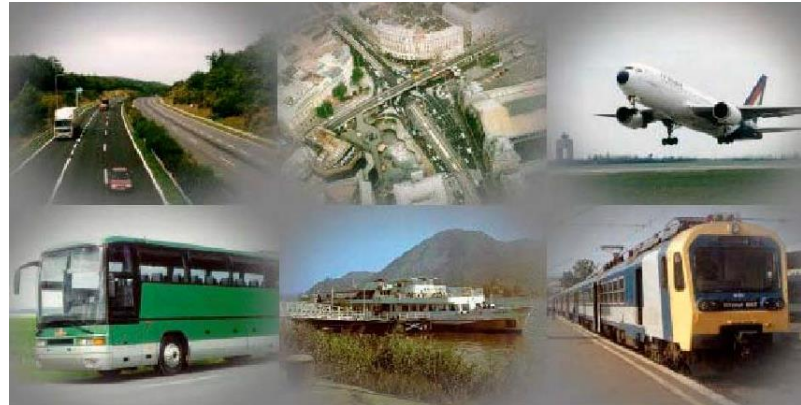


Transport policy, strategies, road network development



Transport networks 2.
András Gulyás PhD habil
associate professor

Content

- Transport policy definition, tasks and content
- The EU White Paper on Transport
- Principles of network development strategy
- National Transport Infrastructure Development Strategy
- Operative Programs for transport development in Hungary
- Connecting Europe Facility
- Transport infrastructure development examples

Definition of transport policy

- Transport is the mass, regular and organised movement of goods and persons from place to place usually performed by technical devices (vehicles).
- Traffic is one of the forms of the appearance of transport, always determined by factual condition such as space and time.
- Transport policy is a comprehensive high-level policy for the entire system of transport, in conformity with general political objectives, based on a professional and scientific background.
- The main goal of a transport policy is to provide the maximal and efficient satisfaction of reasonable mobility demands.

Tasks of transport policy

- Main tasks of the transport policy:
- Principally establishing directives for long-term development of transport, and based on these, determining main development priorities and programs
- Influencing performance proportions of various branches of transport (rail, road, urban, water, air transport and pipelines)
- Economical, environmental and legal regulation of transport
- Considering energetical, environmental and safety aspects, enhancement of life quality, health preservation, decreasing spatial differences

Content of transport policy

- Main tasks of the Hungarian transport policy:
- Promoting successful integration into the European Union
- Improving conditions of connections with neighbour countries as well as developing these connections
- Promoting the realisation of land-use-related development goals
- Establishing conditions for efficient operation and maintenance applying a regulated competition

The EU White Paper on Transport

- Transport is fundamental to our economy and society. Mobility is vital for the internal market and for the quality of life of citizens as they enjoy their freedom to travel.
- Transport enables economic growth and job creation: it must be sustainable in the light of the new challenges we face.
- Transport is global, so effective action requires strong international cooperation.
- A lot needs to be done to complete the internal market for transport, where considerable bottlenecks and other barriers remain.

The EU White Paper on Transport

- According to the Europe 2020 Strategy and the Energy Efficiency Plan 2011, the paramount goal of European transport policy is to help establish a system that underpins European economic progress, enhances competitiveness and offers high quality mobility services while using resources more efficiently.
- Undesirable economic, social and environmental effects of transport, to be eliminated, are the congestion, the oil-dependency, accidents, green-house gas emission, other harmful pollution, noise and habitat fragmentation.



The EU White Paper on Transport

- Targets for 2050:
- Reduce transport originated CO₂ emission by 60 % ((with less energy consumed)
- Decrease significantly the oil-dependency (use of cleaner energy)
- Control the increase of congestion (need for a better utilisation of the infrastructure)



The EU White Paper on Transport

- The White Paper is based on a global transport system model, that means thinking not in branches or modes and not in personal and freight transport infrastructure but in long-distance, middle distance and urban transport scope.



The EU White Paper on Transport

- The White Paper settles three development areas:
 - vehicle and fuel technology,
 - transportation chain related, and
 - information system developments.



The EU White Paper on Transport

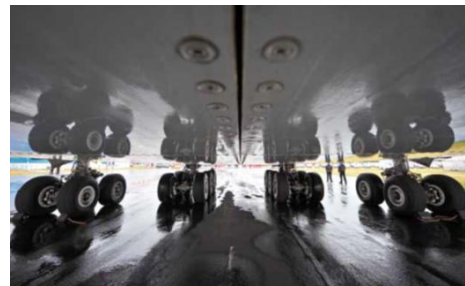
- Future vision:
- Growing transport and supporting mobility while reaching the 60% emission reduction target
- An efficient core network for multimodal intercity travel and transport
- A global level-playing field for long-distance travel and inter-continental freight
- Clean urban transport and commuting

The EU White Paper on Transport

- Goals for a competitive and resource efficient transport system for achieving the 60% GHG emission reduction target:
- Developing and deploying new and sustainable fuels and propulsion systems
- Optimising the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes
- Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives

The EU White Paper on Transport

- Implementing the future vision requires an efficient framework for transport users and operators, an early deployment of new technologies and the development of adequate infrastructure.



The EU White Paper on Transport

- Initiatives:
- Single European Transport Area
- A true internal market for rail services
- Completion of the Single European Sky
- A maritime “Blue Belt” and market access to ports
- Promoting quality jobs and working conditions
- Secure transport
- Acting on transport safety: saving thousands of lives
- Service quality, accessibility and reliability

The EU White Paper on Transport

- Initiatives :
- European Transport Research and Innovation Policy
- Promoting more sustainable behaviour
- Integrated urban mobility
- Modern infrastructure and smart funding
- Transport infrastructure: territorial cohesion and economic growth
- European Mobility Network
- Getting prices right and avoiding distortions

Principles of network development strategy

Effect of regulation on transport networks and traffic

Economic Regulations



- Investments in transportation infrastructure (modal and intermodal).
- Control of routes, ports of entry, pricing, scheduling.
- Level of ownership and competition.

Safety Regulations



- Safety and operation regulations (speed and design).
- Labor regulations (work hours).
- Security (passengers and cargo).

Environmental Regulations



- Transportation of hazardous materials (HAZMAT).
- Pollutant emissions.

Principles of network development strategy

Main Transport Policy Instruments

Public Ownership



- Full or partial (PPP) ownership of transportation modes (e.g. public transit) or assets (e.g. roads and bridges).

Subsidies & Taxation



- Funding for transport infrastructure and modes.
- Taxation on fuel and transactions.

Regulatory Control



- Technical standards for transport modes and assets.
- Entry and competing conditions.

Research & Development



- Funding research improving the technical, economic and environmental performance of transportation.

Labor Regulations



- Standards such as certification, working conditions and compensation and benefits in the transport sector.

Safety & Standards

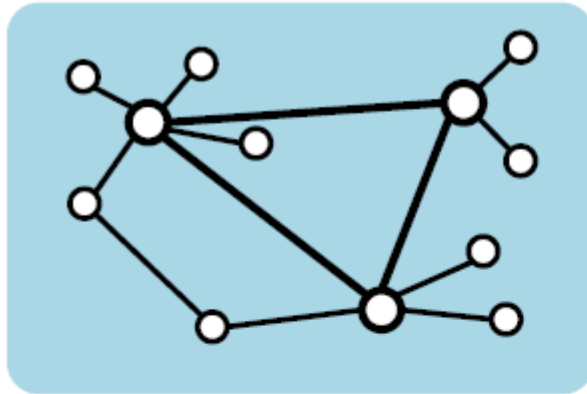


- Operational standards for transport modes and assets such as speed and weight limits.

Principles of network development strategy

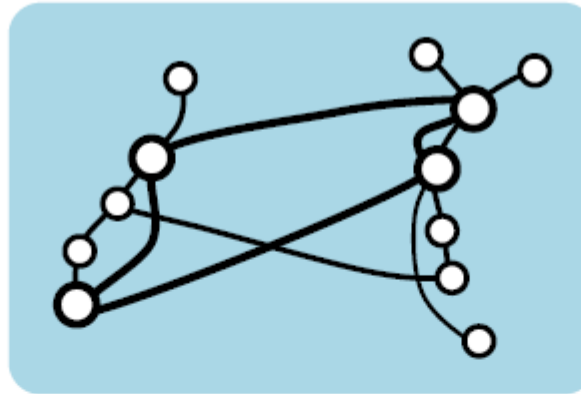
Types of
Transport
Networks

Air Networks



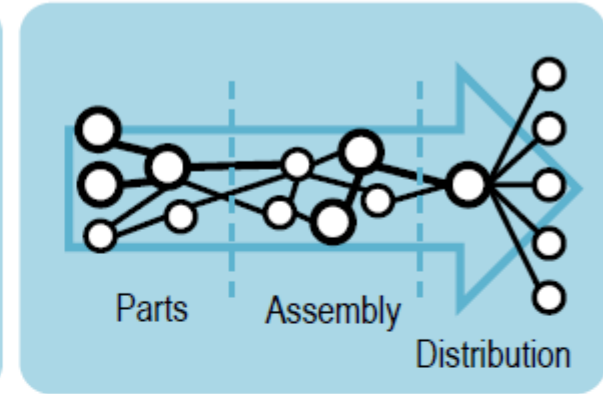
Nodal hierarchy (hub-and-spoke)

