

The sustainable construction process

VÆRDIBYG



SUSTAINABLE CONSTRUCTION REQUIRES CLOSER COOPERATION AND BETTER PROCESSES

You cannot build sustainably alone! Those working in the construction industry need to make a concerted effort in order to seriously contribute to the sustainable transition. We have the necessary professional tools, but we need to talk about sustainability using a common language in order to incorporate sustainability into projects from the very beginning and anchor it in the building process across the value chain. This requires that all parties in the construction industry put sustainability on the agenda and work together to find solutions to the issues that prevent sustainability from being prioritised. If sustainability is to become an integrated part of the construction process, it must be in focus where it matters most: from the beginning – and an increased effort must be made to maintain the good intentions throughout the construction process so that we also end up with a more sustainable construction.

It is a common situation that a construction project's ambitions for sustainability decline as the project becomes more and more concrete, and often only a few of the original ideas about sustainability are realised when the project is completed. During the construction process, there is a need to identify the challenges and barriers that hinder sustainable construction and on that basis develop the process so that it supports the sustainability ambitions. We need to find out what the good sustainable construction process looks like.

We have set out to uncover this in more detail in this publication. And these are challenges that we as an industry must seek to find answers to when we want to contribute to our common ambitious goal of limiting climate change and over-consumption of the planet's resources and achieving healthier and better buildings for the benefit of society as a whole.

Economic factors often play a crucial role in the degree to which sustainable solutions are prioritised, because it can cost more to build sustainably. But this is not always the case – especially not in the long run. At the same time, we see a number of factors related to the construction process that to a large extent also have an impact on sustainable construction. These absolutely fundamental challenges need to be addressed in order to ensure more sustainable construction: there is a lack of concrete goals, a common language and an early focus on sustainability. There is a lack of clarification of roles, management and resources. And there is a lack of a closer and earlier cooperation between the parties involved in construction projects.

In this publication, we are looking to lay the foundations for a stronger understanding of how the organisation of roles, interfaces, processes and collaboration can be the path to more sustainable construction. This publication does not solve this, but we want to initiate a movement where construction industry parties in the coming years work towards sustainability being more than just a one-off option on selected projects. The sustainability agenda must be integrated into the ordinary construction process so that it does not end up being an add-on while decisions are made under other auspices. Construction processes must support sustainable construction in becoming the new widespread norm within the industry.

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THE SUSTAINABLE CONSTRUCTION PROCESS

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SUSTAINABILITY IS THE CONSTRUCTION INDUSTRY'S BURNING PLATFORM

Where do you draw the line for something to be called sustainable – and can construction at all be sustainable? Our general perception of what sustainability entails is constantly changing as we gain more knowledge about the subject. And sustainability in construction is a complex issue that is difficult to pinpoint in a clear-cut overall definition.

The concept of sustainability covers social, economic and environmental sustainability. With regard to construction, we can also talk about cultural sustainability: architectural and cultural quality in construction, which has an impact on the quality of life for residents and the lifespan of buildings.

THE ENVIRONMENT IS THE IMMEDIATE CHALLENGE

In Denmark, we have a strong tradition for focusing on cultural, economic and social qualities in construction – and finding the right balance between these conditions. But there is little doubt that it is the climate crisis and the fight against man-made climate change that have recently put sustainability at the top of the international community's agenda – and made it the most pressing challenge in construction. Therefore, the industry's focus in the coming years should be on solving problems associated with environmental sustainability – in particular CO2 emissions and, in the longer term, scarcity of resources and the destruction of biodiversity.

Environmental sustainability is thus the immediate agenda that the construction industry must relate to and find solutions for – of course, not forgetting the other dimensions of sustainability. But it is difficult for many to have to work with yet another framework condition. In addition, a framework condition that directly affects all phases of construc-

tion and requires the involvement of all actors in the value chain – and which only the few in the industry have worked with on a concrete and measurable level.

In reality, it is rarely possible with today's widely used methods to build sustainably in the absolute sense – that is, to build what we need, without exceeding the planet's environmental capacity. But we cannot just stop building, because society needs buildings. As the world's population continues to grow and the needs of society change, the need for building space grows. That is why it is necessary that we continue to raise the bar for how environmentally sustainably we can build. In the long term, we need to develop approaches and solutions that are radically different from today's solutions. And in the short term, we must build more sustainably based on existing knowledge and technology. At the same time, we must maintain a focus on how we arrive at the most sustainable compromise that meets the greatest possible needs with the least possible damage. This transition requires both change and innovation in the construction industry.

CONSTRUCTION PROCESSES

In this publication, 'construction processes' must be broadly perceived as the entire process – from the initial idea to the operating of the finished construction – and relate to all the actors who work, interact and collaborate in these phases.

When we use the term 'construction processes', it thus covers topics such as roles, responsibilities, interfaces, services, relationships and cooperation, forms of contract, change, innovation and more.

FIRST STEP OF THE JOURNEY

The purpose of this publication is to examine how processes – including collaboration, roles, interfaces, services, division of responsibilities and more – can be organised so that they support sustainable construction. The aim is not to present definitive conclusions or solutions but rather to create a debate and common understanding of how processes are a crucial factor in fulfilling the ambitions of sustainability in construction.

The publication is aimed at construction practitioners who order, plan, design and carry out sustainable construction – or who want to do so. The goal is to give this broad target group an insight into the prerequisites, framework conditions, processes, etc. that lie behind sustainable construction – from the initial idea to the final product. In addition, the publication is aimed at construction industry organisations, development initiatives, relevant authorities, business leaders and decision makers, researchers, etc., who need to see the construction process as a central focus area in relation to the development of sustainable construction.

In this way, it is our ambition that the publication can help to focus and nuance the debate on how we accelerate the sustainable transition of the construction industry by highlighting the crucial role of processes, collaboration and organisation.

