Buildwise

CIRCULARITY

A PUBLICATION
OF BUILDWISE'S
VISION COMMITTEE

Buildwise

Table of Contents

1/ Foreword

For a research centre like BUILDWISE, it's important to keep scanning the horizon. To ensure growth in the sector, we need an effective approach, a clear strategy and a strong vision for the future. BUILDWISE cannot content itself with merely meeting companies' short-term needs. We must also play a visionary, pioneering role in today's rapidly evolving society.

Our 15 Technical Committees, made up of people working in various building trades, are a permanent, living link to our members' everyday work. These Committees determine the priorities for action in their sectors for the next 12 to 36 months. As the Centre's hive of activity, they ensure that BUILDWISE's action in the short term is guided by practice and suited to the industry's actual requirements.

With the construction industry looking to us for advice, in 2020 BUILDWISE drafted its new strategic plan, Ambitions 2025. This provides our members with inspiration, motivation and enthusiasm to meet the challenges they face in terms of technology, the economy, the environment and society.
We aim to make a real impact on companies' day-to-day work: through our research and by sharing the knowledge we have gathered. The industry must also continue to modernise by adopting new technologies. Over the next years, we will continue to focus our efforts on three strategic areas: our trades and professions, the Green Deal and construction 4.0.

Now more than ever, technological developments provide unprecedented opportunities in the construction industry. We are living at a time when the challenges, opportunities and technical possibilities lead us to believe in a bright future. Technology is developing rapidly, and as our education and training advances, our potential to adopt new technology grows. We are developing clear objectives for how to tackle trends in society. And there is the political will to join forces behind Europe's long-term aim to be climate-neutral by 2050, in line with the Paris Agreement. The construction industry plays a key role in several of these changing areas, and we therefore need to establish a clear vision spanning 10 years or more.

By commissioning its Vision Committee in 2019, BUILDWISE set itself up as a source of inspiration over the long term. The Committee's members see their role as: "Sharing inspiration and vision as a driver for progress and innovation in construction". We hope that this initial publication will engage and inspire you as we envisage the future of our industry, together.

Olivier VANDOOREN
Director General Buildwise

2/ Introduction

‘Sharing inspiration and vision as a driver for progress and innovation in construction’

The world seems to be turning faster than ever. New technologies are rapidly emerging yet there is also no denying that we are facing some major social challenges. Naturally, this has an impact on the way we live and build. In these exciting times, it is essential for our companies to have a better vision of the future of the construction sector in the medium term. The Vision Committee of BUILDWISE was set up in 2019 to focus on developing a long-term perspective for developments within construction in Belgium. It aims to assess future evolutions within construction by mapping and analysing challenges and opportunities within the sector, while taking account of economic, technological and social evolutions.

The function of the Vision Committee is to develop a medium- and long-term vision for the construction sector and help steer the long-term strategic vision of BUILDWISE.
The plan for the Vision Committee’s programme for 2020 was to hold a vision conference with top international speakers and three parallel sessions, scheduled to take place on 25 March at IMEC. However, COVID-19 put paid to that idea and the programme had to be cancelled at the last minute, as a result of which a virtual approach was quickly adopted and a series of three interactive sessions planned.

In these sessions, several specialists together with Vision Committee members reflected on the future of construction, focusing on economic, technological and social developments.

- The session on DIGITAL TRANSFORMATION was held in June, with Alain WAHA as keynote speaker.
- Then in September, the topic of CITY & BUILDING TRANSFORMATION was addressed, with Luk PEETERS as keynote speaker.
- Finally, a session on CIRCULARITY and CHANGING BUSINESS MODELS was held at the end of the year in December, with Thomas RAU as keynote speaker.

Each digital session consisted of two parts, one week apart.

- A keynote presentation
- A scheduled discussion panel, with possible audience interaction using chat and interactive questions. The audience also had the opportunity to contribute to discussions afterwards via the blog on the vision.cstc.be website.

The aim of the workshops was to develop a vision on the subject at hand. The final vision document contains the following 3 main parts:

- The vision of the keynote speaker,
- A summary of the discussion points from the debate with the panel of experts and the interactions with the audience
- A summary vision of the BUILDWISE Vision Committee

This publication is the third of a set of 3 reporting on the sessions on Circularity and Changing Business Models. It contains the keynote speech given by Thomas RAU and the reflections of a discussion panel made up of several visionary contractors, assisted by experts from various other professions and segments. We used a PESTEL analysis as a framework to consider the impact on trends at a political, technological, social and legal level. In the process, we tried to look at the trends that our contractors will soon be facing from several different angles.

Finally, the concluding remarks in this report summarise the reflections of the Vision Committee. They are intended to inspire us and set us on the path to building the digital future of construction. We are sure that this will make exciting reading for you.

Finally, our special thanks go to Geert VERACHTERT and Vincent DETEMMERMAN who, as session chairs, steered this digital session in the right direction. Thanks go also to the Buildwise employees who organised the whole set-up of the digital event so professionally.

Tom WILLEMEN,
Chairman of the Vision Committee

Bart INGELAERE
Deputy Director General, Buildwise

3/ Keynote

Thomas Rau

Abstract

As an architect and visionary, Thomas Rau argues in this text that notions of sustainability and the green stamps that accompany them should be trashed – because they do more to obscure the situation than to make it better. In his view, the linear system itself is bankrupt, meaning that any solution that leaves the shape of the system intact does nothing but fight the symptoms, distracting attention from the real problem – the fact that the current system just converts finite materials into waste, a path irrevocably leading to a dead end within a closed system like our Earth. Instead, Rau proposes a circular model in which products, materials and buildings are continually being recycled. By designing products and buildings to be easily disassembled, we can ensure that our planet's materials remain available forever. This can only be done with the help of central data libraries such as the Madaster, a database set up by Rau himself to track where (raw) materials are in the economic system and who has the right to use them at a certain point in time.
In the same vein, this new situation cannot work on the basis of existing business models, meaning that these too will have to be redesigned. Rau shows how changing a few simple marketplace rules will prompt producers to automatically adjust their behaviour to the principles of the closed system – and that this is many times more powerful than any top-down imposition of rules and restrictions. But Rau makes it clear that all these practical ideas only have a chance of success when accompanied by a shift in our mindset: the acceptance of finiteness – that of ourselves and the Earth.

From a linear to a circular economy

Sustainability. That's good, right? But what exactly does it mean? That it takes longer for things to get trashed? OK. Nothing to argue about that, you might say. But there is a persistent assumption behind such an attitude: that things necessarily have a beginning and an end, i.e., that materials constitute the input to a set of supply chains and production lines which spew out products. These are then sold on the market, used for a while, and ultimately become waste. Some may be recycled – but even that means the material will at most be used a couple of times more. Either way, it eventually ends up on the scrap heap: the terminus of the linear economy. Sustainability is thus all about making a material's useful life as long as possible.

So when we say that sustainability is good, we actually mean that sustainability is good *within the context of a linear economy*. Sustainability as a concept has nothing to do with transforming the way we organise our economy. It is purely synonymous with optimising our current system, something that is quickly overlooked.

Green stamps?

As soon as an issue gains a moral aspect, as has (rightly) been the case in recent decades with such issues as climate change and the way we treat the Earth, we start to distinguish between what we see as right and what as wrong. Such a clear distinction provides guidance – especially when endorsed by organisations, institutions and certifications. People no longer need to get to the bottom of the complex subject matter themselves: a stamp suffices.

But this is almost more dangerous than letting things run their course, as the same mistakes are repeated over and over again, perpetuating the problem system, while masking the urgency to change something. All these certificates and stamps are nothing but tranquillisers, allowing us to carry on thinking we're on the right track.

And as time goes by, they become more important than the purpose they are supposed to serve. This often leads to manipulation, as witnessed, for example, by the Volkswagen diesel scandal.

A paradigm shift: the roots of the system

To truly change the situation without falling into empty do-good symbolism, a radical paradigm shift is needed. The word *radical* comes from the Latin word for root, 'radix' – and that is exactly what we should be focusing on: the roots of our current system, i.e., the very concepts determining our material world.

First and foremost, we need to realise that we live in a closed system, a system in which everything is finite, and whose complex interconnectedness means that everything is equally important. We must realise that the Earth does not belong to us, but that we are its guests and that everything is a gift and not something that is there for us to take.

About Thomas Rau

An architect of buildings as well as economic systems, Thomas Rau is the embodiment of practical insight and conceptual vision – a combination allowing a valuable perspective on the world. While practical insight without vision risks ending up as the endless optimisation of the existing, a vision without practical insight often ends up as utopian dreams with little or no connection to reality. Rau therefore relies as much on thinkers for his ideas as on hands-on practitioners. While a thinker philosophises about concepts of finiteness and transience, a hands-on practitioner lives these concepts, with his practical reality guided and shaped by them. In a nutshell, his vision is linked to reality.

Founded in 1992, Rau's architectural firm RAU has grown to become a pioneer in circular construction, winning numerous awards in recent years for its innovative way of building. In 2010, Rau founded a different kind of architectural firm together with his wife, economist Sabine Oberhuber. Named Turntoo, the firm's focus is on the architecture of a new economic system. Since then, the two organisations have been running in parallel, with RAU focused on practical aspects and Turntoo on conceptual ones. In the book written by the couple, *Material Matters*, these two aspects are brought together.

Published in 2016, the book quickly became a bestseller in the Netherlands (printed more than 40,000 times), and has since been translated into German, English and Italian. The 2015 Dutch documentary *Het einde van bezit* (The end of ownership) was a further factor putting Rau on the map in the Netherlands. Both he and his wife have since become sought-after speakers at home and abroad, and are known as the brains behind such business models as *Light as a Service*, and such concepts as the Madaster data library, the materials passport and the Universal Rights of Material, a concept presented to the United Nations in New York in 2018, and proposing that materials be given rights.

For example, we should stop using terms like ‘raw materials scarcity’. That’s like using the word ‘scarcity’ when talking about Rembrandt’s paintings – we know full well that Rembrandt, as a single person with a single life, only produced a finite number of paintings. In such a scenario, we take finiteness for granted. By the same token we only have one Earth – and yet, through our current mindset, we are endangering everything through assuming that everything is infinitely available. We need to start considering the Earth’s resources as ‘limited editions’ – to be treated with reverence and care.

Finiteness

You may be thinking now: what difference does it make what words we use? But they do matter. The way we talk about the world determines the way we think about it: our language not only reflects our world view, but also influences it. The main point I want to make here is that we need to become aware of how the way we think and talk can impair our vision. To achieve any meaningful change to our system, we first need a significant paradigm shift, acknowledging the finiteness of the Earth and its resources, as well as that of ourselves and our needs.

