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**Project SUSTRAIN- SUSTainable urban tRansport best prActices sharing; Project number:2-2019\_01**

## **Mobility scenarios**

### **Municipality of Derventa**

**The Action is funded by the Austrian Development Agency (ADA) through the BACID grant scheme (Building Administrative Capacities in Danube Region & Western Balkans), managed by the Austrian Association of Cities and Towns (AACT) and KDZ Centre for Public Administration Research.**

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## Strategic framework for the development of the Municipality of Derventa

Important document is Strategy for development of Derventa in period 2018 until 2025 that sets strategic goals and priorities of sustainable economic, social and environmental development. It is focused to create better conditions for citizens' life, strengthen businesses, and raise ecological awareness. The purpose of planning is to make Derventa a center of new, technologically advanced and business activities reaching modern European standards of living. Derventa has surface of 517 km<sup>2</sup> and according to the census of 2013 27404 citizens. Town settlement covers 16,67 km<sup>2</sup> while urban area covers 8 km<sup>2</sup>. The Derventa municipality borders with Brod, Modriča, Doboje, Stanari, Prnjavor and Srbač, as well as Croatia across the Sava river. The town of Derventa lies on the river Ukrina, and roads lead from it to Brod, Kotorsko (Doboje), Prnjavor (Banja Luka) and Srbač. Total length of streets network in the town is 676.894,15 meters, out of which 83.986 meters (12,41%) are comprising magistral roads. On the territory of the Municipality are recorded 37 local roads, 142 uncategorized roads and around 100 city streets. Pedestrian trails on the territory of the City are not appropriately developed, although walking is common manner of the transportation in the City. Only 18 streets have available pedestrian trails or sidewalks. Length of the streets with pedestrian trails is 14.570 meters. Parking for vehicles in urban area is set on marked spots along the streets, however parking lots are crowded during peak hours when cars are parked on green surfaces and along pedestrian lines. This inappropriate parking problem was reduced from April 2017 when penalties were introduced. There are more than 460 parking lots in the city center. More than 20% of streets in city center are regulated as one way traffic, while the rest of streets are organized as two-ways traffic.

### 1. "Business-as-usual" scenario

Area Name	Municipality of Derventa, Bosnia and Herzegovina
Scenario Name	Business-as-usual
Date	April 2020
Policy target year	2030

Baseline data for 2018 shows that Derventa has a motorization rate of 273 per 1000 residents. The modal split is the following: car 75,5%, public transport 21,5%, cycling 1% and walking 2%. Other types of transport do not exist on the target territory. Green vehicles are not registered in the territory. On the demographic side, Derventa has a population of around 25310 residents with negative trend of slow decrease of population for approximately 150 per year. Number of registered accidents in 2018 with serious injuries is 16, while there were 4 fatalities. The baseline data is based on the previously carried out survey, experts estimates and calculations using the EU Urban Transport Roadmaps tool<sup>1</sup>.

This scenario foresees continuation of the current transport/mobility policies in the next 10 years.

<sup>1</sup> <http://www.urban-transport-roadmaps.eu/>

The local authorities will continue with current trend of small investments in regular maintenance of the road network. Construction of cycling lanes and pedestrian paths is not considered as a priority.

The results of scenario “Business as usual” are mainly influenced by overall trend of economic growth are slightly rising incomes, leading to increase of the motorization rate and modal share of cars. The motorization rate will continue to increase and will be 345 vehicles per 1000 residents. The modal split of cars will increase to 76,3%, while other modes will slightly decrease. The uptake of green vehicles will be negligible. Emissions from transportation (CO<sub>2</sub>, PM, CO, NO<sub>x</sub> and VOC) will decrease, mostly as a result of technological improvements and replacement of older vehicles with newer, cleaner engines. However, this decrease is not a result of any specific policy or incentive by the local authority.

Impacts of “Business as usual” scenario are very limited since it is not made by the choices of the local authority but rather by external factors. There are some positive impacts regarding decrease of emissions and accidents, but there is constant increase of use of personal cars for transport that will have negative effects of congestion. If these policies continue to be implemented in the long term, the currently positive impacts will turn to negative, caused by the high motorization rate, neglected public transport and active modes. The scenario foresees continuation of the current, very limited and outdated, mobility policies.

## 2. Scenario description

This scenario foresees continuation of current transport / mobility policy in the next 10 years. The modal share of cars will increase, with increase of the motorization rate to 345 cars per 1000 residents, and congestion in the urban center will be increased. Traffic will adversely affect the environment and business activities. The modal share of cycling and walking will decrease. Public transport will be of poor quality and its modal share will slightly decrease. There will be an increase in the number of improperly parked vehicles, and a worsening of traffic safety. Vehicles will have an advantage over people. Integrated mobility will not exist. Currently, population has a negative trend of decrease of about 0.6% per year.

