Unlocking the future

Sustainability in the real estate industry

A white paper from

BUILDING MINDS

Over the next few years and decades, the real estate sector faces a challenge that will reshape the industry: it must become sustainable. While this is certain, the ways and means of achieving this goal are still often unclear or limited to small-scale solutions.

This **white paper** highlights the key sustainability challenges and presents holistic solutions.

Sustainability – A challenge for society and industry

Business in the face of **climate change**

Caribbean-like temperatures north of the Arctic Circle, CO2 emissions accelerating global warming faster than previously assumed, record temperatures worldwide – 2020 could well end up as the warmest year since records began in the 19th century.

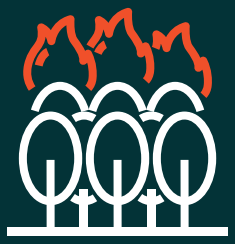
In January 2020, the World Economic Forum published its annual Global Risks Report and for the very first time included only ecological risks in its ranking of the Top 5 global risks. According to the report, extreme weather, climate action failure, natural disasters, biodiversity loss and human-made environmental disasters have the highest probability of occurrence – even ahead of data fraud or theft, cyberattacks or a blow up in asset prices.

People around the world have developed a more heightened awareness of climate change and its consequences, largely thanks to younger generations and their Fridays for Future movement. The Paris Accord and the European Commission's Green Deal have also helped to draw people's attention to climate change and sustainability and have set specific mitigation targets.

2020 could become the **warmest year** since records began in the 19th century.

Extreme weather

Climate action failure



Natural disasters

Biodiversity loss

Human-made environmental disasters

However, the fact that these mitigation measures are often not implemented in practice, or arrive too slowly, is demonstrated, among other things, by statements from the German Minister of Economics, Peter Altmaier, who in early August 2020 admitted that the German government had made climate policy mistakes and acted too late. He stressed the importance in the coming months of ensuring that the path to CO2 neutrality becomes irreversible. To achieve this, he added, government and business must work together.

Many companies have not only committed themselves to protecting the environment, they have already taken action. Apple, for example, already runs all its offices, data centers and production facilities on renewable energy. The technology company has committed to achieving carbon-neutrality for its supply chain and products by 2030. In early 2020, Microsoft announced that it would be carbon-negative by 2030, i.e. it will remove more carbon dioxide from the atmosphere than it emits. By 2050, it will remove from the environment all the carbon the company has emitted either directly or by electrical consumption since it was founded in 1975. In July, asset manager BlackRock followed up on the announcement at the beginning of the year that the U.S. investment management firm would be more closely aligning its financial operations with ESG criteria. Many companies, including some where BlackRock is the top shareholder, have been warned that they need to conduct their business more sustainably.

For the first time ever, the Top 5 risks in the **Global Risks Report** are **ecological risks.**

Milestones and catalysts of change

By signing up to **Paris Accord** at the end of the UN Climate Change Conference in 2015, almost 200 countries set themselves a common goal:

To limit global warming to well **below 2.0°C** (ideally 1.5°C) compared to pre-industrial levels. The only way to achieve this goal is to **reduce carbon emissions**.

The European Union unveiled its **Green Deal** at the end of 2019, which included plans to mobilize at least EUR 1 trillion in sustainable investments over the next decade to become climate-neutral by 2050.

In order to establish a framework to facilitate sustainable investment, the EU has developed a taxonomy which will apply from 2022. The **EU Taxonomy** defines criteria for sustainable investments and disclosure. All financial market participants offering financial products in Europe are affected, especially fund companies.

In response to the coronavirus pandemic, the German government launched a **fiscal stimulus package** in June 2020. The stimulus package also includes a comprehensive set of measures – totaling EUR 50 billion – to invest in Germany's future. The funds are to be used to promote investments in areas that are crucial for future growth and sustainability.

Funding for the **CO2 building renovation program** will be raised **to EUR 2.5 billion** in 2020 and 2021, an increase of EUR 1 billion.

The potential to reduce carbon emissions in the building sector is enormous – even greater than in the transport sector.

Jens Mueller, CEO BuildingMinds

The real estate industry **needs to act**

And the real estate industry? As in other industries, sustainability has moved to the top of the agenda. This is partly due to the intrinsic motivation of individual players, but above all has been driven by social and regulatory factors. However, not every company has the financial resources of corporations like Apple or Microsoft. Moreover, the interrelationships are extremely complex.

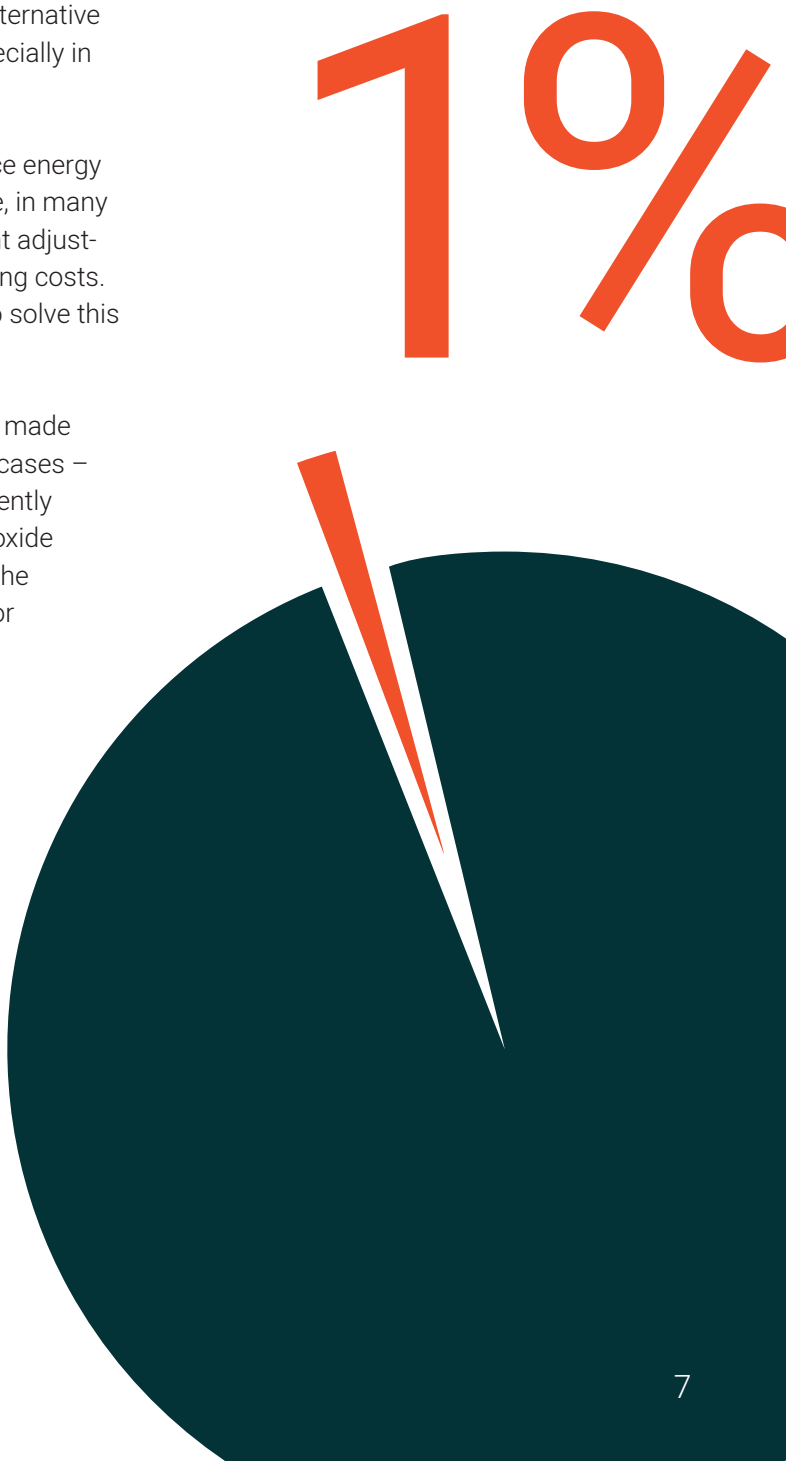
One example: Since burning of fossil fuels for heating generates a large proportion of building-related emissions, companies are still a long way from achieving the major goal of carbon-neutrality even if they switch to "green electricity". Moreover, the volume of sustainably generated electricity is limited. Consequently, there is no alternative to cutting energy consumption – in new buildings, but especially in existing buildings.

