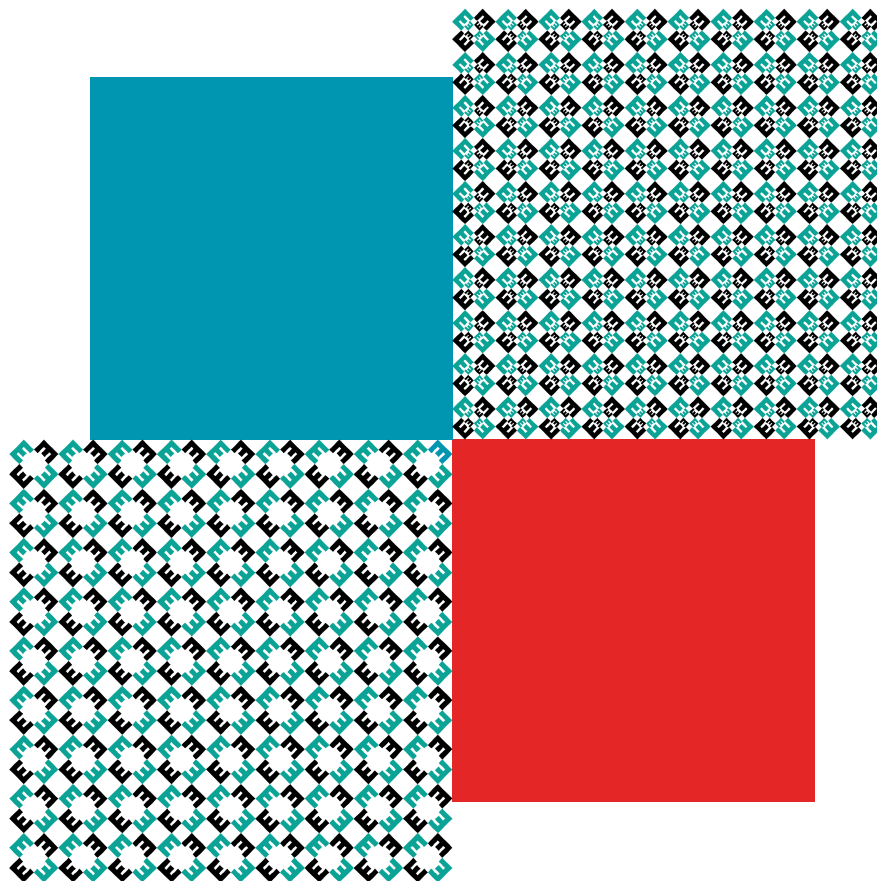




ENERGY EFFICIENCY ANALYSIS OF THE TRANSPORTATION SYSTEM OF TATA

A case study in the frame of the international
project “Cooperation for sustainable transport in
the V4 region”



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**A joint report in the frame of the international project
“Cooperation for sustainable transport in the V4 region”**

Supported by the International Visegrad Fund

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1. EXECUTIVE SUMMARY

The EU has a primary energy savings target of 20% below the 2007 projections for 2020. Following the recognition that the EU could cut 20% of current energy use in a cost effective manner, the Commission proposed this energy savings target in the 2006 Energy Efficiency Action Plan (EEAP). In 2007 the European Parliament and Council confirmed and supported it. In 2010 European Heads of State and Government (the European Council) reconfirmed the 20% target as part of the 'Europe 2020' strategy. Achieving the 20% energy savings target requires around 394 million tons of oil equivalent (Mtoe) of energy savings by 2020. In addition to energy efficiency improvements already included in the baseline, latest calculations estimate that the 2008 economic recession will have reduced EU primary energy consumption by about 70 Mtoe by 2020, while new policies adopted since the 2006 EEAP are expected to have an impact of 115 Mtoe. This leaves the EU with a savings gap of 208 Mtoe by 2020, requiring a tripling of policy impact to achieve the target. This summarizes the importance of energy efficiency. One area of development could be the energy efficiency of urban transportation system. Huge differences could be found between CORE European countries and NAS Countries. This gap has been realized by the Visegrad Fund. Therefore a comparative analysis has been financed in order to learn the best practice and locate the economical and social barriers of energy efficiency development in V4 countries.

