

# **B15 in Portugal**

## **For a higher contribution to climate protection through road transport**

**FUELS OF THE  
FUTURE**

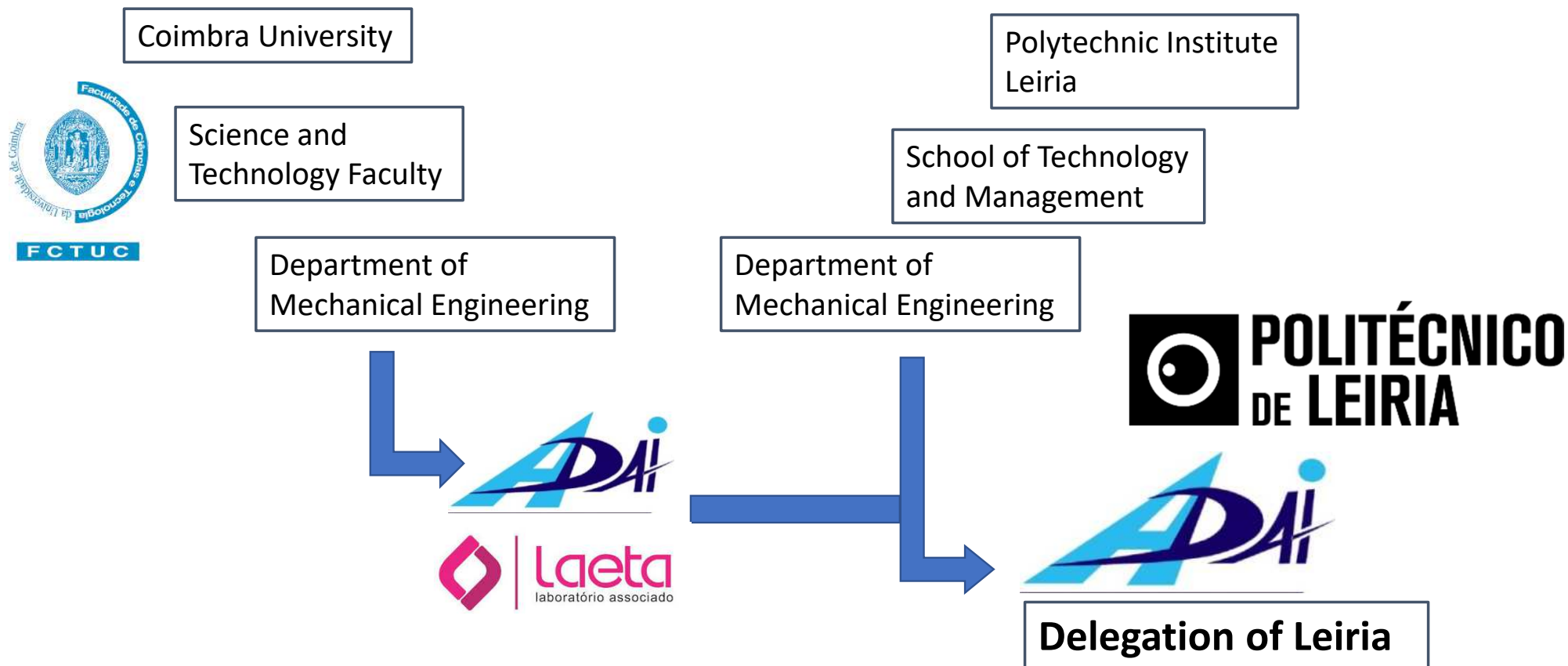


**Luis Serrano**



January 2021

# ADAI – Research Center



# Objectives



Analyse the effects of using Biodiesel in engines.



