

Keeping it circular

Conversion and deconstruction-friendly planning

The aim of the circular economy is to reuse components, products and building materials for as long as possible and then recycle them in a high-quality process. Waste that has to be disposed of is thus largely reduced and avoided as far as possible in the long term.

This checklist is an extract from the knowledge module "Keeping it circular". Further information can be found here: wissensstiftung.eu/en/knowledge-nuggets/keeping-it-circular

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Checklist:

Conversion and deconstruction-friendly planning

In summary, the following checklist provides an overview of relevant issues that building owners and planners should consider during the entire planning process with regard to deconstruction. Of course, the complexity of this process and the dependencies of building projects on location, typology, etc. cannot be adequately represented here. The checklist is therefore neither complete nor exclusive, but is intended to serve as an orientation and impulse for planners and to support them in considering and integrating deconstruction capability in the respective planning and life cycle phase.

Basic evaluation/preliminary planning

Informing the client about the advantages of a circular construction method

Comparison of circular and conventional construction methods

- Can I convince the client by informing him about the aspects of risk avoidance and future security (with regard to future developments), health (freedom from pollutants), comfort (user comfort and convertibility) and the disposal problem?

- Can a deconstruction and recycling-friendly construction method, i.e. the use of sustainable and preferably pollutant-free building materials as well as a flexible and separable construction method, be defined as a premise for planning?

Using sustainability as a design element and appreciating existing buildings

Promoting the visibility of sustainability in the built environment

- Can I achieve identification with the building and create lasting value by preserving what already exists (if any)?

- Does the planning of the deconstruction of any existing building fabric aim to maximize its use and recycling? (Note: A corresponding DGNB certificate is currently being developed).
Can my building serve as a model for other planners or builders?

Check the reuse of components, building elements and the use of secondary raw materials at the start of the planning process and ideally integrate them into a holistic concept

- Have I involved all the key experts who can contribute to a circular construction project in the planning process?

- Can possible areas that allow the use of reused components or secondary raw materials be identified in the initial planning discussions?

- As a planner, do I have sufficient product knowledge?

Consider time and cost factors and check existing offers

Check availability of used components

- o What quantities are available or required?
 - o What specific applications are possible in the project?
 - o For small quantities or in the private sector: Is there a component exchange that can provide information and has suitable components in stock?
 - o For the historical sector: Can historical building material dealers supply the required components?
 - o supply the required components?
 - o Are there any buildings in the region that will soon be demolished?
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Are there system components from series production with formats suitable for the project?

Is it already known before removal where and how the component will be used in the future?

Are certain components or materials already offered by manufacturers for reuse?

Alternatively: Can manufacturers recondition reused components and restore the warranty for these components?

Check availability of secondary raw materials

If building fabric to be demolished is available: Can this serve as a source of secondary raw materials for the new building in the same location? Is it possible to recycle the mineral deconstruction materials on the construction site or locally?

Can my need for secondary raw materials be covered alternatively via (regional) trading centers for secondary raw materials or other offers?

Check the possibility and usefulness of using the available components and secondary raw materials in the specific project

Are any deconstruction materials that can be extracted from the existing building technically suitable for use in the new building?

Have I identified the most relevant components and materials (criteria: mass, replacement quantity, material value) and examined the use of alternatives for these?

Does the use of alternatives make sense after weighing up the effort (including requirements, service life, availability, costs) and benefits?

Calculate costs taking into account the entire life cycle

Have I provided the client with a life cycle cost calculation as a basis for decision-making? Does this also take into account the disposal costs during operation (conversion, modernization, change of tenant)? (Note: For methodology, see DGNB System for New Buildings and Interiors).

Can my demand for secondary raw materials be covered alternatively via (regional) trading centers for secondary raw materials or other offers?

Design and implementation planning - building level

Include future deconstruction in the planning and prepare as best as possible

Consideration of the deconstruction hierarchy in the planning ("start from the end") and provision of scenarios that can occur after the loss of the original function of the building. Comparison of circular and conventional construction methods.

- Have I prepared for future reuse and recycling as comprehensively as possible?

- Does my planning allow for the separation of components and building materials by type and high-quality recycling? (Assessment according to DGNB criterion TEC1.6 Circular Construction or similar instruments, e.g. level(s) see p. 30)

- Have I carried out a life cycle assessment calculation and ensured that the environmental impact is kept to a minimum, especially if further use is unlikely and/or recycling of the components and building materials is not possible?

- Have I planned in such a way that the removal and replacement of components that are frequently replaced (e.g. interior walls, floor coverings) can be carried out as smoothly as possible?

Provide recycling-oriented documentation

- Is the creation of a material or building passport planned?

- Does the documentation (in analog or digital form) include the following aspects?
 - Material flows (quantities, bill of materials)
 - Installation location (location/component/layer structure; see also DGNB criterion ENV1.2 Risks for the local environment)
 - Periods of use
 - Possible recycling and disposal routes, including identification of harmful and hazardous substances
 - Connections with other components or layers
 - Product data sheets for the products and materials actually used

- Can I use BIM in the planning phase and hand over an "as built" model to the client or facility manager after completion?

