

Reuse of cast-in-place concrete in load bearing structures - questionnaire

The questionnaire takes about 15 minutes to answer. The deadline for answering is the 26th of March 2023.

Background and purpose

This questionnaire is part of a master thesis that seeks to investigate barriers and drivers for reuse of cast-in-place concrete in load bearing structures (RC) in a new site. The research question is part of the project GjenOm, which is a collaboration between Trondheim municipality, NTNU, Sintef, Loopfront and Asplan Viak.

What does participation in the project involve?

Participants will be asked questions about their experience, meanings and general thoughts on concrete, reuse of building materials and reuse of cast-in-place concrete. They will also be questioned on some background information to establish the participants approach to the subject.

What will happen with the information you give?

Data is gathered only on the basis of this agreement with the participant. Participation is voluntary, and you can withdraw from the questionnaire at any time without having to give a reasoning for this. After the questionnaire is sent, the data is anonymized automatically. The data can then not be traced back to a single participant, meaning that withdrawal is no longer possible.

Steinar Valbø, supervisors Gearóid Lydon and Pasi Aalto from NTNU and external supervisors Henriette Mo Sandberg, Jill Saunders and Terje Kristoffersen from Asplan Viak are the only ones with access to the raw data from the questionnaire. When published, the participants will not be recognisable by name. For questions or comments regarding data gathering, please contact NTNU's "personvernombud", Thomas Helgesen (thomas.helgesen@ntnu.no) or "databeskyttelsestjenester" at Sikt (<https://www.nsd.no/personverntjenester/>). Any participant can send a complaint to "Datatilsynet". The project is planned to end within 01.07.2023. After this date, only fully anonymized data is stored securely. NTNU is responsible for the storage of data. For questions regarding the project, please contact Pasi Aalto at +47 98025519 or pasi.aalto@ntnu.no.

By pressing "Send" at the end of the questionnaire you are giving your consent to the publication of your anonymized answers.

1. Background information

1.1. What is your age?

Your age, between 18 and 65, as a whole number.

1.2. What is your gender?

Female

Male

Other

Prefer not to respond

1.3. What country are you employed in?

Norway

Other:

1.3.1. If other, what country is this?

This element is only shown when the option 'Other:' is selected in the question '1.3. What country are you employed in?'

1.4. What is your role in the planning process of a project?

Choose up to three fields that are relevant for your role in the planning process.

Client
Design
Structural analysis
Quantity surveyor
Logistics
Finances
Demolition
Material sourcing
Main contractor
Sub contractor
Other:

1.4.1. If other, what role is this?

This element is only shown when the option 'Other:' is selected in the question '1.4. What is your role in the planning process of a project?'

1.5. What type of structures have you been involved with?

Buildings under 5 floors
Buildings over 5 floors
Infrastructure
Landscaping
Other:

1.5.1. If buildings under or over five floors, what type of buildings were these?

This element is only shown when the option 'Buildings under 5 floors or Buildings over 5 floors' is selected in the question '1.5. What type of structures have you been involved with?'

Commercial
Residential
Mixed use

1.5.2. If infrastructure, what type of structures were these?

This element is only shown when the option 'Infrastructure' is selected in the question '1.5. What type of structures have you been involved with?'

Bridges
Roads
Large scale public works (sewers, water conduits etc.)

1.5.3. If other, what type of structure was this?

This element is only shown when the option 'Other:' is selected in the question '1.5. What type of structures have you been involved with?'

1.6. Have you worked with reuse of building materials in a new site before?

Reuse of building materials in a new site refers to building materials that are taken from an old building that is deconstructed/demolished and reused in a new building.

Yes, in load bearing structures
Yes, but not in load bearing structures
No

1.6.1. If in load bearing structures, what materials did you reuse?

This element is only shown when the option 'Yes, in load bearing structures' is selected in the question '1.6. Have you worked with reuse of building materials in a new site before?'

Wood

Steel

Concrete

Brick

Other:

1.6.2. If other, what components or materials did you reuse?

This element is only shown when the option 'Other:' is selected in the question '1.6.1. If in load bearing structures, what materials did you reuse?'

2. Concrete as a building material

2.1. With current regulations, to what degree do you see the emissions from the use of concrete as a limiting factor in the planning process of a project?

By limiting factor, it is referred to your freedom to choose materials, the amounts thereof and how they are used.

Concrete is here referring to all forms of concrete based products (cast-in-place, pre-cast, hollow core etc.).

On a scale from 1 to 5, where 1 is no limiting factor and 5 is a significantly limiting factor.

2.2. To what degree do you believe new cast-in-place concrete will be used in the sustainable building industry of the future?

On a scale from 1 to 5, where 1 is not at all and 5 is a lot.

2.3. If you have any additional comments on concrete as a building material, please share them below:

3. Reuse of building materials

3.1. How do you perceive the building industry's view on reuse of building materials today?

On a scale from 1 to 5, where 1 is very negative and 5 is very positive.

