Implementation of life cycle thinking in planning and procurement

TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION

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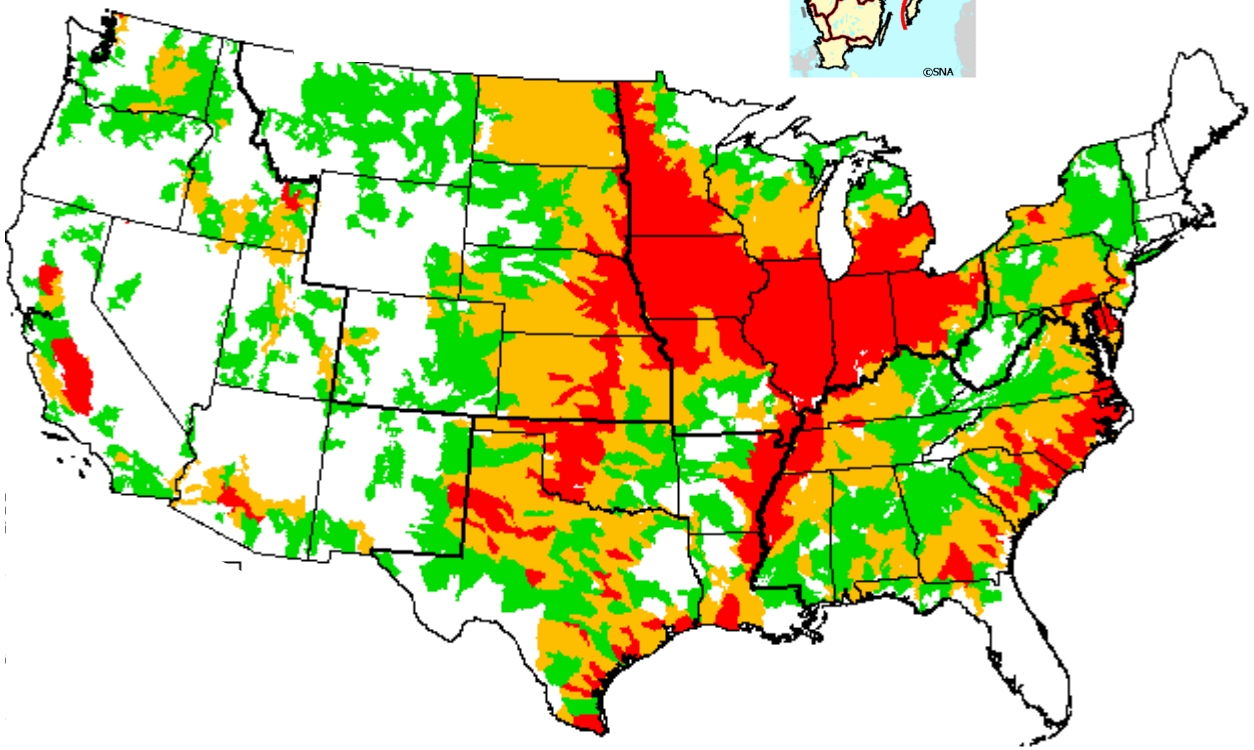
Comparison USA-Sweden (latitude and scale)

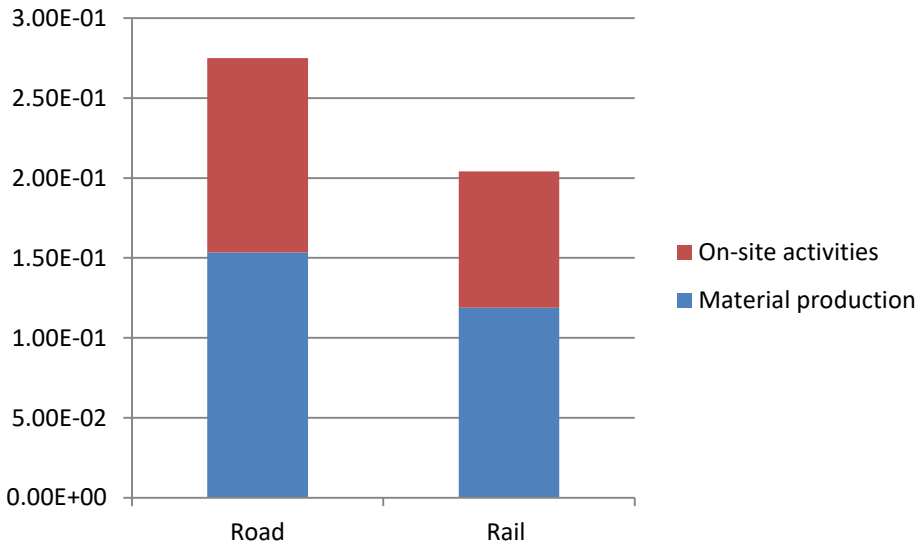
98.500 km of state roads
14.000 km of state owned railway line



