

Route Related Real-world Particulate Number and NOx Emissions of Euro 5 and Euro 6 Passenger Cars



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- **Motivation**
- **Methodology**
- **Results of the Investigations**
- **Conclusion**

Motivation

Environment

- High exceeded NO₂ and PM air quality limits
- Strong European specifications to cut down CO₂ emissions

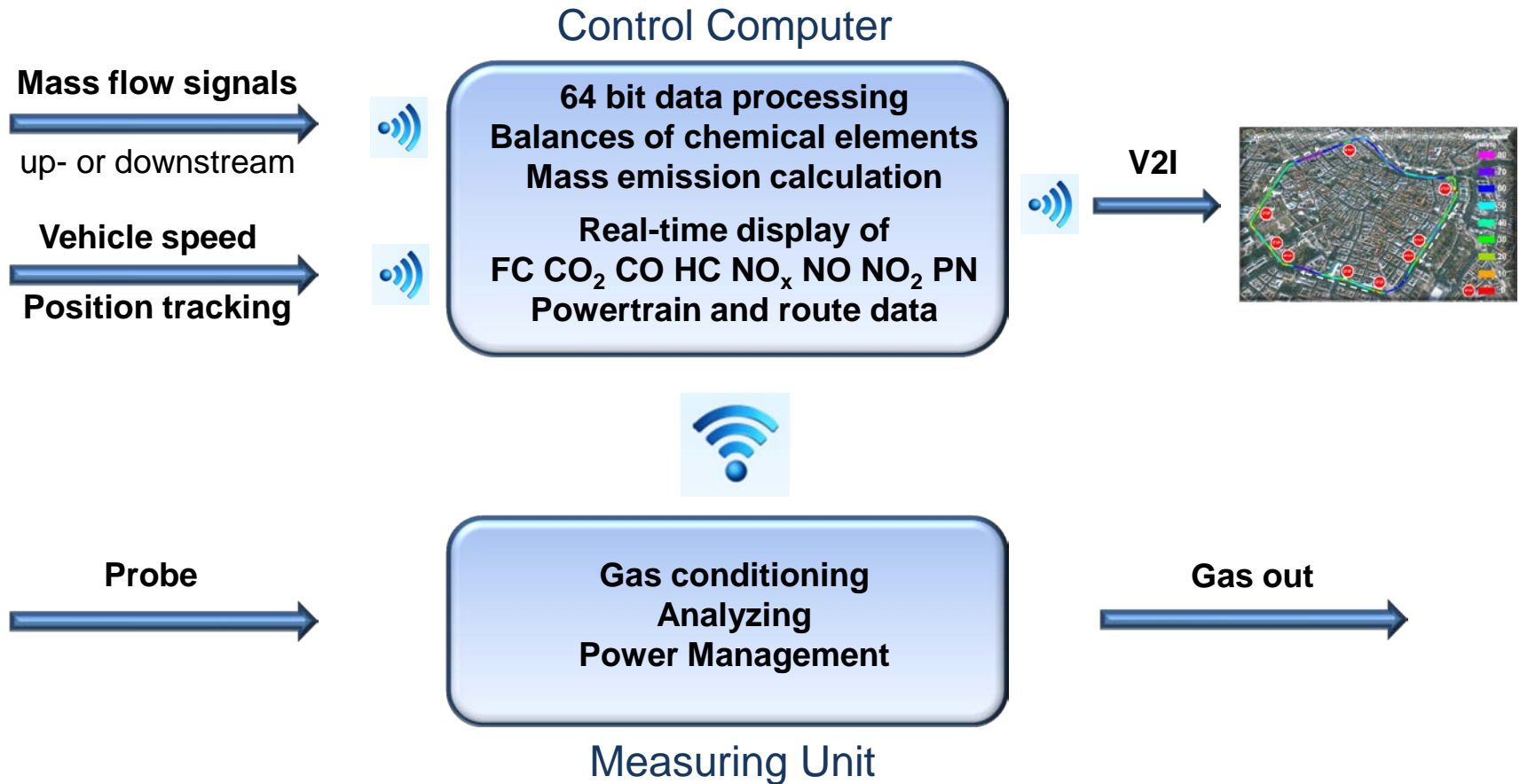
Technology

- Real-world emission performance of Euro 5 and Euro 6 cars
- Testing of new features of our PEM