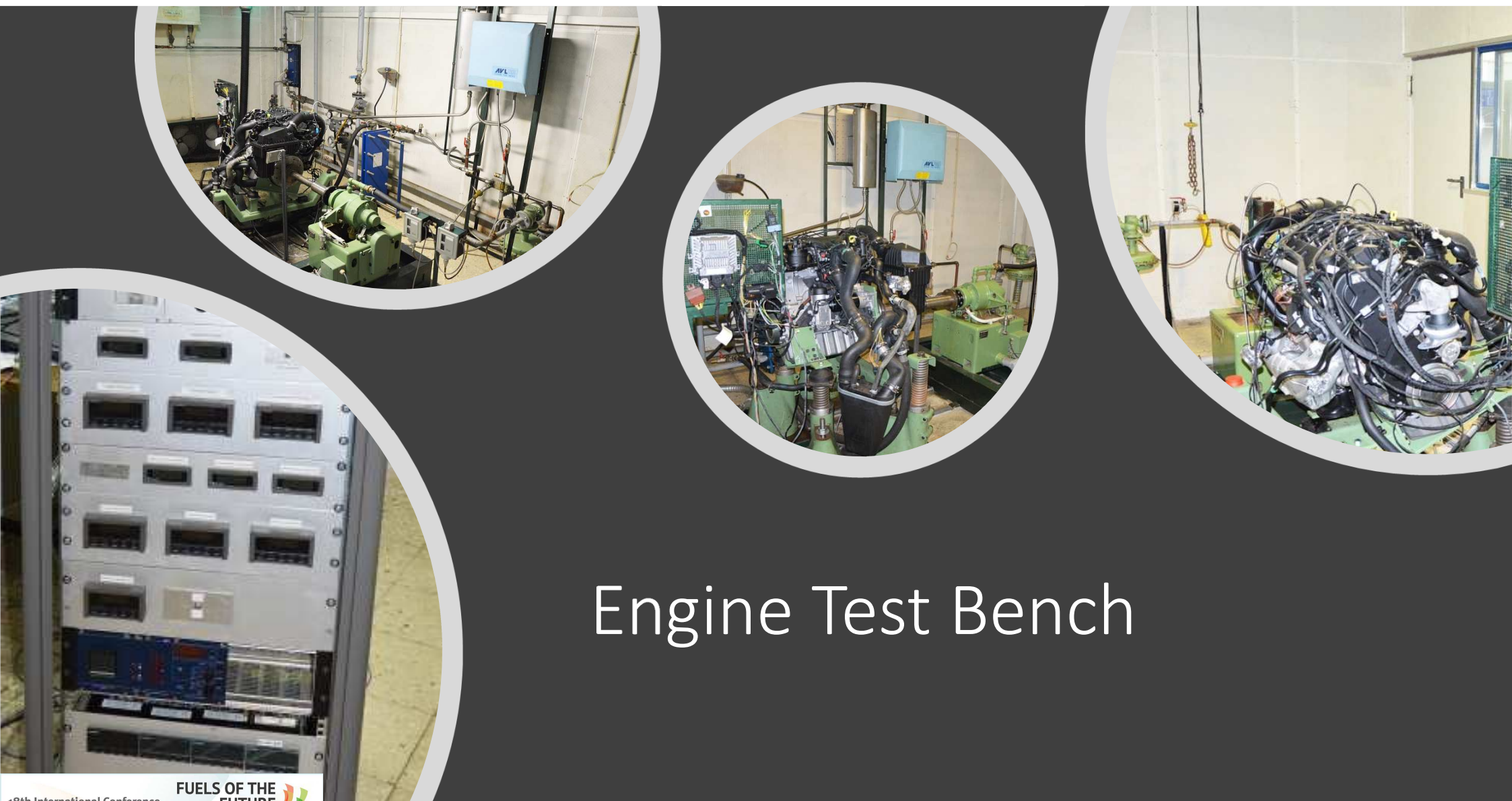
Use an integrated approach (engine tests, chassis dynamometer and real driving tests) to have reliable data.



Main information regarding fuel consumption (CO2 emissions), performance degradation and pollutant emissions.

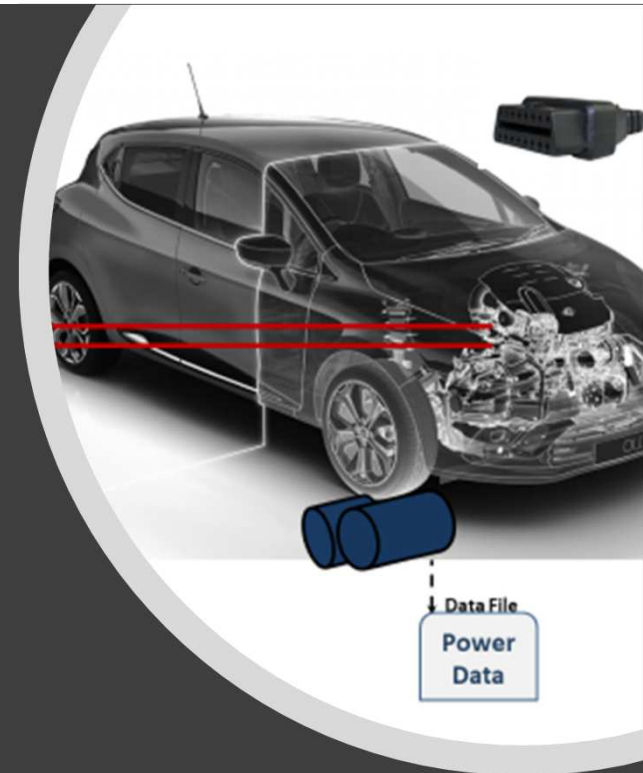


Analyse the impacts of using a low biodiesel blend in road vehicles.

