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Barriers and opportunities to reuse of building materials in the Norwegian construction sector

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Abstract: In spite of ambitious goals regarding implementing circular economy, many well-intended projects fail in practice. One essential question is how reuse of building materials from demolitions can be realized at industrial scale in the high-cost country of Norway? The paper points to barriers and opportunities for reuse of construction products and technical installations in Norwegian buildings. The technical, legislative and market barriers are interrelated and linked to 1) An undeveloped market due to lack of economic driving forces, 2) Lack of information about used construction products and 3) Inexpedient legislation that is not adapted to the sale and use of used building materials. Proposals for measures to increase reuse are linked to the legal framework, economic incentives, competence, information system/ marketplace, technical control and certification procedures as well as risk management. It is recommended to clarify and adjust the regulations relating to both the trading and the use of reused construction products. Also, it may be useful to study how other EEA countries deal with the challenges presented by the Construction Products Regulation. The study will be further followed up by the NHP-network, consisting of 15 Norwegian building industry organizations.

Keywords: materials, reuse, policies, regulations, measures

1. Introduction

Asplan Viak has been engaged by the NHP Network (National Action Plan for Construction Waste 2017-2020) to investigate technical, legislative, environmental and market barriers and opportunities for reuse of construction products and technical installations.¹ The project has been followed by a reference group.

The intention of the study is to give recommendations for implementation of measures to increase reuse of materials in the Norwegian construction industry within a legal and safe framework.

In the investigations, we have benefitted from our previous R&D work on the topic, as well as experience from building projects where we have contributed with consultancy on material reuse.

¹ <https://www.asplanviak.no/prosjekt/12652/>



A number of other Norwegian and international R&D and construction projects are also included in the knowledge base for the work. The working method has consisted of reviewing relevant material to find and structure responses to the given challenges.

2. Barriers

The technical, organizational and market barriers are interrelated and linked to;

- An undeveloped market for professional actors because it lacks economic driving forces. A construction process with used materials becomes complicated and expensive due to additional time for demolition and engineering and uncertainties related to product documentation.
- Lack of information about used construction products that will be possible to obtain, and with a time horizon that allows them to be included in the design of new buildings.
- A regulatory framework that is not adapted to sale and utilization of used building materials in new buildings.

Legal restrictions

- Products with hazardous substances should be removed from circulation and not reused.
- Used construction products that are traded in a market must, in the same way as new construction products, comply with the EEA Construction Products Regulation. Thus, product characteristics must be documented in accordance with the Norwegian Regulations on Documentation of construction products (DOK). For construction products with harmonized product standards, the products must be CE labelled and have a performance declaration. In practice, however, these requirements are not pursued with respect to used building materials.
- It must always be considered whether a construction product will contribute to fulfil the Building Technical Regulations (TEK) in the actual building where it is intended to be used. The responsibility for this belongs to the designing architect/ consultant and the performing contractor. [1]
- The properties of building products, new as well as used, should be documented before the product is used at a construction site.

3. Environmental drivers

The main drivers for increasing reuse of construction materials are national targets for reduced greenhouse gas emissions in buildings - and as a result; some demand for used building materials in the market. In addition to this, there is a general need for better management of resource flows, which is reflected in the EU Waste Framework Directive.

Reuse of building materials can potentially reduce greenhouse gas emissions from material production, transportation and waste management. Based on Statistics Norway's data base for generated waste from construction activity [2], it is assumed that 10% of the building waste can be reused in new buildings and rehabilitation projects (national perspective, top-down analysis). Since the demand for new building materials by far exceeds the amount of building waste, the reduction potential only amounts to around 2% compared with today's total emissions from production, transportation and waste treatment of all new building materials. The reduction potential per ton of material (project perspective, bottom-up analysis), however is about 94% with given assumptions. For a single project, therefore, reuse will potentially have a significant impact on the emission reductions.

When Norwegian buildings from the decades after World War II eventually reach their functional lifespan, the demolition rate will increase significantly. If good systems for reuse of building materials are being established, reuse could meet an increasing demand for building materials. The reduction potential for greenhouse gas emissions therefore has a significant potential in the decades to come.