Maritime Networks



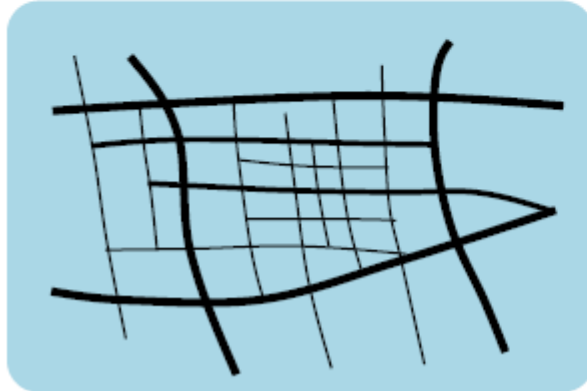
Circuitous nodal hierarchy

Logistical Networks



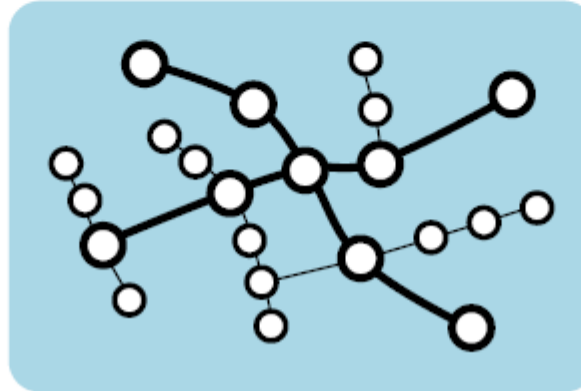
Sequential multi-nodal hierarchy

Road Networks



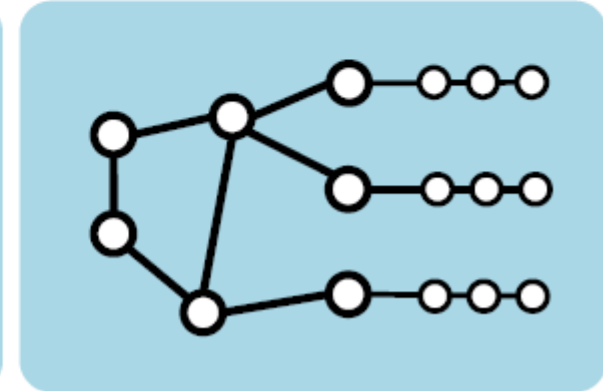
Hierarchical meshes

Rail Networks



Linear nodal hierarchy

Power Grids



Sequential linear hierarchy

Principles of network development strategy

Root causes of transport network development:

- at early ages: military, trade, industry, agriculture
- nowadays: productivity, mobility, competitiveness

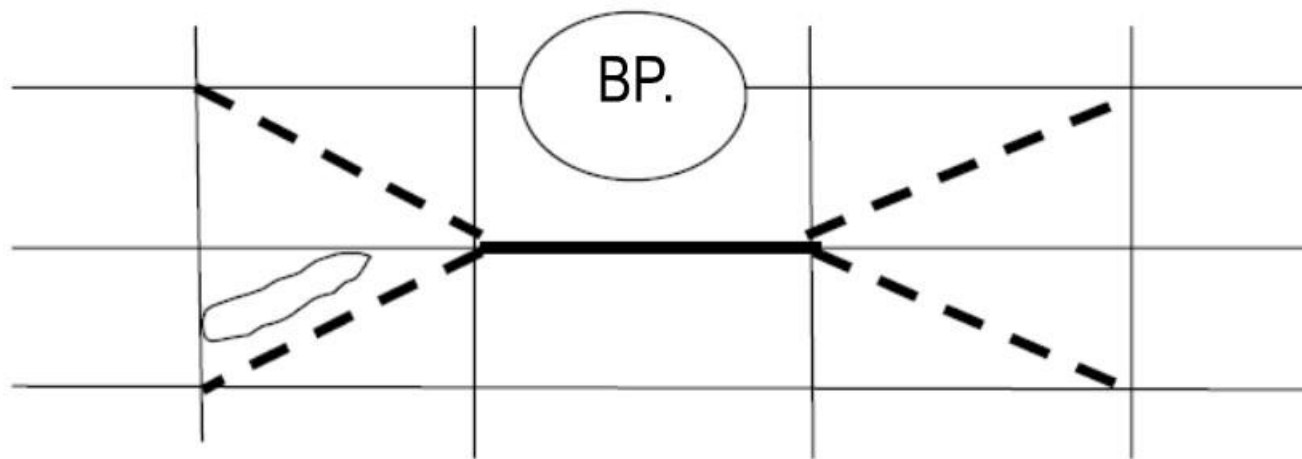
In Central-Europe there has been a significant backlog in road network development in the 20th century. A close up may occur in the beginning of the 21st century.

Possibilities for increased network capacity (without new construction):

- intelligent transport systems,
- autonomous and connected vehicles, road-vehicle interaction,
- mobility as a service,
- enhancement of reliability.

Principles of network development strategy

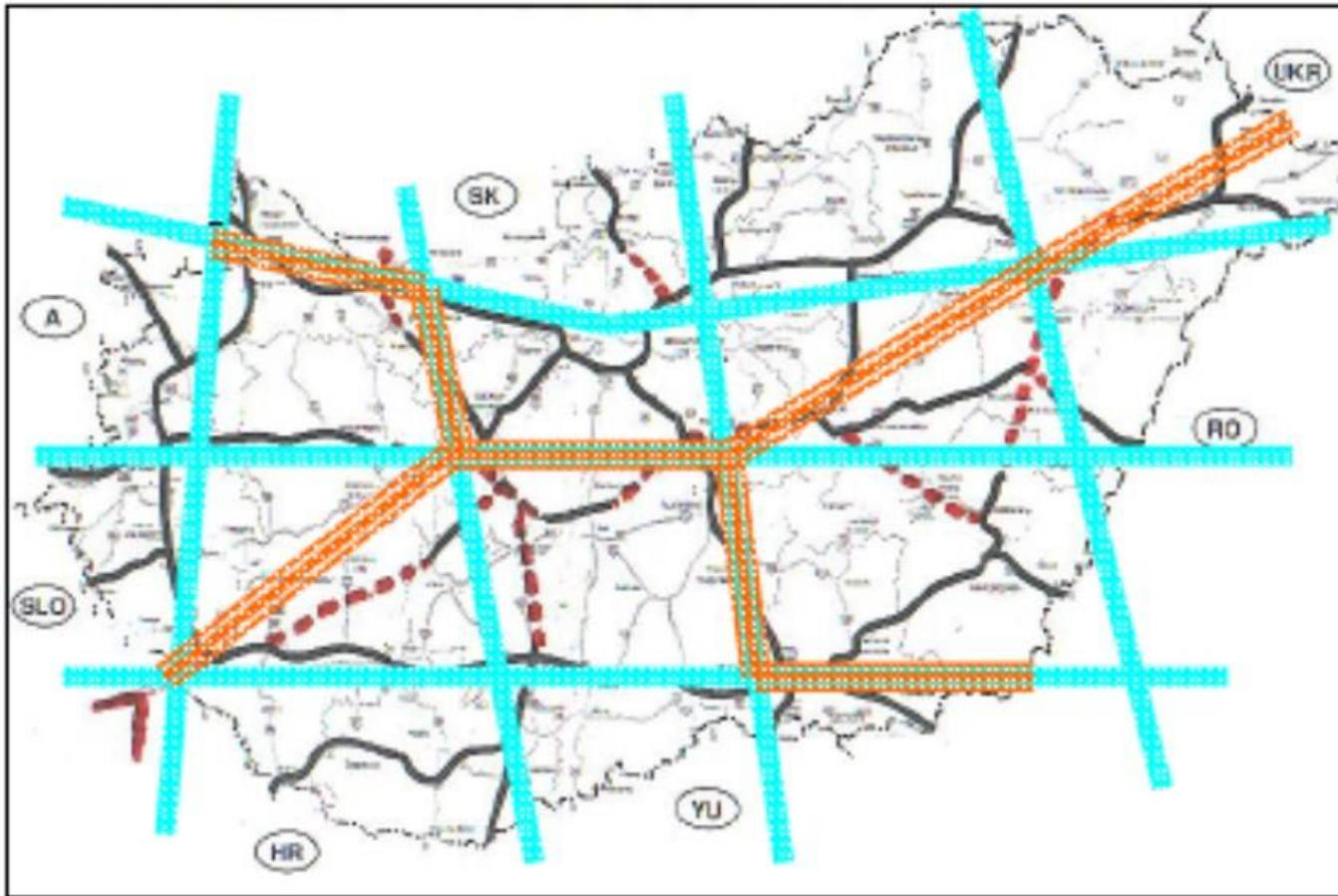
The Hungarian motorway network has got a Budapest-centred radial system. In order to achieve a better spatial structure, there is a need for an inter-regional grid type development bypassing the capital city, resulting in theoretically shortest network length, more economic operation, better environmental effects and use of an existing central Danube bridge (at Dunaújváros).



Source of picture: https://upload.wikimedia.org/wikipedia/commons/2/2c/Duna%C3%BAjv%C3%A1ros%2C_Pentele_h%C3%ADd_I%C3%A9gi_felv%C3%A9telen.jpg

Principles of network development strategy

Effect of motorway network development on spatial structure



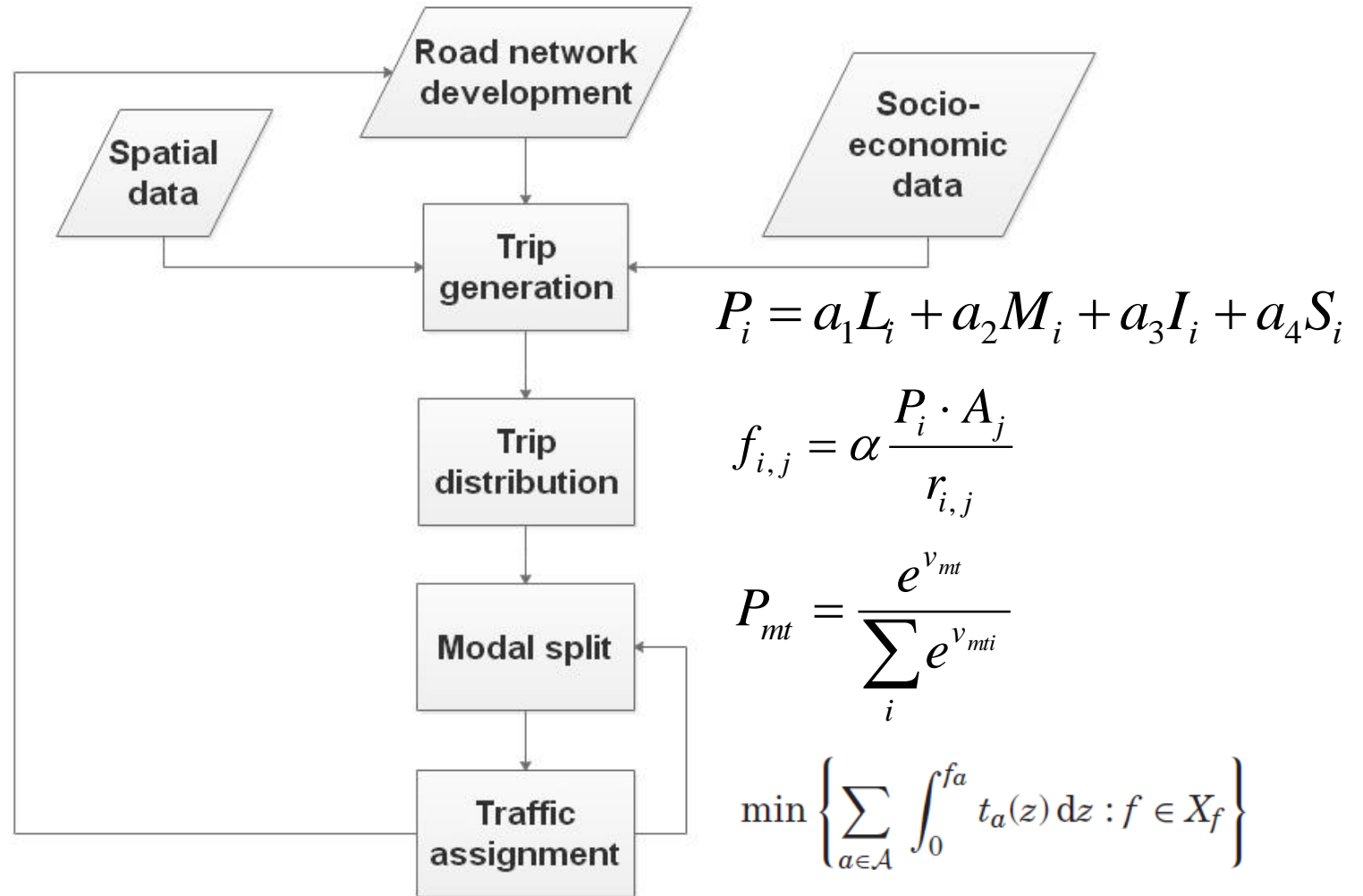
Historical Hungary had got a ring-radial network, presently lacking ring elements and overweighing the capital city.