2. GENERAL INFORMATION

Name of city: Tata

Location of city: Central-Transdanubian Region, Komárom-Esztergom county, Tata microregion

Number of inhabitants: 23,726 (as of January 1, 2013), Population density: 318.61 people per km²

Area: 78.17 km²

GDP: 10,974.32 USD per capita

Regional role: center of the Tata microregion

Tata's main profile: tourist destination

Tata's main role in transport: transit and destination town

Motorization: 339.4 vehicles per 1000 inhabitants

3. GEOGRAPHICAL FEATURES

Tata is located in the Northern part of the Transdanubian region, where the Transdanubian Mountain and the Little Hungarian Plain intersect; at the Northwestern gate of Tata-Valley that separates the Vértes and Gerecse Mountains; at the flow of the Által Brook. There are several lakes in the city, of which the biggest, called Tatai- or Old-lake, which is surrounded by nature conservation areas from the south, divides the southern part of the city to two parts

There are not significant differences in level in the city, as most of the city is between approximately 120-130 meter above sea level.

4. HISTORY

Tata is situated at the foothills of Gerecse Mountains, in the Eastern corner of the Little Hungarian Plain. The city is centrally located with roads from eleven towns leading into it, therefore in the 19th century, the surrounding geographical area encompassing several towns, were named Tata Basin after the city.

Tata has been populated from the beginning of early human civilization. In the 2nd century BC the Romans occupied the Pannonia region and established an important camp of the Limes, called Brigetio (located at Ószőny).

In the Early Middle Ages, Tata has become a royal estate and the town's name was first mentioned in 1221. From the 13th century, Tata had belonged to the estate of the Csák Family and it was granted market town rights in 1387.

The town was occupied by the Turks in 1543. During the Turkish reign of one hundred and forty-five years, it changed owners nine times, and the castle had belonged to the Turks for a period of sixteen years. The Castle on the waterfront was reconstructed between 1568 and 1577 and its citadels—that stand even today—were also erected during this period.

In 1727, Count József Esterházy had purchased the town and the surrounding villages. Between 1727 and 1811 Tata had not only been the administrative center of the estate

but it had also developed into one of the most beautiful agrarian cities of Komárom County, rich in Baroque-style buildings.

After being defeated by Napoleon at the city of Győr in 1809, Hungarian King Ferenc I. (1792–1835), stayed at the Castle of Tata for two months with his royal court, where he signed the peace treaty on October 24, 1809. The urbanization of Tata and Tóváros begin after the Austro–Hungarian Compromise of 1867, when smaller factories were being built and the Budapest–Vienna railway line reached Tata in 1883–1884.

The emergence of the middle class has accelerated between the two World Wars. On June 1, 1938, Tata and Tóváros had been united under one administrative district. On March 19, 1954, the Russian troops occupied the city. The Post–World War development and reconstruction began after 1954, when Tata was awarded city status.

In the past decades, Tata has not become renowned only thanks to its waters, English gardens, shady parks, renovated buildings, neat roads, or its Olympic Training Camp, but also by its museums, scientific meetings and permanent events (Water, Music and Flower Festival, Tata Concourse, Baroque Festival, Outdoor Games, great autumn fishing)—all of which enhance the city’s reputation.

Tata has been populated from the beginning of early human civilization; hence the city’s current infrastructure has developed over the centuries. The most recent event that has shaped the city’s landscape was its reconstruction and development following the intermittent bombing at the end of World War II in 1954, before the Soviet occupation.

5. FEATURES OF THE TRANSPORTATION SYSTEM OF TATA

5.1. THE RATIO BETWEEN PUBLIC AND PRIVATE TRANSPORTATION IN THE CITY

Currently in Hungary there is no reliable data for cyclist on urban level. The motorized transport is counted. The following map shows the main traffic volumes and road traffic accident points.

