparatus. Therefore, in 2010 following an international comparative study of governance development opportunities, a decision was made to establish a new intermediate integrated transport organiser (procurer), a transport manager, transport strategy planner (including also infrastructure tasks) level between the municipality (as owner) and the transport service providers, together with establishing a two-tiered system of public service contracts. In order to perform related tasks, the Budapest General Assembly established and designated BKK as the transport competence centre of the capital.

However, after a few years, the strategic goals of institution-building aimed at full integration were sidelined and, based on a decision by the municipality, a profile cleaning and reorganisation of BKK started for reasons of transparency while ignoring professional aspects of the transport sector, which resulted in the fragmentation of the by then almost fully integrated institutional structure. By the creation of these new institutions, the reallocation of tasks and the reorganisation of powers the integration "task" moved towards the main decision-making bodies (Metropolitan Assembly, Central Government). However, the new concept continues to hold BKK responsible for transport strategy related issues, including the implementation of SUMP. The financial environment available for the performance of tasks is stable, but the scope for reallocating financial resources has narrowed in recent years. The current institutional system performs its tasks functionally and the necessary professional capacity and competences are available, although disproportionately to the tasks of the individual institutions. The relatively rapid changes in institutional development concepts, including the inevitable consequences of decisions on BKK's future operation or termination, result in process-planning imperfections (such as assignment of tasks, powers

and responsibilities) to the detriment of long-term efficiency gains in the entire transport system, making more difficult to achieve the strategic goals of BMT as well. The evaluation of the efficiency of the institutional operation is detached from the evaluation of the activity related to the achievement of the overall transport objectives. The efficiency evaluation of the individual phase activities alone is misleading and sometimes it leads to the opposite of achieving the overall and strategic goals.

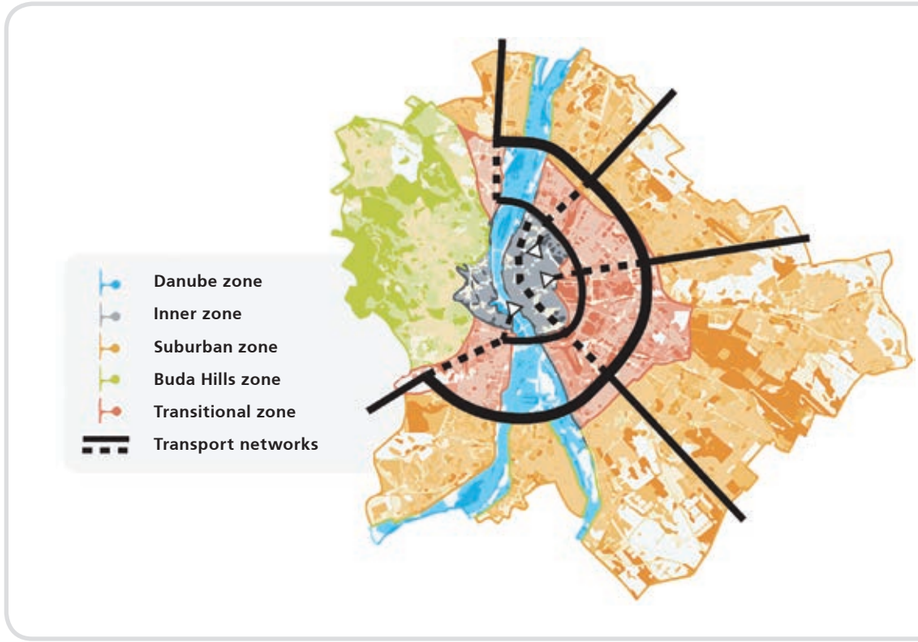
Proposals for changes that are indispensable for the effective achievement of the objectives of the BMT include:

- to ensure institutional transformations and reallocations of competences in line with the professional competences needed to fulfil the BMT objectives
- transition to process-based work organisation, eliminating the inhibiting effects of changes in tasks and responsibilities due to a changing institutional environment while continuing to provide the necessary authorisations and resources
- the establishment of a common procurement organisation for the functional urban region in relation to the integrated transport manager tasks and customer model, furthermore establishment of a support body for strategic decision-making and the establishment of a coordination forum bringing together all stakeholders in the institutional system to support operational functions
- establishment of close strategic cooperation between BKK and the relevant Budapest municipal administration in an institutionalised form, regarding complex urban and transport development issues
- in the case of developments on the territory of Budapest, either through municipal or governmental investment, the unified designation of the organisation responsible for the implementation of investments (whether through the establishment of a project company), in line with the operation of the Municipal Public Development Council (FKT), formed in 2018, as well as the clear definition and distribution of tasks and powers between the parties and close cooperation with state actors in developing the legal and regulatory framework for transport.

1.3. STRATEGIC GUIDELINES FOR THE PLANNING OF TRANSPORT STRUCTURE

The strategic guidelines designate the transport infrastructure framework within which the BMT Transport Development and Investment Programme projects can be positioned, based on the BMT Objectives and Measures. Thus, the overall and strategic goals of the BMT Objectives and Measures – to achieve the integration of planning in the region, within the transport sector and between urban development and transport development activities – are the starting point. The strategic guidelines go beyond the final state of this programming process to be reached by 2030, or beyond any other date that is covered by any project that can be foreseen today. They contribute to the identification of projects that run counter to the long-term goals and hinder the achievement of the integrated perspective goals, and help to identify synergies between projects.
In order to achieve the BMT objectives, the zones differentiated by the Budapest 2030 Long-term Urban Development Concept and appearing in the BMT require differing interventions (Figure 2). In order to reduce the load and concentration in the inner zone, in addition to reducing the motorised vehicle traffic, it is not beneficial to introduce new public transport transfer connections in this area either. With-

Figure 2: *DIFFERENTIATED TRANSPORT INTERVENTIONS OF BMT IN THE ZONES DEFINED BY THE BUDAPEST 2030 LONG-TERM URBAN DEVELOPMENT CONCEPT*



in the Danube zone, pedestrian access to the riverside, and in the northern and southern sections access to all major public transport links need to be ensured. The development of the transitional zone can be facilitated by the construction of a road and public transport ring within the area. On the other hand, building a new transversal road connection in the Buda Hills zone would attract significant traffic from elsewhere, which is detrimental. From the suburban zone, as well as from the metropolitan area, access to the inner city is to be realised primarily by public transport.

The guidelines define the status when the strategic and territorial objectives are achieved according to three functional layers: (1) liveable urban destinations, (2) backbone network and (3) fine transport network (see Figure 3).

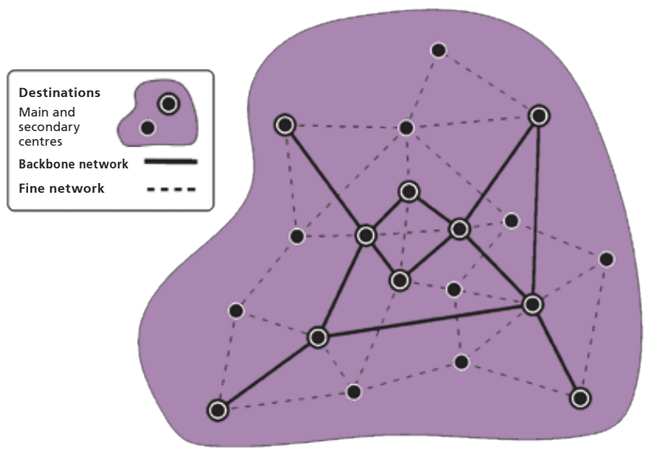


Figure 3: *CONNECTION OF FUNCTIONAL LAYERS DEFINED BY THE STRATEGIC GUIDELINES*

(1) LIVEABLE DESTINATIONS IN THE URBAN SPACE

The sectoral integration of urban development and of transport requires that transport pay particular attention to the destinations served by transport (place making). The goal of a people-centred liveable city based on a societal approach thus involves the decisive role of 'places' which are, though technically outside of transport, yet they justify transport. (see Figure 4).

Based on this aspect, the process of reallocating public space comes to the fore, which takes back from the overwhelming expansion of motorised transport experienced over the past decades to the benefit of other urban functions. Fast, convenient and barrier-free accessibility to local destinations and services, as well as access to other modes of transport, requires the development of a coherent and expanded pedestrian network. It is also primarily the pedestrian network that needs to accommodate tourism related needs in the city centre and inner city areas.

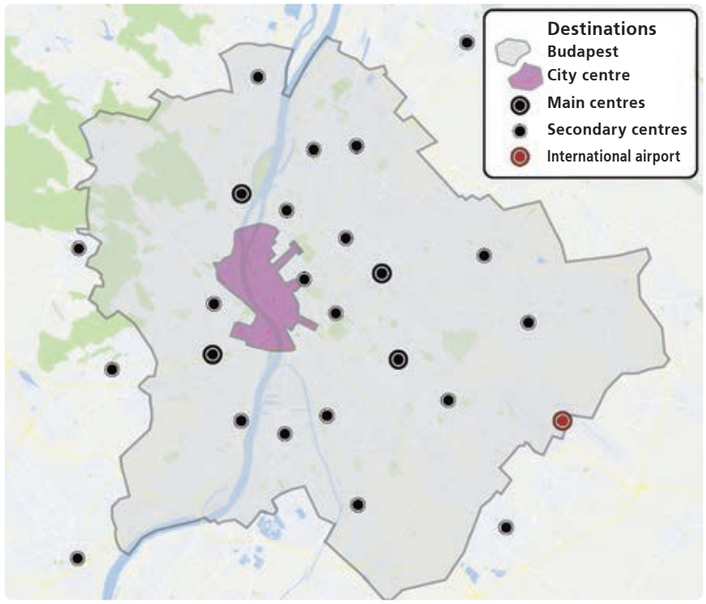


Figure 4: *MAJOR URBAN TRANSPORT DESTINATIONS*

In case of the transport purpose use of public space, it is important to take into account the emergence of new technologies that affect travel patterns, the impact of vehicle sharing and automation processes, as they are expected to significantly reduce the need for short- and long-term car storage. Therefore, extending public parking capacity beyond the transport mode-switching connections to be discussed below is not justified and what is more, parking needs to be limited by changing the minimum requirements of relevant regulations, especially in densely built-up areas. Clear regulation needs to be applied for managing the existing capacities, by extending pay zones, reviewing fee-charging strategies and tightening residential car parking conditions in public space.

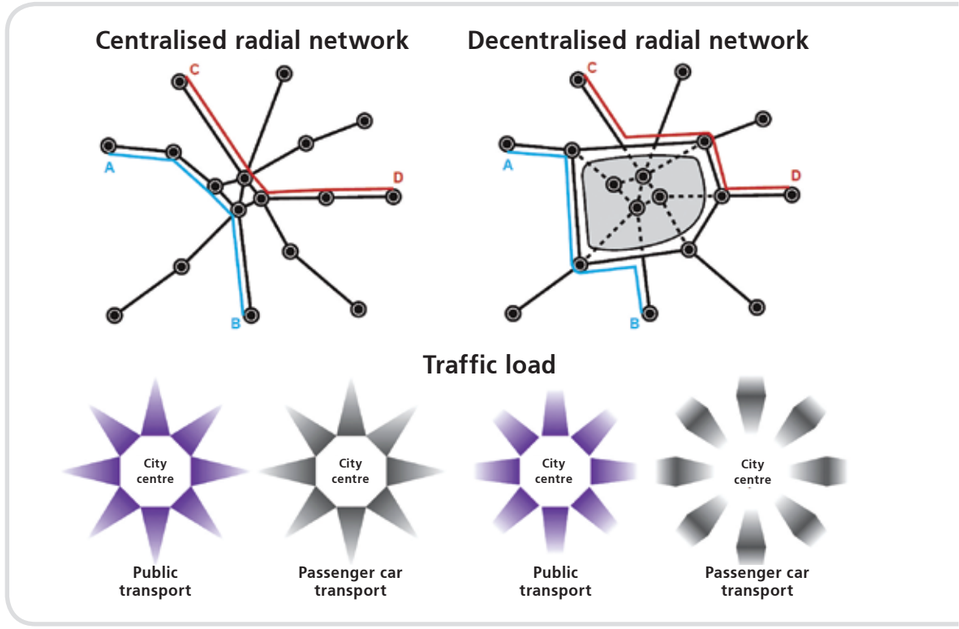
In case of cycling, a connected core network and a secondary one complementing the core are to be established. In the outer districts, recreational cycling facilities, especially green corridors, should also appear alongside the transversal and radial main network serving commuting cyclists.

The connection system of the transport destination sites (link making), i.e. the tightly interpreted transport facilities, can be covered in two further functional layers. The backbone network connecting the main zones of the entire region is one layer, while the other fine network elements that allow access to local destinations are the other. The connection points of the two layers must ensure inter-layer crossing and mode-switching conditions. The layers manage and integrate the various modes of transport ensuring their functionalities in order to achieve a common optimum.

(2) BACKBONE NETWORK CONNECTING THE CAPITAL CITY AND THE ZONES OF THE AGGLOMERATION

In order to realise the goals of a liveable city and of the integrated transport services embedded in the full range of urban functions, different interventions need to be adopted for each mode of transport. Road traffic in general, especially in densely built-up urban areas, needs to be reduced; public transport and cycling possibilities need to be provided as alternatives to ensure convenient access, with few transfers, and by providing simple, quick and easy-to-use solutions for the transfers and transport-mode switches. An important consideration for this is that the city centre should not function as a transport hub to bring together all transfers. In addition to the good accessibility of the city centre, the connectivity of the transport network, including the significant part of transfers, must be provided in a decentralised manner. While the external extension of existing inner city connections primarily improves the accessibility of the city centre, the introduction of new lines into the city centre further centralises transport functions. Decentralisation can also help to balance traffic loads and reduce the burden on the city centre (see Figure 5).

Figure 5: *IMPACT OF DECENTRALISATION OF THE RADIAL TRANSPORT NETWORKS*



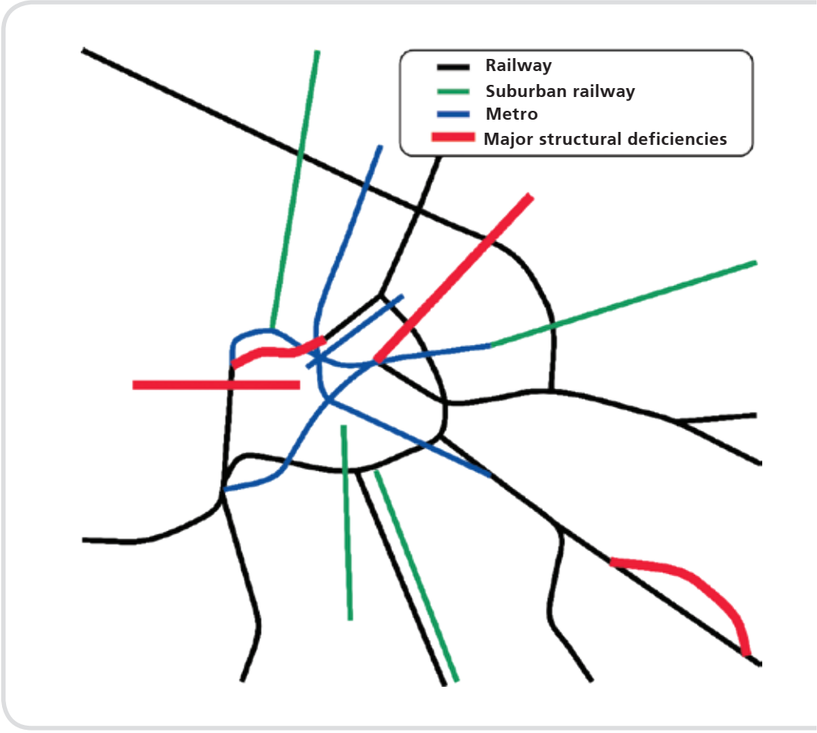
The modal shift from road traffic can be made flexible if this task is not concentrated on a single high-capacity intermodal node along each ingoing direction, but there are several options on the route for connecting to the public transport links to the city. On most introductory sections, this can be ensured by means of P+R and B+R connections to be established near metropolitan area (commuter and suburban railway) stations. However, in order to achieve that public transport connections remain attractive for accessing a wide range of urban destinations, there is a need to organise public transport into a competitive metropolitan area railway system ("S-Bahn network") which is integrated into urban transport. In addition to commuter railway lines, also suburban railway lines need to connect to this system by constructing a complete railway ring with new stations as required. By creating overlapping links along the ring, convenient transfer connections can be provided to all major radial directions of the urban transport system. The metropolitan area railway system and – by cancelling the exclusive terminal railway station system – the use of railway territory can equally be rationalised, which promotes the realisation of the goals set by the capital, both from a financing as well as a land use aspect.

The other core element of the backbone network, the metro network, is connected to the metropolitan area railway system primarily at the intersections with the railway ring. The condition of this is that the metro lines at least reach the railway ring. In addition, where current metro terminuses are connected to train stations, leading the line further on the surface, would be beneficial. The feasibility of metro-rail integration needs to be considered depending on the technology change and taken into account during the associated investments (e.g. vehicle requirements, platform heights, stop reconstructions, operation equipment). For suburban areas not served by the metropolitan area railway system but generating significant traffic, extensions to existing metro lines up to the M0 motorway ring will be considered, utilising existing shopping centre parking capacities also as P+R and B+R functions.

Currently, two important transport corridors in district centres are not served well by backbone network elements. One of those

is Zugló-Újpalota in Pest and the other is the Buda Hills area. It is preferable to replace the existing bus connections with a fixed-track link only if this does not result in any new forced transfers, i.e. if the city centre and Danube bridge links can also be replaced. The role of the backbone network is also to provide connection to the strategically important international airport. The current and expected passenger traffic levels at the airport do not justify a separate, dedicated inner city fixed-rail connection, neither is it structurally reasonable to realise it. The integration into the metropolitan area railway system can be solved reasonably by the relocation of the railway tracks and the construction of a new station, thus providing the airport with several connections to the city centre as well as direct access to the airport from the eastern part of the country. This way, later on, the railway ring can be used to connect directly from more parts of the city and also the western part of the country.
The public transport part of the backbone network and the main structural deficiencies are shown in Figure 6.

Figure 6: *PUBLIC TRANSPORT PART OF THE BACKBONE NETWORK*



The outlined design of the public backbone network provides a good basis for the reasonable restriction of the flow of road traffic to the inner city areas. It is a priority objective to reduce the share of car users in daily commuter traffic originating from the radial connections and from among those arriving in the city to run errands. In order to achieve this, in addition to network developments, there need to be a tariff incentive being in line with the objectives, including congestion charging, which does not necessarily mean physical cordoning, but a tariff system using modern technology applying differentiation in terms of time and location.
Instead of channelling motorway traffic all the way to the Hungária Ring, it is advisable to create a unified closing line between the Hungária Ring (see Figure 7, Ring 2) and the M0 Motorway Ring (Ring 4) along the ring road running parallel to the railway ring (Ring 3); strengthening, at the same time, the role of that transversal route to be realised there by adding this internal distribution function.
On the road transport network, it is primarily appropriate to ease the current state of centralisation, for which new crossing points on the Danube are needed in the transitional zones along the road to be completed in parallel to the railway ring. In addition to the railway ring road, a further exterior transversal connecting element needs to be integrated into the sprawling urban structure of South-Eastern Pest by connecting the region of the M31 and M51 motorways (practically the missing section of Ring 4 in Pest). These new public road links will improve accessibility and trans-

versal penetrability of the Transitional Zone, thereby supporting the area where the Budapest 2030 Long-term Urban Development Concept concentrates new housing construction and the axes of priority land development.

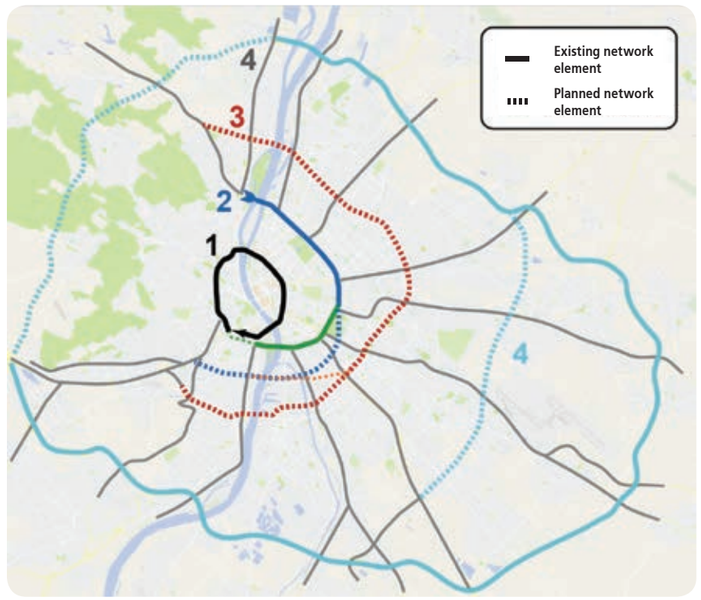
The construction of road network elements that reinforce centralisation needs to be avoided. Such a connection contrary to the structural objectives would be, for example, a new radial link to the city centre or capacity increase on the existing radial elements.

Among the new transversal connections, the question of the extremely costly western (Buda side) closure of the M0 motorway ring (the missing Buda section of the 4th ring) is arising, more precisely the justification of the needs related to it. Based on the BMT principles, the offering of public transport alternatives is a priority in the provision of transversal connections in Buda. In terms of the backbone network, the metropolitan railway ring improves the competitive edge of public transport, but the already completed Buda interconnected tram network offers a meaningful alternative. It would make sense to evaluate the justification for the implementation of new transversal roads in Buda using public funds after the completion of public transport investments.

Further design considerations include the sensitivity, resilience of the network as well as the manageability of emergencies. The strategic guidelines formulated intend to achieve these partly through the encouragement of public transport use and the increase of the resilience of the public network, but these are also facilitated by the transversal road transport developments that allow for the choice of alternative routes.

The road transport part of the backbone network is shown in Figure 7.

Figure 7: *TRANSPORT PART OF THE BACKBONE NETWORK*



(3) FINE TRANSPORT NETWORK

The primary function of this network layer is to complement the backbone network by realising appropriate connection points. This is not a rigidly defined feeder network, occasionally the fine network layer itself needs to be capable of facilitating inter-district travel. In the case of the public transport network, this means developments strengthening the integrity of it: interconnection of isolated network parts, extension of transversal links and, where appropriate, the extension of radial network elements. In connection with this, the reduction and, if possible, elimination of the city centre terminus functions is justified from the aspects of passenger traffic, operation organisation and urban development as well.

Connecting riverboat services into the urban and suburban transport system, which can take over commuter travel as well, can perform a significant fine network function by complementing the backbone network. This requires, in addition to pier developments, vehicle procurement along with competitive service organisation.

Demand-responsive solutions play an important role in promoting the flexibility of the system, which can provide solutions primarily in areas and periods where due to the volume or the hectic character of travel demand the provision of constant bus service is not justified. This can mean the connection of unserved areas and periods of time to the public transport system or, on the other hand, the replacement of existing but extremely uneconomic services and introducing alternative modes of transport, for example in areas with low population density. In the long term, partly through the spread of autonomous vehicles and vehicle sharing, public transport as a service can involve the entire fleet-size range.

2

METHODOLOGY FOR THE ELABORATION OF THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

2.1. ESTABLISHMENT OF A PROJECT DATABASE

The starting point for the realisation of the Transport Development and Investment Programme is the identification of potential projects to achieve the objectives of the BMT and the structured, unified recording of their data. This chapter describes the determination of the possible projects to be included in this project database, the different project types used to characterise the projects and the system of descriptive data (the so-called project sheets).

2.1.1. DETERMINATION OF THE LIST OF POSSIBLE PROJECTS

A list of possible projects (the so-called "long list") is a list of all intervention ideas that are identified in relation to the achievement of the objectives of the BMT and the associated measures.

The starting point for the long list is represented by the intervention ideas proposed as project by the potential project owner organisations. The long list will be compiled based on consultations completed with representatives of the capital transport governance system and other partner organisations. Depending on the stage of preparation, project content is refined by means of the available documents (e.g. study plans, feasibility studies, traffic assessments) and through interviews with project owners.

In addition to the development ideas identified as a project, the other necessary (“missing”) projects can be deduced from the BMT objectives and measures system, the strategic guidelines as well as from other strategic documents closely related to the BMT. In addition, it is also possible that a project idea from project owners is not related to BMT measures, so there is no reason to include it in programming at a later stage, but these projects are still on the long list, classified as cancelled project types. The finalisation of the long list through an iterative process, thus closely linked to the examination of how the project fits into the BMT objectives, which provides a top-down approach to derivation from the strategy.

Projects that do not fall within the competence of the General Assembly and require national decision-making are also identified. These so-called state projects are also distinct from the projects to be implemented solely by the transport governance system of the capital city in terms of the project owner organisation. These will be evaluated but not included in the ranking and in the cost and financing plan.

The long list also includes projects the implementation of which has already started, in order to achieve the goals of the BMT, or decision has already been made for the realisation. These approved projects are not included in project evaluation and ranking.

Projects that are primarily related to operation and maintenance practices and satisfy smaller development needs are treated as "tasks" and are not included into project evaluation and ranking.

2.1.2. DEFINITION OF PROJECT TYPES

Projects can be divided into six different project types based on their content, evaluation and ranking:

1. **Concrete and modellable project:** the project content is precisely defined (clear content, determined location, identified time and cost plan) and a traffic model can be created for it. During the evaluation the extent of the expected impact of the development can be quantified. e.g. extension of the tram line along Bécsi út.
2. **Concrete and non-modellable project:** the content of the project is precisely defined, but by its very nature, the impacts cannot be fully evaluated using traffic modelling, therefore its impacts are evaluated by expert estimate. e.g. implementation of Kelenföld intermodal junction.
3. **Non-concrete project:** a generally described project that involves multiple and/or non-specific areas and therefore it cannot be modelled. e.g. regulation of the transport and parking of tourist buses.
4. **Decided project:** a project that has financing for realisation or is in the implementation phase.
5. **Task-type project:** activities arising from a statutory obligation as well as maintenance or depreciation replacement activities which do not involve any substantial development (e.g. road renovation).
6. **Project idea:** project concept with a low-level of preparation for which the minimum data content required for project evaluation is not available.

The projects of the first three categories can be ranked and can be considered in the ranking process. Among the projects that can be ranked, the state projects are not represented technically as concrete projects and are evaluated accordingly. These projects influence the outcome of overall programming through examining their relationships with the other ranked projects.
The decided, task-type projects and project ideas are not ranked, but are part of the investment programme.

2.1.3. SYSTEM OF THE DATA DESCRIBING PROJECTS, PROJECT SHEETS

The project database is used to record the data related to the projects, allowing for consistent and transparent information management. The overview of this is facilitated by the project datasheets, which summarise the data of the individual projects (e.g. project title, technical content, project owner organisation, districts concerned, transport modes involved, investment cost) and project evaluation results in a unified structure, in 2 pages.
The project database also allows for flexible handling of possible modification requests and the inclusion of new project proposals too.

For the process of uploading data into the project database, the starting point is the identification of the data owners belonging to each project. Data acquisition and processing is based on the documentation available for each project. If any project plan documentation or feasibility study is available for the project, then the data that can be identified based on the documents will be considered, in consultation with the project owner. In case such project documentation is not available, then the project data will be recorded within the framework of interviews completed with the project owner.

CONTENT OF THE FIRST PAGE OF THE PROJECT DATA SHEET:

- **Projekt ID:** the three digit ID number used to identify the project (in Pxxx format)
- **Projekt name:** name of the project
- **Project owner organisation(s):** the organisation managing and implementing the project or list of those organisations (e.g. Municipality of Budapest Capital, BKK, NIF, MÁV)
- **Project type:** classification according to the project evaluation methodology (see sub-chapter 2.1.2.)

- **Map of Budapest:** a map illustrating the spatial extent of the project, based on the districts of the capital concerned
- **Area of intervention:** a visual representation of how the project fits in with the areas of intervention defined by the BMT Objectives and Measures: **1. improving connections**, **2. attractive vehicles**, **3. better services**, **4. effective governance system**
- **Mode of transport affected:** representation of the transport modes affected by the project in the form of pictograms: public transport, car transport, walking, cycling, freight vehicle transport.
- **Affected zone:** list of zones affected by the project as defined in the Budapest 2030 Long-term Urban Development Concept: Inner zone, Danube zone, Transition zone, Buda Hills zone, Suburban zone, and Metropolitan area
- **Image/map:** an image, map or site plan associated with the project
- **Project status:** the implementation status of the given project, classified into one of the following categories: project concept developed; decision preparation in progress (MT, RMT, decision preparation study, design study – prepared or in preparation); decision was made (government decision, resolution of the General Assembly of Budapest); detailed planning in progress (licensing and implementation plan prepared or in progress); implementation in progress (implementation or its public procurement has begun); not known.
- **Project description:** textual description of the project content.

CONTENT OF THE SECOND PAGE OF THE PROJECT DATA SHEET

- **Connecting measures:** connection of the project to the measures defined in the BMT (possible attributes: 57 measures defined in the BMT)
- **Preparation time required:** estimated total project preparation time in months

- **Implementation time required:** estimated total project implementation time in months
- **Investment cost:** the estimated net investment cost of the project at the 2017 price level, in million HUF
- **Project appraisal results:** presentation of numerical values resulting from the following evaluations. In case the given evaluation cannot be completed, the designation "not relevant" is shown. If the project is excluded on the basis of the given evaluation, it will be labelled with "KO criterion, excluded project".
  - **CBA results:**
    - **BCR:** benefit–cost ratio calculated on the basis of the cost-benefit analysis (ratio of the present value of economic benefits and costs)
    - **Total profit (million HUF):** sum of economic benefits calculated on the basis of cost-benefit analysis at current value, year 2017 price level
    - **Total cost (million HUF):** sum of economic costs calculated on the basis of cost-benefit analysis at current value, year 2017 price level
  - **Converted CBA or MCA score:** a converted cost-benefit analysis or multi-criteria evaluation score calculated based on project evaluation methodology (possible value range: 0–100)
  - **Converted MEG score:** converted feasibility score calculated using the project evaluation methodology (possible value range: 0–100)
  - **KÖR score:** a score calculated using project evaluation methodology, based on the results of an environmental sustainability assessment
  - **ILL score:** a fit score calculated using the project evaluation methodology
- **Output indicators:** outputs obtained by realising the project (e.g. construction of 10 km of new tram tracks and refurbishment of 15 km of tram tracks), project level indicators
- **Result indicators:** list of target values for result indicators for project-related measures
- **Impact on the natural and built environment:** a brief textual assessment of the impact of the project on the natural and built environment (e.g. whether the project impacts a World Heritage Site or Nature 2000 site)

2.2. PROJECT EVALUATION METHODOLOGY

2.2.1. DETERMINATION OF THE METHODOLOGY BY PROJECT TYPE

The purpose of individual project evaluation is to examine the strategic fit of the projects, the environmental and sustainability adequacy, the social utility, the feasibility and the relationship with other projects.

The following methods are applied during project evaluation:

- examination of how the project fits with the measures serving the BMT objectives (ILL)
- examination of the compliance with environmental and sustainability objectives (KÖR)
- evaluation of the social utility (efficiency):
  - in case of concrete projects which can be modelled economic (social) cost-benefit analysis (CBA) based on traffic modelling;
  - in case of projects which cannot be modelled multi criteria analysis (MCA)
- feasibility evaluation which examines how well the project is prepared along with its technical feasibility and social acceptance (MEG)
- examination of the synergistic relationships with other projects (SZIN).

Table 1 shows the relationship between the project types and the evaluation methods.

Table 1: *EVALUATION METHODS APPLIED PER INDIVIDUAL PROJECT TYPE*

Evaluation method	Rankable project			Task	Project-idea	Decided project
	Concrete modellable project	Concrete non-modellable project	Non-concrete project			
Fit examination (ILL)	+	+	+	+	+	+
Environmental and feasibility examination (KÖR)	+	+	+	+	+	–
Cost-benefit analysis	+	–	–	–	–	–
Multi-criteria analysis (MCA)	+	+	+	–	–	–
Feasibility evaluation (MEG)	+	+	+	–	–	–
Synergy evaluation (SZIN)	+	+	+	+	+	+

Comment: + method used for evaluation of the project type; - method not used for evaluation of the project type

2.2.2. FIT EXAMINATION (ILL)

The purpose of the fit examination is the quantitative evaluation of how the individual projects fit in with the measures defined in the BMT objectives and to identify missing projects based on these objectives. All measures serving the objectives are expected to have a project that supports the given measure. In line with this, each project on the long list must fit to at least one measure.

The fit of a given project to a given measure is evaluated on a scale of 0–2, where 0 point means the neutral connection, 1 point is a partial fit and 2 points are a complete fit. The fit score of a project (ILL_i) is calculated as the sum of the scores that were given for their connection to individual measures. During expert evaluation, each project receives a fit score.

