BrennerLEC

EU-LIFE project “Brenner Lower Emissions Corridor”

Questions and answers on the project

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The BrennerLEC project in brief

BrennerLEC is the contraction of Brenner Lower Emissions Corridor. BrennerLEC aims at making traffic along the Brenner axis more respectful of the local population's health and more compatible with the geographical features of the land, in order to protect the particular Alpine environment crossed.

It is a demonstrative and innovative project aiming at defining how, where and when speed limits and other traffic management measures can be applied to achieve the maximum environmental and transport benefit with the minimum inconvenience for road users.

The three pillars of the projects are: dynamic speed limits management, dynamic lane usage and "intelligent" on-road information. The efficiency of these measures will be evaluated in terms of environmental impact reduction as well as their socio-economic impact and in traffic fluency terms.

The project was approved by the European Commission on March 3rd 2016, started in September 2016 and will end in April 2021. The overall project budget amounts to 4 million euros and is co-financed by the EU funds of the LIFE Programme (Environment) for a total amount of 1.9 million euros.

Which are the project partners?

The project is coordinated by Autostrada del Brennero Spa (Brenner Motorway) in partnership with the environmental agencies of Bolzano and Trento, the University of Trento, the local agency CISMA and IDM Südtirol / Alto Adige.

Each partner has important specific competences they consolidated during years of activity. This mix of competences and experiences allows to have a project team meeting the ambitious objectives that BrennerLEC wants to achieve.

These specificities are summarized hereafter:

- **Autostrada del Brennero:** it has been builder and manager of the A22 motorway since 1959 and has a long experience in the management of a motorway in close contact with the Alpine environment. It also has to face daily problems related to the management of heavy goods and tourists traffic.

- **Agencies for the environment of Trento and Bolzano:** provincial authorities for the control and management of air quality and responsible for the planning of the environmental protection policies.
- **University of Trento:** scientific competence center in the environmental engineering field and in particular in meteorology and in the management of mathematical forecasting models.
- **CISMA:** local company specialized in environmental assessments and in the development and use of complex calculation algorithms to be used in the implementation of decision support systems.
- **IDM:** technological innovation center supporting the local industry having specific competences in the "smart mobility" field and with several experiences in the management of EU projects.

Furthermore, the project is supported externally by observers with a technical and strategical high value that could give a productive contribution for the success of the project. Among them in particular the Environmental Ministry, the Transport Ministry, the Austrian motorway operator (ASFINAG) and the Agencies for environment of the Lombardy, Emilia Romagna and Veneto regions.

Which are the main aims of the BrennerLEC project?

Trentino - South Tyrol is an Alpine region with a worldwide recognized high value in terms of landscape and nature. The region counts approximately 1 million residents and over 7 millions tourists per year (source: Astat 2014). It hosts the road and rail infrastructure needed to grant the free circulation of people and goods between Italy and North Europe. The environmental impacts caused by the traffic crossing the narrow Alpine valleys are very relevant in the same way as the sanitary risks related to it. This difficult coexistence between environmental protection and free circulation of people and goods represents a particularly relevant challenge for the road transport sector. The emissions of atmospheric pollutants, greenhouse gases and noise produced by traffic force us to act concretely and quickly in order to grant as soon as possible air quality in line with European norms and a better life quality for the resident population.

The BrennerLEC project is co-financed by the EU funds allocated for nature and environmental protection. Its priority objective is to increase the environmental compatibility of road traffic along the Brenner corridor.

BrennerLEC aims at being a “win-win” project as it follows environmental objectives (better air quality and reduction of greenhouse gases and noise) by trying at the same time to achieve a more efficient transport system (more transport capacity and safety).

The reduction of polluting emissions is pursued by means of the following strategies:

- Traffic flows management during heavy traffic situations by combining dynamic speed limit reduction and dynamic lane activation strategies;
- Dynamic management of the maximum speed limits allowed according to air quality;
- Traffic flows management near the biggest urban areas by means of “intelligent” on-road information.

Where will the project be concretely implemented?