In addition, we must become more aware of the consequences of what we are doing. Indeed, these are permanent – in sharp contrast to our own finiteness. Everything we do sets an everlasting chain of cause and effect in motion. The cause of the world’s greatest problems has always been people’s concern just with their present interests, without looking at the chain of cause and effect they started. Look at the conflicts in the Middle East, for example, almost all of which can be traced back to decisions made by (especially Western) government leaders seeking to protect important interests at the time. Yet the chain of cause and effect continues to run decades after they have left office. The same holds true for our economic system.

Learning to understand what life holds in store for us

Nothing less than a paradigm shift is needed for us to stop this endless race to the bottom. Instead of understanding the world in retrospect, we will then be able to start understanding it proactively. How can we get there? We need to stop understanding and organising our world along a linear timeline, but via a circular model. Just as nature – through the sun and the seasons – makes the finite infinitely available, so can we. What the sun is to nature, information is to us. By registering everything we have, we can ensure that nothing gets lost. Indeed, for centuries we have managed to preserve important artefacts and pieces of art for future generations, keeping track of exactly what we have and where it is.

All that this requires are new business models: models that are no longer at the expense of anything – because dividing the world into owners and hierarchies is incompatible with such a circular model. But that does not mean that the solution is to nationalise materials and do away with the market: history clearly shows us what a bad idea that would be. Fortunately, there is an alternative, a situation where we can register base materials to centrally track where they are, while also allowing them to be used by private individuals and companies in the marketplace. That model takes the form of a kind of library, where the base materials lent to producers, for example construction companies, are registered, albeit without them ever really owning them. Under such a system, a producer buys a temporary right to use the material in a product or building, and then offers that product or building on the market. Obviously, this also means that this product or building does not become the property of the consumer, because as the property was never owned by the producer, he cannot resell it to the consumer either. Likewise, the consumer no longer assumes *ownership*, but instead gains the *temporary right to use a service, product or building.* Every step in the process is documented, meaning that it is always clear where various materials and products are located in this cycle.

Using, but no longer owning

This creates an economic system in which the focus shifts from ownership to use – the concrete manifestation of the insight I described above, i.e., that we are guests on the Earth, and not the owners of the planet. What makes this approach so attractive is that it involves real transformation, without having to tear things down first. Business relationships, markets and production processes are hardly affected – only the internal rules of the game change. Because: through ensuring that the conservation of materials and our environment matches players’ own interests, you will see how quickly everything changes by itself. This is much more potent than imposing from above an abstract ‘good’ that only exists outside the boundaries of the game, but not within it – and which in many cases is even completely contrary to the internal rules of the game: this would only encourage fraud and head-in-the-sand politics. To really influence the outcome of the game, you have to speak the game’s language.

Does this all sound a bit abstract? Let me make things a little more concrete. First, how it all began. When my architecture firm's offices were due for refurbishment in 2010, we made an appointment with Philips for the lighting. They were supposed to send someone to our office building on KNSM Island in Amsterdam to draw up a special lighting plan. But that day I suddenly had an inspiration. Seeing a pile of scrapped central heating boilers on the street, I wondered a little sadly whether we too would leave such a pile of discarded appliances outside our building later on.

"Actually, I don't want to buy lamps from you," I said to the Philips employee when he rang our office doorbell, "but only lighting". The employee looked at me confused. I explained to him that I wanted to try out something new: the lamps Philips would install in our offices would continue to belong to Philips. We would only pay for their use. As owners, responsibility for their maintenance would also remain with the company: if a lamp suddenly stopped working, Philips would have to replace it. Still in a slight state of confusion, the man got back into his car and headed back to Eindhoven. On his way back, he called me on the car phone. "Mr. Rau", he said, "I don't know exactly where this is heading, but I'm going to work on it. I've got this feeling your question is interesting."

A few weeks later he came back with the lighting plan. "One more thing", I said to him. "You also get the energy bill. After all, we are only buying lighting. The fact that you need energy to generate that light is your business." The man fell silent. After pondering a bit, he announced that this meant he would have to mull over a few things with his design team again. On his next visit, he presented us with a very different plan: it was suddenly possible to accomplish everything with far fewer lamps. In addition, energy-saving lights we could never have otherwise afforded were installed, meaning that our energy consumption went down 44 percent overnight.

Organised problems?

That was the moment something clicked. I suddenly realised that it pays to play around with a sort of organised problem within the normal rules of the game. After all, any pile of scrapped central heating boilers means that a similar amount of new boilers will have to be purchased: a way for manufacturers to maintain demand for their products. What is thus sold as a solution is actually a future problem: and one day that whole system is set to break down irrevocably – and that day is getting closer and closer: product lives are getting shorter and shorter, while technological capabilities grow and grow. But if you change the rules of the game the way we did in consultation with Philips, the organised problem gets sent back to the manufacturer like a boomerang, with him suddenly finding himself up against all the organised problems actually meant for the consumer.

And when a manufacturer has the problem, you can count on a solution being found. After all, the manufacturer has options unavailable to the consumer: the design can be changed, the technology improved. He can think ahead, making products easier to repair – you name it. The responsibility assumed by consumers for decades is thus handed back to the producer. Responsibility and power are thus finally reunited.

A new revenue model was born: *Light as a Service.* But it did not stop at light: we developed similar revenue models together with a variety of companies, including Bosch, Desso, Interface, Steelcase and Schiphol.

Such service models are now on the rise, as witnessed for example by vehicle manufacturer Volvo. Its CEO described the new approach as follows. "Volvo is no longer a vehicle manufacturer", he said, "but a *mobility provider*." His statement once again underlines the important role of thought and the language we use. Once we manage to say goodbye to our old world view and thinking patterns, we naturally start behaving differently – and by adopting new solutions, we gradually start thinking differently, too. For decades now we have been trying to solve problems through thinking in the way that caused the problems in the first place; we were stuck in a given mindset. Once we free ourselves, all those possibilities that we had been overlooking for so long suddenly appear.

Limited editions: the information library

However, these new revenue models at consumer level are just the first step: the rules need to change at a more fundamental level. We need to think differently not only about products and the market, but also about the entire underlying production process, and the materials used. As already mentioned, the shift for consumers from owning

to using is a concrete manifestation of the understanding that we are guests on the Earth, not owners of the planet. But how can we turn that second paradigm shift – the reassessment of the planet's resources as the 'limited editions' they always were – into a new rule in the game? That's where the above-mentioned data library comes in.

If we are going to consider materials as unique and finite, we have to find a way to ensure that they never become anonymous again: just as we do with people, or with Rembrandt paintings. By issuing passports to materials and keeping track of their properties and location in the economic system at all times in a central database, we can ensure that they remain infinitely available. We ourselves have established such a database: the Madaster.

The existence of information libraries like Madaster allows products and buildings to play a dual role from now on: that of a product or building on the one hand, and that of a materials depot on the other. Once we know exactly what is inside a product or building, and their design already takes account of their future disassembly without damaging or losing material in the process, we can continue to build and produce indefinitely. The buildings designed by my architectural firm RAU have long taken up these principles. They are categorised either as materials mines, materials depots or materials banks.

Materials mines

Materials mines are made up of all existing buildings in the world where the materials used in their construction are not tracked and recorded. Nonetheless, this can still be determined by going into a building to investigate. Though you obviously can't recover everything, you often see that a building that people thought was going to cost them money (i.e., for its demolition) suddenly actually becomes a goldmine for the owner – in the form of the recovered materials. Like a coal or gold mine, you establish in advance that there is value to be found, and you go looking for it. Here again, this is about creating rules and incentives making it in the interest of those concerned to handle materials carefully.

Materials depot

A materials depot is a building for which the materials to be used in its construction have already been determined beforehand. Records exist of where they will be located in the building, and how they can be easily 'recovered' from it at the end of the building's life. This is a way of building that my architectural firm is now specialised in: through partnerships with people who have a lot of experience in temporary construction projects – such as the constructors of fairground attractions –, we have learned all kinds of techniques over the past decade that we can use to ensure that buildings have circular potential. We specifically use the term 'circular potential' and not 'circular certainty': though we can ensure the possibility to one day completely dismantle a building, as it will almost certainly outlive us, it is of course up to future generations to actually do that. This is another reason why it is important to think about creating incentives at all times: to ensure that the self-interest of all players remains consistent with the principles of the closed system.

What does such a building look like? There are now numerous examples, but a good one is a project on IJburg in Amsterdam that we are currently working on. X screws are used to stack a set of prefabricated units to form one large building. Everything can simply be unscrewed later. Moreover, we use a lot of wood, one of the few non-finite materials. In our view, such methods are the construction techniques of the future. Indeed, they are the only construction techniques with a future.

Materials bank

Finally, we speak of a materials bank when the value of a building's materials is not only guaranteed and registered, but when it is also included in the financial statements of the company occupying it, as in the case with the new Triodos Bank headquarters we built. Featuring a negative CO_2 balance of 1,684 tons, it is the world's first fully dismantlable office building. Most of this building is made of wooden structures, held together by 165,312 screws.

Material as a service

When materials are issued with a passport, and their value guaranteed through the system by this kind of innovative way of building and creating financial incentives for the prudent management of materials by all stakeholders, then the final step in this transformation can be introduced: *Material as a service*. Though this revenue model operates on principles similar to those described earlier in my story about Philips, it is one step back in the production chain: the step between supplying the materials and processing them into finished products.

The revenue model is based on the fact that producers and manufacturers will henceforth not own the material needed to produce their products, but merely will have purchased the right to use it – just as the consumer only buys the right to use the finished product. Eventually, that final product is returned to the producer, who can then reuse the material to make new products. But the day may come when a company ceases to exist, or the producer moves with the times and shifts its focus. For example, a manufacturer may have been very successful selling smartphones, but at some point has missed out on a new technology used by an upcoming company, meaning that it is no longer competitive in this field. As a result, it decides to shift its focus.

That's when Material as a service becomes relevant: smartphones contain rare materials such as copper, tellurium, lithium and cobalt. If anticipated at this point in the design process, these materials can then simply be 'recovered' from the product and returned to the initial supplier – after which the producer's right to use them is terminated. Subsequently, these materials then become available to a new producer.

The *United Nations University* has calculated that 49.8 million tons of e-waste were generated worldwide in 2018. Expressing this amount in terms of smartphones, it means that, every second of that year, 9,023 smartphones were trashed – full of all these rare materials critical to the functioning of the technologies that we as societies have come to depend on. It's actually quite simple: every milligram of rare, 'limited edition' material we throw away is no longer available for reuse in future technologies. To use another popular slogan of consumer culture: *when it's gone, it's gone.*
The bottom line here is that Material as a service is not so much an optional, radical idea, but rather the only way to continue our way of life. We need to keep materials available by designing our products to also serve as materials depots, and by designing our production lines so that materials can also travel back up the chain, in a series of interconnected circles, from product to mine.