In case of rankable projects, the fit scores are also converted to a scale of 0 to 100. Thus, the so-called converted fit score (P_{ILL_i}) is determined for the set of ranked projects as follows:

$$P_{ILL\,i} = \frac{ILL_i - \min\limits_{i\in[1,n]} ILL_i}{\max\limits_{i\in[1,n]} ILL_i - \min\limits_{i\in[1,n]} ILL_i} \cdot 100$$

$where, ILL_i: the\ ILL\ value\ calculated\ for\ project\ number\ i,$

$\min\limits_{i\in[1,n]} ILL_i : lowest\ ILL\ score\ \ received\ by\ a\ rankable\ project$

$\max\limits_{i\in[1,n]} ILL_i : highest\ ILL\ score\ \ received\ by\ a\ rankable\ project$

The result of the fit examination is used not only for the evaluation of individual projects, but also for the evaluation of project packages, since fit scores can be summed up not only for the measures defined in the BMT Objectives and Measures, but also for operative and strategic objectives as well as for areas of intervention. This can also serve to qualify the contribution of the project packages compiled based on project evaluations to the BMT objectives.

2.2.3. EXAMINATION OF THE COMPLIANCE WITH ENVIRONMENTAL AND SUSTAINABILITY OBJECTIVES (KÖR)

The KÖR examination is performed in the context of the Strategic Environmental Assessment (SEA) and aims to assess the compliance with environmental and sustainability objectives.

As a first step of the examination, the projects are classified, based on their contents, into 24 SEA types, to each of which a basic environmental qualification, a base score, is allocated. The score can be between 1 and 10, with 10 points for the type of project that is most beneficial to the environment and quality of life, while 1 point means that the type shows no benefit from these aspects. Scoring is prepared by several environmental experts, independently from each other. The final scores for each type are calculated by averaging the scores, but omitting the highest and lowest values.

In the second step, the base score is adjusted on the basis of eight factors per project, based on the content of the project. For this purpose, the relevant values of the multi-criteria analysis (MCA) as well as data from earlier strategic environmental assessments related to the individual projects are used. The eight factors examined are as follows:

- territorial location, importance
- beneficial effects directly perceptible by the population
- facilitation of better adaptability to climate change
- potential impact on natural and built environmental assets
- increase of the coverage of built-up, biologically inactive areas, decrease of green space and surfaces
- transport safety
- significant change in environmental emission levels and the improvement of conditions caused by it (air, noise, vibration)
- special construction related effects.

Scores for each factor can range from -2 to +2. A project can be given 0 score because of three reasons. On one hand, the factor may not be relevant to the project, for example, vehicle procurement does not necessarily have construction related effects. The next reason can be that the positive and negative effects have more or less equal relevance, so they cancel each other out. Thirdly, there may be a lack of information originating from the preparedness that makes it impossible to evaluate the extent of the effect.

A value of 2 means that a strong improvement or deterioration, increase or decrease is expected. The value of 1 may not necessarily indicate a weaker effect, but it may also indicate a more uncertain estimate.

Based on the above, a project can be awarded up to 10 base points and 16 factor points.

2.2.4. TRAFFIC MODELLING

The purpose of traffic modelling, based on the theoretical basis of network planning, is to map traffic demand and supply, both current and future, in order to determine traffic flows between traffic areas and the traffic load and capacity utilisation of network elements (e.g. road sections).

The traffic data and indicators generated this way as output of traffic modelling can be used to quantify the social benefits of the modelled projects in the cost-benefit analysis.

The basic model used in traffic modelling is the Unified Traffic Model (hereinafter referred to as EFM), which is suitable for the examination of transport investments in the capital and agglomeration. This integrated transport model is an independent, continuously maintained, regularly updated decision-support tool owned by BKK Zrt., which provides a solid professional foundation, transparency and consistency of modelling work for future projects. EFM is an all- transport, strategic model. For details on how it works, please refer to the EFM Modelling and User Guide.

The EFM is capable of performing the following tasks:

- long-term transport strategic examinations
- examination of the effects of major traffic engineering and regulatory interventions
- examination of projects resulting in significant traffic realignment affecting at least 2-3 districts
- examination of complex infrastructure interventions affecting several transport modes.

However, it cannot be used directly:

- to examine minor interventions in the timetable(e.g. changing departure frequency)
- to analyse the distribution of traffic between parallel routes
- to examine minor traffic engineering interventions
- to analyse fare and tariff related issues.

The above considerations need to be taken into account when evaluating if a project can be modelled or not. Presently there is no way in EFM to model projects related to the fare scheme or tariffs, those resulting in service quality changes or combined journeys (e.g. P+R), but the planned model developments will allow future examination of such projects as well.

Examining each project for all timeframes involves the comparison of two cases; the so-called project-free ("without") case and the project ("with") case representing project implementation. Planning intervals: baseline year (year of examination), short term, medium term and long term. Thanks to this approach, all the developed states of each project are compared to the same starting, "without" case as the benchmark. This ensures the objective evaluation of the projects, independent of each other.

Within the framework of the "without" case, in the EFM there will be established an existing, current status (year of examination) and three agreed perspective baseline statuses which include the most likely future road and public transport developments, independent of programming, and expected traffic demand changes originating from the expected spatial developments. Those projects which are on the project list as decided projects will be built into the "without" status starting from the first modelling "future reference year". In case of those projects where there is a prerequisite ("build-on"), the prerequisite is built into the "without" case.

The "with" cases basically mean the mapping of a given project, for a predefined future reference year, into a network model and the inclusion of the supply characteristics (e.g. headways). Other modifications associated with the project may include:

- modification of the demand matrix, exclusively in justified cases, when a significant traffic generating and attracting facility directly related to the project is implemented. Areas and their data, if necessary, can be merged or disaggregated based on appropriate estimation.
- necessary modifications of the public transport network connecting to the project (e.g. termination of parallel lines).

The modelling process, per project, is carried out in succession of the following main steps:

- checking the adequacy of all input data needed for modelling
- necessary modification of the "without" case
- elaboration of the network model
- inclusion of supply characteristics and timetable characteristics
- necessary modification of the demand model
- first running of the load process ("troubleshooting run")
- integrating the traffic-rearrangement effect of the project examined into the demand model matrices
- second running of the load process (iterative, in several steps with the previous point)
- model validation ("verifying runs")
- output generation.

During modelling, uniformity and comparability were the primary considerations. In this spirit:

- The same "without" network was considered for each project. (Deviation from this is only possible in case of "build-on" projects.)
- The structure data of demand model matrices are the same for every project per each future reference year.

- The network for a given project is basically the same for the three future reference years.
- The model contains the same number of iteration steps for each project.
- Runs were always performed using the same parameters and settings.

Thus, during the evaluation of each project, actually only the marginal effect of the measure to be examined appears and all other influencing factors can be excluded, disconnected.

The consistency of the structure data of the demand model can be ensured in a way that in case it becomes necessary to consider the implementation of a major traffic-generating and -attracting facility, not included in the EFM, it will be built into all projects through the "without" case.

For the above considerations to be valid, the EFM network models for future reference years have not been used, as they include a number of transport development interventions, examined also already during modelling. Therefore, the starting point is always the current network model, supplemented by changes concerning projects decided.

Modelling therefore begins with the necessary modifications of the base year EFM network. This means:

- inclusion of the decided projects
- minor error corrections
- technical modifications to the network model which help the comparison of projects with each other and with the “without” case, facilitate the later modelling.

The network modified this way is the basic network of the model (Base_corr).

Based on the impedance data (skim matrices) obtained from loading the original initial matrices on the basic network, execution of

the load generation, traffic distribution and traffic sharing (mode selection) steps are required by means of the EFM demand model macro. This is followed by loading the newly obtained matrices onto the basic network. The resulting scenario can be considered the basic case of the model (Base_corr_mtx).

Based on the impedances of the basic case, it is also necessary to run a complete demand modelling step sequence for all three future reference years. Any modifications to the structure data in the demand model macros used here must be incorporated in advance, and the resulting demand matrices will be the basic matrices for the three future reference years (N_20## _ mtx).

The three "without" cases (N_20##) are generated by loading the basic matrices onto the basic network.

Modelling of the individual projects or project packages starts following this. The projects are based on the basic network and include exclusively network modifications. At project level, modifications to the spatial and demand models are not allowed for comparability purposes. During elaboration of the network model

- appropriate transformation of the infrastructure network
- mapping of the expected public transport route network
- recording of the Parameter Book data for each route

is completed based on the required input data. One network modification belongs to a single project, that is, the networks are the same for the three future reference years, deviations from this can arise only in exceptional cases, e.g. when modelling project packages. In the case of some projects it can occur that they are built on another project or other projects to be modelled independently. In this case, the network belonging to the project examined is available as a modification to the network of the basic project, rather than the basic network. In this case, the project has to be compared to the basic project (i.e. the basic project serves as a "without" case) in order to determine the marginal effects of the project under examination. Project packages were in fact modelled as stand-alone “projects”, using the same methodology as for projects.

By loading the three basic matrices to the network of the project examined, one can obtain the scenarios for each project, i.e. the "with" cases (Pxxx_20##). This generates the traffic model for iteration step 0.

In this case, however, the modelling contains a first iteration step as well. For each scenario, including also the three "without" cases, the mode selection is run again based on the extracted impedance data,

with the demand model macro for that reference year. The first two steps of the demand modelling are not performed because

- traffic generation would be unnecessary due to the unchanged structure data
- and the step of distributing traffic is not necessary because the individual interventions only have a smaller, slower impact on the overall transport matrix.

On the other hand, the impact of projects on mode selection and thus on the flow of traffic is significant also in the short run. The redistribution of the three "without" cases, despite the lack of network intervention, is needed because experience shows that only the results of scenarios in the same iteration step can be compared meaningfully.

As a result of the repeated mode selection, an independent demand matrix is produced for all three time frames of each project, which, when loaded onto the network belonging to it, the final model scenario underlying the output data can be obtained (N_20## _ Mx2 and Pxxx_20## _ mtx).

So, the entire model is built of the following scenarios (see Figure 8):

- loading the basic network (modified EFM baseline) with the original baseline matrices
- loading the basic network following the a complete baseline demand model re-run ("basic case")
- loading the three “without” cases: load the basic matrices for short, medium and long term on the basic network
- loading the three basic matrices on the network of each project
- final loading of the “without” cases and projects concerning three future reference years, following mode selection.

In order to effectively demonstrate benefits and impacts, it is necessary to develop objective, quantifiable qualifying parameters. The outputs of the traffic model are accordingly as follows:

- summed travel time change (at network level, for all subsectors together) [million passenger hours/year]
- change in passenger kilometre performance (by subsector: passenger car, bicycle, public transport) [million passenger km/year]
- change in seat kilometre performance (for public transport) [million seats km/year]
- change in freight traffic vehicle kilometre performance (J1+J2+J3 categories) [million vehicle km/year]
- additional index numbers as required for a cost-benefit analysis (CBA).

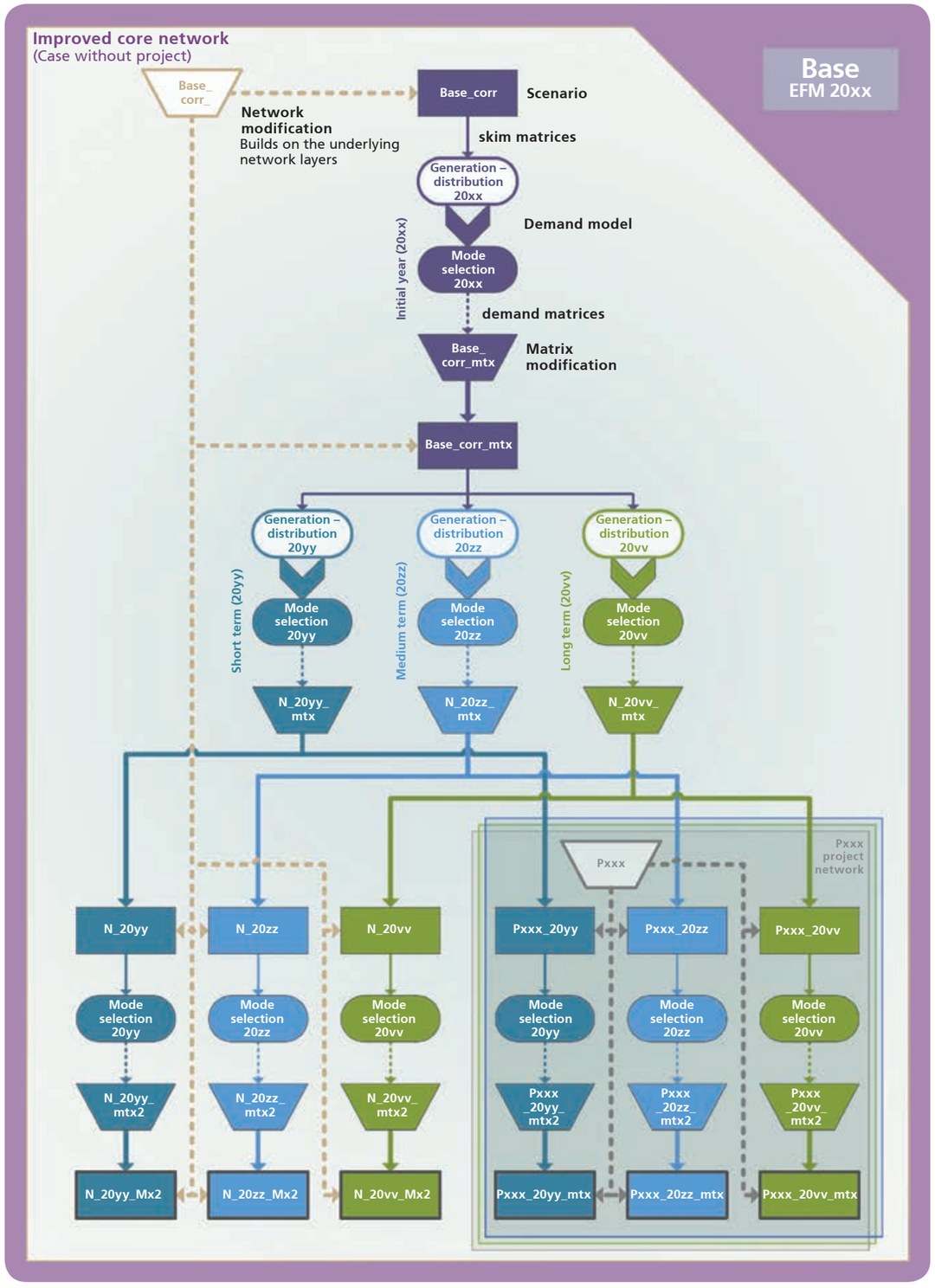


Figure 8: *GENERAL STRUCTURE OF THE TRANSPORT MODEL*

2.2.5. ECONOMIC COST-BENEFIT ANALYSIS (CBA)

The basis for the economic or social cost-benefit analysis (CBA) is the methodological framework determined by the prevailing national CBA guidelines elaborated for the evaluation of transport development projects (hereinafter: Guidelines). Analysis is prepared about the concrete projects that can be modelled.

The basic purpose of preparing the economic CBA is to quantify and evaluate the social utility of each project. The CBA methodology compares the discounted future benefits and costs that arise at the social level during the period under review. The analysis assumes a 30-year study period, which includes also the implementation period of the projects. The latter can vary in duration from project to project, so the effective running time also varies from project to project.

Economic costs are calculated in accordance with the Guidelines, adjusted for financial costs, while the benefits are calculated on the basis of input data gained from traffic modelling. The following cost-benefit elements are quantified in the cost-benefit analysis:

- Social cost:
  - investment costs
  - change in operation and maintenance costs
  - change in replacement costs
  - residual value.
- Social benefit:
  - change in travel time cost
  - impact on traffic safety (accidents)
  - change in vehicle operation costs
  - impact on air pollution
  - impact on climate change
  - impact on noise pollution.

For CBA analyses, the following specific methodological considerations are taken into account:

- **Residual value calculation:** the residual value is taken into account as a proportion of the investment cost and the value of the replacement investment elements in relation to the remaining lifecycle.
- **Monetisation of the climate change impact:** the guidelines recommend to use the area impact CO2 equivalent emission based method instead of the mileage based specific value method. However, in case the preliminary project evaluation does not provide sufficient emission data for a detailed analysis, mileage based calculation may be used.
- **Change in perceived quality of service:** CBA analysis does not examine changes in perceived quality of service because no consensus-based methodology is available.
- **Spatial development impact:** CBA analysis does not take into account the spatial development impact as its economic measurement is methodologically debatable and there is no methodology based on professional consensus.
- **Impact on land use:** similarly to the above, the impact on land use is also not quantified in the cost-benefit analysis due to immaturity of the methodology.

Based on the methodological principles presented above, a project can be considered to be a socially efficient investment in case the monetary value of all benefits calculated at present value exceeds the present value of all costs. The benefit-cost ratio (BCR) is used to quantify and illustrate this social return.

In case the BCR index is greater than 1, the project can be considered socially effective. At a value of less than 1, the quantifiable social benefits cannot offset social costs. Although in accordance with the CBA methodology and the Guidelines, a project with a BCR of less than 1 is not recommended to be realised, a threshold of 0.8 is applied (the so-called KO criterion). Projects with a BCR of less than 0.8 will be excluded from further analysis and will be classified as "not recommended". The reason for the deviation from the BCR 1 threshold is the fact that there can be many effects (e.g. agglomeration effect, service quality improvement effect) that are not quantified by the methodology applied. By lowering the threshold, it is also possible to take into account those projects for which these rather difficult-to-quantify effects can be significant.

For projects with a BCR greater than 0.8, a converted CBA score (CBA_i) is calculated using the following formula, which results in a BCR value converted to a scale of 0 to 100:

$$CBA_i = \frac{BCR_i - \min\limits_{i\in[1,n]} BCR_i}{\max\limits_{i\in[1,n]} BCR_i - \min\limits_{i\in[1,n]} BCR_i} \cdot 100$$

$where, BCR_i: BCR\ calculated\ for\ project\ number\ i,$
$with\ the\ exception, if\ BCR_i > BCR_{max}, in\ this\ case\ BCR_i = BCR_{max}$
$\min\limits_{i\in[1,n]} BCR_i : BCR\ value\ of\ the\ project\ with\ the\ lowest\ social\ return$
$\max\limits_{i\in[1,n]} BCR_i : BCR\ value\ of\ the\ project\ with\ the\ highest\ social\ return;\ or$
$if\ the\ value\ determined\ from\ cross\text{-}examination\ with\ MCA\ values\ in\ case\ of\ scale\ distortion$

Excessive BCR values when corrected to a 0–100 scale can distort the converted CBA scores, thus the result of subsequent ranking as well. The maximum BCR value in the formula needs to be determined based on the prevailing project portfolio and evaluation results of the project. To this end, it is also reasonable to perform an MCA evaluation of the CBA assessed projects. By comparing the converted CBA and MCA scores, the maximum BCR value can be determined, thus eliminating the potential difference in scaling between the two methods for assessing social utility.

2.2.6. MULTI-CRITERIA ANALYSIS (MCA)

There is no possibility to express the effects in terms of money in case of the non-concrete projects and those which cannot be modelled from traffic aspects. Thus, societal utility evaluation is performed by multi-criteria analysis (MCA), which means the application of expert evaluation supported by a standardised method. The MCA criteria are in line with those examined in the CBA method, with the goal of assessing social utility in both cases.

The examination aspects are as follows:

1. investment cost
2. impact on net operating costs
3. traffic safety
4. environmental impacts
5. change in accessibility (including change in travel time)
6. change in service quality and/or built environment
7. urban development aspects.

The impacts of individual projects are assessed on a scale of 1 to 5 for each aspect. The evaluation aspects and the rating scale are as follows:

1. **investment cost:** the expected net investment cost of the intervention
   - 1 point: less than 1 billion HUF
   - 2 points: 1–3 billion HUF
   - 3 points: 3–10 billion HUF
   - 4 points: 10–30 billion HUF
   - 5 points: more than HUF 30 billion
2. **impact on net operating costs:** expected change in the balance of revenue and operating costs (relative to the non-invested state)
   - 1 point: significant negative impact (more than 250 million HUF additional cost)
   - 2 points: slight negative impact (more than 50 million HUF additional cost)

- 3 points: neutral impact
- 4 points: slight positive impact (more than 50 million HUF savings)
- 5 points: significant positive impact (more than 250 million HUF savings)

3. **traffic safety:** expected change in the probability and/or severity of injuries (relative to the state without investment)
   - 1 point: significant negative impact
   - 2 points: slight negative impact
   - 3 points: neutral impact
   - 4 points: slight positive impact
   - 5 points: significant positive impact
4. **environmental impacts:** expected change in noise and air pollution as well as area separating effect (relative to no-investment condition)
   - 1 point: significant negative impact
   - 2 points: slight negative impact
   - 3 points: neutral impact
   - 4 points: slight positive impact
   - 5 points: significant positive impact
5. **accessibility:** expected change in access times by mode of transport, transfer connections, spatial accessibility (relative to the state without investment)
   - 1 point: significant negative impact
   - 2 points: slight negative impact
   - 3 points: neutral impact
   - 4 points: slight positive impact
   - 5 points: significant positive impact

6. **changes in service quality and/or built environment:** track and vehicle quality, travel comfort, quality of public space (e.g. green surface ratio), expected change in information supply (relative to the condition without investment)
   - 1 point: significant negative impact
   - 2 points: slight negative impact
   - 3 points: neutral impact
   - 4 points: slight positive impact
   - 5 points: significant positive impact
7. **urban development aspects:** expected impacts on urban development and spatial development potential (relative to the status without investment)
   - 1 point: significant negative impact
   - 2 points: slight negative impact
   - 3 points: neutral impact
   - 4 points: slight positive impact
   - 5 points: significant positive impact

During the evaluation of projects at first the scores of the 2–7 aspects will be summarised. Those projects will be excluded from programming (KO criterion) for which:

- the total score for aspects 2–7 does not reach 18 points out of the maximum 30 points, or
- in the case of evaluation aspects 2–7, the evaluation score is less than three (negative change) in case of more than three aspects.

For projects involved in programming, the total score for evaluation aspects 2–7, which is an integer between 18 and 30 points, is divided by the evaluation score for evaluation aspect 1 (investment cost). This quotient represents the MCA score for the project.

The converted MCA score gained from the MCA (P_{MCA_i}) is calculated as follows, which results in the conversion of the MCA scores from the evaluation to a scale of 0 to 100:

$$P_{MCA_i} = \frac{MCA_i - \min\limits_{i\in[1,n]} MCA_i}{\max\limits_{i\in[1,n]} MCA_i - \min\limits_{i\in[1,n]} MCA_i} \cdot 100$$

$$where, MCA_i: MCA\ score\ calculated\ for\ project\ number\ i,$$

$$\min_{i\in[1,n]} MCA_i : the\ lowest\ MCA\ score\ received\ by\ a\ project$$

$$\max_{i\in[1,n]} MCA_i : the\ highest\ MCA\ score\ received\ by\ a\ project$$

2.2.7. FEASIBILITY ASSESSMENT (MEG)

Similarly to MCA analysis, the feasibility of ranked projects is evaluated by expert evaluation supported by a standardised method.

The evaluation of the feasibility is based on the following three main aspects:

1. preparedness
2. technical feasibility
3. social support.

Within the main aspects, the evaluation is based on sub-aspects on a 0–2 scale. In the evaluation of feasibility, each sub-aspect is taken into account with the same weight within the main aspect. The score for each main aspect is the arithmetic mean of the scores for the sub-aspects divided by the maximum score (2). In case, due to the nature of the project, certain (sub-) aspects cannot be interpreted, then the given (sub-) aspect will be labelled 'not relevant' in the evaluation. In this case, the score of the main aspect can be calculated on the basis of the other, interpretable sub-aspect. Based on the weighted sum of the main aspects, the feasibility score for a project is calculated as follows (MEG_i):

$$MEG_i = \sum_{j=1}^{3} s_j F_{ij} = s_1 \cdot F_{i1} + s_2 \cdot F_{i2} + s_3 \cdot F_{i3}$$

$$where, s_j: weight\ of\ main\ aspect\ number\ j$$

$$F_{ij}: the\ score\ of\ project\ number\ i\ received\ for\ main\ aspect\ number\ j$$

The rating scale and the weights of the main aspects are shown in Table 2. Those projects for which during the MEG evaluation at least four relevant sub-aspect are assigned the lowest value, i.e. 0 points, are excluded from the programming (criterion KO).

The converted MEG score for the project (P_{MEG_i}) is calculated by converting its feasibility score to a scale of 0 to 100, as follows:

$$P_{MEG\,i} = \frac{MEG_i - \min\limits_{i\in[1,n]} MEG_i}{\max\limits_{i\in[1,n]} MEG_i - \min\limits_{i\in[1,n]} MEG_i} \cdot 100$$

$$where, MEG_i: the\ MEG\ score\ calculated\ for\ project\ number\ i,$$

$$\min_{i\in[1,n]} MEG_i : the\ lowest\ MEG\ score\ received\ by\ a\ project$$

$$\max_{i\in[1,n]} MEG_i : the\ highest\ MEG\ score\ received\ by\ a\ project$$

Sub-aspects	0 point	1 point	2 point
1. Preparedness, 40% weight			
1.1. Soundness of legislation/regulatory background (development and management tool projects) orderliness	inappropriate, risky, change needed	change needed	appropriate
1.2. Technical and environmental licensing of the project (development projects)	only project idea	can be problematic	are available or there is no risk
1.3. Area acquisition (development projects)	unpredictable	risky	not risky or irrelevant
1.4. Difficulties in the procurement of special equipment (development projects)	high risk, no go	risky, but solvable	not risky or irrelevant
1.5. Organisational background/IT equipment's availability (management projects)	none, and its creation is very risky	none, and its creation is risky	creation is not risky
1.6. Other relevant preparation risks not mentioned above (development and management tool projects)	the solution cannot be proposed	risky	no risk
2. Technical feasibility, 30% weight			
2.1. Risk of the complexity of implementation (the technical content of the project is complex, the technology is new, new IT technology)	extremely complex and risky	no significant risks are expected	not complex/risky
2.2. Dependence on weather conditions during implementation and operation	extremely exposed to weather	exposed to weather but manageable	not significant
2.3 Maintenance of operation during the implementation period	impossible or very difficult	risky	no problem
3. Social support. 30% weight			
3.1. Existence of social consensus (development and management tool projects)	extraordinary, dangerously high resistance	expected resistance, but manageable	basically no resistance or supported

Table 2: *AEVALUATION OF THE MAIN ASPECTS AND SUB-ASPECTS OF FEASIBILITY*

2.2.8. SYNERGY EVALUATION (SZIN)

In addition to the test methods described above, projects have to be evaluated also from the aspect of interactions between projects. The so-called synergy examination reveals the following relationships interpreted between projects:

- Projects building on each other: those projects where the realisation of one project is a prerequisite for another. These include, for example, scheduled developments or the construction of a bridge as a prerequisite for a tram line crossing a bridge.
- Projects excluding each other: such projects that cannot be implemented together, the realisation of one project makes impossible to accomplish the other. Such examples

are a traffic calming and a capacity-building project for the same route.

– Synergistic projects: project relationships that reinforce the effects of each other, so their joint implementation offers increased benefits. The synergistic relationships are explored on the basis of spatial and travel chain harmonisation.

2.3. PROGRAMMING METHODOLOGY

2.3.1. OVERVIEW OF THE PROGRAMMING PROCESS

The purpose of the programming process is to create a scheduled investment programme that fits in with the BMT objectives, which ensures the selection of the most socially beneficial projects to achieve the strategic goals, taking into account the available financing and how the developments can be scheduled. This process consists of the following three steps:

1. ranking projects based on the different weightings of project evaluation results
2. production of so-called mechanical project packages, taking into account the different rankings and the available financing sources
3. developing project packages ("short lists") proposed for different financing sources as part of the investment programme.

The course of the programming process and its position within the overall methodology is illustrated by Figure 9. Since the General Assembly of Budapest has decision-making power only over the implementation of projects which fall within its own sphere of competence, out of the projects that can be ranked only those are included into the programming process which are coordinated by the governance system of the capital city. There is no separate ranking for projects falling outside the scope of the General Assembly, these projects are included in the evaluation through the examination of synergistic effects between projects, this way influencing the programming process.

The timeframe of the investment programme can be determined adjusted to the objectives and measures. Programming does not

extend to the few years immediately following the audit, since on the development of these the decisions have already been made or are already in the implementation phase (projects decided). The programming determines project packages for the following three timeframes:

– Phase I: the short term within the investment programme
– Phase II: the medium term within the investment programme
– Phase III – long-term developments: projects that go beyond the short- and medium-term priorities of the investment programme.

Due to the uncertainty about the level of financing that is expected to be available – government, community and own resources for the Municipality of Budapest and its organisations – three scenarios of different financing budgets need to be defined. It is reasonable to assume in the absence of other information that the financing budgets for Phases I and II are of the same extent.

Based on the above, the proposal for the Transport Development and Investment Programme consists of programmed projects (proposed project package, i.e. short list) to be implemented by the governance system of the capital city, decided and task-oriented projects as well as proposals for project ideas and state level projects. This is illustrated by Figure 10.

On the basis of the professional proposal for the Transport Development and Investment Programme, institutional consultations can be initiated through the Mór Balázs Committee. Following the necessary modifications on the basis of the consultations, the proposal can be submitted to the FKT and then to the General Assembly of the Municipality of Budapest for approval.

