Construction Site Machinery in the Clean Vehicles Directive

Bellona Europa Recommendations Paper

Why construction machinery emissions matter?

Construction is a fundamental component of human civilisation. It lies at the heart of economic and social development. In fact, the construction industry generates roughly 9% of European GDP and accounts for 18 million jobs. In spite of this, construction sites are also a major source of environmental and human health damage throughout all aspects of the construction process. In a majority of European cities construction sites make up a significant share of overall emissions of both CO_2 and air pollutants, while also contributing to noise pollution and disruption. In Oslo for example, construction accounts for 18% of total CO_2 emissions, while in Germany construction emissions exceed those originating from domestic air and rail travel combined. In spite of that, construction emissions remain inadequately addressed via EU legislation.

A number of different pathways and tools exist to enable efficiency gains and emission cuts from construction site machinery, ranging from engine and machine component improvements; process optimisation; dedicated training of machine operators to reduce fuel use; to the deployment of alternative technological solutions such as electrification of the machinery. Electrification holds the largest CO_2 mitigation potential, while delivering significant environmental, human health and economic benefits. The Committee for European Construction Manufacturers (CECE), states in its own report that "*[electrification] results in 100% local CO2 reduction, and 100% total CO2 reduction when using renewable energy sources to produce the electricity. Even where this is not the case, reduction is still in the region of 10-15%".*

The technology already exists today, with a growing number of construction manufacturers developing electric models which boast higher efficiency rates, lower operating costs, low noise pollution, and zero tail-pipe emissions of air and climate pollutants. As is the case with almost all new technologies, however, there is a challenge relating to economies of scale, underlining the need to boost market demand for clean and zero emission construction.

CVD recast: an opportunity to create demand for clean construction

The ongoing recast of the EU Clean Vehicles Directive (CVD) offers a unique opportunity to create this market demand by extending public authorities' procurement obligations to construction site machinery and equipment. While the scope of the existing legislation has to date been limited to light- and heavy-duty road vehicles, there is a clear rationale to expand its provisions to **non-road mobile machinery** in order to further reduce urban dwellers' exposure to health damaging levels of air and noise pollution. The need for such an extension has already been acknowledged and supported via tabled amendments by a number of MEPs from the S&D, Greens, EFDD and GUE/NGL groups. Further support, however, needs to be mobilised within both the EP and among Member States as negotiations advance.

How to make it work? Defining 'clean construction machinery and equipment'

It has become clear that extending the CVD's scope to construction machinery would require the **creation of a dedicated 'non-road mobile machinery' category** (in addition to the existing LDV and HDV categories of the CVD). Bellona sees two possible options for the definition of 'clean construction', namely: 1) gr of air pollutant/kWh basis which is tightened to 0 gr/kWh by 2030, or 2) a two-step approach whereby a list of clean technologies limited to electricity, hydrogen, and bio-methane is used till 2025, followed by a transition to 0 tailpipe emissions/kWh by 2030. This is illustrated below for the existing NRMM categories, based on tabled amendments (i.e. bulldozers; mechanical shovels, excavators and shovel loaders, and mining machinery; excavating machinery; and construction machinery and equipment).

***Option 1:* Defining 'Clean Construction Machinery and Equipment' on gr of air pollutant/kWh basis**

The Stage V emission standards, set out in the NRMM Regulation, will phase in from January 2019 for all new non-road engine types used for construction machinery, and offer one obvious benchmark for the definition of 'clean construction'. A gr of air pollutant/kWh metric is a technology neutral metric that enables easy comparison of different technologies. In order to classify as 'clean', however, construction machinery would need to over-comply with Stage V emission limits set for HC, NOx and PM, as the objective of the CVD is not to reinforce existing standards, but rather to promote cleaner and more efficient technologies. With this in mind, there are a few challenges associated with the setting of a new air pollutant threshold that over-complies with the latest Stage V standard. Firstly, the NRMM regulation distinguishes its emission limits by engine category not machinery category, meaning that the setting of new thresholds for each type of machinery/equipment would probably require a 'delegated' act, which in turn risks delaying the start date of the procurement obligations under the CVD. Furthermore, when it comes to PM emissions for example, the most stringent emission standard - Stage V, varies from 0.40 to 0.01 gr PM/kWh which are already very close to 0 gr/kWh, meaning the next logical step would be to aim for 0 emissions. By 2030 all newly procured construction machinery and equipment should have 0 gr/kWh of air pollutants.