How can we achieve a transport infrastructure that meets the goal for GHG emissions (0 net emissions by 2050 and 15% decrease in GHG by 2020)?

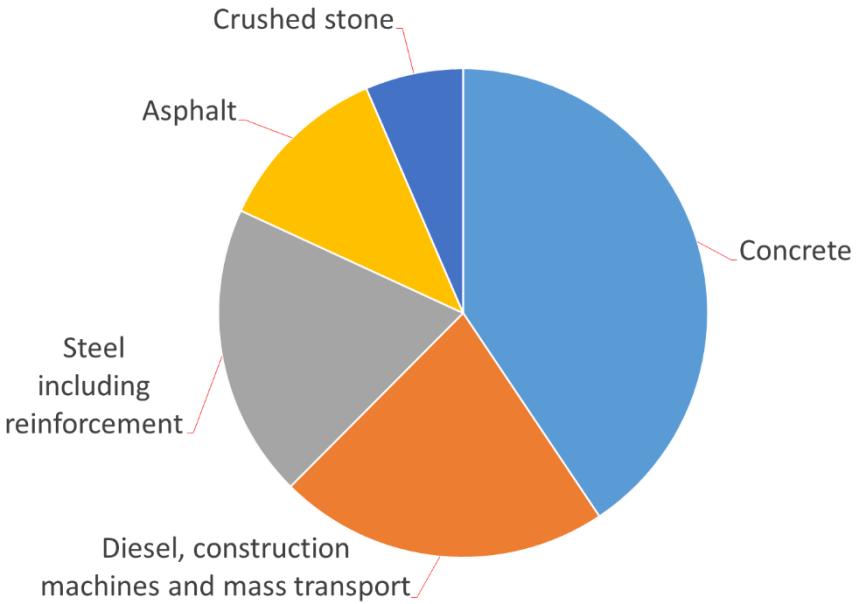
The importance of applying a life cycle perspective

New construction of state owned roads and railways in Sweden 2015, cradle to gate (Mton CO2/year)



Liljenström, Toller, Åkerman and Björklund 2017, Royal institute of Technology (KTH)

GHG emission from material in road construction

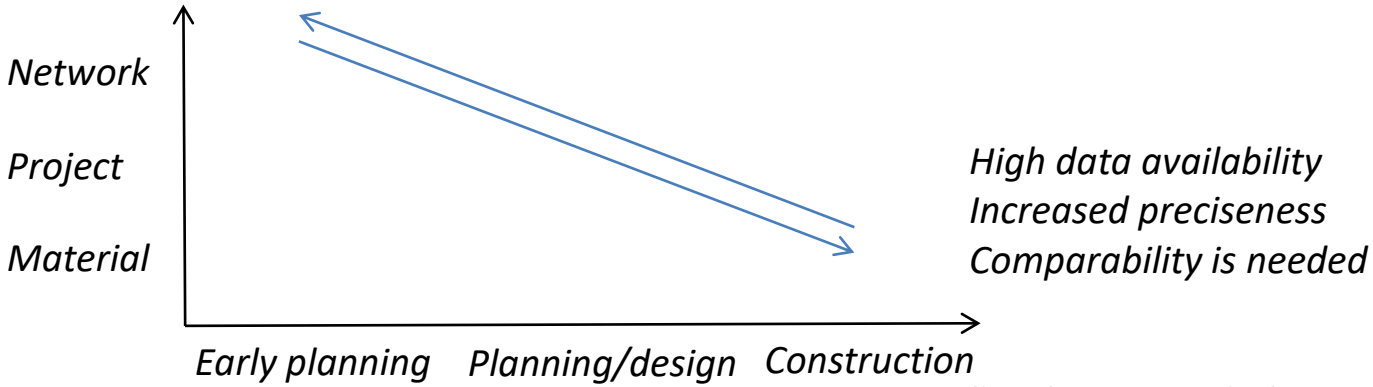


Environmental assessment of the Swedish national transport plan 2014-2025 (2013)

