



# Inspiration catalogue



# URBAN SYMBIOSIS

Local collaborations based  
on residual resources





## Inspiration catalogue for urban symbiosis

Developed by Transition ApS in collaboration with Copenhagen Municipality.

Transition advises and facilitates processes within circular economy, energy, climate and indoor climate.

Many thanks to everyone who has contributed to company cases for their time and contribution to the inspiration catalogue.

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# Circular economy in the cities

Cities around the world play a key role in the green transition. In cities, there are both a high concentration of human resources and innovative power and a high degree of physical materials and waste.

Every day, large quantities of consumer goods and products are transported into the cities and equally large amounts of waste are transported for waste treatment - often outside the cities. Such is the dynamic.

But does it have to be this way?

In recent years, new business models are emerging, which are based on local production and consumption in the cities. Central to this development are innovative companies that manage to collaborate and make use of each other's residual resources, as a starting point for local production.

In the City of Copenhagen, commercial waste amounts to 218,000 tonnes, which means that one third of the municipality's total amount of waste comes from commercial waste. More than half of the commercial waste is sent to incineration, even though it is suitable for recycling. This means that much of what we call waste is actually resources.

One of the objectives in the City of Copenhagen's Circular Copenhagen Resource and Waste Management Plan 2024 is to recycle 70% of commercial waste.

One way to recycle commercial waste is when local businesses collaborate about residual resources. In these collaborations, one company's residual resource becomes another company's usable resource. In this way, the companies enter into a collaboration where they are dependent on each other as resource suppliers. Such a collaboration is called an urban symbiosis.

This inspiration catalogue describes 40 urban symbiosis collaborations, where two or more companies collaborate about valuable resources.

**Happy reading!**





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# Local collaborations based on residual resources

With this inspiration catalogue, we want to give you inspiration on how your waste can become a valuable resource in another company.

The type of collaboration in which two or more companies collaborate based on one company's residual resource becoming another company's usable resource is called an urban symbiosis.

In this inspiration catalogue, you will find exciting examples of local, innovative urban symbiosis collaborations between companies.

The companies collaborate based on many different resources. These are residual resources that are typically found in a city, and through the collaboration, the receiving companies produce everything from new furniture, interior products, skin care, shoes and food, based on the residual resources.

The inspiration catalogue is relevant for you who have waste. You may run a café, restaurant, hairdresser, tailor or similar. Your waste can be anything from coffee grounds, orange peels, discarded clothes and textiles, over-ripe fruit, old water pipes, tires and much more.

The examples in the catalogue have been selected in order to show the range of residual resources in realized local resource collaborations.

The inspiration catalogue is especially focused on examples from Copenhagen, and are a snapshot of what companies, especially in Copenhagen are doing and can do today.

The hope is that there will be no waste in the future, and that everything will be reused, redesigned and recycled in new circuits. A future without waste will therefore mean that products and materials are recycled. This inspiration catalogue does not show the final solution for such a future but shows a step in the right direction and an opportunity to extend the life of products and materials by making waste a valuable resource.

Local collaborations on resources is not a new concept, and the examples that appears in the catalogue must therefore also be considered as a selection of the many collaborations that exist in Denmark and abroad.

The inspiration catalogue shows a total of 40 resource collaborations. 20 of the 40 mapped resource collaborations have been interviewed to gain insights into the various innovative ways in which the companies participate in local collaborations. The 20 companies have shared their experiences, both how the collaboration started and the practical set-up in the collaboration.



**The companies in the catalogue have been selected on the basis of the following criteria:**

- 🔗 Collaboration between a minimum of two companies
- 🔗 The residual resource is typically found in cities
- 🔗 Focus on different residual resources
- 🔗 Companies primarily in Copenhagen and Greater Copenhagen

Our ambition with the inspiration catalogue is to give you the desire and motivation to investigate whether your waste can become new resources instead of ending up as waste. At the end of this inspiration catalogue, you can therefore read about how to get started with a local resource collaboration as well as find more knowledge about resource collaborations.



# Urban symbiosis

The type of collaboration where one company's waste product becomes another company's resource is often called an industrial symbiosis. In this catalogue, we use the same approach that lies behind industrial symbiosis, which means that residual resources become valuable resources.

In this catalogue, we call the symbiosis collaboration an urban symbiosis. Urban because it happens with resources that are typically found in cities, and symbiosis because the collaborating companies use each other's resources to exist.

See the definition we use in the inspiration catalogue in the box to the right.

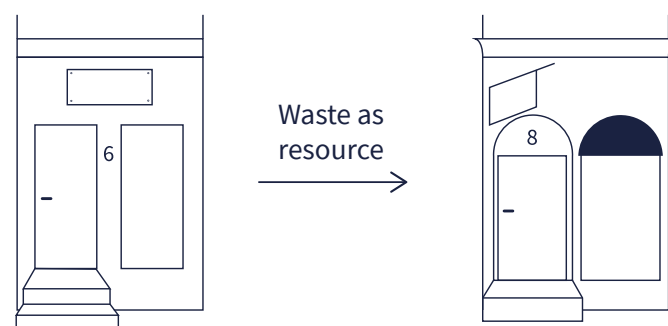
The purpose of the collaboration is to create value with resources that would otherwise have been thrown away. The collaboration can take place either by one company receiving a residual resource from one or more other companies, which becomes new products for new customers, or mutually, where the residual resource from one company is sent to another company, where it becomes a product, which is then used again by the company that sent the residual resource.

