



AIR QUALITY AT CONSTRUCTION WORKS AND DEMOLITIONS: IMPROVING THE INFORMATION TRANSMITTED TO CITIZENS

HIGHLIGHTS

- **Air pollution at construction works and demolitions, in the form of increased dust and noise, is usually a reason for complaints.**
- **Monitoring air quality at construction works and demolitions using relocatable sensors is a reliable way to oversee the conditions in which the work is undertaken.**

A common impact of construction works and demolitions is an increase in air pollution. Clearly, dismantling a building or infrastructure that has reached the end of its useful life implies an increase in noise and dust concentration.

Nevertheless, this type of work should proceed with maximum guarantees, respecting at all times the current environmental legislation. Likewise, and regardless of any applicable standards, it is highly recommended to put into practice all those measures that reduce inconvenience to the neighbourhood and the environment.

What does dismantling or demolishing involve, and what role does environmental monitoring play?

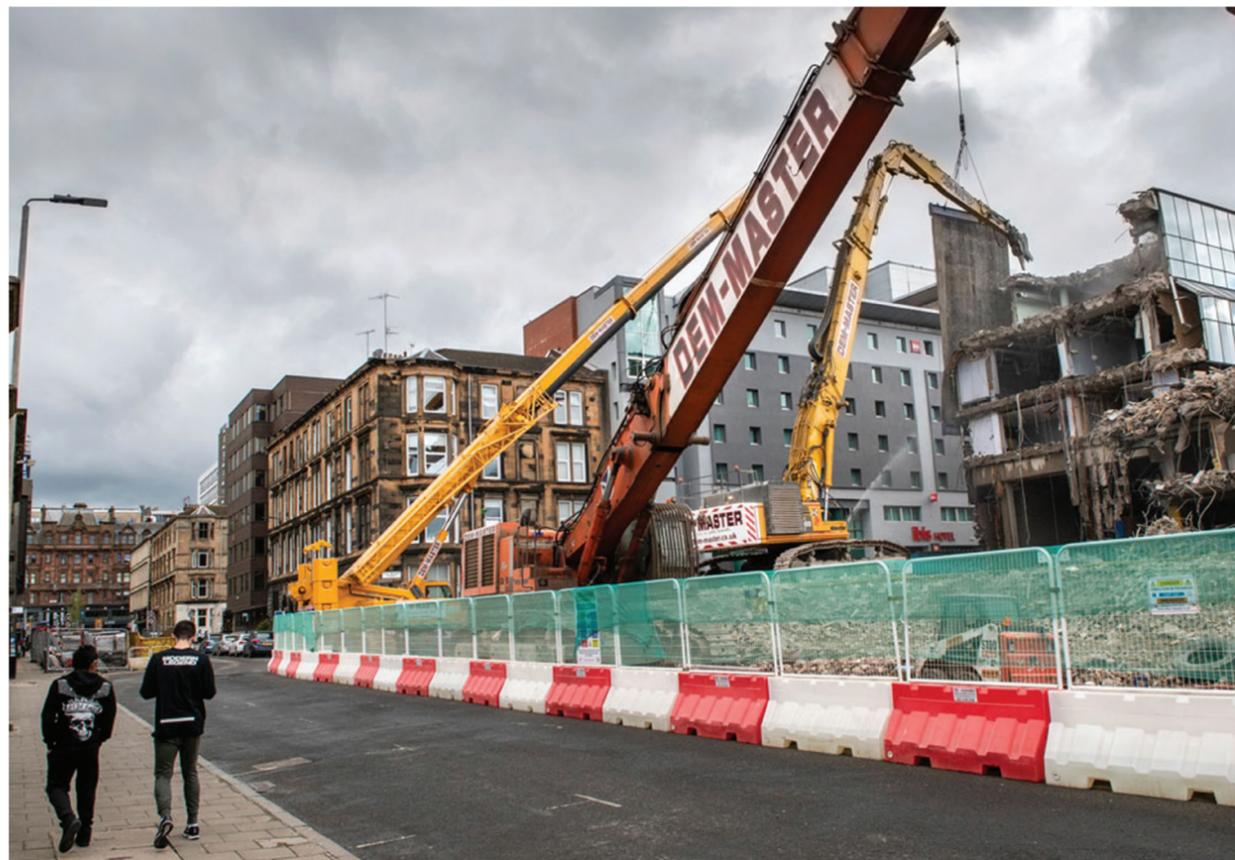
Dismantling and demolition activities basically involve pulling down a wall or building. In fact, the RAE (Spanish Royal Academy of Language) considers these terms synonymous.

However, the building sector makes a distinction (1):

- **Dismantle:** the opposite of construct; this means to undo what was constructed, pull it to the ground, take down a construction.
- **Demolish:** break-up what was dismantled, break materials, components and subcomponents of the general construction system.'

Therefore, it can be concluded that dismantling and demolishing are complementary actions, but they are not always jointly carried out. Nonetheless, and taking into account the demands set forth in waste legislation, in the majority of projects demolition is carried out for the purposes of recycling, reusing and evaluating usable materials.

Similarly, and regarding air quality, the machinery and the operations of both stages are similar. During dismantling, perhaps, there may be greater repercussions relating to noise pollution, resulting from the transportation of heavy machinery and falling debris; during demolition, more dust may be generated from the crushing machines, but the differences are not significant.



