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The Real Estate Sector and the Sustainable Development Goals

A literature review of measures and indicators

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Foreword

This is the first edition of a report which aims to provide an introductory and broad overview of measures and metric indicators that link the real estate sector to the UN Sustainable Development Goals. It offers a brief introduction to a range of different measures and indicators that may contribute to the achievements of the goals, as it concerns the real estate sector, accompanied with sources that provide more extended information on the aforementioned measures and indicators. The real estate sector has a versatile nature and has the potential to impact the Sustainable Development Goals through activities throughout the whole life cycle of buildings: during construction phase, usage phase and during the recovery of the building site. Although measures and indicators have been collected that are relevant throughout the whole life cycle, the main focus of this report is on measures and indicators that concern the usage phase of real estate. The material has been gathered through a literature review of academic articles, relevant organisations' publications, and sustainability reports of Swedish real estate companies. The aim has been to account for these sources in a factual manner. Even though the summaries are made up of a selection of measures and indicators that may apply to real estate companies in general, the cited material in this report is dependent on the specific character of the particular real estate company from which it derives.

Both the real estate sector and the Sustainable Development Goals are extensive in nature, and to align the sector with the goals will require a great amount of effort and research in both areas. This report should be interpreted as a first attempt to assemble relevant measures and metric indicators in the field, which all need to be further investigated and developed in order to yield any practical aid for the sector. The intention is for this report to be updated on a yearly basis, and serve as part of Sustainable Finance Lab's work to develop a framework for a balanced scorecard which measures the sustainability of real estate companies. The Sustainable Finance Lab has also developed a database which will continue to be expanded upon. Bearing the interpretive limits of this first edition report in mind, this report will still hopefully provide some initial useful insights in how the real estate sector may support the UN Sustainable Development Goals.

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Key findings

- The real estate sector has potential to contribute to all of the 17 Sustainable Development Goals (SDGs) through a broad variety of measures, but some goals are more clearly connected to real estate than others.
- Metric indicators have been found for almost every goal, which may serve as useful tools to measure different types of goal fulfilment.
- The most supportive measures and indicators were found towards achieving Sustainable cities and communities (SDG 11), Responsible consumption and production (SDG 12) and Climate action (SDG13).
- The least measures and indicators were found towards the goals of Zero hunger (SDG 2), Partnerships for the goals (SDG 17) and Life below water (SDG 14).
- Single measures and indicators may be relevant for a multitude of SDGs at once. These positive and negative interactions need to be further clarified.

Example of measures

SDG 11	Sustainable planning of cities, sustainable buildings, green infrastructure and provision of affordable housing.
SDG 12	Conscious construction and material sourcing, resource efficiency, reuse and recycling.
SDG 13	Taking action for the climate, such as energy efficiency of buildings, using sustainable assessment methods and analytical tools.
SDG 8	Transcendence to a green economy and ensuring decent working conditions.
SDG 7	Energy efficiency measures and increase the proportion of renewable energy sources.
SDG 3	Provision of safe and healthy work environments and environments in- and outside the properties.

Example of indicators

SDG 7, 11, 12 & 13	Energy consumption metrics such as gross consumption, intensity, renewable, reduction, demand flexibility etc.
SDG 11, 12 & 13	Greenhouse gas emissions such as gross consumption, intensity and reduction.
SDG 5	Indicators of workforce diversity such as gender distribution, age groups etc.
SDG 3 & 8	Indicators of employee health and safety.
SDG 8 & 9	Economic indicators such as revenue, solidity, surplus ratio etc.

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1. Introduction

As revealed by the EU Technical Expert Group (2019), buildings throughout Europe are responsible for around 40% of energy consumption and 36% of carbon emissions. Additionally, it has been estimated that buildings globally consume about 30% of raw materials, 12% of drinking water and generate 25%-40% of solid waste and 20% of total gas emissions (Ionascu et al., 2020). The real estate sector's impact is needless to say great and it is therefore essential that the real estate sector, in Europe and beyond, aligns with the Sustainable Development Goals. Looking at these figures, through a perhaps overly optimistic lens, it could be argued that the real estate sector is an incredible opportunity. Due to the essential nature of the sector, as the provider of living and working spaces (and more) and it being a cornerstone of national economies. Through collaboration, research and multidimensional initiatives the sector could be sustainably transformed, and with it to a great extent society - into alignment with the ambitions of the 2030 Agenda.

The 17 Sustainable Development Goals of the agenda were adopted by all United Nation Member States in 2015 and constitute an urgent call to action to end poverty, combat climate change, counteract inequalities, and more. More specific 'targets', sub-goals, were brought forward in 2017 with the purpose of making the goals more tangible, and to aid in their adoption. The agenda recognizes in its goals that "… ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests." (United Nations, 2021a). Furthermore it recognizes that these interconnected issues need to be addressed at every level of society. That the achievement and advancement of the SDGs are not only the domain of governments or international organisations. Instead the 2030 Agenda forms an integrated framework for addressing the most urgent global sustainability issues, and their successful implementation depends on the joint efforts of all individuals, organisations and governments (Ionascu et al., 2020).

Businesses have more and more as a consequence been encouraged to align their models and strategic priorities with the broader socio-economic context in which they operate, and to directly connect their strategies with the SDGs (Izzo et al., 2020). Increasingly sustainable development additionally emphasises the role of business entities in designing and implementing sustainable solutions (Ionascu et al., 2020). As identified by Ionasu et al. (2020), the real estate sector, by virtue of the nature of its core operations, has the capacity to contribute towards the attainment of all of the goals. While it might be more obvious how SDGs such as SDG 11 (Sustainable Cities and Communities) and SDG 7 (Affordable and Clean Energy) concern the real estate sector – and the reviewed literature somewhat reflect this bias – the real estate sector also has an important role to play in preserving the ecosystems, for example, through the development of real estate which pro-actively concern itself with minimizing its potential negative impact on local biodiversity (SDG 14 & 15). In regards to energy, a report by the IPCC (2018) estimates that annual investments of around 2.4 trillion USD are needed in that sector in order to seriously combat climate change and

succeed with meeting the Paris Agreement's target of ensuring only a 1.5°C rise in global temperatures.

The EU Technical Expert Group (2019) when presenting the EU Taxonomy aptly described some of what is needed to mobilize capital and efforts at scale for sustainable development across all sectors,

"… a technically robust classification system to establish market clarity on what is 'sustainable'. This system would cover a wide range of activities, investments and assets that can be clearly linked to the Paris Agreement and the Sustainable Development Goals (SDGs)… The Taxonomy would enable market growth by re-orienting capital flows towards assets that contribute to sustainable development; by creating much needed comparability across standards, labels, products and jurisdictions; and by enabling market participants to invest in sustainability with greater confidence and ease. " (EU Technical Expert Group, 2019).

Disclosure practices following EU directives and recommendations is one of the tools utilized by a multitude of real estate companies to aid in the advancement of the SDGs, making possible the investment into sustainable practices and encouraging the further development of those practices through the "power of transparency" (Ionascu et al., 2020). What is further needed is more sector-specific frameworks, researched-based assessment tools and recommendations of sustainable practices and strategies. As revealed by an earlier literature review of a sample of European real estate entities' sustainability reporting conducted by Ionascu et al. (2020), most real estate companies do not have the strategy, culture and tools necessary to turn sustainability commitments into effective actions. Sustainable Finance Lab as a research consortium seeks to facilitate the development of innovative and sustainable business ideas and financial practices that would contribute toward sustainable development, and to be the bridge between research and financial actors. This ensuing literature review is hopefully a first step, and will provide some insights as well as tools and frameworks for real estate entities to further integrate their business models with the SDGs.

The ambition of this literature review is to map out real estate's actual and possible contribution toward the alignment with the SDGs. To examine the participation in sustainable development of a selection of Swedish real estate companies, and through it potentially identify some best practises that have been developed and which can subsequently be incorporated by others. In addition, the ambition has been to find the 'gaps', so to speak, to identify the potential lack of academic literature, recommendations and undertaken measures in relation to what SDGs and by doing so broadening the concern of the real estate sector as it relates to sustainability.

1.1 Purpose and limitations

The purpose of this literature study is to gain an overview of the possible contributions of the real estate sector towards the 17 Global Development Goals. Proposed positive measures brought forward by the academic literature, as well as actual already undertaken measures and sustainability goals of real estate companies, are compiled and categorized under the Sustainable Development Goals. Proposed indicators to measure the progress of some of the proposed and undertaken actions are also described. The website sdgcopmpas.org has collected additional indicators that are relevant for businesses, and offers further reading on the subject. The study focuses on Western countries, especially the European area with case studies exclusively of Swedish real estate companies. A further limitation of the study is that only sources which refer to the UN:s Sustainable Development Goals (SDGs) are utilized.

The aim of this survey is to map out what measures are currently being undertaken to develop sustainability as defined by the 2010 Agenda, through looking closer at a selection of Swedish real estate companies, as well as the measures proposed by the academic literature seeking to align the real estate sector with the 17 Sustainable Development Goals. One of the ambitions of this survey is to expose the 'gaps' between current measures in place and those recommended by the academic literature, as well as to identify any research 'gaps' as well as to identify indicators through which to track sustainable development. In summary: to examine and reveal what the real estate sector can do, is doing and needs to do to ensure sustainable development.

1.2 The interactions between the different SDGs

It is important to recognize the complex interactions between different Sustainable Development Goals, where synergies exist between some goals while others conflict (United Nations, 2015; Valencia et al., 2019). For example, there may be a trade-off between SDG 2 of ending hunger, and SDG 14-15, which aim to preserve marine and terrestrial ecosystems (Valencia et al., 2019). While the linkage between the goals and targets where defined in a strategy document by United Nations (2015), and the connection of targets and indicators were clarified by United Nations Economic and Social Council (2016), the connections between different goals were first explored by an expert group in 2017 (International Council for Science, 2017). The experts examined SDG 2, SDG 3, SDG 7 and SDG 14 in detail, and found them mostly connected to other SDGs. The interlinkage of SDG 6 and other SDGs was later investigated by Requejo-Castro et al. (2020) and UN-Water (2016), where the latter has shown that SDG 6 is linked to all other SDGs and across sectors. Further research on the synergies and trade-offs of all of the SDGs have been carried out by Maes et al. (2019), Sebestyén et al. (2019) and van Zanten and van Tulder (2021). Optimisation of the interaction between different SDGs due to economic activities, where co-benefits are created and trade-offs are reduced, have been studied by van Zanten and van Tulder (2021), through a systematic review of 876 articles published between 2005 and 2019. According to their findings, most economic activities are expected to have a positive impact on SDG 8 and SDG 9, while many activities help to meet the basic human needs described in SDG 2-4, SDG 6-7 and SDG 11. However, a multitude of the examined economic activities were found to

generate negative impacts widespread on SDG 3, SDG 13-15. Economic activities within the real estate sector had mainly negative impacts on the SDGs, but a considerable proportion of activities had both positive and negative effects. For example, real estate could provide safe and affordable housing, supporting SDG 11.1, but it also generates greenhouse gas (GHG) emissions and waste, and consumes a lot of water, afflicting SDG 13.2, 12.4 and 6.4 (van Zanten & van Tulder, 2021).

Because of these interactions between different Sustainable Development Goals, proposed measures and metrics to support the SDGs often impact several goals at once. The impact on multiple Sustainable Development goals, targets and indicators as a consequence of a specific measure entails that a singular measure in this report will not always be categorized under a single SDG. To illustrate the possible synergies that have been found, figure 1 contains a bubble chart with the impact of all proposed actions and indicators on the SDGs according to the utilized sources.

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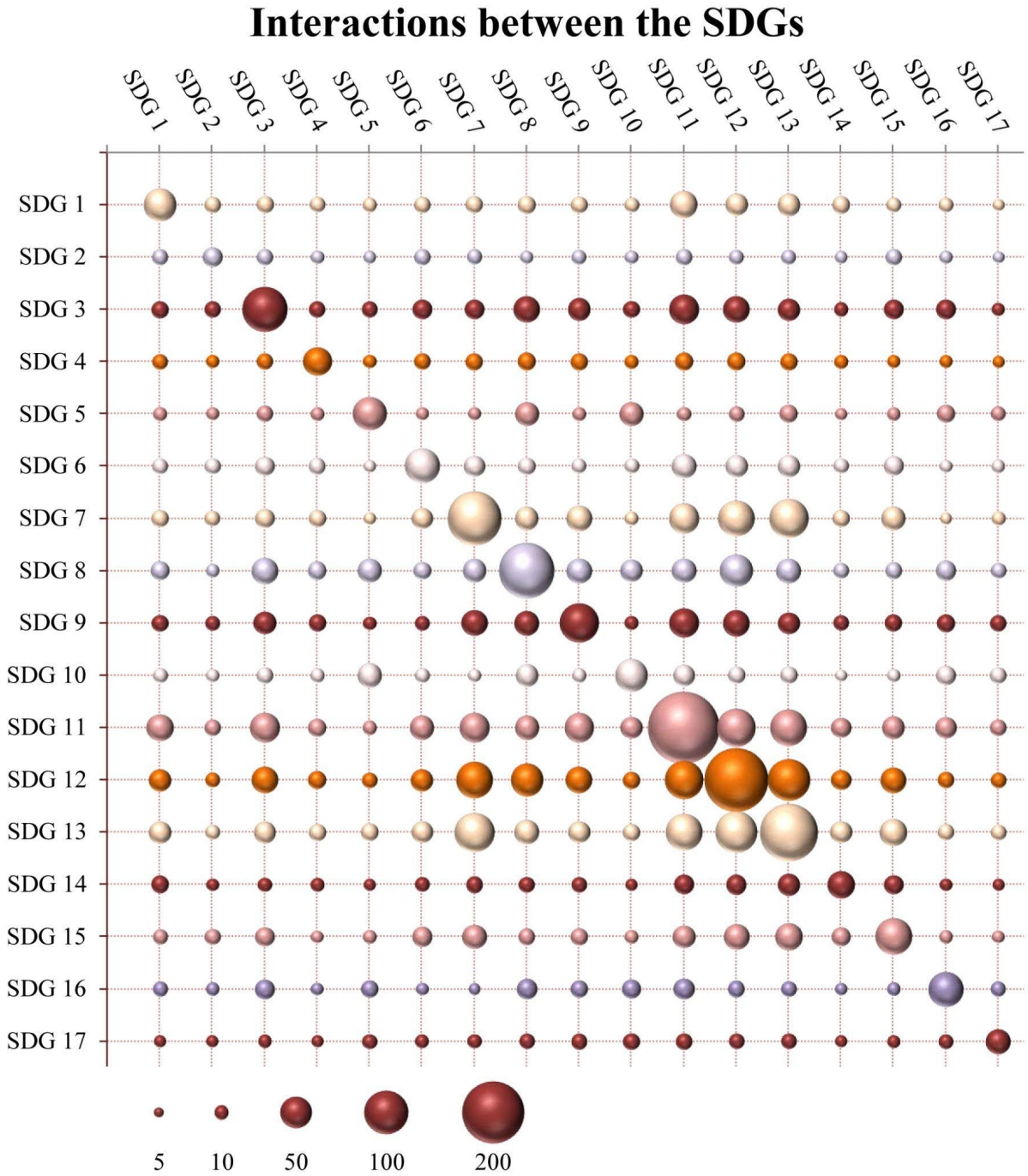

Figure 1. The figure illustrates the interaction of the SDGs according to the sources, of all the 782 measures and indicators that are proposed in this report. The bullets in the bubble chart represent the collected actions and indicators for every SDG, where bigger bullets symbolise a larger number of single measures and metrics. The size of the bullets on the downward pointing diagonal shows the amount of measures that relate to each SDG, e.g. the largest number of measures and indicators was found for SDG 11, 12, 8 and 13, while the least measures and indicators were found for SDG 2 and SDG 17. According to the bullets that show intersection of different SDGs, SDG 13 and 12 interact most times, while SDG 11 and SDG 12 overlap the second-most times.

2. Method

This study is made through a literature study, with sources gathered from the databases Google Scholar, KTH Primo, Scopus, Emerald, and GreenFILE. References were also found from sustainability reports of real estate companies and from the websites of a couple of organisations that have published material about the Sustainable Development Goals, such as: the UN, RICS, World Green building Council, BREEAM, LEED, GRI and UNCTAD. The organisations were mainly found from the references from the databases.

The searches on the databases were made with query strings which were combined by Boolean operators, consisting of a couple of search phrases that were aimed to target indicators and actions that support the SDGs and that may be relevant to the real estate sector. Separate query strings were used for the different Sustainable Development Goals, in order to target one specific goal per search. The same query strings were used in KTH Primo and Google Scholar, but the strings had a custom-made design for the other databases. Scopus offered pre-generated queries for SDG 1-SDG 16, which were utilized. SDG 17 was missing from the pre-generated queries since it is too complicated to quantify a satisfactory query for the goal, according to the site (Elsevier, 2021). Therefore, no search was made on Scopus for SDG 17. Appendix A contains all query strings that were used in KTH Primo, Google Scholar, Scopus, Emerald and GreenFile. Figure 2 and figure 3 below shows the total search results for each search query that were used in the databases. All results from Scopus, Emerald and GreenFILE were reviewed. All peer reviewed articles from the search result in KTH Primo were also examined, except for the results for the first goal. SDG 1 yielded more than 500 peer reviewed articles and the results were limited so only reviewed articles that had “real estate” as subject were examined. Some sources have been more thoroughly reviewed, while others are mentioned quite briefly in order to limit the scope of this report. The shorter references are included to provide an interested reader with some further reading.

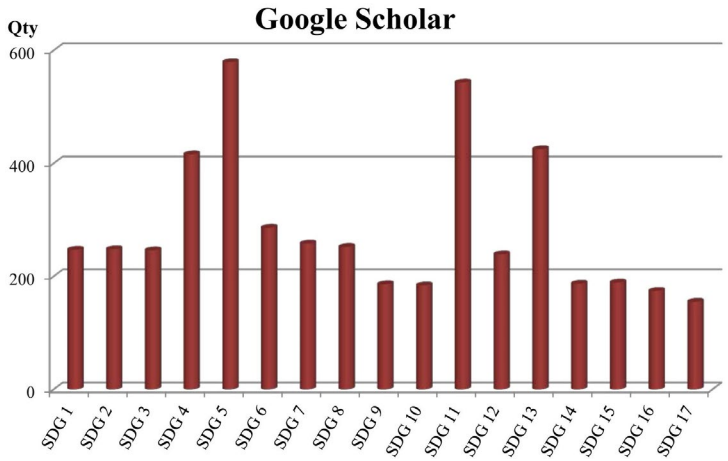

Figure 2. The total search result for each SDG in Google Scholar. See search queries in Appendix A.

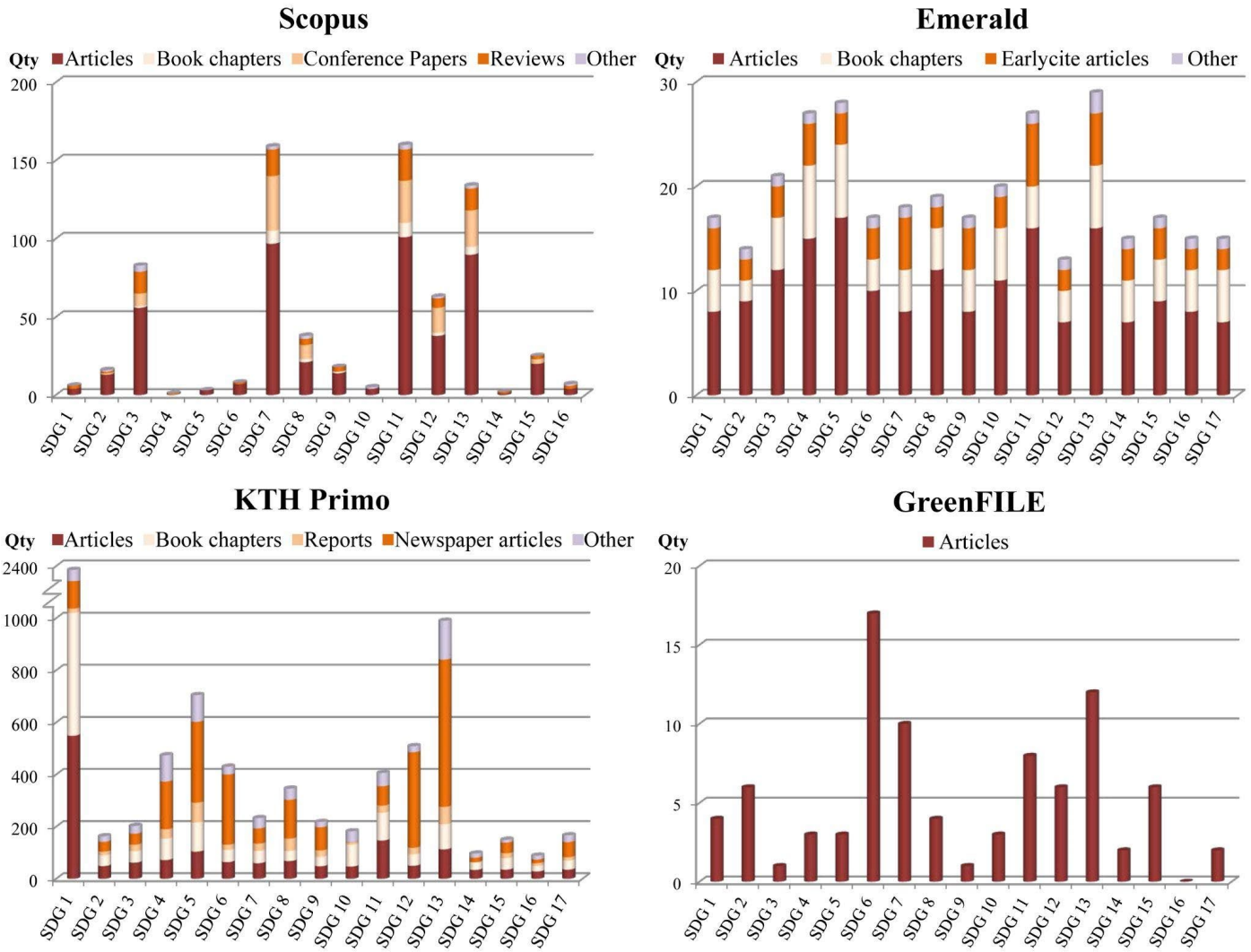

Figure 3. Search results for each Sustainable Development Goal, with searches made in the databases Scopus, Emerald, KTH Primo and GreenFILE. The search queries are found in Appendix A.

The sustainability reports of Swedish real estate companies were chosen in the following way. Under the assumption that larger companies more often incorporate information about the SDGs into their annual reports and sustainability reports, all companies from the real estate sector (SNI-code 68) with at least 2 billion Swedish crowns in total assets were extracted from Retriever Business, a database which collects information about all Swedish companies. The latest annual reports and sustainability reports from these 338 companies were examined manually to find the companies that have an extensive sustainability reporting, and eleven companies that have reported progress towards the Sustainable Development Goals were chosen to be represented in this literature study.

3. Literature review

3.1 No poverty

The first sustainable development goal is to “End poverty in all its forms everywhere” and is made up of seven more specific and actionable targets. Target 1.4 sets out the aim to “Ensure that all men and women, in particular the poor and vulnerable, have equal rights to economic resources, as well as to basic services, ownership and control over land and other forms of property”, while target 1.5 articulates the aim to “Build the resilience of the poor and vulnerable and to reduce their exposure to climate-related extreme events and other economic, social and environmental harms”. (United Nations, 2021a)

3.1.1 Proposed measures and indicators

Measures have been proposed by qualified sources through which the real estate sector may support SDG 1 throughout the whole lifecycle of a building. To begin with, the UN Global Compact and the Royal Institution of Chartered Surveyors (RICS, 2018) have joined forces to map the relevance of the SDGs against the context of the land, construction and real estate sector. Due to the complex nature of the sector, the relevant measures have been divided into three phases according to a life cycle assessment: the development, real estate use, and recovery phase. In the case of SDG 1, measures have been proposed which primarily would be undertaken in the development and the recovery phase. In terms of land governance, companies could contribute to target SDG 1.4 through five different actions during the development phase: by ensuring that land acquisitions by governments or others have been executed properly, by respecting indigenous peoples’ claims on land which has been recognized by authorities, by ensuring equitable land acquisition and that compensation for the acquired land is based on the market value, by avoiding involuntary resettlement of communities or by making sure to mitigate adverse social and economic impact in case of resettlement, and finally by ensuring that agents and advisers do not take any shortcuts on the company's behalf when conveying land. The first two of these actions would contribute solely to target 1.4 while the three following actions would also contribute to SDG 2.3. In addition, companies could contribute to SDG 1.5, SDG 11.5, SDG 11.b and SDG 13.1 by ensuring that buildings have been constructed to safely sustain foreseeable impacts, such as: ground movements, weather events, fire, and future impacts caused by climate change, which are applicable to the buildings’ potential future use and local geographical factors (RICS, 2018).

In regards to the real estate using phase, Dachaga and de Vries (2021) have argued that land tenure security is a social environmental factor of health that plays a role in shaping urban environments, housing conditions, and health. It can influence health in four different ways: through access to infrastructure, environmental justice, psycho-ontological security, and social cohesion. According to the authors, tenure security feeds into various SDGs: SDG 1, SDG 2, SDG 15, SDG 11, and SDG 6. Another proposal that contributes to SDG 1 by considering the tenants wellbeing, is by providing affordable and social housing, an action

that also overlaps with SDG 10 and SDG 16 (Wiktorowicz et al., 2018). Through a literature review of 294 articles, Roy et al. (2021) have examined various measures within the industry, building and transport sector that may have an impact on the Sustainable Development Goals. According to their article, switching to clean energy in the building sector can reduce poverty (Poblete-Cazenave & Pachauri, 2018; Rosenthal et al., 2018; Roy et al., 2021). The real estate situation of a place is ostensibly closely intertwined with the surrounding infrastructure and the ensuing possibilities of transportation of that area, which is why the mobility of a place could be an appropriate aspect to examine in regards to aligning the real estate sector with the Sustainable Development Goals. Roy et al. (2021) concluded with evidence from Gilderbloom et al. (2016), Macmillan et al. (2020) and Skayannis et al. (2019), that using active transport modes such as cycling generates income for the local communities and thereby contributes to the first Sustainable Development Goal. Roy et al. (2021) state that active transport modes are low-cost methods for accessing basic services and that the availability of such have a positive impact on SDG 1.

Green buildings may also contribute to SDG 1 in the real estate use phase, due to their adherence to the requirements of the certification criteria to be classified as such. The certification organisation BREEAM (n.d.) has listed how their standard criteria correspond to the United Nations (2021a) general indicators for the SDGs, for their different standards such as: BREEAM In-Use, BREEAM New Construction and BREEAM Refurbishment & Fit Out. This has been done in a particular detail, where several of the criteria correspond to a multitude of SDG indicators. For BREEAM In-Use, the standard for certification of a building´s operational performance, the criteria relevant for SDG 1 corresponds to indicators SDG 1.4.1 and SDG 1.5.1-1.5.3, and assesses the provision of basic services and improves the resilience against natural disasters and extreme weather. For example, the criteria include: to take account of possible sources of flooding by making a flood risk assessment that takes account of climate change and having the resulting recommendations implemented, to take appropriate measures to minimise surface water run-off to a reasonable rate, and to implement emergency plans for all relevant natural hazards. The emergency plan should include a delegation of responsibility, a strategy for relevant disasters, and specify suitable community spaces for different types of emergencies. An assessment of acute, chronic and transition risks should be carried out by a qualified person or a third party organisation. The corresponding metrics for these measures include energy, water, land-use and waste management. These criteria also correspond to indicators of SDG 3, SDG 4, SDG 6, SDG 7, SDG 11, SDG 12, SDG 13 and SDG 14, to various extent (BREEAM, n.d.).

In the recovery phase of the real estate, several measures are proposed that relate to brownfield regeneration, which would be relevant for SDG 1.4. Here, companies could review potential planning, legal and environmental restrictions that may lead to conflicts in how the brownfield land was utilised and for the sake of its future use. This action would also contribute towards the progress of target 11.3. Companies may also consider general community needs such as food and housing, especially those of indigenous peoples who might have been displaced during the original development. A measure which would contribute towards the progress of target 1.4 as well as 11.1. Furthermore, companies may

prepare consultation design materials that may be useful in the development of future proposals for the site, which are acceptable to existing and indigenous communities. This action would also contribute toward targets 12.8 and 16.7. Lastly, companies could engage in actions that relate to the land recovery and thereby contribute to target 1.5, among others, as is further described in section 3.12.1 (RICS, 2018).

3.1.2 Company studies

While a number of measures are proposed that could contribute to SDG 1, only K2A Knaust & Andersson Fastigheter AB (K2A, 2021) out of the examined Swedish real estate companies reports on progress towards this goal, see case SDG 1 below. This is in line with the results of Ionascu et al. (2020), who have used content analysis to determine the extent to which real estate companies participate in the development of sustainability. Their research sample consisted of 39 observations from 16 real estate companies in Western European countries. The extent of contributions towards the first Sustainable Development Goal (SDG) was determined by analysing the presence of "Projects to support poor communities" in real estate companies' annual reports and sustainability reports (SRs). When analysing the companies' annual reports and SRs, from 2016 to 2018, the first SDG was on average ranked as the least important. The results of the study also revealed that while more and more real estate companies are communicating a general interest in sustainable development, a gap still exists between the assumed intentions and the real actions initiated by the entities. The review concluded that most companies do not have a strategy or the tools needed to fulfil their intentions.

Case SDG 1

The Swedish real estate company K2A (2021) cited all of the Sustainable Development Goals in their 2020 annual report. In addition, they specified their company's contributing actions and their level of contribution towards the goals, by using an assessment template that was developed in collaboration with Sweco. According to an assessment of three of the targets which make up SDG 1 and were deemed relevant for the company, K2A was assessed as having made some - to large contributions towards the goal's targets. A way in which K2A contributes towards SDG 1 is by building a large part of their new projects with support of "Boverkets investeringsstöd för hyresbostäder" resulting in that they can thus rent out these apartments for a lower and for some more affordable price than would otherwise have been possible. K2A also provides its residents with several different mobility solutions that reduce the need to own a car, such as a car pool at cost price and a bicycle pool. That the location of their projects is close to public transport and the students' campus is according to K2A one of their most important selection criteria when determining to build and when acquiring new residencies. (K2A, 2021)

3.2 Zero hunger

The second SDG is to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture” and is separated into eight targets. One of these targets’ (2.3) aim is to increase the agricultural productivity and income of small-scale food producers, including through secure and equal access to land. (United Nations, 2021a)

3.2.1 Proposed measures

Not many suggestions of measures or studies were found through which the real estate sector may support the second Sustainable Development Goal. According to RICS (2018), companies could contribute to target 2.3 and 1.4 during land governance, as described in section 3.1.1. According to Dachaga and de Vries (2021), land tenure security is a social environmental factor that feeds, amongst others, into SDG 2 as previously mentioned in section 3.1.1. Wiktorowicz et al. (2018) has proposed some actions that may make minor contributions, including: planting edible fruit trees, promoting home food growing, and connecting residents with local community gardens through the Resident Information Pack. During the recovery phase, companies may contribute to target 2.1, 2.3, 2.4, 15.1, 15.5, 15.8, 15.9, 7.2, 14.2, and 6.6 through a single action (RICS, 2018). They may develop an integrated action plan which aims to create multiple uses and benefits, taking into account several aspects, such as: the competing demand for high quality rural land, forestry/water management/ bio-energy/food security/areas for wildlife and livestock, interaction with local communities, policies on food and energy conservation, sustainable expansion of agriculture, promotion of native species, and ecosystem valuation (e.g. land, forestry, water and marine resources, unblocking of animal routes) that is required to plan and create connected greenways, swales and wildlife corridors. At last, Van Beers et al. (2020) state that eco-industrial parks have a positive correlation with SDG 2, which is further described in section 3.9.1.

3.2.2 Company studies

According to Ionascu et al. (2020), a study described in section 3.1.2, the second SDG was the second to least prioritized Sustainability Development Goal within the reporting of European real estate companies between 2016 and 2018. For the second SDG, the external reporting of real estate companies was analysed in regard to if there was “ … efforts made for the efficient planning of land use according to the needs of the community and the diversification of the supply chain”. In line with the result of Ionascu et al. (2020), none of the reviewed Swedish real estate companies have reported any contribution towards SDG 2 in their latest sustainability report.

3.3 Good health and well-being

The third sustainable development goal, to “Ensure healthy lives and promote well-being for all at all ages” is divided into 13 targets. A couple of the targets focus on reducing various types of mortality rates, such as target 3.4 which aims to reduce premature mortality from non-communicable diseases through prevention and treatment and to promote mental

health and well-being, and target 3.9 which aims to reduce mortality and illness from hazardous chemicals and air, water and soil pollution and contamination. (United Nations, 2021a)

3.3.1 Proposed measures

The real estate sector may support SDG 3 both by actively engaging the health and safety of the company's workforce, as well as by ensuring a healthy environment for building occupants. In the development of real estate, companies could contribute toward the advancement of target 3.9 and 12.4 by ensuring that building sites are free of contaminants and geotechnical risks that might damage the building or be a health or safety hazard to occupants and people in the surrounding area. In the design and construction process, design features aimed at improving the well-being of future occupants would contribute toward target 3.9, through features such as adequate lighting, good indoor air quality, common areas, etc. In the usage phase of the real estate, companies could contribute to target 3.9 by ensuring a healthy indoor air quality, e.g. by minimising the use of products and materials that contain harmful toxins and chemicals. By disclosing potential public health risks caused by the building and its operations, companies could also contribute toward target 3.9 and 12.4 (RICS, 2018).

According to the World Green Building Council (WorldGBC, n.d.), green buildings (including homes and offices) can improve the health and wellbeing of people and employees, thereby contributing to SDG 3. According to WorldGBC, green buildings may also contribute toward the advancement of SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13, SDG 15 and SDG 16. BREEAM and LEED are examples of green building standards that support SDG 3. LEED supports SDG 3 by, for example: reducing water contamination and flooding when a design is applied that mimics the natural hydrology of the site, by reducing the contribution to heat island effects and local air pollution through improved energy performance and use of renewable energy, and by supporting community health through provision of space for recreation, implementation of strategies addressing existing health issues and by avoiding project features which pose a health risk (U.S. Green Building Council [USGBC], 2018a). BREEAM (2018) state that their family of standards and tools make a significant contribution toward SDG 3, SDG 6, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, and SDG 15. For example, BREEAM (n.d.) has listed the standard criteria for BREEAM In-Use which correspond to SDG indicators 3.4.1, 3.4.2, 3.6.1 and 3.9.1-3.9.3. Largely, the standard criteria target the health and well-being of occupants by ensuring a clean, healthy and reduced stress indoor environment, by requiring pollution controls, and by ensuring safe access to responsible transport. For example, the standard criteria include: to make a risk assessment of the exposure to legionella, and to make annual reviews of drinking water outlets including the hygienic location and condition. Also, the criteria include to have carbon dioxide sensors installed, tested, calibrated and maintained, and to have a carbon monoxide detection system of acute levels. Additional criteria include that a permanent carbon monoxide alarm system is being maintained, to ensure proper servicing of combustion appliances and to have a smoking policy. The criteria that are relevant for SDG 3 overlap with SDG 1, SDG 4, SDG 6,

SDG 8, SDG 11 and SDG 12, to various extents. See more about the BREEAM criteria in section 3.1.1. However, green building certifications and green products might not necessarily promote indoor air quality, and in some cases they result in adverse outcomes through causing exposure to hazardous substances, and might therefore have a negative impact on health and well-being (Roy et al., 2021; Steinemann et al., 2017). There are different assessment tools to assess the wellbeing and social sustainability of buildings. For example, the WELL-certificate is studied by Danivska et al. (2019), among other rating tools for wellness that are relevant for the built environment. A human-centric approach in the built environment supports SDG 3, SDG 9 and SDG 11. Regarding implementation of SDG 3 in real estate, Hale (2020) has investigated business-model innovations for healthy buildings and the role of smart technology for supporting the third SDG, and influencing SDG 11. The study emphasises the opportunity of using smart technology and cross-sector collaborations in healthy building solutions. According to Roy et al. (2021), using waste heat from industrial production can be used for the heating of buildings, thereby optimising the building energy system (Fraccascia, 2019; Roy et al., 2021; Safaei et al., 2021).

During the recovery phase, companies could support SDG 3 through waste management, resource conservation and recycling during demolition. By ensuring that the surroundings are not affected by either the demolition works or waste disposal, contribution is made towards target 3.9 and 12.4. In addition, companies may support the same targets by taking effective measures to ensure that no hazardous materials are stored or disposed of on indigenous peoples' territories without their informed consent. Further measures that support target 3.9 regarding waste management are described in section 3.8.1. As a last proposal, companies may contribute to target 3.9, 6.3, 11.5 and 12.4 through brownfield restoration, by examining the current impact of previous environmental damage and spillages on local communities. This may include an assessment of the possible future effect on the local community of the brownfield site, in particular with regard to the presence of hazardous materials and other issues that might affect the site sanitization process. (RICS, 2018)

Wiktorowicz et al. (2018) state that real estate companies may yield a slight contribution toward SDG 3 by providing access to attractive and engaging outdoor environments, and by connecting the residents with activities and networks through the Residential Information Pack. Badland and Pearce (2019) have studied if factors of urban liveability have the opportunity to enhance equality of population health and wellbeing, such as green space, housing and walkability, among others. The study suggested that urban liveability attributes could potentially reduce health inequalities, but that they operate within a complex system. Grazuleviciene et al. (2020) have also suggested urban green space to be a social determinant of health, supporting SDG 3. They have assessed urban environmental quality using citizen science, and could link a low exposure to urban green spaces in combination with low socioeconomic status to an increased risk of hypertension. In regards to transport, shifting to active travel increases physical activity and has been found to reduce mortality rates (Doorley et al., 2015; Lin et al., 2018; Roy et al., 2021; Schneider & Willman, 2019). The habit of replacing car trips with active transportation modes can contribute to targets

relating to fighting non-communicable disease (Macmillan et al., 2020; Roy et al., 2021; Useche et al., 2019). The study found that using low or no-carbon fuel helps reduce air pollution and therefore delivers direct health benefits and thereby has a positive impact on SDG 3 (Roy et al., 2021; Yang et al., 2018).

3.3.2 Proposed indicators

Several indicators have been proposed to measure the progress towards SDG 3. One of these proposals entail tracking GHG emissions for the purpose to keep track of air quality (Global Reporting Initiative [GRI], 2021). The metrics of GHG gases may be divided into gross direct (Scope 1) GHG emissions, gross location-based energy indirect (Scope 2) GHG emissions, gross market-based energy indirect (Scope 2) GHG emissions if applicable, and gross other indirect (Scope 3) GHG emissions. These emissions correspond to the GRI reporting standards 305-1 (Scope 1), 305-2 (Scope 2) and 305-3 (Scope 3) and support SDG 3.9, SDG 12.4, SDG 13.1, SDG 14.3 and SDG 15.2. All of the analysed Swedish real estate companies have reported on Scope 1 and Scope 2 emissions through their sustainability reporting, and most of them also report on Scope 3. According to GRI (2021), the emissions should be disclosed in the unit metric tons of CO_2 equivalent per year, and the gases included in the calculation should be specified (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3, or all). If possible, reporting should include the base year for the calculation, including: the rationale for choosing it, emissions in the base year, the context for any significant changes in emissions that triggered recalculations of base year emissions. Additional information should include the source of the emission factors and the global warming potential (GWP) rates used, or a reference to the GWP source, the consolidation approach for emissions (equity share, financial control, or operational control), and the standards, methodologies, assumptions, and calculation tools used. Other environmental indicators include the total weight of hazardous waste and non-hazardous waste, respectively, which constitutes GRI disclosure standard 306-2 and support SDG 3.9, SDG 12.4 and SDG 12.5. These indicators should be broken down into the following disposal methods where applicable: reuse, recycling, composting, recovery, including energy recovery, incineration (mass burn), deep well injection, landfill, on-site storage, and other (to be specified by the organisation). Four of the analysed Swedish real estate companies have used disclosure standard 306-2 in their latest sustainability report.