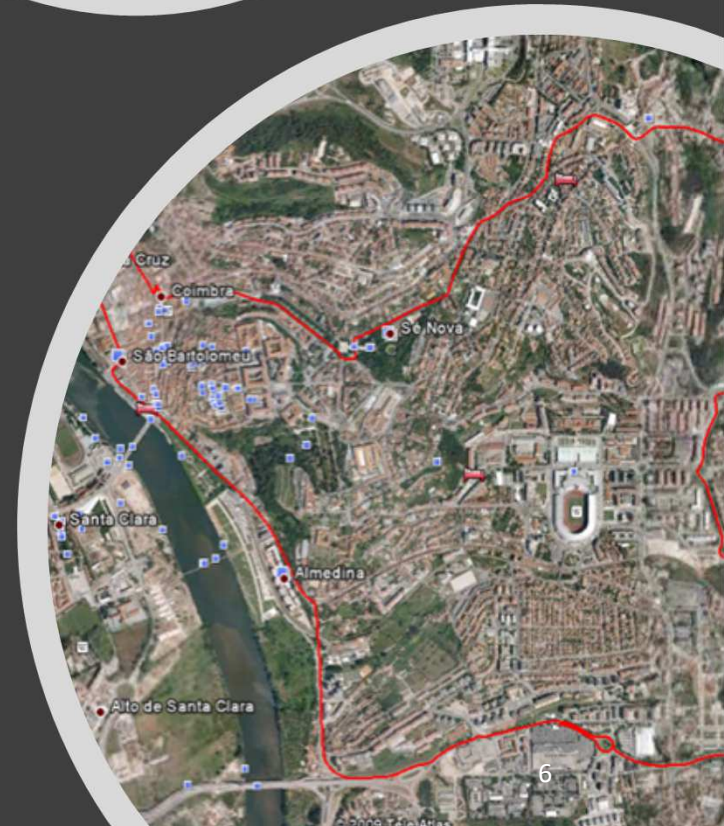
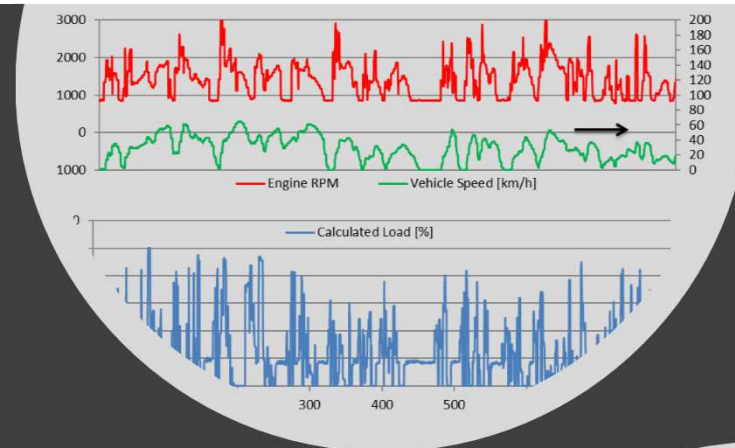


# Engine Test Bench



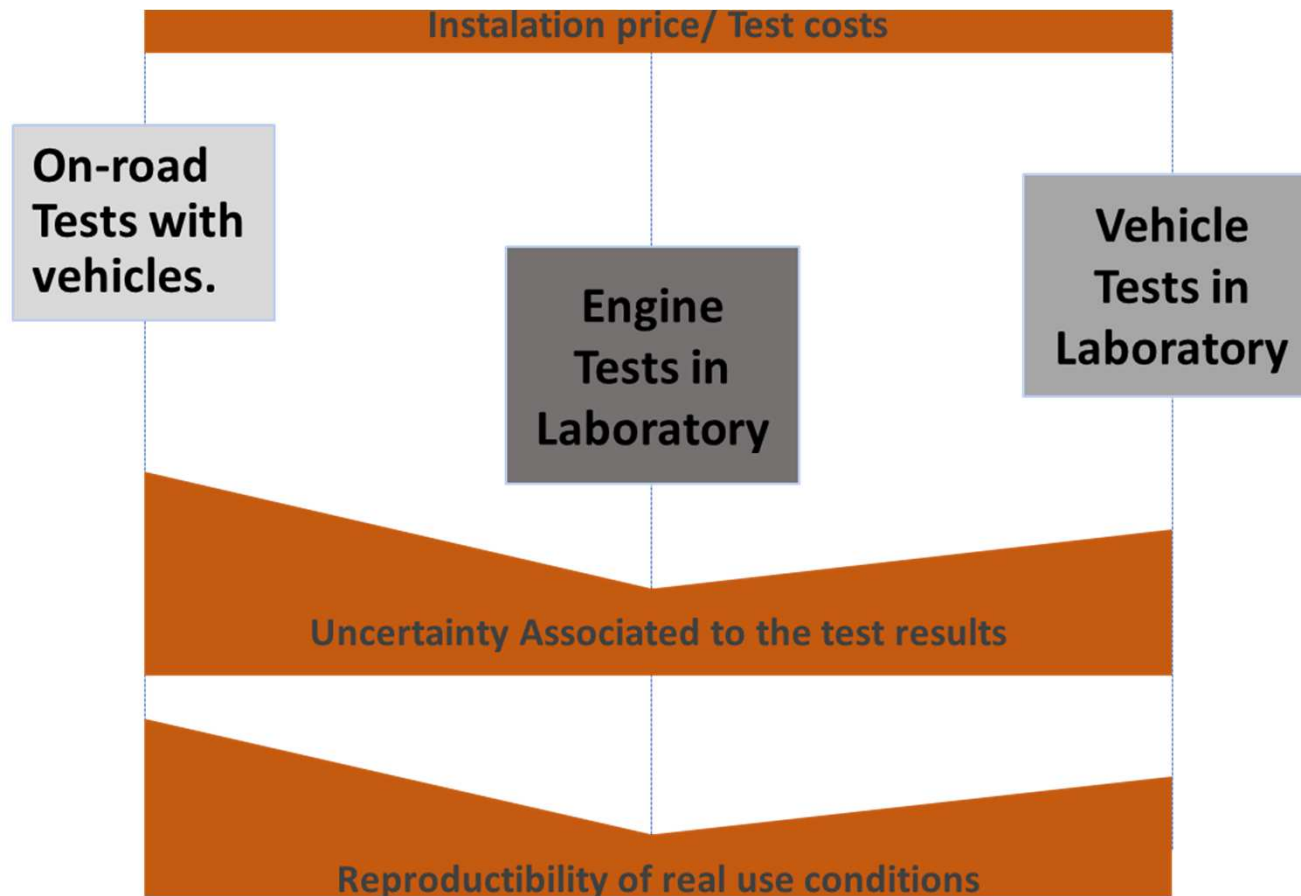


# Chassis Dinamometer



# Real Driving Tests

# Different Approaches for the Tests







# Biodiesel potential use in vehicles





Possible to be use in current fleet of vehicles (in fact it has been used)



