

# The “lower emissions Brenner Digital Corridor”: final empirical results of the BrennerLEC project

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# The BrennerLEC project



## Partner

A22 (coordinator)  
APPA – Autonomous Province of Bolzano  
APPA - Autonomous Province of Trento  
University of Trento  
CISMA  
NOI Techpark

## Duration

01.09.2016 – 30.04.2021 (extended to  
30.09.2021 due to Covid-19 emergency)

## Overall budget

€ 4,018,005

## Eligible budget

€ 3,311,365

## LIFE co-funding

€ 1,922,772 (approx. 60% of the eligible  
budget)

## Location

Trentino South Tyrol, Italy



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# The BrennerLEC project

## BLEC-ENV

SPEED LIMITS  
REDUCTION TO  
INCREASE CAPACITY



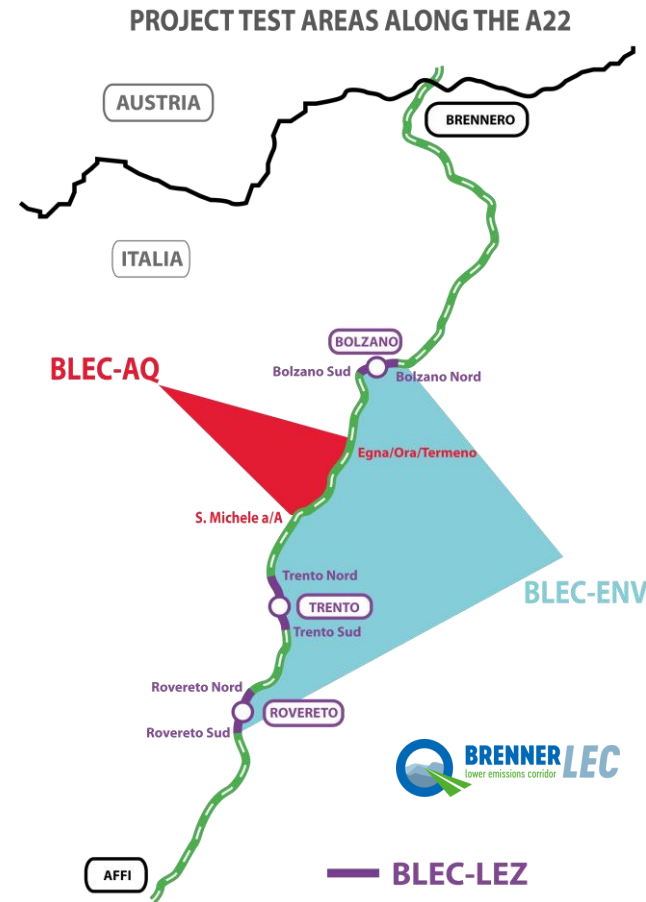
## BLEC-AQ

SPEED LIMITS  
REDUCTION TO  
REDUCE EMISSIONS



## BLEC-LEZ

JOINT MANAGEMENT OF TRAFFIC  
BETWEEN URBAN ENVIRONMENT AND  
MOTORWAY



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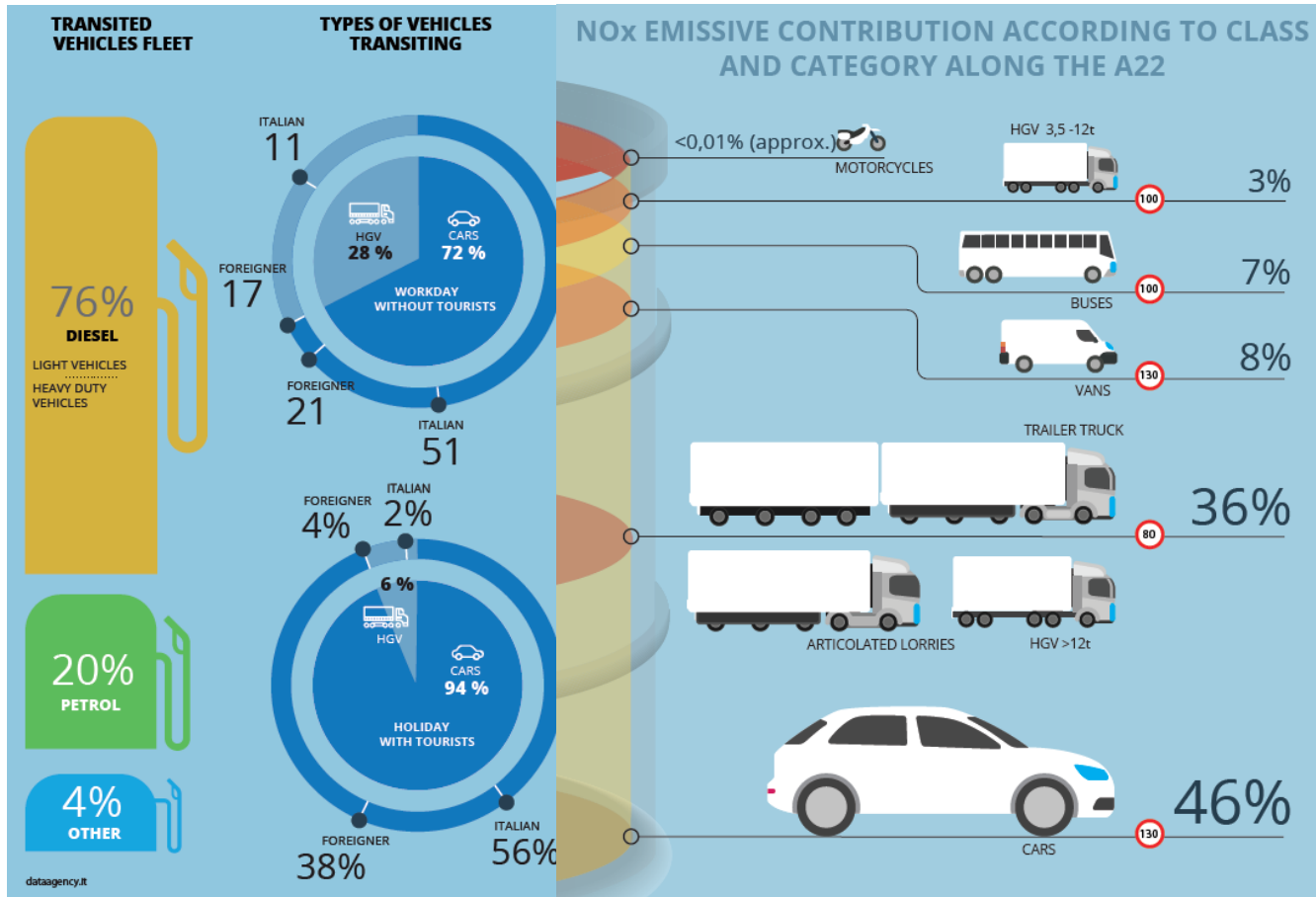
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# The environmental problem

In the years, local (political) focus has been mainly put on freight traffic only.... But almost half of the NOx emissions area caused by passenger traffic!