3.2. How do you think the efficiency of planning/building with reused materials will compare to planning/building with virgin materials in the future?

By efficient it is referred to the resources spent on a project (time, money, materials etc.).

On a scale from 1 to 5, where 1 is less efficient and 5 is more efficient.

Imagine a scenario where a system for buying and selling used building components exists and is actively used in the building industry. The components are gathered at a local storage facility and are sold with all necessary documentation, ready for use.

3.3. To what degree would this change the amount of reused building components you include in your projects?

On a scale from 1 to 5, where 1 is not at all and 5 is a lot.

3.4. Who should be financially responsible for providing such a system?

Public organ

Contractors

Planners

Shared between the above

3.5. If you can think of another solutions to the challenge of sourcing used materials, please share them below:

4. Reuse of RC (cast-in-place concrete in load bearing structures)

4.1. To what degree do you see reuse of RC as feasible in today's building industry?

On a scale from 1 to 5, where 1 is not at all and 5 is highly feasible.

4.2. As of today, to what extent do you see barriers (1) and drivers (5) in the following categories for the reuse of RC?

On a scale from 1 to 5, where 1 is large barriers and 5 is significant drivers.

Regulations

1

2

3

4

5

No opinion

Cost of reused materials

1

2

3

4

5

No opinion

Cost of labour

1

2

3

4

5

No opinion

Design

1

2

3

4

5

No opinion

Structure

1

2

3

4

5

No opinion

Logistics

1

2

3

4

5

No opinion

Sourcing

1

2

3

4

5

No opinion

Documentation of sourced materials

1

2

3

4

5

No opinion

Emissions

1

2

3

4

5

No opinion

Knowledge

- 1
- 2
- 3
- 4
- 5
- No opinion

Attitude/motivation

- 1
- 2
- 3
- 4
- 5
- No opinion

Time

- 1
- 2
- 3
- 4
- 5
- No opinion

Other:

- 1
- 2
- 3
- 4
- 5
- No opinion

4.2.1. If other, what barriers and/or drivers would this be, and how would you range them on a scale from 1 to 5?

Seperate your barrier or driver and your grading of it by a comma.

4.3. How would the following RC elements be suited for reuse regardless of end-use?

Regardless of end-use, meaning that, for example, a floor divider could be reused as a slab on ground (down-cycling).

On a scale from 1 to 5, where 1 is not suited and 5 is highly suited.

Load bearing walls

- 1
- 2

3

4

5

No opinion

Columns

1

2

3

4

5

No opinion

Beams

1

2

3

4

5

No opinion

Floor dividers

1

2

3

4

5

No opinion

Slabs on ground

1

2

3

4

5

No opinion

Foundations

1

2

3

4

5

No opinion

Other:

1

2

3

4

5

No opinion

4.3.1. If other, what building element would this be, and how would you range it on a scale from 1 to 5?

Seperate your building element and your grading of it by a comma.

4.4. How would the following RC elements be suited for reuse, where the end-use is the same as initially intended use?

End-use same as initially intended use, meaning that, for example, a floor divider is reused as a floor divider.

On a scale from 1 to 5, where 1 is not suited and 5 is highly suited.

Load bearing walls

1

2

3

4

5

No opinion

Columns

1

2

3

4

5

No opinion

Beams

1

2

3

4

5

No opinion

Floor dividers

1

2

- 3
- 4
- 5
- No opinion

Slabs on ground

- 1
- 2
- 3
- 4
- 5
- No opinion

Foundations

- 1
- 2
- 3
- 4
- 5
- No opinion

Other:

- 1
- 2
- 3
- 4
- 5
- No opinion

4.4.1. If other, what building element would this be, and how would you range it on a scale from 1 to 5?

Separate your building element and your grading of it by a comma.

4.5. If you are paying attention to the questionnaire, please choose the option four on the linear scale.

This question is asked to ensure that the participant is not answering questions at random and ensure reliable data.

On a scale from 1 to 5, where four is the only correct answer.

4.6. What would be the expected average price of a reused component compared to new RC?

100% refers to the price of one unit of new RC.

- Lower
- Equal
- Higher (-150%)
- Significantly higher (150-%)

4.7. What would be an acceptable average price of a reused component compared to new RC?

100% refers to the price of one unit of new RC.

Lower

Equal

Higher (-150%)

Significantly higher (150-%)

4.8. How would the collaboration between client, architects, engineers, and contractors change in a planning phase where reused RC is being used?

4.9. What information about the RC that is to be reused would be necessary for you to do your part of the planning process in a project?

4.10. If you have additional thoughts and opinions on reuse of RC, please share them below:

By pressing "Send" you are agreeing to the following:

I have received information about the project and I am willing to participate. Jeg agree to data being collected, analyzed and published anonymous. Further, i agree to being confidential about the project to ensure non-partial conditions for every participant.