

Summary of the report

Emission-free Construction Sites

Definitions, boundaries, and
terminology – Current status
in the Nordic countries

Nordic Sustainable
Construction

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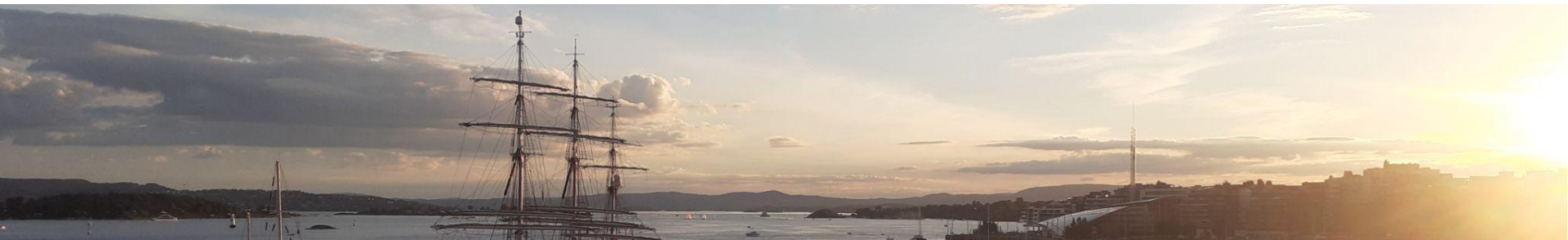
Nordic
Innovation

Buildings and Construction

~ 25% of Global GHG Emissions
~ 35% of Urban Waste

Emission from materials and construction - Embodied carbon.
In the range of 100-500 kgCO₂eq/m²

The part of construction activities and waste, could be in the range of **10-20%** of embodied carbon. Further studies and harmonised definitions are needed for a better understanding and estimation of construction emission.



Fossil fuels for transport,
machinery, etc.
CO₂ - PM - NO_x - CO - HC

Construction Waste -
Production and Processing
CO₂ - CH₄ - N₂O



Definitions

A **construction site** is a defined area where construction activities take place. Construction projects can be of various types, such as building construction, road construction etc.

A **fossil-free** construction site does not make use of any fossil fuels, such as diesel or propane, within the system boundary.

An **emission-free** construction site has no airborne emissions from fuel combustion within the system boundary.

