

Welcome to the Online Final Event



What to expect today









- 14:00** Welcome by the Coordinator and word from the European Commission
- 14:10** Presentation of the project and its main results
- 14:30** Introduction to demo car innovative components and their performance
- 15:10** Electric vehicle cabin disruptive designs: from sketches to full scale Mock-Up
- 15:15** Break
- 15:25** Virtual assessment and optimization of comfort controller and cabin configuration
- 15:45** Discussion
- 16:20** Break
- 16:30** Parallel sessions: In depth explanation of hardware and software innovations



- 16:30** Parallel sessions: In depth explanation of hardware and software innovations
- Parallel session one: Active Glazing and Permanent Anticoating - Main room (click [here](#) for the link)
 - Parallel session two: Radiant panels and cabin configuration optimization
 - Room 2 (click [here](#) for the link, PIN: 302154)
 - Parallel session three: Automatic control logic and HVAC
 - Room 3 (click [here](#) for the link, PIN: 608455)
- 17:30** Closure (which will take place in the [Main room](#))

EMAIL: DOMUS FINAL EVENT - PARALLEL SESSIONS AND AGENDA



-  Mute your microphone during presentations
-  Reserve your questions for the discussion time -write questions via chat
-  Turn off the webcam during presentations
-  Moderator of the discussion at 15:45 will be:
 -  **Eric Cerneaz**
 -  Project Officer H2020 Research and Innovation – Transport



About the project





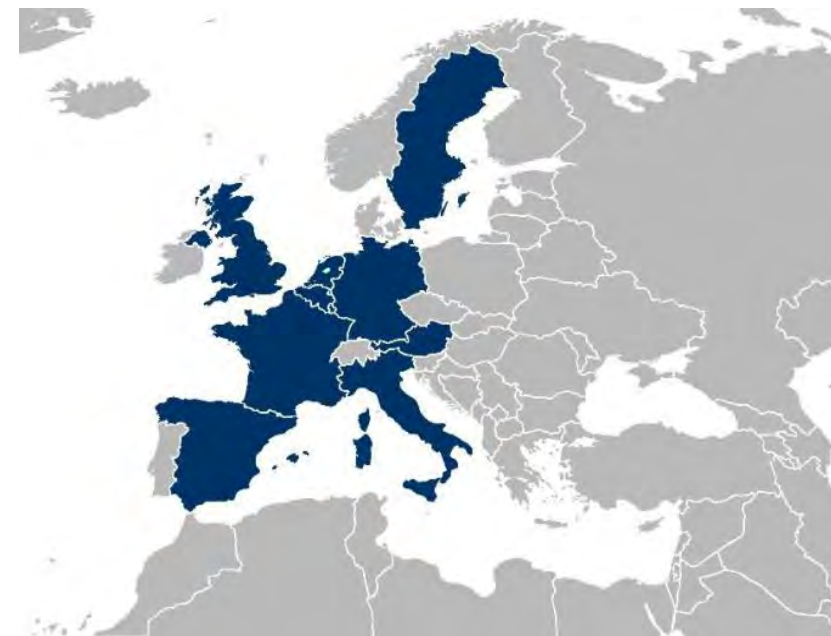
“Range anxiety is one of the main barriers to EV adoption by the broader customer pool”

- ❏ **Topic:** Electric vehicle user-centric design for optimised energy efficiency (GV-05-2017)
- ❏ **Title:** Design OptiMisation for efficient electric vehicles based on a USer-centric approach (DOMUS)
- ❏ **Type of action:** Research and Innovation Action (RIA)
- ❏ **Budget:** 8.958.010€ (100% EU contribution)
- ❏ **Duration:** 48 months
- ❏ **Start date:** November 2017
- ❏ **End date:** October 2021



TYPE	COMPANY NAME	COUNTRY
ESP	IDIADA Automotive Technology S.A.	ES
OEM	Centro Ricerche Fiat S.C.p.A. (CRF)	IT
OEM	Stellantis / CRF (fkna FCA)	IT
OEM	Toyota Motor Europe	BE
OEM	Volvo Personvagnar A.B.	SE
TIER1	AGC glass Europe S.A.	BE
TIER1	Denso Thermal System S.p.A.	IT
TIER1	Faurecia Sièges d'Automobile	FR
TIER1	Faurecia Interior Systems	FR
TIER1	Faurecia Autositze GmbH	DE
TIER1	Hutchinson S.A.	FR
TIER1	IEE International Electronics & Engineering S.A.	LU
U & RI	Luxembourg Institute of Science and Technology (LIST)	LU
U & RI	Coventry University	UK
U & RI	Fraunhofer -Gesellschaft zur Förderung der angewandten Forschung E.V.	DE
U & RI	Rheinisch-Westfaelische Technische Hochschule Aachen (IKA)	DE
U & RI	Fundacion Tecnalia Research and Innovation	ES
U & RI	Kompetenzzentrum - Das Virtuelle Fahrzeug, Forschungsgesellschaft m.b.H. (VIF)	AT
CONS	Uniresearch B.V.	NL

