

# Legislation and policies for sustainable architecture

Article IV, WP3: SUSTAINORDIC  
– Sustainable Construction  
Materials and Architecture



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# Preface

This article is a part of the Nordic Sustainable Construction programme initiated by the Nordic Ministers of Construction and Housing and funded by Nordic Innovation. The programme contributes to the Nordic Vision 2030 by supporting the Nordics in becoming the leading region in sustainable and competitive construction and housing with minimised environmental and climate impact.

The programme supports the green transition of the Nordic construction sector by creating and sharing new knowledge, initiating debates in the sector, creating networks, workshops and best practice cases, and facilitating Nordic harmonisation of regulation for buildings' climate impact.

## **The programme runs from 2021–2024 and consists of the following focus areas:**

- Work package 1 – Nordic Harmonisation of Life Cycle Assessment
- Work package 2 – Circular Business Models and Procurement
- Work package 3 – Sustainable Construction Materials and Architecture
- Work package 4 – Emission-free Construction Sites
- Work package 5 – Programme Secretariat and Capacity-Building Activities for Increased Reuse of Construction Materials

This article is a result of Work package 3, SUSTAINORDIC. The article is written by Malin Zimm with research by Pernille Martiny Modvig.

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# Legislation and policies for sustainable architecture

Legislation as a tool to transform the construction sector in a sustainable direction

The built environment is the result of a complex network of policies and legislations. The reason for each of these is to protect people, by providing rules for fire safety, structural integrity, and for use of safe materials. The rules are also there for our comfort and life-quality, such as energy performance, acoustic properties, and accessibility. Today, we need to be as attentive to safety and comfort on a planetary level, as we have been in protecting the individual by laws and regulations.

The following interviews bring together the voices of researchers, policy-makers, and contributors from non-governmental organisations, universities, architectural practices and EU advisors. Their knowledge is bringing together pieces of the puzzle of how to move forward in sustainability in construction and identifying the main obstacles for replacing unsustainable with sustainable practices in construction and architecture. They also point at the areas of the puzzle where pieces of legislation are missing, or where different policies or rules stand in the way of each other.

Policy work is in progress across the entire field of planning and construction, where research has provided knowledge, but there are still patches to cover, such as regulation that promotes efficient systems for reused materials. The sense of urgency is strongly conveyed by all the interviewed experts. Acting on the knowledge we have today is as imperative as the willingness to adapt to new data, and to do it without delay. The planet boundaries are set. It is people who have to make the move.

## Experts interviewed for this article:

- Kai Reaver, Head of Architecture & Chief Advisor Norwegian Architecture Association, NAL.
- Matti Kuitinen, Associate Professor, Department of Architecture, Aalto University.
- Harpa Birgisdottir, Professor at the Department of Civil Engineering, City and Environment at Aalborg University, housing the BUILD research institute (Danish Building Research Institute SBI).
- Dani Hill-Hansen, sustainable design engineer at EFFEKT architects, team member of the Reduction Roadmap initiative.
- Nel Jan Schipull, Architect MAA, Ph.d., partner at Vandkunsten Architects.
- Ruth Schagemann, President, Architects' Council of Europe (ACE).



Photo: National Association of Norwegian Architects, NAL

# Kai Reaver

Head of Architecture & Chief Advisor Norwegian Architecture Association, NAL

## Why do we build?

Kai Reaver is an architect, working for the Norwegian Architects Association (NAL) where his time is roughly divided into policy work and affiliated research, lecturing and teaching, organizational democracy, and national architecture competitions. Reaver is also a guest professor in Switzerland and Geneva and runs a small-scale architecture studio. With this wide role in the field, Reaver has identified a peculiar condition in architectural practice.

– Architects are currently balancing two tasks in their sustainable practice. On one hand, they deal with a very technical legislative component, and on the other hand they are implementing this in a design that is in the light of a public debate on style. Architects operate at a crossing of a society in which democratic participation is a part of the process of building and planning, and the technical requirements of EU-defined energy efficiency all other regulations applied to building systems.

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**“I think that the first structural move is to really consider why we build. This includes the question of whether we have to build anything at all.”**

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At this crossroads, Kai Reaver has direct experience of the bureaucratic and technocratic side of the table, where the systematic approach is very time-consuming. From this side, it might be challenging to reverse all the way to the purpose of the legislation behind our plans and buildings.

– I think that the first structural move is to really consider why we build. This includes the question of whether we have to build anything at all. Failing to ask this basic question is probably the main obstacle to understanding the structure of legal matters; at the level of the first intuitive thought of building. That gut feeling saying that “we need to build” comes with an economy that tells us to get rid of what is there so that we can build new. It is almost a philosophical task to challenge the current go-to solution, where we “build our way out of each problem”.

## The fundament of all laws

Facing this fundamental change of architectural practice and thinking, Reaver has gone all the way back in his argumentation and looked at the first paragraph of the planning and building law in Norway.

– Sustainable development for future generations should be the very fundament of any law. If we find that the national law in its core does not support sustainable development, it would mean that we would have to rewrite the legal code. Our task today is to methodologically and philosophically reconstruct a logic or an ideology for why we build and if we have to build and with what methods, based on a fundamental understanding of sustainability and sustainable practices.

