

FIRST RESULTS AND LESSONS-LEARNT ON AIR QUALITY AND TRAFFIC MANAGEMENT FROM THE APPLICATION OF VSL WITHIN THE BRENNERLEC PROJECT

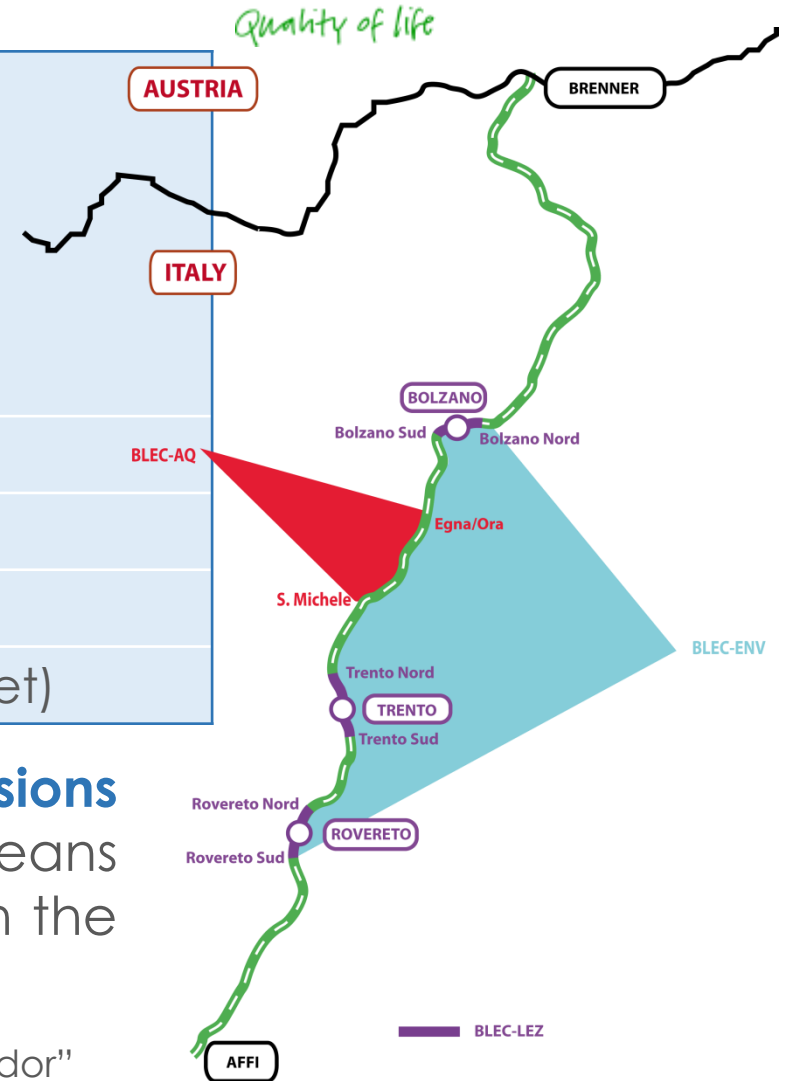
Paper ID EU-TP1487



BRENNER *LEC*
lower emissions corridor



Partners	A22 (coordinator) APPA - Provincia Autonoma di Bolzano APPA - Provincia Autonoma di Trento Università degli Studi di Trento CISMA IDM Südtirol / Alto Adige
Duration	01.09.2016 – 30.04.2021
Overall budget	€ 4.018.005
Eligible budget	€ 3.311.365
LIFE co-financing	€ 1.922.772 (approx. 60% of the eligible budget)

