



Bundesministerium
für Verkehr und
digitale Infrastruktur

CBA of transport infrastructure projects in Germany

Dr. Catharina Horn
Federal Transport Infrastructure Planning, Investment Policy
Paris, 27th of February 2014



1. **The Federal Transport Infrastructure Plan**
2. CBA as the main tool for project evaluation
 - a. Main components
 - b. Key issues
 - c. Choices and difficulties with CBA
3. CBA for decision making

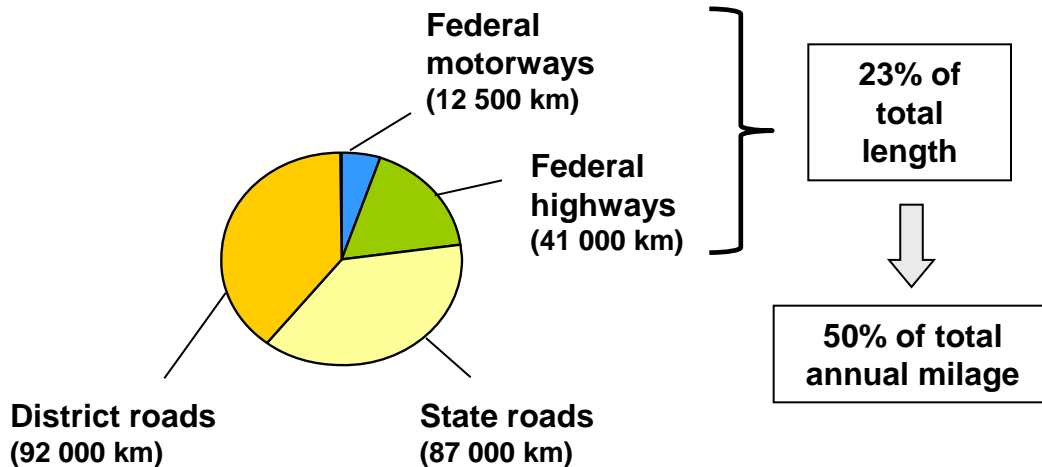
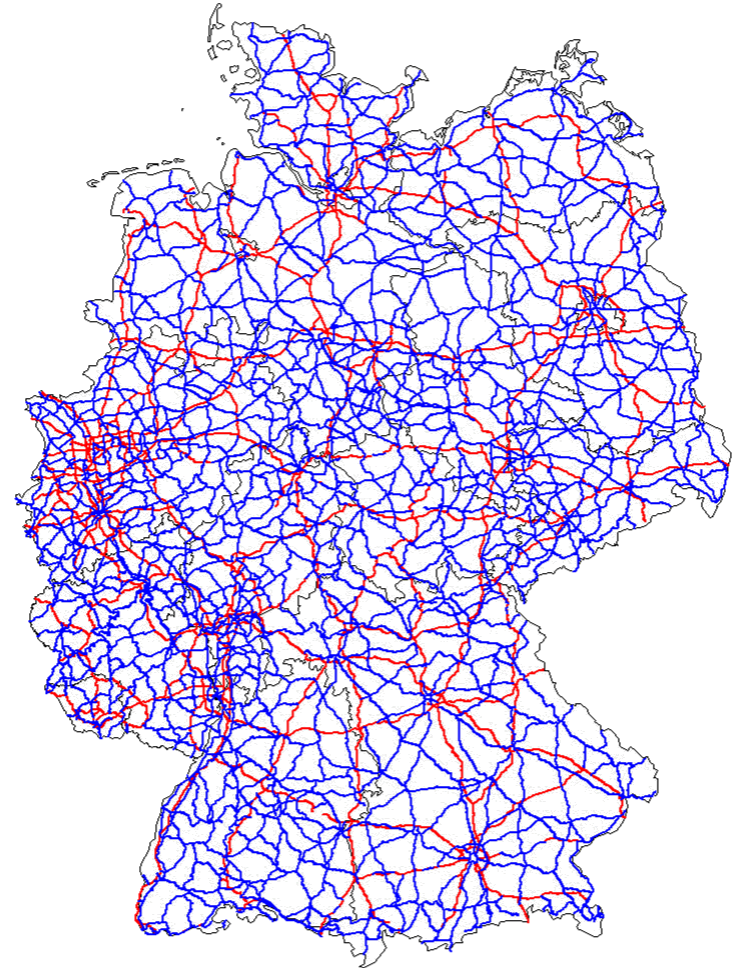