**In this catalogue, urban symbiosis is defined as: “symbiotic relations between two or more local companies in a city, where one company's waste is reused or recycled locally in the city by other local companies. The waste here is typically found in urban areas and in smaller continuous quantities.”**



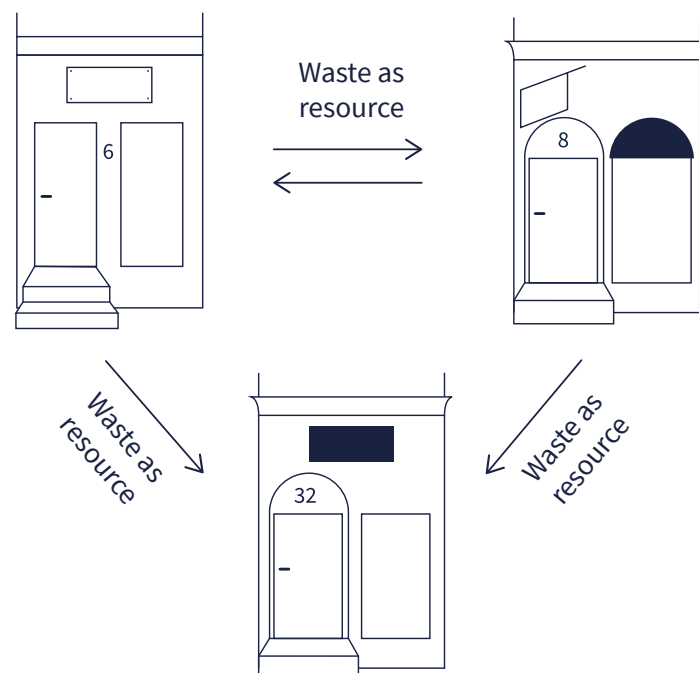
## Urban symbiosis exchange

Physical exchange of residual resources



## Urban symbiosis network

A network with several symbiosis exchanges



## Your gain in a symbiosis collaboration

When you enter into a symbiosis partnership, you, as the sender of a resource, can save money, and sometimes even make money, on your residual resources. At the same time, if you are the receiving company, you can get cheaper raw materials for your production.

consumers who want products that are made with greater concern for the environment.

The collaboration also means environmental savings through unnecessary use of new resources. Therefore, urban symbiosis creates environmental, economic and social benefits.

Collaborating on various resources across industries is a unique story that you can offer

