POLICY BRIEFING 02|2022

German Economic Team
UZBEKISTAN

Organisation of road traffic in Germany and recommendations for Uzbekistan

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1. Introduction

- Strong economic and population growth led to rapidly increasing traffic volumes in Uzbekistan
- The road segment as most important and fastest growing transport mode bears the greatest burden in this development
- In a recent Policy Study* we identified a number of challenges in the road segment, which include
  - funding gap for maintenance of roads and expansion of network
  - need for improved design, construction quality control, compliance with standards and specifications
  - weak safety standards

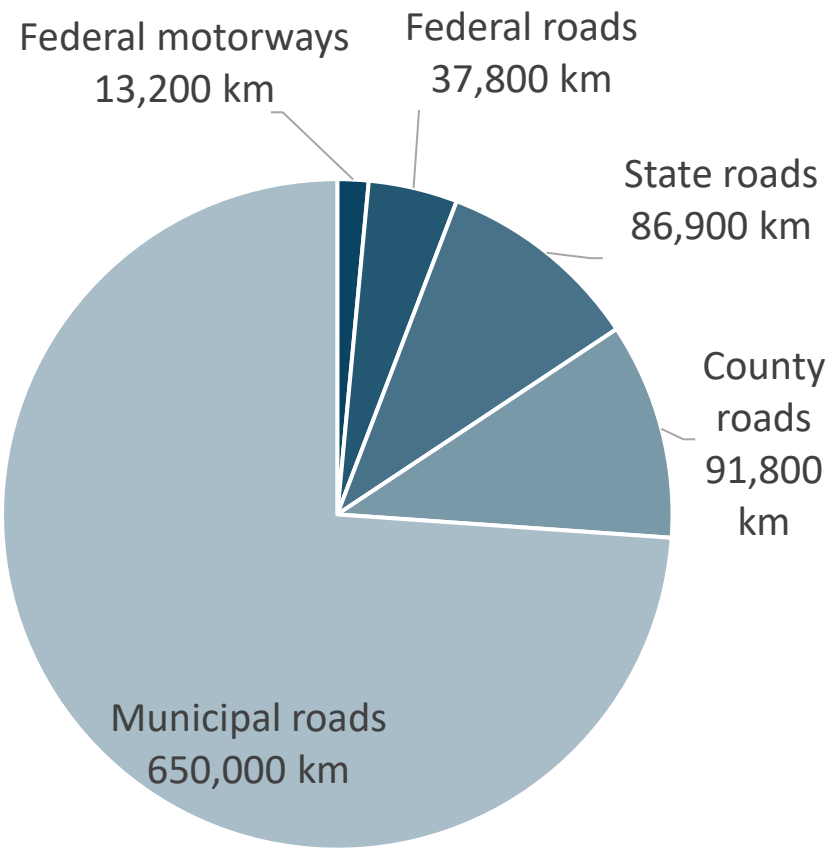
➢ **Goal of the current analysis** is to describe the organisation of the road traffic in Germany and derive recommendations for the improvement of the road organisation in Uzbekistan

*Policy Study PS/01/2021: *Uzbekistan's transportation sector: Brief status analysis and major challenges*

2. German road classification

Classification of German road network

Length of road network according to road classification



Source: German Federal Ministry for Digital and Transport

- Roads are classified according to the ownership which could be on federal, state, county or municipal level
- The ownership depends on the traffic purpose and connectivity of the road

➢ **Federal motorways and federal roads form a minor part of the road network, but they are important to enable the majority of all interregional, national and international traffic flows**

Classification and ownership of roads

Sign	Road type	Owner	Traffic purpose	Special features
	Federal motorway (“Bundesautobahn”)	Federal	Long distance connection between cities	• No speed limit, just a suggested speed of travel of 130 km/h • Only for vehicles which can reach more than 60 km/h • No intersections • Separate lanes should be provided for directional traffic
	Federal road (“Bundesstraße”)	Federal / State*	Connection between cities and city regions	• Only for vehicles which can reach more than 60 km/h
	State road (“Landesstraße”)	State	(Supra-)regional in the state	
	County road (“Kreisstraße”)	County	Within a county	
	Municipal road (“Gemeindestraße”)	Municipality	Between districts / neighbouring communities and within cities	