NRMM category	**2025**	**2030**
	HC + NOx, PM gr /kWh	
Bulldozers	Stage V over compliance	0
Mechanical shovels, excavators and shovel loaders, and mining machinery	Stage V over compliance	0
Excavating machinery	Stage V over compliance	0
Construction machinery and equipment	Stage V over compliance	0

***Option 2*: A two-step approach to defining 'clean construction machinery and equipment' on the basis of a list of clean technologies by 2025; and as strictly zero emissions by 2030.**

Clean construction can, alternatively, be defined on the basis of a list of technologies by 2025 limited to electricity, hydrogen and bio-methane, which are technologies which all exist and are invested into

today, while offering significant emission mitigation potential. This methodology should be accompanied by a sub-target requiring that at least 50% of the 2025 target be met via zero emission machinery. Such a 'safeguard' mechanism becomes even more important if the list of technologies is further expanded. Moreover, this share would be raised to a 100% of the target by 2030.

NRMM category	**2025** **Whereby 50% of the target would have to be met via 0 emission machinery and equipment*	**2030**
	Methodology for definition of clean NRMMs	
Bulldozers	Electricity, hydrogen, bio-methane*****	0 gr CO2 /kWh
Mechanical shovels, excavators and shovel loaders, and mining machinery	Electricity, hydrogen, bio-methane	0 gr CO2 /kWh
Excavating machinery	Electricity, hydrogen, bio-methane	0 gr CO2 /kWh
Construction machinery and equipment	Electricity, hydrogen, bio-methane	0 gr CO2 /kWh

Construction works and services

An alternative approach to incorporating construction site machinery and equipment within the CVD would be in the form of services and works as opposed to machinery types, as proposed by tabled amendments. Such an approach would also ensure consistency with existing road vehicles included in Annex 1, all of which are expressed in the form of a service (e.g. refuse collection services, taxi services etc.). Based on the EC's existing list of CPV codes, Bellona proposes the inclusion of the following construction and building works.

CPV Code	**Construction work/service**	**Justification for inclusion**
45200000-9	Works for complete or part construction and civil engineering work	Please note that this is an overarching category encompassing all of the below CPV codes with the exception of the last one.
45210000-2	Building construction work	This CPV code also encompasses the two codes below it.
45214000-0	Construction work for buildings related to education and research	These are target sectors since they accommodate vulnerable segments of the population, such as children, sick, and elderly. Thus, clean construction machinery should be a priority here, and the inclusion of these two categories should be the absolute minimum. (Examples: kindergartens, nurseries, hospitals,
45215000-7	Construction work for buildings relating to health and social services, for crematoriums and public	

	conveniences	retirement homes, day-care centres).
45500000-2	Hire of construction and civil engineering machinery and equipment with operator	Hiring plays an increasingly key role in the construction industry.

Moreover, as the table suggests, **hired construction machinery** should be included in the CVD. This is because there is a growing tendency towards hiring as opposed to purchasing in the construction industry. As the machinery becomes more specific in terms of functions and uses, it also becomes more expensive. As such, contractors avoid purchasing machinery which will remain unused for periods of time. Machinery that is hired is generally used for more hours in a year than purchased machinery. This means that since fleet renewal of construction machinery is becoming faster, there are more opportunities to regulate and push for greater ambition. **Retrofitting**, too, plays an important role in the electrification of construction site machinery today, in enabling an accelerated shift towards cleaner technologies, while securing significant savings in capital expenditure. Some equipment importers operating in Europe such as PON Equipment – importers of Caterpillar – retrofit conventional machinery into electric. In view of this, retrofitted clean construction machinery should be able to count towards compliance with the procurement targets under the CVD.

Fair tendering procedures, based on the MEAT criterion

Procurement targets need to be underpinned by fair tendering procedures which take into account not only TCO, but also other machinery characteristics, such as accessibility, insertion in urban landscape, noise levels, energy efficiency as well as recyclability of batteries and components, using the **most economically advantageous tender (MEAT) criterion**. The city of Oslo has already successfully demonstrated the benefits of applying the MEAT criterion in its procurement practices aimed at promoting clean construction. To stimulate clean construction of social buildings, such as schools and kindergartens, Oslo's procurement criteria allowed for lower emissions to be weighted 17.5% in the tender scoring and price was a maximum of 30%. This procurement strategy included a risk management approach that placed more risk on the building owner, which encouraged the appetite of the market to innovate. This example shows that using the MEAT principles in procurement can drive value for money, while delivering significant environmental benefits.

To learn more about the possibilities and barriers of electric construction machinery read Bellona's recent report on the topic here.