### Economy



Lower price or free resources



Lower waste collection costs



Income from residual resources



Greater resilience to price increases on resources



Contribution to sustainability strategy



Unique selling point



Talent acquisition

### Society



Local job creation



Local organizations benefit from larger customer base

### Climate & environment



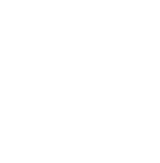
Less extraction of new resources



Less waste



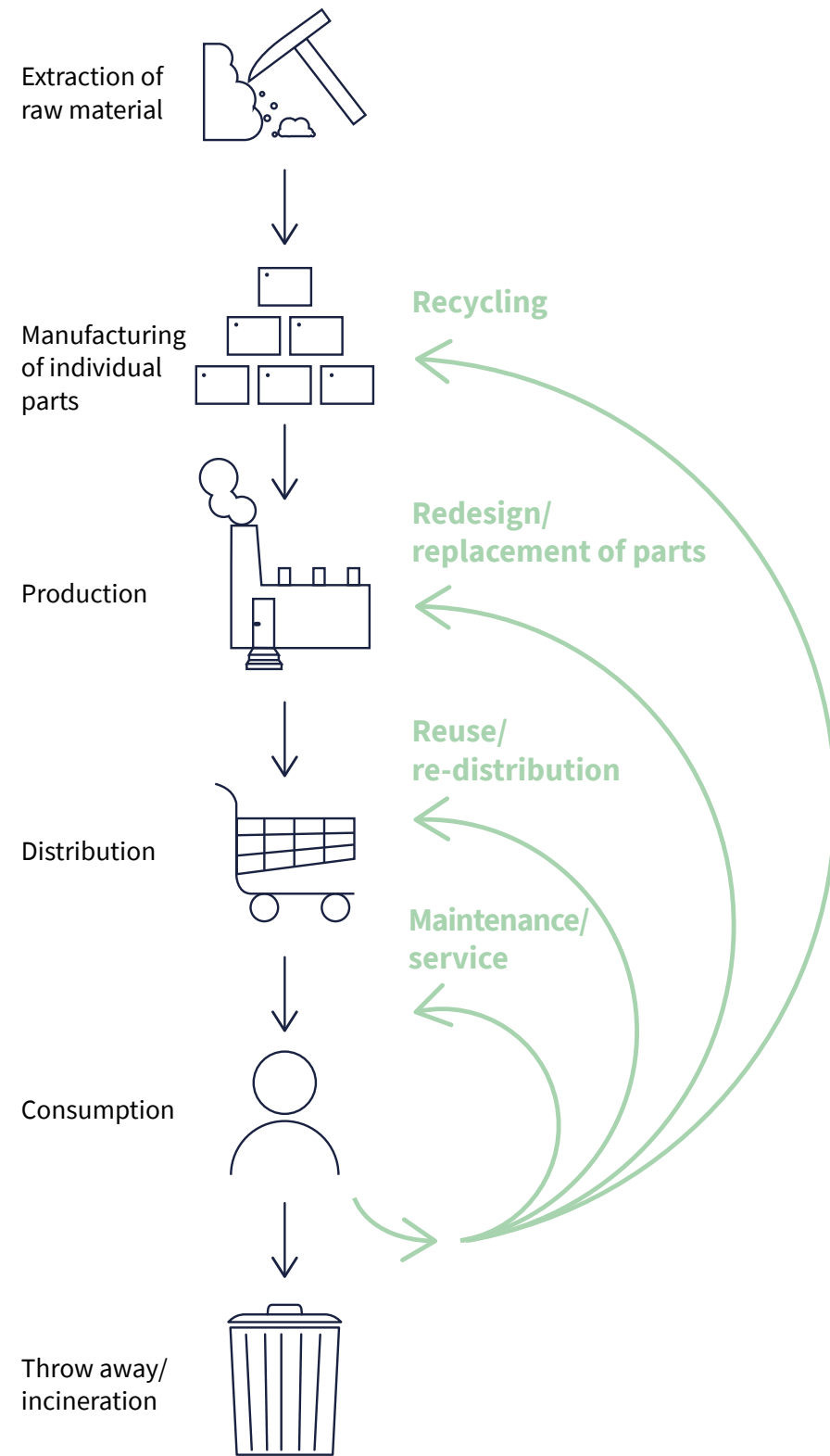
Smaller CO<sub>2</sub> footprint



Mindre aftryk fra transport



# Circular Economy



## Circular economy

Today's economy is primarily linear, which means that we extract raw materials, manufacture products and consume these. At the end of its life, the products are thrown away and become waste.

In the linear economy, we are therefore dependent on large amounts of raw materials and energy to produce new products, and many valuable resources are lost in the process, with associated major environmental challenges.

Unlike the linear economy, the circular economy is about taking better care of the resources we have, so that they can be included in a circuit and used again and again, while maintaining the highest possible value while circulating.

Urban symbioses are part of a circular economy where residual resources are recirculated by being reused, redesigned or recycled instead of ending up as waste.



# 40 URBAN SYMBIOSES

## Cases

On the following pages, you can read about existing symbiosis collaborations, where companies collaborate about different types of residual resources.

**14**

### FOOD WASTE

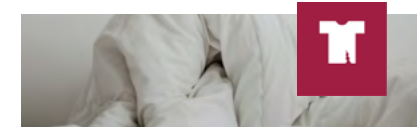
Coffee grounds, spent grain, fruit, orange peel, bread.



**28**

### TEXTILES

Clothes, laundry bags, duvets, leather.



**36**

### GLASS & CERAMICS

Glass bottles, glass, stoneware, porcelain.



**40**

### PLASTICS

PE, PP, LDPE & PDH plastic, plastic lids, tarpaulin.



**48**

### METALS

Used pipes, steel plates.



**52**

### ELECTRONICS

Light fixtures.



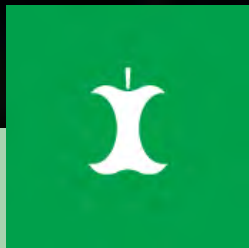
**54**

### OTHER

Tires, wood, saw dust, straw, books.







# Food waste

Food waste is what is cut off or a residue, when preparing food, and what is left over after a meal. It can be meat, fruits, and vegetables – both raw and cooked – or coffee grounds and spent grain, which are leftovers from brewing coffee and beer at companies.

Every year around 1,214,000 tonnes of food waste is produced in Danish households, restaurants, retail and the processing sector (Miljøstyrelsen, 2021). Today, many Danish households sort their food waste, while 5% of Danish companies do the same (Dansk Affaldsforening, 2020).

Even though food has become waste, it still has a lot of potential and can be used as a resource across industries. Today, food waste is transformed into resources in the production of new foods, skin care products, and furniture, among other things.

On the following pages, you can read about the possibilities of food waste and be inspired by companies that work with food waste as a resource every day.



**Residual resource:** Coffee grounds

**Collaborative partners:** Office buildings, cafes, restaurants (resource suppliers)

**Contact:** [beyondcoffee.dk](http://beyondcoffee.dk)

**Open to new partnerships**

## Beyond Coffee

**Beyond Coffee, which is located in Nordhavn, Copenhagen, grows edible mushrooms on waste products such as coffee grounds. Today, Beyond Coffee sells mushrooms, starter-kits and mini farms, which the company install for the customer.**

With inspiration from the Netherlands, where they also grow oyster mushrooms on coffee grounds through urban symbiosis, Beyond Coffee started by simply writing to and calling different restaurants. They spoke to the chefs, and there was a general interest in participating.

“After a while we learned that it didn’t really make sense to pick up coffee grounds from restaurants. They simply do not produce enough coffee grounds,” says Ebbe Korsgaard, Director of Beyond Coffee. They discovered that there were more coffee grounds to be found in e.g., office buildings, where the employees drink coffee every day. “Right now, we collect coffee grounds from an office building with 5,000 employees,” Ebbe explains. And it makes sense. Because gradually, Beyond Coffee learned that coffee from a machine is better to grow mushrooms in than espresso coffee grounds from cafes.

### The coffee grounds need to be handled as food

Beyond Coffee quickly gained publicity due to their concept, and eventually companies with coffee grounds began contacting them. For companies to be able to share their coffee grounds, they must treat the coffee grounds like food instead of waste. When hot water is poured over the coffee grounds, they are pasteurized, and all bacterial and fungal spores are killed. Then, they are put in the fridge in a closed plastic bag so they remain pasteurized.

“In most cases, it’s pretty much the same workflow. Normally, the service employee walks around the building and empties the coffee machines. Instead of throwing the coffee grounds in the trash, we ask them to put them in a container and store it in the fridge,” Ebbe explains. They deliver a pallet to the partners, wherein they can put the coffee grounds. The company then collects the coffee grounds during the week, and Beyond Coffee picks them up on Friday. A challenge though might be lack of cooling space.



”  
**The company saves money because we’re reducing their amount of waste, which they would otherwise have to pay to get rid of. But we also ask them to do something.**

- Ebbe Korsgaard, director of Beyond Coffee

Beyond Coffee does not pay for the coffee grounds, but they are responsible for collecting them. Earlier, they would pick up the coffee grounds on a cargo bike, but they are now using an electric van so that they can collect the coffee grounds from their partners in Greater Copenhagen more easily.

