



**Circular Construction Challenge**  
— Rethink waste



# Turning waste into transformative solutions for the built environment



# Call in short

Realdania is calling for innovators that reuse, recycle and upcycle waste to create new solutions for the built environment. The Circular Construction Challenge – Rethink Waste addresses the global challenge of waste overload and rapidly increasing waste deposits, both locally and globally. We invite innovators to help build a world where waste does not exist: **what is your solution for reuse and upcycling in the built environment?**

We aim to find new ideas to support waste minimization through intelligent use of waste. We embrace innovative products, materials, components or approaches that seek to rethink, redesign and reuse large fractions of waste, or smaller but complicated waste fractions, into new solutions in the built environment. The ideas and solutions for smart waste usage may include other industries or remain within the building industry itself. All ideas are welcome – from upcycled plastic bottles to old building materials, whether they are plastic, wood, concrete, brick, textile, steel or something else. Your idea can be an early-stage or more mature innovation that – with the right support, new partnerships, prototyping and tests – can be advanced and radically scaled.





# The award

The winning teams will receive substantial, long-term development support comprised of the following:

## Help setting the right team

The finalists will receive help to find team members that can help create a – a technically, aesthetically and commercially strong solution. The teams may be organized as project companies or as entrepreneurial companies, and the winners will receive individual counselling based on their projects.

## Six months of charged innovation

The winners will receive exclusive access to a six-month-long charged innovation process that includes three boot camps, where – the newly established teams – use co-creation and expert guidance to take the solution to the next level. Throughout the programme, the winners will receive tailored mentoring from domain experts to support the prototyping phase, including access to labs and prototyping facilities.

## Up to DKK 1,000,000 for development costs

The winners will receive up to DKK 1,000,000 [€130,000] to support the development of a physical prototype. The financial support will cover expenses for materials, purchase of data, travel costs and working hours.

## Extended network and partnerships

The Circular Construction Challenge is also an opportunity for the participating businesses and organizations to connect with national and international networks, to get access to new partnerships throughout the value chain and to get solid PR and branding. Winners will have access to dialogue and feedback sessions with a panel of potential buyers and investors for the new solutions.



# Timeline

Dates and deadlines for the Circular Construction Challenge, 2018–2019:

For more details, go to the following section of the process description.





# Challenge description

## Why the Circular Construction Challenge — Rethink Waste?

The Circular Construction Challenge addresses the global challenge of waste overload and rapidly increasing waste deposits, both locally and globally. We aim to build a world where waste does not exist. A zero-waste world, where all waste goes into a circular system, where waste is a resource, and where waste can help build capital rather than reduce it. The Circular Construction Challenge taps into several of the UN Sustainable Development Goals by supporting new solutions for a world without waste.

The Circular Construction Challenge – Rethink Waste is calling for innovators to help build a world where waste does not exist: what is your solution for reuse and upcycling in the built environment? We aim to stimulate a shift within three important realms of the circular economy:

1. **A shift in how we typically design and construct our buildings** — highlighting solutions that reinforce the shift from a linear economy to a circular economy.
2. **A shift in how we perceive waste in society** – promoting waste as a resource for new solutions and products commercially, for consumers and for society as a whole.
3. **A legal and regulatory shift** — letting these innovative solutions serve as a way to influence political thinking and push the agenda towards a more circular society.



# Background

Due to the continuously growing population and the ongoing urbanization worldwide, the building industry is among the fastest-growing industries in the world. Waste from construction and demolition is one of the biggest waste streams in the world, and the debris is most often downcycled into fill under roadbeds or ends up in one of the many landfills.

Globally, 1.3 billion tons of solid waste is produced every year. This volume is expected to increase to 2.2 billion tons annually by 2025. Building material accounts for half of the solid waste generated every year worldwide, according to The World Bank. In Europe, the building industry accounts for approximately 30% of all waste generated. The same goes for Denmark, where the construction sector accounts for 1/3 of all waste production with a total amount of 4.2 million tons of construction waste generated in 2015. In countries like the United States and China, the percentage is even higher. In the US alone, more than 500 million tons of construction waste go into landfills every year.