READING INSTRUCTIONS

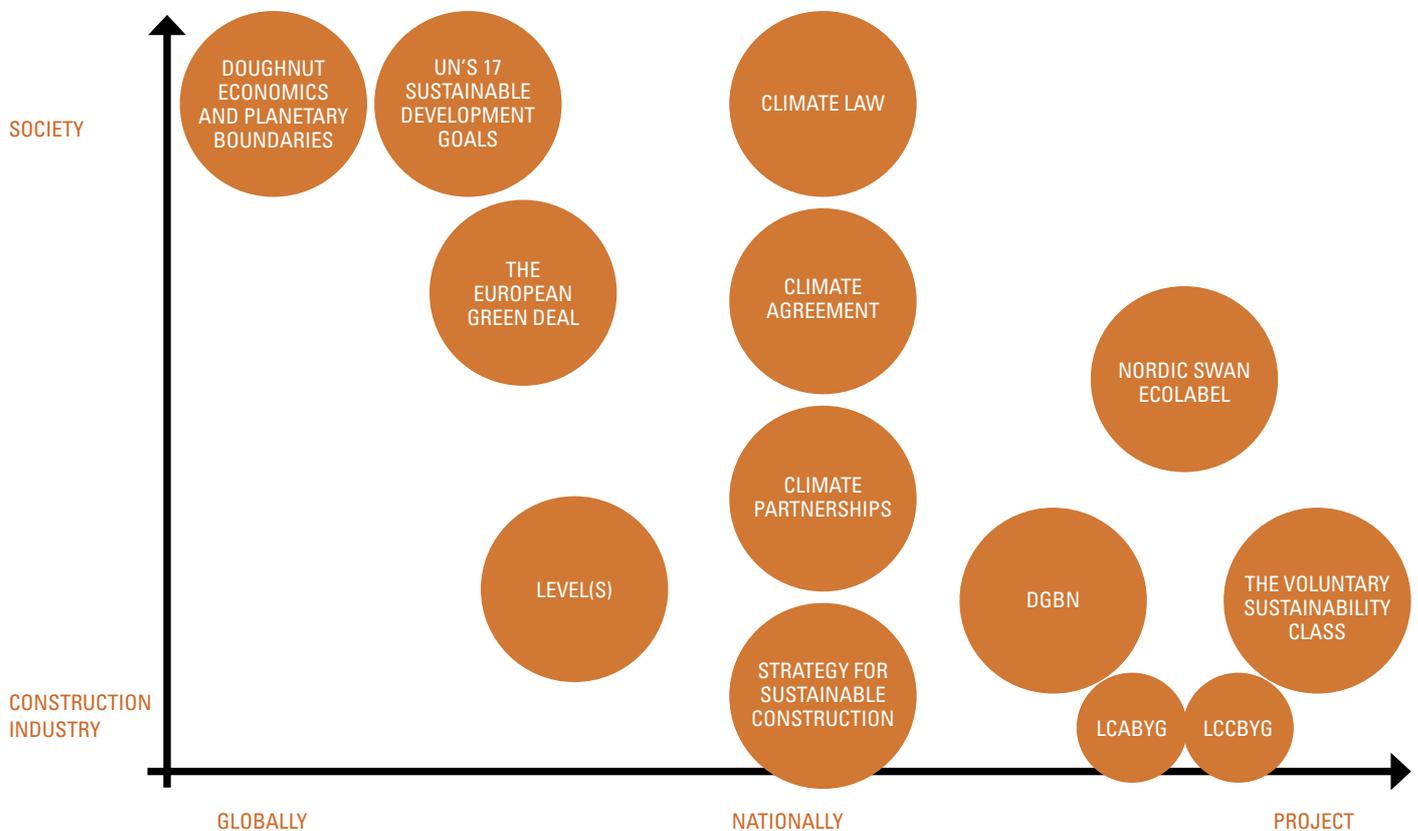
This publication consists of two primary parts: one on the specifics of the sustainable construction process and one on process challenges in working with sustainability in construction. These are in a way two sides of the same coin, and the two parts of the publication deal with some of the same topics. We believe that the two different approaches to the material complement each other and provide a greater understanding of the conditions for sustainability in construction – and therefore both angles are included. As the reader, you are free to read them in the order you want.

The publication is based on knowledge and insights found in the industry today. This knowledge is gathered at a kick-off theme meeting with a great deal of participation from practitioners in the construction industry and subsequently an intensive programme consisting of four workshops with approximately 25 practitioners from all parts of the construction value chain: developers, consultants, contractors, knowledge institutions, etc. In the publication, the project participants' input has been compiled, edited and nuanced by the writer and editorial staff.

WHERE IS THE INDUSTRY TODAY?

The industry is already in rapid development, even though there are divided opinions about the level of ambition. There are constantly new lighthouse projects that set new standards for how to work with sustainability in construction. In addition, there are many practitioners who work every day with specific initiatives to strengthen the sustainability of the individual construction projects.

But the work is underway, also on a general level. There are a large number of initiatives and tools that are already part of the framework for sustainability, and which are practiced in various forms in specific construction projects. The diagram below shows some of the initiatives and tools – they are placed according to whether they are general to society or specific to the industry – and according to whether they are global, national or project-oriented.



Initiatives and tools that frame sustainability are ranked according to whether they are general to society or specific to the industry – and according to whether they are global, national or project-oriented. Read more about each initiative in the appendix.

THE SUSTAINABLE CONSTRUCTION PROCESS

The way we think about sustainability today is mainly aimed at the finished sustainable construction – be it a new build or renovation. There is a lack of focus on and knowledge of the process in relation to sustainable construction. This is where choices are made with crucial importance for the final construction. In this section, we unfold the ‘sustainable construction process’ and offer suggestions for how it differs from a normal construction process.

SUSTAINABILITY MEANS CHANGE AND INNOVATION

Traditionally, construction processes have been characterised by a strong focus on the interplay between economic factors, quality and time. If we are to work towards sustainable construction, it requires a focus on other matters, or in other words: a focus on even more framework conditions at the same time. It places significant and new demands on construction industry parties, because sustainability really means change from ‘what we usually do’ and innovation at all levels of the value chain. This is a broad process of change, where we as an industry must learn to build sustainably.

