

CIRCULAR ECONOMY AT SCALE

WILL SCALE-UPS BE TRAILBLAZING THE CONSTRUCTION SECTOR TOWARDS A CIRCULAR ECONOMY?



Soest, the Netherlands, 29 oktober 2020 | Guido Braam, Maaïke Broekhuis, Wouter van Twillert

FOREWORD

In 2017, the government signed the raw materials agreement together with 300 business partners, trade unions, nature and environmental organizations, educational institutes and financial institutions. This agreement promises that by 2050, the Netherlands have a fully circular economy which uses as few raw materials as possible. Within our economy we will then only use sustainable, recycled and renewable materials. That's a great ambition. Moreover, it is very necessary. If we continue to use building materials in the construction sector the way we do today, it will inevitably lead to scarcity of materials which will hinder the construction of new and highly necessary homes. You already see this problem today, for instance, with sand. In addition to a lack of sufficient housing, we will no longer have any beaches and river life left in a couple of years. Therefore, we need to look beyond our practice as a construction sector. What we do has a major effect on the world around us.

I warmly welcome the broad signing of the raw materials agreement. But a signature is just a signature. How will we proceed in making our processes and materials circular?

In the construction industry, we don't have an answer to that question just yet. Because what exactly is circularity? That turns out to be a very difficult topic. More difficult than, for instance, the reduction of CO₂, due to the many different facets circularity has. Which 'building blocks' will we use in the construction of homes and offices?

In an attempt to answer this question, the transition agenda "Circular Construction Industry"

(an affiliation of De Bouwagenda) was started under the leadership of Elphi Nelissen. This agenda stems from the raw materials agreement and is a joint effort between the government, companies and science, to collaborate on the frameworks and standards for circularity in construction. These standards give the government the tools to ask market-parties the right questions in their tenders to give these companies the space to innovate their materials and processes. In order to be able to use our materials over and over again, we have to radically rethink how we design and maintain buildings. This will also change the image of real estate as an economic unit. Every building needs to be modular to enable the reuse of elements after disassembly. Preferably to infinity. But then, how do we calculate the costs of a building versus its value?

Some of these questions remain unanswered. Therefore it seems impossible to build a circular building tomorrow. Because, where are the examples of successful circular buildings? There are prototypes, but few. Circular construction simply takes time. It will be quite the quest to create new standards for circular buildings by 2050. We are already pushing for circular manners where possible, since experimenting and pioneering are the only ways to get further. In some companies, that means creating biobased business processes through growing bulrush for insulation purposes, for instance. These types of innovative examples show the new possible ways of working. However, this requires courage and perseverance from clients and contractors alike and it requires a different way of working together. As is rightly pointed out in this whitepaper. Innovation is only possible once

an open dialogue and mutual trust is established. Stakeholders must dare to share in-house knowledge and clients as well as the government must provide long-term assurance on the award of circular assignments and projects. As a building agenda we are committed to guiding the way towards this goal.

Once the government signals that the raw materials agreement is not only an agreement on paper, but rather becomes a policy instrument that will be managed over the coming years (ideally in the form of a Ministry of Construction and Spatial Planning), scale-ups can invest in research and the development of circular products and processes.

As soon as the interplay between supply and demand gains momentum and the parties involved gradually start collaborating and challenging one another, a circular future will be a lot closer.

Bernard Wientjes | Chairman of "De Bouwagenda"

"As the Dutch construction sector accounts for 50% of raw materials used, 40% of total energy consumption and 40% of national waste produced, this sector is the key starting point to accelerate circular innovations and investments. In addition, these developments will require new skills and knowledge, at all levels in the workforce; from construction workers to architects and material suppliers. These are the people who will power the transition and shake up traditional processes. This is why the Goldschmeding Foundation is excited to support the Circular@Scale programme. The programme enables innovative scaleups, building companies and commissioners of new building projects to come together and build the future in a cooperative and innovative space. We look forward to the various deliverables of the programme, starting with this insightful whitepaper."

Birgitta Kramer | Program Manager Circular Economy | Goldschmeding Foundation



BoomBuilds.nl | space&matter.nl | copyright 2020

TABLE OF CONTENTS

Foreword	2
Table of Contents	4
Summary	5
1. Introduction	9
2. The transition to a circular economy faces an implementation gap	10
3. Research approach	11
3.1 Testing our hypothesis on current needs	11
3.2 Testing our assumptions on circular scale-ups	11
4. The Circular Economy in the construction sector	12
5. Research into existing barriers	15
5.1 Barriers in the construction sector	15
5.2 Barriers for circular scale-ups	16
5.3 Barriers for commissioners to increase market demand	18
6. Conclusion on how scale-ups will be trailblazing the construction sector towards a circular economy	20
Attachment 1 Interview list	23
Attachment 2 About the partners	24

SUMMARY

Will the circular economy be the new normal in the coming years? We see a fast growing interest and awareness in the last eight years. With the European ambition set forth in the Green deal and with the Dutch ambition to achieve a fully circular economy in 2050, the odds might be in favor of this scenario. The dominant factor of success is whether business can fully adopt the circular economy principles. Many business owners see the opportunity and start to test circular business models in their companies. The research for this whitepaper focuses on the role scale-ups play in the transition to a circular economy. The research tries to find the barriers and success factors for these scale-ups in the construction industry. The outcomes were used to set up a program called Circular@Scale.

The circular economy is an economic system aimed at eliminating waste and the continual reuse of resources. The circular economy addresses the challenges we face in our current economy and offers an inspiring prospect for the future: a new perspective on working, developing, producing and consuming. Collaboration in the circular economy requires new ways of thinking and working. It demands that supply chains are integrated into the entire usage cycle of products. The role of entrepreneurs is essential in forging these new relationships, introducing new ways of working and innovating towards a circular economy. Pioneering entrepreneurs in the circular economy encounter different market barriers.