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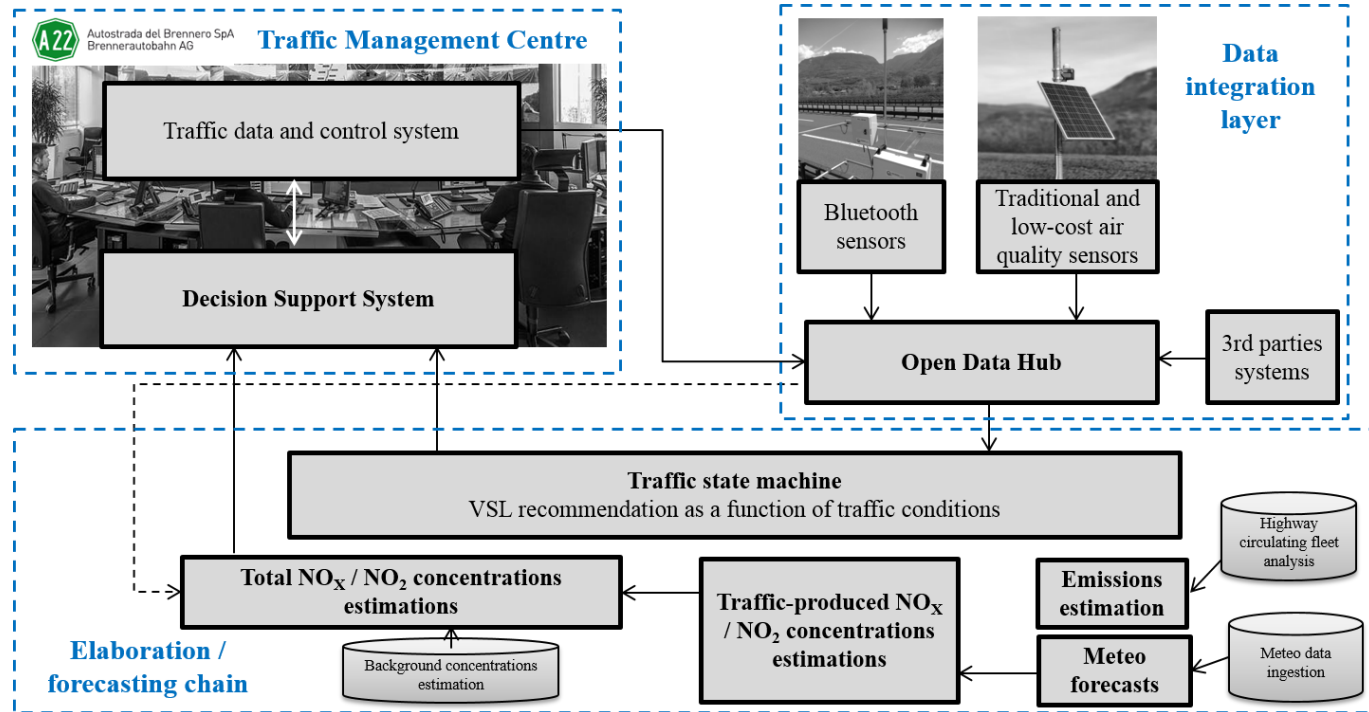


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# The ITS system architecture deployed

Intelligent system implemented so to activate the measures only when needed so to obtain the **best possible efficiency** (max benefit with the min. amount of time and the with the min. disturbance for the travelers).



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# The ITS system architecture deployed

Use of a semi-automatic management system to calculate the optimal speed limit based on current traffic conditions

*Bolzano Nord – Rovereto Sud*

Northbound

2 homogeneous sub-sections:

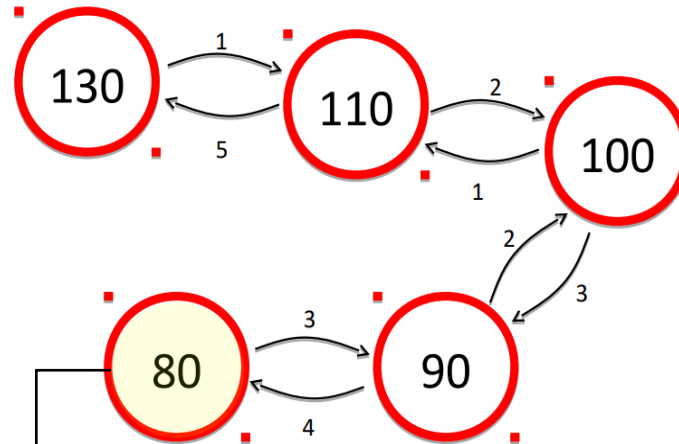
- T1: S. Michele – Bolzano Sud
- T2: Trento Sud – S. Michele

Southbound

3 homogeneous sub-sections:

- T1: Bolzano – Egna
- T2: Egna - Trento
- T3: Trento – Rovereto Sud

- 1: Se  $105 < v < 115$  [km/h] && Portata > 1500 [veicoli]    3: Se  $85 < v < 95$  [km/h] && Portata > 2000 [veicoli]  
2: Se  $95 < v < 105$  [km/h] && Portata > 1800 [veicoli]    4: Se  $v < 85$  [km/h] && Portata > 1500 [veicoli]



5: Nessuna delle 4 condizioni precedenti

Possible complementary measure:  
HSR (speed limit: 80 [km/h])