### Coffee grounds are given a new life

“We quality check the coffee grounds, after which we mix them with mushroom culture and put them in bags. The bags are then put in our containers, where they are monitored, and then, after almost a month they are ready to be harvested” Ebbe explains about the process. In total, they can harvest twice from the coffee grounds. After that, the coffee grounds are sent to a farm on Amager, which uses them for soil improvement in relation to vegetable farming.

### Waste is not something you advertise

According to Beyond Coffee, you have to get out and create a dialogue with people, since waste resources are not something, we normally advertise or can simply find by searching on Google. Other than that, Ebbe stresses that it is important to choose symbiosis partners with respect for one another as well as a mutual excitement and approach to the project.



In addition to coffee grounds, Beyond Coffee also uses sawdust to a lesser extent. In regards to the future, Beyond Coffee is considering expanding their business in Copenhagen and establishing the concept in other cities, and they are generally open to new materials, as long as they can produce organic mushrooms with it.



International example



## Kaffeeform

**Already in 2009, German Kaffeeform began experimenting with coffee grounds as an alternative material to plastic.**

In 2015, the company managed to find a recipe for making coffee cups and to-go cups with a mix of coffee grounds collected from Berlin coffee shops and remnants of beech wood left over from other productions. The materials are held together by biopolymer and plant fibers. Today, Kaffeeform's coffee cups are sold to both companies and individuals.

**Residual resource:**

Coffee grounds

**Collaborative partners:**

Coffee shops in Berlin (resource suppliers)

**Contact:** kaffeeform.com



## Kaffe Bueno

**Residual resource:** Coffee grounds

**Collaborative partners:** Sinatur Hotels, hotel chains, larger companies, foreign coffee producers (resource suppliers), Danish Technological Institute (research partner), Alfa Laval Innovation House (facilities)

**Contact:** kaffebueno.com

**Open to new partnerships**

**With its knowledge of coffee, the company Kaffe Bueno in Copenhagen wanted to get more value out of the coffee than just caffeine. By extracting oil from coffee grounds, which are collected from hotels and larger offices, Kaffe Bueno produces and sells an ingredient that is used in products for cosmetics, personal care, nutraceuticals, and food.**

The founders of Kaffe Bueno are originally from Columbia and have a knowledge of farmers' coffee cultivation and the many ways in which coffee can be used. Coffee can be used, among other things, for the care of skin and wounds or as a nutrient that is added to foods, which provide medical or health benefits (nutraceutical). Due to the founders' knowledge of coffee cultivation, it was important for them both to create more value for the farmers who grow the coffee, but also to exploit the many potentials of coffee beans – because as founder and co-owner Alejandro Franco explains: “Coffee is more than just caffeine. Caffeine is only 1% of it.”

**The search for technology and coffee grounds**

After having developed a technology that makes it possible to extract oil from coffee grounds, Kaffe Bueno contacted the Danish Technological Institute in 2017. The institute helped test the technology in their laboratory, before Kaffe Bueno industrialized their production. They received funding for the research from the Danish Environmental Protection Agency and the European Commission, among others.

To begin with, Kaffe Bueno had a very simple approach to the project. They themselves found and contacted local coffee shops in order to collect coffee grounds that would otherwise be thrown out. But most often they were met with disinterest and small quantities, and therefore Kaffe Bueno slowly began to adjust their search and contact larger companies and hotel chains.



**Across industries**

Luckily, the lack of interest belongs to the past. Companies with left over coffee grounds are now contacting Kaffe Bueno in order to cooperate. If you ask Alejandro, a transitional phase in recycling is occurring at the moment: “We can see a difference from when we arrived in Denmark five years ago, where we were met with closed doors”.

Today, Kaffe Bueno receives coffee grounds from hotels and offices of larger companies, but also from a large coffee producer in Finland that has invested in Kaffe Bueno and delivers the largest amounts of coffee grounds to the company.

Collaborative partners in Denmark collect coffee grounds in special bags, which Kaffe Bueno delivers, to prevent mold. Then, the bag is put in a container solely for coffee grounds, whereafter they put it in a container that is emptied and picked up by a freight company. Kaffe Bueno does not pay for the coffee grounds. Afterwards, the coffee grounds are sent to Alfa Laval Innovation House, where they have their own production facilities, and where the process of extracting oil begins. Coffee grounds from international collaborative partners are sent to Spain, where the same process happens.

When the oil is extracted from the coffee grounds, it is sold to companies, that use it in their production of food, nutraceuticals, cosmetics, and products for personal care. In this way, elements of the coffee are distributed across industries instead of becoming waste.

On a smaller scale, Kaffe Bueno has established circular collaborations with the hotel chain Sinatur and the fashion company Ganni. From these companies, Kaffe Bueno receives coffee grounds, extracts and forwards the oil to a soap producer that produces soap – soap, which Sinatur and Ganni subsequently use.



**All the things we did, which led to mistakes, made us realize that we needed to go in another direction.**

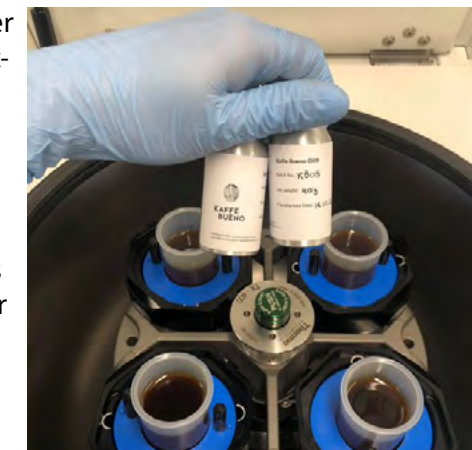
- Alejandro Franco, founder & co-owner of Kaffe Bueno

The recurring challenge is to establish an infrastructure for the exchange of coffee grounds and resources in Copenhagen, especially if collaborations with small local businesses are to be feasible in the future. Because even though companies with left over coffee grounds have an interest in collaborating today, a logistic part is missing for the company to be able to collect larger quantities.

