

# Sustainability Makes Sense

Case Study: Rhomberg Bau

Urs von Arx

Status: final draft, 4 May 2018

## Table of Contents

ACKNOWLEDGMENTS .....	4
AND THE WINNER IS ... RHOMBERG BAU GMBH .....	5
INTRODUCTION .....	5
RHOMBERGS JOURNEY TO SUSTAINABILITY .....	6
A Commitment to Responsibility.....	7
Tackling the Challenge.....	7
Cradle to Cradle.....	9
Network Building.....	10
CREE.....	11
Bauen 4.0.....	12
Going Public.....	13
Well Worth the Effort.....	14
RESEARCH APPROACH.....	16
Methodology .....	16
Focal Topic.....	16
Data Collection .....	16
Survey.....	16
Interviews .....	17
Data Triangulation.....	18
UNDERGOING THE CHALLENGES OF BUSINESS SUSTAINABILITY.....	18
Business Sustainability .....	18
Setting the Stage .....	19
Leadership .....	20
Willingness to Change .....	20
Climate and Culture.....	21
Extending Responsibility .....	22
From Shareholder to Stakeholder Value .....	23
Internal Stakeholders .....	23
External Stakeholders.....	24
Environmental Responsibility.....	<u>25</u> <u>24</u>
Redefining Value .....	<u>26</u> <u>25</u>
Organizational Systems .....	26
Value for the Triple Bottom Line .....	<u>27</u> <u>26</u>
Economic Performance .....	27
Changing the Purpose of Business .....	28

CONCLUSION AND DISCUSSION .....	30
What factors triggered Rhomberg's sustainability efforts? .....	30
How are sustainability problems addressed? .....	31
What is the state of maturity of Rhomberg's sustainability activities? .....	33
LIMITATIONS AND NEED FOR FURTHER RESEARCH .....	35
OUTLOOK.....	<del>37</del> 36

## ACKNOWLEDGMENTS

I would like to thank all those who took the time to complete the survey and participate in the interviews. Their feedback helped us achieve a greater understanding of Rhomberg Bau. Special thanks go to Markus Scherrer, who served as a liaison for the organization and the execution of the case study, and to Mona Egger-Grabher, who handled the administrative tasks and coordinated appointments. Finally, I would like to thank Hubert Rhomberg, who made this case study possible by inviting us to take a close look at his company.

## AND THE WINNER IS ... RHOMBERG BAU GMBH

In 2015 Rhomberg received the TRIGOS Award in the category for Holistic CSR Commitment. The jury was particularly impressed by how Rhomberg incorporated sustainability into its core business. Three years earlier, the company had already become the first Austrian construction company to be certified by ÖGNI (Austrian Sustainable Building Council), whose seal is given to companies that are value-oriented and have ethical and sustainable business practices.

When Hubert Rhomberg took over operational management of his family's business in 2002, he adopted responsibility as a guiding principle: namely, responsibility to the company and its employees, and responsibility to people and the environment. His "ecological backpack" program and instructions for dismantling buildings quickly made clear to everyone how construction companies can contribute to environmental protection. Rhomberg's early flagship project *Sandgrubenweg* incorporated ecological and social concerns in its project goals, despite initial fears that it might hurt the bottom line. And the Rhomberg Recycling Center has brought about a massive increase in resource efficiency while also closing material cycles. After only a few years, the company was recycling 70,000 tons of waste and materials annually, most of it construction waste and paper. Less than three percent of its waste ends up in disposal sites. Rhomberg has thus been assuming responsibility in a manner that transcends the conventional purview of a construction company.

In order to approach sustainability issues in a holistic manner, Rhomberg has also been continuously growing in the direction of an all-in-one service provider. Furthermore, the company has forged partnerships with actors outside the building sector, both in and outside the Vorarlberg region. In this way, numerous networks have arisen linking Rhomberg with other companies and organizations.

Ten years after taking over operational management, Hubert Rhomberg presented the Rhomberg Group's first-ever sustainability report, the *SinnEntFalter*. The report provides internal and external stakeholders with a transparent accounting of Rhomberg's goals and achievements. Likewise, the company CREE, its LifeCycle Tower in Dornbirn and Hubert Rhomberg's book *Bauen 4.0* are impressive displays of what is possible in the construction industry, both now and in the future.

In the future, Rhomberg is likely to receive more awards for its practices and sustainable solutions, which are helping bring about a revolution in the industry, a veritable "building 4.0." Its path so far has required unusual amounts of vision, creativity and fortitude. "It has been a brutally tough process," explains Hubert Rhomberg. But his company's success lies in tireless, gradual progress.

In 2017, the Rhomberg Group decided to take stock of its 15-year-long commitment to sustainable development, so it commissioned a leading educational institute in the field, Business School Lausanne, to carry out a case study. The recently completed study is now sitting on Hubert Rhomberg's lectern, and he turns to the first page.

## INTRODUCTION

Buildings account for 40% of energy and resource consumption both in the EU (European Parliament and Council, 2010, p. 13) and worldwide (UNEP, 2014, 2009a). Data on CO<sub>2</sub> emissions from buildings vary some, but the levels they show are all significant, ranging from around 20% (Lucon et al., 2014, p. 675) to around 50% (Dimoudi and Tompa, 2008, p. 86). The earth's surface has warmed by more than 0.5°C on average since 1950 and scientists believe anthropogenic emissions have made a significant contribution to rising

temperatures (IPCC, 2013). In addition, humans produce up to 3.5 million tons of waste per day (Hoorweg et al., 2013, p. 616), of which up to 60% comes from the building sector (Preuss, 2011, p. 120).

Demographic experts have projected that the world's population will increase almost 30% by 2050. If they are right, humankind will quickly come face to face with major problems when it comes to resource and energy use. At the same time, urban regions are expected to grow by 10% in relation to the total population (United Nations, Population Division, 2017, 2016). This will require the construction of new living spaces. Sand and gravel are the world's most widely used raw materials after water. But their extraction rates have been rising exponentially and now exceed that of their natural renewal (Peduzzi, 2014, p. 215). The United Nations Environment Programme (2009b, p. 5) has warned of the considerable potential for intensified conflicts over raw materials in the coming decades.

A team led by Johan Rockström has defined nine planetary boundaries to describe human environmental impact. Of these nine, the world has already crossed four, and some regions have even crossed more (Rockström, 2015; Rockström et al., 2009). The construction industry has a direct influence on three of these boundaries: climate change, loss of biosphere integrity, and land-system change. At the same time, the construction industry can play a role in achieving the 17 Sustainable Development Goals identified by the UN in 2016 and that each UN member state has been charged with meeting by 2030. If the construction industry is to help, it must transition to sustainable practices that protect the environment and society while rethinking its economic assumptions.

This case study examines Rhomberg's contribution to this transition. It addresses three main questions: First, how and why did sustainability become so central to Rhomberg? Second, how has it handled and/or solved sustainability problems? Third, how sustainable has the company become, as measured by Dyllick and Muff's Business Sustainability Typology? The study's findings are based on an online survey, personal interviews and archival data.

The study begins by tracing Rhomberg's development into a sustainable company. After discussing its research method, the study then assesses Rhomberg's corporate development in terms of leadership, organizational systems, corporate culture, ability to change and stakeholders. This is followed by an analysis of the company's strategic initiatives for sustainability. Finally, the study evaluates its findings, determines the company's maturity level as a sustainable organization, discusses methodological limitations, and highlights possibilities for further research.

## RHOMBERGS JOURNEY TO SUSTAINABILITY

Rhomberg Bau is a fourth-generation construction company founded by Otto Rhomberg in 1886. During the early years, the company focused on the construction of residential and commercial buildings in the Bregenz area, Austria. Later, it embarked on its first major regional projects such as the expansion of the port of Bregenz. In 1972 Walter-Heinz Rhomberg became the company's chief executive officer. Thirty years later he handed over management to his son, Hubert Rhomberg, who had joined the company in 1999 as the head of its Civil Engineering and Railway Technology Department. He began his tenure by expanding the railway division by merging Rhomberg Bahntechnik and the Sersa Group to form the Rhomberg Sersa Rail Group. He continued to gain attention in the building sector with the construction of the residential area *Sandgrubenweg* and the CREE LifeCycle Tower.

Today, the Rhomberg Group employs around 2,800 people and its revenues in the 2016/2017 fiscal year totaled 714 million euros. The Construction Department, which employs 633 people, generated revenues of

278 million euros in the same period. Its headquarters are in Bregenz, where it serves the Vorarlberg region. It has additional offices in Vienna, southern Germany and Switzerland.

As a family business, Rhomberg has always set its sights on long-term development, placing great emphasis on its employees and the region's people. In this sense, the company has always pursued sustainable goals. However, when Hubert Rhomberg took over at Rhomberg in 2002, a new emphasis was placed on sustainability.

### A Commitment to Responsibility

When asked why he brought sustainability to the fore of the company, Hubert Rhomberg replies, "Because I could." After a short pause, he adds: "Because I was able to. And if you are able to do it, you have the responsibility to do it." In his view, sustainability is nothing new for the company. Rhomberg, he says, has always invested in young people and has always tried to preserve jobs, despite economic fluctuations. It is in the nature of a family business to think of the next generation. As a father, Hubert Rhomberg asks himself about his children's future; as an entrepreneur, he thinks about how best to organize his company so that it continues to survive. The key, he believes, lies in anticipating the world's long-term changes.

His long-standing friendship with Friedrich "Bio" Schmidt-Bleek has also had a lasting influence on him. The German chemist and environmental researcher developed the Factor 10 dematerialization model and influenced discussions about resource use in today's consumer society with his "ecological backpack" approach (Schmidt-Bleek, 1994).

### Tackling the Challenge

In 2003 Rhomberg Bau launched the research project *inkl.wohnen* as part of a multi-year research and technology program by the Austrian Federal Ministry of Transport, Innovation and Technology to develop and introduce concrete approaches to innovative building. What set *inkl.wohnen* apart was the way it approached sustainability. It did not focus exclusively on the environment, as is usually the case in the building sector. Rather, its idea of sustainability also included economics, society and human health. A key focus was placed on redefining where people live and how they lead their lives in view of changing societal, psychological and demographic conditions. Accordingly, the project considered the increasingly important social issues that affect the planning of multi-family housing units: e.g. child care, family life, health, education, mobility, environment, energy systems, work, life cycles and lifestyle.

The findings of *inkl.wohnen* (Thür et al., 2006) served as the framework for the residential area project *Sandgrubenweg*, a complex of 78 condominiums and a large office floor located in Bregenz. Construction of the first stage began in mid-2005 and was completed in October 2006; the second stage was completed in April 2010. During the project's planning phase, Rhomberg organized a workshop devoted to the question, how will we live in the future? Together with experts, the workshop's 70 participants defined their personal requirements for current and future living, from individual floor plan design to furnishings. Thanks to a reinforced concrete skeleton construction, the interior walls are not load-bearing, allowing buyers to design the floor plan and interiors according to their needs. With the help of an order form they were free to determine the configuration, the desired materials and the colors themselves. This gave the buyers a detailed sense of their future home and a great deal of cost transparency from the start. And it enabled the builder to retain maximum flexibility in the design of the interiors. Topics such as memory, perception and infrastructure also figured in the planning process. All this feedback appears to have worked:

*Sandgrubenweg* receives the fewest complaints of all the properties in Rhomberg Bau's portfolio (Rhomberg Bau, 2012, p. 7).

But such alternative approaches to planning require perseverance when it comes to convincing partners and staff. As one interviewee put it, there were always at least 10 people who knew why it would not work, whether because it was too expensive or impractical (Interviewee A, 2017). Hubert Rhomberg registered the concerns and replied: "We'll just do it and see how it turns out."

The original goal was to construct all residential units as low-energy buildings. After excellent insulation values and very good air-tightness were achieved for the first two residential units, Rhomberg decided to design one of the two buildings in the second construction phase as a passive house (Haus der Zukunft, n.d., p. 4). Passive houses have higher energy efficiency standards than low-energy houses. For instance, the target value for the energy consumption of a passive house is approximately 1.5 liters of heating oil (or its equivalent) per square meter and year. A low-energy house allows around twice that amount.

After completing the *Sandgrubenweg* project, Rhomberg Bau commissioned a study to assess energy use and resident satisfaction. For 34 months, meters installed in the apartments of one of the low-energy buildings and of the passive house measured energy and resource consumption, and residents received regular questionnaires. The data showed no significant differences between building types, with both receiving very good values for living comfort, especially with regard to indoor air quality (alpS GmbH et al., 2013, p. 23).

The *Sandgrubenweg* study also examined the connection between highly developed building technologies and individual user behavior. The results showed that even very small changes in building technology settings can lead to a noticeable increase or decrease in energy consumption. While the actual values of the low-energy building did not deviate much from the target values, a quadrupling of the effective heat consumption compared to the target values was observed for the passive house. According to the authors of the study, this massive difference was mainly due to higher interior temperatures and incorrect settings in the building's heating and cooling systems (Schreglmann, 2013). The lesson for Hubert Rhomberg was that the building sector needs not only technology. It also needs to work on raising awareness: "The construction industry and political leaders must both work to educate the public; otherwise the best passive house technology is useless and merely raises false expectations." (ibid.)