Some additional indicators target the health and wellbeing of the company workforce. Regarding all employees and non-employed workers, the GRI disclosure standard 403-9 includes reporting of the number and rate of: fatalities as a result of work-related injury, high-consequence work-related injuries (excluding fatalities) and recordable work-related injuries. The main types of work-related injuries should be specified in addition to the number of hours worked. This disclosure relates to SDG 3.6, SDG 3.9, SDG 8.8 and SDG 16.1. Similarly, the GRI 403-10 includes reporting, for all employees and for all workers who are not employees but whose work or workplace is controlled by the organisation, the number of fatalities as a result of work-related ill health, the number of cases of recordable work-related ill health, the main types of work-related ill health. This disclosure relates to

SDG 3.3, SDG 3.4, SDG 3.9, SDG 8.8 and SDG 16.1. In addition, the reporting of work-related hazards according to GRI 403-9 and GRI 403-10 should include: how these hazards have been determined, which of these hazards have caused or contributed to high-consequence injuries or cases of ill health during the reporting period, and actions taken or underway to eliminate these or other work-related hazards and minimise risks using the hierarchy of controls. Any contextual information necessary to understanding how the data has been compiled should also be specified, such as any standards, methodologies, and assumptions used, whether the rates have been calculated based on 200,000 or 1,000,000 hours worked, and whether and why any workers have been excluded from this disclosure, including the types of worker excluded. Four of the analysed Swedish real estate companies have disclosed GRI 403-9 in their latest sustainability report, while only one has incorporated GRI 403-10.

Another proposed indicator of employee health and safety is to track the total expenditures on employee health and safety, which would support SDG target 3.8 and 8.8 (United Nations Conference on Trade and Development [UNCTAD], 2019). The indicator may be measured as the total cost of occupational safety and health related insurance programmes, for health-care activities financed by the company, and all costs sustained in relation to work environment issues related to occupational safety and health incurred during a reporting period, divided by the total revenue in that same period. At last, Humlegården (2021) have used indexes of commitment and of leadership to measure the goal of having the most committed employees and the best leaders in the sector, which contribute to target 3.4 and 3.5, as well as to SDG 5, SDG 8, SDG 10, SDG 13 and SDG 16.

3.3.3 Company studies

The third SDG was on average ranked as tenth most important according to an analysis of European real estate companies, a review which is further described in section 3.1.2 (Ionascu et al., 2020). However, several Swedish real estate companies engage with measures which support SDG 3. For example, Klövern (2020) aims to offer a healthy and safe working environment where everybody feels valued, and to have business-driven employees who live up to the company's values and are good ambassadors (Klövern, 2020). Hufvudstaden (2021) wants to ensure a good and safe working environment, as well as ensure that their properties and business models contribute to the development of attractive and more sustainable cities, thereby supporting target 3.4, 8.8, 11.6 and 11.7. They actively work for a more sustainable supply chain and collaborate within sustainability and urban development, for example by signing green agreements with tenants which includes a concrete action plan with measures that will contribute to a more sustainable city (Hufvudstaden, 2021). Humlegården (2021) supports target 3.4, 3.5 and 3.6, among others, through measures which are reviewed in section 3.9.3 and 3.13.2.

Some other Swedish real estate companies also support SDG 3 by focusing on a sustainable environment in and around their buildings. Hemsö (2021) works to ensure a safe and healthy indoor environment in and around their buildings, among other things, by using

environmental certification systems and conscious material choices and responsible management. By using the digital log-book *Byggvarubedömningen* with environmentally assessed construction products, and having their buildings certified green, Atrium Ljungberg (2021) helps reduce harmful chemicals and materials and minimises air pollution, water pollution and land pollution, which advances SDG 3.9. In their sustainability report, they have described which SDGs they help advance and their contributing actions, including a ranking of how directly they impact the specific SDGs. K2A (2021) has stated that one of the most important reasons for choosing "Svanen" as an eco-label for their self-produced homes is due to the great focus on establishing a non-toxic living environment. With a high level of ambition for the outdoor environment, the company creates attractive and safe housing estates where people thrive and can socialize. Electric grill, abundant and well-thought-out vegetation, nice outdoor furniture and easily accessible bicycle parking is something that is always available at K2A's homes. Active management with its own landlords contributes to security and well-being. K2A has been assessed to make some - to a large contribution to SDG 3, based on an assessment of six targets of the goal that were relevant for the company (K2A, 2021). Kungsleden also supports SDG 3, by measures described in section 3.16.2.

Case

Vasakronan (2021) has set a number of long-term sustainability goals. One of their aims is to ensure a good and safe working environment for their employees, devoid of any work-related accidents. Incidents and accidents are reported by a tool called "Kris och incidenter" on their website. Their annual report communicates these accidents and the percentage of sick leave taken. Vasakronan's work with health and safety contributes to SDG target 3.4 and 8.8. Vasakronan had a goal set for 2020 that at least 100 of their suppliers would be evaluated considering the company code of conduct. They keep records of the suppliers in a supplier register, which contains information about accepted requirements and appendices and events such as supplier audits. The number and proportion of suppliers evaluated in terms of working conditions and human rights were retrieved from this register. By having requirements on suppliers regarding working conditions and human rights Vasakronan contributes to target 3.4, 5.5 and 8.8. The company also contributes to target 3.9, 8.4, 12.1, 12.2 and 12.4 by working to reduce the risk that building materials contain hazardous substances that can harm human health or ecosystems. Vasakronan aspires to have areas and properties that are aesthetically pleasing, which are designed to promote safety and security, health and well-being and inclusivity. (Vasakronan 2021)

3.4 Quality Education

The fourth sustainable development goal, to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" is separated into ten targets. Indicators of these targets include: monitoring the proportion of children under 5 years of age who are developmentally on track in health, learning and psychosocial well-being, as well

as surveying the participation rate of youth and adults in formal and non-formal education and training during the previous 12 months. (United Nations, 2021a)

3.4.1 Proposed measures and indicators

Only a few articles were found that propose what real estate companies may do to contribute toward SDG 4. A study by Roy et al. (2021), revealed that having better indoor air quality and thermal comfort in schools could improve students' performance and help them make more sustainable lifestyle choices (Hu, 2017; Franquesa-Soler & Sandoval-Rivera, 2019; Goldman et al., 2018; Roy et al. 2021). In addition, Wiktorowicz et al. (2018) stated that organising educational demonstration projects about sustainable living may yield minor contributions to SDG 4.

To support SDG 4, the building certification standard BREEAM In-Use ensures provision of services such as electricity, water and wash facilities. The criteria for the building standard correspond to the SDG indicator 4.a.1 and include for example: intrinsic energy efficiency of building fabric and services, having solar thermal panels and solar photovoltaic panels installed where applicable, to meter electricity data and having renewable energy generated on or near asset, criteria for drinking water outlet standards and compliant drinking water outlets, and ensuring provision of water efficient equipment related to hand washing basins, toilets, urinals and showers. The criteria for SDG 4 overlap with the criteria for SDG 1, SDG 3, SDG 6, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13, SDG 14 and SDG 15 (BREEAM, n.d.). See more about the BREEAM criteria in section 3.1.1.

UNCTAD (2019) has proposed the expenditures on employee training per year per employee broken down by employee category, as an indicator of human capital that corresponds to SDG 4.3.1. The indicator may be measured as the direct and indirect costs of training per employee per year, possibly broken down by employee category, including costs such as trainers' fees, training facilities, training equipment and related travel costs. In addition, both UNCTAD (2019) and GRI (2021) have proposed an indicator of the average hours of training per year per employee broken down by employee category. It may be calculated as total hours of training per year divided by total employees, and corresponds to SDG 4.3.1 (UNCTAD, 2019). This indicator corresponds to GRI disclosure standard 404-1, where the average hours of training during the reporting period additionally should be divided into gender. The standard supports target SDG 4.3, SDG 4.4, SDG 4.5, SDG 5.1, SDG 8.2, SDG 8.5 and SDG 10.3. The GRI CRE8 includes reporting of the type and number of sustainability certification, rating and labelling schemes for new construction, management, occupation and redevelopment and connects thereby to SDG 4.a, SDG 6.4, SDG 7.3, SDG 8.4, SDG 10.2, SDG 11.3, SDG 12.2 and SDG 13.1. Only one of the analysed Swedish real estate companies have disclosed GRI 404-1 in their latest sustainability report, while four have disclosed GRI CRE8.

3.4.2 Company studies

Ionascu et al. (2020) found that the fourth SDG was seventh to least prioritized when comparing real estate companies sustainability reporting. For SDG 4, the content of the reporting was analysed as it related to “Lifelong learning opportunities at all levels of the value chain” and the opportunity to develop “Skills to support the future needs of the business”. The study is further described in section 3.1.2. Three of the examined Swedish real estate companies mentioned SDG 4 in their latest annual and/or sustainability report. Hemsö (2021) stated that they contribute to SDG 4 by working to create and manage sustainable, inclusive and safe educational environments, for example through their concept “Hemsö apple”. Through their project “Skolgårdslyftet” they invest in the outdoor environment around schools. K2A (2021) provides student housing to students over the age of 17, with the goal that their student housing should be good enough so that the students can focus on their studies while not having to be concerned about common housing problems. K2A's student housing is located close to the universities and are well equipped in regard to young students' needs. Larger homes encompass a coffee shop for socialising or group work. It is also possible for students to switch ‘internally’ i.e. between K2A’ student housing to another location, for an exchange semester or similar. In addition, K2A's factories and construction sites offer internships for high school students who study construction, and the company head office welcomes interns from various administrative educations. K2A has been assessed to make some contribution toward SDG 4, based on an assessment of five targets of the goal that were deemed as relevant for the company. (K2A, 2021).

Case

The real estate company Akademiska Hus (2021) stated in their latest annual report that they support SDG 4.a by showing consideration to availability and differences in the planning of buildings and campus. They have contributed toward SDG 4 through research collaborations relating to new learning environments and the importance of green environments for the sake of performance and well-being. Lastly, they contribute toward SDG 4.a by providing varied apartment design in student housing that supports living in different stages of life. (Akademiska Hus, 2021)

3.5 Gender Equality

The fifth sustainable development goal is to “Achieve gender equality and empower all women and girls”, and it is divided into nine targets. They include target 5.1 that aims to end discrimination against women, target 5.2 which is to eliminate all kinds of violence against women, and target 5.5, which is to “Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life”. (United Nations, 2021a)

3.5.1 Proposed measures

According to RICS (2018), companies may contribute toward target SDG 5.2 and 5.a during the development phase of real estate through land governance, which is further described in section 3.16.1, by more specifically carrying out a social impact assessment which encompasses the protection of human rights including those of marginalised groups, as well as differentiated impacts on gender. In section 3.10.1, an additional action is described that contributes to target 5.5 which is making a sustainable supply chain choice. Additional actions regarding the treatment of tenants and community that would contribute toward target 5.2 is described in section 3.16.1 and 3.10.1. Companies could ensure decent work and human rights in the value chain via a diversity management strategy, and promote diversity and gender equality within their own workforce as well as amongst subcontractors, thereby contributing to target 5.1, 5.5, 10.2 and 10.3.

In addition, Wiktorowicz et al., (2018) propose the goal of gender equality could be achieved through strong women's leadership in social housing. Also, Roy et al. (2021) have stated that shifting to cleaner cooking fuels benefits women as it helps reduce indoor air pollution and improves overall well-being (Poblete-Cazenave & Pachauri 2018; Rosenthal et al., 2018; Roy et al., 2021). Roy et al. (2021) also found that digitalization which has allowed for women to use more carpooling due to the built-in safety features contributes to the fifth Sustainable Development Goal (Arora et al., 2016; Macmillan et al., 2020; Mitra & Nash, 2019; Roy et al., 2021). Urban environments that enable active travel modes can also help advance SDG 5 as this can reduce the physical and financial barriers that exist which hinders women from participating in education (Roy et al., 2021).

3.5.1 Proposed indicators

The indicators that have been proposed to keep track of the advancement of SDG 5 mainly consist of data disclosing the diversity of the workforce. For example, UNCTAD (2019) proposed that the proportion of women in managerial positions should be an indicator of gender equality. It should be measured as the number of women in managerial positions to the total number of employees, in terms of headcount or FTE, and would thereby correspond to SDG indicator 5.5.2. Another metric of corporate governance disclosures that corresponds to SDG 5.5.2 indicator is: the number or percentage of women board members. It should be measured as the proportion of female board members to total board members (UNCTAD, 2019). This indicator is similar to GRI disclosure standard 405-1 that support target 5.1, 5.5 and 8.5: reporting of the percentage of employees per employee category and the percentage of individuals within the organisation’s governance bodies, respectively, in each of the following diversity categories: gender, age group (under 30 years old, 30-50 years old, over 50 years old), other indicators of diversity where relevant (such as minority or vulnerable groups). All but one of the examined Swedish real estate companies have disclosed GRI 405-1 in their latest sustainability report.

GRI (2021) have proposed additional indicators to disclose on the equality within a company. The disclosure standard 404-3 is the percentage of total employees by gender and

by employee category who received a regular performance and career development review during the reporting period, and support target 5.1, 8.5 and 10.3. The progress of these same targets are supported through reporting on the ratio of the basic salary and remuneration of women to men for each employee category, and by significant locations of operation, and thereby constitutes GRI standard 405-2. Disclosure of GRI 406-1 includes reporting the total number of incidents of discrimination during the reporting period, and reporting the status of the incidents and actions taken with reference to the following: incident reviewed by the organization, remediation plans being implemented, remediation plans that have been implemented, with results reviewed through routine internal management review processes, and incident no longer subject to action. This disclosure supports target 5.1 and 8.8. Reporting 5 of the total number and rate of new employee hires and employee turnover, respectively, during the reporting period, by age group, gender and region, constitutes GRI standard 401-1 and support target 5.1, 8.5, 8.6 and 10.3. Four of the analysed Swedish real estate companies have disclosed GRI 403-9 in their latest sustainability report, while only one has incorporated GRI 403-10. Of the reviewed Swedish real estate companies, three have disclosed 405-2, seven have disclosed GRI 404-3 and 406-1, and six have disclosed 401-1 in their latest sustainability report.

Additional indicators focus on gender equality in the supply chain. GRI 414-1 entails reporting the percentage of new suppliers that were screened using social criteria, and thereby support target 5.2, 8.8 and 16.1. Reporting on the number of suppliers that has: been assessed for social impacts, been identified as having significant actual and potential negative social impacts, and has significant actual and potential negative social impacts identified in the supply chain constitutes GRI standard 414-2 and support target 5.2, 8.8 and 16.1. This standard includes reporting the percentage of suppliers identified as having significant actual and potential negative social impacts, with which: improvements were agreed upon as a result of assessment, and relationships were terminated as a result of assessment, and why. Six of the reviewed Swedish real estate companies have disclosed 414-1 in their latest sustainability report, while only two have reported on 414-2. Further indicators that support SDG 5 are GRI 404-1, and indexes of commitment and leadership that support SDG 5.1, 5.2 and 5.5 among others, as mentioned in section 3.3.2 (GRI, 2021; Humlegården, 2021). In addition, Familjebostäder (2021) has used employee experience and leadership indexes to measure the employees' skills supply, which supports SDG 5 and SDG 8.

3.5.2 Company studies

Ionascu et al. (2020) ranked the fifth SDG as ninth most prioritized by real estate companies, in their study which is further described in section 3.1.2. For this SDG, the content of the external reporting was analysed as it relates to "Equal pay for women and men for the same work" and "Representation of women in leadership positions". Some of the analysed Swedish real estate companies support the fifth Sustainable Development Goal by working to improve equality and diversity within the workforce (Akademiska Hus, 2021; Atrium Ljungberg, 2021; K2A, 2021; Vasakronan, 2021; Wallenstams, 2021). Akademiska Hus (2021) have contributed toward SDG 5.5 through their work to ensure equal treatment within the

company, which was done through their plan “Lika Unika”. Atrium Ljungberg (2021) consistently work to increase gender equality and counteract discrimination in the workplace, thereby advancing SDG 5.1. The gender distribution within their company is even and they were in 2020 ranked as the sixth most gender equal company among 335 Swedish listed companies. The work continues, especially with occupational groups in construction and property management (Atrium Ljungberg, 2021). Familjebostäder (2021) has stated in their sustainability report for 2020 that they help advance SDG 5 and SDG 8 by employing strategic competence provision to attract, recruit, introduce, motivate and develop existing and new employees. They strive for a good working environment and the company utilizes employee experience and leadership indexes to measure its development. Familjebostäder also works actively for gender equality, non-discrimination and diversity and strives to combat abusive discrimination and sexual harassment in the workplace, in contact with customers as well as in collaborations with external entities. Humlegården (2021) also engages in similar measures with their employees, and thereby contributes to SDG 5.1 and SDG 5.2, among others, as mentioned in section 3.13.2.

Most of the reviewed real estate companies have disclosed employee data such as the gender and age distribution of their employees. In addition, K2A (2021) have reported on the gender distribution in different parts of the company and have declared that there is potential for improvement in terms of gender equality in senior positions and in production. K2A works continuously with security in the homes through active management, well-thought-out outdoor environments, illuminated entrances, washing machine in the home instead of laundry room, windows facing the street and the yard and measures that create community in the houses. K2A has been assessed to make some contribution toward the advancement of SDG 5, based on an assessment of three of the goal’s targets that were deemed as relevant for the company. Hufvudstaden (2021) also performs environmental work on their properties, thereby supporting SDG 5.1 as mentioned in section 3.12.1. In addition, Kungsleden (2021) supports SDG 5 through measures described in section 3.17.2, and Vasakronan (2021) contributes to target 5.2 and 5.5 through work further detailed in section 3.3.3 and 3.10.2.

Case

According to Wallenstam (2021), their employers must work together with employees to achieve equality and diversity. Gender equality and diversity issues shall be integrated throughout the organisation and its working methods. Both in recruitments and internally through their own processes. Through their investments in development and their wage setting in their recruitments and internal processes, they work to ensure that women and men face the same conditions. The company also works to counteract discrimination by, for example, having a clear code of conduct where it is formulated that discrimination is not allowed. These actions, together with having an ongoing dialogue about what gender equality, respect and diversity means within the company, helps advance SDG 5. (Wallenstam, 2021)

3.6 Clean water and sanitation

The sixth sustainable development goal is to “Ensure availability and sustainable management of water and sanitation for all” and is split into eight targets. Target 6.3 is to improve water quality by reducing pollution, and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally. Target 6.4 is to substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity. (United Nations, 2021a)

3.6.1 Proposed measures

Several measures pertaining to what the real estate sector can do related to water management have been proposed, often specifically concerning the need to reduce buildings' water demands. Measures which would aid in the advancement of SDG 6 (RICS, 2018; Roy et al. 2021; Wiktorowicz et al., 2018). Roy et al. (2021) has stated that efficient water management through industrial symbiosis can help improve the efficient utilization of water resources. Water-related ecosystem services are needed for meeting the fresh water demand and could impact all SDGs (Vörösmarty et al., 2018). They have identified some actions that could support the adoption of more efficient and sustainable water futures, for example through green infrastructure such as watershed banks in cities. Building design can also advance SDG 6 by reducing energy and water demand and waste water generation (Poblete-Cazenave & Pachauri 2018; Roy et al 2021). Houghton & Castillo-Salgado (2017) have studied resilience of urban flooding in green building design. Reduction of water usage, improved water efficiency, and water sensitive design also contribute to SDG 3 and SDG 17 (Wiktorowicz et al., 2018). According to RICS (2018), companies may contribute toward the achievement of SDG 6 in various ways through environmental stewardship, one of these measures that would take place during the development phase is described in section 3.12.1.

In the real estate using phase, RICS (2018) states that companies could contribute toward target 6.4, 7.3 and 13.2 by introducing operating procedures that minimise the use of energy and water. Those targets may also be supported through the adoption of a maintenance strategy that includes modern and energy efficient lighting fittings, lighting that is controlled by motion in common areas and low-flow water plumbing and taps. They could also contribute to target 6.4 and 7.3 by optimising resource consumption by capturing consumption data (e.g. metering, BMS and BIM). Outdoors, companies could contribute to target 6.4 and 15.5 through the use of native plants that survive without additional watering, and thereby opt for landscaping solutions that reduce water usage and enhance biodiversity. Furthermore, companies could address health, safety and the well-being of occupants by providing access to water, sanitation and hygiene facilities for real estate occupants, considering the privacy needs of women in particular. They would thereby contribute toward the achievement of target 6.1 and 6.2. (RICS, 2018)

According to BREEAM (2018), their family of building certification standards and tools make a significant contribution to the SDG 3, SDG 6-7, SDG 9, SDG 11-13, and SDG 15. To

support SDG 6, the building certification standard BREEAM In-Use ensures provision of water and wash facilities, encourages the use of greywater to reduce waste, and mitigates the pollution of surrounding watercourses. The criteria for the building standard correspond to the SDG indicator 6.1.1, 6.2.1, 6.3.1, 6.3.2, 6.4.1, 6.4.2, 6.5.1, 6.6.1, 6.a.1, and 6.b.1. The criteria include: to ensure water efficient equipment regarding hand washing basins, toilets, urinals, showers, washing machines and dishwashers, and criteria for drinking water outlet standards, to make a risk assessment of the exposure to legionella and pollution, and more. The criteria call for scheduled inspections of watercourse pollution prevention features and minimise watercourse pollution, and make annual reviews of drinking water outlets including the hygienic location and condition. Also, the criteria assess if the buildings have flow control devices, leak detection systems and cold-water supply isolation, and if data of annual water consumption is available. The criteria for SDG 6 overlap with the criteria for SDG 1, SDG 3, SDG 4, SDG 8, SDG 11, SDG 12, SDG 14 and SDG 15 (BREEAM, n.d.).The BREEAM criteria are further detailed in section 3.1.1. According to Dachaga and de Vries (2021), land tenure security is a social environmental factor that also feeds into SDG 6, among others, as mentioned previously in section 3.1.1.

During the recovery phase, companies may contribute to target 6.3 during brownfield regeneration, which is further described in section 3.3.1. They could also contribute to target 6.6 by developing an integrated action plan during the rehabilitation of the real estate site, which is more thoroughly described in section 3.2.1. At last, RICS (2018) states that companies could contribute to target 6.4, 6.6 and 14.1 through the waste management during the recovery phase, by ensuring that waste water is managed to protect groundwater and existing natural water courses and drains (RICS, 2018).

3.6.2 Proposed indicators

The Joint Monitoring Programme (JPM, n.d.) and the Global Analysis and Assessment of Sanitation and drinking-water (GLAAS) are two monitoring mechanisms for SDG 6. According to JPM (n.d.), all households in Sweden had safely managed access to drinking water by 2020, and 95 % had safely managed access to sanitation. However, these mechanisms have trouble evaluating the access to water, sanitation and hygiene (WASH) services for vulnerable and marginalised groups. Ezbakhe et al. (2019) have found a score card developed by UNECE/WHO-Europe, called Equitable Access Score-card, useful for assessing WASH services for this group. While WASH metrics support SDG 6.1 and SDG 6.2 in general, the assessment of WASH services for marginalised groups also support SDG 10 of reducing inequalities. They also pinpoint that the score-card should be accompanied with the five normative dimensions of human rights: access, availability, quality, acceptability and affordability.

There have been some different indicators and methods proposed to measure water use efficiency which relates to advancing SDG 6. Reporting of the total water consumption from all areas in megaliters, including areas with water stress, corresponds to GRI disclosure standard 303-5 and support target 6.4. There is also the CRE2 which reports building water

intensity and support targets 6.4, 8.4 and 12.2. A similar measure have been proposed by UNCTAD (2019), who measure the water use efficiency as the water use per net value added in the reporting period, as well as the change of water use per net value added between two reporting periods (where water use is defined as water withdrawal plus water received from third party) in percentage terms, in terms of change and in absolute amount. The indicator of water use efficiency corresponds to SDG indicator 6.4.1.

Another GRI indicator that support target 6.4 is 303-3, which include a breakdown of the total water withdrawal from some specified sources in megaliters by the following categories: freshwater (≤1,000 mg/L Total Dissolved Solids) and other water (>1,000 mg/L Total Dissolved Solids). Again, a similar indicator of water stress has been proposed by UNCTAD (2019), who measures the water withdrawn broken down by sources, such as surface, ground, rainwater, waste water, and with reference to water-stressed or water-scarce areas. This indicator corresponds to indicator 6.4.2 and may be expressed as a percentage of total withdrawals, in absolute amount and in percentage terms. Of the reviewed Swedish real estate companies, only Vasakronan (2021) have disclosed the GRI standard 303-5 and 303-3, while three companies have reported CRE2. UNCTAD (2019) has also proposed an indicator of water recycling, measured as the total volume of water recycled and reused by the company during the reporting period in absolute amount and in percentage terms, corresponding to SDG indicator 6.3.1. The disclosure CRE8 also supports target 6.4, among others (GRI, 2021).

Widening the perspective a bit, Hysa (2021) has developed ecological indicators that could measure water scarcity and be relevant for SDG 6.4. Building on a spatial approach, they use a transversal connectivity index (TCI) to classify natural landscape patches and could be used to evaluate the effectiveness of blue-green infrastructure (Hysa, 2021). Another proposal is to use citizen science as a cost-effective means to monitor the progress towards the Sustainable Development Goals (Quinlivan et al., 2020). Citizen science could be described as research carried out by the public using available technical tools such as the internet, mobile phones and relatively low-cost sensors. For example, citizen science could be used to monitor the water quality and detect contamination, thereby supporting SDG indicator 6.3.2 (Hegarty et al., 2021; Quinlivan et al., 2020). But according to Quinlivan et al. (2020), some challenges still remain before it could be perceived as a reliable scientific approach.

3.6.3 Company studies

Ionascu et al. (2020) listed the sixth SDG as the eighth most prioritized by real estate companies. For this SDG, the content of the external reporting were analysed as they related to “Water use efficiency” and “Proportion of wastewater treatment”, further details of the study described in section 3.1.2. Atrium Ljungberg (2021) states in their sustainability report from 2020 that they help advance SDG 6.3 and 6.4 by minimising emissions and pollution of water and through employing smart day-water management, which results in an improvement of the water quality. Vasakronan (2021) helps advance target 6.4 by reducing

water consumption, and Humlegården (2021) contributes to target 6.3 and 6.4 as further described in section 3.13.2.

Case
K2A (2021) have stated in their annual report from 2020 that green roofs, plant beds, very permeable material on the farms, reservoirs and ponds that delay and purify are examples of measures that delay stormwater and very heavy rain. Often, K2A's stormwater solutions are even more extensive than what the municipality requires and less untreated stormwater risks ending up in watercourses. In production, there are no water-demanding activities and no untreated wastewater. Low-flush toilets, taps and showers are standard in the apartments. However, there is potential for improvement in reducing water use among residents, especially among students. K2A has been assessed to make no, or some contributions to SDG 6, based on an assessment of three targets of the goal that were pertinent for the company. The company has stated that they have great potential for improvement in regards to this goal. (K2A, 2021)

3.7 Affordable and clean energy

The seventh sustainable development goal is to "Ensure access to affordable, reliable, sustainable and modern energy for all" and is separated into five targets. Target 7.2 is to substantially increase the share of renewable energy in the global energy mix, while target 7.3 is to double the global rate of improvement in energy efficiency by 2030. (United Nations, 2021a)

3.7.1 Proposed measures

Buildings account for nearly 40 % of the global energy usage, therefore the transition to sustainable and efficient energy is key for the real estate sector to aid in the advancement of SDG 7 (USGBC, 2019a). Energy efficiency measures as well as the use of renewable energy sources contribute in advancing SDG. In addition, various technological innovations could contribute to a greater energy supply (Javied et al., 2015; Matinaro et al., 2019; Roy et al., 2021). But technologies such as additive manufacturing can lead to a higher consumption of electricity if not operated efficiently (Liu et al. 2018; Roy et al., 2021). According to RICS (2018) companies could contribute to target 7.2, 7.3 and 12.4 in the development of real estate by using a design and construction that minimise resource use with future refurbishment and recyclability of the building in mind, and which mitigates waste impact and disposal costs during the recovery phase of the real estate. Moreover, companies could contribute to 7.3 by various actions, such as: choosing sustainably sourced green construction materials that reduce impacts related to energy and carbon, introducing operating procedures that minimise the use of energy, by optimising resource consumption by capturing consumption data, and through the adoption of a maintenance strategy that includes energy efficient lighting fittings and lighting that is controlled by motion in common

areas. These actions also contribute to other SDG targets, which is further described in section 3.12.1 and 3.6.1.

Companies could also engage in environmental stewardship during the use phase of the real estate, and thereby contribute to target 7.3, 12.2 and 13.2, by focusing on resource efficiency and monitoring an integrated part of facilities management, whether in-house or outsourced, e.g. through adopting ISO 50001 for energy and ISO 14001 for general resource consumption in operation. Furthermore, by investigating the possibility of buildings to become self-sufficient, e.g. by creating and producing a maximum amount of renewable energy on site, companies could contribute to target 7.2 and 13.2 (RICS, 2018). This may include solar and battery storage that can be incorporated into buildings and dwellings, thereby supporting SDG 7, SDG 9, SDG 12, SDG 13 and SDG 17 (Wiktorowicz et al., 2018). Solar panels, also known as Building Integrated Photovoltaic (PV), distributed renewable generation and solar water heaters also help achieve targets under SDG 7 (Mbakwe, 2016; Roy et al., 2021; Salpakari & Lund, 2016). Further research on ground photovoltaic systems has been made by Semeraro et al. (2020). According to Roy et al. (2021), access to modern energy fuels, especially regarding cooking, is one of the most significant aspects in transitioning to clean energy (Poblete-Cazenave & Pachauri, 2018; Rosenthal et al., 2018; Roy et al. 2021). The space cooling of buildings uses an increasing amount of energy. Ascione (2017) has studied renewable technologies for the passive cooling of buildings and has discussed several methods that could reduce building cooling, such as: greenery of facades and roofs, phase change materials, dynamic thermal insulation, solar systems such as solar chimneys, and emerging technologies as breathing walls (Ascione, 2017). According to Roy et al. (2021), passive design like cool roofs or green roofs could also decrease the demand of artificial lighting and heating services, but non-committal policies for green roofs is not an effective preparation for future climate changes. In regards to sustainable building design, Forzani et al. (2019) have studied integration of vegetation to enhance building energy efficiency, and Santamaria et al. (2020) have studied water flow glazing (WFG), a type of architecture for energy saving thermal comfort that contributes to SDG 7. Kampelis et al. (2019) have investigated HVAC optimisation for nearly Zero Energy Buildings that contribute to SDG 7 and SDG 13. A function-based system modelling to assess and structure sustainability of buildings is proposed by Fauth (2020), which links to SDG 3, SDG 7.2-3, SDG 8.4 and SDG 12.2.

Energy performance gaps of buildings are defined as the difference between predicted energy demand during the planning phase, and measured energy demand during the operational phase. Reducing energy gaps contribute to SDG 7, SDG 11 and SDG 13 (Janser et al., 2020). The use of Internet of Things (IoT) to enable technology towards Smart Readiness Indicators (SRI) for non-residential buildings. SDG-enabling technologies towards NZEB could contribute to all SDGs (Martínez et al., 2021). For example, IoT could also be used for energy efficiency of buildings and contribute to SDG 7 through a smart grid (Krishna & Perumal, 2021). Energy efficiency of buildings could also be addressed through other technical solutions. Parvin et al. (2021) have reviewed conventional and intelligent control methods for optimisation of building energy management, in respect to comfort management, energy

consumption, and scheduling. They have outlined the different methodological approaches to optimization algorithms used in building energy management, and related the contribution of these measures towards SDG 3.8, SDG 7.1-3, SDG 8.3, SDG 9.1, SDG 11.2, SDG 12.1 and SDG 13. In addition, sustainable energy technologies and smart buildings in the built environment with the LCA approach have been studied by Fokaides et al. (2020). Optimising energy efficiency through Building Information Modelling (BIM) could contribute to SDG 7, SDG 8 and SDG 11, according to Khahro et al. (2021) who have applied BIM to a hospital building in a case study. A range of smart home technologies that support SDG 7.1 are described by Tirado Herrero et al. (2018), while Hoody et al. (2021) has proposed a low cost residential energy reduction program.
Remote islands that are not connected to the energy grid could benefit from a range of renewable energy sources and contribute towards SDG 7 (Kouloumpis & Yan, 2021). They have assessed seven renewable energy generation scenarios, using techno-economic, social and environmental indicators, and are offering an easy-to-use framework for receiving useful insight and adjusting energy scenarios.

Green buildings (including homes and offices) can use renewable energy which makes them cheaper to operate, thereby contributing to SDG 7 (WorldGBC, n.d.). According to the same source, green buildings may also contribute to SDG 3, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13, SDG 15 and SDG 16. Both BREEAM and LEED building certification standards support SDG 7. For example, to reduce the carbon footprint and energy usage of buildings are some of the driving forces behind LEED standards and high-performing green buildings are energy efficient and drive the adoption of sustainable energy technologies. Also, the LEED Zero Energy and Zero Carbon certification specifically reward net zero building operations which have maximised the energy efficiency and implemented renewable energy. In addition, to further promote an affordable and reliable electricity supply the GridOptimal project develops standards for how buildings can use energy and interact with the grid (USGBC, 2019a). Some of the metrics from GridOptimal are mentioned in section 3.7.2 (Miller, 2020).

According to BREEAM (2018), their family of standards and tools makes a significant contribution to the SDG 3, 6, 7, 9, 11, 12, 13, and 15. To support SDG 7, the building certification standard BREEAM In-Use ensures provision of water and wash facilities, encourages the use of greywater to reduce waste, and mitigate the pollution of surrounding watercourses. The criteria for the building standard correspond to the SDG indicators 7.1.1, 7.1.2, 7.2.1, 7.3.1, 7.a.1, and 7.b.1. For example, the criteria target the energy consumption for the entire asset, the metering of energy and electricity consumption, and significant energy consumption levels, with specification of significant energy and HVAC system consumption areas, and sub-metering of certain areas. The criteria test if common area units are metered separately for electricity and primary heating fuel. The energy consumption is assessed against local energy performance standards, where local standards should be met and correspond to benchmarks energy performance value. Legal regulatory requirements should also be met. The criteria also include energy efficient standards for escalators, internal lighting, and energy performance of hot water systems, and the on-site generation of cooling

and heating. An assessment is made of the Demand Side Management (DSM) capabilities for electricity, renewable electricity generation sources, and renewable energy generated on or near asset, such as if solar thermal panels and solar photovoltaic panels have been installed where applicable. The criteria include minimising operational energy consumption and having energy efficiency of ventilation services, lighting with efficient lighting controls and automatic lighting control that generates energy saving. The criteria for SDG 7 overlap with the criteria for SDG 1, SDG 4, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13 and SDG 14 (BREEAM, n.d.). See more about the BREEAM criteria on page 3.1.1.

In the recovery phase, companies could contribute to target 7.3 and 13.2 by assessing the available renovation and retrofitting interventions related to environmental risks and choose suitable and cost effective solutions that optimise energy efficiency and minimise carbon dioxide emissions of operations and used materials. They could also contribute to target 7.2, amongst others, through environmental impact assessment in regard to land recovery, which is further explained in section 3.2.1.

In order to combat climate change, a transformation of large cities is needed that effectively leads to a reduction in GHG emissions and meets the aim of SDG 7, SDG 9 and SDG 11. Gailard Couston et al. (2020) have studied an energy efficiency scenario for Berlin, a city of rapid growth, which would lead to increased production of socially sustainable affordable housing and energetic production. Conway and Hainoun (2020) have analysed the use of Regional Energy Demand Analysis Portal (REDAP) to estimate regional energy demand, to support decision making for sustainable energy and climate actions plans of governments in alignment with SDG 7, SDG 11 and SDG 12. A proposed method to analyse household energy consumption is also given by Verma et al. (2021). Energy poverty in developed countries is another issue that has received increasing attention, even though it affects a relatively small part of the population. Dalla Longa et al. (2021) have studied machine learning as a tool to quantify the risk of energy poverty in the Netherlands, with the conclusion that income remains the single most important predictor. Methods of gathering household energy data to disclose energy poverty have also been studied by Gouveia et al. (2018), which is relevant for SDG 1 and SDG 7. Neacsa et al. (2020) have studied energy poverty through a case study in Romania, where a business model was created that helped citizens benefit from energy from renewable sources at reduced costs, while more financial resources were created that could be utilized to generate new projects for reducing carbon emissions and energy poverty, supporting SDG 7. Regarding transport, using public transport or active modes when commuting saves energy and thereby advances SDG 7 (Roy et al., 2021; Sovacool et al., 2019; Trinh & Linh, 2018). The study brings awareness to the fact that electrical vehicles still consume a considerable amount of energy and contribute to other external effects (Langbroek et al., 2017; Roy et al., 2021). Uyar (2020) includes several articles for further reading in tackling the issue of transition to renewable energy in cities, often with proposed measures for local governments.

3.7.2 Proposed indicators

The proposed indicators to measure the progress in the advancement of SDG 7 mainly focus on measuring energy use and demand, and energy efficiency measures. To begin with, the measured energy consumption per net value added may serve as an indicator of energy consumption, which would correspond to SDG indicator 7.3.1. In addition, the measure of renewable energy consumption as the percentage of the total energy consumption during a reporting period may serve as an indicator of the prevalence of renewable energy, which would correspond to indicator 7.2.1 (UNCTAD, 2019). The GRI disclosure 302-1 is a similar indicator, which tracks the total energy consumption, and fuel consumption within the organisation from non-renewable sources and renewable sources respectively, reported in joules or multiples and the fuel types used. It also includes the reporting of the total electricity consumption, heating consumption, cooling consumption and steam consumption, in terms of joules, watt-hours or multiples. It also includes the reporting of the total electricity, heating, cooling and steam sold, disclosed in the same units. All standards, methodologies, assumptions, calculation tools, and sources of the conversion factors used should be specified. The standard supports SDG targets 7.2, 7.3, 8.4, 12.2 and 13.1. Reporting of the energy intensity ratio for the organisation corresponds to GRI disclosure 302-3 and supports targets 7.3, 8.4, 12.2 and 13.1. The same targets are supported through the GRI disclosure CRE1, which constitutes reporting on the building energy intensity, and disclosure 302-4, which entails the reporting of the amount of reductions in energy consumption achieved as a direct result of conservation and efficiency initiatives. The standard 302-4 should be disclosed in joules or multiples. All of the reviewed Swedish real estate companies have disclosed 302-1 in their latest sustainability report or annual report, while eight companies have reported 302-3, and six have reported 302-4 and CRE1. UNCTAD (2019) has also proposed an indicator of green investments, measured as the total amount of expenditures for those investments whose primary purpose is the prevention, reduction and elimination of pollution and other forms of degradation to the environment in absolute amount and in percentage terms. The indicator corresponds to SDG indicator 7.b.1.

The metrics of GridOptimal all support SDG 7 according to USGBC (2019a). The indicators include the Grid Peak Contribution that measures the degree to which the building demand contributes to the load on the grid during system peak hours, and the Grid Carbon Alignment that measures the degree of which building demand contributes to upstream grid carbon emissions per year. It also includes metrics of onsite renewable utilisation efficiency, measured as the building consumption of on-site generated energy per year. The GridOptimal also includes metrics of energy efficiency compared to baseline figures, measured as the percent better than annual total energy use. It also assesses the energy demand flexibility by measuring the ability of the building to reduce demand for 1 hour, for 4 hours, and the ability to automatically reduce the demand for 15 minutes controlled by a third party. Lastly, the resilience of the building's energy demand is assessed by measuring the ability to go island from grid and to provide energy for critical loads for 4-24 hours, and by testing the motor soft start capability to help grid restart after blackout (Miller, 2020; USGBC, 2019a).

3.7.3 Company studies

Ionascu et al. (2020) has ranked the seventh SDG as third most prioritized by real estate companies. For this SDG, the content of the external reporting was analysed as it related to "Improving energy efficiency" and "Share of the renewable source energy usage", see further details of the study in section 3.1.2. Some Swedish real estate companies engage in the Science Based Targets Initiative (SBT), which contributes with forward looking and transparent information about GHG emissions originating from operations within real estate companies. According to interviews done with seven Swedish companies that are engaged in the initiative, the main objective to disclose their GHG-emissions through SBT voluntarily was to provide their disclosure with a proof of quality, which would lend the company credibility. Another common reason to take part was to precede an expected stricter legislation, which might include higher fees or the prohibition of GHG emissions. Also, to gain access to capital and pressure from investors and stockholders motivate companies to disclose GHG emissions in a transparent way. The interviewed companies have undergone a complex transformation in regards to their business models, working methods, products and productions. The access to energy efficiency, renewable energy sources and carbon neutral transportations serve a crucial role (Tillväxtanalys, 2019).