Following this, every country should ask themselves this question, according to Reaver:

– Do we have the right foundation or do we have to change it, and what incremental changes would be needed in the procedure?

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## **“As architects and planners we have to get out of our offices and integrate ourselves with the communities that are going through changes.”**

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Reaver reminds us that all kinds of detailed discussions will have to take place in every related field of building and planning, still from within the mindset of looking at existing conditions and assets, supported by a legally binding framework and sharing the same goal.

Democratic processes are at the core of this, since real solutions to sustainability are within this collective intelligence of the population. And even with respect to legal procedures, time is of the essence, Reaver reminds us:

– If we’re going to be able to make the decisions as quickly as we need to do when the climate crisis hits us, we actually will not have enough bureaucrats and technocrats to do it. We have to rely on the citizenry to do it themselves through crowdsourcing, through the local initiatives, through local disaster management. The people on the ground are actually the datapoints.

## Activate the tools for participation

Reaver emphasizes that we need to activate the tools of participation and democracy and at the same time, we have to work on the legal

structure. The way we often involve citizens and stakeholders is through hearings, Reaver points out, but there is a great difference between participation and “box-ticking for decisionmakers”. The latter is not good for the stakeholders and it is not good for making informed decisions.

– We need the citizens to feel ownership over these processes so that they are able to do it themselves, but to keep democracy as the main function of a society that will have to go through fundamental changes. Formerly in Norway and many other countries, nearly all plans were initiated by the public sector and now it is the other way around; 90 percent of all plans are brought forward by private interests. This is an example of how we have lost contact with the citizenry, and pushed these decisions over to the electoral process. Now we have a populist debate-climate where voters may think that their only influence on city decisions is to choose sides in this rhetorical political game. Still, the voters do have access to a direct participatory process within the planning process. As architects and planners we have to get out of our offices and integrate ourselves with the communities that are going through changes, to engage in qualitative research with local citizens to understand their needs and to also understand what they know about their neighborhoods.

Reaver reminds us that citizen decision-making processes bridge the silo thinking. He uses the contemporary building process as a metaphor of how an actual building has become a compound of separate responsibilities; the façade is the concern of someone different than the fundament, and so on, where liabilities are on different dotted lines on the contract. All these contractual limitations are there because nobody wants to accept any risk outside of their own domain. These legal boundaries are going to disappear, and in turn we have to bridge these problems related to sovereignty and physicality, same as in national boundaries – climate change happens across any border, creating continuous grey zones of legality and responsibility.

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**“But we have to accept that there will be much more risk involved with construction in the era of climate change.”**

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## **A societal contract**

Kai Reaver has thought a lot about how responsibility would be distributed between individual and society in a new legislative model.

– We have to somehow accept some sort of methodology or an understanding of the risk we are taking as professionals. We may not have all the information to mitigate all risks, but it is in our contract with society to act within the amount of information we do have. As an architect I try to make the best possible decision on my side, while trusting you to use your best judgment. This form of trust needs to be integrated within a legal framework.

Reaver's observation is that a lot of legislation today allocates the responsibility on the individual.

– Professional code of ethics or responsibility can function as a way in which to generate trust, but also to create a methodological platform of collaboration across disciplines where all of us are trying the best we can to solve the problem. We also have to accept each other's risk and we have to be able to function within a general framework of collaboration. In this model, professional organizations like NAL will have to step up our game and talk about ethics and responsibility. But we have to accept that there will be much more risk involved with construction in the era of climate change. We have to find a way to keep professionals willing to practice within that increased risk, without fear of losing their license or their job. At the same time, we have to cultivate a high standard of professionalism that stops bad actors from exploiting that trust.

There is a silent knowledge in architecture that Reaver explain as the result of various components of phenomenological data, combined and re-combined in something that can best be described as intuitive methods. Maybe the time we live in will give us the chance to articulate this knowledge and exchange knowledge across disciplines, in a new moral landscape.





Photo: Jukka Eratuli

# Matti Kuittinen

Matti Kuittinen, Associate Professor, Department of Architecture, Aalto University

## No more business as usual

Matti Kuittinen is an architect, researcher and educator, who has worked at the Finnish Ministry of the Environment for seven years, developing the regulation related to climate policies and construction, the climate declarations, circular economy and public procurement. Kuittinen is mostly working with environmental and ecological sustainability and resource consumption. The main obstacle to replacing unsustainable with sustainable practices in construction and architecture is in Kuittinen's view not of legal or technical character.

– We have increasing needs for repair of existing buildings and infrastructure, but our material efficiency hasn't really improved in building construction over the past 100 years. To meet the housing needs of an increasing global population, we would need to build 2 billion new apartments by the end of this century, while reducing construction emissions by 90 percent. Of course there are forward-thinking companies who are doing great work, but still the majority of the building sector hangs on to the idea of business as usual, leaving it to legislation to provide very stringent minimum requirements.

## A strong but slow tool

Kuittinen admits that there is a very important legislative development, especially in the EU, where the revision of the Energy Performance of Buildings Directive and the Construction Products Regulation have a potential to meet our goals. Still we need to trust our systems' ability to change in order to keep up with the Paris agreement.

