SWEDISH LIFE CYCLE CENTER

hosted by the Swedish Life Cycle Center & arranged within the project Innovation cluster for the life cycle perspective in collaboration with KTH Sustainability Office

Welcome to the webinar

Applying life cycle thinking when assessing climate impact of the Swedish transport system

2021-03-10, 13.00-14.15

Carolina Liljenström, KTH, Anna Björklund, KTH & Susanna Toller, Trafikverket

Information and guidelines

MUTE YOUR MICROPHONE

QUESTIONS AFTER THE PRESENTATIONS

PRESENTATION CAN BE FOUND HERE: HTTPS://WWW.LIFECYCLECENTER.SE/EVENTS/

RECORDING WILL BE AVAILABLE ON YOUTUBE

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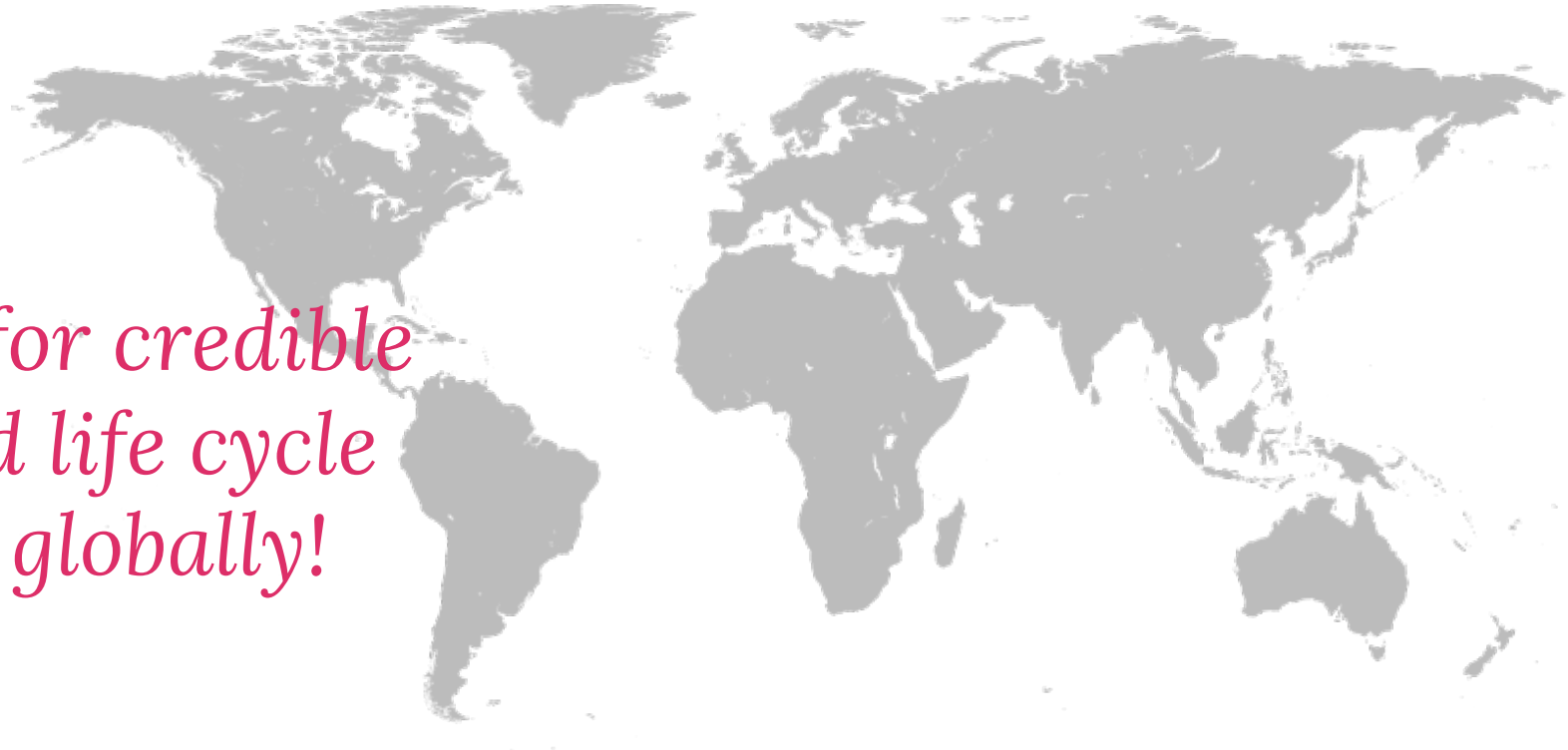
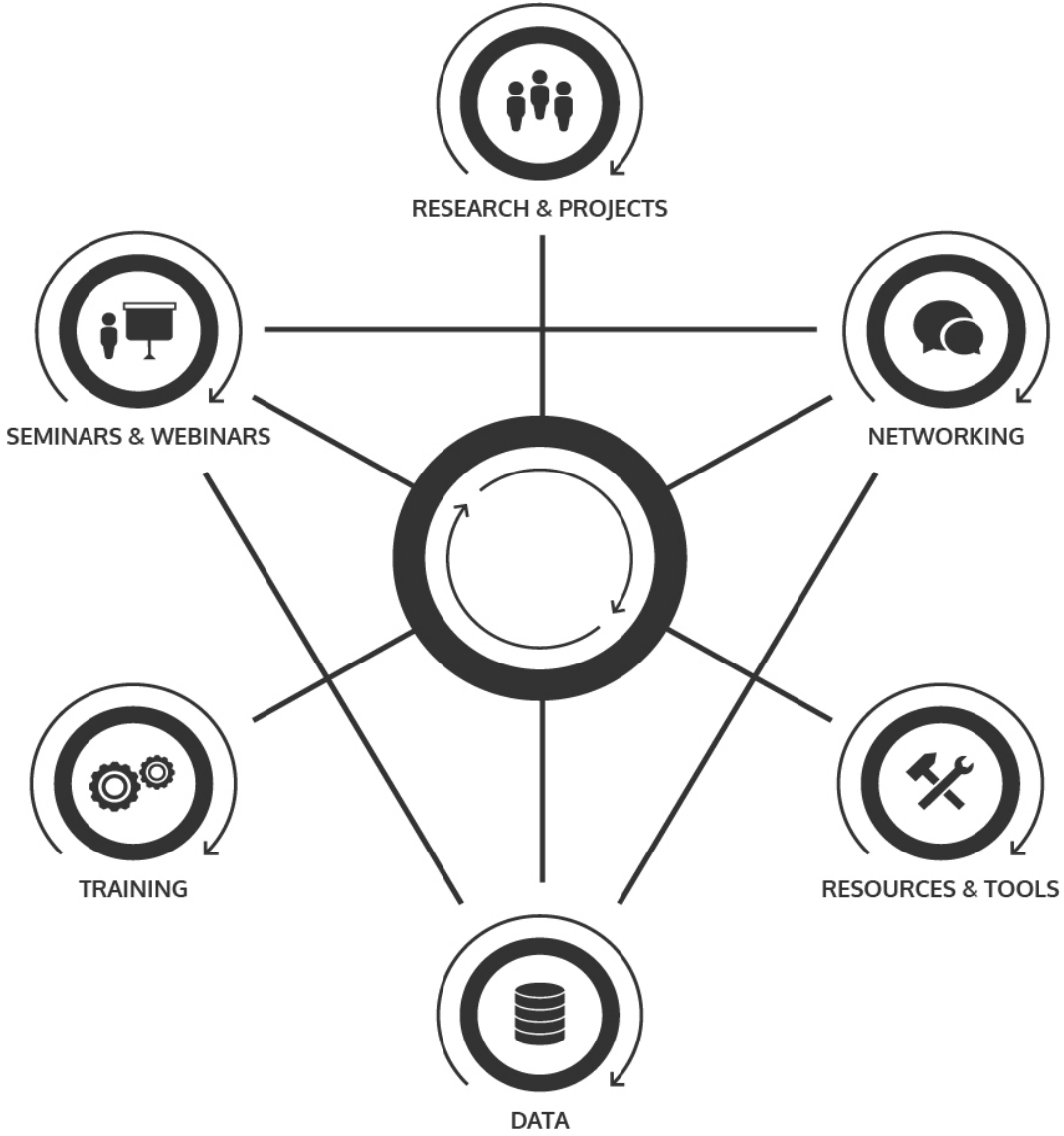


