Zero-Emission Construction Sites

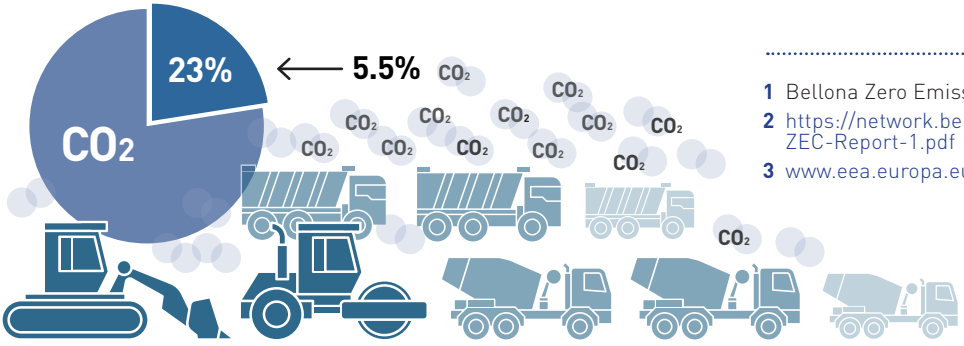
- Changing the way we build in cities

The city of Oslo was the first in the world to launch a zero-emission construction site, using all electric machinery to complete the works. In 2020, large emission-free construction machines also debuted in public projects in Copenhagen, Helsinki and Trondheim. Zero-emission solutions are already available on the European market, but greater demand is needed to accelerate innovation, especially on heavy machines. Large public buyers have the power to drive the market for sustainable solutions as early adopters, which present a benefit to the wider construction sector, to local environmental quality and to their own citizens' health.

Putting construction emissions in context

Conventional construction works are important sources of pollution both locally and globally. The construction industry contributes 23% of the world's CO_2 emissions across its entire supply chain, and approximately 5.5% of these emissions come directly from activities on construction sites—predominantly through the combustion of fossil fuels to power machinery and equipment.[1] Fossil-fuelled construction machinery causes harmful local air pollution and noise, and also contributes to global greenhouse gas emissions.

Currently there is no overarching policy at EU level that addresses greenhouse gas emissions from non-road mobile machinery and equipment. Policies that touch upon construction machinery specifically do not do so sufficiently to address the climate and human health challenge. As it stands today, the Non-Road Mobile Machinery Regulation only addresses carbon monoxide (CO), total hydrocarbons (HC), oxides of nitrogen (NOx) and particulate matter (PM), thereby ignoring the impact of the CO_2 being emitted.



The Local Government Mandate: Why transition to zero-emission construction now?

Improve quality of life for citizens

- Noisy and polluting construction sites have no place in modern urban centres. If zero-emission solutions are used, construction workers and citizens in the vicinity of the site will have improved health and wellbeing by avoiding the harmful local air pollutants and noise from fossil-fuelled machinery.
- Zero-emission solutions are estimated to produce 5 to 10 times less noise than conventional construction machinery.[2] Avoiding the nuisance of noise contributes to a safer, healthier and more pleasant environment to live, work and play.

Reduce urban air pollution

- Air pollution causes around 400,000 premature deaths per year in Europe, and 90% of European city-dwellers are exposed to harmful levels of air pollution.[3] Unlike diesel-driven, electric construction machinery does not emit PM2.5, PM10, NOx or CO_2.

1 Bellona Zero Emission Construction Status Report 2019
2 https://network.bellona.org/content/uploads/sites/3/2018/06/ZEC-Report-1.pdf
3 www.eea.europa.eu/themes/air/intro

Icons: Insanity100 / Vecteezy
Illustration: Stephan Köhler / ICLEI

Lead climate action

- In order to follow-through with targets for local, national, and international greenhouse gas emissions reduction, action must be taken to tackle construction emissions, too. This aligns with the Paris Agreement in supporting the achievement of NDCs.
- By setting a clear and ambitious direction of travel, cities can play a key role in the transition to a climate-neutral future. Amsterdam, Copenhagen, Helsinki and Oslo have announced plans to drastically reduce carbon emissions over the next decade, including measures to clean up the construction sector. In Oslo, fossil-free construction sites have been the minimum requirement for public projects since 2017.

Be ahead of the curve

- Even though CO_2 emissions are not yet accounted for in the EU's NRMM Regulation, the next logical step in a revision will be to restrict the emission of greenhouse gases. Hence, it can only be beneficial for policy makers to already move in the direction of zero-emission construction.