Renewability of the fuel




Possible use of residues to produce a useful and powerful energy source.



Potential for a small increase in combustion efficiency due to the presence of oxygen in the molecular struture..



Potential for lower CO<sub>2</sub> emissions in current large fleet of vehicles (mainly high duty ones and ships).



# Technical hitches in the use of biodiesel in vehicles



Biodegradability - oil degradation



Water mixture



Lower energetic value



Particulate filters possible accelerated degradation



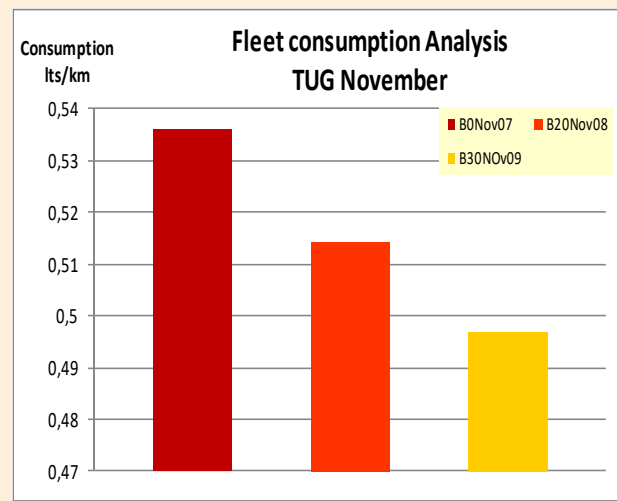
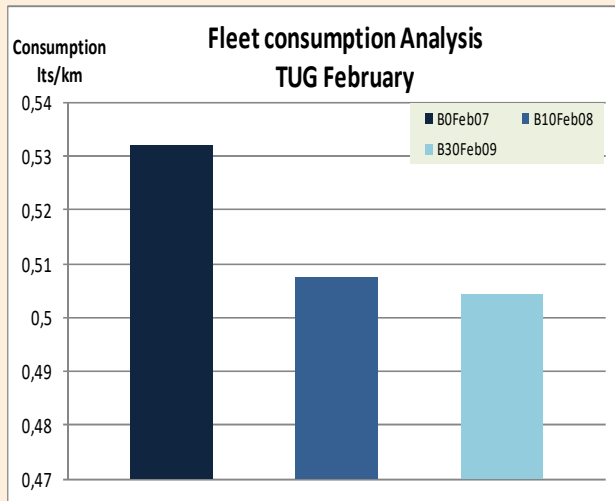
Effects in SCR is not fully known yet

# Some results

- Obtained through different or mixed methodologies...







# Fleet Consumption Results - Urban

Energy Conversion and Management 60 (2012) 2–9

Contents lists available at SciVerse ScienceDirect

**Energy Conversion and Management**

journal homepage: [www.elsevier.com/locate/enconman](http://www.elsevier.com/locate/enconman)

ELSEVIER

PERFORMANCE STUDY ABOUT BIODIESEL IMPACT ON BUSES ENGINES USING DYNAMOMETER TESTS AND FLEET CONSUMPTION DATA

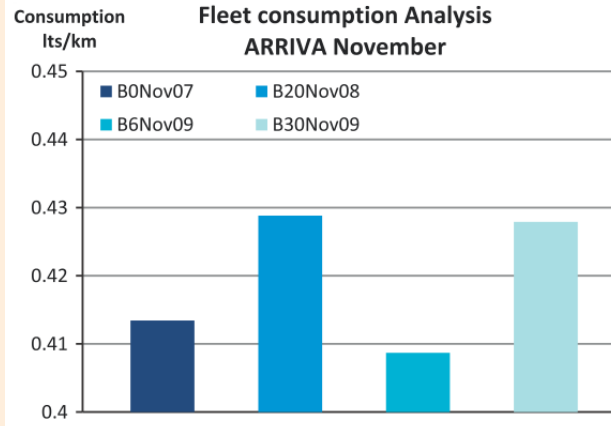
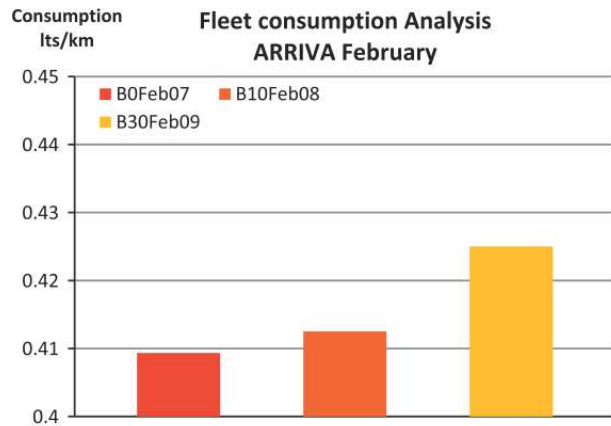
Luis M.V. Serrano<sup>a,b,\*</sup>, Rui M.O. Câmara<sup>a</sup>, Vasco J.R. Carreira<sup>a</sup>, M.C. Gameiro da Silva<sup>a</sup>

