Chapter 12
Motivation for Doing a Sustainable Building Refurbishment from a Norwegian Building Owner's Perspective

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Abstract Norway aims to be a part of the European Green Deal where refurbishing and renovating buildings is an important action towards sustainable development to reach national and global SDG. This paper aims to shed light on what motivates the building owner to do sustainable building refurbishment (SBR) and discuss strategies that promote further SBR. This is examined through a scoping literature review and in-depth interviews of public and private property owners in the southeast of Norway. This study confirms that the first and foremost motivations of doing a SBR are cost-driven, technically, and regulatory-driven. Secondly, environmental aspects have the potential to be a motivator due to future changes in terms of demands of doing climate gas calculations and the implementation of the EU's taxonomy. Social aspects such as user demands and user involvement are discussed but not found as a motivation in itself. However, for historical buildings, the willingness to invest and find sustainable solutions is more likely to be true, as historic buildings are important for the identity and attractiveness in their neighborhood. The findings suggested that stricter regulations and higher demolition fees, climate gas calculations and life cycle cost demands, and EU's taxonomy are likely to further promote SBR.

Keywords Sustainable building renovation · Sustainable refurbishment · Adaptive reuse · Adaptability · Historic buildings

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12.1 Introduction

In the last decades, Norwegian cities put a lot of effort into achieving emissions reductions by setting visions, policies, strategies, and actions. According to the UNFCCC Paris Agreement at COP 21 in 2015, targeting the limitation of the global temperature increase by 2050, a fast transition to renewable and fossil-free energy is required and reducing the energy demand. As the building sector accounts for approximately 28% of total energy-related CO_2 emissions, there is a vast potential for sustainable renovation/refurbishment of existing buildings (Temeljotov & Lindkvist, 2021). The Buildings Performance Institute Europe emphasizes that 97.2% of the building stock is currently not in the energy performance A class and should be upgraded. Even though some barriers and drivers for sustainable renovation/refurbishment (SBR) have been studied broadly (Jensen et al., 2022), there is still a need to develop new instruments to increase the volume of SBR and methods to evaluate such instruments, especially from the perspectives of building users. This social viewpoint is critical as there is a need for more research that can support a pull from the demand side, including building owners, facilities managers, and end-users, to disclose and drive unfulfilled needs and new opportunities (Temeljotov & Lindkvist, 2021).

SBR is relevant to meet the UN Sustainable Development Goals (SDGs) (Jensen & Maslesa, 2015; Jowkar et al., 2022). SBR is an action that supports SDG 11, protection and securing cultural heritage and negative impact on the environment, and SDG 12 by reducing the primary energy consumption and affecting the circular economy.

Although accelerated investment in energy retrofitting of the existing buildings is supported (EPBD 844, 2018), the challenge of climate resilience at the building level is still high (Kristl et al., 2020). Therefore attention should be focused on creating adequate guidelines for SBR of the existing stock adapted to future climatic conditions and user (owner and end-user) inclusion. The EU emphasizes the involvement of citizens in the generation of renewable energy, which can increase social acceptance and thus enable the low carbon energy transition (Hauge et al., 2019). In Norway, the White Paper 13 (2010–2011)-Active Ownership, mentioned that "Utilization, renovation, and refurbishment of existing buildings rather than the construction of new buildings have a most significant effect on the environmental carbon footprint."

A dilemma to renovate or demolish was discussed in many articles. The conclusion is similar that three primary decision-making criteria still exist: cost-driven, technical building conditions, and regulatory aspects (Alba-Rodríguez et al., 2017; Bullen & Love, 2011; Shah, 2012). Hagen and Sørstrøm (2021) consider the higher investment risks of many refurbishment projects due to unknown factors revealed. While the economic aspects are still a significant driver (high risk and high economic profit), the ecological and societal impact assessments are becoming more critical in reducing the carbon footprint and developing facilities that add value to the owner and the end-user's well-being. SBR is a necessary action to lower the

building's carbon footprint. According to Hopkinson et al. (2020), building products associated with environmental benefits have a massive potential to reuse and redesign existing building products.