We aim for credible & applied life cycle thinking globally!

A partner driven center

14 partners and 7 government agencies in collaboration


RESEARCH & PROJECTS
SEMINARS & WEBINARS
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DATA

Course in Applied Life Cycle Thinking
20-21 april, Online

The life cycle perspective, understanding the environmental impacts of a product or service throughout the value chain, is gaining increased importance. In this popular two-day course, you will get a deeper understanding on how to apply life cycle thinking in your organization, through real cases and proven methods.

Course: Applied Life Cycle Thinking
Date: April 20-21, 2021
Location: Online
Price: 11 500 SEK ex. VAT (Partners get a 20% discount)
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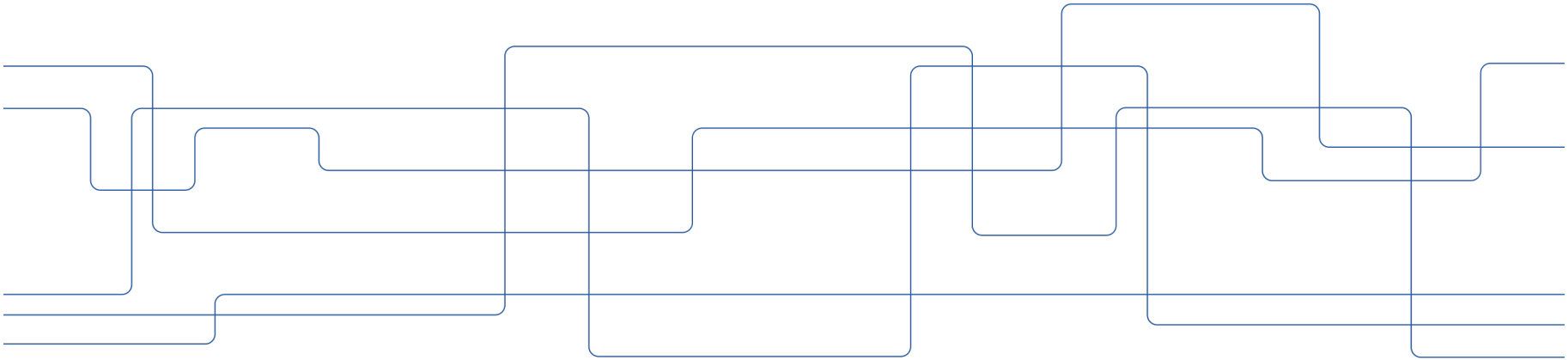
KTH ROYAL INSTITUTE OF TECHNOLOGY

