WP1 Project Coordination

D1.1 Data Management Plan

Provides information about all relevant sets of data generated in the course of the project that can be disseminated and protected, including the lifespan of every data-set and a description of the technical and organizational measures that will be implemented to safeguard the rights and freedoms of the data subjects / research participants.

D1.2 Quality Assurance and Risk Management Plan

Provides information on the identified quality indicators for the deliverables, risk contingency plans and risk management protocols, as well as information that the appropriate health and safety procedures conforming to relevant local/national guidelines/legislation are followed for staff involved in this project, including the relevant risk analyses, training and health and safety mitigation/protection measures.

WP2 Requirements and Use-Cases Specifications

D2.1 Report on requirements for E-components modelling and integration

Identification of methodologies and tools for model development of all e-components such as battery, inverter and electric motor.

D2.2 Report on requirements for ICE, charging and after-treatment modelling and integration in xEV framework

Full report on the requirements for the models of the internal combustion engines, the after-treatment, and their thermal management, with particular focus on their specifications and integration for xEV application.

D2.3 Report on Use-Case definition

Specification of four Use-Cases, defined by project partners as reference basis for the model development and validation/demonstration activities: the battery system, the xEV-powertrain layout and e-components, the after-treatment system and architecture definition.

D2.4 Report on definition of reference Real World Driving Cycles

Description of “generic” vehicle driving mission profiles from real-world driving measurements, serving as a basis for assessment of different xEV powertrain architectures and components/sub-system sizing/dimensioning with respect to overall energy efficiency.

WP3 Integrated Electrical Energy Storage Component Models

D3.1 Battery characterization/modelling, initial design and control strategies

This deliverable comprises non-linear/electro-chemical battery models (FMU format or similar) and corresponding documentation on model theory and validation

D3.2 Supercapacitor storage systems modelling and experimental validation

This deliverable involves Matlab based super-cap models including the related parameterization and a related report on model theory and validation.

D3.3 Multiphysics models of electrical/thermal/fluid-flow processes in e-storage components and related documentation

This deliverable comprises multi-physics models and related documentation of e-storage components accounting for electrical, thermal and fluid flow processes adopting AVL's 3D modelling and simulation platform.

D3.4 Report on initial battery characterization/modelling and related design and control strategies

Finalization of the model of the of whole energy storage system considering the interaction with other parts of the vehicle and optimization of the control strategies accordingly.

WP4 Scalable Electrical/Mechanical Energy Conversion Modelling

D4.1 Multiphysics-based models of different types of e-machines

Report on model prototypes (FMU format, Matlab/Simulink or similar) for coupling/implementation into the simulation framework of WP6.

D4.2 High-fidelity performance/thermal models of inverters/converters and super-caps

This deliverable comprises documented generic models (FMU format, Matlab/Simulink or similar) for linking/integration into the WP6 framework.

D4.3 Report on a methodology for seamless parameterization of reduced order models for different types of e-machines, inverters/converters and super-caps

The deliverable provides a methodology for the development of reduced order models for different types of e-machines, inverters/converters and super-caps.

WP5 ICE, Charging and Aftertreatment System Fluid-flow and Thermal Integration

D5.1: Experimental models of an electric turbocompressor and of a turbocharger including heat transfer and pulsation

This deliverable comprises an extensive experimental data base from specific test benches for turbocharger and electrical turbo-compressor with a focus on thermal and pulsating effects.

D5.2: Numerical tools for assessing the thermal management in ICE

Report containing the detailed description of the computational methodology and the implemented models for the calculation of the thermal management in the ICE for HEV drivetrains. The validation of the numerical tool by comparison with experimental data will be also included.

D5.3: Portable, validated models (FMU format) of exhaust aftertreatment components for desktop use

This deliverable contains a description of a practical simulation approach for a variety of components of the aftertreatment chain with emphasis on reliable predictions of zero-flow heat losses.

D5.4: New methods and tools for efficient combustion modes

This deliverable includes complete and validated 1D schematics of IC engine systems, with parametrization for use in HEV vehicles, including thermal and chemical transient of in-cylinder and aftertreatment devices.

D5.5: High-fidelity unsteady CFD data-base associated with realistic pulsating flow and temperature conditions in realistic manifold-turbine configurations

Database used for predicting turbocharger maps that take into consideration flow pulsations and temperature effects.

D5.6: Advanced powertrain model including thermal and electrical energy flow, including new matching criteria for components in a hybrid powertrain

This deliverable comprises advanced numerical models for e-turbocompressor and turbocharger for coupling/implementation into the WP6 simulation framework.

D5.7: Three-way catalyst - PCM model including the modelling of exhaust aftertreatment thermal management

Report with detailed description of the developed models for the calculation of the thermal management of EAT of IC engines for hybrid drivetrain. The validation of the model and the resulting solutions for the thermal management of EAT will be also reported.

D5.8: Reports with test results vs respective simulation results of catalysts under zero-flow heat losses and active electrical heating

This deliverable contains description of advanced 3D heat transfer sub-models for free/forced convection and radiation in exhaust systems, for a variety of components of the aftertreatment chain, with emphasis on reliable predictions of zero-flow heat losses and active electrical heating.

D5.9: Verified and validated exergy-based method for assessment of aero-thermodynamic related losses in the exhaust manifold and turbine

Report to provide data for verification and calibration purposes of the developed exergy-based model.

D5.10: Report on thermal flows interaction in hybrid vehicles

Report on cooling requirements and thermal flows in hybrid vehicle systems. This report will discuss the degree of interaction of the heat flows to evaluate the viability of integrated concepts of thermal systems.