– Legislature is a strong but slow tool. The question is if legislation will be fast enough in a situation where many nations around the globe do not have any construction regulations at all. At the ministry we have initiated funding and support programs for companies who want to improve the sustainability performance of their solutions and products. This was before the depression in the construction sector that is hitting us very hard now, so it was actually sometimes difficult to get companies to apply for that sort of development funding. Now we have witnessed the most critical bankruptcy wave in construction companies since the late 1990s.

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**“The majority of the building sector hangs on to the idea of business as usual, leaving it to legislation to provide very stringent minimum requirements.”**

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In relation to the ongoing depression, Kuittinen refers to a study conducted at Aalto University, looking at a carbon neutral scenario in 2050, where the researchers identified a few sectors that would be increasing in profitability.<sup>1</sup>

– According to this study, the most financially productive sector in 2050 would be the service sector, followed by the construction sector. But we need to make that transition. It's not going to happen just by waiting.

## Legislate for transformation

Matti Kuittinen has recently published a policy brief on sustainability and construction, advocating for legislation in circular economy, so as not to lose momentum in development. Kuittinen's proposal is to make a pause – a time out – from constructing new buildings in countries where the populations are constant and there is no need to build. In EU, 74 percent of all construction materials is concrete, and we can't consume in a similar manner. And in the EU, 16 percent of existing buildings are unused or underused, so reuse and repurposing would be the first choice. The next best option would be to repair and refurbish buildings, and the third best option would be to use the foundations or frames of buildings as scaffolds, and the least preferred option would then be to build new ones.

Kuittinen establishes that in some cases new buildings would be justified, but they have to offer a very high added societal value. There is of course the challenge to match existing buildings with users, in the right places, as Kuittinen says:

– I have suggested that policies or support mechanisms should be introduced on EU level, to help match existing spaces with users. I have also suggested that this matchmaking service would be installed on a regional, national and municipal levels to facilitate better use of resources in the existing infrastructure. Just imagine if EU was a company – how could it afford to keep 16 percent of its premises empty? No company would allow that inefficiency. Kuittinen sees solutions not just in existing structures but also in building components.

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<sup>1</sup> Sitra studies 185: [Growth-positive zero-emission pathways to 2050](#).

– I am hopeful about legal development in the new regulation of construction products, where one of the key bottlenecks – such as the CE marking – will be eliminated finally.

## The missing link in the value chain

Combined with a smart and new forward-thinking design, it could be more attractive and cost efficient to use materials that also have some nice patina in them, maybe even more attractive than the new. I'm imagining that an old building product could actually be more expensive than a new one. When all the quality and safety requirements are regulated, there will be a shift in how we appreciate and value materials. Soon we will see the end of the missing value chain and create the logistical chains needed for reuse of building material.

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### **"A glazed shiny steel-frame skyscraper no longer stands as a symbol for progress and wealth, but as a monument over fossil-linear economy."**

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Kuittinen sees the change of mindset primarily in his architecture students' work in Sustainable Construction, where a majority of the students are focusing entirely on reuse of buildings.

– It is like "flying shame" of private air travelling – a similar "construction shame" is emerging among the young architects. I have also observed what could be called "aesthetical disillusionment", where a glazed shiny steel-frame skyscraper no longer stands as a symbol for progress and wealth, but as a monument over fossil-linear economy.

If we could apply a historical perspective, we might understand the acute situation that has literally been building up in our industry, says Kuittinen:

– After the Second World War, most European countries had a shortage of many commodities. Back then, we had to be really careful in the use and re-use of resources and adapt to scarcity measures. Actually, we are living in a similar sort of shortage, not because of a war in most countries, but because of we are taking the resources from future generations.

Kuittinen goes even further back in history in search for the most efficient way to change society:

– What we need now is a new enlightenment, similar to the European enlightenment in the late 18th Century, when strong shifting values spread in society. This is wishful thinking, but at times, I think I can see it happening in the actions and thinking of a younger generation.



# Harpa Birgisdottir

Professor, BUILD, Aalborg University

## Bringing research into practice

Harpa Birgisdottir is Professor at The Faculty of Engineering and Science at Aalborg University, housing BUILD, or the Department of the Built Environment, and the researcher behind the implementation of LCA (Life-cycle assessment). Birgisdottir's team has created the LCAbyg tool that is used in the Danish construction industry today for calculation of the environmental impact of building materials throughout the entire lifespan of a construction project. Birgisdottir's work involves the evaluation of a handful of certification schemes, resulting in the decision to use the DGNB system to Danish conditions. The DGNB Certification System (Deutsche Gesellschaft für Nachhaltiges Bauen) covers the key aspects of sustainable building: environmental, economic, sociocultural and functional aspects, technology, processes and site.

In her research group for building sustainability, focus is on sustainability assessment of buildings, including certification and voluntary sustainability classes. Bringing research into practice is a key focus for Harpa Birgisdottir.

– The academic world has its own measures for success, but today we need to bring the knowledge into the built environment, and we need to do this as quickly as possible. We aim to support the building sector's environmental sustainability and capability of contributing to a circular economy. Through research and international collaboration, we develop tools and knowledge for the construction industry. Construction accounts for 30 percent of Denmark's total climate impact.