The European Green Deal focuses on transforming into a sustainable and circular economy by reducing greenhouse gas emissions and pollution. Furthermore, health, life quality, and the generation of new workplaces will also be focus areas (The European Green Deal, 2019). The taxonomy is one of the cornerstones of the EU Action Plan for Sustainable Financing is the introduction of EU taxonomy, a classification system with criteria that define whether an action or a project investment is considered green or sustainable, thereby reducing the risk of greenwashing and steering private capital in a green direction. The taxonomy is also introduced to Norway by January 2022 in large enterprises. This year will be profound to implement knowledge, a standard syllabus, and adjusted terminology relevant to Norwegian property owners, investors, and developers.

Although the taxonomy is initially aimed at the financial sector, it will impact large parts of the market, including buildings and construction (Finansdepartementet, 2021). In terms of SBR and energy efficiency, it is mentioned in the report *that* taxonomy should focus more on the "production phase" and the "recycle phase" of the life cycle to improve carbon print and achieve better total energy efficiency through the entire life cycle. To overcome the cost-driven approach of developing a building to adaptive reuse or a SBR, the taxonomy is seen as a solution to prioritize the upgrading and modernization of existing buildings.

One of the measures discussed in The European Green Deal is to initiate a wave of renovation in the construction sector, referred to as a "renovation wave" (The European Green Deal, 2019). This is due to the great need to take measures on existing and inefficient buildings. Today, the energy-efficient renovation rate in Europe is 1%. In addition, only 0.2% of European building stock undergoes deep renovations, where energy consumption is reduced by at least 60%. The goal is to double annual energy-efficient renovations in Europe by 2030 (European Commission, A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives, 2020).

This paper looks at Norwegian property owners' motivation to do a sustainable building refurbishment (SBR) or adaptive reuse supporting sustainable development. We focus on the owner's decision base before doing a SBR and discuss the need for new strategies to be taken in the future in terms of achieving SDGs 11 and 12 at a national level.

12.2 Research Methodology

The aim of this paper is to understand the motivation and decision base of Norwegian building owners' motivation of doing a SBR. This was done in two steps. First, a scoping literature review was conducted looking at the drivers of doing an adaptive reuse of buildings in terms of sustainability. Secondly, the list was tested on a

Table 12.1 Characteristics of informants interviewed

Role	Informants	$N = 18$
Private property owners	Norwegian private property owners that develop properties for rent in Southeast Norway	14
Public property owners	Oslo Municipality, Oslo University and Statsbygg	5

selection of property owners, the Norwegian Green Building Council members. As members, they are first and foremost interested in the Green Shift and contribute toward sustainable development in society. The information among the property owners was collected by semi-structured in-depth interviews. The informants were asked questions about what motivates them to do SBR and confronted with the list found from the literature. Their attitude toward doing SBR, as well as the challenges that they experienced, was explored. In this paper, we focus on the motivation of doing SBR and discuss what is suggested to be important strategies to promote SBR in the future. The findings from the interviews were analyzed and discussed compared to the findings in the literature. The interviews were conducted over a 3-month period in Spring 2021. The following characteristics of the informants are presented in Table 12.1.

12.3 Literature Review

12.3.1 Sustainable Building Renovation and Refurbishment (SBR)

ISO's definition of a sustainable building is "a building that creates the required performance and functionality with minimum environmental impact and at the same time encouraging improvements in economic and social as well as cultural aspects at local, regional and global levels" (ISO 15392:2008, *Sustainability in Building Construction — General Principles*, 2008).

So, when sustainable building renovation or refurbishment (SBR) is discussed, it addresses the renovation or refurbishment actions that will improve the building performance to satisfy the users' needs both socially, functionally, and environmentally. The actions taken should lower the carbon footprint and optimize the building performance in terms of usability, functionality, and energy efficiency.

Graabak et al. (2014) highlighted the importance of increasing the focus on the principle of sustainable development of today's buildings as the building technical requirements for the buildings continue to increase. The main purpose of the principle of sustainable development is to look at the building's opportunities to meet the current and future needs for the construction's purpose. At the same time, they are having positive impacts on the building's stakeholders, such as building owners and users, by looking at the conditions of the environment, the economy, and the

social developments in context. By putting these three areas in context, one can ensure that important aspects are considered when designing and building and when the building is used, which will prevent a unilateral focus on, for example, conservation in the rehabilitation of protected buildings (Graabak et al., 2014).