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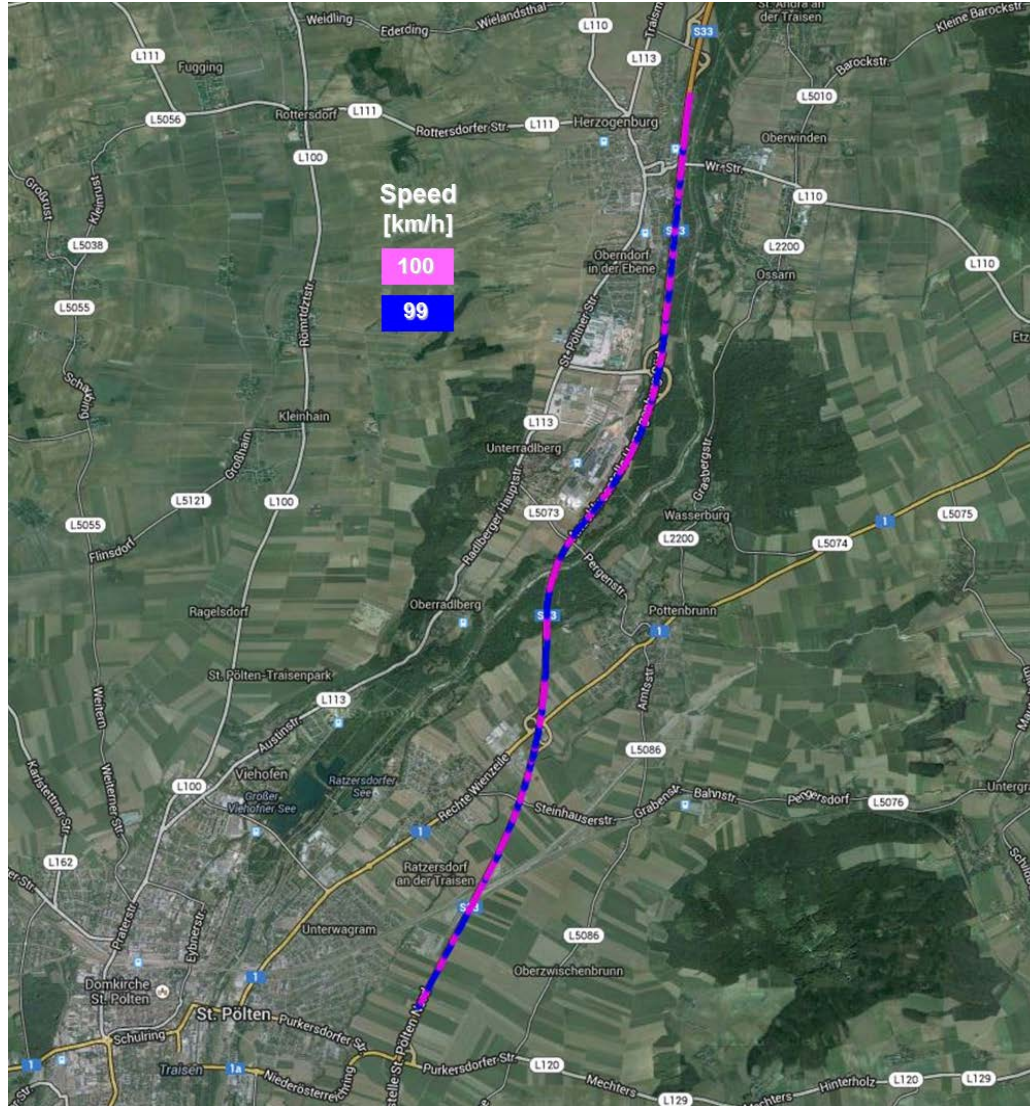
Wireless Experimental System



