

# Motorways in Agglomerations – Changing Concepts for Changing Needs

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## 1 ABSTRACT

Limited financial resources, environmental regulations, new mobility trends and outdated planning concepts call for a rethinking – not only in politics, society and spatial planning, but also in infrastructure development.

The past thrive for constantly expanding capacities of motorways through new routes or enlarging existing infrastructure is becoming outdated. Intelligent expansion and new technologies displace "conventional"

(= increase-driven) strategies. Austrian motorway provider ASFINAG is already extending his future policies to new topics of strategic network planning: effects of motorways on space- and regional development, opportunities for intermodal crosslinking, enhance of information services, etc.

Also the demands of customers have changed. Linked traffic information in real time like Traffic Message Channel (TMC) is already an integral part of traffic-information and will in future be increasingly offered in a package with various mobility services. The discrete one-dimensional traffic information is already past. Future services will provide a cross-modal integrative mobility information, which means, that customers get reliable support in multimodal routing and mobility any time he needs.

Further, ASFINAG defines itself not only as a provider for road-infrastructure and high-quality technical services, but also committes itself to a builing culture in the sense of environment responsibility. The ambitious objective in the long term is to improve the appearance of motorways and expressways in terms of architectural quality and their integration in landscape. In cases of construction of new routes, ASFINAG early began to pay considerable attention to design aspects. Now, these activities will be extended to the existing network. From noise barriers up to motorway maintenance buildings, all design-related constructions will be architecturally revised, so that the appearance of our entire network – from bridge to rest areas – will be refurbished for our customers and residents nearby motorways.

## 2 MOTORWAYS IN COMPETITION OF SITES

### 2.1 Motorways affect Spatial Development

Spatial development in Austria is strongly influenced by highcapacity-infrastructure and has generated certain principles: industrial parks settle mainly in the catchment area of existing motorway junctions. It is considered as a precondition by local authorities and investors to build new junctions for the purpose to establish commercial real estates. It is even politically demanded. Common task in spatial und infrstructure-planning is it therefore, to develop an integrative view, ie. to anticipate possible effects of infrastructure on regions and communities followed by deriving regional and balanced transport policy objectives. Positive and negative effects are to be faced in terms of balancing interests!

### 2.2 EU Research project "TIILUP"

In 2012 a noteworthy EU research project named "TIILUP" (Transport Infrastructure Integrated Land Use Planning) was started. As a member of the coregroup team, ASFINAG assists to develop innovative instruments and methods, which can integrate land-use-planning more efficient into the process of multimodal infrastructure planning. Existing cases in the Netherlands, Germany and Austria have shown how such an integrated approach can lead to significant increases in cost efficiency in terms of investment costs, improved planning and investment processes and social/economic benefits as well as better reliability of the transport system and liveability for citizens in the regions involved. The TIILUP approach will analyse these and other relevant best practices to determine the key elements of the various approaches and consolidate them in a suite of generic approaches: the TIILUP toolbox.

The outcome will be a practical toolbox which enables organisations (such as local, regional and road authorities) to plan infrastructure more efficiently and meet policy objectives. The solutions in the toolbox

will be proven in practice and be accompanied with common standards, guidelines and specifications. This product will be disseminated through a sound knowledge transfer process.

### **2.3 Paying for benefits initiated by motorway connections**

Fulfilling her duties, ASFINAG is increasingly confronted with projects and measures in the interests of other (third) parties. Especially interchanges often prove as a "magnet" for extensive business relocations. Usually the provision of infrastructure generated by ASFINAG implicates a significant rise of values in land use creation, but there are no adequate benefits (eg. road toll income) in return. As a customer-financed motorway operator it is therefore legitimate interest, to share costs with other parties according to the calculated monetized benefits. In these cases of cost sharing, the funding is usually aliquot to the achieved benefits.

Since a few years this approach was established as common practice in ASFINAG. Further appropriate cost-sharing models are applied successfully for: the provision of noise barriers, protection of torrents and avalanches, Park & Drive facilities etc.