*Source: own illustration; *Federal ownership, but administered by states*

- **German road classification is comparable to international classification standards. The classification reflects different connection categories and the different road types are dedicated to different managing authorities**

3. Structure of road administration

Responsible executive bodies/authorities for road construction and maintenance

- The road owning authority is generally responsible for planning, financing, construction, operation and maintenance
- **Exceptions:**
  - Federal roads: federally owned but administered by the states
  - Federal, state or county roads which pass through bigger cities (usually >50,000 inhabitants): responsibility of the municipality

- Maintenance responsibilities are carried out by road maintenance departments
  - Regular inspection
  - Maintenance
  - Cleaning / winter service
  - Monitoring of accident black spots

There are no special authorities for the operation of tunnels and bridges. These infrastructures are maintained by the responsible road executive body/authority

Road administration on federal level

Federal Highway Authority

Technical and legal supervision

German Federal Ministry for Digital and Transport

Represents the Federal Republic as owner in the supervisory Board

Financing

Planning

Construction

Autobahn GmbH

Limited company responsible for all federal motorways

Maintenance

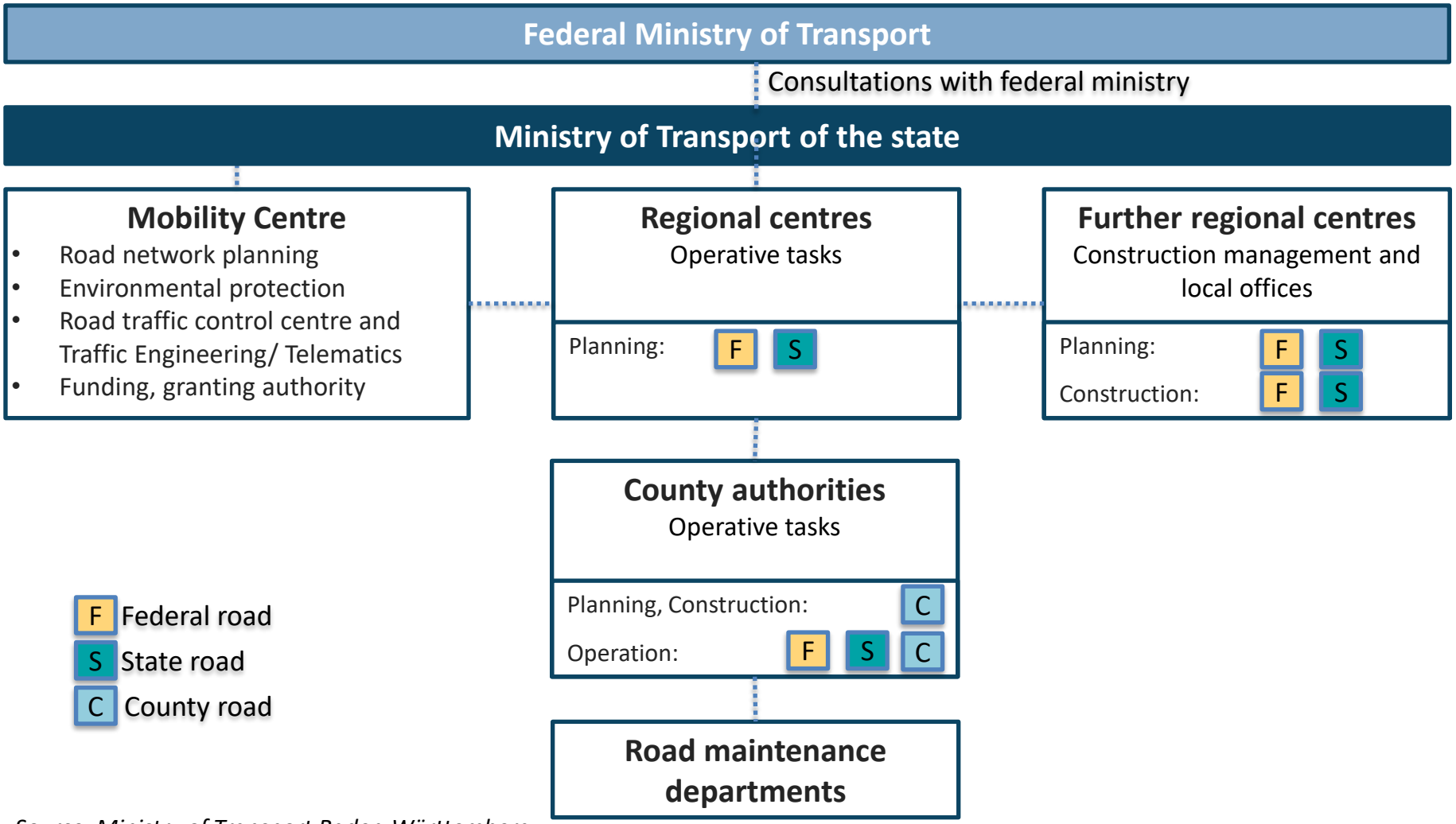
Operation

Administration