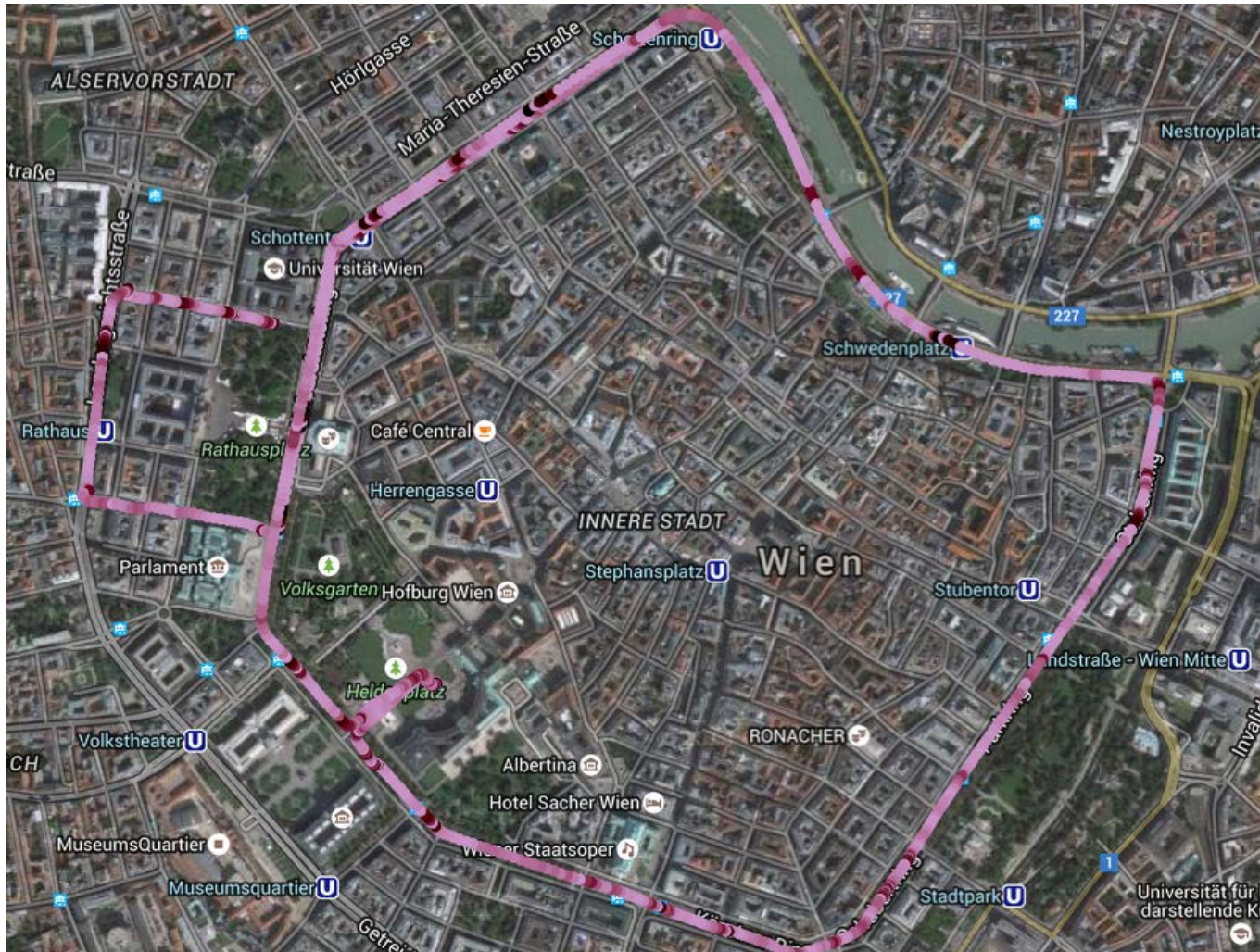
Car Equipped with PEM



Freeway Driving



City Center Driving



Test Routes

	V_{mean} [km/h]	Distance [km]
City	15 - 30	5 - 10
Freeway	80, 100, 130	20

Vehicles

	Category
Euro 5 Gasoline DI and Diesel	Compact
Euro 6 Diesel	Standard

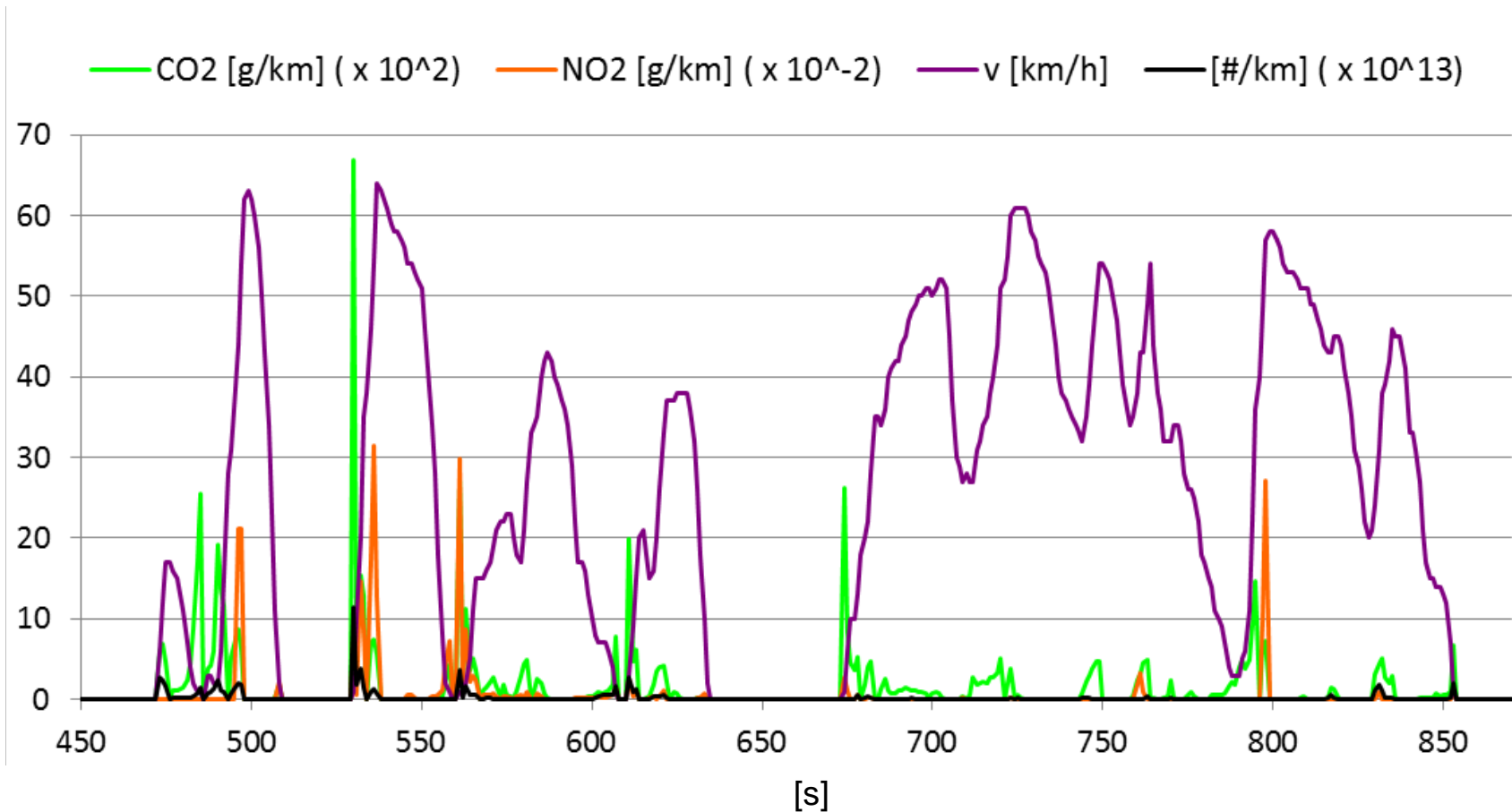
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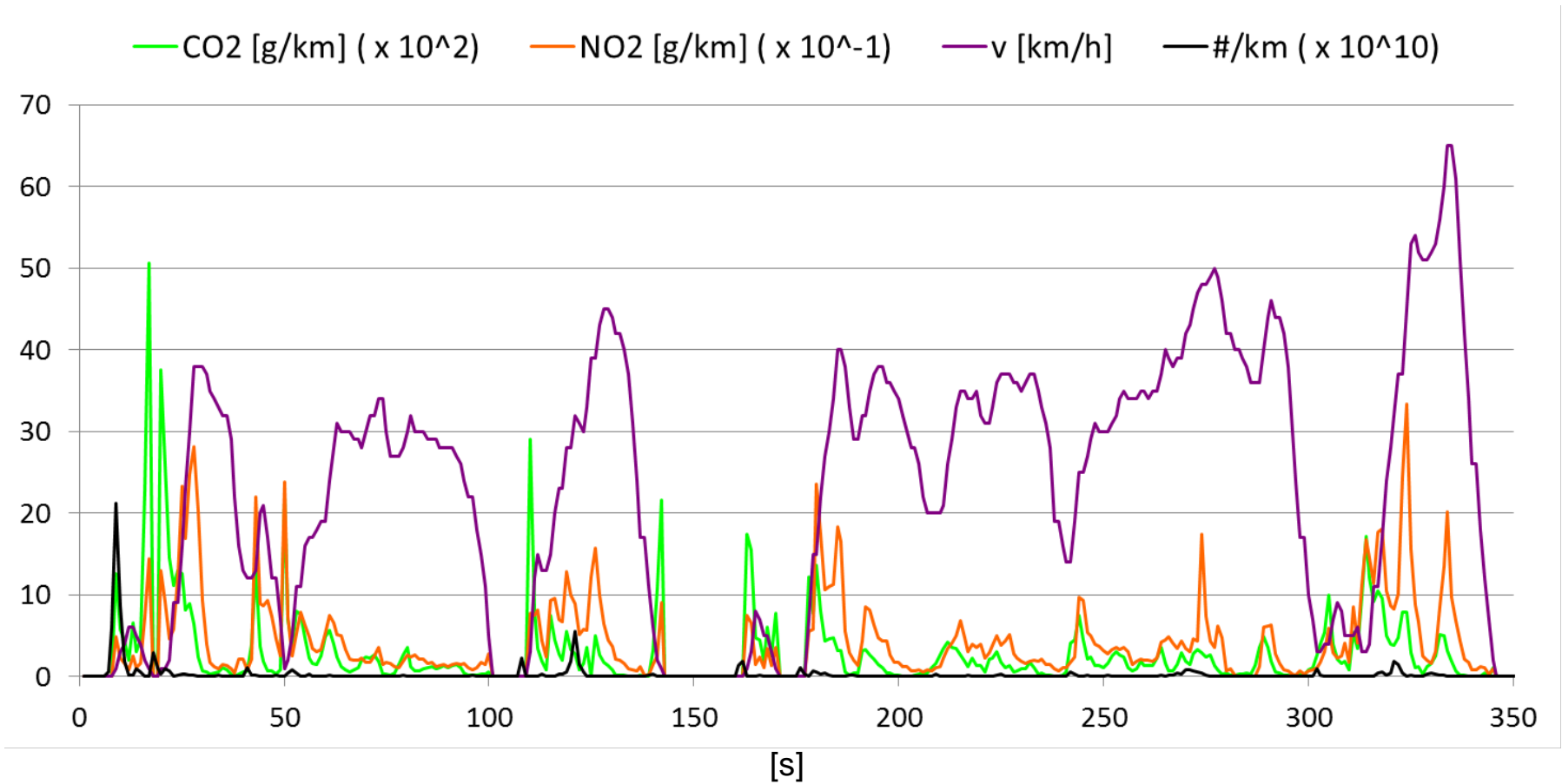
Distance Related Emissions

	CO ₂ [g/km]	NO _x [g/km]	NO [g/km]	NO ₂ [g/km]	PN [#/km]	FC [l/100km]
Euro 5 Gasoline DI						
City	146	0,017	0,012	0,004	9,7E+11	6,34
Euro 5 Diesel						
City	129	0,459	0,181	0,182	4,3E+08	4,93
80 km/h	94	0,126	0,056	0,040	7,6E+11	3,96
100 km/h	97	0,114	0,038	0,056	3,7E+08	3,65
130 km/h	129	0,555	0,207	0,239	2,6E+08	4,87
Euro 6 Diesel						
City	180	0,642	0,177	0,372	2,3E+09	6,78
80 km/h	102	0,072	0,014	0,051	2,0E+08	3,84
100 km/h	122	0,053	0,021	0,023	1,3E+08	4,57
130 km/h	147	0,056	0,019	0,030	1,3E+08	5,52

Euro 5 Gasoline DI City Driving



Euro 6 Diesel City Driving



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Conclusion

- The measurement system worked satisfying
- All experiments were carried out within two days
- Significant trade-off NO₂ versus particle
- Gasoline or Diesel?
- Programs for high emitting in-use vehicles

Thank you