Today, the construction industry is responsible for more than one-third of the global resource consumption. Construction organizations still operate according to the linear 'take-make-dispose' model, in which materials are sourced, used and then disposed as waste. A lot of potential value is wasted. The built environment in the Netherlands alone accounts for 40% of all the material- and energy-consumption.

Hypothesis: There is a need to stimulate scaling in the circular economy.

To test our hypothesis, we have conducted interviews with 8 circular scale-ups, 2 corporate commissioners and 12 industry experts of the construction sector combined with desk research. This resulted in two key findings:

- The construction market hesitates and needs the nudging of various key stakeholders in order to breakthrough and create sufficient circular demand for scale-ups to grow;
- Scale-ups and their business partners face challenges in reaching this scale by themselves.

Our research identified 14 barriers that circular scale-ups encounter in the current system. To overcome these barriers, we can conclude 20 success factors for the construction industry in total and more specific for the collaborating in this ecosystem and for the scale-ups and the commissioners:

CONSTRUCTION SUCCESS FACTORS

The sector needs to transform in order to provide a favorable context for the scale-ups. Since the sector is inert and highly traditional, the barriers are not easy to overcome. The following success factors, when attained, will facilitate this process, step by step:

Make affordable: In a low-margin sector circular solutions will not reach scale if the price levels are not competitive to the linear alternatives.

Invest in growth: Financing economies of scale. Managing a long time to cash. Invest in innovation.

Assure quality: The sector is known for being risk averse. Quality assurance of product standards eases procurement.

Create long-term relations: Long-term relations and collaborations enable co-creation, opportunities for innovation and financial models with long horizons, hence, help to tackle the 'split incentive'.

Strategize for support: Support on board level is required to align publicly expressed circularity ambitions with the actual financial decisions. The intentions need to be captured into strategy and practice, to guide circular choices within the organization.

SCALE-UP SUCCESS FACTORS

The overall goal of the program is to accelerate significant mid-term growth, 10% in revenues in 5 years, for the circular scale-ups in the building construction sector. To achieve this growth, scale-ups have to master the success factors and overcome the barriers that currently prevent them from scaling.

Upfront gains: Provide hard proof of projected savings of the total cost of use (including residual cost) and emphasize on capex savings. **Construction quality:** Provide high quality on time installation, ensure effective inclusion of suppliers and employ product as a service model.

Modular solutions: Develop modular solutions, to be able to plug & play and link solutions to certification requirements. Have a clear use for the different building blocks at the end of the first use cycle.

Adaptability to local context: Use digital tools to provide platforms which help in integrating local supply input in localized construction.

Persuasive storytelling: Converse with the audience by building the story on a value system that aligns with the audience and leads to effective changes. Keep at it until a standard or consensus is created in the market.

COLLABORATION SUCCESS FACTORS

Multiple barriers from the industry, scale-ups or commissioners cannot be resolved by program activities involving only one of the stakeholders. Collaboration is needed to co-create innovative solutions for these types of challenges, inherent to 'wicked problems' with a social or sustainable focus that go beyond organizational borders. Several success factors contribute to achieve collaboration:

Shorten the sales cycle: Create real business opportunities under the most favorable circumstances for both scale-ups and commissioners.

Assure quality: Build mutual trust between commissioners and scale-ups by assuring the maturity of the scale-ups and the delivery of high quality circular products.

Bridge the gap: Mutual learning and understanding in a practical context with a guiding process, translation and circular expertise. Create long-term relations: Long-term relations and collaborations enable co-creation, opportunities for innovation and financial models with long horizons.

Solve the 'split incentive', share success: Circular showcases increase both the market growth and business opportunities for scale-ups and commissioners and break through the traditional market status quo with innovative solutions on industry barriers such as the 'split incentive'.

COMMISSIONER'S SUCCESS FACTORS

Activities specifically aimed at commissioners need to address organizational barriers such as the lack of internal alignment and circular expertise and the conservative organizational culture. Circular commissioners should focus on the following success factors:

Strategize for support: Support on board level is required to stimulate circular choices within the organization. The corporate strategy and KPI's need to embed circularity to guide decision making focused on value creation instead of cost efficiency. Strategy and support are also leading to organize centralized processes in collaboration with circular solutions and scale-ups, instead of starting from scratch in every new project; creating internal scale.

Co-create impact: The circular economy requires new ways of collaboration. Open, equivalent and an experiment- and learn-approach are characteristics that create innovation and shared circular value, demanding internal collaboration between departments and circular commissioning.

Train business partners: Purchasing, finance, accounting and project managers need new capabilities and skills to integrate circularity in project and product design, tenders, contracts, systems, business models and depreciation. Accordingly, HR becomes an important partner to support the employees and organization to adapt towards circularity with development, training and recruitment.

Engage the organization: A basic understanding of the circular economy to master the theory, relevant market developments and especially recognize the opportunities and challenges for the organization. A notion of the urgency and possibilities of the circular economy engages the organization, enables them to work in circular context and creates ambassadors.

ADVOCACY & COMMUNICATION

In order to create breakthroughs for the solutions of circular scale-ups, more stakeholders than only the commissioners and scale-ups need to be enticed. All relevant players in proximity of the scale-up must be willing to adopt and adapt in order to create a level playing field for innovation. Important stakeholders are, amongst others: the government on EU, national and local level for a level playing field in terms of law and legislation, financial institutions for the cost of capital and alternative risk assessments, industry associations for new standards, and universities, schools and media that need to be informed on new developments and translate this into trainings, educational programs and content.

CIRCULAR
@
SCALE



Image: Madaster

¹ ARUP & Ellen MacArthur Foundation (2020). From principles to practices: realising the value of circular economy in real estate.

01. INTRODUCTION

The circular economy addresses the challenges we face in our current economy, and offers an inspiring prospect for the future: a new perspective on working, developing, producing and consuming.