THE INDUSTRY MUST PAVE THE WAY FOR LEGISLATION AND REGULATION

Construction is a highly regulated area in Denmark, and the entire industry must ensure compliance with a comprehensive and complex set of legislation. Traditionally, there has been innovation in the industry when legislation has been tightened – but when it comes to sustainability, other mechanisms are at stake: society’s demand for solutions that do not destroy our planet is so great that it can shift an entire industry before it is written into legislation.

The construction industry is in the midst of an urgent transition motivated by a climate crisis and the need for major reductions of environmental impacts within relatively few years. There where this transition is right now, sustainable construction is an expression for a higher level of ambition than current legislation or common practice in the industry. Therefore, sustainability in construction begins where minimum requirements and legislation end, and where players in the industry take over based on their own initiative with innovation, development and changed practices.

This creates a situation where the development of the industry goes in several directions without being characterised by a clear goal or a common understanding of how to get there. The industry works in a large number of areas without actual guidelines and tries more or less autonomously to do the best it can.

For the same reason, it is often difficult to compare two buildings with each other to find the most sustainable building – because there may be a focus on different needs and objectives between the projects, and because there are several framework conditions at stake, which makes the basis of comparison extremely complex.

GOOD PROCESSES MUST ENSURE RESULTS

It is these conditions – that sustainable construction challenges the norm and that development is practice-driven rather than regulated by legislation – that lead to the process being crucial if the ambitions of sustainability are to be maintained throughout a construction project.

It is through well-structured processes that it is possible to ensure that common goals for sustainability are established, that roles and responsibilities are clarified and that collaboration is created on the challenges associated with doing things in a new way. It is these processes that make it possible to develop, manage and realise the project so that the finished building lives up to the original ambitions for sustainability, despite the challenges that new requirements, innovation and change bring with them.

The construction process that supports sustainability is not radically different from the traditional construction process – but it has a special focus. As such, the challenges facing the sustainable construction process are not new challenges in the construction industry. These are well-known processes that need to be strengthened in order to deal with the change and innovation that the sustainable transition entails. However, sustainable construction often means a higher degree of uncertainty and complexity, which all parties in the process must be involved in dealing with.

The following sections shed light on different parts of the sustainable construction process with a focus on how a sustainable construction process differs from a traditional process. →

ROLES AND RESPONSIBILITY

In order to create more sustainable buildings and construction, it is necessary that the right knowledge and the right competencies are put into play at the right time and that they focus on common goals.

“The client must take an active role in the process and set the direction for the project.”

- Client

Clients have a key role because they must make the crucial decision of wanting to build sustainably and be able to formulate it in the process as specific requirements to participants in the project. They must set the direction for the project, they must be visible in the development of the visions for the project, and they must create the framework for the sustainable process and good cooperation. It is their responsibility that sustainability is prioritised and included concretely and measurably early on in the process. In order to be able to set specific requirements for the sustainability of a building, it is crucial that the client participates in defining sustainability in the specific project (i.e., which parameters the degree of sustainability is measured by). This requires the client to have a firm insight into what sustainability is and what decisions need to be made.

“The professional competencies are present, but they need to be put into play at the right time.”

- Contractor

The **consultants** have a responsibility to bring their knowledge into play with the client and highlight opportunities and potentials. It is typically the consultants who help the client shape the sustainability vision, and thus they can help to set a direction for the sustainability ambitions in the individual project. In addition, the consultants must have

a broad knowledge of strategies for sustainability and be able to clarify potentials in the individual project. They must be able to validate their own designs in relation to objectives for sustainability and in the design process, as well as incorporate knowledge about sustainability in solutions and requirements for materials from contractors and suppliers.

The **operation** of the final building is often decisive for how sustainable the construction proves to be. Buildings are becoming more and more complicated and technically demanding, and special skills are required to operate them in the most optimal way. It is necessary to constantly adapt and maintain both ‘passive’ building parts and technical facilities if the building is to be able to be used and operated in a sustainable and appropriate way according to the intentions of the project. Therefore, it is important to involve the client’s operating organisation or people with operational experience early in the process.

Contractors and suppliers must be involved early on in the process to uncover the possibilities for sustainable solutions, deliveries, systems, materials, etc. At the same time, the other links in the value chain expect the contractor to take responsibility for achieving the project’s objectives and actively contributing to realising the vision. In short, the contractor engages and actively participates in the process of sustainability.

Suppliers must also be able to provide the necessary knowledge and documentation so that the right solution can be found based on data about the environmental impact. This applies to new products but also in relation to reused products.

In projects that are certified, it is important that the **certification team** is not disconnected from the rest of the project team. The certification team must be involved so that sustainability becomes an integral part of the process.

INTERFACES AND EARLY INVOLVEMENT

Creating sustainable construction requires collaborating on the challenges and putting interdisciplinarity into play. As one practitioner from the industry says: 'You cannot be sustainable alone' – in the same way that you cannot leave it to other parties to make the project sustainable. Silo thinking and sub-optimisation are not compatible with holistic thinking, where several framework conditions are in play.

EARLY FOCUS ON SUSTAINABILITY

In the very early stages of a construction project, a number of key choices are made that are of great importance for the project's possible level of sustainability – and clarification and planning in relation to sustainability should therefore start and be prioritised much earlier in the process than industry players have traditionally done. It is necessary that sustainability becomes an integral part of the process from the start and is anchored centrally in the project – therefore, more time must also be set aside for it in the initial phases.

"You cannot be sustainable alone!"

- Architect

The parties in the project must be able to handle the complexity of the early design phases in order to create holistic solutions with sustainability as a guiding principle.

All parties in the process must be willing to work together to realise the overall vision and goal of sustainability in the project and have a shared commitment to bring the necessary knowledge and professionalism into play at the right time. It can be orchestrated by a sustainability manager – but if sustainability is to be integrated, everyone has to take responsibility.

