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Comparison of the congestion policies of national road authorities

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This report is: **FOR DECISION**

Executive summary

Road networks in CEDR member states are becoming increasingly congested. Various policies have been introduced to mitigate this negative trend. The goal of task group 11 is to provide a better understanding of how NRAs reduce congestion, taking into account the policies adopted by governments. This report is the result of this work. The added value of this report is that it allows NRAs to present the work they are doing in reducing congestion and mitigating its negative effects both to the broader public and to those in charge of policy[1].

The main conclusions of the report are as follows:

- The high-level goals and the interventions of the countries that participated in the study are similar.
- There are differences in the relationship between goals and interventions. There is a 'grey area' between the goals and interventions in most countries. In some countries, there appears to be little or almost no direct relationship between goals and interventions.
- The relationship between goals and interventions can be improved by developing adequate performance indicators to bridge the gap. By monitoring effects, NRAs can determine if and to what level interventions contribute to the delivery of their goals and targets and in turn if the decision-making cycle is complete.
- It is important to use indicators that are measurable and, preferably, can be quantified; in this way they can reflect performance.

The following aspects were recognised as being the main causes of congestion: recurrent congestion (traffic demand), incidents and accidents, road works, major planned events, and severe weather. With regard to the roles of NRAs, in most countries they are responsible for maintenance, the gathering of traffic data, and traffic management. Policy interventions in all countries are quite similar and can be divided into four categories: physical expansion of capacity, better management of capacity, pricing mechanisms, and information systems.

Developing a strategy to reduce congestion, starting implementation, managing operation, and conducting evaluation are all complex processes that involves a large number of different parties. NRAs should be aware of the various roles they play within these processes.

Because of their position and the external environment in which they operate, NRAs run certain risks. For example, society's goals may not be realistic; the NRA may be responsible for aspects that it cannot influence; or because the organisation's goals have changed over time while the organisation itself hasn't.

[1] See Terms of Reference CEDR task 11, approved 23 October 2008.

Task group 11 recommends the following to NRAs:

→ Analyse the risks run by the NRA, taking into account the NRA's position in the policy process and their responsibilities.

→ Elaborate on the indicators, bridging the gap between goals and interventions.

→ Take traffic management measures into account as a smart way of accommodating mobility with fewer costs and less environmental impact. In addition to the construction of (new) roads and spatial planning, this is an important area[2].

→ Increase the focus on monitoring to determine the status of the indicators and to further understand the effects of interventions.

[2] Traffic management measures are elaborated in CEDR task 12.

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1 Definition of the issue

1.1 Introduction to the task group

Task group 11 was established within the framework of CEDR's second strategic plan (SP2: 2009–2013). This strategic plan called for a project group on ITS within Thematic Domain Operations. Project Group ITS covers four tasks:

Task 11 Comparison of the congestion policies of NRAs
Task 12 Traffic management to reduce congestion
Task 13 Incident & emergency management
Task 14 NRAs' roles in ITS, EasyWay, eSafety

This report is the final report from Task 11. SP2 stipulated that task group 11 would finish its work in 2010. The other task groups within the project group will continue their work until 2013.

A group of congestion reduction specialists from the NRAs was formed, with representatives from Austria, Denmark, Finland, France, Germany, the Netherlands, and the United Kingdom.

1.2 Purpose

Road networks in member states are becoming more and more congested. Various policies have been introduced in order to mitigate this negative trend. The goal is to reduce road noise and energy consumption, to boost the economy, and to protect the environment. The goal of task group 11 is to provide a better understanding of how NRAs reduce congestion, while taking into account the policies adopted by their respective governments.

This final report compares NRA congestion reduction policies. The added value of this report is that it allows NRAs to present the work they are doing in reducing congestion and mitigating its negative effects both to the broader public and to those in charge of policy[3].

1.3 Scope

The comparison of congestion policies has been limited to those countries that participated in the work of task group 11. The task members completed the questionnaires themselves or asked other representatives from their respective countries to perform this task.

1.4 Methodology

Task group 11 held three meetings. At these meetings, the group discussed its goals, the setting-up of questionnaires, and the results of these questionnaires. Task group members stayed in touch between meetings to discuss intermediate outcomes and the way forward. This final report was compiled following discussions at the final meeting. An extensive review process was completed and, as such, this report is the result of close cooperation between task group 11 members.

[3] See Terms of Reference CEDR task 11, approved 23 October 2008.

2 Possible ways forward

2.1 Introduction

For this report, work was divided into four stages:

1 a comparison of the current and future **causes of and driving forces behind congestion**;
2 a comparison of the **policy interventions and programmes** being implemented by NRAs to tackle congestion and improve reliability;
3 a comparison of the **role of the different NRAs**;
4 the drafting of **objective trees** for each country.

The findings of each of these stages will be summarised in this chapter.

2.2 Congestion causes and driving forces

The countries involved in the work of this task group recognised the following factors as the **main causes of congestion**:

- recurrent congestion (i.e. weight of traffic)
- unplanned events and accidents
- roadworks
- major planned events (concerts, sporting events, etc.)
- severe weather

Other causes of congestion mentioned were police and border controls, movable bridges, and the failure of technical equipment.

Germany, France, the Netherlands, and the UK have studied the relative importance of these causes of congestion and have reached different conclusions:

1 A study on motorways conducted in **Germany** found that 33% of congestion was caused by bottlenecks, 33% by roadworks, and 33% by incidents/accidents.
2 **The Netherlands** monitors the causes of congestion on a regular basis. Its most recent annual report found that 80% was recurrent congestion, 12% was caused by incidents and accidents, 5% by roadworks, and 3% by other causes (including special events and the weather).
3 **French** studies have found that 85% of congestion was recurrent (of which 70% is weekday commuting and 30% is weekend and seasonal traffic), 4.5% was caused by accidents, 2% by obstacles and incidents, 1.5% by roadworks, and 1% by major events.
4 **The UK** has not carried out recent studies in this area, but has in the past found that about 65% of congestion is recurrent, 25% is caused by incidents and accidents, and 10% by roadworks. This work was carried out prior to the Highways Agency introducing a traffic officer service. The UK would expect that a similar study conducted now would find that incidents and accidents cause less congestion than in the past.

The views of the countries on the **driving forces** behind congestion are as follows:

1 Socio-economic and demographic trends, resulting in mobility growth, in combination with limited capacity were mentioned by a number of countries as the driving forces behind congestion.

2 Some countries have very specific problems (extreme weather conditions, congestion at border stations).

3 In the Netherlands and the United Kingdom, there seems to be an apparent recognition that congestion cannot be completely eliminated by conventional means, thus focussing increased attention on the mitigation of the negative consequences of congestion (travel time reliability). In the Netherlands, this has resulted in an increased awareness of the relationship between travel time reliability and systems characteristics (system robustness/system vulnerability).

2.3 The roles of the different NRAs

When assessing congestion problems and possible interventions, it is important to understand the NRAs' roles and responsibilities.

Figure 1 shows the results of a survey on this topic.

Main area	**Task**	**Responsibility** (of the 7 countries involved, how many are responsible for a certain topic)
Network development	Spatial planning	2 / 7
	Policy development	2 / 7
	Strategic network planning	3 / 7
	Network implementation	7 / 7
	Regular maintenance	7 / 7
Informing users	Gathering traffic data	6 / 7
	Supply of travel info (pre-trip)	2 / 7
	Supply of travel info (en route)	3 / 7
Management	Active traffic management	7 / 7
	Incident/emergency management	6 / 7
Other road-related tasks	Vehicle registration	1 / 7
	Issuing drivers licences	1 / 7
	Toll collection	1 / 7

Figure 1: Overview of the results of a survey on the roles of NRAs[4]

Network development

- In the UK and France, the NRAs appear to have either a direct influence on or responsibility for spatial planning, policy development, and strategic network planning. In the Netherlands, the NRA has a specific responsibility for strategic network planning (project impact assessment).

- All NRAs play an active role in network implementation and regular maintenance. In France, however, other parties (motorway concessionaires) assume this role for their part of the network. There is also a dedicated part of the motorway in Austria where concessionaires are responsible for maintenance.

[4] The answers from Germany were given by the BASt from the perspective of one of the federal states (Bundeslaender). The states administer the federal superhighways and other federal highways used by long-distance traffic on federal commission.