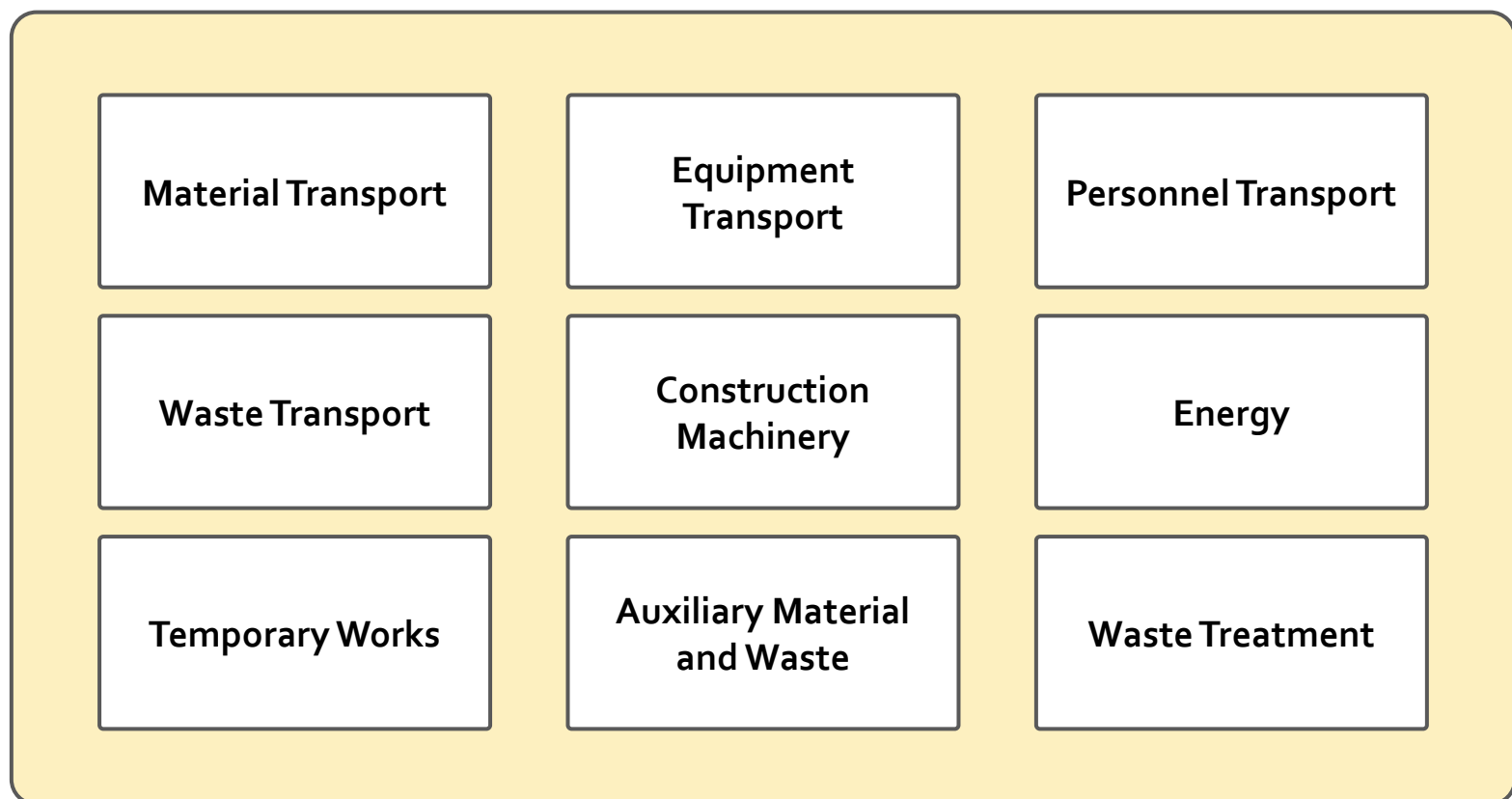
Waste-free construction sites do not generate waste in any of their activities (including the production of the materials).



Definition of a construction site

Definition of the construction site boundaries and which emissions are included should be harmonised in the Nordics. This is beneficial for discussion and work in this field.

Construction activities according to EN 15978



Construction sites boundaries are defined in Life Cycle Assessment standard EN 15978. The standard defines what activities and material use should be included in the assessment of emissions.

Definition of a construction site

The major emitting activities are Energy and Materials

Energy

Emissions from energy use -
Transport of materials to and from site
Construction Machinery
Heating, Ventilation etc.

Materials

Emissions from production and
processing of wasted building
material, auxiliary material and
other waste

Complexity in implementation

This boundary definition covers most emissions, but is difficult in practical implementation. A step-wise approach is suggested where a construction site can have different ambition levels, such as:

- Fossil free machinery
- Fossil free machinery and transport
- Emission free machinery
- Emission free machinery and transport
- Emission free machinery, transport and waste



Clean Energy for Construction

Fossil diesel will be replaced by Biofuels and Electricity.

Energy carrier	Advantages	Disadvantages
Biofuel	Drop-in fuel Long range Low vehicle cost	Pollution from combustion Low efficiency
Hydrogen	Emission free Medium efficiency	Medium range High vehicle cost
Batteries	Emission free High efficiency	Short range High vehicle cost
Electrofuel	Drop-in fuel Long range Low vehicle cost	Pollution from combustion Low efficiency

Emission-free sites are currently based on battery electric machinery while hydrogen fuel cells could provide more range for larger vehicles and machines. Hydrogen technologies could soon be commercially available.

Fossil-free sites are now based on biofuels, such as HVO for diesel engines. Heating is sometimes provided by wood fuel and biogas. Technology is available for making synthetic fuel made from electricity and carbon dioxide, but availability is limited.



Procurement is a powerful tool

Government agencies, municipalities, and county councils play an important role as drivers by setting examples with their significant purchasing powers. Often seen are contracts awarded based on both environmental- and quality-related factors.

The city of Oslo is a pioneer on this front and has since 2019 used procurement to encourage emission-free construction sites. This has enabled the rapid development and implementation of new market-oriented fossil- and emission-free solutions.

There are different forms of sustainability criteria and requirements that are used. The Swedish procurement authority has a bank of sustainability criteria for procurement with four different forms of criteria: qualification requirements, technical specifications, award criteria and special contract conditions.

