



Heavy Duty Gas Engines integrated into Vehicles

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**Project partners:**

- 1 - AVL - AVL List GmbH - AT
- 2 - BWR - Borgwarner Ludwigsburg GmbH - DE
- 3 - BOSCH - Robert Bosch GmbH - DE
- 4 - DAI - Daimler AG - DE
- 5 - DINEX - Dinex Ecocat OY - DK
- 6 - FPT - FPT Industrial S.p.A. - IT
- 7 - IDIADA - Idiada Automotive Technology S.A.- ES
- 8 - IVECO - Iveco Espana SL - ES
- 9 - MAN - MAN Truck & Bus AG - DE
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- 11 - RCD - Ricardo UK Limited - UK
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- 19 - VIF - Virtual Vehicle Research Center – AT

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## Public Summary

Based on the work package D6.1 - Prototype injectors for SCE and ECU – further objective is to build up a multi-cylinder (MCE) engine that is powered by LNG. To fulfill this task the design of the prototype injector of the SCE has to be refined for MCE application. Out of the lower working pressure of 300 bar on the MCE, especially the nozzle design is refined regarding the number of sprayholes and hole diameter for the NG spray, to achieve the required flow rate. Before hardware delivery every injector had been tested on a Bosch internal test bench to review the functional behavior.

Additional to the dual fuel injectors further components are provided. All extra components and their logical interconnection to each other is shown in Figure 1. Generally all six dual fuel injectors (Pos.1) in the MCE must be supplied by natural gas and diesel. Therefore two fuel supply systems are supported. A high pressure pump CP4.2 (Pos.2) in combination with a mechanical feed pump generates the required flow rate on the desired pressure level. The high pressure pump feeds a diesel rail (Pos.3) that distributes the diesel fuel to all six dual fuel injectors. By reason of insufficient connectivity of the diesel rail, a mini rail (Pos.4) is interposed to unite the feed pipes of the high pressure pump. A pressure sensor in the diesel rail gives the opportunity to observe the diesel pressure. Regarding the NG supply all dual fuel connectors are connected to a special developed NG rail (Pos.5). Beside the required fuel capacity and interface compatibility to the MCE, the NG rail is especially designed to damp internal pressure waves for a more constant fuel supply. Similar to the diesel rail, an integrated pressure sensor in the NG rail observes the pressure of the NG fuel. The NG mass-flow to the NG rail is applied by an upstream connected pressure controller (Pos.6). The pressure controller is pilot controlled by a hydraulic pressure control valve (PCV), which is also connected to the diesel fuel supply. Similar to a pressure maintenance valve the NG supply pressure is regulated by the diesel pressure. The PCV and an integrated throttle to the diesel rail gives the opportunity to regulate the diesel pressure in the pressure controller and consequently the NG pressure in the NG rail at a level below the diesel pressure in the diesel rail.

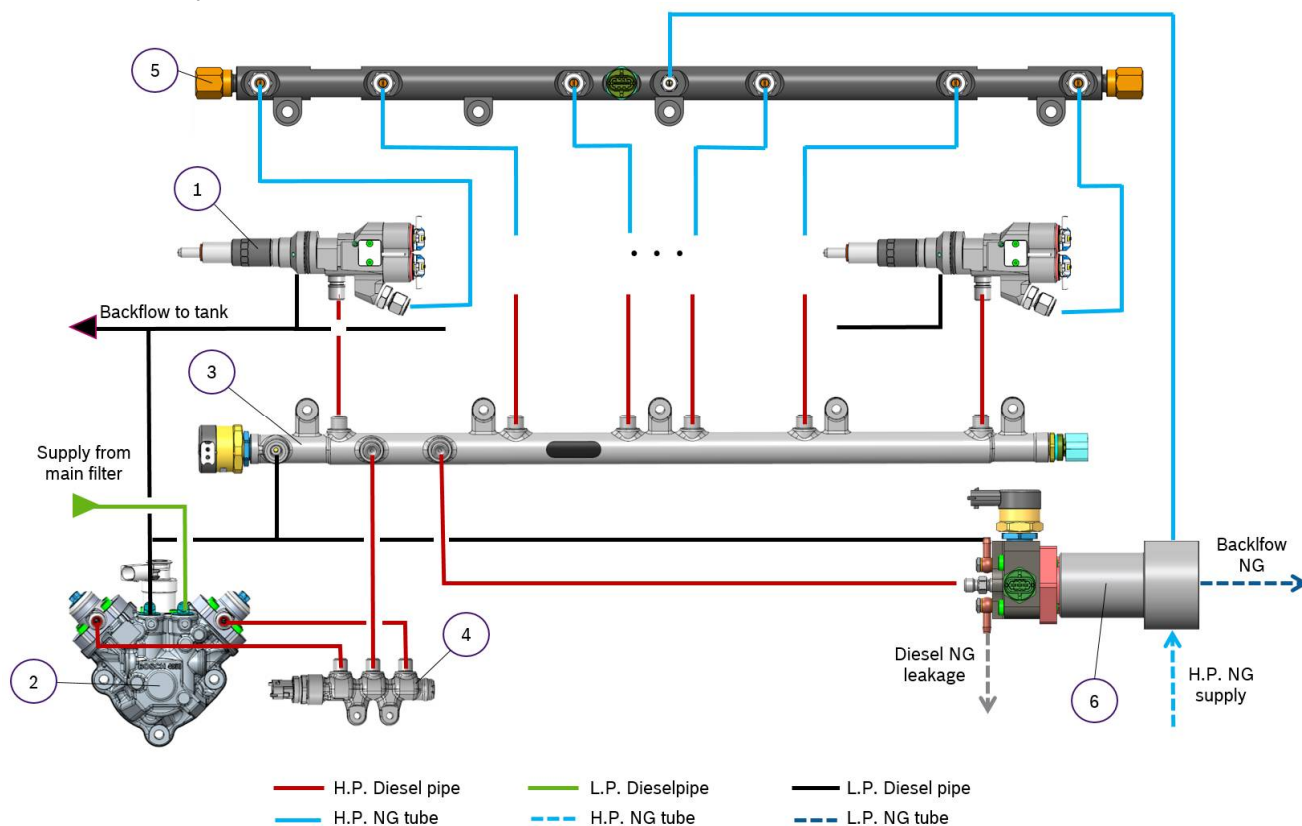


Figure 1: Schematic overview of provided hardware and their logical interconnection to each other

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