Implement life-cycle thinking

- For cities that own their own construction machinery, investing in zero-emission solutions makes economic sense. Due to significantly lower operation and service costs, electric machines have a lower total cost of ownership than diesel machines.
- The first large electric construction machines have demonstrated increased productivity and energy efficiency, in addition to longer machine lifetimes than comparable diesel machines.

> *"In Oslo, construction sites generate as much as 7% of total emissions, equivalent to an additional 30,000 petrol cars on the road. The building industry is our closest ally and an enthusiastic supporter. We are confident that by 2030 Oslo's air will be cleaner, emissions lower and environment healthier thanks to the actions we are taking today."*
>
> Raymond Johansen, Governing Mayor of Oslo

Leverage public purchasing power

- Setting ambitious, predictable targets for the reduction of emissions from construction sites is a way to encourage suppliers to invest in innovation and accelerate market development. As more and more construction clients demand emission-free solutions, availability of the machines will improve and upfront costs are expected to fall.
- In Oslo, the ambitious demands of the city came even before large electric construction machines were commercially available. However, backed by political will and supported by market engagement throughout the planning process, the market was able to deliver.
- Helsinki's dialogue with suppliers in 2019 revealed that the market was already able to deliver fossil-free sites, so the city will use that as a minimum requirement going forward. Zero-emission solutions will be offered a bonus in award criteria, with increasingly stringent procurement criteria announced to enable a market transition over the coming years.

> *"Copenhagen will work to purchase fossil-free fuel for its own machinery and heavy vehicles, pilot projects with tender requirements for fossil- or emission-free construction machinery in construction projects. We will also collaborate with market players to make them use fossil-free fuels."*
>
> Frank Jensen, Lord Mayor of Copenhagen

Remaining challenges:

Initial investment - The cost of innovation for the first zero emission machines make them prohibitively expensive for small construction contractors.

- Given the lower total cost of ownership of electric machines, big buyers and large contractors should invest in electrified solutions where possible. Increased aggregate demand can signal to the market a predictable need for such machines, which will lead to greater availability and more competitive prices with time.

Regulatory landscape - There is currently no EU policy regarding CO_2 emissions of construction machinery, meaning contractors and machine manufacturers lack the clarity and guidance necessary for rapid innovation for more sustainable solutions.

- Therefore, big buyers such as cities can incentivise innovation and provide a clear political will by setting targets for transition to zero emission construction so that the market can invest in innovation with certainty. Amsterdam, Copenhagen, Helsinki and Oslo have included action on construction emissions in their respective carbon neutrality targets.
- Competition clauses have an impact on what criteria and standards buyers can set in tenders. Buyers must ensure legal compliance while using increasingly ambitious requirements. More stringent environmental regulation on construction machinery at a national or EU level is key to support buyers in setting higher standards for emissions coming from construction sites.

On-site energy supply - Electric heavy-duty construction machines require reliable power sources on site, which should come from renewable sources.

- Clean energy supply can be a challenge in terms of logistics and responsibility, and requires coordination between the contracting authority, the grid provider and the construction contractor. Approximate energy needs should be shared with stakeholders early in the project planning process to ensure necessary infrastructure is in place in good time.
- For zero-emission technologies to be a success, the power they rely on through electricity supply and batteries should also be environmentally and socially sustainable.

See to believe: Videos show zero-emission construction machinery in action in Oslo and in Copenhagen.

What is the Big Buyers Initiative for Zero-Emission Construction Sites?

The Big Buyers Initiative working group on Zero-Emission Construction Sites brings together the cities of Amsterdam, Brussels, Budapest, Copenhagen, Helsinki, Lisbon, Oslo, Trondheim and Vienna to promote zero-emission construction sites, focussing on alternatives to traditionally diesel-driven non-road mobile machinery (NRMM). These cities work together as big public buyers to develop and pilot innovative sustainable procurement approaches in order to reduce the environmental impact of construction activities and encourage market innovation.

How can policymakers engage with this initiative and learn more?

- Join the Big Buyers Initiative's Observer Group to receive regular updates and engage with the cities leading the change to Zero Emission Construction Sites across Europe.
- Learn more about the Big Buyers Initiative: https://sustainable-procurement.org/big-buyers-initiative
- Database of zero-emission construction machinery already available: https://bellona.org/database-emission-free-construction-equipment-by-manufacturer
- Further information on zero-emission construction sites in Europe: https://bellona.org/publication/zero-emission-construction-sites-status-2019

Get in touch!

For inquiries or to get involved, contact Kaitlyn Dietz, ICLEI Europe - Kaitlyn.Dietz@iclei.org

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