D5.11: Report on new methods and tools for efficient combustion modes

This deliverable will outline the application of complete and validated 1D schematics of IC engine systems, with parametrization for use in HEV vehicles, to achieve reliable evaluations and optimizations of engine-out and tailpipe emissions, together with fuel consumption, under different operating conditions (cold start, part/full load, transients, with different states of electric charge).

WP6 Multi-energy Powertrain Components and System Integration Framework

D6.1 Generic modelling framework for the energy management optimization of xEV powertrains and the control of their individual components

This deliverable consists of generic Matlab-Simulink models for xEV energy management strategy and control system development and optimization, involving the thermal models of **WP5** and including the related coupling methodology for integration with complex xEV powertrain/vehicle models.

D6.2 Complete 1D modelling system of IC-engines for use in HEV vehicles, including in-cylinder processes and aftertreatment devices

This deliverable provides generic integrated models consisting of coupled sub-system models for ICE and aftertreatment system and xEV powertrain/vehicle, adopting different tools and applying suitably adapted/extended coupling methodology.

D6.3 Simulation framework for holistic xEV thermal system layout

This deliverable contains thermal models for powertrain cooling and HVAC based upon different software of the heterogeneous industrial simulation tools eco-system, the e-component models developed in **WP3** and **WP4** and adopting multi-applicable methodologies for the appropriate calculation of the thermal behavior of xEVs.

D6.4 Components and system integration framework for xEV powertrain/vehicle application

This deliverable comprises generic electric/hybrid powertrain component and sub-system models set up on the basis of the multi-physics system simulation codes FireM and CruiseM including the component models of **WP3**, **WP4** and **WP5** and adopting the adapted/extended Model.connect coupling/co-simulation technology.

WP7 Demonstration and Impact Assessment

D7.1 Report on application and assessment of **VISION-xEV** simulation framework regarding battery management system development

This deliverable demonstrates the applicability of the models and methods developed for the simulation of the battery system and its thermal management, in different operating conditions. It also shows the efficiency gained by the VISION-xEV integrated approach in terms of development effort and duration with respect to the current state-of-the-art.

D7.2 Report on E-powertrain energy management layout and optimization based on **VISION-xEV** framework application

This deliverable summarizes the proper virtual choice and dimensioning of the major elements of an xEV-powertrain and the related sub-systems required for battery/e-machine cooling and passenger cabin heating, ventilation and air conditioning (HVAC), which are decisive for the overall energy management and hence the achievable electric driving range of electrified/hybrid vehicles.

D7.3 Report on the application of IC engine simulation tools, integrated in the co-simulation platform, with validation on the basis of experimental data provided from the industrial partners.

This deliverable describes the results of IC engine simulation tools, integrated in the co-simulation platform, to determine the optimum choice of internal combustion engine & after-treatment system for PHEV/HEV architectures, exploiting the methodologies developed in WP5 together with the system integration framework developed in WP6.

D7.4 Report on optimal choice of ICE and AT system for (P)HEV energy efficiency and emissions adopting the **VISIONxEV** framework

This deliverable summarizes the choice of optimal IC engine and associated innovative aftertreatment system for (P)HEV application regarding energy efficiency and emissions adopting the Vision-xEV framework. It is also including an estimation of time saving related to hybrid powertrain design using VISIONxEV compared to standard development methodologies.

D7.5 Report on assessment of the **VISION-xEV** simulation framework regarding optimised choice of hybrid powertrain system (ICE, e-Motor, ATS, e-Storage, etc.) in comparison with traditional development methodologies

Assessment report from the OEM point of view, on using the VISION-xEV simulation framework to optimised choice of hybrid powertrain system. The report will layout how the methodologies have helped streamline the workflow in optimum choice of hybrid powertrain components. Also including an estimation of the time saving related to hybrid powertrain design using VISION-xEV compared to standard development methodologies.

WP8 Dissemination and exploitation

D8.1 Project website creation (PUBLIC)

The project website is main tool for communication and dissemination of the project results.

D8.2 Project flyer (PUBLIC)

It presents in a very summarized and graphic fashion the project: funding entity, objectives, partners, contacts, etc.

D8.3 Initial Plan for Exploitation and Dissemination of Results (PEDR)

This deliverable defines an initial version of the PEDR, which lists the actions that have to be undertaken by the consortium for the exploitation of the project results and to create and ensure awareness of the project results in the public and scientific communities during and after the project.

D8.4 Press releases (PUBLIC)

First press release close to the starting of the project targeted at the general public and distributed via diverse media (internet publications, newspapers, appropriate magazines, etc.).

D8.5 Press releases (PUBLIC)

Final press release close to the project end targeted at the general public and distributed via diverse media (internet publications, newspapers, appropriate magazines, etc.).

D8.6 Final PEDR report

This deliverable defines the final version of the PEDR, which lists the actions that have to be undertaken by the consortium for the exploitation of the project results and to create and ensure awareness of the project results in the public and scientific communities during and after the project.

WP9 Ethics Requirements

D9.1 POPD - Requirement No. 1

This deliverable will describe the measures undertaken by all partners in the course of the project for protection of personal data.

D9.2 NEC- Requirement No. 2

This deliverable will report on all materials imported to / exported from the EU in the course of the project.

D9.3 EPQ - Requirement No. 3

This deliverable report will summarize the health and safety procedures followed for the staff involved at all partners in the project.