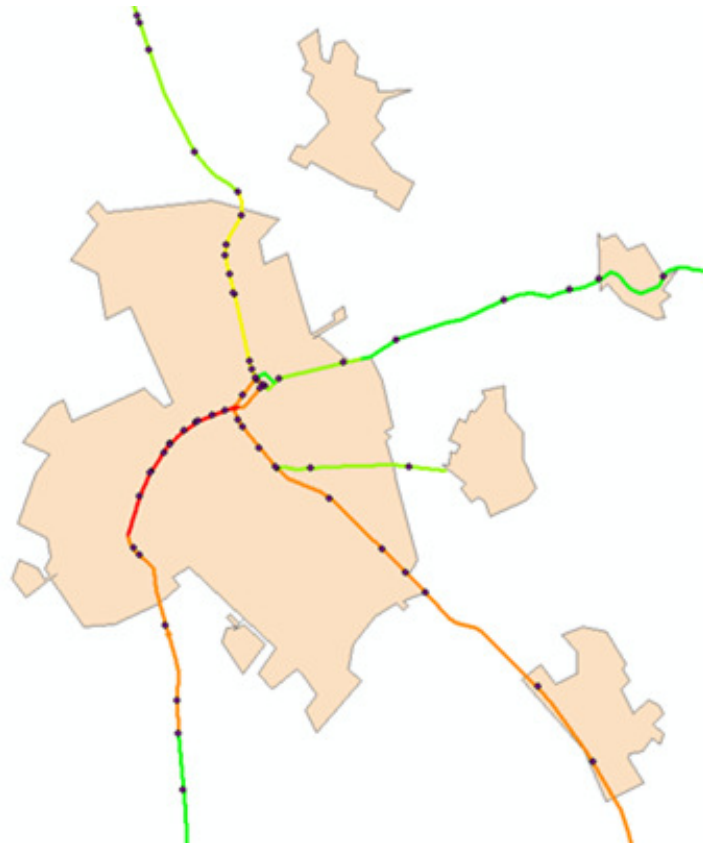


Fig. 1. Traffic volume and accident data in Tata

5.2. ROAD INFRASTRUCTURES

Motorway M1—the backbone of Komárom-Esztergom county’s transport system—and Budapest–Hegyeshalom Railway Line Nr. 1 running parallel to the motorway, also known as the “Helsinki Corridor IV” (Berlin/Nürnberg-Prague–Bratislava/Vienna–Budapest–Constanța/Thessaloniki/Istanbul) both go across the county. [11]

The geographical area stretching from Oroszlány to Tatabánya and from Tata to Almásfüzitő/Komárom includes a tight network of various industrial, logistics, and business parks that create the county’s economical backbone. The connections within

the county are weakened, since its transportation backbone—Motorway 1 and Route 1—are partly perpendicular to the connections, with merging and diverging sections within the city of Tata, which creates difficulties. The more complex road connections of the Tata microregion that go through the residential areas, should be reestablished on new lines. [12] Route 1, which is the former M1 Motorway running almost parallel to the motorway, is overcrowded between Tatabánya and Tata. [13]

Tata already has a convoluted and difficult to operate infrastructure, and the unfavorably selected location of the M1 junction creates even more difficulty in the long run. It would be timely to diverge Route 1 out of the city limits, however due the large ratio of destination traffic, a major shift in traffic could only be expected, if simultaneously a well planned reconstruction or a potential restructuring of the Eastern Tata road network was to take place. [13]

The outer transport connections of the Tata microregion are considered favorable, while the transport connections within the region are rather a mixed bag. The microregion is linked to the national road network by M1, Route 1, and Route 10. Route 10 runs in the Northern part of the microregion, in the Danube Valley, and connects Budapest to the Northwestern parts of the country. It is a one lane route in both directions running through the residential areas of many towns and villages, and reaches Budapest from the Northwest. Route 10 has heavy traffic around the Metropolitan Area of Budapest, and drivers encounter longer travel times as compared to M1. Route 1 runs parallel to M1 from Budapest to Tatabánya, then crosses the microregion and Tata itself from North to South, and it merges with Route 10 at the Almásfüzitő junction. Route 1 poses a great environmental burden to Tata since it has one lane in both directions, causing a significantly lower average travel speed than that of the motorway. [13] Route 8119 and Route 1 are not suitable for urban traffic and they fragment the city of Tata. Increased traffic volume and routes inappropriate for urban traffic lead to a great number congestions and accidents in the city.