THE FIRST PHASES REQUIRE RESOURCES

In fact, up to half of the time spent focusing on sustainability should occur in the initial stages, because it is precisely here where the direction is set and the most important decisions are made. After this, changes become much more expensive, and therefore the possibility of making adjustments to the project becomes less and less the more advanced the project is.

Nevertheless, we must be aware that a project is constantly changing, and throughout the project we must be prepared to adjust the design, prerequisites and framework for the project.

SUSTAINABILITY MUST BE INCLUDED IN THE TENDER

It is often suggested that the tender rules are a limitation to sustainable transition – that the Public Procurement Act means that it is not possible to demand sustainable solutions or products, and that the clients therefore cannot make sustainability a competitive parameter. But that is not true. The tender rules do not place limits on including more sustainability in projects. But it does not happen by itself either.

Collaboration on sustainability is new, and it places new demands on the tender process, where the clients must use all their opportunities to ensure that they get the desired solutions, competent partners and crucial processes. This can be achieved through new, modified criteria for selection and awarding, through requirements for deliveries and not least through the use of the opportunities for dialogue in the tender process.

“Sustainability must be defined clearly, ambitiously and measurably for the specific project – from the very earliest considerations. And it’s hard!”

- Engineer

This is no different than if the clients want to focus on any other qualitative area in their procurement. This is not to say that it is easy – and the challenge of purchasing sustainability is that we have to work with completely new parameters and criteria. The clients lack help and inspiration for how to choose and demand the right sustainable parameters, and how to measure and evaluate them in the received bids.

KNOWLEDGE ABOUT SUSTAINABILITY MUST BE PASSED ON

In connection with the change of phases in the project process, the parties must focus on the fact that requirements for and knowledge about sustainability must be transferred to new parties. This can, for example, take place at project review meetings. It is important that the intentions of the various solutions are understood by all parties so that no changes are made that do not take into account the sustainable elements of the solutions. It is important that common standards are established for how sustainability is assessed so that discussions do not arise later.

SERVICES

The industry must be able to handle new requirements for the projects. Both in relation to what a project is measured on and in relation to an increased amount of documentation. It creates new expectations for construction project actors, who must be able to formulate and follow up on requirements in relation to sustainability. The competencies to deliver these new services are widely present and available in the industry. When this does not always succeed, it is to a large extent due to the fact that the work on sustainability is often not sufficiently structured and coordinated, and thus there is not enough involvement, knowledge sharing and coordination across professional groups.

SERVICES AND LANGUAGE SHOULD BE AGREED EARLY

It is important to match expectations and agree on the services initially and during the project (e.g., who should do what and when). In addition, in sustainable projects there is a special ‘language’ that the individual actor must understand and take part in. There are several options for language choice and interpretation of sustainability. For instance, there is a big difference between whether it is DGNB or the UN Sustainable Development Goals that set the framework for sustainability in the project. This must be agreed before the project goes too far. The parties must have a common understanding of how sustainability is defined and measured in the project so that sustainability can become a common goal and form the basis for the decisions and management of the project.

SPECIALISTS MAY BE NECESSARY

By and large, construction practitioners today possess the necessary technical knowledge to be able to handle sustainability requirements during the project. However, there may be times when it is necessary to involve specialists to create clarification and solutions, such as in relation to a sustainability strategy, life cycle assessments, overall economy, sustainable supply, circular economy, reused materials, etc.

DOCUMENTATION REQUIREMENTS ARE GREATER

There are often significantly higher requirements for the documentation of materials, projects and technical solutions in sustainable projects (e.g., in the case of unproven materials and solutions). Consultants, contractors and

suppliers have a responsibility to provide accurate documentation material so that it can be included both as a basis for decision-making during the project and as finished documentation at the end of the project – both as as-built material and for certification, participation in the voluntary sustainability class or similar.

SUSTAINABILITY IS A MANAGEMENT TASK

The work with sustainability is a management task, and if you want to build sustainably you should appoint a sustainability manager who is responsible for implementing sustainability in the project.

The goal of sustainability management is to ensure that objectives and requirements for sustainability become a central part of the decision-making throughout the project. It is thus the task and responsibility of the sustainability manager that the processes that are to support sustainability are carried out in a satisfactory manner.

The sustainability manager must both ensure coherence across the project and orchestrate the cooperation between the parties on sustainability. The sustainability manager assists in the initial stages with setting the requirements for sustainability. During the design and execution, the sustainability manager checks that the requirements are constantly met. The parties in a project must regularly participate in meetings/forums where the requirements for sustainability are discussed (i.e., with a focus on the interdisciplinary, holistic solution). These meetings are initiated and conducted by the sustainability manager.

The work with sustainability management spans all the phases of the construction process and can be handled by different parties during the process: During the initial phases, sustainability management lies well with a client consultant or in the client's own organisation. During the design, the sustainability manager – depending on the size of the project – should be in a management team with the project manager, or the two roles should be handled by the same person on smaller projects. During the execution of the project, the sustainability management can be placed with several of the actors involved, but in all cases it should be together with the construction management.

FORMS OF COLLABORATION

Sustainability requires closer collaboration in projects – not only between the consultants but also between the client, the operating staff, the contractor and the subcontractor as part of the team. This is because sustainability is very much about getting the right professional input at the right time, so that the project can be shaped by the latest knowledge and not by 'this-is-how-we-do-it' solutions. When many new issues need to be coordinated, cooperation between the parties is paramount.

In the early phases, the collaboration must be about setting the framework and direction of the project. This applies to considerations about the overall sustainability strategy, about the wishes for the final result and about how sustainability becomes a design parameter that is incorporated early on. But it is also important to consider how this happens, including tender strategy, forms of contract, requirements for certification or not, requirements for documentation, etc. Often, these considerations require the involvement of a range of actors, such as users, operating staff, etc.

In the later phases, the close cooperation must continue in order to achieve the best possible result. The sustainable choices are interconnected, and a sustainable project will often be a compromise between many incompatible issues and perspectives. Therefore, all actors play an important role, and the team must be open to involving contractors and suppliers in the development and realisation of the project.

