

2nd Newsletter Edition/July 2019

PROJECT MEETINGS

**General Assembly and Mid-term Review, Aachen
11-12 October 2018**

Hosted by FEV, all 20 partners gathered to focus on their main achievements for the Mid-term Review and discussed the upcoming challenges.

**General Assembly, Paris
09-10 April 2019**

Hosted by IFPEN, the meeting focused on the status of the main 6 work packages and the upcoming dissemination and exploitation activities.

**General Assembly,
Tarragona, 20-21 November
2019**

General A. in Paris on April 10th, 2019



1 YEAR TO GO – 3 DEMONSTRATOR VEHICLES TO BE BUILT EVALUATED

During the first 18 months of ADVICE extensive work has been performed, systems have been developed and evaluated.

ECO Routing has been developed, which is more complex for hybrid vehicles than for conventional ICE driven vehicles or pure EVs due to additional degrees of freedom in the energy management system.

A dedicated HMI has been developed providing the driver real time information on the Eco-Routing and Eco-Driving functionalities and giving advice.

We set up powertrain energy management strategies considering input from the optimized predictive control and driver request, with the aim of reducing the energy consumption and emissions production (reducing the AdBlue consumption)

The thermal management includes prediction of energy demand by the auxiliaries and phase change materials for heat storage have been analysed.

The efforts will now concentrate on bringing the technologies and controls into the three demonstrator vehicles (gasoline hybrid, Diesel hybrid and gasoline P-HEV) that should demonstrate the added value of ADVICE to the whole range of hybrid vehicles.

DISSEMINATION HIGHLIGHTS IN THE LAST MONTHS

Aachen Colloquium, October 2018: presentation by AVL and GM and conference paper „An Affordable Approach Towards Local Zero Emission!“

37th FISITA World Automotive Congress Chennai, October 2018: conference paper „An Affordable Approach Towards RDE and Local Zero Emission“ by AVL

15th Int. Conference on Control, Automation, Robotics and Vision, November 2018: conference paper „An Intelligent Torque Vectoring performance evaluation comparison for electric vehicles“ by Tecnalía

Applied Thermal Engineering, Vol 147: Journal paper “Review of thermal management of catalytic converters to decrease engine emissions during cold start and warm up” by University of Surrey

14th Intern. MTZ conference-powertrain of tomorrow, January 2019: conference paper “Minimal emissions based upon 48V-an affordable entrance for green cities” by AVL

11th Intern. Symposium Advanced Battery Power Aachen, April 2019: conference paper “Requirements of a High-Power 48V Battery System for Future XEV Applications”

Journal Paper on EHC simulation in June 2019 by University of Surrey

SIA Powertrain & Electronics in Paris, June 12-13th, 2019, presentation: „AVL’s Low Voltage High Power Electric Axle System“ by AVL

UPCOMING EVENTS AND PUBLICATIONS IN 2019

ATI National Congress in Modena, September 11-13th, 2019, conference paper: „Predictive NOx emission control of a Diesel-HEV for CO2 and urea consumption reduction“ by ALMA

Master Thesis on “Thermal Modelling of a Hybrid Vehicle with latent Heat Storage and optimized Thermal Management” in September 2019 by Virtual Vehicle

e3CAV-workshop with poster presentation in Paris, September 30/October 1st by IFPEN

AVL International Simulation Conference, October 2019, presentation by AVL and VIF

HMI WITH ECO-DRIVING/ROUTING INFORMATION ADVISING THE DRIVER

An HMI app has been implemented that can be used on an Android smartphone. Three different tabs for the pre-, in- and post-trip phase and their usage from driver’s perspective are provided. The first **tab (pre-trip)** accesses Eco-Routing functionality. The second one (**in-trip**) presents the output of the Eco-Driving function. Via the **post-trip** tab the user gets a score for his performance based on the energy demand

during the trip and on how good the speed advice was followed. The visual and auditory concept of the HMI is outlined especially for the display of in-trip information.



Figure 1 3 HMI Tabs (left) and implementation (right)

The HMI was successfully tested within a HiL test with ECO-Driving sample data.

THERMAL MANAGEMENT WITH HEAT STORAGE

The experiments by simulation show that the integration of a heat storage into either the high temperature or the low temperature coolant circuit proves to be beneficial in several ways. Results predict that for the high temperature cooling circuit the heat storage can contribute by reducing heat up time of the combustion engine. This in return leads to a reduction of tailpipe emissions.