Applying life cycle thinking when assessing climate impact of the Swedish transport system

Collaboration between KTH and the Swedish Transport Administration



Carolina Liljenström

PhD student

Dept. of Sustainable development, environmental science and engineering (SEED), KTH Royal Institute of Technology

Susanna Toller

PhD co-supervisor

LCA expert, Swedish Transport Administration

Affiliated faculty, SEED, KTH

Anna Björklund

PhD supervisor

Associate professor, SEED, KTH

Project funded by Swedish Energy Administration

Continuation on-going, funded by Mistra

Aim of the research project

Aim: assess the current climate impact and primary energy use of the Swedish transport sector from a life cycle perspective

- What are the hotspots?
- Size of impacts?

Two studies:

- Annual impacts of Swedish transport infrastructure (road, rail, air, sea)
- Annual impacts of the whole Swedish transport system (road, rail, air, sea)
  - Infrastructure, vehicles, fuel
  - Swedish transport needs worldwide

Focus on transport systems at a network level

Transport system:

- Enabling transport between two locations
- Infrastructure, vehicles, fuel

System boundaries at different levels:

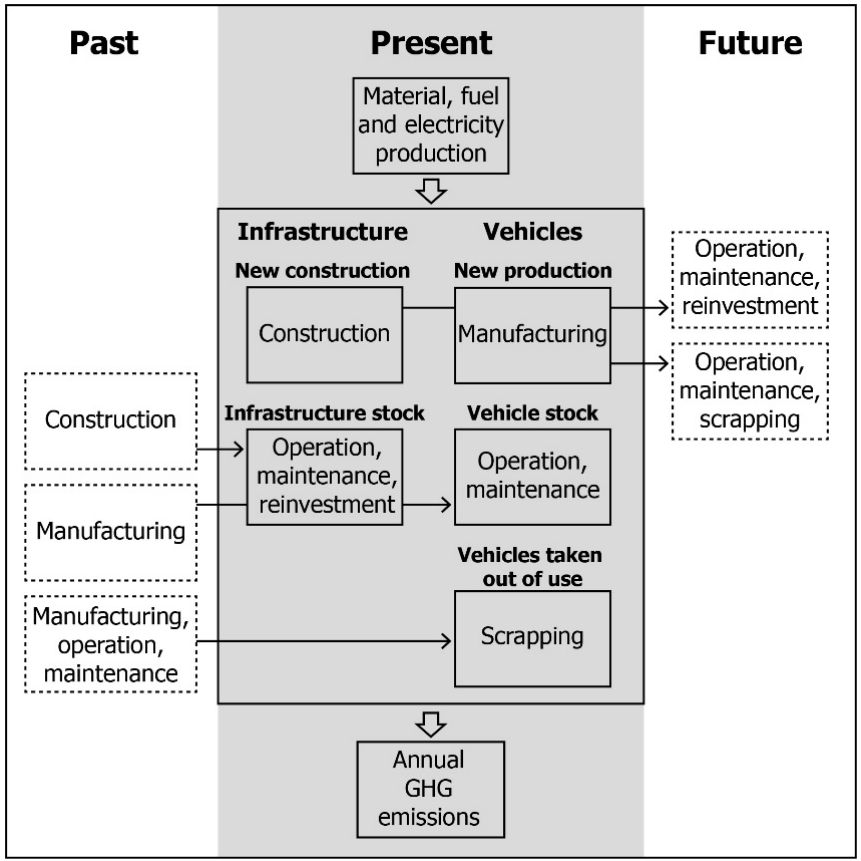
- Project level: a specific construction project
- Network level: several construction projects ← focus of the studies

Unique properties of transport systems

- Long durability
- No clear end-of-life
- Life cycle stages spread out in time
- Components have different life lengths

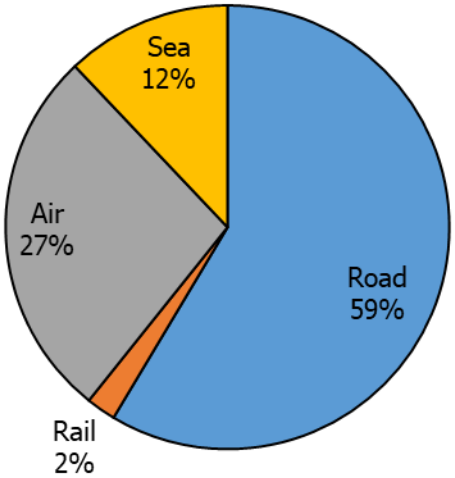
How can annual impacts be calculated?