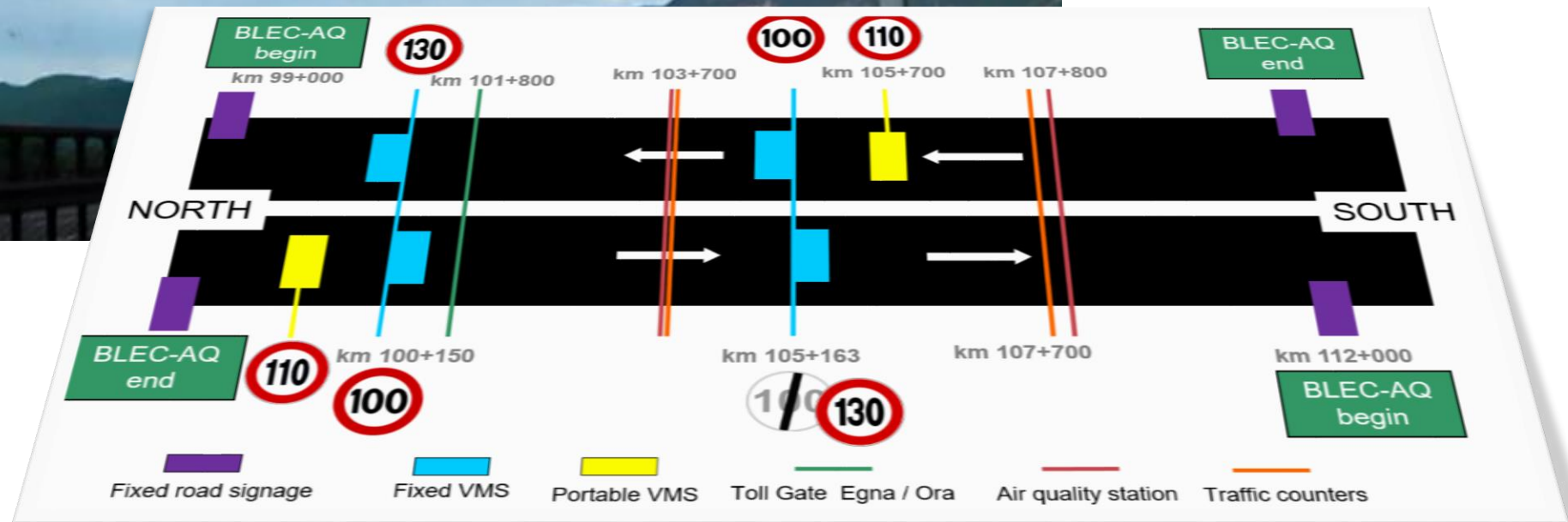


Main objective: develop and demonstrate a **«Low Emissions Corridor»** concept to be applied on the A22 highway by means of an **integrated set of dynamic policies** to be activated on the basis of a **proactive logic**.

More information available in paper “A novel concept of “Low Emission Corridor” empowered by ITS: the BrennerLEC project” (12th ITS European Congress, Strasbourg).

VSL FOR AIR QUALITY

Goal: reduce air quality (NO₂) concentrations



VSL FOR AIR QUALITY

Test period: April 2017 – April 2018

Duration of test sessions	1.918 hours
Duration of valid test sessions	1.227 hours
On working days	72%
On holidays and days before holidays	28%
During the summer	27%
During the winter	43%
During the other seasons	30%

- Valid test sessions:**
- Complete functioning of test site equipment
 - Absence of traffic events (different VMS messages)
 - Minimal observance of reduced speed limits by light vehicles (average lower than 115 [km/h])

Impacts' assessment

Favorable tests conditions

- Wind flowing from the highway in direction to the air quality stations
- Differences in the average speeds measured at the two monitoring sites greater than 10 [km]
- Minimal amount of traffic, greater than 20 vehicles every 10 minutes

730 hours

00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
14	13	10	11	11	10	15	26	28	37	37	38	38	47	46	40	37	40	47	46	45	41	35	20