Source: Autobahn GmbH

Road administration on state, county and local level

General road management structure of a state (variations apply in some states)



Source: Ministry of Transport Baden-Württemberg

Responsibilities for traffic control

Several authorities are responsible for safe road and traffic conditions

Road type	Approval of planning + construction	Control of traffic flow	Traffic control	
	• Approval of extensions, conversions and new constructions	• Traffic signs and road markings • Traffic restrictions like speed limits, closures and traffic lights • Permits for heavy goods transports	• Control of speed limits • Traffic control (check of driving license, roadworthiness tests of vehicles and drivers	• Control of goods transports • Control of truck toll payments • Weight control
Federal motorway	Federal Highway Authority (FBA)	Federal motorway company (Autobahn GmbH)	Police	Federal Office for Freight (BAG)
Federal road	Road construction authority on municipal, county or state level	Road traffic authorities on municipal, county or state level		
State road				
County road			Police / Local administration	-
Municipal road				-

Source: own illustration

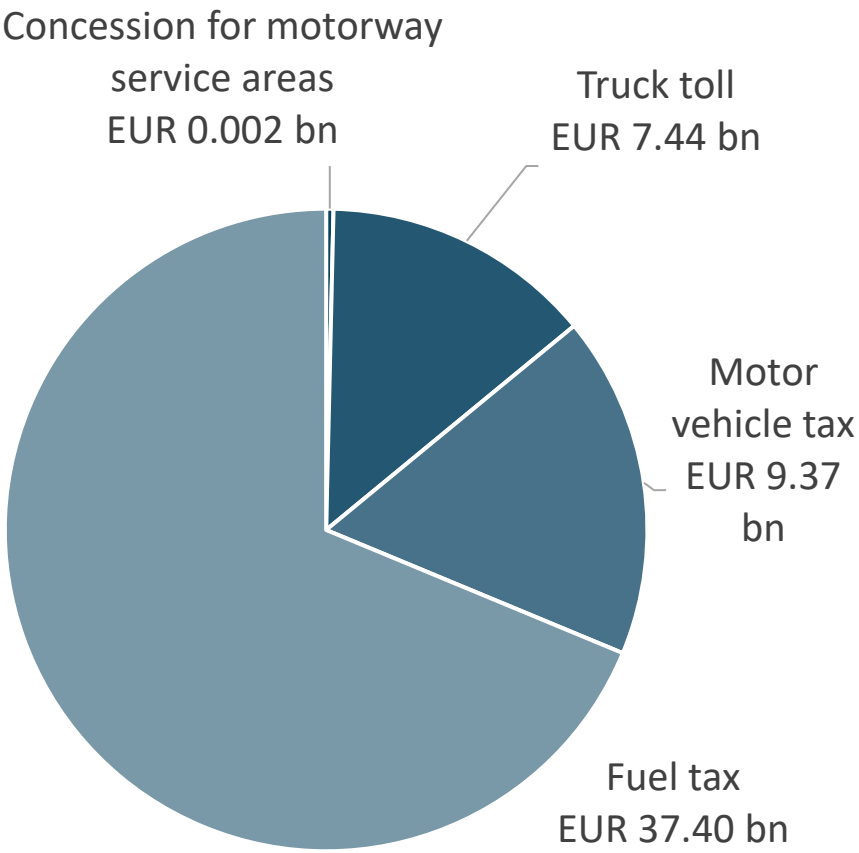
- Registration of cars and driving licenses: task of municipal authorities

➢ **German experience shows that an appropriate share of responsibilities can optimise traffic control functions. Interfaces between responsibilities have to be defined in a proper way to avoid regulation gaps**