A new world: a circular chain

Materials can thus move backwards and forwards in the chain forever, thereby creating a world in which materials remain infinitely available, in which we have virtually no waste (except for organic waste), and in which far fewer fossil fuels are needed. At the same time, the pollution of the Earth will decrease dramatically. These steps are specifically intended to greatly slow down the huge production and consumption machine: when it is in the manufacturer's interest for products to last longer, their quality will naturally go up. Indeed, producers in this new system will no longer be dependent on constantly selling new products to generate cash flow. As a result, marketing will no longer have to focus so much on this aspect, with advertisers now able to focus on pushing quality – as they used to do before the 1930s – instead of creating all kinds of needs by catering to dormant psychological desires and uncertainties.

The eighteenth Sustainable Development Goal

Through a series of very practical steps, we thus arrive at a vision perhaps changing much more than just our economic system: our whole way of life, and the way we give meaning to our lives, may ultimately change because of it.
But while such a paradigm shift is a possible outcome, any change is dependent on us changing our way of thinking. We first have to wake up to the fact that we have been living in a dream for almost a century; that we humans are not part of nature and live in a self-created and controlled 'second nature' - a comfortable world in which we adjust the climate to our preferences at the touch of a button, in which there is always neatly packaged food available to us in the supermarket, and where gas and electricity enter our homes through an invisible and unquestioned network. In such a world, it is particularly easy to forget how vulnerable we are.

The world of this 'second nature' exists by the grace of the raw materials and laws of the first: i.e., our world cannot exist standalone. As a result, the single greatest condition for change remains the same for now: a change in our way of thinking. A change in our attitude toward the Earth.

While we can have such good intentions, such good ideas, if we don't start thinking differently about our relationship with the planet we live on, we will just continue doctoring the symptoms, i.e., optimising our current system. Even an admirable project like the United Nations has little significance if it does not also pay attention to changing our way of thinking. While each of the 17 Sustainable Development Goals are valuable on their own, they ultimately mean little unless accompanied by this precondition. Let's call that the eighteenth Sustainable Development Goal: reassessing our place on earth.

Conclusion

The linear economy is bankrupt – that much is known. Any attempt to make it a model with a future is doomed to failure. This is not due to a lack of ideas. As I describe in this text, the transition to a cyclical model need not be that difficult in practical terms. Instead, the problem seems to lie in our way of thinking: we need to think out of the box. By coming together and talking about possible ways to shape our future, we may be able to do something about it. My hope is that in this way we can stretch the boundaries of 'the imaginable' little by little – and ultimately free ourselves from the limitations of linear thinking. That is the real challenge ahead.

4/ Forum discussion

Geert Verachtert & Vincent Detemmerman

In a circular economy, business models are changing

Thomas Rau's keynote speech on 7 December was followed by a debate on the circular economy on 16 December. In the first part, the Vision Committee had 'circularity and changing business models in construction' discussed.

After Thomas Rau had given a short summary of his keynote speech, moderators Geert Verachtert from construction group Van Roey and Vincent Detemmerman from the Confederatie Bouw/ Confédération Construction briefly explained the first topic: "It's mostly about preserving buildings in a constantly changing environment. This includes topics such as flexibility, urban mining and the lower impact of materials, with circular economy principles applicable to every phase of a building's life. We want to reduce the use of raw materials and to design buildings that adapt to evolutions in the construction world and to the needs of a city."

Geoffroy Knipping, 'environmental officer' at Befimmo, was quick to say that Befimmo was already integrating these concepts into its strategic actions.

"At Befimmo, introducing circularity around raw materials is a logical extension of what we have been doing for years in the field of energy. We want to reduce the carbon footprint of our operations. We have already integrated circular economy aspects into a calculation module. In particular, our efforts are focused on the flexibility and adaptability of our buildings, as well as on using healthy materials. We make an inventory of the materials we use in our construction projects, allowing us to know what we can possibly reuse later. We are now building flexible, adaptable buildings, a move that we hope to benefit from later. Noticing that our customers are paying more and more attention to the materials used and their impact on their health, we are also taking that into account."

Additional costs

"Though flexible construction costs more, it allows us to quickly adapt our buildings to the changing needs of customers and respond quickly to new demands. Flexible construction thus creates added value for a building as well."

Michael Moradiellos of Drees & Sommer set out the vision of the residual value of materials in a building.

"With a materials passport, we can determine the recycling or reuse value of the materials on demolition. We currently estimate that market value at one to two percent. When we have materials reclaimed under the circular cradle-to-cradle principle and which are reusable, separable, dismantlable or healthy for the environment, returns can be as high as ten percent. We guarantee that added value to the investor or builder through the materials passport. Such a value-added circular materials project obviously involves additional costs, such as expertise from study firms, additional work for traditional design firms or additional investment costs in the search for materials. Certain aspects can already be integrated fiscally into the business plan, meaning that we do not have to wait for the building to be dismantled. Backed by guarantees, the stakeholders work with a long-term vision around quality, health impact, recyclability, etc. However, no standards are currently available. We hope that, based on the work already performed in the Netherlands and Germany for the Madaster, we will soon arrive at a framework for that materials passport, thereby better integrating that principle into the economy and allowing stakeholders to heighten their engagement."

Information

Marc Bosmans from Knauf Insulation stressed the need for information about the materials used. "The value chains in the construction industry are very diverse. As a producer of glass wool and rockwool, we are faced with a total fragmentation in our various markets. We are seeing new trends emerging in the value chain when communication within a project goes well, as generally seen with larger projects. We consider it important to also provide information along with our products. Once we put a product on the market, we also provide information on its composition in the hope that this will continue to guide that product through its life. If someone wants to do something with that later, that information is available. But building material manufacturers in particular are not (yet) following that principle. Small steps are needed to achieve a turnaround. A legislative framework would help accelerate that process."

Legal barriers

Marc Bosmans saw an opportunity in harvesting building materials from buildings: "We are trying to make circular the materials we are now putting on the market. We are already taking back insulation material from wood frame construction. It's clean material that was recently produced, meaning that we know its chemical composition and that it is reusable. We are also seeing quite a lot of glass wool and rockwool coming back from demolition or construction sites, but that's a cost we can't possibly cover today. Its residual value is difficult to determine because we do not know its chemical composition. While we see it as a future raw material – we're looking for a solution to that –, taking such material back in large quantities is going to be a technical challenge. We are not legally obliged to take it back, but we would like to recover it in the long run. This is a purely strategic choice. For every product we market ourselves, a CE marking is needed. Moreover, there are strict chemical composition guidelines. If we take old insulation back, we have no information about it, making its reuse very difficult. Unfortunately, the legal obstacles are very great. For several years, demands from building owners to take back our construction waste have been on the rise – a completely new situation for us."

Data

Reacting to the "harvesting' of materials, Thomas Rau had this to say: "Clients and owners need to have an insight into the materials used in their building so that they can harvest them at a certain time. All data on a building must therefore remain with its owner. As the value is created by the client, he should also receive the financial compensation."

Vincent Detemmerman and Geert Verachtert agreed on the need for more transparency in the market to gain better knowledge of the materials used. "On the one hand, there is the option of introducing a materials passport, though Europe is also working on a passport for buildings. Clearly, there are technical, financial and legal challenges. A regulatory framework is needed."

Johan Van Dessel from the WTCB has this to say on 'harvesting'. "Urban mining is mostly about existing, older buildings where we currently have no knowledge or information on the materials used. At some stage we will have to somehow get these inventoried, as this is the only way we can properly capture the value. We can link that to evolutions associated with a building logbook or passport, but before we steer our contractors in that direction, we need to be able to move quickly to a materials inventory."

Service model

Christ'l Joris from Etap Lighting saw an energy issue in addition to the material aspect: "We offer 'light as a service' to our customers. Via long-term contracts, we take over responsibility and the risk for the product over the entire contract term. In addition to materials, we also need to look at energy consumption. We know our materials, even if we haven't made out a passport for them. We also need to be able to monitor the operation of our lighting fittings for maintenance, repair or upgrading purposes. This data must thus be in our hands. We need designers and developers able to come up with long-term solutions together with us and who want to commit to circularity. People who want to consider our product's entire life cycle. In the long run, quality will make the difference. Quality deficits lead to additional costs and preclude circularity. Light as a service is just a steppingstone to circularity. Financing such models also remains a key challenge."

Geert Verachtert questioned whether the service model was ultimately more expensive for the customer: "In addition to the value of the materials, you have to identify, harvest, take back, re-manufacture, provide new quality guarantees … Doesn't all this make the service model more expensive for the customer or does the residual value offset that extra cost?"

Customers' peace of mind

Christ'l Joris: "We should not think in terms of more expensive or cheaper. We give our customers peace of mind. We offer them use, energy and comfort at a very acceptable price. This is a whole new model and we are still at the very beginning. We design and develop for the long term. With an eye for circularity we are giving old products a new value and a new lease of life."

Thomas Rau also emphasised the financial benefits: "By 2060, there will be 60% more buildings worldwide, but we don't have enough resources for that. Using the materials available today, we will need to construct 60% more buildings. So we urgently need to know where these materials are currently stored. Each client must have an understanding of the materials at his disposal. On the basis of the value of those materials, he can depreciate his buildings to the minimum material value. It is important to identify the financial benefits of doing so. Regulations must also react accordingly. When a client remains responsible for his building for at least 30 years, he will make very different decisions."

Government

Vincent Detemmerman saw energy-efficient renovation work doubling in the next few years. He wondered whether the market and technology were ready for renovation using circular principles. Jan Buyle from BAM restated the question, asking whether renovating an old building was in itself a circular intervention. Thomas Rau did not immediately have an answer to that.

"A lot depends on the type of building: how it is constructed, what the residual value of the materials is. Some find it more sustainable to use a building for as long as possible. In my mind, that's not the most sustainable solution. We are up against an enormous renovation task. This requires a fundamental change, for which the market is not yet ready. The government also needs to take much stronger action and adapt legislation. If the government sets down requirements, the market will come up with solutions. The tax system must also change. We currently tax labour too much and materials too little, despite materials being finite and labour infinite. The tax on labour must go down, because labour is unlimited."

Renewable resources

Peter Suys from Eurabo bvba argued that renewable materials deserved a much more important place in construction.

"In Belgium, we use very few materials from renewable resources. The use and application of such materials are still not well established among engineering firms, designers or architects. Moreover, contractors and building owners remain reluctant to use renewable materials, mainly because they lack knowledge about them. However, wood and other biomaterials are interesting in terms of circularity. More knowledge is needed about biomaterials so that we can use them – as elsewhere in Europe – much more in construction."

Nadja Van Houten from Bureau Bouwtechniek found that, though the design of a circular building was not much different from that of a conventional building, there were some challenges.
"As architects, we ask ourselves where we can get the materials, where they are available and how they are distributed. Another problem is that, as designers, we have no knowledge of the properties of those materials, many of which are decades old. Even if we want to reuse materials from a demolition site, we just don't have enough data on them to include them in our design. Though those details are usually in architects' plans, these plans have a tendency to get lost over time. If those models were available, we would usually be able to make good further use of the materials. Harvesting and transforming such materials would have a greater circular impact than creating bio-based new materials. If we know the technical properties of these materials, we can bring down the cost for the client by reusing that material on the site itself, while also proving that we are meeting the specified requirements."