The project will be experimentally implemented on the A22 motorway stretch between Bolzano North and Rovereto South and aims at acting as prototype for the extension of management techniques to the whole Alpine motorway section. The test section is 91 km long and will host the following specific experimentations:

1. Dynamic speed reduction will be experimented on the southbound carriageway of the whole section to optimally manage traffic peaks and avoid, as far as possible, queue building and “stop&go” phenomena and other traffic flow disturbances.
2. Dynamic lane management will be experimented on the southbound carriageway between Trento South and Rovereto South (approx. 23 km) with the objective to understand how to optimize its use in combination with the management of the dynamic speed limit.
3. Dynamic speed reduction will be experimented along the motorway stretch between Egna and San Michele all’Adige (approx. 10 km), on both carriageways, to reduce the atmospheric pollution aiming at preventing situations where European limit values are exceeded.

4. Intelligent on-road information techniques will be experimented in proximity of the urban areas of Bolzano, Trento and Rovereto in collaboration with the local municipalities in order to better distribute traffic flows to routes being less impacting in terms of environment.

When will the project be implemented?

The project started in September 2016 and will end in April 2021. The infrastructures and the devices needed to carry out the experimentations and to monitor the effects will be prepared during the first three months. The first tests will start at the beginning of 2017 on reduced motorway stretches. Month after month these experimentations will be more frequent in order to be able to collect all necessary amount of information to successfully plan the following phases.

Starting from March 2018 tests will be carried out on all experimental stretches with the objective of completely quantifying the environmental and traffic benefits and prepare everything is needed to start the final phase of the tests. Starting from October 2019 the plan is to implement all complete measures on all experimental sections. In this phase all methodologies and modalities of application of the dynamic measures will be fine-tuned in order to optimize the effects. The aim is to have, by the first months in 2021, an active, tested and optimized system that can be also exploited in other stretches of the Alpine corridor, in particular along the A22 motorway stretch Brenner – Verona.

What environmental benefits can be achieved by reducing speed?

Less pollutant emissions, less fuel consumptions, less noise, increased road safety. By passing from 130 km/h to 100 km/h, a EURO 5 diesel car releases (exhaust) on average 39% less nitrogen oxides and 22% less CO_2, allowing at the same time a relevant fuel saving. These data of potential reduction have been extracted from the most recent version of the COPERT v4.11 calculation method.

Field tests carried out in Austria have also confirmed consistent reductions of pollutants emissions.

One of the objectives of the BrennerLEC projects is to empirically validate these results, by analyzing in detail the vehicles fleet along the A22 motorway.

Vehicle fleet 2014	Nitrogen oxide NO_x	Carbon dioxide CO_2	Fine dust PM_{10} (from the engine)
Motorway with speed limit at 100 km/h instead of 130 km/h	-25%	-16%	-20%
Motorway with speed limit at 80 km/h instead of 100 km/h	-15%	-5%	-8%

Source: Austrian Environmental Ministry

How much time do I waste by observing the speed limits?

In case of heavy traffic, speed reduction allows to reduce queues and therefore it tends to reduce travel time rather than increasing it.

In case of critical situations for atmospheric pollution speed limit reduction actually increases travel time. But what does it mean concretely?

Even if it is not possible to define a priori which speed would be ideal to be used in the dynamic speed management strategies, it is however already possible to suppose a reference speed of 100 km/h. Therefore, in case of atmospheric pollution a reduction of 30 km/h on limited motorway sections (in the experimental project it is about approximately 10 km between Egna and San Michele) applied for a limited period of time will effectively determine an increase of the travel time for a large part of motorized users.

In the specific case of the BrennerLEC project, this would mean about 83 seconds more for each travel (which is at least 1 hour long for most of the users). In this context, a concrete contribution for the environment costing 83 seconds from time to time can certainly be considered a collective benefit instead of a personal disadvantage.

Is it better to reduce the speed of trucks or that of cars?

The maximum speed limit allowed for truck is 80 km/h. The truck engines have been designed and optimized on this commercial speed. By reducing then the operational speed of these vehicles in

normal conditions (i.e. on a flat road), there wouldn't be any positive effect, but a probable worsening of emissions.

This is not the case for cars as their optimal speed (as far as consumptions and emissions are concerned) is usually 80-90 km/h. From a logical point of view heavy goods vehicles should then constantly travel at 80 km/h and cars at 90 km/h (primarily to grant overtaking maneuvers). This ideal configuration cannot be obviously reproduced in real conditions. However, trying to have constant and regular traffic flows is one of the primary objectives we have to aim at in order to optimize fuel consumptions, to reduce emissions, to increase transport capacity and users' safety.