The collaboration can be strengthened by introducing **alternative methods**, such as OPP, framework agreements, strategic partnerships, etc. This can lead to closer collaboration, to building a strong team and to creating a shared responsibility to meet the project's goals. In addition, there is an opportunity to create financial incentives for taking an interest in the construction's actual performance during the operational phase. These forms of collaboration can come into play either when the individual project is sufficiently large or when a partnership has to handle a portfolio of projects, where the experiences from one project can be used on the next.

FORMS OF CONTRACT

Regardless of the form of contract chosen, the client should involve contractors and suppliers early on in order to identify which options are most obvious in relation to the client's vision and goal for sustainability.

At the same time, it is important that requirements for sustainability are included in the tender material so that the individual actor can be selected on the basis of his or her competencies and point to the solutions that contribute to achieving the highest degree of sustainability in the project.

There may be reason to put out to tender on the basis of objectives instead of concrete solutions. It may depend on the individual project and how late or early it is put out to tender. Especially when tendering occurs early on, it is often to involve other parties in the creation of the project, which is why the requirements must not be too fixed.

The **turnkey contract** is appropriate if the client can define the sustainability vision and objectives sufficiently clearly from the beginning and would like to minimise their risk in the project process. But the client also loses influence by choosing this form of contract, since the responsibility is handed over to the contractor, who in turn can come with their own competencies and sustainable solutions. Therefore, there is a need for clear expectations in the tender material on how the turnkey contractor and their team has to accomplish sustainability in the project.

The **main contract** gives the client the opportunity to be closer to the creation of the project, since the consultants, in collaboration with the client, lead the project to a stage that is more completed before it is offered to the contractor. Here, a great responsibility lies with the consultants to incorporate sustainable solutions in the project before the contract tendering, but in this form of contract it is also important to involve contractors and suppliers in the choice of solutions.

In the **individual trade contract**, the client has full control and management in relation to the project, but also assumes a greatest risk and a greater responsibility with regard to coordination. It is up to the client and the client's consultants to move the project forward, since it is typically smaller contractors who bid for specialist contracts, and they may be less experienced in relation to sustainability or to documentation requirements for the chosen solutions and products. There is thus a greater responsibility in terms of coordination for the clients and the consultants, if the visions for sustainability are to be implemented.

In **strategic partnerships**¹, which are typically a special form of turnkey contract in a framework agreement, the contractor, consultants and the client meet and prepare the project together. This is a comprehensive contract form and requires a large project or portfolio, but it is extremely effective when it comes to finding innovative, interdisciplinary and sustainable solutions.

¹ For more information on strategic partnerships, visit www.værdibyg.dk.

CHALLENGES

The clarification of what is special about the sustainable construction process leaves an urgent question: if we understand what it takes to build sustainably, why don't we then do it? What are the main challenges and barriers that prevent the spread of sustainability in construction and lead to the opting-out of sustainable solutions in the projects? This is examined in the following sections based on practitioners' own experiences.

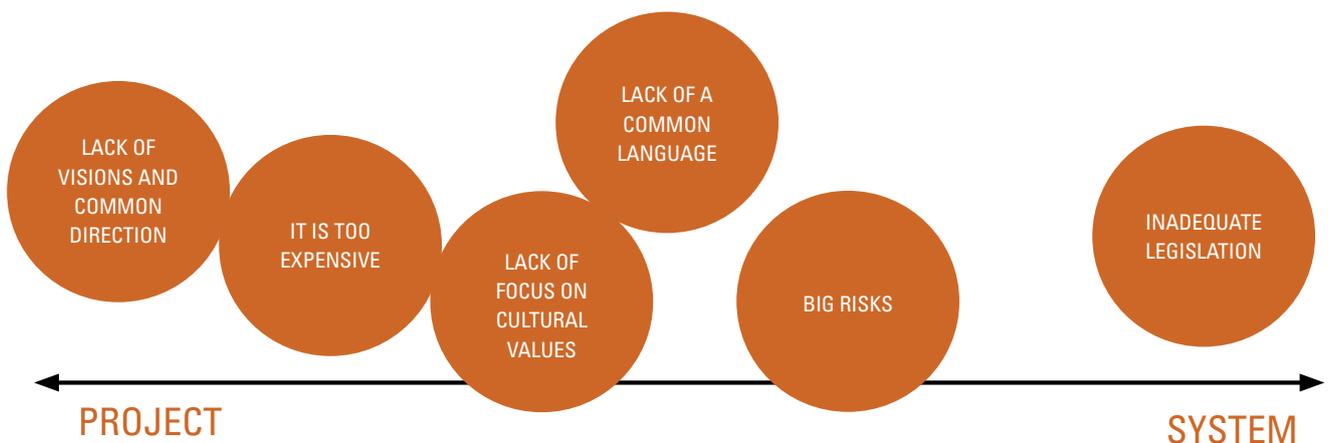
"Why do we not aim for sustainability in every project now that we know it's the right thing to do?"
 - Architect

The key challenges for sustainable construction are the lack of visions, a common language, common standards and a common direction. In addition, sustainable construction is challenged by a lack of ambitious legislation, sometimes great risks and in general that building sustainably is perceived as too expensive. Finally, there is often insufficient focus on cultural values as part of the overall assessment of a building's sustainability level.

In the figure below, these challenges are placed on an axis in relation to whether the individual challenge is related to the project or whether it is to a greater extent of a systemic/ industry-oriented nature.

Many of the challenges are interdependent. For example, the lack of visions – and the resulting lack of common direction in projects – underlines the need for a common language; a common frame of reference for the parties in the individual project and for the industry as a whole. Another example is the special risks associated with sustainable projects, where new and untested solutions are used or where reused materials without supplier responsibility are used. It can be linked to legislation, industry cooperation agreements or norms that do not sufficiently support the wishes.