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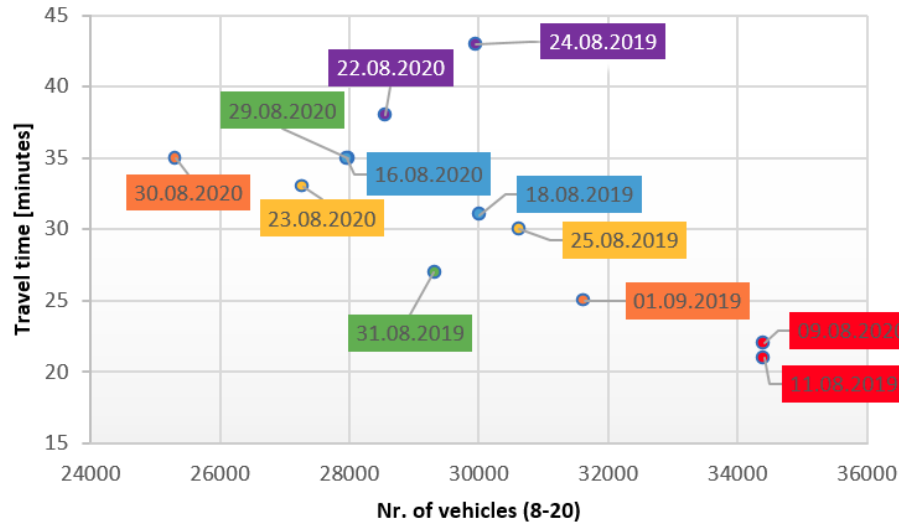


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# Project results – BLEC-ENV

Tests	Phase 1	Phase 2	Phase 3	Phase 4
Activation period	03.2017-05.2018	01.2019-09.2019	12.2019-02.2020	05.2021-09.2021
Test sessions	34	77	15	79



## Best comparison possible:

Comparison of days with high traffic volumes in 2019 (with measure in place) vs 2020 (without measure, due to COVID) – **more traffic and lower travel times!**

Results of 2021 summer season (under consolidation) confirm and also strengthen these first preliminary results

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# Project results – BLEC-AQ

Tests	Phase 1	Phase 2	Phase 3	Phase 4
Type of activation	Calendar	Calendar	DSS (forecast mode only)	DSS
Activation period	04.2017-06.2018	07.2018-08.2019	09.2019-03.2020	10.2020-09.2021
Number of test hours	1367	1715	1310	1185
Average speed northbound and southbound [km/h] during tests	109	114	117	118
Average speed northbound and southbound [km/h] during no tests	123	119	121	123
Average speed delta Test vs. No Test [km/h]	14	5	4	5

Note: higher delta observed as a function of traffic volumes → poor results are mainly due to reduced traffic during COVID-pandemic

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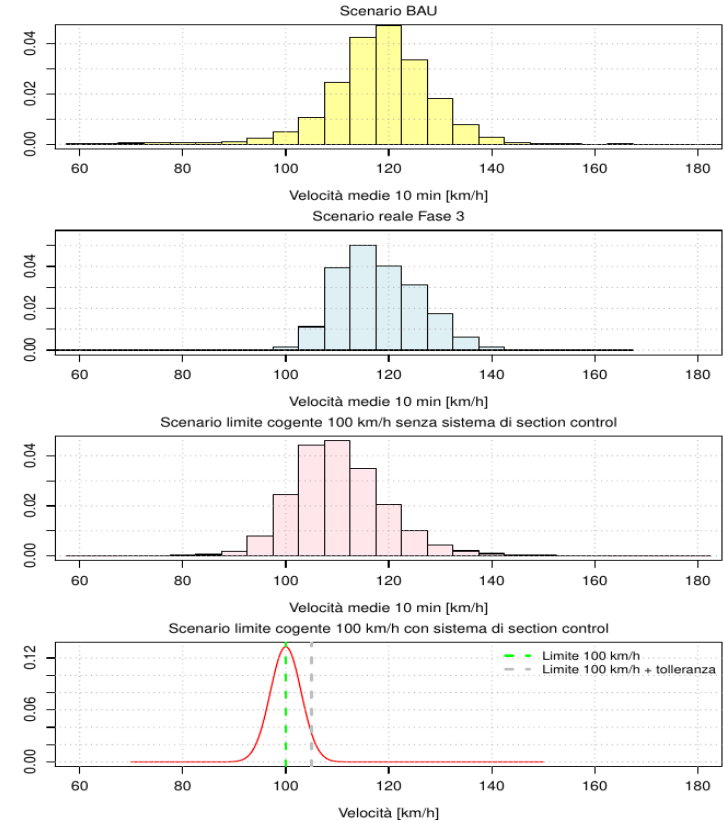
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# Project results – BLEC-AQ

