



Nordic research collaboration

Project plan

Project name:	Life Cycle Analysis tools to assess climate impact of road building
A.K.A:	NordLCA
Project owners:	Norwegian Public Roads Administration, Swedish Transport Administration, Finnish Transport Agency

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PLEASE CONSIDER THIS WHEN YOU WRITE YOUR PROJECT PLAN ...

Make sure to identify and involve the owners/end users of the project results from the beginning of the project

The challenge(s) and solution(s) your project tries to solve and make must be accepted by the end users of the results in advance of the project start...

If the project goals or anticipated results change during the project, they should be accepted by the end users as they occur

Consider if an implementation plan and budget is needed – if so, specify it in the project plan and in the budget

When necessary implementation should be a separate working package in the budget

Please name the [NVF group\(s\)](#) that is relevant for your project in the dissemination chapter

Please send a copy of your project plan to the relevant [NVF group\(s\)](#)

Please inform the relevant [NVF group\(s\)](#) about your results once they are ready

Present your results to the [NVF group\(s\)](#) when your project is finished

1. DOCUMENT INFORMATION

1.1 TITLE AND STATUS

Project name:	Life Cycle Analysis tools to assess climate impact of road building
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	Name	Date
Author(s):	Bob Hamel (N)	24.01.17
	Bob Hamel, Åsa Lindgren (S), Arto Hovi (F)	Rev 1: 01.02.17
	Bob Hamel, Åsa Lindgren, Arto Hovi	Rev 2: 09.02.17
Approved by (NordFoU member):		

2. SUMMARY – BACKGROUND, PURPOSE AND USE OF THE PROJECT.

Norwegian Public Roads Administration (NPRA) in Norway, Swedish Transport Administration and Finnish Transport Agency (FTA) proposed a new NordFoU project on LCA tools for assessing climate impact of road building. We need to introduce more focus on climate in road building and in our contracts.

Reduction of climate impact is highly prioritized and need methods and tools that help good decisions and choices through all processes from planning to designing and construction further to operation and maintenance. Existing tools have different background in their development because of aim. They stand well alone but would gain of cross-linking.

The Nordic countries have largely similar conditions in terms of road construction, raw materials and machinery. We therefore wish to further develop and link the respective Nordic tools, and create national adaptations.

Possible applications of the tools are:

- Environmental budget to be used by NRA internally
- Tender procedures (requirement or award criterion)
- Accounting for environment after/during construction

For early project stages, we need tools to consider the environmental impact of road projects and to compare various road alternatives. At these stages decisions are made that have large impacts on emissions. Efforts in early stages may save time and money in later stages.

For late project stages, we need tools to be able to compare different contractors, and to enable contractors to see how various measures affect the climate impact. The contractors are often Nordic and work across borders, so it would be useful if road authorities and contractors can use the same tools, regardless of what country they operate in.

In-house developed late-stage-tools meet comments from contractors on how models are constructed, their system boundaries, emission data, and transparency. A recurring view is that it is difficult for them to present their inventions and proposed solutions because these "cannot be squeezed into our models". A solution is to adapt existing tools according to existing standards for LCA (ISO and EN). Another way to present climate performance is with an EPD (Environmental Product Declaration). An EPD can be costly to produce and thus might limit the small players to compete on equal terms. This will change the more EPDs produced. There are also opinions on that climate impact no longer can be handled as a single environmental issue. Another upcoming challenge is to present GHG or LCA data digitally in e.g. BIM-systems (Building Information Models). Circular economy is another theme which might have impact on this project.

In this project, more knowledge about the tools will be obtained, e.g.:

- do they lead to other choices making climate impact benefits?
- can they serve as tools in public procurement?
- can data sets and information be exchanged and transferred in a chain of different actors (client, designer, contractor, material producer)?

The project will be of interest also for other (Nordic) countries that want to reduce greenhouse gas emissions. The project will be linked to NVF group Environment (Miljø). In addition, the project partners will use their international relationships and contacts to create further value to the project.

The project is proposed as a three year project in the period 2017-2019 with the participation of countries funding the project. Norway has agreed to assume the role as leading country.

3. CONTENT OF THE PROJECT

3.1 EXISTING KNOWLEDGE

Existing knowledge is to be found in existing tools in Norway, Sweden, Finland and other countries.