The Rhomberg Group has sought to promote the value of communal life at the *Sandgrubenweg* development by providing a range of services. One residential unit came with a common room and outside meeting areas. In addition, all residents were given access to a shopping service, a laundry service, a relocation service and advice on getting from place to place. The in-house bicycle parking spaces are equipped with a service and repair station. Initially, the residential area also featured a Caruso car sharing vehicle, but it was removed due to lack of use. The car was not actively used because the residents did not realize it belonged to the residential area, just as its playground or a laundry room does (Interviewee F, 2017).

Contrary to initial fears, and thanks to the perseverance and commitment of all those involved, the project was a financial success. Moreover, the project's approach to construction has lent the Rhomberg Group a sterling reputation (Interviewee B, 2017). As one interviewee put it: "In the end it was a positive for everyone. The engineers made an effort and although the focus was clearly on sustainability, it also worked surprisingly well economically" (Interviewee I, 2017). What *Sandgrubenweg* showed, in other words, was that it is possible to build differently.



## Cradle to Cradle

As emphasized previously, the construction industry produces an enormous amount of waste, around 60% of the planet's total. There are two ways to reduce waste: produce less of it or reuse what is produced. Michael Braungart, who helped pioneer the cradle-to-cradle principle, sees nature as a role model for the latter: "Nature has been producing completely inefficiently for millions of years, but effectively. A cherry tree produces thousands of flowers and fruits without polluting the environment; quite to the contrary: as soon as they fall to the ground, they become nutrients for animals, plants and soil in the surrounding area" (Fuss, 2004).

In 2007, Rhomberg had Braungart's principle in mind when it launched Rhomberg Recycling GmbH. The next step in Rhomberg's commitment to resource efficiency and sustainability, the new operation collects waste wood, industrial and commercial waste, waste paper, metals, construction waste, and mixed plastics and recycles them at its resource center in Vorarlberg Rhine Valley. For instance, during the remodel of the Feldkirch railway station Rhomberg used an industrial rail line to transport demolished concrete and steel to its resource center, where most of it was reprocessed into usable building materials. Thanks to its efficient approach, Rhomberg was able to eliminate 15,000 truck trips and salvage 275,000 tons of raw materials, all in a single project.

Just a few years after opening its doors, Rhomberg Recycling was collecting 70,000 tons of waste annually. It can now wash and sieve gravel from construction sites and reuse around 25% as filler material for concrete manufacturing. It can recycle close to 100% of construction waste and wood; and it can sort plastics by size, color, and type, sending them to a plastics recycling plant for further processing. Furthermore, the plant can incinerate unusable waste and utilize the resulting heat for electricity production and district heating. Of the 70,000 tons of waste that pass through the facility, only around 2,000 tons, or less than 3%, end up in a landfill. In 2012, Rhomberg Recycling added 1,000 square meters to its 10,000-square-meter recycling center. The expansion was needed to meet growing demand and extend its range of products and services. Now the facility can offer waste storage to external parties.

In addition to recycling, the Rhomberg Group takes a holistic approach to its projects in general, managing everything from the extraction of building materials at its quarries to the calculation of lifecycle costs for buildings and the follow-up assessment of completed projects. Implementing this holistic approach requires foresight across all its areas of business in the railway and construction sectors. From the earliest planning stages, Rhomberg takes into account repurposing options at the end of a project's lifespan. For instance, Rhomberg created manuals instructing crews on how to dismantle the LifeCycle Tower in a way that preserves its valuable raw materials. Rhomberg also seeks to provide a recycling solution for track ballast that needs replaced. In this way, Rhomberg has become a full-range supplier and contractor covering all phases of a project (Rhomberg Bau, 2014, p. 2).

Lifecycle thinking can be appealing to investors as well. Soon after Rhomberg began general contracting, they were tasked with building a sports equipment production facility. The investor was concerned that such a large factory might pose risks if the manufacturer could no longer operate at full capacity. So Rhomberg proposed the creation of three smaller, multifunctional plants, each with its own access point. This increased the likelihood of long-run use for each plant, and the investor signed off on the plans (Interviewee C, 2017).

Another example of Rhomberg's commitment to lifecycle thinking is the master's program it designed together with the Donau University Krems. Starting in April of 2011, the university offered students the chance to enroll in Lifecycle Management for Construction, its first two-year degree course in green building (Rhomberg Bau, 2012, p. 10).

All these examples show the Rhomberg Group's unique commitment to environmental responsibility. In a 2017 interview, Hubert Rhomberg described his company's philosophy: "What is important is not, as in the past, that we repair the environment after the damage is done. We must start by deciding what we want to introduce into the environment. That is responsibility."

## Network Building

In 2009, four individuals formed Caruso, a working group to promote car sharing in the Vorarlberg area. Three years later, Rhomberg turned to Caruso's project leader, Christian Steger-Von Metz, to propose car sharing options for the *Sandgrubenweg* residential area. Always interested in car sharing for residential complexes, Hubert Rhomberg decided to forge a regional partnership with Steger-Von Metz to foster sustainable mobility. In mid-2015 the nonprofit Caruso CarSharing Cooperative was born, with Hubert Rhomberg as chair.

Although Caruso has not been around for long, it is already turning a profit (Interviewee I, 2017). Earnings have been reinvested in the company instead of being distributed (Caruso Carsharing eGen, 2015, p. 13). According to Interviewee F (2017), Caruso CarSharing has a two-fold business model. On the one hand, the cooperative operates a network of mostly electric cars in the Vorarlberg area; on the other hand, it offers consultation and sells booking software and on-board computers throughout Austria. One of its current projects is the optimization of Rhomberg Bau's vehicle fleet. It is also in the process of placing a car sharing vehicle at the *St. Gebhardstrasse* residential complex in Bregenz (Rhomberg Bau, 2016, p. 7).

Another central concern of Rhomberg is reducing the enormous amount of resources used in the construction industry. In 2009, Rhomberg became a founding member of the Austrian Sustainable Building Council (*Österreichische Gesellschaft für Nachhaltige Immobilienwirtschaft*, or ÖGNI). The nonprofit organization promotes the establishment of CSR standards, identifies landmark projects in sustainable construction, and certifies construction and real estate firms whose practices meet its ethical standards. In June 2012, Rhomberg Bau was the first Austrian construction company to be certified by ÖGNI standards (Rhomberg Bau, 2012, p. 3). The LifeCycle Tower of CREE and the headquarters of the Rhomberg Group in Bregenz also received ÖGNI recognition.

Rhomberg Bau puts great emphasis on the creation of networks through membership in regional organizations. Around five years ago, Hubert Rhomberg launched the initiative "*Moll, des goht!*" ("Yes, it works!") together with eight other family-run businesses in the Vorarlberg region. The aim of the project is to make Vorarlberg a model for sustainable business practice while drawing attention to important topics such as education, energy and nutrition. In the spring of 2012, local power plants initiated what would become the first of three Energy Efficiency Networks. With this initiative, some two dozen companies, including Rhomberg, created a system to increase the energy efficiency of their operations and reduce global warming. The networks have since facilitated energy consultations from experts in the field and regular meetings where members can share their experiences. The initiative specifically called on each of its members to increase its energy efficiency and reduce its CO<sub>2</sub> emissions by 6% by 2015. The network exceeded these targets by more than 2% (Vorarlberger Kraftwerke AG, 2015, p. 16). For its own contribution, Rhomberg invested 30,000 euros in its quarry processing plants, reducing annual electricity use by 220 MWh.

The Climate Neutrality Alliance 2025 (*Klimaneutralitätsbündnis 2025*) is a similar effort. In 2013, Rhomberg Bau and nine other Vorarlberg companies set themselves the task of completely offsetting their CO<sub>2</sub> emissions by 2025. Each company promised to cut its CO<sub>2</sub> emissions annually by one-twelfth through 2025, or at least to offset an equivalent amount of carbon by purchasing CO<sub>2</sub> certificates (Rhomberg Bau, 2016,

p. 13). In January 2015, the Climate Neutrality Alliance 2025 opened membership to any business interested in pursuing this goal. The alliance now consists of over 100 partners, who together have since kept 190,000 tons of CO<sub>2</sub> from entering the atmosphere.

Rhomberg is partnered with Smart City Rheintal, one of more than 60 projects throughout Europe for the development of intelligent energy, mobility, and urbanization strategies (Rhomberg Bau, 2016, p. 7). Smart City Rheintal is now planning four emission-free districts in the Vorarlberg Rhine Valley. Likewise, Rhomberg works closely with nonprofit building contractors such as *Wohnbauselbsthilfe Vorarlberg*, *Alpenländische Heimstätte*, and the *Vorarlberger gemeinnützige Wohnungsbau- und Siedlungsgesellschaft (VOGEWOSI)*, whose mission is to create affordable housing. In 2014, Rhomberg was active in nine such building projects (Rhomberg Bau, 2015, p. 5).

To these ends, Rhomberg also formed a working group with a variety of partners on the topic of micro apartments, one-room residences with high-quality design. In seeking to design affordable housing that maximizes comfort, the working group takes into account the psychological needs of residents as to lighting, room height, colors, materials, and shared space. The group also works together with a furniture manufacturer to create furnishings that optimize living areas and storage space.

Thanks to these partnerships and joint efforts, Rhomberg has earned itself a reputation in the Vorarlberg region and beyond for its commitment to sustainability and socially minded practices.

## CREE

In 2010 Rhomberg founded the company CREE GmbH. CREE, which stands for "Creative Resource & Energy Efficiency," is named after the Cree tribe of North America, an indigenous people whose tradition places great value on preserving nature. As one Cree saying has it, "Only when the last tree is felled, the last river poisoned, the last fish caught, will you realize that money cannot be eaten." Like the *Sandgrubenweg* project, CREE emerged from a research project and Rhomberg's desire to prove that, despite the naysayers, the seemingly impossible was possible. The project, 8+, was initiated by the architectural firm Schluder Architektur ZT GmbH in Vienna as part of Building of Tomorrow PLUS, a cooperative program of the Federal Ministry of Transport, Innovation and Technology and the Austrian Research Promotion Agency. Rhomberg worked with Schluder Architektur to develop a timber-framed office building exceeding eight stories for urban areas. The goal was to establish high-quality timber construction in high-density urban areas. While wood as a structural material is still around 70% more expensive than reinforced concrete, its turnkey cost is only 12–14% higher (Bundesministerium für Verkehr, Innovation und Technologie, 2008, p. 156). The advantages of wood include faster construction times (due to prefabrication), flexibility, and a smaller carbon footprint. The project's investigators originally assumed that between 8–12 floors were possible, but ultimately found that up to 17 floors could work, with the potential of even more stories in the future (proHolz Austria, 2008, p. 2).

The LifeCycle Tower (LCT One) in Dornbirn was Rhomberg's attempt to prove that a timber-framed high-rise was not only possible in theory but achievable in practice. Working together with the newly founded company CREE, Rhomberg completed LCT One, Austria's first ever eight-story wooden structure, in 2012. In addition to meeting the technical challenges of high-rise wood construction, the project highlighted the importance of resource efficiency and lifecycle considerations in the construction sector.

Though wood makes up most of the LifeCycle Tower, other materials were used when it was more efficient and functional to do so. One example are its hybrid ceilings, in which reinforced concrete is intermixed with wood for optimum sound, noise, and fire protection. According to Rhomberg, this approach reduces CO<sub>2</sub> emissions by 90% while reducing construction time by 50% relative to conventional reinforced concrete

buildings. Calculations show that the LCT method emits 9,493 fewer tons of CO2 equivalents than does a comparable reinforced concrete construction when taking into account production, maintenance, and disposal (Rhomberg, 2016, p. 265). As a result, the ecological backpack of the building is reduced by about half (Rhomberg, 2016, p. 262). Rhomberg's decision to purchase a 50% stake in Sohm Holzbautechnik in 2013 underlines its commitment to wood as a building material.

In the future, Hubert Rhomberg would like to see building permits based not only on blueprints, but also on materials and dismantling instructions. "I plan a building quite differently when I have to have a concrete idea of how to disassemble and reuse the materials right from the start," he says (Rhomberg Website, 2014). For Rhomberg, the dismantling of the LCT One is a crucial issue. "We wanted to build something that consumes 50% fewer resources while allowing those it does to be reused later" (Rhomberg Bau, 2012, p. 7). Hubert Rhomberg wants to ensure that all construction materials can be dismantled, recycled, or reused in other buildings (Rhomberg, 2015, p. 121). This is just one of the many challenges of *Bauen 4.0* (Building 4.0), a turn to sustainable construction that Rhomberg discusses in his book of the same name (described in detail below).

Although the LCT project was realized by the CREE company, it provided an immense boost to the image of Rhomberg Bau. Interviewee C (2017) describes it as "a world-champion achievement in marketing measured by the effort involved." As the interviewee explained, the achievement was made possible by Hubert Rhomberg, "who impressed everyone with his enthusiasm and his missionary attitude to the subject." Even in Vienna, almost seven hours by car from the company headquarters in Bregenz, Rhomberg Bau's timber structures are increasingly creating buzz (Interviewee D, 2017).