One reason why refurbishment measures that would reduce energy consumption are often not implemented is that owners are, in many cases, unable to recoup their investment costs through rent adjustments, while tenants benefit unilaterally from lower operating costs. It is up to politicians to work with the real estate industry to solve this "investor-user dilemma".

With so many complex issues involved, the progress being made by the real estate industry appears to be too slow in many cases – a problem shared by many other industries. Buildings currently account for around 39 percent of energy-related carbon dioxide emissions – more than the transport sector. According to the Coalition for Urban Transitions, buildings are responsible for 58 percent of urban carbon emissions. In comparison: The transport sector accounts for 21 percent.

Only **one percent** of buildings worldwide are rated carbon-neutral.

Energy consumption in the building sector is also enormous. Today, buildings are responsible for around 30 percent of final energy use and over 55 percent of global electricity consumption.



The building sector has **the largest ecological footprint**

39 %

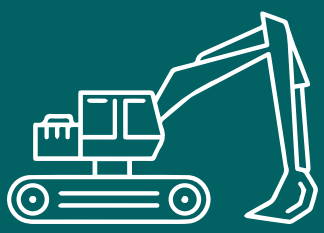
of energy-related carbon dioxide emissions

30 %

of energy consumption

55 %

of the global electricity consumption



50 %

of consumption of natural resources through construction

The real estate industry's enormous ecological footprint compels it to act.

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Tobias Decker, CPO BuildingMinds

Challenge in practice

Companies that have committed themselves to complying with the Paris Climate Convention have usually faced the problem of a lack of clarity about how to translate the overarching goal to limit global warming to 1.5 or 2.0°C into actual business practice.

Although more and more real estate companies are recording and reporting greenhouse gas emissions from buildings, there remains a lack of clear targets.

Are annual emissions of, for example, 60 kilograms of CO2 per square meter a lot or a little? And how much of a reduction would be considered "Paris proof"? **CRREM** (Carbon Risk Real Estate Monitor), a project supported by the EU and a consortium of leading real estate investors, is creating more transparency in this regard. Based on scientific findings on the maximum available global emissions budget that is compatible with the Paris climate goals, CREEM has calculated country- and use-specific decarbonization pathways that enable the industry to identify climate risks ("carbon risk") for the first time and to take appropriate measures to mitigate them.

But even with this tool, reducing the building sector's high emissions remains an enormous challenge that cannot be met by sustainable new construction alone, but must also be achieved in the existing building environment.

Around 80 percent of the building stock in 2050 already exists today.

According to the World Green Building Council, in order to comply with the Paris Climate Agreement, all new buildings must be carbon-neutral by 2030 and, by 2050, all buildings will need to be carbon-neutral.

So, time is of the essence and more investment is urgently needed in the existing building stock. Moreover, the concept of "sustainable new buildings" must not be reduced to simply achieving the lowest possible emissions during operation ("operational carbon footprint"). On the contrary, by the time the building goes into operation, the volume of greenhouse gases that has been emitted in the production of the necessary building materials, their transport, etc. ("embodied carbon footprint") far exceeds the building's operational carbon footprint. Therefore, it is important to prioritize the use of less carbon-intensive (and more recyclable) materials, processes and transport chains wherever possible.

Reducing emissions requires dynamic detection and precise monitoring. We need more than just Excel.

Dr. Jens Hirsch,
Domain Expert Sustainability
BuildingMinds

The real estate industry's approach to sustainability

Certificates: Limited effect
Sustainability in the real estate industry is not a new topic. Ever since the early 1990s, a large number of green building certification systems have been developed – there are now more than 50 worldwide.

More than 50 certificates worldwide.

The main reason there are so many certificates is because individual systems with country- and asset class-specific profiles are rarely suitable for nationwide, let alone global application. Moreover, there are other problems that make it to compare different certificates and appreciate their benefits. The first certificates were primarily designed to evaluate sustainability from an ecological perspective. As our understanding of sustainability has broadened, the criteria measured by the certificates has expanded and a greater emphasis has been placed on economic and social aspects. Although they are called green building certificates, this should not hide the fact that environmental components, and in particular greenhouse gas emissions, only account for a small part to the overall assessment and that the remaining influencing factors can vary considerably from certificate to certificate. In addition, developers and owners can always choose the certificate that puts their property in the best light and gives them the best cost-benefit ratio.

Some market participants have criticized the arbitrariness of the certificates and their unsuitability for climate risk management, where greenhouse gas emissions naturally play the most important role. An active strategy for emission reduction (mitigation) requires dynamic documentation and precise monitoring wherever possible. It is obvious that carrying out emissions assessments that are limited in scope and only occur at irregular intervals once every several years – normally just before an existing certification expires – is not enough.