<sup>a</sup>ADAI-LAETA, Department of Mechanical Engineering, University of Coimbra, Coimbra, Portugal  
<sup>b</sup>IPL – Polytechnic Institute of Leiria, School of Technology and Management, Leiria, Portugal

B10, B20 and B30  
=> 4 to 6% fuel consumption reduction

- 200 buses fleet

- Use biodiesel for 2008 and 2009



# Fleet Consumption Results – Extra-Urban

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ELSEVIER

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Luis M.V. Serrano<sup>a,b,\*</sup>, Rui M.O. Câmara<sup>a</sup>, Vasco J.R. Carreira<sup>a</sup>, M.C. Gameiro da Silva<sup>a</sup>

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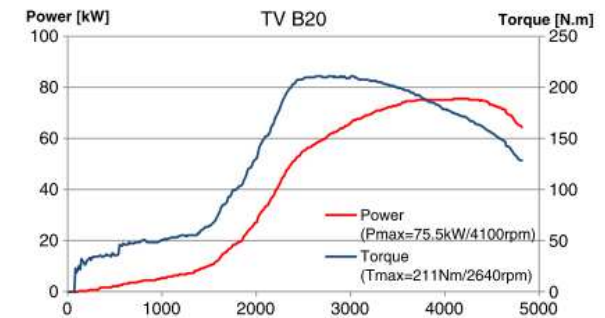
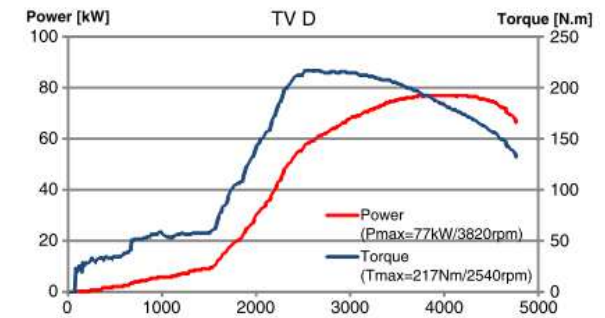
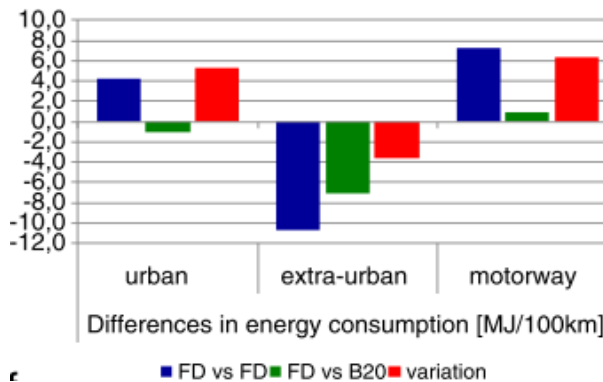
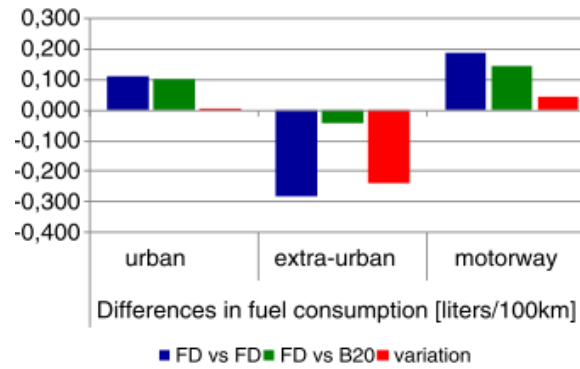
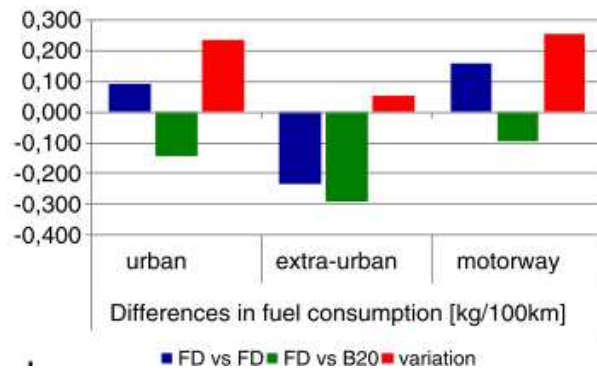


## On-road performance comparison of two identical cars consuming petrodiesel and biodiesel

L. Serrano <sup>a,b,\*</sup>, V. Carreira <sup>b</sup>, R. Câmara <sup>b</sup>, M. Gameiro da Silva <sup>b</sup>

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## Emissions characterization from EURO 5 diesel/biodiesel passenger car operating under the new European driving cycle