## **3 MOTORWAY OF THE FUTURE: INTELLIGENT AND CROSS-LINKED**

### **3.1 Intelligent solutions replace expansion measures**

The strategic focus getting motorways more efficient, is – by implication – focused on urban areas. Changed transport policy perspectives, changing mobility needs and rigorous cost reduction targets have distinct consequences: capacity constraints on the primary road network will in future be faced not only through expansion projects, but will be compensated by intelligent inventory-orientated solutions.

ASFINAG is developing sustainable solutions as follows:

- **Emergency Lane Release:** on critical routes a temporary release of emergency lanes shall compensate high traffic volumes during morning and evening peaks. The objective is it, to keep traffic fluent and avoid accidents and traffic jams. To make this concept work, appropriate dynamic overhead displays and a video control system have to be installed. After implementation of all traffic safety-related requirements, the emergency lane can be released temporarily.
- **Ramp metering:** ramp meters could be installed to restrict the total flow entering the motorway, temporarily storing it on the ramps – a process called "access rate reduction." In this way, the traffic flow does not exceed the motorway's capacity.

### **3.2 Cross-modal network**

ASFINAG has developed a strategy- and action plan for linking road networks with other modes of transport – concerning both – passenger and freight traffic. Appropriate locations connecting motorway with other carriers are examined regularly in order to find and develop multimodal nodes. First measures on motorways as signposting of Park & Ride (P&R) facilities were already implemented on ASFINAG network.

To optimise collaboration and information generally, regular meetings with delegates of other infrastructure operators are taking place. Besides P&R supply ASFINAG also thinks ahead how existing Park&Drive (P&D) facilities and service stations or rest areas can be developed as intermodal nodes for bus line operators in future. New "features" can be implemented in those locations, such as "Ride&Drive" (a combination of public transport and carpooling), as well as e-mobility devices in Park&Drive locations.

Concerning P&R facilities, information management in Austrian motorway-network will be continuously expanded. The information provided includes the current connection status, the availability and utilization of public-transport, which can provide incentives for customers to change modes efficiently.

ASFINAG telematic network shall play a key role in intermodal information management. The development and implementation of "Cooperative Systems", based on an exchange of information and communication between vehicles and road infrastructure, is progressing rapidly. As part of the recent ITS World Congress 2012 in Vienna, achievements in cooperative services were demonstrated live in a "Showcase" in and around the city Vienna. Through a wireless communications network, a cooperative vehicle system can enable cars, buses, trucks to communicate not only with each other, but also to intermodal nodes. Major goal is to

integrate different modes of transport and to provide efficient interchanges between private and public transport.



Fig. 1: "Car-to-Infrastructure" – communication

Increasing cross-linking of vehicles through the area-wide availability of mobile, wide band, communication solutions offers numerous opportunities for communication with infrastructure networks. Thus, traffic information will be an indispensable part of future mobility.

### 3.3 Incident management, traffic control, Level of Service

Another strategic approach to improve quality of transport in urban areas are „soft" skills like intelligent network monitoring and data analysis. These traffic control measures also help to increase capacity of motorways without constantly enlarging capacities by additional lanes. Associated with comprehensive congestion causal-research activities, alternative solutions (for example release of emergency lanes) can displace expensive expansion measures. Intelligent traffic-monitoring can result in quite ordinary optimization measures which increase road safety substantially and thus a better route availability. Since today ASFINAG has already installed numerous of intelligent analysis- and control systems. The objective of all activities is it, to offer customers a safe and efficient traffic-network and make use of the existing data-infrastructure as much as possible. Since a few years, traffic problems on Austrian motorway-networks are actively managed and motorists are informed immediately about hazards or obstacles. To be able to communicate with drivers, road-side facilities, known as Traffic Control Systems – supported through different traffic information services – are already provided.

Basis for all Real-time informations are 2150 sensors along the Austrian motorway network, as well as Real-time data from partner organizations (eg executive or radio Ö3). Skillful coupling these different data sources significantly improves the quality of single informations.