There is a need for agreement at professional, economic and legal fields for ring roads development.

The theoretically shortest network length can be approached by grid-like network elements.

Long-term traffic planning of road networks

Road users are consumers of the transport network, the demand is the road traffic. Estimation of future traffic is based on scientific based computational models (trip generation: regression, trip distribution: gravity, modal split: logit/probit, traffic assignment: Wardrop equilibrium and road user balance). Taking into account uncertainty is important.

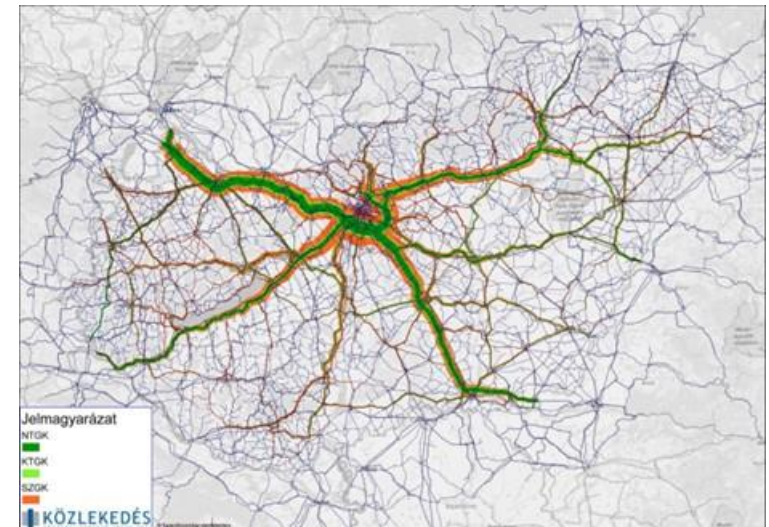


Long-term traffic planning of road networks

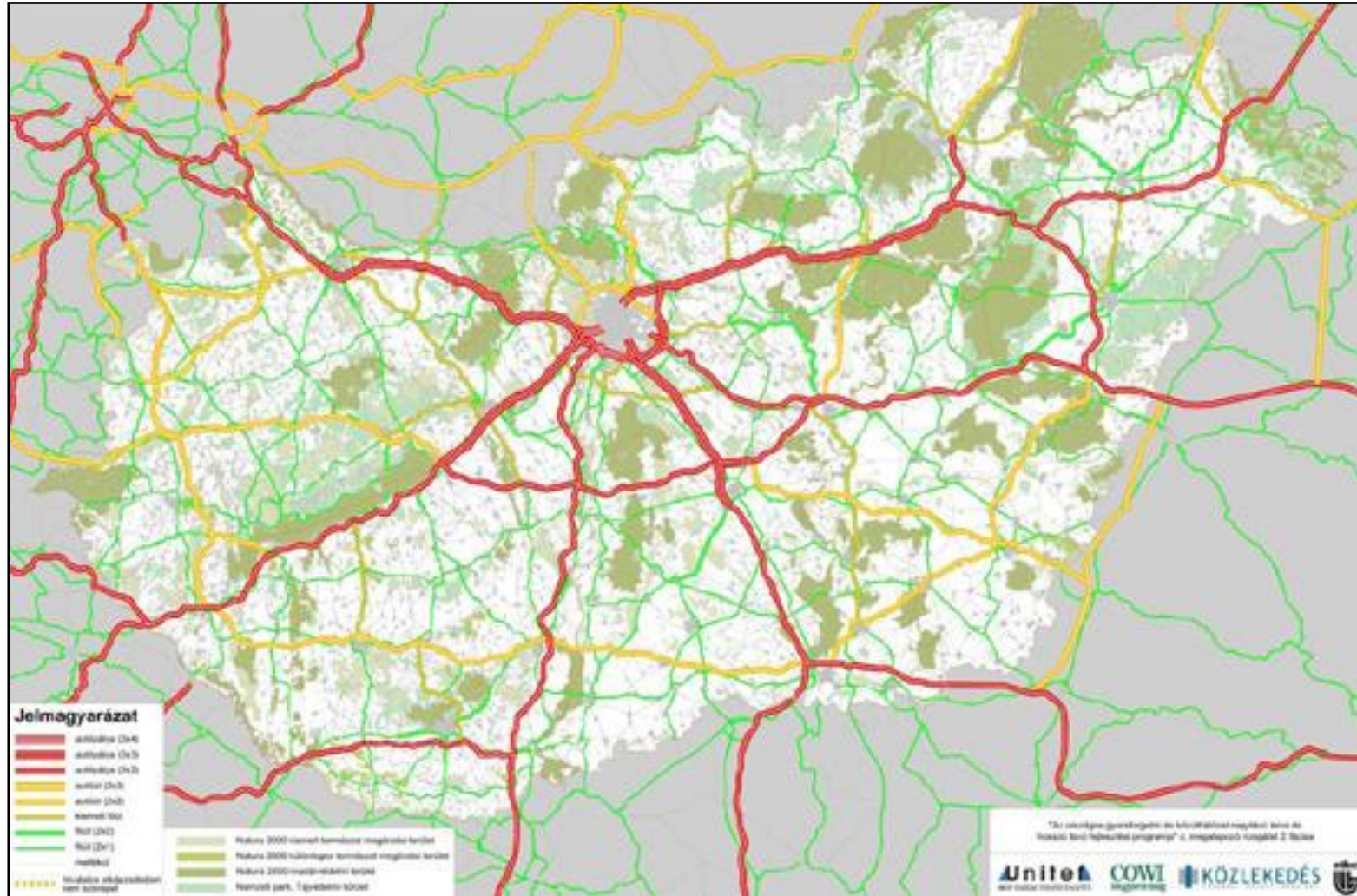
Model of the road network is mathematically graph consisting of links and nodes, where parameters are: length, number of lanes, resistance based on travel time, etc. For proper modelling there is a need for knowledge on future socio-economic changes (population, mobility, motorisation, employment, etc.) as well as the future transport network (development, services, etc.) along with expected system changes (intelligent transport systems, toll payment, tariff system, distributed services, etc.).

Recent traffic modelling in Hungary:

- National Transport Infrastructure Development Strategy global model (2014)
- Budapest unified traffic model (2016)
- Origin-destination (OD) national model based on the result of the national OD survey (2017)



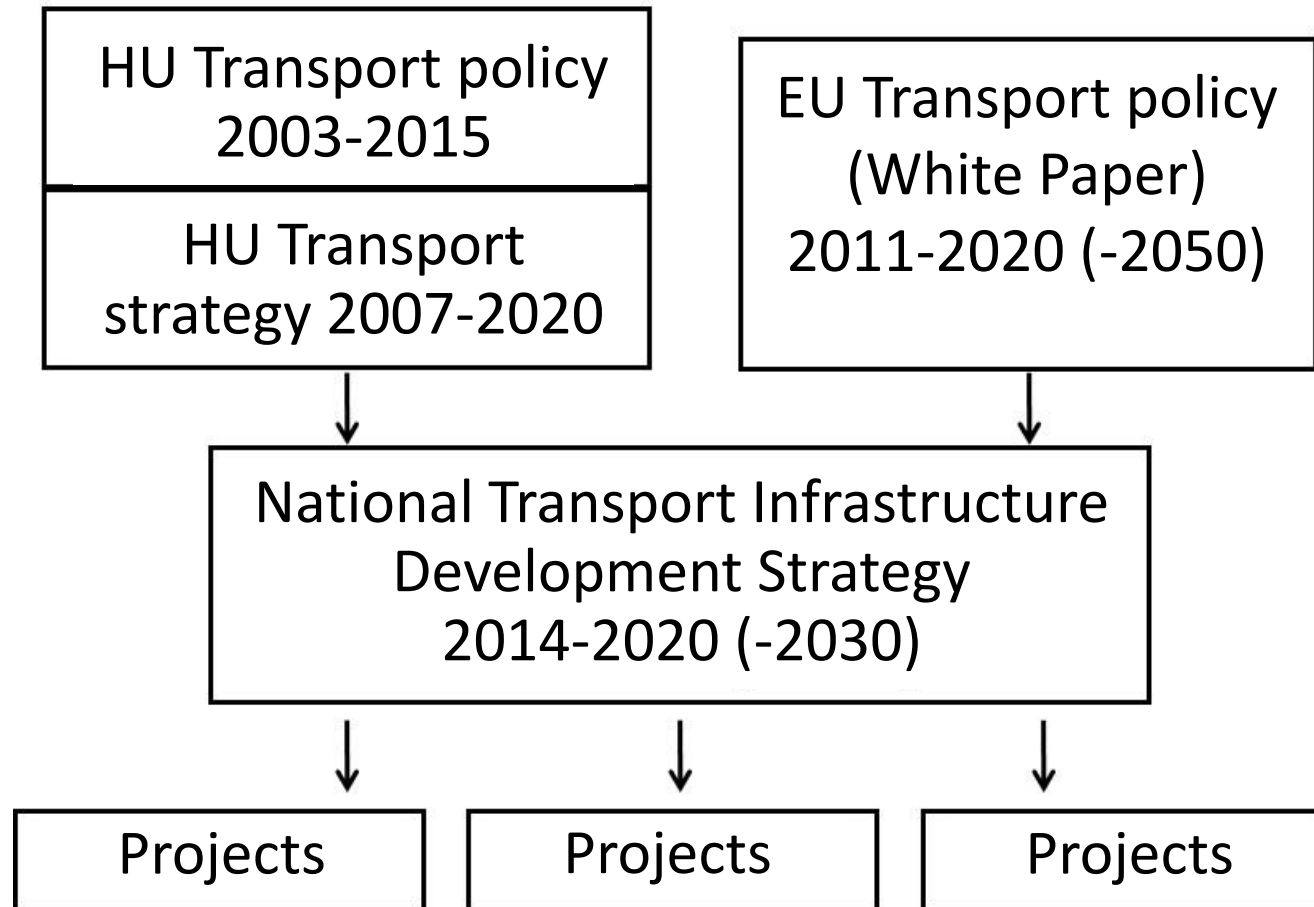
National road network development plan



The 1222/2011. (VI.29.) Government Decree on the long-term plan and mid-term development program of high-speed and main road network

A review of the plan and program would be timely as the economic situation has recently been changed.