Some of the reviewed Swedish real estate companies support SDG 7.2 and SDG 7.3 through energy efficiency measures that reduce energy consumption and by switching to renewable energy sources (Atrium Ljungberg, 2021; Fastighets AB Balder, 2021; Vasakronan, 2021). Atrium Ljungberg (2021) uses only bought electricity from hydro power and installed solar panels in their properties. Akademiska Hus (2021) have stated that SDG 7.2 and SDG 7.a are their prioritised targets among the SDG 7 targets. They contribute to target 7.2 through goals and activities that seek to achieve climate-neutral property management and operations, which include investing in renewable energy. The company advances target 7.a through collaborations with customers and other parties that relates to bringing forward innovative renewable solutions for energy production and systems. All of Fastighets AB Balder´s (2021) purchased electricity for their properties in Sweden and Finland are certified green, the company additionally also owns several wind turbines in Sweden. Solar cells and charging stations are also being installed at several properties, and the company is continuously working on operational optimisation and efficiency, by for example adding additional insulation and through window replacements. These measures support target 7.2 and 7.3. In addition, Fastighets AB Balder (2021) aids in the advancement of SDG 7 through measures further detailed in section 3.13.2, and Hufvudstaden (2021) contributes toward targets 7.2 and 7.3 through measures mentioned in section 3.12.3.

Kungsleden (2021), Familjebostäder (2021), Hemsö (2021) and K2A (2021) contribute toward SDG 7 by reducing their climate impact that is caused by the energy consumption of both existing properties and new production. Hemsö (2021) works systematically to reduce its energy use in buildings and places high demands on energy efficiency in new production. They have made extensive investments in solar cells and geoenergy. K2A (2021) only signs electricity agreements with good environmental choices for the properties and production

facilities. Solar cell systems are built in all new production and batteries that store solar power are used to reduce the need of purchased electricity. K2A has geothermal heat in most projects, which makes it possible to heat the houses in a sustainable way. Heat recovery from the air is employed which reduces the need for heating. They provide electric cars and bicycle pools at residences to reduce the use of fossil fuel. New company cars will be electric or hybrid and the company provides the use of a car pool to its employees. K2A has been assessed to make a large - to a very large contribution toward SDG 7, based on an assessment of two targets of the goal that were deemed relevant for the company (K2A, 2021). Familjebostäder's (2021) and Kungsleden's (2021) measures towards SDG 7 are further described in section 3.15.2. In addition, Klövern (2020) supports SDG 7 by measures described in section 3.12.3, and Humlegården´s (2021) measures that help advance SDG 7.2 and 7.3 are described in section 3.13.2.

Case

Wallenstam (2021), according to their annual report from 2020, contribute toward SDG 7. The company is self-sufficient though renewable energy generated from their own wind turbines. The largest part of their carbon footprint stems from using district heating to heat their properties. They state that to the extent that the heat is based on waste heat or produced with renewable raw materials, district heating can be an environmentally good alternative. They strive, where possible, to be able to replace district heating with their self-produced wind energy in more of their properties. Wallenstam also investigates and evaluates other technical solutions for sustainable energy production, such as solar energy and energy storage. They are installing solar cells on rooftops and will also install solar cells on the facade of a new parking garage. Their wind turbines are still financed through green bonds that were issued in 2019 within their own green framework, which received the highest rating Dark Green. (Wallenstam, 2021)

3.8 Decent work and economic growth

The eighth sustainable development goal entails to "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" and is divided into twelve targets. They include target 8.2 which aims to "Achieve higher levels of economic productivity", target 8.4 "Improvement of the global resource efficiency in consumption and production" as well as target 8.5 which aim to achieve full and productive employment and decent work for all and target 8.8 which concerns the need to protect labour rights and promote safe and secure working environments. (United Nations, 2021a)

3.8.1 Proposed measures

Economic growth could be aligned with the eight SDG: the green growth (or green economy) narrative supports SDG 8 by simply reducing emissions for economic benefit (Hinkel et al., 2020). However, most measures towards the achievement of SDG 8 involve addressing

issues of workers' rights and ensuring a decent work environment (RICS, 2018). By respecting of workers' rights during the real estate development, companies could contribute to target 8.8 in the following ways: by encouraging the workforce to raise questions or concerns without worry of consequences, by making a thorough risk and opportunity assessment of the organisation´s own business operation impact and the suppliers' impact on labour and human rights, by encouraging suppliers to develop internal labour and human rights policies, by only enter into business arrangements with contractors who prove to meet certain standards regarding workers' rights, by ensuring responsible supply chains that has full compliance with national or ILO labour rights and occupational health and safety regulations, and by establishing practices that ensures a safe and healthy work environment in regard to international labour standards. Moreover, companies could take measures to ensure the respect of workers' rights, and to provide opportunities for decent work in accordance with the Decent Work Agenda established by the International Labour Organisation. This action helps the achievement of target 8.5 and 8.8. Companies could also contribute to target 8.7 by playing a key role in the fight against forced labour and human trafficking, and contribute to both target 8.7 and 16.2 by carrying out due diligence when it comes to dealing with suppliers or subcontractors possibly engaged in child labour. The placement of mechanisms to ensure that no mistakes or poor judgement will not go undetected, such as the protection of whistleblowers, contribute to target 8.8. Companies may also contribute to target 8.4 and 15.4 by investigating the possibility of brownfield rather than greenfield development to ensure efficient land use. (RICS, 2018)

During the real estate use phase, RICS (2018) propose that contributions can be made to target 8.8 via placement of health and safety policies within the building, including access routes to and from the building, and by holding regular training to ensure that statutory health and safety regulations are followed by both employees and subcontractor staff. In addition, companies could contribute to target 8.3, 8.4 and 11.c by setting "local purchasing" as a target within the procurement policy, prioritising both employment and professional development of community members and the use of local materials. Target 8.8 and 16.b can be supported by addressing potential security and privacy issues for men and women and implement a non-tolerance policy for all forms of violence at work, including verbal and physical abuse and sexual harassment. Identification of ways to improve work areas, including increasing exposure to natural daylight, providing green spaces outdoors and reducing noise, contributes to target 8.8 and 11.7. Companies could contribute solely to target 8.8 by engaging in human rights in the value chain in several ways: by ensuring that workers' rights are respected throughout the organisation and among subsidiaries, by ensuring a properly and continuing maintenance and evaluation of property safety and health concerns, by paying attention to work environment issues and use appropriate personal protective equipment if necessary, and by referring to the basic work rights in contracts with subcontractors to ensure that the same principles apply to subcontractors workers that would apply to the organisation's own employees. Making sure that there is no forced labour or child labour in the company's and subcontractors´ operations will contribute to target 8.7, while the incorporation of children's rights into the corporate policies and codes of conduct contributes to both 8.7 and 16.2. Companies could also

contribute to target 8.5, by making sure that salaries paid to their own employees and those of subcontractors are meeting the minimum wage thresholds in the country of operation, and are equal between men and women. SDG 8 may also be supported by industrial symbiosis, which enhances technological innovation and creates new decent work opportunities (Roy et al., 2021; Safarzadeh & Rasti-Barzoki, 2019). Improved efficiency and reduced electricity consumption in the building sector also reduce costs for households and advance the eight SDG (Ahvenniemi & Häkkinen, 2020; Roy et al. 2021). Wiktorowicz et al., (2018) has studied a sustainable residential project in Australia where the citizens produce their own solar energy, and are sharing the energy through a peer-to-peer network. This project also offered affordable housing. All of these actions contribute to SDG 8 (Wiktorowicz et al., 2018).

According to the WorldGBC (n.d.), to build green buildings (including homes and offices), create jobs and boost the economy, thereby contributing to SDG 8. According to the same source, green buildings may also contribute to SDG 3, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, SDG 15 and SDG 16. The building certification standard BREEAM In-Use supports SDG 8 by helping to reduce the environmental footprint regarding the use of raw materials, and ensure a responsible and sustainable sourcing of materials. The criteria for the building standard correspond to the SDG indicator 8.4.1, 8.4.2, 8.7.1, 8.8.1, 8.8.2, and 8.10.1. For example, the criteria include access to cash via a safe pedestrian route, and having a building user guide with building or site specific guidance, including safety and emergency instructions and incident reporting. Ensure a functional adaptation of the asset with building design flexibility that enables the possibility of future changes. Have a procurement plan with sustainability aims adopted across several sites or at organisational level, where the criteria for sustainable procurement are met. Provide guidance on product choice, use certified supplier organisations, and have a timber procurement policy which is sponsored and used during management. Formulate procedural checks and verifications for effective implementation of procurement plans. Increase in reuse and recycling of waste from the asset, and adopt a waste data reporting tool that specifies the waste generated during management, and that records occupant waste separately to management waste. In addition, all criteria related to the indicators of SDG 7 also apply to the indicators of SDG 8. The criteria for SDG 8 overlap with the criteria for SDG 1, SDG 3, SDG 4, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, SDG 14 and SDG 16 (BREEAM, n.d.). See more about the BREEAM criteria in section 3.1.1.

Regarding the recovery phase, an action during refurbishment and retrofitting that supports target 8.8 is further described on page 3.12.1. They could also contribute to target 8.8 and 12.5 in the waste management, by preparing a schedule for pre-demolition audit and deconstruction as a basis for developing the method statement, defining how to carry out the demolition in a safe way and to maximize the amount of recycled material. In addition, companies could contribute to target 8.8, 12.4 and 12.5 by preparing a risk assessment and method description before dismantling any structure, disconnecting services or tearing down civilian work. This should include: sequencing of work, site-specific working methods, material recycling targets and specifications, protective equipment and clothing, emergency

procedures, and issuing final certification. The same targets could be supported by complying with international safety standards and the use of management systems from demolition and recycling specialists. Companies could also contribute to target 8.8 and 3.9 regarding waste management, by applying the highest standards of occupational health and safety, and to pay particular attention to the ILO safety standards for demolition and protection against biological agents, and ensure the use of appropriate protective equipment within the workforce during the whole demolition and waste management process. In addition, companies may comply with the following obligations under legislation and communal customs, as part of any demolition process: to address health and safety, including public health and environmental concerns, heritage and archaeological issues, conservation of nature, biodiversity protection, democratic choices of local communities and finally to consider contractor schemes. The action contributes to the following targets: 8.8, 3.9, 12.4 and 15.9. Furthermore, companies could support target 8.8 in the recovery phase by adopting international safety standards and management systems for protective purposes, if the organisation is the main or subcontractor at the demolition point and waste management. The company could contribute to the same target by observing decent work and work routines as described in ILO mandate in the areas of employment, training, working and living conditions and industrial relations during demolition. At last, companies could support target 8.8 during brownfield regeneration, by ensuring that the highest standards of working environment health and safety are applied, and that appropriate personal protective equipment is used during brownfield regeneration and rehabilitation of location.

3.8.2 Proposed indicators

A number of indicators have been proposed through which the progression towards SDG 8 may be monitored and disclosed by the real estate sector. UNCTAD (2019) has included a few economic indicators for SDG 8. The indicator of revenue, disclosed according to the International Financial Reporting Standard 15, corresponds to SDG indicator 8.2.1. The indicator of value added is calculated as the revenue minus the cost of bought-in materials, goods and services (gross value added), and corresponds to SDG indicators 8.2.1, 9.b, 9.4.1. An indicator that corresponds to SDG 8.2.1 and SDG 9.4.1 is the net value added, calculated as the revenue minus the cost of bought-in materials, goods and services minus depreciation on tangible assets (net value added). The GRI disclosure 201-1 also pertains to companies' economic reporting. The disclosure standard entails to report on the direct economic value generated and distributed (EVG&D) on an accruals basis, including the basic components of the organization’s global operations: direct economic value generated (revenues), economic value distributed (operating costs, employee wages and benefits, payments to providers of capital, payments to government by country, and community investments) and economic value retained (direct economic value generated less economic value distributed). Reporting of significant EVG&D should be separated at country, regional, or market levels. The disclosure 201-1 supports targets 8.1, 8.2, 9.1, 9.4 and 9.5 (GRI, 2021). All but one of the reviewed Swedish real estate companies have disclosed 201-1 in their latest sustainability report or annual report. Several of the reviewed Swedish real estate companies employ

additional economic indicators to keep track of SDG 8. Klövern (2020) have used surplus ratio and adjusted equity/assets ratio to keep track of goals that support SDG 8 and SDG 12, as well as a satisfied consumer index (*NKI index*). Familjebostäder (2021) has tracked progression towards SDG 8 through key figures such as a high solidity, a low debt to equity ratio and by having significant surplus values, they have also used employee experience and leadership indexes as mentioned in section 3.5.2. Indexes of commitment and leadership aid in the advancement of SDG 8.5 and 8.8, among other SDGs, as mentioned in section 3.3.2 (Humlegården, 2021).

The employee wages and benefits, broken down by employment type and gender, have been proposed by UNCTAD (2019) as indicators of human capital that correspond to SDG 8.5.1 and SDG 10.4.1. It should be calculated as the total wages and benefits of the employee workforce divided by the total revenue of that reporting period. GRI (2021) has another indicator of employee diversity that supports target 8.5 and 10.3, the disclosure 102-8 of the total number of employees by employment contract (permanent and temporary) broken down by gender and by region. The disclosure includes the total number of employees by employment type (full-time and part-time), by gender, and if applicable, a description of the nature and scale of work performed by workers who are not employees and whether they perform a significant portion of the organisation's activities (GRI, 2021). The percentage of employees covered by collective agreements has been proposed by UNCTAD (2019) as an indicator of collective agreements, which corresponds to SDG indicator 8.8.2. It should be measured as the number of employees covered by collective agreements to total employees, in terms of headcount or FTE (UNCTAD, 2019). This indicator is similar to GRI disclosure 102-41, which is the percentage of total employees covered by collective bargaining agreements, which supports target 8.8. All but one of the reviewed Swedish real estate companies have disclosed 102-8 and 102-41 in their latest sustainability report or annual report.

UNCTAD (2019) have also suggested the frequency rates or incident rates of occupational injuries, as indicators of employee health and safety that correspond to SDG 8.8.1 and are similar to the GRI disclosure standard 403-9. According to UNCTAD (2019), frequency rates should be measured as the number of new injury cases divided by total number of hours worked by workers in the reporting period, and incident rates as the total number of lost days expressed in terms of number of hours divided by total number of hours worked by workers during the reporting period. In addition, the expenditures on employee health and safety, as an indicator of employee health and safety corresponds to SDG 8.8 among others, as mentioned in section 3.3.2. GRI (2021) also has a disclosure standard that applies to organisations that have implemented an occupational health and safety management system based on legal requirements and/or recognised standards or guidelines. The disclosure standard 403-8 supports target 8.8 and includes reporting of the number and percentage of all employees and non-employed workers in the organisation who are covered by such a system, and if the system has been audited or certified. The reporting should specify whether any workers have been excluded from this disclosure, plus any contextual information necessary to understand how the data have been compiled, such as any standards,

methodologies, and assumptions used. Two of the reviewed Swedish real estate companies have disclosed 403-8 in their latest sustainability report or annual report.

GRI (2021) has also proposed some environmental indicators that support SDG 8. The GRI disclosure 301-1 includes reporting of the total weight or volume of materials that are used to produce and package the organization's primary products and services during the reporting period, by non-renewable and renewable materials used, and support SDG targets 8.4 and 12.2. Reporting of the percentage of recycled input materials used to manufacture the organization's primary products and services, constitutes GRI disclosure 301-2 and supports targets 8.4, 12.2 and 12.5 (GRI, 2021). Only Vasakronan (2021) of the reviewed Swedish real estate companies have disclosed 301-1 in their latest sustainability report or annual report, while Humlegården (2021) is the single company who have reported 301-2. GRI (2021) have a number of additional disclosure standards that contribute to SDG 8.4, which has already been mentioned in other sections since they overlap with support toward other SDGs, namely: the disclosure 302-1 of energy and fuel consumption, the disclosure 302-3 of organisation energy intensity, the disclosure 302-4 of reductions in energy consumption, the disclosure CRE1 of building energy intensity, the disclosure CRE2 of building water intensity, and the disclosure CRE8 of sustainability certifications. Further standards that are relevant but described elsewhere in the report includes: the disclosure 401-1 of employee hires and turnovers that support SDG 8.5 and SDG 8.6, the disclosures 403-9 and 403-10 of work related injuries and ill health that support target SDG 8.8, the disclosure 404-1 of employee training hours that support SDG 8.2 and SDG 8.5, the disclosure 404-3, 405-1 of employee diversity that supports target 8.5, the disclosure 405-2 of salary distribution that support target 8.5, the disclosure 406-1 of discrimination incidents that support target 8.8, and the disclosures 414-1 and 414-2 of supplier assessment that support target 8.8.

3.8.3 Company studies

The study executed by Ionascu et al. (2020) found that the eighth SDG was the fourth most prioritized among the sample of companies analysed. For this SDG, the content of the external reporting was analysed as it related to "Economic impact on the community" and "Increasing labour productivity by creating decent and modern workspaces", see further details of the study in section 3.1.2. Ansari et al. (2015) have studied if sustainability reporting has an impact on the stock prices of 89 listed Western real estate companies. The results showed that releasing sustainability reports had a positive impact on the value of real estate companies, which emphasize the significance of reporting the company's sustainability measures as this suggests increased growth expectations. Ansari et al. (2015) reason that if additional information is provided in sustainability reports one should expect a positive impact on corporate value.

Some of the reviewed Swedish real estate companies support SDG 8 by ensuring a good work environment. Atrium Ljungberg (2021) works actively promoting a safe and secure work environment and good working conditions for both its own employees and subcontractors', thereby aiding in the advancement of SDG target 8.8. The company states that combating

human rights violations is an important part of their work as well as the demands they place on their suppliers. Fastighets AB Balder (2021) also focuses on good working conditions, and strives for increased diversity and equality. A number of young people who live in the company's areas are employed as seasonal summer employees every year. Balder also offers opportunities for work experience and internships to students in real estate-related education and within the framework of various local initiatives. Balder strives to conduct sustainable purchasing, to follow up suppliers and to shop locally where possible. According to the company's annual report for 2020, these actions contribute toward targets 8.4, 8.6 and 8.8. Fastighets AB Balder (2021) also supports SDG 8 through measures described in section 3.13.3. As mentioned in section 3.12.1, Hufvudstaden (2021) contributes to SDG 8.8, among other targets, by ensuring a good and safe working environment. Akademiska Hus (2021) contributes to targets 8.2, 8.4 and 8.8. To advance target 8.2 the company pro-actively works with energy plans and technical upgrades and they collaborate with customers and other parties to improve innovation for technical upgrades and increased efficiency. Target 8.4 is supported through goals to achieve climate-neutral project operations and activities to abide by the "Fossilfritt Sveriges färdplan mot 2045". They also advance target 8.4 through their innovative project "Co-Living" that focuses on the design of various forms of shared living. Lastly they contribute toward target 8.8 through actively engaging in and being co-founder of the organisation "Håll Nollan", which works to institute stronger requirements for safe workplaces, and the company regularly conducts work environment dialogue in their administrative areas (Akademiska Hus, 2021).

Another way to advance SDG 8 is by ensuring economic sustainability. Long-term profitability is a basic condition for Wallenstam (2021) and their owners want to see a return on the capital they have invested in the business. Through efficient organisation, climate and cost efficiency throughout the business, and a focus on locations with growth and strong demand, they can ensure long-term economic stability. Wallenstam is flexible in an altering housing market in a way that provides security for stakeholders. With a profitable development of properties, they create value for their customers, society at large and for the company's employees and owners. Long-term plans and investments over time also create secure jobs in production and management. Hemsö (2021) strives to be responsible and to think long-term when doing business and in their relationships with tenants and suppliers. The company creates societal benefits through the community properties they build and manage. The company generates returns for the Swedish pension system and is a long-term and stable employer with satisfied and healthy employees. All these actions align with SDG 8 (Hemsö, 2021). Klövern (2020) also advance SDG 8 by focusing on economic stability, as described in section 3.12.3. In addition, Vasakronan (2021) contributes towards target 8.4, 8.5 and 8.8 as described in section 3.3.3 and 3.10.2, Humlegården (2021) contributes towards targets 8.2, 8.3, 8.4, 8.5 and 8.8 as detailed in section 3.9.3 and 3.13.2, Kungsleden (2021) support SDG 8 through measures listed in section 3.17.2, and Familjebostäder (2021) contribute toward SDG 8 as further detailed in section 3.5.3.

Case

K2A (2021) states that their industrialized construction process is innovative and is based on an architecture that originates from inside the home, not from the shell. The design of the homes is standardized and all processes are thus adapted and become more efficient than in traditional construction. Building parts are assembled to be dismantled, and the company works to be able to reuse building materials. In production, support employment is applied, which entails that the long-term unemployed are given the opportunity to establish themselves on the labour market. The industrial production method makes it easier for the low-skilled and disabled to work in production. All suppliers must sign and abide by K2A's code of conduct. K2A has been assessed to make some - to large contributions toward SDG 8, based on an assessment of six targets of the goal that were relevant for the company. (K2A, 2021)

3.9 Industry, innovation and infrastructure

The ninth sustainable development goal is to “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation” and is split into eight targets. Target 9.1 entails to develop quality, sustainable and resilient infrastructure, target 9.2 to promote inclusive and sustainable industrialization, and target 9.4 aims to upgrade infrastructures to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes. (United Nations, 2021a)

3.9.1 Proposed measures

Innovative design in residential development has been proposed as a method to advance SDG 9, which additionally would also aid in the advancement of SDG 7 and SDG 11(Wiktorowicz et al., 2018). Research in energy systems and monitoring devices have been found to spark green innovations (Boßmann et al., 2015; Roy et al., 2021; Salpakari & Lund, 2016). Proper infrastructure promotes transit-oriented development and reduces the amount of privately owned vehicles (Khan et al., 2016; Roy et al., 2021; Sjöman et al., 2020). According to the WorldGBC (n.d.), green building design for homes and offices can spur innovation and contribute towards the development of climate resilient infrastructure, thereby advancing SDG 9. Green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 11, SDG 12, SDG 13, SDG 15 and SDG 16. For example, BREEAM (2018) has stated that their family of standards and tools contribute significantly in advancing SDG 3, SDG 6, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, and SDG 15. Their building certification standard BREEAM In-Use supports SDG 9 by ensuring access to pedestrian roads and public transport and promotion of sustainable travel plans, making assessment of travel patterns for the asset, and by reducing carbon dioxide through energy efficiency measures (BREEAM, n.d.). The criteria correspond to the SDG indicator 9.1.1, 9.1.2, 9.4.1 and 9.a.1. The criteria call for provision of annual energy consumption data, including asset subtype mix. They also

include having a procurement plan with sustainability aims adopted across several sites or at organisational level, where the criteria for sustainable procurement should be met. Additional criteria target the provision of guidance on product choice, use of certified supplier organisations, and have a timber procurement policy. Criteria include formulation of procedural checks and verifications for effective implementation of procurement plans. Regarding transport, the criteria assess cyclist safety and promote sustainable travel by: providing cycle storage facilities, access to public bicycle sharing systems, car clubs and electric car provision. They also include a measure of the distance to public transport and amenities via safe pedestrian routes. In addition, all criteria related to the indicators of SDG 7 also apply to the indicators of SDG 9. The criteria for SDG 9 additionally overlap with the criteria for SDG 1, SDG 4, SDG 7, SDG 8, SDG 11, SDG 12, SDG 13, SDG 14 and SDG 16 (BREEAM, n.d.). See more about the BREEAM criteria in section 3.1.1.

In industry, promotion of industrial innovation through technological upgradation and energy efficiency leads to reduced energy demand in industrial process (Ashraf et al., 2018; Guo et al., 2018; Hens et al., 2018; Roy et al., 2021; Safarzadeh & Rasti-Barzoki, 2019). Eco-industrial parks (EIP) is a concept which is about creating more resource-efficient and cost-effective industrial parks which are more competitive, attractive for investment, and risk resilient. This is done by transforming challenges into business opportunities through improved resource efficiency, utilization and recycling, company collaborations, and shared infrastructures, as well as utility services. EIP links most explicitly to SDG 9: to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation, but also has a positive correlation to SDG 2, SDG 3, SDG 4 and SDG 7. Organisations such as real estate companies, may apply the EIP Assessment Tool, developed by UNIDO, to transform an existing industrial park into an EIP (Van Beers et al. 2020).

SDG 9 could also be supported by ensuring an efficient and sustainable use of resources. Röstlund and Björling (2020) have studied sustainable material processes with use of local resources from a Swedish perspective. According to them, sustainable construction materials support SDG 5, SDG 9 and SDG 12, while the wellbeing of people in the production, construction, use and demolition support SDG 1, SDG 3, SDG 4, SDG 8, SDG 12 and SDG 13. Avoiding land and sea degeneration and loss of biodiversity support SDG 5, SDG 9, SDG 12 and 15, and to transfer the knowledge of a holistically sustainable material process between detailed building scale to the layout of buildings and communities advance SDG 9 and SDG 4. As an alternative material in sustainable renovation of buildings, the use of the super insulation plasters (SIP) contribute to SDG 7, SDG 8 and SDG 9. SIP are new and high energy efficient plasters mixed with aerogel particles, that is a low-density material with low thermal conductivity compared to conventional insulation materials (Karim et al., 2020). According to Kline et al. (2021), who has analysed the supply chain of wood-based pellets produced in the southeast United States and shipped to Europe, the pellets could generate positive effects on several SDGs including goal 7.2, 8.4, 9.2-9.4, 12.2 and 15.2. The main contribution was made towards the goal of inclusive, small-scale industries (SDG 9.2-9.3) since the majority of US private timberland is family owned, and toward target 9.4, the upgrade of industries through clean and climate-smart technologies since the net CO_2

emissions are reduced when wood pellets replace fossil coal. However, pellets may generate a negative impact on air, water, and biodiversity if the resource base and harvest activities are not managed properly.

3.9.2 Proposed indicators

A couple of indicators are proposed through which the progress of SDG 9:s targets may be disclosed by the real estate sector. UNCTAD (2019) has suggested an indicator which keeps track of total expenditures on research and development, which would correspond to SDG indicator 9.5.1, and should be measured as the total amount of expenditures on research and development by the company during the reporting period in absolute amount and in percentage terms. The percentage of local procurement may serve as an indicator of local supplier programmes, which corresponds to SDG indicator 9.3.1. It may be measured as the proportion of procurement spending of a reporting entity at local suppliers (based on invoices or commitments made during the reporting period) in percentage terms and in absolute amount. UNCTAD has also proposed that the indicator of greenhouse gas Scope 1 and Scope 2 emissions corresponds to SDG indicator 9.4.1, and may be measured as the Scope 1 and Scope 2 contribution respectively, in absolute amount, in percentage terms and in terms of change. As mentioned in section 3.8.2, the economic indicators of value added and net value added supports SDG 9.b and SDG 9.4.1, among other targets (UNCTAD, 2019). In addition, the GRI (2021) disclosure 201-1 of economic performance support targets 9.1, 9.4, and 9.5.

3.9.3 Company studies

Ionascu et al. (2020) found that the ninth SDG is seventh to most prioritized by real estate entities. For this SDG, the content of the external reporting was analysed as it related to “Development of qualitative, reliable, sustainable and powerful infrastructure”, “Supporting small industrial enterprises”, “Green industrial technologies and processes” and “Investments in research and development”, see further details of the study in section 3.1.2. Both Fastighets AB Balder (2021) and K2A (2021) support SDG 9 through sustainable industrialisation and resource efficiency. K2A (2021) work for inclusive and sustainable industrialisation in a traditional industry that is characterised by manual work on construction sites. In the industrialised production of volume elements, K2A has pushed a production method that has not traditionally been industrialised, to become so. In addition, K2A strives for more circular processes and to be able to reuse components, it must be possible to disassemble what is mounted. The ecolabel “Svanen” guarantees, among other things, that industrial processes are free from chemicals that are harmful to the health and environment. The company also aims to expand collaborations with researchers at colleges and universities. K2A (2021) has been assessed to make some - to a large contribution to SDG 9, based on an assessment of three targets of the goal that were relevant for the company.

Humlegården (2021) contributes towards SDG 9.4 and SDG 9.5, as well as SDG 3.6, SDG 8.2, SDG 8.4, SDG 8.7, SDG 12.6 and SDG 12.8 by focusing on sustainable supply chains,

green funding, supplier collaborations and setting the goal that 100% of new suppliers sign their code of conduct and fill out a self-assessment survey that evaluates their sustainability. The company also contributes towards SDG 3.9, SDG 9.1, SDG 11.2-11.4, SDG 11.7, SDG 11.a, SDG 15.1, SDG 15.5, SDG 15.8 and SDG 15.9 by creating green areas and through climate adaptation. They are one of the founders of the organisation “Centrum för AMP” which strives to create safe and attractive environments. Humlegården strives to conduct yearly customer surveys regarding safe environments and 100% of their actively managed properties shall have been the subject of an associated ecological investigation (Humlegården, 2021). Kungsleden (2021) also contributes to SDG 9, through measures mentioned in section 3.16.3.

Case

Fastighets AB Balder (2021) supports innovation and continuously works to improve their resource efficiency. The company strives to increase the proportion of recycled materials in both renovation and new construction and to increase the use of new technology, through for example increased digitization of properties, thereby contributing towards SDG 9.2 and 9.4. The company also supports SDG 8 and SDG 9 by instituting various goals which they keep track of by employing a range of different metrics. Their goal of having satisfied customers is followed up through the usage of a customer satisfaction index (*NKI-index*), while the goal of having a profitable and stable economic result in the long term is being measured through their economic result and GRI disclosure 201-1. In addition, they engage in the key issues of having ethical relations with the outside world and responsible suppliers. Their goal is to not have any reported incidents of corruption or discrimination, which they monitor through the key figure of number of incidents of corruption and discrimination. They also utilize the GRI standards 205-2 of education in anti-corruption, 205-3 of number of cases of corruption, and 419-1 of impacts due to non-compliance with regulations. Balder also supports SDG 9 and SDG 11 by promoting safety and well-being in their properties, and by taking responsibility for transportation. They have measured the goal of creating jobs for youths within the real estate operation through the number of jobs that have been created per year. They have also measured the key issue of responsible and sustainable travel as number of car pools and bike pools at new properties per year. They also disclose Scope 1 and Scope 2 emissions through the GRI standards 305-1 and 305-2. (Fastighets AB Balder, 2021)

3.10 Reduced inequalities

The tenth Sustainable Development Goal is to “Reduce inequality within and among countries", and is separated into ten targets. Target 10.2 entails to empower and promote the social, economic and political inclusion of all, while target 10.3 aims to ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws and by promoting appropriate legislation. (United Nations, 2021a)

3.10.1 Proposed measures and indicators

According to RICS (2018), one method through which to bring benefits to local communities and aid in the advancement of targets 10.1 and 10.2 would be to hire local labour during the land governance of real estate development. In regards to transparency and anti-corruption, companies could support target 10.3 by implementing control mechanisms and systemic barriers to prevent people from having the opportunity to abuse their power, or to benefit from it. Also, companies could respect the workers' rights and thereby contribute toward target 10.3 and 5.5, through the development of non-discrimination strategies and business relationships with women-owned enterprises, being inclusive of small businesses and women entrepreneurs. In section 3.16.1, it is also mentioned that companies may contribute toward target 10.2 through land governance by carrying out a social impact assessment related to human rights.

During the real estate use phase, companies may contribute toward target 10.2, 10.3 and 11.3 through the adoption of a non-discrimination policy concerning the choice of tenants. The same targets could be supported by ensuring that all rental agreements and contracts are fair and reasonable. Companies can also help ensure the health and safety of occupants by ensuring that people with reduced mobility can access all parts of the premises, which would support target 10.2. Advancement of target 10.2 and 5.2 could be aided by ensuring that buildings with public access allow entrance for all members of the communities, regardless of gender, age, religion, disability, sexual orientation and ethnicity. In sections 3.5.1 and 3.16.1, further actions are described that contribute toward target 10.2 by considering the treatment of tenants and community. Measures that also contribute toward target 10.2 and 10.3 through the development of a diversity management strategy relating to the workforce. In addition, Wiktorowicz et al. (2018) argue that various alternative housing projects, such as Gen Y housing and sustainable housing for artists and creatives (SHAC) advance SDG 10. Additionally, it was found that improvements were needed in regards to combating inequitable access to cooling in buildings, in particular air conditioning, since this unfairness results in energy poverty and also undermines SDG 7 (Mastrucci et al., 2019; Roy et al., 2021). Regarding transport, access to bicycle lanes increase the probability of female commuters using bicycles (Arora et al., 2016; Mitra & Nash, 2019; Roy et al., 2021). In addition, digitalization has contributed to more women carpooling, as mentioned previously in section 3.5.1.

The indicators proposed for SDG 10 mainly relate to the employees, but all of them have been described in other sections of this literature review. UNCTAD (2019) have suggested that employee wages and benefits broken down by employment type and gender, as indicators of human capital that corresponds to SDG indicator 10.4.1 and is explained in section 3.8.2. GRI (2021) have a number of disclosure standards that contribute to SDG 10.3, which has already been mentioned in other sections since they also support other SDGs, namely: the disclosure 102-8 of employees per employment contract, the disclosure 401-1 of employee hires and turnovers, the disclosure 404-1 of employee training hours, the disclosure 404-3 of employee performance reviews, the disclosure 405-2 of salary

distribution, and the disclosure CRE8 of sustainability certifications that only support target 10.2. Indexes of commitment and of leadership support SDG 10.2, among others, as mentioned in section 3.3.2 (Humlegården, 2021).

3.10.2 Company studies

The study done by Ionascu et al. (2020) ranked the tenth SDG as fifth to least prioritized among real estate companies. For SDG 10 the content of the external reporting was analysed as it related to "Equal opportunities for employees, including those with disabilities or from disadvantaged backgrounds" and "Remuneration of employees in relation to the maximum value of the income registered in the entity", further details of the study is detailed in section 3.1.2. Vasakronan (2021) has disclosed wage differences between men and women and has declared that employee data is retrieved from their HR system. The percentage of employees who experience or interpret their workplaces as free from discrimination was calculated based on an employee survey conducted during 2020. The company's work with diversity and equal treatment contributes to the global sustainability goal 5.5, 8.5 and 10.2. Vasakronan also contributes to target 5.2, 10.2, 11.7 and 16.1 through their work to maintain a safe and secure environment in and around their properties. Building and managing group housing is part of K2A's business model and these are often included in buildings with ordinary rental apartments (K2A, 2021). K2A strives to mix different groups and create heterogeneous residential areas. Inclusion is also considered by providing information in different languages. K2A also has a strong focus on creating social meeting places in and around residential buildings. Courtyards and homes are always accessible to people with disabilities. People who are long-term unemployed are offered work in production. It is accepted in production that some religions require interruptions for prayer. K2A has been assessed to make a large - to a very large contribution to SDG 10, based on an assessment of two targets of the goal that were relevant for the company (K2A, 2021). Similarly, Kungsleden (2021) contributes to SDG 10 by focusing on community involvement, transparency and business ethics and work environment and safety, as mentioned in section 3.17.2. Humlegården (2021) also contributes to target 10.2, through measures that are described in section 3.13.2.

Case

Familjebostäder (2021), according to their 2020 sustainability report, aims to contribute to a sustainable and competitive real estate market, and prioritises transparency, security, inclusion and taking responsibility. They have intensified their work against corruption and fraud and are working to institute a more sustainable supply chain. They measure progress towards SDG 10, SDG 11 and SDG 12 through the number of completed apartments, a service index, a security index and through the surplus ratio, and they have goals regarding surplus ratio and the number of completed apartments. Familjebostäder also employs young people as summer workers. They also support SDG 10 and SDG 16 by taking safety measures in the management and through different collaborations. For

example, they have installed surveillance cameras and security locks, and use a security index to measure the impact of these safety measures. (Familjebostäder, 2021)

3.11 Sustainable cities and communities

Since 2007, more than half the world's population live in cities. Rapid urbanization has resulted in an increasing number of slum dwellers, overburdened infrastructure, worsening air pollution and unplanned urban spread (United Nations, 2021b). The eleventh Sustainable Development Goal is about handling these issues by making cities and human settlements inclusive, safe, resilient, and sustainable. The goal is divided into 10 targets, and the UN has defined 15 metric indicators, through which the achievement of these targets can be traced. Among them are, target 11.1 which is to ensure that all have access to adequate, safe and affordable housing, target 11.3 which aims for enhancement of inclusive and sustainable urbanisation, and target 11.6 which is to reduce the environmental impact in cities with special attention to air quality and waste management. (United Nations, 2021a)

3.11.1 Proposed measures for cities

Barnett and Parnell (2016) argue that the meaning of cities in SDG 11 is twofold: it both refers to place-specific aspirations, and to general issues of urban development for which indicators will be institutionalised. The perception of cities as places were multiple processes operating over various spatial and temporal scales constitutes a challenge in the architecture for monitoring and evaluating urban transformations, and technical challenges of data analytics and defining indicators. It also involves a conceptual challenge regarding the dynamic relationship between local activities and dispersed outcomes, and the issue that some positive outcomes are dependent on actions undertaken elsewhere. When implementing the SDGs to achieve sustainable cities in alignment with SDG 11, practitioners need to consider the delimitation of the urban boundary, integrated governance, actors, synergies and trade-offs and indicators (Valencia et al, 2019).

The environmental performance of cities depends on effective green strategies and physical structure. Cities can be designed, planned and managed to limit the use of resources and greenhouse gas emissions. A lower ratio of surface in comparison to volume of denser building typologies can result in lower heating and cooling loads (United Nations Environment Programme [UNEP], 2011). A more compact form of the city and reduced travel distance has been shown by Hoornweg et al. (2011) to lead to greater energy efficiency, if the city provides good public transportation in metropolitan areas. Cities can also be structured with grid-based energy systems, for example a combined power and heating system or micro-generation of energy (UNEP, 2011). In addition, cities can make use of rainwater harvesting, provide access to clean water, and have efficient waste management that minimises or recycle waste. To apply infrastructure that improves air quality, and to include waste management in the community infrastructure supports target 11.6 (Wiktorowicz et al., 2018). In these ways, cities can be planned to make use of critical urban

mass and reduce individual patterns of consumption. Reduced pollution, as a consequence of increased environmental performance of the city, leads to improved public health, and urban greening is already used in many cities to improve air quality. It is also important to secure urban ecosystems in order to reduce risk exposure of lacking water supply, food security, and the impact of extreme weather (UNEP, 2011).

Smart cities have the possibility to have a positive impact on almost every SDG, through aspects such as smart: mobility, living, environment, citizens, governments, architecture and related technologies and concepts (Ismagilova et al., 2019). In order to transition to a smart city with net-zero emission, a decarbonisation of renewable energy is needed with the support of an accelerating development of green buildings, electrical vehicles, while ensuring long-term stability (Razmjoo et al., 2021). The concept of smart and sustainable cities that meet the aims of SDG 11 have been further investigated and defined, and have also been linked to other SDGs such as SDG 7, SDG 12, SDG 13 and SDG 16 (Heinonen, 2020; Lützkendorf & Balouktsi, 2019; Moreno et al., 2021; Moschen et al., 2019; Serey et al., 2020; Zarco-Periñán et al., 2021; Zimring, 2020). Sustainable spatial planning is another subject that is important for sustainable cities to emerge, supporting not only economic growth, but also human health and wellbeing (Solly, 2021). Some urban interventions that improve health and advance SDG 1-8, SDG 10-11, SDG 13 and SDG 15 are zero carbon buildings, active transport, urban connectivity, pollution control, clean household fuels and protection from heat and flooding events (Vardoulakis et al., 2020). Weijs-Perrée et al. (2021) have further investigated the relation between urban health and urban design, where the perception of accessibility, safety and inclusiveness is emphasised by SDG 11.7.