Informing users

- Nearly all NRAs play an active role in gathering traffic data in order to provide users with information. In Germany, this is the responsibility of a private service provider; the NRA only gathers traffic data for traffic control and management purposes. The service provider can buy this data. Traffic data collection equipment is financed by the Federal Ministry.
- The NRA's responsibility for supplying pre-trip information varies from country to country. In most countries, the NRA is the sole supplier of this information, either using fixed partners for dissemination or disseminating the information itself (e.g. Austria). In some countries, direct provision to the end-user is limited to information on planned roadworks (the Netherlands) and safety-related information (Finland). In this case, information on expected travel conditions is supplied by commercial enterprises, using data provided by the NRAs.
- The NRAs' responsibility for supplying en-route information also differs. In most countries, the NRA is the sole supplier, using fixed partners for dissemination. In some cases (e.g. Austria), the NRA disseminates the information itself. In some countries, the provision of information by the NRA is limited to variable message signs (VMS) with information on current traffic conditions (weather, travel times, congestion). In this case, the information on current traffic conditions is supplied by commercial enterprises, using data provided by the NRAs.

Traffic management

Active traffic management and emergency/incident management on motorways is an important task for nearly all NRAs. In France, other parties (motorway concessionaires) are responsible for their part of the network. There is also a dedicated part of the motorway in Austria where concessionaires are responsible for incident management. The NRA is still responsible for re-routing and VMS.

Other road-related tasks

- In Austria, ASFINAG is responsible for (and dependent on) fare collection. Other NRAs do not have this responsibility. In Germany, a private service provider collects tolls on behalf of the Federal Ministry.
- In Germany, the federal states are responsible for vehicle registration and the issuing of drivers licenses.

2.4 Policy interventions and programmes

The analysis of policy interventions and programmes shows that the following programmes and policies are the most important when it comes to tackling congestion. The previous section listed the responsibilities of the NRAs; as a logical consequence, most of the policies listed below relate to those fields where a lot of NRAs have responsibilities. The interventions are split into four categories, in accordance with the framework presented by the OECD and ITF[5].

[5] Improving reliability on surface transport networks, summary document. OECD/ITF, 2009.

1 Physical expansion of capacity

- **Major projects** to add capacity to traffic corridors, such as adding lanes to roads, building new road links, by-passes, improving large intersections, shortening of planning procedures to speed-up delivery of projects, new design/construct contracts, centralisation of planning and realisation.
- **Minor road construction projects** at specific bottlenecks and junctions, which often give a high benefit-to-cost ratio.

2 Better management of capacity

- **Management of roadworks** by optimising planned roadworks and using ITS to optimise traffic operations and reduce the socio-economic costs of the roadworks; a construction site management system to optimise the timing and planning of works; innovative quick-change moveable barriers to reduce the time needed to set out traffic management and to improve the safety of the on-road workforce; a new regulatory framework providing organisational and technical specifications; improvement of the co-ordination of roadworks between different road authorities.
- **Incident and accident management**, including procedures and training for contractors. In the UK, the creation of a dedicated traffic officer service to manage traffic, clear debris from motorways, and order the removal of abandoned, broken down and accident-damaged vehicles from the motorway network. Area-wide coordination between the NRA, emergency services, and other service providers. In France, on days when traffic is heavy and likely to cause disruption, traffic progress is monitored in real time by the police and *gendarmerie* and operations are adjusted accordingly, including the setting of signs to control access or the provision of alternative routing information.
- **Intelligent Transport Systems** (ITS) at bottlenecks, e.g. information signs, queue warning, variable message signs (VMS), travel times shown on a website, travel times shown on VMS, CCTV images on the internet, dynamic speed limits to harmonise the distribution of traffic, ramp metering, temporary use of the hard shoulder, dynamic lane management, and strategic diversions of traffic.
- **Heavy Goods Vehicles**: Overtaking bans on some stretches of the network for lorries, and regular checks of lorries to identify dangerous loads that might cause accidents, HGV tolling schemes, and the testing of anti-tilting devices.
- **Winter road operations**, including 24/7 maintenance on motorways, intelligent use of thawing agents, and spraying systems at particular hotspots. Bad weather plans are in place in France in 7 'defence zones' to minimise the impact of heavy snowfall and ice on the network. These plans contain a variety of interventions including priority salting, traffic control, and diversions with decision-making being coordinated between all of the affected defence zones.
- **Management of major events** through dissemination of information, the implementation of traffic management on the network, and the provision of guidance on best practice.

- **Creating parking areas** for pool driving or parking areas at public transportation terminals to support the transfer between private cars and public transportation, thereby reducing the traffic volume.

3 Pricing mechanisms

- **Fiscal measures** such as road charging, duty on petrol, and other taxation measures to manage demand. Charging for the use of (parts of) transport networks is becoming a more common method of managing traffic demand and, consequently, traffic flow and network reliability. It is also possible to charge for information systems, such as GPS guidance systems, to which network users can subscribe in order to mitigate the worst effects of delays. Although most of these techniques are directed at cost recovery and congestion management, they can also be effective in improving reliability.

4 Information systems

- **Influencing driver behaviour** through pre-trip information services to help drivers avoid congestion and make other journey choices (other modes) and by providing on-trip information.
- **Collection of data** to improve knowledge of where congestion is a problem and to contribute to decision-making on solutions; implementation of a nationwide data warehouse.

2.5 Objective trees

Some countries (Austria, Denmark, Germany, the Netherlands, and the UK) have set-up objective trees, which set out transport goals, interventions, and indicators. Examples of the trees can be found in Appendix 1.

1 Example 1 shows the tree for England, which has an emphasis on goals and targets for the Ministry (Department for Transport, DfT) and their translation into the objectives of the NRA (Highways Agency, HA).
2 Example 2 shows the tree for the Netherlands, where quantified objectives are a distinctive part of the process.
3 Example 3 shows the tree for Austria, where the NRA (ASFINAG) has a very specific role, being a state-owned company.

The inspiration for these objective trees was the common goal concept for traffic policy which was elaborated in the ENTERPRICE project (Enhanced Network for Traffic Services and Information Provided by Regional Information Centres in Europe) within the 4th Framework Research Programme of the EU. The basic idea behind this concept was to operate traffic compatibly with social and environmental conditions while simultaneously guaranteeing people's mobility. For common evaluation, criteria and indicators can be linked to these objectives. This system can, therefore, also be used for evaluation purposes.

The objective trees show that the general strategic goals of the different NRAs are similar; only the highlights and the priorities of the goals differ. Most countries have goals on:

- protecting the environment
- increasing road safety
- supporting economic development
- improving the quality of life

The interventions that are implemented in the countries are also very similar; some have measures such as (see also section 2.4):

- increasing road capacity
- traffic and incident management
- road pricing
- driver behaviour/information

For the indicators, the following applies:

1 All countries monitor congestion in some way, using a wide array of different indicators. There is very little uniformity in this respect.
2 In nearly all countries, the emphasis is on monitoring traffic flow (volume–capacity ratios (V/C ratios), density) and travel time data, which is used for active traffic management and providing information to road users (pre- and en-route).
3 In most countries, more specific indicators are used to provide information on the characteristics of congestion. Besides use in active traffic management and providing actual information to road users, the indicators concerned are also used for statistical analysis and impact assessment (systems approach).
4 In a limited number of countries (Denmark, the Netherlands, and the UK), indicators representing travel time reliability resulting from congestion are used, thus illustrating a tendency towards a more user-orientated approach.

The indicators included in the objective trees do not relate to congestion alone, but also include:

- surface area of transportation
- annual traffic volume/growth
- delivery of a high level of road user satisfaction
- contribution to national and international goals for the reduction of carbon emissions
- number of accidents/number of people killed or seriously injured
- travel time reliability
- costs of delay due to congestion

The following can be said about the relationship between indicators and strategic goals:

1. In a limited number of countries ((France), the Netherlands, the UK), there is (was) a direct link between congestion-related indicators and transport policy goals or objectives.
2. In some countries (Finland (in the future) and the UK), the level of service indicators representing congestion play a role as specific targets for the NRA (Service Level Agreement).