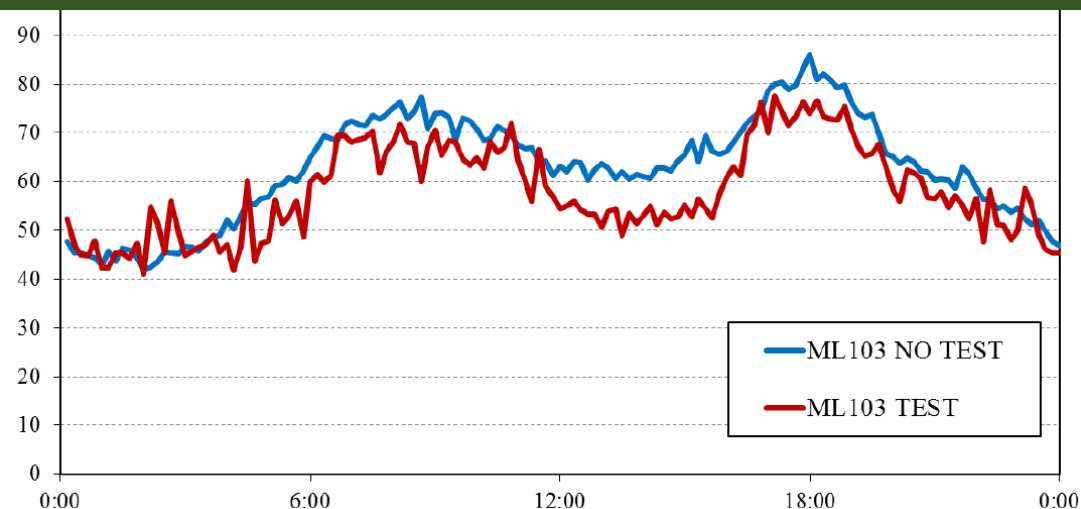
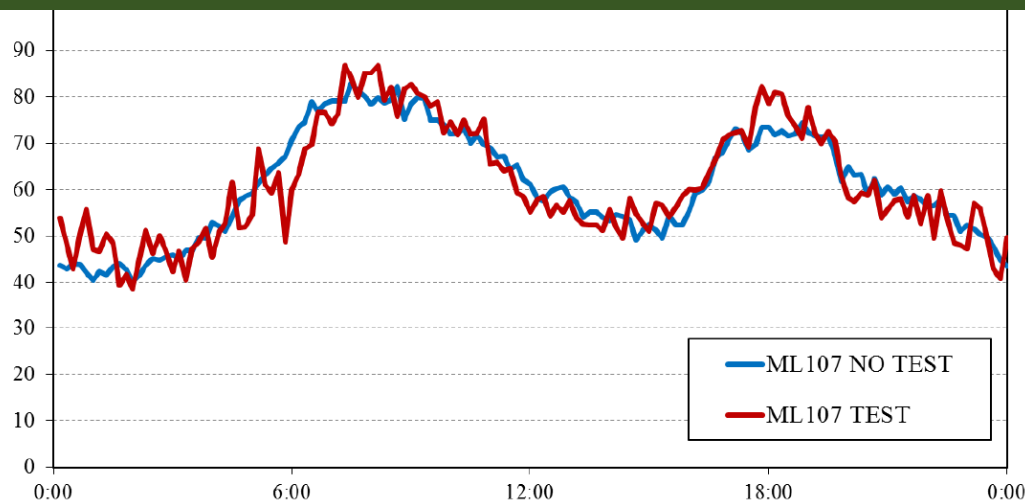
VSL FOR AIR QUALITY

Results

Results are expressed in terms of difference between the concentrations at km 107+800 (no speed limits) and at km 103+700 (speed limits). Values are in [$\mu\text{g}/\text{m}^3$].

	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
NO₂	1.5	5.3	2.2	-3.1	-0.4	5.1	1.8	-0.6	8.7	9.0	7.2	3.4	2.2	6.3	7.4	10.4	15.9	4.5	11.6	10.9	5.4	0.0	3.0	1.5
NO	-0.8	5.2	3.8	-1.4	-2.3	4.0	0.9	-3.5	20.8	17.9	13.2	0.8	1.5	5.9	4.4	7.6	11.8	1.4	10.0	11.1	8.1	2.3	6.5	5.2