From having life cycle knowledge to practice life cycle thinking

- LCA can support decisions at different system levels and in different stages within the planning process
- LCA can be performed as a case study that is generalised, or it can be applied to each specific project
  - But if we want to create incentives for innovative solutions, avoid sub-opimisation, and enable more accurate follow up, life cycle thinking needs to be implemented in each project

Low data availability, High uncertainties
"Hot spots" can be identified



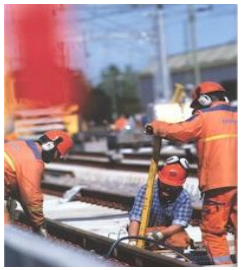
Life cycle assessment for the green procurement of roads: a way forward (Butt, Toller and Birgisson 2015). Journal of Cleaner production

The climate calculation model ”Klimatkalkyl”

- A model that enables us to efficiently and consistently calculate life cycle energy use and greenhouse gas emissions from transport infrastructure
- Easy to use – no expert competence and no data inventory is needed (default values are provided)
- It can be applied for different purposes – identify improvement measures, define requirements and follow up
- A unique design, can be used in both early planning and in later stages, and it can be applied on different system levels
- Energy use and greenhouse gas emissions are calculated based
  - Use of resources (default or project specific)
  - Backround LCA data (default or product specific)

