

“The housing construction chain in motion: a systems approach to accelerate the transition to a circular housing construction system based on circular and conceptual building”

Summary

One of the sectors that has a large share in reaching the climate targets is the built environment. The Climate Agreement that is presented in 2019 shows that they are one of the sectors that should urgently reduce their emissions. Nonetheless, there is a blind spot in tackling the CO₂ emissions in the built environment: more than one third of all CO₂ is emitted during construction and maintenance of buildings. This is problematic, since the Netherlands has a large national task to accelerate housing construction to around 100,000 homes per year. To take these aspects of sustainable and affordable development into account, it is essential to reconcile the climate goals and the housing task.

The principles of the circular economy make this concept a relevant means to the goal of housing construction in line with the climate targets. The transition to a circular construction system has started, with an increasing number of housing construction projects that include principles of circular and conceptual building (CCB). Even though the first steps in CCB have been taken, the current Dutch housing construction system is still largely embedded in its traditional, linear system. Large-scale CCB not only requires an innovative construction perspective but entails a transition in the entire housing construction system. All actors in housing construction are part of this transition, each having their own role and interests. Altogether, accelerating the transition to a circular housing construction system to make CCB the new standard is a major challenge.

This thesis attempts to understand the barriers and enablers that the actors in housing construction experience in the transition to a circular housing construction system, to find out what they need to make CCB the standard in new-build. Accordingly, the aim is to understand what support actors in the housing construction system require to accelerate the transition to a circular system based on CCB. The final objective is to deliver a practical tool that present-day actors in housing construction could use if they engage in CCB and wish to accelerate the transition to a circular system. The study has adopted a systems approach that understands housing construction as a socio-technical system. A ‘system of systems approach’ serves as a conceptual framework for this study. Transition theory is used as a research frame for analyzing the process from one socio-technical system to another. Transition theory allows for determining the stage of the transitions, so that interventions could be tailored to facilitating the desired change in that stage.

The key findings of this study show that the transition to a circular system based on CCB is not particularly a technical challenge, as little barriers were identified on the technical capacity for this transition. Rather, it is a social challenge that requires cultural change in the housing construction sector. The success of the transition to a circular system based on CCB lies in the collaboration between actors in the housing construction chain. There are too many dependencies in the housing construction chain to unilaterally place the responsibility for circularity on one actor. Therefore, transactions and negotiations between the actors should make place for collaboration. More collaboration leads to an integral approach and ultimately to achieving the climate targets. All actors must make the transition from a linear to a circular system their common goal, and each actor should fulfill a role with corresponding tasks and responsibilities in the collaboration for the transition to a circular system. That is the basis for the tool: collaboration for a circular system based on CCB, that is presented in this thesis (p.83). The tool is developed for municipalities, project developers, architects, contractors, housing corporations and (institutional) investors as actors in present-day housing construction. The tool elaborates on the role that each of these actors could fulfill in a circular system, including their responsibilities and practical suggestions.