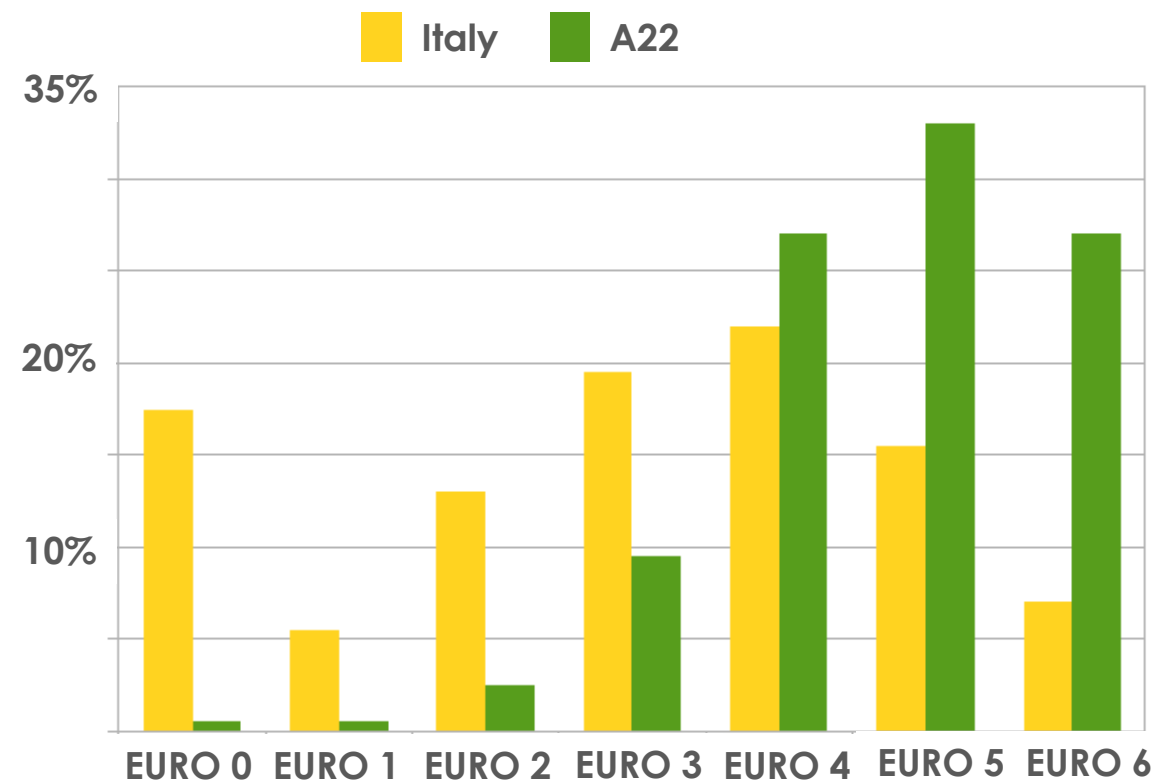
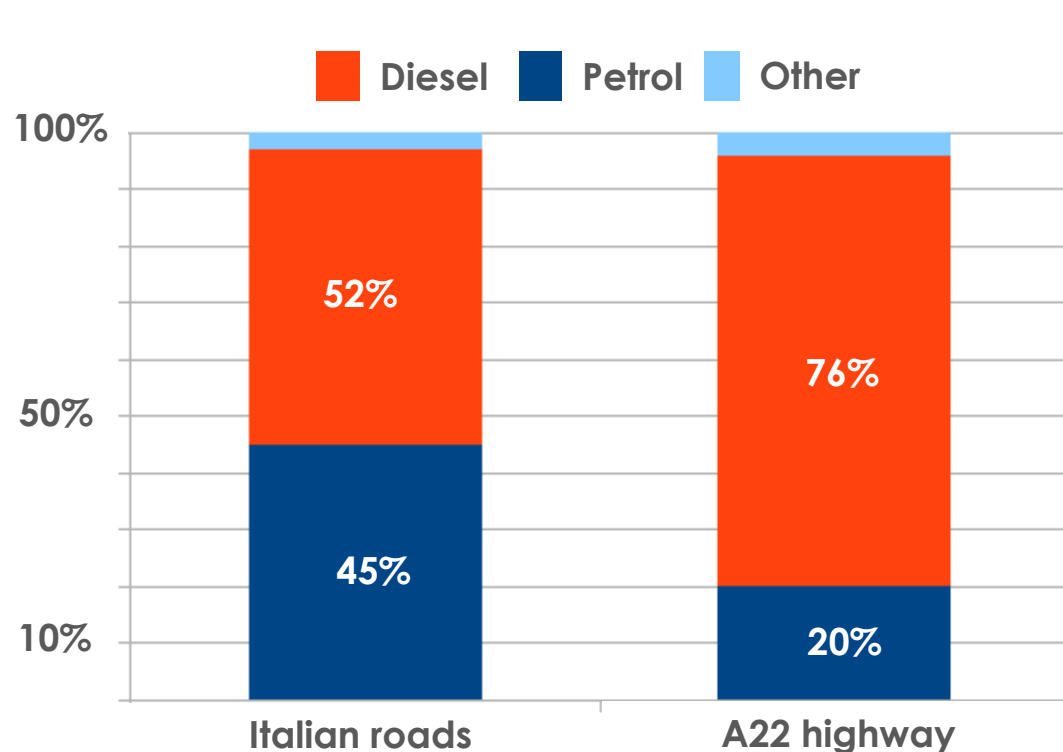
-10% concentrations (at roadside level) with an average speed reduction of 15 [km/h]



VSL FOR AIR QUALITY

Results explanation

Preliminary analysis of the fleet of the vehicles driving on the A22 highway, based on ANPR data and compared with reference statistics of Italian circulating fleet.