Peter Suys: "One prerequisite for reusing material is that the cost of the virgin raw material needs to be higher than what you get from demolition. That is currently not the case, because you have to build a whole new logistics chain to enable reuse, and that costs money. We won't get there just with a building passport or a BIM model."

Lower environmental impact

Johan Van Dessel saw environmental benefits even with conventional materials: “We see attempts to work with short chains to produce low-impact renewable materials. Wood certainly has a future as a material. BUILDWISE has been focusing on that evolution for several years. But at the same time, the environmental impact of conventional materials needs to go down. Producers need to greatly reduce the environmental impact, the CO_2 footprint, of their products.”

Thomas Rau continued to argue for a complete conversion: “We need a complete shift in the construction industry. We need to carefully consider where further optimisation is still possible and when we need completely new chains. Those new chains also need new legislation, and the government needs to provide guidance here.”

Marc Bosmans agreed: “For us as a manufacturer, environmental performance is hugely important. We are making a big switch, including in our production methods. While this is a strategic choice, it is also being driven by new laws and competition. The environmental performance of our products must improve, and production must become more bio-based. It’s not a case of either one or the other.”

The traditional value chain requires other business models

Fuelling the discussion, Rudi Hageman of Pearlchain outlined the changes successfully accomplished by the automotive industry in recent years. He spoke of a disruptive overall process.
“We will have to do what we are doing today in a completely different way tomorrow, and we have to continuously improve that process. Some sacred cows will have to go. Top-down decisions have to be made, and the hardest part of that is getting away from thinking in terms of projects and tasks. We have to switch to thinking in products, starting out from what consumers need: what experiences do they want? In the case of the construction industry, consumers will want to enjoy living somewhere at a reasonable price and within a reasonable timeframe. Indeed, it will be a challenge not to make it too expensive or too long a process for the consumer. We’ve got to think years ahead and come up with a product meeting the demands of the end consumer. In the automotive industry – an industry characterised by very large partnerships –, it takes on average five to seven years to develop a new product. The challenge is to invest sufficient effort in mastering the overall process so that you can take all the steps quickly, i.e., everything has to be prepared in detail. All producers and suppliers are involved in the process. They need to constantly optimise their products with an eye to the end result: a building that meets all requirements, whether quality, experience or price.

Benefits

By managing the whole process, we know in advance exactly what parts are needed, what they will be used for, what logistics they need and how much it will cost. Just by managing the process in real time the automotive industry achieves a 20% gain on labour capital. The potential gains for the construction industry are even greater, as there is much more waste here. If you plan everything carefully in advance, then suppliers can work according to these plans, delivering not only just in time, but also just in sequence. Such precise sequencing ensures not only greater continuity, but also tidier building sites. In the construction industry, critical mass is a different story. If we want to re-invent the wheel every time, processes get very difficult. Standardisation would help to a certain extent. Time management will play a key role. As you know, there is room for improvement there in the construction industry.”

Prefabrication

Geert Verachtert kicked off the debate by arguing that there had been few productivity improvements in the sector in recent decades. He wondered why.
Jan Buyle from BAM felt that the construction industry had somewhat missed out on the industrial revolution.
“The automotive industry has worked towards a product built on the basis of repetitive actions. Therein lies the difference. The question is whether we need to transfer a large share of our production from the construction site to the factory. Or even to do everything in such a safe environment. And then we have to think about what products we want. We all feel that there are many steps still to be taken there.”
Thomas Vandenbergh from BESIX Stay saw a shift in the role of building contractors.
“The contractor is no longer a pure assembler or a coordinator of subcontractors. He is becoming a product owner. At BESIX Stay, we now sell the hospitality experience, just like a car manufacturer sells a mobility experience. It’s a completely different approach. We first determine who we want to sell to: what does our target market want, how does it consume? You then use this as the starting point for building your experience, the characteristics of your product and your processes. Today that’s the other way round: our clients now determine what they want and we carry it out as cheaply and qualitatively as possible. As a result, our margins are small. To buck that trend, we need to offer products that we can sell. The architect then designs the buildings that fit within that product. We must be more daring, putting products on the market and not just being an assembler of building blocks.”

Quality and efficiency

Peter Suys felt that there was still a long way to go before construction companies would really be able to offer products on the market. But he saw short-term opportunities for quality and efficiency improvements.
“If companies and service providers would only do what they are good at and work together efficiently, we could already get quality products. That would prevent a lot of wasted time and money. A first intermediate step might be to form groups – informally, if necessary – so that we can get better acquainted and work better together.”

Prototypes

Thomas Rau saw a prototype in almost every building.
“No one knows exactly what it will cost, when it will be ready and whether it will work as intended. To improve things here and meet the challenge of providing more housing, we need to move from project to product. We need to standardise more, though not necessarily at the expense of individualisation. We just need to have a good knowledge of what kind of products we need and then assemble them. And if a client has a problem with his home, he should have one point of contact to follow up on everything on his behalf.”
Rudy Hageman noted that 80% of the added value in the construction industry was provided by subcontractors. He saw the need for a different vision of collaboration.
“You have to work with other companies to develop a product, with collaboration beginning early in the process. Innovating means becoming much more aggressive in your thinking. How am I doing something today and how do I want to do it tomorrow? Projects and tasks are set to disappear as more gets assembled. In fact, assembling itself then becomes enjoyable.”

Specialisation

Thomas Vandenbergh looked further at the ‘specialisation’ aspect brought up by Peter Suys. In his view, everyone should do what they were best at.
“A general contractor creates order and structure in processes. To avoid reinventing the wheel every time, the contractor must first make strategic choices: which market and which market segment does he want to serve? The general contractor is a jack of all trades, bringing order to the ever-repeating chaos, while a subcontractor is specialised. Innovation comes at two levels: How do you combine things and how do you sell the product; and how can you make the product better? The chaos you find on every building site is just not sustainable. We don’t earn enough because of it, and it’s stressful, exhausting and full of risks.”
Thomas Rau saw a further role before a general contractor gets started: “A contractor always responds to demand. The product industry itself creates the market and the product, without waiting for the customer. The contractor now has the opportunity to actively market a product or a building. He thus creates a new market, while the construction industry gains new opportunities.”

Life-cycle costing

Geert Verachtert introduced the next part of the debate by stating that a building’s construction itself accounted for just 20-30% of its life-cycle cost.
“Construction only involves the investment cost, while all other costs are incurred during a building’s operation: maintenance, energy, facility costs, etc. For 95% of new buildings, price remains the main criterion, even if the construction price is totally unimportant. I urge all clients to use the cost of a building over its lifetime as the main criterion. Instead of a best endeavours commitment, we need to move to a performance commitment over a much longer period of time, incentivising prospective bidders to come up with creative solutions.”
Geoffroy Knipping stated that Befimmo was already integrating life-cycle costing into its projects. “But we no longer sell buildings. We sell an experience. As we continue to own the building, we integrate those costs into our calculations. If the building needs renovation in 30-40 years, i.e., while we will probably still own it, we will be responsible for that renovation. This means we also have an interest in ensuring that our buildings are built to last, because if we are able to use something for a long time, that’s also a circular economy aspect for us. We are experimenting with this and now applying it in our other projects. We want to increasingly integrate those aspects of the circular economy more in public tenders.”

European framework

Christ'l Joris from Etap Lighting absolutely agreed that the government should tender differently, with circularity playing a greater role. "But circular is not always circular. We need the right framework first, and that is best achieved at the highest possible level. Only then will we get a level playing field for everyone. Therefore, I look with anticipation at the path the European Union will take to become the first climate-neutral continent by 2050. That's where circularity comes in. If we get a clear and ambitious framework, governments will have the opportunity to handle their tenders differently. There is currently still a large margin for improvement, because price remains the decisive element."
Johan van Dessel took up the monitoring aspect: "We are currently developing the technology to monitor building systems and determine whether those systems are doing what they are supposed to do. This allows us to better monitor a building's performance, not only to make adjustments to the installation in good time, but also to offer new services on the basis of the data gathered. This can further professionalise a building's maintenance and management and reduce the volume of work in that area. There are many new opportunities for contractors there as well."

New lifestyles

Thomas Vandenbergh from BESIX introduced the next part of the debate, focusing primarily on the sociological and generational aspect.
"Today's younger generations – the millennials (the under-40s) and Generation Z (the under-20s) - are set to account for more than half the population in Europe and the United States by 2050. Having grown up with social, financial and economic problems, these generations will be the first to suffer the effects of climate change. Moreover, they have been immersed in a high-tech world for their whole lifetime. They see society differently and have a completely different way of consuming. They thus present many new opportunities as an interesting target group. We should leverage those new generations as an entry point for our business models. After all, innovative and sustainable business models only make sense if the market adopts them. Two questions thus arise: do we think that this younger generation is much more open to a real estate service model, and is that then part of the solution to achieving greater circularity? And can these younger generations, unwilling to surround themselves with products, but mostly wanting to enjoy services and experiences, become the early adopters of circularity?"

Limited offer

Jan Buyle from BAM agreed that circularity and ownership went hand in hand. "If you offer a service, you need to think about the life cycle and production guarantees. This causes you to make very different choices. However, I think that older generations are similarly open to such a service model, though the current offer is still far too limited. The market needs to generate that offer, before someone from a completely different sector steps in and fills that gap in the market for us."
Rudy Hageman stated that those with a good command of products, materials and assembly could deliver the experience required at a reasonable price. "The industry needs to be able to quickly offer a well-designed experience at a reasonable price. Then you have to be able to deliver a well-designed product whose life-cycle costs and accompanying services are under good control. That is precisely the added value of that revenue model."

Responsibility

Nadja Van Houten noted that the service model gave no responsibility to the user. She found it a great challenge to learn how to work with such a service model. Jan Buyle suggested a system of ratings, in which both parties would be rated to detect less responsible users.
As regarded the revenue model and its implications, Christian Levie from Econocom confirmed that, for the circular aspects, it was important for the supplier to retain responsibility.
"Suppliers who retain ownership will design their products to be circular from the outset, and will know in advance how to manage them and what happens to them over time. But just remaining an owner is not enough. The important thing is that he retains responsibility. All those who launch into the service model experience cash problems in the first few years. As a service model runs over a longer period, this initially means less revenue, lower annual profits, more borrowing and a destabilised balance sheet. That makes many companies reticent to adopt a service model. But ownership can for example also be taken over by a partner. In a service model, collaboration is important. Few companies today can vouch for everything – design, production, distribution, collection and recycling or reuse. Throughout such a value chain, the various partners must reach agreement on responsibility. Working together and making clear agreements while one party retains ownership has many advantages. The supplier can focus on the experience its customers want, while someone else takes ownership. That can work well. Leasing is not a true service model and is not necessarily circular, but it can be a means of releasing the supplier from his ownership responsibility."