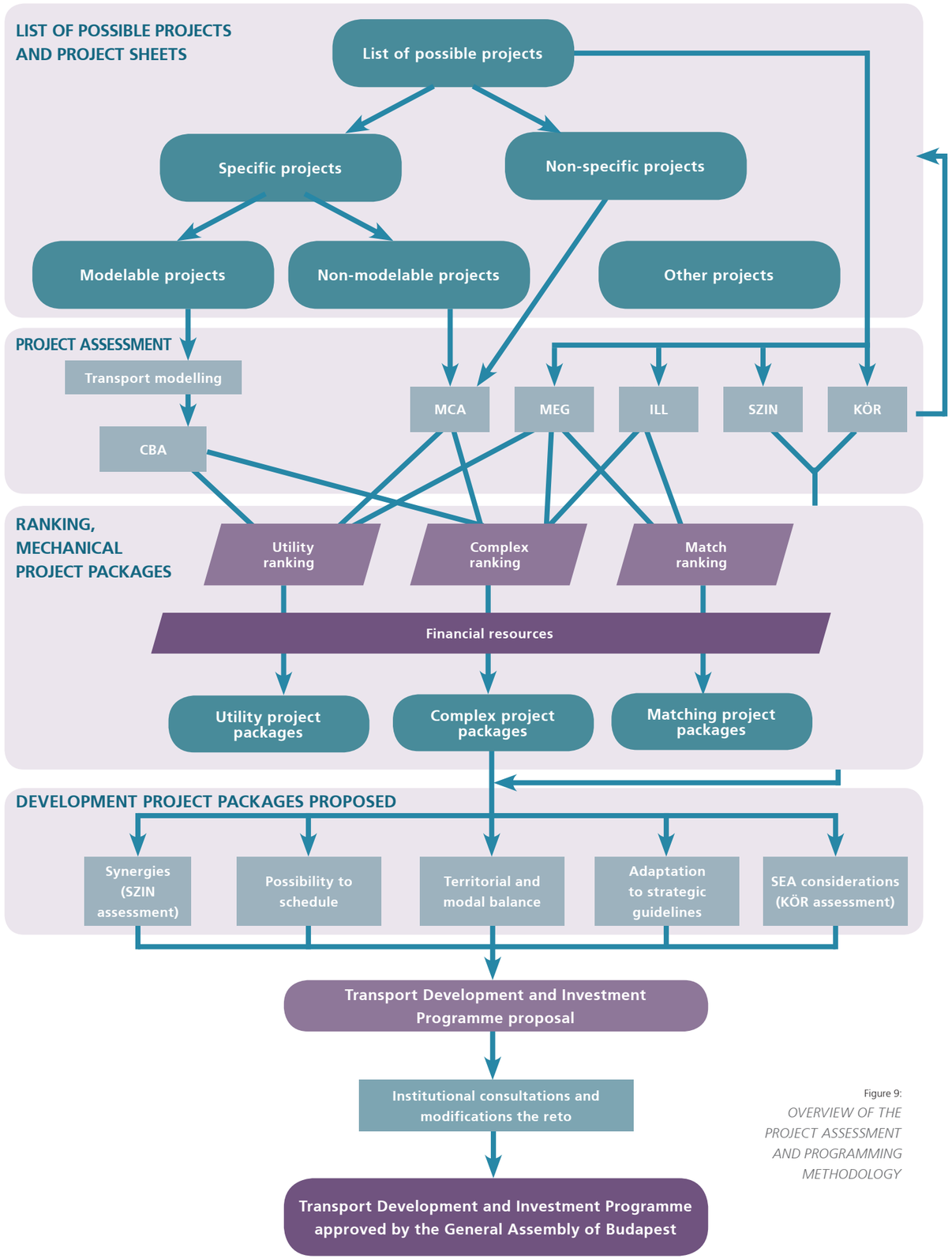


Figure 9:
OVERVIEW OF THE PROJECT ASSESSMENT AND PROGRAMMING METHODOLOGY

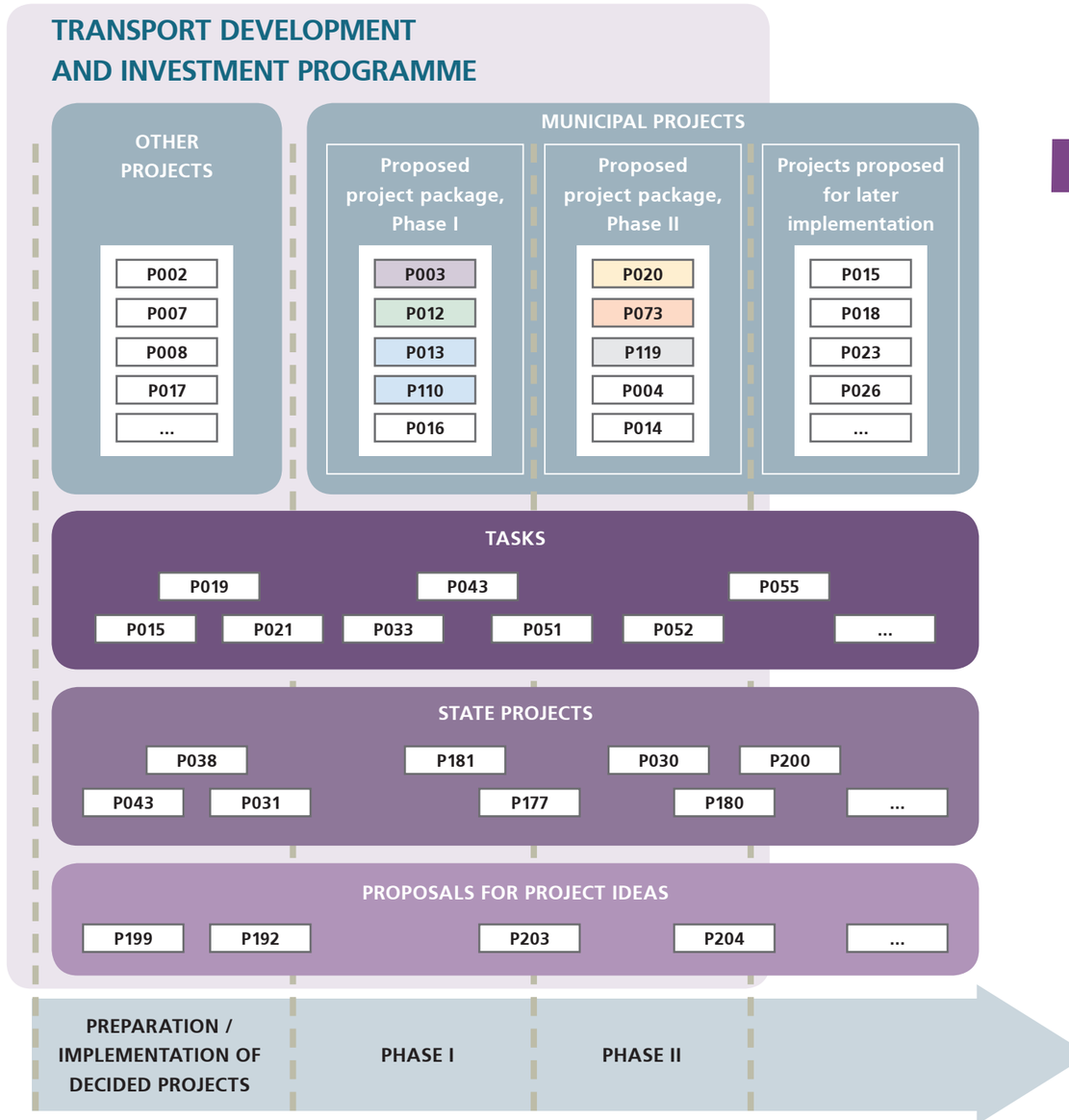


Figure 10: *ELEMENTS OF THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME (EXAMPLE)*

2.3.2. RANKING OF THE PROJECTS

During the ranking, the converted scores obtained from project evaluation results are used. Three different rankings are prepared: one for fit, one for utility and one complex ranking. Ranking is based on the so-called composite score, which is determined by weighting the converted project scores (P_{ILL_i},CBA_i,P_{MCA_i},P_{MEG_i}) according to Table 3.

Weights taken into account in the composite score	ILL converted score	CBA/MCA converted score	MEG converted score
Fit ranking	70%	-	30%
Utility ranking	-	70%	30%
Composite ranking	40%	40%	20%

Table 3: *CALCULATION METHOD OF THE PROJECT RANKINGS*

The composite scores are the inputs for the mechanical project package preparation described below.

2.3.3. PREPARING MECHANICAL PROJECT PACKAGES

The preparation of the mechanical project packages is based on the schedule of the investment programme over three time periods: Phase I (short term), Phase II (medium term), Phase III (long-term developments).

According to the three rankings described above, three scheduled mechanical project packages (fit, utility and mechanical project packages per complex ranking) are created on the basis of the assumed financing budget. Projects with a higher composite score take timing priority. Thus, projects will be included in a given phase of a given mechanical project package, following the relevant ranking until their investment costs have exceeded the financing budget still available for that period. In case there are still unused resources in a given phase, but the investment cost of the next highest composite score project exceeds this limit, then the algorithm will find the project with next highest composite score whose investment cost is less than or equal to the funds still available. This process is repeated until the available resources get exhausted in a given phase.

Based on the three financing budgets, three scenarios are created, each of which contains three mechanical project packages. Thus, a total of nine mechanical project packages are created.

2.3.4. METHOD OF DEVELOPING PROPOSED PROJECT PACKAGES

For each of the three financing scenarios, the proposed project packages are developed in several steps. First, the projects that are recommended for implementation in Phase I of each of the three ranked mechanical project packages will be taken out from the mechanical project packages. Following this, it is possible to select from those projects which in the majority of the mechanical project packages are either in Phase I or in Phase II. The selection will be made by expert evaluation taking into account the following aspects: synergistic effects (including the scope of state projects), environmental impact (SEA considerations), spatial and modal balance, scheduling considerations (circumstances of feasibility, projects building on each other, provision of traffic during construction work) as well as compliance with the strategic guidelines. The process is illustrated by Figure 11.

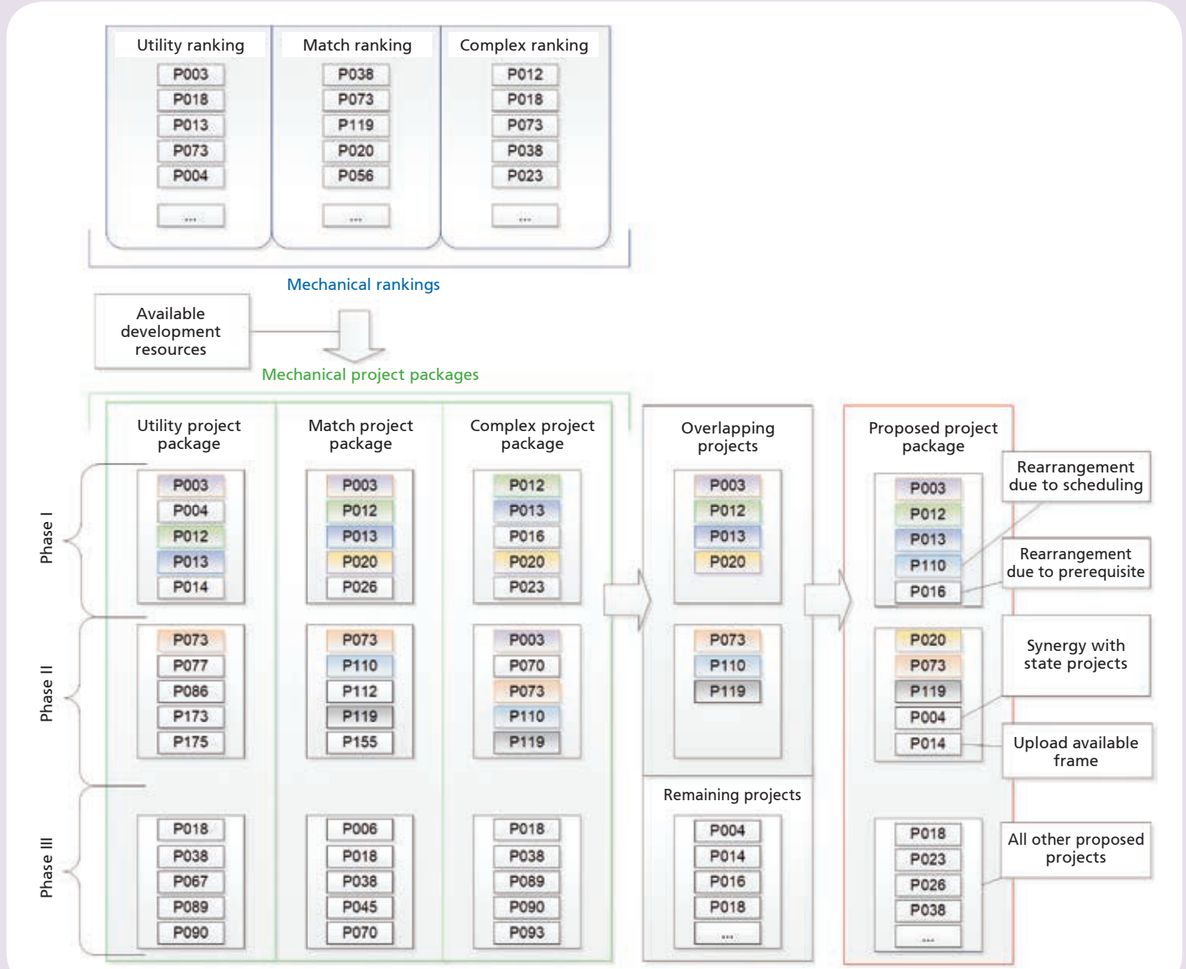


Figure 11: *PROCESS OF DEVELOPING THE PROPOSED PROJECT PACKAGES (EXAMPLE)*

2.3.5. METHOD OF EVALUATING THE PROPOSED PROJECT PACKAGES AND THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

In case of all three scenarios, the projects included in the proposed project packages will be evaluated jointly and in a complex way, as follows:

1. **Average feasibility score:** the MEG score calculated for each planning period based on the average converted MEG score of the projects in the project package.
2. **Average composite score:** the composite score calculated for each planning period based on the average converted complex composite score of the projects in the project package.
3. **Consolidated CBA:** modellable projects in the project package will be fed into the traffic model together. In the traffic model, the joint traffic impact of the projects is evaluated, therefore the interaction between the individual projects can also be taken into account. Using the results of the traffic model, a consolidated cost-benefit analysis (CBA) is prepared, which is used to quantify all social benefits, total social costs and the BCR index for the entire project package.
4. **Operational impact:** the impact of all projects included in the project package on the total operational cost. The calculation is based on project data available for projects or on the operational impact estimated during project evaluation.
5. **Strategic fit:** The contribution of the project package to the realisation of the objectives can be examined based on the ILL scores of the projects included in the project package. Contribution to the achievement of goals, in case of the operational goals, strategic goals and intervention areas can be evaluated by aggregating the ILL scores according to the given objective categories. Contribution to the achievement of objectives may also be evaluated on the basis of the number of actions supported. In this way, it is possible to determine how balanced the project package is in serving the individual elements of the objectives, and where there are potential shortages in the implementation of the strategy (e.g. non-supported measures). The completion of these examinations is justifiable, not only for project packages but for the entire investment programme.
6. **Environmental Impact:** an assessment of the environmental impact of projects included in project packages.

7. **Achievement of the environmental objectives:** evaluation of the project packages on their own, and comparison with a project package which considers solely environmental aspects and was generated based on KÖR scores. The achievement of environmental objectives can be measured by the environmental score obtained and the degree of overlap.
8. **Modal balance:** the distribution of projects in the project packages by mode of transport (public transport, passenger car, walking and cycling, freight traffic) in terms of number and investment cost.
9. **Territorial balance:** the distribution of the projects included in the project packages based on number and investment cost according to geographical area, Budapest district and territorial unit defined in the Budapest 2030 Long-term Urban Development Concept.

2.4. METHODOLOGY FOR THE STRATEGIC ENVIRONMENTAL ASSESSMENT

In the early 2000s, the European Union extended the practice of pre-development environmental impact assessments to pre-investment phases (e.g. sectoral policies, plans and programmes) in order to ensure that the environmental considerations are taken into account as early as possible in the planning process. This is the regulated by Directive 2001/42/EC of the European Parliament and of the Council "on the assessment of the effects of certain plans and programmes on the environment" (wording in Hungary: the directive on strategic environmental assessments). The national implementation of the directive is based on Government Decree 2/2005 (I. 11.).

Article 1, paragraph (2) point (b) subsection (ba) of the SEA Decree stipulates that for plans or programmes which (inter alia) are intended for freight transport, transport and which "provide a framework for future official approval of activities or facilities which constitute the use of the environment'' performing an environmental assessment is mandatory. Thus, the BMT, which provides the framework for the approval of future concrete transport development investments (e.g. road, bicycle path, railway, metro and tram developments, independent car park), must be subject to environmental assessment.

One of the main "virtues" of the environmental assessment is that it is in an optimal case prepared together with the strategy and plan, so it is particularly suitable for strengthening the consideration of environmental aspects and finding a compromise between different interests.

The (Strategic) Environmental Assessment is such a tool that originated from environmental impact assessments (KHV) and became independent. The environmental impact assessment is a procedure that is used to estimate and evaluate significant changes in the state of the environment expected to result from a planned human activity and through this it influences the decision about the activity. (The KHV type regulation applies to activities appearing in the form of investment.)

The most important question to be decided on in the environmental impact assessment of investments is whether the environmental status resulting from the realisation of the planned new activity is acceptable or not. However, in the case of Strategic Environmental Assessment assessing a higher level of investment plan hierarchy (plans, programmes, professional policies), it is no longer a matter of approving a specific project or not. In the case of sector development concepts, programmes, spatial plans and other plans above the investment level, which are subject to strategic environmental assessments, the decision cannot be to reject the plans, only to influence the way ("how to do") in which the plans are implemented.

The basic aim of any development plan or measure must be to ensure a better quality of life and sustainable economic development that are relevant at the regional level, while preserving and, where necessary, restoring environmental assets. The most important goal that any plan should formulate is to achieve that living in the region be better once the plans have been implemented. This is one of the key goals of the BMT as well.

Based on the aspects above, the key issue is determining what we consider to be a good quality of life. This is usually measured in terms of infrastructure and economic indexes, which do not necessarily guarantee that we are getting the right results. The state of the environment, the need for personal security, as well as the preservation of the possibility of being together in a community form parts of the quality of life. In the end, the satisfaction of the population can be one of the basic indicators of sustainability, even if people often do not consider professional aspects when choosing values.

The environmental assessment is carried out in accordance with the following work phases:

a) overview of the BMT
b) development and selection of benchmarks for evaluation
c) predicting expected environmental changes
d) impact assessment
e) proposal to modify the Plan (if necessary)
f) proposal for mitigating and controlling unfavourable environmental effects

The basic logic of the work flow is illustrated in Figure 12.

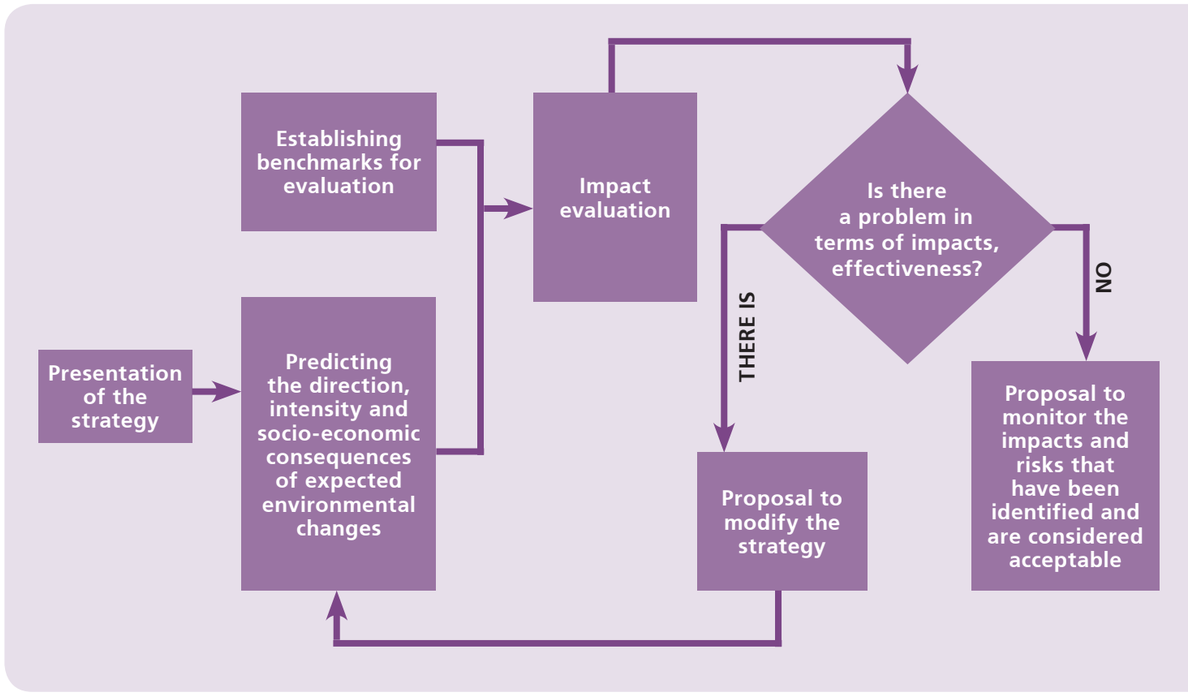


Figure 12: *MAIN SUB-PROCESSES OF THE ENVIRONMENTAL ASSESSMENT*

As a starting principle, the plan needs to be examined from sustainability and environmental aspects as well. When preparing the SEA, as a proven methodological element, basic question(s) are formulated, which then have to be answered by completing the work.

The specifics considered when developing the methodology for environmental assessment of BMT II are as follows:

The SEA, being closely integrated in decision-making, is not only significant as an impact assessment tool, but also closely linked to the idea of sustainable development. Therefore, the most immediate question for the evaluator is whether the strategy as a whole or the set of selected project packages is helping or hindering the move towards sustainability.

The concept of sustainability goes well beyond the realisation of strictly environmental ambitions, so this type of assessment of the goals and the value system applied also have a wider scope. From the aspects of sustainable development, the plan has to comply with determined principles, priorities and objectives and not with some kind of threshold limit system. The value system to be developed, which is the basis for the qualification of changes, during the examination relies on the EU and domestic environmental pro-

gramming and sustainability strategies. The value system shall be laid down at the beginning of the examination process. The validation of the value system can be effective if it is accepted by the SEA experts and programme designers as a common basis.

At the level of the BMT objectives, environmental protection was not only a set of conditions but it represented also goals, so the task of the environmental study was to examine the appearance of environmental goals in project packages and to examine the harmony of non-environmental goals with environmental goals.

The SEA is not confronting, but is prepared together with the plan, and wants to enforce environmental interests during the process. The environmental assessment must result in project packages containing acceptable compromises and objectives. The main objective of the work is to maximise the role of the environmental benefits of developments in the development of sustainable regional systems. In addition, identifying potential environmental conflicts and their extent and settlement of them (as far as possible) is indispensable. This can only be realised if the creators of the SEA are involved in the work from the very beginning of planning, because this ensures the continuous management of the problems and the search for compromises. The goal of the SEA experts is to facilitate the work with continuous communication and iteration based on partnership (at the same time, this is the working method as well) along the value system of the environmental assessment.

In addition to the validation of the established value system, part of the SEA is of a character like an environmental impact assessment. Thus, the basic logic and concept usage of the environmental assessment methodology is similar to the system applied in investments. The main difference is that here, specific impact factors (the causes of status changes) cannot be identified, only the presumed types, directions, and expected trends of these can be given. As a consequence, the prediction of status changes is, of course, less reliable than the impact assessment of investments. However, those critical programme content elements can be identified which possibly have significant unfavourable environmental impacts. These must be carried out on the basis of the precautionary principle, conditions need to be drawn up for future invitations to tender, proposals can be prepared for design requirements and, in extreme cases, the abandonment of such programme elements can be considered.

In summary, the three pillars of the benchmark for environmental qualification criteria are the following:

- **Sustainability value system:** By determining the sustainability conditions, a general criterion system needs to be specified which can be applied as a kind of planning requirement during the environmental assessment. The sustainability criteria determine those aspects which form the basis for sustainable socio-economic processes and behaviour. During the work process, the general principles need to be prepared in accordance with the content of BMT II, and it needs to be specified how and which criteria can be applied as conditions for the planned measures.
- **Relevant domestic and EU environmental policy objectives:** The environmental policy objectives can also be interpreted as "external factors". The realisation of not only domestic, but also EU environmental policy goals means a condition system (through legislation and regulations) within the framework of which development efforts are necessary and must be implemented.
- **Environmental problems, their causes and consequences:** The impacts of the expected developments can be forecasted through the identification of these. The objective of the developments is socio-economic and directly affects one or more environmental components.

The SEA must comply with relevant EU Directive 2001/42 and Government Decree 2/2005 alike. When preparing the SEA, in addition to the two pieces of legislation above, other relevant EU and national legislation, methodological materials and the experience gathered from previous SKVs need to be taken into account. See, among others, the EU Handbook on SEA for Cohesion Policy 2007–2013 or the experience of previous evaluations (The Programming Period 2014–2020: Monitoring and Evaluation of European Cohesion Policy Guidance documentation ex-ante evaluation).

3

TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME 2019–2030

This chapter presents the project evaluation and programming process performed during 2017–2018 and the resulting Transport Development and Investment Programme.

3.1. LIST OF POSSIBLE PROJECTS

Within the framework of the planning process, the determination of the list of potential projects (long list), starting from the so-called indicative project list prepared as part of the BMT Objectives and Measures was completed in consultation with the actors of the Budapest governance system (Municipality of Budapest Capital, BKK Zrt., BKV Zrt., Budapest Közút Zrt.) and other partner organisations (ministries, Prime Minister's Office, KKBK Nonprofit Zrt., NIF Zrt., companies of the MÁV group). The indicative list available from the previous workflow included 113 projects. As a result of the data collection carried out in 2017–2018, a total of 212 projects were identified (end of data collection period: 30 November 2018). The distribution by project type of these is shown in Table 4.

Project types		Projects coordinated by the municipal governance system	State projects	Total
Rankable project	Concrete modellable project	19	0	19
	Concrete non-modellable project	14	0	14
	Non-concrete project	12	22	34
Task-like project		25	0	25
Decided project		23	6	29
Project idea		23	2	25
Deleted project		58	9	67
Total (without deleted projects)		**116 (174)**	**30 (39)**	**146 (213)**

Table 4: *PROJECT BREAKDOWN BY TYPE DURING THE 2017–2018 PROGRAMMING*

During the elaboration of the long list, the project owner organisations have formulated new project proposals too, some projects have been split, others have been merged, and some have been deleted (beyond the technical management of project changes, e.g. due to the expiry of intervention proposals or the lack of connection to the BMT). For the sake of traceability, the project database also contains deleted projects (67 projects in total). Without the cancelled projects, a total of 146 projects participated in the programming, the breakdown of which by type is shown in Figure 13. See the detailed Long list of projects at the end of the volume. About half of the projects can be ranked (67). Approximately two thirds of these are within the competence of the municipal governance system (45). For 19 out of these, detailed traffic assessment and CBA were completed. For the other 26 projects coordinated by the capital, multi-criteria evaluation was carried out. The non-municipal, state level projects were treated as not concrete projects. The number of these is 22. For them, multi-criteria evaluations were completed as well.

The not ranked projects are made up of three groups: 25 task-like projects, 29 decided projects and 25 project ideas. The task-related projects are all within the competence of Budapest municipality. BMT by its nature does not handle the task-related activities of the state. Among the decided projects, six are state projects which play an important role in programming. There are two state projects among the project ideas.

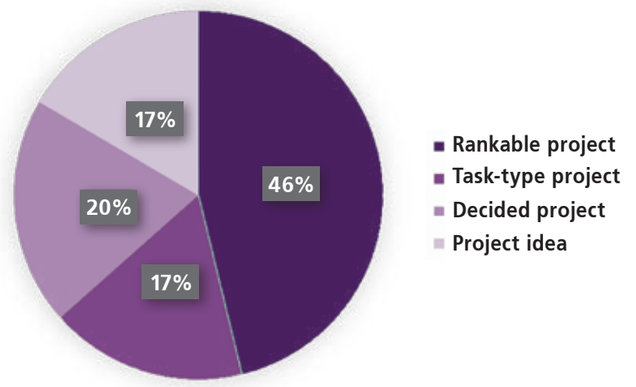


Figure 13: *DISTRIBUTION BY NUMBER OF PROJECTS PARTICIPATING IN THE PROGRAMMING PER PROJECT TYPE [%]*

The total investment value of projects on the long list without project ideas and task-like projects is approximately 4,160 billion HUF (about 11-12% of Hungarian GDP). Approximately half of this, 2,500 billion HUF constitutes the value of the state projects, while decided projects are valued at 670 billion HUF and approximately 990 billion HUF is the value of the rankable projects coordinated by the municipal governance system. The approximate cost requirement for task-like projects until 2030 is approximately 585 billion HUF. The development ideas that can be formulated in order to achieve the goals set by the BMT – together with the project ideas – would require an investment of approximately 6,500 billion HUF, which is the current estimated investment need for transport in the capital region.

Based on the distribution by transport mode of the projects, it can be seen that the total project portfolio covers each mode approximately as the current modal split. Public transport has the highest proportion (41%), with the proportion of pedestrian, cycling and passenger car traffic being roughly one quarter each based on the number of projects, while the remaining 7% is linked to freight traffic (see Figure14). Freight traffic may appear to be under-represented based on the number of projects, but this can be explained, on the one hand, by more comprehensive freight transport projects and by the tightening of restrictions on freight transport within the urban transport, on the other. The distribution of investment costs is similar, with the proportion of walking and cycling projects slightly decreasing due to their less resource-intensive nature, while the role of public transport is slightly increasing. In terms of territorial coverage, project numbers are balanced (Figure15). The transitional zone is affected by most of the projects

(25%), which is a key area of the city in terms of regional development, according to the urban development concept. The other zones are represented by the number of projects roughly in proportion to the population size. On the basis of investment costs, a similar distribution can be observed: the proportion of the Buda Hills zone is lower due to the concentration of less expensive projects in the area, while the proportion of suburban areas is higher due to the higher cost of the suburban infrastructure. From the aspect of Budapest districts, a similar balance and proportion can be observed in the number of projects (see Figure16).

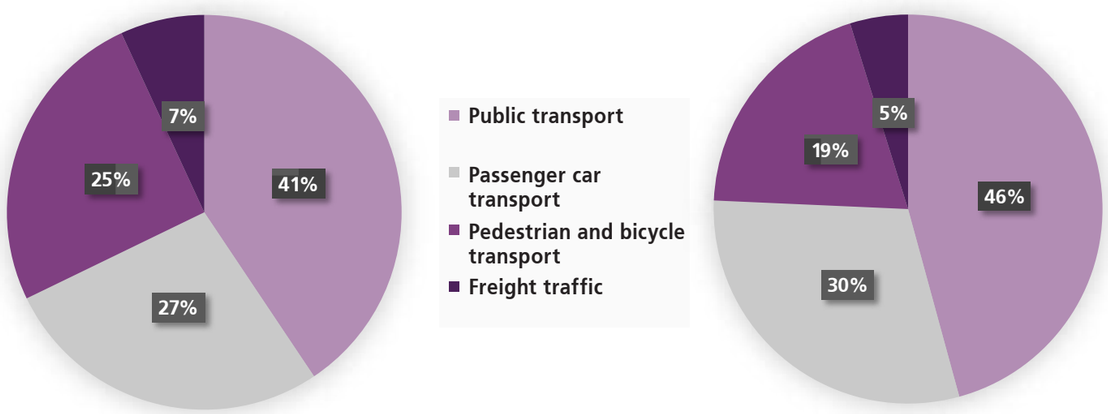


Figure 14: *DISTRIBUTION OF PROJECTS INVOLVED IN PROGRAMMING BY MODE OF TRANSPORT [CHART ON THE LEFT: NUMBER OF PROJECTS, CHART ON THE RIGHT: INVESTMENT COST]*

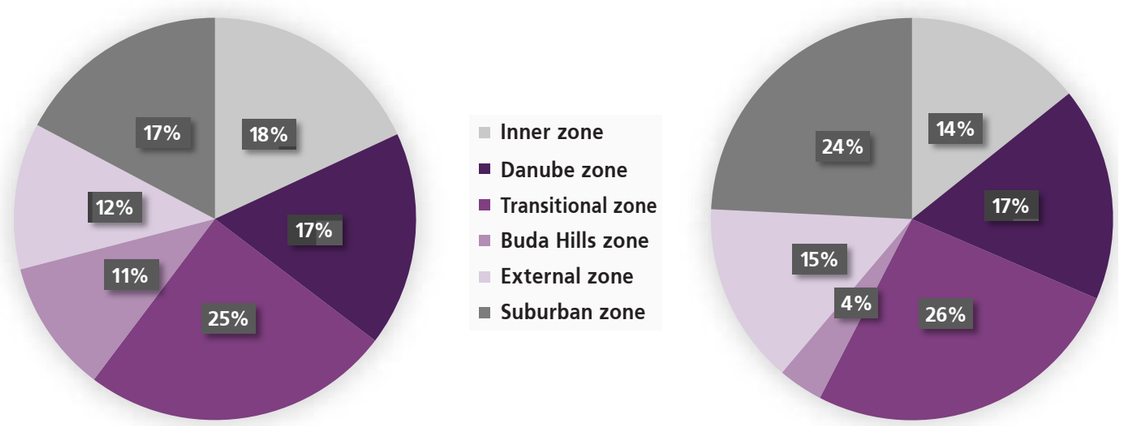


Figure 15: *TERRITORIAL DISTRIBUTION OF THE PROJECTS INVOLVED IN THE PROGRAMMING ACCORDING TO THE ZONE SYSTEM OF THE URBAN DEVELOPMENT CONCEPT [CHART ON THE LEFT: NUMBER OF PROJECTS, CHART ON THE RIGHT: INVESTMENT COST]*

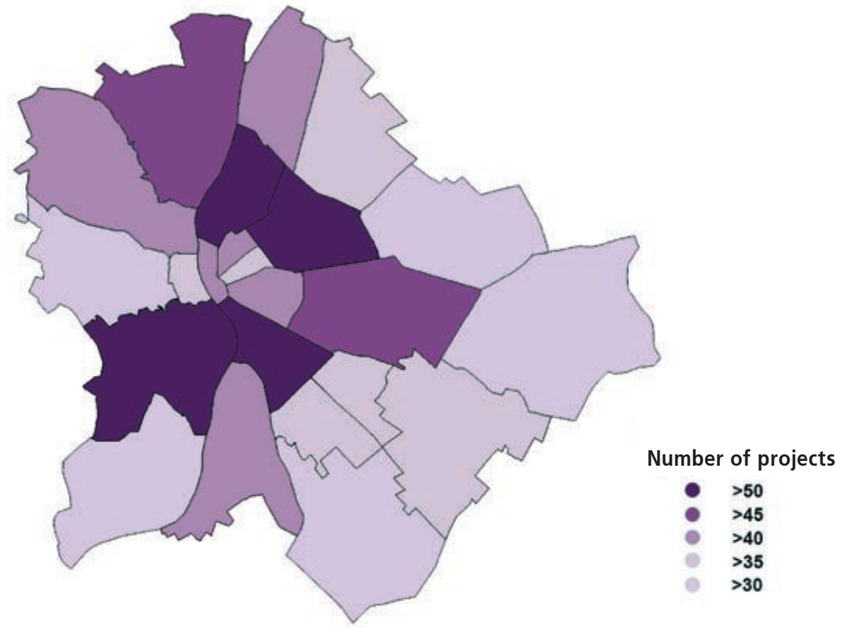


Figure 16: *DISTRIBUTION OF THE PROJECTS INVOLVED IN THE PROGRAMMING BETWEEN THE DISTRICTS OF THE CAPITAL*

3.2. PRESENTATION OF THE PROJECT EVALUATION RESULTS

3.2.1. FIT EXAMINATION (ILL) RESULTS

The fit test does not assess the characteristics of a project on its own, but examines the extent to which the project contributes to the objectives laid down in the BMT Objectives and Measures work phase and further, the extent to which all projects together cover the range of measures. So this is a top-down evaluation.