M. Lopes<sup>a</sup>, L. Serrano<sup>b,c</sup>, I. Ribeiro<sup>a,\*</sup>, P. Cascão<sup>d</sup>, N. Pires<sup>b</sup>, S. Rafael<sup>a</sup>, L. Tarelho<sup>a</sup>, A. Monteiro<sup>a</sup>, T. Nunes<sup>a</sup>, M. Evtugina<sup>a</sup>, O.J. Nielsen<sup>e</sup>, M. Gameiro da Silva<sup>c</sup>, A.I. Miranda<sup>a</sup>, C. Borrego<sup>a</sup>

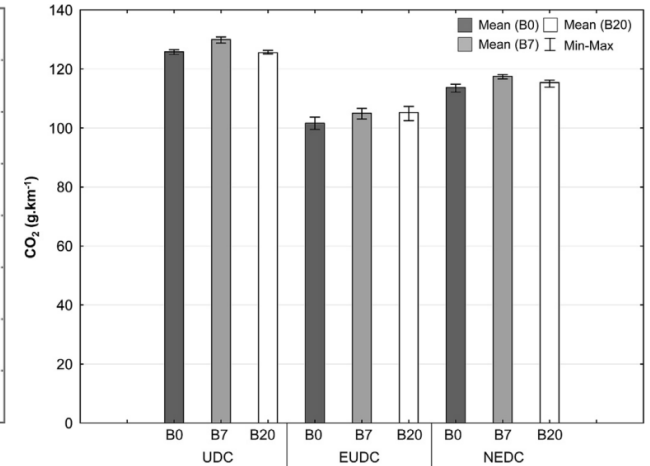
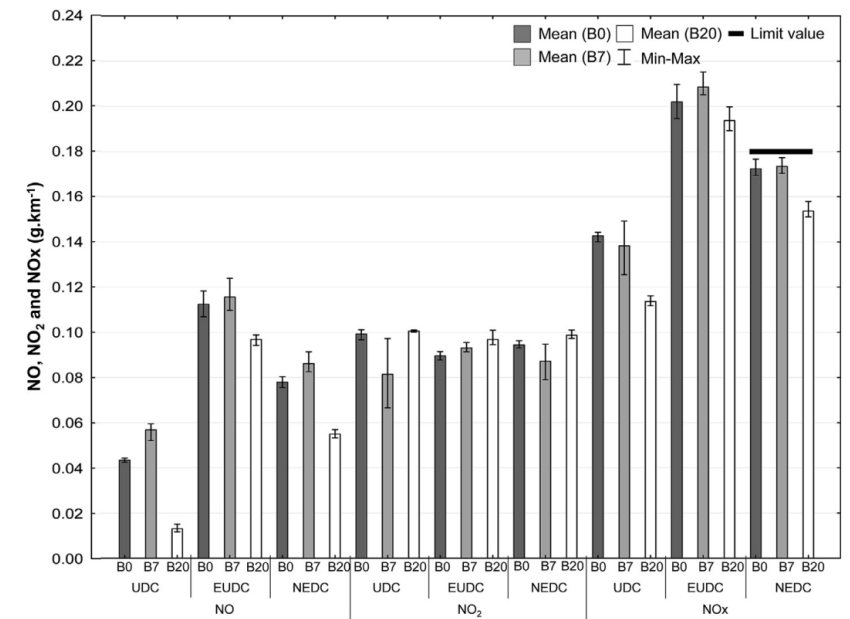
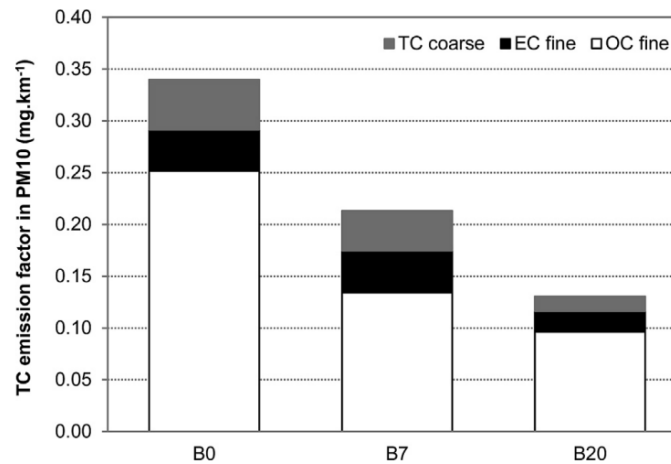
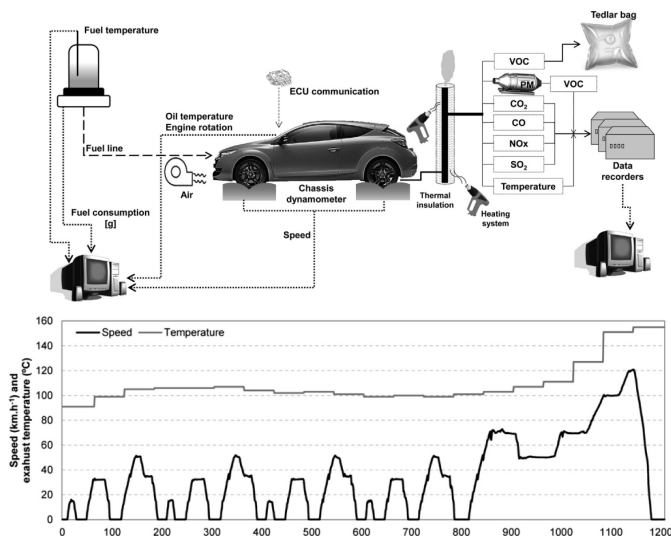
<sup>a</sup> CESAM & Department of Environment and Planning, University of Aveiro, 3810-193 Aveiro, Portugal