Leasing

Thomas Rau stressed that leasing had nothing to do with a service model. "Under a leasing agreement, a financial institution takes over ownership from the producer, without having any influence on the product. This has no influence on the value chain. The producer, who retains influence over his product, must market that product himself as a service. If he does so, this will have major implications for the entire value chain. The chain is changing and some partners will drop out of the chain, but great opportunities are opening for other partners."

Confirming this, Christian Levie saw leasing as a facilitator for the service model. "For example, we have a 'flooring as a service' project, a collaboration between the architect, the carpeting supplier, the carpet layer and someone who maintains it. We organise that process as a leasing model, translating these various contributions into a monthly cost. This is transparent to the customer and he is relieved of all burdens. He receives the same invoice each month for the service provided, while the costs and revenues are shared among the various partners. A facilitator makes that service model more feasible."

5/ General conclusion and prospects for the future

Johan Van Dessel, Jeroen Vrijders, Lisa Wastiels, Geert Verachtert, Vincent Detemmerman

Prospects for circular construction

Geert Verachtert, Vincent Detemmerman, Johan Van Dessel, Jeroen Vrijders, Lisa Wastiels

Circularity and sustainability are two different things. While sustainability is all about constantly trying to improve the existing system, circularity is more about a mindset, an attitude. If we want to move to a circular economy, we need to invent a whole new system, rather than continuing trying to optimise the existing one.

Thomas Rau, Limelette 7/12/2020

Thomas Rau's statement underlines the disruptive nature of the circular economy, an aspect complicating its breakthrough. Yet one of the goals of the European Green Deal (EGD) is to achieve a circular economy by 2050. The EGD explicitly refers to the construction sector due to its extensive consumption of resources. Let us take a closer look at this issue on the basis of the discussions within the Vision Committee. The starting point for this foresight note are Thomas Rau's reflections in his keynote speech on 7/12/2020 and the output of the vision workshop held in Limelette on 21/12/2020. Its aim is to look at the middle-term challenges needing to be overcome and what concrete steps need to be taken in the next 10 years.

Twin target

Targets have been set, not only at European level, but also at the level of Belgium's regions (Wallonia, the Brussels Region and Flanders). For example, the policy programme of Ovam (the Public Waste Agency of Flanders) entitled "Towards Circular Building" contains interim targets for 2030. This policy programme has two strands with regard to construction:

- on the one hand focusing on "urban mining"" with respect to existing buildings,
- on the other highlighting circular material and design choices in new construction or in the renovation of existing buildings.

For both strands, Ovam has set concrete targets for 2030:

- for recycling: to reuse 95% of mineral and 70% of non-mineral demolition waste and to return at least 50% of the reused material to high-quality use;
- for change-oriented/flexible design: 25% of buildings to be designed and/or (re)built according to circular principles.

While one aspect of circular construction – the use of renewable materials – went unmentioned, the paper proves that the policy focus is evolving from a recycling approach to a more global one. This is also the case in the Brussels Region.

But circular construction can only take off if business models based on the aforementioned pillars of Urban Mining, Circular Design and the use of renewable materials are able to emerge. Companies must be able to respond to market needs while creating value. Circular construction must create an economic benefit for all concerned: clients, manufacturers, designers and contractors. At the same time, business models must be sustainable, seeking to minimise the environmental impact and striving for a long product or service life.

In search of added value

Uncertain value of materials in existing buildings

How much are the materials in an existing building worth? Construction professionals estimate that value at less than 10%. However, according to Thomas Rau, that value is more likely to be 18 to 19%, though he links the higher value to the availability of an inventory. In this respect, however, it is important that such an inventory or register of materials lists not only the types of materials and their quantities found in the building. Knowledge of their construction properties is also helpful.

The fact that these properties are currently for the most part unknown is a major obstacle to reuse. For example, to continue using existing foundations or concrete structures, it is crucial to know the condition of their reinforcements. In the future, BIM in particular can provide a true picture of the materials contained in a building. But in general, the amount of circular materials and products on offer remains too limited.

Unfavourable prices compared with new materials

The value of recovered materials also depends on the price of comparable new materials. New and recycled materials compete against each other, with the former favoured when the raw materials needed for them are widely available. Moreover, material costs make up just part of the total cost, with additional logistics effort potentially (greatly) pushing up the overall cost. But raw materials are, by definition, finite. In the long run, they are set to become scarcer and also more expensive.

The government could further influence the true cost of new materials by applying a CO_2 tax to them, thereby taking account of the total environmental cost. Policy can also help reduce the supply of raw materials, with the government preventing certain extraction opportunities, for example through phasing out gravel extraction.

At the same time, recycled materials are set to become cheaper as the market for and supply of these materials further mature.

Higher processing effort

In addition, logistics (transport and storage) have a significant impact on the economic cost of materials. Materials and components in existing buildings are disadvantaged when their recoverability requires more effort than that required for the production of new materials and building components. A further major drawback of existing materials is that, in existing buildings, they are more often interconnected and difficult to separate.

Another drawback is the space and labour required to selectively sort them. Recovery now requires a complex and costly logistical process, driving up the price of what can be recovered from demolition to levels higher than those of new (raw) materials.

Lack of quality guarantees

In addition, we need some form of quality guarantee for materials recovered from existing buildings. While newly produced materials conform to clearly documented norms and standards, that is by no means the case for materials recovered from existing buildings. Nevertheless, it is and remains a logical goal that buildings and structures erected with recycled materials should meet the same architectural qualities as those built with new materials.

Additional costs of flexible construction

While flexible construction involves additional costs, it also allows developers and building managers to adapt their spaces to the needs of occupants and users more quickly and cheaply. Flexible construction thus creates added value for a building over time, though may initially incur higher investment costs.

However, the payback period for the construction of flexible buildings is longer than, for example, energy-related improvements which have an almost immediate downward effect on energy bills. By contrast, the benefits of flexible design are only realised when clients take a sufficiently long-term view.

Evolutions in the regulatory framework

The regulatory framework plays an important role in giving recovered materials the edge over new materials.
For example, the European Union set a 70% recycling rate for construction and demolition waste by 2020.
As mentioned earlier, regional governments in Belgium are setting stricter target percentages for 2030.

Regional environmental policies may also impose additional demolition requirements in this respect. For example, in 2022 the Flemish government prescribed a demolition succession plan for larger buildings. In addition, it is considering introducing an M-level (materials level) in addition to the E-level (energy level), with a number indicating how ecological the use of materials is. The already existing tool TOTEM will be available to determine the M-level. For their part, the Walloon and Brussels regional governments are working on drawing up a demolition inventory.

Building permit policies can also play a role here: for example, a regional government (such as Brussels) can discourage demolition and promote dismantling in its permits. A government may also require a certain recycling rate in its permits.

Moreover, the government can set recycling targets in its procurement policies for government buildings, serving as an example in this regard. Designers and contractors would then be required to adapt to this.

The European regulations contained in the Taxonomy establish mechanisms to encourage a higher recycling rate. One major obstacle here, however, is the limited availability of recycled materials.

What is clear is that any such policies can only bear fruit when the measures keep pace with market developments, as the evolution toward near-zero-energy buildings has shown. At the end of the day, it will all come down to balancing availability, additional costs, payback periods, affordability and environmental benefits.

English version

Future developments Main Takeaways on circularity

Radically rethinking construction

Circular construction should help ensure that the construction industry continues to develop, while reducing the pressure on the environment and the use of natural resources. Though intertwined, it is important to realise that ‘circularity’ and ‘sustainability’ are two different things. Sustainability is all about constantly trying to improve the existing system to minimise the environmental impact (CO_2-footprint - impact decoupling). Circularity is primarily about a mindset, an attitude aimed at reducing resource consumption (material decoupling).

The circular economy is a model of production and consumption in which materials and products are shared, rented, reused, repaired, refurbished and recycled as long as possible, thereby minimising their loss of value and, in the long run, their environmental impact.
In practice, this means minimising waste and keeping materials and products in the same value chain within the economy as much as possible. This approach involves not only finding technical solutions to close the loop (Urban Mining) and/or to use renewable materials, but also in considering the design and the way products are brought together (dismantable construction, Circular Design) with a view to extending their lifespan and enabling reuse. In doing so, new business models are also needed to support this circular model of production and consumption.

Companies must indeed be able to respond to the increasingly urgent environmental challenge and to market needs, while at the same time creating value. Circular construction should be about sustainable business models aimed at minimising the ecological impact and ensuring that a product or service has as long a life as possible. At the same time, it should bring financial benefits to all parties concerned: clients, manufacturers, designers and contractors. The high residual value of materials and products in new, circularly optimised buildings must also be factored into the financing models of such projects.

Although data has been pointing to a fairly high recovery and recycling rate in construction for many years, this rate largely includes the reuse of materials in lower-value applications (‘downcycling’). A disruptive approach is thus now needed to create circular breakthroughs. As regards reuse, we cannot simply fall back on existing rules and documents. We need to thoroughly rethink risk management in new construction, conversion work and rebuilding. A quality framework is needed for the reuse of materials and building systems. At the material and building system level, we must be ready to think more radically, also with regard to the most commonly used building material: concrete.

Construction evidently suffers from an aversion to innovations because of the liability placed on designers and contractors. Hence also the importance of establishing an open innovation culture, backed by additional (government) support for research and development.

At present, circular construction, and in particular the reuse of materials and building systems, is only slowly gaining traction among building contractors. Any real breakthrough in circular construction requires a change in mindset, including thinking about longer-term ecological impacts and implementing a life-cycle approach. It will also be a question of having the will to invest in this. Shortages of raw materials can drive the evolution towards circular construction. But government policies can also encourage circular construction through R&D programmes or for example by imposing a recycled or reused 'materials level'.

In line with sustainable objectives

Seeking to define which activities can be labelled 'sustainable', the European Taxonomy Regulation obviously plays an important role for the future promotion of ecological investments. Its fourth objective relates to supporting the transition to a circular economy, targeting reuse, waste prevention as well as recycling.

Construction companies and building developers who want to invest sustainably, and banks who want to finance sustainable investments, are expected to rely on these criteria in the future. The further development of these criteria is set to be an important factor in promoting a circular construction economy. One goal of the Taxonomy Regulation is to generate (internationally tested) evaluation frameworks for circular construction. Concrete implementation of this part of the Taxonomy Regulation is now in its final stages. Looking to the future, it is important for construction industry players to have clear guidance on how to concretely implement, report and follow up on these criteria.

Crucial element: inventorying

Drawing up inventories of materials and building systems in existing buildings is a crucial element in promoting their reuse and should be done with the necessary transparency. Construction professionals are still lacking information in this Urban Mining area, inter alia because these materials and building systems are poorly documented and because their properties cannot be readily determined or verified. Material passports can serve as a support in this respect, but should not impose additional burdens.

Existing regulations primarily aim to remove hazardous waste, for example asbestos, from existing buildings. But in the future, the mandatory use of a reuse inventory will undoubtedly become a reality.