3. In many countries, the link with transport policy goals or objectives is only indirectly formulated in terms of contributions to economic, sustainability, or efficiency objectives.
4. In the Netherlands and the UK, policy attention is clearly shifting from congestion (a system characteristic) to travel time reliability (a user-oriented characteristic).
5. Germany and the Netherlands specifically mention the importance of travel time savings in policy impact assessment and cost-benefit analysis.

In conclusion: while strategic goals are very similar, there are differences in the relationship between objectives and interventions. At the moment, there is a 'grey area' between the goals and the interventions in a lot of countries. In those cases where there is no apparent direct relationship between goals and interventions, setting up indicators can be used to bridge this gap. Furthermore, indicators may not always be measurable or quantifiable.

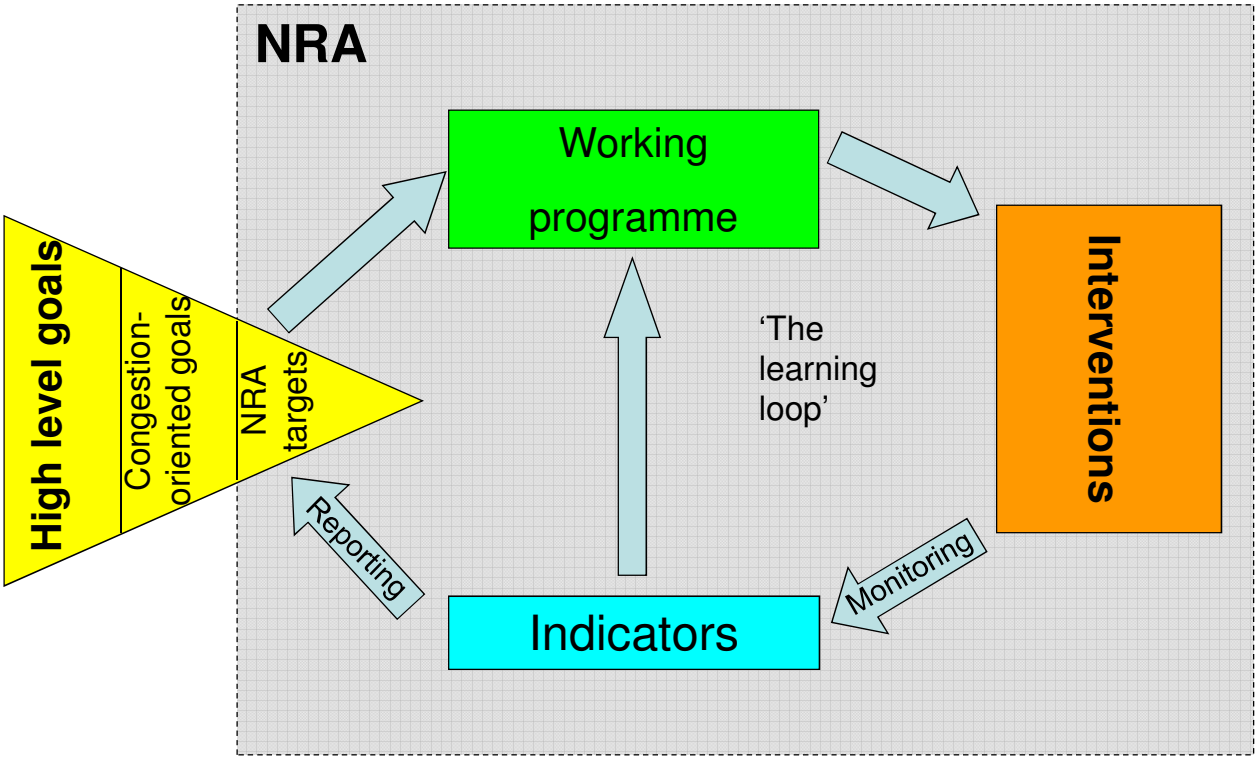
3 Comparison of ways forward

The results as described in chapter 2 show that there are a lot of similarities between the countries in terms of causes of congestion, interventions, and strategic goals. Upon closer examination, the differences become clear. The differences occur because of the external environment that NRAs operate in. A number of factors play a role in this respect:

- geographical
- weather conditions
- characteristics of network
- type of congestion
- 'political colour' of government
- institutional history
- responsibilities
- measurement of effects
- behaviour of drivers

Different ways of comparing congestion polices have been presented in chapter 2. The objective tree is the most promising framework for further comparison. This is a common analysis structure that can be elaborated for each country. The outline of this structure is presented in Figure 2. The objective trees in Annex 1 are a first step in the analysis.

Figure 2: diagram task 11



The diagram can be explained as follows:

- On the far left are the strategy and goals for traffic and congestion.
- On the far right are the implemented interventions.

- In between, there's a working programme that is derived from the strategy and leads to certain interventions. The question is whether there is a direct relationship between strategic goals and interventions.
- Through indicators, the success of interventions can be measured. On the one hand, there are general indicators that show the performance on a strategic level; on the other, there are targets that show how the organisation (NRA) is performing.

Elaborating the diagram will give countries an insight into their goals and interventions, and to establish whether there is a direct relationship between them. It will make NRAs even more aware of both their position in the country's traffic and mobility strategy and their responsibilities. It also provides an opportunity to elaborate on the indicators, which is important because accountability has become increasingly important to society. In setting up the indicators, countries can learn from each other.

It is important to identify the risks that are associated with the position of the NRA. The following risks could be relevant for countries:

1 Society's goals are not realistic;
2 The NRA's goals cannot be achieved;
3 NRAs are responsible for strategic goals that involve aspects they can't influence, because:
   a) another organisation is responsible for these aspects
   b) these aspects can't be influenced by any organisation (e.g. the weather)
4 When goals change (because of changes in the environment), the organisation and the goals may no longer be compatible.

4 Conclusions

Road networks in member states are becoming more and more congested. This report provides a better understanding of how NRAs reduce congestion, taking into account the policies adopted by their respective governments.

For this report, work was divided into four stages:

1 a comparison of the current and future **causes of and driving forces behind congestion**;
2 a comparison of the **policy interventions and programmes** being implemented by NRAs to tackle congestion and improve reliability;
3 a comparison of the **role of the different NRAs**;
4 the drafting of **objective trees** for each country.

The main conclusions reached by task group 11 are as follows:

→ The general strategic goals of the different countries are similar.

→ The interventions implemented in the countries are also very similar.

→ Differences occur in the relationship between strategic goals and interventions. At the moment, there is a 'grey area' between the goals and the interventions in most countries. In some countries, there appears to be little or almost no direct relationship between the goals and interventions.

→ In an ideal world, the strategic goals, indicators, interventions, effects, responsibilities, and their relationship would be completely clear. In practice, this is often not the case.

→ The relationship between these goals and interventions can be improved by defining performance indicators. It is important to develop these indicators to bridge the gap between goals and interventions. By monitoring the effects of interventions, NRAs can determine if these interventions contribute to the reaching of their goals and targets and in turn if the planning/decision-making cycle is complete.

→ It is important to use indicators that are measurable and, preferably, can be quantified; this way, they can really measure performance. At the moment, this is often not the case.

→ It is beneficial to take note of the indicators used by other countries.

→ Indicators show where an NRA should focus its monitoring activities. Analysing the effects of interventions is a topic on which NRAs could put more emphasis. The lack of knowledge of these effects is a problem. Society as a whole asks for policies that are in line with goals and wants proof that goals have been achieved. It's about 'value for money', instead of 'spending the budget'.

→ The decision-making circle ('the learning loop') can be completed by setting up a good monitoring mechanism: because one knows the effects, goals can be translated into interventions. Interventions are evaluated so the actual effects on the strategic goals can be determined. If needed, interventions can be adapted, and the decision-making circle starts again.

Recommendations

→ Analyse the risks run by the NRA, taking into account the NRA's position in the policy process and their responsibilities. The goals of society or the NRA may not be realistic; the NRA may be responsible for aspects it cannot influence, or because of developments, the organisation's goals have changed over time while the organisation itself hasn't.
By filling in the flow diagram for the NRA, risks become clearer. Be aware that making responsibilities and relationships completely clear can make organisations vulnerable.

→ Elaborate on the indicators for each country, bridging the gap between goals and interventions. The choice of indicators should reflect the responsibilities of the organisation (the targets). These targets should be developed carefully. By using the indicators, the 'learning loop' is closed.