5.3. RAILWAY INFRASTRUCTURES

The Budapest–Hegyeshalom railway line cuts in between Tata and the small towns of the microregion, such as Baj, Agostyán and Tata's Újhegyi district. The level crossings and the heavy train traffic cause significant delays on the roads. The level crossing at Szomód was replaced by a bridge crossing on the region's main line. Such developments would be necessary in Agostyán, as well. [13]



Fig. 2. Surroundings of Tata

Tata has radial road connections to other towns and villages in the microregion (all roads lead to the historical town). Tata, as the center of the microregion, is relatively easily accessible by road (8 km). The traffic passing through the city is significant, given its central location. A road going around the city is yet to be built. The road networks between the towns are fairly advanced given the circumstances. [14]

5.4. OTHER TRANSPORTATION INFRASTRUCTURE

An upgrade of the railroad tracks has been planned to enable a 140–160 km per hour speed in a major transport axis of the country and to minimize the number of level crossings. The premises of the railway stations are also to be renovated. In addition, P+R parking facilities and bike storages are to be built. ¹ Tata’s railway station was last renovated in the 90’s. As a result of the developments mentioned above, the management of MÁV-START Zrt. expects a great increase in the number of passengers (similar to the doubling of railway passengers going to Austria after the introduction of RailJets in 2007).

5.5. NUMBER OF REGISTERED VEHICLES, FUEL CONSUMPTION, AND CO₂ EMISSION

The city has 8053 registered vehicles (2012). The registered traffic flow was as below:

Table 1: **Traffic flows in Tata**

Nr.	Average Traffic Flows	Motor bicycle	Passanger Car	Bus	HGV
1	13700	200	10420	340	1130
1128	6392	130	4514	206	671
8119	17760	160	12520	890	1630
11135	5319	80	4568	59	264
11603	1994	29	1817	3	66

¹ <http://www.kormany.hu/hu/nemzeti-fejlesztesi-miniszterium/infrastrukturaert-elelos-allamtitkarsag/hirek/utemesen-halad-a-biatorbagy-tata-vasutvonal-korszerusitesenek-tervezese>

5.6. PUBLIC TRANSPORTATION

Vértés Volán Zrt. operates the city's extensive public transport network. The vehicle fleet consists of 8 buses, with an average age of 8.5 years. The public transportation of bikes is currently not possible. Figure 7 shows the service performance and key figures. [15] In order to operate the city's bus lines, 7 vehicles are needed on weekdays, and 3 on weekends.

Table 2: **Changes in the performance of Vértés Volán in Tata**

	2010	2011
Number of passengers (in thousands)	5,784	5,477
Passenger kilometres (in thousands)	22,125	20,950
Number of services initiated (number)	66,190	65,348

Source: [15]

5.7. BIKING INFRASTRUCTURE

It is well known that regular exercise is an essential part of healthy living. In today's fast paced environment, biking is one of the most convenient ways of exercising, since it does not require additional time to be spent at the gym—one can simply ride their bike to work every day or run their errands by bike. As far as the air pollution is concerned, motorists are more at risk than bikers. Scientific studies show that those sitting in a car inhale a greater amount of polluted air, since they are usually seated lower, than those on a bike. Furthermore, motorists travel in the middle of the road where harmful gases and dust pollution are present in a greater concentration and the closed spaces of cars contain them for a longer period of time. [6]