The approach that we used



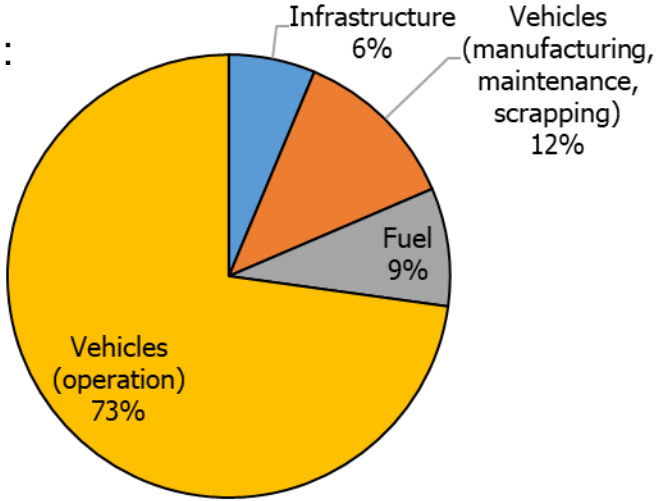
Results of the research project

Total impacts: 46 million tonne CO_2 equivalents



The different transport modes

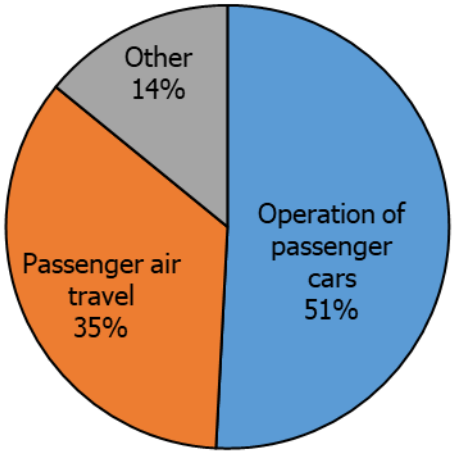
Share of impacts from:



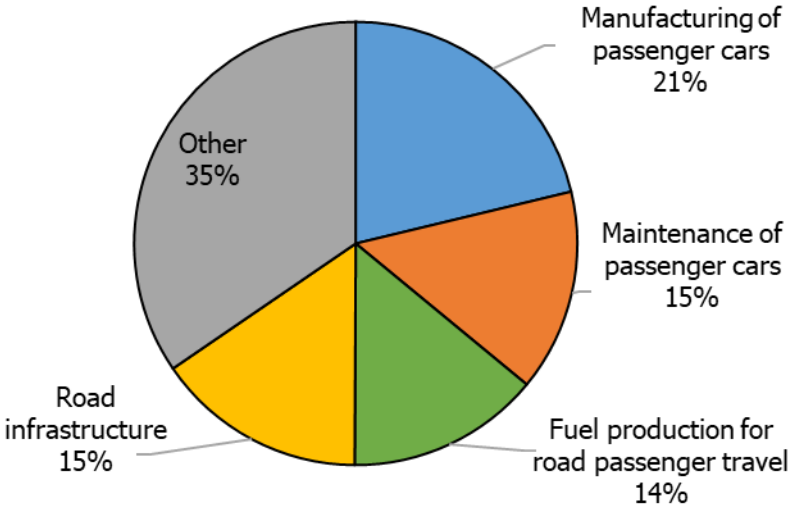
Direct and indirect aspects

Results of the research project

Contribution to direct and indirect impacts



Direct impacts



Indirect impacts

Collaboration with the Swedish Transport Administration

- Relevant research questions
- Motivation
- Data collection
  - Where should I start looking
  - Incentive for others to provide data

Applying life cycle thinking when assessing climate impact of the Swedish transport system - lessons learned from the cooperation with KTH

Susanna Toller
The Swedish Transport Administration, Trafikverket

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The Swedish Transport Administration (Trafikverket)