## A tool box for the building sector

Birgisdottir's work can be distinguished as two lines of strategy. Firstly, the need of regulations and legislation, and secondly, in response to this, develop efficient tools for the building sector to use – tools that are continuously aligning with the regulations.

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**“Right now we need to convince and educate the larger part of the building sector.”**

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The response from the building sector is unevenly distributed, even if many actors claim to want to do the right thing, they do not act forwardly.

– We need a broad response from the building sector, and we are very happy to have some really innovative actors, but right now we need to convince and educate the larger part of the building sector. And when it comes to the scale of the projects – big developments matter, of course, but the smaller projects have a big impact in the statistics because they constitute the great majority.

An important field of knowledge is how to handle buildings that are maybe 50-60 years old, which unfortunately face demolition. Today, the general opinion is that they are difficult to renovate, so we need to respond with providing knowledge both of the cost of demolition and how to use the existing structures. If all buildings were listed, and maybe calculated for their value by material, social, cultural use, then a demolition permit would not be as easy to obtain as it is today.

## Absolute and relative sustainability

Harpa Birgisdottir makes a clear distinction between absolute and relative sustainability. With relative sustainability we try to improve our situation compared to business as usual, with aims for reducing our impacts by 10, 20 or 30% related to current practice. The absolute sustainability is based on planetary boundaries and e.g. absolute carbon budgets in relation to the Paris agreement. Here there is a need for numbers and quotas of emissions, resource consumption as a budget basically, where we can work towards climate goals, and look at where numbers should be improved. Our current legislative practice is normally based on relative sustainability but needs to also be compared to – or based on – absolute sustainability as an overarching goal or benchmark

Birgisdottir confirms that legislation plays a big role, but that there is also a need for incentives for faster results.

– Denmark should aim at fulfilling the climate goals that we have agreed on by signing the Paris Agreement. But since our emissions shoot far above the goal, our sector may need the politicians to decide on a limit-value setting us back on track towards the Paris Agreement.

We need to get back on track with Paris agreement as soon as possible – and, ideally, today. We can start the process with small steps already

today. But if we wait too long – then we need to take one enormous step in 10 years – and at that point it is perhaps too late.

Birgisdottir's work on the climate impact of buildings from the construction phase and along its entire lifespan, including production of elements, transport, and building methods.

– By reducing CO2 emissions in the construction phase, we get an immediate effect.

Looking at the lifecycle of a building, 70 percent of emissions is a result of the choice of materials that we make today – if we change that, we have an immediate effect.

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## **“Municipalities need to know what the climate effect is when deciding on new construction, compared to effects of reuse or renovation.”**

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Looking ahead, Birgisdottir sees the need to keep the focus on climate requirements in construction, and to follow through on the head start where Denmark has been among the first countries to set climate requirements for new construction. But there is a great need to take care of the existing built environment, why a lot of research focus on setting requirements for existing buildings.

## **The need for municipal guidelines**

As a researcher, Harpa Birgisdottir is hoping to see the result of her work being incorporated in the decision-making processes.

– We have data showing that we can more than halve the climate impact in construction. We also have the methods, but it is unknown to most decision-makers. At a municipal level, you have to be aware of the consequences of plans. I don't work directly with physical planning, but I have knowledge about the consequences of development of larger areas and new buildings. Municipalities need roadmaps and guidelines on what they can do to achieve the goals, both in construction and in infrastructure. The Danish Road Directorate has developed a tool for life cycle assessment of infrastructure (InfraLCA), but it is not concrete enough for municipalities to use. With pilot projects, we make this tool more operational so that it fits different types of municipalities. Municipalities need to know what the climate effect is when deciding on new construction, compared to effects of reuse or renovation.

A concrete advise from Harpa Birgisdottir is to place knowledge in-house in the municipalities, since they have to deal with climate requirements in building permit processing, and of all the construction or demolition that takes place locally.

– Some municipalities have a high involvement and knowledge, others don't. There has not been enough focus on developing tools, guidelines, and roadmaps for municipalities. It is a question of who makes the choices and takes responsibility for this CO2 burden.

## Halving the climate effect

The first thing to do would be to look at the municipalities' own buildings, where they can set ambitious requirements for their own projects. When knowledge is increased at municipality level, the methods and results would be shared across municipalities, then nobody would have to reinvent the wheel. In the municipal processes of planning, tools and guides like the Reduction Roadmap and the Housing from 4 to 1 planet project, can facilitate setting ambitious requirements for what is to be built. So far, we have mostly worked with tools that focus on individual buildings, but we can also assist municipalities when they are working on new areas. There is plenty of data on new construction, existing buildings, and infrastructure that can be used for calculations for urban development areas or an entire municipality.

The need to act on this knowledge now is what matters, according to Birgisdottir:

– We have spent the last ten years completing the research, and in the next three years, we need to show real effect in good examples where climate effect has been at least halved. We need a much more ambitious reduction in climate impact than is currently being worked on, in order to comply to the Paris Agreement. All legislative levels need to be aligned so that we can close the performance gap.