As a start, all projects included in the long list have been qualified by experts to determine whether the project contributes in part (1 point) or significantly (2 points) to the achievement of the individual measures determined in the BMT Objectives and Measures document. One project can support more than one measure. In this case, it receives a point for each connection. The 146 projects on the long list, excluding the deleted ones, received a total of 610 points in the fit test, which means an average ILL score of 4.2 per project. Within this, ranked projects scored an average of 5.2 (ranked projects coordinated by the capital, 5.4). Project ideas re-

ceived an average of 4.3 points, task-like projects scored 2.7 points, while the decided projects, which were for this reason not ranked, received an average of 3.4 fit points. The distribution of ILL scores between projects is shown in Figure 17.

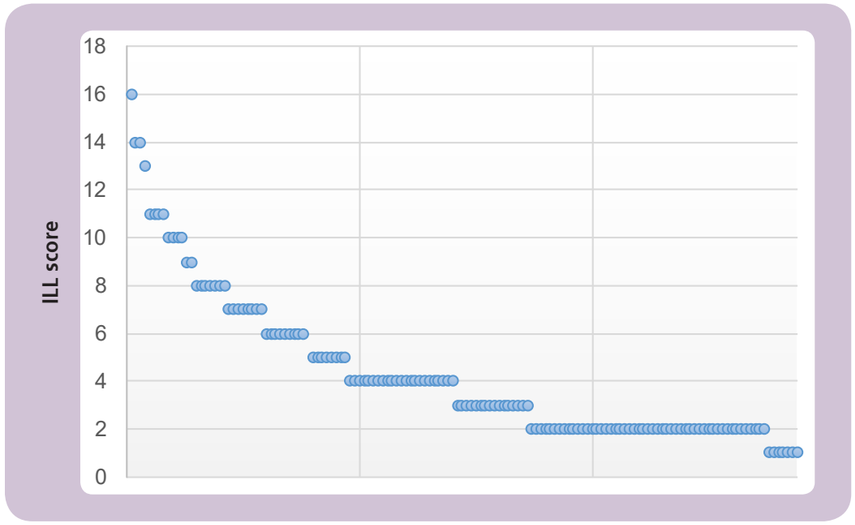


Figure 17: *DISTRIBUTION OF FIT SCORES FOR PROJECTS INVOLVED IN PROGRAMMING*

Taking all projects examined into consideration, the highest score reached was 16 (project for the scheduled deployment of the commuter railway "S-Bahn" system). 13 projects received at least 10 points (see Table 5). These are, with two exceptions, projects that can be ranked while the one with the highest score is a project idea. Due to this method, first of all large-scale, complex projects have been brought forward, as these projects promise solutions for numerous problems – at what price, that is not measured by the fit test.

Out of the 146 projects, 57 are related to only one measure, out of which 9 projects received only one point (see Table 6). Out of these, three are decided projects, while the other six are project ideas or task-like projects.

Projekt ID	Project name	Project type	ILL score
P199	Budapest East-West Railway Interoperability Extension: through the area of Déli Railway Station to Nyugati Railway Station through a 'railway connecting tunnel' and the development of Nyugati Railway Station into a central railway station	Non-concrete project	16
P089	Connecting metro line M2 and suburban railway line H8, construction of the Rákoskeresztúr branch line- Gödöllő section (Pillangó utca–Cinkota)	Concrete project, can be modelled	14
P209	Renovation of the H8 suburban railway line's Budapest-Cinkota-Gödöllő track section and of the H9 line's Budapest–Cinkota–Csömör-Kavicsbánya-elágazás section	Non-concrete project	14
P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	Concrete project, can be modelled	13
P207	Extension of metro line M3 to Káposztásmegyer	Concrete project, can be modelled	12
P038	Construction of the southern section of the North-South Regional Rapid Railway (ÉDRV): (H6/H7 suburban railway lines between Kálvin tér–Csepel and Ráckeve)	Non-concrete project	11
P039	Construction of the inner city section of the North-South Regional Rapid Railway (ÉDRV) (connection of the H5-H6/H7 lines between Kálvin tér and Kaszásdűlő)	Non-concrete project	11
P040	Reconstruction of the northern section of the North-South Regional Rapid Railway (ÉDRV) (H5 suburban railway line between Batthyány tér and Szentendre)	Non-concrete project	11
P173	Renovation of the inner city Danube embankment in Pest between Kossuth tér and Fővám tér	Non-concrete project	11
P013	Development of city and suburban riverboat lines and service facilities	Concrete project, cannot be modelled	10
P046	Cogwheel railway (tram 60) reconstruction and development	Decided	10
P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	Non-concrete project	10
P175	Renovation of the Buda inner-city Danube embankment	Non-concrete project	10

Table 5: *LIST OF PROJECTS WITH THE HIGHEST FIT SCORE*

Projekt ID	Project name	Project type	ILL score
P027	Extension of the lower embankment of Buda on a new routing (between Záhony utca and Pók utca)	Project idea	1
P048	Comprehensive renovation of pedestrian underpasses	Project idea	1
P088	M2 express way (between Budapest and Vác with 2x2 traffic lanes)	Decided project	1
P118	Connection of Cinkotai út and Keresztúri út, in District 17	Decided project	1
P138	Reconstruction of the Keresztúri út road overpass, (Districts 10–17)	Project idea	1
P154	Construction of noise protection wall on Szerémi út (Budafoki út-Dombóvári út)	Task-like project	1
P162	Reconstruction of Gubacsi Bridge (public road section)	Project idea	1
P201	Realisation of a web socialisation platform in relation to the SMART-MR project	Task-like project	1
P208	Renovation of Orczy tér	Decided project	1

Table 6: *LIST OF PROJECTS WITH THE LOWEST FIT SCORE*

There is no project that does not fit into any measure at all. On the basis of reverse control, there is one measure (3.1.10. Sanitation and public health related tasks of urban transport), to which none of the long list projects fit. In this case, an idea-level project proposal is desirable at least – or the cancellation of this measure at a later review.

The ILL scores of the 146 projects within the strategic objectives give greater weight to Strategic Goal II (Safe, reliable and integrated transport) than the number of the measures would suggest, which is supported by 48% of the scores. Strategic goal I (Liveable urban environment) and Strategic goal III (Cooperative regional relations) enjoy 26% support. Concerning the areas of intervention, there is a further increase in the predominance of infrastructure interventions in the number of projects and even in that of measures (46%) in the fit scores (Improving connections 68 %). Half of the remaining 31% is for Attractive vehicles (16%), while the other half is divided between Better services (8%) and Effective governance (8%). Considering infrastructure and vehicles to be transport hardware, the goals' coverage rate for hardware/software related measures based on fit scores is 84% / 16%. The above is illustrated by Figure18.

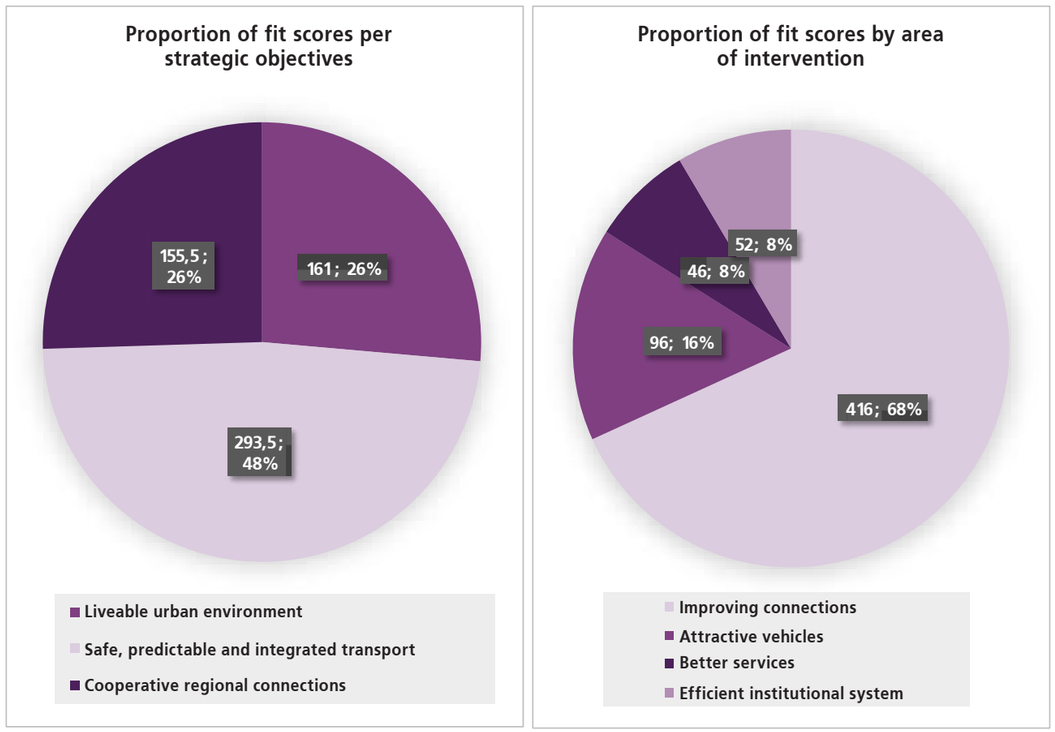


Figure 18: *DISTRIBUTION OF THE FIT SCORES FOR PROJECTS PARTICIPATING IN PROGRAMMING AND THE NUMBER OF BMT MEASURES IN ACCORDANCE WITH THE STRATEGIC GOALS AND THE AREAS OF INTERVENTION*

Based on the above, the coverage of the entire BMT objectives including operative objectives by projects that fit is represented by Table 7. The row totals show the breakdown of scores by intervention area, while the column totals reflect the coverage of the strategic goals.

	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	125	187	104	**416**
2. Attractive vehicles	10	61.5	24.5	**96**
3. Better services	10	28	8	**46**
4. Effective governance system	16	17	19	**52**
Total	**161**	**293.5**	**155.5**	**610**

Table 7: *COVERAGE OF THE ENTIRE BMT OBJECTIVES BASED ON THE FIT SCORES OF THE PROJECTS LONG LISTED*

The fit test examined the fit of the projects with the BMT objectives, but the procedure also provided an opportunity to test the objectives in the form of feedback. When examining the relationship between the projects and measures, it becomes clear if one measure incorporates or overlaps with another measure, and if the measure is not specified in a sufficiently comprehensive manner, so that projects logically linked to it could not be formally fitted to it. In such cases, it was appropriate to propose the modification of the measures.

For example, the former Complex approach road renovation measure was interpreted too narrowly, as it was precisely the wording that contradicted complexity, and it was reasonable to extend it to Complex approach public space renovations. Similarly, it was appropriate to exclude from the measure the Promotion of environmentally friendly road transport technologies the wording "road" which unduly narrowed the measure. Other measures had to be updated, for example, instead of Developing the single traffic model, which, in the meantime was realised, the focus needs to be on its further development. The revised list of measures is contained in the revised and updated 2019 BMT Objectives and Measures. In all cases, the results of the post-change fit assessment were used in the programming process.

3.2.2. RESULTS OF THE ENVIRONMENTAL AND SUSTAINABILITY EXAMINATION (KÖR)

From the long list, 107 projects were evaluated. In addition to the cancelled projects, the ones already decided were also left out because these are not subject of the effective programming process. A further eight projects could not be evaluated due to improper preparation or incomplete data content.

Based on the project evaluations the highest KÖR scores were given to cycling developments. The project with the best evaluation received 19 points: bicycle-friendly development of contiguous neighbourhoods (P012). The average score of the 107 evaluated projects is 10.4, which signifies the positive environmental assessment of the project contents. Among the eight assessment factors: the potential impact on natural and built environmental assets, increase in built-up areas, decrease in green space/green areas and the special construction related effects were those where most problems occurred.

There was no negative (total) project value, which means that all planned projects have expected environmental benefits and those exceed the expected damage.

3.2.3. RESULTS OF TRAFFIC MODELLING

Out of the 45 ranked projects within the competence of the institutional system of the capital city, 19 projects could be examined with the help of traffic modelling based on the Unified Traffic Model (EFM). Of the 19 projects, 15 include the development of public transport while four the development of individual road transport.

The traffic examination (modelling) of each project was performed by comparing two cases for each time period, the without project ("without") case and the ("with") case representing the realisation of the project. The reference years applied are: starting year (2016), short term (2020), medium term (2030) and long term (2050).

The decided projects, starting from the 2016 reference year onwards, have been built into the "without" state. It was also necessary to fine-tune the basic network of EFM in order to determine the impact of the modifications on smaller areas (passenger and individual transport performance) better: for example, missing bus lanes or inclusion of streets with low traffic affected by the projects, or changing the timetable of services with coordinated transfer connections as well as short-section "insert" routes.

It is common experience that projects improving the quality of public transport reduce road traffic: in case of 13 public transport projects out of the 15, this statement is fulfilled. For projects in-

volving tram network development, passengers of the cancelled bus lines will choose the new tram service, while out of individual passengers typically an order of magnitude fewer convert to public transport. In the majority of public road developments (e.g. the construction of individual sections of the ring road along the railway ring), the number of passengers travelling by car increases to the detriment of public transport. Increasing supply is typically followed by traffic performance and at the same time travel time savings can be realised.

The specific experience gained from modelling the individual projects are summarised below.

In the case of the project to connect metro line M2 and suburban railway H8 with the construction of the Rákoskeresztúr branch line–the Gödöllő branch project between Pillangó utca and Cinkota (P089) in the inner route section of the suburban railway the number of passengers will increase by more than two and a half times in the medium term (from 35,000 to 91,000 per day). The number of passengers on metro line M2 at Örs vezér tere will grow approximately by 20% (from 132,000 people per day to about 161,000

people). In the case of the Rákoskeresztúr branch line (P090), the substitution of the Rákoskeresztúr buses by metro causes a remarkable degree of rearrangement. This project will result in the largest short-term increase of 50,000 passenger hours per day on fixed-rail lines, while the bus and trolleybus hours will decrease by 44,000. The project is also outstanding in terms of travel-time savings, with 8,800 hours per day in the short term, taking into account also the modal switch from road transport.

The project to extend the M3 metro line to Káposztásmegyer (P207), while reducing the overall travel time, it increases both access and egress times, as the spacing of metro stops is less frequent than that of the current tram line. According to the modelling results, the commuter railways will not be a significant competitor for the metro on the territory of capital city, moreover, the possibility of an earlier transfer to the metro will provide an attractive alternative to passengers arriving from the suburbs by rail.

The construction of the Újpalota tram line (P107) will not significantly affect road traffic. For public transport passengers, the elimination of the Thököly út bus corridor offers a higher quality (faster, transfer free) and environmentally friendly travel option. The higher capacity trams perform 1.2 times the vehicle kilometres of the replaced buses each day, increasing this way the seat kilometre performance.

Through the tram link between Deák Ferenc tér and Lehel tér (P112), while the total travel time reduces, the time spent on the vehicle increases. The reason for this is that passengers who have previously switched from trams to metro line M3 will not transfer, but will remain on the tram instead to travel onward conveniently without the need to walk, even though the tram is slower.

3.2.4. RESULTS OF THE COST-BENEFIT ANALYSIS (CBA)

The cost-benefit analysis of each project was carried out according to the methodological description and applying the specific values determined by the Hungarian IKOP CBA Guide. The input data for the cost-benefit analysis were the traffic modelling results. Cost-benefit analysis was completed for the concrete modellable projects belonging to the competence of Budapest municipality. Out of the 45 ranked municipal projects, this represents 19 projects with a total investment cost of approximately 725 billion HUF. The cost-benefit ratio of the projects and the converted CBA score based on the methodology are presented in Table 8. The converted CBA score scale has been corrected based on the scale of the MCA evaluations.

ID	Project name	BCR ratio	Converted CBA score
P004	Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád bridge) and construction of Szegedi út overpass	4.56	40.88
P098	Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)	3.13	25.33
P070	Construction of the ring road along the railway ring Section II (section between M3 motorway and Üllői út)	3.04	24.39
P073	Construction of the ring road along the railway ring Section III (Between Üllői út and Soroksári út)	1.97	12.68
P035	Construction of Csepel backbone road (Teller Ede út) Phase II	1.87	11.57
P089	Connecting metro line M2 and suburban railway line H8, construction of the Rákoskeresztúr branch line-Gödöllő section (Pillangó utca–Cinkota)	1.77	10.57
P129	Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area–extension of the Buda interconnected tram network (Phase II)	1.47	7.27
P080	Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy)	1.47	7.22
P112	Connecting the tram network between Deák Ferenc tér and Lehel tér (Bajcsy-Zsilinszky út–Váci út track)	1.45	7.10
P183	Southern extension of tram line 2, connection of the tram lines 2 and 24, and reconstruction of tram line 2	1.26	4.94
P006	Extension of tram line 42 to Gloriett residential area	1.07	2.97
P107	Construction of Újpalota tram line	1.05	2.66
P207	Extension of metro line M3 to Káposztásmegyer	0.85	0.52
P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	0.81	0.06
P090	Connecting metro line M2 and the suburban railway H8 and constructing the Rákoskeresztúr branch line-Rákoskeresztúr section	0.80	0
P164	Establishment of the Pesterzsébet tram network	0.62	KO
P099	Establishment Pacsirtamező utca tram line (north-south connection of Óbuda residential area)	-1.60	KO
P165	Southern extension of tram line 2, connection of tram lines 2 and 51	-2.32	KO

Table 8: *THE BCR VALUES FOR CONCRETE MODELLABLE PROJECTS WITHIN THE COMPETENCE OF THE CAPITAL INSTITUTIONAL SYSTEM AND CONVERTED CBA SCORES CALCULATED BASED ON THE METHODOLOGY*

In total, the realisation of 15 projects is proposed taking into account the 0.8 BCR criterion. Out of these, 11 are fixed-rail while four are public road investments. The latter are ranked 2–5 among CBA projects with BCR values ranging from 1.87 to 3.13. The total investment cost of the proposed projects is 690 billion HUF. The BCR values are illustrated in descending order by Figure 19.

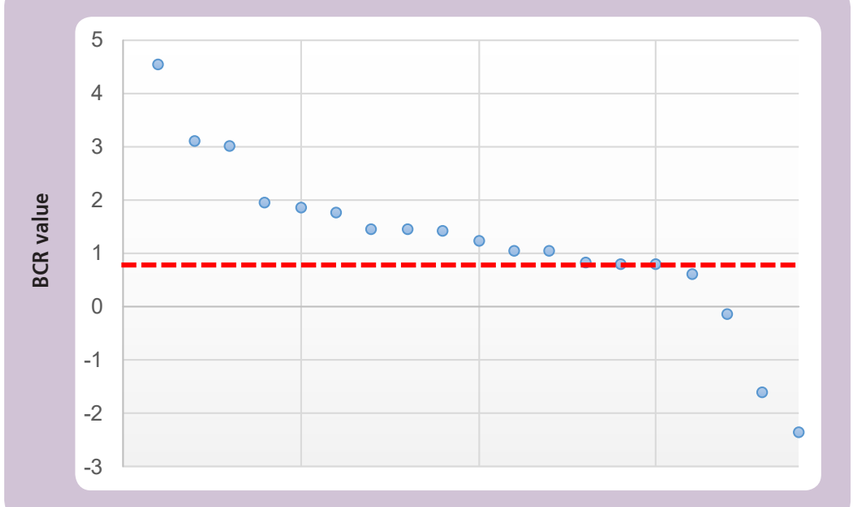


Figure 19: *RESULTS OF THE COST-BENEFIT ANALYSES BASED ON THE BCR RATIO*

The highest converted CBA score is for the northern extension of tramline 3 project (P004) with a 40.9 score, which is remarkably high compared to the 25.3 value of the next project. The lowest score was given to the project connecting metro line M2 and the suburban railway line H8 and building the Rákoskeresztúr branch line-Rákoskeresztúr section (P090). The average of the converted CBA scores is 10.55, the standard deviation is relatively high, 11.47.

The implementation of three projects is not recommended due to the KO criterion, out of which in two cases all the benefits are negative, so the BCR index is below zero. Each project includes fixed-rail track development.

The project to extend metro line M3 north (P207) involves the largest investment cost with nearly 175 billion HUF and with a converted CBA score of 0.52 (BCR: 0.85). The least amount of expense is required for the project to develop Nagy Lajos király út on the existing routing (P098) with a converted CBA score of 25.28 (BCR: 3.13).

As a consequence of their nature, a consolidated CBA was also prepared for the two major scheduled projects. The result of these is as follows:

- construction of the ring road along the railway ring (between Road 10 and Egér út, P069-P073): BCR = 1.16
- connecting metro line M2 and suburban railway line H8 and building the Rákoskeresztúr branch line, including also the sections in the agglomeration (P089, P090 and P209): BCR = 1.24.

3.2.5. RESULTS OF THE MULTI-CRITERIA EVALUATION (MCA)

In case of the projects which could not be modelled from a traffic aspect and of the non-concrete projects, their social utility was assessed by multi-criteria expert evaluation, for a total of 50 projects.

Project				Ranking	
ID	Name	MCA score	Converted MCA score	Within project type	Absolute
P018	Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)	24.00	100.00	1	1
P063	Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport	23.00	95.10	2	2
P152	Introduction of the Pedestrian Wayfinding System (GYERE)	20.00	80.39	3	4
P172	Development of the cycling infrastructure along Szilas creek	10.00	31.37	4	9
P014	Introduction of the Budapest congestion charge system and related infrastructure investments	8.00	21.57	5	13
P115	Construction of bus station(s) in Csepel	7.00	16.67	6	14
P113	Development of Városház tér in District 22	6.67	15.03	7	16
P119	Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3	6.00	11.76	8	18
P013	Development of urban and suburban riverboat lines and related service facilities	5.75	10.54	9	20
P173	Renovation of the Pest inner city Danube embankment between Kossuth Lajos tér and Fővám tér	5.75	10.54	10	20
P155	Comprehensive cross-sectional review of the Grand Boulevard	5.25	8.09	11	23
P087	Metro line M1 (Millennium Underground Railway) rolling stock upgrade	5.00	6.86	12	25
P077	Establishment of Józsefváros tram depot	4.50	4.41	13	33
P093	Extension of metro line M4 to the west	3.80	0.98	14	46

Table 9: *CONVERTED MCA SCORES AND RANKING OF THE CONCRETE AND NON-MODELLABLE PROJECTS WITHIN THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM*

Based on MCA evaluations, the implementation of all 50 projects can be recommended.

The long list includes 14 concrete and non-modellable projects, all of which are within the competence of the capital city, with a total investment cost of approximately 175 billion HUF. Out of the non-concrete projects, 12 are within the competence of the capital, with a total investment cost of approximately 90 billion HUF. There are 22 state projects with an approximately 1,700 billion HUF investment requirement (no investment cost data are available for three projects), the results of these are not presented separately.

The MCA results of the concrete and non-modellable municipal projects, indicating the score for social utility assessment (3.6–30 points), the corrected converted MCA score (0–100 points), and the absolute rank in the entire project list as well as the rank reached within project type is presented in Table 9. The best evaluation was achieved by the project for the realisation of the Comprehensive City Logistics Regulation (P018) with 24 MCA points, which corresponds to a maximum of 100 points on the uniform scale as a result of the conversion. The project to extend metro line M4 to the west (P093) has received the lowest MCA. The average converted MCA score for concrete and non-modellable projects is 29.5.

The MCA results of the municipal competence non-concrete projects are illustrated by Table10. The highest value is for the project on the development of the integrated timetable and fare system, the harmonisation of the services of BKK–MÁV–Volán (P053), (converted MCA score: 85.29), with which it is ranked third in the

Project				Ranking	
ID	Name	MCA score	Converted MCA score	Within project type	Absolute
P053	Establishment of an integrated timetable and fare system for the harmonisation of the BKK–MÁV–Volán services	21.00	85.29	1	3
P051	Development of demand responsive public transport services	20.00	80.39	2	4
P020	Developing a penetrable, safe main cycling network within the Hungária Ring	11.00	36.27	3	6
P028	Development of urban greenways in Budapest and development of their connections to regional greenways	10.50	33.82	4	8
P016	Developing a penetrable, safe main cycling network outside of the Hungária Ring	10.00	31.37	5	9
P026	Improvement of the public bike-sharing system	10.00	31.37	6	9
P110	Regulation of the transport and parking of tourist buses	7.00	16.67	7	14
P012	Cycling-friendly development of contiguous neighbourhoods	6.67	15.03	8	16
P076	Transport history and heritage vehicle project	6.00	11.76	9	18
P175	Renovation of the Buda inner-city Danube embankment	5.50	9.31	10	22
P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	5.25	8.09	11	23
P005	Extension of tram line 3 to the south (towards Pesterzsébet–Csepel vk.–Budafok, Városház tér)	4.20	2.94	12	38

Table 10: *CONVERTED MCA SCORES AND RANKING OF THE NON-CONCRETE PROJECTS WITHIN THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM*

absolute rank line. The lowest score was given to the southern extension of tram line 3 (P005) (converted MCA score: 2.94). In this project type, the average of converted MCA scores is similar to the previous one: 30.2.

The average MCA score of all projects is 18.3. The scores are illustrated in descending order by Figure 20. It can be seen that the results of the first five projects are significantly better, the results of the next seven projects are slightly above average and the results of the next five projects are close to average, while the scores of the other projects are below 10.

3.2.6. RESULTS OF THE FEASIBILITY STUDY (MEG)

Feasibility study was completed for all rankable projects. Based on the evaluation, 66 projects out of the 67 can be proposed for realisation. Northern extension of tram line 2 to the Árpád Bridge area (P009), due to the intensive urban development investments

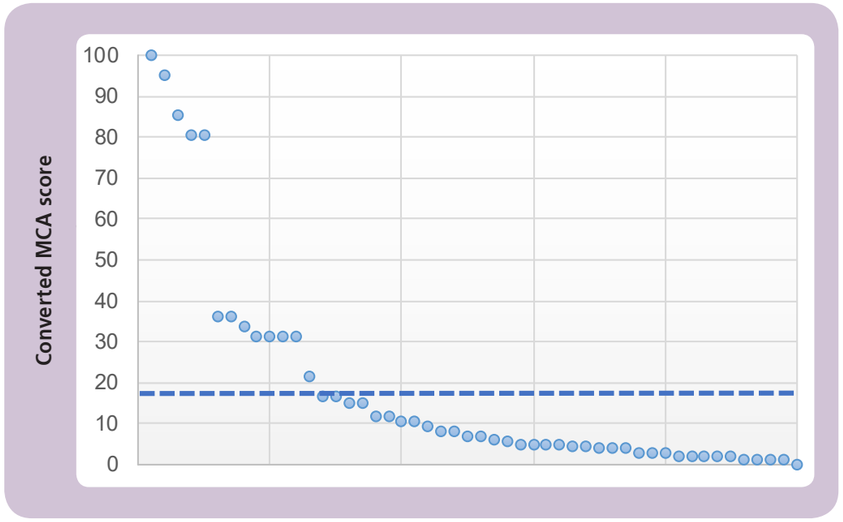


Figure 20: *RESULTS OF THE MULTI-ASPECT ANALYSES BASED ON THE CONVERTED MCA SCORE*

in process and planned along the proposed route, needs to be revised in the future based on the unified SUMP project assessment methodology used in the BMT.

The highest converted MEG score (100 points) was given to three projects: Development of demand responsive public transport services (P051), Transport history and heritage vehicles (P076) and Pedestrian Wayfinding System (GYERE) (P152). The average of the converted MEG scores is 55.7, the standard deviation is 27.2.

The MEG scores are illustrated in descending order by Figure 21.

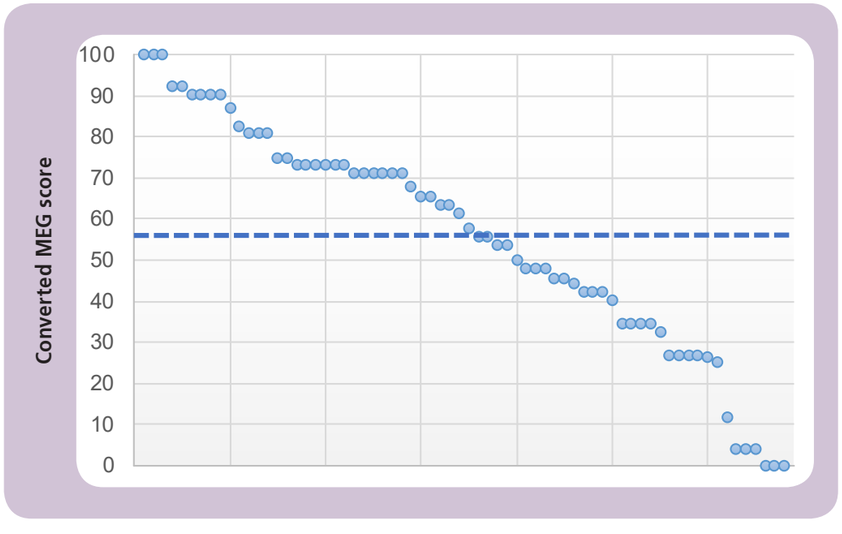


Figure 21: *DISTRIBUTION OF THE CONVERTED MEG SCORES*

3.2.7. RESULTS OF THE SYNERGY EXAMINATION

Table 11 shows the connection of 145 projects with each other – without the cancelled projects. One project can increase the value of multiple cells in a table, because for example, a given project may be a prerequisite for another project while another project may preclude its implementation. 56 projects do not have this type of relationship with other projects, of which 49 are in municipal competence and seven are in state one. There are 12 projects for which another project or projects are prerequisites, of which nine are in municipal competence and three are in state one.

There are a total of two projects the realisation of which is excluded by another project:

- The Development of the access to the South Buda Centre (P187) project is excluded by the Extension of metro line M4 to the west (P093) project
- The Introduction of low-emission zones (LEZ) (P192) project

A total of 113 projects have synergistic effect on 56 projects within the scope of the municipality, while 24 projects have a synergistic relationship with 52 state projects, i.e. in total, 165 projects have effect on a total of 80 projects.

	Projects built on each other	Projects excluding each other	Synergistic projects	No connection
Projects coordinated by the municipal governance system	9	2	56	49
State projects	3	0	24	7
Total	12	2	80	56

Table 11: *NUMBER OF PROJECTS BY THE CONNECTION TYPES*

The Introduction of Congestion charging system project (P014) has the most connections. It is a prerequisite for project (P017) Construction of P+R car parks connected to urban modal switching points in Budapest and has seven additional synergistic links.

Project (P005) Extension of tram line 3 to the south has also more synergistic relationships: two projects are prerequisites for it while it is in synergy with four projects. The Development of a penetrable, safe main cycling network within the Hungária Ring (P020) and the Construction of the Ring railway S-Bahn stations (Angyalföld, Ferencváros) (P074) projects are equally in synergy with five projects.

There are projects that have only a prerequisite. Such are the Modernisation and extension of the metro line M1 (P086) and the Rolling stock upgrade of metro line M1 (P087) projects, which are prerequisites for each other, so their simultaneous implementation is recommended. Furthermore, in the case of Connecting metro line M2 and the suburban railway H8, the completion of the section of the Gödöllő branch line on the territory of Budapest (P089) is a prerequisite for the development of the Rákoskeresztúr branch line (P090). The distribution of projects by the number of connections with other projects is shown in Figure 22.

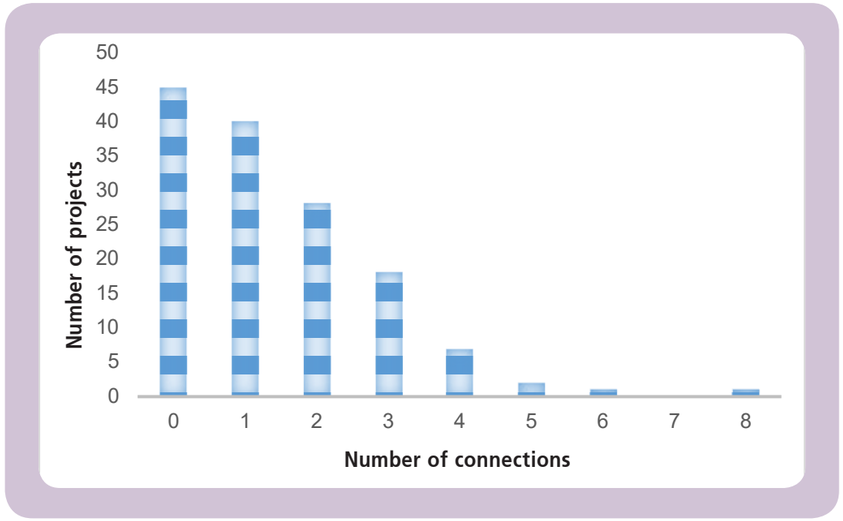


Figure 22: *NUMBER OF PROJECTS BY THE NUMBER OF CONNECTIONS*

3.3. PRESENTATION OF THE PROGRAMMING RESULTS

The time frame for the BMT and thus for the investment programme is a period lasting until 2030. Programming does not cover the period 2018–2020 since the decision has already been made for the relevant developments of the period, and some are already in the phase of implementation, (decided projects). Consequently, effective programming covers the period 2021–2030, for which project packages have been developed for the following three time periods:

- Phase I (short term): 2021–2025
- Phase II (medium term) 2026–2030
- Phase III (long-term developments) post-2030 times (projects that go beyond short- and medium-term priorities).