Scenario	Speed distribution		No <sub>x</sub> emissions reduction	CO <sub>2</sub> emissions reduction
«BAU»	Real	Measured during «no test»	0.0%	0.0%
100 km/h «suggested»	Real	Measured in Phase 3	-4.2%	-1.9%
100 km/h «limit»	Real	Measured in Phase 1	-12.0%	-6.1%
100 km/h «tutor» - with section control	Theoretical	According to model	-25.4%	-12.9%



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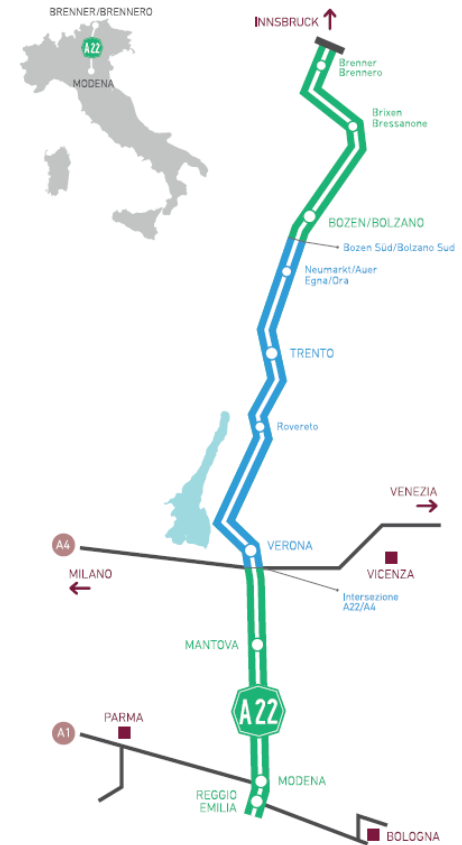


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# Project replication – BLEC-ENV

- ❑ Need for an infrastructure that allows continuity of information to users
- ❑ The implementation logic of the speed control dashboard had to take into account the availability of variable message signs and loops
- ❑ The infrastructure set up for the HSR proved to be suitable, without further modification, for the application of the dynamic traffic management measures foreseen by the BLEC-ENV measure
- ❑ Traffic volumes, infrastructural characterisation and homogeneity of information infrastructure justify the decision to **extend** the speed regulation measure to the **Bolzano Sud - A4 Intersection** section



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Reduzierung der Geschwindigkeit bei erhöhter Verkehrsbelastung  
Misure di riduzione della velocità per traffico sostenuto



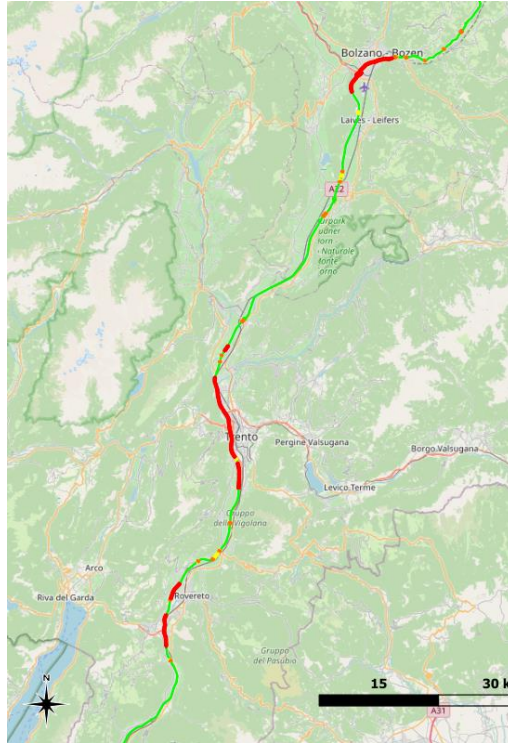
# Project replication – BLEC-ENV

## IMPLEMENTATION OF THE MEASURE WITH THE INTRODUCTION OF C-ITS SYSTEMS

Opportunity to extend the application of the measure to the section between **Brenner** and **Bolzano South**, since the geometric conformation of the route, the morphology of the territory and the infrastructure will not affect the possibility of applying the measure effectively.