Much modern vehicles on the highway, but the potential benefits on the environment are however balanced by the significantly higher percentage of diesel vehicles.

VSL FOR TRAFFIC CONTROL

Goal: reduce stop&go and related emissions peaks'



Test site details (direction South):

- Reduced BLEC-ENV (Trento South – Rovereto South, about 30 [km])
- A VMS every 2-3 [km], 3 traffic counters and 1 AQ station
- Stretch fully equipped for the usage of HSR
- VSL activated by road operators when levels of service start to decrease.

Valid test sessions:

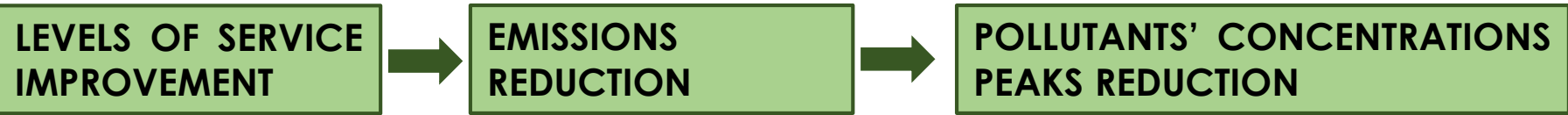
- Complete functioning of test site equipment
- No traffic events

Test period: March 2017 – May 2018

Number of test sessions	34
Number of valid test sessions	23
On summer Saturdays (tourist peaks)	8
On summer Sundays (tourist peaks)	4
In correspondence of other holidays	11
Average duration of a test session	5h 11'