The challenges are elaborated in the following. →



Here, the challenges in the sustainable construction process are placed on an axis in relation to whether the individual challenge is related to the project or whether it is to a greater extent of a system/industry-oriented nature.

LACK OF VISIONS IN THE PROJECT

In order to achieve success with sustainability, it is important that a common vision or strategy is established for the project that can act as a benchmark for all project participants. This vision must be translated into specific and operational goals for the project – and they must be followed up on throughout the project. At the same time, the goals must be prioritised and set by a joint effort amongst the project's stakeholders. This work should start with the client.

If the ambitions are not sufficiently clear and operational from the start of the project, sustainability will never be an integral part of the project and the process but rather just an 'add-on' – a layer placed on top and handled as a parallel process. Or it becomes a process that is carried out at the very end – for example, through incorrect use of certification schemes – without it having a real impact on the project. The consequence is that important decisions are made too late and that work in relation to sustainability becomes superficial.

Furthermore, it is difficult to formalise requirements for sustainability in relation to tendering and procurement if the project lacks a clear vision and operational goals.

The basis for good cooperation between the parties in the project will not exist if there is a lack of an early common understanding of the direction of the project. Incidentally, this challenge is inextricably linked to another challenge: the need to introduce and agree on a common language in each project.

IT IS TOO EXPENSIVE TO BUILD SUSTAINABLY

It can be resource-intensive to think innovatively. Sustainable construction requires innovation, and it is often more expensive to choose new, untested solutions for which there is no well-developed market and supply chain. At the same time, there are requirements for extensive documentation of new materials, products and solutions, which is both expensive and cumbersome to obtain. But as with any first-time service, repetition has a significant impact on cost and efficiency – the more 'the new' product or service is used, the more it will become the 'new normal'.

When a client decides to build sustainably, it is clear that they have to deal with the costs that can be associated with introducing new requirements. But on the other hand, sustainability cannot just be calculated as a separate expense either. If a client considers sustainability to be a desirable option in the project and only wants 'as much sustainability as possible' within the financial framework, ambitions for sustainability will succumb to the financial priorities. Sustainability must instead be incorporated into the project as a whole and be part of the larger considerations about the project's opportunities and potentials. We need to put sustainability at the top of the agenda in construction projects through a strategy that is not subject to financial constraints. When sustainability in the project becomes a framework condition at the same level as time, quality and price, it can no longer be considered a separate expense and will instead become a key competitive parameter for the supplying parties.

Therefore, all parties in the construction industry must participate in this transition. Participating in this transition is important not least because of the obvious seriousness of climate change. But the individual company's increased efforts and investment in change and development now can also be seen as an investment in the future – a maturation that equips companies for a future with a greater consumer focus on sustainability and for legislation that develops and places greater demands for sustainability. Those companies who do not participate risk being outcompeted by more sustainable competitors in the long run.

Together, the construction industry must speed up this necessary development – and until then, a structured process can help to minimise any unnecessary costs from moving in new directions. We need to equip ourselves with the best construction processes in order to work together on new sustainable solutions and joint contributions in terms of strategies, risk, responsibility and business models across a collective market.

LACK OF FOCUS ON CULTURAL VALUES

There is too little focus on the value of existing construction, and there is a lack of initial analyses in projects of whether it makes sense in terms of sustainability to demolish and build new or to renovate existing buildings. In addition, new construction is not always developed with a view to a building's cultural value and relevance in the future. The functional service life is, so to speak, much shorter than the technical service life – and the building is demolished before it has served its time, which severely affects the building's overall environmental accounts.

Long durability is a fundamental aspect of sustainability, and it requires the possibility of changing the use of buildings over the years – that is, flexible buildings that enable rebuilding and renovation for new needs and functions. It is a resource expense every time a new building has to be built and new materials used. Buildings with high cultural and architectural quality minimise the need to demolish and build new, which saves resources.

LACK OF COMMON LANGUAGE

There is a lack of a clear common language for and about sustainability – at a completely general level in the industry but also in specific projects. In projects, it is a challenge that the parties have different perceptions of sustainability and do not have time to establish a clear common understanding and a common language for how sustainability is defined in the project. This shared understanding and language are essential to be able to define objectives and methods for a project's sustainability level but also to be able to set a direction at industry level.

A common language for sustainability is a prerequisite for us to be able to talk together across disciplines and competencies – and it is precisely this interdisciplinarity that is particularly important for sustainable projects. At the same time, a common language is closely linked to the need for an early and clear vision of sustainability and a clear direction for projects.

Having a common language can be divided into the following levels:

- Having common concepts for which forms of sustainability are focused on – which strategies are in play.
- Having a common approach to how sustainability is measured and calculated in the project.
- Having a common understanding of what the level of sustainability should be.

There are quite a lot of initiatives in the industry, all of which are trying to introduce a common language but which nevertheless approach sustainability differently. Examples are certification schemes (the Nordic Swan Ecolabel, DGNB, etc.), the building regulations, the voluntary sustainability class, work with the UN's Sustainable Development Goals, and so on. These efforts each represent a way of expressing sustainability in construction and contribute to creating awareness and a discussion of sustainability as an important parameter in the projects – but in themselves they are

not a guarantee that construction will actually be sustainable. Especially not if the certification or assessment of sustainability is carried out late in the project.

SIGNIFICANT RISKS ASSOCIATED WITH SUSTAINABLE CONSTRUCTION

There are already many risks in a construction project that clients and other project participants have to deal with – and focusing on sustainability can lead to additional risks. For example, there can be doubts about the properties, durability and possible health risks of reused materials. The same can be true when using untested materials and solutions. And the parties involved often have a strong desire not to take too many big risks.

It is necessary to work actively with risk management in the projects, and the parties must make it clear whether there are special conditions in the solutions that give rise to a greater risk for the individual.