The successful completion of LCT One proved that it was possible to construct a multi-story building with a prefabricated modular composite of wood and concrete, and it showed that it was possible to finish such a project faster than using conventional reinforced concrete alone. What is more, Rhomberg has used the project to lay the foundation for the future of timber-concrete composite, inspiring similar projects such as the Illwerke Zentrum Montafon or a mixed-use building in downtown Memmingen.

## Bauen 4.0

In 2015, Hubert Rhomberg published his book *Bauen 4.0* (Building 4.0). In it, he looks back on his ten-year effort to develop a new approach to construction that maximizes resource conservation. The book recounts Rhomberg's at times audacious journey to erect high-rise buildings from wood despite the bewilderment of experts, who considered it impossible.

In his book, Rhomberg identifies three megatrends that he thinks will determine the future of construction: resource scarcity, global warming, and urbanization (Rhomberg, 2015, p. 27). In the face of the global challenges associated with each trend, the book describes how the construction industry can make an enduring contribution. In developing the LifeCycle Tower, for instance, the research team focused on three work phases: systematization, modularization, and technologization.

The book's title borrows from the new automation trend Industry 4.0. But while Industry 4.0 envisions the smart factory, *Bauen 4.0* envisions the smart building. Smart buildings are like intelligent organisms, bionic structures whose components adapt automatically to changing environments. Planning such buildings, writes Rhomberg, is cybernetic, relying on agile structures and organizational forms that increase cooperation. The process can be likened to the swarm intelligence of ants, where individual intelligence serves a collective purpose. Rhomberg's ideas are bold, and as such are likely to upset and alarm today's construction industry.

As Rhomberg stresses, building in the digital age means using new technologies to open up new possibilities. The question is how digital tools can help optimize sustainability. *Bauen 4.0* describes the research that ultimately led to the realization of the LifeCycle Tower (LCT One) in Dornbirn. The building epitomizes the principles of its builder, CREE, which in turn epitomizes the principles discussed in *Bauen 4.0*.

As Rhomberg explains, CREE's work draws on an extensive digital palette. It deploys BIM – Building Information Modeling – from the earliest planning stages. With BIM, data exchange between project participants takes place via an internationally standardized format. This enables consistent and collaborative planning with an open database structure that integrates new work as it is completed, helping to increase workflow and reduce errors. Using this systematic top-down approach, CREE designs project components that can be adapted to the requirements and regulations of any country. Moreover, it allows planners to anchor sustainability at a project's core. For example, they can select materials that have less environmental impact, that are available regionally, or that can reduce global warming. CREE's modular approach to planning has another important effect: it facilitates industrial prefabrication, which offers better working conditions and fewer accidents than work performed at the construction site. Industrial production also helps reduce waste production and better reuse materials. Elements that fit precisely obviate the need for harmful adhesives and sealants. And CREE exploits the potential of the Internet of Things (IoT) to minimize the energy and resource consumption of buildings. Rhomberg calls it the "software" of the smart building (Rhomberg, 2015, p. 173).

CREE is also breaking new ground in marketing. The BIM components, which are much like digital Lego bricks, can be downloaded free of charge from the BIM platform of BIMObject, a publicly traded company (bimobject.com). "Our system," explains Rhomberg, "focuses on certain types of buildings, but the idea behind it is universal. In principle, anyone can copy us. We think this would be good, because the more concepts rely on systematization and modularization, the faster bionic thinking spreads in the construction industry" (Rhomberg, 2015, p. 171). CREE seeks to internationalize its approach by opening up new markets around the world. It begins with the development of systematic construction and continues with the expansion of the system via platforms, sales partners, and a subsidiary in the USA. CREE also uses new media such as YouTube or Twitter to publicize its approach.

CREE knows how to make optimum use of the possibilities of digital transformation in the construction industry for the sake of sustainability. It addresses the major social and environmental challenges of our time with a completely new host of strategies, business models, products, and services.

## Going Public

In 2012, two years after the foundation of CREE, the Rhomberg Group first published *SinnEntFalter* (*unfolder of meaning*), a report for external stakeholders that describes its achievements and future goals in sustainability. The *SinnEntFalter* also serves to raise employee awareness about sustainability by featuring articles on environmental issues, current projects, social issues, mobility, health, compliance, and innovation.

The report, published in the form of a newspaper, appears every two years. For the odd years in between, Rhomberg publishes a poster on current topics. Rhomberg made a conscious decision to separate *SinnEntFalter* from the group's corporate identity so as to ensure its autonomy (Interviewee E, 2017).

In the introduction to the first issue of the *SinnEntFalter*, its authors note that they never intended to publish such a report. That they nevertheless did come from encountering international reporting

standards and realizing how important it was to take a self-critical view: "Self-examination is sometimes painful – but it is often gratifying" (Rhomberg Bau, 2012, p. 2).

The international reporting standard for sustainability reports is the GRI Index, which was developed by the Global Reporting Initiative (GRI) to determine which indicators and topics a sustainability report should contain. As with most CSR reports, GRI Index certification is voluntary. The Rhomberg Group has adopted the elements it believes is important, thus acting in line with the slogan: Where can Rhomberg make sense?

This touches upon a major point of criticism that is made concerning CSR reporting. If a company does not certify its reporting, then it is free to decide on which topics it will report. Such is the case with Rhomberg. In this way, sustainability reports can suffer from a lack of credibility (Knebel and Seele, 2015, p. 197). Rhomberg, however, is concerned less about satisfying all the criteria of the GRI Index than about communicating projects or company focal points and discussing the sustainability aspects that went into them (Interviewee E, 2017).

With *Bauen 4.0*, Hubert Rhomberg has chosen a vehicle with which to reach people far beyond the company's existing networks. At the end of the book, Rhomberg invites readers to have a seat at the cybernetic table and to engage in dialog with him concerning *Bauen 4.0*. Perhaps this could lead to the start of a new network.

### Well Worth the Effort

In 2015 Rhomberg received the TRIGOS Award in the "large companies" category for its commitment to CSR. The jury was impressed by its holistic approach to sustainability. Other factors in the jury's decision include Rhomberg's efforts to reduce resource consumption through the use of recycled and regionally sourced materials; its ÖGNI certification for ethical corporate management in 2012; its long-term partnerships with low-income housing developers; and its reporting efforts in the *SinnEntFalter*.

In 2016, the Rhomberg Group took 4<sup>th</sup> place in Austria's Great Place to Work competition in the "companies with 251–500 employees" category (an improvement of three places over its performance 4 years earlier). In 2017 it came in first at the Top Employer in the Construction Industry competition, which is organized by the business magazine Trend, the employer evaluation platform Kununu, and the Statista statistics portal. Three years earlier, the government of Vorarlberg officially recognized the company as an "excellent family-friendly business." Another expression of the Rhomberg Group's strong social commitment to sustainability toward its employees is its low staff turnover (Interviewee B, 2017). And between 2013 and 2016, 95% of employees on parental leave returned to the company afterwards (Rhomberg Bau, 2016b, p. 16).

Interviewee B (2017) noted that "a company can achieve real sustainability beyond mere words on a page only if you can get your employees on board." To these ends, Rhomberg has introduced targeted activities to involve its employees in its sustainability efforts. One such event is the annual mobility campaign. In the months from April to September, employees who agree to use alternative means of transportation to get to work receive vouchers from regional shops. In 2009, Rhomberg employees drove 25,000 fewer kilometers as a result; in 2016 they cut their total car travel by 132,000 kilometers (Rhomberg Bau, 2016a, p. 18).

A look at the company's sales figures shows that sustainable construction need not be at odds with economic growth. From 2002 to 2017, the annual revenues of Rhomberg's construction division increased from 55 to 278 million euros (Rhomberg Website, 2017). In fiscal year 2011/2012, construction revenues amounted to just over 180 million euros (Rhomberg Bau, 2014, p. 8), and peaked at over 280 million euros in 2014/2015. This tremendous growth and financial success are attributable not least to Rhomberg's

strategy of becoming a full-service provider – that is, to provide services across the entire value-added chain of a project. By employing this strategy, Rhomberg has increased its influence over project planning and construction and can thus impact sustainability aspects over the entire project lifecycle.

The *Sandgrubenweg* project, with its holistic approach to sustainable construction, gave Rhomberg's reputation a significant boost. Rhomberg has since utilized the same careful planning and execution of the *Sandgrubenweg* project in subsequent work. "Today we can optimize building lifecycles in their planning stages and prepare CO2 balance sheets in advance, which reduces operating costs and conserves resources. More and more, customers see these services as a reason to go with us" (Rhomberg Website, 2011).

One example is the Star Inn Hotel Premium Vienna Central Station, for which Rhomberg Bau served as initiator, developer, builder and general contractor. Completed in 2015, the hotel has been called "a beacon for sustainable building in Austria" and was the first hotel building to meet LEED Gold criteria (Rhomberg Bau, 2016a, p. 11). LEED – Leadership in Energy and Environmental Design – is an internationally recognized certification system that assesses environmental factors along with social aspects such as indoor climate, workplace quality, location, and technical innovation.

Another one of Rhomberg's projects is located in the village of Lech. A former schoolhouse, the "*Haus des Kindes*" is now "the most energy-efficient and environmentally friendly listed building in the Vorarlberg region" (Rhomberg Bau, 2014, p. 4). Rhomberg was able to eliminate more than 90% of harmful construction-related emissions in the interiors and reduce heating requirements to meet 2014 standards for new buildings.

With its array of achievements, accolades, and certifications, Rhomberg has demonstrated that tireless pursuit of sustainable construction is well worth the effort.

## RESEARCH APPROACH

### Methodology

The case study of Rhomberg Bau collected data from three sources: an online survey, individual interviews, and an analysis of archival data. Its research employed both qualitative and quantitative methods. Data collection began with an analysis of public information to assess the suitability of Rhomberg for the study and to create an initial framework for the research. The study's author then prepared and conducted a SCALA survey. After evaluating the results, he created interview questions designed to clear up areas of uncertainty, delve more deeply into certain topics, get better data, and avoid systematic errors. Finally, Rhomberg provided the author with private records from the company archive to help verify data and gain some additional insight.

### Focal Topic

Planning and constructing a building is a complex process. It involves many actors, and they can shape the sustainability of a building in a number of different ways. Buyers, planners, and contractors play a central role in the decision-making process. If sustainability is not an integral part of ordering and planning from the outset, it will be difficult for suppliers and contractors to ensure a sustainable execution.

When is a building truly sustainable? Though there are now many sustainability certification standards, they can obscure the true ecological performance of a building, leading to what is known as greenwashing. This occurs when, say, the effective power consumption of a building far exceeds the values calculated during its planning. Are such certification standards the best way to ensure truly sustainable buildings? Instead of planning first and thinking about sustainability later, a better approach would be to factor in sustainability from the start. In addition to reducing the negative impact on people and the environment, this approach to sustainable construction seeks to find solutions to social and ecological problems.

In the past decade, digital automation – sometimes referred to as the fourth industrial revolution – has had a growing influence in the construction industry. Soon digital transformation will play an essential role in all areas of planning and execution. In the process, new technologies will emerge that can link together every aspect of a project into a single holistic approach.

This raises the central question of the study: how can sustainability be made an integral part of planning and construction? More specifically, how must planning and construction companies change in order to make a real contribution to solving social and ecological problems? And how can the digital transformation of planning and construction support sustainability and establish it as the new industry standard?

This case study is intended to help learn from sustainability pioneers and identify strategies for creating a sustainable construction industry.

### Data Collection

#### Survey

The SCALA survey was developed by Miller Consultants Inc. The American consulting firm specializes in the field of sustainable business management. The purpose of SCALA™ (Sustainability Culture and Leadership Assessment) is to provide companies with information about their organization's ability to implement sustainability strategies. The survey assessment is based on benchmark data. SCALA™ builds on a wide



range of research methods, including case studies, fieldwork, survey research, archival research, and empirical analysis. In 2010 and 2011, investigators from Miller Consultants conducted more than 200 interviews in over 60 companies to study how businesses develop and implement sustainable strategies. On the basis of their findings, they identified certain managerial and organizational patterns. They then tested these patterns in a series of surveys, where they compared responses from leading sustainable companies with those from a control group. The current version of SCALA™ is based on the investigator's cumulative research (Miller-Perkins, 2011).

The survey for the Rhomberg case study comprises a total of 45 questions in four sections. The first section asks respondents to indicate their company division, function, age group, and sex. The second section consists of 26 questions about company organization. Eight questions are about leadership; four, about organizational systems; four, about corporate culture; four, about readiness for change; three, about internal stakeholders; and three, about external stakeholders. The eleven questions in the third section rate the organization using Dyllick and Muff's typology matrix. The final section contains four questions related to the focus of the study. The survey consists mainly of closed questions with several open ones scattered throughout.

Thirty-seven individuals at the Rhomberg Group were asked to participate; 34, or 92%, submitted completed surveys. The surveys were sent to three members of Rhomberg Holding, six persons in executive management, seventeen persons in divisional management, and eleven persons in group service management. All survey participants were from Rhomberg management. The exclusive focus on management-level employees was due to the fact that they were responsible for strategic decisions and initiatives relevant to the case study.