Digitalisation as a facilitator

Digitalisation should lead to new, 'circularly optimised' building concepts using intrinsically sustainable materials and building systems. Digitalisation of the entire chain is set to make reuse through 'urban mining' much more efficient. The digital disclosure of existing materials and building systems is expected to create collaboration platforms as well as supply and demand platforms. To properly capture the residual value of existing buildings, digital (scanning) techniques can be used. Only then will it be possible to tackle reuse on a more industrial scale and with lower logistics costs.

Development of a long-term strategy

Many families or organisations continue to own the same building for several decades. Long-term strategies will thus need to be developed for these buildings, taking account not only of the initial installation, but also of the subsequent maintenance and upkeep.

Buildings must then remain in service for decades, even under changed circumstances, for example when rooms are reallocated or functions change. This also implies that buildings and their building systems, materials and installations can be easily disassembled and reassembled in a modified form, thereby largely avoiding useless waste. Moreover, added value is created as the addition of new elements is kept to a minimum.

In this context, manufacturers and/or contractors should be able to provide long-term quality guarantees, even though perhaps not everything will necessarily be reversible. Of great importance in this respect is that construction players can rely on the unambiguous agreements and guidelines of Belgian and European normative frameworks for ensuring the sustainability of buildings.

Importance of knowledge dissemination

The circular construction breakthrough is closely related to the knowledge available to detect, inventory and dismantle materials, to develop circular products and to assemble and install recovered and circular products correctly and appropriately. Scaling up circular construction requires knowledge to be disseminated at all levels – from new training programmes to information websites and databases. Spotlighting circular construction trailblazers is also an important aspect. Disseminating this knowledge is an important mission for Buildwise and its partners.

In search of cooperation

Few companies are able to handle the whole circular construction value chain – design, production, distribution, collection and recycling or reuse. Throughout that value chain, the various partners must reach agreement on who is responsible for what, working together in a transparent and trustful manner as a construction team. With circular construction still largely at an experimental stage, it is important for construction players to share risks. Moreover, the government needs to abandon the lowest price principle in its procurement policy as this principle does not accommodate the long-term thinking required for circular construction.

In summary, the following challenges need to be overcome to implement circularity:

- ensuring a sufficient supply of circular materials, building systems and installations gained through Urban Mining or a renewable approach
- providing transparency in relation to data on the quality of reused materials and building systems, with the necessary normative and technical support
- providing knowledge and training for Circular Design, proper employment, and installation requirements for circular materials, building systems and installations
- addressing regulatory constraints

Nederlandse versie

Toekomstige ontwikkelingen Voornaamste Takeaways over circulariteit

Bouwen radicaal herdenken

Circulair bouwen moet er mee voor zorgen dat de verdere ontwikkelingen van de bouwsector kunnen plaatsvinden terwijl toch de druk op het milieu en het gebruik van natuurlijke hulpbronnen worden getemperd. Het is belangrijk om te beseffen dat 'circulariteit' en 'duurzaamheid' op zich twee verschillende aspecten zijn die weliswaar met elkaar verweven zijn. Bij duurzaamheid proberen we het bestaande systeem voortdurend te verbeteren om tot een minimale milieu impact (CO_2-voetafdruk – impact decoupling) te komen. Bij circulariteit gaat het in de eerste plaats om een ingesteldheid, een attitude gericht op het verminderen van resource consumptie (material decoupling).

De circulaire economie is een model van productie en consumptie, waarbij materialen en producten zo lang mogelijk worden gedeeld, verhuurd, hergebruikt, hersteld, opgeknapt en gerecycleerd om zodoende hun waardeverlies en op lange termijn de milieu-impact te minimaliseren. In de praktijk betekent dit dat het afval tot een minimum wordt beperkt en dat materialen en producten zoveel mogelijk binnen de economie in dezelfde waardeketen worden gehouden. Deze aanpak bestaat er niet alleen in om technische oplossingen te vinden om de kringloop te sluiten (Urban Mining) en/of hergroeibare materialen te kunnen inzetten, maar ook om na te denken over het ontwerp en de manier waarop producten samengebracht worden (demonteerbaar bouwen, Circular Design) om hun levensduur te verlengen en hergebruik mogelijk te maken. Hierbij zijn er bovendien nieuwe economische bedrijfsmodellen nodig om dit circulaire productie- en consumptiemodel te ondersteunen.

Bedrijven moeten inderdaad kunnen inspelen op de steeds dwingendere milieu-uitdaging, marktbehoeften, en tegelijk moeten ze waarde kunnen creëren. Circulair bouwen moet om duurzame businessmodellen gaan waarbij gestreefd wordt naar een zo beperkt mogelijke ecologische impact en naar een lange levensduur van het product of de dienst. Tegelijk moet het alle betrokken partijen economisch ten goede kunnen komen: opdrachtgevers, producenten, ontwerpers en aannemers. De hoge restwaarde van materialen en producten in nieuwe, circulair geoptimaliseerde gebouwen moet ook in rekening gebracht worden in de financieringsmodellen van deze projecten.

Hoewel gegevens reeds vele jaren een vrij hoog terugwinnings- en recyclingpercentage in de bouw laten zien, omvat dit percentage in belangrijke mate het hergebruik van materialen in toepassingen met een lagere waarde ('downcycling'). Een disruptieve aanpak is nu dus nodig om circulaire doorbraken te creëren. Voor hergebruik kunnen we niet zomaar terugvallen op bestaande regels en documenten. We moeten het risicomanagement bij het bouwen, verbouwen en herbouwen grondig herdenken. Er is een kwaliteitskader nodig voor het hergebruik van materialen en bouwsystemen. Op materiaal- en bouwsysteemvlak moeten we radicaler durven doordenken, ook wat betreft het gebruik van het meest gebruikte bouwmateriaal: beton.

In de bouw bestaat er ongetwijfeld aversie tegenover vernieuwingen omwille van de aansprakelijkheid die op ontwerpers en aannemers rust. Vandaar ook het belang om hieromtrent een open innovatiecultuur te installeren via extra (overheids)ondersteuning voor onderzoek en ontwikkeling.

Op dit ogenblik komt circulair bouwen en in het bijzonder het hergebruik van materialen en bouwsystemen pas schoorvoetend uit de startblokken bij de bouwers en de verbouwers. Circulair bouwen zal pas doorbreken door een verandering van de mindset, onder andere door op langere termijn over ecologische effecten na te denken en een levenscyclus-aanpak te implementeren. Het zal ook een kwestie zijn van hierin te willen investeren. De schaarste aan grondstoffen kan de evolutie naar circulair bouwen bevorderen. Maar ook het beleid van de overheid kan het circulair bouwen stimuleren via O&O-programma's of door bijvoorbeeld het gebruik van een gerecycleerd of hergebruikt materialenpeil op te leggen.

In lijn met duurzame doelstellingen

Duidelijk van groot belang voor de toekomstige bevordering van ecologische investeringen is de Europese taxonomieverordening. Die tracht te omschrijven welke activiteiten de stempel 'duurzaam' mogen dragen. De vierde doelstelling van die verordening heeft betrekking op het ondersteunen van de overgang naar een circulaire economie. Daarbij gaat het zowel om hergebruik, afvalpreventie als om recycling.

Bouwbedrijven en bouwpromotoren die duurzaam willen investeren, en banken die duurzame investeringen willen financieren, zullen zich in de toekomst op die criteria baseren. De verdere ontwikkeling van die criteria wordt een belangrijke factor in de bevordering van een circulaire bouweconomie. De taxonomieverordening ambieert om (internationaal geteste) evaluatiekaders voor circulair bouwen te genereren. De concrete invulling van dit luik van de taxonomieverordening is nu in een eindfase. Het is belangrijk naar de toekomst toe dat de actoren van de bouwsector duidelijke handvaten krijgen om die criteria concreet in te vullen, te rapporteren en op te volgen.

Cruciaal element van de inventarisatie

Voor het hergebruik van materialen en bouwsystemen uit bestaande gebouwen wordt de inventarisatie ervan een cruciaal element. Deze inventarisatie moet ook met de nodige transparantie kunnen gebeuren. Bouwprofessionelen zijn op dat vlak nog maar weinig geïnformeerd, onder meer omdat die materialen en bouwsystemen slecht gedocumenteerd zijn en omdat bij Urban Mining hun eigenschappen ook niet onmiddellijk te bepalen of te controleren zijn. Materiaalpaspoorten kunnen hierbij ondersteunend werken, maar mogen wel geen extra last met zich meebrengen.

Bestaande regelgeving heeft nu vooral tot doel om gevaarlijke afvalstoffen, zoals asbest, uit bestaande structuren te weren. Maar in de toekomst zal het verplicht gebruik van een hergebruikinventaris ongetwijfeld een feit worden.

Digitalisering als facilitator

De digitalisering moet leiden tot nieuwe, 'circulair geoptimaliseerde' gebouwconcepten met intrinsiek duurzame materialen en bouwsystemen. De digitalisering van de volledige keten zal hergebruik via 'urban mining' heel wat efficiënter maken. Een digitale ontsluiting van de bestaande materialen en bouwsystemen zal

samenwerkings- en vraag- en aanbodplatformen doen ontstaan. Enkel dankzij digitale (scan)technieken kan de restwaarde van bestaande gebouwen goed worden gecapteerd. Pas dan wordt het mogelijk het hergebruik op een meer industriële schaal aan te pakken en de logistieke kosten ervan te drukken.

Ontwikkeling van een langetermijnstrategie

Heel wat gezinnen en organisaties blijven gedurende meerdere decennia eigenaar van hetzelfde gebouw. Het moet dus mogelijk zijn om voor die gebouwen een langetermijnstrategie te ontwikkelen. Zij zorgen dan niet alleen voor de initiële installatie, maar ook voor het daaropvolgende onderhoud en voor de instandhouding.

Het gebouw moet dan decennialang dienst blijven doen, ook in gewijzigde omstandigheden, bijvoorbeeld bij een herschikking van lokalen of bij een verandering van functies. Dit impliceert ook dat het gebouw, bouwsystemen of materialen en installaties in het gebouw gemakkelijk kunnen worden gedemonteerd en in een aangepaste vorm opnieuw kunnen worden gemonteerd. Op die manier wordt in belangrijke mate nutteloos afval vermeden, maar ook meerwaarde gecreëerd omdat de toevoeging van nieuwe elementen tot een minimum wordt beperkt.

In die context moet producent en/of aannemer op lange termijn kwaliteitsgaranties kunnen bieden, ook al zal wellicht niet alles per se omkeerbaar kunnen zijn. Van groot belang in dit verband is dat de bouwpartijen voor de duurzaamheid van gebouwen zich kunnen richten op de eenduidige afspraken en richtwaarden van een Belgisch en Europees normatief kader.