According to the report prepared by Selvig (2011), listed inhabitants were having difficulties rehabilitating their assets to the current energy standard and achieving as good energy efficiency as new buildings. The purpose of the report is to show the impracticality to require equal energy requirements for new and older houses to achieve reduced energy demand from the building stock. This is illustrated by comparing greenhouse gas emissions from an older protected building with high energy consumption in the operational phase with a new low-energy building where greenhouse gas emissions from the production of the building are included. The report showed which of the buildings contributes to the highest greenhouse gas emissions. Selvig (2011) mentions that experience in this area indicated that energy use in the operational phase of a protected rehabilitated building is higher than that of a low-energy house. However, existing buildings are already built, and emissions per year from building components are thereby low, seen over the life of the building. In addition, rehabilitation of an existing building will result in lower energy use than when new buildings are built, as emissions from the production of the new materials are already included and negligible emissions from material transport. One way to reduce greenhouse gas emissions in the protected building can be by changing the energy used in the operational phase or reducing or changing the energy supply. The report also sheds light on the level of energy efficiency that the building must have for greenhouse gas emissions for both types of buildings to be as equal as possible.

The study showed that greenhouse gas emissions due to the operation of the building could be compensated by the low emissions from material use when renovating the listed building. If a protected building is required to achieve the equivalent amount of greenhouse gas emissions as for a low-energy house, or lower, energy sources that affect greenhouse gas emissions must be used to a lesser extent. This can be done by replacing energy sources that use oil, gas, and electricity with renewable energy sources that use bioenergy, solar heat, and heat pumps (Flyen et al., 2019).

The criterion for constructing new buildings depends on the national definition of nZEB. The threshold values for nZEB vary within the EU by between 20 and 100 kWh/m2 per year. This can cause significant differences in how many buildings can fulfill the activity from one country to another. An unfortunate effect of this may be that investors will add investments to countries where the requirements are less stringent since it will provide “greener” portfolios for their own business (Schütze & Stede, 2020). There is no national definition of nZEB for all EU member states (Raux & Fischer, 2021), which is a major challenge. Soares et al. (2017) argue that the biggest challenge associated with developing the nZEB definition lies in the balance between reducing energy consumption and efficient energy systems and suitability for renewable energy production.

12.3.2 The Circular Economy

The scoping literature review searched for what drives building owners to SBR. The literature says it is necessary to transition to a circular economy to achieve the UN Sustainable Development Goals (SDG). The circular economy is about the more prudent and efficient use of resources (Kvale & Norang, 2021). On 11 March 2020, the EU's new circular economy action plan was introduced and became an integral part of the European Green Deal to ensure a cleaner and more competitive Europe. The construction industry is highlighted as one of the most critical sectors for achieving these goals, and a separate strategy for the sector is addressed. More efficient use of materials, longer life spans, more recycling, and better waste sorting were decided to be implemented (The European Green Deal, 2019).

Sandberg and Kvellheim (2021) reviewed several research articles and documents to understand the circular economy In Norway. They concluded that new buildings must be designed with a high ability to handle changes using materials and building components that easily can be reused and demounted. One of the challenges is that the contractors do not consider that the component should be dismantled and reused one day. However, one practice that has changed in this concern is that it is common to screw the beams together rather than nail them (Sandberg & Kvellheim, 2021). As long as components and building parts are not designed for reuse, there will be a cost related to demounting the parts of the building. Another challenge is the logistics and storage for those components, which require new knowledge and competencies in the whole value chain. Sandberg and Kvellheim (2021) believe there is a future market for environmental consultants and dismantling assessments and demolition contractors.

12.3.3 Adaptive Reuse

Refurbishment is about putting older buildings, building parts, technical facilities, and objects in usable condition, adapted to current regulatory and user requirements, but without changing functionality, including repair, restoration, upgrade, and floor plan construction. Adaptability is the characteristics of a building to meet the requirements for functionality and the building's authenticity flexibility (Finansdepartementet, 2008). Adaptability and usability are important elements in sustainable upgrading and rebuilding. Buildings with poor functional suitability combined with poor adaptability constitute a significant challenge. Many such buildings may need to be demolished. A small, adaptable building, which is suitable today, will develop into unsuitable and can hardly be justified to upgrade from a sustainability perspective. According to Finansdepartementet (2008), one can make a technical upgrade in a short-term outlook for such buildings. However, an incompatible building with high adaptability can be refurbished sustainably.