To obtain a green economy and sustainable cities according to the meaning of SDG 11, a synergy of collaborations between ecology, economy, legislation, spatial planning, territorial governance and society is needed. Many cities in Europe have begun to take measures towards a green economy, including policies, programmes, and innovative actions such as investment in green infrastructure, sustainable mobility and resource efficiency (Pultrone, 2019). The development of sustainable mobility systems and the integration of sustainability measures into policies, strategies, and planning tools contributes to both SDG 11 and SDG 13 (Tiboni et al., 2021). Policies and regulations that support sustainable urban planning and enable a transition to sustainable and smart cities have been studied by several researchers, at times intended to support local government decision making, policies, strategies and actions towards the SDGs (Alves, 2020; Attolico & Smaldone, 2020; Fudge et al., 2020; Razmjoo et al., 2021; Sebastiani et al., 2021; Tiboni et al., 2021). However, sustainable facility management in cities could be carried out of agencies and the private sector in new and innovative settings to benefit local communities, contributing mainly to SDG 3 and SDG 11 (Temeljotov Salaj & Lindkvist, 2020).

Green infrastructure is defined as a network of natural and engineered green space and could be categorized into the five branches: green roofs, green walls, urban vegetation and forestry, urban agriculture systems, and tree-based intercropping systems (Anderson and Gough, 2021). For example, green infrastructure could be used to enhance urban thermal comfort

and mitigate urban heat island (Allam, 2021). Integration of nature-based solutions (NBs) in cities contributes to SDG 11.4 and has several advantages: improving health, sequestering carbon, enhancing biodiversity and sustainable water management, providing acoustic comfort, reducing urban heat island, among other things (Coombes & Viles, 2021). The positive impacts of nature are also referred to as ecosystem services (UK National Ecosystem Assessment, n.d.). Further research on nature based solutions in urban planning and ecosystem services have been carried out by (Calderón-Argelich et al., 2021; Drenning et al., 2020; Dushkova & Haase, 2020; Russo & Cirella, 2020; Voskamp et al., 2021; Wendling et al., 2018), linking NB mainly to SDG 11, but they also support SDG 3 and SDG 12. The provision of access to safe, inclusive and accessible green and public spaces is target 11.7, and has a positive effect on human health and wellbeing, especially for people with a low socioeconomic status (even though there is not yet any proof of the need of green spaces to achieve human health). But according to de Vries et al. (2020) a densification of cities will likely lead to reduced open green areas such as urban parks and domestic gardens, and greenery of certain city areas might make the neighbourhood more attractive and lead to increasing housing prices, a phenomenon called eco-gentrification. The issue might be mitigated by making deprived neighbourhoods just green enough, in terms of nearby greenspace per capita. The risk for green gentrification is also raised by Yazar et al. (2020). Anderson and Gough (2021) has analysed the benefits of a decision support framework called Climate Change Local Adaption Action Model (CCLAAM), for implementation of green infrastructure within communities. The framework can be used by real estate companies, and provides a strategy to increase climate resilience, enhance ecological connectivity, create healthier communities, and support sustainable urban development.

Disaster management through water sensitive urban design supports target 11.6, especially stormwater sumps (Wiktorowicz et al., 2018). Zhang et al. (2019) have proposed four types of urban drought mitigation actions that advances SDG 6, SDG 11, SDG 12 and SDG 13. Urban resilience and disaster risk management have been the subjects of additional research and contribute to SDG 11 and the targets 11.5 and 11.b, but have also been linked to SDG 4, SDG 9, SDG 12 and SDG 13 (Leuzzo & Nava, 2020; Newman et al., 2017; Sarmiento, 2018). Krellenberg and Kock (2021) have analysed potentials, contradictions and challenges to implement SDGs in cities during the Covid-19 pandemic, with focus on German cities. To achieve the subgoal of resilient cities and communities, SDG implementation needs to consider global challenges to be able to pursue a transformative approach. The pandemic has led to a growing demand for private (green) spaces and large housing estates. This might be a consequence of the need for social distancing during the pandemic, which is not always feasible in dense urban areas. At the same time, being out in the fresh air is key to personal wellbeing. Urban sustainable transformations especially advance SDG 11, but also SDG 4, SDG 6, and SDG 13.

According to (Wiktorowicz et al., 2018), communities can also be designed to achieve the social targets of SDG 11. For example, the development of residential areas could include community gardens and activities, and shared amenities. In addition, target 11.2 may be advanced by the development of walkable and cyclable internal street design within

residential areas, by availability to utilise shared electrical vehicles, and by built-in universal access to homes and roads. Target 11.3 may be supported by applying an inclusive community design with shared areas, e.g. BBQ area, internal streets that encourage walking, and community events organised by residents. According to Iodice et al. (2021), who have investigated the historic centre of Naples which has been subject of numerous reuse processes, an adaptive reuse of historical abandoned buildings is an effective strategy to give new life to underused areas. Adaptive reuse has several positive consequences: it is supporting cultural heritage while minimising environmental impacts, and is both activating new activities in the area and reactivating the economy of existing activities. Cultural and natural heritage mainly contribute to SDG 11.4 (Petti et. al., 2020; Rodwell, 2018). Petti et al. (2020) also argues that it has an indirect link to SDG targets 4.7, 8.9, 12.b, 14.7, 16.3, 16.8, and 16.b, while Rodwell (2018) has stated that cultural heritage in society is associated with SDG 2, SDG 6, SDG 13 and SDG 15. Target 11.4 could be advanced both via the incorporation of cultural heritage into new development, e.g. cultural names of streets, and restoration of old public buildings, and by involving local artists in the design of public spaces (Wiktorowicz et al., 2018).

Urban environments are multidimensional systems, therefore multi-criteria frameworks are appropriate to evaluate different points of views when developing socially sustainable cities and architecture (Lami & Mecca, 2021). The concept of smart cities offers alternative urban planning approaches to tackle the problems that cause a reduced life quality, using new technologies. Such concepts often include three-dimensional modelling of envisioned designs, and realistic implementations must include existing urban structures in the planning. Buyukdemircioglu and Kocaman (2020) have compared several three-dimensional modelling approaches for urban planning, and found the modelling to be challenging in various ways. However, several frameworks and tools have been developed to support assessment and decision making for sustainable cities (Sharifi, 2021). For example, Mirabella and Allacker (2020) have applied a LCA assessment to evaluate urban environmental impacts, supporting SDG 11 and SDG 13, and Kazak (2018) have presented a decision support system for assessment of urban heat island effects. Grafakos et al. (2016) have investigated sustainability and resilience benefits assessment (SRBA) in urban development, with linkage between the SRBA framework and all SDGs. The quality of life (QoL) assessment tool could be used to evaluate the importance of water and climate-related aspects in cities (Ptak-Wojciechowska et al., 2021). Ortega-Momtequín et al., (2021) have proposed a framework for ranking neighbourhoods based on family and environmental criteria, with tools that can be used by real estate companies. In addition, Girard and Nocca (2020) have studied tools to evaluate health impacts in urban areas, supporting SDG 3, SDG 7, SDG 11, SDG 11.6 and SDG 13. The software iMODELER could be used to structure a SDG model for projects on a concrete operative level where synergetic measures are increased and trade-offs are minimised (Neumann, 2019). The rating system LEED for Cities and Communities is aimed at local leaders and supports SDG 11 by providing a better quality of life for all residents. It assesses the economic, environmental and social health of a city or community, and provides various tools for keeping track of progress (USGBC, 2019b, 2020).

3.11.2 Proposed measures for buildings

The stock of buildings and infrastructure play a crucial role in achieving SDG 11 and SDG 9 according to Lanau et al (2019). While Goubran et al. (2019) mean that SDG 7.2-3, SDG 11.1, SDG 11.a, SDG 12.7 and SDG 13.1 are the most relevant SDGs to sustainable real estate. A sustainable design and construction of buildings that uses renewable energy sources results in sustainable cities (Roy et al., 2021). Cities need to prioritize reduction in energy consumption of existing buildings and make more efficient use of water and materials for buildings (UNEP, 2011).

RICS (2018) have proposed various ways through which companies in the construction and real estate sector could support SDG 11. Companies could engage in environmental stewardship during real estate development and contribute toward target 11.3 by applying a sustainable design of new buildings and surrounding infrastructure that results in an efficient use of land in urban areas. They could also carry out an environmental impact assessment in an early stage of the planning and design stage of the real estate development project, thereby supporting targets 11.6, 12.2 and 15.9. Furthermore, by applying architecture of high quality that ensures that the constructed building is fit for its purposes, companies could contribute to target 11.1. To incorporate best practice structural and safety standards by applying local and international building and planning regulations when it's appropriate, and when possible, applying quality and environmental management standards, such as ISO 9001 and ISO 14001, supports target 11.3. To meet changing user preferences by enabling a significant future change of use without major construction, and to plan for the probable use and abuses of the building by occupiers and ensure that safety standards are adequate in that context supports target 11.1 and 12.5. Companies could also contribute to target 11.5 and 11.b through other measures regarding the quality of planning, design and construction, as is mentioned in section 3.1.1. Furthermore, a downscaling of home sizes in high-income countries is needed to achieve the target of sustainable consumption. Cohen (2021) has estimated the equitable per person living area, and has also highlighted five emblematic cases of space-efficient housing.

The building sector could contribute to SDG 11 through the provision of affordable, innovative and near zero-energy housing (Wall & Hofstadler, 2019). The construction industry uses a considerable part of the total resource consumption and energy demand in the European Union, and therefore has a great potential to contribute towards the advancement of the UN Sustainable Development Goals, namely: SDG 7, SDG 9, SDG 11, and SDG 13. In addition, the built environment could also make a positive impact on SDG 1, SDG 3, SDG 6, SDG 8 and SDG 15, according to Scherz et al. (2020) who have studied challenges towards a netzero carbon built environment. Missing information on sustainability issues is an important problem in the sourcing procedure. Wall and Hofstadler (2019) has identified action areas and future potential of the application of building information modelling (BIM). They emphasise the importance of interaction between sustainable sourcing and life-cycle oriented planning processes, as well as the responsibility of stakeholders to improve collaborations on the sustainability performance of a building. According to the study,

construction activities from the construction and building industry are linked to SDG 7, SDG 9, SDG 11 and SDG 13. Usage of new digital planning tools, BIM and the support from new start-ups and contractors to implement new business models and technical solutions, are identified as three key actions to make a transition to a nearly zero carbon emission of the building sector. These strategies aim to reduce the environmental impact of cities in line with SDG 7, SDG 11 and SDG 13 (Hess et al. (2020). Urban building energy modelling (UBEM) could also be utilized to support SDG 11 (Ferrando et al., 2020). Loudyi and El Harrouni (2019) have presented an architectural tool for the construction sector that helps decrease energy consumption of buildings in order to adapt to climate change, and synergies and trade-offs towards a sustainable construction industry could be analysed with the tool iMODLER, that mainly contributions towards SDG 11, but also is related to SDG 4, SDG 6, SDG 7, SDG 9 and SDG 13 (Wieser et al., 2019). Porfiriev et al. (2017) have studied sustainable planning and green construction of buildings for resilient cities, with a link to green certification. Technological solutions for green buildings that would support SDG 11 are proposed by Korol et al. (2018). In addition, green building materials (GBM) could be used for housing construction and urban infrastructure development and would contribute the most to SDG 7, SDG 9 and SDG 11(Balaras et al., 2020). For example, there are architectural glass with thermal properties that improves energy efficiency of sustainable buildings (Gusta et al., 2017). Contributions towards SDG 11.5 may also be done through implementation of solar or battery systems and smart building systems with power storage (Janhunen et al., 2020; Wiktorowicz et al., 2018). The influence of apartment design on resident health and wellbeing could contribute to SDG 3, SDG 10 and SDG 11 (Foster et al., 2019).

According to Alam et al. (2021), key stakeholders', such as investors, tenants, HVAC engineers and architects, engagement in the industry are important to achieve near zero-energy buildings (NZEB). Sustainable building material can contribute significantly to 13 SDGs, of which SDG 3, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13 and SDG 15 are supported the most. Further research on the concept of NZEB has been carried out by Camporeale and Mercader-Moyano (2019) and Frossard et al. (2020). LCA aspects in nEZB design advance SDG 7, SDG 11, SDG 12 and SDG 13 (Frossard et al., 2020). Röck et al. (2020) have made an analysis of GHG emissions of buildings with a LCA approach, operationalising SDG 11 and SDG 13. Wiktorowicz et al. (2018) has studied the WGV project, which is a residential development project in the suburb of Perth, Australia. Through urban planning and innovation, the project attempted to demonstrate net zero carbon emission as well as other sustainable goals. The sustainable development featured: solar photovoltaics and battery storage to create net zero carbon power, water sensitive design, energy efficiency, social housing, heritage retention, and landscape and community involvement. While 12 of the SDGs were achieved in a major way, the project was mainly contributing to SDG 11 of sustainable cities. Mecca et al. (2020) has shown that the market value increase in residential buildings due to energy class upgrade through an Italian case study.

Waste management is also a crucial factor of urban sustainability that is noted in SDG target 11.6, and is needed in commercial buildings to obtain green building certification (Gollagher

et al., 2017). For example, sewage sludge ash recovery in building applications is a form of sustainable waste management strategy that is based on principles of circular economy, and that relate to SDG 11 and SDG 12 (Ducoli et al., 2021). Environmental stewardship in the form of avoidance of unnecessary waste from renovation at the time of leaving the premises at the end of a lease, and by taking practical measures to reduce daily waste from business activities in the building, support target 11.6 and 12.5 (RICS, 2018).

Disaster risk management (DRM) of buildings is another topic that corresponds to SDG 11.5.2 (Etinay et al., 2018). Perera et al. (2018) have mapped the educational need in disaster risk-reduction within the built environment against the relevance of the SDGs, where several subjects have been related to certain targets within SDG 6, SDG 7, SDG 9, SDG 11, SDG 13, and SDG 17. Considering the degree of building resilience against environmental risks at the location or site, such as subsidence or flooding that may be caused by predicted impacts of climate change, contributes to target 11.5 (RICS, 2018). In sections 3.1.1, 3.8.1 and 3.12.1, it is further described how companies could support: target 11.7 by managing the health and safety of building occupants, target 11.1, 11.3 and 11.5 by minimising the environmental impact during brownfield regeneration, and target 11.4, 11.5 and 11.b by undertaking an environmental impact assessment regarding land recovery. At last, target 11.4 and 11.b may be supported during the rehabilitation of the site, as is further described in section 3.12.1.

Balaban and Puppim de Oliveira (2017) has manifested the benefits of sustainable (green) buildings in Japan. They found that sustainable renovated buildings could yield significant benefits such as energy and GHG emission reduction, cost savings, and improved health for building users due to better indoor and ambient air quality, better thermal condition and more natural ventilation and lighting indoors. Green buildings can also reduce the need for artificial lighting and heating and cooling services by using mitigation actions such as passive design, cool roofs, and green roofs (Roy et al., 2021). Building certification as a strategy for energy transition supports SDG 7 and SDG 11 (Cozza et al., 2020). According to the WorldGBC (n.d.), green buildings are the fabric of sustainable cities and communities, thereby contributing to SDG 11 .Furthermore, green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 9, SDG 12, SDG 13, SDG 15 and SDG 16. Both BREEAM and LEED building certification standards support the eleventh goal. For example, LEED´s Sustainable Site category promotes a development that preserve natural systems and combat urban sprawl, while the Location and Transportation category address accessible and affordable transport, which constitutes a key element of inclusive cities. In addition, LEED´s resilient design credit rewards projects that address the risks and vulnerabilities of natural and human-caused disasters (USGBC, 2019b). According to BREEAM (2018), their family of standards and tools makes a significant contribution to the SDG 3, 6, 7, 9, 11, 12, 13, and 15. For instance, the building certification standard BREEAM In-Use, further explained in section 3.1.1, supports SDG 11 by helping to move towards a sustainable urbanisation and address social, economic and environmental issues in urban areas, focus on operational waste management, improve resilience against natural disasters and extreme weather, encourage a reduction of air pollution and promote sustainable travel plans. The criteria correspond to the SDG indicator 11.1.1, 11.2.1, 11.3.1, 11.3.2, 11.5.1, 11.5.2, 11.6.1, 11.6.2, 11.7.1,

11.a.1, 11.b.1 and 11.c.1. For example, the criteria include having an environmental management policy or plan, making risk assessments of pollution and minimising watercourse pollution, having chemical storage and reporting evidence of containment of spillage and measuring emissions and ensuring that emission limits for local air quality are not exceeded. It also includes an assessment of the global warming potential of refrigerants and having typical low GWP refrigerants installed on site and refrigerant leak detection in place. Make an assessment of illuminance or luminous intensity requirements, including internal and external lighting, illuminated signs, and ensure that qualitative and quantitative criteria for external lighting are met. Have an operational and construction waste management facility with waste segregation and storage for reusable construction products. Have water meters installed with instantaneous reading of the water utilisation on site. Assess the dual flush efficiency and flush volume of toilets, and consider the maximum flow rate and capacity of showerheads, bathtubs, hand washing taps and kitchen taps. Having flow control devices, leak detection systems and cold-water supply isolation. Assess the data of annual water consumption, including rainwater and greywater. Assess cyclist safety and promote sustainable travel by measures that are mentioned in section 3.9.1. In addition, all criteria mentioned for the indicators of SDG 13 also apply to the indicators of SDG 11. The criteria for SDG 11 overlap with the criteria for SDG 1, SDG 3, SDG 4, SDG 6, SDG 7, SDG 8, SDG 9, SDG 12, SDG 13, SDG 14, SDG 15 and SDG 16 (BREEAM, n.d.). Chodnekar et al. (2021) have made an assessment of factors in green rating systems, and found that LCA and the use of green principles in buildings support SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13, SDG 15 and SDG 17. Furthermore, Balaras et al. (2020) have studied CESBA MED, a multicriteria European built environment assessment method for rating the sustainability of buildings and neighbourhoods that contribute to SDG 11, SDG 13 and SDG 7. The framework includes an exhaustive list of quantifiable sustainability indicators, and a small number of mandatory key performance indicators (KPIs).

The particular use of a building could also contribute to the SDGs. For example, the arts and culture bring people pleasure and also yield social and economic benefits. Therefore the use of buildings to display collections, either through galleries or shops, could contribute to some of the SDGs, namely SDG 5, 10, and 11. From an environmental and economical perspective, both historical and new buildings may be the most sustainable choice for the display of museum collections. However, social factors are most important to consider when deciding about where to put collections, such as the museum's location, and physical accessibility and inclusivity (Griffin & Ridge, 2020). Regarding the treatment of tenants and communities, companies may support target 11.3 and 11.c through actions which are further described in section 3.8.1 and 3.10.1. Contribution could also be made to target 11.4 through respecting all issues related to culture and spiritual inheritance in society, such as places to worship and the burial grounds of ancestors. In the recovery phase companies could carry out a strategic revaluation regarding the use of the site by assessing the social impact of a changed use of the building, such as future value after gentrification, and through this action support target 11.1 and 16.b. Companies could also follow heritage and archaeological guidelines, and integrate them into the reconstruction or rehabilitation assessment process, in order to support target 11.4 (RICS, 2018).

According to Dachaga and de Vries (2021), land tenure security is a social environmental factor that feeds into SDG 11, among others, as mentioned in section 3.1.1. Affordable housing through various tenure types and reduced operational costs, with basic services through community utility supports target 11.1 (Wiktorowicz et al., 2018). According to Soederberg (2017), the spread of neoliberalism has resulted in an increasingly central role of private corporations in delivering housing justice in accordance with target 11.1. Because of this, both Soederberg (2017) and Leon (2021) express worry that marginalised groups may be bypassed in favour of real estate interests. Social and affordable housing have been investigated further by Dean et al. (2017) and Vukmirovic et al. (2021), and contribute both to SDG 3 and SDG 11 according to the latter. Strategies in the field of real estate for: investing in affordable, decent, healthy and safe housing (supporting SDG 1 and SDG 3), building and refurbish residents to become energy efficient (supporting SDG 7), and improving the quality and safety in residential neighbourhoods while reducing urban congestion (supporting SDG 11) have been developed by professional bodies of Housing Europe (2017). Souaid et al. (2020) has investigated current financial, cultural, legislative and technical barriers and drivers for the adoption of innovative, affordable, and zero-energy dwelling in Belgium and Ireland. Even though efforts have been undertaken to promote and accelerate the transition to these kinds of sustainable dwellings, the number of dwellings that comply with standards like EPBR remains low in the year of 2020. According to the study, context specific barriers are considerably different across different countries, even though focus groups reveal similar perceptions of general barriers and drivers in the two countries.

3.11.3 Proposed indicators

Material and energy flow analysis of cities are important tools to understand cities environmental performance and to propose more sustainable urban design and planning. Indicators to measure the environmental performance of cities may include: the level of pollution and carbon emission, energy and waste consumption, water quality, energy mix, waste volumes, recycling rates, ratio of green space, forests, agriculture land loss, share of apartment living, motorisation rate, modal share of urban transport, and Ecological footprint (Feiferyté-Skirienė et al., 2020; UNEP, 2011).

Energy consumption may be divided into renewable energy (e.g. solar energy and hydro energy), non-renewable energy (e.g. natural gas and fossil fuel), and transport fuel. Also energy production may be measured, as solar energy production. Electricity consumption may be divided into residential, commercial, public services and other, and may be measured in the unit MW/h. Heating may be measured in the unit MW/h. Water consumption may be measured as 103 ton/yr and be divided into residential and industrial and commercial. Solid waste may be measured in the unit ton/year, for example construction and demolition waste. Recyclable waste may be measured in the same unit and divided into: glass, metals and plastics. Other possible measures of waste are: biodegradable waste (ton/yr), wastewater (103m3), heat losses (MW/h), and electricity losses (MW/h). GHG emissions may be divided

into emissions of the greenhouse gases CO2, SO2, O3, NO2, C6H6, and the particle concentration of PM10, and PM2,5 (Feiferyté-Skirienė et al., 2020).

The GRI disclosure CRE8 of sustainability certifications supports target 11.3, and 306-2 of the total weight of hazardous waste and non-hazardous waste supports target 11.6, as previously mentioned (GRI, 2021). Fastighets AB Balder (2021) have tracked their progress towards SDG 7, 11, 12, 13 by reporting GRI standard 302-1 of energy consumption within the organisation, CRE1 of energy intensity, 305-2 of indirect GHG emissions and CRE2 of water intensity. The water consumption has been disclosed as the total cubic metres of water consumption per square metres per year and is accompanied with a goal of percentage reduction. Progress towards SDG 9 and SDG 11 are tracked with the key figures: number of created jobs for youths per year, while implemented initiatives for sustainable travel to and from the properties have been disclosed as the direct and in-direct GHG emissions, corresponding to the GRI standards 305-1 and 305-2. The emissions have been disclosed as tons of emissions per year. Sustainable travel has also been measured as the number of car pools and bike pools at new properties per year. An increasing number of certification systems address sustainability in urban planning. Citylab is such a certification system, and has been used in several urban planning projects in Sweden. Certification systems for buildings and urban areas may suffer from a number of different drawbacks, for example: they are biased towards ecological sustainability and do not consider enough of other dimensions of the concept, they focus too much on internal sustainability and do not consider external impacts on the surrounding environment, they lack enough mandatory parts that could result in the neglect of important issues, and at last, they lack indicators to assess urban areas post-construction. To address this issue, Lind et al. (2019) has presented four design approaches for a post-construction certification system that could be used by Citylab, which ensures transparency in the design of the framework and enables deliberate choices and priorities. According to their study, the design of certification systems and the choice of indicators may have different focuses that give a different prioritization of sub principles like validity, influence, simplicity, and comprehensibility, where it is difficult to achieve the combination of some of these principles. There is a need for globally-identified and comparable indicators in order to monitor the progress towards SDG 11. The City Prosperity Index (CPI) is a valuable tool in this regard, but is not sufficient by itself. Arslan et al. (2016) have analysed the Leadership in Energy and Environmental Design Neighbourhood Pattern and Design (LEED-NPD) as additional tools in this matter, through a case study at a neighbourhood level. Gui and Gou (2020) have proposed several indicators to evaluate green building performance: indoor air quality (IEQ), energy use intensity (EUI), emission intensity (EMI), and water consumption intensity (WCI), indoor environment quality score (EIQS).

Zuev et al. (2021) suggests different methods for measuring metrics that assess infrastructure provision of a sector of a city, and a systematic indicator of the quality of the urban environment, using geospatial data analysis and GIS technology. The indicators include: a measure of built-up area, the ratio of building total area to area upon which they are built, measure of median city quarter size, measure of road network density, measure of

dubelier coefficient (ratio of streets are to urban area). The indicators may be used in the construction of new city areas, or in reconstruction of old ones. Stokes and Seto (2019) have also used GIS technology, to measure urban landscapes, relevant for SDG 11.3 and SDG 11.6. Urban green space per capita (UGS) is another indicator of infrastructure that could be used to monitor progress towards SDG 11 (Badiu et al., 2016). Floor space ratio (FSR) as a key policy measure to ensure sustainable development in the construction industry and resilient building design, supporting SDG 11 (Vinoth Wilfer, 2020). The resilience of cities could also be measured as an econometric measure based on several indicators, according to Ricciardelli et al. (2018).

Llorca et al. (2020) has also developed some indicators that may help to reach the SDG 11, and some of the proposed indicators that measure the quality of living and the provision of affordable housing. For example: the share of dwellings with the lowest quality and the ratio of dwelling rent to income help keep track of SDG 11.1, where the latter is measured as the yearly dwelling rent divided by the yearly household income. The SDG indicator 11.3.1, the ratio of land consumption, may be measured as the proportion of vacant dwellings by real estate companies, and help measure the progress towards SDG 11.3. Renovation rate is another indicator related to apartments, which could serve as a tool to achieve SDG 11 and SDG 13 (Gepts, 2020). Green infrastructure could also be evaluated using ecological indicators to model provision of air-quality and ecosystem services (Matos et al., 2019). As previously explained, green infrastructure could mitigate urban heat islands. El-Hakim and El-Badawy (2020) have studied ways to quantify the effects of urban heat islands, and Mehrotra et al. (2019) have proposed heat-stress index as a measure of thermal performance of urban environment and indicators for climate-sensitive planning, contributing towards SDG 11 and SDG 13. In addition, Familjebostäder (2021) has used a security index to measure the impact of safety measures. They also use a service index, the key figure of number of completed apartments and surplus ratio to keep track of SDG 10, SDG 11 and SDG 12. They also support SDG 11 solely by calculating the climate impact from all new production. Additional indicators for cities towards the SDGs have been reviewed and evaluated by Giles-Corti et al. (2020), Serey et al. (2020) and Zinkernagel et al. (2018), mainly contributing towards SDG 11, but all SDGs are covered.

3.11.4 Company studies

According to Ionaşcu et al. (2020), SDG 11 expresses one of the most common ambitions of real estate companies, which is to ensure an urban balance by creating smart cities, work spaces and homes. According to the results, European real estate companies have initiated the following actions to incorporate SDG 11 in their business: the design and development of multifunctional urban neighbourhoods and dynamic hybrid cities, capitalisation of urban free land according to the best use, restoration of buildings, and promotion of alternative transportations. In addition, real estate companies invest in: housing close to urban centers that is offered to low and medium income households for an affordable price, workspaces with flexible rental terms, technologies and building certification. See further details of the study in section 3.1.2. Jones and Comfort (2020) have analysed seven of the greatest

housebuilding companies in the UK, and came to the conclusion that these companies may contribute to SDG 11 by making the housing market fairer. They also detected that some companies claimed to contribute to some SDGs, while the actual contribution was not very clear. Jones and Comfort (2020) refer to these sort of uncertain claims as “SDG Wash”.

All of the reviewed Swedish real estate companies report contributions towards SDG 11 through their annual reports or sustainability reports. Hemsö (2021) works actively to contribute to a more sustainable community building sector, which contributes to SDG 11 according to their annual report for 2020. They do this in their business and together with others, through for example industry networks and organisations as well as research and innovation projects. Atrium Ljungberg (2021) actively contributes to the urbanisation of cities in their work. Their strategy is based on sustainable and innovative urban development. With a gentle blend of content in the buildings and design of public spaces and green areas, they create city life, green oases, security and well-being that includes everyone. These actions contribute to SDG 11.3, 11.6 and 11.7. (Atrium Ljungberg, 2021).

Akademiska Hus (2021) has helped advance SDG 11.1 by having targets on the number of created student housing units and by focusing on affordable student housing through reasonable monthly rent and planning for a sustainable everyday life. The company also contributes to target 11.3 by environmental certification of all new construction and major remodelling. They also contribute to 11.3 with a method for campus plans that has a strong focus on participation through a wide range of stakeholders. The same target is supported by taking resilience to climate change into account when investing. Akademiska Hus helps advance target 11.4 by including ecosystem services and controlling nature and culture protection in their method for campus plans. To contribute to target 11.7 they include green areas and its role in the cityscape and they also participate in the Vinnova project “Restorative workplaces” which focuses on showing the importance of green environments for well-being and performance. By building new homes with mixed tenancies, Fastighets AB Balder (2021) contributes to developing residential areas and increasing security and to targets 11.1, 11.3 and 11.6. A mix of workplaces and homes also provides more job opportunities in the local environment and creates new meeting places. Solutions for increased mobility, such as proximity to public transport, cycle paths and electric car pools, are prioritized in the development of properties and areas, as well as green areas and areas for sports and recreation. Balder also works to promote efficient waste management and to keep the areas clean and tidy. The company also supports SDG 11 by measures mentioned in section 3.13.2 (Fastighets AB Balder, 2021).

By building well-planned and space-efficient apartments in a rational construction process, K2A (2021) can keep rents down and offer affordable newly produced homes for many groups. The apartments have a high standard with for example fully tiled bathrooms, large kitchens and a washing machine and dishwasher in all apartments. Access to public transport is important. In addition, K2A offers an electric car pool and in 2021 a box bike pool will be launched. Green and attractive courtyards with opportunities for community contribute to ecological and social sustainability. K2A has been assessed to make a large

contribution to SDG 11, based on an assessment of the first seven targets of the goal, that are relevant for the company (K2A, 2021). Vasakronan (2021) contributes to targets 11.6, 12.2, 12.4 and 13.3 by reducing the climate impact throughout the value chain. They also support SDG 11.6 and SDG 12.5 by reducing waste, and target 11.7 by measures described in section 3.16.3. In addition, Humlegården (2021) support the targets 11.2, 11.3, 11.4, 11.5, 11.6, 11.7 and 11.a with measures explained in section 3.9.3 and 3.13.2, Hufvudstaden (2021) support SDG 11.6 and 11.7 as mentioned in section 3.3.3, Kungsleden (2021) supports SDG 11 by measures mentioned in section 3.16.3, Familjebostäder's (2021) measures are found in section 3.10.2, and Klöverns (2020) work towards the goal is described in section 3.12.3.

Case

Wallenstam strives to create safe and welcoming areas and properties. In the work for increased security, they make a number of contributions both in day-to-day management and as point initiatives. An example is their collaboration with Huskurage, an organisation that works actively to prevent violence in close relationships through neighbourhood cooperation. Within the framework of their urban development projects, they want to create conditions for safe communities through their planning and detailed development plans. They do this by devising their premises for different types of activities in certain areas. They develop their existing properties and carry out activities in collaboration with their commercial customers, the city and other actors in the community, with the aim of creating a vibrant inner city. Wallenstam actively participates in research and development in urban development, construction and administration. They support and collaborate, for example, with various universities. The development concerns everything from new technology in administration to modern solutions for mobility in new districts. (Wallenstam, 2021)

3.12 Responsible consumption and production

The twelfth Sustainable Development Goal is to "Ensure sustainable consumption and production patterns" and is divided into eleven targets. Target 12.2 entails to achieve a sustainable management and efficient use of natural resources, target 12.4 to achieve an environmentally sound management of chemicals and all wastes throughout their life cycle and to significantly reduce the release to air, water and soil, target 12.6 encourages companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, and target 12.8 entails ensuring that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature. (United Nations, 2021a)

3.12.1 Proposed measures

RICS (2018) and Raiden, A., & King, A. (2021) has deemed goal 12 to be one of the most important SDGs for companies within the land, construction and real estate sector, and

Raiden, A., & King, A. also emphasise the special relevance of SDG 9-11 and SDG 16-17 for the built environment. Consequently, a range of different measures have been proposed that may be carried out by companies within this sector. RICS (2018) have proposed that companies may contribute to target 12.6 by disclosing progress on how the organisation has integrated the four UN Global Compact question areas during the development phase: anti-corruption, environment, labour and human rights. This may be done through The Construction and Real Estate Sector Supplement of the Global Reporting Initiative (GRI CRESS), through an annual sustainability report, or as part of integrated financial reporting. To report real estate performance data of the real estate use phase in the same manner would support the same target. Regarding environmental stewardship, companies may support target 12.7 by making sure that the responsible resource management methods they employ encompass their suppliers and contractors, and confirm that the unit taking receipt of their waste has the right permission to do so (RICS, 2028). Kannan et al. (2020) have studied strategies for selecting sustainable circular suppliers, which would advance SDG 8 and SDG 12 (RICS, 2018).

Adaptation of a circular economy with circular design methods in the built environment supports SDG 12 (Dokter et al., 2020). Circular buildings are rooted in the concept of circular economy, where closed material flows are established to create sustainable resource cycles. Geldermans et al. (2020) have studied the performance of the innovative cellulose board product Niaga ECOR Panel, as a healthy and circular alternative to conventional linearboard products that contribute most notably toward SDG 11 and SDG 12. Carrying out a full Life Cycle Assessment (LCA), preferably combined with a Life Cycle Costing (LCC), in order to assess different project options and support decision making, will contribute to target 12.2 and 15.9 (RICS, 2018). Life cycle assessments (LCA) for building components have been studied by Malabi et al. (2020) and van Stijn et al. (2020), and Soust-Verdaguer et al. (2020) have focused on supporting SDG 12 and SDG 13 by organising building LCA information. Van Stijn et al. (2020) have investigated the design of circular building components for kitchens and emphasises the opportunity to re-use, refurbish, recycle and recover building components. Another assessment tool is proposed by Miyazaki et al. (2019), who have stated that the use of Comprehensive Assessment System for Built Environment Efficiency (CASBEE) contributes directly to SDG 11 and indirectly to SDG 12. In order to address a broad spectrum of sustainable development challenges in the built environment, Dyson et al. (2020) have introduced the Built Environment Ecosystem (BEE) framework and Ecological Living Module (ELM) where a developed demonstration project was shown to have an influence on SDG 2-3, SDG 6-7, SDG 9 and SDG 11-13 (Dyson et al. 2020). According to Battisti et al. (2019), adaptive building technologies and sustainable architecture strategies have potential to impact all SDGs.

The provision of appropriate training for workers and members of society, to support consideration of the environment in their daily working practices, contributes to target 12.8 and 13.3 (RICS, 2018). By choosing sustainably sourced green construction materials that reduce impacts related to energy, waste, carbon and water, companies could contribute toward target 12.2, 12.5, 7.3, 6.4, and 13.2 through real estate development. Additional

measures regarding environmental stewardship are described in section 3.7.1 and 3.11.2, which supports target 12.2. Additional measures regarding planning, design and construction that contribute to target 12.4 and 12.5 are further described in section 3.3.1, 3.7.1 and 3.11.2. Regarding the quality of planning, design and construction, companies can contribute to target 12.8 and 13.3 by trying to involve stakeholders in the value chain, such as plant or building managers. This may be done to bring their user experience and expertise into the design and construction process. The same goals could be targeted by delivering safe and high-performance buildings through a so-called "soft-landing" method, which involves a formal handover process to the user upon completion of the project, and ensure that all data related to construction is made available to the user for an efficient building operation in the property use phase. Furthermore, companies could support target 12.6 by producing a sustainability assessment report of the planned building. This could be done using national or commercial assessment tools and methods for evaluating the optimal design solution in terms of economic, social and environmental benefits, such as measures for quality assurance during the design and construction process. The same method may be used to make a transparent sustainability assessment of the building or site in the recovery phase, to evaluate optimal refurbishment or redevelopment options. Before entering into a contractual agreement, checking that the employed construction industry professionals are sufficiently qualified and knowledgeable will support target 12.7 and 12.8. In the development of residential areas, incorporation of renewable energy, production of resources and focus on resource effectiveness all have a major contribution toward the twelfth SDG, as well as SDG 2, SDG 7, and SDG 9 (Wiktorowicz et al., 2018).

Regarding transparency and disclosure, RICS (2018) proposes that companies may support target 12.6 through several actions, for example by determining the level of real estate performance in comparison to peer buildings, through the benchmarking of facilities. In addition, by developing a transparent frame with requirements for: type and extent, format and frequency of building data, information management, and changing contractual arrangements when real estate services are outsourced. Implementing a Corporate Real Estate Sustainability Management (CRESM) tool is a holistic approach to managing building data and information at all company levels. To evaluate the performance of asset managers in regard to responsible business targets contributes to SDG 12.8, 12.2, 13.2 and 13.3. Companies could also contribute to target 12.8 by ensuring that employees have sufficient competence and knowledge of responsible business regarding real estate use, operation and investments, whenever external consultants or real estate professionals are used. Before signing contracts of sale or rental of a building, to contractually require information of any specific environmental issues affecting the property from the landlord or seller and real estate professionals involved in the affair, advances target 12.6. To include a core criterion on resource efficiency when concluding new or renegotiating existing procurement contracts will contribute to target 12.2 and 12.7. Companies could contribute to target 12.2, 12.8, 13.3 and 13.2 by measuring the individual departments and subsidiaries' performance across the organisation, through the adoption of an overall environmental management system for all daily activities, with clear goals and important performance indicators. A total cost of ownership (TCO) budgeting supports life-cycle optimisation of financial and environmental

performance and supports target 12.2. The same target, as well as target 13.2, may be supported when renting or leasing a building, by investigating the possibility of integrating environmental clauses into lease contracts, so called “green leases”. By displaying energy and general resource consumption and carbon footprint onscreen in areas visited by employees and clients, companies could raise awareness about issues regarding resource consumption and thereby support target 12.8, 13.3 and 13.2. In addition, companies could make environmental management an integrated part of employees’ performance reviews by creating resource or ‘green’ teams across departments, to enable regular resource use audits and implementation throughout the organisation, thereby contributing 12.2, 12.8, 13.3 and 13.2. By establishing incentive programs and by providing on-site storage and shower facilities, companies could encourage walking to work or the use of bicycles, and support target 12.8 and 13.2 at the same time. Further measures regarding the health and safety of occupants are described in section 3.3.1, which contributes to target 12.4. Roy et al. (2021) found various actions that have an impact on the twelfth SDG. Material efficiency in industry can be improved through sustainable consumption of raw materials, water and energy (Menato et al., 2017; ElMassah, 2018; Roy et al., 2021; Shahbazi et al., 2018; Soo et al., 2018; Meskers et al., 2019). Green buildings including elements of passive construction, water and energy efficiency help achieve SDG 12 (Alawneh et al., 2019; Roy et al., 2021). Innovation in IoT (Internet of Things) and smart metering raises awareness and can help reduce consumption (Cetin & Kallus, 2016; Casado-Mansilla et al., 2018; Roy et al., 2021).

According to the WorldGBC (n.d.), green buildings use circular principles, where no resources are wasted, thereby contributing to SDG 12. According to them, green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 13, SDG 15 and SDG 16. Wen et al (2020) mean that SDG 12 benefits the most from green building rating tools, while SDG 3, SDG 7 and SDG 11 also are highly supported through them. Through seven case studies, Serrano-Baena et al. (2020) has analysed the implications of BREEAM sustainability assessment on the design of hotels. According to the conclusion, BREEAM may limit the design options of hotels, but could easily be achieved if right measures are included at an early design stage. According to BREEAM (2018), their family of standards and tools makes a significant contribution to the SDG 3, 6, 7, 9, 11, 12, 13, and 15. However, Serrano-Baena et al. (2020) found the main implications of BREEAM on health and wellbeing, land use, and ecology categories, for both refurbished and newly built hotels. BREEAM (n.d.) has stated that their building certification standard BREEAM In-Use, as is further described in section 3.1.1, supports SDG 12 by ensuring efficient and responsible consumption of raw materials, reducing the environmental footprint of construction, sustainable waste management, requiring responsible procurement of construction materials and promotion of low carbon technologies. The criteria correspond to the SDG indicator 12.1.1, 12.2.1, 12.2.2, 12.4.1, 12.4.2, 12.5.1, 12.6.1, 12.7.1 and 12.a.1. The criteria include having intrinsic energy efficiency of building fabric and services, energy efficiency of ventilation services, assessment of the energy consumption for the entire asset and minimise operational energy consumption, as mentioned in section 3.7.1, amongst others. The criteria also assess the energy uses through energy performance metrics that should relate to the floor area, and whether renewable energy is generated on or near assets. The criteria for SDG 12 overlap with the criteria for

SDG 1, SDG 3, SDG 4, SDG 6, SDG 7, SDG 8, SDG 9, SDG 11, SDG 13, SDG 14 and SDG 16 (BREEAM, n.d.).