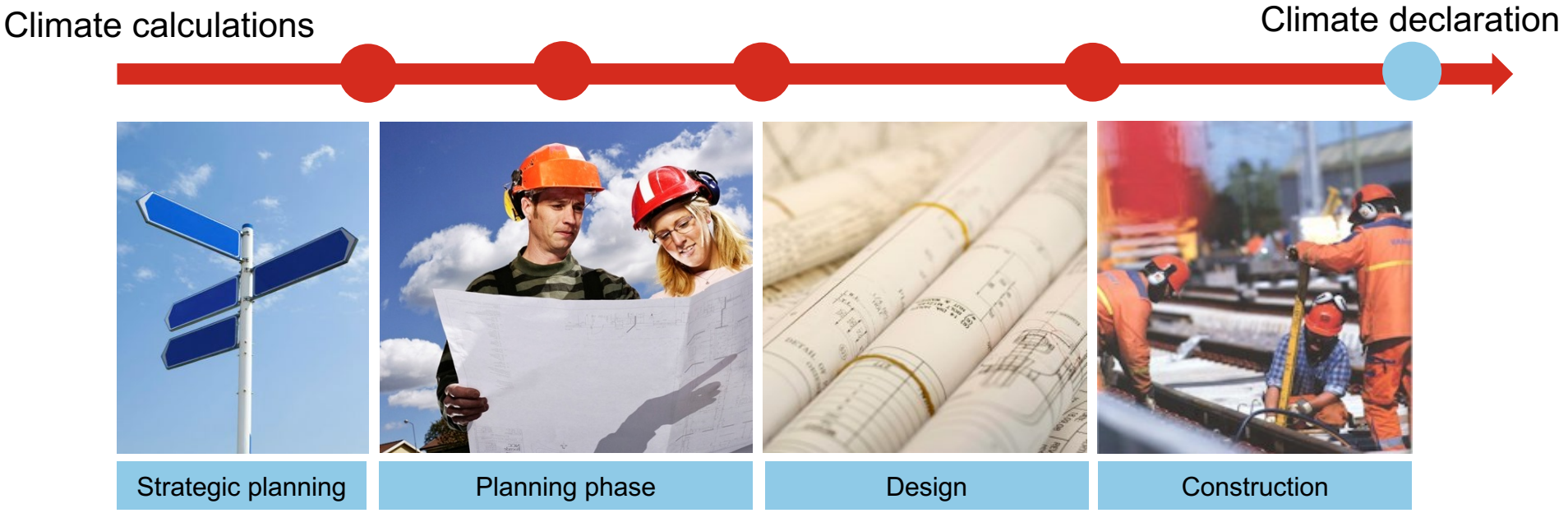
Responsibility:

- Long-term planning of the traffic system (road and rail transport, shipping and aviation)
- The construction, operation and maintenance of State roads and railways

Goal: A climate neutral transport infrastructure 2045

From goals to action

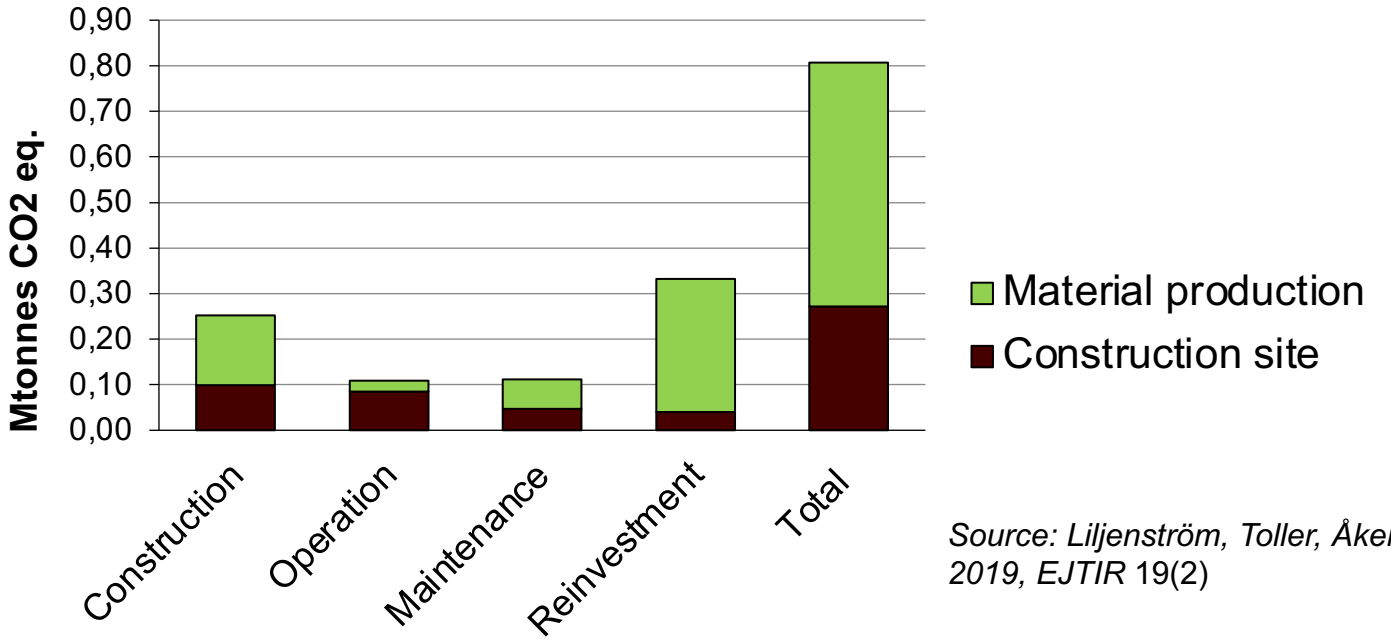
- Implementation of climate calculation model – Klimatkalkyl from 2015. Energy use and greenhouse gas emissions are calculated based on Use of resources and Background LCA data (default data available).
- Climate requirements in planning and procurement. There are requirements for whole project performance and for some selected materials.