Due to the uncertainty about the level of available financing (government, community and own resources available for the Municipality of Budapest Capital and its organisations), three scenarios have been defined for the different budgets. As a starting point, the resources of the recent municipal developments were assumed (based on actual data, 150 billion HUF/5 years), supplemented by two scenarios divided into two phases based on the resolution of the Balázs Mór Committee:

- scenario for low budget: 300 billion HUF (150 + 150 billion HUF)
- scenario for medium budget: 600 billion HUF (300 + 300 billion HUF)
- scenario for full budget: 950 billion HUF (450 + 500 billion HUF).

There are 45 municipality-coordinated projects that can be ranked, three of which are not recommended for implementation (projects under KO criterion). Accordingly, there are 41 projects to choose from in the project package proposal, with a total estimated investment cost of approx. 950 billion HUF. Thus, in case of a full budget, all municipality-coordinated rankable projects can be included. Projects were ranked according to utility, fit and a complex criteria system defined by the methodology. The best project in the utility and complex ranking was the Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport (P063), while project (P089) Connecting metro line M2 and suburban railway line H8 and building the Rákoskeresztúr branch line–Gödöllő section between Pillangó utca and Cinkota got first place in the fit ranking.

The number of rankable state projects was 22, out of which all can be recommended for realisation.

Taking into account the available resources and based on the methodology, three mechanical project packages were developed for each project being within the competence of the Budapest institutional system. Based on the mechanical packages, the proposed project packages were scheduled taking into consideration of the following aspects:

- in Phase I those projects will be included which are in the first phase according to all three or at least two mechanical project packages
- projects evaluated as a prerequisite for projects with a high evaluation score in Phase I will also be put into the same scheduling period
- rearrangements due to scheduling considerations, territorial and modal balance, SEA considerations
- the resources freed up because of the above will be used for projects with the best complex score of the next phase.

3.3.1. SCENARIO FOR LOW BUDGET

During preparation of the 300 (150 + 150) billion HUF scenario with a "low" budget, the following 13 projects were included in Phase I for each of the three mechanical project packages:

- P012 Cycling-friendly development of contiguous neighbourhoods
- P013 Development of urban and suburban river boat lines and service facilities
- P018 Realisation of the comprehensive city logistics regulation (Development of regulation and introduction of IT based technology)

- P020 Developing a penetrable, safe main cycling network within the Hungária ring
- P026 Improvement of the public bike-sharing system
- P028 Development of urban greenways in Budapest and development of connection to the surrounding greenways
- P051 Development of demand responsive public transport services
- P053 Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services
- P063 Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport
- P098 Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)
- P113 Development of Városház tér in District 22
- P152 Introduction of the Pedestrian Wayfinding System (GYERE)
- P172 Development of the cycling infrastructure along Szilas creek.

Therefore, these were automatically included in Phase I of the proposed project package. Five projects were included in Phase I in two mechanical project packages as well as in the proposed project package based on expert evaluation. These are the following:

- P004 Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád bridge) and construction of Szegedi út overpass
- P014 Introduction of the Budapest Congestion charge system and related infrastructure investments
- P016 Developing a penetrable, safe main cycling network outside of the Hungária ring
- P067 Renovation of the Kossuth Lajos utca–Rákóczi út public space
- P086 Modernisation and extension of metro line M1 (Millennium Underground Railway)
- P115 Construction of bus station(s) in Csepel
- P173 Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér.

From a scheduling point of view, it is reasonable to implement the metro line M1 rolling stock upgrade project (P087) together with the infrastructure modernisation and line extension project (P086), so the former was included in Phase I. Furthermore, also from a scheduling aspect, (P175) Renovation of the inner-city Danube embankment in Buda was moved to Phase II of the proposed project package – though it was included in Phase I according to

two mechanical project packages – in order to avoid that it would be in the same scheduling period with project (P173) Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér, and the two embankments would be reconstructed at the same time. The remaining resource, based on consensus of experts, has been allocated for the Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3 (P119), taking into account the synergies with the already decided project of Metro line infrastructure reconstruction (P092).

Number of projects in Phase I: 22. The highest composite score for complex rankings is for the project Development of inner-city goods transfer points, environmentally friendly "last mile" freight transport (P063; 75.5 points) while the lowest is the Reconstruction of pedestrian underpasses and surface exits associated with stations on metro line M3 (P119; 20.4 points). The average score of the projects is 42.4.

The projects of Phase II are basically determined by their place occupied in the complex package. Due to the fact described above, project (P175) Renovation of the Buda inner-city Danube embankment was transferred into Phase II, so it has the highest score there. Based on the mechanical packages, the Southern extension of tram line 3 (P005) should be completed in Phase II, but the Gubacsi Bridge road reconstruction project (P162) is a prerequisite for this, which, due to the fact that it is a state-run project and currently still a project idea, the implementation is only expected in the longer term. Thus, based on the complex ranking in Phase II the following projects can be realised:

- P006 Extension of tram line 42 to Gloriett residential area
- P035 Construction of Csepel backbone road (Teller Ede út) Phase II
- P070 Construction of the ring road along the railway ring Section II (section between M3 motorway and Üllői út)
- P073 Construction of the ring road along the railway ring Section III (Between Üllői út and Soroksári út)
- P076 Transport history and heritage vehicle project
- P077 Establishment of Józsefváros tram depot

- P080 Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy)
- P110 Regulation of the transport and parking of tourist buses
- P129 Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area – Extension of the Buda Interconnected Tram Network (Phase II)
- P155 Comprehensive cross-sectional review of the Grand Boulevard
- P183 Southern extension of tram line 2, Connection of tram line 2 and 24 and reconstruction of tram line 2.

In Phase II, a total of 12 projects are included in the project package. The highest composite score was received by project (P175) Renovation of the inner-city Danube embankment of Buda (41.2 points) while the lowest score was given to project (P110) Regulation of the transport and parking of tourist buses (7.4 points). The average composite score of the projects is 19.9.

As stated above, from Phase II it is recommended to realise the extension of tram line 3 to the south (P005) later. There are six more projects in Phase III, listed below:

- P089 Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)
- P090 Connecting metro line M2 and suburban railway H8 and construction of the Rákoskeresztúr branch line–Rákoskeresztúr section
- P093 Extension of metro line M4 to the west
- P107 Construction of Újpalota tram line
- P112 Connecting the tram network between Deák Ferenc tér and Lehel tér (Bajcsy-Zsilinszky út–Váci út track)
- P207 Extension of metro line M3 to Káposztásmegyer.

Thus, a total of seven projects are on the list of future developments. The project Interconnection of the M2 metro line with the H8 Gödöllő suburban railway and construction of the Rákoskeresztúr wing line from the urban section of the Gödöllő branch line (P089) and the project Extension of the M3 metro line to Káposztásmegyer (P207) should be among the projects of Phase I based on their mechanical packages, however, due to their investment resource need they could not be included in the 150 billion HUF package. Project P089 has the highest composite score in the long-term period as well (51.2 points), while the construction of the Újpalota tram line has the lowest (P107, 9.8 points). The average score of the projects is 24.5.

The distribution of the number of projects per phase is illustrated by Figure 23.

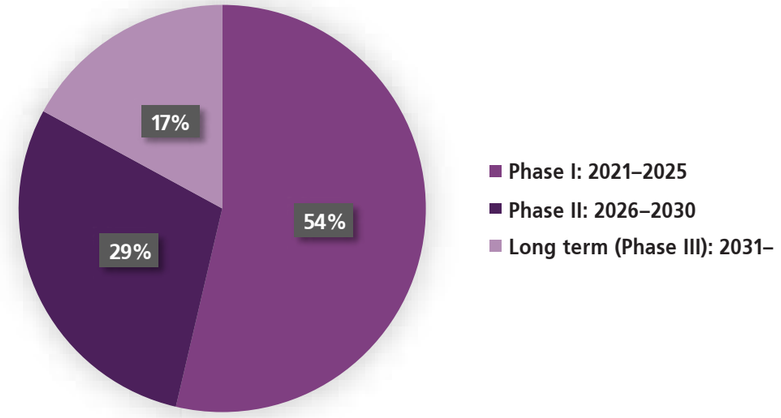


Figure 23: *THE DISTRIBUTION OF THE NUMBER OF PROJECTS PER PHASE IN CASE OF LOW BUDGET*

3.3.2. SCENARIO FOR MEDIUM BUDGET

The scenario for medium budget plans with the availability of 600 billion (300 + 300) HUF. 19 projects were included in Phase I in all three relevant mechanical packages:

- P012 Cycling-friendly development of contiguous neighbourhoods
- P013 Development of urban and suburban riverboat lines and service facilities
- P014 Introduction of the Budapest Congestion charge system and related infrastructure investments
- P016 Developing a penetrable, safe main cycling network outside of the Hungária Ring
- P018 Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)
- P020 Developing a penetrable, safe main cycling network within the Hungária Ring
- P026 Improvement of the public bike-sharing system
- P028 Development of urban greenways in Budapest and development of their connections to regional greenways
- P051 Development of the demand responsive public transport services
- P053 Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services
- P063 Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport
- P086 Modernisation and extension of metro line M1 (Millennium Underground Railway)
- P098 Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)

- P113 Development of Városház tér in District 22
- P115 Construction of bus station(s) in Csepel
- P152 Introduction of the Pedestrian Wayfinding System (GYERE)
- P172 Development of the cycling infrastructure along Szilas creek
- P173 Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér
- P175 Renovation of the Buda inner-city Danube embankment.

At the same time, two scheduling considerations also need to be taken into account. On the one hand, it is reasonable to implement the projects affecting metro line M1 (P086 and P087) at the same time. On the other hand, in case of the Pest and Buda Danube inner-city embankment reconstructions (P173 and P175), realisation in the same phase is to be avoided, therefore it is proposed to include the former in Phase I and the latter in Phase II. The remaining budget can be used for the following projects:

- P004 Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád Bridge) and construction of Szegedi út overpass
- P067 Renovation of the Kossuth Lajos utca–Rákóczi út public space
- P089 Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)
- P119 Reconstruction of pedestrian underpasses and exits connected to stations on metro line M3.

Thus, in Phase I of the recommended project package, 23 projects are proposed to be realised, which is similar in number to the low budget case, despite the fact that twice the amount of resources is available, what is more the resource allocation is exceeded by 2%. Project P063 has the highest composite score (75.5 points) and project P119 the lowest (20.4 points). The average score of the projects is 42.9.

In the medium-term period, in accordance with the composite scores calculated based on the complex ranking, the following projects are proposed for inclusion in Phase II:

- P006 Extension of tram line 42 to Gloriett residential area
- P035 Construction of Csepel backbone road (Teller Ede út) Phase II
- P073 Construction of the ring road along the railway ring Section III (Between Üllői út and Soroksári út)

- P076 Transport history and heritage vehicle project
- P077 Establishment of Józsefváros tram depot
- P080 Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy
- P110 Regulation of the transport and parking of tourist buses
- P129 Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area – Extension of the Buda Interconnected Tram Network (Phase II)
- P155 Comprehensive cross-sectional review of the Grand Boulevard
- P175 Renovation of the Buda inner-city Danube embankment
- P183 Southern extension of tram line 2, connection of tram lines 2 and 24 and reconstruction of tram line 2
- P207 Extension of metro line M3 to Káposztásmegyer.

So, the number of projects included in Phase II is 12. Since the budget was exceeded by 2% in Phase I, therefore to balance this out, in Phase II the nominal designed budget was not fully utilised. Project P207 has the highest composite score (46.6 points) and the lowest score is for project P110 (7.4 points). The average score of the projects is 22.4.

A total of six projects will be transferred to the long-term period, mainly due to the crowding-out effect of the high cost of the project for the connection of metro line M2 and suburban railway line H8 (P089) and the Northern extension of metro line M3 (P207), but these projects are not considered too effective anyway. The average score of the projects is 19.9.

The distribution of the number of projects per phase is illustrated by Figure 24.

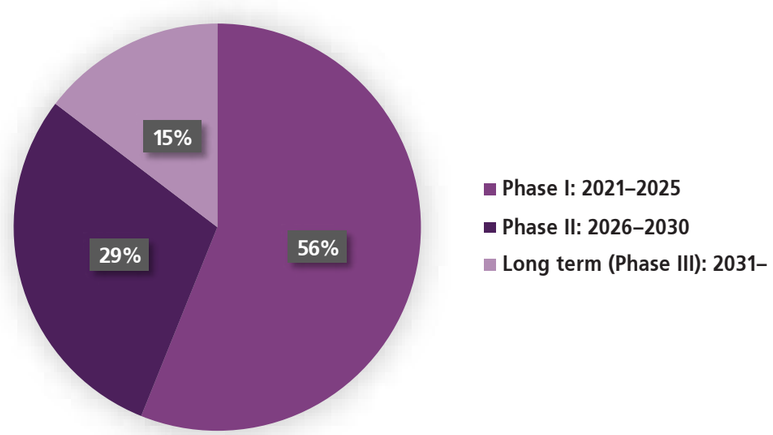


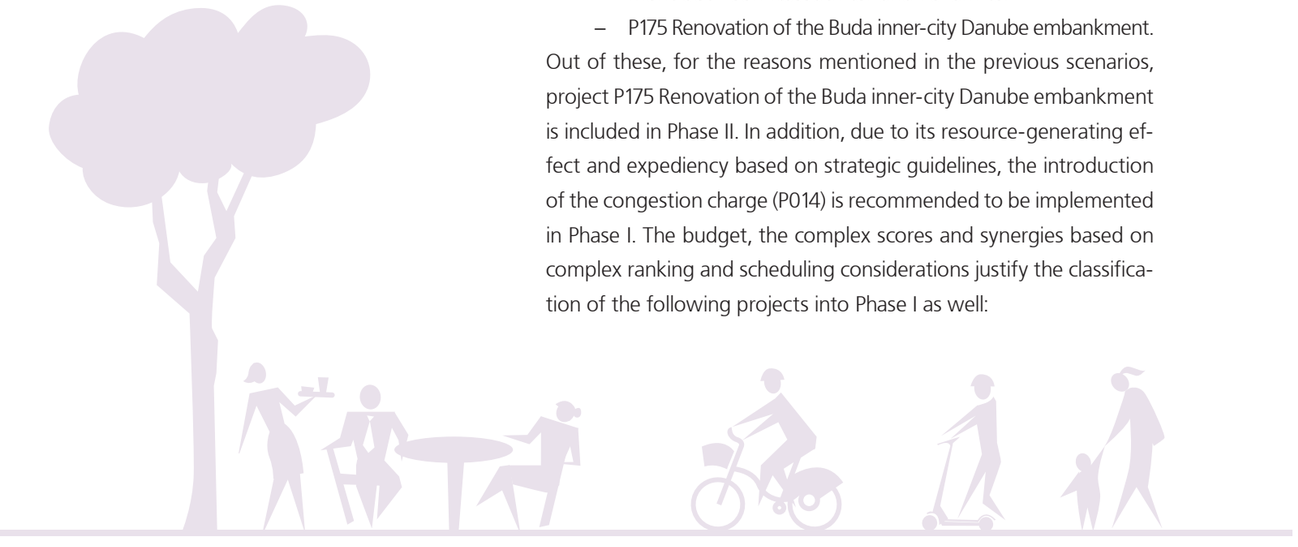
Figure 24: *THE DISTRIBUTION OF THE NUMBER OF PROJECTS PER PHASE IN CASE OF MEDIUM BUDGET*

3.3.3. SCENARIO FOR FULL BUDGET

The scenario for the full budget plans with the availability of 950 billion (450 + 500) HUF. 14 projects are included in Phase I according to all three mechanical project packages, as follows:

- P012 Cycling-friendly development of contiguous neighbourhoods
- P013 Development of urban and suburban river boat lines and service facilities
- P018 Realisation of the comprehensive city logistics regulation (Development of regulation and introduction of IT based technology)
- P020 Developing a penetrable, safe main cycling network within the Hungária Ring
- P026 Improvement of the public bike-sharing system
- P028 Development of urban greenways in Budapest and development of their connections to regional greenways
- P053 Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services
- P063 Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport
- P089 Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)
- P113 Development of Városház tér in District 22
- P152 Introduction of the Pedestrian Wayfinding System (GYERE)
- P172 Development of the cycling infrastructure along Szilas creek
- P173 Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér
- P175 Renovation of the Buda inner-city Danube embankment.

Out of these, for the reasons mentioned in the previous scenarios, project P175 Renovation of the Buda inner-city Danube embankment is included in Phase II. In addition, due to its resource-generating effect and expediency based on strategic guidelines, the introduction of the congestion charge (P014) is recommended to be implemented in Phase I. The budget, the complex scores and synergies based on complex ranking and scheduling considerations justify the classification of the following projects into Phase I as well:



- P016 Developing a penetrable, safe main cycling network outside of the Hungária Ring
- P051 Development of the demand responsive public transport services
- P067 Renovation of the Kossuth Lajos utca–Rákóczi út public space
- P086 Modernisation and extension of metro line M1 (Millennium Underground Railway)
- P087 Metro line M1 (Millennium Underground Railway) rolling stock upgrade
- P207 Extension of metro line M3 to Káposztásmegyer.

However, the cost of prioritising the previous projects is the transfer of P012 and P113 projects back to Phase II. Although these projects should be included in Phase I on the basis of different rankings, through their subordination, the two projects with the highest resource requirement and high utility (P089, P207) can be implemented in Phase I.

As a result, by using the full budget, 18 projects can be implemented in Phase I. Project P063 has the highest composite score (75.5 points) and project P087 has the lowest (23.6 points). The average score of the projects is 47.3.

In Phase II the remaining 23 projects can be implemented. Project P175, which is excluded from Phase I, for scheduling reasons, has the highest composite score (41.1 points), while project P110 has the lowest score (7.4 points). The average score of the projects is 21.4. The distribution of the number of projects per phase is illustrated by Figure 25.

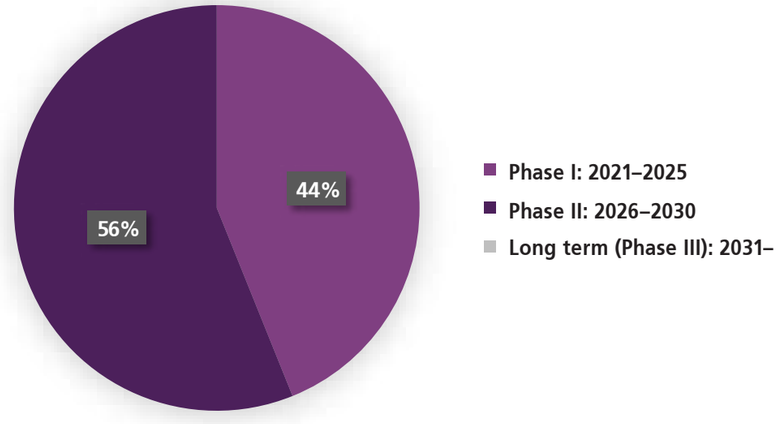


Figure 25: *THE DISTRIBUTION OF THE NUMBER OF PROJECTS PER PHASE IN CASE OF FULL BUDGET*

3.3.4. COMPARISON OF THE SCENARIOS

The distribution of the composite score of the projects within the phases of each financing scenario is shown in the following figures. In case of the low budget, the most efficient projects with a low cost claim are implemented in Phase I. This is illustrated by the light-colour columns of Figure 26. In case of the medium budget, some of the projects with medium utility are transferred from Phase I to Phase II, due to the crowding-out effect of the M2 metro line

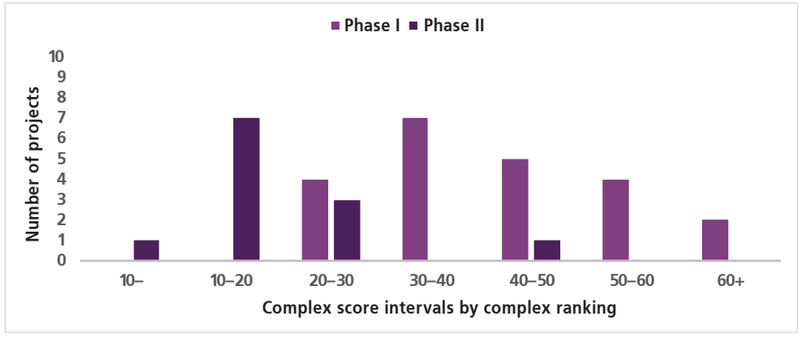


Figure 26: *THE DISTRIBUTION OF THE COMPOSITE NUMBER OF PROJECTS PER PHASE IN CASE OF LOW BUDGET*

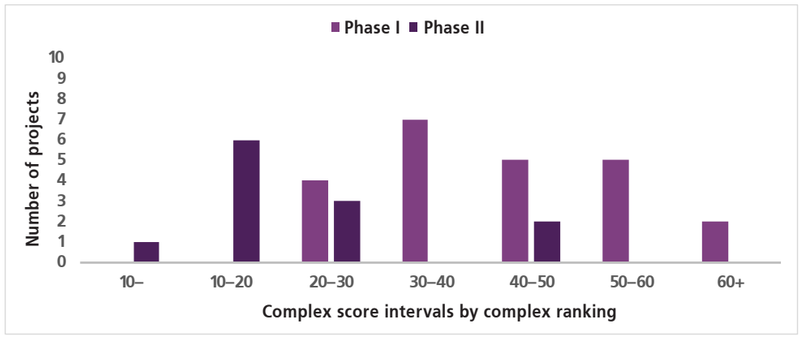


Figure 27: *THE DISTRIBUTION OF THE COMPOSITE NUMBER OF PROJECTS PER PHASE IN CASE OF MEDIUM BUDGET*

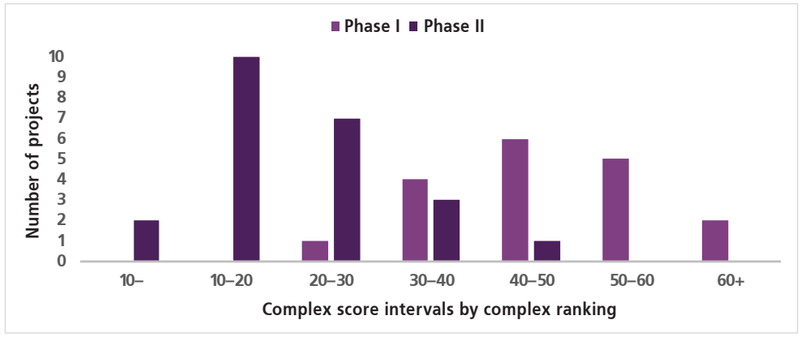


Figure 28: *THE DISTRIBUTION OF THE COMPOSITE NUMBER OF PROJECTS PER PHASE IN CASE OF FULL BUDGET*

and the H8 Gödöllő suburban link (P089) project (see Figure 27), at the same time, there are some relatively effective projects in Phase II as well. In case of the full budget, the most efficient projects can be implemented in Phase I, however, for Phase II mainly low-efficiency projects remain (see Figure 28). However, the supposed full budget is almost three times the amount of transport development resources experienced in the recent period.

The contents of the project packages proposed for each scenario are detailed in Chapter 3.6.

3.4. EVALUATION RESULTS OF THE PROPOSED PROJECT PACKAGE AND THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

Evaluation of the proposed project packages and the Transport Development and Investment Programme is performed as described in Chapter 2.3.5. In addition to the proposed programme packages, for each of the three scenarios, 29 decided projects can be counted on, and the coordination of further 25 task-like projects falls within the competence of the municipal governance system. The proposed project package, the decided projects and the tasks together form the Transport Development and Investment Programme.

3.4.1. AVERAGE FEASIBILITY SCORE

The average feasibility score for projects involved in programming is 62.3. The highest score was given to the project Development of demand responsive public transport services (P051), the Transport history and heritage vehicles (P076) and the Introduction of the Pedestrian Wayfinding System (GYERE) (P152) projects. The lowest score is 3.9 received by project (P110) Regulation of the transport and parking of tourist buses. Table 12 contains the values per scenarios and phases.

Feasibility score		2021–2025	2026–2030	2031–
Low budget	Average	72.4	53.0	46.2
	Max	100.0	100.0	75.0
	Min	26.3	3.9	25.0
Medium budget	Average	71.4	55.6	66.0
	Max	100.0	100.0	75.0
	Min	26.3	3.9	25.0
Full budget	Average	69.9	56.3	-
	Max	100.0	100.0	-
	Min	3.9	25.0	-

Table 12: *STATISTIC CONCERNING FEASIBILITY SCORES PER SCENARIOS AND PHASES*

Out of the best projects based on feasibility, according to all scenarios, projects P051 and P152 will be implemented in Phase I, while P076 in Phase II.

3.4.2. AVERAGE COMPOSITE SCORE

The average composite score for projects involved in programming is 32.7, calculated on the basis of complex ranking. The highest score was received by project (P063) Development of inner-city goods transfer points, environmentally friendly "last mile" freight transport. The lowest score is 7.4 received by project (P110) Regulation of the transport and parking of tourist buses. Table 13 contains the values per scenario and phase.

Composite score		2021–2025	2026–2030	2031–
Low budget	Average	42.4	19.9	24.5
	Max	75.5	41.2	53.8
	Min	20.4	7.4	9.8
Medium budget	Average	42.9	22.4	14.6
	Max	75.5	46.6	22.8
	Min	20.4	7.4	9.8
Full budget	Average	47.3	21.4	-
	Max	75.5	41.2	-
	Min	23.6	7.4	-

Table 13: *STATISTIC CONCERNING COMPOSITE SCORES PER SCENARIO AND PHASE*

Summary table of consolidated economic analyses
[million HUF, rounded]
price levels: 2017

Evaluation aspect	Low budget	Medium budget	Full budget
1. Present value of total investment	132,126	266,087	436,625
2. Present value of total operation cost	23,225	29,957	85,458
3. Present value of economic residual	14,209	32,747	55,849
4. Present value of economic costs (1 + 2 -3)	**141,142**	**263,297**	**466,233**
5. Present value of travel time cost savings	325,340	295,005	651,716
6. Present value of accident cost savings	8,724	6,354	17,824
7. Present value of vehicle operation cost savings	3,629	28,259	45,350
8. Present value of environmental cost savings	-54,164	26,406	-30,371
9. Present value of economic benefits (5 + 6 + 7 + 8)	**283,530**	**356,024**	**684,519**
Economic net present value (ENPV, HUF million, 9-4)	**142,388**	**92,727**	**218,286**
Economic internal rate of return (EIRR)	**11.4%**	**7.2%**	**8.1%**
Benefit cost ratio (BCR, 9/4)	**2.01**	**1.35**	**1.47**

Table 14: *RESULTS OF THE CONSOLIDATED CBA BY SCENARIO*

3.4.3. CONSOLIDATED CBA

Cost-benefit analysis (CBA) was carried out for 19 of the 41 projects coordinated by Budapest municipality (not KO) which were involved in programming. For these, consolidated cost-benefit analysis was also prepared for each scenario. The results of this are shown by Table 14.

In the case of joint traffic modelling forming the basis of the consolidated CBA, it has been observed that the joint implementation of projects results in moderately greater savings (about 5–10%) than the sum of the individual effects, so there are usually synergistic effects between the projects. Only in case of a few projects competing with each other in some respect was the opposite effect experienced, but the impact was also within the 5–10% range.

Based on the CBA results of the packages, it can be seen that the realisation of the low-resource scenario is proven the most effective (BCR: 2.01). With increase of the budget, the BCR index is decreasing, i.e. the decreasing tendency of marginal social benefit is observed. Even in the case of a full budget, where all proposed projects are implemented, the BCR index is positive (1.47), which indicates significant potential for the development of the transport system. In case of the medium budget, the BCR index is slightly lower (1.35) than for the previous case, which can be attributed to the crowding-out effect of the very resource-intensive northern extension of metro line M3 to be implemented in Phase II of the scenario.

Significant part of the benefits (more than 90%) comes from travel time savings. Accident and vehicle operation cost savings are small, while environmental cost savings are sometimes negative. The latter is due to the noise impact of tram developments, in addition to the enhancing effect of road improvements on motorised vehicle mileage.

3.4.4. OPERATIONAL EFFECT

The impact on operating costs for the 41 projects involved in programming is a total of 5,303 million HUF per year, with an average cost of 129 million HUF per project. Eight projects have neutral, five have decreasing and 28 have increasing effects on the operational costs. Table 15 contains the values per scenario and phase.

Cost-benefit analysis		2021–2025	2026–2030	2031–
Low budget	Total (HUF million)	1544.3	916.9	2841.9
	- effect (piece)	3	1	1
	neutral effect (piece)	5	3	0
	+ effect (piece)	14	8	6
Medium budget	Total (HUF million)	589.6	2366.4	2347.1
	- effect (piece)	4	1	0
	neutral effect (piece)	5	3	0
	+ effect (piece)	14	8	6
Full budget	Total (HUF million)	1521.6	3781.5	-
	- effect (piece)	4	1	-
	neutral effect (piece)	4	4	-
	+ effect (piece)	10	18	-

Table 15: *EFFECT ON OPERATIONAL COSTS PER SCENARIO AND PHASE*

3.4.5. STRATEGIC FIT

As a result of the fit tests, it is possible to determine to what extent the projects cover the strategic and operational objectives, the measures and the areas of intervention.

In case of the project package proposed according to the scenario concerning a low budget, Table 16 shows the extent to which the projects cover the measures under the operational objectives in the Objectives. The first number shown indicates the number of measures covered by the fit and the second represents the total number of measures belonging to the operative objectives. The total values for the rows in the table show the project numbers fitting to each intervention area. The column total shows the fit to strategic goals. Based on the results, it can be seen that the proposed project package (1/4) is the least likely to cover the measures of Operational Objective 3.2. Out of the 57 measures, a total of 40 will be covered (70%).

Proposed project package Scenario for low budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	6/8	7/7	8/11	21/26
2. Attractive vehicles	1/2	3/4		4/6
3. Better services	1/4	7/10		8/14
4. Effective governance system	4/6		3/5	7/11
Total	10/17	14/17	16/23	40/57

Table 16: *NUMBER OF MEASURES BY OPERATIONAL OBJECTIVES COVERED BY THE PROPOSED PROJECT PACKAGE (2021–2030) IN CASE OF LOW BUDGET*

Table 17 shows the aggregate fit scores at the operative objective level. The majority of the projects fit to Intervention area 1 (Improving connections). A relative balance of support for strategic objectives can be observed; the number of projects that fit to Strategic objective III (Cooperative territorial relations) lags behind the number of projects supporting the other two objectives. The sum of the fit scores is 177.

Proposed project package Scenario for low budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	54	48	23	125
2. Attractive vehicles	4	14		18
3. Better services	2	15		17
4. Effective governance system	8		9	17
Total	64	66.5	46.5	177

Table 17: *FIT SCORES OF THE PROJECT PACKAGE PROPOSED IN CASE OF LOW BUDGET (2021–2030) BY THE INDIVIDUAL OPERATIVE OBJECTIVES*

The evaluation results of the scenario concerning the medium budget are presented in the following tables, based on the logic described above (Table 18, Table 19). The results are similar in scale to the low budget scenario. Out of the 57 measures, a total of 42 will be covered (74%). The sum of the fit scores is 201. It can be seen that extension of the budget makes the coverage of strategic objectives more balanced.