In the recovery phase, companies could contribute toward target 12.6 by carrying out an accurate and transparent cost-benefit analysis of possible alternatives for renovation or rebuilding. Identifying the extent to which the organisation and its clients benefit from existing site facilities, by reviewing the strategic and long-term requirements from them in relation to the existing building or site, support target 12.2 and 13.1. To make issues regarding refurbishment and retrofitting dependent on the specific characteristics and the performance of the existing building, by holistically considering the range of available renovation and retrofitting interventions and solutions, would advance target 12.6. Companies could contribute to target 12.7 and 8.8 by ensuring that best practices of the ILO's human rights and occupational safety and health criteria are incorporated into specifications and all other contract documents when renovating a building. Regarding waste management, target 12.4 and 12.5 may be addressed by ensuring that waste management strategies include the entire process, including demolition, disposal of waste, waste transportation and final disposal. The same targets, in addition to target 16.5, may be supported if the company makes sure that removal of waste materials from site comply with all local legal requirements, and that legal documents and certifications are available for inspection. Companies may support target 12.5 solely by processing demolition materials for resource recovery, or so that they may be reused, preferably on location. In addition, companies may support target 12.4 and 12.5 through some other actions related to waste management, as further described in section 3.3.1 and 3.8.1. Measures related to brownfield regeneration are described in section 3.1.1 and 3.3.1, which support target 12.4 and 12.8. Identifying, by letting specialists undertake an environmental screening process, whether it is required to make a full environmental impact assessment of the site would be a measure which would contribute towards target 12.2 and 15.1. RICS (2018) also proposes that companies may support target 12.2, 15.1, 11.4 and 11.b during the rehabilitation of a site, by identifying which specialist studies may be required to support a complete environmental impact assessment if necessary, and then by recruiting appropriate specialists to carry out these studies. This may include: reviews of flora, fauna, general wildlife surveys, agriculture, ecological, hydrological, geomorphological, geological, historical, cultural and archaeological studies. Lastly, companies could engage in actions that relate to the land recovery and rehabilitation of a site. In this matter, it is proposed that companies may undertake a survey and evaluation of the condition of the site to assess what rehabilitation technologies may be required to bring it up to future projected environmental standards, based on assessing site features, such as natural, geological, and man-made factors. This last action contributes to target 12.4, 1.5, 11.5, 11.b, 13.1, 15.1, 15.3, and 15.5. In addition, sharing mobility resources, reducing car ownership or using electrical vehicles advances SDG 12 as this helps in the transition toward more sustainable consumption (Chardon, 2019; Roy et al., 2021).

3.12.2 Proposed indicators

To achieve the goal of responsible consumption and production, environmental and health-related information need to support the decisions made about future construction productions and of the design of new buildings and refurbishment projects. Ströebele and Lüetzkendorf (2019) have studied various impact indicators that can provide the relevant information through a life cycle assessment. The environmental information for property construction products are complex, and therefore a single proxy indicator is not appropriate to express the impact. Instead, Ströebele and Lüetzkendorf (2019) simplify the information by grouping indicators into different clusters.

However, UNCTAD (2019) has proposed a few single indicators that companies in general could use to keep track of SDG 12. For example, the reduction of waste generation may serve as an indicator of waste management. It could be measured as the change in waste generated per net value added in percentage terms, in terms of change and in absolute amount, and would support SDG target 12.5. The measure of waste reused, re-manufactured and recycled is an indicator of waste management that corresponds to SDG indicator 12.5.1 and should be reported in absolute amounts, in percentage terms and in terms of change (UNCTAD, 2019). GRI (2021) has developed similar indicators: disclosure 301-1 of the total weight or volume of materials that are used to produce and package the organization that help keep track of SDG 12.2, and disclosure 301-2 of the percentage of recycled input materials used for the organisations products that help keep track of target 12.2 and 12.5. UNCTAD (2019) have developed additional indicators regarding waste management: the hazardous waste is an indicator of waste management and chemicals, including pesticides and ozone-depleting substances that corresponds to SDG indicator 12.4.2. It should be measured as the total amount of hazardous waste, in absolute terms, as well as proportion of hazardous waste treated, given total waste reported by the reporting entity (in absolute amount, in percentage terms and in terms of change). The indicator of ozone-depleting substances and chemicals corresponds to SDG indicator 12.4.2, and should be measured as the total amount of ozone-depleting substances (ODS) per net value added, such as bulk chemicals/substances existing either as a pure substance or as a mixture (UNCTAD, 2019). The two last indicators are similar to GRI disclosure 306-2 of the total weight of hazardous waste and non-hazardous waste, that helps keep track of target 3.9, 12.4 and 12.5 (GRI, 2021).

A number of additional disclosures developed by GRI (2021) that support target SDG 12.2 are presented in other sections of the document, namely: disclosure CRE8 of sustainability certification, disclosure 302-1 of energy and fuel consumption, disclosure 302-3 of the energy intensity ratio of the organisation, disclosure 302-4 of reductions in energy consumption, disclosure CRE1 of building energy intensity, and disclosure CRE2 of building water intensity. In addition, disclosure 305-1, 305-2 and 305-3 of gross GHG emissions keep track of target 12.4 (GRI, 2021). Fastighets AB Balder (2021) have used the GRI disclosures 302-1, CRE1, 305-2 and CRE2 to keep track of SDG 7, SDG 11, SDG 12 and SDG 13 (Fastighets AB Balder, 2021). In addition, a few indicators that are less environmental are

proposed by Klövern (2020) and Familjebostäder (2021) to keep up with SDG 12, as mentioned in section 3.8.2 and 3.11.3.

3.12.3 Company studies

Ionascu et al. (2020) ranked the twelfth SDG as being the fifth most prioritized by real estate companies. For this SDG, the content of the external reporting was analysed as it related to "Management of the efficient use of natural resources (source, quality and consumption of raw materials), "Waste management (prevention, reduction, recycling and reuse)", "The share of recycled waste" and "Promoting sustainable practices throughout the life cycle of the building". Further details of the study found in section 3.1.2. The quality of reporting SDG 12 was based on 25 observations and had a mean of 3.76 with the minimum being 1.00 and the maximum being 5.00. According to Stewart et al. (2018), the life cycle assessment (LCA) methodology has been recognized as an important tool to guide environmental sustainable efforts in the industry. But through a systematic mapping of LCA-related terms in English-written corporate sustainability reports throughout the world from 1995 to 2015, it was shown that the finance and real estate sectors, among others, had a very low presence of LCA mentions in their sustainability reports. This result reveals that companies need to take further steps to achieve SDG 12:6, a target which encourages companies to integrate sustainable practices into their sustainable reporting, since these two sectors have a high indirect environmental impact through their supply chain (Stewart et al., 2018).

All of the Swedish reviewed real estate companies have reported on their work towards the twelfth Sustainable Development Goal in their latest annual reports. Atrium Ljungberg's ambition is to conduct resource efficient business with their suppliers and customers. They strive for a careful handling of chemicals and to reduce the use of hazardous substances, reduce waste and increase recycling and reuse in their areas. They do this by setting clear requirements and through collaborating to develop new innovative solutions in both production and management. These actions contribute to SDG 12.2, 12.4 and 12.5 (Atrium Ljungberg, 2021). Hemsö (2021) works actively to minimise resource use in construction and property management. They do this by developing resource-efficient buildings which optimizes the land use, switching to renewable energy and having climate-adapted construction. To promote sustainable consumption and production, Fastighets AB Balder (2021) strives for a careful consumption of materials, with a focus on increasing recycling. Tenants are also encouraged in various ways to recycle more. The company will continue to increase the level of reuse and recycling, for example in renovation projects to contribute to increased circularity, and through specific initiatives to increase the degree of source sorting and recycling. According to the company's annual report for 2020, these actions contribute to targets 12.4 and 12.5. Further measures to support SDG 12 are mentioned in section 3.13.3 (Fastighets AB Balder, 2021). K2A's production method leads to shorter and less transportations as well as less waste. The ecolabel "Svanen", guarantees that the use of environmentally and health-damaging materials and chemicals is avoided in production. K2A encourages its tenants to live sustainably through low water consumption, the sorting of household waste, good ventilation, reusing and recycling. The company collaborates with

Matsmart to reduce food waste. K2A certifies all self-produced buildings according to the ecolabel Svanen and acquired buildings are certified according to Svanen or an equivalent certification. Existing uncertified properties are certified according to Miljöbyggnad iDrift. K2A has been assessed to make a large contribution to SDG 12, based on an assessment of seven targets of the goal that were relevant for the company. (K2A, 2021).

Akademiska Hus (2021) state in their sustainability report that they contribute toward targets 12.2, 12.4, 12.5 and 12.7. To advance target 12.2 they have set up goals in regards to energy reduction and systematic work with operational optimisation throughout the portfolio. Additionally they also develop business models for premises efficiency through, for example, digitisation of the properties. The company contributes to target 12.4 through control and requirements of chemicals which links to the work with Environmental Building Certification of Buildings, the chemicals in the business are registered and monitored in the Building Product Assessment system. To help advance target 12.5 Akademiska hus participates in the innovation project “Återvinning i Väst” which is run by IVL to build knowledge and create methods to improve the conditions for recycling. Akademiska Hus contributes to target 12.7 by participating in industry-wide groups with the goal of improving requirements and requirement levels for sustainable procurement, for example in demolition and construction machinery. Hufvudstaden (2021) contributes to SDG 12.2, SDG 12.5, SDG 7.2, SDG 7.3 and SDG 13.1 by minimising energy consumption, minimising climate affecting emissions from operation and construction, and by reducing waste. The company also helps advance the targets through the usage of building certifications, having bicycle parking and charging stations and setting goals for energy consumption. They also contribute to SDG 5.1, SDG 12.2, SDG 13.1 and SDG 13.3 by developing long-term flexible solutions that last over time, certifying their properties and adapting their properties for future climate change (Hufvudstaden, 2021). Furthermore, section 3.9.3 and 3.13.2 describe the work of Humlegården (2021) towards targets 12.1, 12.2, 12.4, 12.5, and 12.6. Vasakronan´s (2021) support of target 12.2 and 12.4 are mentioned in section 3.11.4, Kungsleden’s (2021) contribution toward SDG 12 is detailed in section 3.15.3, and Familjebostäder’s (2021) contribution toward that same goal is described in section 3.10.2.

Case

Klövern (2020) has stated a variety of goals relating to SDG 7, SDG 12 and SDG 13: by 2022, all energy used in Klövern's buildings will be derived from renewable energy sources, and they have a target for the energy consumption of their building. In 2025, Klövern’s ambition is to be climate-neutral in its administrative operations. They also state that they will ensure long-term resource-efficient project operations with as low a climate impact as possible. The company will strive to minimise the waste that goes to incineration and landfill, and to increase the proportion of recycled or reused waste. The aim that a sustainability framework shall be developed in all urban development projects and that the company will strive to certify all buildings in the long term are ambitions that will support SDG 11, SDG 12, SDG 13 and SDG 17. The company also have some goals that would

advance SDG 8 and SDG 12: their surplus ratio must amount to at least 65 percent, the adjusted equity/assets ratio should amount to 40 percent in the long term, and the Satisfied Customer Index (*NKI-index*) must amount to at least 75. Lastly, Klövern's suppliers must work in accordance with Klövern's code of conduct for suppliers. (Klövern, 2020)

3.13 Climate action

The thirteenth Sustainable Development Goal is to "Take urgent action to combat climate change and its impacts" and is separated into five targets. Target 13.1 entails to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters, target 13.2 aims to integrate climate change measures into national policies, strategies and planning, and the third target of SDG 13 is to improve education, awareness and capacity on climate change mitigation and adaptation. (United Nations, 2021)

3.13.1 Proposed measures and indicators

Examples of measures that would contribute toward SDG 13 in a major way would be through the increased usage of renewable energy and the incorporation of an energy system that generates zero net carbon emission (Wiktorowicz et al., 2018). These actions also contribute to SDG 7, 9, 11 and 12. RICS (2018) proposes a range of measures that contributes to SDG 13 through the whole lifecycle of a building. However, all measures also overlap with other targets and are more thoroughly explained in other sections of this document. Beginning with the real estate development phase, companies could contribute toward target 13.1, 13.2 and 13.3 through environmental stewardship and the quality of planning, design and construction, which is further described in section 3.1.1, 3.6.1 and 3.12.1. According to Xu et al. (2019) usage of land-use planning has a considerable potential to combat climate change and support SDG 13. RICS (2018) have also stated that an evaluation of the performance of asset managers in regard to responsible business targets would contribute to SDG 12.8, 12.2, 13.2 and 13.3, as a part of ensuring transparency and managing disclosure. Target 13.2 and 13.3 may be supported through various actions regarding environmental stewardship and the health and safety of occupants, which are further described in section 3.12.1. During the recovery phase, target 13.1 and 13.2 could be supported by a strategic site-use revaluation, by renovation and refurbishment measures, and during land recovery and rehabilitation of the site, as is described in section 3.7.1 and 3.12.1 (RICS, 2018).

Net zero GHG buildings contribute to mitigating climate change and to SDG 13 according to Satola et al. (2021), while Marotta et al. (2021) have stated that nearly zero energy buildings support both SDG 7 and SDG 13. To clarify these similar concepts, a more detailed definition of net zero GHG buildings is given by Satola et al. (2021). According to the WorldGBC (n.d.), green buildings support SDG 13 by using circular principles, where no resources are wasted. Green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 15 and SDG 16. BREEAM and LEED are examples of green building standards that support

SDG 13. LEED-certified buildings support SDG 13 by reversing the contribution of buildings to climate change. High-performing green buildings can significantly reduce the greenhouse gas emissions over the life cycle of one building, and therefore approximately one third of the points in LEED v4 are rewarded to climate change mitigation strategies (USGBC, 2018b). According to BREEAM (2018), their family of standards and tools makes a significant contribution to SDG 3, SDG 6, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, and SDG 15. BREEAM (n.d.) has stated that their building certification standard BREEAM In-Use supports SDG 13 by improving resilience against natural disasters and weather and mitigating carbon emissions by energy efficiency and the use of low carbon technologies. The criteria correspond to the SDG indicator 13.1.1-13.1.3, 13.2.1 and 13.3.2. The criteria include, amongst others, an assessment of the energy consumption for the entire asset as mentioned in section 3.7.1. They include energy performance metrics related to floor area, metering of electricity data and the calculations of the average carbon intensity value of the district heating and cooling system. The criteria also include metrics of water, land-use and waste management. Additionally, the criteria target the total accessible area for PV panels, solar thermal panels and solar photovoltaic panels installed, and renewable energy generated on or near assets. The criteria include making a flood risk assessment that takes account of climate change and having recommendations implemented, and to take appropriate measures to minimise surface water run-off. The criterion also includes to implement an emergency plan as mentioned in section 3.1.1. The criteria for SDG 13 overlap with the criteria for SDG 1, SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12 and SDG 14 (BREEAM, n.d.). See more about the BREEAM criteria detailed under section3.1.1.

In a literature review conducted by Gue et al. (2020), the use of artificial neural networks (ANNs) to resolve issues of SDGs have been evaluated. ANNs are computational and statistical tools that can be used as advanced methods to model and forecast complex behaviour of systems, and includes functions such as feature selection, kriging and simulation. ANN could become an important tool to recognise the impact of action plans to reduce GHG emissions. In relation to SDG 11, Gue et al. (2020) found that the application of ANN for meta-modelling of building simulations was a popular utilization in the reviewed articles, and the technique also applied to land-cover classification. ANN was also often used to resolve issues of SDG 6, SDG 7 and SDG 12 according to the study. For example, D'Amico et al. (2019) have used ANN to assess energy performance of buildings, relevant for SDG 12-13. Other assessment methods that contribute to SDG 13 have been examined through case studies by Shirazi & Ashuri (2018) and Ramírez-Villegas (2019). Shirazi & Ashuri (2018) has studied LCA assessment of single family houses from the 1970s in Atlanta, while Ramírez-Villegas (2019) have examined environmental and economic assessment of a multi-dwelling building in the Nordic climate, and claim this type of assessment supports SDG 7, SDG 12 and SDG 13.

Transformation of business models in alignment with the Sustainable Development Goals also constitutes an climate action that contribute to SDG 13, and a number of assessment tools and frameworks have been developed to address and integrate the SDGs within businesses (Honold & Lützkendorf, 2019; Johnsson et al., 2020; Sinkovics et al.,2020;

Smyth & Vanclay, 2017). For example, Honold & Lützkendorf (2019) have proposed a business model that supports sustainable development and accelerates the implementation of energy efficient buildings. In addition, broader collaboration competencies are needed in order for businesses to engage in climate action in collaboration with stakeholders (Muff et al., 2020). This competence could be referred to as responsible leadership (RL) competences. Muff et al. (2020) have analysed the use of the free tool Competency Assessment for Responsible Leadership (CARL) that is used to systematically analyse and develop RL competences. Climate action could also be achieved through cooperation with external parties for innovation. Gómez Zermeño et al. (2020) has conducted an open laboratory for social innovation inside a university with society stakeholder, and found that the participants became actively involved in generation of collective knowledge through this voluntary collaboration. The openlab became a place for exchange of experience and best practice in learning about the SDGs, and the linkage between society, academia, business and government. A similar concept of a living lab approach has been proposed by Espinosa-DurÃ et al. (2020), as a measure of climate activities to improve a sustainable energy model for buildings with the aim to achieve a Nearly Zero Energy Building approach. Strategic actions of Technological Innovation in Building and Civil Engineering (A-CITEEC), a similar structure, have the potential to positively influence all of the SDGs (Regueiro-Picallo et al., 2020). An A-CITEEC structure could be achieved through close collaboration between associated companies, where research talent is retained and research environments are offered at national and international level.

A couple of indicators have been proposed by GRI (2021), through which the progress of SDG targets 13.1, 14.3 and 15.2 may be tracked by the real estate sector. The GRI disclosure standard 305-4 includes reporting of the GHG emissions intensity ratio for the organisation. Reporting on the reduced GHG emissions as a direct result of reduction initiatives is the GRI disclosure 305-5, which should be disclosed in metric tons of CO2 equivalent. In addition, GRI CRE3 includes reporting on the greenhouse gas emissions intensity from buildings. Of the reviewed Swedish real estate companies, six have used 305-4 in their latest sustainability report, only Wallenstam (2021) have used 305-5 and four have used CRE3. GRI (2021) also have a number of additional disclosure standards that contribute to SDG 13, which has already been mentioned in other sections since they also support other SDGs, namely: the disclosure 302-1 of fuel consumption that support target 13.1, the disclosure 302-3 of organisation energy intensity that support target 13.1, the disclosure 302-4 of reductions in energy consumption that support target 13.1, the disclosure 305-1, 305-2 and 305-3 of Scope 1, Scope 2 and Scope 3 GHG emissions, the disclosure CRE1 of building energy intensity, and the CRE8 of sustainability certifications. Lastly, indexes of commitment and leadership support SDG 13.3, among others, as mentioned in section 3.3.2.

3.13.2 Company studies

Ionascu et al. (2020) ranked SDG 13 as being second to most prioritized by European real estate entities. For SDG 13 the content of the external reporting was analysed as it related to “Resilience and ability to adapt to natural disasters”, “Integration of climate change

measures into the business strategy" and "Measures to reduce greenhouse gas emissions", further details of the study found in section 3.1.2. Some of the reviewed Swedish real estate companies contribute to SDG 13 by taking measures to reduce the environmental impact of their operations, and by certifying the building. For example, Atrium Ljungberg (2021) aims to contribute to SDG 13.1 by minimising the energy consumption and the use of fossil fuels to successfully reduce CO2 emissions. They also want to strengthen the resilience of cities and properties, and their ability to adapt to climate-related dangers and natural disasters. Humlegården (2021) contributes toward target 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2 and 15.4, by focusing on building certification, setting goals for energy consumption, and providing bicycle parking and installing charging stations to support sustainable travel. Their aim is to contribute to a sustainable society by becoming climate neutral, by reducing the energy consumption and by providing sustainable and certified properties where people can thrive. Their goal is to have a climate neutral operation by 2045 and that the energy consumption shall be reduced by 32 percent by 2030 in comparison with the year 2019. They also aim for all their properties to be certified. By carrying out health checks, offering exercise activities and skills development they also contribute toward target 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5 and 16.7. They aim to have the most committed employees and the best leaders in the sector, which they measure through indexes of commitment and leadership (Humlegården, 2021).

Hemsö (2021) has adopted a climate strategy and is actively working to reduce their climate footprint in both construction and management through everything from the choice of energy sources and building materials to participating in pilot projects in initiatives linked to climate-adapted construction, such as NollCO2 and Lokal Färdplan Malmö 2030 (LFM30). Vasakronan (2021) are also working to reduce the negative impact that climate change may have on their operations, thereby contributing toward targets 13.1 and 13.3. They also support the goal through further measures described in section 3.11.4. K2A (2021) also wants to reduce its climate impact at all levels with the ambition of becoming climate neutral throughout the entire value chain before 2030. The ambition is that this will be achieved through what the company has at its disposal, not through compensatory measures. In 2021, K2A will carry out climate risk inventories of all buildings and in addition plan to implement climate declarations for all new production. There is potential for improvement in areas such as transport, within production and the employees' journeys to work, for example through green travel plans. K2A has been assessed to make a large to - a very large contribution toward SDG 13, based on an assessment of the company's progress on the first three targets of the goal that were relevant for the company (K2A, 2021).

In Fastighets AB Balder's (2021) operations, transport has a major impact on the environment and climate, and various measures are being taken to reduce this impact. The company's travel policy supports, for example, more environmentally friendly means of transportation and alternatives to business travel, such as video conferencing and telephone meetings. The company has also begun work on mapping climate-related risks and opportunities. These actions help advance targets 13.1 and 13.3 according to the company's 2020 annual report. Fastighets AB Balder uses some measures to keep track of the company

goals, which support SDG 8 and SDG 13. The goal of having all employees educated in the company code of conduct is simply measured by keeping track of the number of employees that have received such training. Measures and responsibility for sustainable and effective travel are measured by keeping count of the number of business trips that have been made by train instead of flight, and by calculating the reduced emissions due to responsible travel. They also disclose the GRI standards 404-3, 405-1 and 406-1. In addition, Balder aims to minimise the use of energy, water and chemicals, reduce waste and increase the use of renewable energy and conscious materials. They are applying key figures of energy and water consumption and are disclosing the GRI standards 302-1, 305-2, 307-1, CRE1 and CRE2, to keep track of measures that support SDG 7, SDG 11, SDG 12 and SDG 13. In addition, Klövern (2021) supports SDG 13 by some measures that are described in section 3.12.3, Kungsleden (2021) contribute to SDG 13 as mentioned in section 3.15.2, and Familjebostäder (2021) contribute to SDG 13 by measures that are described in section 3.15.2. Hufvudstaden (2021) support target 13.1 and 13.3 through measures detailed in section 3.12.3.

Case

Wallenstam (2021) attaches great importance to limiting the climate and environmental impact of their production, operation and management of properties, and helps advance SDG 13 according to their 2020 annual report. The last remaining oil heating in their property portfolio has been phased out, according to their strategy to completely avoid fossil-based heating. In addition, they have converted their gas-heated properties from natural gas to fossil-free biogas. The company strives to reduce the CO2 load in the real estate sector through their climate goals in regards to construction. In the operation of their properties, they optimize and measure in order to reduce energy and resource consumption, and strive to establish a sound economic structure which continuously improves. They use individual metering of electricity and water, which often contributes to the decrease in tenants' consumption of both, usually by 10-25%. Wallenstam also drives the development for reduced climate and environmental impact through various collaborations and initiatives such as the "Roadmap for Fossil-Free Competitiveness - The Heating Industry". Four of the company's residential properties are in environmentally profiled districts and one is environmentally certified according to “Miljöbyggnad Silver”. (Wallenstam, 2021)

3.14 Life below water

The fourteenth Sustainable Development goal is to “Conserve and sustainably use the oceans, seas and marine resources for sustainable development” and is split into ten targets. Target 14.1 is to prevent and significantly reduce marine pollution, in particular from land-based activities, and target 14.2 is to sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts. (United Nations, 2021a)

3.14.1 Proposed measures and indicators

The measures proposed for SDG 14 mainly focus on protection of marine ecosystems. For example, RICS (2018) proposes that companies in the land, construction and real estate sector may support target 14.1 and 15.5 during the real estate development phase through engagement in environmental stewardship, as mentioned previously in section 3.15.1. Real estate in coastal areas may also support SDG 14. Humans are reliant on marine ecosystems and put pressure on marine resources, for example by building various infrastructure in coastal areas. To create and establish a more rational use of marine space, marine spatial planning (MSP) may be utilized. MSP is supported by spatial analysis and mapping tools, and focuses on the spatial and temporal distribution of human activities and species and ecosystems. Thus, the use of MSB contributes to SDG 14 by offering coastal and marine planning frameworks that ensure a sustainable use of marine resources and protects marine species (Lennox et al., 2019). According to Tsurkan et al. (2019), “green” project management standards are tools to implement principles of sustainable development in the construction industry. They improve the population’s quality of life by ensuring economic efficiency, ecological safety of the projects and decrease the negative impact of the construction industry on the environment. Tsurkan et al. (2019) has analysed a couple of ecological-friendly construction projects in the Arctic zone of Russia, and have stated that the projects contribute to SDG 6-7 and SDG 11-15.

In the use phase of the real estate, clean cooking fuels can reduce environmental burdens associated with biomass use (Rosenthal et al., 2018; Roy et al., 2021). The benefits of shifting to Liquified Petroleum Gas (LPG) need to be weighed against the impacts of LPG extraction and processing and the fact that switching to LPG can imply additional costs for poorer households (Roy et al., 2021). In addition, some decisions within real estate companies could indirectly benefit the life below water. According to Adeyeye et al. (2020), who has studied the effect of wind energy on the Sustainable Development Goals, offshore wind turbines may have a negative impact on aquatic species. This could be considered in the choice of renewable energy sources. In addition, coastal real estate owners could benefit from utilizing beach protection ecosystem services, as well as other ecosystem services (Pascal et al., 2021).

According to BREEAM (n.d.), their certification standards for buildings could also support SDG 14. Their building certification standard BREEAM In-Use supports SDG 14 by helping to mitigate the pollution of surrounding watercourses, maintaining ecosystems and reducing land degradation, and by promoting a reduction of carbon dioxide emissions, thus the standard reduces the contribution of real estate to marine acidification. The standard criteria correspond to the SDG indicator 14.1.1, 14.2.1 and 14.3.1. For example, the criteria include minimising consumption and associated carbon emissions of mechanical ventilation. The criteria also assess the energy consumption for the entire asset as mentioned in section 3.7.1, using the same energy performance metrics as proposed in section 3.13.1. Furthermore, they include an assessment of the global warming potential of refrigerants and having typical low GWP refrigerants and corresponding leak detection installed. According to the criteria, watercourse pollution prevention features should be inspected according to a schedule, and a

maintenance policy with a log-book should be in place. It is also assessed if the building includes and supports ecological features such as vertical habitats or green walls, and if native floral species are enhanced. Protection and maintenance of existing ecological value is considered, and if independent, qualified ecologists are appointed. Criteria also include having a biodiversity management plan that links to local and regional biodiversity, including targets and local biodiversity strategies. The criteria for SDG 14 overlap with the criteria for SDG 1, SDG 4, SDG 6, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13 and SDG 15 (BREEAM, n.d.). See more about the BREEAM criteria in section 3.1.1..

In the recovery phase, RICS (2018) states that companies could contribute to target 6.4, 6.6 and 14.1 through waste management, by ensuring that waste water is managed to protect groundwater and existing natural water courses and drains. In addition, companies may contribute to target 14.2, among others, through the development of an integrated action plan as further explained in section 3.2.1. The plan aims to create multiple uses and benefits, taking into account several aspects, such as water management, areas for wildlife and livestock, promotion of native species, and ecosystem valuation, such as valuation of water and marine resources (RICS, 2018).

Through the framework of “Circles of Coastal Sustainability”, de Alencar et al. (2020) provides a number of indicators of critical processes that facilitate and constrain sustainability of the world's coastal cities. The framework has identified key features that influence environmental sustainability and human well-being, and indicators of multiple spatial scales. For example, indicators of ecological sustainability on land may include: land cover (e.g. built-up surfaces), and people and asset risk in coastal areas. Furthermore, Kyvelou and Ierapetritis (2019) propose the metrics of employment in real estate activities compared to all employment in maritime areas as an indicator of maritime spatial efficiency. In addition, GRI have a few disclosure standards that contribute toward SDG 14.3, which all are presented elsewhere: the disclosure 305-1, 305-2 and 305-3 of Scope 1, Scope 2 and Scope 3 emissions, the disclosure 305-4 and CRE3 of GHG intensity, and the disclosure 305-5 of reduced GHG emissions.

3.14.2 Company studies

Of the reviewed Swedish real estate companies, only K2A (2021) have claimed to work to advance SDG 14. This affirms the result of Ionascu et al.’s literature review (2020), which ranked SDG 14 as third to least prioritized by European real estate companies. For this SDG, Ionascu et al. (2020) analysed the content of the external reporting as it related to “Impact of activity on aquatic ecosystems” and “Measures to address future risks caused by depletion of aquatic ecosystem resources”. See further details of the study in section 3.1.2.

Case

K2A (2021) stated in their annual report for 2020 that production is judged to have little impact on the marine environment, as Svanen set requirements for the use of chemicals

and the content of the products. Ambitious stormwater management reduces the risk of untreated stormwater ending up in our watercourses. Within the property portfolio, the impact of car traffic in the immediate area, and in the long run also the pollution in water, is likely to decrease, through a lower parking number where there are sharing services. K2A has been assessed to not make any contribution to SDG 14, based on an assessment of two targets of the goal that are relevant for the company. The company has stated that there is great potential for their improvement in regards to this goal. (K2A, 2021)

3.15 Life on land

The fifteenth Sustainable Development Goal is to "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" and is separated into twelve targets. Target 15.1 is about conservation, restoration and sustainable use of terrestrial and inland ecosystems, while target 15.2 promotes sustainable management of all types of forests. Target 15.5 is to take urgent action to reduce the degradation of natural habitats and halt the loss of biodiversity, and target 15.9 is to integrate ecosystem and biodiversity values into planning and development processes. (United Nations, 2021a)

3.15.1 Proposed measures and indicators

The measures proposed for SDG 15 mainly focus on the enhancement of biodiversity and the preservation of ecosystems. For example, companies could support target 15.4 and 8.4 through environmental stewardship, by investigating the possibility of brownfield development instead of greenfield development and by ensuring land use during the development phase (RICS, 2018). Target 15.5 and 14.1 may be supported too, if the company adopts practices regarding land development that protects existing biodiversity and land- and sea-based ecosystems, improve biodiversity regeneration and facilitate sustainable management of natural resources. Companies may also contribute towards the achievement of target 15.5 and 15.9 through measures mentioned in section 3.6.1, 3.11.2 and 3.12.1. According to Wiktorowicz et al. (2018), the provision of food and habitats for the local wildlife yields medium contribution to SDG 15. In addition, land tenure security is a social environmental factor that feeds into SDG 15, among other SDGs, as mentioned in section 3.1.1 (Dachaga and de Vries, 2021). In regards to traffic, shifting to active modes and reducing car demand preserves land that would have been otherwise used to construct and maintain parking garages and surface parking lots (Gilderbloom et al., 2016; Roy, et al., 2021).

According to the WorldGBC (n.d.), green buildings can help improve biodiversity, save water resources and help to protect forests, thereby contributing toward SDG 15. According to the same source, green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13 and SDG 16. For example, the BREEAM family of standards and tools makes a significant contribution to SDG 3, SDG 6-7, SDG 9, SDG 11-13, and SDG 15 (BREEAM,

2018). Their building certification standard BREEAM In-Use, which is presented in section 3.1.1, supports SDG 15 by helping to mitigate the pollution of surrounding watercourses, by the requirement of sustainable procurement of timber which supports sustainable forest management, by maintaining ecosystems and reducing degradation of surrounding area (BREEAM, n.d.). The standard criteria correspond to the SDG indicators 15.1.2, 15.2.1, 15.3.1, 15.5.1 and 15.9.1. For example, the criteria include making a risk assessment of pollution and minimising watercourse pollution. The criteria tests if watercourse pollution prevention features are inspected according to a schedule, and if a maintenance policy with a log-book is in place. Protection and maintenance of existing ecological value is also considered, and if independent, qualified ecologists are appointed. Criteria also include having a biodiversity management plan that links to local and regional biodiversity, including set targets and local biodiversity strategies. The criteria for SDG 15 overlap with the criteria for SDG 6, SDG 8, SDG 9, SDG 11, SDG 12 and SDG 14 (BREEAM, n.d.).

Green infrastructure (GI) is another category that contributes to SDG 15 (Hoyle & Sant'Anna, 2020; Ibrahim et al. 2020). GI could generally be defined as interconnected systems of green spaces, such as waterways, woodlands and parks (Ibrahim et al. 2020). In addition, Hoyle & Sant'Anna, (2020) have found GI to have a positive impact on human health and marine biodiversity, supporting SDG 14. Hoyle & Sant'Anna (2020) have engaged in further research on the perception of naturalness in urban green spaces, which could help in the decision making and design of GI spaces.

In the recovery phase, a measure regarding waste management that contributes to target 15.9 is described in section 3.8.1. Regarding brownfield regeneration in the recovery phase, companies may contribute to target 15.1 and 15.5 by defining the liabilities of all parties that have been involved in brownfield regeneration in accordance with the "polluter pays" principle, as part of the process of developing a strategy for using brownfield sites. Companies could support the same targets during land recovery and rehabilitation of the site, by checking, and seeking legal advice and clarification if necessary, of the local statutory and regulatory requirements to prepare for Environmental Impact Assessments (EIA). Other measures that may be undertaken during land recovery are described in section 3.12.1, which support the achievements of target 15.1, 15.3 and 15.5. At last, RICS (2018) propose that target 15.1, 15.5, 15.8 and 15.9 may be supported by the development of an integrated action plan which takes several aspects into account, such as areas for wildlife and livestock, sustainable expansion of agriculture, promotion of native species, and ecosystem valuation that requires to plan and create connected greenways and wildlife corridors (e.g. land, forestry and unblocking of animal routes), as is further described in section 3.2.1.

Only environmental indicators are proposed to keep track of SDG 15. GRI (2021) have a few disclosure standards that support SDG 15.2, which all are detailed elsewhere since they also support other Sustainable Development Goals: the disclosure 305-1, 305-2 and 305-3 of Scope 1, Scope 2 and Scope 3 emissions, the disclosure 305-4 and CRE3 of GHG intensity, and the disclosure 305-5 of reduced GHG emissions. According to Furberg et al. (2019),

monitoring urbanisation and environmental impacts is necessary to evaluate and maintain ecosystem functions and services aligned with SDG 15.1.

3.15.2 Company studies

Ionascu et al. (2020) ranked the fifteenth Sustainable Development Goal as sixth to least prioritized by the European real estate companies that make up their sample. For this SDG, the content of the external reporting was analysed as it related to “Measures to reduce the degradation of natural habitats”, “Measures to address future risks caused by depletion of terrestrial ecosystem resources” and “Managing the impact of economic activities on terrestrial ecosystems”. Further details of the study in section 3.1.2. The analysed Swedish real estate companies approach SDG 15 in a similar manner, mainly by reducing their climate footprint, by focusing on climate adoption and certification of their properties and by taking steps to support biodiversity. Atrium Ljungberg (2021) contributes to SDG 15.5 by creating green areas, to stimulate the diversity of species and by working with ecosystem services and using trees, land, walls and roofs in a sustainable way in their urban environments (Atrium Ljungberg, 2021). Humlegården (2021) also creates green areas, and support targets 15.4 and 15.5 through additional measures which are described in section 3.9.3 and 3.13.2.

K2A (2021) only uses domestic PEFC- or FSC-labelled wood, which means, among other things, that each felled tree is replaced with two plants. The industrial production method with finished volume elements leads to more of nature being preserved near the houses as the finished apartment volumes are lifted in place with a crane. For example, large trees and rock outcrops may remain, thus increasing the possibilities for preserving the mobility of animals and plants. When planning the outdoor environment, local conditions are taken into account and plants that can support local ecosystems and biological diversity are selected. Examples of measures are fruit trees, stormwater ponds, flowering plants, green roofs and butterfly restaurants and insect hotels. K2A has been assessed to make a large - to a very large contribution to SDG 15, based on an assessment of five targets of the goal that were relevant for the company (K2A, 2021). Kungsleden (2021) contributes to SDG 7, SDG 12, SDG 13 and SDG 15 by focusing on climate and energy, sustainable material flows, climate adaptation and water, green economy and biodiversity. The company aims to be climate positive in the entire value chain by 2035, to have a climate positive operation and to develop and implement “Klimatsmart” premises. In addition, all new large projects should include solar cells and the property portfolio should use 25 percent less energy in 2025 than in 2020.

Case

Familjebostäder (2021) works to reduce the company's climate and environmental impact in project development and management of their properties and through clarifying their climate and environmental work to increase awareness and encourage participation. The company states that they strive to build in such a way as to ensure low environmental and climate impact. They include green farms that take care of stormwater, and rainfall,

protect against heat, contribute to biodiversity and are a place for recreation. The company has mobility solutions that make it easy for their tenants to live in their properties without needing to own a car. They calculate the climate impact from all new production and set requirements for the use of environmentally approved construction products and products in accordance with the Building Products Assessment, in all procurements and purchases. Familjebostäder strives to reduce construction waste and strives to reduce energy consumption in their homes by working to increase the proportion of renewable energy, for example through installing solar cells on their roofs. Their measures include investing in solar cells, building non-toxically, reducing construction waste, reusing furniture and construction materials and certifying their properties with “Miljöbyggnad”. The company has stated goals regarding energy consumption, carbon dioxide emissions and the proportion of households with access to food waste collection. All these measures support SDG 7, SDG 13 and SDG 15. (Familjebostäder, 2021)

3.16 Peace, justice and strong institutions

The sixteenth Sustainable Development Goal is to “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels” and is divided into twelve targets. Target 16.3 is to promote the rule of law and to ensure equal access to justice for all, target 16.5 is to substantially reduce corruption in all forms, and target 16.6 includes development of effective, accountable and transparent institutions. (United Nations, 2021a)

3.16.1 Proposed measures

Several of the measures proposed to advance SDG 16 are about social issues, ensuring a good working environment and to work against corruption, engage in collaborations, and have ongoing communication with tenants and the community. Through land governance during the real estate development phase, companies may contribute toward SDG 16.7, 10.2, 5.2 and 5.a. by carrying out a social impact assessment, covering the protection of human rights including those of marginalised groups, as well as differentiated impacts on gender (RICS, 2018). Companies could also support target 16.7 through good treatment of tenants and the community, e.g. by putting in place an adequate complaint process and being sure of having an ongoing, open dialogue with tenants. In addition, companies may contribute to target 16.7, 10.2 and 5.2 by developing engagement programmes to increase communication and involvement within the community, increase community involvement and by supporting vulnerable groups such as women, children, the elderly, disabled people, ethnic minorities and indigenous communities. In section 3.8.1, it is further described how companies may support target 16.b as it relates to the health and safety of building occupants. To consider the social impacts of the changing use of a building could support target 16.b, while an action regarding waste management could support target 16.5 (RICS, 2018). Furthermore, the goal of promoting and establishing inclusive societies could be achieved through community engagement and demonstration projects such as Gen Y housing and sustainable housing for

artists and creatives (SHAC). These projects also contribute to SDG 1, 3, and 11 (Wiktorowicz et al., 2018).

