

Better results from applying a life cycle perspective

- Klimatkalkyl, a tool for calculating the climate impact and energy consumption of infrastructure

In 2014, domestic transport (all modes of transport) accounted for 33% of greenhouse gas emissions in Sweden. At a rough estimate the construction, operation and maintenance of the road infrastructure accounts for just over 10% of overall greenhouse gas emissions and just under 30% of the road transport energy consumption from a system perspective.¹

In this example, the Swedish Transport Administration explains how the life cycle perspective can assist in the decision-making process, since the tool it commissioned WSP to develop, Klimatkalkyl, provides a more complete report on climate impact. This is because Klimatkalkyl includes construction and its upstream emissions as well as future operation and maintenance.

1. Kunskapsunderlag och Klimatscenario för Energieffektivisering och Begränsad klimatpåverkan by the Swedish Transport Administration, publication 2014:137 (only in Swedish)

The Swedish Transport Administration is an agency responsible for the long-term planning of all modes of transport and for the construction, operation and maintenance of state roads and railways. In line with the national plan for the Swedish Transport System for 2014-2025,² any improvements to the transport system are to be tested on a step-by-step basis to make sure that resources are well managed and that the action taken will contribute to the sustainable development of society. Following on from this work a tool, Klimatkalkyl, has been developed that will have an impact on a significant element of the Swedish Transport Administration's activities from early planning and design work to the construction phase and maintenance.

To find out more about the Swedish Transport Administration's application of the life cycle perspective and Klimatkalkyl, we met Hanna Eklöf, investigator of climate and energy issues at the Swedish Transport Administration.

What does applying a life cycle perspective mean for you?

- Applying a life cycle perspective involves looking further ahead and not just thinking in the 'here and now'. You need to adopt a life cycle approach when working long-term on sustainability issues.

“You need to adopt a life cycle approach when working long-term on sustainability issues.”

How did you come to be involved with the life cycle perspective?

- The life cycle perspective often involves making both climate-based and financial savings. We want to find savings whether large or small, avoid sub-optimal outcomes and arrive at a more logical assessment. The government wants the Swedish Transport Administration

to account for emissions from construction and maintenance. In the past there was no model available that took a holistic approach to this, dealing with it from a life cycle perspective.

What are the advantages of applying a life cycle perspective?

- It provides a more complete and logical record of our impact from construction, operation and maintenance. The life cycle perspective often involves making both climate-based and financial savings, because it means thinking in the 'now' as well as backwards and forwards. As a result decisions made from a life cycle perspective are well-founded ones. We avoid unpleasant surprises in the form of climate impacts and management and maintenance costs. It helps us to find the most efficient measures.

What is Klimatkalkyl?

- Klimatkalkyl is a model which efficiently and consistently calculates the energy consumption and climate impact created by the transport infrastructure from a life cycle perspective. The tool is intended to reduce the overall climate impact and costs from a life cycle perspective by reducing the climate impact throughout the management stage. This is a tool that can help the decision-making process in relation to new constructions, and allow comparisons to be made between different locations, for example. However, the energy consumption and emissions of the actual traffic are not included. It has been decided in the Swedish Transport Administration that all investments exceeding SEK 50 million are to be calculated using Klimatkalkyl before a decision is made, but in the long term we may also apply it to smaller projects. Since Klimatkalkyl also includes future operation and maintenance costs, this will reduce the risk of a sub-optimal outcome at the construction stage. We can make smart decisions and optimise our climate change performance from a life cycle perspective by ensuring a more consistent assessment.

2. National Plan for the Swedish Transport System for 2014-2025 – Summary and references, Swedish Transport Administration, 2014 (in Swedish only)

How can Klimatkalkyl be used?

- The model can be used to carry out climate calculations on individual investment items and on parts of investment items. It can also be used as a tool for efficiently and systematically applying climate and energy efficiency improvements to infrastructure life cycle management. A limited version of the model is available on the Swedish Transport Administration's website so that other companies and authorities such as municipalities that own roads can also make use of the tool.

Why is this an inspiring example?

- Since all the Swedish Transport Administration's projects affect society as a whole, this tool has great potential to influence Sweden's emissions and energy consumption. The Swedish Transport Administration has the goal of making a 15% reduction in its climate impact from construction and maintenance by 2020 and 30% by 2025 (both compared with 2015).² The Klimatkalkyl model is extremely easy to use. We already have the input data we need, since it is based on the same data as the project costings. There are different levels to the model in which you can start by making rough estimates and then enter more specific data as the project develops."

"We can make smart decisions and optimise our climate change performance by applying a life cycle perspective."

How did you develop Klimatkalkyl?

- Klimatkalkyl was commissioned by the Swedish Transport Administration and developed by WSP. WSP collected the data and built the tool itself. They complied with the ISO standards for life cycle assessments.

Which parts of the life cycle have you worked on in Klimatkalkyl?

- We included everything from the extraction of raw materials to the use phase. Dismantling and waste management are not yet included, but their inclusion is planned for the future.

What benefit can the tool provide?

- The benefit of Klimatkalkyl is the data it provides to improve the decision-making process, since the infrastructure-related energy consumption and climate impact are included in this data. The tool also provides an option to identify and assess the effectiveness of energy and climate efficiency measures on infrastructure life cycle management. Klimatkalkyl provides a more complete statement, since the tool helps to provide a more comprehensive account of the energy consumption

and climate impact of the transport sector.

How has the life cycle perspective advanced environmental issues?

- In the long term we can see that applying a systematic and logical life cycle perspective will enable us to reduce the climate impact from our facilities. Since Klimatkalkyl also includes future operation and maintenance, this will reduce the risk of a sub-optimal outcome at the construction stage. We can make smart decisions and optimise our climate change performance by applying a life cycle perspective.

Who or what got the work started?

- Klimatkalkyl is a tool that has been long awaited, but the work began in the Swedish Transport Administration's environmental section as a result of a preliminary study. The environmental section, along with operation and maintenance, the investment operation, purchasing, environmental specialists and project managers have been involved in the work.

Have there been any challenges involved in developing Klimatkalkyl?

- We have had to adjust the terminology so that it corresponds to the terms that economists use. It has also been hard to interpret the results, such as the difference between different options.

What is your main obstacle to intensifying your life cycle approach?

- One obstacle is that we have different interfaces in the different tools that we use in our assessment of outcomes. An example of this is when we work on cost benefit analyses (CBA), which are not life cycle assessments. It can be difficult to compare the results and weigh them up to reach a conclusion. The fact that it is more complex than just dealing with the here and now is another obstacle. Different stakeholders are responsible for the costs at different stages of the life cycle. Those responsible for construction may optimise from the perspective of the building stage and not in terms of future maintenance and waste management.

What tips would you give to others who want to launch or further develop their own efforts to reduce the climate and/or environmental impact in their organisation?

- Think about where you can make the most impact. Is it through technology or through a change in behaviour? How can you work on these two aspects? The most important items are identified in the preliminary study, before building the model. Focus on making it simple and user friendly. Remember that Excel may be adequate for your purposes. It is important to create a simple tool that employees can make use of.

In addition to the example above on the use of Klimatkalkyl the Swedish Transport Administration also applies the life cycle perspective to the requirements set for dangerous substances in chemical products. Knowledge gained from life cycle assessments is used in decision-making data such as that used for an innovation procurement for wooden sleepers, evaluation of deer fences, use of nanomaterials and monitoring of the share of the transport infrastructure in relation to other sectors of society.

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