Proposed project package Scenario for medium budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	6/8	7/7	9/11	22/26
2. Attractive vehicles	1/2	4/4		5/6
3. Better services	1/4	7/10		8/14
4. Effective governance system	4/6		3/5	7/11
Total	10/17	14.5/17	17.5/23	42/57

Table 18: *NUMBER OF MEASURES COVERED BY THE PROPOSED PROJECT PACKAGE (2021–2030) IN CASE OF MEDIUM BUDGET BY OPERATIVE OBJECTIVES*

Proposed project package Scenario for medium budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	55	50	34	139
2. Attractive vehicles	4	23		27
3. Better services	2	15		17
4. Effective governance system	8		10	18
Total	65	73	63	201

Table 19: *FIT SCORES OF THE PROJECT PACKAGE PROPOSED IN CASE OF MEDIUM BUDGET (2021–2030) BY INDIVIDUAL OPERATIVE OBJECTIVES*

Proposed project package Scenario for the full budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	6/8	7/7	9/11	22/26
2. Attractive vehicles	1/2	4/4		5/6
3. Better services	1/4	7/10		8/14
4. Effective governance system	4/6		3/5	7/11
Total	10/17	14.5/17	17.5/23	42/57

Table 20: *NUMBER OF MEASURES COVERED BY THE PROPOSED PROJECT PACKAGE (2021–2030) IN CASE OF FULL BUDGET BY OPERATIVE OBJECTIVES*

Proposed project package Scenario for full budget				
2021–2030	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	57	64	37	158
2. Attractive vehicles	4	23		27
3. Better services	2	15		17
4. Effective governance system	8		10	18
Total	67	87	66	220

Table 21: *FIT SCORES OF THE PROJECT PACKAGE PROPOSED IN CASE OF FULL BUDGET (2021–2030) BY INDIVIDUAL OPERATIVE OBJECTIVES*

The evaluation of the proposed project package belonging to the scenario with a full budget is presented by Table 20 and Table 21. The results from the fit aspect are almost identical to those of the medium budget. Out of the 57 measures, a total of 42 will be covered (74%). The sum of the fit scores is 220. Compared to the medium budget scenario, the further extension of the budget strengthens the role of Strategic objective II.

Table 22, based on the fit scores, presents the strategic fit of the other elements of the Transport Development and Investment Programme and that of the decided projects and task-like projects as well.

Decided and task-like projects				
	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	39	34	19	92
2. Attractive vehicles	6	29		35
3. Better services	7	13		20
4. Effective governance system	18		3	21
Total	61	64	43	168

Table 22: *FIT SCORES OF THE DECIDED AND TASK-LIKE PROJECTS BY THE INDIVIDUAL OPERATIVE OBJECTIVES*

For the entire Transport Investment Programme, the following tables show the strategic fit, based on the fit scores, by scenarios (see Table 23, Table 24 and Table 25).

Based on the distribution of fit scores, it can be seen that in the investment programme the developments, primarily infrastructure developments, belonging to the first area of intervention (Improving relations) are highly dominating. Depending on the financing scenario, 63–65% of the fit scores are connected here. One of the reasons for this is that a large part of transport developments, due to the nature of the transport system, is infrastructure-centric. On the other hand, in recent years and decades, most of the various transport development programmes, calls for bids and also the EU tenders have focused on infrastructure development, thus the development ideas identified as a project have also focused on that. Developments of service, regulatory or institutional factors which can be identified as "soft" elements of transport, are only addressed in a few complex projects.

Transport Development and Investment Programme in case of the scenario concerning low budget: Proposed project package (low budget) + Decided projects + Task-like projects				
	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	93	82	42	217
2. Attractive vehicles	10	43		53
3. Better services	9	28		37
4. Effective governance system	26		12	38
Total	125	130.5	89.5	345

Table 23: *TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME FIT SCORES BY THE INDIVIDUAL OPERATIVE OBJECTIVES IN CASE OF LOW BUDGET*

Transport Development and Investment Programme in the case of the scenario with a medium budget: Proposed project package (medium budget) + Decided projects + Task-like projects				
	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	94	84	53	231
2. Attractive vehicles	10	52		62
3. Better services	9	28		37
4. Effective governance system	26		13	39
Total	126	137	106	369

Table 24: *TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME FIT SCORES BY THE INDIVIDUAL OPERATIVE OBJECTIVES IN CASE OF MEDIUM BUDGET*

Transport Development and Investment Programme in the case of a scenario with a full budget: Proposed project package (full budget) + Decided projects + Task-like projects				
	I. Liveable urban environment	II. Safe, reliable and integrated transport	III. Cooperative regional relations	Total
1. Improving connections	96	98	56	250
2. Attractive vehicles	10	52		62
3. Better services	9	28		37
4. Effective governance system	26		13	39
Total	128	151	109	388

Table 25: *TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME FIT SCORES BY THE INDIVIDUAL OPERATIVE OBJECTIVES IN CASE OF FULL BUDGET*

The distribution of fitting points according to the strategic goals shows a balanced result, considering that the lower value Strategic Goal III (Cooperative territorial relations) is also supported by state projects, which are not part of the Transport Development and Investment Programme and consequently neither of this evaluation. Strategic objective II (Safe, reliable and integrated transport) supporting integration within the transport system has the strongest role. This phenomenon is also due to the nature of transport developments, but it is also favourable that the role of Strategic objective I (Liveable urban environment) is also strong.

The Transport Development and Investment Programme, depending on the scenario, covers 52–53 measures in total out of the 57 (91–93%), i.e. a significant part of the objectives is supported by the projects. The tasks related to the four measures which are not covered (1.2.7. Life and property safety, crime prevention; 1.3.6. Improving the accessibility of Budapest Liszt Ferenc International Airport; 3.1.10. Sanitation and public health tasks of urban transport; 4.2.3. Strengthening the zone system regulation based on the total weight of freight transport vehicles and traffic restrictions based on environmental category) are dealt with by the state projects and by the proposals concerning project ideas (see 3.9. and 3.10 chapter). For two measures, there is a related project idea available, while for the remaining one, a project idea needs to be developed.

3.4.6. ENVIRONMENTAL IMPACT

The number of projects, within the individual project packages by scenario, which are considered to be sensitive due to their (potential) impact on environmental assets is presented by Table 26. As a consequence of increasing budgets and the resulting increase in the number of projects included in each project package, the number of projects which are considered to be sensitive to environmental assets also increases. The environmental assets potentially affected by each project are listed in the SEA and in the project sheets as well. However, in terms of environmental impact, there is no significant difference between the project packages: environmental risks must be handled with due care at project implementation level.

Financing scenario	Phase I (2021–2025)	Phase II (2026–2030)	Jointly (2021–2030)
Low budget	9	9	18
Medium budget	10	9	19
Full budget	7	17	24

Comment: the table includes only those projects where already in the present planning phase an environmental asset is known to be affected. The table does not contain projects that are "Not known" i.e. the ones that can be examined in a later planning phase.

Table 26: *NUMBER OF PROJECTS CONSIDERED TO BE SENSITIVE ACCORDING TO ENVIRONMENTAL CHARACTERISTICS IN CASE OF THE INDIVIDUAL SCENARIOS*

3.4.7. KÖRNYEZETI CÉLOK TELJESÜLÉSE

Preparing the environmental scoring qualification at project level has served two main purposes: on the one hand, it evaluated each project package from an environmental point of view and on the other hand, it created an environmentally optimised project package (the so-called environmental project package) which made the comparative evaluation of the proposed project packages possible. A low budget was taken into account for preparation of the environmental project package, thus the detailed comparison was completed only for the scenario with this budget.

Project ideas and task-like projects could also be included in the environmental package. Of the projects of unknown cost, the obviously costly ones were not included in the package, but the likely low-cost, mainly regulatory type projects were taken into consideration at zero cost. All the more so because in these cases the pressure for future implementation is not always clear.

By determining the total score of projects in the low budget package and that of the environmental project package, the two packages became comparable. For the environment package, the score of the version without the zero cost tasks was also determined as they could not be included in the proposed project package in the first place. Comparison of the projects of the low budget project package with those of the environmental project package is detailed by the SEA.

The low budget project package with 34 projects received a total score of 359 based on environmental considerations, while the environmental project package with 35 projects received 445 points. The score of the environmental project package not including task-like projects was 409. The differences are also due to the fact that important transport (transport organising) projects, such as the construction of the tram depot, have received a rather low environmental score, but these can obviously be decisive parts of the proposed package. The project with the lowest environmental score in the proposed project package received three points, while in the environmental package there is no score below nine. Naturally, the environmental project package received a higher total environmental score, but the difference is not significant. There is a circa 75% overlap between the low budget and the environmental project package (26 of the 34 projects in the package are in the environmental package as well), which means that the selection can be regarded as good also from an environmental aspect, given that task-like projects and project ideas are not part of the package, but they are included in the environmental package.

The project to create a sustainable and predictable (normative-based) financing framework (P044) can be in doubt not due to its design, but because of the constraint to comply with the regulations, that is why it has been placed into the threat column of the SWOT table of SEA. Maintenance and operation are still not solved satisfactorily from a financing point of view: this will be worsened by the developments.

The medium and full budget project packages are not comparable to the prepared environmental project package because it calculates with the low budget, but it can be said that most of the not task-like or project idea elements of the environmental project package are already included in the medium-budget project package.

On the whole, since none of the projects received a negative environmental score and thus the environmental benefits are expected to outweigh the environmental risks in case of all projects, it can be stated that the project packages with a higher budget can be considered to be better from environmental and also from the quality of life aspects. From the environmental aspect, the mode of implementation of the individual projects (e.g. minimising environmental risks) will always be of decisive importance in all cases.

3.4.8. MODAL BALANCE

The rankable projects in the capital cover the transport modes as follows (one project can be linked to several transport modes):

- Public transport 30 projects
- Car transport 23 projects
- Walking and cycling 26 projects
- Freight transport: 7 projects

73% of the projects are related to public transport, 63% to walking and cycling, 56% to car transport and 17% to freight transport. Investment related to public transport is 890 billion HUF, which is 93% of the total investment cost of 41 projects (953 billion HUF). This figure is 685 billion HUF (72%) for car transport, 680 billion HUF (71%) for walking and cycling and 28 billion HUF (3%) in case of freight traffic.

Table 27 shows by programming period the total number of transport modes affected by the projects in the case of a low budget. The summarised data of project investment costs is illustrated by Table 28.

Low budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	14	11	15	5
Phase II	9	7	6	2
Long-term developments	7	5	5	0
Total	30	23	26	7

Table 27: *THE NUMBER OF PROJECTS BY TRANSPORT MODE AND PHASE (LOW BUDGET)*

Low budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	135,385	61,585	84,801	17,172
Phase II	113,077	105,814	78,262	10,954
Long-term developments	642,376	517,376	517,376	0
Total	890,838	684,775	680,439	28,126

Table 28: *THE INVESTMENT COST OF PROJECTS BY TRANSPORT MODE AND PHASE (LOW BUDGET)*

In the case of a medium budget, Table 29 shows the distribution of the number of projects by transport mode. The summarised data of project investment costs is illustrated by Table 30.

Medium budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	15	12	16	5
Phase II	10	7	7	2
Long-term developments	5	4	3	0
Total	30	23	26	7

Table 29: *THE NUMBER OF PROJECTS BY TRANSPORT MODE AND PHASE (MEDIUM BUDGET)*

Medium budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	292,822	219,022	242,238	17,172
Phase II	287,333	240,070	252,518	10,954
Long-term developments	310,683	225,683	185,683	0
Total	890,838	684,775	680,439	28,126

Table 30: *THE INVESTMENT COST OF PROJECTS BY TRANSPORT MODE AND PHASE (MEDIUM BUDGET)*

In the case of a full budget, Table 31 and 32 illustrate the distribution by transport mode based on the summary of the number of projects and the total of their investment costs.

Full budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	11	8	12	3
Phase II	19	15	14	4
Long-term developments	-	-	-	-
Total	30	23	26	7

Table 31: *THE NUMBER OF PROJECTS BY TRANSPORT MODE AND PHASE (FULL BUDGET)*

Full budget	Public transport	Car transport	Walking and cycling	Freight traffic
Phase I	435,894	364,094	387,310	3,801
Phase II	454,944	320,681	293,129	24,325
Long-term developments	-	-	-	-
Total	890,838	684,775	680,439	28,126

Table 32: *THE INVESTMENT COST OF PROJECTS BY TRANSPORT MODE AND PHASE (FULL BUDGET)*

3.4.9. TERRITORIAL BALANCE

The elements of the proposed project package cover the territorial units defined in the Budapest 2030 Long-term Urban Development Concept (one project can be linked to several territorial units):

- Inner zone 21 projects
- Zone along Danube 20 projects
- Transition zone 27 projects
- Buda Hills zone 9 projects
- Suburban zone 10 projects
- City neighbourhoods 16 projects

51% of the projects are related to the Inner zone, 49% to the Danube zone, 66% to the Transition zone, 22% to the Buda Hills zone, 24% to the Suburban zone and 39% to the City neighbourhood area. The dominance of transport development in the transition zone harmonises well with the development concepts of the urban development concept focusing on this area.

In terms of investment cost, projects impacting the transition zone have the largest funding requirement of HUF 678.3 billion, which

is 71% of the total investment cost of the 41 projects (HUF 953 billion). The investment cost of the City neighbourhood areas is HUF 568.6 billion (60%), in the Suburban area it is HUF 428.5 billion (45%), in the Inner zone it is HUF 217.1 billion (23%), in the Danube zone HUF 169.4 billion (18%) and HUF 97.8 billion (10%) for the mountainous area.

Table 33 shows the number of projects per programming period for the low budget by geographical distribution. The summarised data of project investment costs is illustrated by Table 34.

Low budget	Inner zone	Zone along Danube	Transition zone	Buda Hills zone	Suburban zone	City neighbourhoods
Phase I	14	14	14	7	6	9
Phase II	5	5	8	1	1	4
Long-term developments	2	1	5	1	3	3
Total	21	20	27	9	10	16

Table 33: *THE NUMBER OF PROJECTS BY TERRITORIAL UNIT AND PHASE (LOW BUDGET)*

Low budget	Inner zone	Zone along Danube	Transition zone	Buda Hills zone	Suburban zone	City neighbourhoods
Phase I	113,669	70,602	94,619	8,400	7,400	27,871
Phase II	51,803	58,757	127,163	4,355	4,355	74,962
Long-term developments	51,623	40,000	456,497	85,000	416,693	465,753
Total	217,095	169,359	678,279	97,755	428,448	568,586

Table 34: *THE PROJECT INVESTMENT COSTS BY TERRITORIAL UNIT AND PHASE (LOW BUDGET)*

Medium budget	Inner zone	Zone along Danube	Transition zone	Buda Hills zone	Suburban zone	City neighbourhoods
Phase I	14	14	15	7	7	10
Phase II	5	5	7	1	2	4
Long-term developments	2	1	5	1	1	2
Total	21	20	27	9	10	16

Table 35: *THE NUMBER OF PROJECTS BY TERRITORIAL UNIT AND PHASE (MEDIUM BUDGET)*

Medium budget	Belső zóna	Duna menti zóna	Átmeneti zóna	Hegyvidéki zóna	Elővárosi zóna	Városkörnyéki területek
Phase I	113,669	70,602	252,056	8,400	164,837	185,308
Phase II	51,803	58,757	87,163	4,355	178,611	209,218
Long-term developments	51,623	40,000	339,060	85,000	85,000	174,060
Total	217,095	169,359	678,279	97,755	428,448	568,586

Table 36: *THE PROJECT INVESTMENT COSTS BY TERRITORIAL UNIT AND PHASE (MEDIUM BUDGET)*

In the case of a medium budget, Table 35 shows the distribution of the number of projects by territorial unit. The summarised data of project investment costs is illustrated by Table 36.

In the case of a full budget, Table 37 and 38 illustrate the distribution by territorial unit based on the summary of the number of projects and the total of their investment costs, respectively.

Full budget	Inner zone	Zone along Danube	Transition zone	Buda Hills zone	Suburban zone	City neighbourhoods
Phase I	11	10	11	6	7	7
Phase II	10	10	16	3	3	9
Long-term developments	-	-	-	-	-	-
Total	21	20	27	9	10	16

Table 37: *THE NUMBER OF PROJECTS BY TERRITORIAL UNIT AND PHASE (FULL BUDGET)*

Full budget	Inner zone	Zone along Danube	Transition zone	Buda Hills zone	Suburban zone	City neighbourhoods
Phase I	90,885	44,818	228,272	4,400	335,093	339,193
Phase II	126,210	124,541	450,007	93,355	93,355	229,393
Long-term developments	-	-	-	-	-	-
Total	217,095	169,359	678,279	97,755	428,448	568,586

Table 38: *THE PROJECT INVESTMENT COSTS BY TERRITORIAL UNIT AND PHASE (FULL BUDGET)*

3.4.10. SUMMARY EVALUATION AND PROPOSAL

Based on the results, it can be concluded that, in case of ample funding, the larger, resource-intensive projects have a moderate crowding-out effect as a consequence of which the medium efficiency, small projects are pushed into the background. This can be interpreted as a "crowding-out effect" because, though from an expert point of view it is difficult to quantify, the total number of smaller projects left out may be more valuable than a high-ranking project which replaced them. This consideration is also consistent with the judgment that more external changes during the implementation process will affect the boundary conditions of the programming based on the approved document of the BMT Objectives and Measures. Such changes include the emergence and institutionalisation of cooperation in the governmental and municipal transport decision-making system, institutional changes that follow it, as well as real estate development practices that significantly affect the urban structure and differ from the previous urban development concept, but also, to a certain extent, the role

of technological innovations that have been taken into account in programming, but are changing rapidly. At the same time, projects with a higher-resource need, due to their size and beyond the general uncertainty factors, are also subject to a number of conceptual, technical and financial uncertainties.

Based on the above and previous experience in connection with the M4 metro line investment, it is therefore advisable not to prioritise the projects with a large resource need over small projects during project preparation, because if uncertainties about general or high-resource projects cannot be resolved, then instead of those, the smaller-resource projects less exposed to strategic-level changes can be and are worthwhile to be implemented. Thus, it is more reasonable to prepare each project considering the assumption of the narrowest financing scenario based on actual data of recent years. At the same time, if based on the assumption of a medium or full budget more resources were available (e.g. by involving state aid), then the municipal project linking metro line M2 and suburban railway lines H8-H9 (P089) could be prioritised, so it is still worthwhile to keep the preparation of it on the agenda.

In case of more limited availability of resources, selection among the projects included in the proposed project package may also be necessary. This is guided, in addition to ad hoc considerations, by the strategic guidelines and the rankings based on project evaluation results.

The planning process of the BMT follows the guidelines of the European Union, thus allowing the municipality to be prepared to apply for EU development funds. However, at the time of present programming, the urban development priorities of the European Union concerning the next periods are not known, so it is possible that projects related to certain development areas have been included in the Transport Development and Investment Programme to a greater extent than the EU funds that will be available. This reinforces the message of the BMT Objectives and Measures that domestic resources need to be mobilised for the realisation of those projects which do not qualify for EU funding.

3.5. SUMMARY FINDINGS OF THE STRATEGIC ENVIRONMENTAL ASSESSMENT

The purpose of the SEA was to assess the investment programme and its project package variants on the basis of environmental and sustainability requirements, thereby helping to select the best version. In addition to this, the aim was to make a proposal for the widest possible application of the environmental aspects at both project package and project levels.

Within the framework of SEA (since the decided and cancelled projects are only antecedents for the SEA), 107 projects have been awarded an environmental scored rating, which means that there is no project with a negative overall environmental value. This means that each planned project has environmental benefit and its value exceeds that of the damage.

Environmental scoring served two main purposes. On one hand, to evaluate the development alternatives, packages. However, there was no significant difference between these (so-called mechanical project packages) and the proposed project package resulting from them, which would have justified selection on an environmental basis. Due to this, in a second step, an environmental project package, considered the "best" from environmental and life quality aspects, was produced and could be the subject of comparison. The environmental package applies a wider range, i.e. it takes into account that part of the project ideas and task-like projects which is suitable for inclusion. All the more so because in the case of the latter, the strong need for future implementation is not always clear.

Based on the evaluation, the proposed project packages also have a high total environmental score. The environmental package obviously has a higher total environmental score, but the difference is not too great. The highest scoring cycling projects are also included in the proposed project package. However, the positive judgement could be further improved by including some environmentally important projects. The main differences between the environmental project package and the proposed project package were mainly the abandonment of road development projects as the environmental proposal, as expected, contains public transport development projects rather than road development projects.

The environmental package also contains project ideas that would be desirable to realise in the proposed project package. Such is for example the "Phased realisation of P+R car parks", which would also facilitate the introduction of congestion charging, or the "Establishment of a regional transport organising authority to ensure

the coherence of urban and suburban transport", because without it the efficient operation of the transport system cannot be ensured, or the "Developing a sustainable and predictable (normative) financing framework" without which the developments may result in new operational problems.

There is an overlap of around 75% between the low-budget project package and the environmental package projects, which means that from an environmental aspect, the way of implementation will be decisive and at this stage of the design process, selection can be considered appropriate. On this basis, many of the SEA proposals concern project solutions of a later stage of implementation, too.

3.6. LIST OF THE DECIDED PROJECTS

Table 39 shows the list of projects of decided status included in the Transport Development and Investment Programme.

#	Project ID	Project name	Project owner organisation (in the case of a consortium, by the consortium leader)	Investment cost [HUF million]
Projects affecting public transport				
1.	P002	Extension of tram line 1 to Etele tér (IKOP-3.1.0-15-2016-00007)	Capital	10,700
2.	P034	Budapest tram vehicle project (Within the framework of IKOP-3.1.0-15-2017-00013)	Capital	17,600
3.	P036	Reconstruction of the southern connecting railway bridge over the Danube	NIF	38,200
4.	P041	Introduction of an electronic time-based ticketing system and related new fare system in public transport	Capital and KTI-National Mobile Payment	22,311
5.	P046	Cogwheel railway (tram line 60) reconstruction and development*	Capital	29,570
6.	P057	Kelenföld–Pusztaszabolcs railway line Phase I (Modernisation of Kelenföld–Százhalombatta)	NIF	25,000
7.	P061	Modernisation of the Budapest–Rákos excluded–Hatvan railway line section	NIF	148,000
8.	P075	Realisation of BKK customer service centres	Capital	1,279
9.	P092	Reconstruction of metro line M3 infrastructure (IKOP-3.1.0-15-2015-00001)	Capital	217,000
10.	P096	Procurement of diesel multiple units by MÁV-START (IKOP-2.1.0-15-2017-00039 és IKOP-2.1.0-15-2018-00051)	MÁV-START	99,550
11.	P179	Budapest trolleybus project (Within IKOP-3.1.0-15-2017-00013)	Capital	10,257
12.	P180	Reconstruction of the stations KÖKI–Kőbánya alsó–Zugló	MÁV	6,000
13.	P188	Transport development of the Hungexpo territory	Capital	5,375
Projects affecting car transport				
14.	P017	Construction of P+R car parks for urban transport modal switch points in Budapest (IKOP-3.1.0-15-2016-00008)	Capital	2,298
15.	P088	M2 expressway (between Budapest and Vác with 2x2 lane construction)	NIF	32,970
16.	P118	Connection of Cinkotai út and Keresztúri út, District 17	Capital	848
17.	P132	Reconstruction of Péterhegyi út (Egér út–Neszmélyi út) and Neszmélyi út (Péterhegyi út–Balatoni út) in District 11	Capital	390
18.	P133	Reconstruction of Podmaniczky utca (Bajcsy Zsilinszky út–Teréz körút) in District 6	Capital	300
19.	P163	Complex-approach reconstruction of Pasaréti út in District 2	Capital	750
20.	P167	Construction of M3 motorway noise protection wall	Capital	360
21.	P189	Reconstruction of Széchenyi Chain Bridge along with tram and road underpass	Capital	16,366
Projects affecting cycling and walking				
22.	P024	Construction of B+R bicycle storage facilities	Capital	500
23.	P025	Renovation of the public spaces at Blaha Lujza tér	Capital	4,000
24.	P106	Realisation of the STARS project	Capital	36
25.	P114	Renovation of Széna tér	Capital	2,565
26.	P120	VEKOP bicycle developments	Capital	8,390
27.	P153	Modernisation of the bicycle infrastructure in Hungária and Könyves Kálmán Ring roads	Capital	200
28.	P156	Development of EuroVelo6 and EuroVelo14 international bicycle routes in Budapest	Capital	6,000
29.	P208	Renovation of Orczy tér	Capital	2,240

* The required financing for the implementation of the project is not yet fully available, but a significant part of the development elements can be realised in the framework of other projects, and there is dedicated funding for the production of the vehicle prototype, based on the relevant government decision. Considering this situation and the technical timeliness of the reconstruction, the project was given a decided ranking.

Table 39: *LIST OF THE DECIDED PROJECTS*

3.7. LIST OF TASK-LIKE PROJECTS

The list of task-like (to be done continuously) projects that are part of the Transport Development and Investment Programme is presented in Table 40. Each listed project belongs to the municipal governance system.

#	Project ID	Project name	Cost requirement [HUF million]
Tasks affecting public transport			
1.	P015	Prioritisation of public transport vehicles	1,000
2.	P021	Renewal of the Budapest bus fleet from 2020 (transition to electric transport)	67,000
3.	P023	Development of the unified Budapest taxi service	no data
4.	P055	Realisation of the integrated passenger information service and associated measures	no data
5.	P109	Development of the urban fixed-rail network, establishment of new MÁV connections	no data
6.	P144	Accessible platforms at stops on tram line 50	1,280
7.	P145	Accessible platforms at Selmeci utca and Margit kórház stops	160
8.	P170	Renewal of the Budapest tram fleet from 2019	HUF 13 000 million / year
9.	P171	Renewal of the Budapest trolleybus fleet from 2019	HUF 4 500 million / year
10.	P186	Accessibility on Hűvösvölgy tram line	1,280
11.	P187	Developing the accessibility of Dél-budai Centrum (DBC: South Buda Centre)	no data
Tasks affecting car transport			
12.	P019	Elaboration of the concept for the comprehensive regulation of public space use for transport space in Budapest	17.5
13.	P022	Realisation of the regulation for car-sharing systems	no data
14.	P033	Simplification of road accident data collection	3.5
15.	P052	Realisation of IT developments in the urban transport organisation	4,000
16.	P054	Elaboration of the concept for the development and operation of electric charging infrastructure in the capital	1,206
17.	P064	Complex-approach road and infrastructure renovations within the framework of the Road and Bridge Renovation Programme of the Municipality of Budapest	HUF 22 000 million / year
18.	P079	Road developments to eliminate geographical area separation	30,000
19.	P100	Renovation of Petőfi Bridge	23,622
20.	P154	Construction of noise-protection wall on Szerémi út (Budafoki út–Dombóvári út)	no data
21.	P178	Phased implementation of P+R car parks	20,000
22.	P190	Renovation of the Buda Castle Tunnel	6,000
Other tasks			
23.	P201	Realisation of a web socialisation platform in relation to the SMART-MR project	5
24.	P202	Operation and further development of the Unified Traffic Model	no data
25.	P206	Elaboration of the regulation for e-mobility in Budapest	50

Table 40: *LIST OF TASK-LIKE PROJECTS*

3.8. RANKED PROJECTS PROPOSED FOR REALISATION WITHIN THE COMPETENCE OF THE INSTITUTIONAL SYSTEM OF THE CAPITAL CITY

The contents of the proposed project packages resulting from the programming (in phases) are presented in the following tables for the different financing scenarios. The tables present the projects in groups by the main mode of transport affected by them, and within the groups in descending order, based on the total scores reached according to complex ranking.

3.8.1. SCENARIO FOR A LOW BUDGET

#	Project ID	Project name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P053	Establishment of an integrated timetable and fare system, for harmonisation of BKK–MÁV–Volán services	59.89	100
2.	P051	Development of demand responsive public transport services	55.49	300
3.	P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	49.77	39,234
4.	P013	Development of urban and suburban riverboat lines and service facilities	45.50	19,867
5.	P115	Construction of bus station(s) in Csepel	29.49	3,000
6.	P004	Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád Bridge) and construction of Szegedi út overpass	29.04	10,813
7.	P087	Metro line M1 (Millennium Underground Railway) rolling stock upgrade	23.64	19,200
Projects affecting car transport				
8.	P063	Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport	75.48	100
9.	P018	Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)	69.10	400
10.	P173	Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér	42.68	15,000
11.	P098	Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)	32.95	1,000
12.	P014	Introduction of the Budapest Congestion charge system and related infrastructure investments	30.55	3,301
Projects affecting cycling and walking				
13.	P152	Introduction of the Pedestrian Wayfinding System (GYERE)	55.49	50
14.	P028	Development of urban greenways in Budapest and development of connection to the regional greenways	51.61	2,500
15.	P026	Improvement of the public bike-sharing system	41.01	2,000
16.	P172	Development of the cycling infrastructure along Szilas creek	41.01	2,100
17.	P020	Developing a penetrable, safe main cycling network within the Hungária Ring	39.25	1,500
18.	P113	Development of Városház tér in District 22	36.91	5,400
19.	P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	36.44	10,000
20.	P012	Cycling friendly development of contiguous neighbourhoods	34.09	4,000
21.	P016	Developing a penetrable, safe main cycling network outside of the Hungária Ring	33.96	2,500
22.	P119	Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3	20.35	7,971

Table 41: *PROPOSED PROJECTS WITHIN THE SCOPE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE I (2021–2025) IN THE CASE OF LOW BUDGET FUNDING*

#	Project ID	Name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P080	Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy	27.50	13,207
2.	P183	Southern extension of tram line 2: connection of tram lines 2 and 24 and reconstruction of tram line 2	26.21	17,448
3.	P076	Transport history and heritage vehicle project	24.71	6,960
4.	P129	Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area–Extension of the Buda Interconnected Tram Network (Phase II)	18.04	13,000
5.	P077	Establishment of Józsefváros tram depot	16.76	12,500
6.	P006	Extension of tram line 42 to Gloriett residential area	15.67	21,653
7.	P110	Regulation of the transport and parking of tourist buses	7.44	4,355
Projects affecting car transport				
8.	P175	Renovation of the Buda inner-city Danube embankment	41.16	15,000
9.	P070	Construction of the ring road along the railway ring Section II (section between M3 motorway and Üllői út)	16.68	40,000
10.	P035	Construction of Csepel backbone road (Teller Ede út) Phase II	16.17	8,954
11.	P073	Construction of the ring road along the railway ring Section III (between Üllői út and Soroksári út)	11.99	5,000
Projects affecting cycling and walking				
12.	P155	Comprehensive cross-sectional review of the Grand Boulevard	16.83	2,000

Table 42: *PROPOSED PROJECTS WITHIN THE COMPETENCE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE II (2026–2030) IN THE CASE OF LOW BUDGET FUNDING*

Figure 29: *MAP OF THE RANKED PUBLIC TRANSPORT PROJECTS PROPOSED FOR REALISATION, BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A LOW BUDGET*

The maps of the projects by transport mode are shown in Figures 29, 30 and 31. Those projects of a general nature are not included in the maps, which affect the entire city, or the map representation of which is impossible for other reasons.