## Interviews

The interviews contained a mixture of structured and unstructured elements. A general outline was prepared for each interview to guide the discussion. To elicit more spontaneous responses, interviewees were not shown the outlines ahead of time. The interviews usually lasted between 45 and 60 minutes. All interviews were recorded and later transcribed. The interviewees received a copy of the transcript for review but did not make any changes or deletions. The participants consisted of seven individuals from management, one construction site employee and one external representative.

### List of interviewees:

- Hubert Rhomberg – CEO, Rhomberg Holding; CEO, CREE GmbH; Chairman, Caruso CarSharing; CEO and Member Owner Board, Rhomberg Sersa Rail Group
- Ernst Thurnher – CFO, Rhomberg Holding; CEO of the Executive Board, Rhomberg Bau; Member Owner Board, Rhomberg Sersa Rail Group
- Peter Greussing – Managing Director, Rhomberg Bau; Member of the Board of Directors, Rhomberg Bau Switzerland
- Gerhard Vonbank – Managing Director, Rhomberg Bau; Head of General and Total Contractor, Rhomberg Austria and Germany
- Matthias Moosbrugger – Head of Marketing and Communication, Rhomberg Group
- Stefan Rusch – Business Unit Manager Resources Center Rheintal; Operations Manager, MIGU Asphalt Construction

- Markus Scherrer – CFO, CREE GmbH; Managing Director, Sohm HolzBautechnik GmbH; technical advisor to the Management Board of Rhomberg Holding and responsible for operational implementation, project management and sustainability
- Darius Duschinski – foreman, Rhomberg Bau
- Verena Steidl – Managing Director and Deputy Chair, Caruso CarSharing

The interviews were an opportunity to discuss instances of ambiguity in the SCALA surveys and to find answers to questions raised by some of the responses. The interviews helped develop a clearer picture of Rhomberg's efforts in sustainability over the years and provided valuable insights into individual sustainability initiatives, their catalysts, and their effects on the company. The interviewees consisted of representatives from management (Holding, Construction Austria, Switzerland, System Construction, Construction and Resources, Timber Construction and CREE) and from group services (Sustainability and Project Management, Marketing and Communication), covering almost all the company's divisions.

### Data Triangulation

The section "Rhomberg's Journey to Sustainability" is based mostly on archival data and supplemented by detailed information from the interviews. The results of the SCALA survey form the starting point for the general discussion and the data triangulation in "Undergoing the Challenges of Business Sustainability". This section follows the findings of an earlier article by the study's author (von Arx, 2015), in which he examines what constitutes a sustainable business, which prerequisites must be fulfilled beforehand, and which challenges must be mastered in the process. The analytical part of the case study follows a systematic approach. It builds on the topics of leadership, change readiness, and climate and culture. Then it follows the development of the company as it moved from business as usual through three progressive stages of business sustainability. The study's arguments are based on the SCALA survey results, which were corroborated with statements from the interviews and the company's archival documents.

In the closing section, "Conclusion and Discussion," the study's findings are summarized and discussed and answers are provided to the essay's initial questions.

## UNDERGOING THE CHALLENGES OF BUSINESS SUSTAINABILITY

### Business Sustainability

"Rhomberg's Journey to Sustainability" describes how Rhomberg addressed and implemented sustainability measures in various areas gradually over time. The next section examines how these sustainability initiatives were introduced and the persons or circumstances that precipitated them. What impact did the initiatives have on those that launched them and on the company in general? How did the initiatives influence corporate culture? After addressing these questions, the section assesses the company's progress based on Dyllick and Muff's Business Sustainability Typology (2015).

What does business sustainability mean? What characterizes a sustainable company and how is its progress measured? Before embarking on the path to a sustainable future, businesses must think about what constitutes a truly sustainable enterprise. It helps to learn from companies that have already undertaken the journey.

According to Dyllick and Muff (2015), three essential steps must be taken on the way to creating a sustainable business. The first is a commitment to social and environmental responsibility, which requires that businesses focus less on profits for shareholders than on benefits for stakeholders. Second, it is important to recognize that companies can be interested in more than economic results; they can also want to create ecological and social value. Third, true business sustainability can only be achieved if a business consistently focuses its products and services on major unsolved environmental and social problems. A company must not limit its efforts to minimizing its negative impact on the environment and society; it must also make positive contributions to overcoming these challenges.

Thomas Dyllick (University of St. Gallen) and Katrin Muff (Business School Lausanne) have developed a four-level model with which to assess the sustainability level of a business. The model is based on three central development steps, starting with the business-as-usual case (based on Milton Friedman's economic model) and ending with a company that makes a positive contribution to solving social and ecological problems. It is about what a company does, for whom it does it, and how it does it. The model itself is not an instruction manual. However, it helps classify the sustainability efforts of businesses and to gauge the progress they have made toward sustainability. In this section, the typology can be used to illustrate Rhomberg's commitment to sustainability.

<b>BUSINESS SUSTAINABILITY TYPOLOGY (BST)</b>	<b>Concerns (What?)</b>	<b>Values created (What for?)</b>	<b>Organizational perspective (How?)</b>
Business-as-usual	<b>Economic concerns</b>	Shareholder value	Inside-out
<b>Business Sustainability 1.0</b>	<b>Three-dimensional concerns</b>	<b>Shareholder value</b>	<b>Inside-out</b>
<b>Business Sustainability 2.0</b>	<b>Three-dimensional concerns</b>	<b>Triple bottom line</b>	<b>Inside-out</b>
<b>Business Sustainability 3.0</b>	<b>Three-dimensional concerns</b>	<b>Creating value for the common good</b>	<b>Outside-in</b>
<b>Key shifts involved:</b>			
	<b>1<sup>st</sup> shift: broadening the relevant concerns</b>	<b>2<sup>nd</sup> shift: expanding the value space</b>	<b>3<sup>rd</sup> shift: changing the perspective</b>

Figure 1 – Business Sustainability Typology (Dyllick and Muff, 2016)

### Setting the Stage

According to the sustainability matrix of Dyllick and Muff, the transition from business as usual to true business sustainability involves passing through three stages of transformation. This requires a willingness to change, a supportive corporate culture, and innovative potential. To start this transformation, the

members of executive management must make a clear commitment to sustainability. They must serve as role models and leaders who help guide the company to a sustainable future. At the same time, the employees who implement the strategic initiatives must understand and care about sustainability (Accenture, 2012; Elkington, 2004; Lacy et al., 2010; Mesmer-Magnus et al., 2013; Moffat, 2010).

In the following we explore how Rhomberg started on the path to business sustainability. First we look at the prerequisites for achieving sustainability: a clear commitment, credible and convincing leadership, a willingness to change, a supportive working atmosphere, a supportive corporate culture, and the right instruments.

## Leadership

It began with a clear commitment. When Hubert Rhomberg took over operational management of the Rhomberg Group in 2002, he thought about why, exactly, he had accepted the position and how he wanted to work. One interviewee summarized the answers he found: "I wanted to build on what had been done so far, but I also wanted to take responsibility for what we do. We are a company that builds, everything has to do with building. I wanted to take a closer look at what we do and how we could make it sustainable" (Interviewee I, 2017). Many now consider Hubert Rhomberg a visionary, a pioneer, and a motivator. He often relies on stories when talking to employees. "Telling stories," he says, "is an essential way to explain connections." But he ultimately convinces them with his actions. "Hubert Rhomberg is someone who not only talks. He is a doer. He is someone who gets projects done" (Interviewee I, 2017). When it comes to sustainability, he is the one that everyone in the company and many outside the company look to. The Rhomberg Group does not have a Chief Sustainability Officer, or CSO. Its slogan is "CEO=CSO." As the company's sustainability report put it: "Responsibility for sustainability lies directly with the head of the company. As the CEO of Rhomberg Holding, Hubert Rhomberg also acts as the Chief Sustainability Officer of the group" (Rhomberg Bau, 2012, p. 3). When asked who is responsible for sustainability at the company, all the SCALA respondents and interviewees said Hubert Rhomberg. At Rhomberg, the CEO flies the sustainability flag, explains why it matters, and serves as a role model.

When asked what would happen to sustainability without Hubert Rhomberg, the interviewees said that the company would lose its font of new ideas. "I think creative new impulses would disappear completely," one interviewee said (Interviewee D, 2017). Another believed that not having their "great visionary" would be a "major setback" (Interviewee I, 2017). One, however, was more optimistic, pointing out that sustainability has been an integral part of processes in multiple departments for several years now (Interviewee E, 2017). Likewise, other interviews made clear that the company's owners and strategic decision-makers in Rhomberg Holding have come to see the importance of supporting sustainable business practices (Interviewee B, 2017; Interviewee C, 2017; Interviewee I, 2017). And 81% of the SCALA survey participants said that the management is committed to sustainability. 77% agreed with the statement that the management raises enthusiasm among its employees for sustainable topics and initiatives.

## Willingness to Change

Change is always associated with uncertainty, and often it creates anxiety. Companies that are constantly evolving and re-examining their practices have an easier time with change. As a rule, small changes are easier to adapt to than big ones. Businesses that want to achieve true business sustainability must begin with many small initiatives introducing sustainability into company practice. And they must use each success as an opportunity to show employees that change is beneficial and can even be fun. Rhomberg seems to be doing quite well in this regard. 72% of the SCALA survey respondents believe that company

employees would openly question company practices they found wanting. And 94% believe that the company has successfully implemented small changes.

Such gradual changes help prepare companies for the larger, much more fundamental ones that achieving true business sustainability also requires. Though the Rhomberg Group has yet to implement major initiatives affecting all its divisions, 50% of those surveyed believe that the company has demonstrated its ability to implement far-reaching changes. (Of the others, 40% were uncertain and 9% disagreed.)

The CREE project's focus on resource efficiency and lifecycle optimization is certainly an example of a far-reaching change. But the development of the CREE initiative occurred outside Rhomberg's core business area. Differences between employees at Rhomberg Bau and at CREE quickly emerged, many of them centering around work culture. Simple issues such as hours, breaks, and social media use at work led to disagreements. The CREE project enjoyed a strong degree of autonomy from the parent company. Only seven of the 35 SCALA survey respondents said that they had some involvement in the project, while 28 had little to very little to do with it.

Despite Rhomberg's success with implementing numerous small-scale changes, employees have yet to embrace change with real enthusiasm. One interviewee accounts for the lukewarm attitude as follows: "The company has developed a structure based on performance and success. The processes are clearly defined, which creates a certain amount of inertia. And this inertia is present regardless of the direction of the change." Nevertheless, employees support sustainability because they see that clients now want the same sustainable approaches that Hubert Rhomberg began to envision almost two decades ago (Interviewee I, 2017).

## Climate and Culture

For sustainability to become an integral part of a business, all employees must be prepared to change their behavior. Committed employees identify more with their jobs and their workplace (Eccles et al., 2012, p. 47). Such investment also brings advantages for employers. Employees who care about sustainability are usually highly motivated because their sense of responsibility extends beyond the company to a broader group of stakeholders. But achieving a broad-based commitment to sustainability among a company's workforce requires understanding how to involve and engaged all its employees (Aguinis and Glavas, 2012, p. 947). For this, a supportive corporate culture is indispensable (Elkington, 2004).

The Rhomberg Group describes its corporate culture in its mission statement. Of the eight basic principles that guide the company in its work, the first three focus on sustainability:

1. We are an independent family-run business built on long-term thinking and sustainable practices.
2. Our core values are consideration and respect, transparency and fairness, courage and innovation, exemplarity and integrity, life-long learning and long-term partnerships.
3. We find meaningful solutions for construction and railway technology that benefit our clients while adhering to sustainable principles.

The participants in the SCALA survey gave high marks to corporate culture at Rhomberg. The values they identified corresponded with those in the company's mission statement: trust, continuous learning, and commitment to sustainability for long-term success. The jury of Austria's 2016 Great Place to Work competition, in which Rhomberg Bau took fourth place in the 251–500 employees category, found something similar: "There is a familiar, open, and appreciative workplace culture in which people trust one another." After reviewing the results of the competition's comprehensive survey, in which 380 employees

took part, the jury noted "the trusting interaction with one another, the high degree of autonomy, and individual design and development opportunities" (Rhomberg Bau, 2016a, p. 21).

Interviewee D (2017), who has been with Rhomberg for many years now, was enthusiastic about these company attributes when he was hired. "Even as an intern, people trust you." This trust can also be felt in the individual business units, which enjoy a "relatively high degree of freedom" (Interviewee E, 2017). In the 3<sup>rd</sup> issue of *SinnEntFalter* (2016a, p. 20), Rhomberg explains that "managers create trust by embodying the values they hold and by keeping promises. This, in turn, fosters productive work. Creative freedom should promote creative work and bring into relief the potential for development. This automatically flows back into the project and ultimately benefits the company."