Regarding the types of transport technology that will be diffused by 2030, it is predicted that the modal share of public transport will slightly decrease to 21,4% while the modal share of cars will further increase to 76,3%. The modal share of cycling will remain negligible at 0,8%, while walking will decrease slightly to 1,5%. The uptake of green vehicles will be negligible.

This scenario is a continuation of the current mobility policy of the Municipality of Derventa. The current mobility policy does not feature sustainable development. The scenario business as usual will not lead to improvement of living quality in particular related to acceleration of mobility, transport safety and land use.

Emissions from transport will be decreased as a result of technological improvements and purchase of vehicles with newer, cleaner engines. Traffic safety will be increased, with reduction of accidents with serious injuries and fatalities resulting from regular activities and safety campaigns, for all groups and traffic modes, especially for pedestrians.

The number of public transport users will be reduced due to the lack of a policy of favoring public transport. Costs related to maintenance and construction of new roads will increase due to increased

traffic. CO2 emissions will be slightly decreased. However, this reduction is not result of policies but rather the result of technological improvements and replacement of older, more polluting vehicles.

Characteristics of transport:

- average length of trips will remain the same
- the motorization rate will increase to 345 vehicles per 1000 population
- the modal share of cars will increase to 76,3%
- the modal share of public transport will decrease to 21,4%
- the modal share of cycling will remain negligible and decrease to 0,8%
- the modal share of walking will decrease to 1,5%

### 3. Fostering „active“ transport modes (walking and cycling) scenario

Area Name	Municipality of Derventa, Bosnia and Herzegovina
Scenario Name	Fostering „active“ transport modes (walking and cycling)
Date	April 2020
Policy target year	2030

Baseline data for 2018 shows that Derventa has a motorization rate of 273 per 1000 residents. The modal split is the following: car 75,5%, public transport 21,5%, cycling 1% and walking 2%. Other types of transport do not exist on the target territory. Green vehicles are not registered in the territory. On the demographic side, Derventa has a population of around 28000 residents with negative trend of slow decrease of population for approximately 150 per year. Number of registered accidents in 2018 with serious injuries is 16, while there were 4 fatalities. The baseline data is based on the previously carried out survey, experts estimates and calculations using the EU Urban Transport Roadmaps tool<sup>2</sup>.

This scenario foresees fostering of active transport modes. The local authority will support increase of the modal share of walking and cycling by implementing targeted measures.

The local authorities will implement targeted measures in order to support increase of modal share of walking and cycling.

- Land use planning will be utilized during planning and design of new construction and development in the target territory in order to support sustainable urban mobility and active transport modes.
- Configuration of the urban area is characterized with hilly landscape, thus it is not simple to construct bicycle lanes. On streets, where possible, will be marked bicycle lanes.
- The local authority will widen the walking/cycling network, with obligatory pedestrian and cycling paths constructed with new roads. Cycling paths will be built along the streets and green surfaces where possible. Traffic signs for bicycle traffic will be set up as well as parking spots for bicycles.

<sup>2</sup> <http://www.urban-transport-roadmaps.eu/>

- The local authority will implement traffic calming measures during urban planning and design of neighborhoods with the aim to increase safety and support use of sustainable mobility modes, mainly walking and cycling.

The results of scenario “Fostering active transport modes” are focused on the modal shift to sustainable mobility modes and decrease in emissions. The motorization rate will continue to increase and will be 332 vehicles per 1000 residents. The modal split of public transport, cycling and walking will increase to 23%, 2,7% and 3,3% respectively, while the modal share of cars will decrease to 71%. The uptake of green vehicles will remain negligible and in any case not a result of policies, but rather the result of rising incomes and individual awareness of citizens on environmental protection. Emissions from transportation (CO<sub>2</sub>, PM, CO, NO<sub>x</sub> and VOC) will decrease as a result of increase in the modal share of sustainable mobility modes. The focus on safety will result in decrease of accidents with serious injuries and fatalities.

The “Fostering active transport modes” scenario has a significant impact on the modal split and its shift to sustainable mobility modes. Furthermore, transport emissions will be significantly reduced and accidents will be moderately decreased. While the overall population will reduce, the quality of life will be improved. Congestion caused by vehicles will be reduced.