# Nel Schipull

Architect MAA, DGNB-Auditor, Ph.d.,  
partner at Vandkunsten Architects

## Change starts with a number

Nel Schipull is an architect PhD, specializing in life cycle analysis and sustainable construction. Schipull was involved in advising the Danish building regulation process, particularly regarding the establishment of limit values as detailed in The Danish National Strategy for Sustainable construction.<sup>i</sup> The process, which involved a number of experts and stakeholders around the construction sector proved to be a challenging negotiation where the need to calibrate considerations to keep within planetary boundaries with financial and market interests. Amidst these deliberations, Lene Espensen, former Danish Member of Parliament for the conservative party and director of The Danish Association of Architectural Firms, emphasized that even modest progress can lay the basis for significant advancement.

Despite initial disagreement, the discussions culminated in agreement on a CO<sub>2</sub> emission limit of 12 kilograms per square meter per year – a compromise that left no one entirely satisfied. Schipull initially felt disheartened by settling on a target which was so far from contributing to the Paris agreement. However, Espensen reassured him, highlighting that consensus on the number itself represented a considerable achievement in its function as a tool for revising and reducing these limits every two years further underscored the progress made.

– This is what you say about hard negotiations; a good result is something that nobody is entirely happy about. But only if there is a number, you can change it, and that is actually what is happening now.

Schipull points out that the limit value represents a minimum requirement for emissions from construction. Nobody stops an architect who wants



to exceed this ambition. The limit values can become the foundation of a whole new platform for competition and innovation for all actors in the sector.

– If you have produced the same product for 80 years and you think you can continue for another 80 years, then you are heading for extinction.

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**“There is so much unnecessary stuff that weighs down the CO2 budget in housing today, and we do not even get a better house.”**

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## The shock of the expected

The capacity to change is paramount in our time. It is not as if we did not know what was coming, as Schipull recalls:

– We had teachers in school who told us about the immanent climate crisis. And there are books from the 1880s that describe what happens when you burn coal. Over the past 20 years the majority of people acknowledge that climate change is human-made. We have the annual report issued by IPCC (The Intergovernmental Panel on Climate Change) since 1990. And yet, we refuse to change. Even in this prospect of a violently changing world, we find ourselves agreeing more on our existing economical system than we agree on anything else – even saving the planet. We could have acted differently, but we live the consequences of a philosophy and an economic system that once decided that the Earth provides resources that they are free to get: externalities. Nel Schipull mentions another system thinking that has locked in a resource use way above planet boundaries.

– Housing building standards in Denmark today stipulate that soundproof elevators are needed in all new homes, as well as huge bathrooms, and a thermal quality standard that causes energy consumption for cooling in the summer. Still the old blocks in Copenhagen are the most attractive houses and they do not have anything of these technical fixes. Why is that? You put a sweater on in the winter and you open the old windows to the street in the summer. How do you put that intuitive individual act into an energy calculation?

Schipull takes an example from his PhD research to problematize the way that building regulations affect the built result in housing.

– There is so much unnecessary stuff that weighs down the CO2 budget in housing today, and we do not even get a better house. In my PhD I compared social housing from the 1960s with the equivalent housing built in the 2010s, where energy regulations have pushed us towards bigger apartments. A 65 square meter apartment in 1960 gave a net floor area of 55 square metres, and in 2010 the net floor area is 42, that is 13 square meters of usable floor space gone due to regulations. This is worth looking at, this was relevant in 2010s but should we continue this excessive use of materials and resources and money. I think there is a misconception here.

## Pushing Responsibility Around

In the construction world, everyone is trying to move responsibility to the next party, because responsibility is also risk and risk can cost a lot of money, insurances and lawyers. When everybody is acting on their own interests, of course we cannot align in absolute sustainability or whatever term you could agree on. Trust is needed if we are to develop an intuitive alignment towards true sustainability. Expanding from this example of the conflicts within the same building, on the legislative level, there are regulations that are standing in the way of each other. One regulation might rule out five other regulations and things get complicated, if not impossible, very soon in the process.

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**“We may have solutions today that will be obliterated tomorrow, and what is smart in one place is bad in another. There are many solutions we need to consider.”**

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The core question is – are we honestly prepared to let go of the idea of permanence of our systems, and meet the future with new perspectives?

– The thought that everything should remain as it is, is a very awkward idea. Yesterday is interesting, but it's not relevant. The future is relevant. I experience in my daily work that we actually need to work differently. We need to use different tools. We need to have different contracts. And there is not going to be one way to achieve something – we may have solutions today that will be obliterated tomorrow, and what is smart in one place is bad in another. There are many solutions we need to consider. What would be really stupid is standing still and trying to keep everything as it has been.