Sufficient knowledge of and experience with new sustainable solutions and products can be in short supply (e.g., in relation to reused materials). This means that there is a risk associated with choosing new solutions, since unfortunate 'side effects' can appear later. In many cases, it is relatively clear who is responsible for the different parts of the project, but if you want to try something new then you must also be willing to share the responsibility in a different way. It can, for example, be that the client's desire for sustainability means that they are willing to take a risk in trying new solutions. This can be done by dividing the responsibility for parts of the project between several parties or by defining consequences. But then there is a need for an open dialogue about opportunities and consequences so that the parties in the project can work better together to find the sustainable solutions of the future.

Conversely, an early focus on sustainability can lead to a reduction in the number of different materials, fewer complicated joints and less energy-intensive and operationally heavy technology. And this can therefore help reduce risks overall.

INADEQUATE LEGISLATION

Laws change priorities. Therefore, there is a pronounced need in the industry for a change in legislation, with requirements that make it impossible to disregard sustainability. This will change demand, sharpen the focus in projects and raise the 'bottom line' in the industry. Legislation can set an overall and ambitious direction from a political

point of view that will move the entire industry, where sustainability is no longer a 'nice-to-have' but 'need-to-have'.

Stricter legislation is needed to accelerate the transition, but legislation alone cannot do it. The industry must constantly challenge the legislation in a concrete and constructive way. In addition, the industry has a responsibility to show what can be done and that it is in general prepared for more ambitious legal requirements.

The building regulations have previously been a driving factor in reducing buildings' energy consumption, but only to a very small extent support environmental sustainability in other areas. In the industry, there is a general lack of requirements for low environmental impact that take into account solutions with low resource consumption (e.g., through the use of reused materials or other materials with a low environmental footprint). It is hoped that the voluntary sustainability class can address this challenge if it becomes mandatory with set minimum requirements for the climate footprint.

Another aspect of the legislation is the widespread co-operation agreements and standards that do not support the early inclusion of relevant competencies in the projects. There is a tradition that a client consultant and a drawing architect are all that is needed initially – but this involves a serious risk that the latest knowledge will not be included, that sustainability will not be integrated into the process and that the visions will not be established in time. There is an untapped potential in sustainability being handled in a supplement to the service descriptions and not yet as an integral part.

NEXT STEPS...

Denmark is facing a national target of reducing the overall climate impact by 70% by 2030. Buildings and construction as an industry represent a huge potential to help address this challenge. Initiatives such as the voluntary sustainability class and the government's strategy for sustainable construction set the long-term goal for the industry, but the initiatives do not come with concrete recommendations for action with how companies can meet the goals.

The industry is facing complex and major challenges in the coming years to take decisive steps forward in a sustainable transition. And it is necessary to handle, investigate and collaborate on solving a number of the issues described in this publication. It is unlikely that an individual company will be able to make a cost-effective sustainable transition on its own, and therefore special cooperation and common processes across the industry are necessary for sustainable construction to become the new widespread norm in the industry.

In general, there is a great willingness in the industry to push for sustainable transition – but there is also a great deal of uncertainty among actors in construction in relation to how it should succeed in practice. The industry's interest organisations have – rightly – high ambitions for the sustainable transition of construction and believe that construction can contribute much more than is demanded politically. But when carrying out sustainable construction projects, companies in the industry lack the concrete processes that make it possible to translate ambitions into action – from idea to finished construction. Therefore, today it is all too rare that sustainable ambitions in construction projects are translated into sustainable construction.

This publication is intended as the first step on the way to identifying some of the key issues that stand in the way of the construction industry's sustainable transition. We believe that all actors in the industry should respond to these issues – because we are all a part of the solution. The topics covered in this publication can be simplified and summarised in the following four main problem areas:

- **Projects lack clear goals and strategies for sustainability.**
- **There is a lack of a closer and earlier collaboration between project participants on sustainability.**
- **There is a lack of a common language and methods for setting requirements for sustainability in tenders, agreements and contracts.**
- **There is a lack of resources and management that ensure that sustainability goals are handled and maintained throughout the construction project.**

These are common issues that companies and organisations in the construction industry must work on together in a targeted manner in the coming years, so that sustainable ambitions and attitudes can turn into targeted action and sustainable results.

APPENDIX

THE INDUSTRY RIGHT NOW

In the following, we review some of the framework initiatives and industry-related initiatives and tools that are currently defining construction work with sustainability.

FRAMEWORKING INITIATIVES

THE DOUGHNUT ECONOMY AND PLANETARY BOUNDARIES

Kate Raworth has introduced a new economic model for society that takes into account the limits of the Earth's environmental pressures (planetary boundaries, developed by the Stockholm Resilience Center) and the social foundation a society must build on. Her thesis is that previous economic models that solely focus on growth as goals are outdated in a society where there is a lack of resources and a new social and environmental consciousness. She illustrates the model using a doughnut, where the healthy society is in the green zone. The red markings on the outside show where we are currently placing a strain on the environment and climate harder than the Earth can cope with over time, while the red markings on the inside show where our global social model today does not adequately support a socially responsible society.

www.kateraworth.com/doughnut/

www.stockholmresilience.org/research/planetary-boundaries.html

THE UN'S 17 SUSTAINABLE DEVELOPMENTS GOALS (SDGS)

The UN's Sustainable Development Goals were adopted by world heads of state and government in 2015 and will set a course towards more sustainable development for people and the Earth by 2030.

The goals are based on the challenges described in the doughnut model and contain a total of 17 goals, 169 sub-goals and 232 indicators.

The goals are global, and therefore many initiatives are underway to make them concrete for both Denmark as a whole and more specifically for the construction industry.

www.verdensmaalene.dk/fakta/verdensmaalene

CLIMATE LEGISLATION

In December 2019, the parties in the Danish parliament entered into an ambitious agreement on climate legislation for Denmark. The main goal of the Climate Act is to ensure a 70% reduction in greenhouse gas emissions by 2030 compared to 1990 levels – and a long-term goal of climate neutrality by 2050 at the latest.