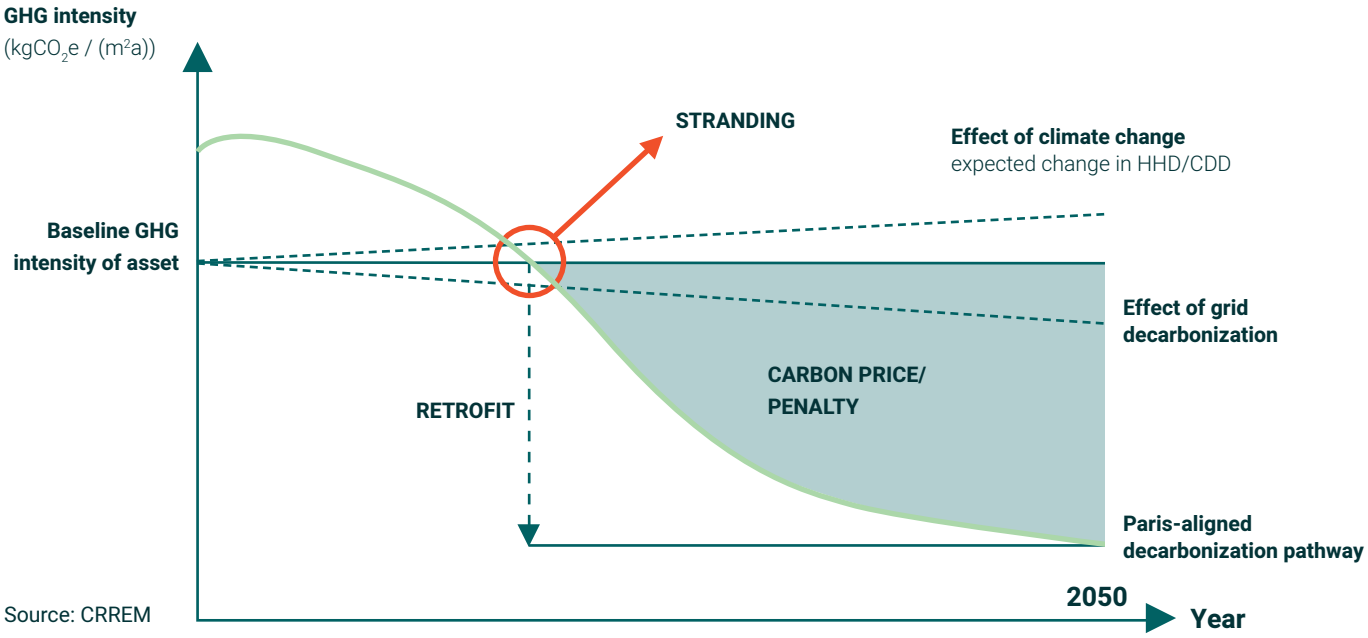
Where, in addition to energy consumption, greenhouse gas emissions are regularly documented, individual solutions based on Excel spreadsheets with all the resulting problems for effective version management, user rights management, interoperability and, last but not least, scalability still dominate. Even though many green building certificates and energy performance certificates now provide recommendations for improvements, they still provide little more than a snapshot. Firstly, there is a lack of information about how a property's emissions will develop in the future as climatic conditions change and energy networks are decarbonized. Secondly, any decarbonization targets need to be considered dynamically. CRREM's real estate and country-specific decarbonization and energy reduction pathways enable precisely this dynamic view and allow an assessment of the climate compatibility of real estate investments beyond the status quo.

Sustainability certificates: Fragmentation prevents comparability

Existing certificates each cover only a fraction of the global real estate portfolio. Three systems dominate in the USA: LEED (Leadership in Energy and Environmental Design), GPR (Global Property Research) and EDGE (Excellence in Design For Greater Efficiencies). In China, there are more than five labels, which are awarded by building type. Australia and New Zealand each have their own Green Star rating systems.

Developed in the UK, BREEAM (Building Research Establishment Environmental Assessment Method) is the leading European standard. As the oldest certificate, it is also the most widely used in almost 80 countries – 65 percent of certified buildings within the European Union carry a BREEAM certificate. Although the more broadly diversified LEED is used in around 170 countries worldwide, its market share in Europe is just over five percent. EDGE is used in almost 30 countries. It is followed by DGNB (German Sustainable Building Council), which is used in 25 countries.

Without decarbonization measures, a majority of properties are in danger of becoming stranded assets



Source: CRREM

Standards: More consolidation needed

Sustainability certificates have not proved to be an adequate means of meeting the above challenges in all their dimensions. Worse still, the emergence of the certificates initially brought the issue of sustainability to a standstill. Only the recent climate movement has pushed sustainability and in particular the risks associated with a poor energy and climate balance back onto the agenda – including and especially among (institutional) real estate investors. The enormous ecological footprint of the building sector obliges the industry to act, and not only as a moral imperative. Government regulation, keyword: EU Taxonomy, and the threat of carbon taxation also increase the pressure. In addition to direct regulatory intervention, demand on the real estate market is also forcing the industry to rethink, as the climate compatibility of a building plays an ever-greater role – whether as a result of self-imposed obligations or simply by anticipating possible future risks.

In the real estate sector, a high degree of responsibility and concern arises not least because of the extended economic life cycle of buildings and the long investment horizons involved, especially among institutional investors. Answers to the now increasingly pressing questions are not now being sought in sustainability certificates, but in ESG strategies and new standards. While established catalogs such as GRESB (Global Real Estate Sustainability Benchmark) are used to translate existing environmental, social and corporate governance strategies into practice, a flood of individual models and standards have also emerged.

It remains to be seen which standards will prevail. In any case, consolidation is needed – especially since most standards hardly differ in their details and regulatory requirements mean that many owner groups have to prepare reports according to different standards depending on where their real estate assets are based. In addition, questions need to be asked regarding the benefits of models that focus on the documentation and evaluation of sustainability data. In view of the fact that sustainability will inevitably find its way into the core business areas of companies through regulation, every model, every standard and every tool need to be highly compatible, for example with regard to risk management processes. Without such compatibility, the result is likely to be very short lived or of limited benefit. Basically, the industry cannot afford either.