4. Opportunities

4.1 The legal framework

- In TEK, the paragraphs regarding selecting reusable materials [3] can be strengthened and followed up with incentives. In addition, the requirement for mapping of hazardous waste prior to demolition may be expanded with a requirement for reuse auditing.
- Requirements for submission of waste plan can be made upon application for start-up instead of upon final reporting. This may allow for the advertising of the materials earlier.
- Protection status for construction components? This may be justified by both resource use and antiquarian considerations and may give rise to an obligation to reuse listed components in refurbished or new buildings or to make the components available to external actors.
- In order to achieve market change, possible policy instruments and regulations that come in addition, or as an alternative to existing ones, should be investigated. Relevant Norwegian references for this measure are the introduction of electric cars and renewable electricity production by solar cells, where separate tax regimes and privileges have been implemented.
- The Construction Products Regulation, which applies throughout the EEA, complicates the overall objectives of better resource utilization and reuse in the Waste Framework Directive. Norway could more actively participate in the process of revision of the Regulation and ensure that the Regulation does not prevent, but actually facilitates reuse.
- In the future, extended manufacturer responsibility may be imposed on more industries so that they provide material passports and takeback arrangements for materials.

4.2 Economic incentives

New tax structures/ fees and financial support through public innovation and demonstration programs can help businesses change their existing and often linear business approach. It may be that Enova (the Norwegian state-owned enterprise for energy efficiency improvements and development of low-emission society) can play a role as a funding agency also for reuse of building materials and for design of new buildings according to circular principles. VAT exemptions on repairs and sales of used goods could be another measure to promote the circular economy.

4.3 Competence and awareness

- Competence can be raised through pilot buildings and dissemination of experience and examples (guidelines/ courses), preferably in cooperation with educational institutions.
- In order to promote pilot projects, public developers can require a certain share of material reuse after demolitions as well as implementation of reused materials in new buildings.
- Developing national roadmap for transition to a circular economy by inviting large private and public builders to workshops or dialogue meetings.
- Establish a national competence center for collecting and coordinating the measures. A reference model for this is the Danish Knowledge Center for Handling and Recycling of Building Waste (VHGB)²

4.4 Information system / marketplace

- Establish an online marketplace, and post information about used materials that are, or will be available. This could possibly be a private-public cooperation where the authorities (through eg Enova) provide support for establishment and operation. A template for the information to be published should be coordinated, so that different actors and physical warehouses can be linked.
- In the municipalities, such an information system can be linked to waste management and waste plans for construction projects on the one hand, and need/ requirements for materials in the municipalities' own buildings on the other side. Possibly, local job training enterprises could contribute to the practical dismantling and sale of used building components.

4.5 Control, documentation and certification schemes

² <https://www.vhgb.dk/>

The authorities can, in cooperation with the construction industry, establish organizational units for the quality control, documentation and possible certification of materials. This can be established, for example, in private-public cooperation, and can be supported through incentive schemes. The system should be affordable and adapted for small enterprises, in order to enhance the competitiveness for reusing materials locally.

4.6 Joint risk management

A government agency could also be established for risk management. A reference for this measure is the Norwegian State Export Guarantee (GIEK). GIEK aims to promote Norwegian exports. Similarly, the authorities can support joint risk management for the sale and use of used construction products as part of introducing a circular economy.

5. Recommendations

We recommend that a number of parallel measures are pursued to meet the need for better resource management in the Norwegian construction industry. Small and larger steps can complement each other and be implemented by various actors.

There is a fundamental need to clarify and adjust the regulations relating to both the trading and the use of reused construction products. A guide should be drawn up for general documentation requirements for used construction products, regardless of whether they are to be traded or not.

If reuse of construction products and technical installations is to be increased, third party players need to enter the market and establish their own organizational units so that reuse can be detached from the ownership of individual builders and in single projects. The general requirement for CE labeling of construction products prevents reuse, as CE labeling is complicated and will be a severe cost-driver if implemented for all used construction components. Norway could more actively participate in the process of revision of the Construction Products Regulation within the EEA, and work for the regulations to actually be designed to promote reuse. It may also be useful to study how other EEA countries deal with these challenges.

6. References

- [1] Sintef 2014 Anbefalinger ved ombruk av byggematerialer.
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- [3] Byggteknisk forskrift (Tek 17) Kapittel 9 Ytre miljø § 9-5. Byggavfall.
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