At the same time, we consume goods and resources as never before. Our natural resources are currently being consumed at twice the rate they are produced. By 2050, this could be triple our production rate, according to OECD estimates. Furthermore, the building industry is one of the biggest consumers of resources globally and is responsible for 25–40% of the world's CO<sub>2</sub> emissions. In Denmark, the construction sector accounts for 40% of Danish resource use [The Danish Construction Association, 2017].

Our enormous consumption of resources also generates huge amounts of waste. The total amount of waste produced in Europe in 2014 was 891 million tons, which would equal an average waste generation of 1.8 ton per EU citizen, according to Eurostat. In Denmark alone, the total amount of waste produced in 2015 was around 11.3 million tons, according to the Danish Environmental Protection Agency.

As cities across the world continue to expand, so do the number of urban residents and the amount of waste production in the cities. Today, in 2018, there are around 3 billion urban residents, who produce 438 kilos of waste per person annually. By 2025 we will reach 4.3 billion urban residents, who will generate approximately 518 kg per person per year, estimates The World Bank.

As these facts clearly show, the whole world will need to transition from a linear to a circular economy sooner rather than later. Fortunately, research carried out by the Ellen MacArthur Foundation, the McKinsey Centre for Business and Environment and SUN [German Endowment Fund for Environmental Economics and Sustainability] in 2015 shows that there are clear gains to be made by adjusting towards a more circular system. The potential economic benefits are estimated to be up to €1,800 billion annually by 2030 for Europe's mobility, food and building sectors. In Denmark alone, we stand to gain more than €6 billion annually by 2035 with an intelligent transition of the Danish society from a linear to circular economy [Ellen MacArthur Foundation et al., 2015].

Addressing this global challenge of waste overload, mass consumption and continuously increasing resource use, the Circular Construction Challenge – Rethink Waste aims to encourage the transition to a more cyclical model, where waste is perceived as a resource.



# Calling for transformative ideas and solutions

## What might a transformative idea or solution look like?

The Circular Construction Challenge – Rethink Waste is calling for ideas from all innovators that perceive waste a resource: a Danish-based material pioneer, designer, engineer, architect, craftsman or construction company – startup, SME or corporate – or a business innovator or tech expert that either reuse, recycle or upcycle waste as new solutions and products in the built environment. We aim to help to advance the construction sector and the building industry to become a key player in the circular transition. Thus, the challenge focuses on promoting the circular economy and helping the construction sector to reduce waste through an intelligent use of resources for new building solutions.

We are looking for the best ideas for how to turn waste into a valuable resource through innovative use and design. That includes products, materials or components as well as new approaches that seek to rethink, redesign and reuse large fractions of waste, or smaller but complicated waste fractions, to create new solutions in the built environment.

## All kinds of waste

The ideas and solutions of smart waste usage may include other industries or remain within the building industry. All ideas are welcome, from upcycled plastic bottles to old building materials, whether they are plastic, wood, concrete, bricks, textile, steel or something else. If you can bring an innovative and transformative solution to the table, we are eager to see it.

## All kinds of innovation stages

We are open to all ideas and solutions at any stage of development. The only requirement is that your idea can be advanced and radically scaled with the right support, new partnerships, prototyping and tests. Therefore, it is crucial that you and your team are willing to work on a physical prototype of the idea throughout the innovation phase of the programme.

## Solutions for the construction sector and the built environment

The submitted idea could be a brand-new building component, an innovative building material, a pioneering building solution or an original approach that will ensure a more circular construction industry overall.





# What might be a good solution?

A good solution in the Circular Construction Challenge takes both the supply and demand sides of the value chain into consideration. It seeks to connect the two sides and develops a more holistic circular solution in the process.

On the supply side, it creates value by minimizing or reducing waste on a specific fraction. The good solution seeks to replace a large, complex and damaging waste fraction with a more circular option – benefiting both business and the environment.