The Federal Transport Infrastructure Plan: Central regulatory element of transport infrastructure policy

- The Federal Government is responsible for the construction and maintenance of the **federal transport infrastructure**.
- The Federal Transport Infrastructure Plan indicates all infrastructure projects that the Federal government decided to realize the next years.
 - ...includes new construction of infrastructure but also upgrading and maintenance.
 - ...covers three modes of transport: road, rail, inland waterway transport.
 - ...identifies the need to invest in infrastructure and assesses the viability of projects.
 - ...is in general valid for about 10 - 15 years.
 - ...is drawn up by the Federal Government.
 - ...marks the beginning of the planning process.

Road Network in Federal Responsibility

- Federal motorways
 - 12 500 km length
 - Average 50 000 veh./24h
 - Peak 150 000 veh./24h
- Federal highways
 - 41 000 km length
 - Average 10 000 veh./24h

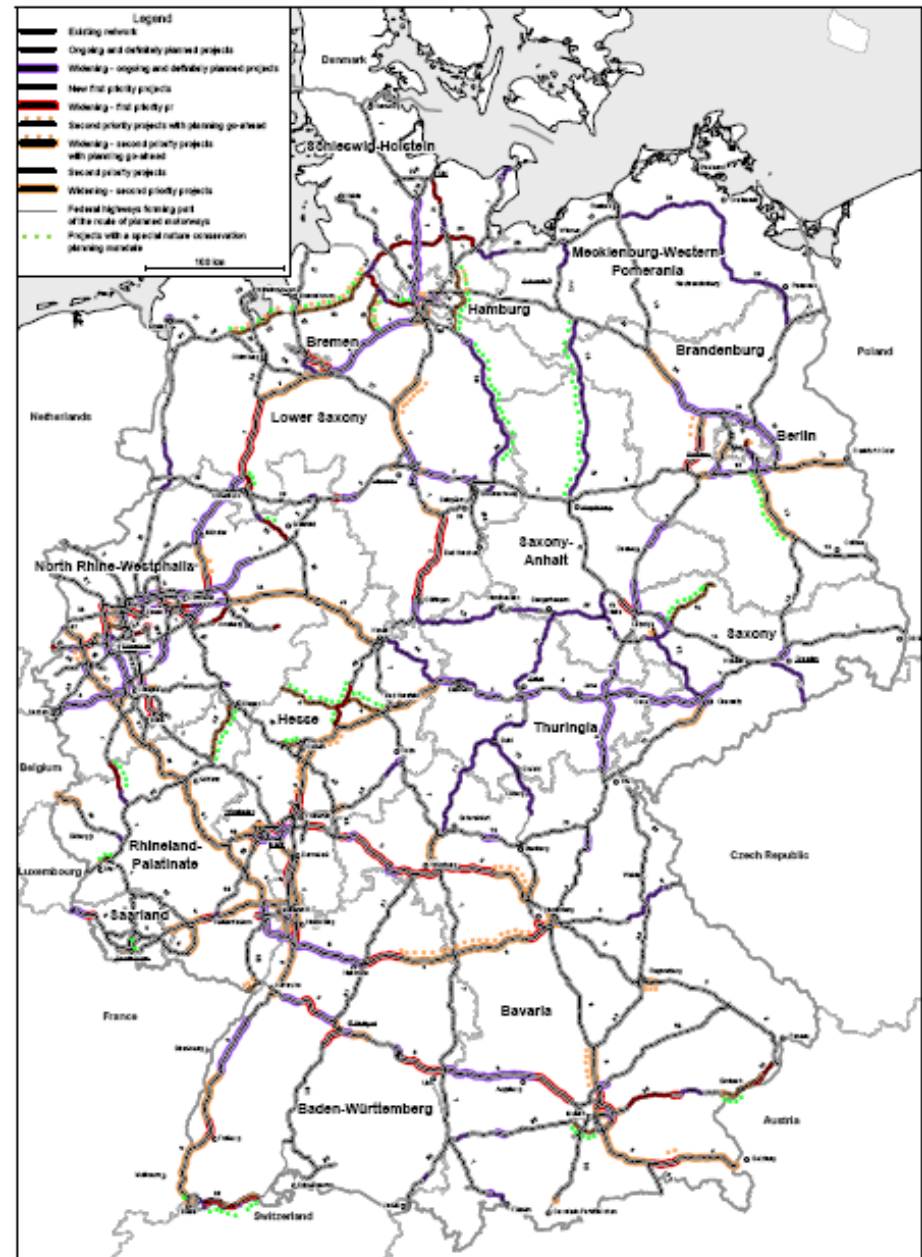


+ 400 000 km rural roads



Federal Transport Infrastructure Plan 2003

- The current plan covers the period 2001 – 2015.
- Contains two main categories of projects:
 - high priority projects
 - other projects
- Map refers to federal roads:
 - Ongoing projects
 - First priority projects
 - Second priority projects
 - Existing infrastructure





1. The Federal Transport Infrastructure Plan
2. **CBA as the main tool for project evaluation**
 - a. Main components
 - b. Key issues
 - c. Choices and difficulties with CBA
3. CBA for decision making