Monitoring is a key

- We need to know the emissions today and we need to be able to follow up the effect of improvement measures
- Applying a life cycle perspective is necessary - the goal cannot be met without decreased emissions from material production

Annual direct and indirect emissions (Mton CO2 eq.) from construction, operation and maintenance of state owned roads:



Source: Liljenström, Toller, Åkerman and Björklund 2019, EJTIR 19(2)

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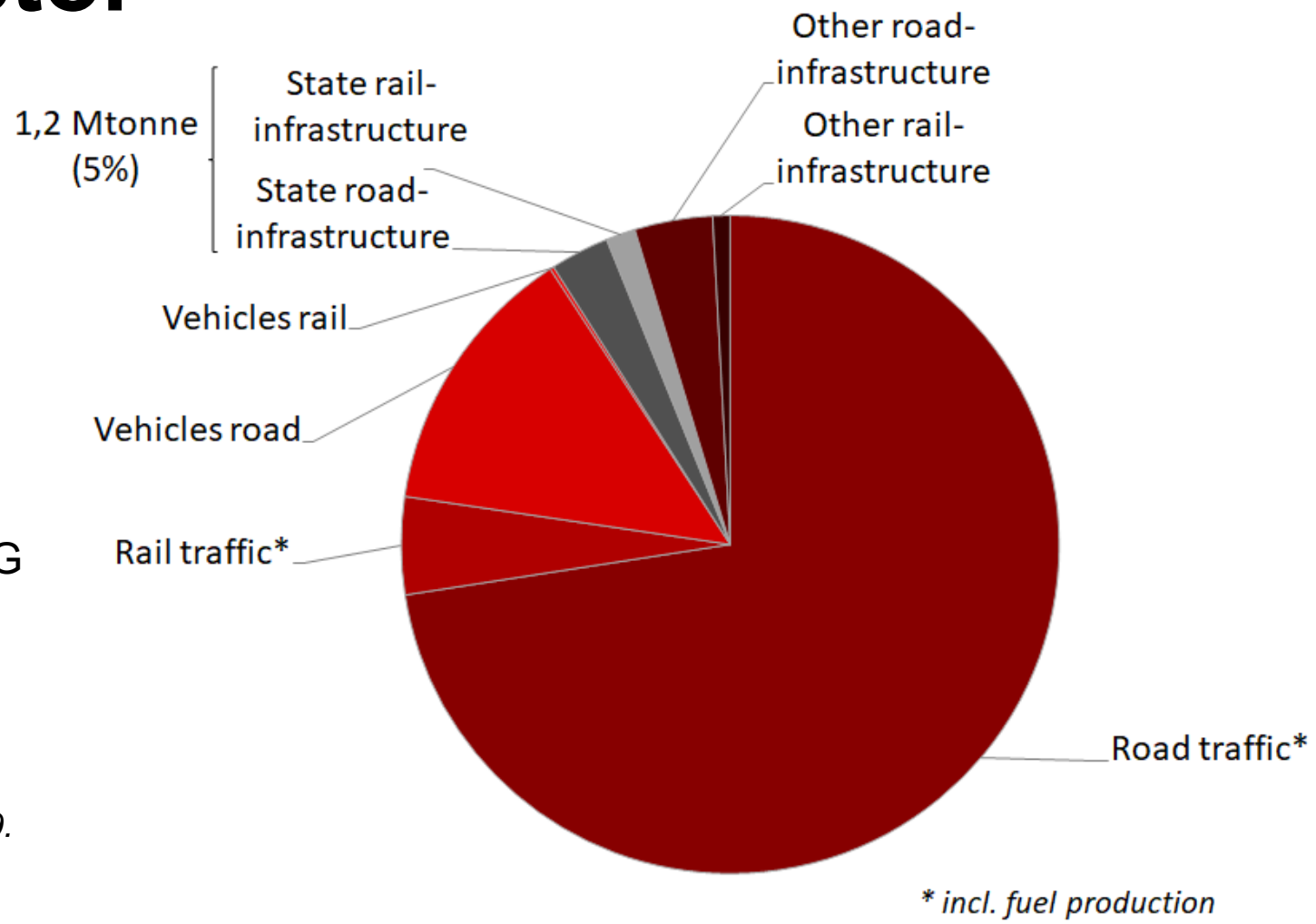
Road and rail sector
in Sweden

Lifecycle emissions

(consumption based emissions)