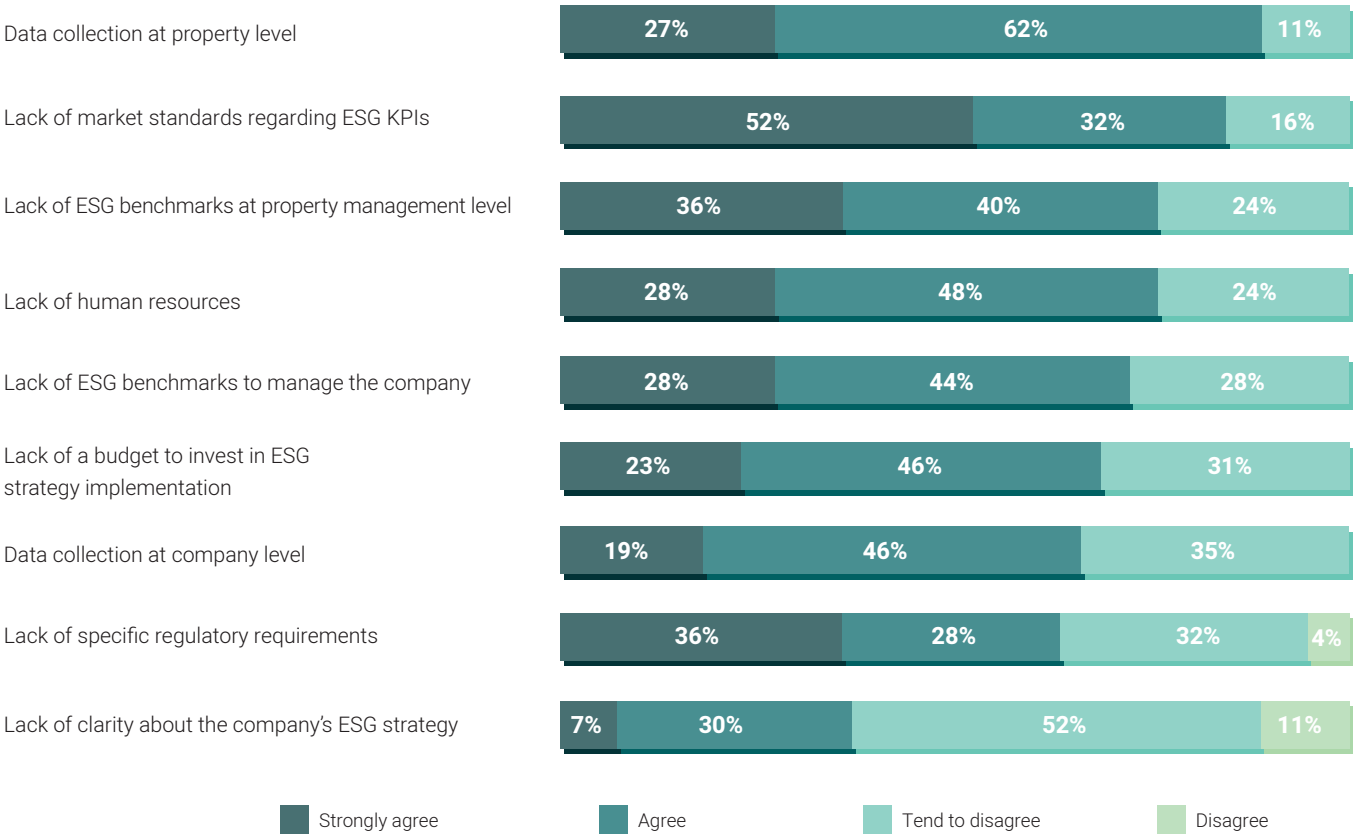
Sustainability in asset management: Relevance recognized, implementation in its infancy

Stakeholders have recognized the urgency and scope of the situation. EY Real Estate's Real Estate Asset Management Study 2020, for example, found that a large majority (85 percent) of asset managers active in the German market expect the proportion of investment in sustainable buildings to increase significantly. The authors of the study emphasize: "The issues of sustainability is on the agenda of many real estate companies."

However, the extent to which sustainability strategies are being developed and implemented varies greatly. According to EY Real Estate, around a quarter of those surveyed are still in the orientation phase, i.e. they are mainly monitoring current developments. More than one third of the study's participants are already in the process of drawing up a strategy, defining sustainability goals and considering how to collect data. Just under a quarter of companies have a sustainability strategy and specific goals and are currently collecting the necessary data. In contrast, only 15 percent of the participants state that they have established a sustainability strategy as an integral part of their corporate processes.

When it comes to practical implementation, the situation is sobering: Only around a third of those surveyed collect data on carbon emissions at property level, and even fewer (30 percent) regularly monitor emissions. In many cases, companies lack even the basic data required to establish ESG-compliant portfolio management strategies Consistent and comprehensive data collection at property level is therefore currently the greatest challenge and almost 90 percent of the surveyed companies know this. A second challenge, identified by 84 percent of those surveyed, is the lack of market standards for ESG KPIs, while 76 percent also identified the lack of benchmarks at property level.

EY Real Estate: Data collection and lack of market standards as major challenges for asset managers



Source: EY Real Estate

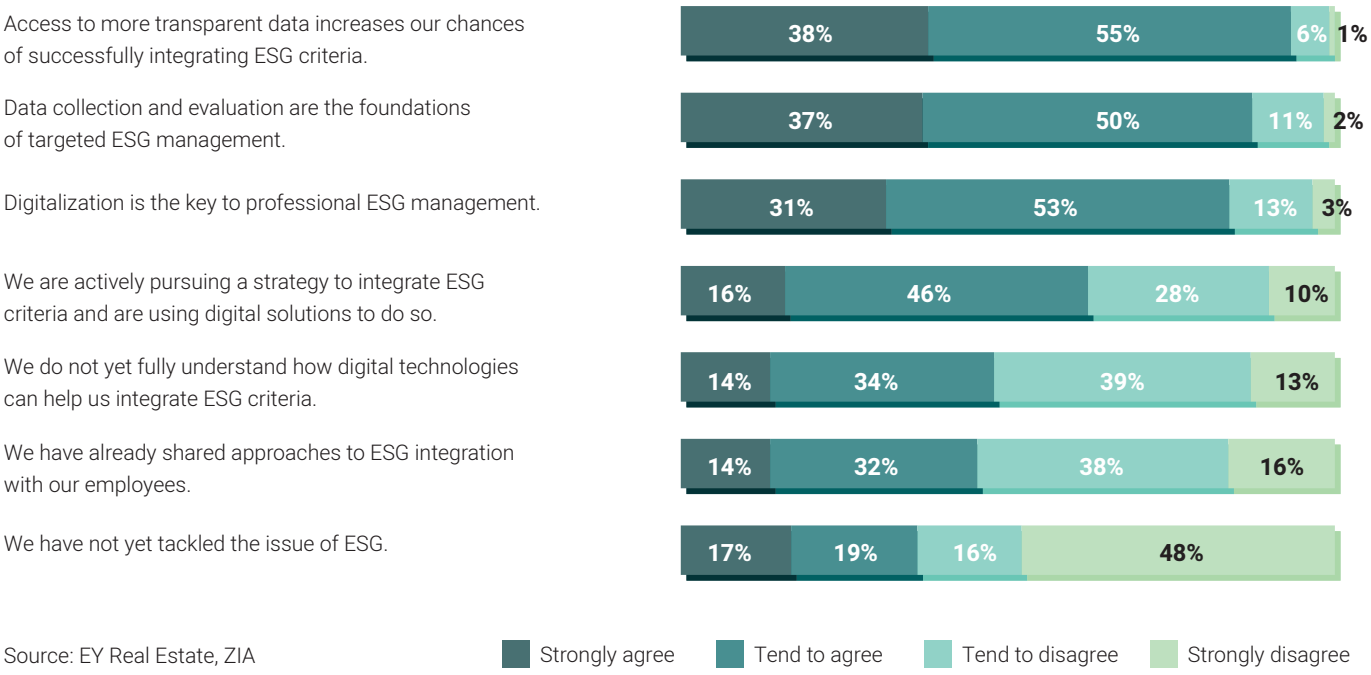
A myriad of data collection methods and an absence of market standards are holding the industry back from achieving its climate targets.