→ Take traffic management measures into account as a smart way of accommodating mobility with fewer costs and less environmental impact. In addition to the construction of (new) roads and spatial planning, this is an important area because most NRAs have a responsibility for traffic management[6]. Furthermore, the long-term effects and cost-benefit ratio of traffic management measures should be evaluated so that they can become a regular part of the planning cycle.

→ Increase the focus on monitoring to determine the status of the indicators and to increase knowledge of the effects of interventions. Besides monitoring and analysing, increased attention to modelling can help determine the expected outcome of a given set of interventions.

[6] Traffic management measures are elaborated in CEDR task 12.

5 Proposal/recommendation and consequences for the directors of roads

During the CEDR Executive Board meeting in Ljubljana on 11 March 2010, it was decided that the draft final report on congestion policies could be submitted to the GB with some amendments. One of them was to contact a number of countries suffering from congestion problems to ask them about their policy. Information was received from Switzerland, Sweden, and Belgium (see below).

We asked the following questions:

- Please indicate which indicator(s) are used in your country to describe road traffic and travel time conditions (definition, measurement/data used, how and where are they presented).
- Please indicate whether the indicator(s) mentioned in the answer to question 1 are related to transport policy.
- Are congestion policy objectives or targets directly described in terms of any of the indicators?
- Is any of the indicators part of a policy monitoring system (ex post)?

The following answers were received:

Sweden (Torsten Bergh, Trafikverket)

The Swedish Transport Administration (into which the Swedish Road Administration was integrated on 1 April 2010) operates main arterials in urban areas and rural roads. We use a number of road traffic and travel time conditions which are probably similar to those in most other European countries:

- Speed index: We have 80 fixed counting points (traffic flow and traffic spot speeds) from which a rolling speed index is calculated to describe driver speed limit acceptance on a general basis. This index is reported to the STA board once a month and to our government once every 4 months.
- Travel time index in major cities: Our major conurbations (Stockholm, Gothenburg, and Malmö) have defined strategic networks that are gradually being equipped with sensors for traffic speed/travel time detection. These speeds/travel times are available on Internet. For those parts of the network that have already been equipped with these sensors, these times are used to calculate average peak hour travel times (7–9 a.m. in the morning, Tuesday–Thursday, Sep.–Nov.) to be reported on a yearly basis to the government to measure the long-term travel time situation. Until 2009, there was a government goal that stipulated that travel times should not increase in major cities.
- Number of hours with traffic problems: We try to measure the number of hours with one direction blocked due to winter problems, accidents, etc.

Once every four months, the STA sends to the government's transport department those indicators that it considers to be measureable and that give a good indication of what is happening. We are also trying to develop measurements on reliability, but have experienced data problems.

We have a number of general political goals (similar to the ones in the report) that have been agreed by parliament and the government, e.g. an efficient and sustainable and safe transport system for all citizens. We have implemented congestion taxes in Stockholm and it has been decided that this system will be extended to Gothenburg. We agree with the general conclusions in the report.

Belgium – Wallonia (André Delmarcelle, Service Public de Wallonie)

In Wallonia, road traffic is measured by traffic loops. The system continuously calculates the level of service for each section (between two interchanges) of the motorway network. This level of service (LOS) depends on traffic density. It results from the combination of three parameters (traffic flow, speed, and occupancy rate) and varies between five different values, according to DATEX specifications: stationary traffic, queuing traffic, slow traffic, heavy traffic, and free-flowing traffic.

This indicator is not as such a target for transport policy, but it is part of the multi-criteria analysis made before investment works or other transport policy decisions.

In everyday network management, a minimum capacity is defined for roads with roadworks. This has an impact on the planning and organisation of roadworks. The management of sections with high-density traffic or with a high rate of heavy goods vehicles is based on the data provided by the counting loops, i.e. action is linked to defined thresholds.

Switzerland (Alain Cuche, ASTRA Bundesamt für Strassen)[7]

Objective tree

We have two different levels of objectives/targets:

- At project level, we look at the best options for implementation. We have a joint objective system for the road and rail sector called ZINV. The road-specific instrument is called 'NISTRA' (www.nistra.ch).
- At political level, road authority management is done using FLAG (Führen mit Leistungsauftrag und Globalbudget (management by performance mandate and global budget)). This management tool stimulates government actions based on performance and effectiveness indicators. It also aims to delegate tasks, skills, and responsibilities to operational units. There is a range of goals that reflects political expectations. One of them is the availability of roads. These goals are naturally tested using control mechanisms.

Measures against congestion

- In the past, we have looked for short-term measures to reduce congestion. At first, we thought there would be specific sets of measures for combating each type of congestion, but unfortunately it turned out that this was not the case. Geographic conditions are more important for finding solutions. We looked for solutions for the worst congestion spots by calculating cost-benefit ratios. Because psychological aspects are very important in addition to cost-benefit ratios, we conducted a telephone survey to establish public acceptance levels. The results have lead to a prioritisation of measures.

[7] Text translated from original contribution in German.

- Switzerland has developed a road maintenance strategy for reducing the congestion caused by roadworks. Work is combined over stretches of (a maximum of) 15 kilometres and planned in a way that traffic disruptions will not be necessary on this stretch of road for another 15 years. This way, we reduce congestion costs being however aware that certain elements of the road are replaced before the end of their lifetime.

Some politicians and traffic professionals see congestion as a good way of controlling traffic demand, but this is a political view.

Annex 1: Country profiles

A Finland

Current problems and future challenges

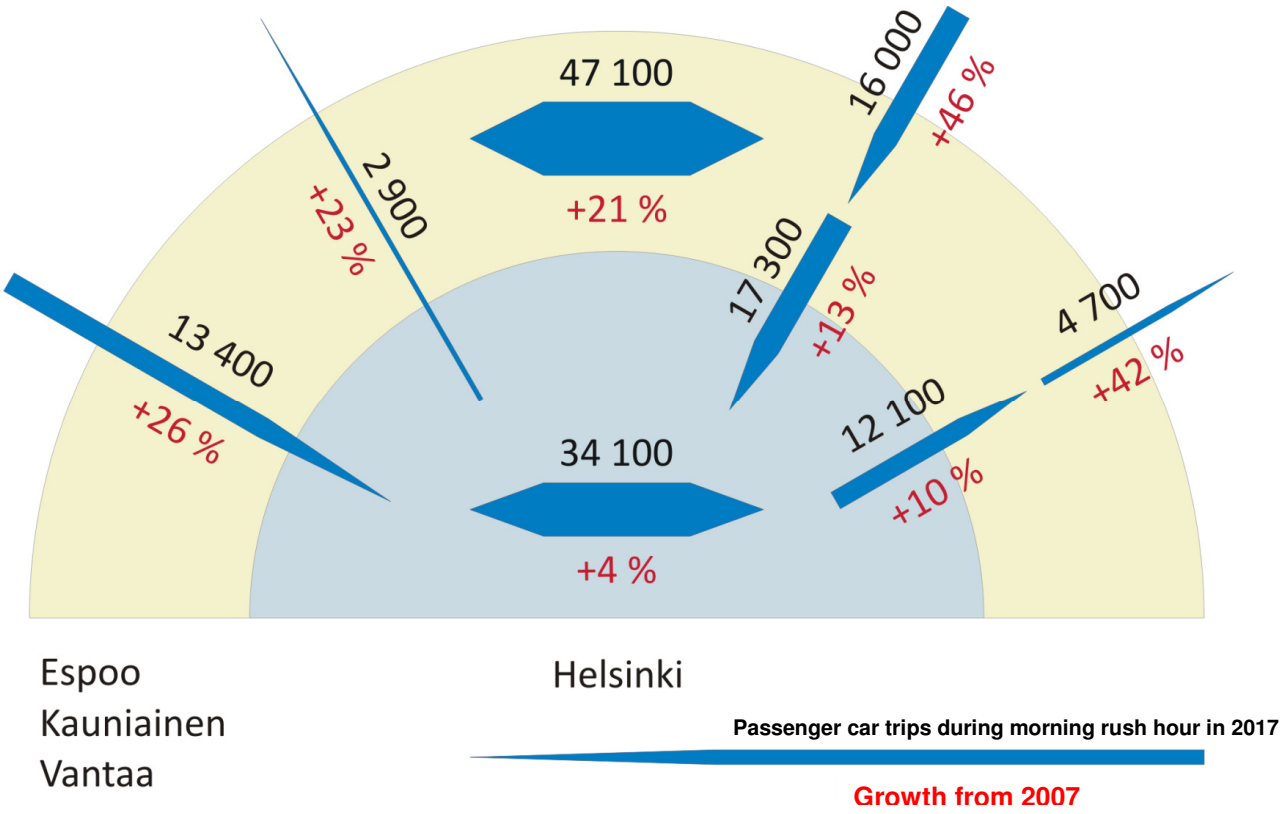
The population of Finland is 5.3 million. It has a total area of 338,000 km^2, of which 77% is forest and 10% lakes and inland waterways. Only about 4% of the area of Finland is built-up land. Finland is a sparsely inhabited country with 17.4 inhabitants per km^2. The population is concentrated in the south of the country. The biggest and the most important cities in Finland are the cities of the Greater Helsinki metropolitan area: Helsinki, Espoo, and Vantaa. About 20% of inhabitants live in the Helsinki metropolitan area. Other large cities include Tampere, Turku, and Oulu.