Planning

Design



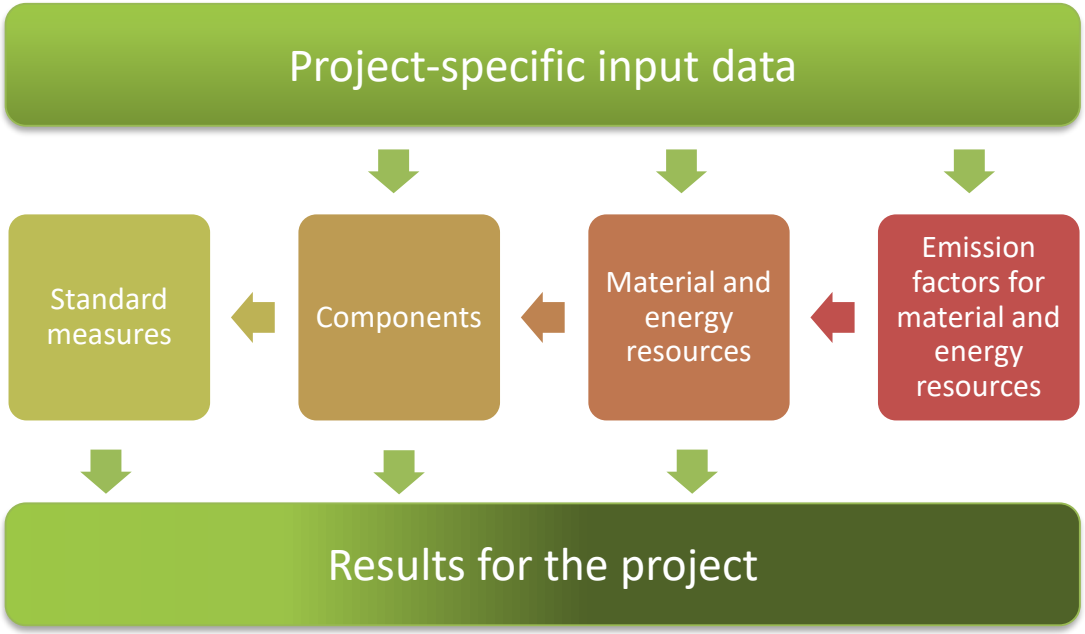
Construction

Maintenance/ operation

Reinvestments/ demolition

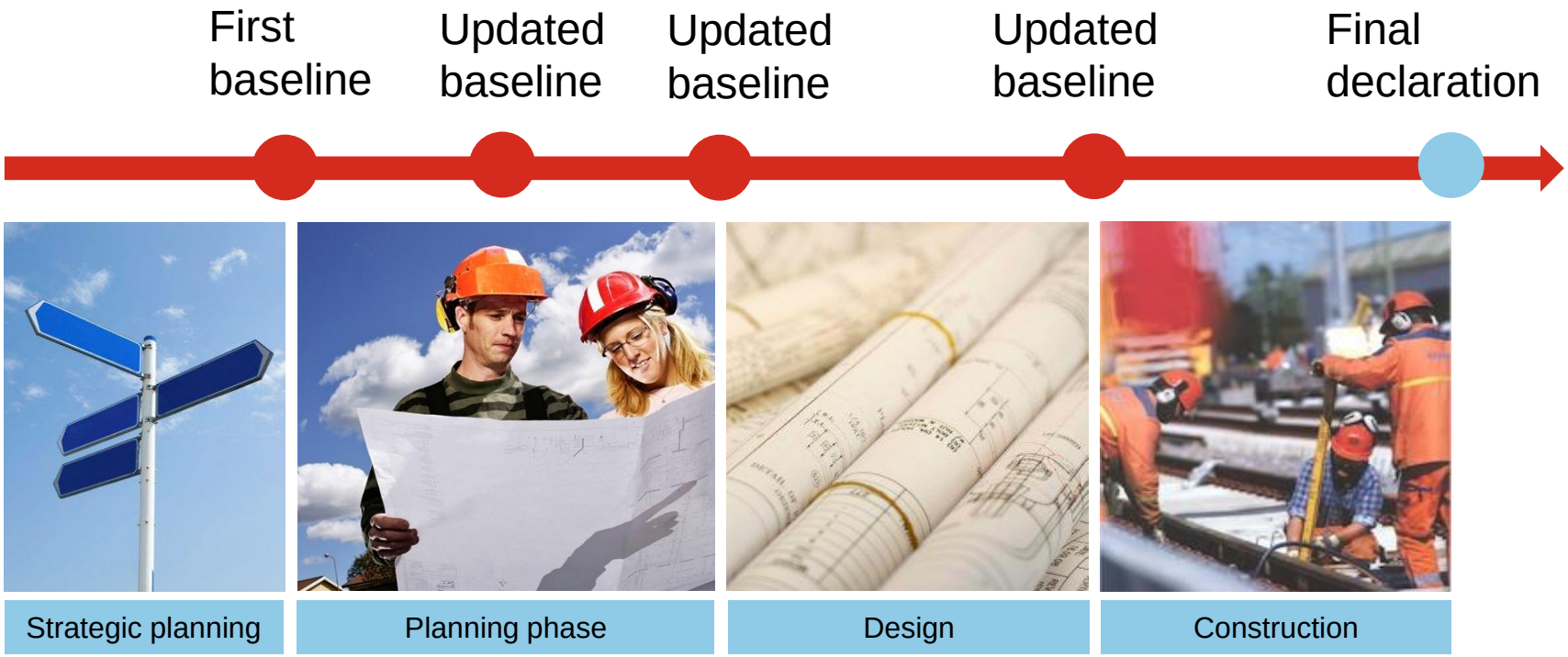
Implementation in planning and procurement

- Pay items are the building blocks
- The precision increases as more information about the specific project is available (going from default values to project specific values)