The reuse of building parts and materials can be cost-saving. There may be a profit potential in reuse, but at the same time, it is pointed out that anything that delays the construction process has little value. The price and availability of matching building materials/parts have been identified by Bullen (2007) as a barrier in the conversion project. This is also in line with the findings of Sandberg & Kvellheim (2021), as the prices of new building materials have stayed relatively low. This view is also supported by the fact that several problematic technical regulations stand in the way of reuse and that strict technical requirements are often disproportionately resourced intensive. The decision-making authorities' priority between safety considerations and technical requirements appears particularly unclear in buildings with protective status.

Before deciding on redevelopment, builders are advised to strategically assess whether the building should be refurbished in the first place. The principles of sustainability should form the basis for this. High rebuilding costs may indicate that the building is not adaptable and therefore not suitable for sustainable redevelopment. Possible ways to regulate this can be by increasing demolition fees, requiring a demolition plan to document the reused materials and components, stricter regulations for sorting waste, and economic incitements for reusing materials in other projects (Klungerbo & Sørland, 2021; Prabowo et al., 2021). According to Ali et al. (2018), redevelopments' economic, social, and environmental benefits have made it an increasingly popular alternative to demolition and new construction. However, rehabilitation work is often risky and uncertain, and the result is generally less planned and more challenging to control than is the case for new construction.

Consequently, more coordination and different planning and control methods, tools, and techniques must be established (Jensen et al., 2022). Ali et al. (2009) note that rehabilitation work is often completed at high cost and time variations. One of the main reasons for this is the late discovery of design information. The building owner should strengthen the information base before construction starts (Ali et al., 2009). One familiar reuse project in Norway, called KA13, is seen as a role model project with great success. They identified that the major challenge is time and resource-demanding to collect information about the products' properties, qualities, and hazardous environment content. They also experienced that the components and building parts are not designed for dismantling and that it is too demanding to plan and demount components and products for reuse. They experienced that the industry is not mature enough to handle circularity reuse processes (Hagen & Sørstrøm, 2021; Klungerbo & Sørland, 2021; Kvale & Norang, 2021).

Bullen (2007) has identified barriers to adaptive reuse and concludes that the barriers always revolve around costs since (1) conversion is only considered sustainable when costs and benefits are included over the lifetime (life cycle perspective), (2) the cost of redevelopment may be high and the construction work, (3) building owners do not consider redevelopment to be economically beneficial, (4) performance of older buildings and ability to meet current building requirements are uncertain, (5) maintenance costs may be higher than for new buildings, and (6) price and availability of matching building materials/parts are uncertain.

It is believed that the safety authorities should be more flexible in measures on protected buildings. It is also mentioned that protected buildings often have good architectural and material qualities and that it is thus worth taking care of these. "The protection in Norway is perceived as conservative, limiting how much can be built on or on listed buildings. It can be reversed, but there is little willingness for the buildings to be transformed from a future perspective. This can prevent increased utilization, active first floors, etc." (Klungerbo & Sørland, 2021; Kvale & Norang, 2021).

12.3.4 The Motivation of Doing Adaptive Reuse of an Existing Building

As stated among the researchers, the motivation and drivers of doing adaptive reuse of an existing building are presented in Table 12.2, based on the findings from the master thesis of Klungerbo & Sørland (2021) and further developed adapted by the authors.

12.4 Results and Discussions

This chapter presents the findings from the interviews of the property owners. The discussion follows, comparing the results from practice with the findings from the literature.

12.4.1 Motivation for Doing SBR

The master thesis from NTNU examined the Norwegian property owner's motivation for sustainable refurbishment and adaptive reuse projects (Klungerbo & Sørland, 2021). They found that property owners will always be cost-driven, so the main focus is to search for other parameters and motivators to make a project more sustainable without increasing the cost. The findings are based on interviews among 18 property owners and are presented in Table 12.3.

12.4.1.1 Environmental Impact

Baker et al. (2017) and Fufa et al. (2020) stated that environmental assessments are important information in decision-making. It is evidenced that property managers are motivated by how adaptive reuse projects reduce climate gas emissions.