The Climate Act is working on requirements for the announcement of sub-targets with a 10-year aim by the minister of climate, energy and utilities. At the same time, a status report on the climate must be produced at the beginning of each year and a climate action plan must be presented to ensure that the objectives of the Climate Act are met.

www.kefm.dk/klima-og-vejrr/regeringens-klimapartnerskaber-og-groent-erhvervsforum/

CLIMATE PARTNERSHIPS

In 2019, the government – in collaboration with the business community – established 13 climate partnerships whose task it is to put forward proposals for solutions, forms of cooperation, etc. for achieving the objectives in the Climate Act of a 70% reduction of greenhouse gas emissions in Denmark. The climate partnerships are divided into sectors and involve various ministries, agencies, industry associations and actors from the industries.

Of the 13 climate partnerships, the following are particularly relevant for construction:

- Energy and utilities sector
- Waste and water, circular economy
- Construction sector
- Service, IT and consulting

The climate partnerships presented their recommendations in independent reports in early 2020.

www.kefm.dk/aktuelt/nyheder/2020/jun/bred-klimaaftale-bringer-danmark-tilbage-i-den-groenne-foerertroeje/

CLIMATE AGREEMENT

In June 2020, the Danish parliament adopted a broad climate agreement. In the agreement, there is a focus on establishing new energy islands, and investments must be made in CO2 capture and biofuels. In addition, the establishment of an additional offshore wind farm is being advanced, individual oil and gas boilers must be phased out and replaced with greener alternatives and the industry must be restructured through energy-efficiency improvements, green electricity and more biogas.

As part of the agreement, the parties have agreed to revisit a green tax reform. The parties have committed themselves to finding a model that makes it more attractive to choose green solutions rather than black ones.

www.ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_da

GREEN DEAL AND LEVEL(S)

The EU's Green Deal is a green pact between the member states. The aim is to tackle the urgent climate and environmental challenges by introducing a new growth strategy. This strategy must transform the EU into a union with a modern, resource-efficient and competitive economy, where by 2050 there are no more net emissions of greenhouse gases and where economic growth is decoupled from resource use. The pact also aims to protect, preserve and increase the EU's natural capital and to protect the health and well-being of its citizens from environmental threats and consequences.

www.ec.europa.eu/environment/eussd/buildings.htm

LEVEL(S)

As part of the Green Deal, the EU has launched the Level(s) initiative, which aims to support sustainable construction and the circular economy. Level(s) is a common European framework for working with sustainability in the development process of a construction project, from the initial idea to the finished construction.

Level(s) consists of six 'macro objectives' that include energy, material consumption, waste, water and indoor climate – and climate change. The evaluation of performance is based on nine indicators, including life cycle assessment and overall economy. The Level(s) framework also includes reporting tools and tools for assessing risk and data quality.

INDUSTRY-RELATED INITIATIVES AND TOOLS

DESCRIPTION OF SERVICES ON SUSTAINABLE CONSTRUCTION

In 2017, the Danish Association of Architectural Firms and the Danish Association of Consulting Engineers published a preliminary version of the Appendix to the Description of Services on Sustainability (Tillæg til Ydelsesbeskrivelser om Bæredygtighed). The purpose of the supplement is to define a basis for advice in connection with sustainability, including defining roles and services and the distribution of these between consultants, the client and the contractor.

In the supplement, three levels of services are discussed, namely 1) sustainability management, 2) sustainability certification and 3) sustainability, individual services.

A final version of the supplement is expected in the near future.

www.danskeark.dk/content/tillaeg-til-ydelsesbeskrivelser-baeredygtighed

DGNB

The DGNB sustainability certification scheme is the most widespread in Denmark and is run by Green Building Council Denmark. The scheme is based on the evaluation of criteria that view the project from different angles – in the scheme these are referred to as ‘qualities’, which are weighted amongst themselves.

DGNB.dk is responsible for a third-party validation of the documentation that is collected and awards the building a certificate according to how well the building scores on both the individual scores and the overall score. It is possible to be awarded a silver, gold and platinum certificate.

www.dk-gbc.dk/dgnb/introduktion-til-dgnb/

THE NORDIC SWAN ECOLABEL

Ecolabelling Denmark offers the Nordic Swan Ecolabel, which is also a sustainability certification scheme. The scheme is based on criteria consisting of simple requirements to be complied with as well as criteria, after which the construction is given a score.

A Nordic Swan Ecolabel construction is reviewed by an independent third party with regard to both the construction process itself and the finished construction. The construction must live up to strict requirements throughout the construction life cycle, and there is a focus on, amongst other things, low energy consumption, including the awarding of prizes for the use of renewable energy, and a good indoor climate with the help of requirements for, for example, daylight, ventilation and moisture protection. The scheme has a special focus on the choice of materials for the project.

www.ecolabel.dk/da/produkter/byg-og-bolig/bygninger

THE VOLUNTARY SUSTAINABILITY CLASS

The Danish Transport, Construction and Housing Authority has launched the Voluntary Sustainability Class, which is a voluntary scheme in addition to the building regulations' minimum requirements. The purpose of the sustainability class is to define and offer an easily accessible and uniform basis on which to build sustainable construction.

The class contains nine requirements, including life cycle assessments, use of resources on the construction site, overall economy, operation and maintenance plan, documentation of problematic substances, degassing for the indoor climate, demonstration of daylight levels, noise from ventilation systems and room acoustics. The last two requirements only apply to housing.

The sustainability class is tested over a two-year period (2020–2022), after which it will be clarified how future sustainable construction will be regulated in the building regulations.

www.baeredygtighedsklasse.dk

LCABYG AND LCCBYG

The most common tools for working with the documentation of sustainability are LCAByg and LCCByg, developed by BUILD (Aalborg University) for the Danish Transport, Construction and Housing Authority. The tools are aimed at Danish conditions and support work with life cycle analysis (LCA) and overall economy (LCC).

There are many tools for managing processes, but only a few are aimed at working with sustainability. Most common is the use of generic tools such as spreadsheets. Tools like MS Teams are also widespread, since they allow communication and collaboration across companies.

www.lccbyg.dk
www.lcabyg.dk