Jens Mueller, CEO BuildingMinds

Digitalization and data are the keys to sustainability.

Digital transformation is the only way to create a sustainable real estate industry. According to the 2020 Digitalization Study by the German Property Federation (ZIA) and EY Real Estate, for example, 84 percent of surveyed real estate companies believe that digitalization is the key to professional ESG management and 93 percent agree that access to more transparent data increases their chances of successfully integrating ESG criteria into their business models. For 87 percent of the survey's respondents, data collection and evaluation are the foundations of targeted ESG management, for example through the use of data analytics and Artificial Intelligence.

Professional ESG management needs transparent data and digital technologies



Source: EY Real Estate, ZIA

Integrated data management **is essential.**

In other words, the data that is collected and managed should allow companies to set targeted benchmarks and take full advantage of the appropriate industry standards. To this end, data need to be harmonized and democratized. After all, the data companies collect come from a wide variety of sources and exist in different forms – analog and digital, structured and unstructured. And data are becoming ever more ubiquitous, especially given the growing prevalence of sensor arrays, IoT technologies and building management systems. Time and time again, the use of different data formats and systems results in transmission errors and integration problems. Even the way in which data are stored can cause problems, as the coronavirus pandemic has clearly demonstrated. As the wide range of certificates and standards across the real estate sector is not likely to consolidate any time soon and the industry has to comply with new sustainability disclosure obligations, there is no alternative to integrated data management. Climate-related indicators such as energy consumption and greenhouse gas emissions must finally be given the same attention as classic financial indicators.

Lessons from the coronavirus crisis: **Agility** is the best form of prevention

The Covid-19 pandemic has clearly demonstrated the importance of identifying risk factors at an early stage and preparing appropriate scenarios to mitigate their impact. However, the overnight switch to remote working has also revealed that, in many cases, the structures within the real estate industry simply do not allow this. Static data were stored in disparate systems and included entirely incompatible data. This prevented companies from evaluating risks at property to portfolio level and stopped them from taking targeted countermeasures. Conversely, this means that the industry needs to make consistent, qualitative data available at all times if it wants to assess risks correctly and act accordingly.

In doing so, it is important not to earmark data for specific purposes. In every instance, data require an agile approach, especially in data management. Data need to be dynamically cross-referenced. In other words, any change to one piece of information has an impact on other related information. In theory, once risk management data have been collected and identified, an infinite number of use cases can be realized – almost instantaneously. This in turn requires a suitably agile technological infrastructure and, in particular, an up-to-date data model.

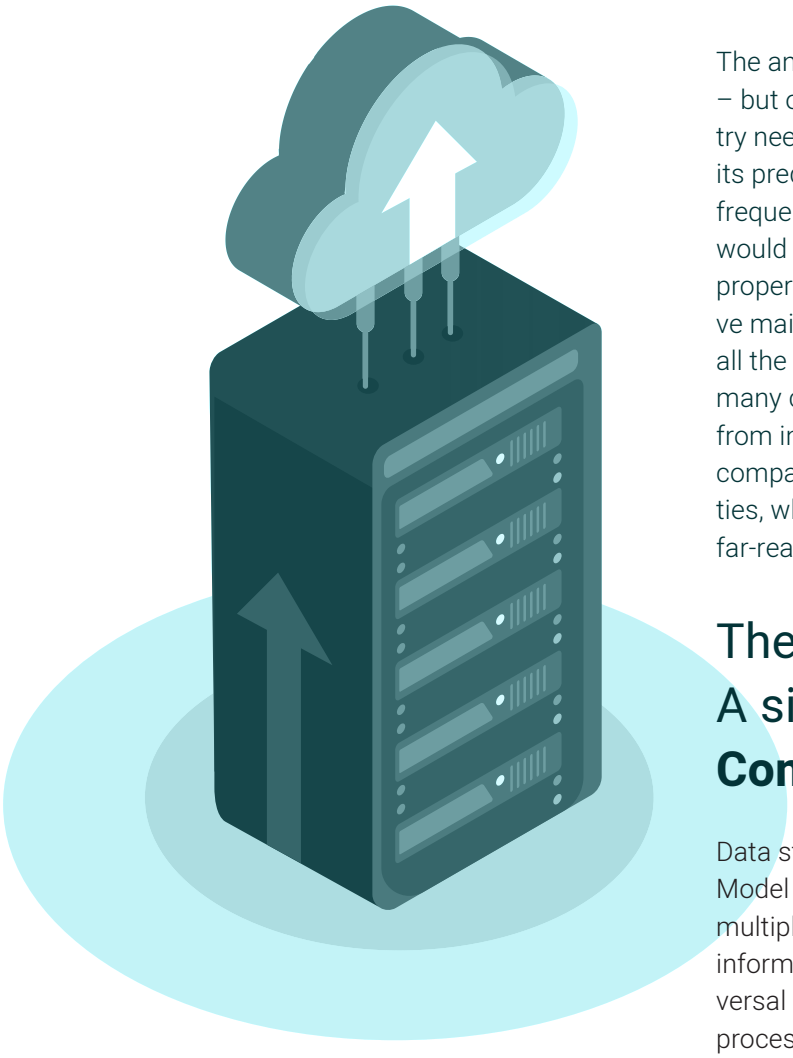
Implementing strategies

The lessons learned during the coronavirus pandemic, combined with the results of numerous market studies and an understanding of the tasks ahead, especially in terms of sustainability, confirm that **one of the greatest challenges facing the real estate industry is how to turn strategic issues affecting entire real estate portfolios into specific action plans with the help of (cross-referenced) data.** The decarbonization pathways presented by the CRREM project and increasingly adopted by the industry represent a first, and necessary, step in evaluating the climate compatibility of real estate. The resulting transparency will usher in the appropriate price signals and demand-side effects, which will in turn contribute to reducing the carbon footprint of the industry as a whole.

While some companies are still taking baby steps on the road to a sustainability-based economy, the topic and associated data have already been integrated into the daily business of the industry's pioneers. In practice, this is a multi-stage process shaped by the following questions:

1. How do you even measure the carbon footprint of a property / portfolio / company?
2. What financial risks do emissions create?
3. What are the most effective measures to reduce emissions and risks and how can they be implemented?

The ideal **platform**



The answers to all these questions can provide data – but only under certain conditions. What the industry needs is to (digitally) structure and systematize its predominantly static building information and its frequently dynamic management information. This would do more than just deliver enormous benefits at property level, from contract management and predictive maintenance to reduced operating and energy costs, all the way through to significant efficiency gains in many cases. By linking, evaluating and calibrating data from individual properties within a portfolio, real estate companies unlock completely new analysis capabilities, which would allow them to develop and implement far-reaching decarbonization strategies.