On the demand side, it seeks to open the market for a more circular solution. It reduces the use of a damaging conventional option and effectively reduces CO<sub>2</sub> emissions. Furthermore, the good solution has the potential to be recycled again, thereby entering a new life cycle in the built environment. Ultimately, the submitted solutions will be evaluated on the total impact they have on the circular life cycle [see evaluation criteria in the following].





# Examples of good transformative solutions

Here you will find some inspirational examples of what a good solution might look like. We welcome variants and developments around these examples as well as ideas relating to different waste fractions or building solutions.



## 1. Wood

Wood from window frames, doors, floors and old scaffolding that is upcycled into high-quality wood panels used for exterior cladding and interior surfaces. The recycled wood panels tell a story about the earlier use of the material.

## 2. Textiles

End-of-life textiles and cotton and wool scraps sourced from the fashion and textile industries, industrial laundries and households and subsequently upcycled into a high-quality engineered sound-absorbing felt used in construction of interior surfaces and design.

## 3. Bricks

Waste from demolition and industrial waste, for example from the ceramic, glass and insulation industries, is crushed and turned into new building bricks. The bricks fit industry requirements, are resilient and have a very strong aesthetic expression. The bricks demonstrate that it is possible to make attractive and technically sound products from waste.

## 4. Glass

Increased demand for energy-efficient housing has gradually led to single, double, triple and now even quadruple glazing. This limits the reusability of old windows. However, by replacing the old frames and combining two double glazing, it has been possible to develop windows that are not only aesthetically pleasing but also meet current energy efficiency requirements.





#### 5. **Technology for manufacturing timber**

Engineered technology is used to manufacture high-performance, exterior timber products for cladding, decking and joinery. Through the acetylation process, the part of wood that readily bonds with water is replaced by acetyl groups. Thus, the acetylation process mimics nature without adding any toxic substances. Similar to untreated wood, the timber product can be re- or upcycled in various ways.

#### 6. **Biological building materials**

Biological methods can be used to treat demolition waste such as wood or insulation and turn it into new building components. By using natural organisms, adding biological binders, such as microbes and fungi, and pressing the materials at the end it is possible to turn construction debris into a new building product with a low carbon footprint.

#### 7. **Plastic**

Plastic is a part of our everyday life and currently constitutes a massive global waste challenge. By granulating, heating and extruding PET – for example from used plastic bottles – it is possible to recycle the plastic and obtain PET fibres. The fibres can then be used to create a PET blanket, which can be fastened on a backing pad and mounted in an acoustically optimized geometry, creating an aesthetically light expression with high acoustic effect.