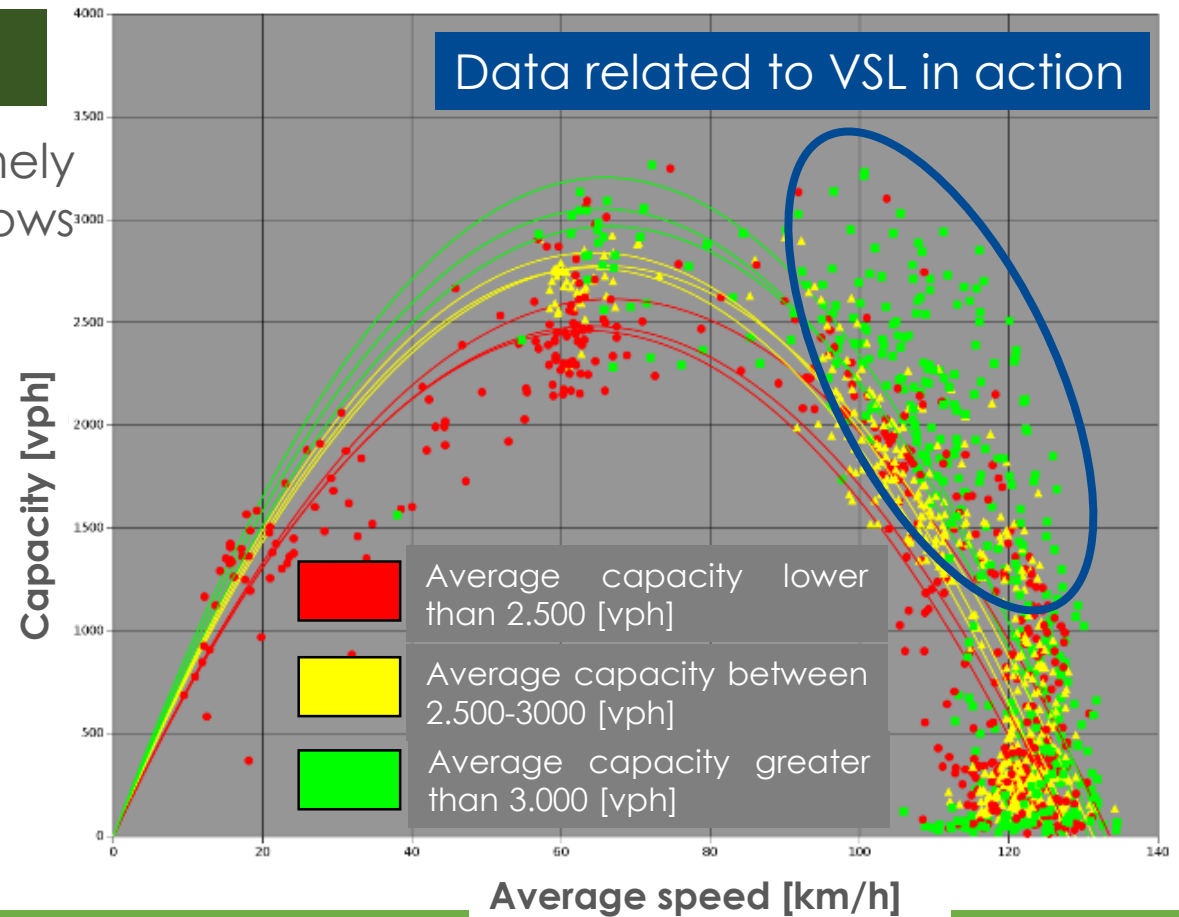
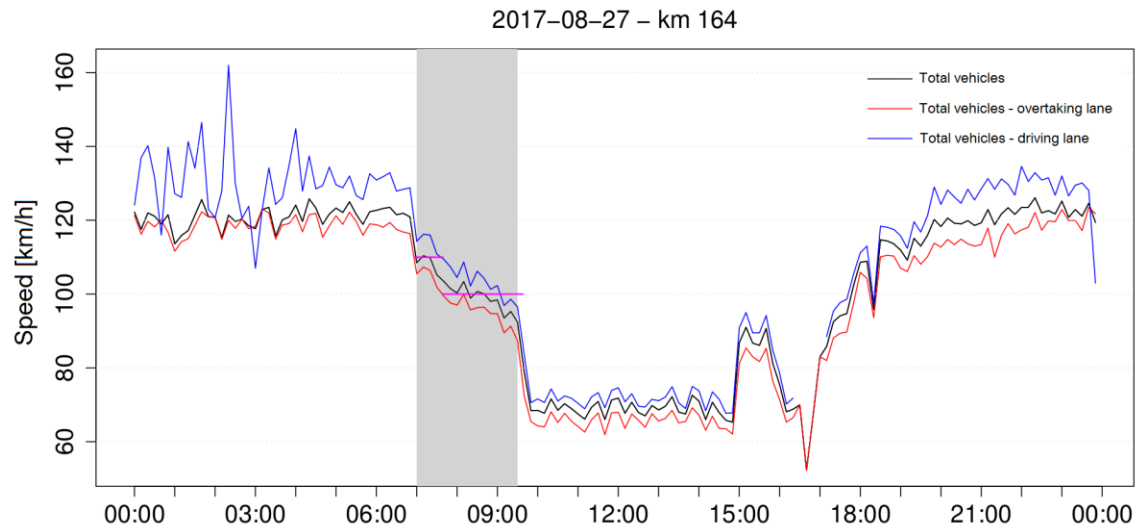
VSL FOR TRAFFIC CONTROL