One of the characteristics of the circular economy is the focus on new partnerships and collaboration. The circular economy is not “just” about recycling bare economic value. It also takes into account the need for balance and social fairness. It ends the zero-sum game in “classical” capitalism, where one might gain at the expense of another without collectively adding net value into the system. In a true circular economy assets are available to all, but success is defined by the total value added on a systemic level, which thereafter can be expressed in monetary terms.

Collaboration in the circular economy requires new ways of thinking and working. It demands that supply chains are integrated into the entire usage cycle of products, in order to preserve the information of the value of our goods in circulation for future reference. It aims for transparency and open standards, not for protectionism.

Definition of the circular economy

The circular economy is an economic system aimed at eliminating waste and the continual reuse of resources. Circular systems employ reuse, sharing, repair,

refurbishment, remanufacturing and recycling to create a closed-loop system, minimizing the use of resource inputs and the creation of waste, pollution and carbon emissions. The circular economy aims to keep products, equipment and infrastructure in use for a longer time, thus improving the productivity of these resources. All waste should become input for another process: either a by-product or recovered resource for another industrial process, or as regenerative.

The role of entrepreneurs is essential in forging these new relationships, introducing new ways of working and innovating towards a circular economy. In the past years a variety of start-ups have grown into mature start-ups or even scale-ups. Some of these entrepreneurs are disrupting the way we think about architecture, design and construction. Although the construction industry is relatively conservative, scale-ups such as Physee, Madaster, Niaga and Finch Buildings are disrupting the industry and are introducing new ways of working. And increasingly, the organizations who commission larger building and construction projects are selecting these innovations.

The growth and stability of these scale-ups does not only depend on their financial and organizational stability, it also depends on market demand for circular solutions. This is why a Circularity Acceleration Program needs to address the growth of the scale-ups as well as the awareness of circular solutions among commissioners.

2. THE TRANSITION TO A CIRCULAR ECONOMY FACES AN IMPLEMENTATION GAP

Today a mere 8,6%² of the global economy is circular, and depletive material use and carbon emissions continue to increase. Of the Dutch economy, 24,5% is circular³. The last years have shown that growth of the circular economy does not continue at the same pace and therefore we can state that the circular economy got stuck in the so-called 'implementation gap'

⁴. The circular economy as a concept gets firmly rooted on government and corporate board level, but its roll out is blocked by implementation issues inside these organizations and in the wider ecosystem. This poses an urgent and major challenge as well as an entrepreneurial opportunity.

In the past few years we have seen a growing number of start-ups, pilot-coalitions and attempts to develop circular alternatives and innovations. Despite these efforts the circular economy has not yet shown an exponential growth. The group of circular scale-ups in the Netherlands remains relatively small. The key difference with a linear economy is that circular innovations encounter more barriers and need more market demand in order to scale. Pioneering entrepreneurs in the circular economy encounter different market barriers. For instance limitations of existing laws and regulations or new risk and valuation assessments within financial institutions to gain long-term funding. They may use unproven business

models or introduce new and untested ways of collaboration that may not yet be 'business as usual' for their customers. These barriers may be overcome in pilots and small scale trajectories. However, in a scaling phase these barriers may cause a roadblock for the ventures, ultimately risking the scale-up to become a stall-up.

The success of the transition towards a circular economy in the scaling phase is strongly related to sufficient market demand. Scaling up requires an increase of demand within the market in which the ventures operate. An increase in the number of (launching) customers (governments, business, consumers) for circular products and services will make companies react and innovate. Governments on local, national and European level and large scale commissioners therefore play a crucial role in this development stage. They have the ability to be a launching customer, and are in the lead to change the rules of the game in favor of the circular economy.

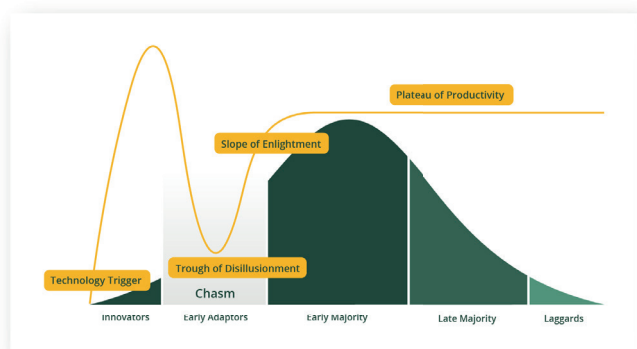


Figure 1: Crossing the Chasm by George Moore

² <https://www.circularity-gap.world/>

³ Circle Economy (2020). The Circularity Gap Report NL 2020.

⁴ <http://www.opai.eu/uploads/ondernemen-in-de-circulaire-economie.pdf>

3. RESEARCH APPROACH

The context described in chapter 2 led to our hypothesis that there is a need to stimulate scaling in the circular economy. This is needed for both the entrepreneurs as well the market partners with whom these ventures work. The following chapters provide insights into how we have tested this hypothesis and our assumptions.

3.1 TESTING OUR HYPOTHESIS ON CURRENT NEEDS

To test our hypothesis, we have conducted interviews with 8 circular scale-ups, 2 corporate commissioners and 12 industry experts of the construction sector combined with desk research. This resulted in two key findings:

- The construction market hesitates and needs the nudging of various key stakeholders in order to breakthrough and create sufficient circular demand for scale-ups to grow;
- Scale-ups and their business partners face challenges in reaching this scale by themselves.

3.2 TESTING OUR ASSUMPTIONS ON CIRCULAR SCALE-UPS

To support the design criteria for the program, we have investigated the assumptions related to the circular scale-ups.

Assumption: Circular scale-ups are crucial in accelerating the circular economy, because:

- a. They enable the increase of market demand with scalable circular solutions;
- b. They enable large circular projects;
- c. They innovate new circular mechanisms;
- d. They are role models for circular pioneers.

