HORIZON 2020
Call: H2020-GV-2016-2017
Technologies for low emission light duty powertrains

DownToTen

"Measuring automotive exhaust particles down to 10 nanometres "

Project Overview

Project Partners

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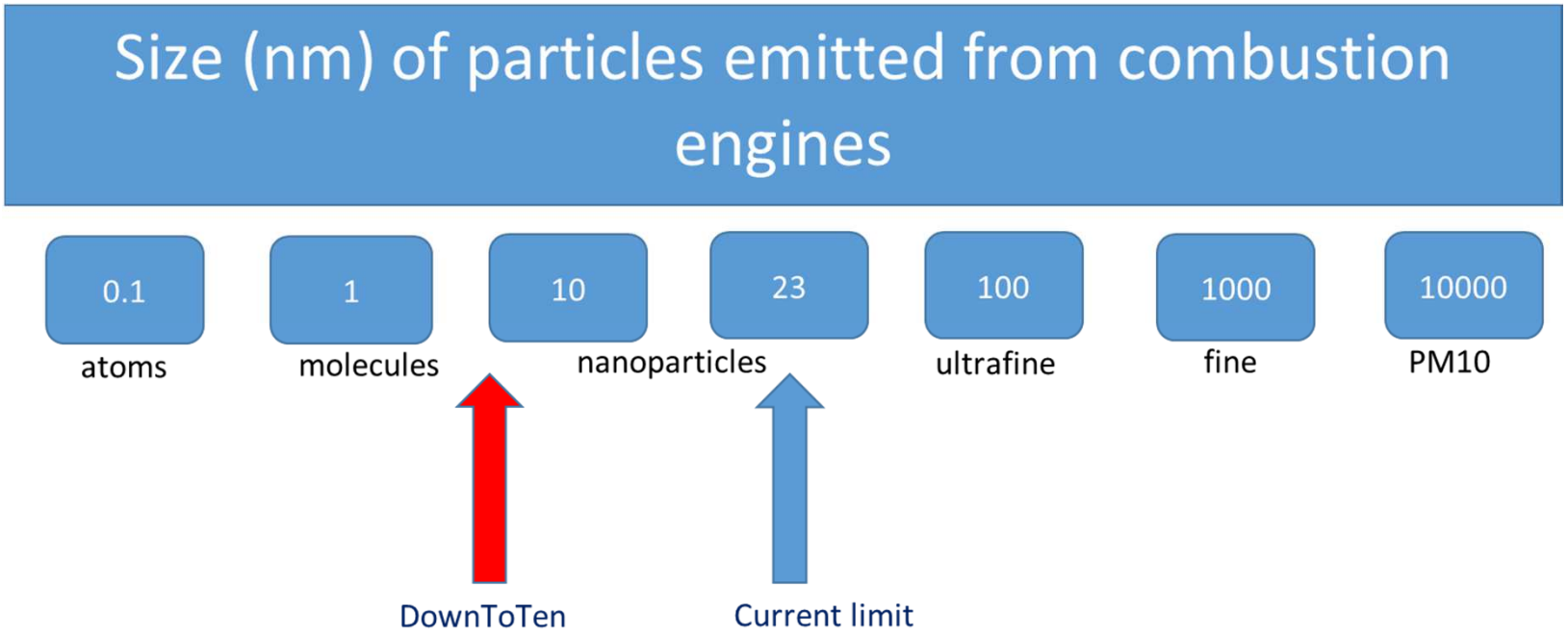
TAMPERE UNIVERSITY OF TECHNOLOGY

Aim of the project

To propose a robust approach for the measurement of particles from about 10 nm both for PMP and RDE, complementing and building upon regulation development activities and addressing topics not tackled so far