According to the WorldGBC (n.d.), strong global partnerships can be generated from building green buildings, thereby contributing to SDG 16. According to them, green buildings may also contribute to SDG 3, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, SDG 13 and SDG 15. The building certification standard BREEAM In-Use, which is further explained in section 3.1.1, supports SDG 16 by the requirement of responsible sourcing of timber and other material that ensure legal harvest and trades (BREEAM, n.d.). The criteria correspond to SDG indicators 16.2.2, 16.5.1 and 16.5.2. The criteria include having a procurement plan with sustainability aims adopted across several sites or at organisational level, where the criteria for sustainable procurement are met. They considered if it provides guidance on product choice, if it promotes the use of certified supplier organisations, and if it has a timber procurement policy which is sponsored and used during management. Procedural checks and verifications for effective implementation of procurement plans are also considered. The criteria for SDG 16 overlap with the criteria for SDG 8, SDG 9, SDG 11 and SDG 12 (BREEAM, n.d.).

In regards to the workplace, RICS (2018) state that companies could contribute to target 16.5 by taking measures against corruption by adopting a project-by-project process regarding this issue, and by providing education in corruption issues to employees at all levels, and training in potential consequences of legal and reputational issues of engaging in corrupt and in-transparent practices. Companies may also contribute to target 16.5 and 17.9 by promoting joint actions such as: certified business coalitions, integrity pacts, anti-corruption declarations, principle-based initiatives and education and training. Transparency and disclosure may be managed in several ways that advance target 16.5: by making a risk assessment and due diligence related to corrupt practices(e.g. money laundering), by implementing whistleblower policies and robust internal compliance programs for anti-corruption, by providing training sessions for employees, contractors, suppliers and clients regarding anti-corruption, by extending the policy for compliance with anti-corruption against suppliers and put in place deterrents from non-compliance with the rules where possible, and lastly by participating in collective action, including sector-wide or regional initiatives to jointly fight corruption and increase transparency in the real estate market. In addition, companies could advance target 16.2 by ensuring decent work conditions for employees and by respecting workers' rights, as is mentioned in section 3.8.1. In addition, companies may support target 16.7 during brownfield regeneration, as previously mentioned in section 3.1.1 (RICS, 2018).

3.16.2 Proposed indicators

UNCTAD (2019) has proposed a number of indicators concerning corporate governance disclosures. Reporting on the number of board meetings and the attendance rate supports SDG 16.6 and may be measured as the number of board meetings during the reporting period and number of board members who participate at each board meeting during the

reporting period, divided by the total number of directors sitting on the board multiplied by the number of board meetings during the reporting period. Additional indicators that support the same target are the number of meetings of the audit committee and their attendance rate, which should be measured as the number of board meetings during the reporting period and number of audit committee members who participate at each audit committee meeting during the reporting period divided by the total number of members sitting on the audit committee multiplied by the number of audit committee meetings during the reporting period. Disclosure of the board members by age range is another indicator that corresponds to SDG indicator 16.7.1. It should be calculated as the average age of board members, e.g. under 30 years of age, between 30 and 50, and over 50. The total compensation, and compensation per board member and executive are also indicators of corporate governance disclosures. They should be measured as the total annual compensation for each executive and non-executive director, including base salary and variable compensation, and support target 16.6. UNCTAD (2019) has also proposed an indicator of community investment, which corresponds to SDG indicator 16.5.2. It would be measured as the total amount of charitable and voluntary donations and investments of funds (both capital expenditure and operating ones) in the broader community that target beneficiaries who are external to the company incurred in the reporting period in absolute amount and in percentage terms.

In addition, several indicators are proposed for SDG 16 in relation to the subject of corruption. The GRI (2019) disclosure 205-1 includes reporting of the total number and percentage of operations assessed for risks related to corruption, and significant risks related to corruption identified through the risk assessment, and support SDG target 16.5. Reporting of the total number and nature of confirmed incidents of corruption and the number of incidents in which employees were dismissed or disciplined for corruption has the designation 205-3 and support target 16.5. It also includes reporting of the total number of confirmed incidents when contracts with business partners were terminated or not renewed due to violations related to corruption, and a description of public legal cases regarding corruption brought against the organisation or its employees during the reporting period. The disclosure 205-2 supports target 16.5 and includes reporting of the total number and percentage of employees, governance body members, and business partners that the organisation’s anti-corruption policies and procedures have been communicated to, broken down by region, employee category and type of business partner. It should include reporting of the total number and percentage of employees and governance body members that have received training on anti-corruption, broken down by employee category and region (GRI, 2021). The last indicator is similar to the average number of hours of training in anti-corruption issues per employee per year as an indicator of anti-corruption practices, calculated as the total hours of training in anti-corruption issues per year divided by total employees, which corresponds to SDG indicator 16.5.2 (UNCTAD, 2019). Four of the analysed Swedish real estate companies have disclosed GRI 205-1 in their latest sustainability report, five have disclosed GRI 205-2, and all have disclosed the GRI standard 205-3.

UNCTAD (2019) has proposed the amount of fines paid or payable due to settlements, as an indicator of anti-corruption practices. It should be measured as the total monetary value of paid and payable corruption-related fines imposed by regulators and courts in the reporting period, corresponding to indicator 16.5.2. The GRI (2019) disclosure 307-1 targets a similar matter, namely the reporting of significant fines and non-monetary sanctions for non-compliance with environmental laws and regulations. The GRI disclosure 419-1 is similar, but targets non-compliance with laws or regulations in the social and economic area. They both support SDG target 16.3 and should be disclosed in terms of: total monetary value of significant fines, total number of non-monetary sanctions and cases brought through dispute resolution mechanisms. Furthermore, the disclosure 416-2 supports the same SDG target and includes reporting of the total number of incidents of non-compliance with regulations or voluntary codes concerning the health and safety impacts of products and services within the reporting period, by incidents non-compliance with regulations resulting in a fine, penalty, or warning and incidents of non-compliance with voluntary codes. In their latest sustainability reports, six of the reviewed real estate companies have disclosed GRI 307-1, five have reported GRI 416-2 and three companies have disclosed GRI 419-1.

GRI (2021) also has a few disclosure standards that are presented elsewhere in the document, which support SDG 16.1: the disclosure 403-9 and 403-10 of work related injuries and ill health, and the disclosures 414-1 and 414-2 of supplier assessment. In addition, indexes of commitment and leadership support the advancement of SDG 16.5 and 16.7, among other targets, as mentioned in section 3.3.2 (Humlegården, 2021).

3.16.3 Company studies

The study done by Ionascu et al. (2020) found that the sixteenth Sustainable Development Goal was fourth to least prioritized by the real estate entities included in their sample. For this SDG, the content of the external reporting was analysed as it related to “Anti-corruption practices”, “Contribution to the efficient and transparent development of institutions” and “Measures to promote responsible, inclusive, participatory and representative decisions at all levels”. Further details of the study detailed in section 3.1.2. The analysed Swedish real estate companies mainly support SDG 16 by taking measures against corruption and by supporting the health and wellbeing of employees and tenants. For example, Atrium Ljungberg (2021) are working proactively to minimise all forms of corruption and bribes within employees and suppliers which contributes to a peaceful and inclusive society and helps advance SDG 16.5. Vasakronan (2021) also contributes to target 16.5, by working to ensure that all their business relationships are free from corruption. The company contributes to target 16.1, 5.2, 10.2 and 11.7 as well, through their work to maintain a safe and secure environment in and around their properties. Kungsleden (2021) contributes to SDG 3, SDG 9, SDG 11 and SDG 16, by focusing on health and well-being, sustainable and vibrant cities, intelligence and service. Their goal is to develop and implement symbiotic districts, buildings and offices. In addition, Humlegården supports targets 16.5 and 16.7 through measures explained in section 3.13.2 while Familjebostäder contributes to SDG 16 by measures detailed in section 3.10.2.

Case

Mixed housing, integrated group housing, integrated apartments for new arrivals, safe outdoor environments, "broken window theory" in the administration, committed customer service, illuminated parking lots, lighted entrances and no shared laundry rooms are some examples of K2A's measures aimed at increasing security and reducing the risk of domestic violence. All suppliers must sign K2A's code of conduct. There is potential for improvement in terms of follow-up. K2A has been assessed to make some contribution to SDG 16, based on an assessment of four targets of the goal that are relevant for the company. (K2A, 2021)

3.17 Partnerships for the goals

The seventeenth Sustainable Development Goal is to “Strengthen the means of implementation and revitalize the global partnership for sustainable development” and is separated into 19 targets. Target 17.1 is to strengthen domestic resource mobilisation to improve capacity for tax and other revenue collection, target 17.9 aim to enhance international support for implementing effective capacity-building in developing countries to support national plans to implement all SDGs, and target 17.17 encourages effective public, public-private and civil society partnerships. (United Nations, 2021)

3.17.1 Proposed measures

It has been proposed that SDG 17 could be achieved through various partnerships with local and federal governments, private corporations, research bodies and the non-profit sector, for example through public-private partnerships (PPPs) (Bull & McNeill, 2019; Wiktorowicz et al., 2018). The formation of partnerships constitutes a sustainable development goal itself (target 17.17), but partnerships could also be used to achieve other goals. Using data from the SDG partnership registry, Bull and McNeill (2019) analysed the extent to which non-Western states and companies participate in PPPs for the sustainable development goals, as well as their qualitative content. They found that PPPs are dominated by companies and other actors from Western countries, and that businesses more often participate in American and Canadian partnerships. As an example, real estate companies could form PPPs to build Green buildings and zero carbon buildings.

RICS (2018) has proposed that companies in the land, construction and real estate sector may support target 17.9 as it relates to other types of joint actions, which is further described in section 3.16.1. Regarding the treatment of tenants and communities, companies may support target 17.17 by helping groups, associations and agencies that work for the good of the society of where they are located (RICS, 2018). Another way to contribute toward the advancement of SDG 17, in residential areas, is through offering community consultations. Partnerships and community consultations also support SDG 9, SDG 10, SDG 11 and SDG 16 (Wiktorowicz et al., 2018). In addition, Roy et al. (2021) have stated that co-design and the

joint development of energy solutions support SDG 17, and to use mentorships of local and indigenous knowledge enable higher adoption (Franquesa-Soler & Sandoval-Rivera, 2019; Roy et al., 2021). In industry, symbiotic relationships among stakeholders constitutes a key factor to run a successful industrial cluster (ElMassah, 2018; Huang et al., 2019; Roy et al., 2021). They are also important for widespread adoption of the public transport system (Macmillan et al., 2020; Rarasati & Iskandar, 2017; Roy et al., 2021). Increasing the use of active modes of transportation requires the development and strengthening of transdisciplinary partnerships for planning (Roy et al., 2021).

UNCTAD (2019) has suggested the only two indicators that were found for SDG 17. The first indicator corresponds to SDG indicator 17.1.2. It includes reporting of taxes and other payments to the government calculated as the total taxes paid and payable for reporting period (income tax and other levies and taxes), plus related penalties paid, all royalties, license fees and other payments to the Government. The second one corresponds to SDG indicator 17.17.1 and is an indicator of community investments. It is measured as the total amount of expenditures (both capital and operating expenditures) on charitable donations and investments of funds in a broader community where target beneficiaries are external to the company in the current reporting period, reported in both absolute amount and percentage terms.

3.17.2 Company studies

Ionascu et al. (2020) ranked the seventeenth Sustainable Development Goal as being sixth to most prioritized by the real estate companies included in their sample. For this SDG, the content of the external reporting was analysed as it related to “The value of investments in partnerships made up of several stakeholders” and “The value of the contribution to the state budgets”. Further details of the study in section 3.1.2. Some of the examined Swedish real estate companies report contribution towards the achievement of SDG 17 in their annual or sustainability report, mainly through various types of collaborations. According to Vasakronan (2021) they contribute to target 17.17 by collaborating with various voluntary organisations and supporting their activities through donations. Similarly, Akademiska Hus (2021) states that they contribute to SDG 17 by being initiators and partners in a number of collaborative projects with a focus on sustainable development together with customers, research partners, industry colleagues and other parties. Kungsleden (2021) contributes to SDG 5, SDG 8, SDG 10 and SDG 17 by focusing on community involvement, transparency and business ethics and work environment and safety. For instance, the company states the following goals in their 2020 annual report: all new projects must have at least one measure relating to local community involvement, and they have zero tolerance for accidents, ethical violations, corruption and human rights violations. Klövern (2020) also supports SDG 17, through measures detailed in section 3.12.3.

Case

K2A wants to inspire and be a leader on the subject of sustainable construction, sustainable housing and sustainable investments. K2A is therefore involved in driving issues concerning green loans for sustainable development and green shares, interpretation of the EU taxonomy for the real estate industry and the training on those matters in relation to banks and investors. K2A is, among other things, a member of BeBo, a network for energy-efficient apartment buildings and the Student Housing Companies. In 2021, K2A will link its climate goals to Science Based Targets; a method for setting scientifically based emission targets that are in line with the 1.5-degree target of the Paris Agreement. Out of all of the SDGs, K2A has been assessed to make the best contribution towards the fulfilment of SDG 17. The assessment concerned four SDG 17 targets that were deemed as relevant to the company, and K2A was assessed to contribute to a very large extent towards the goal. (K2A, 2021)

4. Summary

A summary of the findings of this literature review is presented in table 1 and table 2, in order to yield a brief overview of the studied subjects. In these tables, a selection of identified measures and indicators of similar types have been grouped, and have been given a short explanation. The middle column shows the supported SDGs and the right column contains the references which have linked the measures and indicators to the SDGs. The information in the columns with SDGs and references are divided with semicolons, where the first reference has linked the first group of SDGs to the corresponding measure or indicator, and so on. The idea is to provide an overview of which SDGs that are relevant for a certain type of measure or indicator, according to the sources. A table with almost all measures that support the SDGs is found in Appendix B, and all indicators are found in Appendix C, along with a little more detailed explanations.

Measure	SDGs	Reference
Minimise the energy consumption in the buildings through different energy efficiency measures, e.g. through additional insulation and window replacements.	7.2, 7.3, 13.1; 4.a, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 12.2; 11; 7.2, 7.3; 13; 7, 9, 11; 7; 7, 12, 13; 7, 12, 13; 7, 11, 13; 7, 12, 13, 15; 3.8, 7.1, 7.2, 7.3, 8.3, 9.1, 11.2, 12.1, 13; 7, 8; 3; 7.2	(Atrium Ljungberg, 2021; BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; Gailard Couston et al., 2020; Hemsö, 2021; Hoody et. al., 2021; Hufvudstaden, 2021; Klövern, 2020; Janser et al., 2020; Kungsleden, 2021; Parvin et al., 2021; Roy et al., 2021; USGBC, 2018a; Vasakronan, 2021)
Increasing the proportion of renewable energy.	7.2; 7.2, 7.3; 11; 7.2, 7.3; 12; 7, 12, 13; 7.2, 13.2; 3; 7.2; 7; 12, 2, 7, 9	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; Fastighets AB Balder, 2021; Hemsö, 2021; Klövern, 2020; RICS, 2018; USGBC, 2018a; Vasakronan, 2021; Wallenstam, 2021; Wiktorowicz et al., 2018)
Reduce GHG emissions and climate footprint.	13.1; 13; 7,12, 13; 7, 12, 13; 13; 13, 7, 9, 11, 12	(Atrium Ljungberg, 2021; Hemsö, 2021; Hufvudstaden, 2021; Klövern, 2020; Wallenstam, 2021; Wiktorowicz et al., 2018)
Water efficient equipment regarding hand washing basins, toilets, urinals and showers.	1.4, 3.9, 4.a, 6.2, 6.4, 6.5, 6.a, 6.b, 8.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a; 6; 6; 6, 3, 17	(BREEAM, n.d.; K2A, 2021; Roy et al., 2021; Wiktorowicz et al., 2018)
Reducing water consumption and demand.	6; 7, 12, 13, 15; 6; 6.4; 6, 3, 17	(K2A, 2021; Kungsleden, 2021; Roy et al 2021; Vasakronan, 2021; Wiktorowicz et al., 2018)
Reduce waste. Having installed controls for reduction in unnecessary waste.	1.4, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 11, 13; 11.6, 12.5; 11.1, 11.3, 11.8; 7, 12, 13; 3.9, 6.3, 8.4, 11.6, 12.4, 12.5; 7, 12, 13; 11.6, 12.5; 11.6, 12.5	(BREEAM, n.d.; Familjebostäder, 2021; RICS, 2018; Fastighets AB Balder, 2021; Hufvudstaden, 2021; GRI, 2021; Klövern, 2020; RICS, 2018; Vasakronan, 2021)
Reduce use of hazardous materials and ensure a safe management and storage of	12.4; 12.2, 12.4, 12.5; 11.3, 12.4; 7, 13; 3.9, 6.3, 11.5, 12.4; 3.9, 8.4, 12.1, 12.2, 12.4	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; BREEAM, n.d.; Familjebostäder, 2021; RICS, 2018; Vasakronan, 2021)

chemicals.		
Environmental certification of properties, for example with Svanen, Miljöbyggnad, BREEAM or LEED.	11.3; 3, 6, 7, 9, 11, 12, 13, 15; 7, 11; 7, 13; 3; 5, 12, 13; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2, 15.4; 3; 11, 12, 13, 17; 12; 7, 11, 13; 13; 3, 7, 11, 12; 3, 7, 8, 9, 11, 12, 13, 15, 17	(Akademiska Hus, 2021; BREEAM, 2018; Cozza et al., 2020; Familjebostäder, 2021; Hemsö, 2021; Hufvudstaden, 2021; Humlegården, 2021; K2A, 2021; Klövern, 2020; Roy et al., 2021; USGBC, 2018b; Wallenstam, 2021; Wen et al., 2020; World Green building Council, n.d.)
Sourcing and use of circular and sustainable construction material and Green building materials (GBM).	3, 7, 9, 11, 12, 13, 15; 3.9; 7, 9, 11; 11; 3, 13; 11, 12; 11; 7, 8, 9; 12.2, 12.5, 7.3, 6.4, 13.2; 5, 9, 12; 12	(Alam et al., 2021; Atrium Ljungberg, 2021; Balaras et al., 2020; Familjebostäder, 2021; Geldermans et al., 2020; Gusta et al., 2017; Hemsö, 2021; Karim et al., 2020; RICS, 2018; Röstlund, & Björling, 2020; van Stijn et a., 2020)
Using renewable, recycled or reused materials.	12.5; 9.2, 9.4, 12.4, 12.5; 7, 13; 8.4	(Akademiska Hus, 2021; Fastighets AB Balder, 2021; Familjebostäder, 2021; Vasakronan, 2021)
Adaptive building technologies and technologic solutions and upgrades for buildings.	8.2; All SDGs; 9.2, 9.4; 7; 11; 7; All SDGs; 12.4, 1.5, 11.5, 11.b, 13.1, 15.1, 15.3, 15.5; All SDGs; 12, 7.1	(Akademiska Hus, 2021; Battisti et al. 2019; Fastighets AB Balder, 2021; Fokaides et al., 2020; Korol et al., 2018; Krishna & Perumal, 2021; Martínez et al., 2021; Regueiro-Picallo et al., 2020; RICS, 2018; Roy et al., 2021; Tirado Herrero et al., 2018)
Optimisation of HVAC system.	1.4, 3.4, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.3, 11.6, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 13; 10	(BREEAM, n.d.; Kampelis et al., 2019; Roy et al., 2021)
Develop sustainable and smart cities.	11.3, 11.6, 11.7; All SDGs; 11; 3, 8, 11; 3, 9, 11, 16; 11; 11, 12, 13, 16; 11; 11; 11	(Atrium Ljungberg, 2021; Ismagilova et al., 2019; Hoornweg et al., 201; Hufvudstaden, 2021; Kungsleden, 2021; Moreno et al., 2021; Zimring, 2020; Moschen et al., 2019; Razmjoo et al., 2021; Wallenstam, 2021)
Urban green infrastructure and nature-based solutions (NBs) in cities.	11; 11.7; 11.4; 3, 11, 12; 11; 14, 15; 15; 11; 11; 11; 11	(Allam, 2021; Calderón-Argelich et al., 2021; Coombes & Viles, 2021; Dushkova & Haase, 2020; Familjebostäder, 2021; Hoyle, & Sant'Anna, 2020; Ibrahim et al., 2020; Matos et al., 2019; Russo & Cirella, 2020; Voskamp et al., 2021, Wendling et al., 2018)
Creating green spaces, using trees, land, walls and roofs in a sustainable way in urban environments.	11.7; 15.5; 3; 11.1, 11.3, 11.7; 7; 11.7; 3; 15; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 3; 11.7	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Badland & Pearce, 2019; de Vries et al., 2020; Fastighets AB Balder, 2021; Forzani et al., 2020; Grazuleviciene et al., 2020; Hoyle et al., 2019; Humlegården, 2021; K2A, 2021; Wiktorowicz et al., 2018)
Include and support biodiversity and ecological features.	14.2; 7, 12, 13, 15; 15.5, 14.1; 6.4, 15.5; 5, 9, 12, 15 ; 2, 3, 12, 15	(BREEAM, n.d.; Kungsleden, 2021; RICS, 2018; RICS, 2018; Röstlund, & Björling, 2020; Wiktorowicz et al., 2018)
Offering cycle storage facilities, providing car pools and bicycle pools, and installing charging	1.4, 9.1, 9.a, 11.1, 11.3, 12.1, 12.a; 1, 7; 7.2, 7.3; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5,	(BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; Humlegården, 2021; K2A, 2021; Roy et al., 2021;

stations for electric vehicles.	13.1, 13.2, 15.4 ; 3, 13; 1, 3, 5, 7, 8, 15, 17; 11.2	Wiktorowicz et al., 2018)
Adapt properties for future climate change.	5, 12, 13; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 7, 12, 13, 15; 11	(Hufvudstaden, 2021; Humlegården, 2021; Kungsleden, 2021; Loudyi & El Harrouni, 2019)
Transition to resilient buildings and cities, e.g. with resilience to flooding.	13.1; 6; 11, 4, 6, 13; 4, 9, 11, 12, 13; 11; 6, 11, 12, 13	(Atrium Ljungberg, 2021; Houghton & Castillo-Salgado, 2017; Krellenberg & Kock, 2021; Leuzzo & Nava, 2020; Newman et al., 2017; Zhang et al., 2019)
Disaster risk management (DRM) of buildings, e.g. water sensitive urban design, especially storm water sump.	11.5.2; 11.5; 11.5	(Etinay et al., 2018; RICS, 2018; Wiktorowicz et al., 2018)
Make a sustainability assessment for buildings and urban development projects.	All SDGs; 11; 11; 11; 7, 12, 13; 11.4, 11.6, 11.b, 12.2, 15.1, 15.5, 15.9; 11, 13, 7	(Balaras et al., 2020; Grafakos et al., 2016; Ortega-Momtequín et al., 2021; Ptak-Wojciechowska et al., 2021; Ramírez-Villegas et al., 2019; RICS, 2018; Sharifi, 2021)
Make a LCA assessment or similar.	2, 3, 6, 7, 9, 11, 12, 13; 7, 11, 12, 13; 12, 13; 11, 13; 12; 12.2, 15.9; 11, 13; 13; 12, 13; 12.6, 12	(Dyson et al, 2020; Frossard et al., 2020; Malabi Eberhardt et al., 2020; Mirabella & Allacker, 2020; Miyazaki et al., 2019; RICS, 2018; Röck et al., 2020; Shirazi & Ashuri, 2018; Soust-Verdaguer et al., 2020; Stewart et al., 2018; Ströebele & Lüetzkendorf, 2019)
Implement security-creating measures such as cameras, locks or lighted entrances.	16; 5; 5.2, 10.2, 11.7, 16.1; 11	(Familjebostäder, 2021; K2A, 2021; Vasakronan, 2021; Wallenstam, 2021)
Provide affordable and social housing, through various tenure types.	11.1; 11; 11.1, 11.3, 11.6; 1, 3, 7, 11; 1; 1, 3, 7, 11; 11; 3, 11; 1, 5, 10, 11.1, 16	(Akademiska Hus, 2021; Dean et al., 2017; Fastighets AB Balder, 2021; Housing Europe, 2017; K2A, 2021; Souaid et al., 2020; Vukmirovic et al., 2021; Wiktorowicz et al., 2018)
Creating safe, healthy and attractive environments for tenants.	3; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 3; 3.9, 12.4; 3, 5; 3	(Hemsö, 2021; Humlegården, 2021; K2A, 2021; RICS, 2018; Roy et al., 2021; Wiktorowicz et al., 2018)
Enhance cultural heritage.	5, 10, 11; 11; 11.4, 4.7, 8.9, 12.b, 14.7, 16.3, 16.8, 16.b; 11.4; 11.4, 2, 6, 13, 15; 11.4	(Griffin & Ridge, 2020; Iodice et al., 2021; Petti et al., 2020; RICS, 2018; Rodwell, 2018; Wiktorowicz et al., 2018)
Working for a more sustainable supply chain with sustainable suppliers and contractors.	12; 3, 8, 11; 3.6, 8.2-8.4, 8.7, 9.4, 9.5, 12.6, 12.8; 8, 12; 7, 12, 13, 15; 8.8, 12.2, 12.7; 11.6, 12.2, 12.4, 13.3	(Familjebostäder, 2021; Hufvudstaden, 2021; Humlegården, 2021; Kannan et al., 2020; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)
Ensure that suppliers work in accordance with the company code of conduct, and respect workers' rights.	8.8; 8, 12; 8.7, 8.8, 16.2; 3.4, 5.5, 8.8	(Atrium Ljungberg, 2021; Klövern, 2020; RICS, 2018; Vasakronan, 2021)
Engage in various partnerships with governments, private corporations, research bodies and the non-profit sector.	4.a, 7.a, 8.2, 17; 12.2, 12.4, 12.5; 17; 16; 3, 8, 11; 11; 16.5, 17.9; 17.17; 11, 13; 17, 9, 10, 11, 16	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Bull & McNeill, 2019; Familjebostäder, 2021; Hufvudstaden, 2021; Pultrone, 2019; RICS, 2018; Vasakronan,

		2021; Wallenstam, 2021; Wiktorowicz et al., 2018)
Working to increase gender equality, counteract discrimination.	5.5; 5.1; 12; 5; 5.1, 5.5, 10.2, 10.3; 5.5, 8.5, 10.2; 5	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; K2A, 2021; RICS, 2018; Vasakronan, 2021; Wallenstam, 2021)
Offer a healthy and safe working environment.	8.8; 8.8; 5, 8; 8; 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5, 16.7; 3, 8, 11; 3; 3, 5, 8, 9, 10, 11, 16, 17; 3.9, 8.8, 12.7; 1, 3, 4, 8, 12, 13; 3.4, 8.8	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; Hemsö, 2021; Humlegården, 2021; Hufvudstaden, 2021; Klövern, 2020; Kungsleden, 2021; RICS, 2018; Röstlund, & Björling, 2020; Vasakronan, 2021)
Have climate-neutral administration, property management, project operations and activities.	8.4; 7.2; 11.3; 12; 7, 13, 15; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2, 15.4; 7, 12, 13; 7, 12, 13, 15; 12.2, 12.8, 13.3, 13.2; 13.1, 13.3	(Akademiska Hus, 2021; BREEAM, n.d.; Familjebostäder, 2021; Humlegården, 2021; Klövern, 2020; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)
Having zero tolerance for corruption and measures taken against.	16.5; 12; 5, 8, 10, 17; 16.5; 16.5	(Atrium Ljungberg, 2021; Familjebostäder, 2021; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)
The green growth narrative, green economy or circular economy.	12; 8; 7, 12, 13, 15	Dokter et al., 2020; Hinkel et al., 2020; Kungsleden, 2021
Only use green funding.	3.6, 8.2-8.4, 8.7, 9.4, 9.5, 12.6, 12.8	(Humlegården, 2021)
Integrating environmental clauses into lease contracts, so called “green leases”.	12.2, 12.6, 13.2	(RICS, 2018)
Disclose progress on integration of the four UN Global Compact question areas, and report real estate performance data.	12.6	(RICS, 2018)

Table 1. A selection of some of the found measures for the real estate sector, and corresponding SDGs and sources.

Indicator	SDGs	Reference
Energy consumption metrics: gross, intensity, renewable, reduction, demand flexibility and grid load.	1.4, 4.a, 7.1-7.3, 7.a, 7.b, 8.4, 9.4, 1.4, 11.1, 11.a, 11.c, 12.1-2, 12.a, 13.2-3, 14.3; 7, 13, 15; 7, 11, 12, 13; 7.3.1; 11; 7.2-3, 8.4, 12.2, 13.1; 7.2.1, 9.4, 12.1, 12.a; 7	(BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; Feiferyté-Skirienė et al., 2020; GRI, 2021; UNCTAD, 2019; USGBC, 2019a)
GHG emissions: gross, intensity and reduction.	1.4, 11.1, 11.a, 11.c, 12.1, 12.a, 13.2, 13.3, 14.3; 7, 13, 15; 11; 7, 11, 12, 13; 3.9, 12.4, 13.1, 14.3, 15.2; 9.4.1	(BREEAM, n.d.; Familjebostäder, 2021; Feiferyté-Skirienė et al., 2020; Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)
Indicators of travel.	8, 9, 11, 13	(Fastighets AB Balder, 2021)
Water consumption indicators: withdrawal, intensity, recycling and water stress.	7, 11, 12, 13; 11; 6.4, 8.4, 12.2; 6.3.1, 6.4.1, 6.4.2	(Fastighets AB Balder, 2021; Feiferyté-Skirienė et al., 2020; GRI, 2021; UNCTAD, 2019)
Indicators of waste.	7, 13, 15; 11; 3.9, 11.6, 12.4, 12.5; 12.4.2, 12.5, 12.5.1	(Familjebostäder, 2021; Feiferyté-Skirienė et al., 2020; GRI, 2021;

		UNCTAD, 2019)
Indicators of apartments and rent.	10, 11, 12; 11, 13; 11.1	(Familjebostäder, 2021; Gepts, 2020; Llorca et al., 2020)
City indicators: spatial, environmental performance, resilience etc.	14; 11; 11; 11, 2, 1, 9, 15, 16, 3; 6.4; 11.3.1; 11; 11; 11; 11; 11	(Alencar et al., 2020; Badiu et al., 2016; Feiferyté-Skirienė et al., 2020; Giles-Corti et al., 2020; Hysa, 2021; Llorca et al., 2020; Ricciardelli et al., 2018; Serey et al., 2020; Zinkernagel et al., 2018; Zuev et al., 2021; Vinoth Wilfer, 2020)
Disaster risk reduction indicators.	1.5, 11.5, 11.b, 13.1; 11	(Sarmiento, 2018; Serey et al., 2020)
Thermal performance of urban environment.	11; 11, 13	(El-Hakim & El-Badawy, 2020; Mehrotra et al., 2019)
Satisfied customer index, safety index, service index.	10, 11, 12; 8, 9; 8, 12	(Familjebostäder, 2021; Fastighets AB Balder, 2021; Klövern, 2020)
Indicators of workforce diversity: gender distribution, age groups etc.	5.1; 8, 13; 5.1, 5.5, 8.5, 10.3; 5.5.2	(Atrium Ljungberg, 2021;Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)
Employee wages, benefits, collective agreements and turnover.	5.1, 8.5, 8.6, 8.8; 10.3; 8.5.1, 8.8.2; 10.4.1; 5.5, 8.5, 10.2	(GRI, 2021; UNCTAD, 2019; Vasakronan, 2021)
Indexes of employee experience, commitment and leadership.	5, 8; 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5, 16.7	(Familjebostäder, 2021; Humlegården, 2021)
Employee training hours, expenditures, performance development reviews etc.	8, 13; 4.3, 4.4, 4.5, 5.1, 8.2, 8.5, 10.3; 4.3.1	(Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)
Indicators of suppliers and local procurement.	5.2, 8.8, 16.1; 9.3.1	(GRI, 2021; UNCTAD, 2019)
Board meetings and members.	16.6, 16.7.1	(UNCTAD, 2019)
Employee health and safety.	8, 13; 3.3, 3.4, 3.6, 3.9, 5.1, 8.8, 16.1, 16.3; 3.8, 8.8, 8.8.1	(Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)
Indicators related to corruption.	8, 9; 16.5; 16.5.2	(Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)
Non-compliance with laws and regulations.	16.3	(GRI, 2021)
Economic indicators: revenue, value added, solidity, debt to equity ratio, equity to assets ratio, surplus ratio etc.	8, 10, 11; 8,9; 8.1, 8.2, 9.1, 9.4, 9.5; 8, 12; 8.2.1, 9.b, 9.4.1	(Familjebostäder, 2021; Fastighets AB Balder, 2021; GRI, 2021; Klövern, 2020; UNCTAD, 2019)
Taxes and other payments to the government.	17.1.2	(UNCTAD, 2019)
Indicator of sustainability certifications.	4.a, 6.4, 7.3, 8.4, 10.2, 11.3, 12.2, 13.1	(GRI, 2021)
Indicators of investments and expenditures on research and development.	7.b.1, 9.5.1, 17.17.1	(UNCTAD, 2019)

Table 2. Summary table with main categories of indicators and supported SDGs.

5. Conclusion

Through this literature review, several measures and metric indicators have been gathered through which the real estate sector could impact the Sustainability Development Goals and track the progression in accomplishing them. Measures have been found that influence every goal, and indicators were found for almost every goal. However, it is clear that some goals have received more attention than others of the academic literature and the reviewed real estate companies. The most proposed measures and indicators were found which related to SDG 11, SDG 12, SDG 13 and SDG 8, while the least were found for SDG 2, SDG 17, SDG 14 and SDG 4. Some core measures and indicators have been found that may be relevant for most real estate companies, such as econometric indicators, measures and metrics to ensure health and decent working conditions of the workforce, and environmental measures to reduce energy consumption and GHG emissions of the company operations. However, because of the versatile character of the sector, relevant measures and indicators may depend due to enterprise characteristics, such as types of operations, assets and services of the company.

It is important to recognise that many of the single measures and indicators that have been identified are relevant for a number of SDGs at the same time, and that the sources do not always agree about the nature of these interactions, as shown for example in table 1 and table 2. To successfully align the real estate sector with the Sustainable Development Goals will most likely entail encouraging a range of measures which tackle a multitude of targets simultaneously, taking into account the synergies as well as the conflicts of the SDGs. In addition, some sources had merged various measures in the linkage towards the goals, which made it difficult to interpret the synergy of SDGs due to a certain measure or indicator. Further research needs to clarify the impact on the 169 SDG targets and 231 indicators of certain measures and metrics that are relevant for the real estate sector, and resolve the consequential interactions of the SDGs (both positive and negative effects). It also needs to be determined which are the most important measures and indicators for the sector in advancing the UN Sustainable Development Goals.