Impacts' assessment



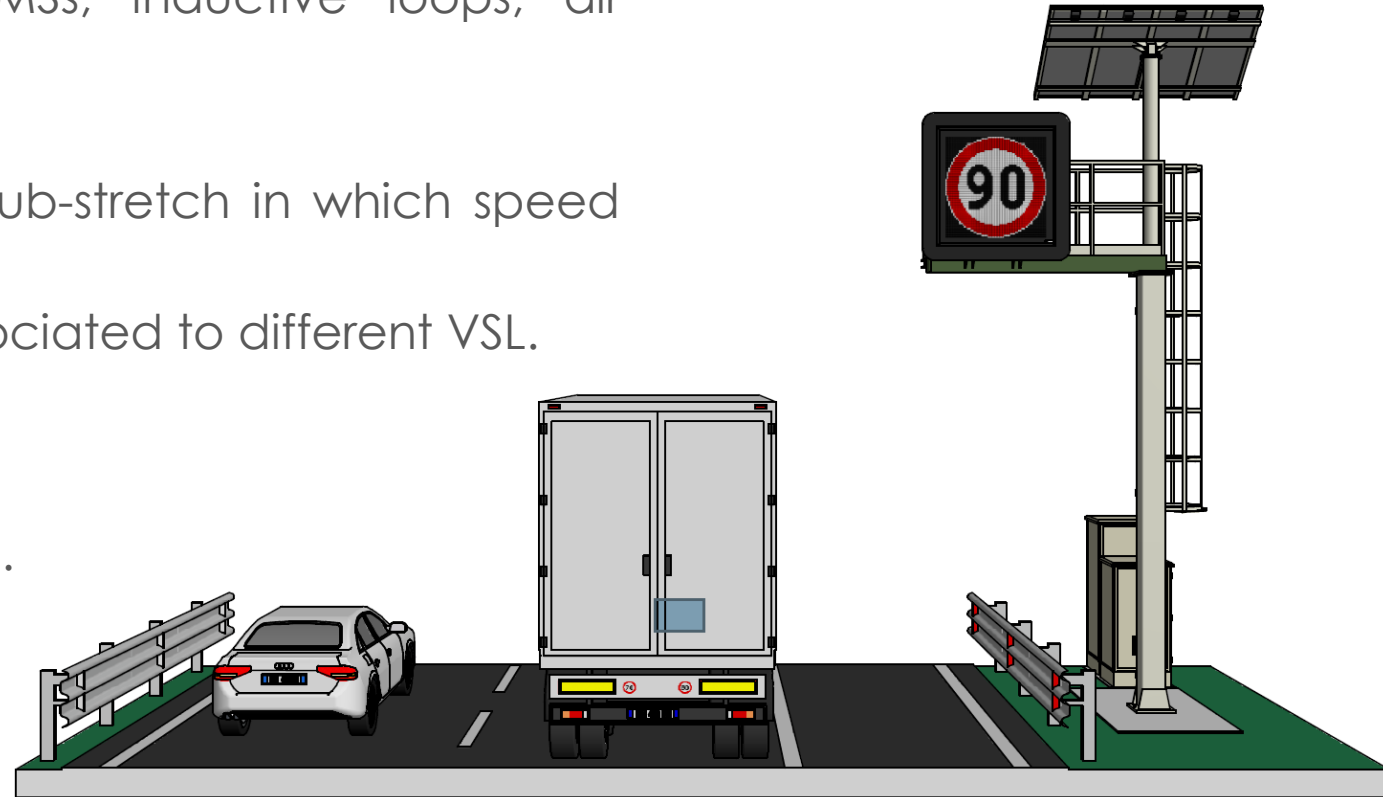
Preliminary results

Levels of services are increased if VSL are timely activated ("smoothness" duration of traffic flows increases, on average of a couple of hours).