# Dani Hill-Hansen

Sustainable Design Engineer and Architect at EFFEKT, project manager and team member of the Reduction Roadmap initiative

## Aligning policy with climate science

Dani Hill-Hansen is an Architect and Sustainable Design Engineer at EFFEKT architects. Dani has been part of the process of conceiving the Reduction Roadmap, which is an initiative to close the gap between Danish building legislation and climate science.<sup>2</sup> The Reduction Roadmap is a collaborative effort, Initiated by EFFEKT, CEBRA and Artelia that aims to ensure that the entire Danish building industry operates within Paris Agreement emissions levels. As a sustainable design engineer, Hill-Hansen has been investigating sustainable development for fifteen years, starting when the discourse focused on cradle-to-cradle, material innovation and indoor air quality. Since then, the definition and understanding of sustainability has changed, moving from relative to absolute approaches. As Hill-Hansen puts it:

– Today it's quite clear that the primary planetary boundaries we need to work within are climate change, to create climate stability and biodiversity, to foster healthy ecosystems. Within the industry were quite good at measuring climate change impact and have design tools and policy in place to limit impact. Where we need a lot more knowledge, frameworks, and legislation is with biodiversity. We know the building industry is accelerating the biodiversity crisis, but we don't yet have the right knowledge foundation or legislation in place to mitigate further destruction.

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<sup>2</sup> The Reduction Roadmap addresses the need for new constructions to emit less than 5.8 kg CO<sub>2</sub>-eq./m<sup>2</sup>/year by 2025 to align with the Paris Agreement, contrasting starkly with the current political requirement of 12 kg CO<sub>2</sub>-eq./m<sup>2</sup>/year. <https://reductionroadmap.dk/reduction-roadmap>

While the Reduction Roadmap is currently directed towards the immediate legislation process, Dani Hill-Hansen has an answer to what a dream of long-term development would look like.

– My two dream scenarios look like this: Firstly, we align our policy with climate science. We have the data, and we have the building knowledge. It is possible, but we need the political will to implement common-sense policy. Secondly, we must set limits to growth. We live on a finite planet, and we have a global economic system that is dependent on unsustainable growth. This is the root cause of all our issues. To degrow the economy and set limits to growth in our industry, means setting sufficiency-based limits to how much and what types of buildings we construct in the future.

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**“The project’s goal is to provide the right knowledge, and hopefully through mobilization around this knowledge, align the building legislation with climate science and the Paris Agreement.”**

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## Finding the safe operating space

Acting here and now, Dani Hill-Hansen presents the process that Reduction Roadmap is involved in negotiations for the Danish building legislation for 2025, where the carbon emission limit value will be set for the following two years.

– We were surprised that there was no target for a safe operating space for the construction industry, it had not been defined even on a national level, so we reached out to researchers at Aalborg University, Aarhus University, Danish Technical University and Southern Denmark University to help us find out.

Dani Hill-Hansen explains that the project's goal is to provide the right knowledge, and hopefully through mobilization around this knowledge, align the building legislation with climate science and the Paris Agreement. Time is running short, but there is a hope that the current limit of 12 kg CO<sub>2</sub>/m<sup>2</sup>/year will be reduced to much lower than the 10,5 CO<sub>2</sub>/m<sup>2</sup>/year that was initially planned. The Reduction Roadmap data indicates a limit of maximum 5,8 CO<sub>2</sub>/m<sup>2</sup>/year in 2025.

– The Reduction Roadmap reduction targets is aligned with climate science data from the IPCC AR6 report, Denmark’s commitment to the Paris Agreements 1,5°C warming degree scenario and the Danish building legislations standardized LCA and carbon limit policy. Aligning with these pre-existing legislative conditions creates a reduction target that all industry professionals can relate to, and in some ways, our government has already committed to following. The Reduction Roadmap targets are based on findings documented in ‘The Safe operating space for greenhouse gas emissions’ by Petersen, S. et al., (2022) which documents that globally we must reduce our emissions by 96% to reach the safe operating space, defined by the Planetary Boundaries. Today, this 96% reduction equates to going from the average of 9,5 CO<sub>2</sub>/m<sup>2</sup>/year down to 0,3 CO<sub>2</sub>/m<sup>2</sup>/year. When the project was released in September 2022, we had

7–10 years to reach target levels, but in June 2023 the remaining carbon budget was updated. Consequently, we have 3–7 years to reach the target levels now. We realize that rather than having a reduction staircase, we have a reduction ladder and soon, unless we radically reduce emissions, there will be no carbon budget left.

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**“There is tendency to make decisions to protect ourselves here and now, without considering the long-term implications of continuing with business-as-usual.”**

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## Creating a competitive field

There are few institutions in the building value chain that do not want to commit to the Paris Agreement, but Dani Hill-Hansen argues that we simply are not acting fast enough.

– In general, there is tendency to make decisions to protect ourselves here and now, without considering the long-term implications of continuing with business-as-usual. And this is true on every level of decision making from contracts to investments to policy.

– Our goal with the Roadmap has always been to create action and to mobilize the industry around knowledge. We know people cannot act or react on things they don't understand or don't have the knowledge about. We see the Roadmap as something that inspires action and gives people something tangible to relate to. And we find that there is a will to follow the Roadmap targets, but no one can do it alone. We need bold leaders, both clients and politicians. If the Roadmap data is implemented in the building legislation, we would have a competitive playing field and many of the fears around innovation and cost will be mitigated.