One place managers learn these skills is the Rhomberg Academy. Its educational programs are also designed for employees and trainees, who receive technical and organizational training. In addition, the academy offers personal development training in areas such as self-reflection and learning how others see you versus how you see yourself. The academy also holds regular lectures on sustainability. In this way, Rhomberg can cover much of its employees' professional development in-house while increasing its attractiveness as an employer (Interviewee B, 2017). 97% of SCALA survey participants agreed that continuous learning is a core concern for the company. In fiscal year 2010/11, around 150 employees completed 340 seminar hours (Rhomberg Bau, 2013, p. 3). Rhomberg also regularly hosts screenings of films on sustainability and the environment (Interviewee E, 2017).

74% of SCALA participants agreed (23% of which strongly) with the statement that Rhomberg employees are encouraged to learn more about sustainability from external sources as well. The key is to create opportunities, said one interviewee. "A company is never sustainable. The employees are" (Interviewee A, 2017). As a founding member of the Austrian Sustainable Building Council (ÖGNI), the Rhomberg Group provides several experts and auditors who are involved in the evaluation of sustainable buildings (ÖGNI, 2017). Besides this, though, we were unable to find any other indicators that employees are actively encouraged to learn more about sustainability from external sources. "Of course," says one interviewee, "employees are encouraged to network. But it is more about memberships than about networking. As far as sustainability networking is concerned, much centers on Hubert Rhomberg" (Interviewee I, 2017).

Sixty-eight percent of SCALA participants agreed with the statement that most employees believe that a commitment to sustainability is crucial to the long-term success of the company. This is a message that the company has already begun to promote: "For more than a decade we have understood sustainability as the most important factor for the future success of the Rhomberg Group" (Rhomberg Bau, 2012, p. 3). The responses from interviewees seemed to vary depending on whether they saw sustainability in terms of the 3 P's – people, planet, profits – or in terms of only a single aspect. For instance, one interviewee observed that "keeping up with the market is ultimately always a question of profitability. If sustainability is not economical, then it is no good at all. The sector is very competitive" (Interviewee G, 2017). Another interviewee (E, 2017) takes a slightly different view: "Look at the company's 130-year tradition. It is not a product, but I also see it as an example of sustainability. It is about managing a company in such a way that I can keep it afloat for more than 100 years."

## Extending Responsibility

Once the conditions for corporate transformation described in the previous section have been met, the first step toward true business sustainability is to take more responsibility. Business Sustainability 1.0 requires that companies cease to focus exclusively on the profits of shareholders and think more about the concerns of stakeholders. While companies continue to pursue their economic interests, they must also become

aware of how their business activities affect the environment and society. They must seek to reduce their negative impact on the environment and to give greater weight to the concerns of their employees and local communities. Most do this by using sustainability management to save costs and minimize risks.

"Corporate sustainability is an approach to business that creates shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments." (SAM and PWC, 2006; cited in Dyllick and Muff, 2016)

### From Shareholder to Stakeholder Value

In the SCALA survey, participants were asked to identify three reasons (from a list of twelve) concerning why Rhomberg began to address sustainability issues. The three most frequent reasons were "desire for innovation and growth" (63%), "awareness of our responsibility to the environment" (60%), and "desire to create long-term value for stakeholders" (51%). In-depth follow-up questions showed that Rhomberg is strongly committed to social sustainability for its employees. Responses to the question "Describe the social issues that your company is not currently addressing that you wish your company would address?" were so varied that no clear picture emerged. Respondents mentioned the promotion of support services and integration, remote work, and the increased involvement of employees in strategic and project-specific decisions.

### Internal Stakeholders

The participants in the SCALA survey mostly drew attention to social issues affecting employees. Several mentioned the promotion of training and further education, flexible working hours, and the work-life balance. Others reported that the company's employee health initiatives were well received.

Rhomberg uses its intranet and the *SinnEntFalter* to make employees aware of sustainability initiatives. In addition, the company organizes sustainability days and movie screenings and has placed a sustainability-themed pinboard in the reception area of the main building.

One interviewee (B, 2017) believes that Rhomberg's social commitment has earned it a good reputation as an employer, which gives it an edge on the competition when it comes to attracting highly qualified applicants. And he said that by valuing its employees and training its managers in-house, Rhomberg has reduced employee turnover, which in turn has had a positive effect on earnings. Interviewee D (2017) stated that employees also benefit from a forward-thinking HR department: Rhomberg was the first company in the Vorarlberg area to introduce paternity leave (for fathers), and its HR manager is proactive about reducing wage inequalities for equal work. Nevertheless, the company admitted in the latest issue of *SinnEntFalter* (2016a, p. 27) that the ratio of women to men in technical areas and management could still be improved.

Rhomberg regularly emphasizes the enormous use of resources in the construction sector and the importance of making it more sustainable. The aim, explains one interviewee, is to use narratives to get employees enthusiastic about sustainability (Interviewee A, 2017). But another interviewee stressed that Rhomberg, in its internal communication, should keep in mind that there are departments with little influence on sustainable construction that are nevertheless successful (Interviewee B, 2017). Despite this, 71% of the survey participants agreed and 17% strongly agreed with the statement "employees feel valued for their work." Employee articles in the first issue of *SinnEntFalter* (2012, p. 10) also stress the positive working environment and the company's special appreciation of its employees. The company very much wants employees to communicate complaints and suggestions. Indeed, any employee can approach Hubert

Rhomberg and speak his or her mind (Interviewee I, 2017). Interviewee H (2017) noted that the company responds to all suggestions and, when feasible, implements them.

In sum, Rhomberg Bau has, despite its size, remained a family business that cares about its employees.

### External Stakeholders

The *SinnEntFalter* and the Rhomberg website provide information to external stakeholders about the company's sustainability efforts. Those efforts also appear in the company's yearly customer magazine *Neue Dimensionen* and in regional media reports about Rhomberg. The Rhomberg Group has an excellent reputation as a builder and employer in the Vorarlberg region and beyond. The company owes this to Hubert Rhomberg's involvement in various regional networks such as "*Moll, des goht*" (a sustainability alliance of 8 family-run local businesses) and the car sharing company Caruso. In the area of social sustainability, Rhomberg Bau works closely with nonprofit companies to promote social issues such as affordable housing for the elderly and low-income earners. The company also organizes information events and discussion rounds on particular subjects. One example is the Hohenems quarry, which Rhomberg has operated since the 1970s. Dust and noise from the site frequently cause disputes with local residents and citizens' initiatives. The company has sought to address these disputes as proactively and constructively as possible by holding regular meetings with local representatives. Nevertheless, participants in the SCALA survey still see room for improvement in the company's interactions with external stakeholders; only around a third say that Rhomberg has mechanisms in place to actively engage with external stakeholders about its sustainability efforts.

When selecting suppliers, Rhomberg Bau does its best to stay within the region. For example, the communications department uses local printing services whenever possible. Moreover, it supports regional institutions and culture by sponsoring local associations (Interviewee E, 2017). Buying local is more difficult in the case of promotional items because many are produced in Asia (Interviewee E, 2017). The company also extends its regional focus to construction. As one interviewee put it, the company wants to do more than "cause trouble, dust and noise"; it also wants to create value (Interviewee D, 2017). One example of this is a hotel project in Montafon, where Rhomberg promised the mayor that "60% of the construction work will be awarded to firms within a 50-kilometer radius" (Interviewee D, 2017).

Company efforts to improve the local economic are paying off. For instance, Rhomberg was able to increase the share of regional purchasing in total purchasing from 59% in 2010 (Rhomberg Bau, 2012, p. 8) to over 78% in 2016 (Rhomberg Bau, 2016a, p. 17). These efforts were corroborated by two-thirds of the SCALA survey respondents, who agreed with the statement that the company encourages sustainability in its supply chain.

The company has less regional influence when it comes to the highly competitive general contractor market and public tenders. Some employees still see room for improvement here. Interviewee C (2017) believes that "tenders should be more closely aligned with sustainability." Hubert Rhomberg is of two minds on this issue. In the introduction to the first edition of the *SinnEntFalter* (2012, p. 2), he writes that the free market economy must take up the cause of sustainability and that neither state policies nor individual efforts are enough to establish it. But he also admitted in a round table discussion that as the public sector accounts for some 20% of construction sector spending, it could help incentivize sustainable construction (Rhomberg Bau, 2014, p. 6).



## Environmental Responsibility

A positive side-effect of regional value creation is shorter transport routes and reduced fossil fuel use and CO2 emissions. The Rhomberg Resource Center's local quarry and recycling program eliminates thousands of truck trips per year. According to Rupert Grienberger, a manager at Rhomberg, the company has "the shortest transport routes in Austria" (Rhomberg Bau, 2017, p. 12). The company alternative mobility program also reduces CO2 emissions. It offers employees vouchers from regional businesses if they commute to work from April through September using public transport or bicycles instead of cars. In 2016, its employees drove 130,000 fewer kilometers by car than they would have without the program (Rhomberg Bau, 2016a, p. 18). Rhomberg has also decreased its CO2 footprint by using more efficient machines and equipment and by introducing company car policies that reduce carbon emissions.

A major part of Rhomberg's commitment to the environment is its promotion of timber construction. In addition to storing carbon, wood is a renewable and regionally available building material. What is more, wood structures can be prefabricated, which shortens construction time, diminishes noise and air pollution, reduces waste, and cuts CO2 emissions by up to 90% relative to conventional buildings. Timber construction is also more resource efficient. For example, 500 kilograms of resources have to be removed from the earth to produce one kilogram of copper. By contrast, an average of 1.2 kilograms need to be removed in order to produce one kilogram of lumber (Rhomberg Bau, 2014, p. 12). Furthermore, wood's ecological backpack is five times smaller than that of concrete (Käö et al., 2013, p. 71).

In the third issue of the *SinnEntFalter* (2016a, p. 9) Hubert Rhomberg describes the ideal lifecycle of wood: "First wood is used for building construction, then it is repurposed for furniture, and only later is it burned to produce energy." Hubert Rhomberg's interest in resource efficiency became noticeable immediately after joining the management board, when he decided that all new office furniture should be purchased based on its ecological backpack, not on its price.

Rhomberg Bau helps customers reduce the ecological footprint of a project by providing environmental performance reports on request. The reports describe the environmental impact of construction and demolition as well as that of upstream processes such as the production of raw materials and supplies. The reports can also calculate lifecycle costs, though customers rarely ask for this (Interviewee C, 2017).

Based on the open SCALA survey question about the company's commitment to environmental issues, Rhomberg's employees are very supportive of efforts to promote timber as an alternative to conventional building materials and reduce CO2 emissions and resource consumption. When asked about which environmental issue Rhomberg should devote more attention to, however, the most frequent response was resource conservation. One respondent hoped that the company would "continue to scrutinize the conventional construction processes from the standpoint of sustainability."

Rhomberg requires that its employees think about ecological optimization during the planning stages of a residential building. There are checklists for everything from material production to building demolition, and employees must keep written records of the process (Interviewee E, 2017). Rhomberg hopes that this will give employees a head start should tendering criteria suddenly appear that "evaluate the topic of sustainability much more strongly than is currently the case" (Interviewee C, 2017). Besides, Rhomberg does not want to wait for governmental regulations to pass before taking responsibility for people and the environment. It wants to do it now.

## Redefining Value

The second step to true business sustainability is known as Business Sustainability 2.0. Here, businesses move from thinking about how to balance economic interests with ecological and social concerns to actually doing it. To do this, they must enshrine sustainability in their very mission. They need to define goals and strategies and formulate plans to achieve them. In contrast to Business Sustainability 1.0, the second stage of true business sustainability requires that businesses adhere to social and ecological values in addition to economic ones. The result is what is known as triple bottom line value creation. Its aim is to avoid or at least reduce the negative effects of the company's economic activity on the environment and on society, reducing its social and ecological footprint.

"Business sustainability is often defined as managing the triple bottom line - a process by which firms manage their financial, social and environmental risks, obligations and opportunities. These three impacts are sometimes referred to as people, planet and profits." (Network for Business Sustainability, 2012; cited in Dyllick and Muff, 2016)

## Organizational Systems

In the introduction to the 2015 issue of *Neue Dimensionen* (p. 3), Hubert Rhomberg states, "We want to do the right thing. And we want to do it right." He describes what this means for sustainability in the second issue of *SinnEntFalter* (2014, p. 2): "We have integrated [sustainability] into our corporate values and our management principles and now apply it to every single business area, every project, and every work process." One example is in residential construction. Several interviewees have mentioned the checklists prepared by the company to encourage employees to examine each project critically for more ecological alternatives (Interviewee B, 2017; Interviewee E, 2017). The checklists help new employees and saves time during training (Interviewee I, 2017).

Moreover, Rhomberg project manuals require employees to explain and discuss sustainability with investors. In this way, investors better understand the potential of sustainability and the requirements that a sustainable construction would make of them. The Rhomberg managers keep careful tabs on these discussions and are aware that some projects do not get as much attention as they would want (Interviewee A, 2017; Interviewee C, 2017). For its control mechanism, Rhomberg follows the dual control principle, in which an additional project developer must check that the potential for sustainable optimization has been exhausted (Rhomberg Bau, 2016a, p. 6).