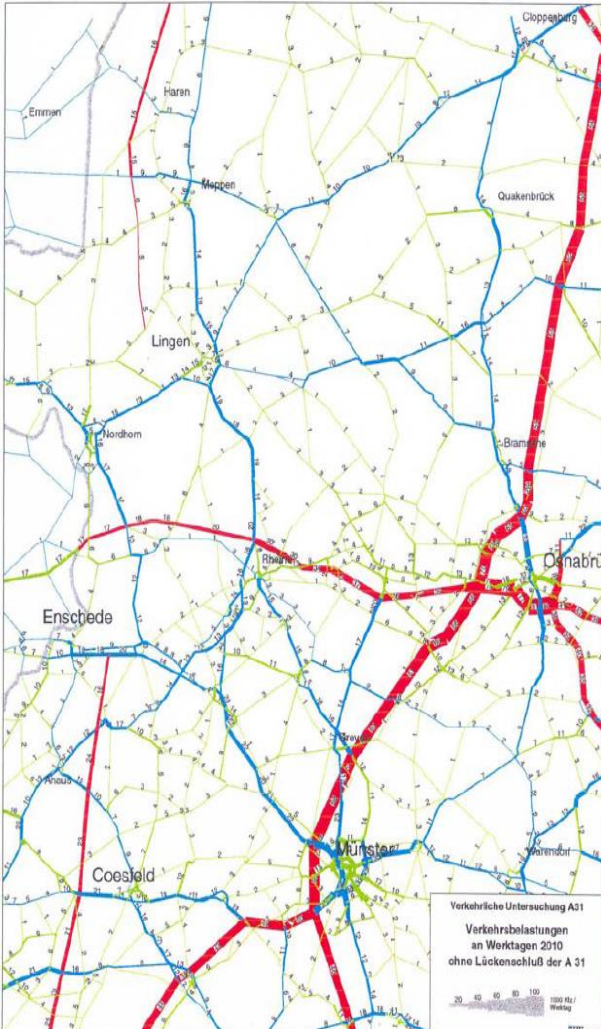


Project evaluation: CBA as the main tool

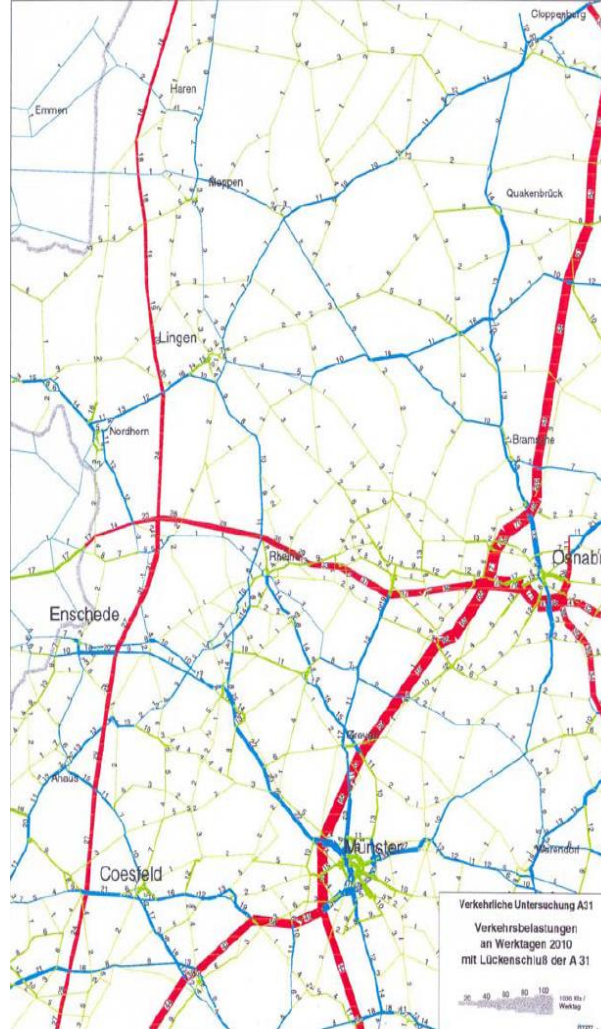
- CBA already used for evaluation of projects for the FTIPs 1992 and 2003.
- The Federal Ministry of Transport is preparing the new FTIP 2015 that will cover the period 2016 to 2030. → revision of the evaluation methodology
- Notification of projects: road, rail and inland waterway infrastructure projects registered for evaluation.
- Evaluation of projects shall be carried out in 2014/2015.
- Assessment of the project impacts → comparison between two scenarios: *with* the project and *without* the project.