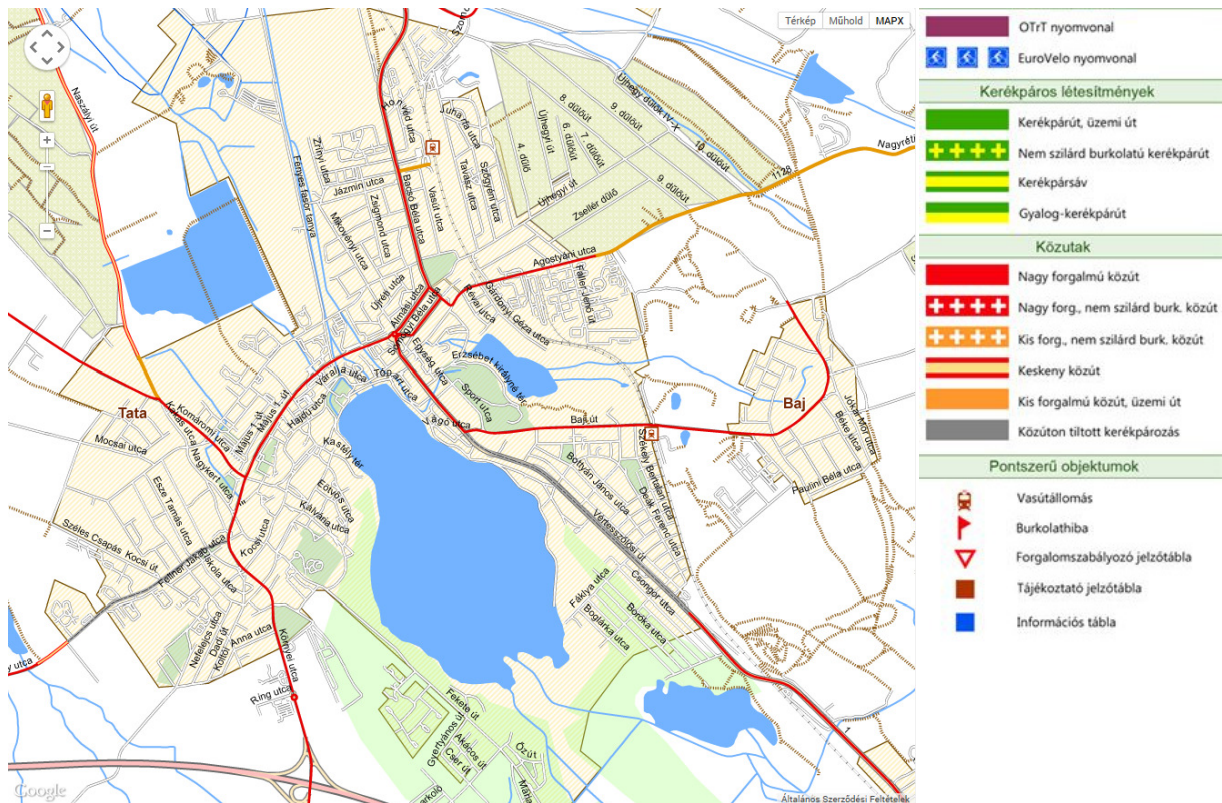


Fig. 2. Road infrastructure of Tata

Source: <http://kenyi.hu>

Legend:

Green/yellow: bicycle roads

Red/orange: normal roads

Grey: cycling prohibited

Currently, Tata does not have a public bike sharing scheme. However, there are several initiatives to increase bikers' safety and accommodate their needs. Route Nr. 6 of the EuroVelo international cycling network passes through the city. [7] Cycling gets more and more attention in Tata due to the growth of the biking community and the positive effects biking has on health and the environment.