Table 12.2 Motivation and drivers of doing a SBR, according to the literature

Sustainability issues	Drivers	Sources
Environmental	Environmentally friendly and reduced carbon footprint	Ball (2002), Bullen (2007), Wilkinson (2011), Foster (2020), Fufa et al. (2020)
	Less resource consumed	Douglas (2006), Highfield & Gorse (2006), Bullen (2007), Power (2008), Shah (2012), Baker, et al. (2017), Alba-Rodríguez et al. (2017)
	Branding/symbolism	Ball (2002), Shipley et al. (2006)
Social	Conserve the social value and cultural value of the building	Douglas (2006), Bullen (2007)
	Positive urban development and individual development	Ball (2002), Highfield & Gorse (2006), Bullen (2007), Bullen & Love (2011), Flyen, et al. (2019)
	Protected buildings	Highfield & Gorse (2006)
Technical	Adaptability is high	Shah (2012)
	Good technical conditions	Alba-Rodríguez et al. (2017), Bullen & Love (2011), Shah (2012)
Economic	Low investment costs	Ball (2002), Douglas (2006), Shipley et al. (2006), Bullen & Love (2010)
	Lower material costs	Highfield & Gorse (2006)
	Shortened construction time	Highfield & Gorse (2006), Douglas (2006), Power (2008), Wilkinson et al. (2009), Shah (2012), Baker (2020)
	The building can be in use under construction.	Shipley et al. (2006), Power (2008), Shah (2012)
	The possibility of adding more floors	Highfield & Gorse (2006), Douglas (2006), Wilkinson (2011)

Adapted from Klungerbo & Sørland (2021)

Table 12.3 The motivation for doing a sustainable building renovation among 15 private and three public property owners (Based on the interviews conducted by Klungerbo and Sørland, 2021)

	Motivation	Responses
Environmental	Reduced climate gas emission Less resource-demanding	14 of 18 5 of 18
Social	Increased attractiveness and identity of a community High user demands	13 of 18 6 of 18
Technical	A high degree of adaptability	6 of 18
Economic	Low cost Short construction time Low cost due to possibility to keep parts of existing buildings	3 of 18 3 of 18 3 of 18

However, few informants believed that environmental aspects are the only motivator for practicing SBR, as the cost is always a more robust driver. Besides, many of them commented that there is an increased awareness of the reduced carbon

footprint of reusing structural elements and foundations. Several informants stated that they make greenhouse gas calculations to show the positive or negative impact of different alternatives, but not as part of the decision-making for SBR as such calculations are not mandatory today. However, most of them agreed that this is expected to change in the future due to the implementation of the EU's taxonomy, new regulations, and standards.

While the literature argues that SBR is less resource-demanding (Alba-Rodríguez et al., 2017; Baker et al., 2017; Bullen, 2007; Douglas, 2006; Highfield & Gorse, 2009; Power, 2008; Shah, 2012), only 5 of 18 interviewees agreed with that in practice. Their opinion is that mostly this depends on the nature of the project. Often, an SBR project combines reusing some part of a building and demolishing and extending other parts. Some property owners view a SBR project as complex that requires knowledge of utilizing existing structures and components and good competencies to find reasonable solutions. The informants do not necessarily consider a sustainability strategy in all projects, especially in the case of terrible technical conditions.

Similar to the literature by Eray et al. (2019), the property managers mentioned refurbishment of historical buildings regarding the requirement to protect heritage components. However, in this case, the involvements of experts become natural and are doable. Many argue for the complexity in the need to involve both expertise and stakeholders, which is time-consuming in conceptualizing the project. Eray et al. (2019) discussed this, pinpointing the scares research of framework and interface management models of adaptive reuse projects. Their framework focused on circular economy was tested on adaptive reuse projects, focusing on the dialogue and exchange of information between the conceptualization, planning, and execution phases of the projects.

Overall, both the literature and the informants agreed that climate gas calculation in a particular project could clarify the effect of refurbishment versus demolishing and add valuable information that can promote sustainable refurbishment.

12.4.1.2 Social Impact

Douglas (2006) and Bullen (2007) argued that transforming an existing building would add social value and be attractive in their neighborhood. In terms of the social impact, more than 13 of 18 agreed that SBR leads to the increased attractiveness and identity of the community. The informants stated that especially in the case of the projects that include historical buildings, it could be linked with the identity value for individuals in the area, community, and other users, similarly mentioned in Kristl et al. (2019) that heritage buildings are vital in terms of transferring cultural and historical memory. This creates extra motivation for building owners to invest in the SBR process. In addition, if the site allows an extension, it could provide a sustainable solution that uptakes the users' historical values and needs. This is in line with the findings of Highfield and Gorse (2009).

