



Initial Programm

Expert Workshop

**“LCA of Electric Vehicles – Current Status
and Future Perspectives”**



Time: November 11, 2015

(in connection to the A3PS Conference 2015 November 9 – 10, 2015)

Place: TechGate Vienna, Austria

Local organisers:

JOANNEUM RESEARCH, A3PS - Austrian Association for Advanced Propulsion Systems and
Austrian Ministry for Transport, Innovation and Technology



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Aims of the workshop:

Electric vehicles (EVs) have the potential to substitute conventional vehicles and to contribute to the sustainable development of the transportation sector worldwide. There is an international consensus that the environmental assessment of electric vehicles can only be performed on a life cycle basis, including production, operation and end of life by using Life Cycle Assessment (LCA) methodology. For example, about 90% of the greenhouse gas (GHG) emissions of a vehicle running on renewable electricity from hydropower are associated with the production and end-of-life treatment of the vehicle, while only 10% are the result of the vehicle operation. If the electricity is coming from a coal power plant, the GHG emissions of the vehicle operation are most dominant (> 95%)

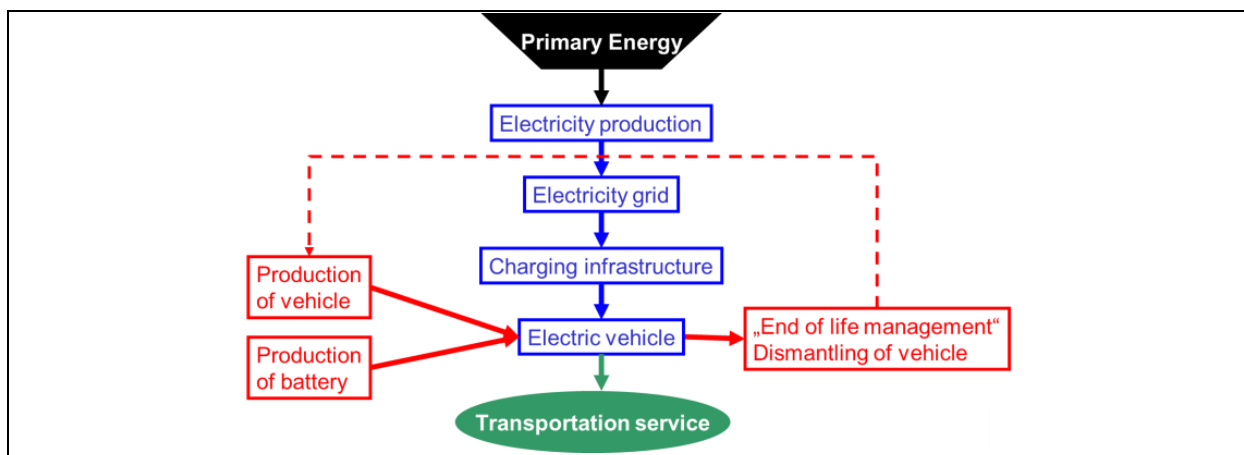


Figure 1: Key elements of the life cycle assessment of vehicles with an electric drive train

The Implementing Agreement on “Hybrid and Electric Vehicle (HEV)” of the International Energy Agency (IEA) is operating the Task 19 “Life Cycle Assessment of Electric Vehicles” to examine the environmental effects of vehicles with an electric drivetrain based on life cycle analyses. The Task 19 started in 2012 and will continue until the end of 2015. The main activities influencing the environmental impacts of electric vehicles on a life cycle basis are:

- 1) Production and life time of the battery,
- 2) Electricity consumption of the vehicle in the operation phase, incl. e.g. energy demand for heating,
- 3) Source of the electricity, only additional renewable electricity maximizes the environmental benefits and
- 4) End of life treatment of the vehicle and its battery.

The aim of the workshop is to present the current status and the future perspectives of Life Cycle Assessment of vehicles with an electric drivetrain. The main focus is on Battery Electric Vehicles (BEV) and Plug in Hybrid Electric Vehicles (PHEV). The results of the activities of Task 19 (2012 – 2015) will be presented and recent developments in LCA methodology development and its application to EVs. In a group of relevant stakeholder from government, industry, research and NGOs the effects of LCA results on the future large scale market introduction of EVs will be discussed.

The three sessions for the workshop are:

1. Results of Task 19 presented by the 4 participating countries (A, G, CH, US)
2. International Highlights on LCA of EVs - Presentations from “Call for contributions”
3. Stakeholder discussion: “Is LCA killing the electric car?” or “How to communicate LCA results”

Programm

Wednesday November 11, 2015

9:00 – 9:15: **Welcome addresses** from IEA and A3PS

Key Notes of IEA Task 19

9:15 – 10:00: **Results of IEA HEV Task 19 Activities 2012 – 2015**, Gerfried Jungmeier (Operating Agent IEA HEV Task 19), JOANNEUM RESEARCH, Austria

10:00 – 10:45: **LCA of Automotive Battery Production&Recycling**, Jennifer Dunn (Vice Operating Agent IEA HEV Task 19), ARGONNE, USA

10:45 – 11:00: Round Robin **Introductions of participants** (all)

11:00 – 11:30 Refreshment break

11:30 – 12:00: **Scenarios for Lightweight Materials for EVs**, Simone Ehrenberger, DLR, Germany

12:00 – 12:30: **Critical Metals in the Automotive Industry**, Rolf Widmer, EMPA, Switzerland