For early project stages (planning), STA has developed Klimatkalkyl for monitoring CO₂ in projects and Geokalkyl which provides information on cut and fill masses and reinforcement methods. NPRA uses EFFEKT, which is well used in the organization.

- EFFEKT includes climate impact in cost-benefit analysis as basis for choice of alternatives of investment projects and measures.
- SEB (samlad effektbedömning) is similar and includes that a climate calculation (according to the model Klimatkalkyl, see under) shall be presented. The climate calculation is revised throughout the project phases and for larger projects ends with a climate declaration after finalizing the project.

- Geokalkyl is GIS-based and include soil and elevation data to optimize placing of road corridor and segments in the terrain and geometrical design. It serves in early stages and design phase.

In the field of LCA, FTA has conducted the following projects:

- 2011 Carbon footprint of construction, operation and maintenance of roads and railways: 100-year LCA emissions for whole road and rail network (PAS 2050 standard, BSI 2008)
- 2012 Carbon Footprint of construction, operation and maintenance of waterways and traffic: 100-year LCA emissions for shipping ports and fairways plus traffic emissions for road, rail and waterways (PAS 2050 standard, BSI 2008).
- 2014-2016 GHG calculations of the Kivikontie interchange: EN 15978 based GHG calculations (calibrating the calculation method by three different calculations, before and after construction).
- Model based CO₂-emission and cost control – Case Pissararata (railway tunnel): Data of costs, scheduling and CO₂ emissions was integrated into combination model based on information models from different fields of technology.

For late project stages (designing, contracting and constructing), STA has developed EKA and Klimatkalkyl (which is used in both early and late stages). NPRA has developed VegLCA.

- EKA calculates CO₂ emissions from asphalt production. EKA is the most detailed and defined tool and is developed in cooperation with contractors.
- The Klimatkalkyl model will be used for setting a starting position and for follow up in contracts where reduction requirements are set. For Swedish investment projects larger than 5.4 M€ the reduction goal is 15 % on average (from 2015 to 2020).
- VegLCA is similar to Klimatkalkyl. It is developed to be used in late project stages (designing, contracting and constructing) and may contribute to climate accounting, tendering procedures and setting climate budgets.
VegLCA has a broader scope than EKA (f.e. earthworks), but is too rough to be used for asphalt works.

In addition, inspiration for improvement and adjustment can be found in several models developed in European (CEDR) relationship with Norway, Sweden and Denmark as participants.

3.2 GENERAL DESCRIPTION OF THE PROJECT

LCA and LCA tools are relatively new themes, which have become more important lately. The Nordic NRA's have had different ways of development, which has led to different actual situations.

It would be easy to define many relevant project activities to learn from each other and to improve and link the tools. More difficult would be to prioritize these activities in advance, as status, advantages and disadvantages are not well known.

The project will therefore have a start phase in which a state of the art will be written, which will have focus on comparing the different tools, define strengths and scopes, and define missing knowledge and links. The state of the art will be the basis to decide on further activities.

Further activities can for example be: translation of existing tools, adapting tools to conditions in the various countries, adapting tools to ISO standards, linking LCA-tools with BIM, linking LCA-tools with LCC, making light versions of the tools (very user

friendly and 80% correct), using the tools to demonstrate the potential of LCA in general cases, and so on.

The various railways organizations have LCA-tools also. It would therefore be obvious to involve railways to a certain degree in the project as well. The role of railways has not been defined yet. This will be done in the start phase of the project.

During and after the start phase the project will decide to which degree emphasis will be laid on early stage and late stage tools.

The project will try to involve students for suitable tasks.

3.3 DESCRIPTION OF THE MAIN GOALS AND TASKS IN THE PROJECT (INCL DELIVERABLES)

The main goal of the project is to improve existing LCA tools and make more efficient use of these tools.

We aim to get:

- Better, more universal and more applicable LCA-tools
- Better understanding for scopes of application of the various LCA-tools
- Common ground for green public procurement criteria

Tasks:

- P1: State-of-the-art (describing existing tools and define the strengths and scope of application)
- P2: Assessment of possible activities mentioned below
- P3: Translation of tools and reports (most likely)
- P4: Adaptation of existing tools to the conditions in the various countries (most likely)
- P5: Application of ISO and EN standards and data quality criteria (most likely)
- P6-Pn (to be decided):
 - Synergies of tools?
 - Making more use of EPD's in the tools?
 - Linking LCA-tools with BIM?
 - Linking LCA-tools with LCC?
 - Making light versions of the tools (very user friendly and 80% correct)?
 - Using the tools to demonstrate the potential of LCA in general cases?
 - Other?
- Dissemination: see 3.6 and 3.7

3.4 ANTICIPATED EFFECTS OF THE PROJECT

See: main goals.