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Appendix A. Search queries

SDG	Search queries for KTH Primo & Google Scholar
SDG 1	“real estate” AND “Sustainable Development Goal” AND (“SDG 1” OR “no poverty”)
SDG 2	“real estate” AND “Sustainable Development Goal” AND (“SDG 2” OR “zero hunger”)
SDG 3	“real estate” AND “Sustainable Development Goal” AND (“SDG 3” OR “good health and well-being”)
SDG 4	“real estate” AND “Sustainable Development Goal” AND (“SDG 4” OR “quality education”)
SDG 5	“real estate” AND “Sustainable Development Goal” AND (“SDG 5” OR “gender equality”)
SDG 6	“real estate” AND “Sustainable Development Goal” AND (“SDG 6” OR “clean water and sanitation”)
SDG 7	“real estate” AND “Sustainable Development Goal” AND (“SDG 7” OR “affordable and clean energy”)
SDG 8	“real estate” AND “Sustainable Development Goal” AND (“SDG 8” OR “decent work and economic growth”)
SDG 9	“real estate” AND “Sustainable Development Goal” AND (“SDG 9” OR “industry, innovation and infrastructure”)
SDG 10	“real estate” AND “Sustainable Development Goal” AND (“SDG 10” OR “reduced inequalities”)
SDG 11	“real estate” AND “Sustainable Development Goal” AND (“SDG 11” OR “sustainable cities and communities”)
SDG 12	“real estate” AND “Sustainable Development Goal” AND (“SDG 12” OR “responsible consumption and production”)
SDG 13	“real estate” AND “Sustainable Development Goal” AND (“SDG 13” OR “climate action”)
SDG 14	“real estate” AND “Sustainable Development Goal” AND (“SDG 14” OR “life below water”)
SDG 15	“real estate” AND “Sustainable Development Goal” AND (“SDG 15” OR “life on land”)
SDG 16	“real estate” AND “Sustainable Development Goal” AND (“SDG 16” OR “peace, justice and strong institutions”)
SDG 17	“real estate” AND “Sustainable Development Goal” AND (“SDG 17” OR “partnerships for the goals”)

SDG	Search queries for GreenFILE
SDG 1	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 1" OR "no poverty")
SDG 2	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 2" OR "zero hunger")
SDG 3	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 3" OR "good health and well-being")
SDG 4	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 4" OR "quality education")
SDG 5	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 5" OR "gender equality")
SDG 6	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 6" OR "clean water and sanitation")
SDG 7	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 7" OR "affordable and clean energy")
SDG 8	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 8" OR "decent work and economic growth")
SDG 9	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 9" OR "industry, innovation and infrastructure")
SDG 10	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 10" OR "reduced inequalities")
SDG 11	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 11" OR "sustainable cities and communities")
SDG 12	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 12" OR "responsible consumption and production")
SDG 13	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 13" OR "climate action")
SDG 14	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 14" OR "life below water")
SDG 15	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 15" OR "life on land")
SDG 16	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 16" OR "peace, justice and strong institutions")
SDG 17	AB("real estate" OR buil* OR residen* OR prop* OR hous* OR infrastructure OR construction* OR architecture OR urban OR city OR cities) AND (action* OR measure* OR metric* OR indicator* OR framework* OR tool*) AND (SDG* OR "Agenda 2030" OR "sustainable development goal*") AND ("SDG 17" OR "partnerships for the goals")

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SDG Search queries for Emerald

SDG 1	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 1" OR "no poverty")
SDG 2	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 2" OR "zero hunger")
SDG 3	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 3" OR "good health and well-being")
SDG 4	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 4" OR "quality education")
SDG 5	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 5" OR "gender equality")
SDG 6	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 6" OR "clean water and sanitation")
SDG 7	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 7" OR "affordable and clean energy")
SDG 8	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 8" OR "decent work and economic growth")
SDG 9	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 9" OR "industry, innovation and infrastructure")
SDG 10	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 10" OR "reduced inequalities")
SDG 11	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 11" OR "sustainable cities and communities")
SDG 12	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 12" OR "responsible consumption and production")
SDG 13	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 13" OR "climate action")
SDG 14	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 14" OR "life below water")
SDG 15	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 15" OR "life on land")
SDG 16	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 16" OR "peace, justice and strong institutions")
SDG 17	(abstract:SDG? OR (abstract:"Agenda 2030") OR (abstract:"sustainable development goal?")) AND (abstract:action? OR (abstract:measure?) OR (abstract:metric?) OR (abstract:indicator?) OR (abstract:framework?) OR (abstract:tool?)) AND (abstract:"real estate" OR (abstract:building?) OR (abstract:built?) OR (abstract:resident?) OR (abstract:property?) OR (abstract:house?) OR (abstract:infrastructure?) OR (abstract:construction?) OR (abstract:architecture) OR (abstract:urban) OR (abstract:cities)) AND ("SDG 17" OR "partnerships for the goals")

SDG Search queries for Scopus

SDG 1	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({extreme poverty} OR {poverty alleviation} OR {poverty eradication} OR {poverty reduction} OR {international poverty line} OR ({financial aid} AND {poverty}) OR ({financial aid} AND {poor}) OR ({financial aid} AND {north-south divide}) OR ({financial development} AND {poverty}) OR {financial empowerment} OR {distributional effect} OR {distributional effects} OR {child labor} OR {child labour} OR {development aid} OR {social protection} OR {social protection system} OR ({social protection} AND access) OR microfinanc* OR micro-financ* OR {resilience of the poor} OR ({safety net} AND {poor} OR {vulnerable}) OR ({economic resource} AND access) OR ({economic resources} AND access) OR {food bank} OR {food banks})) AND NOT KEY("developing countries")

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SDG 2	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({land tenure rights} OR (smallholder AND (farm OR forestry OR pastoral OR agriculture OR fishery OR {food producer} OR {food producers})) OR malnourish* OR malnutrition OR undernourish* OR {undernutrition} OR {agricultural production} OR {agricultural productivity} OR {agricultural practices} OR {agricultural management} OR {food production} OR {food productivity} OR {food security} OR {food insecurity} OR {land right} OR {land rights} OR {land reform} OR {land reforms} OR {resilient agricultural practices} OR (agriculture AND potassium) OR fertili?er OR {food nutrition improvement} OR {hidden hunger} OR {genetically modified food} OR (gmo AND food) OR {agroforestry practices} OR {agroforestry management} OR {agricultural innovation} OR ({food security} AND {genetic diversity}) OR ({food market} AND (restriction OR tariff OR access OR {north south divide} OR {development governance})) OR {food governance} OR {food supply chain} OR {food value chain} OR {food commodity market} AND NOT {disease})) AND NOT KEY("developing countries")
SDG 3	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (((human AND (health* OR disease* OR illness* OR medicine* OR mortality)) OR {battered child syndrome} OR {cardiovascular disease} OR {cardiovascular diseases} OR {chagas} OR {child abuse} OR {child neglect} OR {child well-being index} OR {youth well-being index} OR {child wellbeing index} OR {youth wellbeing index} OR {water-borne disease} OR {water-borne diseases} OR {water borne disease} OR {water borne diseases} OR {tropical disease} OR {tropical diseases} OR {chronic respiratory disease} OR {chronic respiratory diseases} OR {infectious disease} OR {infectious diseases} OR {sexually-transmitted disease} OR {sexually transmitted disease} OR {sexually-transmitted diseases} OR {sexually transmitted diseases} OR {communicable disease} OR {communicable diseases} OR aids OR hiv OR {human immunodeficiency virus} OR tuberculosis OR malaria OR hepatitis OR polio* OR vaccin* OR cancer* OR diabet* OR {maternal mortality} OR {child mortality} OR {childbirth complications} OR {neonatal mortality} OR {neo-natal mortality} OR {premature mortality} OR {infant mortality} OR {quality adjusted life year} OR {maternal health} OR {preventable death} OR {preventable deaths} OR {tobacco control} OR {substance abuse} OR {drug abuse} OR {tobacco use} OR {alcohol use} OR {substance addiction} OR {drug addiction} OR {tobacco addiction} OR alcoholism OR suicid* OR {postnatal depression} OR {post-natal depression} OR {zika virus} OR dengue OR schistosomiasis OR {sleeping sickness} OR ebola OR {mental health} OR {mental disorder} OR {mental illness} OR {mental illnesses} OR {measles} OR {neglected disease} OR {neglected diseases} OR diarrhea OR diarrhoea OR cholera OR dysentery OR {typhoid fever} OR {traffic accident} OR {traffic accidents} OR {healthy lifestyle} OR {life expectancy} OR {life expectancies} OR {health policy} OR ({health system} AND (access OR accessible)) OR {health risk} OR {health risks} OR {inclusive health} OR obesity OR {social determinants of health} OR {psychological harm} OR {psychological wellbeing} OR {psychological well-being} OR {psychological well being} OR {public health})) AND NOT KEY("developing countries")
SDG 4	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY ((school OR education OR educational) AND ({school attendance} OR {school enrollment} OR {school enrolment} OR {inclusive education} OR {educational inequality} OR {education quality} OR {educational enrolment} OR {educational enrollment} OR {adult literacy} OR {numeracy rate} OR {educational environment} OR {educational access} OR ({development aid} AND {teacher training}) OR {early childhood education} OR {basic education} OR {affordable education} OR {educational financial aid} OR {school safety} OR {safety in school} OR ({learning opportunities} AND ({gender disparities} OR empowerment)) OR ({learning opportunity} AND ({gender disparities} OR empowerment)) OR {youth empowerment} OR {women empowerment} OR {equal opportunities} OR {child labour} OR {child labor} OR {discriminatory} OR {educational inequality} OR {educational gap} OR ({poverty trap} AND {schooling}) OR {special education needs} OR {inclusive education system} OR ({schooling} AND ({gender disparities} OR {ethnic disparities} OR {racial disparities})) OR {education exclusion} OR {education dropouts} OR {global citizenship} OR {sustainable development education} OR {environmental education} OR {education policy} OR {educational policies} OR {international education} OR {education reform} OR ({educational reform} AND {developing countries}) OR {educational governance} OR ({developing countries} AND {school effects}) OR {education expenditure} OR {foreign aid} OR ({teacher training} AND {developing countries}) OR {teacher attrition}) AND NOT {health literacy}) AND NOT KEY("developing countries")
SDG 5	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({gender inequality} OR {gender equality} OR {employment equity} OR {gender wage gap} OR {female labor force participation} OR {female labour force participation} OR {women labor force participation} OR {women labour force participation} OR {womens' employment} OR {female employment} OR {women's unemployment} OR {female unemployment} OR (access AND {family planning services}) OR {forced marriage} OR {child marriage} OR {forced marriages} OR {child marriages} OR {occupational segregation} OR {women's empowerment} OR {girls' empowerment} OR {female empowerment} OR {female genital mutilation} OR {female genital cutting} OR {domestic violence} OR {women AND violence} OR {girl* AND violence} OR {sexual violence} OR ({unpaid work} AND {gender inequality}) OR ({unpaid care work} AND {gender inequality}) OR {women's political participation} OR {female political participation} OR {female managers} OR {women in leadership} OR {female leadership} OR {intra-household allocation} OR (access AND {reproductive healthcare}) OR {honour killing} OR {honor killing} OR {honour killings} OR {honor killings} OR {antiwomen} OR {anti-women} OR {feminism} OR {misogyny} OR {female infanticide} OR {female infanticides} OR {human trafficking} OR {forced prostitution} OR (equality AND ({sexual rights} OR {reproductive rights} OR {divorce rights})) OR {women's rights} OR {gender injustice} OR {gender injustices} OR {gender discrimination} OR {gender disparities} OR {gender gap} OR {female exploitation} OR {household equity} OR {female political participation} OR {women's underrepresentation} OR {female entrepreneurship} OR {female ownership} OR {women's economic development} OR {women's power} OR {gender-responsive budgeting} OR {gender quota} OR ({foreign aid} AND {women's empowerment}) OR {gender segregation} OR {gender-based violence} OR {gender participation} OR {female politician} OR {female leader} OR {contraceptive behaviour} OR {women's autonomy} OR {agrarian feminism} OR {microfinance} OR {women's livelihood} OR {women's ownership} OR {female smallholder} OR {gender mainstreaming})) AND NOT KEY("developing countries")
SDG 6	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (((({Safe} AND ({water access} OR {drinking water})) OR ({clean} AND ({drinking water} OR {water source})) OR ({water} AND ({sanitation and hygiene} OR {sanitation & hygiene} OR {quality} OR {resource}) AND ({water availability} OR {water-use efficiency} OR {water supply} OR {water supplies} OR {clean water} OR {hygienic toilet} OR {hygienic toilets} OR {antifouling membrane} OR {antifouling membranes} OR {anti-fouling membrane} OR {anti-fouling membranes} OR {water management} OR {aquatic toxicology} OR {water toxicology} OR {aquatic ecotoxicology} OR {water ecotoxicology})) OR (({freshwater} OR {fresh water}) AND ({water quality}) AND ({pollutant} OR {pollution} OR contamina*)) OR ({freshwater} AND ({water security} OR {water shortage} OR ({waste water} AND "treatment") OR ({wastewater} AND "treatment") OR {water conservation} OR {water footprint} OR {water infrastructure} OR {water pollution} OR {water purification} OR {water use} OR {water uses} OR sanit* OR sewer*)) OR (({water} AND ({ecosystem} OR {eco-system}) AND ({protection of} OR {endocrine disruptor} OR {endocrine disruptors})) AND NOT {marine}) OR ({water} AND {water management} AND ({pollution remediation} OR {pollutant removal})) OR (({groundwater} OR {ground water} OR {ground-water}) AND {freshwater}) OR (({water pollution} OR {water pollutant}) AND ({waste water} AND "treatment") OR ({wastewater} AND "treatment")) OR {freshwater availability} OR {fresh water availability} OR {water scarcity} OR {open defecation} OR {blue water} OR {green water} OR {grey water} OR {black water})) AND NOT {global burden of disease study}) AND NOT KEY("developing countries")
SDG 7	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({energy efficiency} OR {energy consumption} OR {energy transition} OR {clean energy technology} OR {energy equity} OR {energy justice} OR {energy poverty} OR {energy policy} OR renewable* OR {2000 Watt society} OR {smart micro-grid} OR {smart grid} OR {smart microgrid} OR {smart micro-grids} OR {smart grids} OR {smart microgrids} OR {smart meter} OR {smart meters} OR {affordable electricity} OR {electricity consumption} OR {reliable electricity} OR {clean fuel} OR {clean cooking fuel} OR {fuel poverty} OR energiewende OR {life-cycle assessment} OR {life cycle assessment} OR {life-cycle assessments} OR {life cycle assessments} OR ({photochemistry} AND {renewable energy}) OR photovoltaic OR {photocatalytic water splitting} OR {hydrogen production} OR {water splitting} OR {lithium-ion batteries} OR {lithium-ion battery} OR {heat network} OR {district heat} OR {district heating} OR {residential energy

	consumption} OR {domestic energy consumption} OR {energy security} OR {rural electrification} OR {energy ladder} OR {energy access} OR {energy conservation} OR {low-carbon society} OR {hybrid renewable energy system} OR {hybrid renewable energy systems} OR {fuel switching} OR ({foreign development aid} AND {renewable energy}) OR {energy governance} OR ({official development assistance} AND {electricity}) OR ({energy development} AND {developing countries})) AND NOT ({wireless sensor network} OR {wireless sensor networks})) AND NOT KEY("developing countries")
SDG 8	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({economic growth} OR {economic development policy} OR {employment policy} OR {inclusive economic growth} OR {sustainable growth} OR {economic development} OR {economic globalization} OR {economic globalisation} OR {economic productivity} OR {low-carbon economy} OR {inclusive growth} OR microfinanc* OR micro-financ* OR micro-credit* OR microcredit* OR {equal income} OR {equal wages} OR {decent job} OR {decent jobs} OR {quality job} OR {quality jobs} OR {job creation} OR {full employment} OR {employment protection} OR {informal employment} OR {precarious employment} OR {unemployment} OR {precarious job} OR {precarious jobs} OR microenterprise* OR micro-enterprise* OR {small enterprise} OR {medium enterprise} OR {small enterprises} OR {medium enterprises} OR {small entrepreneur} OR {starting entrepreneur} OR {medium entrepreneur} OR {small entrepreneurs} OR {medium entrepreneurs} OR {starting entrepreneurs} OR {social entrepreneurship} OR {safe working environment} OR {labor market institution} OR {labor market institutions} OR {labour market institution} OR {labour market institutions} OR {forced labour} OR {forced labor} OR {child labour} OR {child labor} OR {labour right} OR {labor right} OR {labour rights} OR {labor rights} OR {modern slavery} OR {human trafficking} OR {child soldier} OR {child soldiers} OR {global jobs} OR {living wage} OR {minimum wage} OR {circular economy} OR {inclusive economy} OR {rural economy} OR {Foreign Development Investment} OR {Aid for Trade} OR {trade unions} OR {trade union} OR {working poor} OR {Not in Education, Employment, or Training} OR {carbon offset} OR {carbon offsetting} OR {carbon offsets} OR {offset project} OR {offset projects} OR {economic diversification} OR {material footprint} OR {resource efficiency} OR ({cradle to cradle} AND {economy}) OR {economic decoupling} OR {labour market disparities} OR {sustainable tourism} OR {ecotourism} OR {community-based tourism} OR {tourism employment} OR {sustainable tourism policy} OR {financial access} OR {financial inclusion} OR {access to banking}) AND NOT {health}) AND NOT KEY("developing countries")
SDG 9	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({industrial growth} OR {industrial diversification} OR {infrastructural development} OR {infrastructural investment} OR {infrastructure investment} OR {public infrastructure} OR {resilient infrastructure} OR {transborder infrastructure} OR {public infrastructures} OR {resilient infrastructures} OR {transborder infrastructures} OR ({industrial emissions} AND mitigation) OR {industrial waste management} OR {industrial waste treatment} OR {traffic congestion} OR microenterprise* OR micro-enterprise* OR {small enterprise} OR {medium enterprise} OR {small enterprises} OR {medium enterprises} OR {small entrepreneur} OR {medium entrepreneur} OR {small entrepreneurs} OR {medium entrepreneurs} OR {value chain management} OR ({broadband access} AND {developing countries}) OR {manufacturing innovation} OR {manufacturing investment} OR {sustainable transportation} OR {accessible transportation} OR {transportation services} OR {inclusive transportation} OR {R&D investment} OR {green product} OR {green products} OR {sustainable manufacturing} OR ({cradle to cradle} AND industry) OR {closed loop supply chain} OR (industrial AND innovation) OR {process innovation} OR {product innovation} OR {inclusive innovation})) AND NOT KEY("developing countries")
SDG 10	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (((equality AND (economic OR financial OR socio-economic)) OR (inequality AND (economic OR financial OR socio-economic)) OR {economic reform policy} OR {economic reform policies} OR {political inclusion} OR {social protection policy} OR {social protection policies} OR (immigration AND NOT (chemistry OR disease OR biodiversity)) OR (emigration AND NOT (chemistry OR disease OR biodiversity)) OR {foreign direct investment} OR {development gap} OR {development gaps} OR {migrant remittance} OR {responsible migration} OR {migration policy} OR {migration policies} OR {north-south divide} OR (developing AND ({tariffs} OR {tariff} OR {zero-tariff} OR {duty-free access})) OR {social exclusion} OR {economic marginali?ation} OR {income inequality} OR {discriminatory law*} OR {discriminatory policies} OR {discriminatory policy} OR {economic empowerment} OR {economic transformation} OR ({global market} AND {empowerment}))) AND NOT KEY("developing countries")
SDG 11	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY ((city OR cities OR {human settlement} OR {human settlements} OR urban OR metropoli* OR town* OR municipal*) AND (gentrification OR congestion OR transportation OR {public transport} OR housing OR slum* OR {sendai framework} OR {Disaster Risk Reduction} OR {DRR} OR {smart city} OR {smart cities} OR {resilient building} OR {resilient buildings} OR {sustainable building} OR {sustainable buildings} OR {building design} OR {buildings design} OR urbani?ation OR {zero energy building} OR {zero energy buildings} OR {zero-energy building} OR {zero-energy buildings} OR {basic service} OR {basic services} OR {governance} OR {citizen participation} OR {collaborative planning} OR {participatory planning} OR {inclusiveness} OR {cultural heritage} OR {natural heritage} OR {UNESCO} OR {disaster} OR {ecological footprint} OR {environmental footprint} OR {waste} OR {pollution} OR {pollutant*} OR {waste water} OR {recycling} OR {circular economy} OR {air quality} OR {green space} OR {green spaces} OR {nature inclusive} OR {nature inclusive building} OR {nature inclusive buildings})) AND NOT KEY("developing countries")
SDG 12	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY ({environmental pollution} OR {hazardous waste} OR {hazardous chemical} OR {hazardous chemicals} OR {toxic chemical} OR {toxic chemicals} OR {chemical pollution} OR {ozone depletion} OR {pesticide pollution} OR {pesticide stress} OR {pesticide reduction} OR {life cycle assessment} OR {life cycle analysis} OR {life cycle analyses} OR {life-cycle analysis} OR {life-cycle analyses} OR {low carbon economy} OR {low-carbon economy} OR {environmental footprint} OR {material footprint} OR {harvest efficiency} OR {solid waste} OR {waste generation} OR {corporate social responsibility} OR {corporate sustainability} OR {consumer behavior} OR {consumer behaviors} OR {consumer behaviour} OR {consumer behaviours} OR {waste recycling} OR {resource recycling} OR {resource reuse} OR {biobased economy} OR {zero waste} OR {sustainability label} OR {sustainability labelling} OR {global resource extraction} OR {material flow accounting} OR {societal metabolism} OR {food spill} OR {resource spill} OR {resource efficiency} OR {sustainable food consumption} OR {green consumption} OR {sustainable supply chain} OR {circular economy} OR {cradle to cradle} OR {sustainable procurement} OR {sustainable tourism} OR {fossil-fuel subsidies} OR {fossil-fuel expenditure} OR {sustainability label} OR {sustainability labelling} OR (consumption AND ({resource use} OR spill)) OR (production AND ({resource use} OR spill)) AND NOT ({wireless sensor network} OR {wireless sensor networks} OR {wireless network} OR {wireless networks} OR {wireless} OR {disease} OR {astrophysics})) AND NOT KEY("developing countries")
SDG 13	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({climate action} OR {climate adaptation} OR {climate change} OR {climate capitalism} OR ipcc OR {climate effect} OR {climate equity} OR {climate feedback} OR {climate finance} OR {climate change financing} OR {climate forcing} OR {climate governance} OR {climate impact} OR {climate investment} OR {climate justice} OR {climate mitigation} OR {climate model} OR {climate models} OR {climate modeling} OR {climate modelling} OR {climate policy} OR {climate policies} OR {climate risk} OR {climate risks} OR {climate services} OR {climate service} OR {climate prediction} OR {climate predictions} OR {climate signal} OR {climate signals} OR {climate tipping point} OR {climate variation} OR {climate variations} OR ecoclimatology OR eco-climatology OR {Green Climate Fund} OR {regional climate} OR {regional climates} OR {urban climate} OR {urban climates} OR (climate AND ({adaptive management} OR awareness OR bioeconomy OR carbon OR {decision-making} OR {disaster risk reduction} OR {environmental education} OR {sustainable development education} OR {energy conservation} OR emission* OR extreme OR {food chain} OR {food chains} OR framework OR hazard* OR island* OR {land use} OR megacit* OR consumption OR production OR {small island developing states} OR anthropocene OR atmospher* OR {clean development mechanism} OR {glacier retreat} OR warming OR greenhouse OR {ice-ocean interaction} OR {ice-ocean interactions} OR {nitrogen cycle} OR {nitrogen cycles} OR {ocean acidification} OR {radiative forcing} OR {sea ice} OR {sea level} OR {sea levels} OR {thermal expansion} OR unfccc OR ozone))) AND NOT ({drug} OR {geomorphology}))

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	AND NOT KEY("developing countries")
SDG 14	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY ((marine OR ocean OR oceans OR sea OR seas OR coast* OR mangrove) AND ({water cycle} OR {water cycles} OR {biogeochemical cycle} OR {biogeochemical cycles} OR {oceanic circulation model} OR {oceanic circulation models} OR {oceanic circulation modelling} OR {oceanic circulation modeling} OR {ice-ocean} OR eutrophicat* OR marine OR {coral bleach} OR {coral bleaching} OR {coastal management} OR {coastal habitat} OR {coastal habitats} OR {marine debris} OR {ocean acidification} OR (acidification AND seawater) OR {fishery} OR {fisheries} OR {overfishing} OR {sustainable yield} OR {marine protected area} OR {marine protected areas} OR {marine conservation} OR {ecotourism} OR {community based conservation} OR {community-based conservation} OR {marine land slide} OR {marine pollution} OR {nutrient runoff} OR {coastal ecotourism} OR {destructive fishing} OR {local fisheries} OR {artisanal fishers} OR {fisheries rights} OR {species richness} OR {traditional ecological knowledge} OR {small Island development states} OR {marine quota} OR {marine economy} OR {marine policy}) AND NOT ({paleoclimate} OR {paleoceanography} OR {radiocarbon} OR {genetics} OR {medicine} OR {drug} OR {engineering} OR {aerosol})) AND NOT KEY("developing countries")
SDG 15	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY ((terrestrial OR land OR inland OR freshwater) AND (biodivers* OR {species richness} OR bioeconom* OR bio-econom* OR {biological production} OR deforest* OR desertif* OR {earth system} OR {ecological resilience} OR ecosystem* OR eco-system* OR {trophic cascade} OR {trophic level} OR {trophic web} OR {threatened species} OR {endangered species} OR {extinction risk} OR {extinction risks} OR poach* OR {wildlife product} OR {wildlife products} OR {wildlife traffic} OR {wildlife market} OR {wildlife markets} OR {wildlife trafficking} OR {invasive species} OR {alien species} OR {land uses} OR {land use} OR {land uses} OR {land degradation} OR {soil degradation} OR {LULUCF} OR *forest* OR {land conservation} OR wetland* OR mountain* OR dryland* OR {mountainous cover} OR {protected area} OR {protected areas} OR {REDD} OR {forest management} OR {silviculture} OR {timber harvest} OR {illegal logging} OR {slash-and-burn} OR {fire-fallow cultivation} OR {tree cover} OR {soil restoration} OR {land restoration} OR {drought} OR {sustainable land management} OR {mountain vegetation} OR {habitat restoration} OR {Red List species} OR {Red List Index} OR {extinction wave} OR {habitat fragmentation} OR {habitat loss} OR {Nagoya Protocol on Access to Genetic Resources} OR {genetic resources} OR {biological invasion} OR {biodiversity-inclusive} OR {forest stewardship council} OR {rainforest alliance} OR {forest certification} OR {forest auditing} OR {ecotourism} OR {community-based conservation} OR {community based conservation} OR {human-wildlife conflict})) AND NOT KEY("developing countries")
SDG 16	(SDG OR SDGs OR "Agenda 2030" OR "sustainable development goal" OR "sustainable development goals") AND (action OR measure OR metrics OR indicator OR framework OR tool) AND KEY(("real estate" OR building OR Buildings OR built OR residential OR property OR house OR housing OR infrastructure OR construction OR architecture) W/30 (measure OR indicator OR action OR company OR organisation OR association OR corporation OR energy OR green OR develop OR environment OR smart OR technologies OR circular)) AND TITLE-ABS-KEY (({actual innocence} OR {false confession} OR {armed conflict} OR {armed conflicts} OR {civil conflict} OR {civil conflicts} OR (war AND (conflict OR warfare OR democracy OR {Geneva Convention} OR treaty OR peace)) OR {peacekeeping} OR (corruption AND ({institution} OR {public official} OR {government} OR {bribery} OR {conflict})) OR crime OR crimes OR criminal OR {democratic deficit} OR (democrati?ation AND (institutional OR conflict OR decision-making OR society OR politics OR {financial aid})) OR {ethnic conflict} OR {ethnic conflicts} OR exoneration OR genocid* OR homicid* OR murder* OR {human trafficking} OR {criminal justice system} OR {justice system} OR {arbitrary justice} OR refugee* OR terroris* OR violence OR torture OR {effective rule of law} OR {arms flow} OR {transparent institution} OR {transparent institutions} OR {good governance} OR {legal identity for all} OR {freedom of information} OR {human rights institution} OR {human rights activists} OR {fundamental freedom} OR {fundamental freedoms} OR {violent conflict} OR {violent conflicts} OR {peaceful society} OR {effective institution} OR {effective institutions} OR {accountable institution} OR {accountable institutions} OR {inclusive institution} OR {inclusive institutions} OR {child abuse} OR {arbitrary detention} OR {unsentenced detention} OR {judicial system} OR {criminal tribunal} OR {inclusive society} OR {inclusive societies} OR {responsive institution} OR {responsive institutions} OR {fair society} OR {fair societies} OR {legal remedy} OR {legal remedies} OR {independence of judiciary} OR {independent judiciary} OR {separation of powers} OR extremism OR {war crime} OR {peaceful society} OR {organized crime} OR {illicit transfer} OR {illicit money} OR {arms trafficking} OR {cybercrime} OR {insurgence} OR {democratic institution} OR {political instability} OR ({political decision-making} AND (responsive OR inclusive OR participatory OR representative)) OR {Aarhus Convention} OR {press freedom} OR {freedom of speech}) AND NOT ({disease} OR {genetics})) AND NOT KEY("developing countries")

Appendix B. Table with SDG measures

This table contains nearly every measure that has been found through this literature review, grouped into similar subjects. The middle column shows the supported SDGs and the right column contains the sources which have linked the measures and indicators to the SDGs. The information in the columns with SDGs and references are divided with semicolons, where the first reference has linked the first group of SDGs to the corresponding measure or indicator, and so on.

Measure	SDGs	Reference
Energy	**SDGs**	**Reference**
Minimise the energy consumption in the buildings through different energy efficiency measures, e.g. through additional insulation and window replacements.	7.2, 7.3, 13.1; 4.a, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 12.2; 11; 7.2, 7.3; 13; 7, 9, 11; 7; 7, 12, 13; 7, 12, 13; 7, 11, 13; 7, 12, 13, 15; 3.8, 7.1, 7.2, 7.3, 8.3, 9.1, 11.2, 12.1, 13; 7, 8; 3; 7.2	(Atrium Ljungberg, 2021; BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; Gailard Couston et al., 2020; Hemsö, 2021; Hoody et. al., 2021; Hufvudstaden, 2021; Klövern, 2020; Janser et al., 2020; Kungsleden, 2021; Parvin et al., 2021; Roy et al., 2021; USGBC, 2018a; Vasakronan, 2021)
Increasing the proportion of renewable energy, for example by only using bought electricity from hydroelectrics (water power) and installing solar panels on the roofs of the properties.	7.2; 7.2, 7.3; 11; 7.2, 7.3; 12; 7, 12, 13; 7.2, 13.2; 3; 7.2; 7; 12, 2, 7, 9	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; Fastighets AB Balder, 2021; Hemsö, 2021; Klövern, 2020; RICS, 2018; USGBC, 2018a; Vasakronan, 2021; Wallenstam, 2021; Wiktorowicz et al., 2018)
Work with energy plans and energy class upgrades.	8.2; 11, 13	(Akademiska Hus, 2021; Mecca et al., 2020)
Assessment of the energy consumption and energy demand, and specify significant energy consumption levels and ensure no end uses with significant energy consumption.	1.4, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 11, 12; 7	(BREEAM, n.d.; Conway & Hainoun, 2020; Verma et al., 2021)
Installing solar cells on the properties, also called Building Integrated Photovoltaic (PV), distributed renewable generation and solar water heaters. Sharing the energy through a peer-to-peer network.	1.4, 4.a, 7.1, 7.2, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 13; 7; 7; 7, 12, 13, 15; 7; 8	(BREEAM, n.d.; Hemsö, 2021; Familjebostäder, 2021; K2A, 2021; Kungsleden, 2021; Mbakwe, 2016; Roy et al., 2021; Salpakari & Lund, 2016; Wiktorowicz et al., 2018)
Choose electricity and fuels with good environmental abilities and avoid fossil energy.	7.2, 7.3; 13; 7; 9.2, 9.3, 9.4, 7.2, 8.4, 12.2, 15.2; 1, 7, 14	(Fastighets AB Balder, 2021; Hemsö, 2021; K2A, 2021; Kline et al., 2021; Roy et al., 2021)
Reduce GHG emissions and climate footprint.	13.1; 13; 7,12, 13; 7, 12, 13; 13; 13, 7, 9, 11, 12	(Atrium Ljungberg, 2021; Hemsö, 2021; Hufvudstaden, 2021; Klövern, 2020; Wallenstam, 2021; Wiktorowicz et al., 2018)
Investments in geoenergy.	7; 7	(Hemsö, 2021; K2A, 2021)
Heat recovery from the air reduces the need for heating.	3; 7	(K2A, 2021; Roy et al., 2015)
Install batteries that store solar power to reduce electricity demand. Smart building system with power storage. Solar and battery storage can be incorporated into buildings and dwellings.	11; 7; 7, 9, 11.5, 12, 13, 17	(Janhunen et al., 2020; K2A, 2021; Wiktorowicz et al., 2018)

Optimal interaction with the grid.	7	(USGBC, 2019a)
Remote islands that are not connected to the energy grid, with renewable energy sources.	7	(Kouloumpis & Yan, 2021)
Water efficiency	**SDGs**	**Reference**
Having flow control devices, a flow meter and a leak detection system. Individual metering of electricity and water, which contributes to the fact that tenants' consumption usually drops.	1.4, 3.4, 6.4, 6.5, 6.a, 6.b, 8.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a; 13	(BREEAM, n.d.; Wallenstam, 2021)
Consider the water consumption, including rainwater and greywater.	1.4, 6.3, 6.4, 6.5, 6.a, 6.b, 8.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a	(BREEAM, n.d.)
Water efficient equipment regarding hand washing basins, toilets, urinals and showers.	1.4, 3.9, 4.a, 6.2, 6.4, 6.5, 6.a, 6.b, 8.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a; 6; 6; 6, 3, 17	(BREEAM, n.d.; K2A, 2021; Roy et al., 2021; Wiktorowicz et al., 2018)
Make risk assessments of flooding, pollution and minimise watercourse pollution.	1.5, 3.9, 4.a, 6.1, 6.2; 6.3, 6.6, 11.3, 14.1, 11.5, 11.b, 11.c, 13.1, 13.2, 13.3, 15.1, 15.9; 6.3, 6.4	(BREEAM, n.d.; Atrium Ljungberg, 2021)
Reducing water consumption and demand.	6; 7, 12, 13, 15; 6; 6.4; 6, 3, 17	(K2A, 2021; Kungsleden, 2021; Roy et al 2021; Vasakronan, 2021; Wiktorowicz et al., 2018)
Provide access to water, sanitation and hygiene facilities for employees and real estate occupants, considering the needs of women and vulnerable in particular.	6.1, 6.2, 10; 6.1, 6.2, 12.8, 13.2	(Ezbakhe et al., 2019; RICS, 2018)
Wastewater management.	6; 6.4, 6.6, 14.1	(K2A, 2021; RICS, 2018)
Citizen scientist data could be used to monitor water quality and detect contamination.	6.3.2; 6.3.2	(Hegarty et al., 2021; Quinlivan et al., 2020)
Waste management and chemicals	**SDGs**	**Reference**
Having waste management and waste segregation. Having construction waste management and storage for reusable construction products.	11.6; 11.3, 11.6, 12.4, 12.5; 12.4, 12.5; 11.6	(BREEAM, n.d.; Gollagher et al, 2017; RICS, 2018; Wiktorowicz et al., 2018)
Reduce waste. Having installed controls for reduction in unnecessary waste. Similar to GRI 306-2 of actions taken to prevent waste generation.	1.4, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 11, 13; 11.6, 12.5; 11.1, 11.3, 11.8; 7, 12, 13; 3.9, 6.3, 8.4, 11.6, 12.4, 12.5; 7, 12, 13; 11.6, 12.5; 11.6, 12.5	(BREEAM, n.d.; Familjebostäder, 2021; RICS, 2018; Fastighets AB Balder, 2021; Hufvudstaden, 2021; GRI, 2021; Klövern, 2020; RICS, 2018; Vasakronan, 2021)
Increase proportion of waste that is recycled or reused.	8.4, 12.2, 12.5; 11, 12; 7, 12, 13	(BREEAM, n.d.; Ducoli et al., 2021; Klövern, 2020)
Reduce use of hazardous materials and ensure a safe management and storage of chemicals.	12.4; 12.2, 12.4, 12.5; 11.3, 12.4; 7, 13; 3.9, 6.3, 11.5, 12.4; 3.9, 8.4, 12.1, 12.2, 12.4	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; BREEAM, n.d.; Familjebostäder, 2021; RICS, 2018; Vasakronan, 2021)
Make sure that removal of waste materials from the site comply with all local legal requirements.	12.4, 12.5, 16.5	(RICS, 2018)
Sustainable buildings, design and construction	**SDGs**	**Reference**
SDGs are nearly connected to the real estate sector.	11, 12, 13	(Camporeale & Mercader-Moyano,

		2019)
Environmental certification of properties, for example with Svanen, Miljöbyggnad, BREEAM or LEED.	11.3; 3, 6, 7, 9, 11, 12, 13, 15; 7, 11; 7, 13; 3; 5, 12, 13; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2, 15.4; 3; 11, 12, 13, 17; 12; 7, 11, 13; 13; 3, 7, 11, 12; 3, 7, 8, 9, 11, 12, 13, 15, 17	(Akademiska Hus, 2021; BREEAM, 2018; Cozza et al., 2020; Familjebostäder, 2021; Hemsö, 2021; Hufvudstaden, 2021; Humlegården, 2021; K2A, 2021; Klövern, 2020; Roy et al., 2021; USGBC, 2018b; Wallenstam, 2021; Wen et al., 2020; World Green building Council, n.d.)
Nearly zero energy buildings (NZEB) and the use of green principles in buildings.	3, 7, 8, 9, 11, 12 ,13, 15, 17; 7, 13; 13	(Chodnekar et al., 2021; Marotta et al., 2021; Satola et al., 2021)
Apply an innovative and sustainable design of new buildings that results in an efficient use of land in urban areas and minimise resource use.	11; 7.2, 7.3, 11.1, 11.a, 12.7, 13.1; 12; 7.2, 7.3, 8.4, 11.1, 11.3, 12.2, 12.4, 12.8, 13.2, 13.3, 15.4; 7; 12; 8.4; 9	(Familjebostäder, 2021; Goubran et al., 2019; Hemsö, 2021; RICS, 2018; Roy et al., 2021; Santamaria et al., 2020; Vasakronan, 2021; Wiktorowicz et al., 2018)
Apply a building construction that safely sustains foreseeable geological impacts.	1.5, 11.5, 11.b, 13.1; 3	(RICS, 2018; USGBC, 2018a)
Apartment design that gives resident health and wellbeing, e.g. by having sound insulation between occupied spaces.	3.4; 3, 10, 11; 3, 11	(BREEAM, n.d.; Foster et al., 2019; Hale, 2020)
Ensure a functional adaptation of the asset with building design flexibility that enables the possibility of future changes without major construction.	8.4, 12.2; 12; 11.1, 12.5	(BREEAM, n.d.; Hemsö, 2021; RICS, 2018)
Holistically consider the range of available renovation and retrofitting interventions and solutions.	12.6	(RICS, 2018)
Sourcing and use of circular and sustainable construction material and Green building materials (GBM).	3, 7, 9, 11, 12, 13, 15; 3.9; 7, 9, 11; 11; 3, 13; 11, 12; 11; 7, 8, 9; 12.2, 12.5, 7.3, 6.4, 13.2; 5, 9, 12; 12	(Alam et al., 2021; Atrium Ljungberg, 2021; Balaras et al., 2020; Familjebostäder, 2021; Geldermans et al., 2020; Gusta et al., 2017; Hemsö, 2021; Karim et al., 2020; RICS, 2018; Röstlund, & Björling, 2020; van Stijn et a., 2020)
Optimise resource consumption by capturing consumption data, e.g. with Building Information Modelling (BIM) for sourcing sustainable construction materials.	7, 9 11; 6.4, 7.3; 7, 9, 11, 13	(Khahro et al., 2021; RICS, 2018; Wall & Hofstadler, 2019)
Using renewable, recycled or reused materials.	12.5; 9.2, 9.4, 12.4, 12.5; 7, 13; 8.4	(Akademiska Hus, 2021; Fastighets AB Balder, 2021; Familjebostäder, 2021; Vasakronan, 2021)
Works actively to contribute to a more sustainable community building sector. The use of “green” project management standards in the construction industry.	11; 7, 11, 13; 9, 10, 11, 12, 16, 17; 9, 4; 6, 7, 11, 12, 13, 14, 15	(Hemsö, 2021; Hess et al., 2020; Raiden & King, 2021; Röstlund, & Björling, 2020; Tsurkan et al., 2019)
Adaptive building technologies and technologic solutions and upgrades for buildings, Internet of Things (IoT), SDG-enabling technologies towards NZEB, for energy efficiency of buildings and smart grid. Smart home technologies.	8.2; All SDGs; 9.2, 9.4; 7; 11; 7; All SDGs; 12.4, 1.5, 11.5, 11.b, 13.1, 15.1, 15.3, 15.5; All SDGs; 12, 7.1	(Akademiska Hus, 2021; Battisti et al. 2019; Fastighets AB Balder, 2021; Fokaides et al., 2020; Korol et al., 2018; Krishna & Perumal, 2021; Martínez et al., 2021; Regueiro-Picallo et al., 2020; RICS, 2018; Roy et al., 2021; Tirado Herrero et al., 2018)
Having typical low global warming potential of	11.3, 14.1, 14.3	(BREEAM, n.d.)

refrigerants installed on site and refrigerant leak detection in place.		
Optimisation of HVAC system.	1.4, 3.4, 7.1, 7.3, 7.a, 7.b, 8.4, 9.4, 11.1, 11.3, 11.6, 11.a, 11.c, 12.1, 12.2, 12.a, 13.2, 13.3, 14.3; 7, 13; 10	(BREEAM, n.d.; Kampelis et al., 2019; Roy et al., 2021)
Have carbon dioxide sensors installed, tested, calibrated and maintained, and to have a carbon monoxide detection system for acute levels.	3.9, 6.1, 6.2	(BREEAM, n.d.)
Cities and community	**SDGs**	**Reference**
Smart cities with smart: mobility, living, environment, citizens, governments, architecture and related technologies and concepts. Actively contributes to the urbanisation of cities, with a strategy which is based on sustainable and innovative urban development.	11.3, 11.6, 11.7; All SDGs; 11; 3, 8, 11; 3, 9, 11, 16; 11; 11, 12, 13, 16; 11; 11; 11	(Atrium Ljungberg, 2021; Ismagilova et al., 2019; Hoornweg et al., 201; Hufvudstaden, 2021; Kungsleden, 2021; Moreno et al., 2021; Zimring, 2020; Moschen et al., 2019; Razmjoo et al., 2021; Wallenstam, 2021)
Net GHG emissions in cities and low carbon infrastructure.	11.6, 11.b, 11.c; 7, 11, 12, 13; 7, 11, 12, 13	(Heinonen, 2020; Lützkendorf & Balouktsi, 2019; Zarco-Periñán et al., 2021)
Urban health in urban design.	11.1, 11.3, 11.7; 11.7; 11; 3; 1, 2, 3, 4, 5 6 7 8, 10. 11, 13, 15; 11.6	(Fastighets AB Balder, 2021; Weijs-Perrée et al., 2021; UNEP, 2011; USGBC, 2018a; Vardoulakis et al., 2020; Wiktorowicz et al., 2018)
Planning smart and resilient cities. Certification systems such as Citylab help to address sustainability in urban planning.	11, 13; 11; 11; 11; 11; 11.3, 11.6; 13; 11	(Attolico & Smaldone, 2020; Buyukdemircioglu & Kocaman, 2020; Lind et al., 2019; Porfiriev et al., 2017; Solly, 2021; Xu et al., 2019; UNEP, 2011)
The use of marine spatial planning (MSP) for coastal and marine planning, and measuring urban landscapes using GIS technology.	14; 11.3, 11.6	(Lennox et. al., 2019; Stokes & Seto, 2019)
Aim to contribute to a sustainable and commercial housing market.	10, 11, 12	(Familjebostäder, 2021)
Work to create and manage sustainable educational environments.	4	(Hemsö, 2021)
Consider general community needs including food and housing, especially those of indigenous peoples.	1.4, 11.1, 17.17	(RICS, 2018)
Develop engagement programmes to increase communication and involvement within the community.	16.7, 10.2, 5.2	(RICS, 2018)
Promotion of industrial innovation through technological upgradation and reducing energy demand in industrial processes. Transform industrial parks to eco-industrial parks (EIP).	8, 9; 9, 2, 3, 4, 7	(Roy et al., 2021; Van Beers et al. 2020)
Green infrastructure and biodiversity	**SDGs**	**Reference**
Urban green infrastructure and nature-based solutions (NBs) in cities.	11; 11.7; 11.4; 3, 11, 12; 11; 14, 15; 15; 11; 11; 11; 11	(Allam, 2021; Calderón-Argelich et al., 2021; Coombes & Viles, 2021; Dushkova & Haase, 2020; Familjebostäder, 2021; Hoyle, & Sant'Anna, 2020; Ibrahim et al., 2020; Matos et al., 2019; Russo & Cirella, 2020; Voskamp et al., 2021, Wendling et al., 2018)