**Good preparation and mistakes along the way**

According to Alejandro, solid preparation and learning from mistakes along the way is key to establishing good collaborations. Before you contact a company, it is important to take the time to understand the company and its potentials for a symbiosis collaboration, according to Alejandro. Furthermore, all the attempts in the start-up phase has adjusted and helped define the future direction of the company.

With Kaffe Bueno, Alejandro hopes to help farmers obtain a better income from the coffee, because the new technology creates a better utilization of the entire crop – not just 1% of it.



## Merry Berry

**Merry Berry is a company based in Aarhus, Denmark, that produces fruit snacks out of surplus fruit.**

In Denmark, 130,000 kg of fruit are thrown out every year. Merry Berry has decided to change this. The company buys local producers' surplus and 2nd sorting fruit from which they produce fruit snacks.

**Residual resource:** Apples, strawberries, pears from 2<sup>nd</sup> sorting

**Collaborative partners:** Local food producers (resource suppliers)

**Contact:** merryberry.dk





**Residual resources:** Spent grain, nuts, pulp and whey  
**Collaborative partners:** Frankly, Agrain, La Traccia, Jacobsen, Whitelabs (resource suppliers), Hansen Is, Restaurant Amass, BRØL (resource buyer)  
**Contact:** jalmogb.dk  
**Open to new partnerships**

# Jalm&B

**At the Copenhagen based company Jalm&B, leftover food from other companies is used in the baked goods. The philosophy is that if the product tastes good, it will get sold, and with a nice storytelling and climate considerations attached to the food, it only adds value.**

The first collaboration was initiated after a dialogue about craftsmanship with the brewery Jacobsen: “We discovered that the ways in which you make bread and beer are basically the same,” Martin Marko Hansen, head of Innovation & Sustainability at Jalm&B. tells. The brewery Jacobsen and Jalm&B decided afterwards to test the idea and exchange waste products. The brewery received old bread to brew beer with, while Jalm&B in return got spent grain flour and leftover hazelnuts to bake bread.

After the experiment, Jalm&B wanted to try out similar collaborations. They started mapping out potential partners, and here they became aware of the Danish company Frankly Juice. Frankly produces juices and shots of organic vegetables and fruits, and as a natural part of the production, excess pulp is left: “I have tried myself to squeeze juice at home, and I know that there is an incredible amount of excess pulp left,” Martins states. With this idea, Jalm&B contacted Frankly Juice about a collaboration – and Frankly Juice was on board.



## An additional handling, but free resource

Today, Jalm&B receives leftover pulp from Frankly’s carrot juice, which they use in their carrot buns. Jalm&B picks up the pulp at Frankly Juice, which they receive on a pallet with approximately 500 kg of pulp a couple of times a month. Jalm&B does not pay anything for the carrot pulp, and Frankly Juice does not have to pay to get rid of the carrot pulp. That way, both parties get something out of the collaboration.

The collaboration has required a new handling of the pulp at Frankly Juice, since hygiene requirements such as temperature and storage are now present. “It may seem easy on paper; however, it is an entire system that needs to be changed. But since Frankly Juice can also see the value in the collaboration, they are willing to invest a little extra resources,” Martin shares.

The carrot bun does not look like it used to. Normally, the carrot strips are uniform, but the pulp can actually dissolve, when it is baked, so that the carrot is not visible. There is nothing wrong with the taste however, and Jalm&B also believes that the climate gains and the great story behind the carrot bun has greater value to the consumer.

## Beer, cheese whey, and ice cream

Frankly Juice is not the only company that Jalm&B has resource collaborations with. Besides carrot pulp, Jalm&B makes a burger bun on water with brewer’s yeast from Whitelabs and spent grain flour, which is a waste product from the production of IPA, from Agrain. In their sour dough buns they use whey cheese from La Traccia, that produces Italian cheese in Ishøj. On the contrary, BRØL collects old bread from Jalm&B, which they use in beer brewing. Jalm&B even produces ice cream on old bread in collaboration with Hansen Is and Restaurant Amass: “We have discovered that bread can become a syrup via enzymes and that syrup can become ice cream,” Martin explains. The ice cream was sold out in Irma in just a couple of months, and now the bakery has begun the production for next year’s season.

## What value does the collaboration create?

In regards to establishing a partnership, Jalm&B believes it’s important that both parties can see the value of participating. The bakery realizes that all new developments are costly, yet as long as they are creating tasty products, they are



certain that the products will be sold. certain that the products will be sold. The different symbiosis collaborations that the companies and Jalm&B have made up a great story and a climate gain, which create a unique selling point for the products.

## Are there plans of an upscaling?

Jalm&B sees a potential for symbiosis collaborations and networks, especially in the food industry, but also in other industries. Additionally, Jalm&B also sees great relevance in a resource network – because in that way, the resources will be allocated in a way that fits the need of the market.



**If there was a larger network with different manufacturers, then maybe we could say: “I can’t use that, but you should talk to Hansen Is, perhaps they can use your leftovers”.**

- Martin Marko Hansen, Head of Innovation & Sustainability at Jalm&B

# Banana CPH

**Copenhagen based Banana CPH makes bread, rum truffles, caramel sauce and ice cream from organic excess bananas.**

The bananas that Banana CPH uses in their food have been discarded, because they are overripe and brown. 40% of bananas are discarded by the farmers, while even more get thrown out, when they reach the supermarkets. Overripe bananas are sweeter and are used to give Banana CPH’s bread, ice cream, sauce and rum truffles a natural sweetness, which would otherwise come from sugar. Banana CPH sells their products in Torvehallerne and on Jægersborggade in Copenhagen.