SUCCESS CRITERIA'S OF THE PROJECT

3.5 RESULTS AND USE

The project will provide an important contribution to the goals set in 3.3. The results of the project will have a significant benefit beyond the project lifetime.

3.6 IMPLEMENTATION OF THE PROJECT RESULTS

- Testing in actual projects
- Incorporation in NRA's guidelines and handbooks
- Courses, presentations, seminars, conferences
- Nordic branch meetings /workshops

3.7 DISSEMINATION OF THE PROJECT RESULTS

Dissemination is considered as part of implementation (see 3.6)

The project will be linked to NVF group Environment (Miljø).

4. MILESTONES AND DELIVERABLES

Activities		2017				2018				2019				2020			
Main tasks																	
P1	State-of-the-art																
P2	Assessment																
P3	Translation																
P4	Adaptation																
P5	Application ISO and EN																
Pn	To be decided																
Deliverables																	
L1	State-of-the-art																
L2	Choice of projects																
L3	Status report: Translated tools																
L4	Status report: Adapted tools																
L5	Status report: Application ISO and EN																
Ln	To be decided																
Implementation																	
	Testing in actual projects																
	Incorporation in handbooks, contracts, etc.																
	Courses, presentations, seminars, conferences, news letter																
	Branch meetings																
Project Steering																	
	Planning																
	Meeting																

5. ORGANIZATION

Table 3: Project participants and stakeholders

Role	Name(s)	Organization
NordFoU contact person	Camilla Nørbech	Norwegian Public Roads Administration (NPRA)
Project-steering group	Bob Hamel Åsa Lindgren Arto Hovi	NPRA Swedish Transport Administration (STA) Finnish Transport Agency (FTA)
Project group	Bob Hamel Jørn Arntsen Brynhild Snilsberg/Rabbira Saba Vidar Rugset Åsa Lindgren Cecilia Kjellander Kristina Martinsson Susanna Toller Arto Hovi Timo Tirkkonen Tuomas Vasama ...	NPRA NPRA NPRA NPRA STA STA STA STA FTA FTA FTA
Project leader	Bob Hamel	NPRA
Sub project leaders	To be decided	
Reference group*	KraKK project members Klimatkrav project members ..	NPRA STA FTA

*If the end users of the project results aren't part of the project consortium, please consider setting up a reference group consisting of end users

6. RESOURCES AND ECONOMY

Table 1: Suggested budget for work packages (€)

Work packages*	(€)				Sum
	2017	2018	2019	2020	
P1: State-of-the-art	30.000			-	30.000
P2: Assessment	-			-	-
P3: Translation	10.000			-	10.000
P4: Adaptation	20.000	40.000		-	60.000
P5: Application ISO and EN		30.000		-	30.000
Pn: To be decided		-	...
Implementation (incl. dissemination)**	15.000	15.000	15.000	-	45.000
Travel costs ***	15.000	15.000	15.000	-	45.000
Total	90.000	Ca 135.000	Ca. 135.000	-	360.000

*Consider if implementation should be a separate work package and ensure to specify the required funds for achieving it

** 1 seminar and 1 branch workshop per year (5.000 each) plus other items

***3 countries, 4 members each, 3 meetings a year (1 per country), €400 per journey

6.1 EXTERNAL CONSULTANTS

The need for external consultants will be considered in the project planning phase.

6.2 EQUIPMENT

Purchase of equipment is not anticipated.

6.3 BUDGET DESCRIPTION

The project activities will be planned more in detail after the state-of-the-art, and this may lead to changes in the budget allocation.

6.4 FINANCING

Table 4: Contributors, yearly budget per partner in Euros

Country	2016	2017	2018	2019	2020	SUM
Norway	40.000	40.000	40.000	-	-	120.000
Sweden	40.000	40.000	40.000	-	-	120.000
Finland	-	40.000	40.000	40.000	-	120.000
Total	80.000	120.000	120.000	40.000	-	360.000