Life cycle perspective in decision guidance documents

- Volvo Group's focus on improving energy efficiency in mobility

As a result of urbanisation there is an increasing demand for new transport solutions to reduce climate impact, since the transport emissions in large cities account for around 1.6 tonnes of CO2 per inhabitant per year.[1] By applying a life cycle perspective Volvo found that the biggest environmental impact from transport came during the use phase in the form of fuel consumption.[1] This was the basis for the development of electric vehicles in the Volvo Group.

Looking at products from a life cycle perspective has helped Volvo to implement changes in product development to reduce impacts specifically in the use phase. The first move towards electric vehicles is in urban traffic where the commercial and technical infrastructure is available.

1. WWF, Svenska kommuners koldioxidavtryck, 2010 http://www.wwf.se/source.php/1285817/Svenska%20kommuners%20koldioxidavtryck_FINAL_WWF-rapport_2010.pdf

Increasing urbanisation requires a more efficient and eco-friendly public transport system. Through life cycle assessments the Volvo Group has identified that electric power is most efficient by far from 'well to wheel', which was a key criterion for the choice of technology.

We met Lisbeth Dahllöf from the Volvo Group's life cycle team who explained more about this work:

- Our life cycle approach ensured that we focused on energy efficiency in the use phase early on. That led to the development of a hybrid vehicle that we could bring to the market with a fuel saving of up to 39%. A plug-in hybrid then followed, with an energy consumption that was up to 60% lower than a conventional powertrain. A fully electric bus with a fuel consumption up to 80% lower than that of a conventional powertrain comes out in 2017.

How does the Volvo Group apply the life cycle perspective?

- The life cycle perspective gives you a direction to work for so you know you're doing the right thing. We make sure to consider all the environmental aspects before making the decision to develop a product. Life cycle assessment is mainly used in product planning and product development.

"The life cycle perspective gives you a direction to work for..."

What do you consider to be the biggest motivators for intensifying the life cycle approach in your organisation?

- They are commercial in the first place, but society is also changing and we need to be well prepared and keep one step ahead. There's more and more talk about the increasing scarcity of resources and about the greenhouse effect creating problems for society.

What is the key to success when applying a life cycle approach?

- Developing tools and training, using indexes and setting environmental targets. Targets are essential because they really make things happen.

What information did you obtain by applying the life cycle perspective?

- We've realised that scarce raw materials are crucial and that these materials should be recirculated in the technological loop. It's evident from life cycle assessments that energy efficiency is the most important area for heavy vehicles.

Do you have a concrete example of a change that has led to reduced environmental impact thanks to your life cycle perspective?

- Life cycle assessments have shown that electric power is superior to other powertrains if the electric power is produced efficiently and in an environmentally sustainable way.

How do you apply the life cycle perspective in this case?

- We have calculated the energy efficiency and carried out general life cycle assessments on batteries. We carry out a life cycle assessment if a technology is completely new, and when faced with a choice of technology. The assessment allows us to fine-tune the environmentally damaging aspect of the design. It is iterative work, with life cycle assessments continuing throughout the project to monitor and improve on the environmental performance. For example, in order to predict the environmental impact of electric buses, it's necessary to analyse different ways of generating electricity, depending on where in the world the bus will be used.

What tools and methods have you used in your focus on the life cycle perspective?

- We have applied Environmental Priority Strategies (EPS), characterisation methods in life cycle assessments, GaBi and DfX. We have developed a simplified life cycle assessment for product development ourselves in Excel. We publish life cycle assessment studies and have carried out an environmental impact assessment and FMEA (impact checklist) from cradle to grave.

We have also carried out a qualitative environmental assessment which takes legislation and Volvo's requirements into account. We have worked with Design for Recycling and are in the process of developing an eco design.

Did you call upon in-house or external expertise?

- Both. We have often called upon the expertise available from Swedish Life Cycle Center. We have collaborated with several players on the electric bus. We have carried out research projects on the environmental impact of batteries, financed by the government and the EU. The electric bus involves a collaboration between the Volvo Group, Chalmers, Göteborg Energi and the bus operator Keolis.

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What is the reason for applying a life cycle perspective in this example?

- In this case, we wanted to learn about the environmental impact of electric power.

Why is this a good and inspiring example?

- It's a really good basis for making a decision, as it makes the environmental aspects more visible. You can obtain competitive advantages by choosing the right technology at the right time.

Which target group do you think could learn from the example?

- Anyone who is interested in life cycle assessments and wants a guide to environmental impact.

What results have been achieved?

- The greatest benefit is that electric buses consume up to 80% less energy. The electricity used produces almost no emissions of carbon dioxide into the atmosphere, and generates much lower noise levels and no exhaust emissions.

Electric buses meet the need for a quieter environment in cities, and can even be driven indoors. KPMG has analysed the costs and benefits to society from electric buses. Another benefit is that the bus is quiet inside, thus improving the drivers' working environment.

Another conclusion is that electric buses will be used for longer since there is no reason to switch to a better technology in the foreseeable future. It's important for the scarce materials in the battery to be recyclable.

What tips would you give to others who want to launch or further develop their own efforts to apply a life cycle perspective?

- Start by focusing on the areas which have a significant environmental impact and which you can do something about in the near future.

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This article is part of the project entitled: Good examples – Inspiration for energy efficiency through the entire value chain, which was carried out with funding from the Swedish Energy Agency. You can find out about additional examples of applied life cycle thinking, read more about the Volvo Group's work on climate change or learn more about the life cycle perspective via these links:

Volvo Group's work on climate change
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