Consortium



Reduce overall energy consumption of future EVs

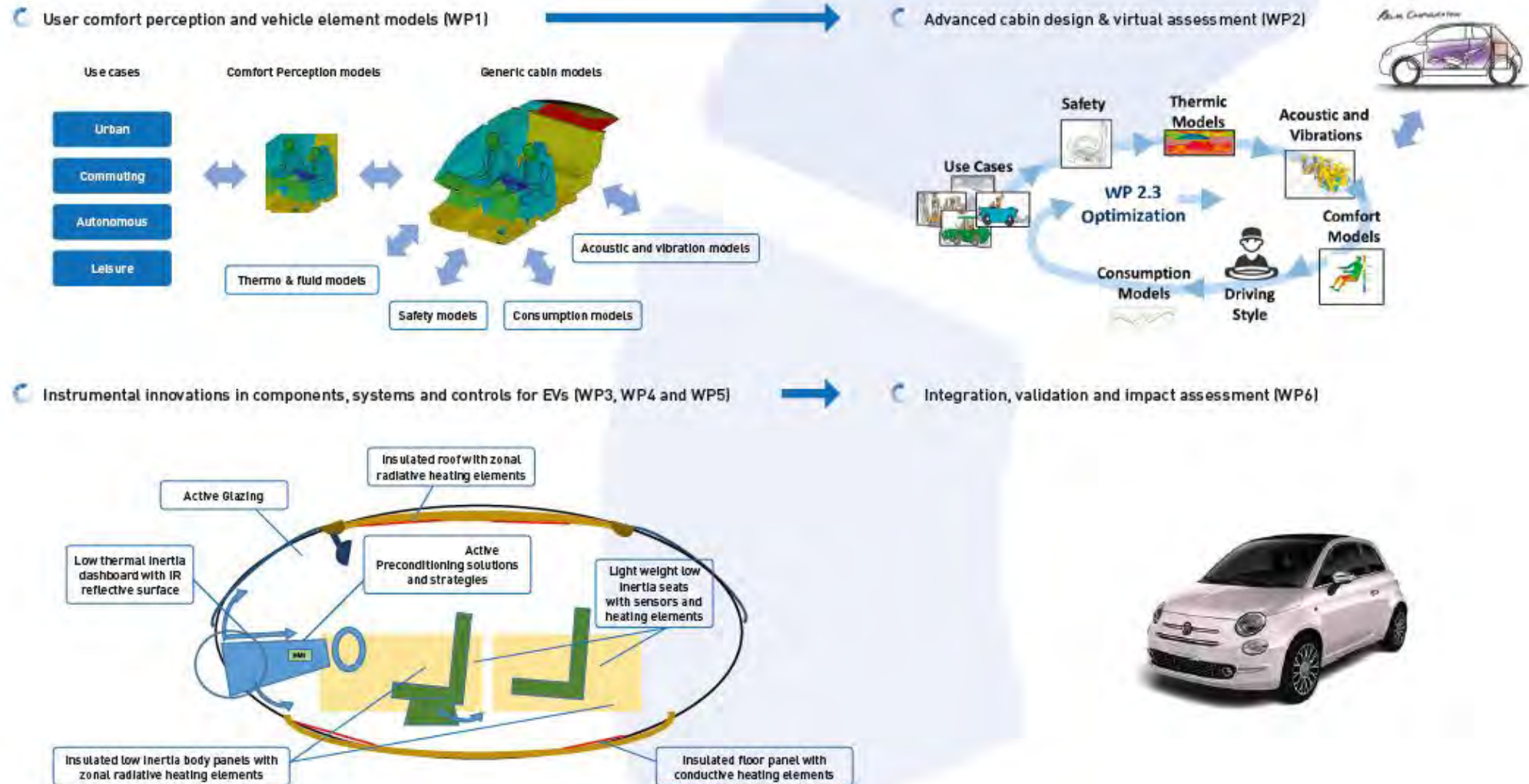
Minimisation of energy consumption from cabin systems

Design guidelines for Future EVs:
comfort vs. efficiency

As cabin heating and cooling represent the highest auxiliary loads drawing on the vehicle's energy resources, DOMUS aims to deliver advanced solutions to lower significantly the energy demand for cabin conditioning while improving the user experience by developing, validating and applying a user-centric approach to EV design.