Belang van kennisverspreiding

De doorbraak van circulair bouwen hangt nauw samen met de beschikbare kennis om materialen te detecteren, inventariseren en ontmantelen, om circulaire producten te ontwikkelen en om gerecupereerde en circulaire producten op een correcte en aangepaste manier te assembleren en plaatsen. Een opschaling van circulair bouwen vereist kennisverspreiding op alle niveaus. Dat kan gaan van nieuwe opleidingstrajecten tot informatieve websites en databanken. Ook het zichtbaar maken van de voorlopers op het vlak van circulair bouwen vormt daarbij een belangrijk hulpmiddel. Deze kennisverspreiding betekent een belangrijke opdracht voor Buildwise en zijn partners.

Op zoek naar samenwerking

Weinig bedrijven kunnen op circulair vlak instaan voor zowel ontwerp, productie, distributie, ophaling en recyclage of hergebruik. In heel die waardeketen moeten de verschillende partners afspraken maken over hun verantwoordelijkheid.

Het is nuttig om op het vlak van circulair bouwen volgens de bouwteamformule transparant en in vertrouwen samen te werken. Circulair bouwen is nog grotendeels experimenteel. Ook daardoor is het belangrijk dat de bouwpartijen onderling de risico's verdelen. De overheid moet dan wel in haar aanbestedingsbeleid het principe van de laagste prijs verlaten omdat dit principe geen ruimte schept voor de lange termijn. En die is precies zo belangrijk voor circulair bouwen.

Samengevat zijn zeker de volgende uitdagingen aan de orde met betrekking tot het implementeren van circulariteit:

- Een voldoende ruim aanbod ondersteunen aan circulaire materialen, bouwsystemen en installaties vanuit Urban Mining of een hergroeibare aanpak
- Voorzien van transparantie in verband met gegevens rond de kwaliteit van de herbruikte materialen en bouwsystemen, met de nodige normatieve en technische ondersteuning
- Verzorgen van kennis en opleiding voor Circulair Design, correcte tewerkstelling en plaatsingsvoorschriften en implementatie van circulaire materialen, bouwsystemen en installaties
- Aanpakken van regelgevende beperkingen.

Version française

Développements futurs Principales réflexions sur la circularité

Repenser radicalement la construction

La construction circulaire a pour objectif de contribuer aux nouveaux développements dans le secteur de la construction, tout en atténuant la pression sur l'environnement et l'utilisation des ressources naturelles. Il est important de comprendre que la « circularité » et la « durabilité » sont en soi deux aspects différents, mais qui sont étroitement liés. La durabilité tente d'améliorer en permanence le système existant afin de réduire au minimum l'impact sur l'environnement (empreinte carbone - impact decoupling). La circularité est avant tout une question d'attitude qui vise à réduire la consommation des ressources (material decoupling).

L'économie circulaire est un modèle de production et de consommation dans lequel les matériaux et les produits sont partagés, loués, réutilisés, réparés, remis à neuf et recyclés le plus longtemps possible afin de minimiser leur perte de valeur et leur impact environnemental à long terme.

Dans la pratique, cela signifie minimiser les déchets et maintenir autant que possible les matériaux et les produits dans la même chaîne de valeur au sein de l'économie. Cette approche consiste non seulement à trouver des solutions techniques pour boucler la boucle (Urban Mining) et/ou des matériaux régénérables, mais aussi à réfléchir à la conception et à la manière dont les produits sont assemblés (bâtiment démontable, Circular Design) pour prolonger leur durée de vie et permettre leur réutilisation. Tout ceci exige de nouveaux modèles économiques pour soutenir ce modèle de production et de consommation circulaire.

En effet, les entreprises doivent être en mesure de répondre aux défis environnementaux de plus en plus pressants et aux besoins du marché, tout en créant de la valeur. La construction circulaire devra s'appuyer sur des modèles économiques durables qui s'efforcent de minimiser l'impact écologique et de garantir la longévité du produit ou du service. Parallèlement, elle devra pouvoir bénéficier à toutes les parties concernées sur le plan économique : les donneurs d'ordre, les fabricants, les auteurs de projet et les entrepreneurs. La valeur résiduelle élevée des matériaux et des produits dans les nouveaux bâtiments optimisés au plan circulaire devra également être prise en compte dans les modèles de financement de ces projets.

Bien que les données montrent un taux de récupération et de recyclage assez élevé dans la construction depuis de nombreuses années, ce taux inclut largement la réutilisation des matériaux dans des applications de moindre valeur (« downcycling »). Il est donc nécessaire d'adopter dès à présent une approche disruptive pour créer des avancées circulaires. En termes de réutilisation, il faudra aussi revoir les règles et documents existants. Il convient de repenser en profondeur la gestion des risques lors de la construction, de la transformation et de la rénovation. Un cadre de qualité est nécessaire pour la réutilisation des matériaux et des systèmes de construction. La réflexion doit être plus audacieuse en termes de matériaux et de systèmes de construction, y compris l'utilisation du matériau de construction le plus couramment utilisé : le béton.

Le secteur de la construction en particulier est sans doute empreint d'une réticence à l'innovation du fait de la responsabilité qui pèse sur les auteurs de projet et les entrepreneurs. D'où l'importance d'instaurer une culture de l'innovation ouverte dans ce domaine par le biais d'un soutien (gouvernemental) supplémentaire à la recherche et au développement.

Actuellement, la construction circulaire et, en particulier, la réutilisation des matériaux et des systèmes de construction ne font que pointer le bout de leur nez parmi les constructeurs et les rénovateurs. La construction circulaire ne percera qu'en changeant les mentalités, notamment en pensant aux effets écologiques à long terme et en mettant en œuvre une approche fondée sur le cycle de vie. Ce sera également une question de vouloir investir dans ce domaine. La raréfaction des matières premières infléchira probablement l'évolution vers la construction circulaire. Mais les politiques gouvernementales peuvent également encourager la construction circulaire par le biais de programmes de R&D ou en imposant un niveau de matériaux recyclés ou réutilisés, notamment.

Dans la logique du développement durable

Le règlement européen sur la taxonomie revêt clairement une grande importance pour la promotion future des investissements écologiques. Il vise à définir les activités qui peuvent être qualifiées de « durables ». Le quatrième objectif de ce règlement est de soutenir la transition vers une économie circulaire. Cela inclut la réutilisation, la prévention des déchets et le recyclage.

Les entreprises de la construction et les promoteurs qui cherchent à réaliser des investissements durables, ainsi que les banques qui cherchent à financer des

investissements durables, s'appuieront sur ces critères à l'avenir. Le développement ultérieur de ces critères constituera un facteur important dans promotion d'une économie de la construction circulaire. Le règlement sur la taxonomie entend générer des cadres d'évaluation (testés au niveau international) pour la construction circulaire. L'application concrète de ce volet du règlement sur la taxonomie en est maintenant au stade final. Il est important qu'à l'avenir, les acteurs du secteur de la construction disposent d'outils clairs pour remplir concrètement ces critères, en rendre compte et en assurer le suivi.

Élément essentiel de l'inventaire

Pour la réutilisation de matériaux et de systèmes de construction provenant de bâtiments existants, leur inventaire devient un élément crucial. Cet inventaire doit également pouvoir se faire avec la transparence nécessaire. Les professionnels de la construction sont encore largement peu informés à cet égard, en partie parce que ces matériaux et systèmes de construction sont mal documentés et parce que, dans le cas de l'Urban Mining, leurs propriétés ne peuvent pas être immédiatement déterminées ou vérifiées. Les passeports matériaux peuvent être utiles à cet égard, mais ne doivent pas constituer une charge supplémentaire.

Aujourd'hui, les réglementations existantes visent principalement à éliminer des déchets dangereux, comme l'amiante, des structures existantes. Mais à l'avenir, l'utilisation obligatoire d'un inventaire de réutilisation deviendra sans aucun doute une réalité.

La numérisation comme facilitateur

La numérisation doit conduire à de nouveaux concepts de construction « optimisés au plan circulaire » avec des matériaux et des systèmes de construction intrinsèquement durables. La numérisation de l'ensemble de la chaîne rendra la réutilisation beaucoup plus efficace grâce à l'Urban Mining. Le déploiement numérique des matériaux et des systèmes de construction existants créera des plateformes de collaboration, d'offre et de demande. Ce n'est que grâce aux techniques numériques (de scanning) que la valeur résiduelle des bâtiments existants pourra être correctement évaluée. Ce n'est qu'alors qu'il sera possible d'aborder la réutilisation à une échelle plus industrielle et de réduire ses coûts logistiques.

Développer une stratégie à long terme

De nombreuses familles et entreprises restent propriétaires du même bâtiment pendant plusieurs décennies. Il devra donc être possible d'élaborer une stratégie à long terme pour ces bâtiments. Elle veillera alors non seulement à l'installation initiale, mais aussi à la maintenance et à l'entretien ultérieurs.

Le bâtiment continuera alors à servir pendant des décennies, même dans des conditions modifiées, par exemple lorsque les locaux sont réaménagés ou que les fonctions changent. Cela implique également que le bâtiment, les systèmes de construction ou les matériaux et installations du bâtiment puissent être facilement démontés et réassemblés sous une forme modifiée. Cela permettra d'éviter les déchets inutiles, mais aussi de créer de la valeur ajoutée en minimisant l'ajout de nouveaux éléments.

Dans ce contexte, les fabricants et/ou les entrepreneurs doivent pouvoir offrir des garanties de qualité à long terme, même si tout n'est pas nécessairement réversible. À cet égard, il est très important que, pour la durabilité des bâtiments, les acteurs de la construction puissent se concentrer sur les accords sans ambiguïté et les valeurs directrices d'un cadre normatif belge et européen.

Importance de la diffusion des connaissances

La percée de la construction circulaire est étroitement liée aux connaissances disponibles pour détecter, inventorier et démanteler les matériaux, pour développer des produits circulaires et pour assembler et placer les produits récupérés et circulaires de manière correcte et appropriée. Le développement de la construction circulaire nécessite la diffusion des connaissances à tous les niveaux. Cela peut aller de nouveaux programmes de formation à des sites web informatifs et des bases de données. Il est également important de rendre visibles les précurseurs dans le domaine de la construction circulaire. Cette diffusion des connaissances représente une tâche importante pour Buildwise et ses partenaires.

En quête d'une collaboration

Peu d'entreprises peuvent revendiquer la circularité à la fois pour la conception, la production, la distribution, la collecte et le recyclage ou la réutilisation. Tout au long de cette chaîne de valeur, les différents partenaires doivent se mettre d'accord sur leurs responsabilités.

Il est utile de travailler ensemble de manière transparente et en confiance dans le domaine de la construction circulaire selon la formule de l'équipe de construction. La construction circulaire est encore largement expérimentale. C'est pourquoi il est également important que les acteurs de la construction partagent les risques entre eux. Le gouvernement doit alors abandonner le principe du prix le plus bas dans sa politique d'adjudication, car ce principe ne laisse pas de place au long terme. Or c'est précisément ce qui importe pour la construction circulaire.

