Final Event 24-25th of May 2022

Key innovations



Powerful Advanced N-Level Digital Architecture for models of electrified vehicles and their components

Multi-level models of batteries



Dr. Theodoros Kalogiannis

Vrije Universiteit Brussels-Battery Innovation Center (BIC) theodoros.kalogiannis@vub.be



MOBILITY, LOGISTICS & AUTOMOTIVE TECHNOLOGY RESEARCH CENTRE



Main Objectives and Challenges

- The development and validation of real-time multi-scale models of batteries
 - Solution Knowledge models
 - Behavior models

- The Cloud-Computing real testing of a battery
 - Battery Hardware In the Loop (HIL) testing
- The determination of the environmental impact of the battery system
 - ☺ Life cycle analysis (LCA)



Multi-scale models: Battery cell behavior









Behaviour models: experience-based







Battery HIL testing: cloud-based





- IIL testing is performed with the BEV and P-HEV models
- Solution Various model-levels are explored at Lille and Brussels
- Solution High accuracy in power and thermal behaviors is achieved

[Costa et al. Panda D2.2: Cloud-computing real testing of batteries]

Slide 6

[German et al. Flexible cloud-based HIL Testing of Batteries for various Electrified Vehicles, under submission]

Key Innovation on battery multi-level models



- Solution Implement and validate multi-level electro-thermal battery models with several novel techniques
- Solution Investigate and develop innovative data-driven behavior models and optimization approaches
- Solution Conduct a flexible battery-motive co-simulation cloud HIL testing in real time
- LCA for the impacts of alternative battery end-of-life management, with second life, refurbishment and recycling





Thanks for your attention!

www.project-panda.eu





Slide 8



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824256.