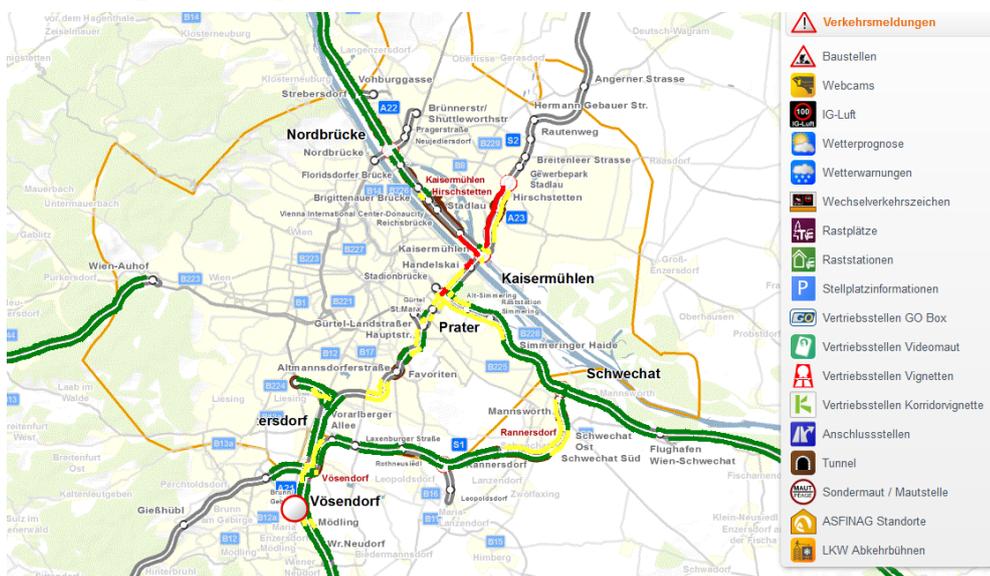


Figure 2: webbased ASFINAG Traffic Control and Level Of Service Information

Further, as truck parking facilities are increasingly demanded, ASFINAG, for example, has installed a truck parking information systems for metropolitan areas of Vienna and Linz.

Another successful information-service are, for instance, ITS-supported recommendations of alternative routes in case of line blocking and congestions situations.

#### 4 INFORMATION / COMMUNICATION: MORE IMPORTANT THAN EVER

##### 4.1 Telematic services

Successful Transport systems in urban areas are today a matter of information. Future traffic information services of transport operators will be a highly specialized, quality-assured, data-management that provides reliable, timely, high-available and multi-modal informations for the linked up customers. The usefulness of mobility information is elementary for the customers and has to be offered easy and simple to understand. Especially traffic information has to be integrated to those platforms which are utilized by customers for their daily information. Not to forget additional „key-innovations“ like e-Mobility, e-Safety, as the latest progressions in urban mobility.

Standalone-Informationstechnologies of today will continuously be replaced by integrated centralized services. Multimedia service for traffic information is provided on uniform, standardized platforms and available for customers by mobile devices and digital broadcast services.



Figure 3: Traffic information services ASFINAG

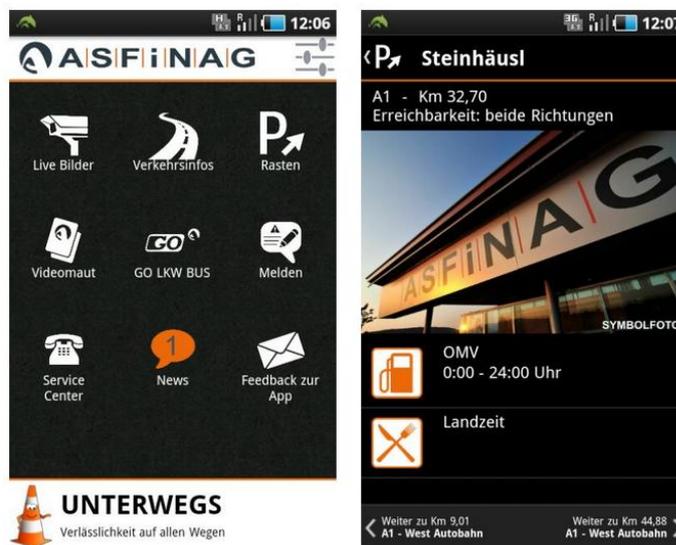


Figure 4: Mobile Internet ASFINAG

From ASFINAG point of view sustainable mobility can only be achieved by measures along all three intervention-axes: vehicle – man – infrastructure. In multimodal transport networks of the future, users choose from the most comfortable and best suitable transport-facility for the particular route, travel purpose and the current traffic situation (eg unavailable route because of roadworks). Successful application of multimodality in daily life requires integrated route planning, reliable knowledge of the current traffic situation and well directed alternative options. For those purposes powerful communication and information solutions are necessary. A variety of different traffic information services are currently available to road users in Austria. One of the most efficient services will be the „Traffic Information Austria (VAO)“, a