FUTURE TEST PHASES

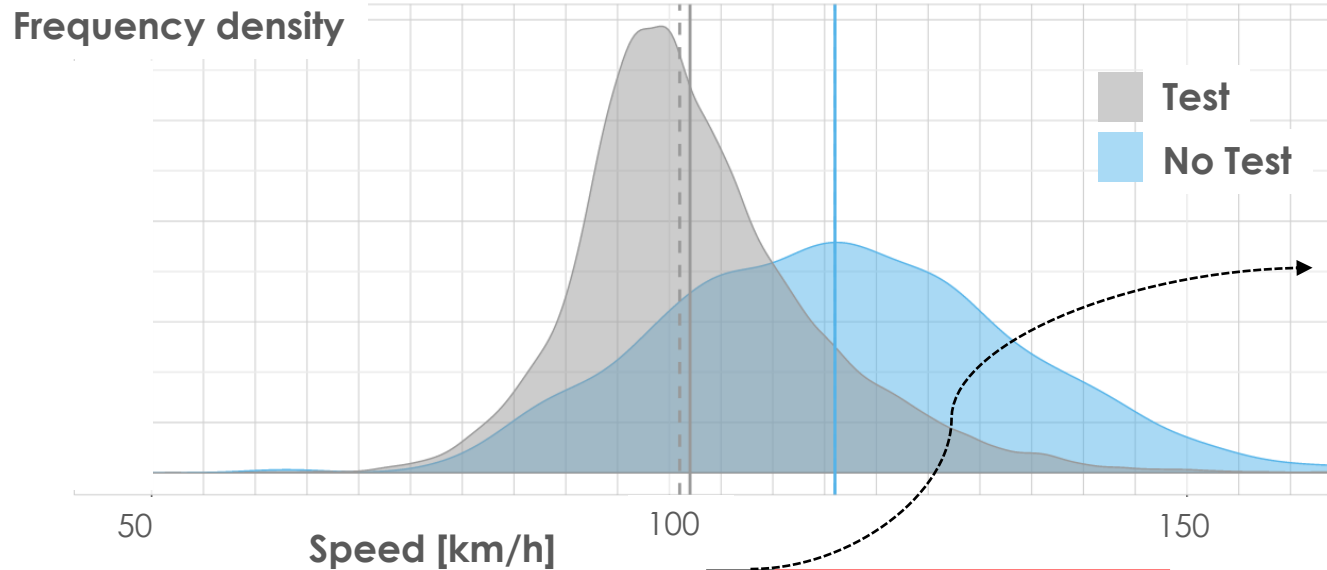
- **Extension of test stretches** (pilot on whole test area)
- **Infrastructure improvement** (additional VMSs, inductive loops, air quality sensors, etc.).
- **VSL for air quality:**
 - Results consolidation by inverting the sub-stretch in which speed limits are reduced
 - Deeper evaluation of test scenarios associated to different VSL.
- **VSL for traffic control:**
 - Increase of (successful) tests samples.
 - From subjective criteria to objective KPIs.



From **late 2019** operators of TMC A22 will start to have a disposal a **Decision Support System (DSS)** suggesting when and which VSL should be activated / deactivated. These suggestions will be triggered based on quantitative **threshold values** and on top of complex **reactive / proactive traffic and air quality models**.

STICK & CARROT APPROACH

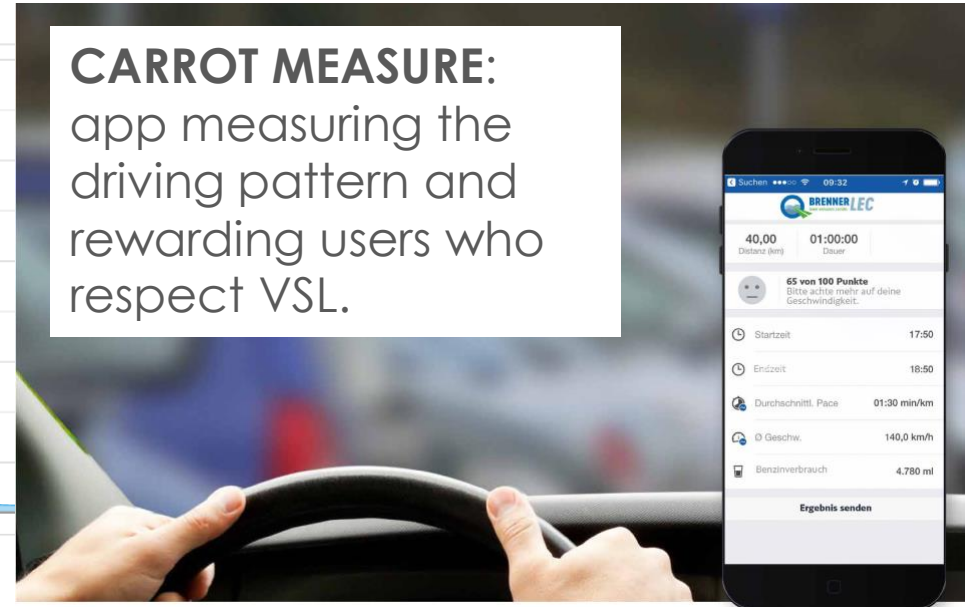
One of the key factor for the project's success is **VSL compliance**.



**“Potentially
persuadable
drivers”**

**“Unpersuadable
” drivers**

CARROT MEASURE:
app measuring the
driving pattern and
rewarding users who
respect VSL.



STICK MEASURE: enforcement systems
(section control).

**Issue: VSL for air quality reasons (still) not
allowed in Italy....**