Figure 30: *MAP OF THE RANKED PUBLIC ROAD PROJECTS PROPOSED FOR REALISATION BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A LOW BUDGET*

Figure 31: *MAP OF THE RANKED CYCLING AND WALKING PROJECTS PROPOSED FOR REALISATION BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A LOW BUDGET*

3.8.2. SCENARIO FOR A MEDIUM BUDGET

#	Project ID	Name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P053	Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services	59.89	100
2.	P051	Development of demand responsive public transport services	55.49	300
3.	P089	Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)	53.84	157,437
4.	P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	49.77	39,234
5.	P013	Development of urban and suburban riverboat lines and service facilities	45.50	19,867
6.	P115	Construction of bus station(s) in Csepel	29.49	3,000
7.	P004	Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád Bridge) and construction of Szegedi út overpass	29.04	10,813
8.	P087	Metro line M1 (Millennium Underground Railway) rolling stock upgrade	23.64	19,200
Projects affecting car transport				
9.	P063	Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport	75.48	100
10.	P018	Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)	69.10	400
11.	P173	Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér	42.68	15,000
12.	P098	Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)	32.95	1,000
13.	P014	Introduction of the Budapest Congestion charge system and related infrastructure investments	30.55	3,301
Projects affecting cycling and walking				
14.	P152	Introduction of the Pedestrian Wayfinding System (GYERE)	55.49	50
15.	P028	Development of urban greenways in Budapest and development of their connections to regional greenways	51.61	2,500
16.	P026	Improvement of the public bike-sharing system	41.01	2,000
17.	P172	Development of the cycling infrastructure along Szilas creek	41.01	2,100
18.	P020	Developing a penetrable, safe main cycling network within the Hungária Ring	39.25	1,500
19.	P113	Development of Városház tér in District 22	36.91	5,400
20.	P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	36.44	10,000
21.	P012	Cycling friendly development of contiguous neighbourhoods	34.09	4,000
22.	P016	Developing a penetrable, safe main cycling network outside of the Hungária Ring	33.96	2,500
23.	P119	Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3	20.35	7,971

Table 43: *APROPOSED PROJECTS WITHIN THE COMPETENCE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE I (2021–2025) IN THE CASE OF MEDIUM BUDGET FUNDING*

#	Project ID	Name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P207	Extension of metro line M3 to Káposztásmegyer	46.62	174,256
2.	P080	Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy)	27.50	13,207
3.	P183	Southern extension of tram line 2: connection of tram lines 2 and 24 and reconstruction of tram line 2	26.21	17,448
4.	P076	Transport history and heritage vehicle project	24.71	6,960
5.	P129	Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area–Extension of the Buda Interconnected Tram Network (Phase II)	18.04	13,000
6.	P077	Establishment of Józsefváros tram depot	16.76	12,500
7.	P006	Extension of tram line 42 to Gloriett residential area	15.67	21,653
8.	P110	Regulation of the transport and parking of tourist buses	7.44	4,355
Projects affecting car transport				
9.	P175	Renovation of the Buda inner-city Danube embankment	41.16	15,000
10.	P035	Construction of Csepel backbone road (Teller Ede út) Phase II	16.17	8,954
11.	P073	Construction of the ring road along the railway ring Section III (between Üllői út and Soroksári út)	11.99	5,000
Projects affecting cycling and walking				
12.	P155	Comprehensive cross-sectional review of the Grand Boulevard	16.83	2,000

Table 44: *PROPOSED PROJECTS WITHIN THE COMPETENCE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE II (2026–2030) IN THE CASE OF A MEDIUM BUDGET*

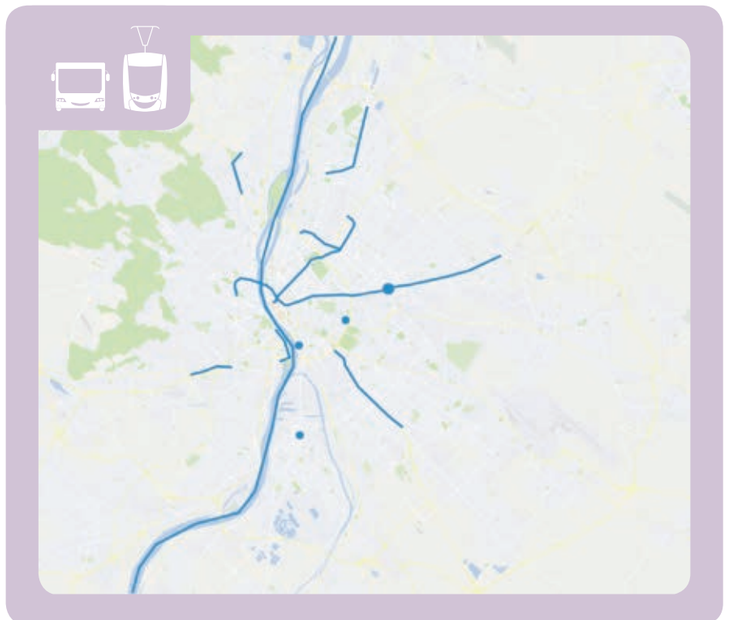


Figure 32: *MAP OF THE RANKED PUBLIC TRANSPORT PROJECTS PROPOSED FOR REALISATION, BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A MEDIUM BUDGET*

The maps of the projects by transport mode are shown in Figures 32, 33 and 34. Those projects of a general nature are not included in the maps, which affect the entire city, or the map representation of which is impossible for other reasons.

Figure 33: *MAP OF THE RANKED PUBLIC ROAD PROJECTS PROPOSED FOR REALISATION BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A MEDIUM BUDGET*

Figure 34: *MAP OF THE RANKED WALKING AND CYCLING PROJECTS PROPOSED FOR REALISATION BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A MEDIUM BUDGET*

3.8.3. SCENARIO FOR A FULL BUDGET

#	Project ID	Name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P053	Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services	59.89	100
2.	P051	Development of demand responsive public transport services	55.49	300
3.	P089	Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)	53.84	157,437
4.	P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	49.77	39,234
5.	P207	Extension of metro line M3 to Káposztásmegyer	46.62	174,256
6.	P013	Development of urban and suburban riverboat lines and service facilities	45.50	19,867
7.	P087	Metro line M1 (Millennium Underground Railway) rolling stock upgrade	23.64	19,200
Projects affecting car transport				
8.	P063	Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport	75.48	100
9.	P018	Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)	69.10	400
10.	P173	Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér	42.68	15,000
11.	P014	Introduction of the Budapest Congestion charge system and related infrastructure investments	30.55	3,301
Projects affecting cycling and walking				
12.	P152	Introduction of the Pedestrian Wayfinding System (GYERE)	55.49	50
13.	P028	Development of urban greenways in Budapest and development of their connections to regional greenways	51.61	2,500
14.	P026	Improvement of the public bike-sharing system	41.01	2,000
15.	P172	Development of the cycling infrastructure along Szilas creek	41.01	2,100
16.	P020	Developing a penetrable, safe main cycling network within the Hungária Ring	39.25	1,500
17.	P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	36.44	10,000
18.	P016	Developing a penetrable, safe main cycling network outside of the Hungária Ring	33.96	2,500

Table 45: *PROPOSED PROJECTS WITHIN THE COMPETENCE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE I (2021–2025) IN THE CASE OF A FULL BUDGET*

#	Project ID	Name	Composite score	Investment cost [HUF million]
Projects affecting public transport				
1.	P115	Construction of bus station(s) in Csepel	29.49	3,000
2.	P004	Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád Bridge) and construction of Szegedi út overpass	29.04	10,813
3.	P080	Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy)	27.50	13,207
4.	P183	Southern extension of tram line 2: connection of tram lines 2 and 24 and reconstruction of tram line 2	26.21	17,448
5.	P076	Transport history and heritage vehicle project	24.71	6,960
6.	P005	Southern extension of tram line 3 (towards Pesterzsébet–Csepel vk.–Budafok, Városház tér)	22.84	40,000
7.	P129	Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area–Extension of the Buda Interconnected Tram Network (Phase II)	18.04	13,000
8.	P077	Establishment of Józsefváros tram depot	16.76	12,500
9.	P006	Extension of tram line 42 to Gloriett residential area	15.67	21,653
10.	P093	Extension of metro line M4 to the west	15.14	85,000
11.	P090	Connecting metro line M2 and suburban railway H8 and construction of the Rákoskeresztúr branch line–Rákoskeresztúr section	11.79	134,060
12.	P112	Connecting the tram network between Deák Ferenc tér and Lehel tér (Bajcsy-Zsilinszky út–Váci út track)	11.17	11,623
13.	P107	Construction of Újpalota tram line	9.78	40,000
14.	P110	Regulation of the transport and parking of tourist buses	7.44	4,355
Projects affecting car transport				
15.	P175	Renovation of the Buda inner-city Danube embankment	41.16	15,000
16.	P098	Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)	32.95	1,000
17.	P070	Construction of the ring road along the railway ring Section II (section between M3 motorway and Üllői út)	16.68	40,000
18.	P035	Construction of Csepel backbone road (Teller Ede út) Phase II	16.17	8,954
19.	P073	Construction of the ring road along the railway ring Section III (between Üllői út and Soroksári út)	11.99	5,000
Projects affecting cycling and walking				
20.	P113	Development of Városház tér in District 22	36.91	5,400
21.	P012	Cycling friendly development of contiguous neighbourhoods	34.09	4,000
22.	P119	Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3	20.35	7,971
23.	P155	Comprehensive cross-sectional review of the Grand Boulevard	16.83	2,000

Table 46: *PROPOSED PROJECTS WITHIN THE COMPETENCE OF THE BUDAPEST INSTITUTIONAL SYSTEM FOR PHASE II (2026–2030) IN THE CASE OF A FULL BUDGET*

The maps of the projects by transport mode are shown in Figures 35, 36 and 37. Those projects of a general nature are not included in the maps, which affect the entire city, or the map representation of which is impossible for other reasons.

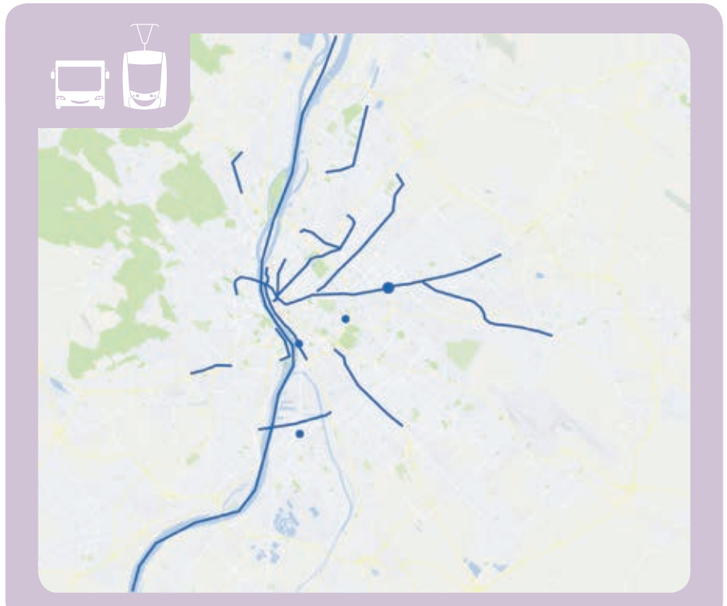


Figure 35: *MAP OF THE RANKED PUBLIC TRANSPORT PROJECTS PROPOSED FOR REALISATION BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A FULL BUDGET*

Figure 36: *AP OF THE RANKED PUBLIC ROAD PROJECTS PROPOSED FOR REALISATION, BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A FULL BUDGET*

Figure 37:
MAP OF THE RANKED WALKING AND CYCLING PROJECTS PROPOSED FOR REALISATION, BELONGING TO THE COMPETENCE OF THE MUNICIPAL GOVERNANCE SYSTEM, IN THE CASE OF A FULL BUDGET

3.9. PROPOSALS CONCERNING THE STATE PROJECTS

In connection with BMT, during the 2017–2018 programming period, a total of 22 state-funded, rankable projects (not coordinated by the municipal governance system) were identified, out of which all can be proposed for implementation based on the BMT project evaluations.

The projects are in line with both the previous and current urban and transport development plan of the Municipality of Budapest Capital using, among others, the data provided by BKK Zrt., as well as along with the national transport development ideas, and in harmony with the decisions of the central government made in order to place the Budapest heavy rail and suburban railway systems on new foundations as well as to develop the road network: Government Decrees 1564/2018 (XI. 10.) and 1565/2018 (XI. 10.) along with 1693/2018 (XII. 17.).

Out of the state projects, 20 concern public transport while two are public road developments. The total investment cost is 2,500 billion HUF. The state projects are presented in Table 47 grouped according to the main transport mode affected.

Project ID	Project name
	Projects affecting public transport
P007	Modernisation of railway line 70: Nyugati station–Rákospalota-Újpest railway line section
P008	Rákospalota-Újpest–Veresegyház–Vác railway line bottleneck elimination
P029	Renovation of Keleti Railway Station
P030	Implementation of a fixed-rail connection to Liszt Ferenc International Airport
P031	Renovation of the historic building of Nyugati Railway Station
P038	Construction of the southern section of the North-South Regional Rapid Railway (ÉDRV) (suburban railway lines H6/H7 between Kálvin tér–Csepel and Ráckeve)
P039	Construction of the inner-city section of the North-South Regional Rapid Railway (ÉDRV) (connection of suburban railway lines H5-H6/H7 between Kálvin tér and Kaszásdűlő)
P040	Reconstruction of the northern section of the North-South Regional Rapid Railway (ÉDRV) (suburban railway line H5 between Batthyány tér and Szentendre)
P043	Establishing a three-track link between Kelenföld and Ferencváros, developing suburban stations and creating new stations
P045	Development of Budapest Liszt Ferenc International Airport road links (Üllői út–Határ út junction–Kőér utca–Gyömrői út–airport access road)
P050	Suburban railway rolling stock upgrade
P068	Kőbánya-Kispest–Lajosmizse–Kecskemét railway line bottleneck elimination and electrification
P074	Railway ring S-Bahn (Angyalföld–Ferencváros) construction of stations
P177	Renovation of Kelenföld reception building
P181	Development of telecommunication, power and interlocking systems to improve efficiency and safety
P184	Realisation of the Soroksár–Ferencváros line (number 150, relocation of introductory section of the Kelebia mainline within the capital)
P185	Unification of four tracks on the Kőbánya-felső–Rákos railway line
P199	Budapest East-West Railway Interoperability Extension: through the area of Déli Railway Station to Nyugati Railway Station through a 'railway connecting tunnel' and development of Nyugati Railway Station into a central railway station
P200	Reconstruction of the railway facilities related to the development of the Gubacsi Railway Bridge and to the development of the Csepel River Freeport
P209	Renovation of the H8 suburban railway line's Budapest–Cinkota–Gödöllő track section and of the H9 line's Budapest–Cinkota–Csömör–Kavicsbánya-elágazás section
	Projects affecting car transport
P047	Development of the transport network connecting to the new Danube bridge to be constructed on Galvani utca–Illatos út and to the Fehérvári út and Üllői út–Határ út junctions (northern section of Csepel Island)
P083	M0 motorway ring, northern sector (between main roads 10 and 11, with 2 x 2 traffic lane layout)

Table 47: *LIST OF STATE PROJECTS CONNECTING TO THE BMT*

This chapter presents the priority aspects of the capital city for the state funded projects. Based on this, the Municipality of Budapest Capital, as a stakeholder, can develop its professional position and represent its interests in the preparation and implementation of the developments concerned. The priority aspects are presented in Table 48.

Project ID	Project name	Priority aspects
P007	Modernisation of railway line 70: Nyugati station–Rákospalota-Újpest railway line section	Development is justified based on the strategic guidelines + significant synergies
P008	Rákospalota-Újpest–Veresegyház–Vác railway line bottleneck elimination	Development is justified based on the strategic guidelines + significant synergies
P029	Renovation of Keleti Railway Station	Development is justified based on the strategic guidelines + significant synergies
P030	Implementation of a fixed-rail connection to Liszt Ferenc International Airport	Development is justified based on the strategic guidelines + it creates significant potential for the development of the airport
P031	Renovation of the historic building of Nyugati Railway Station	Development is justified based on the present technical conditions
P038	Construction of the southern section of the North-South Regional Rapid Railway (ÉDRV): (suburban railway lines H6/H7 between Kálvin tér–Csepel and Ráckeve)	This development is justified based on the strategic guidelines and also due to the current status of the infrastructure
P039	Construction of the inner-city section of the North-South Regional Rapid Railway (ÉDRV) (connection of suburban railway lines H5-H6/H7 between Kálvin tér and Kaszásdűlő)	Its realisation is not a priority based on the strategic guidelines
P040	Reconstruction of the northern section of the North-South Regional Rapid Railway (ÉDRV) (suburban railway line H5 between Batthyány tér and Szentendre)	This development is justified based on the strategic guidelines and also due to the current status of the infrastructure
P043	Establishing a three-track link between Kelenföld and Ferencváros, developing suburban stations and creating a new stations	Development is justified based on the strategic guidelines and due to the current capacity conditions + significant synergies
P045	Development of Budapest Liszt Ferenc International Airport road links (Üllői út-Határ út junction–Kőér utca–Gyömrői út–airport access road)	Development is justified based on the present technical conditions
P047	Development of the transport network connecting to the new Danube bridge to be constructed on Galvani utca–Illatos út and to the Fehérvári út and Üllői út–Határ út junctions (northern section of Csepel Island)	Development included in the settlement structure plan
P050	Suburban railway rolling stock upgrade	Development is justified based on the present technical conditions
P068	Kőbánya-Kispest–Lajosmizse–Kecskemét railway line bottleneck elimination and electrification	Development is justified based on the strategic guidelines
P074	Railway ring S-Bahn (Angyalföld–Ferencváros) construction of stations	Development is justified based on the strategic guidelines + significant synergies
P083	M0 motorway ring, northern sector (between main roads 10 and 11, with 2 x 2 traffic lane layout)	Optional public road development element (fits closely to P085)
P177	Renovation of Kelenföld reception building	–
P181	Development of telecommunication, power and interlocking systems to improve efficiency and safety	Development is justified based on the present technical conditions
P184	Realisation of the Soroksár–Ferencváros line (number 150, relocation of introductory section of the Kelebia mainline within the capital)	Territorial developments can justify the possible prioritisation of the project
P185	Unification of four tracks on the Kőbánya-felső–Rákos railway line	Development is justified based on the strategic guidelines
P199	Budapest East-West Railway Interoperability Extension: through the area of Déli Railway Station to Nyugati Railway Station through a 'railway connecting tunnel' and development of Nyugati Railway Station into a central railway station	Development is justified based on the strategic guidelines + high ILL score (16 points)
P200	Reconstruction of the railway facilities related to the development of the Gubacsi Railway Bridge and to the development of the Csepel River Freeport	–
P209	Renovation of the H8 suburban railway line's Budapest–Cinkota–Gödöllő track section and of the H9 line's Budapest–Cinkota–Csömör–Kavicsbánya-elágazás section	This development is justified based on the strategic guidelines and is also connecting to capital project (P089)

Table 48: *PROJECTS OF STATE COMPETENCE*

3.10. PROPOSALS FOR PROJECT IDEAS

In connection with the BMT, a total of 25 project ideas have been identified during the 2007–2018 programming period, 22 of which are within the competence of the Budapest institutional system. The project ideas are presented in groups according to the main mode of transport they affect, in Table 49.

Project ID	Project name
Project ideas affecting public transport	
P042	Development of life and property safety, crime prevention project
P044	Establishment of a sustainable and predictable (normative) financing framework
P108	Establishment of a regional transport organising institution which ensures coherence between urban and suburban transport
P111	Provision of accessibility on tram infrastructure
Project ideas affecting car transport	
P027	Extension of the lower embankment in Buda on a new routing (Záhony utca and Pók utca)
P069	Construction of the ring road along the railway ring, section I (between main road 10 and M3 motorway)
P071	Construction of the ring road along the railway ring, section IV (between Soroksári út and M6 motorway access road, together with the construction of the Albertfalva Danube bridge)
P072	Construction of the ring road along the railway ring, section V (Albertfalva-Egér út)
P081	Realisation of transport developments in Városliget (City Park)
P085	M0 motorway ring, western sector (between main roads 1 and 10, with 2 x 2 traffic lane layout)
P138	Reconstruction of the Keresztúri út road overpass (Districts 10–17)
P162	Reconstruction of Gubacsi Bridge (public road section)
P192	Introduction of low emission zones (LEZ)
P193	Developments related to automated vehicles
P198	Renewal and improvement of the signage system of Budapest roads
P203	Construction of a road connecting the outer districts of Pest between the regions of the M31 and M51 motorways
P204	Development of Hamzsabégi út
P210	Transformation of the traffic order of Nyugati tér by dismantling the Nyugati tér overpass
P211	Transformation of the traffic alignment of the Rottenbiller utca–Rákóczi út–Fiumei út junction by dismantling the overpass
P212	Construction of noise protection walls in District 3
P213	Reconstruction of Kőbányai út along with the tram line and provision of accessibility on the connecting tram network in Inner Józsefváros and Ferencváros.
Project ideas affecting cycling and walking	
P010	Organisation of the new pedestrian and cycling-friendly public spaces in the inner city into a unified network
P048	Comprehensive renovation of pedestrian underpasses
P049	Development of pedestrian and cycling connections to the Danube islands
P104	Integrated development of the RSD (Ráckeve–Soroksár Danube branch)

Table 49: *LIST OF PROJECT IDEAS CONNECTING TO BMT*

As part of the Transport Development and Investment Programme, this chapter formulates a proposal for project ideas, based on which these can be prioritised. The proposal also covers the missing projects, i.e. those BMT measures for the realisation of which the development of new project ideas is justifiable. The proposal is presented in Table 50.

#	Project ID	Project name	Reason for priority classification
Key project ideas			
1.	P108	Establishment of a regional transport organising institution which ensures coherence between urban and suburban transport	Indispensable institutional system advancement + significant synergies
2.	P044	Establishment of a sustainable and predictable (normative) financing framework	Indispensable institutional system advancement + significant synergies
3.	P069	Construction of the ring road along the railway ring, section I (between main road 10 and M3 motorway)	Development is justified based on the strategic guidelines
4.	P071	Construction of the ring road along with the railway ring, section IV (between Soroksári út and M6 motorway access road, together with construction of the Albertfalva Danube bridge)	Development is justified based on the strategic guidelines (fits closely to P072)
5.	P072	Construction of the ring road along the railway ring, section V (Albertfalva-Egér út)	Development is justified based on the strategic guidelines (fits closely to P071)
6.	P192	Introduction of low emission zones (LEZ)	It covers an incomplete measure + is justified also based on the strategic guidelines + high ILL score (8 points)
7.	P042	Development of life and property safety, crime prevention project	It covers an incomplete measure
8.	P210	Transformation of the traffic order of Nyugati tér by dismantling the Nyugati tér overpass	The FKT decision has been made and the project is being developed
High-priority project ideas			
9.	P081	Realisation of transport developments in Városliget	It is justified because of the connecting territorial development
10.	P198	Renewal and improvement of the signage system of Budapest roads	There is a need for a one time remedial intervention in line with future technological developments
11.	P203	Construction of a road connecting the outer districts of Pest between the regions of the M31 and M51 motorways	Public road development is justified based on the strategic guidelines
12.	P010	Organisation of the new pedestrian and cycling-friendly public spaces in the inner city into a unified network	High ILL score (9 points)
13.	P104	Integrated development of the RSD (Ráckeve-Soroksár Danube branch)	High ILL score (8 points)
14.	P193	Developments related to automated vehicles	High potential, preparation for future technologies
15.	P211	Transformation of the traffic alignment of Rottenbiller utca–Rákóczi út–Fiumei út junction, by dismantling the overpass	The FKT decision has been made and the project is being developed
Low-priority project ideas			
16.	P049	Development of pedestrian and cycling connections to the Danube islands	Building of the missing connections
17.	P048	Comprehensive renovation of pedestrian underpasses	Justified one time condition remedial intervention
18.	P111	Provision of accessibility on tram infrastructure	Justified modernisation
19.	P162	Reconstruction of Gubacsi Bridge (public road section)	Justified modernisation
20.	P138	Reconstruction of the Keresztúri út road overpass (Districts 10–17)	Justified modernisation
21.	P212	Construction of noise protection walls in District 3	Project idea that emerged based on local need
22.	P204	Development of Hamzsabégi út	Optional public road development element
23.	P027	Extension of the lower embankment in Buda on a new routing (between Záhony utca and Pók utca)	Public road development not justified based on the strategic guidelines
24.	P085	M0 motorway ring, western sector (between main roads 1 and 10, with 2 x 2 traffic lane layout)	Optional public road development element + fits closely to P083
25.	P213	Reconstruction of Kőbányai út along with the tram line and provision of accessibility on the connecting tram network in Inner Józsefváros and Ferencváros.	Justified public road and tram network development

Table 50 *PROPOSAL FOR THE PROJECT IDEAS, PRIORITY LIST*

The only identified incompletely covered measure of the BMT Objectives and Measures is measure 3.1.10. (Sanitation and public health related tasks of urban transport), to which no project is linked. It is crucial to formulate project idea(s) for this measure. Furthermore, a deficiency in the public transport backbone network has been identified in the Buda Hills area based on the strategic guidelines, for which there is not yet even a project idea, thus it is necessary to develop it as soon as possible.

Among the project ideas, the Improvement of Life and property safety, crime prevention project (P042) and the Introduction of low emission zones (LEZ) (P192) are those without which the implementation of measures 1.2.7. (Life and property safety, crime prevention) and 4.2.3. (Strengthening the zone system regulation based on the total weight of freight transport vehicles and traffic restrictions based on environmental category) remain incomplete. Therefore, further preparation of both project ideas is of high priority.

For other project ideas, the order of priority can be determined based on the fit with the strategic guidelines, the synergies with other projects as well as the fit scores associated with the measures.

According to the strategic guidelines, the most important project ideas are the construction of sections of the ring road along the railway ring, the construction of a road connecting the outer districts of Pest and the establishment of low emission zones (P069, P071, P072, P203, P192). From an institutional point of view, it is inevitable to move towards regional transport management and a predictable transport financing system, so project ideas P108 and P044 are of high priority. The number of synergistic links is also outstanding for these projects. In terms of alignment with the objectives, the most powerful projects are the creation of low emission zones (P192), the creation of new pedestrian and cycling-friendly public spaces in the inner city (P010) as well as the integrated development of the Ráckeve–Soroksár Danube branch (P104). From a strategic point of view, the automated vehicle development (P193) can be highlighted, for which the project on the renewal and development of the signage system of the Budapest roads (P198) is required and justifiable.

The implementation of the City Park transport developments (P081) project is currently only a project idea, but it is definitely justified to work it out as soon as possible in respect of the development projects being in process in the City Park area. The Liget Budapest project also aims to achieve the radical reduction of car traffic in the public park, at this stage however, for the time being, it is limited to the abolition of street-level parking and the construction of underground parking facility on the edge of the park. However, an important and long-disputed topic is the clarification of the future role of the Kós Károly Promenade and the road network elements in the vicinity of City Park, with special attention to handling the traffic demand changing as a result of the developments in the area.

Based on the above, the project ideas concerning the institutional framework, covering the incomplete measures and considered to be the most important in terms of the strategic guidelines will be given high priority.

4

REALISATION OF THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

4.1. ACTION PLAN OF THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

The Action Plan summarises the operational steps to facilitate the implementation of the developments contained in the Transport Development and Investment Programme. The Action Plan sets out the actions to be taken from the perspective of the Municipality of Budapest Capital and its organisations, in line with the time frame and phases of the investment programme. Projects coordinated by the institutional system of the capital city are linked to the organisations of the Municipality of Budapest Capital, their preparation and implementation depends on the nature and circumstances of the project (for example, from the project preparing organisation or the support opportunities).

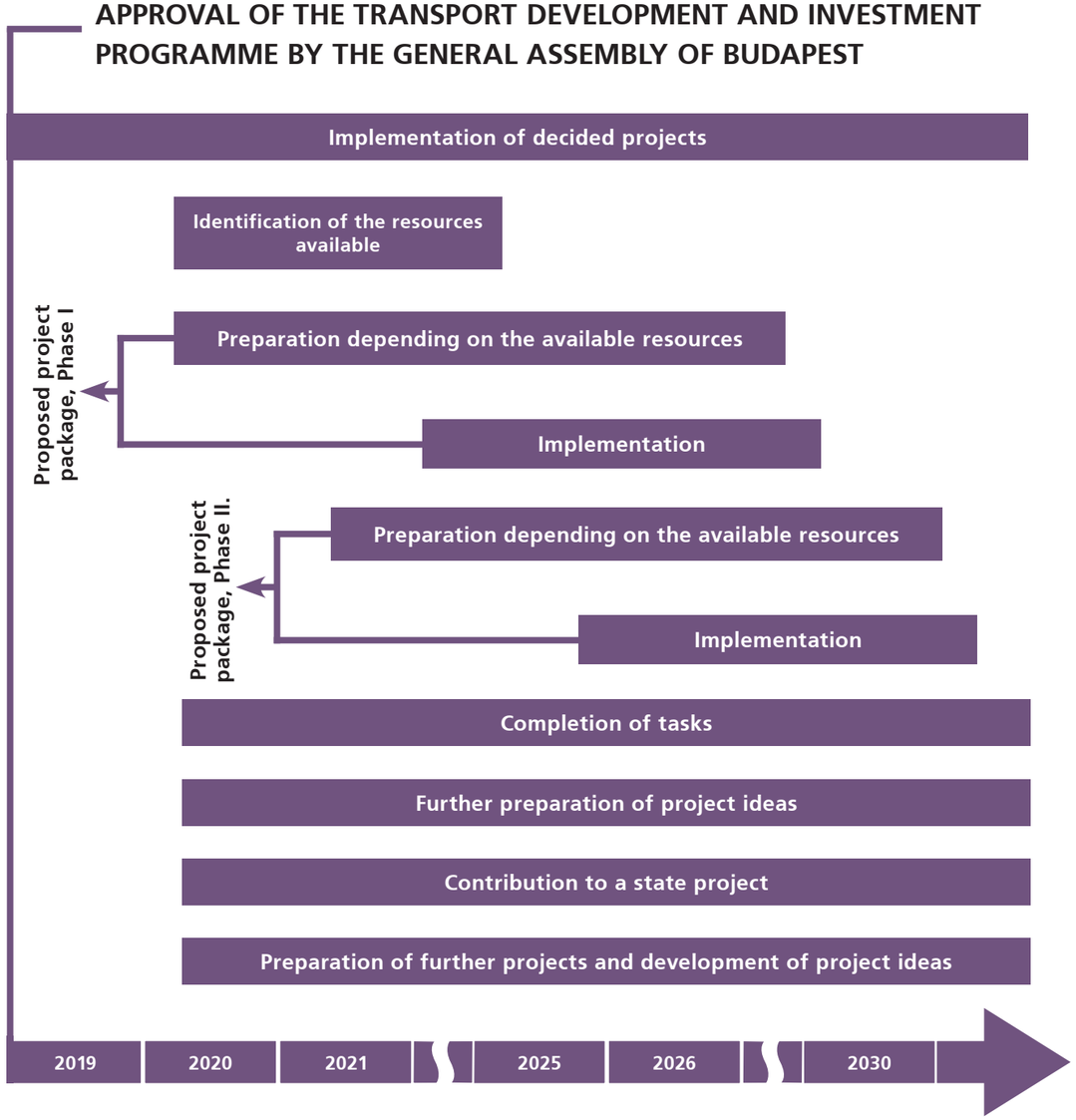


Figure 38: *ACTION PLAN OF THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME*

In the case of state projects, the transport governance system of the capital city is involved in the processes as a stakeholder in both the preparation and implementation phases, which essentially requires continuous cooperation with government organisations and other partner organisations.

The Action Plan is presented in Figure 38.

4.2. COST AND FINANCING PLAN

The purpose of the cost and financing plan is to summarise and evaluate the financial impact of the Transport Development and Investment Programme. This means on the one hand exploring the investment cost needs and the impact on operating costs on the other.

Based on the experience of the recent years (2011–2017), financing for transport system development purposes were available in the amount of 150 billion HUF/5 years in Budapest. This amount includes all types of domestic and EU development funds, but excludes operating, maintenance and renovation (reconstruction) funds.

Table 51 shows the total estimated net investment cost requirements of the Transport Development and Investment Programme concerning the municipal governance system, based on scenarios of different financing budgets.

[HUF million]	Low budget	Medium budget	Full budget
Total for decided projects		279,602	
Total for task-like projects		585,274	
Phase I (2021–2025) total	150,336	307,773	449,845
Phase II (2026–2030) total	160,077	297,333	502,944
Total investment cost requirement	**1,175,289**	**1,469,982**	**1,817,665**

Table 51: *NET INVESTMENT COST REQUIREMENT OF THE PROJECTS INCLUDED IN THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME*

The total investment costs of municipal decided projects is approximately 360 HUF billion (together with state projects it is HUF 670 billion). Total cost of the task-like projects until 2030 is approx. 585 billion HUF. The proposed project packages include development portfolios of 150–150 billion HUF, 300–300 billion HUF and 450–500 billion HUF according to the assumed level of financing. The total investment cost requirements of the decided, task-like projects and projects managed by the municipal governance system proposed for realisation by 2030, depending on the scenario, will be approx. 1,175–1,818 billion HUF. This is supplemented by the 310 billion HUF value projects decided by the state, and by other developments of relevance to the capital, managed also by state organisations, in the order of 2,500 billion HUF.

The expected annual impact of the Transport Development and Investment Programme on the operational costs for each of the three scenarios is presented in Table 52. The operational impacts may be positive as well as negative for each project, depending

on the expected increase or decrease in operating costs (operating, maintenance and depreciation related replacement costs). The evaluation in the case of projects elaborated in more detail (e.g. those having a detailed feasibility study) is based on more accurate design estimates, while in the case of less prepared projects, the data is based on the expert estimate of the multiple aspect evaluation. The operational impact is reported as an average annual cost for better transparency, but may result in higher resource requirements in some years and lower in other years, which can be planned in the light of a more detailed preparation of the developments and the exact scheduling of implementation.

[million HUF/year]	Low budget	Medium budget	Full budget
Total for decided projects	433.6		
Phase I (2021–2025) total	1,544.3	589.6	1,521.6
Phase II (2026–2030) total	916.9	2366.4	3,781.5
Total	**2,894.8**	**3,389.6**	**5,736.7**
Overall operational impact (average annual cost 2019–2030)	**1,517.6**	**1,222.9**	**2,100.2**

Table 52: *THE IMPACT OF PROJECTS INCLUDED IN THE TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME ON ANNUAL OPERATING COSTS*

The overall operating impact is positive, so the implementation of the developments results in an increase of the summarised operating costs. The operating cost surplus in case of the decided projects is approx. 0.4 billion HUF per year. Each phase of the proposed project packages will result in an additional cost of 2.9–5.7 billion HUF per year, depending on the budget. The above-mentioned additional resource need will not be fully required from 2019 onwards. In total, 14.7–25.2 billion HUF can be estimated as the total additional operating resource requirement between 2019 and 2030. This results is an average of 1.5–2.1 billion HUF per year for the 12 year period, so this is the average annual additional operating cost caused by the decided and ranked capital projects. In order to achieve sustainable transport financing in the capital, the expected additional costs must be taken into account when planning the municipal budget and the financing of the additional operating costs must be agreed upon with the state-level partners as well.