Somewhat surprisingly, 62% of SCALA participants said that Rhomberg Bau lacked a company-wide management system for sustainability. At least on paper, however, things look different. Rhomberg Bau uses a continually updated integrated management system based on the ISO 9001 quality management system; and the company is certified by the ISO 14001 environmental management system and by the OHSAS 18001 safety and health management system (Rhomberg Bau, 2016a, p. 4). The most likely reason for the survey responses is that Rhomberg does not have a separate sustainability strategy. Rather, sustainability is part of its overall strategy (Interviewee I, 2017) and anchored in the individual departments. The findings from the interviews confirm that a company-wide management system for sustainability does indeed exist. More detailed questions revealed some uncertainty among employees about the nomenclature, however.

## Value for the Triple Bottom Line

Several SCALA questions asked whether the company factors sustainability goals into its performance measurement and assessment system and whether compensation is clearly linked to these goals. The survey participants provided very different responses to these questions. Interviewee C (2017) said that a performance-based bonus system exists but that it does not contain any specific sustainability targets. He believes that individual sustainability goals would be possible, though evaluating them would prove difficult. At any rate, he does not think bonuses should be given out for achieving sustainability targets. Instead, one should strive for sustainability out of inner conviction. He thinks that sustainability should be like other aspects of construction: "It is simply expected that engineers get the statics right and that planners adhere to thermal insulation rules. It should also be expected that builders pay more attention to ecology and sustainability." Interviewee E (2017) offers another reason why sustainability is not included in Rhomberg's target agreements: "It would serve as a stick. And that is something that Hubert Rhomberg wants to resist. He does not want to force employees to do something; he wants it to develop in them from within. And [target agreements] would go against that." He concedes that putting sustainability into target agreements "would have been quicker." He recommends that other companies incentivize management in this way. Asked whether he thinks it would be possible to introduce such a system today, he replies, "It would be counterproductive at this point. But if I could go back in time, I would have introduced it early on. Right from the start. A clear commitment from the top."

As a result of this missed opportunity, the company continues to prioritize economics above everything else. The motto "It has no use if the company does not survive" is still deeply rooted in management. As Ernst Thurnher, the CFO of Rhomberg Holding, put it in *SinnEntFalter* No. 2 (2014, p. 9): "Sustainability has a lot to do with economic success. After all, companies can only do good for the environment, for society, and for their employees if they bring in revenue and turn a profit. Economic success is a fundamental form of sustainability – and vice versa."

## Economic Performance

In this section we turn to the company's economic performance. Rhomberg Bau GmbH is a privately run, family owned company. The company has released revenue figures in the past, but has never reported profits. No profit figures were made available for the preparation of this case study. Accordingly, no quantitative statements can be made about the economic success of the company. However, a number of determinations can be made from available information, including in particular from the sustainability reports published in recent years.

The *Sandgrubenweg* project, which started in 2003 as a research project and was implemented from 2005 to 2010 as a real estate development, broke new ground with its innovative ideas and sustainability targets. Although clear fears were expressed in the planning phase that the project was too expensive and not feasible, Rhomberg accepted the risk. According to interviewee B, however, the project was even a success financially, which is not always the case in an innovation project. Indeed, the fact that financial success can regularly elude innovation projects was evident in the LCT One project in Dornbirn. Several interviewees indicated that the project presented economic difficulties. In an article contained in the *SinnEntFalter* (2014, p. 7), Hubert Rhomberg comments on how profits can be achieved with sustainable products. According to him, the company reinvests earnings in order to generate future profits with sustainable, resource-saving technologies. However, these investments are not yet being rewarded by the market, Rhomberg notes. In addition, Rhomberg sees an opportunity to achieve a clear competitive advantage in the future "by creating benefits while also maximizing resource productivity," a concept that was conceptually implemented in LCT One project. However, he also emphasizes the market is only moving

slowly in the desired direction, i.e. that demand is still small (ibid.). Accordingly, the LCT One project appears to indicate that CREE is still at an early stage in its development and is not yet economically successful.

Rhomberg states that 90% of profits remain within the company and are reinvested in new and sustainable projects (Rhomberg Bau, 2012, p. 8). Rhomberg's Construction and Resources division generated sales of 55 million euros in fiscal year 2000/2001. Revenues continually increased in the following years, reaching 215 million euros in 2008/2009. In 2009/2010, sales declined to 140 million euros. While this decline was likely attributable to the global financial crisis, a more detailed discussion of the macroeconomic environment is beyond the scope of this study. To provide a fuller picture, it should be mentioned that Rhomberg's second division, Rail Technology, was able to increase revenues from around 20 million euros in fiscal year 2000/2001 to 436 million euros in fiscal year 2016/2017. The equity capital ratio (as a % of total assets) of Rhomberg Holding AG amounted to 40.6% in fiscal year 2013/2014 and increased to 45.9% in fiscal year 2015/2016.

In this way, from 2002 to 2016 the revenues of the Construction and Resources division increased about fivefold. This dynamic increase, coupled with a profit reinvestment rate of 90%, would appear to indicate that the company is very successful economically.

### Changing the Purpose of Business

The third and final step to achieving Business Sustainability 3.0, or true business sustainability, does not center on achieving further reductions in a company's social or ecological footprint. Rather, achieving Business Sustainability 3.0 involves creating value for the common good; it means making a positive contribution to solving the global, social, and ecological problems of our time. This requires a fundamental reorientation. The key issue at hand is no longer which opportunities arise from organizational strengths, but rather which opportunities arise from addressing sustainability issues and how the organization can position itself accordingly. In this way, the company should not be taking an inside-out view of the market, but rather should be appraising itself from an outside-in perspective. This perspective is atypical and places significant demands on a company. The sustainability goals adopted by a company must be based on the sustainability challenges faced by the environment and society if the company is to make an effective contribution to tackling global problems.

"Truly sustainable business shifts its perspective from seeking to minimize its negative impacts to understanding how it can create a significant positive impact in critical and relevant areas for society and the planet. A Business Sustainability 3.0 firm looks first at the external environment within which it operates and then asks itself what it can do to help overcome critical challenges that demand the resources and competencies it has at its disposal." (Dyllick and Muff, 2016).

As described in detail under "Willingness to Change," Rhomberg has repeatedly shown that the company can successfully implement small, limited changes. Nevertheless, the SCALA survey participants believe that the company is also capable of implementing more far-reaching and fundamental change. However, Rhomberg has a mature organizational structure with clearly defined and well-established processes, which means that implementing change may take time. A further aggravating factor is that the entire construction industry reacts rather sluggishly to change, and the boom of recent years has exacerbated this inertia. In this way, outside pressures that would encourage the company to change are missing. Nevertheless, even without external pressure, Rhomberg has adopted the goal of making a contribution to solving social and ecological problems.

Sustainability goals were set right from the start in the *Sandgrubenweg* project. In the project, a key focus was placed on creating living conditions optimally attuned to modern demographic, psychological sociological needs. The planning and realization of the multi-family apartments took into account a great deal of social issues, including child care, family life, health, education, transportation, the environment, utility services, work, and lifestyles. The project was unique in that it did not view sustainability purely in terms of ecological factors, as it is usually the case in the construction industry. Rather, the planners sought to integrate economic, ecological and above all quality of life concerns (Haus der Zukunft, n.d.).

The Caruso (electric) car sharing project is another example of how Rhomberg has addressed social concerns. The aim of the project is to promote sustainable transport and reduce CO2 emissions from vehicles in the region. Car sharing services empower individuals to forego owning a car. This leads to fewer cars on the road, and thus to a reduction in resource and land consumption.

In 2015 Hubert Rhomberg published his book *Bauen 4.0* (Building 4.0). The book illuminates the construction practices of the future. It uniquely combines sustainability concerns with aspects of the digital transformation. For Rhomberg, new construction practices are driven by ecological concerns, and not merely by technical change. However, the digital transformation plays a key role in enabling the vision presented by Rhomberg. "With its conventional construction methods, the construction industry accounts for 30 to 40% of today's resource and energy consumption and approximately 40% of current waste generation and CO2 emissions," he notes, commenting on a key problem in the construction industry (Rhomberg, 2015, p. 13). The recognition of this problem prompted him to initiate a research project, and ultimately to write the book.

The insights attained in this research project flowed directly into the design of the LifeCycle Tower (LCT One) in Dornbirn. For the purpose of constructing the LCT One project, Rhomberg founded the subsidiary CREE, which pursued a clear "outside-in" strategy from the very beginning. CREE's mission is to massively reduce the resources and energy consumed during the construction and operation of buildings, to improve carbon footprints, and to produce less waste. By pursuing these goals, Rhomberg not only reduces its negative environmental impact, but also makes a broader contribution to reducing resource consumption. CREE projects use approximately 40% less materials than conventional buildings. They are also designed to use less land than conventional projects, which helps to address the shortage of land available for housing developments. This is an important issue, for according to Rockström, we have already exceeded the planetary limit on human land use.

To adopt an outside-in perspective, companies have to develop new products and business models. New paths have to be taken; and innovation is indispensable in this regard. Rhomberg has been involved in research projects from an early stage. For example, *Sandgrubenweg* residential area is based on the interdisciplinary research project *inkl. wohnen*. This was carried out as part of Rhomberg's "*Haus der Zukunft*" (House of the Future) program. Similarly, the CREE LifeCycle Tower is the result of the 8+ research project. "As a company with a drive to innovate, we participate in research projects in the areas of sustainability, resource efficiency and lifestyle design. We see excellent opportunities to translate our research results into concrete products and business fields" (Rhomberg Bau, 2012, p. 9). True to the "open innovation" approach, Rhomberg deliberately transcends company boundaries, incorporating external resources, perspectives, and skills into the innovation process.

In the housing construction sector, innovation is typically of a slow and incremental nature. This means that innovations are typically realized in small steps or in discrete areas of a project. In the SCALA survey, 63% of respondents indicated that a commitment to innovate is rewarded at Rhomberg, while a third disagreed with this view. This finding may be attributable to the fact that company's most significant innovation activities are undertaken as part of CREE. The importance of firmly embedding a commitment to innovation in a company's culture can be seen when one considers the divergence in working cultures between the

established and successful Rhomberg Bau GmbH and the start-up company CREE, which was expressly formed with the aim of bringing about change. Integrating new organizational structures and working practices into existing ones often fails because of internal resistance and cultural differences. In this way, distance from established routine is essential for disruption and change. "Every company that has tried to manage mainstream and disruptive businesses within a single organization has failed" (Bower and Christensen, 1995, p. 51).

Hubert Rhomberg himself describes the *Bauen 4.0* concept as disruptive. In the book, a disruptive technology is described as an innovation that may completely replace an existing technology, product or service (Rhomberg, 2015, p. 60). Disruptive technologies have the potential to completely change existing markets. Often disruptive products and services originate from newcomers who nobody knows, who are smiled at and underestimated for a long time, who apparently offer something that nobody wants. The term "disruptive technology" was coined by Clayton M. Christensen in his book, *The Innovator's Dilemma*. Generally, a distinction is made today between two types of disruptions. "Low end disruption" involves offering a product or service to niche markets that are not satisfactorily served by existing technologies. CREE's modular construction techniques using prefabricated elements in large projects could be viewed as an example of this form of disruption. "New market disruption," on the other hand, involves creating an entirely new market by offering a novel product or service. CREE is pursuing the goal of constructing wood buildings up to 100 meters high. By offering such a product, the company can engender a completely new customer desire. While establishing a new startup to undertake innovation activities and decouple them from a company's core business is a beneficial strategy for propelling innovation forward, this approach brings its own challenges. The much-cited "not invented here" syndrome describes a basic attitude towards everything new that does not come from one's own organizational unit. Some Rhomberg employees also seem to have reservations about the overarching concept that informs CREE, and its concrete solutions (Interviewee B, 2017). The challenge currently faced by Rhomberg is to profitably integrate knowledge and experience from CREE into its core business.

## CONCLUSION AND DISCUSSION

This section discusses the survey and interview results while placing them in relation to the research questions posed at the outset. We will first explore why and how Rhomberg began to place a focus on sustainability. We will then examine how sustainability issues were addressed and solved. Next, we will categorize Rhomberg's sustainability journey using the Business Sustainability Typology developed by Dyllick and Muff. This will allow us to assess the level of sustainability achieved by Rhomberg in its sustainability initiatives.

### What factors triggered Rhomberg's sustainability efforts?

As a family owned enterprise, Rhomberg has always felt an obligation to engage in sustainable business practices. One of the interview participants described this commitment as a gradual process that became more intense as each new generation took the reins of the company (Interviewee C, 2017). Most recently, management of the company passed to Hubert Rhomberg, who has shown a particular commitment to sustainability, addressing it at all levels of the organization. The changes initiated by Hubert Rhomberg have not been motivated by regulatory requirements or other outside pressures, however. Rather, they are based on his intrinsic motivations as a young entrepreneur who has been strongly influenced and inspired

by individuals outside of the company, including in particular Friedrich Schmidt-Bleek and Michael Braungart.