SBR leads to a positive individual and urban development (Ball, 2002; Bullen, 2007; Bullen & Love, 2011; Highfield & Gorse, 2009). Considering sociocultural

sustainability, Murphy (2012) looked at the participation, equity, and awareness as part of the conservation of sociocultural patterns. Even though the goals of conservation, restoration, and renovation look more for the preservation of authenticity to ensure historical, cultural, and social values (Li et al., 2022), SBR or adaptive reuse of buildings in an area with poor performance will increase in value and attractivity in terms of willingness to invest and establish new businesses. This is relevant for residential spaces, as renovation helps renew poor neighborhoods (Power, 2008).

The respondents agreed that the user demand is important, but only 6 of 18 respondents said that the user demands are a drive for doing SBR. They emphasize that the users/renter's attitude is that they require new and fresh workplace facilities and must be convinced that an SBR project can have the same qualities as a new building. However, some tenants are more aware of the sustainability aspects as working in a building that has been through a sustainable refurbishment/development will align with the company's sustainability profile.

This is not found highlighted in the literature as an important driver. However, Bullen and Love (2011) found that while the building owners emphasize commercial performance, the users focus on the usability of the building (well-being and productivity). Here, we see the benefit of including the users in finding reasonable profitable and functional solutions. The informants do not mention this in this research. However, the property owners are aware of this, as one of them said: "It's the tenants that govern the market. If we offer a product that the tenants do not ask for, we have missed an important point."

12.4.1.3 Technical Aspects

The technical aspects are always relevant before doing an SBR. However, only 6 of 18 say that the high adaptability is a motivation of itself. In many ways, this reflects the fact that often the low adaptability, like, low ceiling height, is a limitation that can lead to demolition instead of SBR. Both Shah (2012) and findings from the study confirm this. Adaptability is becoming more relevant, but the need for adaptability depends on the building category. In office buildings that are internally renovated every 10 years, when the tenant contract is renewed, there is important to think about flexible and detachable interior walls and technical solutions that are not integrated with the walls.

12.4.1.4 Economic Impact

Only 3 of 18 said that an SBR project would reduce cost or shorten construction time. They argue that in practice, the design phase in an SBR project will take more time than a new building project as there are many modifications during the process that takes time to find good solutions. Also, their experience is that the cost typically increases in an SBR because of many unforeseen actions revealed during the

process. Another argument is that building materials are reasonably low cost while labor payments are costly.

Bullen and Love (2011) argued that it will almost always be a more viable option to use an adaptive reuse strategy from a sustainability perspective. Highfield and Gorse (2009) also argued that SBR projects give lower costs when considering whole life cycle costing, including the sustainable outcome in terms of increased value, energy efficiency, social attractiveness, and well-being. However, Bullen and Love (2011) also point out the lack of accurate sustainability assessment measures that hinder making an SBR. Douglas (2006) and Power (2008) argued that demolition is costly and that SBR will benefit. However, they looked at the main renewal of residential housing.

Hagen and Sørstrøm (2021) investigated why refurbishment projects often have a cost overrun. In their study, they discovered that the building owner lacked information about the technical condition, lack of drawings, and information about the adaptability of the building and lacking strategies for sustainability development. They recommended early involvement of the contractor and expertise at the strategic phase to improve the decision base before deciding on SBR.

12.5 Conclusions

Motivation for doing an SBR varies in terms of the benefits and added value of the project. Low competencies of sustainability assessments and cost overrun risk are the main barriers to doing so. However, the informants confirm earlier findings that the environmental aspects are important in terms of reuse materials and climate gas emission. However, there is still a need to develop further incentives and strategies to increase the profitability and sustainability of adaptive reuse projects. Based on the Norwegian property owners' views and what is emphasized in the literature, it is evident that the EU's taxonomy, future regulatory requirements, and economic incentives will be relevant to stimulating and promoting SBR.

The future focus on the circular economy will also promote further SBR projects. To sum up, the findings that motivate the building owner to do an SBR are (1) user involvement to increase well-being, (2) technicalities and adaptability, (3) regulatory requirements, and (4) climate gas calculations.

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