4.3. RISK MANAGEMENT PLAN

The purpose of the Risk Management Plan is to identify the potential risk factors affecting the achievement of the objectives of the BMT, to assess them according to their likelihood of occurrence and expected consequences and, based on these, to determine the most important risk management steps. By means of the risk management strategy, the effects jeopardising the achievement of goals can be prevented and if they do occur, their adverse effects can be mitigated. In addition, the risk management plan provides feedback to the investment programme because, if the risk incident can be connected to a particular project or set of projects, and the risk management measure chosen or expected is to reject the incident giving rise to the risk, then the project may be excluded from the investment programme regardless of programming or may need to be redesigned to reduce risks.

The exploration and evaluation of potential risk factors is based on expert estimate and is primarily built on the experience of previous similar strategic plans (e.g. Budapest Transport System Development Plan) and project level developments of the capital. Considering that it is not possible to draw empirical conclusions for all risk factors, the risk management plan uses conservative, pessimistic ex-ante estimates based on the SUMP guidelines, as these are often proven to be realistic from domestic experience.

The risk factors identified in the case of BMT, their probability of occurrence, the expected impact and the risk tolerance experienced in the institutional environment of the capital, together form a basis for determining the level of severity assigned to individual risk elements. This is presented by Table 53 (classification of risk elements) and Table 54 (risk matrix).

Table 53: *CLASSIFICATION OF RISK FACTORS ACCORDING TO PROBABILITY OF OCCURRENCE AND IMPACT*

Name of the risk incident	Impact of the occurrence of risk	Probability of occurrence	Extent of impact of occurrence	Risk level
Risk group 1: Risks related to the preparation phase				
1. Investment cost increase	Endangering social returns	C	IV	High
2. Operating cost increase	Endangering social returns, need for additional operating costs	B	III	Moderate
3. Radical change in socio-economic structures	Endangering social returns and strategic relevance	A	IV	Low
4. Radical change of transport habit characteristics	Endangering social returns and strategic relevance	A	IV	Low
Risk group 2: Legal and institutional risks				
5. Changes of the governance system	Delay, preparation difficulties	B	III	Moderate
6. Difficulties in institutional cooperation	Endangering social return, negative impact on users	C	III	Moderate
7. Human capacity, availability of competences	Delay, preparation and quality problems	A	III	Low
8. Changes in the legal, regulatory background	Delay, impossibility	B	III	Moderate
9. Changes in public procurement rules	Delay, impossibility	C	III	Moderate
10. Changes in subsidy rules	Delay, impossibility	B	III	Moderate
Risk group 3: Process management and implementation risks				
11. Preparation difficulties	Delay, quality problems	B	III	Moderate
12. Changes in scheduling, difficulties with project connections	Delay, uncertain effect on preliminary estimation results, possibly impossibility	D	III	High
13. Difficulties in authorisation procedures	Delay, impossibility	B	III	Moderate
14. Difficulties in land acquisition and spatial planning	Delay, impossibility	C	IV	High
15. Difficulties in the procurement of special equipment	Delay, cost increase, impossibility	B	IV	Moderate
16. Work force shortage during implementation	Delay, cost increase, quality problems	D	III	High
17. Quality problems during implementation	Delay, negative impact on users	C	III	Moderate
Risk group 4: Financial and economic risks				
18. Significant change in macroeconomic factors	Lack of funds, impossibility	A	IV	Low
19. Changes in aid schemes	Increase of own cost need, impossibility	C	IV	High
20. Availability of own resources	Delay, impossibility	C	IV	High
21. Difficulties in ensuring operation and maintenance costs	Quality problems, negative impact on users	D	III	High
Risk group 5: Technical risks				
22. Technical difficulties due to the complexity of implementation	Delay, cost increase, quality problems	C	III	Moderate
23. New technology or difficulties caused by technological change	Delay, cost increase, quality problems, impossibility	B	III	Moderate
24. Difficulties caused by weather	Delay, cost increase, quality problems	B	III	Moderate
25. Providing traffic during construction	Delay, negative impact on users	C	III	Moderate
Risk group 6: Social risks				
26. Social acceptance	Delay, impossibility	B	III	Moderate

Risk impact / probability	I Negligible effect	II Small effect	III Moderate effect	IV Critical effect	V Catastrophic effect
A Negligible probability (0–10%)			7	3, 4, 18	
B Small probability (10–33%)			2, 5, 8, 10, 11, 13, 23, 24, 26	15	
C Medium probability (33–66%)			6, 9, 17, 22, 25	1, 14, 19, 20	
D High probability (66–90%)			12, 16, 21		
E Can be considered a definite event (90–100%)					

Table 54: *RISK MATRIX*

Risks	Risk level	Risk management strategy
1. Investment cost increase	High	Mitigation / prevention: reliable and realistic quantity statement; comparative examination of the cost of previous works of similar volume and subject; prudent tendering; risk sharing with the contractor based on the ability to influence uncertainty, setting up a reserve
2. Operating cost increase	Moderate	Mitigation / prevention: broad benchmark in estimations; continuous cost control during operation
3. Radical change in socio-economic structures	Low	Mitigation / prevention: prudent preliminary planning
4. Radical change of transport habit characteristics	Low	Mitigation / prevention: prudent preliminary planning
5. Changes of the governance system	Moderate	Acceptance
6. Difficulties in institutional cooperation	Moderate	Mitigation / prevention: continuous consultation with the customer of regional services and other stakeholders
7. Human capacity, availability of competences	Low	Acceptance
8. Changes in the legal, regulatory background	Moderate	Acceptance + preparation in due time
9. Changes in public procurement rules	Moderate	Acceptance + preparation in due time
10. Changes in aid rules	Moderate	Acceptance + preparation in due time
11. Preparation difficulties	Moderate	Mitigation / prevention: timely preparation, proper planning, use of an independent procurement expert, careful compliance with procedure rules, ongoing consultation with stakeholders
12. Changes in scheduling, difficulties with project connections	High	Mitigation / prevention: identifying potential obstacles; involvement of stakeholders; preparation of organisational plan, high penalty for late payment; continuous control
13. Difficulties in authorisation procedures	Moderate	Mitigation / prevention: ongoing consultation with authorities
14. Difficulties in land acquisition and spatial planning	High	Mitigation / prevention: appropriate planning and preparation, continuous consultation with stakeholders
15. Difficulties in the procurement of special equipment	Moderate	Mitigation / prevention: appropriate preparation, wide-ranging benchmark
16. Work force shortage during implementation	High	Acceptance + preparation in due time
17. Quality problems during implementation	Moderate	Mitigation / prevention: strict on-site supervision; control of compliance with authority regulations
18. Significant change in macro-economic factors	Low	Acceptance
19. Changes in aid schemes	High	Acceptance + preparation in due time
20. Availability of own resources	High	Mitigation / prevention: preliminary financial planning
21. Difficulties in ensuring operation and maintenance costs	High	Mitigation / prevention: preliminary financial planning
22. Technical difficulties due to the complexity of implementation	Moderate	Mitigation / prevention: appropriate planning and preparation
23. New technology or difficulties caused by technological change	Moderate	Mitigation / prevention: appropriate planning and preparation
24. Difficulties caused by weather	Moderate	Acceptance
25. Providing traffic during construction	Moderate	Mitigation / prevention: appropriate planning and preparation
26. Social acceptance	Moderate	Mitigation / prevention: informing the public and involving them as much as possible (participation)

Table 55: *RISK MANAGEMENT STRATEGY*

In order to manage the risks identified in the risk analysis, the implementation of measures shown in Table 55 is recommended. By means of these measures, the risk levels can be prevented or reduced.

4.4. PRELIMINARY PROPOSALS FOR THE NEXT STRATEGIC REVISION

On the one hand, the BMT Transport Development and Investment Programme describes in detail the method according to which the projects are evaluated and programmed (see Chapter 2), and on the other hand it communicates concrete programming results (see Chapter 3).

In case of project-level changes, the programming methodology is open to new investment ideas arising from time to time or to proposals that modify previous proposals, but changes can also be dealt with that stem from the availability of new, more exact information concerning the budget. This type of change does not require strategic review, but it is a very important rule that a new or modified project (or budget) can only be entered into the procedure at the long list level. In such cases, the changed projects must be subject to project evaluations (classification and corresponding ILL, KÖR, CBA / MCA, MEG, SZIN) and, if necessary, the otherwise unchanged projects associated with the new project need to be modified, as well as the status of the decided projects need to be updated and then, after uploading the database, the programming process needs to be run for all projects. This procedure requires a significant amount of work, so it is advisable to collect several change proposals and repeat the programming at intervals of up to one or two years.

Smaller upgrades to the programming methodology or the inclusion of new background data that may emerge require a review of each project which is more comprehensive than the one described above, but basically this does not imply a strategic review either. The exception is when the modification results in feedback affecting the objectives and the measures to a degree which necessitates the amendment of basics fixed at the level of the objectives or the strategic guidelines; however, typically the changes of such significance do not come from the bottom, that is, from the project and programming side.

Strategic review is required in case of changes which cannot be included within the framework of the objectives or the strategic guidelines: such changes typically affect transport development from the outside. The BMT Objectives and Measures describes that

the BMT objectives are influenced by the urban development goals of Budapest, national and international trends as well as the needs emerging within transport. Accordingly, the changes of the goals can be triggered by modifications occurring in the listed factors as well. These may happen like a shock (if, for example, Budapest wants to host a major event that requires a review of previous ideas, or the position of the capital changes within the country or changes in transport technology occur), but even if no such spectacular change occurs, it is also advisable to revise the mobility plan every five to seven years – partly for the purpose of ensuring that those in a transport related decision-making position at the given time can study it thoroughly to take ownership. In case of significant transport investments built in such a time duration, transport will adapt to them and the time is available for checking whether the initial expectations have been met. The strategic review should analyse with special emphasis how the performance and impact indicators are met to verify if the facilities built and the changes made result in a move towards the strategic goals. The experience can be used primarily for planning for the next period, therefore it is advisable to use it as feedback during strategy review.

The BMT Transport Development and Investment Programme contains a chapter (1.3. Strategic guidelines for transport structure development), which was elaborated upon the suggestion of the Balázs Mór Committee. Logically it is related to the work phases of BMT Objectives and Measures, but it would have been impermissible to integrate such an important new strategic element into a previously accepted document as result of a review. Therefore, the strategic guidelines have been included in the investment programme – and the Balázs Mór Committee and then the General Assembly of the Municipality of Budapest will decide on its adoption at a later stage. As a result, compliance with the proposed guidelines, similarly to the objectives and measures already adopted, would not have been a fair explicit condition during the preparation of the investment programme. However, if the Strategic Guidelines are subsequently adopted, then during the next Strategic Review examining the compliance with the guidelines must be given a special emphasis and its evaluation needs to account for about half the weight of the fit scores reachable.

At the time of completion of the BMT Transport Development and Investment Programme in 2018, there are signs of several external changes which will require a later re-thinking of the transport development strategy. These include the development of the new Budapest 2020–2030 Development Plan within a governmental framework, the development of a joint transport development system between the government and the municipality (in the form of the Budapest Public Development Council) and the expected resulting institutional changes; but the impact of rapid technological change with regard to the strengthening of the service pillar of transport (MaaS) and the consequent shift in funding needs – as well as revenue opportunities – towards the service-operation side also need to be considered here. The occurrence of these changes will provide an opportunity to formulate a strategy resulting in the coordinated enforcement of transport development guidelines. Although this may begin in the near future, currently no timeline is available, therefore it is definitely reasonable that the capital, in the meantime, has an accepted and approved Transport Development and Investment Programme which can serve as the basis for later review.

In addition, needs for the formation of sub-area concepts emerge as a basic strategy in respect of the BMT Objectives and Measures. Where it was possible, the BMT Objectives and Measures set out the main guidelines for the individual concepts, but this could not be done in all cases, depending on the strategic preparedness of the individual sub-areas. In some areas, certain concepts exist (e.g. Budapest Track-based Vehicle Strategy 2013–2027) that should be revised on the basis and in the spirit of BMT. In other cases, the BMT defines the principles and actions at the level of measures, but these need to be elaborated at the conceptual level. Based on the current status of the BMT Objectives and Measures, the need for developing more detailed, specific concepts or revising existing concepts can be identified for many sub-areas. They cover, for example: sustainability, equal opportunities, active mobility (walking, cycling), micromobility, transport safety, freight transport and city logistics, vehicle strategy, riverboat service, organisational background integration, awareness raising, taxi services, sanitation, governance and regulation, as well as parking-waiting-storage. Parallel to the implementation of the BMT projects, but in any case, before the next review date, the development of concepts in the areas listed above can be proposed.

LONG LIST OF PROJECTS

(WITHOUT CANCELLED PROJECTS, SORTED BY ID)

Project ID	Name	Low budget	Medium budget	Full budget
P002	Extension of tram line 1 to Etele tér (IKOP-3.1.0-15-2016-00007)	Decided project		
P004	Extension of tram line 3 through Kassai tér to the north (Angyalföld, Árpád Bridge) and construction of Szegedi út overpass	2021–2025	2021–2025	2026–2030
P005	Southern extension of tram line 3 (towards Pesterzsébet–Csepel vk.–Budafok, Városház tér)	2031–	2031–	2026–2030
P006	Extension of tram line 42 to Gloriett residential area	2026–2030	2026–2030	2026–2030
P007	Modernisation of railway line number 70: Nyugati–Rákospalota-Újpest railway line section	State project		
P008	Rákospalota-Újpest–Veresegyház–Vác railway line bottleneck elimination	State project		
P009	Northern extension of tram line 2 to the area of Árpád Bridge	To be revised		
P010	Organisation of the new pedestrian and cycling-friendly public spaces in the inner city into a unified network	Project idea		
P012	Cycling-friendly development of contiguous neighbourhoods	2021–2025	2021–2025	2026–2030
P013	Development of urban and suburban riverboat lines and service facilities	2021–2025	2021–2025	2021–2025
P014	Introduction of the Budapest congestion charge system and related infrastructure investments	2021–2025	2021–2025	2021–2025
P015	Prioritisation of public transport vehicles	Task-like project		
P016	Developing a penetrable, safe main cycling network outside of the Hungária Ring	2021–2025	2021–2025	2021–2025
P017	Construction of P+R car parks for urban transport modal switch points in Budapest (IKOP-3.1.0-15-2016-00008)	Decided project		
P018	Realisation of the comprehensive city logistics regulation (development of regulation and introduction of IT based technology)	2021–2025	2021–2025	2021–2025
P019	Elaboration of the concept for the comprehensive regulation of public space use for transport space in Budapest	Task-like project		
P020	Developing a penetrable, safe main cycling network within the Hungária Ring	2021–2025	2021–2025	2021–2025
P021	Renewal of the Budapest bus fleet from 2020 (transition to electric transport)	Task-like project		
P022	Realisation of the regulation for car-sharing systems	Task-like project		
P023	Development of the unified Budapest taxi service	Task-like project		
P024	Construction of B+R bicycle storage facilities	Decided project		
P025	Renovation of the public spaces at Blaha Lujza tér	Decided project		
P026	Improvement of the public bike-sharing system	2021–2025	2021–2025	2021–2025
P027	Extension of the lower embankment in Buda on a new routing (between Záhony utca and Pók utca)	Project idea		
P028	Development of urban greenways in Budapest along with their connection to regional greenways	2021–2025	2021–2025	2021–2025
P029	Renovation of Keleti Railway Station	State project		
P030	Implementation of a fixed-rail connection to Liszt Ferenc International Airport	State project		
P031	Renovation of the building of Nyugati Railway Station	State project		
P033	Simplification of road accident data collection	Task-like project		
P034	Budapest tram vehicle project (within the framework of IKOP-3.1.0-15-2017-00013)	Decided project		
P035	Construction of Csepel backbone road (Teller Ede út) Phase II	2026–2030	2026–2030	2026–2030
P036	Reconstruction of the southern connecting railway bridge over the Danube	Decided project		
P038	Construction of the southern section of the North-South Regional Rapid Railway (ÉDRV): (H6/H7 suburban railway lines between Kálvin tér–Csepel and Ráckeve)	State project		
P039	Construction of the inner-city section of the North-South Regional Rapid Railway (ÉDRV) (connection of the H5-H6/H7 suburban railway lines between Kálvin tér and Kaszásdűlő)	State project		
P040	Reconstruction of the northern section of the North-South Regional Rapid Railway (ÉDRV) (H5 suburban railway line between Batthyány tér and Szentendre)	State project		
P041	Introduction of an electronic time-based ticketing system and related new fare system in public transport	Decided project		
P042	Development of life and property safety, crime prevention project	Project idea		
P043	Establishing a three-track link between Kelenföld and Ferencváros, developing suburban stations and creating new stations	State project		
P044	Establishment of a sustainable and predictable (normative) financing framework	Project idea		
P045	Development of Budapest Liszt Ferenc International Airport road links (Üllői út-Határ út junction–Kőér utca–Gyömrői út–airport access road)	State project		
P046	Cogwheel railway (tram 60) reconstruction and development	Decided project		
P047	Development of the transport network connecting to the new Danube bridge, to be constructed on Galvani utca–Illatos út and to the Fehérvári út and Üllői út-Határ út junction point (north of Csepel)	State project		
P048	Comprehensive renovation of pedestrian underpasses	Project idea		
P049	Development of pedestrian and cycling connections to the Danube islands	Project idea		
P050	Suburban railway rolling stock upgrade	State project		
P051	Development of demand responsive public transport services	2021–2025	2021–2025	2021–2025
P052	Realisation of IT developments in the urban transport organisation	Task-like project		

Project ID	Name	Low budget	Medium budget	Full budget
P053	Establishment of an integrated timetable and fare system, for harmonisation of the BKK–MÁV–Volán services	2021–2025	2021–2025	2021–2025
P054	Elaboration of the concept for the development and operation of the electric charging infrastructure in the capital	Task-like project		
P055	Realisation of the integrated passenger information service and associated measures	Task-like project		
P057	Kelenföld–Pusztaszabolcs railway line Phase I (modernisation of Kelenföld–Százhalombatta)	Decided project		
P061	Modernisation of the Budapest-Rákos excluded–Hatvan railway line section	Decided project		
P063	Realisation of city centre goods transfer points, environmentally friendly "last mile" freight transport	2021–2025	2021–2025	2021–2025
P064	Complex-approach road and structure renovations within the framework of the road and bridge renovation programme of the Municipality of Budapest	Task-like project		
P067	Renovation of the Kossuth Lajos utca–Rákóczi út public space	2021–2025	2021–2025	2021–2025
P068	Kőbánya-Kispest–Lajosmizse–Kecskemét railway line bottleneck elimination and electrification	State project		
P069	Construction of the ring road along the railway ring, section I (between main road 10 and M3 motorway)	Project idea		
P070	Construction of the ring road along the railway ring, Section II (section between M3 motorway and Üllői út)	2026–2030	2031–	2026–2030
P071	Construction of the ring road along the railway ring, section IV (between Soroksári út and M6 motorway access road, together with construction of the Albertfalva Danube bridge)	Project idea		
P072	Construction of the ring road along the railway ring, section V (Albertfalva-Egér út)	Project idea		
P073	Construction of the ring road along the railway ring, Section III (Between Üllői út and Soroksári út)	2026–2030	2026–2030	2026–2030
P074	Railway ring S-Bahn (Angyalföld –Ferencváros) construction of stations	State project		
P075	Realisation of BKK customer centres	Decided project		
P076	Transport history and heritage vehicle project	2026–2030	2026–2030	2026–2030
P077	Establishment of Józsefváros tram depot	2026–2030	2026–2030	2026–2030
P079	Road developments to eliminate geographical area separation	Task-like project		
P080	Extension of the Külső Bécsi út tram line (Vörösvári út–Aranyvölgy	2026–2030	2026–2030	2026–2030
P081	Realisation of transport developments in Városliget	Project idea		
P083	M0 motorway ring, northern sector (between main roads 10 and 11, with 2 x 2 traffic lane layout)	State project		
P085	M0 motorway ring, western sector (between main roads 1 and 10, with 2 x 2 traffic lane layout)	Project idea		
P086	Modernisation and extension of metro line M1 (Millennium Underground Railway)	2021–2025	2021–2025	2021–2025

Project ID	Name	Low budget	Medium budget	Full budget
P087	Metro line M1 (Millennium Underground Railway) rolling stock upgrade	2021–2025	2021–2025	2021–2025
P088	M2 express way (between Budapest and Vác with 2x2 lane construction)	Decided project		
P089	Connecting metro line M2 and suburban railway H8, construction of the Rákoskeresztúr branch line–Gödöllő section (Pillangó utca–Cinkota)	2031–	2021–2025	2021–2025
P090	Connecting metro line M2 and suburban railway H8 and construction of the Rákoskeresztúr branch line-Rákoskeresztúr section	2031–	2031–	2026–2030
P092	Reconstruction of metro line M3 infrastructure (IKOP-3.1.0-15-2015-00001)	Decided project		
P093	Extension of metro line M4 to the west	2031–	2031–	2026–2030
P096	Procurement of Diesel multiple units by MÁV-START (IKOP-2.1.0-15-2017-00039 és IKOP-2.1.0-15-2018-00051)	Decided project		
P098	Development of Nagy Lajos király út along the current routing (between Kassai tér and Bosnyák tér)	2021–2025	2021–2025	2026–2030
P099	Establishment of Pacsirtamező utca tram line (north-south connection of Óbuda residential area)	KO CBA		
P100	Renovation of Petőfi Bridge	Task-like project		
P104	Integrated development of the RSD (Ráckeve–Soroksár Danube branch)	Project idea		
P106	Realisation of the STARS project	Decided project		
P107	Construction of Újpalota tram line	2031–	2031–	2026–2030
P108	Establishment of a regional transport organising institution which ensures coherence between urban and suburban transport	Project idea		
P109	Development of the urban fixed-rail network, establishment of new MÁV connections	Task-like project		
P110	Regulation of the transport and parking of tourist buses	2026–2030	2026–2030	2026–2030
P111	Provision of accessibility on tram infrastructure	Project idea		
P112	Connecting the tram network between Deák Ferenc tér and Lehel tér (Bajcsy-Zsilinszky út–Váci út track)	2031–	2031–	2026–2030
P113	Development of Városház tér in District 22	2021–2025	2021–2025	2026–2030
P114	Renovation of Széna tér	Decided project		
P115	Construction of bus station(s) in Csepel	2021–2025	2021–2025	2026–2030
P118	Connection of Cinkotai út and Keresztúri út, District 17	Decided project		
P119	Reconstruction of pedestrian underpasses and surface exits connected to stations on metro line M3	2021–2025	2021–2025	2026–2030
P120	VEKOP bicycle developments	Decided project		
P129	Construction of the 'Műegyetem' tram line for the development of transport in the Kopaszi gát area–Extension of the Buda Interconnected Tram Network (Phase II)	2026–2030	2026–2030	2026–2030
P132	Reconstruction of Péterhegyi út (Egér út–Neszmélyi út) and Neszmélyi út (Péterhegyi út–Balatoni út) in District 11	Decided project		

Project ID	Name	Low budget	Medium budget	Full budget
P133	Reconstruction of Podmaniczky utca (Bajcsy Zsilinszky út-Teréz körút) in District 6	Decided project		
P138	Reconstruction of the Keresztúry út road overpass (Districts 10–17)	Project idea		
P144	Accessible platforms at stops of tram line 50	Task-like project		
P145	Accessible platforms at Selmeci utca, Margit hospital stops	Task-like project		
P152	Introduction of the Pedestrian Wayfinding System (GYERE)	2021–2025	2021–2025	2021–2025
P153	Modernisation of the bicycle infrastructure in Hungária and Könyves Kálmán Ring roads	Decided project		
P154	Construction of noise protection wall on Szerémi út (Budafoki út-Dombóvári út)	Task-like project		
P155	Comprehensive cross-sectional review of the Grand Boulevard	2026–2030	2026–2030	2026–2030
P156	Development of EuroVelo6 and EuroVelo14 international bicycle routes in Budapest	Decided project		
P162	Reconstruction of Gubacsi Bridge (public road section)	Project idea		
P163	Complex-approach reconstruction of Pasaréti út in District 2	Decided project		
P164	Establishment of the Pesterzsébet tram network	KO CBA		
P165	Southern extension of tram line 2: connection of tram lines 2 and 51	KO CBA		
P167	Construction of M3 noise protection wall	Decided project		
P170	Renewal of the Budapest tram fleet from 2019	Task-like project		
P171	Renewal of the Budapest trolley bus fleet from 2019	Task-like project		
P172	Development of the cycling infrastructure along Szilas creek	2021–2025	2021–2025	2021–2025
P173	Renovation of the Pest inner-city Danube embankment between Kossuth tér and Fővám tér	2021–2025	2021–2025	2021–2025
P175	Renovation of the Buda inner-city Danube embankment	2026–2030	2026–2030	2026–2030
P177	Renovation of Kelenföld reception building	State project		
P178	Phased implementation of P+R car parks	Task-like project		
P179	Budapest trolley bus project (within the framework of IKOP-3.1.0-15-2017-00013)	Decided project		
P180	Reconstruction of the stations KÖKI–Kőbánya alsó–Zugló	Decided project		
P181	Development of telecommunication, power and interlocking systems to improve efficiency and safety	State project		
P183	Southern extension of tram line 2: connection of tram lines 2 and 24 and reconstruction of tram line 2	2026–2030	2026–2030	2026–2030
P184	Realisation of the Soroksár–Ferencváros line (number 150, relocation of introductory section of the Kelebia mainline within the capital)	State project		
P185	Unification of four tracks on the Kőbánya-felső–Rákos railway line	State project		
P186	Accessibility of Hűvösvölgy tram line	Task-like project		

Project ID	Name	Low budget	Medium budget	Full budget
P187	Developing the accessibility of Dél-budai Centrum (DBC: South Buda Centre)	Task-like project		
P188	Transport development of the Hungexpo territory	Decided project		
P189	Reconstruction of Széchenyi Chain Bridge along with tram and road underpass	Decided project		
P190	Renovation of the Buda Castle Tunnel	Task-like project		
P192	Introduction of low emission zones (LEZ)	Project idea		
P193	Developments related to automated vehicles	Project idea		
P198	Renewal and improvement of the signage system of Budapest roads	Project idea		
P199	Budapest East-West Railway Interoperability Extension: through the area of Déli Railway Station to Nyugati Railway Station through a 'railway connecting tunnel' and development of Nyugati Railway Station into a central railway station.	State project		
P200	Reconstruction of the railway facilities related to the development of the Gubacsi Railway Bridge and to the development of the Csepel River Freeport	State project		
P201	Realisation of a web socialisation platform in relation to the SMART-MR project	Task-like project		
P202	Operation and further development of the Unified Traffic Model	Task-like project		
P203	Construction of a road connecting the outer districts of Pest between the region of the M31 and M51 motorways	Project idea		
P204	Development of Hamzsabégi út	Project idea		
P206	Elaboration of the regulation for e-mobility in Budapest	Task-like project		
P207	Extension of metro line M3 to Káposztásmegyer	2031–	2026–2030	2021–2025
P208	Renovation of Orczy tér	Decided project		
P209	Renovation of the H8 suburban railway line's Budapest–Cinkota–Gödöllő track section and of the H9 line's Budapest–Cinkota–Csömör–Kavicsbánya-elágazás section	State project		
P210	Transformation of the traffic order of Nyugati tér by dismantling the Nyugati tér overpass	Project idea		
P211	Transformation of the traffic order of Rottenbiller utca–Rákóczi út-Fiumei út junction, by dismantling the overpass	Project idea		
P212	Construction of noise protection walls in District 3	Project idea		
P213	Reconstruction of Kőbányai út along with the tram line and provision of accessibility on the connecting tram network in Inner Józsefváros and Ferencváros	Project idea		

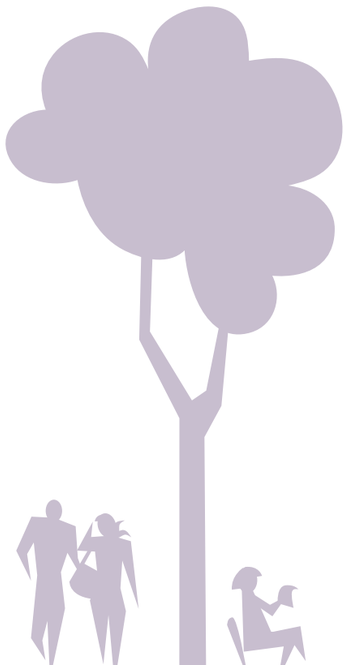
List of abbreviations, concept explanations

ABBREVIATIONS:

BKK: Centre for Budapest Transport
BMB: Balázs Mór Committee, the institutional coordination forum for the mobility plan
BMT: Budapest Mobility Plan (previous name: Balázs Mór Plan)
EFM: Unified Traffic Model of the capital city region
IT: information technology, a set of tools and technologies for machine-based data processing
SEA: Strategic Environmental Assessment
SUMP: Sustainable Urban Mobility Planning / Plan

CONCEPTS, EXPRESSIONS, EXPLANATIONS IN THE CONTEXT OF BMT:

backbone network: the proportionally highest capacity lines of a public transport network serving an area
comprehensive objective: comprehensive objective included in the objectives of BMT
decided project: a project that has financing for implementation or is in the implementation phase
demand responsive services: a flexible transport system (element) in which, unlike in the case of traditional public transport services, the timetable and/or transport route is determined within a predefined framework according to the actual (changing) travel demand of the passengers
fine network: network elements giving the fine fabric of the transport network complementing the basic infrastructure, the backbone network
indicative project list: a preliminary long list of BMT, produced as part of the BMT Objectives and Measures volume
intermodal: organisation of the different modes of transport to optimise the travel chain according to environmental, economic and travel time aspects
intervention areas: the four intervention areas included in the BMT objectives
KO criterion: a threshold set in case of a given project evaluation method; failing to reach it, the project under examination will be excluded from programming and will be given a "not recommended" evaluation
link making: establishing links (transport planning) between destinations
liveable city: urban environment considered to be liveable from the point of view of city residents, a set of criteria and requirements which represent the human dimension of urban and related transport planning
long list: a list of all possible projects identified in the context of BMT, the subject of programming
long-term developments: range of scheduled projects, from a programming perspective, beyond the BMT time frame (after 2030)



MaaS: Mobility as a Service, interpreting transport as a service within the scope of the BMT, putting the service pillar at the forefront and taking it into account in planning
measures: the set of tasks assigned to strategic goals in BMT objectives, which helps to achieve the given target; one measure can be facilitated by the realisation of several different projects; in terms of operational objectives, they are a means to realise the objective, while from a project aspect, the measures are the goal
mechanical project packages: mechanically (without expert intervention) generated project packages resulting as part of the programming process
modal split: proportion of the different transport modes
municipality coordinated project: project coordinated by the transport governance system of the capital city (the Municipality of Budapest capital and its organisations)
operative objectives: the nine operative objectives included in the BMT objectives
P+R, B+R: park and ride, bike and ride, combined parking area for passenger cars and/or bicycles near the point of transfer to public transport
place making: activities to create destinations, places justifying transport; in BMT terminology: enabling this from a transport point of view
programming: programme development, scheduling the projects according to the defined budget
project: a limited vision of development relevant to transport to achieve the goal set
project data sheet: a two-page document providing a unified overview of project-related data, which contains the data describing the project and the results related to their project evaluation
project ID: the three-digit ID number used to identify a project
project idea: project with a low level of preparation (project concept)
project package: the scheduled range of projects with respect to the budget for the different phases
S-Bahn system: a unified rapid railway (suburban) network of the capital and its metropolitan area, for the development of which a concept was elaborated in 2009
short list: content of the proposed project package resulting from the programming
stakeholders: partners (e.g. societal) interested in/affected by strategic planning
state project: range of projects relevant to Budapest from a transport aspect, but not coordinated by the institutional system of the capital, but by state-central governmental organisations
strategic goals: the three strategic objectives included in the BMT objectives
strategic guidelines: all guidelines concerning the establishment of the transport structure
task-like project: such projects which are related to maintenance, amortisation replacement activities or to activities which are resulting from a legal obligation and do not involve any significant development (e.g. conventional road renovations)

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BUDAPEST MOBILITY PLAN
VOLUME II: TRANSPORT DEVELOPMENT AND INVESTMENT PROGRAMME

The plan was prepared by the Centre for Budapest Transport for the Municipality of Budapest. The Budapest Mobility Plan is the SUMP framework document for transport development in the next decade (2020–2030), dynamically aligned with sustainable urban development. The range of projects evaluated in this may vary according to the BMT methodology laid down according to the objectives.

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