National Transport Infrastructure Development Strategy



National Transport Infrastructure Development Strategy

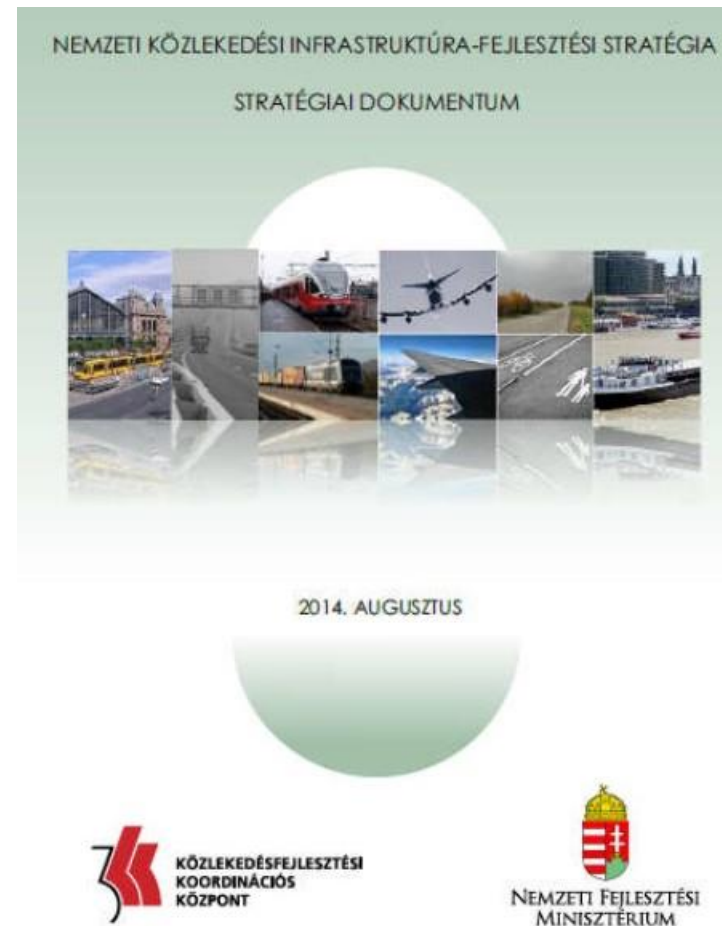
- The National Transport Infrastructure Development Strategy has been accepted by the 1486/2014. (VIII. 28.) Government Decree
- Objective: determination of mid-term and long-term goals of the transport branch with future vision, providing a planning frame for transport-related economical, social, environmental and land-use processes.
- The Strategy had formed the basis for the Integrated Transport Operative Program (2014–2020) sent to the European Commission



National Transport Infrastructure Development Strategy

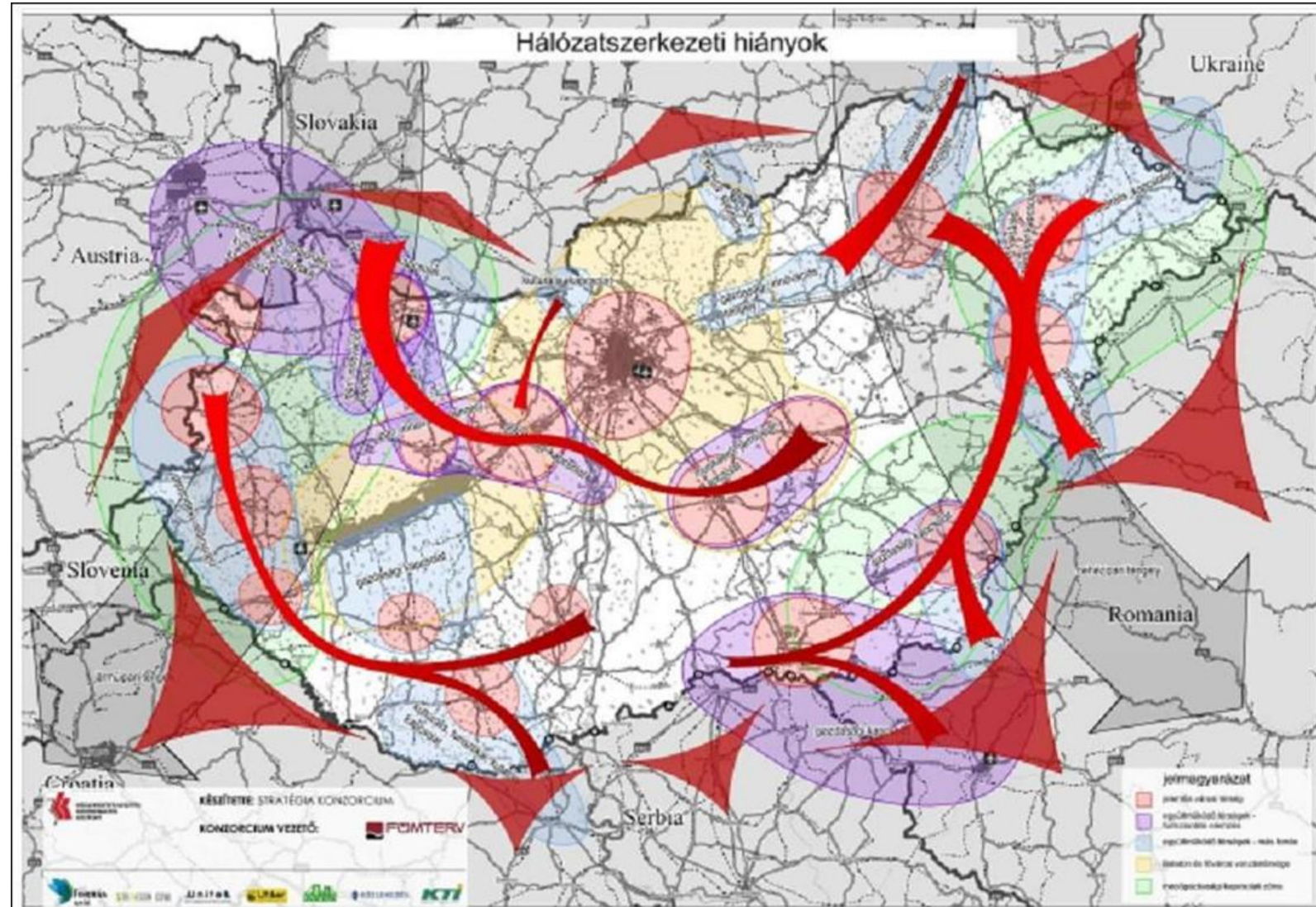
Main chapters of the Strategy:

- current situation
- traffic analysis and forecast
- development directions
- partial modal strategies
- strategic environmental analysis