Road network and traffic

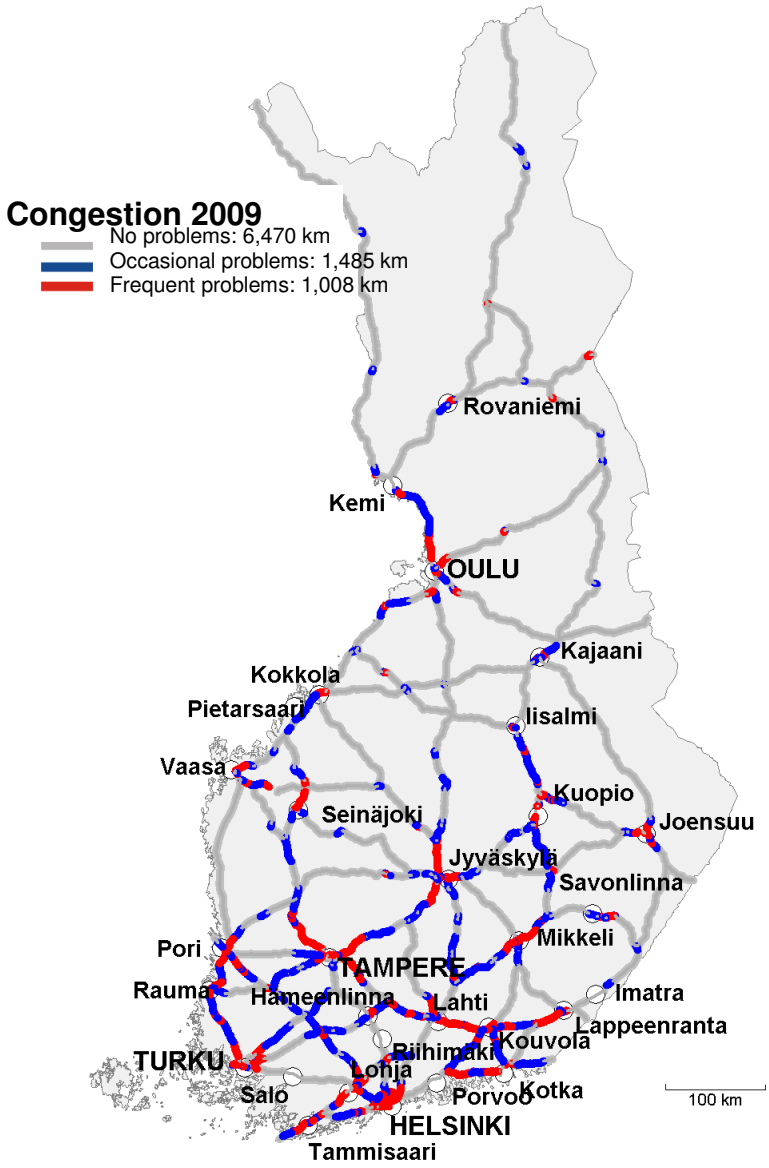
The total road network of Finland measures 454,000 km, of which 26,000 km are streets and 350,000 km are private roads. Finland's 348 municipalities, of which 108 are towns, are responsible for streets. The Finnish Road Administration, Finnra, is responsible for 78,000 km of public roads, of which 740 km are motorways. 65% of public roads are paved and the rest are gravel. The busiest 10% of the public road network carries 65% of the traffic. The automobile density in Finland is 550 automobiles per 1,000 inhabitants. The road network carries 93% of passenger traffic and 67% of all goods traffic in Finland. Passenger traffic grew by 62% (person km) and car traffic by 82% in the period 1980–2008. Of the daily travel performance, 76% is done by car, 15% by public transport, 5% on foot or by bicycle, and 4% by other means of transport. The Finns make an average 3 trips per day, lasting for a total of 70 min. The average trip distance is 16 km and an average Finn travels 42 km each day.

Traffic in Finland is rather free-flowing

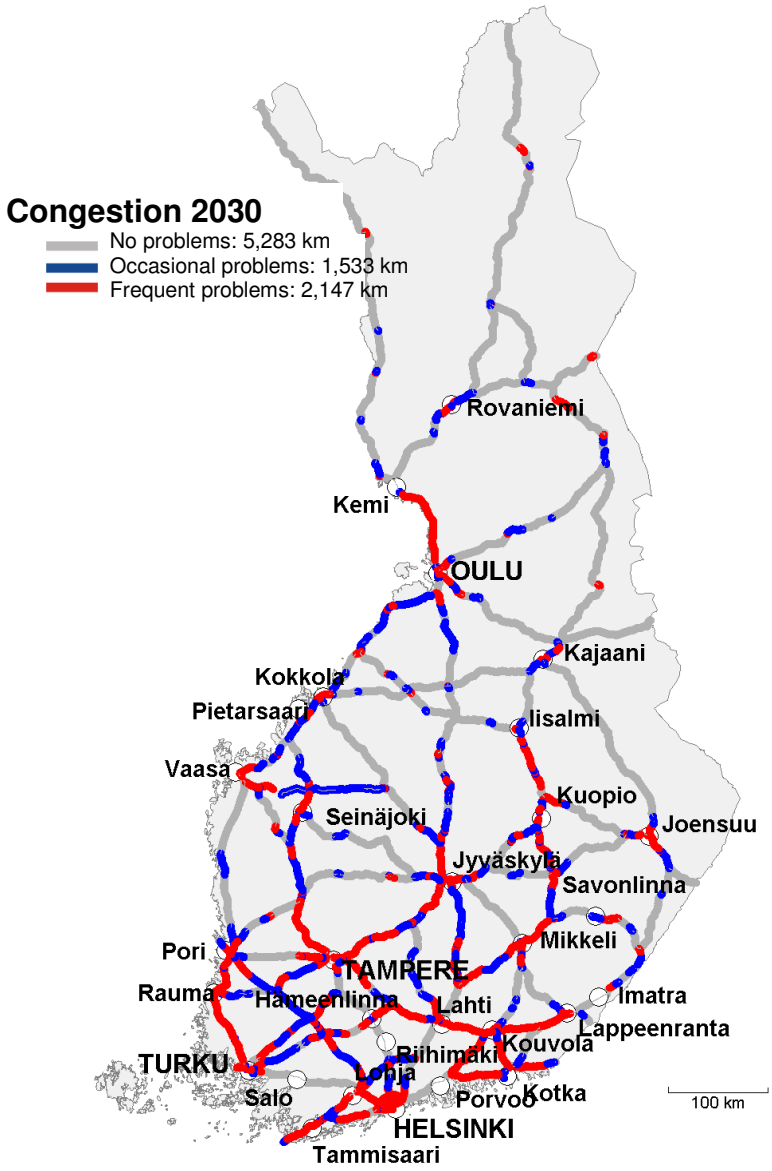
Daily congestion occurs mainly in the Helsinki metropolitan area, where congestion is already a growing problem on Ring Roads I and III. Radial roads leading to Helsinki are also becoming congested. There are long daily queues of long-distance lorries at border stations on the Russian border in South-East Finland. The lengths of queues at the border depend on world economy trends.