#### 8. **Packaging**

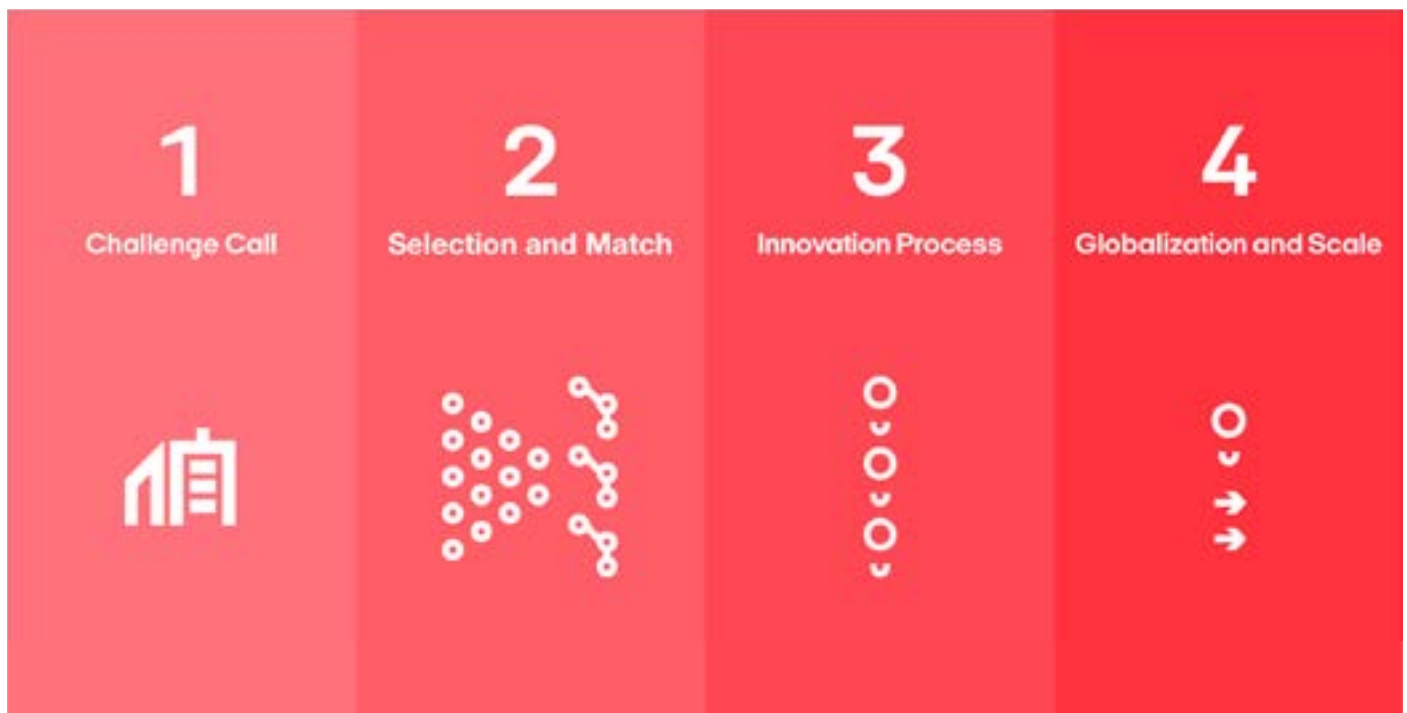
Packaging can often be difficult to recycle due to its composite structure. Without using any formaldehyde glues, water or hazardous chemicals, it is possible, however, to transform composite packaging into durable moisture and mold-resistant panels suitable for roofs and walls. It takes about 30 cartons to make up a single 60 x 60-cm ceiling tile.





# Process

Circular Construction Challenge is comprised of four phases in 2018–2019.



## Phase 1 – Challenge call and response

Calling for Danish-based innovators and front-runner businesses with an idea or a solution that responds to the Call in the Circular Construction Challenge.

24 August 2018

### Launch of Circular Construction Challenge, kick-off event at BLOX, Copenhagen

At the kick-off event we launch the Challenge Call and explain the one-year process. Danish and international experts share insights into the value of challenge processes and business cases within circular construction.

1 October 2018

### Submission deadline for ideas and solutions

Submissions to the Challenge Call are due by 12:00 [noon]. Late responses will not be taken into consideration. We only accept responses submitted through the Challenge submission site: [challenges.dk/circularconstructionchallenge](http://challenges.dk/circularconstructionchallenge). Find more details on how to submit in the following section.



## Phase 2 – Selection and match

The six most innovative ideas and solutions are selected by the Selection Committee, and the finalists are announced. The finalists form their teams and outline agreements.

10–17 October 2018

### **Shortlisting of 10 solutions by the Selection Committee**

Up to 10 ideas and solutions are shortlisted, and the selected candidates continue in the Circular Construction Challenge.

19 October 2018

### **Feedback to the shortlisted**

All candidates are informed by email whether they made the short list. They also receive further feedback on their proposal.

23 October 2018

### **Pitch day for the 10 shortlisted ideas or solutions**

The selected candidates pitch their idea or solution to the Selection Committee. This gives the candidates the opportunity to unfold their idea and business plan further and present early-stage sketches or demos of the idea. It is also an opportunity to answer in-depth questions from the Selection Committee.