Besides having national, local, and micro regional actions and events, a growing number of employers popularize biking as a healthy way of transport in order to gain a more favourable view of society. In 2014, partly due to these efforts, the Municipalities Offices of the Tata region has received the "Biker-Friendly Workplace" title for the first time, while Tata won the "Biker-Friendly City" title for the 6th time (first in 2008). Tata received this award partly due to the fact that the Által Brook

bike path was constructed and the city has future plans to join Route Nr. 6 of the EuroVelo international bike path. The construction of an eco-tourist center is also under way to welcome biking tourists. The city also places great emphasis on students' biking safety education.²

Tata has a steady biking traffic all year around, both from bike commuters and tourists and these groups are represented about equally. The biking traffic spikes during the summer months, because of tourists coming from the Netherlands, Germany and Austria, but Hungarian bikers are also well represented. [10] The lack of and bike storage facilities at the railway station and around tourist destinations should be resolved. In the past few years, a biker friendly transport connection was developed between Tata and the city of Tatabánya.

Despite of the local government's development plans and the structural specification of the city's transport, the bicycle infrastructure is undeveloped compared to the occurring demands. The routes are mostly paths assigned for bicycles, the existing lines are not connected and there is little chance to evolve new bicycle paths and lanes by the local government. At the railway stations the storage of bicycles are not solved.

The Ecotourism Center of Tata is planning to buy 50 bicycles which can be used in urban transport or rented on leisure purposes.

Tata also plans to create a Bicycle Academy in a school where the children will be educated for bicycle transport by 40 bicycles.

² http://www.tata.hu/13009/kerekparosbarat_varos_es_munkahely

Introducing an efficient, well operated bike sharing scheme based on a European models would greatly contribute to creating an energy efficient transportation system in the city. The scheme could be built upon Tata's cultural offerings, while taking advantage of the well established train connections to the capital. The cycling developments in recent years provide an optimistic outlook. Such initiative should be supported in the future, however **when selecting the exact location of the development, a comprehensive needs assessment is necessary, and decisions should be made after seriously considering the pros and cons, and potential implications using a systematic approach.**

5.8. PARKING

Urban transport is a complex system with multiple dimensions. The vehicles in waiting (parking and vehicle storage) are an integral subsystem of the transportations processes of a city, hence parking is an unproductive sub-process of transportation.

Parking is free but in the city centre there is a limit of 2 hours for parking. The number of parking lots in three main areas in the inner city is 1954. According to a 2008 assessment, further 2040 parking lots could be built in underground garages and multi-storey car parks.

Upon upgrading the Biatorbágy–Tata railroad tracks, the number of P+R facilities will also increase, and such facilities will be also constructed at the train station of Tata. Beyond their function at the train station, P+R parking facilities are also important when it comes to accessing tourist destinations.

The need to establish and extend P+R parking facilities is unquestionable, and they are extremely important when it comes to emphasizing public transportation. The spreading of P+R facilities is essential in order to increase energy efficiency. Nevertheless, increasing their popularity is not possibly without providing proper information to end-users.

6. SUSTAINABLE TRANSPORTATION CAMPAIGNS

School age children are allowed to travel for free on the city lines, which on one hand helps to use the capacity of public transport in a higher proportion and on the other hand decreases the proportion of individual transport.

The city organizes the „Car Free Day” in every September. On that day every traveller can use urban bus lines for free.

In January 2013, two trainings were held in the city under the umbrella of Energiaklub Transport Learning project. One covered the topics of mobility management which was useful for families, kindergartens and schools, while the other was organized for local governments with the title 'Planning and organizing sustainable transport campaigns'.

The city of Tata and the Hungarian Motoring Club organizes annually the „Életúton” programme, during which several programs, educations about sustainable transport are held in the schools of the city.

7. THE USE OF EU FUNDING

From the past years there are two projects related to Tata, out of which two are running projects. The summary of the projects can be seen in the following table:

Project	Starting date	Closing date	Total cost (HUF)	Eligible cost (HUF)	Non-eligible cost (HUF)	Intensity
Preparation of the development of the bicycle road system connecting the existing systems of Tata and surrounding settlements with the settlements' near the Danube - 1st period	15/01/2012	31/05/2014	15,045,800	15,045,800		100%
Preparation of the development of the bicycle road system connecting the existing systems of Tata and surrounding settlements with the settlements' near the Danube - 2nd period	15/01/2012	31/05/2014	19,724,000	19,724,000		100%
Construction of Tatabánya-Vérteszőlős-Tata bicycle road	06/07/2011	31/12/2013	479,486,050	444,520,057	27,786,995	95%
Road development of Deák Ferenc Street, Tata	project is on reserve list		65,432,656	58,889,390*	6,543,266	90%
*claimed						

8. STRUCTURE OF TATA

The urban spatial structure basically considers the location of different activities as well as their relationships. Core activities are those of the highest order in the urban spatial structure. Central activities are concerned to leisure and sport in Tata as the world heritage located in the city centre. Production and distribution with activities such as warehousing, manufacturing, wholesaling are peripheral activities.