<sup>b</sup> School of Technology and Management, Polytechnic Institute of Leiria, Morro do Lena, Alto do Vieiro, ap.4163, 2411-901 Leiria, Portugal

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<sup>e</sup> Department of Chemistry, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen Ø, Denmark

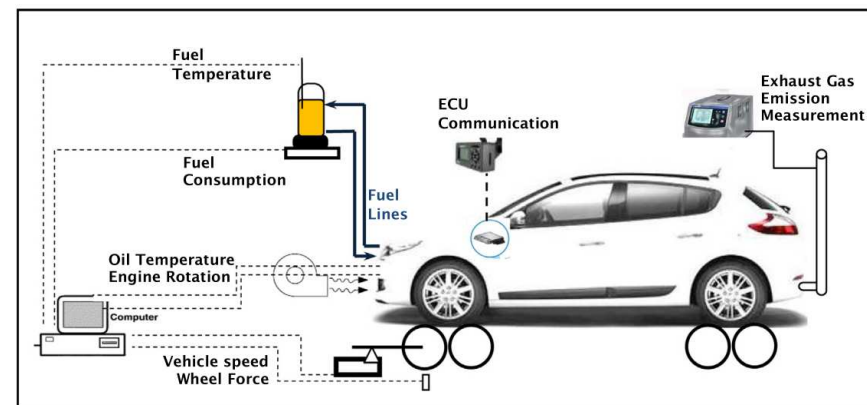
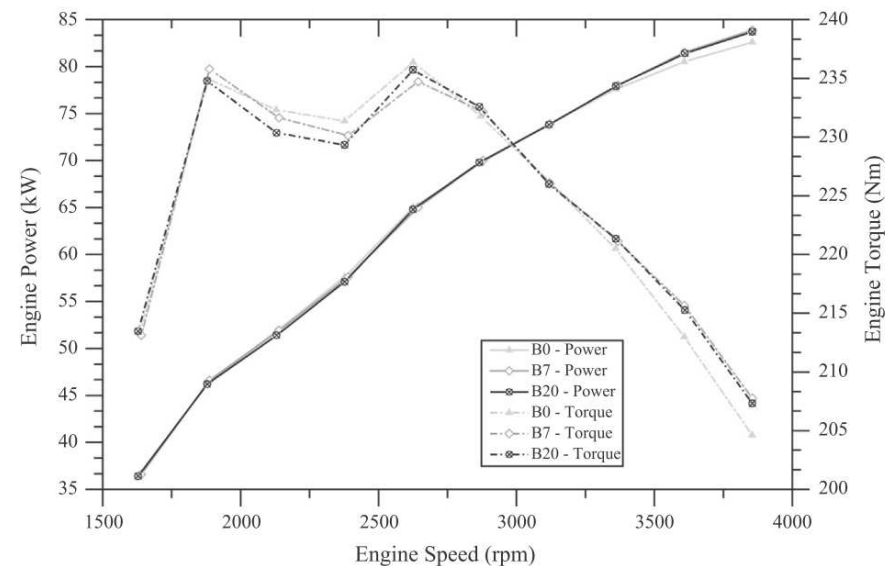
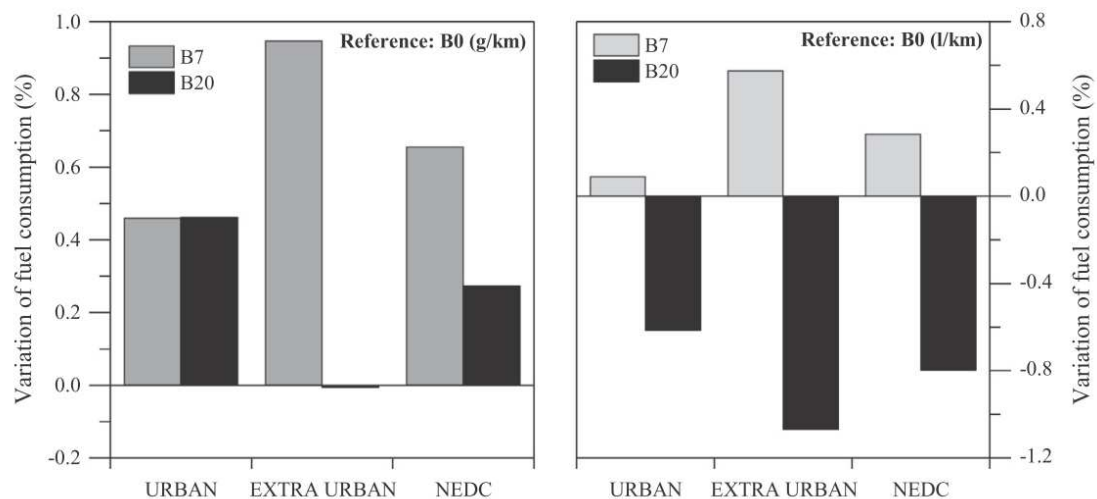






