



# SUMMARY

## DUTCH ROADMAP FOR

## ZERO EMISSION

# CONSTRUCTION EQUIPMENT



## INTRODUCTION

The Netherlands is progressing towards zero emission construction equipment. This is crucial for climate, natural spaces, and improving the health of our inhabitants and construction workers. To achieve this, emissions from construction equipment—including mobile machinery, road vehicles, and floating equipment used in construction—must be reduced. The Dutch Program for Zero Emission Construction Equipment brings together governments, industry stakeholders, and knowledge institutions to collaborate on enhancing the sustainability of construction equipment. This initiative involves various national government agencies, about 87 municipalities (including the five largest), all provinces, and key business networks and industry bodies.

At the core of the program is the [Roadmap for Zero Emission Construction Equipment](#) (Roadmap ZECE), established in 2023. The Roadmap ZECE outlines how targets for nitrogen, CO<sub>2</sub>, and particulate matter can be met. Polluting machines will be gradually replaced with zero-emission alternatives.

### **The scope of the Dutch Program for ZECE includes:**

All machinery, road vehicles, and floating equipment used in construction, maintenance, and demolition projects, within:

- Civil Engineering and Infrastructure, including Roads, Waterways, Dikes, and Railways
- Housing and non-residential Construction
- Coastal Protection and Fairway Maintenance
- Energy (onshore and offshore grid)

Through the [Voluntary Agreement ZECE \(“convenant SEB”\)](#), participating parties commit to implementing the Roadmap ZECE.

### Targeted Emission Reduction for Construction Equipment in the Netherlands

The Dutch Program for Zero Emission Construction Equipment aims to achieve significant emission reductions by 2030, contributing to several objectives (relative to 2018 levels):

- 60% reduction in NO<sub>x</sub> emissions, which will help protect nature;
- 75% reduction in PM<sub>10</sub> emissions, improving air quality in urban areas and safeguarding the health of construction workers;
- Reduction of 0.4 M in CO<sub>2</sub> emissions, supporting the climate goals set by the Paris Agreement;
- Central government infrastructure projects in line with climate-neutrality and circularity.

Additionally, the use of sustainable construction equipment is crucial for the continuation of construction projects. Due to the nitrogen crisis in the Netherlands, acquiring the necessary permits presents a significant challenge with high-emission construction equipment.

## Emissions from construction equipment in the Netherlands

Due to the lack of baseline data on the number of mobile machinery, road vehicles, and floating equipment, as well as their emissions, an estimate was made during the development of the approach (see Table 1). Regarding the scale of the Dutch construction sector: the total construction output in the Netherlands for housing, non-residential, and civil engineering projects amounted to 97.1 billion euros in 2023. In 2018, emissions from all construction equipment in the Netherlands accounted for approximately 7.4% of total NO<sub>x</sub> emissions, around 2.5% of total CO<sub>2</sub> emissions, and about 2.8% of total particulate matter emissions (PM<sub>10</sub>).

	Equipment	NO <sub>x</sub>	CO <sub>2</sub>	PM <sub>10</sub>
<b>Mobile machinery (2020)</b>	150.000	11 kt	1,5 Mt	414 t
<b>Road vehicles (2020)</b>	277.300	6,3 kt	1,8 Mt	245 t
<b>Floating equipment (2021)</b>	350	4,2 kt	0,3 Mt	90 t

Total		21,5 kt	3,6 Mt	749 t
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Source: [TNO \(2023\)](#) | *Transitiepaden Schoon en Emissieloos Bouwen (SEB)*

## Measures of the Roadmap for ZECE

The core of the measures involves applying emission requirements to construction equipment used in construction, maintenance, and demolition projects. These requirements are enforced through tendering processes and the granting of permits for projects and are differentiated per power range, and types of construction equipment (machinery, road vehicles, floating equipment). The emission requirements will progressively become more stringent, with lighter power ranges being transitioned to sustainable options more quickly than heavier and specialized equipment. By 2030, a significant portion of mobile machinery and road vehicles will be required to be zero-emission.

### Supported approach

The emission requirements are formulated in collaboration with sector representatives, governmental bodies and knowledge institutions. They consider factors such as technological development, the pace at which zero-emission equipment can be implemented and associated costs and depreciation periods. A set of emission requirements has been established that is both achievable and sufficiently challenging to drive the transition forward. This approach provides an investment perspective for the sector, enabling companies to incorporate the future emission requirements and depreciation periods into their investment plans. As many commissioning bodies implement this approach, it offers clarity and uniformity for the sector.

### Different ambition tiers

The roadmap defines multiple ambition tiers, to encourage frontrunners to accelerate the deployment of zero-emission construction equipment, ahead of the majority driving the transition. The lowest tier (the minimum tier) is linked to the permitting process for construction projects and must always be applied. The basic and ambitious tiers set more stringent emission requirements; parties involved in the Voluntary Agreement ZECE commit to adopting one of these two ambition tiers. The ambitious tier specifically focuses on the accelerated adoption of zero-emission construction equipment to further stimulate the development of such equipment. Starting in 2023, a portion of the work is already required to be zero-emission (technology-neutral).

An overview of the emission requirements is included in Appendix 1. Biofuels are considered only for floating equipment that is more challenging to make sustainable, aligning with the policy of the Renewable Energy Directive (RED).

## Additional measures in the Roadmap ZECE

Additional measures being developed as part of the Roadmap ZECE include:

- Promoting the implementation of construction logistics measures, such as setting up construction hubs and industrial construction.
- Establishing a methodology to ensure compliance with emission requirements in practice, to promote a level playing field.
- Monitoring progress, identifying bottlenecks, and sharing best practices.
- Jointly developing knowledge to advance the sustainability of construction equipment.