<https://www.upphandlingsmyndigheten.se/kriterier/>



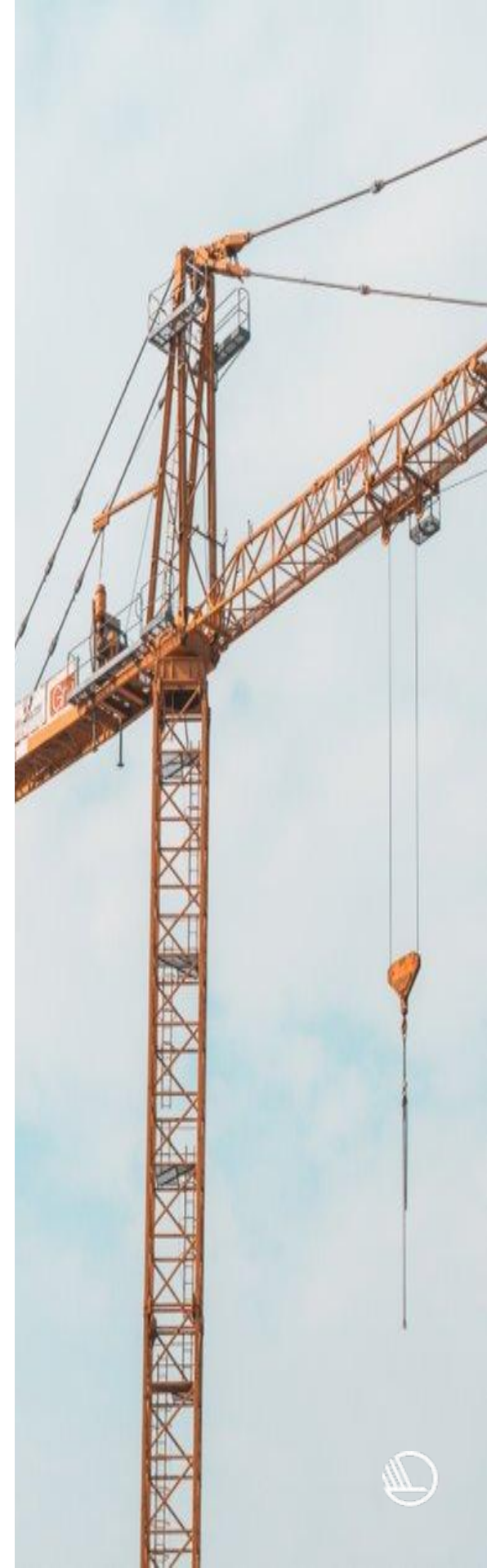
Case studies

Insight into emission-free and zero-emission construction sites can be gained from the growing number of pilot projects in the Nordic countries.

The sharing of case studies, best practices, and knowledge development can contribute to better understanding and help to identify solutions in real-world situations

Here are examples of building projects where emissions during construction are addressed:

- Mindet office building, Denmark
- Mundi daycare, Denmark
- Strøget pilot project, Denmark
- UN17 Eco Village, Denmark
- Kulosaari park road, Finland
- Lukutori site plan, Finland
- Campus Evenstad, Norway
- Lia Nursery School, Norway
- Midtbygda nursing home, Norway
- Hoppet preschool, Sweden



This pamphlet provides a summary of the report titled
"Emission-free Construction Sites: Definitions, Boundaries, and Terminology - Current Status in the Nordic Countries."

<https://nordicsustainableconstruction.com/knowledge/2023/march/report-on-emission-free-construction-sites>

The report examines and establishes the general definitions, boundaries, and terminology related to emission-free construction site areas. It offers insights into the present state of this field and serves as a resource to guide future steps. A standard definition of construction site boundaries and what emissions are included is a foundation for cooperative Nordic development in this field.

The report is an integral component of the Nordic Sustainable Construction programme, which aims to fulfill the ambitious vision outlined in Nordic Vision 2030. By establishing the Nordic region as a leading hub for sustainable and competitive construction and housing, this project strives to drive positive change in the industry.

The field is experiencing rapid growth, constantly generating new knowledge. If you desire to remain up-to-date and make valuable contributions, we invite you to join our network.

<https://nordicsustainableconstruction.com/work-packages/emission-free-construction-sites->

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