Creating green spaces, using trees, land, walls and roofs in a sustainable way in urban environments.	11.7; 15.5; 3; 11.1, 11.3, 11.7; 7; 11.7; 3; 15; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 3; 11.7	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Badland & Pearce, 2019; de Vries et al., 2020; Fastighets AB Balder, 2021; Forzani et al., 2020; Grazuleviciene et al., 2020; Hoyle et al., 2019; Humlegården, 2021; K2A, 2021; Wiktorowicz et al., 2018)
Include ecosystem services.	11.4; 15.5; 11, 13, 15; 13; 11	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Drenning et al., 2020; Familjebostäder, 2021; Sebastiani et al., 2021)
Include and support biodiversity and ecological features such as vertical habitats or green walls, enhancement of native floral species. Using native plants, plant edible fruit trees, promoting home food growing.	14.2; 7, 12, 13, 15; 15.5, 14.1; 6.4, 15.5; 5, 9, 12, 15 ; 2, 3, 12, 15	(BREEAM, n.d.; Kungsleden, 2021; RICS, 2018; RICS, 2018; Röstlund, & Björling, 2020; Wiktorowicz et al., 2018)
Evaluate, protect and maintain existing ecological value, where independent, qualified ecologists are appointed.	14.2, 15.1, 15.3, 15.9; 15.1	(BREEAM, n.d.; Furberg et al, 2019)
Mobility	**SDGs**	**Reference**
Walkable and cyclable internal street design within residential areas. Access to cash via a safe pedestrian route.	3.6, 3.9, 8.10; 11.1, 11.3, 11.6; 10; 11.2	(BREEAM, n.d.; Fastighets AB Balder, 2021; Roy et al., 2021; Wiktorowicz et al., 2018)
Offering cycle storage facilities, providing car pools and bicycle pools, and installing charging stations for electric vehicles.	1.4, 9.1, 9.a, 11.1, 11.3, 12.1, 12.a; 1, 7; 7.2, 7.3; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2, 15.4 ; 3, 13; 1, 3, 5, 7, 8, 15, 17; 11.2	(BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; Humlegården, 2021; K2A, 2021; Roy et al., 2021; Wiktorowicz et al., 2018)
Have a travel policy that supports more environmentally friendly means of transport and alternatives to business travel.	11; 13.1, 13.3; 11, 13	(Familjebostäder, 2021; Fastighets AB Balder, 2021; Tiboni et al., 2020)
Location close to public transport in mind when building and acquiring new homes.	1	(K2A, 2021)
Reducing vehicle ownership.	1; 3, 9, 12, 17	(Roy et al., 2021; K2A, 2021)
Demolition	**SDGs**	**Reference**
Prepare a risk assessment and method description before dismantling any structure, disconnecting services or tearing down civilian work. Comply with international safety standards in demolition.	8.8, 12.4, 12.5	(RICS, 2018)
To ensure that the surroundings are not affected by either the demolition works or waste disposal.	3.9, 12.4	(RICS, 2018)
Process demolition materials for resource recovery, or so that they may be reused, preferably on the location.	12.5	(RICS, 2018)
As part of any demolition process: address health and safety, including public health and environmental concerns, heritage and archaeological issues, conservation of nature, biodiversity protection, democratic choices of local communities and finally to consider contractor schemes.	8.8, 3.9, 12.4, 15.9	(RICS, 2018)
Ensure equitable land acquisition and that	1.4, 2.3	(RICS, 2018)

compensation for the acquired land is based on the market value.		
Apply the “polluter pays” principle, as part of the process of developing a strategy for using brownfield sites.	15.1, 15.5	(RICS, 2018)
Review potential planning, legal and environmental restrictions for the use of brownfield land. Applying local and international building and planning regulations, and environmental management standards, such as ISO 9001 and ISO 14001.	1.4, 11.3	(RICS, 2018)
Resilience and disaster risk reduction adoption	**SDGs**	**Reference**
Have a building user guide, including safety and emergency instructions and incident reporting. Implement an emergency plan for all relevant natural hazards.	1.5, 8.7, 8.8, 11.5, 11.b, 11.c, 13.1, 13.2, 13.3	(BREEAM, n.d.)
Map climate-related risks and opportunities.	1.5, 11.5, 11.b, 11.c, 13.1, 13.2, 13.3; 13.1, 13.3	(BREEAM, n.d.; Fastighets AB Balder, 2021)
Adapt properties for future climate change.	5, 12, 13; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 7, 12, 13, 15; 11	(Hufvudstaden, 2021; Humlegården, 2021; Kungsleden, 2021; Loudyi & El Harrouni, 2019)
Transition to resilient buildings and cities, e.g. with resilience to flooding.	13.1; 6; 11, 4, 6, 13; 4, 9, 11, 12, 13; 11; 6, 11, 12, 13	(Atrium Ljungberg, 2021; Houghton & Castillo-Salgado, 2017; Krellenberg & Kock, 2021; Leuzzo & Nava, 2020; Newman et al., 2017; Zhang et al., 2019)
Assess the available renovation and retrofitting interventions related to environmental risks and choose solutions that optimise energy efficiency.	7.3, 13.2	(RICS, 2018)
Disaster risk management (DRM) of buildings, e.g. water sensitive urban design, especially storm water sump.	11.5.2; 11.5; 11.5	(Etinay et al., 2018; RICS, 2018; Wiktorowicz et al., 2018)
Educational needs in disaster risk-reduction within the built environment.	6, 7, 9, 11, 13, 17	(Perera et al., 2018)
Decision support frameworks, tools and assessment	**SDGs**	**Reference**
Decision support framework for implementation of green infrastructure and sustainable urbanization.	11; 11, 12, 3, 13	(Anderson & Gough, 2021; Kazak, 2018)
A sustainability framework must be developed in all urban development projects.	11, 12, 13, 17	(Klövern, 2020;
Make a sustainability assessment for buildings and urban development projects, e.g. through an environmental impact assessment, Quality of life assessment, sustainability and resilience benefits assessment (SRBA), or CESBA MED for rating buildings and neighbourhoods.	All SDGs; 11; 11; 11; 7, 12, 13; 11.4, 11.6, 11.b, 12.2, 15.1, 15.5, 15.9; 11, 13, 7	(Balaras et al., 2020; Grafakos et al., 2016; Ortega-Momtequín et al., 2021; Ptak-Wojciechowska et al., 2021; Ramírez-Villegas et al., 2019; RICS, 2018; Sharifi, 2021)
Frameworks for evaluating socially sustainable projects, cities and architecture.	3, 9, 11; 3, 7, 11, 11.6, 13; 11; 16.7, 10.2, 5.2, 5.a, 11.1, 16.b; 1, 5, 10, 13	(Danivska et al., 2019; Girard & Nocca, 2020; Lami & Mecca, 2021; RICS, 2018; Smyth & Vanclay, 2017)
LCA assessment , Comprehensive Assessment System for Built Environment Efficiency (CASBEE)	2, 3, 6, 7, 9, 11, 12, 13; 7, 11, 12, 13; 12, 13; 11,	(Dyson et al, 2020; Frossard et al., 2020; Malabi Eberhardt et al., 2020;

and Ecological Living Module (ELM) for assessing the built environment.	13; 12; 12.2, 15.9; 11, 13; 13; 12, 13; 12.6, 12	Mirabella & Allacker, 2020; Miyazaki et al., 2019; RICS, 2018; Röck et al., 2020; Shirazi & Ashuri, 2018; Soust-Verdaguer et al., 2020; Stewart et al., 2018; Ströebele & Lüetzkendorf, 2019)
A total cost of ownership (TCO) budgeting supports life-cycle optimisation of financial and environmental performance.	12.2	(RICS, 2018)
Urban building energy modeling (UBEM) and Artificial neural networks (ANNs) for solving issues of the SDGs, and Function-based system modelling to assess and structure sustainability of buildings.	12, 13; 3, 7.2, 7.3, 8.4, 12.2; 11; 6, 7, 11, 12	(D'Amico et al., 2019; Fauth, 2020; Ferrando et al., 2020; Gue et al., 2020)
Assessment of the SDGs of companies. Use the software iMODELER to structure a SDG model for projects on a concrete operative level where synergies and trade-offs are optimised.	13; 11; 2, 3, 6, 8, 10, 11, 12, 13, 15, 16; 4, 6, 7, 9, 11, 13	(Johnsson et al., 2020; Neumann, 2019; Sinkovics et al., 2020; Wieser et al., 2019)
Use of the free tool Competency Assessment for Responsible Leadership (CARL) to analyse and develop RL competences.	13	(Muff et al., 2020)
Identifying benefits from existing site facilities, by reviewing the strategic and long-term requirements from them for the existing building or site.	12.2, 13.1	(RICS, 2018)
Health, safety and wellbeing of building occupants	**SDGs**	**Reference**
Land tenure security. Ensure that all rental agreements and contracts are fair and reasonable.	1, 2, 15, 11, 6; 10.2, 10.3, 11.3	(Dachaga & de Vries, 2021; RICS, 2018)
Implement security-creating measures such as cameras, locks, lighted entrances, washing machines in the home instead of laundry rooms and windows facing the street.	16; 5; 5.2, 10.2, 11.7, 16.1; 11	(Familjebostäder, 2021; K2A, 2021; Vasakronan, 2021; Wallenstam, 2021)
Provide affordable and social housing, through various tenure types and reduced operational costs, with basic services through community utility.	11.1; 11; 11.1, 11.3, 11.6; 1, 3, 7, 11; 1; 1, 3, 7, 11; 11; 3, 11; 1, 5, 10, 11.1, 16	(Akademiska Hus, 2021; Dean et al., 2017; Fastighets AB Balder, 2021; Housing Europe, 2017; K2A, 2021; Souaid et al., 2020; Vukmirovic et al., 2021; Wiktorowicz et al., 2018)
Engage in alternative housing projects, such as "Co-Living", Gen Y housing and sustainable housing for artists and creatives (SHAC).	8.4; 10, 16, 1, 3, 11	(Akademiska Hus, 2021; Wiktorowicz et al., 2018)
Student housing.	4.a; 4	(Akademiska Hus, 2021; K2A, 2021)
Ensure that buildings with public access allow entrance for all members of the communities. Giving all people with reduced mobility access to all parts of the premises.	10.2, 5.2	(RICS, 2018)
Create societal benefits, e.g. through community gardens and activities, and shared amenities.	8; 11, 11.3	(Hemsö, 2021; Wiktorowicz et al., 2018)
Creating safe, healthy and attractive environments for tenants, eg. by active property management, offering access to attractive and engaging outdoor environments, using products and materials that minimise the use of harmful toxins and chemicals.	3; 3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9; 3; 3.9, 12.4; 3, 5; 3	(Hemsö, 2021; Humlegården, 2021; K2A, 2021; RICS, 2018; Roy et al., 2021; Wiktorowicz et al., 2018)
Ensure proper and continuing maintenance, having cleaning procedures, and evaluation of property safety and health concerns.	3.4, 8.8	(RICS, 2018)
Enhance cultural heritage, e.g. by renovating old	5, 10, 11; 11; 11.4, 4.7,	(Griffin & Ridge, 2020; Iodice et al.,

buildings, follow heritage and archaeological guidelines and respect all issues related to culture and spiritual inheritance in society. Use of buildings for displaying arts and culture.	8.9, 12.b, 14.7, 16.3, 16.8, 16.b; 11.4; 11.4, 2, 6, 13, 15; 11.4	2021; Petti et al., 2020; RICS, 2018; Rodwell, 2018; Wiktorowicz et al., 2018)
To offer community consultation in residential areas.	17, 9, 10, 11, 16	(Wiktorowicz et al., 2018)
Organize educational demonstration projects about sustainable living.	4	(Wiktorowicz et al., 2018)
Put in place an adequate complaint process and have an ongoing, open dialogue with tenants.	16.7	(RICS, 2018)
procurement, supply chain and suppliers	**SDGs**	**Reference**
Working for a more sustainable supply chain with sustainable suppliers and contractors.	12; 3, 8, 11; 3.6, 8.2-8.4, 8.7, 9.4, 9.5, 12.6, 12.8; 8, 12; 7, 12, 13, 15; 8.8, 12.2, 12.7; 11.6, 12.2, 12.4, 13.3	(Familjebostäder, 2021; Hufvudstaden, 2021; Humlegården, 2021; Kannan et al., 2020; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)
Strive to make sustainable purchases, and to shop locally when possible. Have a procurement plan with sustainability aims.	12.7; 8.4, 8.7, 8.8, 9.4, 11.a, 12.1, 12.2, 12.7, 12.a, 16.2, 16.5; 8.4, 8.6, 8.8; 8.3, 8.4, 11.c	(Akademiska Hus, 2021; BREEAM, n.d.; Fastighets AB Balder, 2021; RICS, 2018)
Ensure that suppliers work in accordance with the company code of conduct, and respect workers rights.	8.8; 8, 12; 8.7, 8.8, 16.2; 3.4, 5.5, 8.8	(Atrium Ljungberg, 2021; Klövern, 2020; RICS, 2018; Vasakronan, 2021)
Collaborations	**SDGs**	**Reference**
Collaboration with suppliers.	3.9, 9.1, 11.2-11.4, 11.7, 11.a, 15.1, 15.5, 15.8, 15.9	(Humlegården, 2021)
Collaborate and involve stakeholders to benefit from their user experience and expertise.	11.3; 12.8, 13.3; 17	(Akademiska Hus, 2021; RICS, 2018; Roy et al., 2021)
Open lab to collaborate and learn about the SDGs and improve energy efficiency.	13; 4	(Espinosa-DurÃ, 2020; Gómez et al., 2020)
Co-design and development of energy solutions and adoption through collaborations, as well as research and innovation projects.	4.a; 11, 13; 17; 13	(Akademiska Hus, 2021; Hemsö, 2021; Roy et al., 2021; Wallenstam, 2021)
Focusing on community involvement with the goal to have at least one measure for local community involvement in all new projects.	5, 8, 10, 17	(Kungsleden, 2021)
Engage in various partnerships with local and federal governments, private corporations, research bodies and the non-profit sector.	4.a, 7.a, 8.2, 17; 12.2, 12.4, 12.5; 17; 16; 3, 8, 11; 11; 16.5, 17.9; 17.17; 11, 13; 17, 9, 10, 11, 16	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Bull & McNeill, 2019; Familjebostäder, 2021; Hufvudstaden, 2021; Pultrone, 2019; RICS, 2018; Vasakronan, 2021; Wallenstam, 2021; Wiktorowicz et al., 2018)
Sustainable facility management (FM) in cities could be carried out of agencies and the private sector in new and innovative settings to benefit local communities	3, 11	(Temeljotov Salaj & Lindkvist, 2020)
Workforce	**SDGs**	**Reference**
Working to increase gender equality, counteract discrimination and combat abusive discrimination and sexual harassment in the workplace.	5.5; 5.1; 12; 5; 5.1, 5.5, 10.2, 10.3; 5.5, 8.5, 10.2; 5	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; K2A, 2021; RICS, 2018; Vasakronan, 2021; Wallenstam, 2021)

Hire local labor.	10.1, 10.2	(RICS, 2018)
Employs young people as summer workers and offers internships.	10, 11; 8.4, 8.6, 8.8; 4	(Familjebostäder, 2021; Fastighets AB Balder, 2021; K2A, 2021)
Ensure that employees are sufficiently qualified and knowledgeable.	12.7, 12.8	(RICS, 2018)
Work with strategic competence supply and with development of employer skills.	5, 8; 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5, 16.7	(Familjebostäder, 2021; Humlegården, 2021)
Having business-driven employees who live up to the company's values and are good ambassadors.	3	(Klövern, 2020)
Offer a healthy and safe working environment, e.g. through having health controls and arrange exercise activities. Ensure that the highest standards of working environment health and safety are applied, and that appropriate personal protective equipment is used.	8.8; 8.8; 5, 8; 8; 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5, 16.7; 3, 8, 11; 3; 3, 5, 8, 9, 10, 11, 16, 17; 3.9, 8.8, 12.7; 1, 3, 4, 8, 12, 13; 3.4, 8.8	(Akademiska Hus, 2021; Atrium Ljungberg, 2021; Familjebostäder, 2021; Hemsö, 2021; Humlegården, 2021; Hufvudstaden, 2021; Klövern, 2020; Kungsleden, 2021; RICS, 2018; Röstlund, & Björling, 2020; Vasakronan, 2021)
Focuses on showing the importance of green environments for well-being and performance. Implement increasing exposure to natural daylight, providing green spaces outdoors and reducing noise.	11.7; 8.5, 8.8, 11.7	(Akademiska Hus, 2021; RICS, 2018)
Zero tolerance for ethical violations and violence against human rights.	5, 8, 10, 17; 8.5, 8.7, 8.8, 16.b	(Kungsleden, 2021; RICS, 2018)
Implement control mechanisms and systemic barriers to prevent people from having the opportunity to abuse power and protection of whistleblowers.	8.8, 10.3	(RICS, 2018)
Make sure that salaries are meeting the minimum wage thresholds, and are equal between men and women.	8.5	(RICS, 2018)
Risk and opportunity assessment of the organisation´s own overall business operation impact as well as the suppliers impact on labour and human rights.	8.8	(RICS, 2018)
Provide appropriate training and make broader efforts to increase awareness and incorporate environmental management into the employee's daily working practices, and their performance reviews.	8.8; 7, 13, 15; 12.2, 12.8, 13.3, 13.2	(Akademiska Hus, 2021; Familjebostäder, 2021; RICS, 2018)
Hold regular training to ensure that statutory health and safety regulations are followed by both employees and subcontractor staff.	8.8	(RICS, 2018)
Encourage the workforce to raise questions or concerns without worry of consequences.	8.8	(RICS, 2018)
Sustainable business model	**SDGs**	**Reference**
Developing business models for premises efficiency through, for example, digitization of the properties.	12.2; 11, 12, 13	(Akademiska Hus, 2021; Honold & Lützkendorf, 2019)
Have climate-neutral administration, property management, project operations and activities. Having an environmental management policy or plan.	8.4; 7.2; 11.3; 12; 7, 13, 15; 6.3, 6.4, 7.2, 7.3, 11.5, 11.6, 12.1, 12.2, 12.4, 12.5, 13.1, 13.2, 15.4; 7, 12, 13; 7, 12, 13, 15; 12.2, 12.8, 13.3, 13.2; 13.1, 13.3	(Akademiska Hus, 2021; BREEAM, n.d.; Familjebostäder, 2021; Humlegården, 2021; Klövern, 2020; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)

Optimise measures in operations, in order to reduce energy and resource consumption and improve the economy.	12.2; 13	(Akademiska Hus, 2021; Wallenstam, 2021)
Adopt a maintenance strategy that includes modern and energy efficient lighting fittings, and low-flow water plumbing and taps.	11.3; 6.4, 7.3, 13.2	(BREEAM, n.d.; RICS, 2018)
Being responsible and long-term when doing business and in their relationships with tenants and suppliers.	8	(Hemsö, 2021)
Incorporate children's rights into the corporate policies and codes of conduct.	8.7, 16.2	(RICS, 2018)
Having zero tolerance for corruption and measures taken against.	16.5; 12; 5, 8, 10, 17; 16.5; 16.5	(Atrium Ljungberg, 2021; Familjebostäder, 2021; Kungsleden, 2021; RICS, 2018; Vasakronan, 2021)
Economics, disclosure and transparency	**SDGs**	**Reference**
The green growth narrative, green economy or circular economy.	12; 8; 7, 12, 13, 15	Dokter et al., 2020; Hinkel et al., 2020; Kungsleden, 2021
Sustainable investing and profitable development of properties, climate and cost efficiency throughout the business, to ensure long-term economic stability.	8, 8	(Hemsö, 2021; Wallenstam, 2021)
Only use green funding.	3.6, 8.2-8.4, 8.7, 9.4, 9.5, 12.6, 12.8	(Humlegården, 2021)
Integrating environmental clauses into lease contracts, so called “green leases”.	12.2, 12.6, 13.2	(RICS, 2018)
Having an annual presentation of data.	8.4, 12.2, 12.5, 12.6	(BREEAM, n.d.)
Disclose potential public health risks caused by the building and its operations.	3.9, 12.4	(RICS, 2018)
Disclose progress on how the organisation has integrated the four UN Global Compact question areas, e.g. through GRI CRESS, or external reporting. Report real estate performance data in comparison to peer buildings.	12.6	(RICS, 2018)
Develop a transparent frame with requirements for real estate services that are outsourced.	12.6	(RICS, 2018)

Appendix C. Table with SDG indicators

The table below contains every indicator that has been found through this literature review, grouped into similar subjects. The middle column shows the supported SDGs and the right column contains the references which have linked the measures and indicators to the SDGs. The information in the columns with SDGs and references are divided with semicolons, where the first reference has linked the first group of SDGs to the corresponding measure or indicator, and so on.

Indicator	SDGs	Reference
Energy	**SDGs**	**Reference**
Energy consumption metrics. Corresponding to the GRI index 302-1 of energy consumption within the organisation. Indicator of energy efficiency, measured as the energy consumption per net value added. Include asset subtype mix in energy consumption data and ensure consistent reporting period.	1.4, 11.1, 11.a, 11.c, 12.1, 12.a, 13.2-3, 14.3; 7, 13, 15; 7, 11, 12, 13; 7.3.1; 9.4, 12.1, 12.a	(BREEAM, n.d.; Familjebostäder, 2021; Fastighets AB Balder, 2021; UNCTAD, 2019)
Meter electricity data. Electricity consumption may be divided into residential, commercial, public services and other. Electricity and heating may be measured in the unit MW/h.	1.4, 4.a, 7.1-7.3, 7.a, 7.b, 8.4, 9.4, 1.4, 11.1, 11.a, 11.c, 12.1-2, 12.a, 13.2-3, 14.3; 11	(BREEAM, n.d.; Feiferyté-Skirienė et al., 2020)
Indicator of renewable energy, measured as percentage of total energy consumption. Consumption is divided into renewable energy (e.g. solar energy and hydro energy), nonrenewable energy (e.g. natural gas and fossil fuel), and transport fuel. Corresponding to disclosure 302-1. Building consumption of on-site generated energy per year.	11; 7.2-3, 8.4, 12.2, 13.1; 7; 7.2.1; 11; 7	(Feiferyté-Skirienė et al., 2020; GRI, 2021; Miller, 2020; UNCTAD, 2019; USGBC, 2019a)
GRI disclosure CRE1 of building energy intensity and GRI disclosure 302-3 of energy intensity ratio for the organisation.	7, 11, 12, 13; 7.3, 8.4, 12.2, 13.1	(Fastighets AB Balder, 2021; GRI, 2021)
GRI disclosure 302-4 of reductions in energy consumption, reported in joules or multiples. Energy efficiency compared to baseline figures, measured as the percent better than code of annual total energy use. Indicator of energy demand flexibility by measuring the ability of the building to reduce demand for a certain time.	7.3, 8.4, 12.2, 13.1; 7; 7	(GRI, 2021; Miller, 2020; USGBC, 2019a)
Metrics for the energy grid: Grid Peak Contribution, Grid Carbon Alignment measures and resilience of building energy demand. See more details in section 3.7.2.	7	(Miller, 2020; USGBC, 2019a)
GHG Emissions	**SDGs**	**Reference**
Carbon dioxide emissions, and by having certain goals of reduction. GHG emissions divided into emissions of the greenhouse gases CO_2, SO_2, O_3, NO_2, C_6H_6, and the particle concentration of PM_{10}, and $PM_{2.5}$.	7, 13, 15; 11	(Familjebostäder, 2021; Feiferyté-Skirienė et al., 2020)
Indicator of greenhouse gas emissions Scope 1 in absolute amount, in percentage terms and in terms of change. Corresponding to GRI disclosure 305-1, reported in metric tons of CO2 equivalent, with specification of the gases included in the calculation.	3.9, 12.4, 13.1, 14.3, 15.2; 9.4.1	(GRI, 2021;UNCTAD, 2019)
Indicator of greenhouse gas emissions Scope 2 in absolute amount, in percentage terms and in terms of change. Corresponding to GRI disclosure 305-2 of the gross location-based and market-based energy indirect (Scope 2) GHG emissions in metric tons of CO2 equivalent. Including specification of the gases included in the calculation.	7, 11, 12, 13; 3.9, 12.4, 13.1, 14.3, 15.2; 9.4.1	(Fastighets AB Balder, 2021; GRI, 2021; UNCTAD, 2019)

GRI disclosure 305-3 of the Gross other indirect (Scope 3) GHG emissions in metric tons of CO_2 equivalent and specification of the gases included in the calculation if available.	3.9, 12.4, 13.1, 14.3, 15.2	(GRI, 2021)
The average carbon intensity value of the district heating/cooling system, and from all fuels used to generate heat or cooling. Corresponding to GRI disclosure 305-4 of GHG emissions intensity ratio for the organisation and CRE3 of GHG emissions intensity from buildings.	1.4, 11.1, 11.a, 11.c, 12.1, 12.a, 13.2, 13.3, 14.3; 13.1, 14.3, 15.2	(BREEAM, n.d.; GRI, 2021)
GRI disclosure 305-5 of reduced GHG emissions, reported in metric tons of CO_2 equivalent.	13.1, 14.3, 15.2	(GRI, 2021)
Travel	**SDGs**	**Reference**
Key figure of the number of travels that have been made by train instead of flight.	8, 13	(Fastighets AB Balder, 2021)
Calculating the total emissions from travel.	8, 13	(Fastighets AB Balder, 2021)
Scope 1 and scope 2 emissions from travel to and from the properties within the property management, reported as tons of emissions per year. Corresponding to the GRI 305-1 and 305-2.	9, 11	(Fastighets AB Balder, 2021)
Key figure of number of car pools and bike pools at new properties per year.	9, 11	(Fastighets AB Balder, 2021)
Water consumption	**SDGs**	**Reference**
GRI disclosure CRE2 of building water intensity. Disclosed as the total cubic metres of water consumption per square metres per year.	7, 11, 12, 13; 6.4, 8.4, 12.2	(Fastighets AB Balder, 2021; GRI, 2021)
Indicator of water use efficiency, measured as the water use per net value added in the reporting period, in percentage terms, in terms of change and in absolute amount. Corresponding to GRI disclosure 303-3 of total water withdrawal, breakdowned into freshwater and other water and GRI disclosure 303-5 of the total water consumption from all areas in megalitres. Water consumption measured as 10^3 ton/yr and divided into residential and industrial & commercial.	11; 6.4; 6.4.1	(Feiferyté-Skirienė et al., 2020; GRI, 2021; UNCTAD, 2019)
Indicator of water recycling, measured as the total volume of water recycled and reused in absolute amount and in percentage terms.	6.3.1	(UNCTAD, 2019)
Indicator of water stress,measured as the water withdrawn with a breakdown by sources, and with reference to water-stressed or water-scarce areas. Expressed as a percentage of total withdrawals, in absolute amount and in percentage terms.	6.4.2	(UNCTAD, 2019)
Waste and chemicals	**SDGs**	**Reference**
Indicators to measure the environmental performance of cities may include: recycling rates, ratio of green space, forests, agriculture land loss, share of apartment living, motorisation rate, modal share of urban transport, and Ecological footprint.	11	(Feiferyté-Skirienė et al., 2020)
Calculates the climate impact from all new production.	11	(Familjebostäder, 2021)
Metrics should include energy, water, land-use and waste management.	1.5, 11.5, 11.b, 11.c, 13.1-13.3	(BREEAM, n.d.)
GRI 306-2: Report the total weight of hazardous waste and non-hazardous waste, with a breakdown by: reuse, recycling, composting, recovery, including energy recovery, incineration, deep well injection, landfill, on-site storage, and other.	3.9, 11.6, 12.4, 12.5	(GRI, 2021)
The proportion of households with access to food waste collection.	7, 13, 15	(Familjebostäder, 2021)
Solid waste may be measured in the unit ton/year, for example construction and demolition waste. Recyclable waste may be measured in the same unit and divided into: glass, metals and plastics. Other possible measures of waste are: biodegradable waste (ton/yr), wastewater (103m3), heat losses (MW/h), and electricity losses (MW/h).	11	(Feiferyté-Skirienė et al., 2020)
The reduction of waste generation, measured as the change in waste generated per net value added d in percentage terms, in terms of change and in absolute amount.	12.5	(UNCTAD, 2019)

Indicator of waste reused, re-manufactured and recycled, measured as the total amount of waste reused, re-manufactured and recycled in absolute amount, in percentage terms and in terms of change.	12.5.1	(UNCTAD, 2019)
Hazardous waste, measured in absolute terms, as well as proportion of hazardous waste treated, given total waste reported by the reporting entity (in absolute amount, in percentage terms and in terms of change).	12.4.2	(UNCTAD, 2019)
Indicator of ozone-depleting substances (ODS) and chemicals, measured as the total amount per net value added.	12.4.2	(UNCTAD, 2019)
Resources	**SDGs**	**Reference**
GRI disclosure 301-1 of the total weight or volume of materials that are used to produce and package the organization's primary products and services during the reporting period, by non-renewable and renewable materials used.	8.4, 12.2	(GRI, 2021)
GRI 301-2: Report the percentage of recycled input materials used to manufacture the organization's primary products and services.	8.4, 12.2, 12.5	(GRI, 2021)
Physical space	**SDGs**	**Reference**
The share of dwellings with the lowest quality.	11.1	(Llorca et al., 2020)
Number of completed apartments.	10, 11, 12	(Familjebostäder, 2021)
The ratio of land consumption measured as the proportion of vacant dwellings.	11.3.1	(Llorca et al., 2020)
Indicators measured with geospatial data analysis and GIS technology: built-up area, the ratio of building total area to area upon which they are built, measure of median city quarter size, measure of road network density, measure of dubelier coefficient.	11	(Zuev et al., 2021)
Land cover in coastal cities (e.g. built-up surfaces), and people and asset risk in coastal areas.	14	(Alencar et al., 2020)
Transversal connectivity index (TCI) to classify natural landscape patches, to evaluate the effectiveness of blue-green infrastructure.	6.4	(Hysa, 2021)
Urban green space per capita (UGS) as an indicator of green infrastructure.	11	(Badiu et al., 2016)
Disaster risk reduction indicators.	1.5, 11.5, 11.b, 13.1; 11	(Sarmiento, 2018; Serey et al., 2020)
Resilience of cities as an econometric measure based on several indicators.	11	(Ricciardelli et al., 2018)
City indicators. Analysis of which NUA and SDG indicators that could be used to evaluate cities.	11, 2, 1, 9, 15, 16, 3; 11; 11	(Giles-Corti et al., 2020; Serey et al., 2020; Zinkernagel et al., 2018)
Thermal performance of urban environment and indicators for climate-sensitive planning, heat-stress index.	11, 13	(Mehrotra et al., 2019)
To quantify the effects of urban heat islands.	11	(El-Hakim & El-Badawy, 2020)
Floor space ratio (FSR) for measuring resilient building design.	11	(Vinoth Wilfer, 2020)
Renovation rate.	11, 13	(Gepts, 2020)
The measure of employment in real estate activities compared to all employment in maritime areas.	14	(Kyvelou & Ierapetritis, 2019)
Tenants and clients	**SDGs**	**Reference**
NKI-index (satisfied customer index).	8, 9; 8, 12	(Fastighets AB Balder, 2021; Klövern, 2020)
Measure the impact of safety measures through a security index.	10, 11, 12	(Familjebostäder, 2021)
Service index.	10, 11, 12	(Familjebostäder, 2021)
The ratio of yearly dwelling rent to yearly household income.	11.1	(Llorca et al., 2020)
Employee equity and diversity	**SDGs**	**Reference**
Indicator of workforce diversity. Corresponding to GRI disclosure 405-1 of the percentage of employees and individuals within the governance bodies, respectively, in each of the following categories: gender, age group and other relevant indicators of	5.1; 8, 13; 5.1, 5.5, 8.5	(Atrium Ljungberg, 2021;Fastighets AB Balder, 2021; GRI, 2021)

diversity.		
The employee wages and benefits with breakdown by employment type and gender. Calculated as the total wages and benefits of the employee workforce divided by the total revenue in that reporting period. Similar to GRI disclosure 405-2 of the ratio of the basic salary and remuneration of women to men for each employee category, by significant locations of operation.	5.1, 8.5, 10.3; 8.5.1, 10.4.1; 5.5, 8.5, 10.2	(GRI, 2021; UNCTAD, 2019; Vasakronan, 2021)
GRI disclosure 401-1 of the total number and rate of new employee hires and employee turnover, by age group, gender and region.	5.1, 8.5, 8.6, 10.3	(GRI, 2021)
The proportion of women in managerial positions, measured as the number of women in managerial positions to the total number of employees, in terms of headcount or FTE.	5.5.2	(UNCTAD, 2019)
The number or percentage of women board members.	5.5.2	(UNCTAD, 2019)
GRI disclosure 102-8 of the total number of employees by employment contract, by gender and by region.	8.5, 10.3	(GRI, 2021)
GRI disclosure 102-41 of the percentage of total employees covered by collective bargaining agreements. Measured as the number of employees covered by collective agreements to total employees, in terms of headcount or FTE.	8.8; 8.8.2	(GRI, 2021; UNCTAD, 2019)
The number of jobs that have been created for youths within the real estate operation per year.	9, 11	(Fastighets AB Balder, 2021)
Employee training and performance	**SDGs**	**Reference**
Employee experience index, index of commitment and leadership index.	5, 8; 3.4, 3.5, 5.1, 5.2, 5.5, 8.5, 8.8, 10.2, 13.3, 16.5, 16.7	(Familjebostäder, 2021; Humlegården, 2021)
GRI disclosure 404-3 of the percentage of total employees by gender and by employee category who received a regular performance and career development review during the reporting period.	8, 13; 5.1, 8.5, 10.3	(Fastighets AB Balder, 2021; GRI, 2021)
The average hours of training that the organisation's employees have undertaken during the reporting period, by gender and employee category. Corresponding to GRI disclosure 404-1.	4.3, 4.4, 4.5, 5.1, 8.2, 8.5, 10.3; 4.3.1	(GRI, 2021; UNCTAD, 2019)
The expenditures on employee training per year per employee broken down by employee category.	4.3.1	(UNCTAD, 2019)
The number of employees that have received training in the company code of conduct.	8, 13	(Fastighets AB Balder, 2021)
Suppliers	**SDGs**	**Reference**
Percentage of local procurement, measured as the proportion of procurement spending at local suppliers in percentage terms and in absolute amount.	9.3.1	(UNCTAD, 2019)
GRI disclosure 414-1 of the percentage of new suppliers that were screened using social criteria.	5.2, 8.8, 16.1	(GRI, 2021)
GRI disclosure 414-2 of the number of suppliers that has: been assessed for social impacts, been identified as having significant actual and potential negative social impacts, and has significant actual and potential negative social impacts identified in the supply chain.	5.2, 8.8, 16.1	(GRI, 2021)
Employee health and safety	**SDGs**	**Reference**
GRI disclosure 406-1 of the total number of incidents of discrimination during the reporting period and status of the incidents.	8, 13; 5.1, 8.8	(Fastighets AB Balder, 2021; GRI, 2021)
GRI disclosure 416-2 of the total number of incidents of non-compliance with regulations and/or voluntary codes concerning the health and safety impacts of products and services, by incidents resulting in a fine, penalty, or warning and incidents of non-compliance with voluntary codes.	16.3	(GRI, 2021)

Expenditures on employee health and safety, measured as the total cost of occupational safety and health, divided by the total revenue.	3.8, 8.8	(UNCTAD, 2019)
GRI disclosure 403-8 of the number and percentage of all employees covered by occupational health and safety management system based on legal requirements and/or recognised standards or guidelines.	8.8	(GRI, 2021)
The frequency rates or incident rates of occupational injuries, measure frequency rates as the number of new injuries divided by total number of hours worked by workers, and incident rates as the total number of lost days expressed in terms of number of hours divided by total number of hours worked by workers.	8.8.1	(UNCTAD, 2019)
GRI disclosure 403-9 of the number of fatalities as a result of work-related injuries.	3.6, 3.9, 8.8, 16.1	(GRI, 2021)
GRI disclosure 403-10 of the number of fatalities as a result of work-related ill health.	3.3, 3.4, 3.9, 8.8, 16.1	(GRI, 2021)
Corruption	**SDGs**	**Reference**
Indicator of anti-corruption practices, as the amount of fines paid or payable due to settlements. Measured as the total monetary value of paid and payable corruption-related fines imposed by regulators and courts in the reporting period.	16.5.2	(UNCTAD, 2019)
The average number of hours of training in anti corruption issues per employee per year is an indicator of anti-corruption practices, calculated as the total hours of training in anti-corruption issues per year divided by total employees.	16.5.2	(UNCTAD, 2019)
GRI disclosure 205-1 of total number and percentage of operations assessed for risks related to corruption, and significant risks related to corruption identified through the risk assessment.	16.5	(GRI, 2021)
GRI disclosure 205-2 of communication and education of the workforce in the subject of anti-corruption.	8, 9; 16.5	(Fastighets AB Balder, 2021; GRI, 2021)
GRI disclosure 205-3 of confirmed incidents of corruption.	8, 9; 16.5	(Fastighets AB Balder, 2021; GRI, 2021)
GRI disclosure 307-1 of significant fines and non-monetary sanctions for non-compliance with environmental laws and regulations.	16.3	(GRI, 2021)
GRI disclosure 419-1 of significant fines and non-monetary sanctions for non-compliance with laws and/or regulations in the social and economic area.	16.3	(GRI, 2021)
Board meetings and members	**SDGs**	**Reference**
The number of board meetings and attendance rate, measured as the number of board meetings during the reporting period and number of board members who participate at each meeting, divided by the total number of directors sitting on the board multiplied by the number of board meetings during the reporting period.	16.6	(UNCTAD, 2019)
Board members by age range as an indicator of corporate governance disclosures. Calculated as the average age of board members, e.g. under 30 years of age, between 30 and 50, and over 50.	16.7.1	(UNCTAD, 2019)
The number of meetings of the audit committee and attendance rate as an indicator of corporate governance disclosures. Measured as the number of board meetings during the reporting period and number of audit committee members who participate at each audit committee meeting during the reporting period divided by the total number of members sitting on the audit committee multiplied by the number of audit committee meetings during the reporting period.	16.6	(UNCTAD, 2019)

The total compensation, and compensation per board member and executive, as an indicator of corporate governance disclosures. Measured as the total annual compensation for each executive and non-executive director, including base salary and variable compensation.	16.6	(UNCTAD, 2019)
Economics	**SDGs**	**Reference**
Indicator of revenue, disclosed according to the IFRS 15.	8.2.1	(UNCTAD, 2019)
Indicator of value added calculated as the revenue minus the cost of bought-in materials, goods and services (gross value added).	8.2.1, 9.b, 9.4.1	(UNCTAD, 2019)
Indicator of net value added, calculated as the revenue minus the cost of bought-in materials, goods and services minus depreciation on tangible assets (net value added).	8.2.1, 9.4.1	(UNCTAD, 2019)
GRI 201-1: Report direct economic value generated and distributed (EVG&D) on an accruals basis, including the basic components for the organization's global operations.	8, 9; 8.1, 8.2, 9.1, 9.4, 9.5	(Fastighets AB Balder, 2021; GRI, 2021)
Key figures such as solidity and debt to equity ratio.	8	(Familjebostäder, 2021)
A certain goal in regards to adjusted equity/assets ratio in the long term.	8, 12	(Klövern, 2020)
Surplus ratio.	10, 11, 12; 8, 12	(Familjebostäder, 2021; Klövern, 2020)
Taxes and other payments to the government.	17.1.2	(UNCTAD, 2019)
GRI disclosure CRE8 of the type and number of sustainability certification, rating and labeling schemes for new construction, management, occupation and redevelopment.	4.a, 6.4, 7.3, 8.4, 10.2, 11.3, 12.2, 13.1	(GRI, 2021)
Indicator of green investments, measured as the total amount of expenditures for those investments whose primary purpose is the prevention, reduction and elimination of pollution and other forms of degradation to the environment in absolute amount and in percentage terms.	7.b.1	(UNCTAD, 2019)
Indicator of total expenditures on research and development, measured as the total amount of expenditures on research and development by the company during the reporting period in absolute amount and in percentage terms.	9.5.1	(UNCTAD, 2019)
Indicator of community investments. Measured as the total amount of capital and operating expenditures on charitable donations and investments of funds in a broader community where target beneficiaries are external to the company in the current reporting period, reported in absolute amount and percentage terms.	17.17.1	(UNCTAD, 2019)