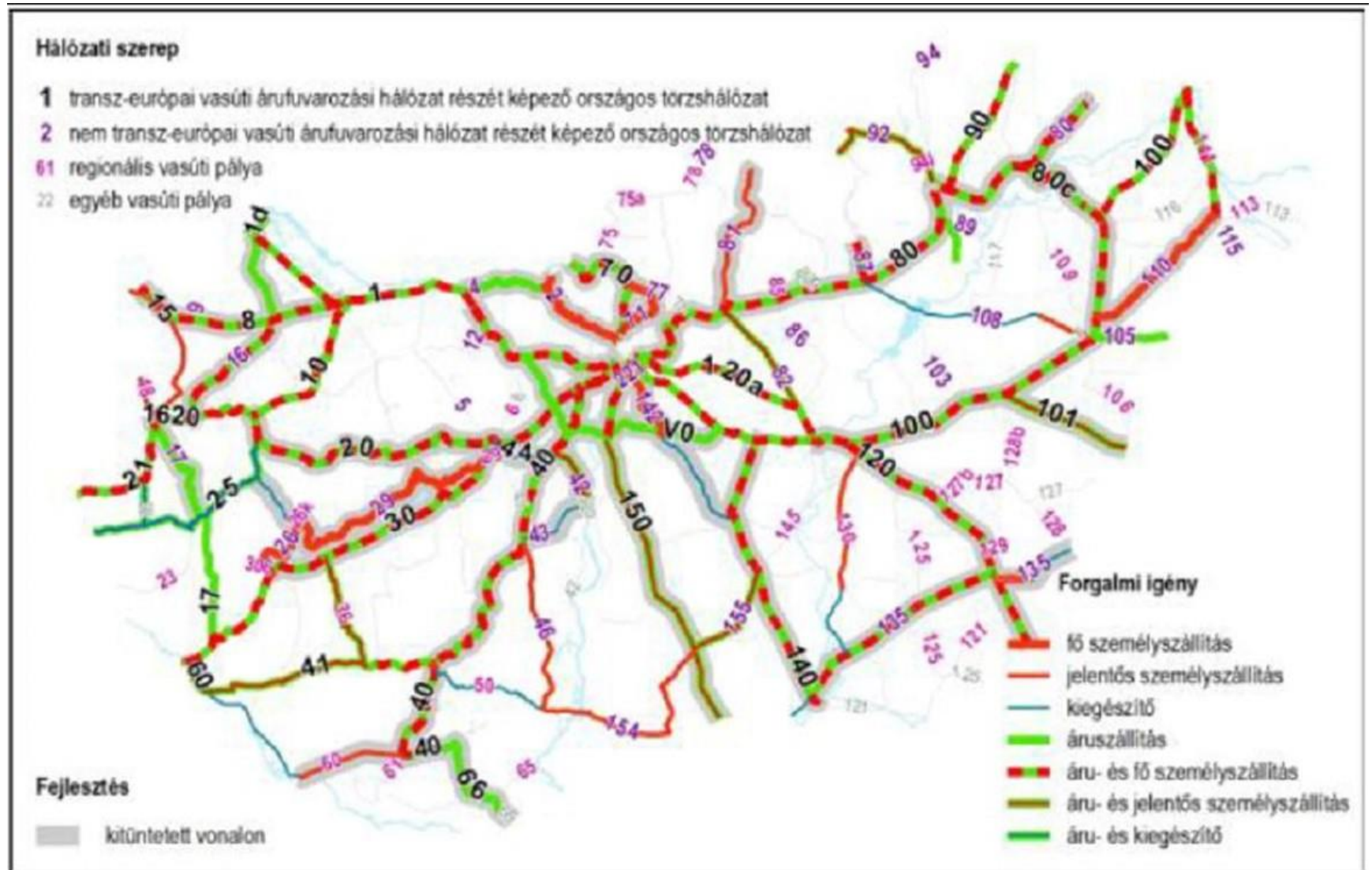


National Transport Infrastructure Development Strategy

Network
structural
problems



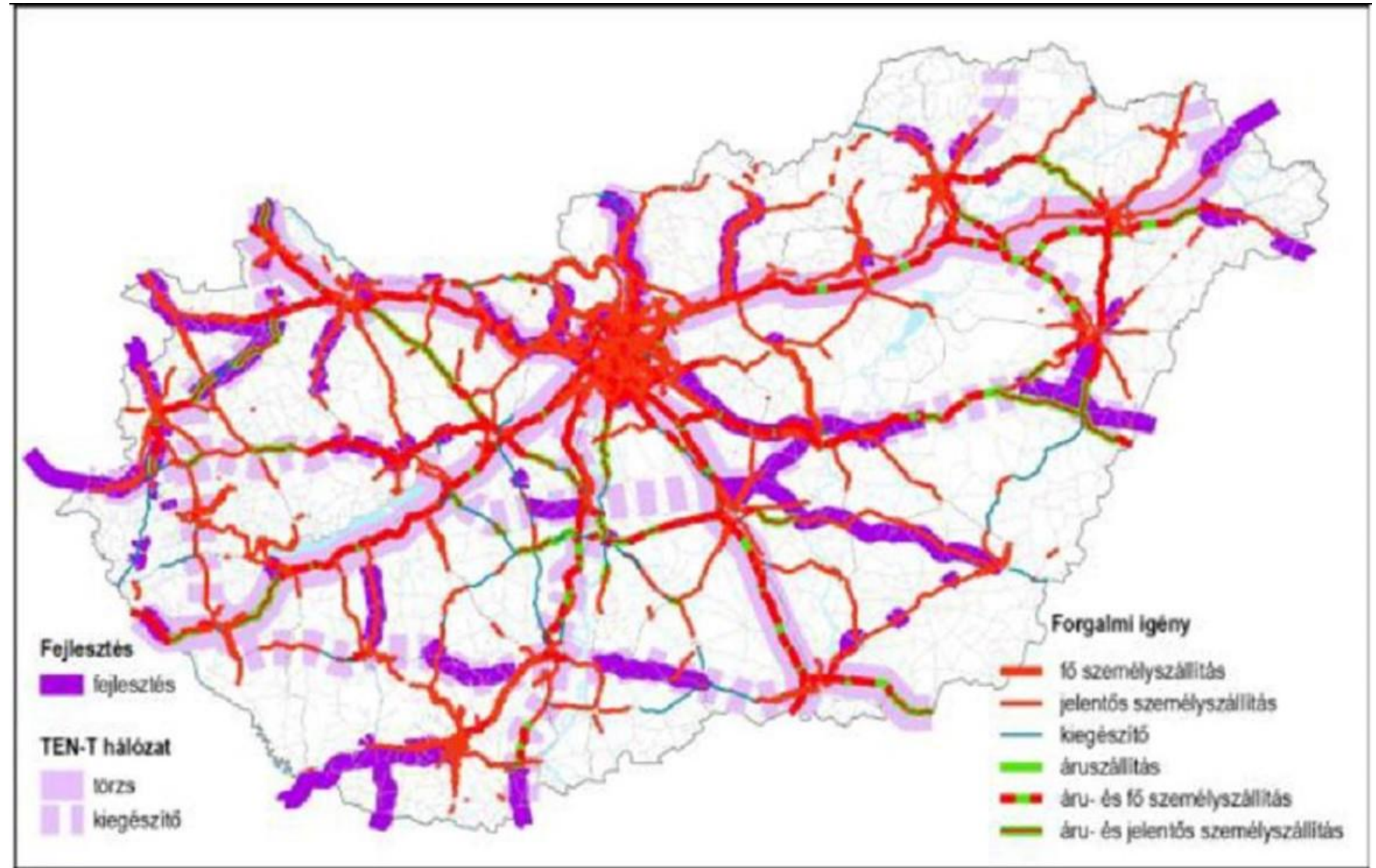
National Transport Infrastructure Development Strategy



Railway
development

National Transport Infrastructure Development Strategy

Road development

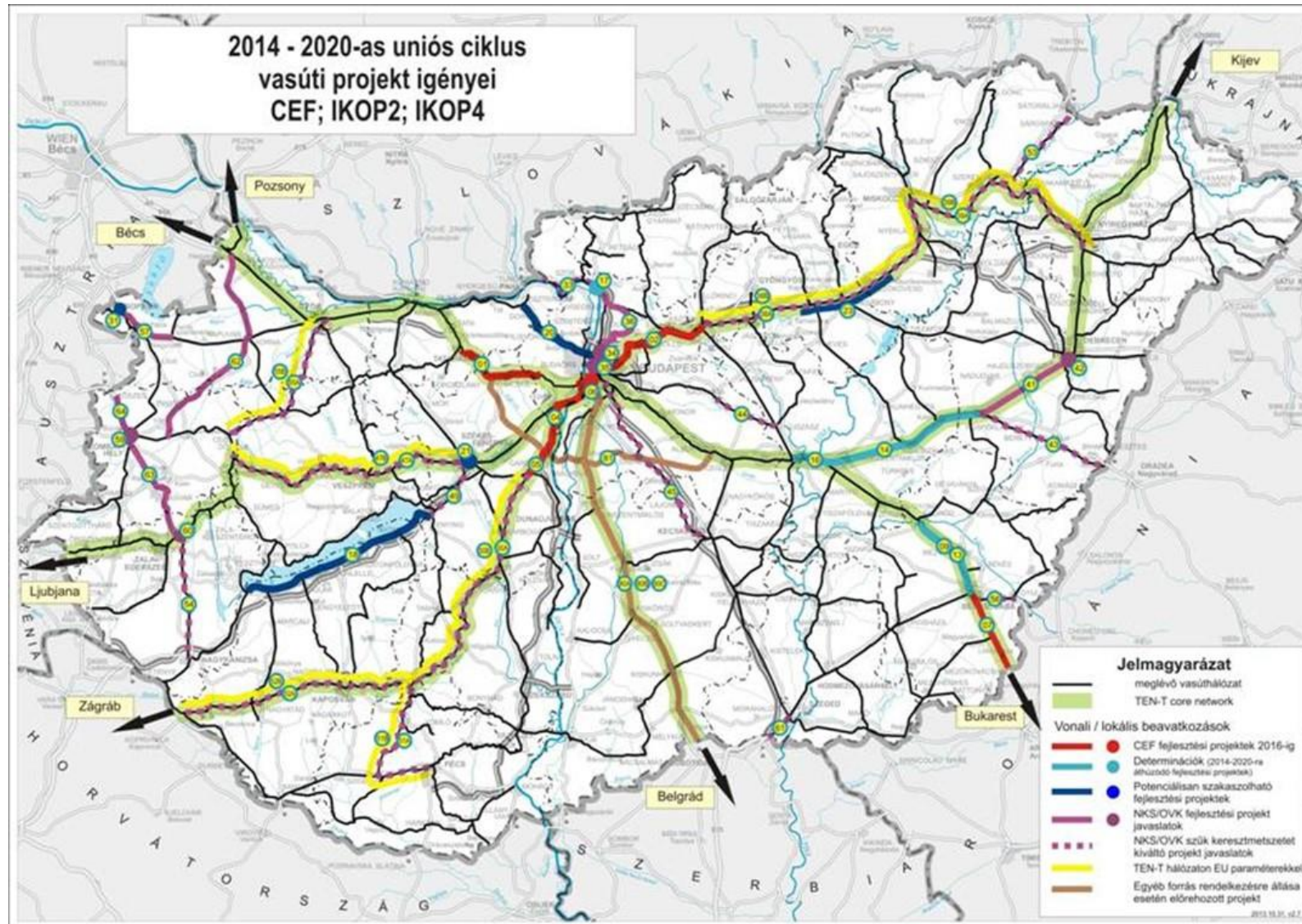


National Transport Infrastructure Development Strategy

Main expected results of the Strategy for 2030 in transport connections with significant traffic demand:

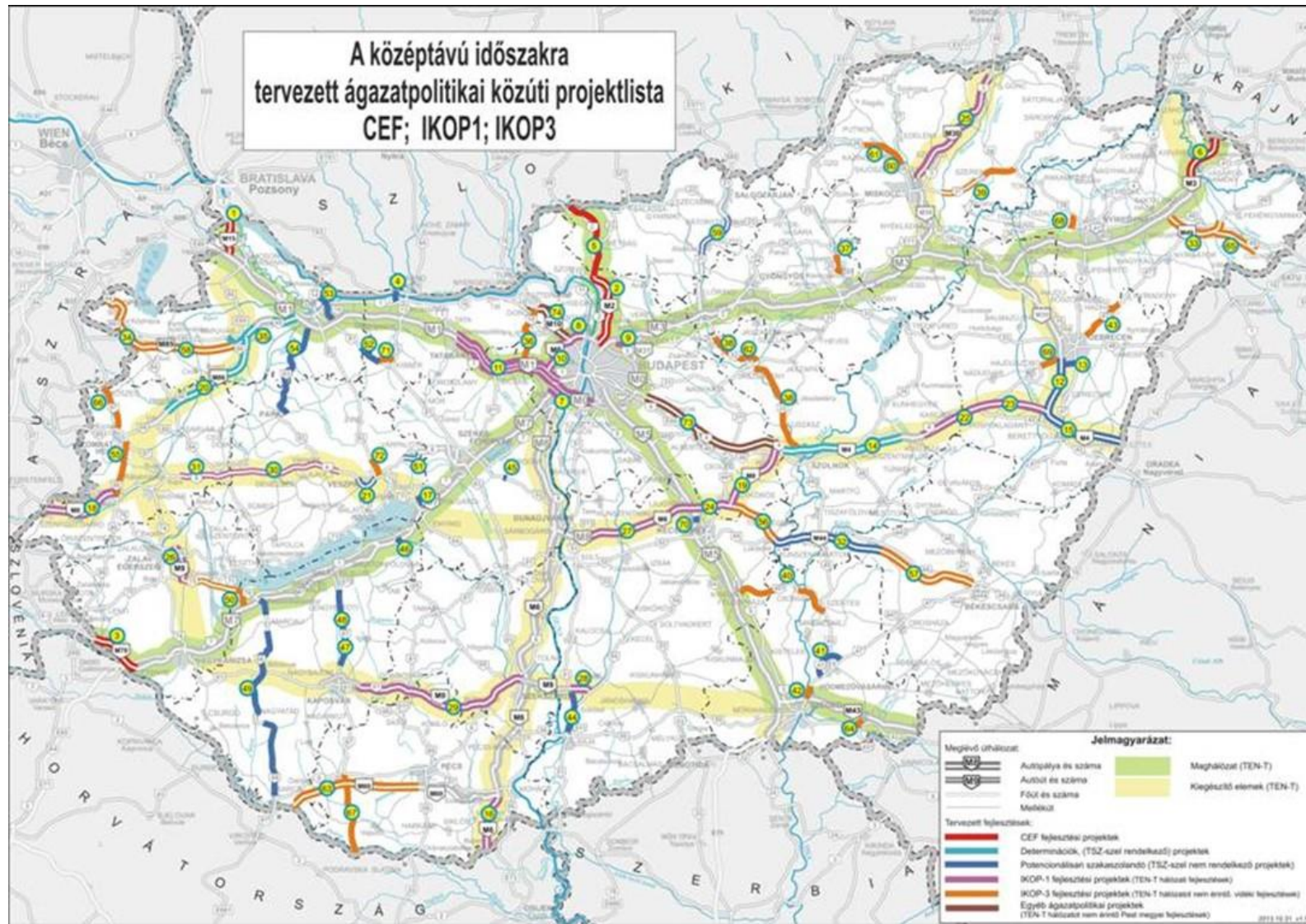
- a rail and road infrastructure of good technical condition, where sustainability is ensured by management tools
- transport fees and tariff remain at an acceptable level by applying sustainable support for public transport
- maintenance surplus cost of newly developed and constructed infrastructure elements are balanced by their benefits at implementation

National Transport Infrastructure Development Strategy



Railway
mid-term projects

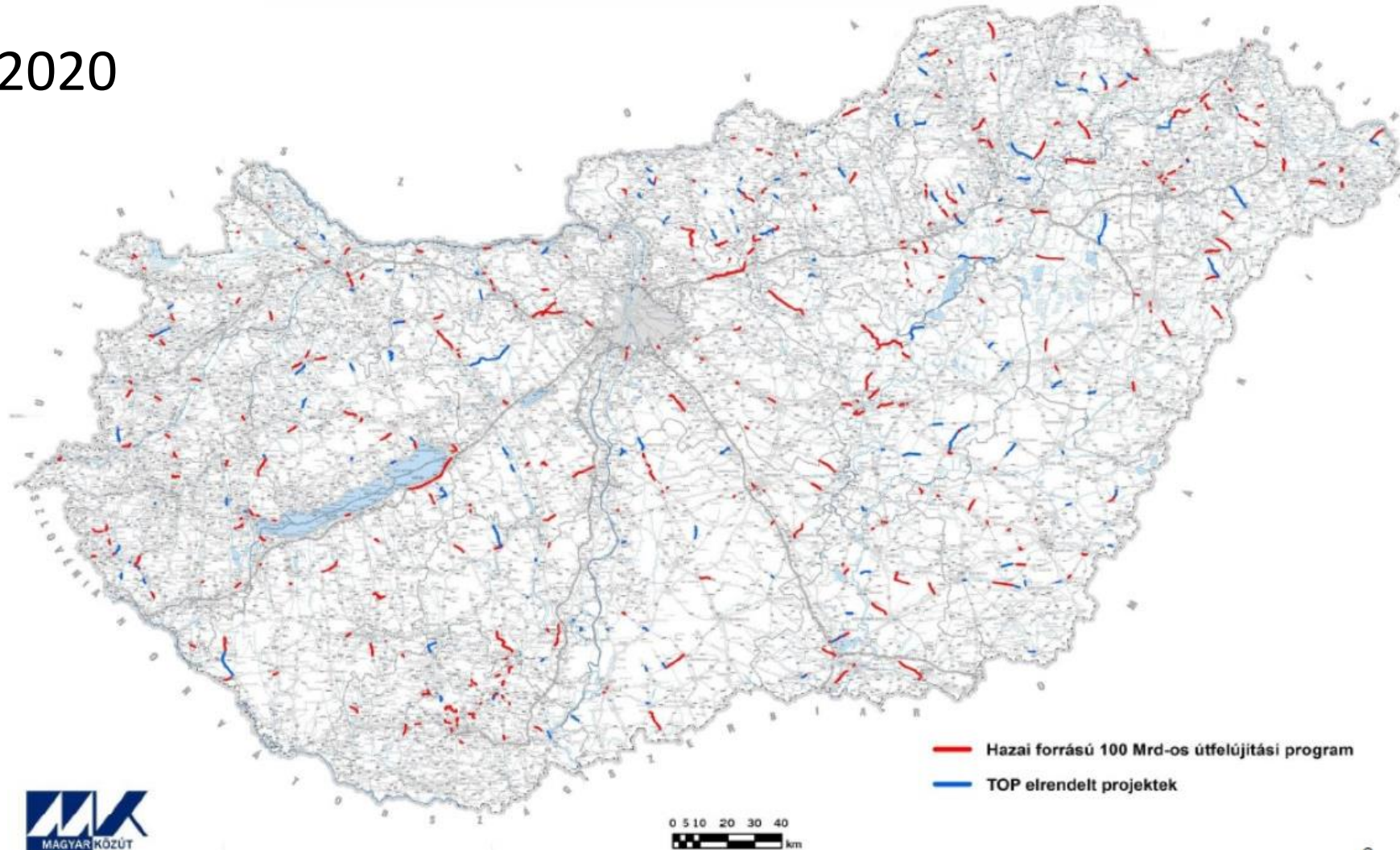
National Transport Infrastructure Development Strategy



Road
mid-term projects

Road network development strategy - rehabilitation

2017-2020



Integrated Transport Operative Program

- The Operative Programs are detailed plans for thematic objectives. This 2014-2020 programme included the main transport infrastructure investments. It focused on further developing highways and railways across the country, improving public transport services not only in and around the capital, but also in the main cities, and, in improving regional accessibility. As the results, the highways will reach the borders, and more "cities with county rights" will have direct link to the trans-European transport network.
- Railway modernisation will continue along the main corridors across the country, with several stations to be upgraded (Békéscsaba, Székesfehérvár, Szombathely).
- Urban transport will be further developed both in and around Budapest. Other large cities will also benefit from urban transport investments, and light train developments will link cities in the country together.

Integrated Transport Operative Program

- The Programme focused on four main priorities:
 - Improve international road accessibility
 - Improve international railway accessibility
 - Developing sustainable urban and suburban transport
 - Improving access to the TEN-T road network
- Expected Impacts
 - Almost 240 km highway to be built to reach the borders
 - Improved travel times on railways, close to 280 km railway line to be upgraded
 - Decrease in navigation accidents on the Danube
 - Public transport to become a more attractive alternative

Mobility Operative Program 2021 - 2027

- The European Green Deal announced by the European Commission aims the transition to sustainable and intelligent mobility, considering that transport is responsible for a quarter of the EU's greenhouse gas emissions, and this proportion is increasing. These tasks are included in the Mobility Operative Program (MIOP), which can be considered a continuation of the Integrated Transport Operative Program.
- The operational program is related to the policy objectives of "Greener, low-carbon Europe" (PO2) and especially "Better connected Europe - mobility and regional ICT connectivity" (PO3) defined by the Union.

Mobility Operative Program 2021 - 2027

- The OP consists of three priority axes, which can be further divided into individual objectives and areas of intervention.

Priority axis	Financing Fund	Region category
1. Strengthening clean urban-suburban transport	ERDF, CF	developed, less developed
2. Development of TEN-T railway and regional intermodal transport	CF	developed, less developed
3. More sustainable and safer road mobility	ERDF, CF	developed, less developed

Mobility Operative Program 2021 - 2027

- Priority axis 1: Strengthening clean urban-suburban transport
- 1.1 Strengthening the biodiversity and environmentally friendly infrastructure of the urban environment and reducing environmental pollution
 - Development of suburban railway sections that are not part of the TEN-T network Vehicle procurement (e.g. HÉV trains)
 - Developments helping to connect transport chains (e.g. P+R, B+R, intermodal passenger transport connections)
 - Development and introduction of IT applications and databases favoring public transport
 - Development of track and other (tram, trolley, bus) public transport, elimination of bottlenecks (construction of new sections, purchase of vehicles, modernization and accessibility of stops, infrastructure development)
 - Conversion of Budapest's urban road transport infrastructure to mixed-traffic, bicycle developments
 - Development of alternative refueling infrastructure (e.g. e-chargers, H-chargers).