platform developed under guidance of ASFINAG. The mission was to create a collaborative information service covering all Austrian traffic means and all traffic-states (for cyclists, pedestrians, public transport, motor vehicles, Park&Ride) in realtime and in consistently high quality. Highlighting alternatives and options enable customers to switch to more environmental-oriented means of transport and ensure more attractiveness and greater awareness. According to the results of the research project „ITSworks“, the potential for shifting traffic from the car to more environmentally friendly modes ranges up to six percentage points.

Particular requirements in data quality and comprehensive information have to be implemented:

- the offering has to become coherent and not only cover small sections of the mobility range, as is currently often the case
- the quality of all services should be equally high; they should thus have access to a collaborative database in order to prevent inconsistent recommendations
- the digital maps currently employed should also be standardised to reduce inconsistencies in routing and localisation to a minimum
- a common coordinated strategy would ensure traffic control more flexible, ecological and efficient in terms of mobility

## 5 MOTORWAYS AND BUILDING CULTURE

The perfect motorway meets several aspects: it must be planned safe and functional – and simultaneously must fit in the landscape as much as possible. Motorway routes, noise barriers, bridges, tunnels, rest areas, toll cabins and other buildings leave – because of their size and feature – distinctive marks in landscape and are therefore not only a technical but also an architectural challenge for Highway authorities.

As part of the ASFINAG – design initiative, launched in 2010, was the founding of a „design advisory board“ of internal and external experts in the fields of architecture, landscape architecture and planning as well as representatives of the Austrian Chamber of Architects. As a strategic approach, the company has focused not on ordinary design proposals or catalogs but on sustained strategic and organizational regulations, in order to allow plenty of room for creative minds to realize innovative (design) ideas in the project execution.

Austria's 2175 km long road network consists of over 1,250 kilometers of noise barriers and 4745 bridges, both with renewal cycles starting from 15 to 20 years up to 70 years. Purpose of the design initiative ASFINAG is to guarantee, that our construction projects are not reduced on safety and functionality, but should also fit aesthetically into the landscape.

In cases of construction of new routes, ASFINAG early began to pay considerable attention to design aspects by undertaking architecture competitions. Very positive customer feedback confirmed the chosen path. Now, these activities are already extended to the existing network, which is a far more complex exercise. Just in the year 2012 eleven different design contests for renewal measures in the existing network were settled.

An important aspect of the design initiative was, already from the beginning, the subject of economics. To ensure efficient and cost effective solutions, one of the most decisive requirement is to implement design aspects early and coordinated in the planning process. This must be guaranteed by all involved disciplines.

Objectives of the ASFINAG design initiative:

- Continuity and long-term effectiveness
- Standardization instead of sprawl
- Innovation as an element of design
- Basic principle of economics
- Defined and achievable quality criteria
- Employee training on "Architecture"
- Top-quality renovations – particularly bridges and noise barriers



Fig 5:. Construction of Motorways has to deal with building culture

## 6 CONCLUSION

Already for several years ASFINAG faces increasing traffic challenges in urban areas, which only can be solved in an overall context. Common target of all measures is it, to run the road-network to the lowest possible costs and related to highest efficiency and innovation. Thus under precondition of largest possible customer satisfaction on high level of quality. To ensure furthermore, that customers travel safely and unhindered on ASFINAG network, it requires increasing intelligent and innovative solutions – with a reinforced focus on optimizing the existing infrastructure as well as deepen intermodal strategies and information services.

## 7 REFERENCES

- ASFINAG: Annual Report 2011, Vienna, 2012.
- ASFINAG: F&E Schriftenreihe ASFINAG No 6, Vienna, 2012