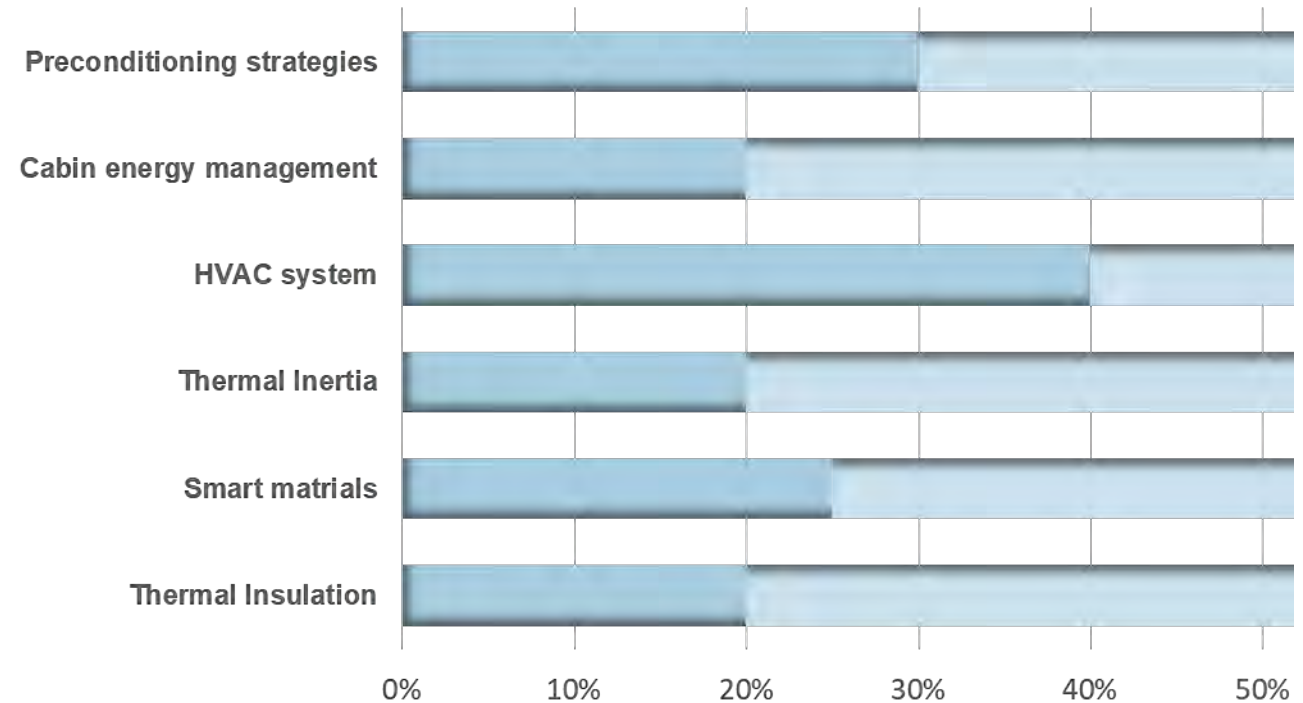
Deeply understanding users' comfort perception

Develop an active system reacting to users' characteristics and conditions



For different ambient conditions

Thanks to a wide range of innovations



**Example of targeted energy savings for 'cold use case': 0°C RH:55% compared to the 2016 reference model*

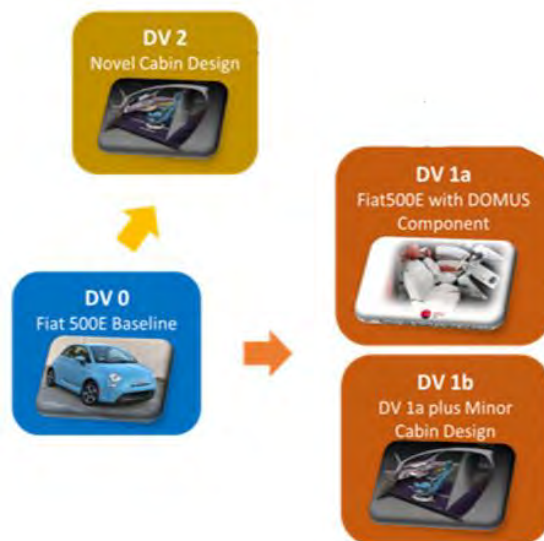
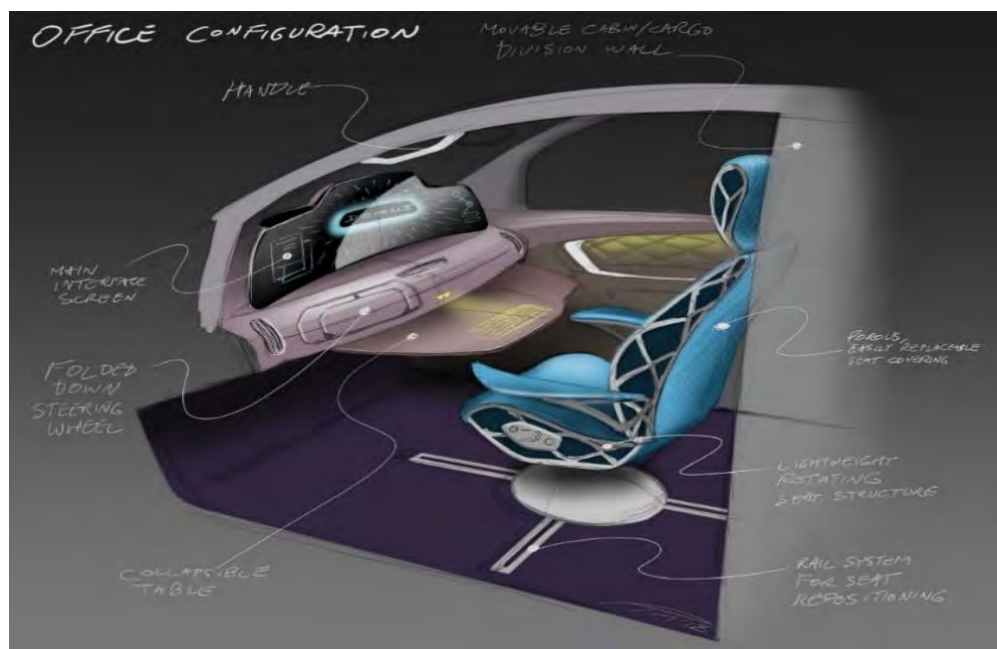
Reduce energy demand > Increase the electric range of future EV's > Increase of EV adoption