Pre industrial era. For cities that existed before the industrial revolution like Tata, a small part of the city core itself generally nearby the lake, where the main road and main traffic is passing by in the city. These were locations where major transactions took place and thus required financial, insurance, warehousing and wholesale services. In case of Tata this place is the inner city core next to Lake Tata with the castle. The development would be to build a bypass and the HGV traffic would not enter to the leisure area. After the industrial revolution matured, major transportation axis spurred from the central area towards the periphery. The railway has been built in Tata in July 15, 1884. The tracks are fragmenting the city that is still a problem. After the Second World War, industries massively relocated away from central areas to suburban areas, leaving room to the expansion of administrative and financial activities. Warehousing and transportation, no longer core area activities in the city centre, have also relocated to new peripheral locations close to modern terminal facilities such as motorway. Nowadays only the connection of industrial park is missing, therefore the goods vehicles go to the historical core.

The city structure is very fragmented due to the road and rail infrastructure.

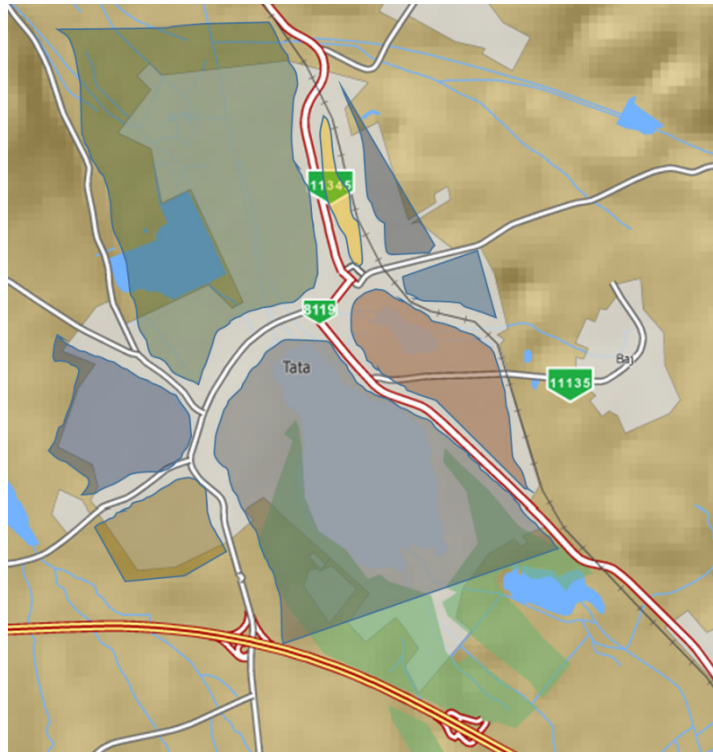


Fig. 3. **Fragmented city structure of TATA**
Source: <http://kenyi.hu>

Major roads and the railway fragment the city's urban fabric, which makes cycling particularly difficult.

9. LEGAL INSTRUMENTS AND LIMITATIONS, ETC.

In Tata there are several examples of using legal means for traffic calming and other purposes, stimulating the use of more environmentally friendly transport methods.

- There is one pedestrian street in Tata in the city centre, which is closed from car traffic (Bajcsy-Zsilinszky street);
- in the city centre there is time limitation applied for parking. The time limit is 2 hours;
- traffic calming (30 kmph for road vehicles) is applied in some residential areas, especially in streets along the main roads.