Mobility Operative Program 2021 - 2027

- Priority axis 2: development of TEN-T railway and regional intermodal transport
- 2.1 Development of a resilient, intelligent, safe and intermodal TEN-T against the effects of climate change
- TEN-T railway network:
 - elimination of bottlenecks
 - strengthening railway digitization (e.g. central traffic management, replacement of transformers)
 - procurement of motor trains and passenger cars
 - modernization of railway stations and stops
- TEN-T water transport:
 - Developments of the waterside and landside infrastructure of TEN-T ports
 - conversion of the propulsion chain of ships operating on the Danube section in Hungary to a natural gas or hydrogen-based one

Mobility Operative Program 2021 - 2027

- Priority axis 3: More sustainable and safer road mobility
- 3.1 Sustainable, climate resilient, smart, safe and intermodal TEN-T
- 3.2 Developing sustainable, climate-resilient, smart and intermodal national, regional and local mobility, including improving access to the TEN-T and cross-border mobility
- High-speed and 1-3 digit numbered main roads:
 - construction of missing sections
 - increasing the capacity of the road network
 - interventions that increase the environmental and technical sustainability of road infrastructure and thus the current service level
 - interventions to increase traffic safety (e.g. reconstruction of intersections, replacement of lane barriers, increased visibility, further development of intelligent transport systems)

Mobility Operative Program 2021 - 2027

- Priority axis 3: More sustainable and safer road mobility (continued)
- Development of EUROVELO cycling facilities
- Development of technologies for the production of renewable energy for transport purposes, primarily in relation to biogas (bio LNG, CNG), renewable-based hydrogen and advanced biofuels.
- Development of alternative refueling infrastructure (e.g. e-chargers, H-chargers).
- Development of border crossing points, acquisition of equipment necessary to speed up border crossing
- Construction/development of support systems for autonomous vehicles
- Preparation of the management tools of the National Transport Strategy



Connecting Europe Facility

- A special financial source has been established in 2013 for development of trans-European Networks, the Connecting Europe Facility (CEF).
- Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010
- Commission Delegated Regulation (EU) No 275/2014 of 7 January 2014 amending Annex I to Regulation (EU) No 1316/2013 of the European Parliament and of the Council establishing the Connecting Europe Facility

Connecting Europe Facility

- In order to achieve smart, sustainable and inclusive growth and to stimulate job creation in line with the objectives of the Europe 2020 Strategy, the Union needs an up-to-date, high-performance infrastructure to help connect and integrate the Union and all its regions, in the transport, telecommunications and energy sectors. Those connections should help improve the free movement of persons, goods, capital and services.
- The trans-European networks should facilitate cross-border connections, foster greater economic, social and territorial cohesion, and contribute to a more competitive social market economy and to combating climate change.

Connecting Europe Facility - objectives

- CEF shall support the implementation of projects of common interest which aim at the development and construction of new infrastructures and services, or at the upgrading of existing infrastructures and services, in the transport, telecommunications and energy sectors.
- It shall give priority to missing links in the transport sector.
- The CEF shall also contribute to supporting projects with a European added value and significant societal benefits which do not receive adequate financing from the market.
- Contributes to smart, sustainable and inclusive growth, in line with the Europe 2020 Strategy, by developing modern and high-performing trans-European networks which take into account expected future traffic flows

Connecting Europe Facility - objectives

- Enables the Union to achieve its sustainable development targets, thus contributing to the Union's mid-term and long-term objectives in terms of decarbonisation.
- In the transport sector, the CEF shall support projects of common interest (up to 50 % of the eligible costs):
 - removing bottlenecks, enhancing rail interoperability, bridging missing links and, in particular, improving cross-border sections
 - ensuring sustainable and efficient transport systems in the long run, with a view to preparing for expected future transport flows
 - optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures

Connecting Europe Facility - priorities

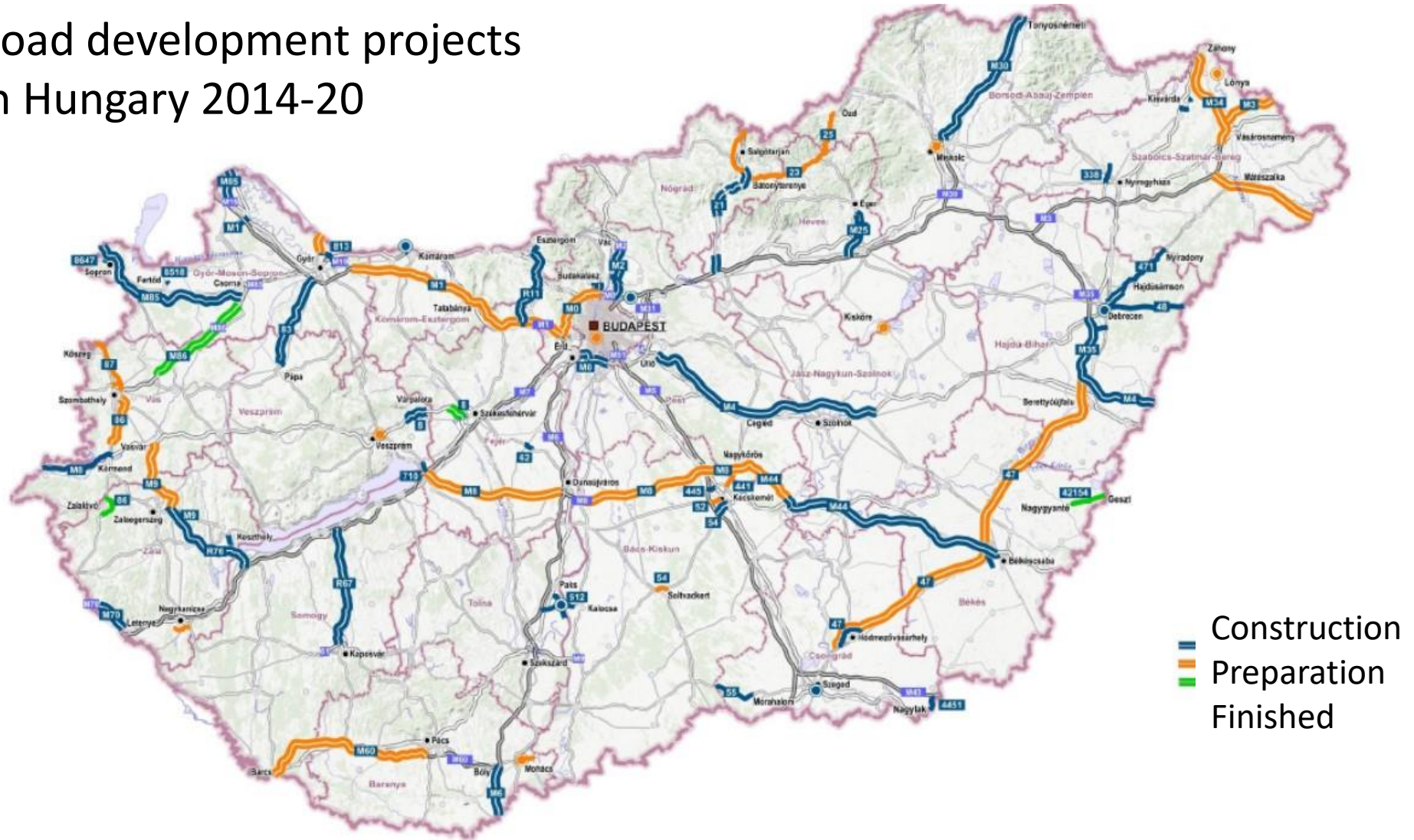
- CEF priorities in Hungary:
- Cross-border connections on the TEN-T network, eliminating bottlenecks (M15 motorway to Slovakia, M70 motorway to Slovenia)
- Providing multimodality in passenger and freight transport
- Horizontal traffic management projects: SESAR (air), ERTMS (railway)
- Telematic applications in water transport (River Information System)
- LNG usage, other new technologies and innovation

Connecting Europe Facility - assessment

- When setting award criteria the following general orientations shall be taken into account:
 - maturity of the action in the project development
 - soundness of the implementation plan proposed
 - stimulating effect of Union support on public and private investment, when applicable
 - the need to overcome financial obstacles, such as the lack of market finance
 - when applicable, the economic, social, climate and environmental impact, and accessibility
 - the cross-border dimension, when applicable

Transport infrastructure development examples

Road development projects in Hungary 2014-20



Transport infrastructure development examples

- Preparation of M60 high-speed road Pécs – Barcs border crossing section
- Feasibility study and physical design of the M60 high-speed road from the city of Pécs to the Hungarian-Croatian border crossing at Barcs including about 60 km length of high-speed road.
- An environmental impact assessment and a high-speed road feasibility study has been prepared and developed by two Hungarian consultant companies (UNITEF-83 Műszaki Tervező és Fejlesztő Zrt. and VIKÖTI Mérnök Iroda Kft.)

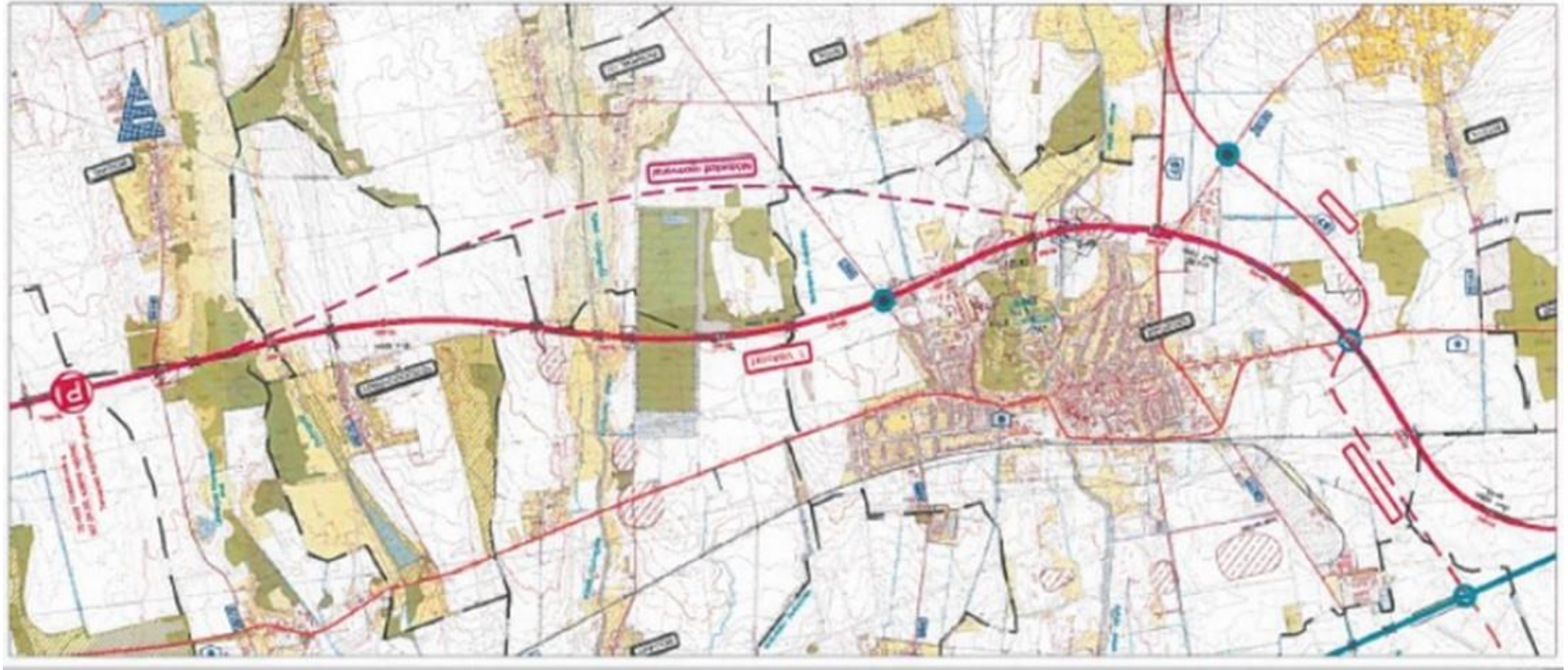
Transport infrastructure development examples