4. Funding road infrastructure

Road related revenues

Road related revenues in 2019



Source: Federal Ministry of Finance

- Fuel tax is a major source of road related revenues
- But fuel tax and motor vehicle tax are not purpose related and don‘t have to be used for road financing
- Truck toll must be used for federal roads or motorways
- Other revenues, mainly on municipal level are
  - Parking fees
  - Fines for speeding
- There are no official numbers available for these revenues

➢ **Total road related revenues in 2019: EUR 53 bn, more than twice the amount of annual road related expenditures**

Road related expenditures

- The owner of the road finances construction, operation and maintenance

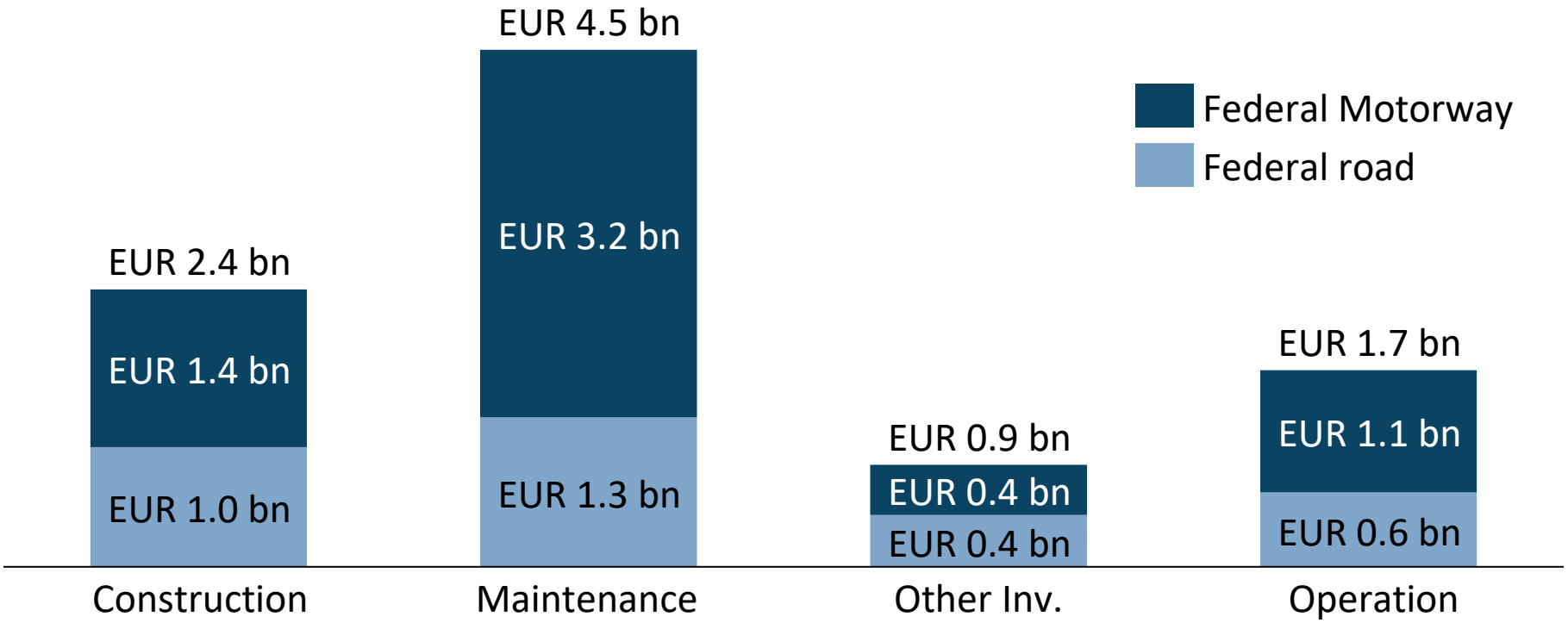
Road type	Owner	Length of road network	Total road related expenditures, 2012*	Financing
Federal motorway	Federal	13,200 km	approx. EUR 3.6 bn	• ~66% Funds of the federal budget (taxes) • ~33% User financing (truck toll) • Further funding from the European Union
Federal road	Federal / State**	37,000 km	approx. EUR 5.3 bn	
State road	State	86,900 km		• Financing by the respective territorial authority • Supplementary federal funds for municipalities
County road	County	91,800 km	approx. EUR 1.2 bn	
Municipal road	Municipality	650,000 km	approx. EUR 8.9 bn	
Total		**878,900 km**	**approx. EUR 19.0 bn**	