## Starting a movement

Dani Hill-Hansen emphasizes that participation is the key, and that there are important first movers in the building sector, who in turn attract others to join. A big part of the project has been about communication and figuring out what are the right stories to tell to make the Roadmap interesting for different actor groups.

– We tried to give the politicians a solution, not a problem by presenting how much the building sector can reduce carbon emissions, in carefully researched data. We also help other people create change in their own networks. We presented the Roadmap to a major engineering company, and then they in turn collected one hundred signatures of their colleagues to bring to their upper management. Eventually, the company was compelled by employees to sign the initiative. So many people have helped us along the way towards a successful mobilization, but also to point us in the right direction in terms of strategy and what people we needed to talk to.

As the industry continues to sign-up and mobilize, what is the response from the politicians?

– We find that politicians were willing to talk to us from almost all political parties. Most politicians don't see the building industry as core part of what they do or are responsible for. When we met with them and could explain the big impact our industry has today, and how much we can contribute to national reduction targets, they were generally more interested. Through communication, we made the issue more accessible for them and presented them with an industry asking for stricter regulation.

## We can do it

As the Reduction Roadmap is presented, with the backing of over 580 organizations saying, "we can do it", there are almost no other avenues to convince the politicians, but Dani Hill-Hansen still has work to do.

– We have a dialogue with the Housing Ministry who are concerned with consequences for the market – will it slow construction activity if we have set the limit carbon emissions too low? Are the material producers ready? Can we make the transition already by 2025?

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**"Anything other than listening to an entire industry who is asking for stricter regulations, is a missed opportunity for Denmark to lead the way."**

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Despite the solid support and a good communication with the politicians, Dani Hill-Hansen is not optimistic.

– I am quite pessimistic today about the prospect of having a legislation aligned with climate science in 2025. I think we're going to overshoot on our carbon budget and that we will be stuck in a building legislation that is not going to enforce any change in how we build. The next chance to do it right will be in 2027, but that means another three years of a politically sanctioned overshoot. If, on the other hand, Denmark would show the world a building legislation aligned with climate science and aligned with the Paris Agreement – this would set a historically important precedent for other countries to do the same thing and for other parts of legislation to align with climate science. Anything other than listening to an entire industry who is asking for stricter regulations, is a missed opportunity for Denmark to lead the way.



# Ruth Schagemann

President of the Architects' Council of Europe (ACE)

## Forming a narrative

Ruth Schagemann recalls that when starting her own architectural practice fifteen years ago, high level architecture was never about working within the existing building stock, it was always to build new, monumental landmarks. During this period, following the discussion in architectural practice, it is now a part of a legislative and political level in the European discussion.

– We really see this paradigm shift, where we transform our building stock in a high-quality way, and architecture is recognized for having an input.

Since her presidency of the European Architecture Association, Schagemann has noticed that this transformation happens all over Europe, starting like "islands of knowledge".

– These small islands of concepts are growing bigger and suddenly they are joining up to form a narrative that makes sense to everyone and finds its way into politics and public policies.

She identifies that we are now in the midst of this process, where best practice examples are shared. The Energy Performance of Building Directive (EPPD) of the Construction product regulation is a part of the European legislation which have been adapted to these changes as a way to get all the countries under one hat and indicate a positive change in legislation, and from this the next big step would be a transposition of this legislation on a national level.

## Changing attitudes

With the EU elections coming up in 2024, from the citizen perspective, we expect to see changes of attitude. Schagemann is relieved to find that in the field of architecture, the most important pieces of legislation have been nearly adopted before the elections, as a result of a year of intensive negotiations and regular procedure on the Energy Performance Building Directive and on product regulation, which resulted in an approval at the end of 2023, and an expectation of a formal decision before the 2024 elections. To have a legal framework on EU level is crucial for the future development for the national regulation of the building sector.

– Having a law in place is like having a "button to press". It becomes the start button to start figuring out how to build instead of starting with the discussions of why limiting the amount of CO2 emissions per square meter and to what number the emissions should be set.

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**"Architects are familiar with their national regulations, but cannot be expected to be updated on the contract, liability and construction rules of other European countries."**

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There is however a concern on whether the high profile of sustainability that has been the mark of Von der Leyens office, will continue after the election. As President of the European Architecture Association, Ruth Schagemann believes climate change is not going to be regarded as important as it has been in the previous five years, but hopes that Europeans will cast a conscious vote, in order to maintain the European values and the democratic approach. All votes count.

## Identifying the costs

A sociopolitical challenge shared by nearly all European countries is the need for affordable housing, and this has to be achieved well within the CO2 limits. Schagemann responds by expanding the concern a bit:

– In our discussions we see two big dilemmas. The first is sustainability and affordability in housing, which has to be explored in detail to identify the costs that stand in the way of sustainable choices. Our job is basically to understand how much regulation we need and where. We look at regionally produced materials and the builders' responsibilities, but on the user end we ask the question of what is a reasonable comfort level in a house, and this differs a lot within the EU. In Germany, we have a high comfort level regarding sound insulation between apartments, compared to France for example. As architects we are bound by contract to deliver within the local framework of legislation, but if the regulations change, costs may change. The other dilemma is achieving sustainability while maintaining architectural quality. Among architects this is not a problem, or even a question, but from the point of view of clients, private as well as public, there are preconceptions. The attitude that you cannot combine the two ambitions to achieve high profile architecture while making a sustainable building investment – this attitude has to change.