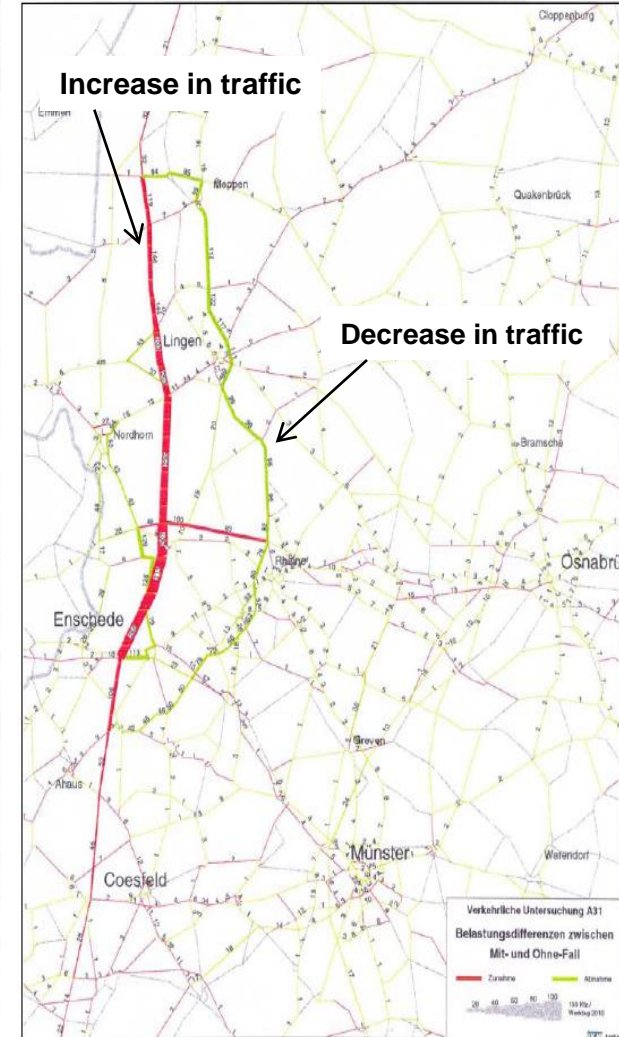
Traffic load *without* project



Traffic load *with* project



Traffic load difference to be valuated



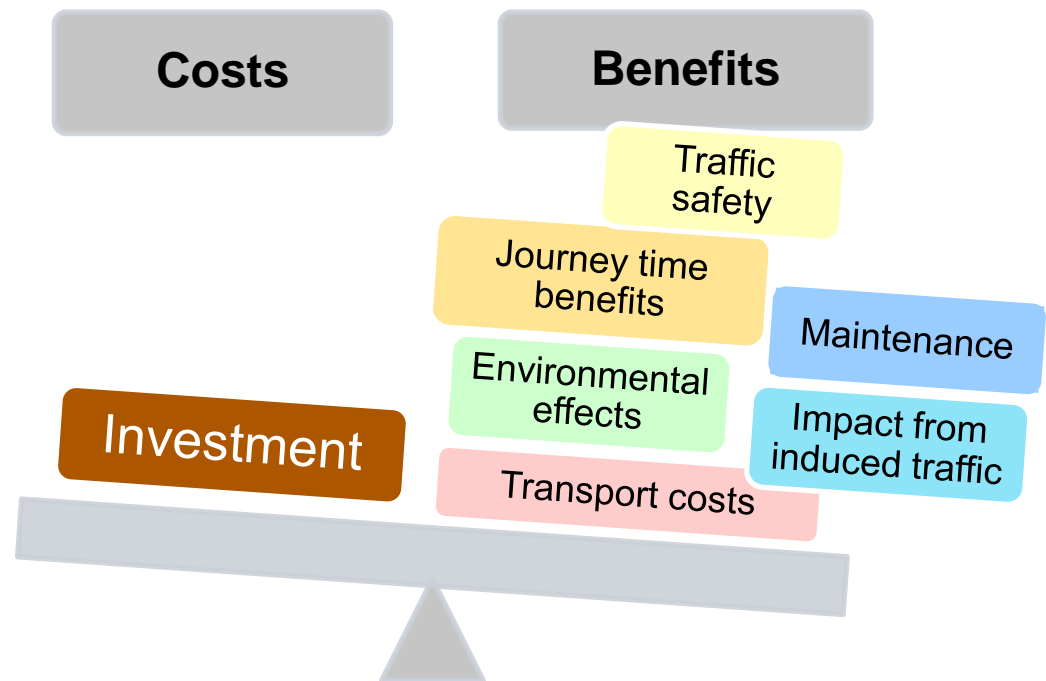


1. The Federal Transport Infrastructure Plan
2. CBA as the main tool for project evaluation
 - a. **Main components**
 - b. Key issues
 - c. Choices and difficulties with CBA
3. CBA for decision making



Cost-benefit analysis

- Benefit-cost ratio is calculated for each project: to see how much the project-related benefits exceed the project's investment costs.
- To calculate project-related benefits:
negative benefits
are deducted from
positive benefits.





Cost-benefit analysis (Federal Transport Infrastructure Plan 2003)

Benefit components – example of the road	Share
Reduction in transport costs Standby and operating costs for heavy goods vehicles and passenger cars, main benefit: reduction in labour costs	62,0%
Better accessibility Time savings in commercial and non-commercial passenger transport	34,8%
Improvement in traffic safety	15,4%
Regional effects Impact on the employment situation	1,4%
Environmental impact Especially noise, emissions such as CO ₂	0,3%
Maintenance of the transport infrastructure	-1,7%
Impact from induced traffic Only in passenger transport	-12,3%



Revision of the evaluation methodology for the FTIP 2015

- Components with the most important influence:
 - **Decrease in transport costs:** faster journeys, shorter distances and better use of vehicle capacities
 - Effect on vehicle standby costs: time-dependent material costs
 - Effect on vehicle operating costs: time-dependent personnel costs of the driving and accompanying staff, speed-dependent energy and fuel consumption costs, mileage-dependent material costs
 - Changes in transport costs due to modal shift
 - **Improved accessibility:**
 - Time savings due to decreased journey time in passenger transport, now also for the transport of goods
 - Update of the values of travel time savings according to the purpose of the trip and traveling distance; values for time savings in the transport of goods, handling of small travel time savings (< 2min)