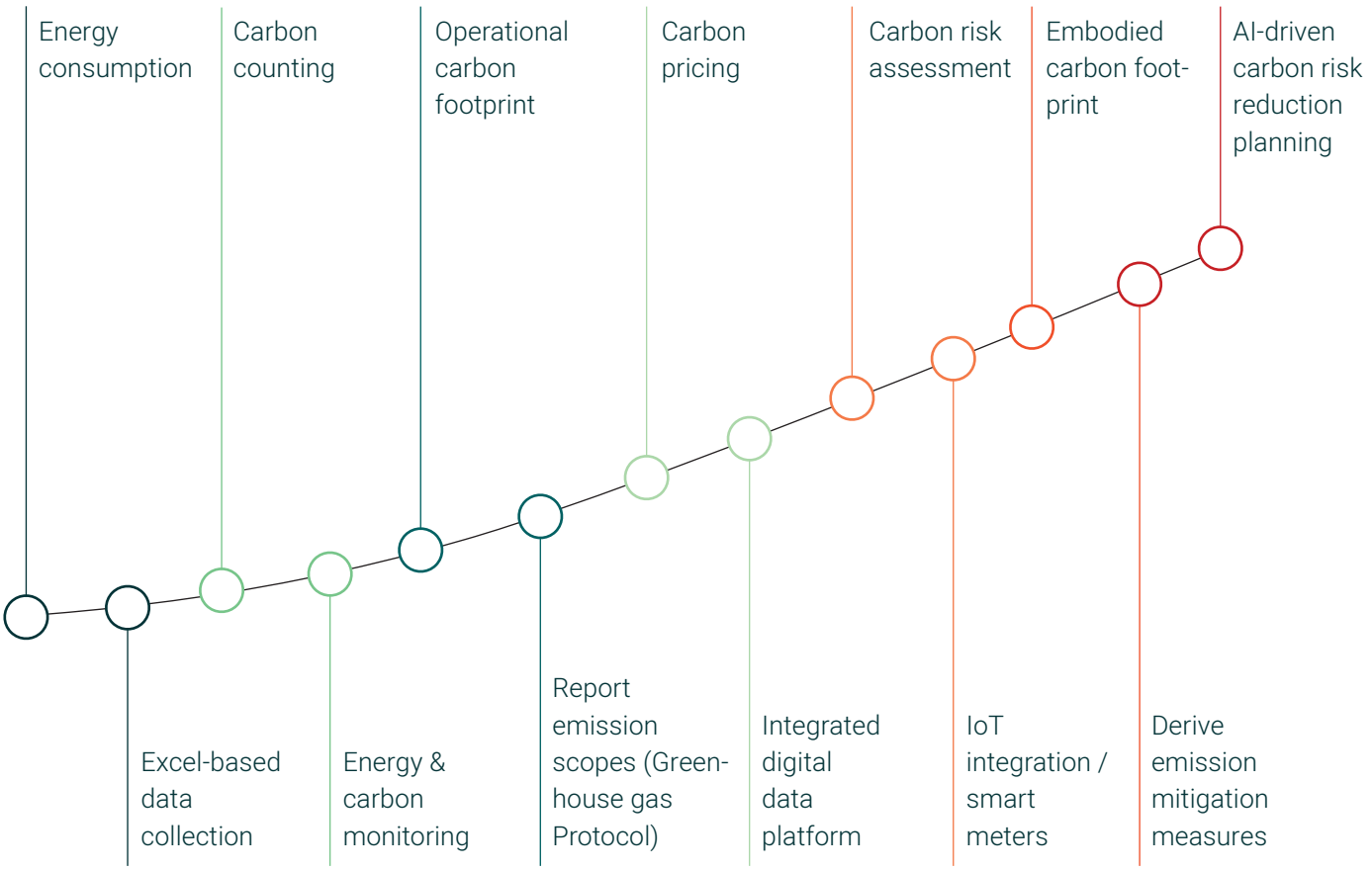
The essential foundation: A single platform and a **Common Data Model.**

Data standardization in the form of a Common Data Model is the only way to consolidate and evaluate the multiplicity of global building standards and building information. The **Common Data Model** serves as a universal data language for all property-related business processes and is the foundation of the digital platform. By bringing all data together, the platform provides investors, owners and other stakeholders with the information they need, whenever they need it. Whether from a universal portfolio perspective or at a granular individual property level, the platform integrates sustainability strategies, user satisfaction and profitability targets. Moreover, the Common Data Model consolidates both domestic and international standards. The concept is derived from Microsoft's Open Data Initiative, which is already well established in other major industries, such as the automotive and healthcare sectors, where the application of a Common Data Model has demonstrated its potential for optimizing existing business models and developing entirely new ones. There have been a range of tangible and immediate benefits, including more efficient processes and more effective compliance assurance. Above all, however, a Common Data Model provides unprecedented data quality and thus the optimal basis for the deployment of Artificial Intelligence and machine learning, which in turn open up completely new dimensions of intelligent analyses, thereby providing probably the greatest added value for data-driven property and portfolio management as a whole.

"In order to manage real estate (portfolios) intelligently and sustainably, there is no alternative to unifying **the multitude of data sources, systems and global building standards on one platform.**"

Jens Mueller, CEO BuildingMinds

Unlocking the potential of data is a multi-phase process



It all starts with the **digital building twin**

In order to move beyond theory and unlock these benefits, data need to find their way onto the platform. This is where the concept of the digital twin comes in. Other major industries, including the automotive, energy and healthcare sectors, are increasingly using digital twins, especially in complex systems and for "high value assets" such as aircraft engines and wind turbines. The principle relies on using data to build a virtual image of a physical asset.

It was Professor Michael Grieves, the pioneer of Product Lifecycle Management, who first coined the phrase "digital twin" in 2002. But he was by no means the first to appreciate its potential. When NASA's Apollo 13 mission experienced unforeseen technical difficulties in 1970, the agency used its Earth-based astronaut training simulator to model a variety of scenarios to safely return the space capsule to Earth.

