

Increasing brick recovery for reuse when procuring demolition services

Hjørring Municipality (Denmark)

Background

[Hjørring Municipality](#), located in northern Denmark, has a total population of around 67,000 people. In 2017, Hjørring's City Council adopted a new [Procurement and Supply Policy](#), which sets out a number of goals, including sustainability, environmental and energy requirements. In general, the municipality aims to reduce waste and CO₂ emissions, and use more sustainable materials in construction projects.

In 2018, Hjørring Municipality decided to embark on a pilot project that aimed to increase the recovery and recycling of bricks when procuring demolition services for two buildings, a former police station and one other building, which were both located on the same road and were at the end of their functional life. Once cleared, the sites will become part of a new climate adaptation project, which will include a new rainwater collection basin and recreational area at the site of the former police station.



Procurement objectives

In order to assess the resource recovery potential of the sites, Hjørring Municipality first carried out a feasibility study, including a thorough screening of the buildings for toxic substances like lead, polychlorinated biphenyl (PCB), heavy metals and asbestos, in order to ensure that all materials are properly accounted for and can be handled and disposed of appropriately.

The feasibility study and the subsequent development of the tender documents took three months. Hjørring Municipality decided to include both buildings in the same tender, allowing contractors to bid for both buildings together at a reduced price.

The requirements for dismantling bricks were created in collaboration with the municipal waste disposal company [AVV I/S](#), which has been working on the topic of increasing brick recycling for several years. AVV I/S also entered into an agreement with Hjørring Municipality to purchase the reclaimed bricks, which includes making a container available during the dismantling to collect bricks, and taking responsibility for transporting and emptying this container.

Criteria used

Subject matter of the contract:

Demolition service including selective dismantling of brick walls, and separation into individual bricks.

Technical specifications:

The following requirements for the recycling of bricks must be observed:

1. Bricks from the façade and back walls must be mixed during decomposition.
2. Each brick should be separated. No large blocks of masonry are acceptable.
3. If there is a basement and it is necessary to fill it in order to demolish the building, use the internal partitions (which are not suitable for recycling) for filling before removing the façade brick and back wall.
4. If it is possible to pull the masonry (partitions) away from the intermediate decks and use the bricks, it shall be done this way. If this is not possible, the contractor shall concentrate on the outer walls/bricks.
5. Interior partitions and bricks from ceilings are not suitable for recycling.
6. Only brick should be recycled. Other materials such as porous concrete/ aerated concrete and cement stone should be separated from the brick.
7. Bricks from the chimney are not used and must be handled according to the Municipality's environmental requirements.
8. Materials such as millstone and air dried clay are not desirable for recycling, but smaller quantities are accepted if they cannot be separated.
9. If materials are needed to reach the upper part of the building (sometimes to breakdown a building, it is necessary to pile-up rubble for machines to reach the upper parts), internal partitions – which are not suitable for recycling – should be used. If there is not enough rubble from internal partitions, bricks from a façade with lots of windows can also be used, as many of the bricks will already be cut in halves.
10. Bricks of all sizes can be used for recycling.
11. Bricks from below ground level cannot be recycled.
12. Paving stones can also be recycled, if they are taken from areas with loose soil or sand underneath.

It is expected that use can be made of a minimum 100 whole recycled bricks per tonne of rubble.

Award criteria:

Lowest price.

Contract performance clauses:

During the dismantling of the building, the contractor must document quantities of hazardous waste, contaminated waste and clean waste. When the demolition is complete, the final quantities of recovered materials and waste will be compared to the initial assessment.

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Results

Five contractors were invited to bid for this contract, and four bids were received. All bids were able to meet the standards, however, there was a large difference in the size of the bids, varying from 2 million to 3.4 million Danish kroner (around €270,000 to €455,000). The contract was awarded in February 2018. Work commenced in March 2018 and was completed by June 2018.

As this was a pilot project, Hjørring Municipality embarked on this procurement without knowing how much additional cost the requirement to dismantle and recycle bricks would add to the overall cost. As a result of supplier interest and competition, the Municipality found that dismantling requirements can be carried out at the same price level as traditional demolition.

Environmental impacts

Construction and demolition waste (CDW) accounts for approximately 20-30% of all waste generated in the EU. The [EU Circular Economy Action](#) highlights the importance of actions to increase the recycling and reuse of CDW waste, while the [Waste Framework Directive](#) (Article 11.2) states that by 2020, a minimum 70% (by weight) of non-hazardous construction and demolition waste shall be prepared for re-use, recycling or other material recovery. In reality, however, recovery of CDW varies greatly across the EU, from less than 10% to over 90%, and much work is needed to improve material identification, separation and recovery.¹

The environmental benefits of resource recovery are clear. For example, in Hjørring, the dismantling of the police station resulted in 14,900 bricks for recycling, and 7,000 were recovered from the second building. In total, this means more than enough bricks were reclaimed to build an average-sized single-family house (around 16,000 bricks). In addition, for every brick recycled, 0.5kg of CO₂ is saved², resulting in total savings of 10,950 kg of CO₂.

It may have been possible to recover a higher proportion of the bricks than was done in this pilot, which required the recycling of 100 bricks per tonne. This level, however, was set due to practicalities, such as the limited space around the building for storage containers, and due to the combination of brick and concrete used in one of the two buildings, which makes dismantling more difficult. Demanding a higher rate of brick recovery may have led to significantly higher prices.

As a result of this positive experience, Hjørring Municipality will continue to include requirements for the recycling of bricks from municipal buildings wherever possible, and will also explore how to incorporate recycling criteria for other building materials.

¹ http://ec.europa.eu/environment/waste/construction_demolition.htm

² <https://ec.europa.eu/environment/eco-innovation/projects/en/projects/rebrick>

Lessons learned

Not all buildings and not all bricks are suitable for recycling. The bricks need to meet a certain quality and must be free of toxic substances, and there needs to be space around the building for extra containers etc. Screening is therefore necessary to assess the recycling potential of a building, and procurers will need to make new tender documents from one project to the next.

Even after a detailed feasibility study, surprises can still arise. For example, the police station turned out to have a pile foundation of over 100 piles knocked into the ground, which was only discovered after demolition works had commenced. As such, a good practice is to include older people who were involved in the original construction (including craftspeople and city officials) in the feasibility study, as they can add extra details to a building's story, which may help with its deconstruction.

Protecting the public and workers from potential dangers is also important. The public is kept informed using tools such as social media and signs around the work area. There should always be a security zone around the building to protect neighbours from dust, noise and heavy machinery. Wind direction should be monitored, and demolition even stopped when necessary. The municipality's supervision of the work areas also includes making sure workers are wearing protective safety clothing, and that Danish labour laws are being complied with.

Finally, the building that bricks have been collected from should be recorded. Buildings are an important part of our cultural heritage, and selective dismantling helps keep a building's story 'alive'!

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For related information, please see European GPP criteria for [Office Building Design, Construction and Management](#) and the [Technical Background Report](#) and [Procurement Practice Guidance Document](#).