Main results of the project



3 Workshops with key experts

- The technological innovations from DOMUS
- Future European mobility situations
- Understanding possible futuristic mobility scenarios

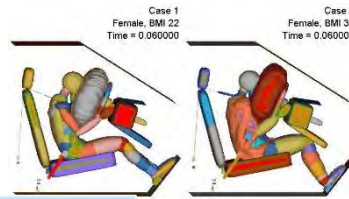


- Baseline design: Fiat 500e cabin
- 3 different cabin designs
- Mock Up

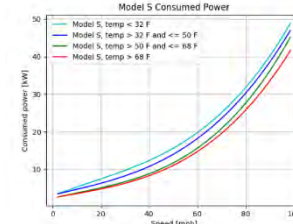
USER'S PERCEPTION OF COMFORT



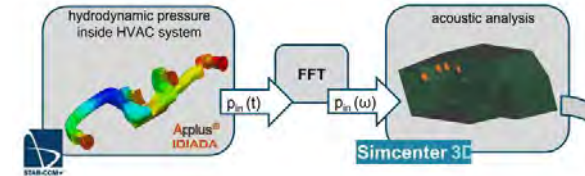
SAFETY



CONSUMPTION MODELS



ACOUSTIC COMFORT MODELS



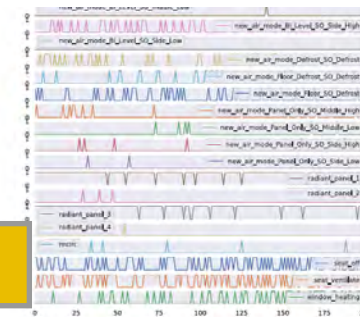
CABIN PARAMETRIZATION



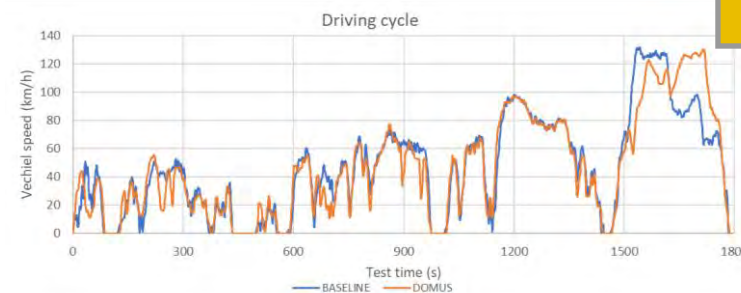
INTEGRATED SIMULATOR



OPTIMIZED CLIMATIC CONTROLLER



ENERGY CONSUMPTION CALCULATION



OUTPUTS

- Range: + 20.2% UC 28
- Range: + 15.4% WLTP

DOMUS HW SW innovative components

Cabin thermal insulation solutions

Cabin lighter elements

Cabin heat and thermal comfort source

Advanced Control system

Thermal Energy Storage

PCM to storage heat otherwise lost to heat the cabin

Connected seats

Heating elements **and humidity absorbing properties** around waist and back

Radiant panels

14 R.P made of Printed Foils in interior components of the cabin

Insulated low inertia body panels

Installed in areas with major thermal losses in the cabin. PCM+VIP

Glazing

Low weight with excellent transparency, insulation properties, variable IR shield, smooth surface and special passive layer coating to prevent fogging and icing

Smart HVAC system

Low airflow air distribution and smart control strategies



HMI

Integration of novel functionalities and strategies in the Human Machine Interface(s) of vehicle control systems

Smart control strategies

Data acquisition from various sensors to secure comfort and safety at minimum energy consumption