*Source: German Federal Ministry for Digital and Transport; *latest existing figures including all categories; **federal ownership, but administered by states*

- Road related expenditures: approx. 0.7% of GDP (German GDP 2012*: EUR 2,745 bn)
- This is above OECD average; OECD total investment in inland transport infrastructure is also 0.7% of GDP but includes also rail, waterways and airports

➢ **Despite relatively high spending Germany has a rehabilitation and maintenance backlog for roads and especially bridges**

Expenditure breakdown of federal motorways and federal roads in 2019



Source: German Federal Ministry for Digital and Transport

- Maintenance is the highest cost item
- Total Expenditures for federal motorways and federal roads 2019: EUR 9.5 bn (0.28% of 2019 GDP)
- Expenditures have remained constant in recent years, despite rising construction costs

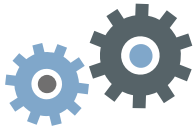
5. Reforms in the road sector

Reformation steps of the German road system

- 1990: Need for reforms after German reunification
  - Enormous maintenance backlog and need for additional infrastructure
  - Road network is publicly owned and administered and use is free of charge

- 1994: Discussion of private sector involvement
  - Adjustment of legal framework to allow public-private partnership projects
  - ➢ Private sector is supposed to construct faster/more efficiently

- Since 2005: Adjustment of road funding
  - Introduction of toll systems on federal roads
  - ➢ System change towards user financing



- Since 2021: Reorganisation of federal motorway administration
  - Transfer of responsibilities from federal states to public owned limited company (Autobahn GmbH)
  - ➢ Centralised and faster planning and construction

Discussion of private sector involvement
Enabling private sector involvement via PPP projects

1994: New law allows public private partnership projects for federal motorways and federal roads

2003/2005: two PPP tunnel projects implemented

- Operator receives initial public investment + user charges via a toll station system for 50 years
- Toll was planed for 30 years but duration was extended due to low ridership

2010: First PPP projects on feral motorway implemented

- Operator builds and maintains road and receives parts of the truck toll for 30 years

Since 2009: Adjustment of conditions for PPP-models

- New possible payment condition with "availability charge“ independent from traffic volume

Adjustment of road funding
New financing schemes – Toll systems

- There are 4 possible types of toll systems, two of them are in use in Germany a third type was put on hold due to legal issues

Type	Handling	Pricing	Use in Germany
Free flow	GPS based, electronic registration and billing	Km-based	Truck toll on federal motorways and federal roads
Closed system	Billing at toll stations	Km-based	Public-private-partnership tunnel projects
Vignette	Coloured sticker is affixed to a vehicle windscreen	Fixed price for a period of time	Planed (but put on hold) car toll for all vehicles < 3.5t
Open system	Toll stations	Fixed price	-

Source: own illustration

➢ **All systems have their advantages and disadvantages, and it depends on the respective circumstances and objectives which system makes the most sense**

Toll on all federal motorways and federal roads for vehicles >7.5 t

- Rollout in 3 steps:
  - 2005: on all federal motorways for vehicles > 12t
  - 2015: on all federal motorways for vehicles > 7.5t
  - 2018: on all federal motorways and federal roads for vehicles > 7.5t
- Pricing takes into account:
  - Costs of air and noise pollution according to vehicle emission class
  - Road wear according to vehicle weight
  - Total price 0.09 – 0.26 EUR/km
- Collection of toll:
  - Automatic log-on based on GSM and GPS via an installed on-board unit
  - Manual log-on via toll station terminals or over the internet
- Operator:
  - A private consortium implemented and collected the toll for the federal government
  - In 2018 the consortium was taken over by the federal government
- Evaluation:
  - Further source of financing of federal highways (~EUR 7.6 bn in 2021)
  - System started with a delay of 1.5 years due to technical problems
  - Avoidance reactions to toll-free roads at the beginning

Further toll systems

Picture: badische-zeitung.de

PPP-projects with station toll

- Two public-private partnership tunnel projects collect toll via toll stations
- ➢ **Both projects have generated far less traffic than predicted**