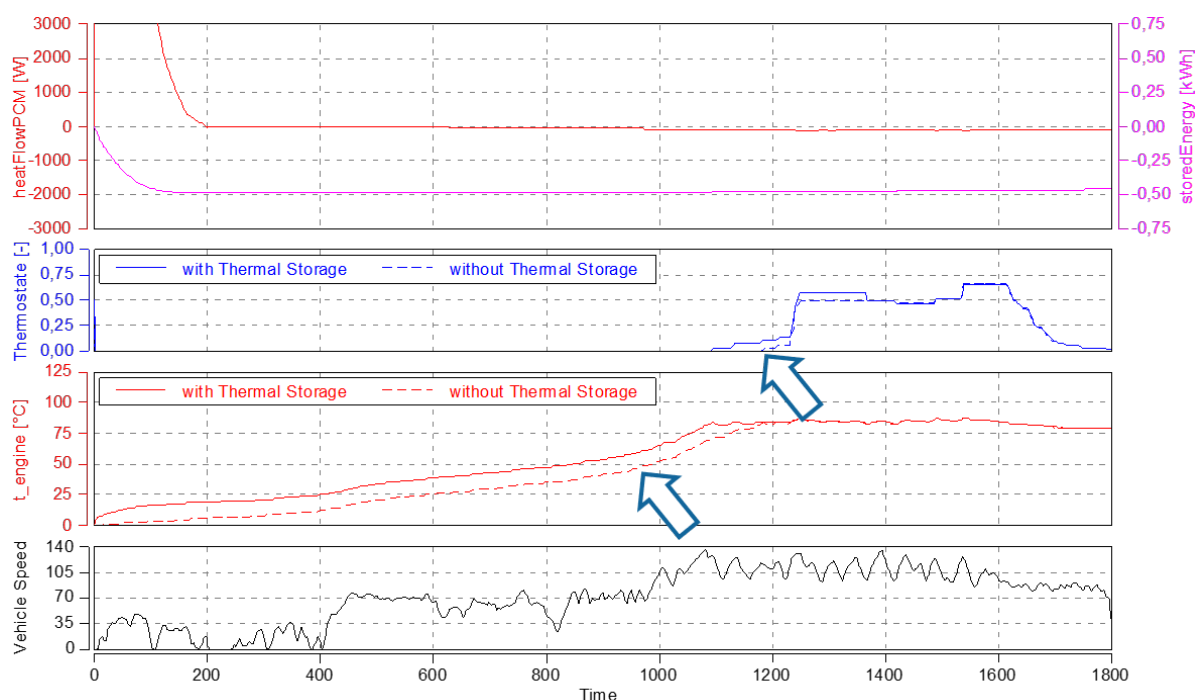


Figure 2: ICE heat up with heat storage during real driving cycle

ELECTRICALLY HEATED CATALYST (EHC) CONTROLLER PROTOTYPE

The EHC is pointed as an effective method to decrease HC and CO emissions of cold start conditions, especially for mild HEV. The heater device should be integrated with a catalyst to heat up the catalyst directly rather than heat up the exhaust to decrease the heating thermal losses.

The heating temperature should be controlled and not be too high, to ensure the catalyst's lifetime. Non-uniform coating of noble metal on the carrier is suggested. Fig. 3 shows the ADVICE concept of EHC with the controller very close to the catalyst, which makes high-temperature electronics necessary.

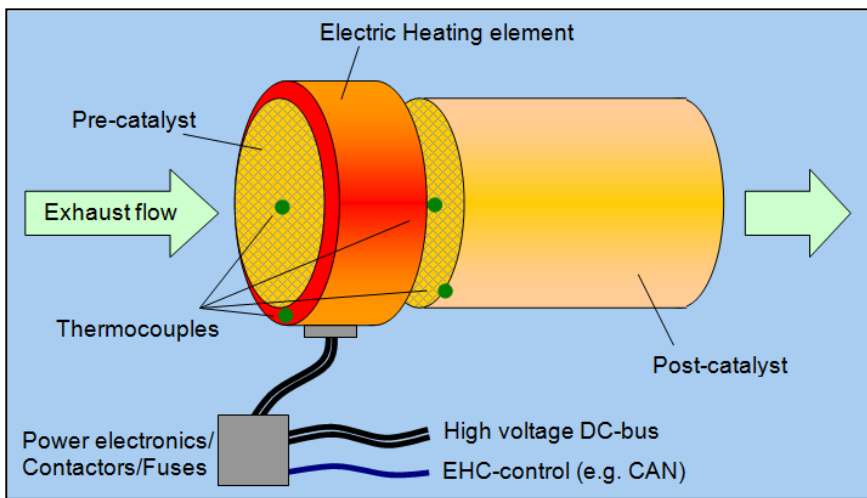


Figure 3 electrical heated catalyst (eHC)

Thanks to the interaction with Infineon Technologies, it has been possible to evaluate a new SoC (system on chip), which integrates most of the functionalities needed (e.g. I/O, power supply, pre-drivers) and a 32 bit ARM controller, being able to operate up to 150°C ambient temperature.

The TLE9867QXW20 is the first device SoC made available from Infineon Technologies and belongs to a family of HT smart drivers.



Figure 4 eHC Driver