## Architecture crossing boundaries

Schagemann recognizes that legislation procedures are in themselves "silo processes":

– Fire regulations are treated as one legal task, sound as another, and every building is a compound of these legal systems. Architects are familiar with their national regulations, but cannot be expected to be updated on the contract, liability and construction rules of other European countries.

Schagemann identifies this as a task for the Architects Council of Europe; to learn more about how the architects are working in the different European countries:

– We want to look into why the use of timber is compatible with fire protection regulations in the Nordic countries, but is a problem in for example the Czech Republic. Knowledge on a national level has to be shared, it is the way of the future, but we also have to acknowledge that building regulation is difficult because architecture is regional – just look at the different shape of roofs in snowy conditions, and the stone walls of hot countries. Germany is like "little Europe" with 16 building codes on a federal level, so working in these conditions, you can really wonder why stairs are dimensioned in different ways in some regions.

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**"Legislation can never be an excuse to not achieve quality of the built environment. You have to find solutions for problems, and this is what architects do."**

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Schagemann emphasizes the need to be flexible in terms of where to ask for harmonization of rules and be attentive to regional conditions, in order to take on the challenge of achieving legislative frameworks on a European level. The work on this takes place within the European Commission in the New European Bauhaus lab on regulation, as one of five labs.

## The "one stop shop"

Another predicament is that current policies apply to projects of 5000 square meters or more, leaving a "wild west" of smaller buildings and single family housing. Schagemann also identifies the 5000 square meters as a crucial number in the taxonomy, not least for the financial sector, which use this number as a marker of a "big player". According to Schagemann, it is of great importance to facilitate the sustainable choice, referring to the EPPD as a "one stop shop". The legal framework supports architects in their work and supports citizens with their questions, and thus becomes everyday practice with craftspeople and builders.

– We should never underestimate legislation, even if it is often ends up as a number, still it defines a level of what we have to achieve. But the way to achieve it and the design measurements to be taken to arrive there, are really up to the architect and the client. Legislation can never be an excuse to not achieve quality of the built environment. You have to find solutions for problems, and this is what architects do.

# Concluding remarks

The world is changing rapidly, but our institutions move slowly. From the experts we learn that we need policies and systems that allow us to act in a more agile way, and to be more in step with existing and developing science and knowledge. Every nation has concerns for industries slowing down, a loss of jobs and deceleration of economy, but if climate is sacrificed, all these fears will inevitably become reality.

It is a fact that the construction industry is responsible for a large portion of resources and greenhouse gas emissions. This means that there are also significant opportunities within the construction industry to make a big difference. Since we have an urgent climate crisis, there is also a need for rapid development of efficient solutions, which is a challenge.

The UN Framework Convention on Climate Change established in their 2023 assessment report of the Paris Agreement that EU and the other 195 signing parties are currently failing to keep the rise in global temperatures well within 2 degrees Celsius. One of the reasons for this is that there are a number of national policy failures. In these interviews, the experts call for a more direct involvement in legislation among stakeholders in the construction sector. A higher degree of knowledge and engagement may be the solution in conflicting regulations, where for example safety considerations may require increased material use and thus an increased environmental footprint.

Both constructors, designers and clients need to set more ambitious requirements in order to close the performance gap. The experts all agree on the need to further explore a circular system for collection, distribution and recirculation of building materials. There is a challenge in aligning existing legislation with reuse of material in construction. Another challenge is to provide support mechanisms to promote circular business models in place in the Nordics and EU, as a complement to EU and national policies that increasingly support the reuse of construction products by improving data quality, reporting, waste management, energy performance and more. To remove some of these barriers there is a need to review and design legislation in a holistic way considering all interdependent considerations and bringing in the "end-users" of the legislation in the design process to ensure efficiency and to screen for unintended barriers.

A particular performance gap on the side of the actors of the construction industry is that, according to the experts, the level of knowledge is high, as is the will to act according to the Paris agreement, but the speed of action is insufficient and the will to deal with high initial costs is scarce. We need to remind ourselves of the window of opportunity of reducing climate impact by design and democracy. The experts represent the work as it is being done in the current mitigation phase, where time spent in councils and committees is as important as the design practice. And just as climate change is the result of the fundamental domination of fossil fuels and excessive extractions of resources, our experts hope for an imminent paradigm shift, this time mitigating the consequences of our fossil dependency and bring on a new era of enlightenment. Like the 18th-century movement, this could be a European movement guided by unifying principles, generating a respectful relationship between people and their built and natural environment.

# About This Article

## Legislation and policies in architecture

### Authors:

Text: Malin Zimm

Research: Pernille Martiny Modvig

### Other contributors:

Angelica Åkerman

Dorte Bo Bojesen

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This project is part of the **Nordic Sustainable Construction** programme initiated by the Nordic Ministers for Construction and Housing and funded by Nordic Innovation. For more information on Nordic Sustainable Construction, visit our website at [nordicsustainableconstruction.com](http://nordicsustainableconstruction.com)