31 October 2018

### **Announcement of the six finalists, Building Green Conference, Copenhagen**

Up to six finalists are announced at the Building Green Conference. Each candidate gives a lightning talk about their idea or solution. Members of the audience will be able to reach out to the finalists with questions or a wish to join the team to develop the idea or solution further.

1 November 2018

### **Application period for team members opens**

Danish and international businesses, start-ups, organizations, waste suppliers and researchers can apply to join one of the six finalist teams. Find more details on how to apply in the following section.

3 December 2018

### **Application deadline for team members**

We need to receive your application to join a team by 12:00 (noon). Apply at [circularconstructionchallenge.org](http://circularconstructionchallenge.org). The programme will reach out to the Danish and international eco-system to enlist their help with recruiting.

The six finalists form their teams from the online applicants. Based on recommendations from the Selection Committee at the pitch event, each finalist will choose three to four team members.

It will carry significant weight in the final evaluation process that the six finalists consider the recommendations from the Selection Committee when setting their teams and that the members are new partners representing a range of stakeholders in the value chain.



15 January 2019

### **Application deadline for the six finalists, incl. teams**

We need to receive your team submission by 12:00 [noon].

The teams are expected to submit a package for the final judgement consisting of:

- A tentative budget for the allocation of the cash prize
- A tentative business plan for the idea or solution
- A tentative cooperation agreement [MoU] for the team

Late January, 2019

### **Selection of the three winning teams**

The three winning teams are announced. An exact date will follow.

The winners get access to the innovation phase and financial support (up to DKK 1,000,000 per team) to co-create and develop the solution, taking their solution to the next level.

## **Phase 3 – Innovation and co-creation**

[For the winners]

The three winning teams enter a six-month long innovation phase specially designed to advance the winning solutions in a co-creative process. During the six-month process, the programme provides customized mentoring by domain and industry experts, technical support and facilitation to help the teams develop a prototype or test version of their solution. Furthermore, the teams will have access to workshops on circular business models, design thinking and tools, prototyping and test facilities and guidance on strategies, global IP protection and legal matters.

## **Phase 4 – Dissemination and global scale**

The three prototypes are presented at events and through relevant networks with the ambition of scaling the transformative solutions and providing access to the Danish and global markets.





# Evaluation criteria

## How will your idea or solution be judged?

Your submitted ideas and solutions will be assessed by our expert Selection Committee and judged according to the following criteria. Please see the list of questions under each criterion for inspiration. Your answer to these questions will be taken into consideration when the experts evaluate your proposal and choose the six finalists for the Circular Construction Challenge.

The three winning teams will be selected in mid-January 2019 according to the following criteria as well as their budget, business plan and MoU.

### Circularity

- What makes the solution circular?
- Which type of waste does the solution reduce?
- How large is the waste fraction that you reduce?
- How much can you reduce this fraction? How big is the upcycled part?
- Why is this type of waste fraction particularly important to reduce?
- How big is the CO<sub>2</sub>-reduction of your solution compared to a conventional approach?

### Vision

- What is the visionary aim of the solution?
- What makes the solution new or even radical?
- How does the solution differ from other solutions on the market?

### Value creation

- What value do you create for the user, the planet and society as a whole?
- Who are the primary customers and users?
- What is the target market for the solution, for example geographically?
- What is the business model for the solution, and what makes it circular?
- What social, economic and environmental gains does the solution achieve?
- Which of the UN Sustainable Development Goals does the solution address?

### Scalability

- What is the market potential of the solution?
- How big a market does the new solution appeal to?
- What does it take for the solution to reach the market and scale?
- How can new technologies help speed up the production or scale the solution?

### Co-creation

- Who is contributing to the solution?
- How does the solution involve the different parts of the value chain? And how does the solution include the value chain in order to optimize its own potential?
- What partnerships are built around the solution, if any?