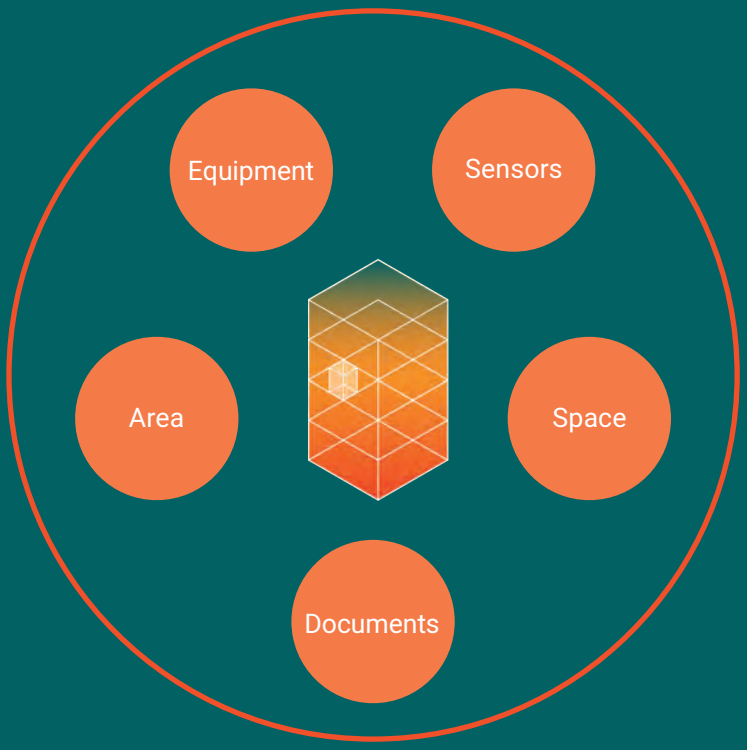
Real estate companies have so far largely failed to apply the concept of the digital twin and the few companies that have done so have tended to be property developers. However, by using digital twins, real estate companies can unlock enormous potential, especially during the operational phases of a building's life cycle, primarily because they offer such an incredible degree of transparency. In order to build a digital twin, BuildingMinds has identified the following five key components:

- The **architecture** and building structure clearly need to be central components of the digital twin.
- The model of the building then needs to be combined with a breakdown of the internal and **exterior areas**, e.g. rental units and common areas, plus
- **building specifications** and equipment, including technical installations, fire prevention systems and elevators.

These three elements – building structure, areas and equipment – are all static by nature. At the same time, the digital twin also needs to depict a range of dynamic factors.

- These are mainly provided in the form of (real-time) information from **sensors**, for example on room utilization and air, temperature and lighting conditions within the building.
- The fifth main component is **documentation**, which frequently exists in large volumes and comes from various sources and in different forms. The information contained in these documents also needs to be extracted and modeled.

The BuildingMinds' digital twin – more than just a mirror image of a physical asset



The combination of these key static and dynamic components creates a holistic digital image of a property, which in turn feeds into a kind of real estate logbook in which all information is brought together. **Thus, the digital twin becomes the central and only source – the nucleus, or the "single source of truth" – of all building data for all stakeholders, from portfolio and asset managers to property and facility managers, tenants, owners, auditors, insurers and more.** In 2D or 3D, the digital twin visually depicts technical issues and space optimization potential and models the interaction of even the most diverse data.

International Building Performance & Data Initiative (IBPDI)

In March 2020, BuildingMinds, Microsoft, RICS and pom+ unveiled the International Building Performance & Data Initiative (IBPDI). In close collaboration, the companies are developing an International Building Performance & Data Standard based on the International Building Operations Standard (IBOS) and the Common Data Model for the real estate industry.

The Motivation
Germany's real estate industry has been undergoing a veritable "standardization frenzy" as it attempts to master and manage its existing data silos. Information in real estate companies' systems cannot be linked because they are not based on a standardized scheme. One body, gif, has for example developed standards for data exchange. But companies are increasingly dependent on an international solution.

The Objective
The International Building Performance & Data Standard will give real estate companies the opportunity to benchmark the performance of their buildings without media discontinuity. This will enable them, in detail, to identify potentials for increasing their buildings' environmental and economic efficiency. IBPDI consists of a core team whose goal is to continuously expand and improve the International Building Operations Standard and, above all, to make it accessible to the entire market. Results are constantly shared, questions defined and strategies discussed at regular open events.

www.ibpdi.org

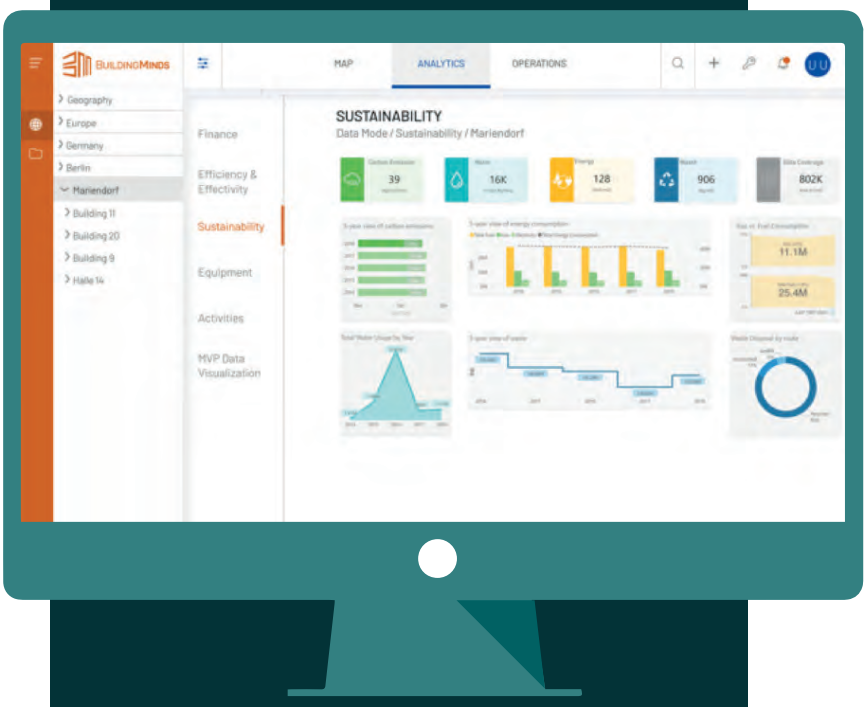
BUILDINGMINDS pom+

Microsoft RICS®

Making progress toward a **common standard**

Transparency is the top priority

In a nutshell: A comprehensive digital building management platform operating with digital twins, in conjunction with a standardized data model, can help to master the increasingly complex demands on real estate companies, including, but by no means limited to, sustainability. For example, more and more companies have committed to disclosing their emissions in accordance with the Greenhouse Gas Protocol, and to do so they need to collect significantly more data and process them more efficiently. For example, companies need to be able to distinguish what proportion of electricity in a building is consumed either by the landlord or the tenant in order to assign the corresponding emissions to the correct emission scope. In addition to energy consumption and greenhouse gas emissions, water consumption and waste (management companies) will play a far greater role, as is already the case in reporting standards such as those of the Global Reporting Initiative (GRI).