Assumption: There are various prerequisites for circular scale-ups to grow:

Operational excellence

1a. Scale-ups need to professionalize their organization to ensure they meet the required quality and process efficiency;

1b. Scale-ups need expertise, good examples and help to realize growth;

Market demand

2a. The construction market needs to increase demand for circular solutions and to offer sufficient sales potential for scale-ups;

2b. Commissioners need to be aware of the possibility to carry out projects in a circular manner and use circular selection criteria;

Showcases

3. Best practices on large scale and inspiring showcases and landmarks are required to show the possibilities, value of circularity and demonstrate that they can have lower opex;

Legislation

4. The context, such as legislation, and the industry status quo need to change to enable scale-ups to be successful. Circular standards are missing.

4. THE CIRCULAR ECONOMY IN THE CONSTRUCTION SECTOR

THE NECESSITY AND OPPORTUNITY

The circular economy aims to minimize and eliminate waste and promotes continual reuse of resources. Today, the construction industry is responsible for more than one-third of the global resource consumption⁵. Construction organizations still operate according to the linear 'take-make-dispose' model, in which materials are sourced, used and then disposed as waste. A lot of potential value is wasted. The built environment in the Netherlands alone accounts for 40% of all the material- and energy-consumption. Material waste streams aggregate to 4 million tons per year, while there is a potential value of endless reuse. Also, if we keep building in this linear model at the current pace, prognoses are that carbon emissions from construction will be responsible for almost half of the new building emissions between now and 2050^{6,7}.

There is clearly a huge potential for minimizing waste and increasing use of renewable materials. Applying circular economy principles to the building construction sector will change the sector to become one that preserves natural ecosystems, reduces carbon emissions⁸ and creates smart and sustainable urban areas. Changing business models, the way we design, and use technology from linear to circular

maintains the value of materials and resources, resulting in more value creation.

In addition managing healthy, non-toxic materials and resources, for example innovative usages of materials such as cement, steel, aluminum and plastic, can contribute to the reduction of carbon emissions⁸. Adopting circular economy approaches presents a tremendous opportunity for investors and construction clients to minimize sources of lost value and thus improve return on investment from built environment assets, whilst also taking a fundamental step towards achieving carbon emissions targets.

AN INERT SECTOR?

Tradition runs deep in the Dutch construction market. The vast majority of projects are built by conglomerates of family-owned construction businesses specialized in doing local business with industry standard solutions maximizing efficiency and leveraging the skilled labor available. Innovative scale-ups must find a way to provide a truly innovative solution and build a trusted role in the chain of conservative and traditional customers. Many innovative circular initiatives exist, but only those that scale will move the needle in terms of impact and economic value creation.

⁵ ARUP & Ellen MacArthur Foundation (2020). From principles to practices: realising the value of circular economy in real estate.

⁶ Architecture 2030 (2019). New Buildings: Embodied Carbon.

⁷ International Energy Agency and the United Nations Environment Programme (2018). Global Status Report: Towards a Zero Emission, Efficient and Resilient Buildings and Construction Sector.

⁸ Ellen MacArthur Foundation (2019). Completing the Picture: How the Circular Economy Tackles Climate Change.

The Dutch government has identified the building and construction sector to be one of five transition sectors to ensure the circular economy⁹. The larger building corporations such as BAM, Dura Vermeer, VolkerWessels and TBI have already declared circular building as a key priority. These larger corporates are leading commissioners in modular and recycled materials.

However, we also conclude that the construction sector is an inert, long cyclical and slow moving sector. The implementation of the circular economy requires a two pronged approach to ensure that the procurement and design departments within companies are supported to gain knowledge of the available business models or circular innovations. Construction may not be an easy industry for circular scale-ups, however it is one of the sectors where the largest circular impact can be achieved. In waste, material and energy consumption, but also because of the long timelines. Although the sector is traditional and the lifetime cycles are long, we have seen significant circular progress during the last years.

PROGRESS DURING THE LAST YEARS

How buildings are used, what impact they have on surroundings and how long they remain fit for purpose, is mainly determined in their design. Stewart Brand's model of 'building in layers' implies that buildings are made of separate and interlinking layers, each with a different lifespan¹⁰. Also, each separate layer

can be repaired, replaced, moved or adapted at different times without affecting the other layers.

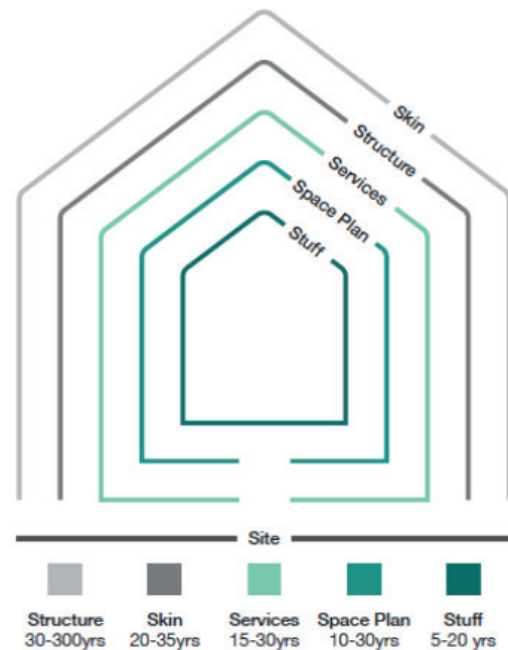


Figure 2: Brand's model 'building in layers'.

Research shows that implementing circular economy in the building construction industry requires understanding of the complete building life cycle and construction value chain, relying on collaborations on high level and information exchange¹¹. Guidance and acceleration is needed to align the 'worlds' of scale-ups and commissioners. Align them to ensure that the strategy of the commissioners leads to tangible results and find solutions for complicated barriers like the 'split incentive'.