## Residual resource:

Bananas

**Collaborative partners:** Irma (resource supplier)

**Contact:** bananacph.com



**Residual resource:** Bread, coffee grounds

**Collaborative partners:** Bakeries, Meyers (resource suppliers), NREP (facilities)

**Contact:** broel.nu

**Open to new partnerships**

# BRØL

**BRØL is a beer brewery in Nørrebro, Copenhagen that experiments with producing innovative beer on leftover bread and coffee grounds with the lowest possible climate footprint. Based on a circular mindset, BRØL wants to take part in moving the industry in a more responsible and sustainable direction.**

Throughout his studies, Saimon Skurichin, founder and CEO of BRØL, has examined urban food systems in regards to transportation of food and quantities of waste, among other things. With this knowledge, Saimon started the nonprofit organization Food Share Copenhagen, which was created to reduce the amount of food waste by redistributing leftovers to people, who needed it.

Later, Saimon came up with the idea for BRØL. In 2017, he began experimenting with brewing beer on old bread and selling it on festivals, where both the concept and the beer were well received.

## Leftover bread becomes beer

When BRØL starts new collaborations, it is always on a trial basis. Here, the company has the opportunity to see, how the concept and the product will work.

BRØL is responsible for picking up the bread from the bakeries and companies that have large amounts of leftover bread. Then, they brew specialty beers on it, which they sell to other companies e.g., restaurants and bars.



Foto: Natalia Oszczudlowska





As it is right now, BRØL does not pay for the resource. In return, the company saves money by letting BRØL collect the bread, since they would otherwise have to pay for management of the waste.

#### How do you get new collaborative partners on board?

Over time, Saimon has been in contact with many restaurants and bakeries, and he has now created a tactic in regards to how he approaches meeting new potential collaborative partners. First and foremost, it is important to find the right company, according to Saimon, and secondly, make sure that the company focuses on sustainability. If they are a small independent company as well, they are more likely to be open to collaborations.

It is also important to talk to the right people. Often, the manager, who is present on site, does not have as good an idea of the quantities of waste, which the company produces, as the chef or the baker does. Saimon always tries to plant a seed with the companies by sharing the idea. Most companies need time to consider, whether a collaboration makes sense for them, and then they can contact BRØL, if they would like to enter into a partnership.

The challenge for the companies is that they have to change the current set up to make sure that the resource is handled correctly; e.g., the bread has to be frozen until BRØL can collect it. In return, the companies save money on pickup, and the symbiosis collaboration helps to substantiate their sustainable profile.

Foto: Natalia Oszczudlowska

#### Plans of expansion

In 2022, BRØL is looking into establishing partnerships with companies that use cargo bikes to transport products. Moreover, BRØL is considering expanding the concept to include production of food. That way, they can increase their use of excess resources and at the same time incorporate their own excess from beer brewing into the process.

BRØL uses a resource that there is a large amount of. So, if you, as a company, have a lot of coffee grounds or leftover bread from production, there are many possibilities of creating collaborations.



**Circular and sustainable symbiosis are not possible without partners, who collaborate.**

- Saimon Skurichin, founder and CEO of BRØL

## Æblerov

**Æblerov produces organic cider, fruit wines and their so-called 'mash-ups', which are a mix of cider, beer and wine, using leftover apples.**

To begin with, the two founders of the company went searching for fallen apples in residential areas. Here, they experimented with the natural yeast from the apples, which contributes to the bubbling effect of the cider.

The production has since increased from 50 liters to 85,000 liters, and Æblerov is now selling their products to bars, restaurants and specialty stores in Denmark and abroad. Today, Æblerov is located in an old Beauvais factory in Svinninge in West Zealand, Denmark, which the beer brewery To Øl owns and runs.

**Residual resource:** Apples, food waste

**Collaborative partners:** To Øl, Læsk and more (resource suppliers)

**Contact:** aeblerov.com

## Agrain

**Danish Agrain collaborates with organic microbreweries and distilleries in Denmark, where they gather excess spent grain and process it for foods like flour, granola, crisps and crackers.**

Spent grain is a waste product from the malted and mashed grains, which are used in the production of beer and whisky. The Danish beer brewery alone produces around 120 million kg spent grain every year that are partly used for animal feed and biogas, but is otherwise disposed of and therefore wasted. The raw mask has a wet porridge-like consistency that Agrain processes and transforms manually to four different types of flour that can be used in baked goods and is included in the company's remaining product range.

**Residual resource:** Spent grain

**Collaborative partners:** Micro-breweries, distilleries (resource suppliers)

**Contact:** agrainproducts.com



International example

**Residual resource:** Orange peel

**Collaborative partners:** Cafes and restaurants (resource suppliers), Seenons, socio-economic company (facilitators)

**Contact:** dikenschil.nl

## Dik&Schil

**Dik&Schil is an Amsterdam-based company that makes Orancello – an orange liqueur made from left over orange peels from restaurants.**

The three founders of Dik&Schil met each other through a course in entrepreneurship, where they had to develop ideas for start-ups. At that time, they all worked in the restaurant and catering industry and found inspiration in the industry's waste streams. "We wanted to do something with waste streams, and we wanted to work with sustainability or something in connection to that" Branco Bolsius, who is co-founder and head of production and finance at Dik&Schil, explains.