Revision of the evaluation methodology for the FTIP 2015

- Update of the other components:
 - **Improved traffic safety:** decrease in accident costs by improving the level of safety, effect results from
 - vehicles using route types with a higher level of safety in the same mode of transport or
 - displacing traffic to other modes with higher level of safety.
 - **Environmental impact:**
 - **Changes in noise exposure in built-up areas and outside**
 - **Impact from pollutant emissions:**
 - Climate change: CO₂
 - Damage to vegetation: CO, CH, NO_x, SO₂, dust
 - Carcinogenic air pollutants: dust, benzene, benzo(a)pyrene
 - Damage to health and buildings: No_x



Revision of the evaluation methodology for the FTIP 2015

- **Transport infrastructure maintenance:**
 - Effect on maintenance costs due to change in traffic load
- **Impact from induced traffic:**
 - Increased mobility leads to additional mileage and thus to higher accident risks and pollution in road transport
- Components that should not longer be included:
 - **Employment effects:**
 - From building transport infrastructure and operating infrastructure by improving the attractiveness of the region as a location
 - According to economic forecast: full employment in 2030



Revision of the evaluation methodology for the FTIP 2015

- Components that should be added:
 - **Life cycle emissions:** greenhouse gas emissions during the whole life of an infrastructure
 - **Reliability of transport times:** how to measure and evaluate more reliable transport times
 - Feasibility study: how to define and measure reliability?
 - Difference between road and rail transport
 - What are passengers willing to pay for an increase in reliability?

- Other components that were also considered:
 - **Negative effects during the construction phase:** quite complex and relatively small effect



Revision of the evaluation methodology for the FTIP 2015

- Components that should be added:
 - **Life cycle emissions:** greenhouse gas emissions during the whole life of an infrastructure
 - **Reliability of transport times:** how to measure and evaluate more reliable transport times
 - Feasibility study: how to define and measure reliability?
 - Difference between road and rail transport
 - What are passengers willing to pay for an increase in reliability?

- Other components that were also considered:
 - **Negative effects during the construction phase:** quite complex and relatively small effect



1. The Federal Transport Infrastructure Plan
2. CBA as the main tool for project evaluation
 - a. Main components
 - b. Key issues**
 - c. Choices and difficulties with CBA
3. CBA for decision making



Key issues

- Discount rate:
 - 3 % in the past
 - Probably lower discount rate: 1 % - 2 %, recommendation: 1,7 %.
- How to cope with uncertainty?
 - Risk premium or sensitivity test
- Carbon value:
 - 205 €/t CO₂ in the past (recommendation from the Federal Environmental Agency: 165 - 205 €/t CO₂)
 - Probably lower value: 80 € for 2010, 145 € for 2030.



1. The Federal Transport Infrastructure Plan
2. CBA as the main tool for project evaluation
 - a. Main components
 - b. Key issues
 - c. **Choices and difficulties with CBA**
3. CBA for decision making



Choices and difficulties

- CBA for FTIP has to take into account some specific features of Federal transport infrastructure planning:

FTIP corresponds to the highest level of infrastructure planning

- Strategic planning: decision on new projects and on priorities is taken when a new FTIP is prepared every 10 to 15 years
- For this reason:
 - A very large number of projects to be evaluated
 - Many projects in an early phase of the planning process, other projects in an advanced phase
 - Different types of projects, different sizes
- Traffic forecast 2030 on a relatively detailed level



1. The Federal Transport Infrastructure Plan
2. CBA as the main tool for project evaluation
 - a. Main components
 - b. Key issues
 - c. Choices and difficulties with CBA
- 3. CBA for decision making**



CBA for decision making

- According to the Federal budget code: benefit-cost ratio > 1 !
- In 2003, 40 % of rail projects had a benefit-cost ratio > 3 and 35 % a benefit-cost ratio between 2 and 3. As regards road and waterway projects, almost 70 % of all projects had a benefit-cost ratio > 3 .
- For the FTIP 2003:
 - classification according to priority level:
 - VB ... First priority projects: high benefit-cost ratio
 - WB ... Second priority projects
 - Planning status of the projects and network design requirements are also taken into account.
- If a project is realized, depends also on the amount to be invested: maintenance and ongoing projects vs. new projects (new construction, upgrading of existing infrastructure).

