Klimatkalkyl
– a model for climate impact calculations of transport infrastructure

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Our tasks

• To be responsible for the long-term planning of the transport system for road, rail, shipping and aviation
• To be responsible for the construction, operation and maintenance of State owned roads and railways

Our Vision
Everybody arrives smoothly, the green and safe way.
Scope of presentation

- The importance of assessing energy use and greenhouse gas emissions in the infrastructure planning, design and construction process
- Klimatkalkyl - a model for calculating energy use and CO₂-emissions of transport infrastructure in an efficient and consistent way
- Benefits from climate calculations in infrastructure projects
Aim – an energy-efficient transport system

Planning and design process

Construction

Minimizing energy use and climate impact in a life cycle perspective

Use/operation

Reinvestments/waste management

Maintanence
Background and aim

• Enable calculations of CO$_2$ emissions and energy use in a consistent and efficient way
• Integrate climate impact in decision making
• Reduce CO$_2$ emissions and energy use from transport infrastructure
• Follow up and report results of implemented measures

Can be used for individual investment projects, for parts of investment projects or for a whole investment plan
Klimatkalkyl = Quantifying CO\textsubscript{2}-emissions and energy use in a life cycle perspective

- According to ISO 14041:2006
- For each activity quantifying in- and outflow
"Klimatkalkyl", a model for transport infrastructure LCA with focus on energy use and CO₂-emissions

- Compare alternative routings in a project
- Identify hotspots – what contributes most to energy use and climate impact in a project
- Analyze how different measures affect energy use and climate impact – work with improvements
- Follow up climate and energy performance

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\text{CO}_2\text{-emissions} = \text{Emission factors} \times \text{Project specific data for material and energy resources}
\]
Climate assessment of the National transport plan 2014-2025
-CO₂ emissions from investment-projects

Total impact of the investment-projects of the transport plan: 3,8 Mton CO₂ equivalents
East Link Project

- Sweden’s first high-speed railway for trains running at up to 320 kilometres per hour.
- Total emission: 615 000 tonnes CO₂ eqv.
- Supplementary investigation on alternative routes through Linköping
E4 The Stockholm bypass

- A new route for the European highway (E4) past the Swedish capital.
- 18 km out of 21 km of the link are in tunnels.
- Requirement on action plan from the Government.
Work procedure in Stockholm bypass

Climate calculation

Action Plan
- Measure 1 – xx kg CO₂
- Measure 2 – xx kg CO₂
- ----
- ----

Workshops

Climate calculation
Results klimatkalkyl Stockholm bypass

Construction:
570 000 tonnes CO2-eqv.
7 000 000 GJ

Operation:
1 000 – 90 000 tonnes CO2-eqv/year
200 000 GJ/year
Efficiency potential during construction

10 % reduction of greenhouse gas emission gives -57 000 tonnes CO₂-eqv

HOW?
• Concrete with 7 % less ”Carbon Footprint”: -14 000 tonnes CO₂, about 2,5 %
• 10 % less concrete and reinforcing bars: -17 000 tonnes CO₂, about 3 %
• Reinforcing bars with about half carbon footprint : -18 000 tonnes CO₂, about 3 %
• Construction steel with 30 % less carbon footprint: -11 000 tonnes CO₂, about 2 %
• 20 % less diesel: -20 000 tonnes CO₂, about 3,5 %
Procurement requirements

• Requirements for the implementation of the contract.
• The contractor shall make climate calculations for its proposed solution, as a baseline for the follow-up of the efficiency improvements.
• Requirement of 10% reduction of climate gas emissions compared to the baseline
• Continuous follow-up of the efficiency improvements
• Climate calculations should be performed based on Trafikverkets model for climate calculation.
• Efficiency improvements through choice of materials should be substantiated with an Environmental Product Declaration (EPD), or equivalent
• The contractor shall present the final climate and energy performance of the contract through compilation of a climate declaration.
The Bothnia Line - EPDs for railway transports

Eight EPDs covering railway infrastructure and railway transports
http://www.environdec.com/en/Articles/EPD/EPDs-for-railway-transports/
Thank you for your attention!

More information on website: www.trafikverket.se/klimatkalkyl

Including report in english:

Klimatkalkyl version 3.0 – model for calculating energy use and greenhouse gas emissions of transport infrastructure from a life cycle perspective,

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