**Started on their own – now others are handing the resources**

The three guys started out by contacting restaurants that had large amounts of orange peels left over to hear about their interest.

To begin with, the production was very small, and Dik&Schil drove around themselves on a cargo bike picking up the peels from restaurants.



**We began by contacting restaurants, who had a lot of orange peels. We just visited them and asked, whether they liked the idea.**

- Branco Bolsius, co-founder and head of production and finance at Dik&Schil



For the concept to succeed, it was important that the restaurants and companies were interested in helping and not least motivated to make sure that the peels were handled correctly. This is because, it is a requirement that the leftovers are handled correct, if they are going to be used for new food production. Therefore, the restaurants are given buckets, in which they can put the orange peels and close it properly.

Dik&Schil are now being matched with orange peels through Seenons. Seenons is a Dutch company that matches waste from one company to another. When a company needs orange peels, they are matched with a restaurant or a café in Amsterdam, who has orange peels leftover. Besides Seenons, Dik&Schil collaborate with a socioeconomic company that collects the orange peels and prepares them for the production of orancello – a process, which is a good example of a job that is manageable by employees of disadvantage.



About the process, Branco explains: “We wash the orange peels, and then we peel them again. We only use the thin outer layer of the peel since that is where the oils are, which is mixed with alcohol.” The collaborating socioeconomic company is merely half a kilometer away from the distillery, where Dik&Schil gets their liquor produced. Dik&Schil strives to keep the production as local as possible, and for that reason, they also try to get the orange peels from the western part of Amsterdam and thereby minimize transportation.

Now, Dik&Schil produces around 10,000 bottles of Orancello, and they are annually using 1-2 tonnes of orange peels, which would otherwise have been thrown out. Many buyers are interested in Dik&Schil’s liqueur because of the story, and the company also makes an effort to tell about process behind.



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**Your partners have to be motivated, because if you are both motivated, it is possible to succeed.**

- Branco Bolsius, co-founder and head of production and finance at Dik&Schil

**Believe in it and find motivated collaborative partners**

Branco has two pieces of advice for others that would like to start symbiosis collaborations. First of all, it’s important to believe that it can succeed as well as remember that there are people out there, who would like to help. Secondly, he believes that it’s important to find motivated collaborative partners.

## Glean

**Glean uses excess water from boiled chickpeas to make lavish and innovative cream puffs.**

In their chocolate covered cream puffs Glean have replaced eggs with aquafaba. More specifically, aquafaba is chickpea water, which is a liquid waste product from food production. The cream puffs are produced locally in Copenhagen and are both vegan and gluten free.

**Residual resource:** Aquafaba (chickpea water)  
**Collaborative partners:** Food producers (resource suppliers)  
**Contact:** glean.dk



## Vintre Møller

**Residual resources:** Sloe, cocoa shells  
**Collaborative partners:** Birthesminde & Friis Holm (resource suppliers), Erhvervsforum Roskilde (facilitator)  
**Contact:** Vintremoller.com  
**Open to new partnerships**

**Vintre Møller produce high quality liquor using use organic and locally grown grains and botanicals. The distillery, which was founded by Henrik Hammer in 2018, focuses on self-sufficiency and collaborates with several local manufacturers to utilize waste products, such as sloe (blackthorn) and cocoa shells.**

**Quality product produced locally**

In 2018, Henrik bought an old watermill located in Mid Zealand wanting to establish a distillery with a focus on self-sufficiency, responsibility, and local collaborations. Today, Vintre Møller uses solar power for production, and water from its own artesian well.

Furthermore, Vintre Møller source local raw materials as much as possible and collaborates with the public job centre to activate unemployed locals.

“When we start something here, we talk to our local suppliers, in order to source as locally as possible.” But for Henrik, it’s also about considering reuse and local resource streams, where one company’s waste, can be another company’s treasure.

**Circulation of raw materials and waste resources**

Closeby Vintre Møller is Birthesminde, a pig production that Vintre Møller collaborates with – a collaboration that goes both ways: When Vintre Møller produce the whisky, spent grain becomes as a residual product, which can be used to feed the pigs. On the other hand, Henrik picks sloe at Birthesminde for free, which Vintre Møller uses in the production of sloe gin. Subsequently, the leftovers from the sloe production are returned to Birthesminde, as pig feed.

Additionally, Vintre Møller collaborates with the chocolate producer Friis-Holm. They use the sloe gin to give the chocolate more flavor, while Vintre Møller uses left over coca shells from the chocolate production as an ingredient in the cocoa liqueur.

Mikkel Friis-Holm, the founder of Friis-Holm, and Henrik met each other and began a collaboration exchanging raw materials and waste resources: “It is a question of presenting the concept to the right person and in the right way, so the potential collaborative partner can see the benefits”. This circular way of thinking locally and using each other’s products and waste resources have been a goal for Henrik and Vintre Møller from the very beginning.

**Takes matters into his own hands**

The collaboration with Friis-Holm proceeds as follows: when Henrik picks up the cocoa shells from Friis-Holm, he brings the gin with him. Because the collaborations take place locally, it makes sense for Henrik to transport the raw materials and the waste products himself.

Vintre Møller is open for collaborations utilizing other local waste resources, yet it is important to him that the collaboration gives value for both parties.



**Sustainability, creativity, and value – the key to good business**

Both Vintre Møller and Friis-Holm are members of a local business forum, where local businesses develop, discuss and establish collaborative projects, with a focus on seasonal products, sustainability and circularity etc. For Henrik, it is important to think about sustainability, while nudging the consumer to change their behaviour, especially when it comes to better utilization of resources.

Henrik advise to rethink innovation and creativity, but also consider that value might be more than economics: “Obviously, it only works if it creates value for both parties. And again, the value is not only financial – the value can be that you are doing something great together, which can be used in your brands storytelling”.