Knowledge development and evaluation remain crucial, especially as we are still at the beginning of the transition. Alongside the development of sufficient zero-emission construction equipment, addressing challenges related to affordability, the organization of charging infrastructure, and safety are also key issues.

## Tools of the Roadmap ZECE

To assist parties in implementing and promoting the transition to sustainable construction equipment, the program provides several supportive tools. The Dutch central government has allocated over 1 billion euros for these tools:

- The ZECE Subsidy scheme:
  - Acquisition of zero-emission construction equipment
  - Retrofit or conversion of existing equipment
  - Innovation related to zero-emission construction equipment and associated charging infrastructure.
- Financial support:
  - Municipalities, provinces, and water authorities can request financial support if zero-emission equipment is used in a construction project they have tendered (specifically for covenant partners).
  - Resources for national agencies for zero-emission procurement of construction equipment in projects.
- Funding for charging infrastructure:
  - Support for developing charging infrastructure as part of tools mentioned above.
- Support program for local governments

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- Assists provinces, municipalities, and water authorities in implementing the Roadmap ZECE and making necessary adjustments to work processes.
- Knowledge Development and Scaling program
  - Focuses on knowledge development, innovation, scaling, and practical experience. This program works on improving baseline data on emissions from construction equipment and developing process measures that reduce emissions through more efficient use, fewer transport movements, digitization, or more industrial construction.

### Zero-emission construction in practice

In practice, an increasing number of projects are utilizing zero-emission construction equipment. The initiatives map provides an overview of some of these projects. Additionally, videos showcasing [initiatives from Harderwijk, Groningen, Tiel-Waardenburg and Lochem](#) offer a valuable impression of the program and its practical application.

Collaboration is a crucial component of this effort. During the implementation phase, governments, sector representatives, and knowledge institutions work together to advance the transition.

#### The covenant has now been signed by over 100 parties, including:

- The central government and national agencies responsible for the construction and maintenance of national infrastructure and government buildings.
- 87 municipalities, all 12 provinces, and 21 water authorities
- About 7 major commissioning bodies, including the Port of Rotterdam, TenneT, and Schiphol.
- 25 key business networks and industry bodies representing the construction sector.

## Appendix 1 | Emission requirements

Simplified Version of Emission Requirements for Tendering. For all emission requirements, including those linked to the permitting process, see the [Voluntary Agreement Clean and Zero-Emission Construction](#).

### Mobile Machinery - Basic tier

	2023-2024	2025-2027	2028-2029	2030 and beyond
<b>Light (19-56 kW)</b>	Stage IIIa/IIIb	Stage IIIa/IIIb	Zero-emission	Zero-emission
<b>Medium and Heavy (56-560 kW)</b>	Stage IIIb	Stage IV with soot filter	Stage IV with soot filter	Stage IV with soot filter (2030) Zero-emission (from 2035)
<b>Specialized and &gt;560 kW</b>	No requirements	No requirements	Catalytic converter and soot filters	Catalytic converter and soot filters (2030) Zero-emission (from 2035-2040)

When a party also applies the ambitious tier, zero-emission machinery will increasingly be required by 2030. By 2030, at least  $\frac{3}{4}$  of the machinery in 90% of projects will be zero-emission.

### Road vehicles - Basic tier

	2023-2024	2025-2027	2028-2029	2030 and beyond
<b>Vans (N1)</b>	Euro 5	Euro 6	Zero-emission	Zero-emission
<b>Trucks (N2 and N3)</b>	Euro V	Euro VI	Euro VI	N2: zero-emission N3: Euro VI

When a party also applies the ambitious tier, zero-emission road vehicles will increasingly be required by 2030. By 2030, all road vehicles in at least  $\frac{3}{4}$  of the projects will be zero-emission.

### Floating equipment - Basic tier

	2023-2024	2025-2027	2028-2029	2030 and beyond
<b>Floating equipment (Coastal maintenance - maritime)</b>	Tier I and 10% renewable energy carriers	Tier I and 20% renewable energy carriers	Tier II and 40% renewable energy carriers	Tier III and 60% renewable energy carriers
<b>Floating equipment (Offshore - maritime)</b>	30% cleaner than NO <sub>x</sub> Tier II 10% renewable energy carriers	40% cleaner than NO <sub>x</sub> Tier II 20% renewable energy carriers	45% cleaner than NO <sub>x</sub> Tier II 40% renewable energy carriers	50% cleaner than NO <sub>x</sub> Tier II 60% renewable energy carriers
<b>Floating equipment (Fairway maintenance – fresh water)</b>	20% renewable energy carriers	35% renewable energy carriers	CCR II and 60% renewable energy carriers	Stage V and 75% renewable energy carriers

When a party applies the ambitious tier for floating equipment, higher emission standards for engines will be required, and a percentage of Renewable Fuels of Non-Biological Origin (RFNBOs, such as hydrogen and methanol) or renewable electricity will be required in part of the projects.

### For all emission requirements:

- These are minimum requirements; parties are free to use more sustainable equipment.
- The emission requirements apply to new contracts and orders.

For more information, visit the Dutch Program ZECE website [www.opwegnaarseb.nl/onderwerpen/english](http://www.opwegnaarseb.nl/onderwerpen/english) or contact [contact@opwegnaarseb.nl](mailto:contact@opwegnaarseb.nl).