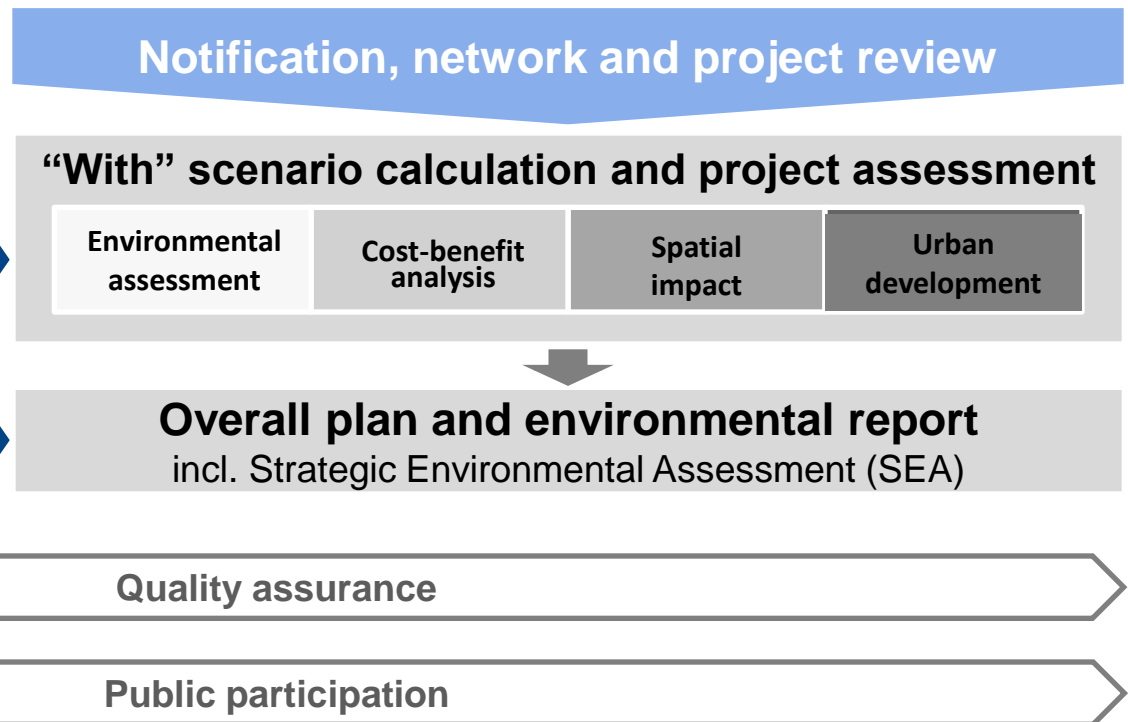


CBA for decision making

- For the FTIP 2015: How to set priorities?
 - 4 tools for project evaluation
 - CBA is still the most important criteria for choosing projects
 - New priority class: VB+ ... first priority projects plus
 - high benefit-cost ratio + to eliminate bottlenecks
 - no high environmental risks
 - Further points:
 - Maintenance and ongoing projects: what is an ongoing project?
 - Better evaluation of investment costs (in particular for projects in an early phase of planning)
 - Study of packages of projects, analysis of network deficiencies



Procedure Federal Transport Infrastructure Plan 2015





CBA for decision making

- On the basis of the FTIP, the government prepares a draft law to be voted by the parliament in order to modify the existing law referring to the upgrading of transport infrastructure.
- In the appendix of the law figures the “requirements plan” = the list of all projects (ongoing and new projects, i.e. upgrading existing infrastructure and new construction, according to priority classes) that shall be realized during the period covered by the FTIP.
 - The need for these infrastructure projects is stipulated by law.
- The “requirements plan” is revised every 5 years: CBA conducted to see if the project has still a benefit-cost ratio > 1 .