# Project replication – BLEC-AQ

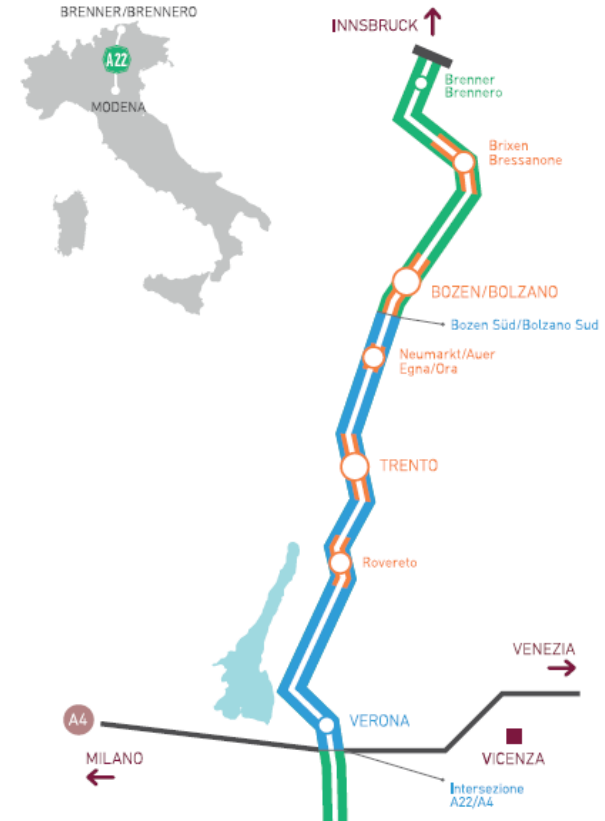


**Red sections:** average concentration on 2 km x 2 km grid  $> 32 \mu\text{g}/\text{m}^3$

**Orange sections:** presence of buildings in the area with concentration  $> 40 \mu\text{g}/\text{m}^3$

**Yellow sections:** presence of buildings in the area with concentrations  $> 38 \mu\text{g}/\text{m}^3$  (at risk of being exceeded)

**Green sections:** non-sensitive section



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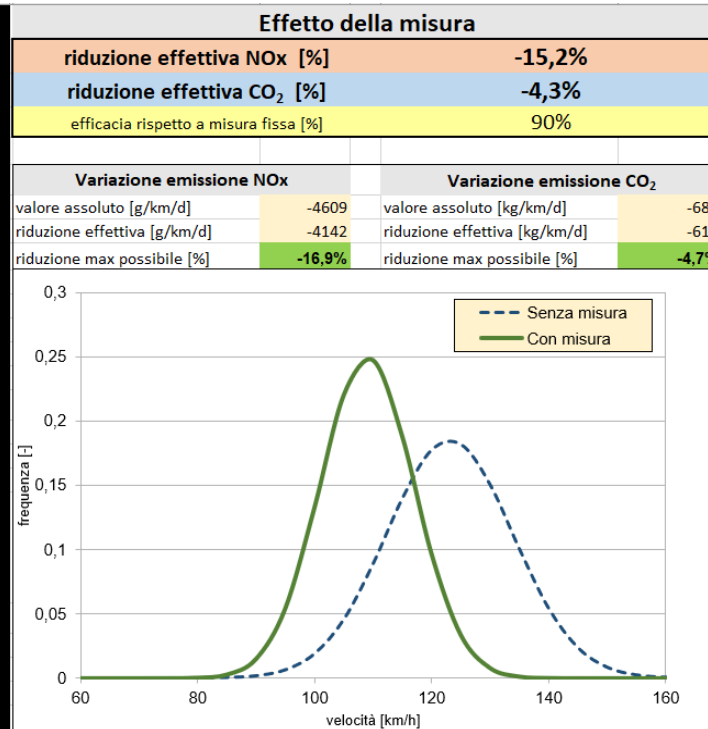
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# Project replication – BLEC-AQ