Design and implementation planning - building level

Include future deconstruction in the planning and prepare for it in the best possible way

Consideration of the deconstruction hierarchy in the planning ("thinking from the end") and provision for subsequent scenarios that may occur after the loss of the original function of the building. Comparison of circular and conventional construction methods.

- Have I reduced the complexity of my construction project as much as possible, e.g. by using traditional joining techniques and/or temporary structures?

- Is the design neutral in terms of use and does it allow a high degree of flexibility with regard to further use?

- Has the number of layers been reduced to the necessary minimum?

Separability

- Can the structure actually be easily dismantled and separated according to type? Are the fasteners accessible? Can the connections be loosened again after years of building use?
 - Can the number and types of fasteners be reduced to a minimum?
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Modularity

- Can selected components be prefabricated?
 - Can standardized serial formats be used that promote further, later use (possibly supported by digital options)?
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Ease of repair

- Are the installations easily accessible (e.g. via a service cabinet/shaft) so that they can be converted, repaired or replaced during operation? Are repair instructions from the manufacturer available?
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Calculate costs taking into account the entire life cycle

- Have I provided the client with a life cycle cost calculation as a basis for decision-making? Does this also take into account the disposal costs during operation (conversion, modernization, change of tenant)? (Note: For methodology, see DGNB System for New Buildings and Interiors).
 - Can my demand for secondary raw materials be covered alternatively via (regional) trading centers for secondary raw materials or other offers?
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Design and implementation planning - material level

Checking and realizing implementation options

Comparison of service lives and sequence of possible refurbishment measures

- Have the service lives of the building materials used been coordinated so that no intact building materials or components need to be damaged during future refurbishment measures?
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Monomateriality

- Have I limited myself to as few different materials as possible and are these coordinated with each other? Have I taken into account the environmental impact and have I prepared a separation by type if materials need to be combined?
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Harmful and hazardous substances and quality of the materials used

- Do the materials used retain their value and generally enable high-quality recycling at a later date?
 - Are the building materials used as low in pollutants and emissions as possible? Do they not contain any substances that are likely to be banned? (Note: For the assessment of a possible restriction of recyclability due to harmful and hazardous substances, see the DGNB criterion TEC1.6 Circular construction)
 - Do the manufacturers of the installed products take them back at the end of their service life? If so, do the take-back declarations indicate the expected recycling route? Do processes already exist for manufacturer take-back? Have appropriate logistics been set up or planned?
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Tendering and contracting

Define clear requirements

Formulate objectives

- Has the client formulated a clear objective (e.g. "No waste leaves the construction site") to guide planning, tendering and awarding?
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Include aspects of reuse, deconstructability and recycling in the invitation to tender

- Have I integrated the reuse of building components and the use of secondary raw materials into the tender? (Note: DGNB criterion PRO1.4 "Ensuring sustainability aspects in tendering and awarding" shows various ways of integrating recycling-oriented requirements).
 - Have I integrated the aspect of deconstructability into the invitation to tender (e.g. via a detailed description of the planned reversible fasteners and construction methods in the individual items)?
 - Can I tender for selective deconstruction with the aim of recycling mineral deconstruction waste and formulate the strict separation of recyclable materials and, if necessary, laboratory analyses in the list of deconstruction services?
 - Can I specifically exclude harmful substances (e.g. by integrating requirements in accordance with DGNB criterion ENV1.2 Risks to the local environment in the individual service items of the tender or by using certified products)?
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Involve manufacturers, deconstruction and recycling companies

- Can I use the tender to motivate or even oblige deconstruction companies to cooperate with (local/regional) recycling companies and help to ensure that those involved in the project coordinate closely? Alternatively: Are there regional deconstruction companies that carry out recycling themselves (e.g. for mineral deconstruction materials on the construction site or close to the site)?
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Require documentation of product knowledge

- Does the invitation to tender include the obligation to prepare recycling-oriented documentation?
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Construction supervision and documentation

Checking the implementation of planning

Ensure correct construction and documentation

- Has it been ensured that, in the event of selective deconstruction, the waste is separated by type on the construction site and prioritized for reuse or recycling (check compliance with the Commercial Waste Ordinance)?

- Has it been ensured that only components and products were installed in accordance with the tender?

- Was the ability to dismantle restricted during the construction phase (e.g. due to time or cost pressure)? Was all information on component and material properties as well as possible further use and recycling routes documented in accordance with the products actually installed? (Note: DGNB criterion ENV1.2 Risks for the local environment requires that implementation on the construction site be monitored by means of a suitable process and corresponding protocols).

Commissioning and use

Promote acceptance

Create acceptance among users and other stakeholders

- Can I increase acceptance among users through proactive communication and promote building use in line with the planning (e.g. through introductory events, user guides, explanation of the concept of reuse)?

Conversion/deconstruction

Prepare the highest possible utilization of resources

Question deconstruction

- Can deconstruction be avoided through conversion and/or refurbishment?

Prepare for further use and recycling

- Can a later use be determined for a large part of the materials before deconstruction and thus prepare for appropriate further use or recycling?

Obtain an expert opinion

- Can the proportion of deconstruction waste to be landfilled be reduced by having an expert assign the components to the waste fractions prior to deconstruction?