Dashboard

Dashboard with IR reflective surface, low weight and low thermal inertia

Low inertia seats

Reducing the weight with innovative structures and materials



PHYSICAL INTEGRATION

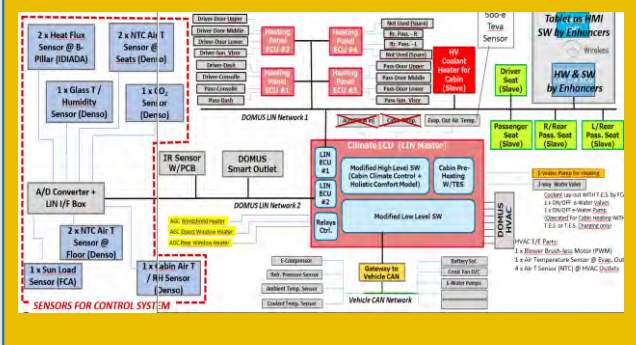
Cabin thermal insulation solutions

Cabin low thermal inertia components

Advanced Control system

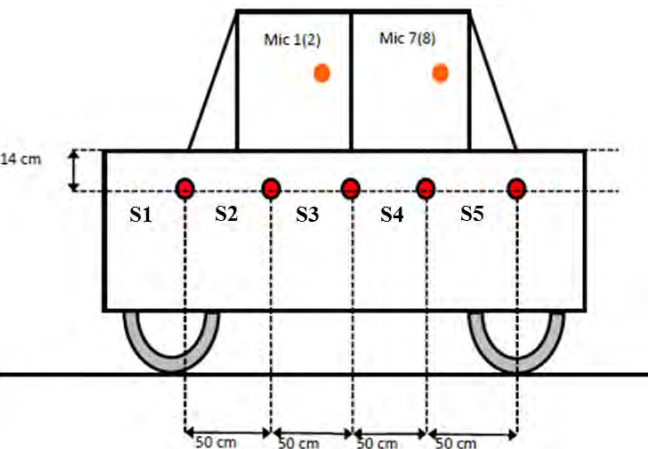


New E/E Architecture



DOMUS DEMO VALIDATION

Acoustic testing

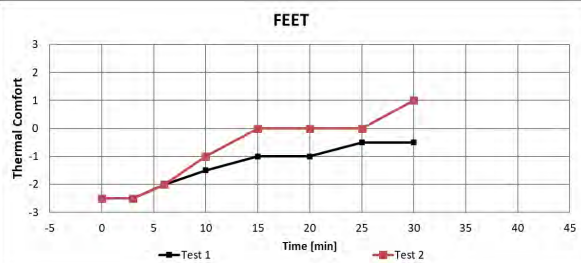


WLTP'+14 °C

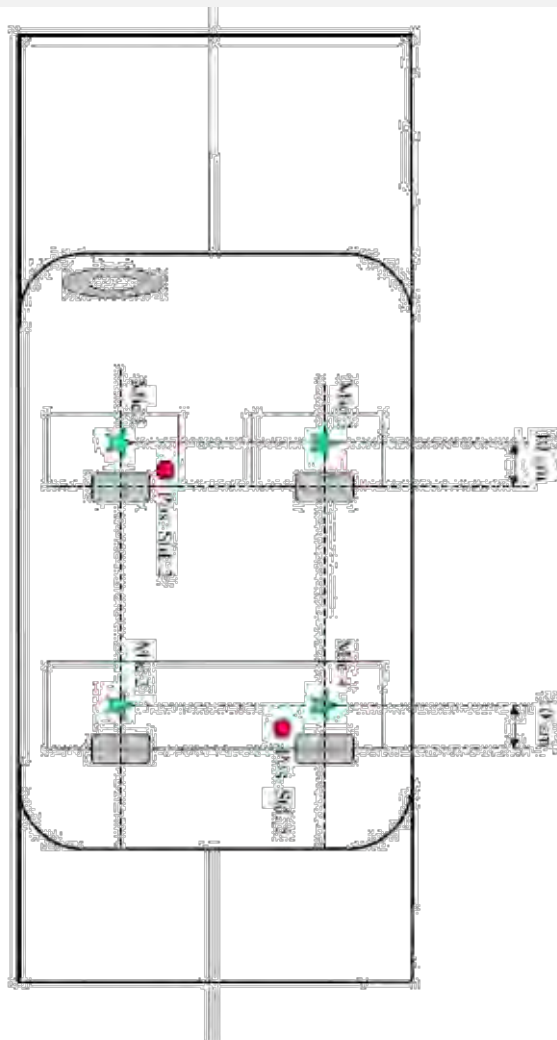


Subjective testing

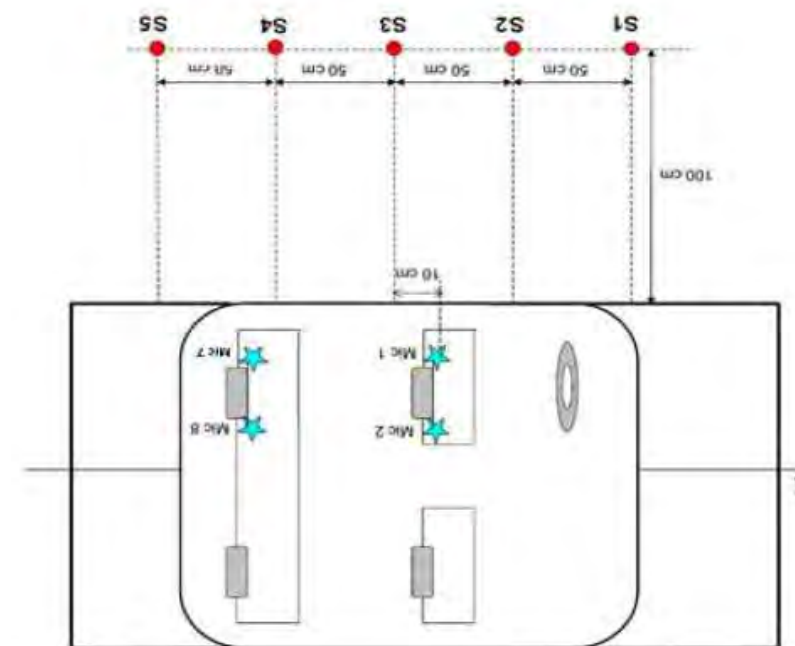
快適感 <Thermal Comfort index>	
+3	非常に快適 (very comfortable)
+2	快適 (comfortable)
+1	やや快適 (slightly comfortable)
0	どちらでもない (neither comfortable or uncomfortable (neutral))
-1	やや不快 (slightly uncomfortable)
-2	不快 (uncomfortable)
-3	非常に不快 (very uncomfortable)