In order to do this, new business models are needed that reimagine the currently fragmented value chain and facilitate more circular behavior, for example by increasing asset use and fostering more use of reusable resources

⁹ Ministry of Infrastructure and Water Management (2019). Uitvoeringsprogramma Circulaire Economie 2019-2023.

¹⁰ Stewart Brand (1994). How Buildings Learn: What Happens After They're Built.

¹¹ ARUP & Ellen MacArthur Foundation (2020). From principles to practices: realising the value of circular economy in real estate.

and components. There is therefore a significant opportunity for stakeholders to extend their application of circular economy principles by implementing new business models. Businesses can take advantage of innovative ideas that harness both digital technologies and changing stakeholder behavior to implement circular economy principles, as well as encouraging smarter use of buildings.



BoomBuilds.nl | space&matter.nl | copyright 2020

5. RESEARCH INTO EXISTING BARRIERS

5.1 BARRIERS IN THE CONSTRUCTION SECTOR

In the interviews we discussed which barriers the sector faces with circular growth and possible solutions to resolve those barriers. The following barriers were the most significant.

Financial investment: The costs of converting towards a circular business model can still be significant. The most impactful bottleneck for implementing circular solutions is the higher price, because the industry still uses traditional pricing mechanisms that exclude environmental costs. Scale-ups on the other hand are dependent on the right scale within their own value chain to keep production costs comparable to linear competition.

“Large scale projects, such as renovating the water purification installations for the water authorities in Limburg, enable us to explore and apply circular solutions with more cost efficiency.”

- Douwe van den Wall Bake, innovation manager TBI.

Low-margin and risk averse sector: The industry is risk-averse and driven by regulation and government. Though circularity and sustainability are listed on many annual reports, the construction sector operates at very low margins, thereby forced to take the route of cost efficiency. It is therefore crucial that management teams and project managers with

innovative mindsets and industry credibility take risks, experiment and invest in successful large-scale circular collaborations.

“It is important to maintain a level playing field and to consider the economic impact of new regulation or legislation carefully.”

- p. 5 Sustainability Report 2019, VolkerWessels ¹².

‘Split incentive’: In the construction sector, the companies that commission a project (housing corporations, Central Government Real Estate Agency, municipalities, water authorities or privately owned property development companies such as BPD or AM) often differ from the companies that execute the project (VolkerWessels, BAM, TBI etc.) and in case of real estate, often pension funds own the building. This situation creates a gap between ownership and usage. This is a ‘split incentive’, since each of these companies have different and short-term financial incentives of cost reduction. The commissioner and constructor for instance aim for cost reduction without taking into account the costs of maintenance, renovation or deconstruction. The split incentive is a barrier for circular solutions, since these circular solutions require higher initial costs, but are cost efficient on the long-term due to extended lifetime cycles and augmented value of materials. Circular solutions eventually result in a positive total cost of ownership, including maintenance (or in fact dissemblance) of the product or building, but only if commissioners take the complete life cycle into account and

¹² https://www.volkerwessels.com/dynamics/modules/SFIL0200/view.php?fil_id=374176

focus on the long-term usage of the end product and materials.

“Commissioners are key to integrate circular solutions in projects. They need to adopt circularity as a decision criterion above the extra costs. This enables us to implement circular solutions from scale-ups in the projects.”

- Lars van der Meulen, CSR manager VolkerWessels.

Circular strategy ≠ circular projects: Board members of large organizations that commission in the construction sector have publicly announced to embrace the circular economy. However, circular scale-ups attempting to do business with these organizations experience a different reality. The procurement, design and project management departments are often not equipped with the knowledge, tools, skills or mindset to commission or purchase circular products and projects.

“The construction sector is project driven, solution-minded and oriented on the short term due to low margins. This makes that VolkerWessels, already being a decentralized organization, is not used to look beyond project boundaries, resulting in a low learning capacity in the holding.”

- Lars van der Meulen, CSR manager VolkerWessels.

5.2 BARRIERS FOR CIRCULAR SCALE-UPS

To understand the barriers that prevent scale-ups from becoming successful, we have combined previous research of ScaleUpLab

into the scale-up success factors with the research phase for this program to focus on circular scale-ups. The following barriers emerged for circular scale-ups.

Sales tenders: The universal enemy of the scale-ups is the current tender process, a black box that claims to reward sustainability, but often defaults to the lowest cost and lowest risk solution. Scale-ups must go around this process typically by forming a strategic partnership or working with a more innovative and experimental customer. However, it is not easy to form these strategic partnerships at a large scale, hence scale-ups keep struggling to secure larger developments and recurring revenues.

“The industry is capital intense and has very long lead times, 7 years on average in the residential market in the Netherlands. Furthermore, most tender processes primarily focus on price. Finch exists 5 years, so we managed to avoid the 7 year lead times mainly by avoiding the traditional tender processes and collaborating with a credible large corporate partner, VolkerWessels, to receive a ‘stamp of approval’.”

- Jurrian Knijtijzer, founder of Finch Buildings.

Business case: A common theme in the circular economy, amplified in construction, is building a business case that is able to compete against conventional materials and methods. Circular scale-ups in the industry see cost competitiveness as a mid/long-term or unrealistic destination, and therefore must reframe the value proposition to be successful.

¹² https://www.volkerwessels.com/dynamics/modules/SFIL0200/view.php?fil_id=374176

A link in the value chain: Circular scale-ups depend on other players in the ecosystem aligning to secure inputs of used materials and a market for their outputs. Constructing this ecosystem as a small player is impossible, so scale-ups rely on strategic partnerships in which they are rather small compared to the large corporates. The first challenge is to secure a partnership, which requires the corporate to take a chance on a small player, which is a risk. Proving success with previous projects and partnerships becomes critical. Next, once a partnership is created, scale-ups may struggle to protect their interest, independence and IP. A common demand from a construction partner is exclusivity for a number of years, which in a small country could be a real barrier to scale.