27 million tonnes CO2e per year 2015

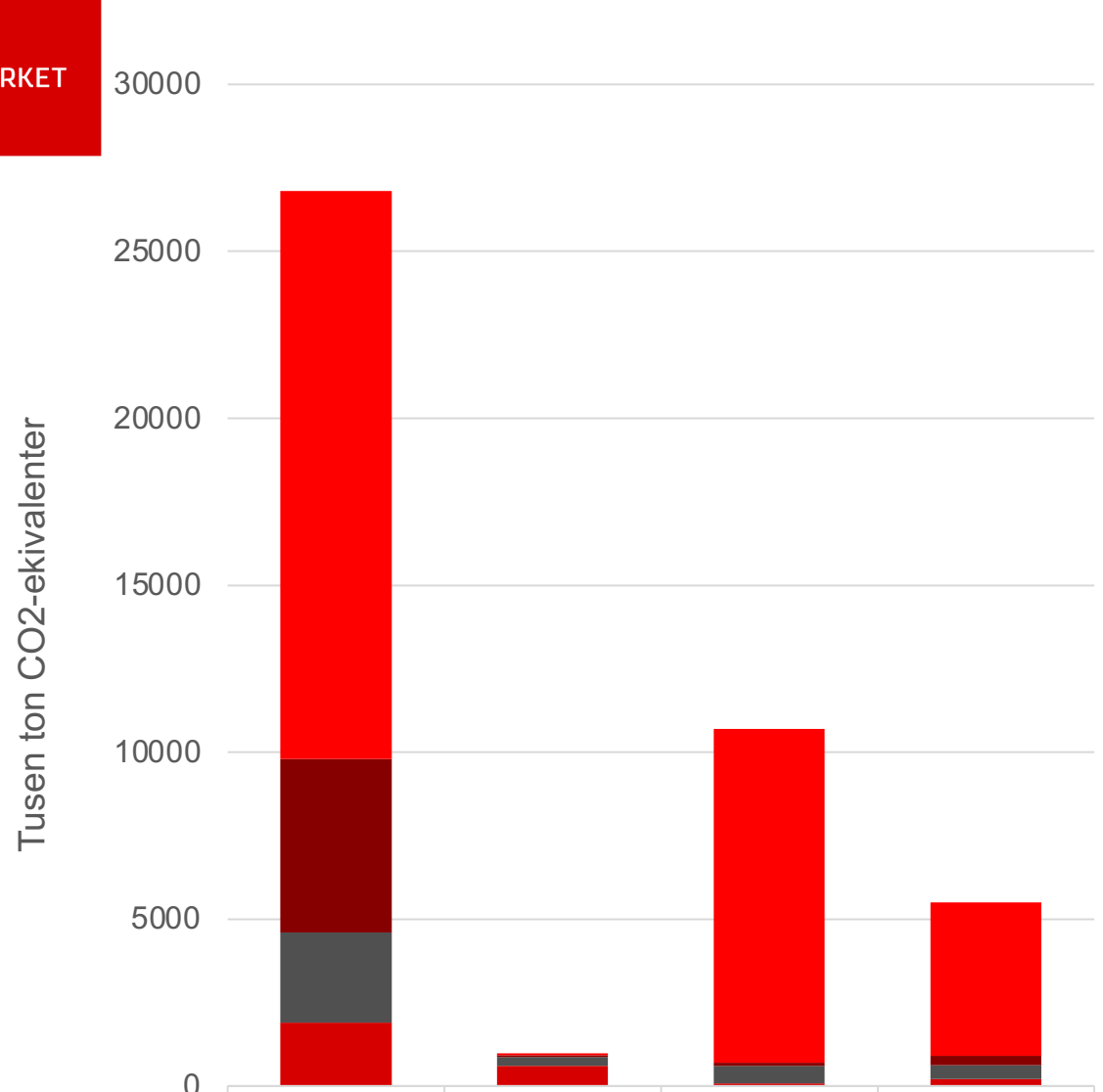
State own infrastructure 5 percent of GHG



Source: Liljeström C. 2018 and Liljeström et.al. 2019.

Transport system

Climate impact* (kton CO2 eqv.) from transport infrastructure, fuel and vehicles in the swedish transport system 2015.



	Väg	Järnväg	Luftfart	Sjöfart
Fordon: drift	17 000	53	10 000	4 600
Fordon: tillverkning, underhåll, skrotning	5 200	59	97	270
Drivmedel: produktion	2 700	250	530	410
Infrastruktur: byggande, drift, underhåll, reinvestering	1 900	610	77	220

**Climate impact is calculated based on consumtion perspective for the swedish population (including travelling and freight transports). Impact from air traffic and includes the high altitude effect.*