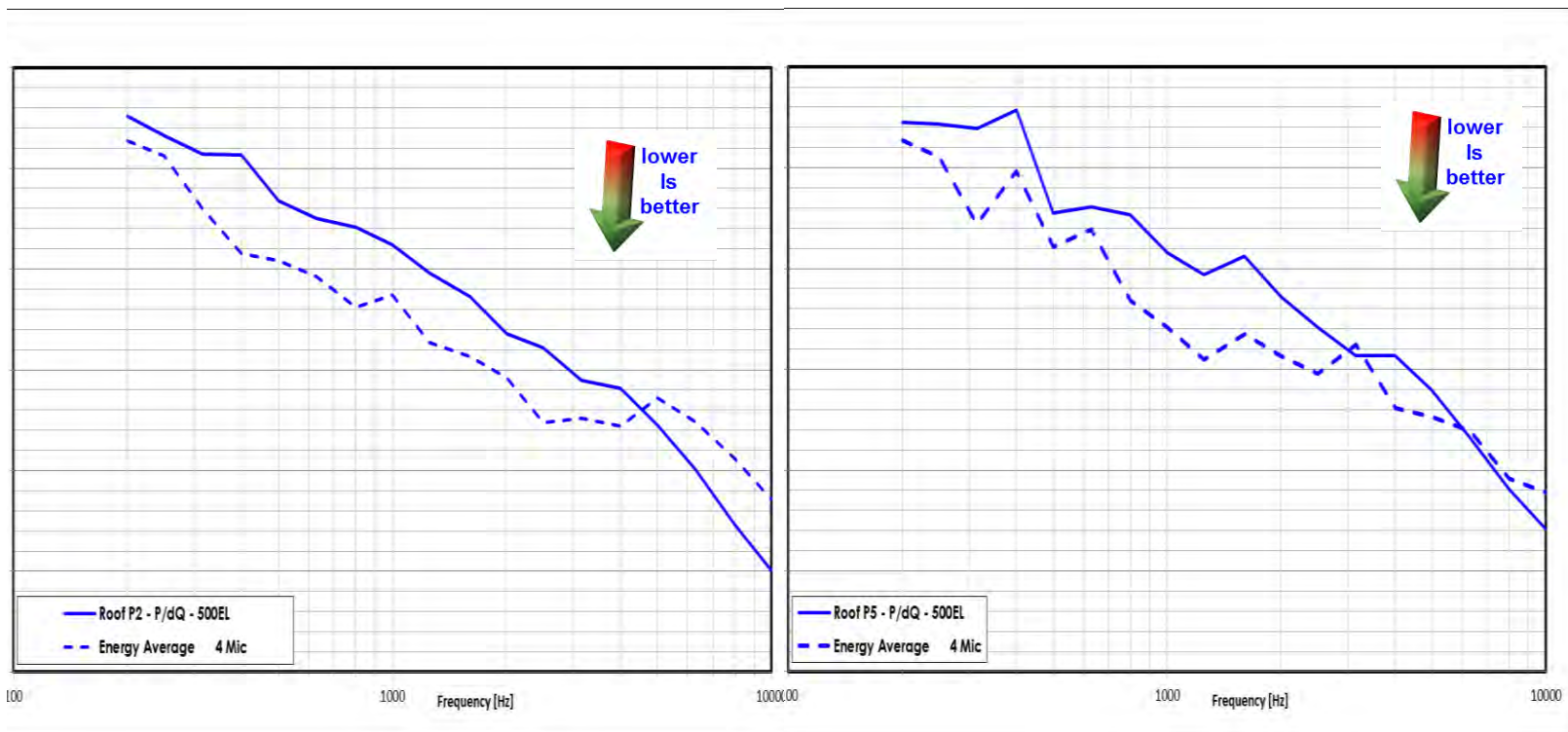
Intrusion noise perceived by vehicle occupants – roof set up & side panel set up