“The transition will not work without a value chain approach. A scale-up can influence the design or operation, but as soon as the chain is longer than 1, you need an integral approach to exceed pilots. In addition, a flow of materials always needs a flow of data and value. And it is extra challenging for the smallest partner in the collaboration to make the first move.”

- Debbie Appleton, Global manager materials recovery DSM-Niaga.

Digital supply chain & transparency: To produce a completely circular product, scale-ups are required to know the full supply chain of all the elements in their product. Furthermore they need to give insight into this data for transparency purposes. To master this information and processes, scale-ups need to be

digitally enabled. This is not only relevant for scale-ups but requires a transformation of the commissioners and sector as well, as VolkerWessels mentions in their annual sustainability report of 2019.

“As a part of the EU Green Deal initiative, the EC adopted a new Circular Economy Action Plan, which has a comprehensive strategy for a Sustainable Built Environment promoting circularity principles for buildings. We expect regulations will be installed and expanded towards the entire construction industry across Europe. We prepare to become the leading digital platform for materials and products in the built environment, that connects data from various sources for different users and objectives across the lifecycle of an object.”

- Martijn Oostenrijk, director Madaster Services.

Specialized financing: The universal struggle shared by all of the companies we interviewed: financing the scale-up phase. The industry average duration for a project to evolve from initial conversations to a final project is 7 years. There is little specialized venture capital in this industry (likely due to lack of deal flow), traditional debt financing is reserved for more mature companies, and the new types of business cases do not fit into the tidy boxes of existing financial instruments.

The barriers provided above correspond with the assumptions 1a & b, because scale-ups have to improve their operational excellence and need guidance to realize this improvement. The barriers also address assumption 3 and 4; scale-ups need showcases and support-

¹² https://www.volkerwessels.com/dynamics/modules/SFIL0200/view.php?fil_id=374176

ting regulation to break through the conservativeness and status quo of the industry.

5.3 BARRIERS FOR COMMISSIONERS TO INCREASE MARKET DEMAND

The challenge of scaling is not only within the influence sphere of the scale-ups themselves. A thorough understanding of the construction sector and circular economy shows that organizations that commission construction projects are crucial for the success of circular scale-ups, because they determine the demand in the market. In the interviews, TBI, Finch Buildings, Madaster, StoneCycling and Circle Economy all confirm the importance of the role of commissioners to enable growth of scale-ups and accelerate the movement towards circularity in the sector. This is in line with assumption 2a.

Sector barriers such as the 'split incentive', low margins, and risk averseness only partially explain the limited demand for circular projects. The interviewed commissioners experience the following: barriers within their organizations.

Resistance to change: Commissioners have worked with circular start- or scale-ups before, but these organizations were often not mature enough to deliver the promised quality or within the agreed timeframe. The commissioners have neither resources nor expertise to conduct a due-diligence before collaboration, and their trust got damaged after several disappointments. The conservative and risk-averse nature of the sector even strengthens the resistance to work with circular scale-ups.

"We often hear from our project managers that start- or scale-up we are not as far as they promised. This damages the trust and therefore the willingness to collaborate and experiment in new circular projects."

- Wendeline Besier, CSR manager TBI.

Different worlds and languages: Commissioners experience difficulties to match the reality of entrepreneurs that tends to be idealistic, with the reality of their corporate large organizations. Purchase criteria, financial models and processes for instance are not comparable. Innovative and circular procedures and models from scale-ups require the same innovative mindset from the commissioners.

Internal alignment and scale: The building construction sector focuses on and is organized around projects. The horizon of the project manager often lasts just as long as the duration of his projects. Furthermore the conditions for innovative circular experiments or circular decision making are often not present in the organization, despite the vocal commitment the board has expressed publicly. As a result every new circular project starts from scratch and no scale and alignment with strategy and reproductive approach is reached.

Limited circular expertise: Commissioners attempt to attain circular innovation and transformation, but rapidly reach their ceiling. The organizational culture and employees do not always possess the required skills and conditions for co-creation, a supply chain approach, open innovation and shared circular value creation. Basic knowledge of the circular economy and the relation to specific areas such as legal, finance and purchasing are frequently absent.

¹² https://www.volkerwessels.com/dynamics/modules/SFIL0200/view.php?fil_id=374176

“At TBI we decided to make the circular economy part of our strategy. Nevertheless there is still plenty of work to be done regarding basic understanding and operational consequences. A giant pink elephant has been put on the table, but so far it’s still unclear where the tail and trunk are located.”

- Douwe van den Wall Bake, innovation manager TBI.

Unfavorable context: Legislation is often counterproductive for the entire circular economy, and also applies to the commissioners. Legislation that promotes the circular economy is still in its early stages, while if applied correctly, it could create an enormous acceleration for circularity. For example the Ex’tax initiative proposes to put taxes on natural resources and pollution and use the revenues to lower the tax burden on labor and increase (social) spending. Such tax reform creates incentives to save (virgin) resources and the natural world, thereby stimulating a circular economy. Implementation of these reforms should be handled with care to prevent provocation and resistance within the industry.

“We recognize the importance that both the business community and the government accelerate the movement towards sustainability. It remains important that there is a “level playing field” and that the economic impact of measures is considered carefully. Predictable and decisive government action is a condition for a successful transition. Unfortunately, the opposite happened with the nitrogen problem. As a result of not having a timely response to the abolition of the PAS, hundreds of projects in the sector have inter-

rupted. This undermines seriously the support for the necessary sustainability measures.”

- p. 5 Sustainability Report 2019, VolkerWessels ¹³.