Source: Liljeström C. 2021

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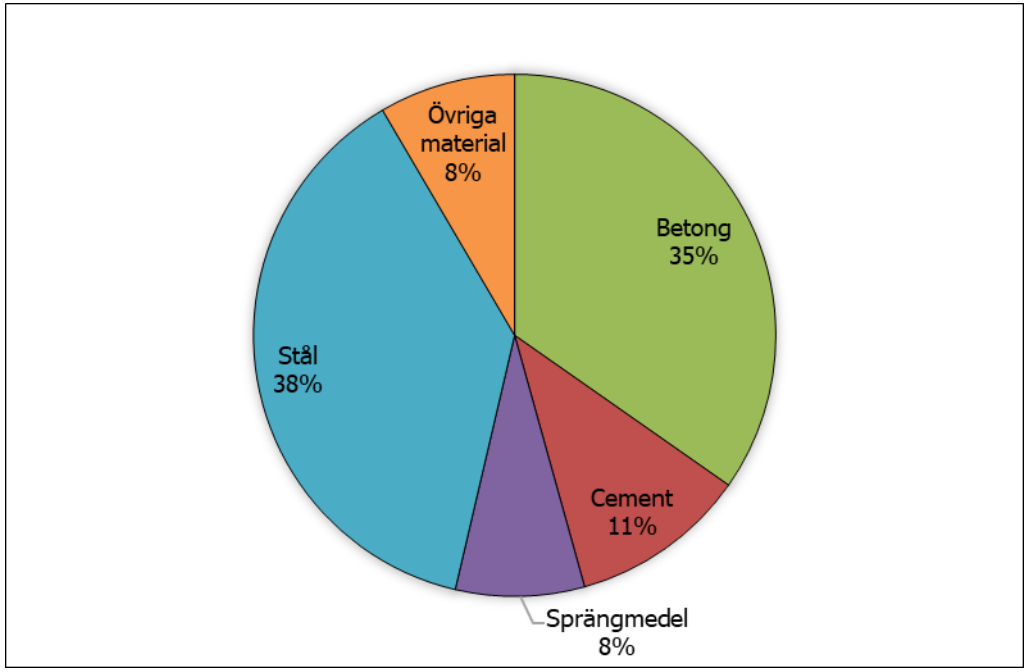
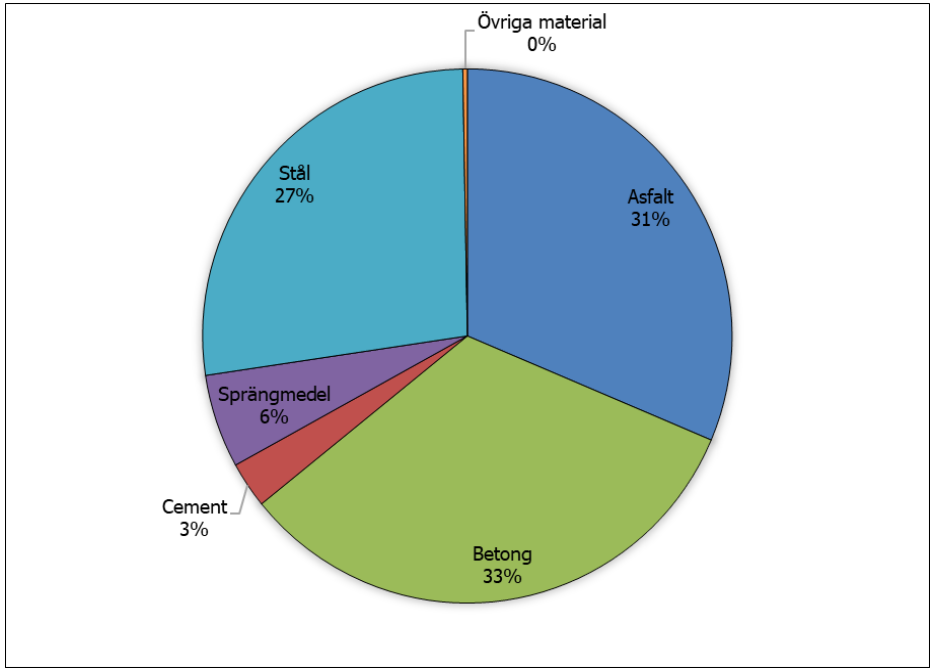
Contribution from different types of material to the annual climate impact

State owned railways (projects >50MSEK, steel includes reinformement steel used in concrete)



State owned roads (projects >50MSEK, steel includes reinformement steel used in concrete)



Source: Liljenström, Toller, Åkerman and Björklund 2019, EJTIR 19(2)

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Questions that have been answered through the project

- What is the annual contribution from the Swedish transport infrastucture to greenhouse gas emissions?
- What is the relation between emissions from construction, use and maintenance?
- What is the relation between different transport modes?
- How much of the greenhouse gas emissions is derived from material production and how much from the work at the construction site
- Which materials contributes most?

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The results from the project have given us a solid basis for decision support

- Climate assessment of the national transport plan 2018-2029
- Design relevant climate requirements to be used in procurement
- A better understanding on how LCA can be applied on transport infrastructure
  - Robust basis for following up and for performing scenario analyses
  - Increased quality in our climate calculation model, used both in planning and procurement

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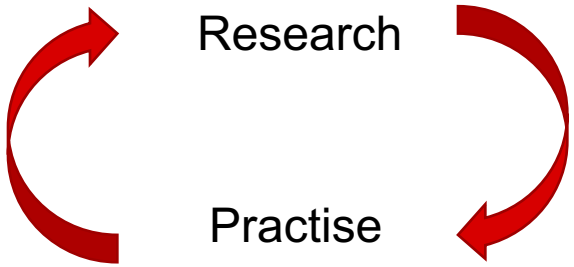
Reflections on the cooperation

- Communication has been a key to success, but also a challenge - important to set aside enough time, to establish a joint terminology and to understand each others standpoints
- Benefits on different levels:
  - Inspiration, motivation and increased knowledge individually
  - Increased knowledge about the climate impact from the transport system and a better basis for different type of decisions within the Swedish Transport Administration
  - Contribution to the loop between research and implementation

Identify relevant research questions for investigation



Impementation - utilise the research results as decision support

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Thank you for your attention!

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Phone: + 46 70-724 61 75

Further information (mainly in swedish):

http://www.trafikverket.se/klimatkalkyl

https://www.trafikverket.se/for-dig-i-branschen/miljo---for-dig-i-branschen/energi-och-klimat/klimatkrav/

QUESTIONS?

THANK YOU

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