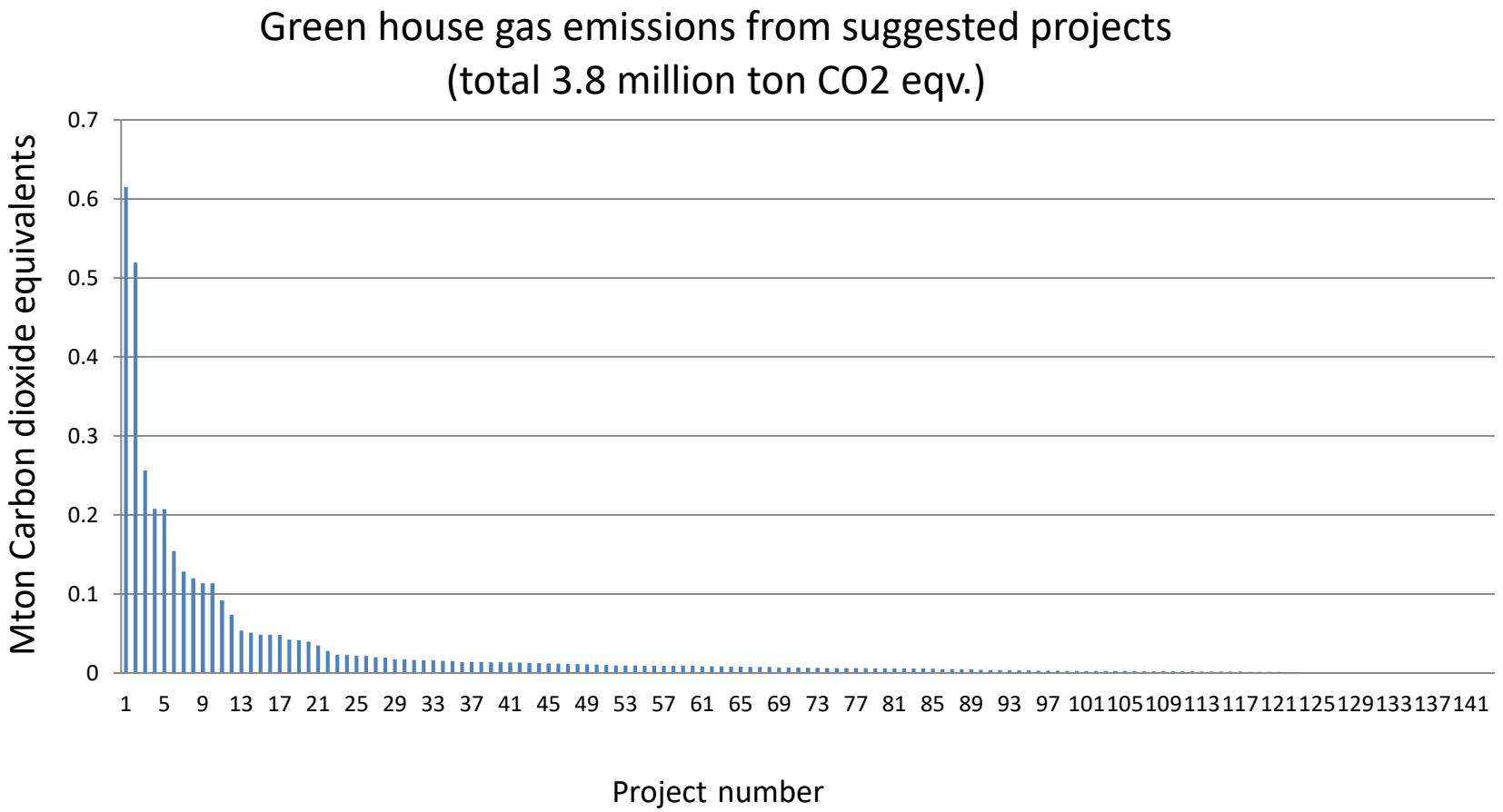


Implementation in planning and procurement

- The climate calculation follows the project from early planning to finalized construction