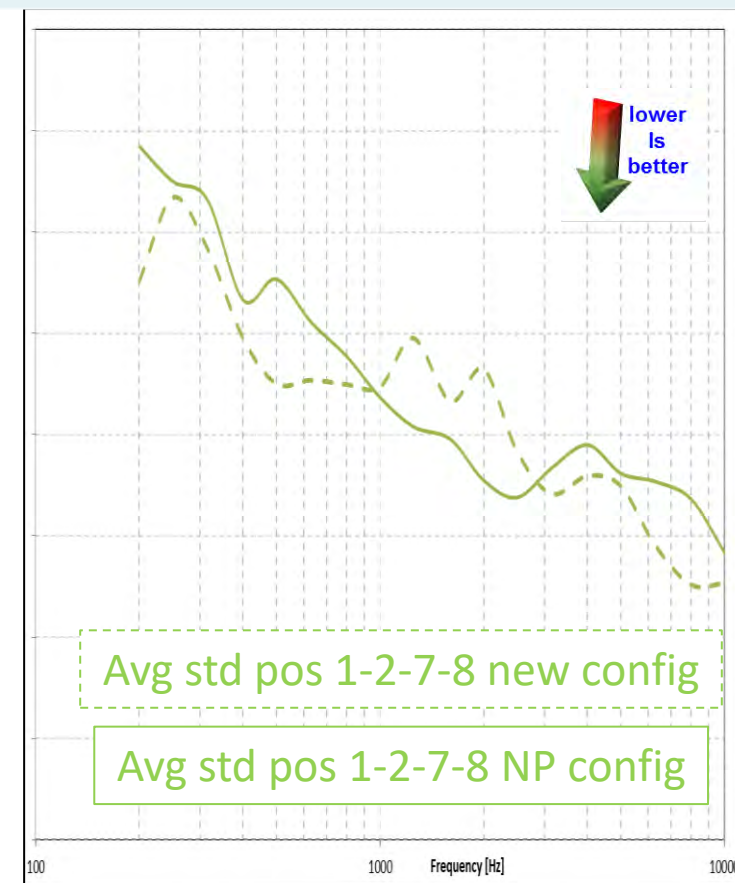
- *Measure done in semi-anechoic room*
- *Frequency range: 200-10000 Hz*



ROOF PANELS

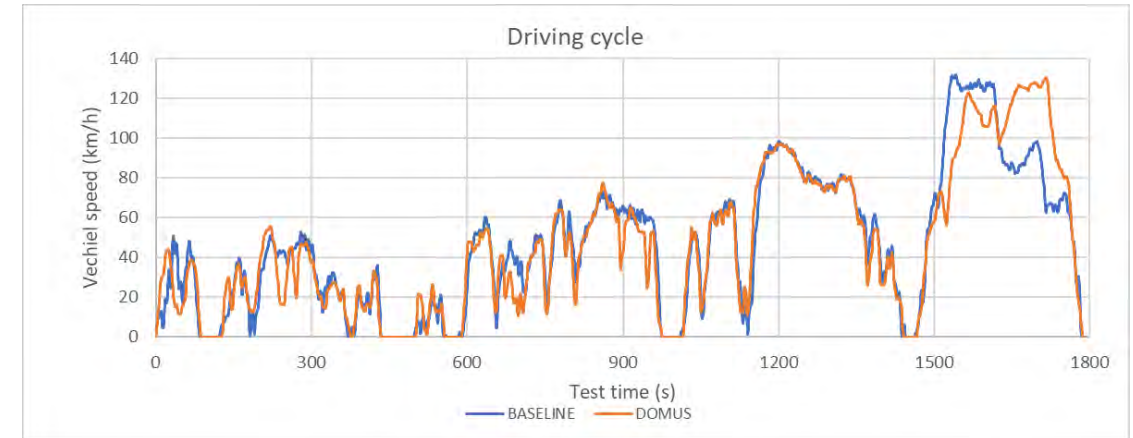


SIDE PANELS



Summary of Results WLTP at 14°C.

	Results	Target
Thermal comfort	Similar comfort	Improved energy efficiency without compromising (...) the safety, comfort and well-being of the vehicle occupants.
Acoustic comfort	Higher comfort	
Safety Visibility	No windshield fogging	
Energy consumption	-9,7%	
Range increase	+9,7%	=15%

