CARBON FOOTPRINT COMPARISON OF TRADITIONAL ROAD STRUCTURE VERSUS FERROCHROME SLAG (OKTO) STRUCTURE

DESTIA

A COLAS COMPANY

Figure: In accordance with Google Maps

- Transportation distances and amounts of material

Material	Mass (t)	Distance (km)
OKTO	130 000	48
Sand	260 000	30
Crushed rock	38 000	8
Cutting mass	102 810	3

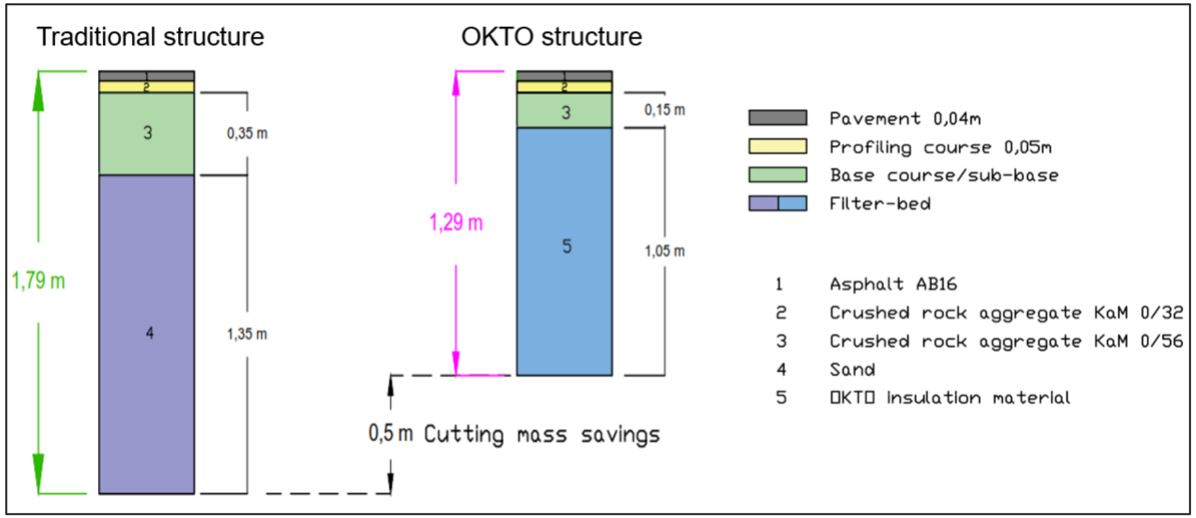
Calculation and reports:
Sanna Torniainen, Destia

Case study – Background, goals and input data

- The aim of the study:

  Comparison carbon footprint (CO_2-ekvivalent) of traditional road structure (sand, crushed rock) and OKTO structure in an actual road construction case in Finland.

- Due to OKTO's better technical properties compared to traditional sand, e.g. load-bearing capacity and thermal insulating capacity, thinner road structures are possible.



DESTIA
A COLAS COMPANY

- **For OKTO, the emissions consist of:**
  - granulation of ferrochrome slag
  - loading OKTO in Outokumpu's storage area
  - transporting OKTO to the construction site.
- **For the traditional structure, the emissions consist of:**
  - the work steps from deforestation to restoration that happened in sand and rock pits
  - for cutting masses excavation, loading and disposal.
    - ➢ The largest amount of emissions from traditional structure are formed in these production process.
  - Transport journeys to or from the construction site for sand, crushed stone and cutting mass have also been taken into account.

Case study – Results

- CO_2e emissions of traditional and OKTO structures divided into production process emissions and transportation emissions:

	Traditional structure*	OKTO structure*
SAND, total (t CO2e) CO2e emissions, production process (t CO2e) CO2e emissions, transportation (t CO2e)	**901,88** 603,20 298,68	
CRUSHED ROCK, total (t CO2e) CO2e emissions, production process (t CO2e) CO2e emissions, transportation (t CO2e)	**102,14** 90,5 11,64	
CUTTING MASS, total (t CO2e) CO2e emissions, production process (t CO2e) CO2e emissions, transportation (t CO2e)	**73,06** 56,54 16,52	
OKTO, total (t CO2e) CO2e emissions, production process (t CO2e) CO2e emissions, transportation (t CO2e)		**412,74** 158,0 254,74
CO2e emissions, total (t CO2e)	**1 077,1**	**412,7**

*Calculation is made based on CO2e emissions from differences between structures when OKTO replaces traditional materials.

DESTIA
A COLAS COMPANY

Case study – Discussion and conclusion

- The location of the construction site and thus the length of the transportation distance has a significant effect to the CO2e emissions of the OKTO structure.
- By utilizing OKTO construction products in infrastructure construction:
  - natural resources are saved as land acquisition and deforestation decrease
  - the working time of machines on sand and rock pits and on construction sites will decrease
- Due to the thinner road structures, the amount of cutting mass generated is reduced by the project (structure in the cut), which means:
  - less working time for the machines
  - less transportation
  - the smaller size of the disposal area

Figure source: Report: Current state of soil extraction and need for rehabilitation in groundwater areas (ELY-center for Southwest Finland)

Figure source: OKTO® construction product design and construction instructions in road, street and land structures

DESTIA
A COLAS COMPANY