## Evaluation on effects of using low biodiesel blends in a EURO 5 passenger vehicle equipped with a common-rail diesel engine

L. Serrano <sup>a,b,\*</sup>, M. Lopes <sup>c</sup>, N. Pires <sup>a</sup>, I. Ribeiro <sup>c</sup>, P. Cascão <sup>d</sup>, L. Tarelho <sup>c</sup>, A. Monteiro <sup>c</sup>, O. Nielsen <sup>e</sup>, M. Gameiro da Silva <sup>b</sup>, C. Borrego <sup>c</sup>



# B15

## Available for the current costumers

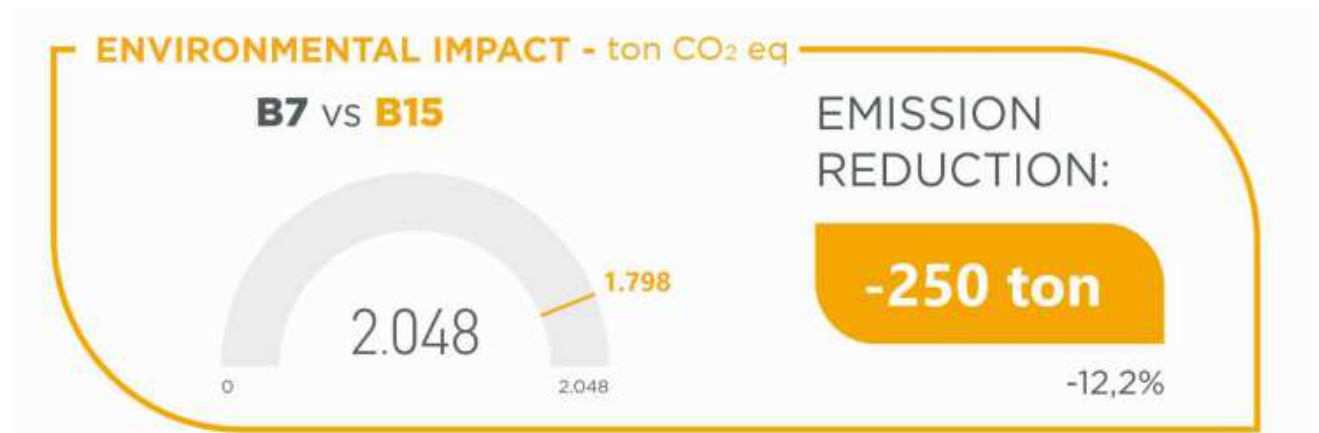
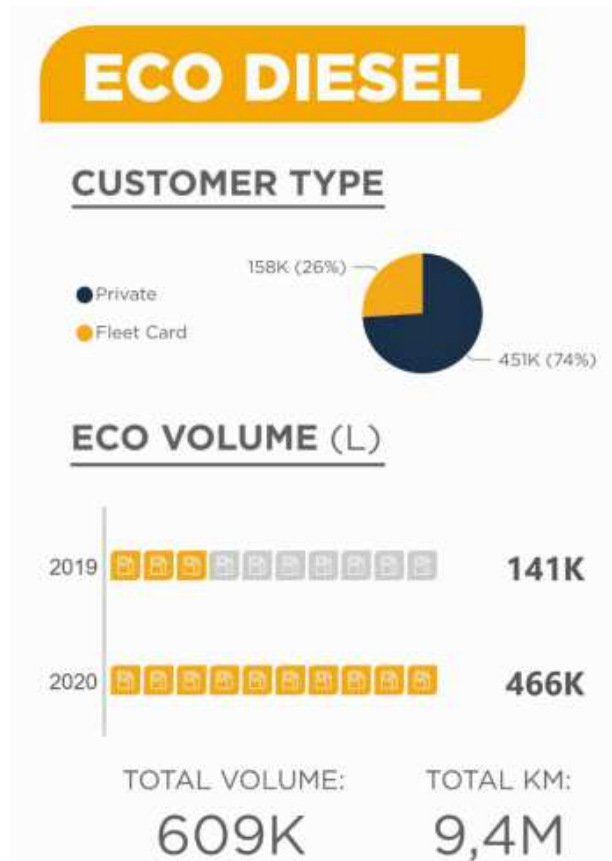




## Fleets analysis

- Heavy duty vehicles
- Light duty vehicles









## Summary – using B10 or B15

- No observable changes in the vehicle maintenance.
- Any impact was detected in the occurrence of failures or malfunctions.
- There were no detectable variations in the performance of the vehicles.
- The data analysis point toward a small decrease in fuel consumption, in several cases.

# Summary – using B10 or B15

- The differences in consumption are not relevant (even so, a small reduction was observed).
- Reduction in generation of particulate emissions (before Particulate Filter).
- Small differences in NOx emissions (not significative).
- Reduction in CO2 emissions – renewability character of biodiesel.
- Highly relevant reduction in environmental aspects – CO2 reduction and making use of a residue to transform it in a valuable Energy source.

# Any questions



Thanks for  
your  
attention!



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