



**Adapting driver behaviour  
for lower emissions**

# Welcome

**Andrew Winder – ERTICO**  
MODALES Project Coordinator



***MODALES Final Conference, Brussels, 12 May 2023***

# MODALES – Adapting driver behaviour for lower emissions

## Project Vision:

To **reduce air pollution** (e.g. NOx, PM, PN) from all types of road vehicles (but especially older vehicles) by encouraging adoption of **low-emission driving behaviour** and **proper maintenance choice**

## Core objectives:

To advance the understanding of the co-variability between **user behaviour** and **vehicle emissions** from **powertrain, brakes and tyres**.

To **modify user behaviour**, via **training** which includes a **driver assistance app** and an **awareness campaign**

To **propose and validate other solutions** to contributing to lower emissions



MODALES runs from September 2019 to May 2023, with a budget of €4.72 million.



MODALES receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 815189.



# Background to MODALES

## Previously... eco-driving initiatives

Several initiatives have focused on ways to help drivers save fuel and hence reduce CO2 emissions. **ecoDriver** was a major European project focusing on this (EU FP6, 2002-2006, ERTICO Partnership project coordinated by University of Leeds)

- Focused on fuel savings and HMI aspects
- Full prototype system with 3 OEM variations
- Aftermarket system
- Smartphone app
- Controlled trials in 7 EU countries + Naturalistic trials in 1 country



Across all the systems, reductions in fuel consumption and CO2 were on **average of 4.2%** with the highest saving (5.8%) on **rural roads**.

**Embedded systems were more effective** than nomadic systems with fuel savings up to 6% (against an average 2.5% for the App).



# Why MODALES?

## Low-emission driving vs Eco-driving

- Eco-driving targets a reduction in CO<sub>2</sub> emissions and fuel consumption by encouraging green driving behaviour.
- MODALES focuses on other air pollutants (not always correlated with CO<sub>2</sub>), e.g.:
  - NO<sub>x</sub> – Nitrogen oxides
  - PM – Particle matter
  - PN – Ultrafine particles
- MODALES also measures particle emission from brake and tyre wear

# 4 main project innovation areas in MODALES



## Driver

1. Low-emission driving style & training
2. Guidelines for regular maintenance
3. Use of adaptive cruise control & navigation to avoid congestion
4. Increased awareness of emissions
5. Real time indication of emission (app)



## Retrofits

6. Diesel-saving technologies for cars & vans
7. NOxBUSTER for buses and trucks
8. Diesel particulate filter servicing



## On-Board Diagnostics

9. More robust & durable emission control systems
10. Enhanced OBD functionality as an anti-tampering measure



## Periodic inspections

11. Enhanced inspection procedure to trap tampering
12. Roadside emissions testing

## Exhaust emission

CO<sub>2</sub>, CO, HC, NO<sub>x</sub>, PM, PN



## Brake and tyre/road wear

Fine and ultrafine particles (PM, PN)



# MODALES partners

## EU-funded partners

### Associations



### Universities



### Research institutes



### Industry and technology providers



### Legal experts



## International Partners

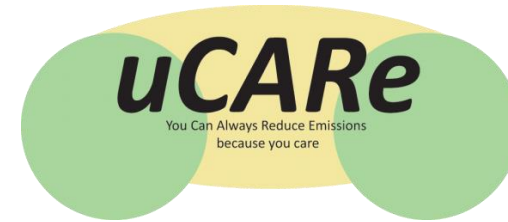


# Parallel projects

EC Call LC-MG-1-1-2018: InCo flagship on reduction of transport impact on air quality

- **uCARE**

- You Can Always Reduce Emissions because you care
- [www.project-ucare.eu](http://www.project-ucare.eu)



- **CARES**

- City Air Remote Emission Sensing
- [cares-project.eu](http://cares-project.eu)



- Also:

- AVIATOR, SCIPPER, TUBE (Transport derived Ultrafines and the Brain Effects), GVI (Green Vehicle Index)

Other closely related EC H2020 projects:

- **DIAS**

- Smart adaptive remote Diagnostic Anti-tampering Systems
- [dias-project.com](http://dias-project.com)



- **NEMO**

- Noise and Emissions Monitoring and Radical Mitigation
- [nemo-cities.eu](http://nemo-cities.eu)



# Today's agenda – Morning

<i>Time (CET)</i>	<i>Item</i>	<i>Presenter</i>
<b>09:30</b>	<b><i>Arrival and coffee</i></b>	
<b>09:50</b>	Welcome and Introduction <ul style="list-style-type: none"><li>Agenda and summary of project innovation areas</li><li>Keynote address</li></ul>	Andrew Winder (ERTICO) Joost Vantomme (ERTICO CEO)
<b>10:15</b>	Driver behaviour: Research and tools <ul style="list-style-type: none"><li>Research results on driver behaviour factors and correlation with emissions</li><li>Driver guidelines, training and awareness</li><li>Data collection with OBD (On Board Diagnostics) dongles</li><li>Development of a low-emission driving app</li><li>App scoring and recommendation system</li></ul>	Haibo Chen (University of Leeds) Ted Zotos (IRU) Uwe Roth (LIST) Sébastien Faye (LIST) Orhan Alankuş (Okan University)
<b>11:45</b>	<b><i>Break</i></b>	
<b>12:05</b>	Periodic Technical Inspections and tampering <ul style="list-style-type: none"><li>Technical Inspections in Europe: current situation, gaps and recommendations</li><li>Legal aspects on vehicle tampering and recommendations</li><li>The MODALES dashboard and potential user for detecting anomalies in vehicle performance</li></ul>	Dimitris Margaritis (CERTH) and Rasmus Pettinen (VTT) Esther Tenge (Spark Legal Network) Dimitris Margaritis (CERTH)
<b>12:55</b>	<b><i>Lunch</i></b>	



# Today's agenda – Afternoon

Time (CET)	Item	Presenter
13:40	Retrofits for diesel vehicles <ul style="list-style-type: none"> <li>Retrofit testing, modelling and potential outlook</li> </ul>	Arno Amberla (Proventia)
14:00	Driver behaviour: Trials and results <ul style="list-style-type: none"> <li>Naturalistic trials: Testing the app and training</li> <li>Trial results</li> <li>Controlled trials: Portable Emissions Measurement System (PEMS) tests</li> <li>Impact assessment</li> </ul>	Dimitris Margaritis (CERTH) Haibo Chen (University of Leeds) Rasmus Pettinen (VTT)  Guillaume Saint-Pierre (Cerema)
15:30	Discussion <ul style="list-style-type: none"> <li>What is the potential of the MODALES output to change behaviour and reduce emissions in the short and medium term? What are the quick wins?</li> </ul> Wrap-up and conclusions	All
16:00	<i>Close and networking cocktail</i>	



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# Keynote address

**Joost Vantomme – ERTICO**  
Chief Executive Officer



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