#### 4. Scenario description

Topographically, Derventa is not favorable for bicycle traffic, as the landscape is hilly. On the street, where possible, cycling routes will be marked. Some streets will turn into one-way ones, and there will be space for marking bicycle tracks. Traffic signs for bicycle traffic will be set up, as well as parking spots for bicycles. Walking trails will be maintained and new will be build up. The area of joint use for all traffic modes will be designated in the municipal center.

The quality of life in the municipality will be better. The municipality will attract young people to come to live in. The total population will decline.

Penetration of green vehicles will be negligible, while the population will slowly replace older vehicles with newer, more efficient and cleaner ones.

This scenario is in line with the upper-level transport policy of the country, the region and the sustainable urban mobility policy of the EU. Thanks to increased modal share of walking, cycling and public transport, population will be healthier, transport emissions will be significantly reduced and overall traffic in FUA will be more efficient. The quality of life in the area will be improved.

The use of cycling and walking as a transport mode by all inhabitants will increase.

In total, end users will achieve savings thanks to lower cost of fuel, parking and vehicle maintenance. There will be a reduction in transport-related energy consumption.

Transport-related CO<sub>2</sub> emissions will be significantly reduced due to decrease in the modal share of passenger cars and gradual replacement of older, more polluting vehicles with newer, more efficient and cleaner ones.

Characteristics of transport:

- the average length of trips will not increase
- the modal share of cycling will increase to 2,7%
- the modal share of walking will increase to 3,3%
- the modal share of public transport will increase to 23%
- the modal share of passenger cars will decrease to 71%
- the local population will develop awareness of healthy life-styles

## 5. “Making public transport more attractive” scenario

Area Name	Municipality of Derventa, Bosnia and Herzegovina
Scenario Name	Making public transport more attractive
Date	April 2020
Policy target year	2030

Baseline data for 2018 shows that Derventa has a motorization rate of 273 per 1000 residents. The modal split is the following: car 75,5%, public transport 21,5%, cycling 1% and walking 2%. Other types of transport do not exist on the target territory. Green vehicles are not registered in the territory. On the demographic side, Derventa has a population of around 28000 residents with negative trend of slow decrease of population for approximately 150 per year. Number of registered accidents in 2018 with serious injuries is 16, while there were 4 fatalities. The baseline data is based on the previously carried out survey, experts estimates and calculations using the EU Urban Transport Roadmaps tool<sup>3</sup>.

The local authorities, in addition to regular maintenance of the road network will develop and implement measures in order to boost utilization of the public transport by residents and tourists. The local authorities will implement the following group of measures:

- Land use planning – planning of new construction and development in the target territory in order to support sustainable urban mobility and public transport modes.
- Improvement of bus network – Local authorities will coordinate with public transport operators in order to redesign layout of public transport and to introduce new lines where necessary. The occupancy and economic impact of each line will be measured and regular updating of the network will be realized. Local authorities will invest in modernization of bus stops and station.
- Public transport integrated ticketing and tariff schemes – The integrated ticketing for all public transport operators will be realized in order to increase flow of the travel by public transport and improve convenience of passengers traveling long distances or to more than one location. Tariff

<sup>3</sup> <http://www.urban-transport-roadmaps.eu/>

schemes will be developed in order to reduce costs for passengers and stimulate use of public transport.

- Prioritizing public transport – The traffic system in the target area will be designed in order to give priority to public transport vehicles where ever possible and to reduce travel time in public transport. This measure will stimulate use of public transport.

The results of scenario “Making public transport more attractive” are influenced by realized measures of the local authorities in target area during short, medium and long term. Nevertheless, the motorization rate will continue to increase thanks to overall economic growth and in 2030 will be 331 vehicles per 1000 residents. The modal split of cars will decrease to 69% while other modes will increase, bus to 25,3%, bicycle to 2,5% and walking to 3,2%. The accidents with serious and fatal injuries will be reduced in comparison to the base year thanks to better land use planning and decrease of personal car use in mode share. The uptake of green vehicles will remain negligible, but thanks to support of the local authorities public buses on alternative fuels will start to emerge. Emissions from transportation (CO<sub>2</sub>, PM, CO, NO<sub>x</sub> and VOC) will be significantly reduced. This reduction is mostly result of reduced modal share of personal cars in overall traffic in addition to the technological improvements and replacement of older vehicles with newer, cleaner engines.

Impacts of “Making public transport more attractive” scenario are mostly visible in the changes of the mode split where use of car is reduced and all other modes are increased. While the main objective of the scenario is to support use of the public transport, the positive effects are showed in increase of active modes as well. Increase of public transport in mode split for in 10 years will result from active policies and change in behavior of the residents.