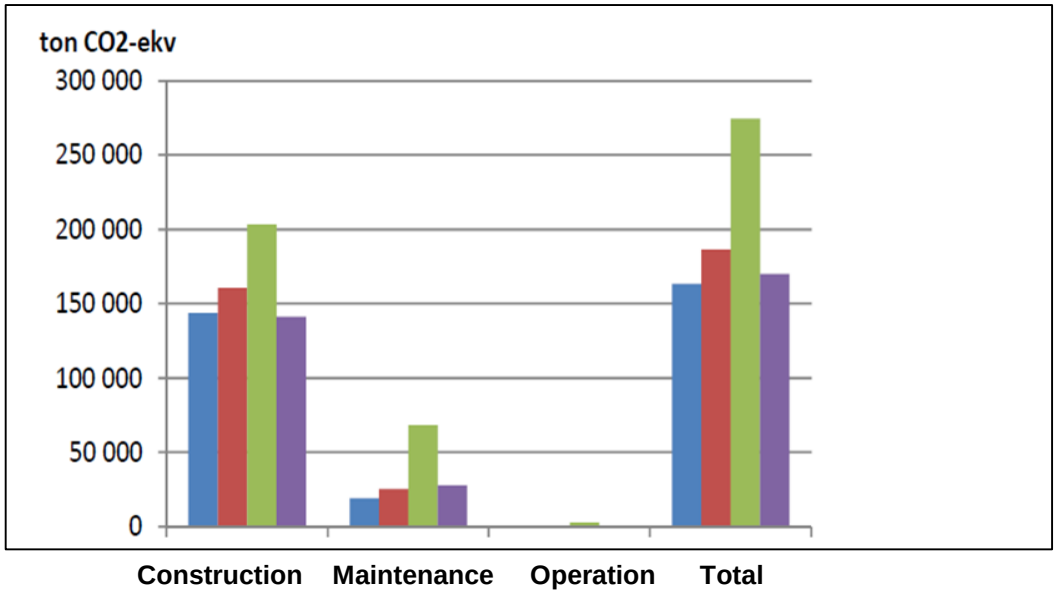


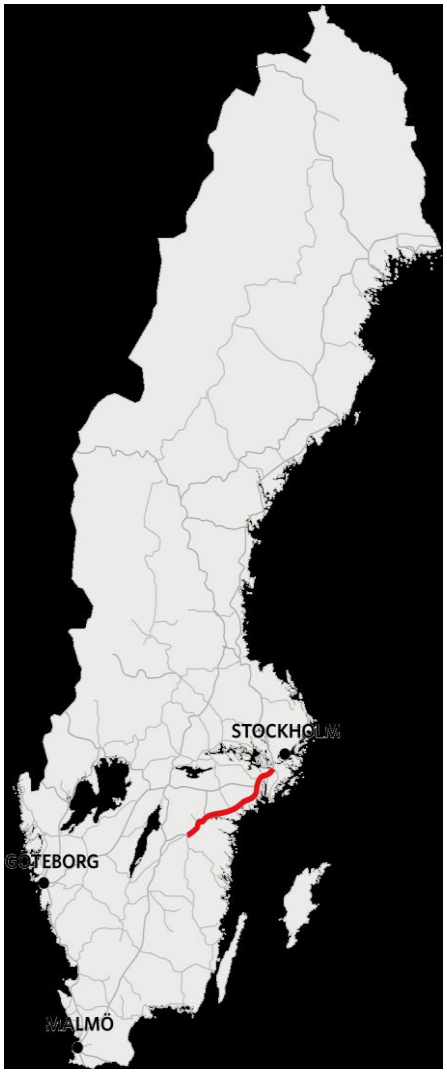
Example: LCA-based assessment of suggested projects within the Swedish transport plan 2014-2025



Example: Improving climate performance within planning, example East Link Project

- Sweden's first high-speed railway for trains running up to 320 km per hour
- Supplementary investigation on alternative routes through Linköping





Improving climate performance through requirements in procurement, example E4 Stockholm bypass

- A new route for the European highway (E4) passing Stockholm
- 18 km out of 21 km of the link are tunnels
- 10% reduction of emissions were achieved:
  - Reduced amount of concrete and reinforcing bars
  - Reduced amount of diesel
  - Concrete with less emissions
  - Reinforcing bars with less emissions
  - Construction steel with less emissions

Further work

- Climate requirements on maintenance contracts for a region
- Better coverage of material transportation
- Utilise the possibilities for exchange of data with other system
- Possibilies to include project specific data on future reinvestments and maintenance – method for verification is needed!
- Cover the interaction material-traffic

Summary

- Life cycle thinking is necessary in order to meet our environmental goals, and it needs to be applied to projects on a broad scale (not only as case study knowledge)
- Methodological choices needs to be clearly defined and consistently applied for the different types of decision situations
- Through our climate calculation model, life cycle thinking is now implemented in all our larger projects, and used both in planning and procurement