Friedrich Schmidt-Bleek is a German chemist and environmental researcher who has spent many years studying the resource intensity of our economy. Schmidt-Bleek developed the concept of the "ecological backpack" and the associated metric known as "Material Input per Service Unit" (MIPS), a basic measure for assessing the environmental impact of a product. Schmidt-Bleek is the author of some 20 books and 400 scientific papers. Michael Braungart is also a German chemist, scientist, and book author. He is perhaps best known for co-developing the cradle to cradle design principle. According to this principle, product designers should seek to mimic natural processes by viewing materials as nutrients circulating in healthy, safe metabolisms. Rhomberg's sustainability initiatives and concepts are crucially informed by the ecological backpack and cradle to cradle principles.

Yet Hubert Rhomberg has also acquired knowledge and inspiration from research projects. For example, the company's participation in the *inkl. wohnen* project paved the way for the *Sandgrubenweg* development, a unique housing complex that has sought to maximize quality of life for residents while also ensuring energy and resource efficiency. Similarly, the 8+ project paved the way for the founding of the CREE and the LCT One project in Dornbirn, a high density residential tower that couples resource efficiency with the lifecycle approach to material flows.

In this way, it was Hubert Rhomberg's personal quest for meaning and exposure to the work of groundbreaking ecological thinkers that ultimately led to the company's strong focus on sustainability issues.

### How are sustainability problems addressed?

The way in which Rhomberg has addressed and resolved sustainability issues can be seen by examining its sustainability journey. The most important sustainability initiatives undertaken by the company can be identified as follows: the *Sandgrubenweg* project; the adoption of Lifecycle Management; the establishment of networks with participants from outside the company; the integration of sustainability in the company's strategy and processes; the company's transformation process; and the company's innovation activities. These initiatives have been optimally supported by credible leadership and skillful communications.

In addition to serving as CEO, Hubert Rhomberg fulfills the role of CSO (Chief Sustainability Officer). Accordingly, sustainability initiatives receive the full support of the company's operative management, which augments their credibility in the eyes of all who work for the company. This has also enabled the company to overcome internal resistance to sustainability initiatives, resistance that might otherwise impair lasting progress. For example, Rhomberg deliberately accepted the financial risks associated with the *Sandgrubenweg* project, ignoring the warnings voiced by specialists that the project would not be a financial success.

Communication has played a key role in Rhomberg's sustainability journey. The company has managed to present the topic of sustainability in a clearly understandable and convincing way, in part through the skillful use of storytelling techniques. "Telling stories is an important strategy for explaining interrelationships," Hubert Rhomberg says. According to Rhomberg, rather than simply discussing the topic of sustainability, one should spotlight and present the sustainability aspects of implemented projects. In this way, he asserts, one should undertake action and then point to the action one has taken, rather than simply engage in talk. The design of the *SinnEntFalter* sustainability report is based on this insight. The report does not just present facts and figures; it discusses in a compelling way the successes that have been

achieved in sustainability projects, both large and small. The CREE project was also leveraged in a skillful way as part of the company's communication activities. The project was a clear boost to the company's image, for Rhomberg is now perceived as an expert in urban wood construction, and not just within the Vorarlberg region. In the wake of the 8+ research project and the construction of the LifeCycle Tower in Dornbirn (the first CREE project), Rhomberg published the book *Bauen 4.0* (Building 4.0). Designed for a broad readership, the book is an excellent example of how Rhomberg uses compelling stories to communicate the challenges faced by the construction industry and garner publicity for its sustainability solutions.

While Rhomberg's strategy development process is initiated "from above", the fleshing out of its actual substance intentionally takes place "from below" within each field of business. Each business unit is free to determine the priorities it wants to assign when pursuing sustainability targets. Yet this approach can give rise to disagreement, for not all of the company's employees understand sustainability in the same way. Some interview participants expressed the view that the adoption of a clear definition of sustainability, the establishment of clear goals, and the explicit identification of how sustainability relates to the company's overall strategy could encourage a more shared understanding of sustainability while also furthering its implementation within the company. Most Rhomberg managers voiced the opinion that the integration of sustainability targets in the company's bonus system could have accelerated the progress made. However, they also predominantly expressed the view that it would be counterproductive to take this step now. At Rhomberg, processes are developed based on the company's strategy. This abets the implementation of sustainability considerations in a rigorous and direct manner in the company's business processes. A review of the processes contained in the organizational handbook for the Rhomberg Group corroborates this fact.

The company's rigorous attention to material lifecycles is an additional sustainability initiative. The company intentionally selects and uses building materials that either produce less waste or that can be recycled. This helps to generate closed material cycles. In the interest of closing material cycles associated with the construction, operation, and demolition of buildings, Rhomberg established the Rheintal Resource Center. In general, Rhomberg strives to promote sustainability across all aspects of a project's lifecycle. This involves taking the entire value creation process into account. The adoption of such a broad perspective has encouraged Rhomberg over time to directly offer an ever wider range of contracting services.

It has also encouraged the company to become active in various organizations and initiatives. Rhomberg encourages its employees to network through membership in various associations. The company is also involved in a number of networks, often through Hubert Rhomberg's direct involvement. Examples of this involvement include the Caruso Car Sharing Project, the Climate Neutrality Alliance 2025, Smart City Rheintal, the Vorarlberg Energy Efficiency Network, the Austrian Sustainable Building Council, and the Vorarlberg Energy Autonomy project. Hubert Rhomberg is often the initiator or driving force of such undertakings. Such activities often have positive knock-on effects for the company's core business, as demonstrated by a number of Caruso projects. Furthermore, this outside engagement has led the company to become known for its commitment to sustainability and social responsibility, both within Vorarlberg and beyond.

When one examines Rhomberg's transformation processes, two distinct strategies are evident. On the one hand, this traditional company has undergone change in small but steady steps. In this way, the company has pursued an incremental approach to transformation that is slow but allows the company to change without endangering its core business. Interview participants repeatedly emphasized that this approach was essential for the company to stay in business. This reveals the rationale behind the establishment of the company CREE: it was designed as a vehicle for implementing large-scale and radical change in the construction industry, without endangering Rhomberg's core business and incremental approach to transformation. Indeed, it was designed to serve as a showcase company that could forge a completely new



path in the construction industry while also being fully committed to the issue of sustainability. One can easily understand why the establishment of CREE aroused skepticism among the company's existing employees. And one can also understand why many employees at the parent company have not been particularly quick to respond to CREE's achievements with effusive praise. Nevertheless, these achievements have encouraged Rhomberg employees to see things in a new light. In many cases, they have also encouraged innovation and new ways of doing things.

This brings us to the final aspect of Rhomberg's sustainability journey: innovation. Success in defining new business models that are based on sustainability criteria depends crucially on the existence of a strong culture of innovation within a company. At Rhomberg, sustainability has been harnessed as a catalyst for innovation. The company has initiated research projects that are focused on sustainability issues, and the results of these projects have flowed directly into the development of new innovations. For example, the *inkl.wohnen* research project paved the way for the *Sandgrubenweg* real estate development. Similarly, the founding of the company CREE preceded the LCT One innovation project.

In the following, we consider how Rhomberg's sustainability journey has progressed from business as usual to Business Sustainability 3.0. According to Dyllick and Muff, companies first begin to transform themselves by expanding their range of relevant concerns. This gives rise to an expanded scope for value creation, which in turn yields a new perspective on the company's business activities. Rhomberg's journey roughly follows these three steps. In construction projects such as *Sandgrubenweg*, the company placed a new focus on social and ecological concerns. The company listened to and actively promoted the interests of its employees. With the introduction of the *SinnEntFalter* sustainability report, the company adopted the "Triple Bottom Line" approach, which highlights value creation for people and the environment. Rhomberg's sustainability report measures and reports on the company's activities and performance in line with the Global Reporting Initiative (GRI) standard. The founding of CREE represented a way for Rhomberg to adopt a new perspective without taking large steps too quickly. In order to make rapid progress while avoiding organizational resistance to change, a company was founded that is fully committed to an "outside-in" perspective. The important thing now is to allow the experiences and insights gathered by CREE to flow back to Rhomberg so that Rhomberg's transformation can make further progress.

### **What is the state of maturity of Rhomberg's sustainability activities?**

Having discussed the origins of Rhomberg's sustainability efforts as well as how Rhomberg has tackled sustainability issues, we discuss in the following the state of maturity achieved by Rhomberg's sustainability activities. To this end, we use the sustainability matrix criteria developed by Dyllick and Muff to assess the insights derived from the interviews and the SCALA questions devoted to the challenges of true business sustainability.

Rhomberg Bau adopted a broad understanding of its stakeholders at an early stage in its sustainability journey. In 2003, for example, the company expanded its range of concerns to encompass ecological and social issues as part of the *inkl.wohnen* research project. It then implemented these ecological and social values as part of the 2005 *Sandgrubenweg* project.

Rhomberg Bau's value creation strategy is based on the "Triple Bottom Line" (TBL) approach, which, aside from financial value, seeks to create value for people and the environment. The TBL approach forms the basis for the measurement and reporting of Rhomberg's activities and achievements. Rhomberg's internal reporting activities are based on the standards of the Global Reporting Initiative (G4 Standards) for the Construction and Real Estate (CRE) sector. For the purpose of communicating with employees and other

stakeholders outside of the company, Rhomberg uses the *SinnEntFalter*, a company magazine that is published every two years and which reports on goals and achievements in the area of sustainability.

The company places a key emphasis on engaging in active dialog with a wide variety of stakeholders. For example, Rhomberg expends considerable energy on initiating, developing and maintaining networks in the Vorarlberg region. Furthermore, it actively participates in interdisciplinary research projects and maintains ties with leading figures in the field of sustainability. In this regard, the company places a primary focus on involving as many relevant stakeholders as possible in the further development of its activities.

It is this aspect of the company's strategy that is associated with the most difficulties. The strategy formulation process is initiated "from above" and deliberately fleshed out with details "from below." However, the survey and interview results indicate that there is considerable difference of opinion among employees regarding the substance of the company's sustainability strategy and goals. Many company executives place a primary focus on the management of risks. Opportunities are pursued first and foremost when they do not entail greater risk, particularly of a financial nature. The interview participants indicated that there is need for action in this area. Individual participants expressed the view that the adoption of a clear definition of sustainability, the establishment of clear goals, and the explicit identification of how sustainability relates to the company's overall strategy could encourage a shared understanding of sustainability while also furthering its implementation.

Rhomberg's business processes are directly derived from this strategy and associated sustainability considerations. The construction site interview and the contents of the Rhomberg Group organizational handbook both confirm this fact. Yet Rhomberg's business processes do not just focus on the activities performed to directly realize a construction project. Rather, they consider the entire lifecycle of a building. In this connection, a key emphasis is placed on maximizing energy and resource efficiency, as well as on ensuring closed-loop material flows.

In defining its target market and positioning, Rhomberg Bau still focuses predominantly on existing markets. CREE is Rhomberg's primary vehicle for identifying new market opportunities, particularly in the area of wood construction and prefabricated building components. Through various projects Rhomberg has shown that it is capable of modifying and further developing its existing product and service line in order to improve its "Triple Bottom Line" performance. This fact is on evidence in various construction projects, including the Star Inn Premium Hotel project in Vienna, the conversion of a former school building in the municipality of Lerch, the micro apartments project, the *Sandgrubenweg* real estate development, and other projects for non-profit construction firms.

Sustainability targets have been directly integrated into Rhomberg's management and governance structures, including Rhomberg's code of conduct, compliance guidelines, strategy, and organizational handbook.

Rhomberg's CEO also holds the position of Chief Sustainability Officer. This allows centralized and effective management decisions with regard to sustainability activities. However, considering the current maturity level of Rhomberg's sustainability efforts, augmentation of executive guidance over activities at lower organizational levels could bring distinct benefits.

Overall Rhomberg Bau predominantly fulfills the criteria for Business Sustainability 2.0. However, there are still deficits that need addressed with a view to the company's strategy development and sustainability implementation.

The state of maturity of sustainability efforts at CREE is somewhat different. The core focus from the outset at CREE was not to minimize the company's own negative impacts, but rather to induce positive social and environmental effects by using considerably fewer resources, improving the company's CO2 footprint,

harnessing naturally renewable resources, reducing land use, and by considering the ecological backpack associated with materials and other activities. CREE was founded with the aim of reinventing construction practices and making them more sustainable. The company was not designed around serving a specific customer need, but rather around the sustainability criteria that were to be fulfilled. In this way, an "outside-in" perspective was taken from the outset.

The concept behind the CREE has allowed Rhomberg to be uniquely successful with the "Triple Bottom Line" approach; beyond being financially profitable, CREE makes a positive contribution to fulfilling key sustainability issues while also creating value for the community. CREE takes a deliberately proactive approach when cooperating with research partners, sustainability experts, and employees who focus on sustainability issues. CREE's overarching vision is to develop the sustainable building practices of the future.

Indeed, CREE is a vehicle for Rhomberg to elaborate completely new strategies, business models, products, and services that address the ecological challenges of our times. The design of the LifeCycle Tower, which relies to a unique extent on prefabricated modules, is a construction industry game changer that has opened up new entrepreneurial opportunities. CREE's strategies and target markets are derived from an assessment of social and ecological challenges. CREE is penetrating new markets and developing scalable business models that promise to have positive ecological effects.