## 6. Scenario description

This scenario is putting public transport in priority. Local authorities will co-finance the cost of public transport in large part. They will finance modernization of bus stations and introduction of new buses. Specially designated traffic lanes for public transport will be developed. Modern technology such as an electronic map will be used, the stations will have bus time displays, Wi-Fi and LCD monitors for useful information. Buses will be used up to 10 years old. New bus lines in the urban part of the municipality will be put in place. The parking cost in the central area will increase. The use of passenger cars will be reduced. The number of passengers in public transport will increase. The negative impact on the environment will decrease.

The quality of life in the municipality will be better. The municipality will attract young people to come to live in. The total population will decline.

New buses with more efficient engines will be used in public transport. The population will be able to use different types of payments for public transport (electronic cards, monthly and daily tickets, prepaid tickets etc.) Current buses that are over 20 years of age will not be used. With increase of modal split of public transport, residents will use more cycling and walking rather than personal vehicles.



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This scenario is in line with the regional upper-level transport policy and the sustainable urban mobility policy of the EU. The problem is the lack of effective transport policy at the entity level that would give priority to public transport. For example, at the moment of registration of the bus, a fee for the use of the highway is paid and buses in public transport do not use the highway. For example, the state should co-finance the use of biodiesel. Public and private institutions should buy a ticket for public transportation to workers and not to pay funds to their accounts that afterwards are not used for the public transport. Thanks to increased use of public transport, overall emissions from transport (CO<sub>2</sub>, PM, CO, NO<sub>x</sub>, VOC) will be reduced and overall traffic in FUA will be more efficient.

Measures under this scenario imply cheaper tickets, free tickets for people older than 65 years, cheaper tickets for student, LCD displays on bus station and in the buses, the greater use of low-floor buses and others. This will affect all demographic groups of the population as well as tourists and visitors from the region. As a result of implementation of measures in this scenario, number of accidents with severe injuries and fatalities will be reduced. Overall traffic safety for all groups will be improved.

Local governments will find financing models in order to invest in infrastructure and provide more funding in public transport based on public-private partnership. The end users will have cheaper tickets with better service and will achieve savings thanks to lower cost of fuel, parking and vehicle maintenance. There will be a reduction in transport-related energy consumption, since use of personal vehicles will be decreased. CO<sub>2</sub> emission will be reduced for approximately 3760 t/year in comparison to the 2018 as the base year.

Characteristics of transport:

- modal share of public transport will increase to 25,3%
- modal share of passenger cars will be reduced to 69%
- modal share of walking will increase to 3,2%
- modal share of cycling will increase to 2,5%
- total emissions from the transport will be reduced
- buses will be able to transport bicycles in a convenient way

Indicator/ Scenarios for the Municipality of Derventa	Baseline (2018)	Business-as-usual	Fostering active transport modes	Making PT more attractive
<b>Motorisation rate</b>	273	345	332	331
<b>Mode split (%)</b>	Car: 75,5% Bus: 21,5% Bicycle: 1% Walk: 2%	Car: 76,3% Bus: 21,4% Bicycle: 0,8% Walk: 1,5%	Car: 71% Bus: 23% Bicycle: 2,7% Walk: 3,3%	Car: 69% Bus: 25,3% Bicycle: 2,5% Walk: 3,2%
<b>Travel distance per trip (km)</b>	3.3	3.3	3,3	3,3
<b>Average car speed in peak hours (km/h)</b>	36	35,8	35,3	35,3
<b>Average bus speed in peak hours (km/h)</b>	14,4	14,3	14,5	14,5
<b>Vehicles-km by car conventional vehicles</b>	80	61,1	54,3	54,3
<b>Penetration of alternatively fuelled car vehicles</b>	0%	0%	0%	0,04% hybrid electric
<b>Penetration of alternatively fuelled bus vehicles</b>	0%	0%	0%	0%
<b>CO2 emissions per year (tonnes)</b>	27340	24545	23580	23580
<b>PM emissions per year (tonnes)</b>	3,04	1,64	1,58	1,58
<b>CO emissions per year (tonnes)</b>	78,72	63,66	66,22	66,22
<b>NOx emissions per year (tonnes)</b>	77,5	38,3	37,22	37,22
<b>VOC emissions per year (tonnes)</b>	21	14,5	14	14
<b>Total Accidents by severity</b>	16 serious 4 fatal	14,4 serious 3,5 fatal	13,3 serious 3,4 fatal	13,2 serious 3,3 fatal
<b>Transport expenditure per individual per year (EUR)</b>	851	801	820	816