## Tratto autostradale sensibile di Egna - San Michele (km 100 - km 105)

Tipologia della limitazione		
Velocità consigliata	100	NO
Velocità obbligatoria		SI
Velocità obbligatoria e controllata con "Section Control" (Tutor)		NO
OK		
Durata massima della limitazione		
limite massimo di ore di attivazione in un anno [%]		



What-if tool at disposal for decision makers. Freedom choices:

- **Measure type** (speed limit + enforcement)
- **Max. nr of yearly hours** in which the measure can be activated

Different scenarios can determine similar results!



# Project replication – BLEC-LEZ

**Analytics**

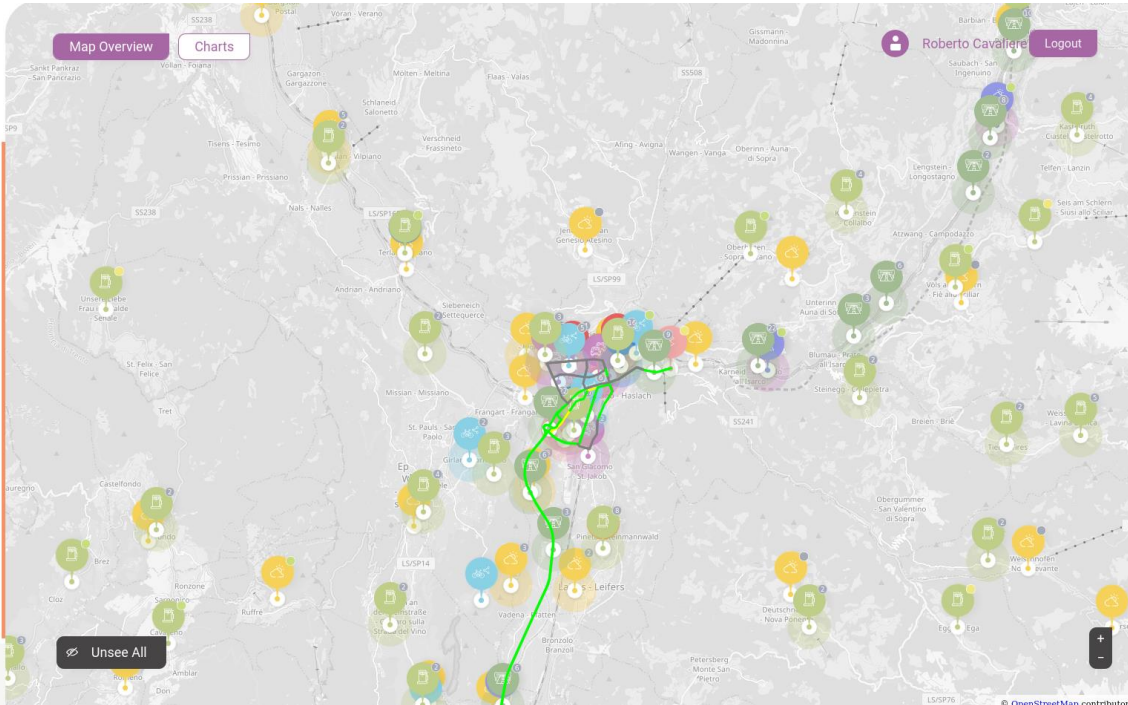
- Weather
- Air quality
- Parking
- Bluetooth
- Traffic
- BikeCounter
- Road weather
- Car sharing
- Bike sharing
- E-Mobility
- VMS

Edge Layer

- Vehicular time

Mappe

Unsee All



Integrated traffic control measures now possible (e.g. **transit traffic re-routed** on the highway in case of jams in the urban network) thanks to data integration effort.

Towards an integration between **individual traffic** and **other transport modes!**

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# GET IN TOUCH

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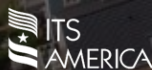
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