International Highlights on LCA of EVs

12:30 – 12:45: **LCA of Recycling of Automotive Batteries**, Begum Yazicioglu, Umicore Battery Recycling, Belgium

12:45 – 13:00: **The Size and Range Effect: Life Cycle Greenhouse Gas Emissions of Electric Vehicles**, Linda Ager-Wick Ellingsen, Anders Hammer Strømman, Norwegian University of Science and Technology (NTNU), Norway

13:00 – 14:00 Lunch Break

14:00 – 14:15: **Results of Reviewing of 100 International LCA Studies on BEV and PHEV**, Georg Knaus, FH-JOANNEUM, Austria

14:15 – 14:30: **Project InitiativeE-BW: Real Life Usage and Energy Consumption of EV-Fleets**, Holger Dittus, DLR, Germany



14:30 – 14:45: **Electric Car Life Cycle Assessment Based on Real-World Mileage**, Eckard Helmers, Johannes Dietz, Susanne Hartard, University of Applied Sciences Trier, Germany

14:40 – 15:00: **Life Cycle Assessment of a Plug-in Hybrid Electric Vehicle Operating in Fully-electric or Conventional Mode - Addressing Variability in the Electricity Mix**, Rita Garcia, Pedro Marques and Fausto Freire, University of Coimbra, Portugal

15:00 – 15:15: **IREC- SUNBATT Project: Second Life EV Batteries for Sustainable Batteries Waste Management**, Gabriela Benveniste, IREC - Catalonia Institute for Energy Research, ES

15:15 – 15:30: Discussion

15:30 – 16:00 Refreshment break

Stakeholder dialogue

16:00 – 17:00: **“Is LCA killing the electric car?” or “How to communicate LCA”** with EV stakeholders (government, automotive industry, NGO, e-mobility regions, electricity companies, LCA experts) tbc

17:00 – 17:30: **Summary and Outlook**, Gerfried Jungmeier, JOANNEUM RESEARCH, Austria

Registration and further Information

There is no registration fee for this Workshop.

Registration for the workshop: via e-mail to gerfried.jungmeier@joanneum.at

For further **information** please contact

Gerfried Jungmeier
Operating Agent of IEA HEV Task 19 „LCA of EVs“

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Hint:

On 9 – 10. Nov. 2015 “Eco-Mobility 2025plus” takes place in Vienna, which is an international conference with the aim to analyze trends in the development of advanced power train and vehicle technologies as well as energy carriers with the target to overcome barriers for their market introduction. Industry, R&D institutions and policy makers will discuss the potential of these technologies for a sustainable mobility system and the competitiveness of the vehicle industry and the energy sector. This year’s conference will have a focus on the latest A3PS Technology Roadmap on Advanced Thermodynamic and Electric Power Trains, Automated Vehicles as well as Renewable Energy Carriers in order to meet future emission and CO₂ targets.

Further information: www.a3ps.at/site/de/eco-mobility-2025plus

Task 19 “Life Cycle Assessment of Electric Vehicles”

Electric vehicles have the potential to substitute for conventional vehicles to contribute to the sustainable development of the transportation sector worldwide, for example, in the reduction of greenhouse gas (GHG) and particle emissions. There is international consensus that the improvement of the sustainability of electric vehicles can only be analysed on the basis of **life cycle assessment (LCA)**, which includes the production, operation, and the end-of-life treatment of the vehicles and the fuel cycle. All environmental impacts must include the whole value chain and - if relevant - interactions from recycling in the dismantling phase to the production phase, if recycled material is used to produce new vehicles.

Based on the LCA activities in the 18 IEA HEV member countries, the **main goals** are:

- Providing policy and decision makers with facts for decisions on EV-related issues
- Improving end-of-life management by identifying and promoting the best available technologies and practices
- Improving the design of vehicle and battery systems for optimal recyclability and minimal resource consumption
- Establishing a research platform for life cycle assessment including end-of-life management for EVs to augment the benefits and competitiveness of vehicles with an electric drive train.

The **main topics** addressed in the four-year working period (2012 – 2015) are:

- 1) LCA methodology (Workshop 1 in Braunschweig/Germany 2012))
- 2) Frequently asked questions on the environmental issues of EVs
- 3) Overview of international LCA studies in a database
- 4) Parameters influencing the energy demand of EVs
- 5) LCA aspects of battery and vehicle production (Workshop 2 Argonne/USA 2013)
- 6) Vehicle end-of-life management, e.g., recycling, or the reuse of batteries in stationary applications (Workshop 3 Davos/Switzerland 2013)
- 7) LCA aspects of electricity production, distribution, and vehicle battery charging (Workshop 4: Barcelona/Spain 2014)
- 8) Summarizing the further R&D demand

The main focus of Task 19 is on **Battery Electric Vehicles (BEV)** and **Plug-in Hybrid Electric Vehicles (PHEV)** for passenger cars. The **key LCA issues** that apply to EVs were identified and applied in various case studies. The following seven key categories were identified, evaluated and applied in “best practice” applications:

- 1) General issues,
- 2) Life cycle modelling approach,
- 3) Vehicle cycle (production – use – end of life),
- 4) Electricity production,
- 5) Inventory analysis,
- 6) Impact assessment
- 7) Reference system.

Operating Agent: Gerfried Jungmeier, JOANNEUM RESEARCH, Austria

www.ieahev.org/tasks/task-19-life-cycle-assessment-of-evs/