Two important aspects can be then deduced from these considerations:

1. The reduction of the maximum speed allowed has effects only on vehicles that can travel at a speed higher than 80 km/h. Almost all heavy goods vehicles are therefore excluded from this measure.
2. The regularity and homogeneity of traffic flows play a crucial role as they tend to reduce acceleration and deceleration situations (which can cause a relevant increase of emissions and of the risk of accidents).

How is air quality measured?

Air quality measurements are ruled at European level by the 2008/50/CE directive and at national level by the legislative decree 155/2010. These norms prescribe the modalities on how, where, by means of which tools and with which detailed configuration the data related to the concentration of pollutants foreseen by the norms have to be collected. All these regulations grant then a remarkable homogeneity at European level and allows a comparison of the different situations. In the specific case of the regional stretch of the Brenner motorway air quality has been measured for several years in two points, i.e. near Bressanone and Ala. Measurements are carried out by the respective Agencies for the environment. The data collected here are directly comparable one to the other and with those collected in other regions and in other EU countries. The data registered in our region are perfectly corresponding to surveys carried out by other authorities for environment protection and show extraordinarily similar values and historical trends. Within the framework of the project the several

measurements foreseen will be carried out also by means of innovative systems (even if they are not recognized by law). This will allow to obtain all necessary additional sources of information to assess in detail the situation of air quality next to the motorway infrastructure and in particular near the buildings standing next to the traffic flow. This assessment will be supported also by the most modern model techniques in order to achieve a complete overview on the whole territory involved.

Glossary

LIFE Programme: financial tool of the European Union aiming at supporting projects on the European territory in order to promote environmental protection, nature conservation and climate safeguard http://ec.europa.eu/environment/life/

Win-win: English expression indicating the sole presence of winners. In a more broaden way win win considers each situation bringing advantage to all parts involved

Dynamic speed reduction: system allowing to change the maximum speed allowed for vehicles according to temporary needs. Drivers are mainly informed by means of variable message signs controlled remotely and in real time

Stop&go: In the transport sector this English expression, also used to describe specific economic policies, indicates the continuous starting and stopping of traffic flows

Dynamic lane management: Extraordinary and temporary opening of the emergency lane in order to increase the road/motorway capacity, by granting at the same time the necessary safety measures for users

European threshold values: maximum levels of pollutants concentration in the air applied in every EU country in order to grant humans health protection. Italy acknowledged these limits by issuing the legislative decree 155 dated August 13th, 2010

Exaust: technical terminology defining the emissions exclusively produced by exhaust pipes (exhaust gases and dust). Emissions produced by the abrasion of tires and breaks as well as the phenomenon of the raising of dust from the soil are thus excluded

COPERT: (Computer Programme to calculate Emissions from Road Traffic) it is a calculation algorithm to calculate traffic emissions. It refers to the European guidelines for processing the emissions inventories (EMEP / CORINAIR Emission Inventory Guidebook) and it is therefore a reference standard at European level

COPERT is a model allowing to achieve emissions factors based on:

- vehicle type (category and engine type)
- driving condition (speed, travel time, traffic type)
- fuel type (fuel, diesel, gas)
- ambient conditions
- road slope
- load transported (for heavy goods vehicles)
- pollutant (PM10, NOx, CO, etc.)

By means of this algorithm a specific emission value (grams released for each kilometer travelled) can be associated to each pollutant. The calculation functions do not derive from theory and do not refer to vehicles' homologation data, but they are drawn from a substantial database of measures carried out on the road with different real driving cycles

Speed limits on the motorway: The traffic laws (Legislative Decree 285 dated April 30th, 1992) define the maximum speed limits allowed, diversified for each vehicle type:

Vehicle type	Motorway
Vehicles with MLM ≤3,5 t (i.e. cars)	130 km/h
Bus with MLM ≤8 t	130 km/h
Bus with MLM >8 t	100 km/h
HGV with MLM >3,5 und ≤12 t	100 km/h
HGV with MLM >12 t	80 km/h
Tractor trailer, independent from the MLM	80 km/h
Articulated lorry, independent from the MLM	80 km/h

Notes: *MLM= Maximum Laden Mass (vehicle weight + weight of the maximum load allowed)*