10. ADMINISTRATIVE AND PROFESSIONAL APPARATUS AND STRATEGIC DOCUMENTS OF THE LOCAL MUNICIPALITY

In the local council the Group of Urban Management and Asset Management deals with transport issues. The group belongs to the Office of Finance and Urban Development.

In this group, one person is dedicated to the administrative questions of transport issues. The transport related tasks are performed by Városkapu PLC., and also there is one person road inspector employed by the city.

10.1. STRATEGIC DOCUMENTS:

- Strategic feasibility study of the bicycle friendly city, 2012
- The feasibility study of bicycle transport is being carried out, it is expected to be discussed by the local government in May 2014.
- Tata took part in the preparations of the plans of the bypass road and this was lobbied successfully into the National Development Plan.

10.2. LIST OF TRANSPORTATION STAKEHOLDERS

- County Office of the Hungarian Road Nonprofit Ltd. (Magyar Közút Nonprofit Zrt. Komárom-Esztergom Megyei Igazgatóság)
- Municipal Office of the City of Tata (Tata Város Önkormányzati Hivatal)
- Transport Authority, County Office (Komárom Esztergom Megyei Közlekedési Felügyelet)
- Vértés Volán Ltd.
- Városkapu PLC.
- MÁV Hungarian State Railways PLC (Magyar Államvasutak Zrt.)

11. ISSUES, CONFLICTS, AND CHALLENGES IDENTIFIED DURING THE ROUNDTABLE DISCUSSION

On the roundtable, local stakeholders on the field of transport: representatives of the local council, experts, representatives of related companies and NGOs were invited and participated on the event. With their help, the following problems were identified.

11.1. PROBLEMS

- The main problem in the transport of Tata is the fragmented city structure. Several main arterial roads cross the city, as well as the railway also cut the city into two parts. This circumstances result in a situation in which the energy efficient, environmentally friendly solutions cannot, or can hardly prevail.
- Although Tata posses the title of “Bicycle friend city” since 2008, the situation hinder the construction of bicycle roads: due to the spatial need of the traffic on the crossing roads, wide roads were constructed, so there were no space was left for bicycle roads or pavements. The high number of the crossing vehicles means pollution and other problems also for the city. Walking is also hindered due to these circumstances.
- As of the three railway crosses two are level crossings, it causes a severe problem as well. In these two crosses, cars have to wait many times 10-20 minutes for passing through.
- The city cannot solve this problem on its own: the roads and the railway are owned by the state, not the city, so not just financing and decision making is beyond the city.
- While many people work in Budapest, there is also a shortage in P+R parking and in bicycle racks at the railway station, which possibly contributes to the unjustifiably high share of car use.
- The station of the intercity bus is in the inner city. This results in traffic that partly could be avoided if the station would be built closer to the railway station.

- Some of the lines of the public transport are also not satisfyingly used: this is mainly due to the schedule of the railways, which basically determines the schedule of the bus lines.
- The intercity bus station will be moved to the main railway station, where, according to the plans, an intermodal transport hub will be constructed, with P+R parking, and bicycle racks.
- The plan of the development of the bicycle infrastructure will be introduced to the city council this year.

12. RECOMMENDATIONS

Great challenge for the inhabitants is the heavy road vehicle traffic that could be eliminated by road infrastructure development. As the roads are owned by the state, the problems cannot be solved by the city itself.

The greatest challenges of city transportation are the over-emphasizing of individual needs, the lack of willingness to collaborate, and the **low occupancy of personal vehicles** (1-2 people per car on average).

The modal shift can be encouraged by the increase of attractiveness of public transport. The proposed EU funded developments can fasten this process.

Using public transportation or carpooling schemes would help improve the current situation.

A bike sharing scheme based on a European models would greatly contribute to creating an energy efficient transportation system in the city. It could be built upon the already existing approach of the city towards cycling, and also, on the inhabitants' practice and needs. However, further development of the bicycle infrastructure also would be needed for increasing the share of cycling, but as a first step, overall road infrastructure development should be implemented.

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