The CEO of the company is animated by a sense of idealism. The hurdles are numerous and significant; there is no lure of quick profits; and success is not guaranteed. As CREE was established as a new company, its organizational structure is still flexible and can be adapted to new challenges.

In summary, we can conclude that CREE was founded with an outside-in perspective and has thus internalized an important prerequisite for achieving Business Sustainability 3.0 according to Dyllick and Muff's typology.

## LIMITATIONS AND NEED FOR FURTHER RESEARCH

This case study focused exclusively on the Rhomberg Group's activities in the area of Construction and Resources while ignoring its activities in its second line of business, Rail Technology.

As this case study was predominantly concerned with Rhomberg's management decisions and initiatives, company executives were the primary focus of the survey and interviews. Some 92% of addressed individuals were reached as part of the SCALA survey, while the interviews featured participants from almost all subsidiaries and divisions, including Rhomberg Holding GmbH, Rhomberg Bau Austria, Rhomberg Bau Switzerland, Modular Construction, Construction and Resources, Wood Construction, CREE, as well as the group service divisions Sustainability & Project Management as well as Marketing & Communication.

The case study solely takes the perspectives of management into account. Lower-level employees were not queried as part of the study. Furthermore, the gathered information about CREE has certain limitations, as only seven of the SCALA survey participants indicated they had an average or high level of involvement in the project, while 28 had little or nothing to do with the subsidiary.

A promising topic for future research would be to gather additional perspectives about the company and its sustainability journey. By querying employees at all levels, one could acquire valuable insights into the company's management, change readiness, and working climate and culture. The solicitation of

perspectives from suppliers and partnering companies could augment our understanding of Rhomberg's value creation process while also illuminating how the company contributes to the economy and region.

## OUTLOOK

With the memory of the TRIGOS Award fresh in his mind's eye, Hubert Rhomberg lays the case study aside. It is unbelievable how everything has developed over the past 15 years and how the company has changed, he thinks. These years have been marked by a great deal of hard work – but also by many valuable experiences and encounters.

Hubert Rhomberg has made sustainability a core aspect not only of the company's values and vision, but also of its code of conduct, compliance guidelines, and organizational handbook. Through its construction of the *Sandgrubenweg* real estate development, Rhomberg has realized a flagship project that maximizes quality of life for residents while also displaying a rigorous commitment to sound ecological practices. By expanding its portfolio to offer an even broader range of services, Rhomberg now has greater potential to realize its ambitious goals in the area of resource management and energy efficiency as well as close material loops over the entire lifecycle of a construction project. The company's development and maintenance of various initiatives and networks, particularly in the Vorarlberg region, enables it to engage in dialog with various interest groups as well as incorporate stakeholders into its sustainability activities. Rhomberg's *SinnEntFalter* sustainability report and its GRI reporting now allow it to communicate and showcase its contributions to society and the environment. Rhomberg has grown into a company that takes on responsibility for people and the environment and which is committed not only to financial success, but also to creating social and ecological value. Furthermore, by establishing CREE, Rhomberg has taken an additional step in this direction, setting new standards in the area of socially responsible construction.

Much has been achieved in recent years, and the results speak for themselves. Yet this does not mean the company should lean back and stop making efforts to develop further. The company still has a number of unfulfilled goals and ambitions. It is the hope of the author that this case study will make a contribution to the advancement of sustainability at the company. Indeed, now that the results of the study have been published, they could be productively shared with relevant employees, and used as a catalyst for the next stage in the company's sustainability journey. To be sure, the case study discusses areas in which positive change could be implemented; for example, it highlights the need for a common understanding of sustainability. Accordingly, efforts could be made to better anchor sustainability in the company's shared culture and outlook. In this regard, the management could work to provide a clearer definition of its sustainability strategy and goals. Yet important questions remain: How can the company better reward employees who advance the cause of sustainability, and how can Rhomberg profit from the experience gathered by CREE and leverage this experience to adopt an outside-in strategy?

By tackling these issues Rhomberg could improve its reputation as a sustainable contractor while also advancing its image as an opinion leader invested with unique competencies at the intersection between sustainability and the construction industry, both in Austria and beyond.

Rhomberg makes sense!

## BIBLIOGRAPHY

- Accenture, 2012. The Chief Executive Officer's Perspective, The Sustainable Organization: Lessons From Leaders Series.
- Aguinis, H., Glavas, A., 2012. What We Know and Don't Know About Corporate Social Responsibility: A Review and Research Agenda. *Journal of Management* 38, 932–968.
- alpS GmbH, Rhomberg Bau GmbH, FH Vorarlberg, 2013. Wohnkomfort und Heizwärmeverbrauch im Passivhaus und Niedrigenergiehaus.
- Bower, J.L., Christensen, C.M., 1995. Disruptive Technologies: Catching the Wave. *Harvard Business Review* 73, 43–53.
- Bundesministerium für Verkehr, Innovation und Technologie, 2008. Möglichkeiten eines vielgeschossigen Holzbaus im urbanen Raum mit Zielrichtung auf acht oder mehr Geschosse.
- Caruso Carsharing eGen, 2015. Satzung der Caruso Carsharing eGen.
- Dimoudi, A., Tompa, C., 2008. Energy and environmental indicators related to construction of office buildings. *Resources, Conservation and Recycling* 53, 86–95.
- Dyllick, T., Muff, K., 2016. Clarifying the meaning of sustainable business: Introducing a typology from business-as-usual to true business sustainability. *Organization & Environment*, Vol. 29, No. 2, 156–174.
- Eccles, R.G., Perkins, K.M., Serafeim, G., 2012. How to Become a Sustainable Company. *MIT Sloan Management Review*; Cambridge 53, 43–50.
- Elkington, J., 2004. Enter the Triple Bottom Line, in: Henriques, A., Richardson, J. (Eds.), *The Triple Bottom Line: Does It All Add Up?* Earthscan, London, pp. 1–16.
- European Parliament and Council, 2010. Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings.
- Fuss, H., 2004. Die Klugheit des Kirschbaums. *Berliner Zeitung*.
- Haus der Zukunft, n.d. Factsheet Sandgrubenweg.
- Hoorweg, D., Bhada-Tata, P., Kennedy, C., 2013. Environment: Waste production must peak this century. *Nature* 502, 615–617.
- Interviewee A, 2017. Interview A.pdf.
- Interviewee B, 2017. Interview B.pdf.
- Interviewee C, 2017. Interview C.pdf.
- Interviewee D, 2017. Interview D.pdf.
- Interviewee E, 2017. Interview E.pdf.
- Interviewee F, 2017. Interview F.pdf.
- Interviewee G, 2017. Interview G.pdf
- Interviewee H, 2017. Interview H.pdf
- Interviewee I, 2017. Interview I.pdf.
- IPCC, 2013. Summary for Policymakers, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
- Käo, T., Schmidt-Bleek, F., Huncke, W., 2013. *Das Wuppertal Haus: Bauen und Wohnen nach dem Mips-Konzept*. Springer-Verlag.
- Knebel, S., Seele, P., 2015. Quo vadis GRI? A (critical) assessment of GRI 3.1 A+ non-financial reports and implications for credibility and standardization. *Corporate Communications: An International Journal* 20, 196–212.
- Lacy, P., Cooper, T., Hayward, R., Neuberger, L., 2010. *A New Era of Sustainability*. UN Global Compact, Accenture.
- Lucon, O., Ürge-Vorsatz, D., Ahmed, A.Z., Akbari, H., Bertoldi, P., Cabeza, L.F., Eyre, N., Gadgil, A., Harvey, L.D.D., Jiang, Y., others, 2014. Buildings, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.

- Mesmer-Magnus, J.R., Viswesvaran, C., Wiernik, B.M., 2013. The Role of Commitment in Bridging the Gap Between Organizational and Environmental Sustainability. *Global Business and Organizational Excellence* 32, 86–104.
- Moffat, A., 2010. The 21st Century Corporation: The Ceres Roadmap for Sustainability. Ceres. Network for Business Sustainability, 2012. Definition of business sustainability.
- ÖGNI, 2017. Alle Experten [WWW Document]. ÖGNI 3P.zum.Glück. URL <http://www.ogni.at/de/experten/> (accessed 9.18.17).
- Peduzzi, P., 2014. Sand, rarer than one thinks. *Environmental Development* 11, 208–218.
- Preuss, N., 2011. Projektmanagement von Immobilienprojekten: Entscheidungsorientierte Methoden für Organisation, Termine, Kosten und Qualität. Springer-Verlag.
- proHolz Austria, 2008. Vielgeschossiger Holzbau im urbanen Raum - Dokumentation Forschungsprojekt 8+.
- Rhomberg Bau, 2017. Neue Dimensionen 2017.
- Rhomberg Bau, 2016a. SinnEntFalter Nr. 3 Nachhaltigkeitsbericht.
- Rhomberg Bau, 2016b. SinnEntFalter Nr. 3 GRI Index.
- Rhomberg Bau, 2015a. SinnEntFalter Poster Buch Bauen 4.0.
- Rhomberg Bau, 2015b. Neue Dimensionen 2015.
- Rhomberg Bau, 2014. SinnEntFalter Nr. 2 Nachhaltigkeitsbericht.
- Rhomberg Bau, 2013. SinnEntFalter Poster Ist-Soll.
- Rhomberg Bau, 2012. SinnEntFalter Nr. 1 Nachhaltigkeitsbericht.
- Rhomberg, H., 2016. Das LifeCycle Tower-System – ein erprobtes Modell für ressourcen- und energieeffizientes Bauen mit Holz im urbanen Raum, in: Hildebrandt, A., Landhäußer, W. (Eds.), *CSR Und Energiewirtschaft, Management-Reihe Corporate Social Responsibility*. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 255–269.
- Rhomberg, H., 2015. Bauen 4.0 - vom Ego- zum Lego-Prinzip. BUCHER Verlag.
- Rhomberg Website, 2017. Rhomberg Gruppe blickt dank erneutem Umsatzplus positiv in die Zukunft [WWW Document]. Rhomberg Bau GmbH. URL <https://www.rhomberg.com/de/presse/rhomberg-gruppe-blickt-dank-erneutem-umsatzplus-positiv-in-die-zukunft> (accessed 4.4.18).
- Rhomberg Website, 2014. Nachhaltige Lektüre [WWW Document]. URL [http://www.rhombergbau.at/de/home/allgemein\\_informationen/media\\_center/news\\_archiv/presseaussendungen.html?tx\\_ttnews%5Btt\\_news%5D=1042&cHash=f04e46a03f905b2cb7bf9a2694a04671](http://www.rhombergbau.at/de/home/allgemein_informationen/media_center/news_archiv/presseaussendungen.html?tx_ttnews%5Btt_news%5D=1042&cHash=f04e46a03f905b2cb7bf9a2694a04671) (accessed 8.16.17).
- Rhomberg Website, 2011. Rhomberg Gruppe peilt Rekordumsatz an [WWW Document]. URL [http://www.rhombergbau.at/de/home/allgemein\\_informationen/media\\_center/news\\_archiv/presseaussendungen.html?tx\\_ttnews%5Btt\\_news%5D=323&cHash=70289a888251a13740f25e2ce9020f02](http://www.rhombergbau.at/de/home/allgemein_informationen/media_center/news_archiv/presseaussendungen.html?tx_ttnews%5Btt_news%5D=323&cHash=70289a888251a13740f25e2ce9020f02) (accessed 8.15.17).
- Rockström, J., 2015. Bounding the planetary future: Why we need a great transition. *Great Transition Initiative* 13.
- Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F.S., Lambin, E.F., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H.J., others, 2009. A safe operating space for humanity. *nature* 461, 472–475.
- SAM and PWC, 2006. The sustainability yearbook 2006. Zurich, Switzerland.
- Schmidt-Bleek, F., 1994. *Wieviel Umwelt braucht der Mensch? : MIPS - das Maß für ökologisches Wirtschaften*. Birkhäuser, Berlin.
- Schreglmann, B., 2013. Das Konzept "Passivhaus" steht derzeit auf dem Prüfstand. *Salzburger Nachrichten*.
- Thür, G., Ritsch, W., Summer, M., Roder, A., Stadelmann, C., 2006. Projektbericht inkl. wohnen. Bregenz.
- UNEP, 2014. *UNEP SBCI Key Messages*.
- UNEP, 2009a. *Buildings and Climate Change - Summary for Decision-Makers*.
- UNEP, 2009b. *From conflict to peacebuilding: the role of natural resources and the environment (Policy Paper No. 1)*. United Nations Environment Programme, Nairobi.
- United Nations, Population Division, 2017. *World Population Prospects: The 2017 Revision, Key Findings and Advance Tables (No. ESA/P/WP/248)*. United Nations, New York.
- United Nations, Population Division, 2016. *The World's Cities in 2016 - Data Booklet*.

von Arx, U., 2015. Understanding the Challenges of Business Sustainability. Building Sustainable Legacies 6, 7–30.

Vorarlberger Kraftwerke AG, 2015. 1. Energieeffizienz-Netzwerk Vorarlberg (Abschlussbroschüre). Energieeffizienz-Netzwerk Vorarlberg.