Forecasted passenger car traffic growth from 2007 to 2017 in the Helsinki metropolitan area



Traffic-related functionality on main roads in Finland in 2009



Expected traffic-related functionality on main roads in Finland in 2030

The restructuring of the Finnish State Administration

Transport Administration Reform
A new transport infrastructure agency covering all transport modes was established on 1 January 2010. It comprises the duties of the Finnish Maritime Administration that were not transferred to the state-owned company specialising in production or incorporated into the Transport Safety Agency, the Finnish Rail Administration, and the Finnish Road Administration, excluding the road districts and functions that were transferred to the Transport Safety Agency.

State Regional Administration Reform
As of 1 January 2010, six regional administrative agencies were replaced by two new agencies: Regional state administrative agencies (6 centres) and Centres for Economic Development, Transport, and the Environment (15 centres), which have three areas of responsibility (economic development, employment, competence and culture; transport and infrastructure [present road districts of the Finnish road administration]; environment and natural resources).

Policy objectives related to congestion

There are no clear objectives related to congestion. Reliable, efficient travel and transport chains, flow of traffic, functional road network, and predictable travel times are mentioned many times in policy papers of the Ministry of Transport and Communication and of Finnra, but no objectives have yet been set.

Only parameters for the physical state of main roads (where 100 km/h speed is possible and safe speed) have been set. Indicators for traffic flow are under development and they will probably be based on travel time deviations.

The 'translation' of policy objectives

There is no 'translation' of policy objectives simply because we do not have clear policy objectives. However, mainly under the heading of traffic management, Finnra is actually doing quite a lot to ensure free-flowing traffic, e.g. the provision of traffic information, incident management, cooperation between different authorities and businesses, and monitoring of the traffic situation.

The relationship of the NRA towards its parent ministry

Finnra is governmental agency operating under the jurisdiction of the Ministry of Transport and Communications.

The role of NRA in implementing congestion policy

Finnra is responsible for the management of public roads. Road maintenance services and products are procured on the free market. Finnra has been a purely procurement administration since 2005; all products and services have been procured through competitive bidding.

Finnra provides transport control and information services. It is responsible for road network and traffic information services and it operates customer-oriented way. Finnra co-operates with different authorities on incident management. Finnra's role in this cooperation is to inform the media and road users about accidents. Finnra creates the conditions for free-flowing traffic at road construction sites on busy roads.

B The English Highways Agency Congestion Statement

1 The Highways Agency (HA) is an executive agency of the Department for Transport (DfT) and is responsible for operating, maintaining, and improving the strategic road network (SRN). This incorporates the majority of England's network of motorways and major A roads. The Highways Agency's strategic road network includes over 4,300 miles of motorways. This represents only 3% of roads in England yet carries around one third of all traffic and two thirds of all England's large goods vehicle traffic.

2 Our approach to tackling congestion is a practical response to the needs of motorists who travel on our network every day, starting from the perspective of the motorist rather than that of the infrastructure provider. We seek to provide road users with access to the information they need when they decide to travel, when they plan their journeys, and to respond to conditions as they are travelling. We seek to ensure that our current road network offers a good service to those who use them, by doing a fully professional job of managing and reducing the impact of disruptive events on the strategic road network. Looking to the future, we are making best use of the funding we have available to mitigate the most serious congestion, safety, or quality-of-life problems, by making carefully targeted investments in management systems or capacity.

3 Part of our approach to dealing with congestion is to ensure that individual drivers have the information and tools they need to make well-informed decisions about their own journeys. We also have a range of plans in place to support responsible, considerate driving.

4 Through our work on alternatives to travel and sustainable travel, we aim to make people aware that they have a genuine choice about whether to travel at all. A reduction in travel demand would bring tangible benefits: reduced congestion, reduced carbon emissions, and improved quality of life. In order to facilitate this, the government is taking steps to increase the speed and take-up of broadband Internet across the country for both business and leisure purposes and holding discussions with bodies such as the CBI and TUC as to how a reduction in travel demand could fit with the needs of business. Businesses are being encouraged to consider measures such as permitting home working and staggering people's working days as options which could increase productivity and reduce congestion.

5 As well as addressing the need to travel, we are also providing people with better choices as to how they travel. The government supports congestion- and carbon-reducing sustainable transport modes.

6 We are dedicated to making our customer's journeys as smooth as possible. Where delays occur, planned or otherwise, we want to get customers the information they need as quickly and easily as possible, to help them make informed decisions about their travel plans.

7 The public can visit our website for traffic information on our network 24 hours a day, 7 days a week, 365 days a year. They can also have this information sent directly to their PC desktop. As long as they are connected to the Internet, full details of traffic incidents in real time can be viewed.

8 Where journeys do need to be undertaken by car, it is important that drivers have high-quality information to support choices of route and timing. The DfT, in partnership with transport stakeholders and technology providers, provides journey-planning and travel information to the public via www.transportdirect.info. This portal provides road users with dynamic route planning, based on predicted traffic speeds at a given time of day, and including real-time information about road incidents. The portal can plan the quickest route, which may not be the shortest or most obvious. This reduces both journey times for the user, and also congestion on the avoided routes.

9 Drivers also need access to information once they are on the roads. On the strategic road network, on-road traffic officers are backed up by regional and national control centres, which also keep drivers informed through real-time traffic information**,** by setting signs and by giving other service providers accurate travel advice, enabling motorists to make more informed decisions about how to avoid (and avoid adding to) congestion.

10 A new National Traffic Information Service (NTIS) is being introduced to replace the current PFI contract for the national control centre, which expires in 2011. The new service will provide the capability to capture and interpret traffic data and to deliver that to users of the strategic road network through a range of information channels, both directly and indirectly through other organisations such as the travel news media.

11 The choices drivers make while they are on the road have a major impact on both the performance of the network and the experience of other road users. Our goal is to support responsible, considerate driving, thereby avoiding accidents that, in addition to tragic loss of life, can cause large amounts of disruption and congestion.

12 The Highways Agency's Traffic Officer Service plays a vital role in achieving the aim of a swifter recovery of our motorways after accidents; it now attends a daily average of 375 incidents affecting 'live' lanes. Following dispatch, traffic officers arrive at over 80% of these incidents within 20 minutes, on the busiest routes during the day-time. Because we clear incidents more quickly, incident-related congestion is minimised and the chance of further incidents is reduced, thereby delivering substantial reliability and safety benefits.

13 The HA liaises closely with DfT who lead on policy-related aspects. A key action in the DfT's business plan is 'to work with the Home Office to review police investigation/closure procedures for motorway incidents.' The review is focusing on indentifying further improvements that could be made in managing serious incidents on the motorway network. The DfT has worked closely with the Association of Chief Police Officers, Highways Agency, and the Home Office in delivering a review which was published in May 2011. They are committed to ensuring that any improvements identified in the review are taken forward by December 2012.

14 During the winter months, the HA has an extremely important job in ensuring that the network remains open and that our customers can travel safely to their destinations. Our new winter fleet uses innovative pre-wet spreading technique which is more accurate than traditional dry salt methods, allowing less salt to be used. To ensure that the HA can deal effectively with winter weather, we carry out a detailed review at the end of every winter season to identify key lessons learned and enable improvements to be implemented.

15 The paragraphs above set out a comprehensive package of measures to support motorists in planning their journeys and to ensure our network is as resilient as possible to events that can disrupt performance. But given the continuing predicted longer-term growth in traffic, we will also need to ensure that we think flexibly and imaginatively about how additional road capacity can be delivered to road users in those places where it is most critically needed. In developing future plans, and in the light of funding constraints, it will be more important than ever to ensure that we are harnessing innovation in making the best use of our existing asset base and ensuring that we adopt novel approaches to managing road capacity to meet the needs of the users.

16 As part of our future spending programme, we will be taking forward a number of managed motorway schemes across the country. The M42 pilot of hard shoulder running showed that the measure can improve reliability and reduce the number of accidents, delivering a substantial proportion of the benefits of conventional road-widening solutions, while securing cost savings of at least 40%.

17 Given that road capacity is often constrained by a small number of key bottlenecks, targeted interventions at these locations can make a critical difference. On the strategic road network, future capacity will be needed at the Dartford Crossing and DfT is committed to embarking upon a review of the options for future capacity increases at Dartford. Subject to consultation, we intend to increase charges for the crossing in 2011 to fund any changes. At the same time, to better manage the traffic and to ease congestion, we will introduce free-flow charging from 2012, and more immediately, we will lift the charges at times of severe congestion to aid flow through the charging plaza.

