Electric cars can become more eco-friendly through life cycle assessment

October 12 2017

Anders Nordelöf believes that the much-discussed environmental issues associated with electric cars should be taken seriously, but thinks that more focus is needed on solving the issues -- not on discussing whether electric cars should exist at all. Here, life cycle assessment is an important tool. Credit: Ulrika Ernström

It is time to stop discussing whether electric cars are good or bad. Instead industry, authorities and policy-makers need to work together to make them as eco-friendly as possible. This is the view taken by Anders Nordelöf, a researcher at Chalmers University of Technology. In a recent thesis, he provides concrete advice and tools showing how life cycle assessment can assist in the development of electric cars.

Electric cars have been criticised in recent times due to their energy-intensive manufacturing processes and because they are currently charged using electricity which is partly produced from fossil fuels.

Anders Nordelöf, a researcher in environmental systems analysis at Chalmers University of Technology, is seeking a more future-oriented approach to the electric car. He thinks it is necessary to focus on solving the problems that arise in the transition to the new technology.

"We need to take the environmental problems with electric cars seriously, but we mustn't get caught up in the situation as it now stands. It's time to give up discussing whether the electric cars of today are good or bad, and start working together step-by-step to make them as good as possible from an environmental perspective," he says.

"Comparing electric cars with diesel or petrol driven vehicles is relevant, but not the most important issue - nor is it what will solve the problems in the long term. We know that fossil fuels have to be phased out, and the automotive industry has decided upon electrification. The most important thing then is to find the best way forward."

Nordelöf points out that the great strength of the electric car is in its potential. In a recent PhD thesis he gives clear advice to industry, policy-makers and authorities to work together to develop electric cars by making their production as fossil-free as possible.

"If we charge the car from a clean source of electricity and combine this with the lowest possible carbon dioxide emissions during production, then the electric car will be revolutionary. But we can't expect to find a ready-made solution immediately," he says.

He is providing key pieces of the puzzle to help progress the development of electric cars, and shows in his thesis how life cycle assessment, LCA, can be used to minimise their environmental impact in the long term.

The thesis contains details of specific tools, methodology recommendations and new models for collecting LCA data, which are aimed at anyone working on the development of electric-powered vehicles using life cycle assessment.

"The models fill important data gaps and allow relevant LCA studies to be carried out on electric powertrains. These studies can then be applied to many different types of vehicles. I've also compared the overall environmental impact from three different electric motors, and can therefore provide basic advice on how to design electric motors to produce as little environmental impact as possible," he says.

Nordelöf provides some technology advice for the automotive industry based on his research. He stresses that energy efficiency and greater production of electricity from renewables is the key to reducing the environmental impact of electric cars in the operational phase, globally.

"But it's also important to realise that the manufacture of components will make up an ever greater proportion of the electric car's environmental impact the further our developments progress, especially if you take a broader perspective than just greenhouse gases. There are major environmental challenges in the extraction of metals, placing many requirements on the supply chain," he says.

Nordelöf's study also contains a summary of what previous LCA studies had to say about the environmental impact of electric cars. He points out that the results are contradictory and disparate, while showing that this is mainly due to shortcomings in the design and reporting of the studies - since the choice of methodology, purpose and target group are not clearly presented.

"More rigorous reporting is required in the research field so as not to increase the confusion that already exists around the environmental impact of electric cars," he says.

Life cycle assessment (LCA) is a systems method that provides a holistic overview of a product's environmental impact over its life cycle from raw material extraction, through production processes and use, to waste management, including all transportation and energy consumption in the intermediate stages.

Provided by Chalmers University of Technology