These barriers provide sufficient argumentation to confirm that commissioners need to become more aware of and able to commission their projects with circular goals and selection criteria (assumption 2b). However, no organizations or initiatives focused on developing the circular market exist today. An effective method to minimize resistance to change and align different worlds is to collaborate in actual projects with guidance to perform due diligence, ensure quality and create best practices that show the conservative industry the benefits of innovation (assumption 3).



Image: Physee

¹³ https://www.volkerwessels.com/dynamics/modules/SFIL0200/view.php?fil_id=374176

6. CONCLUSION ON HOW SCALE-UPS WILL BE TRAILBLAZING THE CONSTRUCTION SECTOR TOWARDS A CIRCULAR ECONOMY

Based on the confirmed hypothesis and assumptions we can conclude several success factors for the construction industry in total and more specific for the collaborating in this ecosystem and for the scale-ups and the commissioners.

CONSTRUCTION SUCCESS FACTORS

The sector needs to transform in order to provide a favorable context for the scale-ups. Since the sector is inert and highly traditional, the barriers are not easy to overcome. The following success factors, when attained, will facilitate this process, step by step:

Make affordable: In a low-margin sector circular solutions will not reach scale if the price levels are not competitive to the linear alternatives.

Invest in growth: Financing economies of scale. Managing a long time to cash. Invest in innovation.

Assure quality: The sector is known for being risk averse. Quality assurance of product standards eases procurement.

Create long-term relations: Long-term relations and collaborations enable co-creation, op-

portunities for innovation and financial models with long horizons, hence, help to tackle the 'split incentive'.

Strategize for support: Support on board level is required to align publicly expressed circularity ambitions with the actual financial decisions. The intentions need to be captured into strategy and practice, to guide circular choices within the organization.

SCALE-UP SUCCESS FACTORS

The overall goal of the program is to accelerate significant mid-term growth, 10% in revenues in 5 years, for the circular scale-ups in the building construction sector. To achieve this growth, scale-ups have to master the success factors and overcome the barriers that currently prevent them from scaling.

Upfront gains: Provide hard proof of projected savings of the total cost of use (including residual cost) and emphasize on capex savings.

Construction quality: Provide high quality on time installation, ensure effective inclusion of suppliers and employ product as a service model.

Modular solutions: Develop modular solutions,

to be able to plug & play and link solutions to certification requirements. Have a clear use for the different building blocks at the end of the first use cycle.

Adaptability to local context: Use digital tools to provide platforms which help in integrating local supply input in localized construction.

Persuasive storytelling: Converse with the audience by building the story on a value system that aligns with the audience and leads to effective changes. Keep at it until a standard or consensus is created in the market.

COLLABORATION SUCCESS FACTORS

Multiple barriers from the industry, scale-ups or commissioners cannot be resolved by program activities involving only one of the stakeholders. Collaboration is needed to co-create innovative solutions for these types of challenges, inherent to 'wicked problems' with a social or sustainable focus that go beyond organizational borders. Several success factors contribute to achieve collaboration:

Shorten the sales cycle: Create real business opportunities under the most favorable circumstances for both scale-ups and commissioners.

Assure quality: Build mutual trust between commissioners and scale-ups by assuring the maturity of the scale-ups and the delivery of high quality circular products.

Bridge the gap: Mutual learning and under-

standing in a practical context with a guiding process, translation and circular expertise.

Create long-term relations: Long-term relations and collaborations enable co-creation, opportunities for innovation and financial models with long horizons.

Share success: Circular showcases increase both the market growth and business opportunities for scale-ups and commissioners and break through the traditional market status quo with innovative solutions on industry barriers such as the 'split incentive'.

CIRCULAR COMMISSIONER'S SUCCESS FACTORS

Activities specifically aimed at commissioners need to address organizational barriers such as the lack of internal alignment and circular expertise and the conservative organizational culture. Circular commissioners should focus on the following success factors:

Strategize for support: Support on board level is required to stimulate circular choices within the organization. The corporate strategy and KPI's need to embed circularity to guide decision making focused on value creation instead of cost efficiency. Strategy and support are also leading to organize centralized processes in collaboration with circular solutions and scale-ups, instead of starting from scratch in every new project; creating internal scale.

Co-create impact: The circular economy requires new ways of collaboration. Open, equivalent and an experiment- and learn-approach

are characteristics that create innovation and shared circular value, demanding internal collaboration between departments and circular commissioning.

Train business partners: Purchasing, finance, accounting and project managers need new capabilities and skills to integrate circularity in project and product design, tenders, contracts, systems, business models and depreciation. Accordingly, HR becomes an important partner to support the employees and organization to adapt towards circularity with development, training and recruitment.

Engage the organization: A basic understanding of the circular economy to master the theory, relevant market developments and especially recognize the opportunities and challenges for the organization. A notion of the urgency and possibilities of the circular economy engages the organization, enables them to work in circular context and creates ambassadors.

ADVOCACY & COMMUNICATION

In order to create breakthroughs for the solutions of circular scale-ups, more stakeholders than only the commissioners and scale-ups, need to be enticed. All relevant players in proximity of the scale-up must be willing to adopt and adapt in order to create a level playing field for innovation. Important stakeholders are amongst others:

- The government: European, national and local, for law and legislation;
- Financial institutions for the cost of capital and alternative risk assessments;
- Industry associations for new standards;
- Universities, schools and media that need to be informed on new developments and translate this into trainings, educational programs and content.

Many (non-profit) organizations play a vital role in influencing these stakeholders. The focus of the supporting activities is representation of the circular scale-ups, where influencing on decision making is needed, and to share insights from this specific target group to a larger audience in order to create more understanding and willingness to support the goals of the scale-ups. This advocacy and communication role will be executed on two levels:

1. Representing, helping to influence and in forming about circular scale-ups in general;
2. The above, but specifically for the challenges individual scale-ups face in the program.