18 Finally, we are taking steps to put right management measures which are simply not making sense for motorists (our suspension of the M4 bus lane and opening it to all traffic in December 2010 ends the injustice suffered by thousands of drivers who used to sit in traffic next to an empty lane). We are monitoring the impact of the suspension over a period of 18 months, but our intention is to scrap the lane permanently once the London 2012 Olympic Games are over.

C France

Current problems and future challenges

Spatial context:
- Population: 65.1 million
- Area: 675,000 km^2
- Paris is a specific area:
  - daily important local traffic *(home–office)*
  - important transit *(heavy goods vehicles)*
  - the most congested section in Europe *(A86–A4, East of Paris: 200,000 vehicles/day)*

Organisational context:
- 5 types of road authorities
  - free motorways, state-run (2,600 km)
  - toll motorways, under concession (8,400 km)
  - other state highways (11,800 km)
  - district roads (380,000 km, 100 districts (départements))
  - municipality roads (600,000 km, about 37,000 'communes')
- Extensive procedure preceding road construction
  - public debate, statement of public interest
  - from idea to new road = about 20 years

In fact, very few highways will be built or enlarged in the coming years
- Other points:
  - 80% of transport (travellers and freight) by road
  - 23% of road traffic on motorways
  - speed control automated system
  - indicator for measuring congestion = km x hours in congestion; ongoing studies to adopt a better indicator
  - cost of time in congestion: ongoing discussions about value

Policy objectives, related to congestion

In the context of the 'Grenelle de l'environnement' (a kind of round-table meeting involving stakeholders) and because of climate change, the policy objective is to reduce the road transport impact in order to develop an healthy environment by:

- ascertaining the coherence of the various infrastructures through a multimodal point of view
- developing alternatives to road, especially railways
- developing the use of public transport
- fostering road traffic transfer to alternatives road sections through appropriate network design
- improving transit traffic around great urban centres
- maximising usage of the existing road network

The role of the NRA in the congestion policy

The French NRA is the 'Directorate for Transport Infrastructure' (DIT), within the General Directorate for Infrastructure, Transport, and the Sea (DGITM) of the Ministry of Ecology, Sustainable Development, Transport, and Housing (MEDDTL). The role of the DIT is to implement policy instruments related to the national road network and railways, waterways, and port infrastructure at national level.

The role of the MEDDTL in congestion policy:

- DIT and Interdistrict Highways Offices (11 in France)
  - construction of the national infrastructure (incl. planning process)
  - maintenance of the national infrastructure (incl. planning process)
  - active traffic management on the national infrastructure
    - the collection, processing, and provision of traffic data to service providers and users
    - the development of traffic management intervention procedures
    - incident management
- MEDDTL associated with other ministries (Interior, Defence)
  - traffic information & control centres (www.bison-fute.gouv.fr)
    - CNIR at national level
    - CRIR at regional level
- Partnerships with motorways companies and local authorities

Traffic management policy:

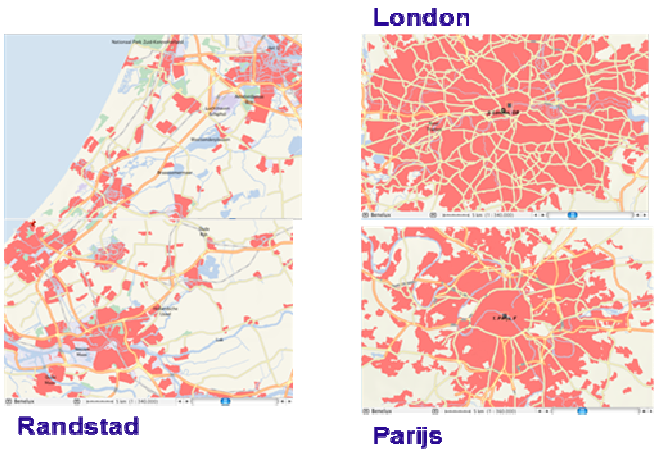
Objectives:
- to reduce travel time
- to make travel safer
- to provide road users with real-time Information

by means of:

- traffic and travel time information (before departure and during the trip): web, radio, VMS
- optimisation of road network occupancy through dynamic traffic management systems:
  - rerouting (by VMS)
  - dynamic speed control
  - ramp metering
  - dynamic lane management
  - hard shoulder running
  - HGV flow control (overtaking ban)

D The Netherlands

- Population: 16.7 million (2011)
- Area: 35,000 km^2
- 480 inhabitants/km^2
- 40% live in the Randstad[8] metropolitan area
- Poly-nuclear structure Randstad



Organisational context

5 types of road authorities:

- Rijkswaterstaat (national network: mostly motorways). 8 regional divisions of Rijkswaterstaat manage all motorways and most important highways.
- 12 provinces (dispersed roads, hardly a network)
- 418 municipalities (2011)
- 25 regional water authorities (river dikes)
- Private owners (very limited, e.g. flower auction)

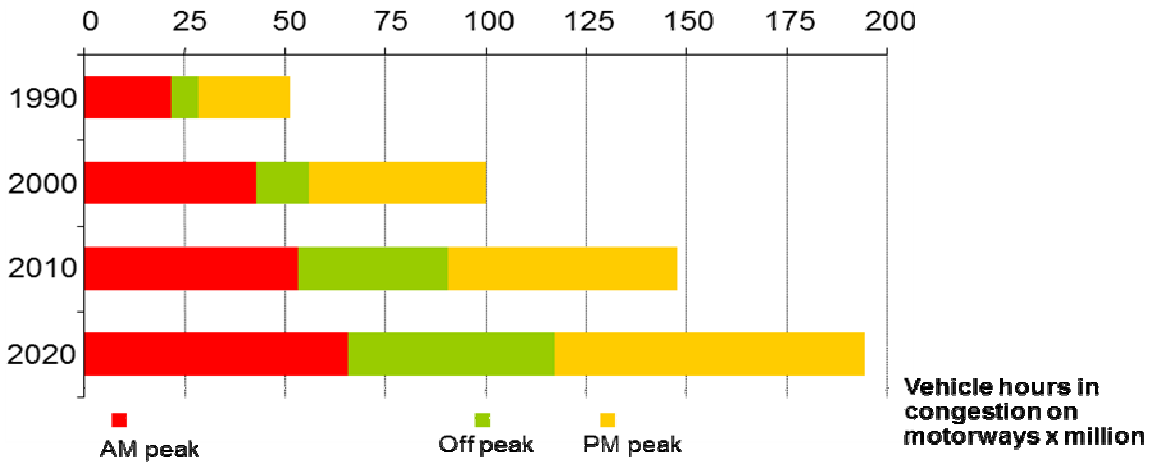
Issues:

- Congestion around the most important cities: in 'dense' areas like 'Randstad' in particular, congestion often leads to spillback effects causing negative network performance.
- On routes with heavy traffic, a large proportion of HGVs, and short spacing between junctions, incidents occur frequently, causing unpredictable congestion and unreliable travel times.
- Seasonal traffic problems on roads to the North sea coast: in the province of Zeeland in particular, a lack of road capacity (small amount of motorways) causes heavy congestion that is caused by tourist traffic.
- Extensive procedures preceding road construction (new laws are being implemented)
- Environmental issues: Nimby
- Average lead time from idea to new road: 20+ years

[8] The Randstad Region is an industrial and metropolitan conurbation in west-central Netherlands. It includes the agglomerations of Amsterdam, Rotterdam, The Hague, and Utrecht, as well as a number of medium-sized and smaller towns, such Almere, Delft, Leiden and Haarlem.