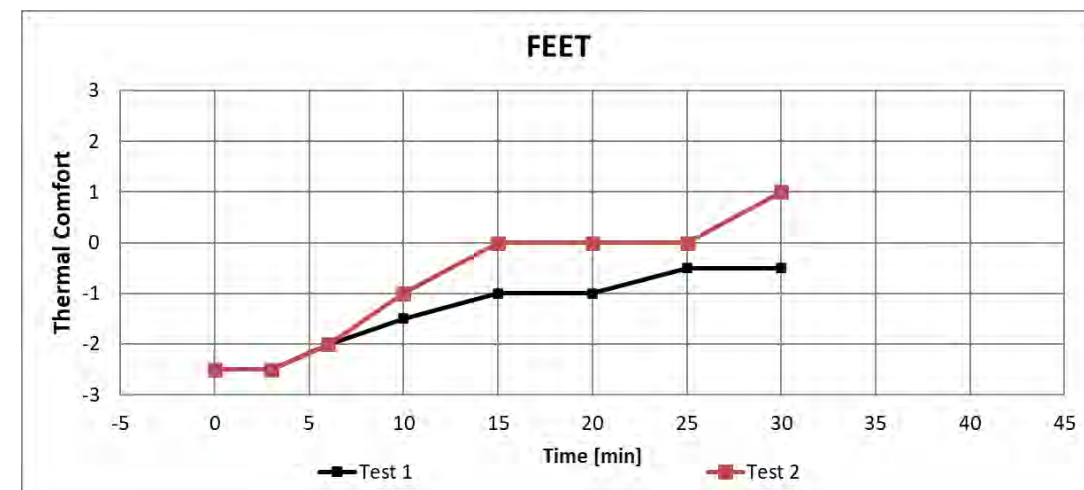
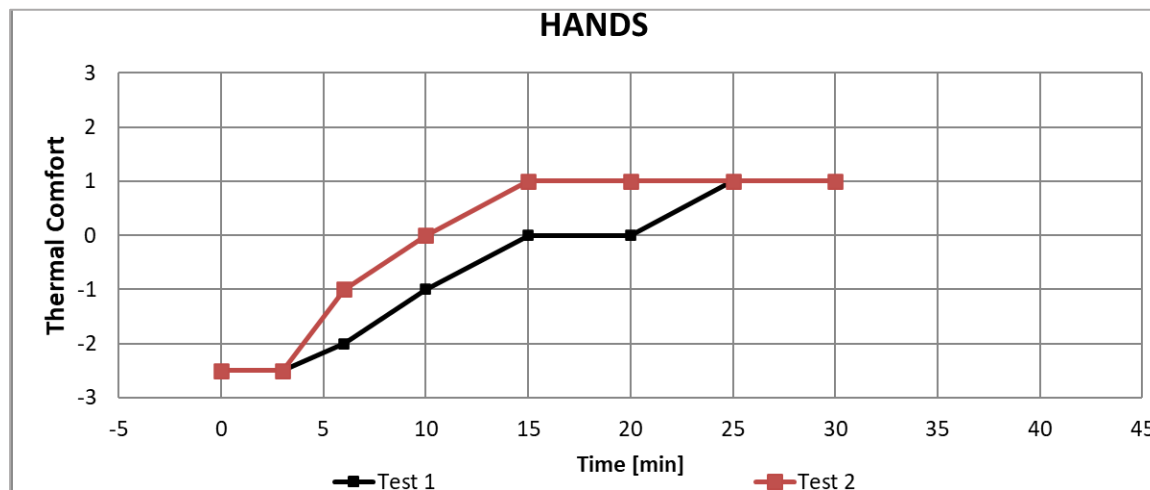
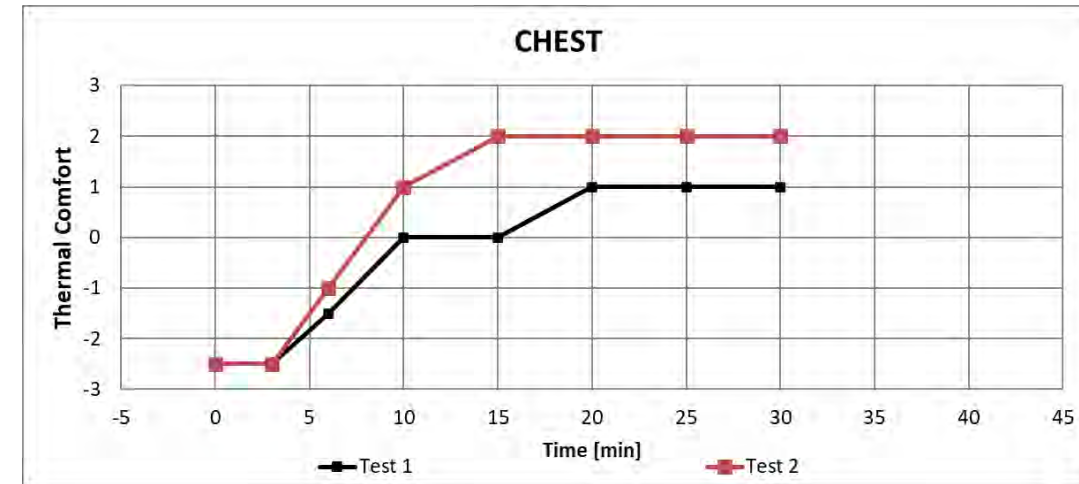


Range calculation	units	Baseline	DOMUS	Difference
Distance (1 cycle WLTP)	km	23,0	22,8	
consumption (1 cycle WLTP)	Wh	5575,3	5036,7	
Efficiency	Wh/km	242,1	220,8	
Battery capacity	wh	22200	22200	
Range (WLTP)	km	92	101	9,7%

Energy consumption	units	Baseline	DOMUS	Difference
HV Battery total	Wh	5575,3	4998,2	
Auxiliary battery (Heating panels)	Wh	0,0	38,4	
Total	Wh	5575,3	5036,7	-9,7%

Two different tests

- Test 1: Warm-up @ 5°C, HVAC AUTO, Tset = 22°C
- Test 2: Warm-up @ 5°C, HVAC AUTO, Tset = 22°C + Radiant Panels
- Jury of thermal experts







End of presentation