M60 high-speed road Pécs – Barcs



Transport infrastructure development examples

M60 – modified alignment based on local government opinion

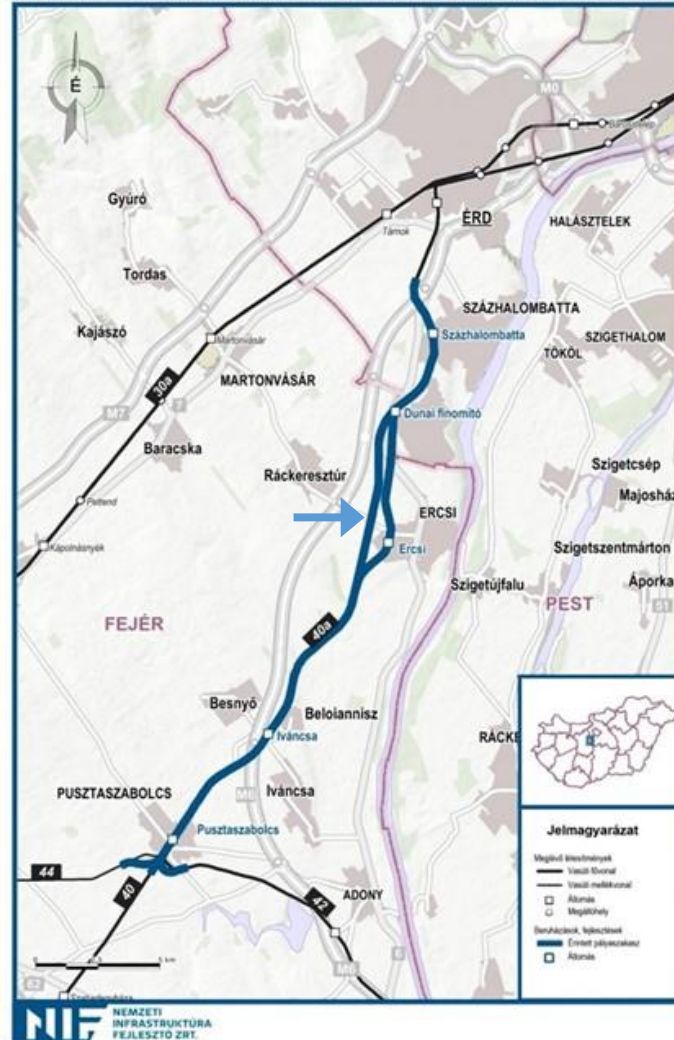


Transport infrastructure development examples

- A new railway line section has been constructed at about 12 km length between Százhalombatta – Ercsi junction with parameters of $v = 160$ km/h speed and 225 kN axle load bearing capacity.
- Besides the new railway line section, the reconstruction of Százhalombatta, Ercsi, Ivánca and Pusztaszabolcs stations is part of the project as well.
- An additional new connection track has been constructed between Érd and Érd alsó stations at about 1,5 km length for $v = 80$ km/h speed because of land-use and topographical conditions.
- Consultants: UTIBER Közúti Beruházó Kft., UVATERV Út-, Vasúttervező Zrt.

Transport infrastructure development examples

New railway line Százhalombatta – Ercsi

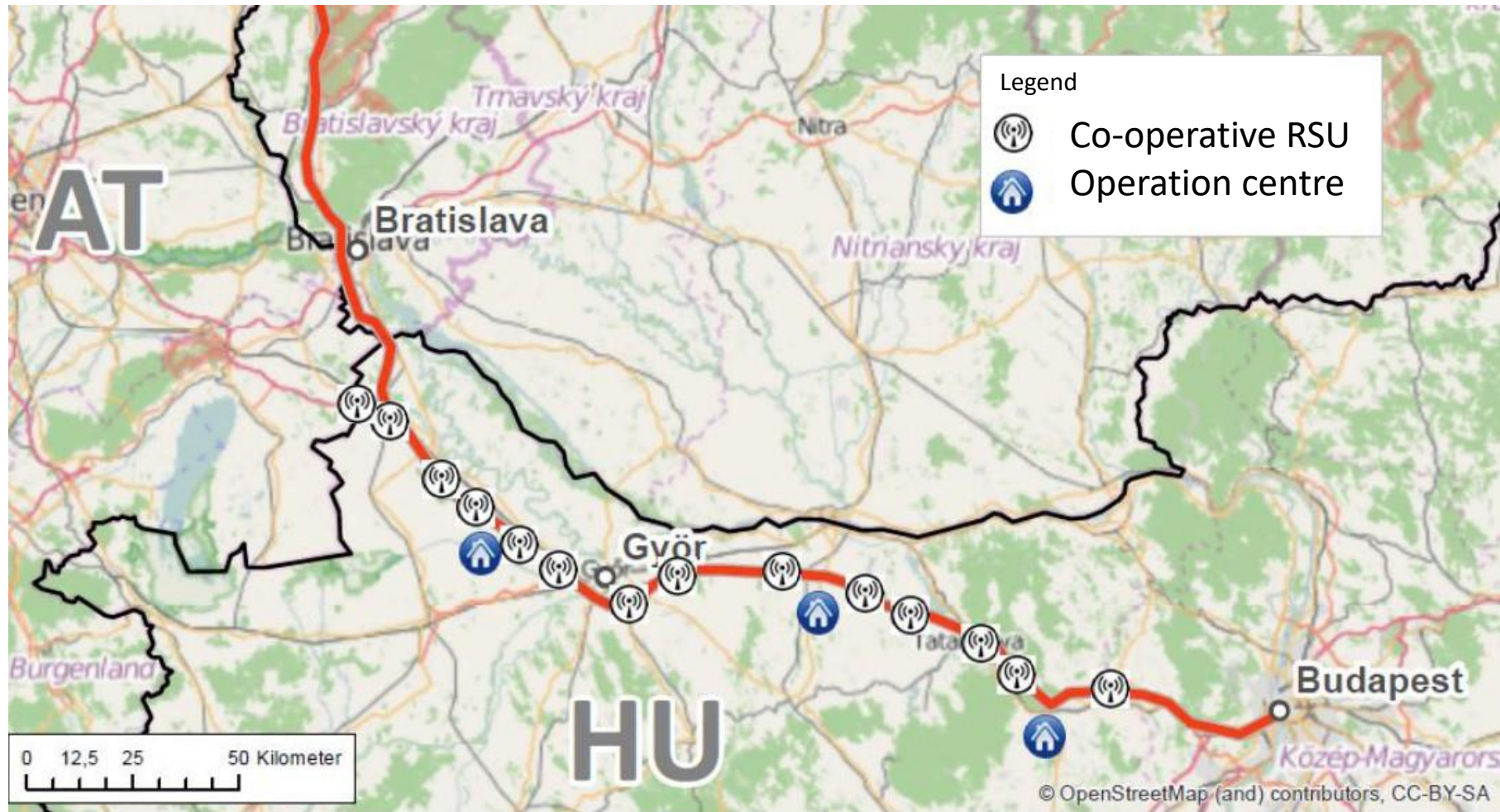


Transport infrastructure development examples

- An intelligent transport system project, an experimental co-operative solution for the road and vehicle communication has been started in 2015 on the Hungarian section of the M1 Budapest – Vienna motorway.
- This innovative technology will be an important traffic management and information system element in the near future, providing bidirectional information exchange between vehicles and roadside units (RSU) operated by a short-range radio transmitter.
- The objective of the C-ROADS ITS project is to collect and summarize the experience of various countries applying this experimental solution as well as the harmonisation of services and the formulation of recommendations for the deployment of such systems.

Transport infrastructure development examples

C-ROADS road and vehicle communication



Main transport-related EU legislation

- Regulation (EEC) No 1108/70 of the Council of 4 June 1970 introducing an accounting system for expenditure on infrastructure in respect of transport by rail, road and inland waterway
- Regulation (EC) No 1370/2007 of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road
- Commission of the European Communities: COM(2007) 551 Green Paper: Towards a new culture for urban mobility
- Commission of the European Communities COM(2008) 886 Communication: Action Plan for the Deployment of Intelligent Transport Systems in Europe
- Directive 2008/96/EC of the European Parliament and of the Council of 19 November 2008 on road infrastructure safety management (amended by Directive (EU) 2019/1936)
- Commission of the European Communities COM(2009) 490 Communication: Action Plan on Urban Mobility

Main transport-related EU legislation

- Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
- European Commission: COM(2011) 144 White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system
- Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU
- Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010

Summary

- Transport policy is a comprehensive high-level policy for the entire system of transport, in conformity with general political objectives, based on a professional and scientific background.
- The main goal of a transport policy is to provide the maximal and efficient satisfaction of reasonable mobility demands.
- European transport policy is to help establish a system that underpins European economic progress, enhances competitiveness and offers high quality mobility services while using resources more efficiently.
- A special EU financial source has been established for the development of trans-European Networks, the Connecting Europe Facility.

Thank you for your attention!

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