# How can you join?

You can join the Circular Construction Challenge in two ways

## 1. **Submit your idea**

If you are a Danish-based innovator with a transformative solution you can submit your idea until 1 October 2018. If you are selected as one of the six finalists, you will receive help to set a team with the competencies you need. You decide who you want on board as well as how you want to design the set-up. We provide support, advice and infrastructure.

## 2. **Apply as team member**

If you are a Danish or international expert with the right competencies, a relevant position in the value chain or a new take on a finalist idea, you can apply from 1 November until 3 December 2018. As a team member, you commit to establishing a partnership around the chosen idea and contributing to developing the idea or solution further during the innovation phase in 2019.





## How to submit your idea or solution

If you are a Danish-based material pioneer, designer, engineer, architect, craftsman or construction company – startup, SME or corporate – or a business innovator or tech expert working with rethinking and reusing old materials or waste to create new solutions, do not hesitate to join the Circular Construction Challenge. As long as you have a commercial ambition with your idea and have a Danish CVR [VAT] number, we are happy to receive your submission.

To submit your idea or solution you must submit the completed response form in English by 12:00 [noon] on 1 October. Late responses will not be taken into consideration.

1. Go to the [Challenges.dk submission site](#)
2. Create a user and remember to fill out the bio text and details for your profile
3. Fill out the form and press submit. You will be able to upload additional documents with your response
4. You will instantly be able to view your submission on the website

## Your response should provide

### Description of your idea or solution

- A short description of the vision behind your idea or solution in response to the Challenge call
- An in-depth description that contains:
  - Answers to the questions posed in the criteria mentioned below
  - An outline of the competencies you need to realize your idea
  - What you expect that the CCC programme can do for you
- Upload as well:
  - A visualization of your solution, for example photos, videos or sketches
  - An outline of a tentative process plan
  - [optional] Documentation and data about the solution

### Information about you

- A bio of you and your business
- A CV including your experience within the field
- An overview of any existing funding, awards, prizes, other highlights and so forth



## How to apply as a team member

Anyone in the global circular ecosystem with competencies and expertise in relation to the chosen ideas can join as a team member to help realize the prototype. Here, we are eager to have international experts join as well.

To apply as a team member you must fill out the form by 12:00 [noon] on 3 December 2018. Late responses will not be taken into consideration. You will need to fill out the application form online at our Circular Construction Challenge website. By applying to be a team member, you commit to establishing a partnership around the chosen idea or solution and to contribute in developing and co-creating the idea or solution further during the innovation phase in 2019.

1. Go to [circularconstructionchallenge.org](http://circularconstructionchallenge.org)
2. Find the description of the six finalist solutions. Choose the solution you wish to contribute to
3. Fill out the application form. You will be able to upload additional documents with your response
4. You will receive a confirmation once we have received your application

## Your response should provide

### Information about your contribution

- A short description of your contribution to the idea or solution
- An overview of how you will contribute, for example, your role, competencies and position in the value chain

### Information about you

- A bio of you and your business
- A CV including your experience within the field



# Official rules

## Rules for submitting your idea

By submitting a response to the Circular Construction Challenge at Challenges.dk, you agree to the official rules for idea owners on the website: [www.challenges.dk/en/about/termsandconditions](http://www.challenges.dk/en/about/termsandconditions)

## Terms and conditions for participating

Make sure to download and read the Terms and Conditions for the programme, which describes the official rules for participation in the Circular Construction Challenge. By submitting an idea as an innovator or applying as a team member, you agree to the terms and conditions described in the document.

The terms and conditions are available for download on [circularconstructionchallenge.org](http://circularconstructionchallenge.org)

# About the organizers

The main organizer of the Circular Construction Challenge – Rethink Waste is Realdania – a Danish philanthropic association. The Danish Design Centre is the operator. The Challenge is launched in collaboration with Danish and international front runners within the field, see website.

## Contact

If you have any inquiries or need further information, please contact us at [contact@circularconstructionchallenge.org](mailto:contact@circularconstructionchallenge.org).

### Owner



### Collaborators

Danish Design Centre