En résumé, les défis suivants sont certainement à relever en ce qui concerne la mise en œuvre de la circularité :

- Soutenir une offre suffisamment importante de matériaux circulaires, de systèmes de construction et d'installations issus de l'Urban Mining ou d'une approche régénérable.
- Assurer la transparence des données relatives à la qualité des matériaux recyclés et des systèmes de construction réutilisés, avec le soutien normatif et technique nécessaire.
- Fournir des connaissances et une formation en matière de conception circulaire, des exigences correctes en matière d'emploi et de placement et la mise en œuvre de matériaux et d'installations circulaires.
- Répondre aux contraintes réglementaires.

6/ Appendix

Tom Willemen
Willemen Groep
PRESIDENT, VISION COMMITTEE

Tom graduated in 1998 from the KU Leuven as a civil engineer in structural engineering. He is now President of the Willemen Groep, a Belgian family-owned construction group familiar with numerous segments of the construction market, such as buildings, civil engineering, road construction, special techniques, foundations and real estate development. The Willemen Group is active in Belgium, in the neighbouring countries and in Morocco. The company has 2,200 employees and achieves an annual turnover of approximately €800 million. Tom also sits on several advisory boards and boards of directors, including those of COPRO, Federal Insurance/Assurance and ADEB-VBA. He also chairs the Vision Committee of BUILDWISE. In addition to his operational tasks, he is mainly concerned with innovation in the construction industry and how digitalisation and new technologies such as drones, wearables, virtual and augmented reality and AI can help people in the construction industry to carry out construction projects better and more efficiently.

Geert Verachtert
Group Van Roey
CHAIR

Constantly on the lookout for new growth opportunities, Geert is passionate about translating customer needs into solutions. He earned his stripes as CEO of Philips Belgium. In 2015, he brought a breath of fresh air to Group Van Roey. He dares to question things and knows like no other how to inspire and motivate teams in times of change and high expectations. It will come as no surprise that he is a cyclist in his spare time.

Thomas Rau
Rau Arch & Turntoo
INVITED SPEAKER - KEYNOTE

In all his actions, he is guided by what will be needed in the future and not by what is currently feasible. For years, Rau has been making a major contribution to the national and international debate on sustainability, the use of renewable energy sources in architecture and the question of how to act with regard to today's shortages of resources. He also puts his words into action; with his architectural firm RAU, he has brought about various innovations and new standards in the field of CO_2-neutral, energy-neutral and energy-positive building and, more recently, circular architecture.

Vincent Detemmerman
Confederation Construction
CO-CHAIR

Vincent Detemmerman is Managing Director of ORI, the organisation of engineering and consultancy firms in Belgium. Vincent has been active in the construction industry for over thirty years, among others as director of strategy, innovation and international affairs at Embuild, the Belgian construction association. An economist by training, he has experience in national and international public affairs in a wide range of fields, management, IT and statistical analysis.

Marc Bosmans
Knauf
PANEL

Marc Bosmans joined Knauf Insulation as Circular Economy Manager for Western Europe in 2019. His role within the management team is to operationalise the circular economy principles in the heart of the business. This includes support to the factories to achieve their "zero waste to landfill" objective, but also strong support to the commercial teams to be a real sustainability partner vis-à-vis our customers and proactively provide open- and closed-loop recycling solutions for Knauf Insulation products.
Knauf Insulation is one of the world's largest manufacturers of insulation products and solutions. We are present in more than 40 countries and have 27 manufacturing sites in 15 countries.
Before joining Knauf Insulation, Marc worked as a Sustainable Construction Manager for Eurima, the European trade association for glass & stone mineral wool. He was an active player in LCA-related policies as well as in the development of Level(s), the European framework to assess the sustainability of buildings. Before working at Eurima he worked 8 years as a consultant at Intertek-RDC on the topics of environmental assessments and the implementation of larger waste management programmes.

Christ'l Joris
Etap
PANEL

Christ'l Joris is a Belgian businesswoman. She is Chairman of the Board of Directors of ETAP Lighting International. She started her career in the academic world (lic. in Psychology and lic. in Social and Cultural Anthropology) and the non-profit sector in mental health. She also worked for the King Baudouin Foundation on environmental and economic programmes. In 1994, she switched to industry and became president of ETAP. She took on several chairmanships, including that of Flanders Investment & Trade (2005-2015), of Agoria, the federation of the technology industry. First Agoria Flanders (2005 - 2010) and from 2010-2016 of Agoria national. From 2008-2016 she was community chairwoman of the Flemish Red Cross.

Jan Buyle
BAM
PANEL

Jan Buyle is Chief Innovation Officer at BAM Belgium, responsible for its innovation programmes. The aim is to improve our margins and increase customer and employee satisfaction. The Future Forward programme focuses on tapping into new markets. And with our Lean and Data programme, we want to do the right things better and better.

Rudy Hageman
Pearlchain
PANEL

Pearlchain builds software to help companies organise their supply chains, from factory to end customer, with a focus on the automotive, food, shipping and construction sectors. Rudy Hageman, former CEO of Real Software, founded the IT provider in 2004.

Geoffroy Knipping
Befimmo
PANEL

After graduating from the KUL as a civil engineer in 2002, he started his career at CIAT, mainly as Technical Application Engineer for preconditioned air units. He went on to work 10 years at IBGE-BIM as head of the heating and air conditioning EPB department before joining Cenergie as a consultant. In January 2019, he started working for Befimmo as Environmental Officer with a focus on the circular economy.

Christian Levie

ABLV

PANEL

Belgian Lease Association (ABLV) Econocom-Circular. Starting his career as an auditor at Deloitte, he moved to Econocom after 2 years where he moved up from internal auditor to its chief funding and legal officer. He is now deputy managing director at Econocom Lease SA. In May 2014 he also became a member of the board of directors of the Belgian Lease Association. He gained a Master of Business Administration from KUL Leuven in 1983.

Michael Moradiellos

Drees & Sommera

PANEL

Almost 10 years of experience in real estate, 30 years in product improvement. EPEA - Part of Drees & Sommer – is today the global pioneer and leader of the circular economy, all sectors combined. After studying architecture at the ISAVH in Brussels, Michael Moradiellos went to Spain to write a doctorate in sustainable urban planning and to start a professional activity in young structures of international projection.

Peter Suys

Woema

PANEL

Peter Suys has been active in the construction sector for 35 years, from 1985 to 2014 as manager of 'The North Tree'. The use of renewable raw materials and building energy efficiently came together in the focus on timber construction. In 1997, the production of FSC-labelled products was incorporated into 'Eurabo'. In 2002, Peter Suys was one of the founding members of the 'Passive House Platform' (today 'Pixii'), of which he is currently director.

Since 2005, Eurabo has further developed into a supplier of bio-ecological wood construction and insulation materials with branches in Ronse and Ghent. In 2018, the activity was expanded to include the production and supply of semi-finished products for the timber construction contractor.

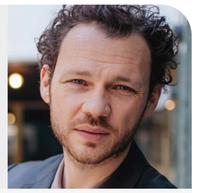
Since 2013, as a director, he has supported the growth of the contracting company 'woema!', active as a total wood construction contractor.

Peter was also vice-chairman of 'Bouwunie', the union of construction companies for SMEs, for many years.

Thomas Vandenbergh

Besix

PANEL



A structural engineering graduate from the Vrije Universiteit Brussel, he pursued his academic education with a doctoral degree on structural optimisation at the same university. After being a post-doctoral research fellow and a lecturer at the Department of Mechanics of Materials and Constructions, his career took a new start at BESIX Group in 2010. Thomas has been successively responsible for BIM, digitalisation and sustainability at BESIX Engineering. In 2017 he became chairman of BESIX Group's innovation board.

In 2019 Thomas became CEO of BESIX STAY, the holding behind the new hospitality concept A-STAY. As of 2021 he will also support BESIX Group in its diversification strategy by taking the role of Head of Concession and Assets New Ventures.

Thomas is board member of Proptech Lab and chairman of the Technical Committee on Smart and Sustainable Constructions from BUILDWISE. He is a guest lecturer at the Polytechnic School of Louvain (UCL).

Nadja Van Houten

Bureau Bouwtechniek

PANEL

Nadja (Antwerpen, 1973) is burgerlijk ingenieur-architect (Ugent, 1997) en gecertificeerde Fire Safety Engineering (KVIV). Nadja volgde de extra opleidingen Zelfverdichtend beton (2001), Bekistingen en zichtbeton (VIK, 2004) en Beton (WTCB, 2004). Nadja is lid van het Technisch Comité Brandveiligheid van het WTCB.

Nadja werkt bij BB sinds 1998. Nadja Van Houtem heeft zich verdiept in verschillende nieuwe samenwerkingsvormen zoals PPS, bouwteam, DBFM en begeleidt hier het Bureau Bouwtechniek in. Daarnaast treedt ze op als Innovatiemanager en Consulent circulair bouwen

Nadja (Antwerp, 1973) is a civil engineer-architect (UGent, 1997) and certified Fire Safety Engineering (KVIV). Nadja took additional courses in Self-Compacting Concrete (2001), Formwork and Fair-Faced Concrete (VIK, 2004) and Concrete (BUILDWISE, 2004). Nadja is a member of BUILDWISE's Technical Committee for Fire Safety. Nadja has been working for BB since 1998. Nadja Van Houten has studied various new forms of cooperation such as PPP, construction team, DBFM and guides the Bureau Bouwtechniek in these matters. She also acts as Innovation Manager and Consultant for Circular Building.

Bart Ingelaere

Buildwise

A civil engineer by trade, Bart Ingelaere obtained his diploma at UGent and has been working at Buildwise for 31 years, where he is Director of Information and Management Techniques and Deputy Director-General.

Johan Van Dessel

ANIMATOR

Johan Van Dessel (Ir 1990 KU Leuven) is Coordinator of Strategy and Innovation at BUILDWISE. He was previously Head of the Sustainable Development and Renovation Department. Johan Van Dessel has a special interest in the themes of circularity, renovation and energy transition; new business models are becoming a reality as a result. He has extensive experience in valorisation and project coordination and is also responsible for the development of projects in the Brussels Region.

Jeroen Vrijders

REPORTER

Jeroen Vrijders is Head of the Sustainable & Circular Solutions laboratory. He has worked for 15 years at BUILDWISE on the themes of urban mining (selective demolition, recycling, reuse, etc.), new circular solutions (recycled concrete, best practices) and the major evolutions in the field of circular economy (policy, standards, life cycle costs, etc.) to support companies and contractors in practice.

Lisa Wastiels

Buildwise

Lisa Wastiels studied at the Vrije Universiteit Brussel and Harvard University and obtained the title of Doctor of Engineering: Architecture in 2010. She joined BUILDWISE in 2011 and currently leads the team working on the environmental performance of buildings. Her research and interests focus on the social and environmental aspects of sustainable construction, including such topics as life cycle assessment (LCA), CO_2 emissions, material efficiency, ageing, adaptability, innovative systems,...

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