Developments in the use of the motorway system and congestion

- The car is by far the dominant means of transport in the transport system (75% of all km; 50% of all trips)
- Around 50% of all car kilometres are driven on motorways
- Dutch roads are among safest in the world (with UK and Sweden)
- Cost of time in congestion: €1.1 billion (2008)
- Increased unreliability of travel times
- Expected transport growth 2005–2020:
  + 35% (people)
  + 80% (freight)



Expected congestion increase 1990 - 2020

Policy objectives related to congestion

The key objective of the Dutch Strategic Transport Policy (Nota Mobiliteit):
Reliable, fast, and safe 'door-to-door' mobility, within constraints of (inter)national arrangements regarding environmental impacts

Ambition for road travel 2020
Reliable and acceptable travel times

Related policy objectives:
- Travellers reach their destination on time in 95% of cases.
- Peak-hour journey time on motorways may not exceed one-and-a-half times the off-peak journey time
- or twice the off-peak journey time on urban orbital roads and non-motorway roads managed by national government.
- Vehicle hours in congestion on motorways is reduced to 1992 levels.
- Traffic safety: 900 fatalities in 2010 and 640 fatalities in 2020.

The 'translation' of policy objectives

- Implementation of a
  - wide range of construction measures
  - wide range of utilisation measures
  - area specific cooperation in 'network approach': integrating all modes of transport & networks
- Rapid elimination of maintenance backlogs
- Management and deployment of traffic management programs with particular focus on 30 road-widening and utilisation projects (HSR) in the period 2010–2014. In addition: ongoing deployment of congestion-related TM measures like variable speeds, ramp metering, travel time information, and incident management on vulnerable motorway sections in particular.

The relationship of the NRA towards its parent ministry

Rijkswaterstaat:

- government agency
- implementation of policy instruments at national level related to national road network, national waterway network, national water management system

The role of the NRA in the implementation of congestion policy

- construction of the national infrastructure (incl. planning process)
- maintenance of the national infrastructure (incl. planning process)
- active traffic management on the national infrastructure
  - the collection, processing, and provision of traffic data to service providers and users
  - the development of traffic management intervention procedures
  - reactive and pro-active traffic management by application of the intervention procedures
  - incident management
- roles to be translated into service level agreements (SLA)

Specific national issues and approaches

Short-term approach to congestion

- pilot implementations, showing local and regional impacts on congestion
- including an annual award to promote and reward private initiatives
- 3,000 ideas generated by ministry employees, public bodies, corporate community, general public; over 40 original ideas implemented

Reduction of congestion resulting from large maintenance projects

- maintenance planning
- targeted mobility management; free/reduced price public transport during road works
  - effects on the image of public transport
  - awareness of mobility management
  - partnerships with operators

E Austria

The Republic of Austria is a landlocked country with roughly 8.4 million inhabitants[9] in central Europe. The territory of Austria covers about 83,879 square kilometres; the population density is about 100 people per square kilometre.

The national road authority in Austria is the Federal Ministry for Transport, Innovation, and Technology. ASFINAG, the Austrian motorway operator, is responsible for all motorways and expressways. In 1997, the ASFINAG group was vested with the concession for the planning, construction, operation, and maintenance of the Austrian motorway and expressway network, and the collection of tolls for the use of this network.

ASFINAG's core responsibilities include planning, constructing, maintaining, and operating a high-capacity, high-grade trunk network system that is clearly adapted to the demands of its users. The main objective is to ensure and optimise traffic flow, traffic safety, and driving comfort on the ASFINAG primary road network in Austria (see Figure 3).

Figure 3: The ASFINAG road network

ASFINAG is an efficient user-financed builder and operator of motorways and expressways. It is structured as a holding company that comprises 5 other companies, which are responsible for core tasks such as the construction, operation, and tolling of motorways and expressways, and for international consulting (see Figure 4).

[9] Source: Statistik Austria: http://www.statistik.at/web_de/statistiken/bevoelkerung/bevoelkerungsstruktur/bevoelkerung_nach_staatsangehoerigkeit_geburtsland/index.html

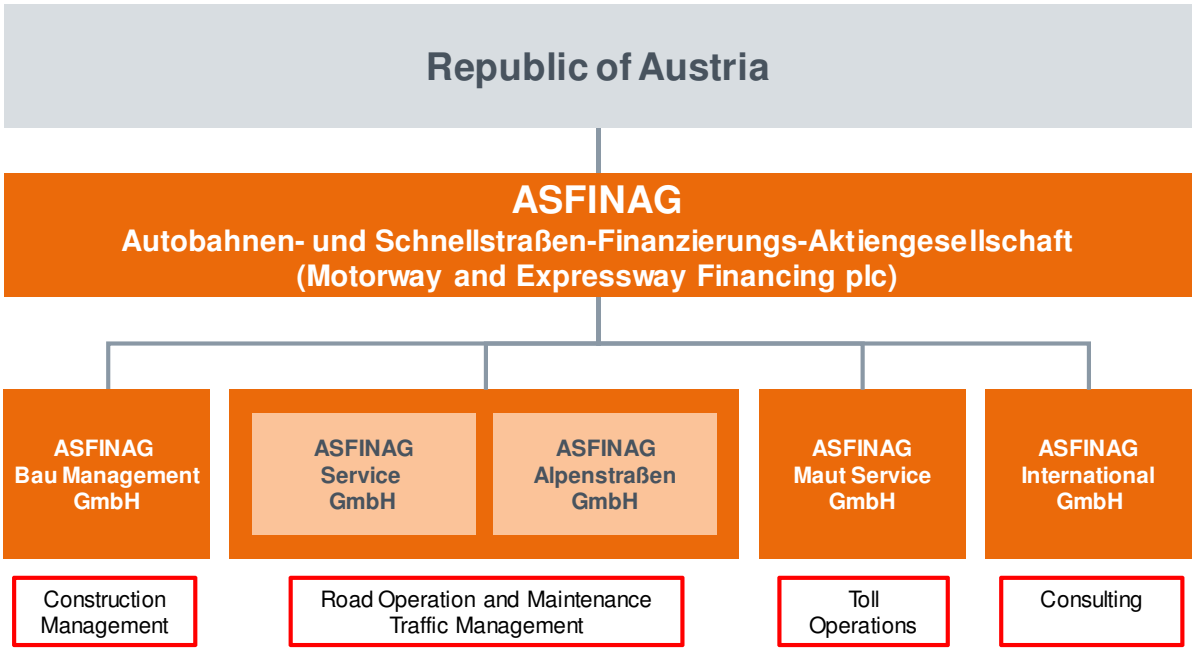


Figure 4: The ASFINAG group

ASFINAG operates a network of about 2,175 kilometres of motorways and expressways. Table 1 includes some facts about ASFINAG and its road network.

Table 1: Facts about the Austrian motorways and expressways

Road network in operation:	2,175 km	**Bridges:**	approx. 4,745 objects approx. 325 km
Maintenance facilities:	43		
Employees:	approx. 2,700	**Tunnels:**	approx. 145 approx. 340 km
Monitoring centres:	12		

ASFINAG traffic management

Traffic management is one of the core tasks of the ASFINAG Service Company. ASFINAG operates several regional and one national traffic management centres all over Austria. All centres are staffed 24 hours a day, 7 days a week. The core business of traffic management is:

- traffic and tunnel monitoring
- national and international traffic and network management
- operation of traffic management systems
- traffic data analysis and traffic information
- development of strategies to improve road safety and network availability
- construction site management
- incident management

As part of its traffic management system, ASFINAG operates the following traffic telematics systems:

- Lane control system Tyrol – A12/A13
- Lane control system West – A12
- Lane control system Linz Bindermichl – A7
- Lane control system Greater Vienna area – S1 / A4
- Lane control system Lower Austria A2 / A3 / A21 East
- Road works information system A1 / A10 / A11 / A2
- Variable message signs Styria A 2 / A 9 / S 35
- Several Network control systems at motorway and expressway interchanges
- Environment-related traffic control system Upper Austria A1
- Environment-related traffic control system Carinthia A2 / S37 / B70 / B92
- Environment-related traffic control system Salzburg A10
- Environment-related traffic control system Styria A2 / A9
- Construction site management system
- Road weather information system
- etc.

Four more line control systems are currently at the planning stage.

Line control systems are mainly used for speed adaption, speed harmonization, line indication, announcement of HGV overtaking bans, warning of risks, etc., whenever necessary.

Network control systems are mainly used for announcing route suggestions and traffic information. Traffic management by rerouting is done on different levels:

- cross-border traffic management (international level)
- national rerouting using the ASFINAG network (national)
- local rerouting using provincial highways (local, only in cooperation with police)

There are currently 3 cross-border traffic management plans and 15 national traffic management plans in operation.

Ref: CEDR report 2011/06 TDConstruction2011 / Congestion Policies

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