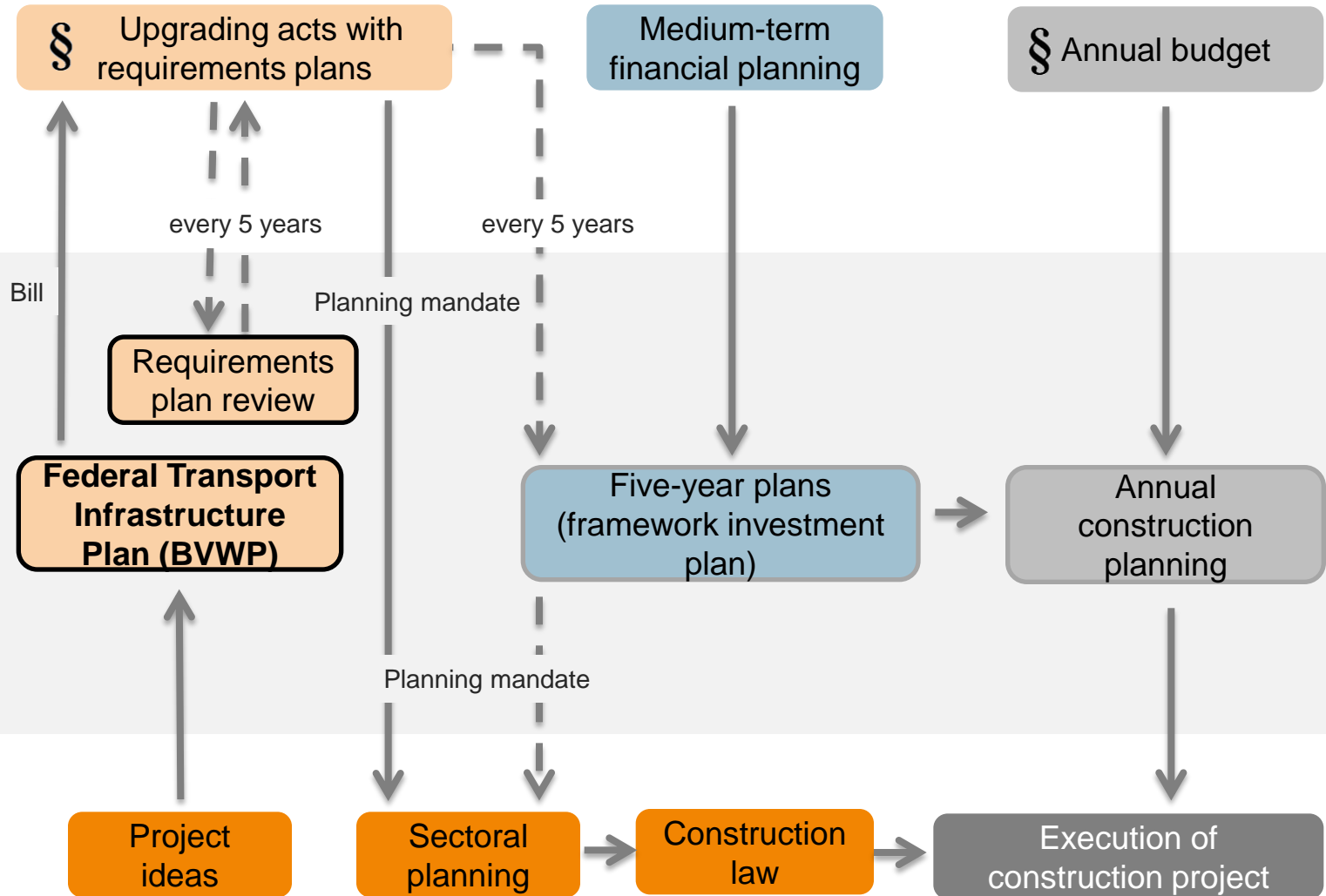
Bundesministerium
für Verkehr und
digitale Infrastruktur

Parliament

REQUIREMENT PLANNING

MEDIUM-TERM PLANNING

FINANCING



IMPLEMENTATION



Thank you very much for your attention!

Dr. Catharina Horn

Bundesministerium für Verkehr und Digitale Infrastruktur (BMVI)

Invalidenstraße 44

10115 Berlin

E-mail: catharina.horn@bmvi.bund.de

www.bmvi.de