Environmental monitoring, a procedure to oversee the impact of construction works or demolitions

Environmental monitoring is obligatory for all activities included in the standard regulating environmental impact assessment

(Appendices I and II of the Environmental Assessment Law 21/2013). Its main purpose is to ensure compliance with all preventative and corrective measures set forth in the environmental impact study (EsiA Environmental and Social Impact Assessment).

The construction of infrastructures or the activities related to the extraction industry are two clear examples of the type of projects

subject to environmental assessment and, therefore, environmental monitoring. Thus, depending on where it is located, the proximity of population centres or other key aspects evaluated during the ESI, the monitoring of air quality may be a measure required by the administration, or considered favourable by the developer.

Dismantling and demolition activities, as such, fall outside the scope of this obligation. That is to say, they are not included in the aforementioned appendices. Nevertheless, depending on the magnitude of the project or the expected impact, the administration may require the project to be subject to environmental assessment.

As can be seen, monitoring plans are not always obligatory. However, Kunak recommends adopting a series of good practices. Measuring air pollution at construction works and demolitions, and providing information regarding air quality, will always be a positive measure in reducing nuisance to citizens.

Main sources of air pollution at construction works and demolitions

Firstly, it is important to clarify that the air pollution produced during dismantling or demolition is temporary, limited to the duration of the works. Nonetheless, depending on the magnitude of the project, different nuisances may have a synergistic or cumulative effect, depending on the already-existing surrounding conditions.

Air quality, for example, may experience a detriment that may be prolonged, even once the emitting source has been interrupted. However, this reduction in quality tends to be minimised over a short period of time. In the case of noise pollution, in contrast, the impact disappears immediately once the machinery or work is stopped.

In this sense, the main sources of air pollution in projects like this are:

- The circulation of vehicles and heavy machinery.
- The dismantling and demolition works in themselves, and other complementary tasks (moving earth, stockpiling materials, etc.).

What contaminating agents are generated by these activities, and what effect do they have?

The main nuisance that dismantling or demolition projects cause are a consequence of:

- High noise levels.
- An increase in the concentration of dust and particles in the air (PM10 and PM2.5 particles).
- An increase in nitrous oxides (NOx) and carbon monoxide (CO)

Noise pollution the demolition machinery, lorries, auxiliary vehicles, greater influx of people and falling and removal of



debris. Day-time noise, although not as harmful as night-time, it is also a distorting agent. Therefore, the prolonged exposure to harmful noise levels may have serious effects on human health, as highlighted by the European Environment Agency.

The increase in dust concentration is also a relevant problem. The movement of machines and vehicles, or the breaking-up of construction waste, generates microscopic grains of earth and sand, soot originating from exhaust pipes, or particles coming off tyres, which remain suspended in the air and may be inhaled. In this sense, it is essential to know what materials were employed in the construction of the building or infrastructure. Thus, if it is suspected that asbestos may be present, for example, it will be necessary to carry out a removal of this material prior to the demolition work.

Nitrous oxides (NOx) are produced in vehicle engines during combustion. NO₂, for example, is an irritant and toxic gas, that also acts as a precursor in the formation of ozone (O₃).

Demolition of the Vicente Calderón football stadium: a practical example of monitoring air quality in an urban environment

The demolition of the Vicente Calderón football stadium is part of a specific modification of the Urban Development General Plan of Madrid that has the objective to reconvert the ground use of this area in the Arganzuela district.

Complying with current legislation, this urban action was

subject to the simplified strategic environmental assessment. In the documentation presented, and amongst the measures proposed in the monitoring programme, was the need to carry out a control on air quality and noise levels. The aim was to comply with the current national, autonomous and municipal environmental standards, and to reduce, as much as possible, nuisance in the neighbourhood.

These types of measures are also provided for by the Department of Environmental Health at the Madrid Town Hall. This department published, in October 2019, a series of suggestions to control environmental contaminants arising from construction. In this document, for example, it is recommended to use easily relocatable sensors, sound-level meters, and meteorological sensors to monitor air quality.

In the case of the aforementioned demolition project, this work was entrusted to Kunak, who deployed various Kunak Air devices, in addition to an autonomous sound-level meter that also incorporated sensors for monitoring wind speed and direction. These devices, at the time of this article, are still measuring, continuously and in real time, the following parameters:

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO₂)
- Sulphur Dioxide (SO₂)
- Ozone (O₃)
- Suspended Particles (PM₁, PM_{2.5} and PM₁₀)
- Noise

All of the information compiled by these sensors is published monthly in the Madrid Town Hall Transparency Portal.

Conclusion

Dismantling and demolition projects, as well as construction works, have environmental impacts that can affect citizens and the environment. These tend to be temporary, but they can have a synergistic and cumulative effect that increases and aggravates their inconvenience and impact.

Therefore, monitoring air quality and other parameters can be extremely useful with for keeping the public informed, an important task when work is being carried out in populated areas inhabited by vulnerable groups (infant population, elderly people, sick people, and pregnant women).

Sources:

(1) Alonso, M.J.; Arnaiz, M.A.; Moreno, I.; Quintana, R.; Sacristán, J.A. Derrribos y Demoliciones. Revista de Edificación, 14 (1993): 25-35. Consulted on 20/03/2020 at <http://hdl.handle.net/10171/16532>

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<https://youtu.be/W4jR142elsg>

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