These activities must pave the way for the circular scale-ups in the program and thereby for circular scale-ups in general. Ultimately this must lead to a level playing field where circular solutions have a fair chance to challenge the status quo.

ATTACHMENT 1 | INTERVIEW LIST

CIRCULAR CONSTRUCTION SCALE-UPS

Niaga	circular carpets and building insulation (a DSM venture)
Madaste	platform to value components of a building via material passports
Stone Cycling	high-end bricks made entirely from waste
Finch buildings	modular wooden houses
MG Aubel	fast-acting and long-lasting concrete repair technology
Sustainer Homes	standardized wooden framing and software design solutions
Kameleon Solar	integrated color and design solar panels
Physee	solar windows with climate control

COMMISSIONERS CONSTRUCTION SECTOR

Volkerwessels	leading international listed construction company
TBI	main commissioner in technique, construction and infrastructure

INDUSTRY EXPERTS

Martijn Lopes Cardozo	former CEO Black Bear and CEO Circle Economy
Ecor	midsize circular venture in composite material
Team C-creators	accelerating circular construction
Carlita Vis	Royal Haskoning
Olaf Blaauw	Real Estate developer
Petran van Heel	ABN-Amro
Jacco Verstraeten-Jochensen	Circle Economy
Thomas Endhoven	EIB
Jelger Arnoldussen	EIB
Remco Zuidema	Briqs
Jelmer Vierstra	Natuur en Milieu
Johan Bakke	CBRE

ATTACHMENT 2 | ABOUT THE PARTNERS

SCALEUPNATION

The world's social challenges are also entrepreneurial opportunities, opportunities for innovative products and services that make the world a better place. Many initiatives exist but only those that scale move the needle in terms of impact.

Scale-ups operate in a volatile, uncertain world and are entrepreneurial by nature. They engage in risk-taking and depend on good fortune. This makes scaling hard. Still, we have learnt that scale-up practices can be distilled, explored and shared, to increase the probability of scale-up success. In doing so, we aim to make the Netherlands a scale-up nation.

ScaleUpNation helps scale young, innovative ventures with potential for large societal impact. 54% of our portfolio companies grow more than 20% in the year following our programs, with an average growth rate of 50%.

In 2017, ScaleUpNation was founded by Menno van Dijk with strong support from the Goldschmeding Foundation, McKinsey & Company, THNK, New Venture, Deloitte, Startup Amsterdam, ECE, Eneco, NL Groeit/Scale-up Company, EFRO and Province of Noord Holland. Since our founding, we have worked intensively with over 135 ventures and established alliances with research institutions, corporates and investment firms.

The ScaleUpNation approach combines research with practice, support programs with digital tools, and mentoring and coaching with growth capital. We support our ventures through our 3 pillars: **ScaleUpLab, ScaleUpPractice, and ScaleUpInvest** (Fund, TBD).

We focus on the social challenge of climate change by supporting scale-ups active in sustainable Energy and in circular and sustainable Food, Construction and Materials.

POWERED BY MEANING

Who are we?

The Powered by Meaning Group was founded in 2013 and is the holding of 11 impact driven ventures: YSE, Kirkman Company, Make Participations, Next2Company, Buildings that Matter (C-Bèta), Social Impact Factory, World Startup Factory, Outside Inc, Aim for the Moon, Foodstars and Smart Climate Opportunities.

Vision

We believe that entrepreneurship and entrepreneurs should go back to the core of their existence: finding, creating and facilitating solutions to social challenges that affect us all. Our goal is to make

meaningful entrepreneurship the new normal. To achieve this, we start up new businesses, help existing ones to scale-up, transform large companies into meaningful enterprises and invest in existing ventures. We want to achieve impact through collective entrepreneurship. Let's create a more resilient economy: circular and inclusive.

Experience in the circular economy & entrepreneurship

As a group with 350 employees we have expertise from various perspectives and a track record in the circular economy. This started with Guido Braam as founder of Netherlands Circular Hotspot, C-Bèta, C-creators, former director of Circle Economy and author of the book Circular Route ¹⁴. Nowadays multiple ventures are active in the circular economy. C-creators as an expert and thriving force in circular construction. Buildings That Matter invests capital and effort in creating meaningful, exceptional buildings. C-Bèta is an example of a transformed circular building, with a social function for the environment as a creative workspace and event location. YSE designed a circular traineeship to scout and train the circular professionals of the future. Make Participation invests in Dutch manufacturing companies to make linear companies circular. Outside.inc is specialized in supporting corporates to spin-off impactful (mostly circular) ventures and World Start Up has an impressive track-record in supporting circular start-ups and scale-ups. Kirkman Company, founded in 2000, transforms organizations towards 100% relevance for all stakeholders. Helping organizations prepare for the challenges of today and opportunities of tomorrow, such as the circular economy, with a team of 80 dedicated professionals. Together we created a strong foundation of people with experience, profound expertise, assets and a large network to accelerate the transition towards a circular economy.

C-CREATORS

C-creators, an initiative of the Municipality of Amsterdam, Municipality of Haarlemmermeer, Rabobank and Schiphol, has been founded in 2017 as a not for profit organization. The ambition of C-creators is to help speed up the transition towards a Circular Built environment within the Metropolitan Region of Amsterdam aligned with following principles:

- Scaling is key
- Create and share gathered knowledge
- Raise the circular bar each project
- Activate & connect relevant organizations

The Building Program, flagship product of C-creators, was developed together with TNO, Cirkelstad and EIB for the Amsterdam metropolitan area focusing on circular tendering in construction, circular financing, tool design, matching right parties and projects and knowledge sharing. The C-creators team works on construction projects in the entire sector: housing, commercial, industrial and infrastructure.

¹⁴ <https://www.managementboek.nl/boek/9789463012058/circular-route-engels-guido-braam>



BoomBuilds.nl | space&matter.nl | copyright 2020

www.circularatscale.com