Questions to be answered within the new size range

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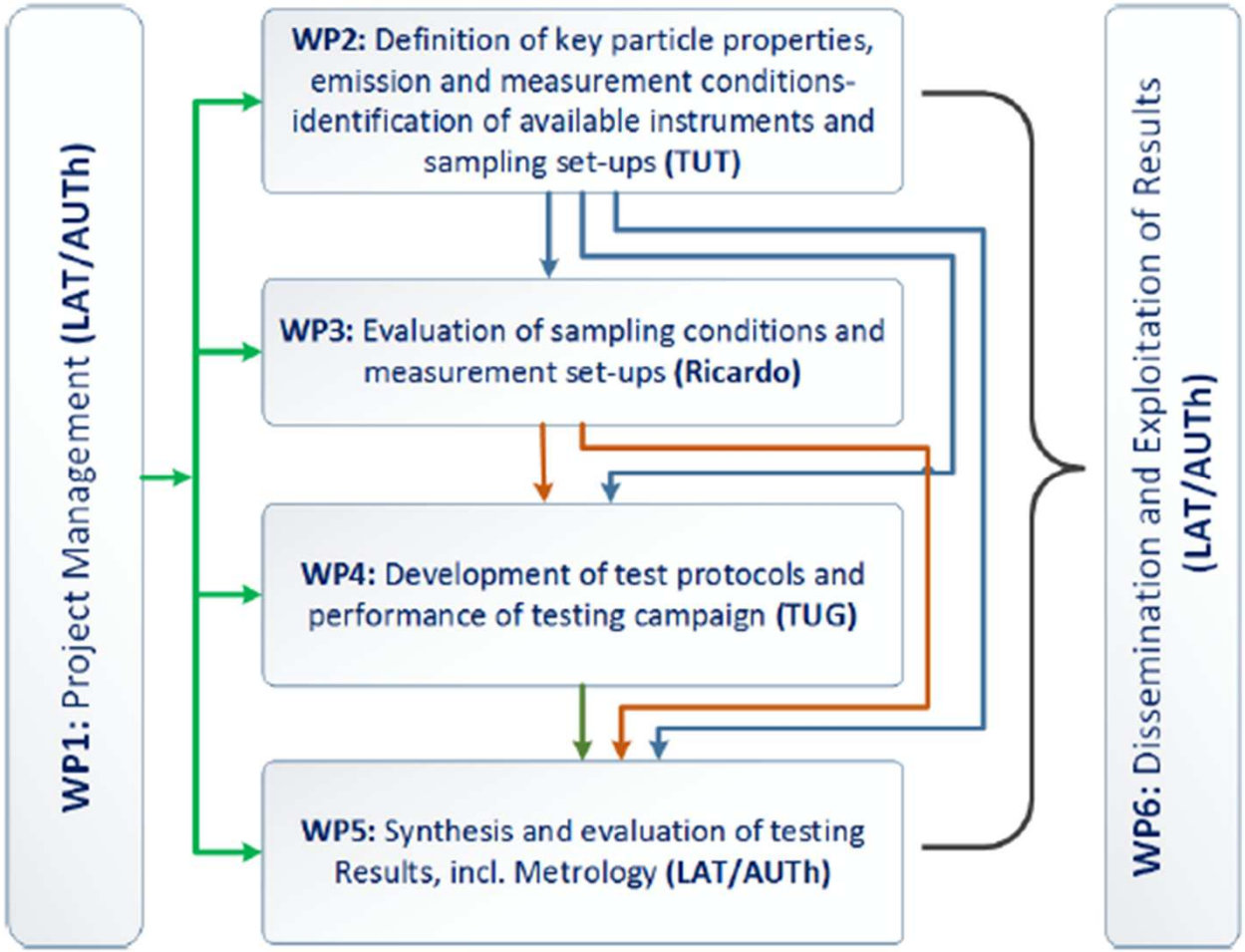
1. What is the number fraction of exhaust particles below 23 nm?
2. What is the specific chemistry of the particles?
3. How to define the particle species: accumulation – nucleation mode, volatile – non-volatile, solid –liquid, Black Carbon – Elemental Carbon (BC-EC)
4. What fraction of exhaust particles corresponds to which species?
5. How potentially un-regulated particles are linked to secondary aerosol formation
6. Which is the appropriate exhaust particle cut size?
7. How to robustly correlate raw exhaust sampling suitable for both RDE with dilution methods and sampling approaches employed during engine and vehicle type approval?

DownToTen structure and WP interaction



Test matrix

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Vehicle class	Engines	Exhaust aftertreatment	Fuels	Cycles	Source of the test vehicles (Related programmes/ projects)
Passenger cars	GDI	3WC with and without GPF	Reference Petrol and biofuel admixtures	NEDC, WLTC, 3 RDE cycles; real PEMS trips	uPGrAdE, PaREGEn
	SI-Hybrid	3WC with and without GPF			A hybrid from GV-2-2016
	Diesel	SCR and/ or NSC with DPF	Reference diesel and biofuel admixtures		DiePeR
	CI-Hybrid	SCR/NSC with DPF			A hybrid from GV-2-2016
	CNG	3WC with and without GPF	Different qualities		GasON
HDV	Diesel	SCR and DPF	Reference diesel and biofuel admixtures	WHVC, standard CO2-vehicle test cycles; PEMS trips	To be decided
	CNG	Not decided yet	Different qualities		To be decided
2-wheelers	≥500ccm	3WC	Reference Petrol and biofuel admixtures	WMTC, RDE cycles, PEMS test for >500ccm	Suggestions from the German programme
	50ccm	3WC			

Overview of key project results

WP	Exploitable knowledge	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Owner & other partners involved
WP2	Proposal for system to generate laboratory-grade exhaust-type of aerosol	Device and method to generate aerosol (demonstrator in month 14)	Calibration institutes, users of aerosol instruments	2020	TUT, TUM
WP2	Instrument benchmarking below 23 nm	Knowledge on instrument performance	Exhaust aerosol measurement labs	Not relevant	TUT, AVL, LAT/AUTh, RICARDO
WP3	Understanding formation, properties and characteristics of PN <23 nm	PN <23 nm definition for regulatory purposes	Standardization and regulatory bodies	2018	Entire consortium
WP3	PN <23 nm sampling configuration for laboratory testing and PEMS	Demonstrator (in month 17)	Exhaust aerosol measurement labs	2020	TUT, AVL, LAT/AUTh, RICARDO
WP3	PN <23 nm measurement configuration	Instrumentation to be proposed	Exhaust aerosol measurement labs	Not relevant	Entire consortium
WP4	DownToTen PN PEMS demonstrator unit	Device and Test protocol (demonstrator in month 22)	Exhaust aerosol measurement labs, regulatory authorities	2020	TUG, AVL, LAT/AUTh, RICARDO, TUT
WP4	Evaluation procedures for RDE particle number	Software code and method (demonstrator in month 32)	Exhaust aerosol measurement labs, regulatory authorities	2019	TUG, AVL, LAT/AUTh, RICARDO, JRC
WP5	Emission performance of late and forthcoming vehicle types	Emission factors to be used in models and estimates	Air quality research, policy making	2019	LAT/AUTH, TUG, TUT, TUM
WP5	Calibration procedures for measuring PN<23 nm	Calibration test protocols	Standardization and regulatory bodies	2020	TUT, TUG, TUM, JRC
WP5	Modelling of exhaust particle processes from emission to dilution	Simulation model	Researchers, manufacturers	2021	LAT/AUTH, TUT

Planned progress per work task, including milestones and deliverables

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