Transparency and scenario analyses are the keys to success: **The BuildingMinds' Sustainability Dashboard**

(Data) transparency is the key to mastering the challenges of climate change – not only in terms of guaranteeing compliance with legal and regulatory requirements, but also in leveraging previously untapped potential and opportunities. Real estate (companies) generate vast volumes of static and dynamic data, and not all of them are related to sustainability. Breaking down existing physical and digital data silos reveals these hidden potentials. New insights can be gained from the data, including many that were previously undetectable to the human eye – via the application of smart algorithms, Artificial Intelligence (AI) and machine learning.

A study of the latest generation of Building Energy Performance Simulation (BEPS) tools conducted by the South Korean Sungkyunkwan University concluded that analyzing the energy consumption of buildings using data-driven models such as machine learning is superior to more traditional approaches. Nevertheless, the real estate industry has so far been very slow to adopt such state-of-the-art tools. A 2019 survey by BNP Paribas confirmed that investors and asset managers want to purchase AI and/or machine learning systems to support their ESG investments. And 35 percent of real estate investors worldwide say that coping with the increased granularity and detail of ESG specific data is the main priority for their technology investments. However, the real estate digitalization study by the German Property Federation (ZIA) and EY Real Estate also confirms that 21 percent of surveyed real estate companies (still) do not believe that they can achieve energy and resource efficiency, even with the deployment of digital technologies and applications. However, the study's authors rightly highlight the incredible potentials of AI and machine learning, as well as robotics. The real estate industry cannot afford not to exploit or develop this potential as quickly as possible.

Case study

Plenty of studies confirm that the challenge may have been recognized, but progress on implementation has been painfully slow. Real estate companies are hesitant because the potential impacts have not yet been fully quantified. The following case study provides a clear and urgent warning. The calculation is based on a 2,000-square-meter office building in Berlin, built in 1980.

Within the space of just a few years, buildings are at risk of becoming high-cost, stranded assets

Own calculation, according to CRREM

Net present value NPV (2019) of costs of excess emission
Calculation on 1.5°C and 2°C CRREM Decarbonization target and € 226 ($ 268) per ton of emissions above target according to New York Building Emissions law
NPV 1.5°C: 172.376 €
NPV 2°C: 98.796 €

Carbon penalty risk CPR
Ratio of NPV of costs of excess emissions and building‘s market value
CPR 1.5°C: 2,87 %
CPR 2°C: 1,65 %

Building details
Location: Berlin, Germany
Gross internal area: 2,000 square meter
Construction year: 1980
Use type: Office
Market value: 6,000,000 €

Outlook

The real estate industry faces enormous challenges. The requirements of users, investors and politicians are constantly changing and at an ever-faster pace. As a result, the demands placed on buildings and built spaces are also increasing. Without a doubt, one of the major drivers of recent developments is sustainability. In fact, over the next few years, sustainability will become the linchpin of real estate management.

- It is becoming increasingly clear that active sustai nability management can make a significant con tribution to reducing risk, optimizing real estate and ultimately even to boosting investment returns.

- Furthermore, numerous studies have confirmed that investors are likely to redirect capital toward “green” investments in the very near future.

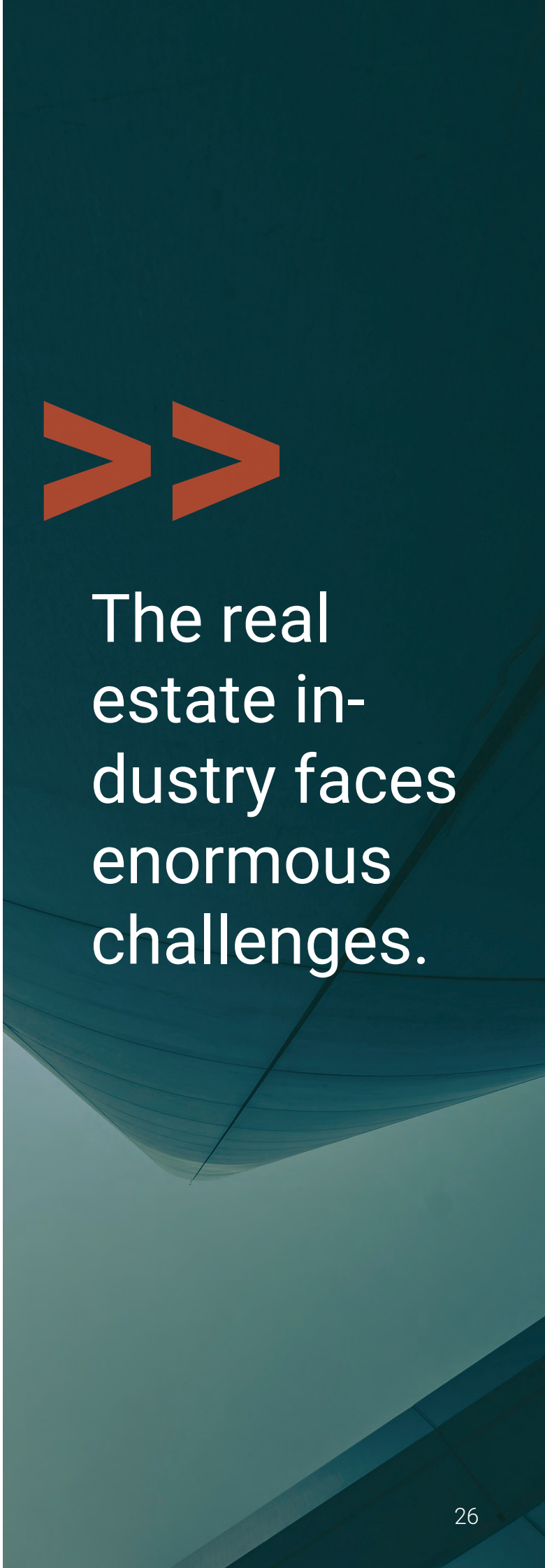
- Conversely, this shift will result in a loss of value or even make unsustainable products impossible to sell.

The real estate industry has long neglected the issue of sustainability and where it has embraced the issue, it has largely done so for marketing purposes. Commendably, the industry as a whole has now recognized the im- portance of sustainability, not only in pursuit of climate targets but also as a key investment criterium.

- The industry now needs to walk the walk and not just talk the talk with its ESG strategies and new, sometimes seemingly interchangeable initiatives and standards.

- The implementation of practical measures to reduce energy consumption and greenhouse gas emissions, both of which will ultimately determine whether climate targets are reached or not, needs to gather momentum. Whatever approaches and solutions the real estate industry develops, it cannot afford to lose sight of this overriding goal.

- New certificates and stand-alone solutions, for example from PropTech companies, may be jus tified, but they do more to fragment the sector rather than contributing to transparency, standardization and benchmarking.



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About BuildingMinds

BuildingMinds was founded in 2018 by Schindler. With Microsoft and select co-innovation partners, the company has developed a fully integrated data platform to transform the entire real estate value chain and optimize the management of real estate portfolios using data-driven insights, machine learning and Artificial Intelligence.

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