Picture: autohaus.de

Car toll

- 2016-2019: Plans to introduce a car toll for all vehicles < 3.5t with a vignette
- ➢ **Put on hold due to legal reasons**

Reorganisation of federal motorway administration

Die Autobahn

- Before 2021: Federal motorways owned and financed by the federal government but administered by the states
- In 2021: Federal government takes over planning, construction, operation, maintenance and financial management of federal motorways from the states

➢ **Creation of federally owned limited company "Autobahn GmbH"**

Goal: Enable construction projects to be planned, approved and carried out faster, more efficiently and more economically from a single source. Better planning processes across state borders

➢ **New company started in January 2021. An evaluation is not yet possible**

6. Traffic control and telematic infrastructure

Traffic control centres to reduce traffic jams

- Traffic control centres on different regional levels (mostly used on federal motorways sections or in mayor cities) are tasked to reduce traffic jams

Picture: jungmann.de

Picture: augsburger-allgemeine.de

- Detection of traffic volumes (via sensors, cameras) and conditions of roads and weather
- Management of traffic flows due to planned construction works or events
- Incident management
  - Dynamic traffic information boards to recommend alternative routes or give information on traffic flows
  - Variable speed limit signs to smoothen traffic flow
  - Switching of green times at traffic lights
- Information management
  - Use of information and communication tools to inform users about current traffic status, like interfaces with radio or navigation systems

➢ **Traffic control centres are often operated by local authorities in conjunction with local police and transport operators and are an important instrument for managing traffic flows**

Technical infrastructure to measure traffic performance parameters

Route control system on an federal motorway

Picture: abdsb.bayern.de

Parts and tasks of route control systems

- Sensors, induction loops, video for measurement of
  - traffic volume, traffic density, local speed velocity
  - weather conditions (fog, rain)
- Electronic displays for
  - Speed limits
  - Overtaking bans for trucks
  - Warning signs (traffic jam, fog, slippery roads, construction works, accident sites)
  - Temporary use of service lane for traffic
  - Traffic redirection

Weight control of vehicles

- Who controls the weight of heavy vehicles

Authority	Where?
Federal Office for Goods Transport (BAG)	Federal motorways, federal roads and state roads
Police	All types of roads

- How weight is controlled

Picture: rp-online.de

Weight control is usually part of general traffic controls and is conducted with mobile scales

Picture: rp-online.de

Permanent truck scales are rarely in use, for example in front of weight sensible infrastructure like bridges

Speed limit enforcement

Different types of velocity control

Picture: badische-zeitung.de

Picture: autozeitung.de

- Speed control is task of the police or local administration
- Usually use of fixed or mobile radar systems
- If a vehicle runs to fast, a photo is taken
- The driver is identified via the number plate and receives a fine via mail

7. Lessons learned

Lessons learned 1/2

- The German organisational structure has proven reliable: it is important to avoid gaps in responsibility, especially in the monitoring of freight traffic
- In Germany expenditure for road infrastructure relatively high in international comparison, nevertheless maintenance backlog especially in last decades. More earmarked revenues might have been useful
- German experience with tolls is mixed, but they nevertheless are useful to generate additional revenues
- Even simple toll procedures appear to make sense, especially if they are implemented in conjunction with PPP projects
- Toll collection of all road users would have the advantage of generating more revenues but tolling of individual segments like freight transport, could also be used

Lessons learned 2/2

- Traffic guidance systems and digital systems in the toll sector show good results for avoiding traffic jams, measuring and guiding private and commercial traffic and implementing control tasks
- Private infrastructure financing are only partially used in Germany, it might nevertheless be recommendable to
  - speed up infrastructure development
  - enable modern maintenance processes and
  - safe and reliable adaptation of the existing infrastructure
- Increased use of digital monitoring systems for freight transport, such as number plate recognition or automatic weight control of vehicles, could further reduce the number of accidents and increase road safety

About the German Economic Team

Financed by the Federal Ministry for Economic Affairs and Climate Action, the German Economic Team (GET) advises the governments of Ukraine, Belarus, Moldova, Kosovo, Georgia, Armenia and Uzbekistan on economic policy matters. Berlin Economics has been commissioned with the implementation of the consultancy.

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