## Pond

**Pond from Aarhus have developed a biobased and biodegradable type of plastic, made from natural waste resources that can be used as a substitute for conventional fossil-based plastic.**

As a part of a project on symbiosis collaborations in Aarhus Havn, where the company is placed, Pond found out that the food manufacturer AKK, who is also located on the dock, have residual resources in the form of shea seeds. The shea seeds are considered waste and are usually incinerated. Now Pond receives the shea seeds from AKK. The shells are crushed and mixed with Pond’s biobased plastic, which makes it possible to 3D-print a chair solely made of plants and recycled shea seeds.

**Residual resource:** Nutshells  
**Partners:** AKK (resource supplier)  
**Contact:** pond.global



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**Being green is very important to me, but I also consider it an opportunity to communicate to the end consumer. By increasing awareness of being green and we hope that the customer also becomes a little more responsible.**

- Henrik Hammer, founder.





# Hegnsholt

**Residual resource:** Leftovers from different food productions  
**Collaborative partners:** Puglisi, Foodpeople, Copenhagen Distillery, Empirical Spirits, Østergård (resource suppliers)  
**Contact:** Hegnsholt.net  
**Open to new partnerships**

**Hegnsholt is an organic farm in Lejre that uses different collaborative partners' leftovers from food production like feed for the farm's chickens, pigs and sheeps. In the farm shop, Hegnsholt sells its own food products, furthermore they frequently deliver to 25 restaurants in Denmark. According to farmer and owner, Johanne Schimming, Hegnsholt exemplifies what the future may look like for a more sustainable agriculture and farming supported by resource collaborations.**

Johanne started Hegnsholt in 2014 with a desire to proof that it is possible to produce quality food and run a farm in a more climate

friendly way: "Agriculture plays a significant part in the climate crisis. If we could stop the resource consumption related to producing and transporting feed, then we would have overcome a large part of the climate challenge".

## Flourishing collaborations

The idea of using residual resources came from a conversation that Hegnsholt had with their customer, Puglisi. When Hegnsholt delivered eggs to Puglisi, it was an obvious opportunity to take old bread and leftovers from vegetables back with them and use for animal feed. Today, Hegnsholt is collaborating with different cafes and kitchens on utilizing by-products, which the organic farm is using as feed for their animals. Including bread from Foodpeople, spent grain from Copenhagen Distillery and Empirical Spirits as well as other waste resources from Østergård, who produces flour. Hegnsholt usually does not pay for the residual resources, when they collect them.

It is not always easy to get access to the resources. This is partly due to the fact, that the foods must to be organic, and partly because the collaboration must make sense for both parties, e.g., when it comes to logistics: "We get a lot of inquiries, but some of them are too far away. Or then they are not certified organic". Even though Johanne experience a great interest in resource collaborations, it is especially the unclear rules for food resource management that can cause concern among potential partners. Here, Johanne would like the municipality and the Danish Veterinary and Food Administration help create clear guidelines.

However, it should not ruin a potential partnership, since it usually involves changing some routines. Hegnsholt is always on the lookout for new collaborations with companies that have residues waste from food production.

## Manages transport themselves

When Hegnsholt establish a new partnership with a company, they offer to deliver vessels or containers that the company can collect their waste in. Hegnsholt collects the vessels themselves once or twice a week, and delivers a new vessel at the same time.

To begin with, Hegnsholt used a trucking company to collect the residual resources, but in the long run it didn't make sense, since they drive four times a week anyway: "We deliver eggs two times a week, and back with us we have residual resources. Og then we have bought a truck and hired a driver, who drives three days a week. We are out five days a week to collect waste products".



”  
**We are very open and interested in new residual resources. Especially those that are a bit calorie-dense.**  
 - Johanne Schimming, farmer and owner of Hegnsholt



## Seeing the value of waste

Though the food products from Hegnholts are expensive, they take a stand on animal welfare and climate. And that is something that their private customers and collaborative partners buys into – several of the partners use it in the marketing of their products and their work with sustainability.

In the future, Johanne hopes that waste is a thing of the past, and that we all become better at sorting and using the valuable resources that waste also consist of: "in the future, we cannot continue to manage resources as we do today. We cannot allow ourselves to throw out valuable resources. We have to keep the good resources in the ecological ecosystem".

One advice from Johanne is to take the leap. Of course, you must know the rules and guidelines, but by thinking creatively, challenging the possibilities and join forces, a lot can be achieved: "You really need to have a positive attitude. Then anything is possible".

# Buggin Denmark

**Copenhagen's Buggin is Denmark's first urban insect farm.**

Insects as food is part of the solutions to the resource scarcity in the future, since they are rich in protein and emit less CO2 as well as require less water in production. As part of an urban ecosystem, Bugging's insects are fed with waste products from other companies – for example Spent grain that is a waste product from beer production. Other than that, the manure from the chickens is used to grow vegetables in planters.

**Residual resource:** Spent grain  
**Collaborative partners:** Beer-producers and other companies (resource suppliers).  
**Contact:** buggingdenmark.dk

# Fruitleather Rotterdam

**The Dutch company Fruitleather Rotterdam produces mango leather of discarded mangoes, which the company resells to manufacturers of shoes, bags, furniture, and interiors.**

Due to the demand for "pretty" fruits from the food industry, up to 40% of all fruits are discarded because of spots, marks or different forms – despite of the fact that nothing is wrong with them. The designers, Koen Meerkerk and Hugo de Boon, who are behind Fruitleather Rotterdam, have a vision to create awareness around food waste and at the same time show that discarded food products still have potential as resources in new products. Also, the company wants to create an alternative to the world's resource-heavy and polluting leather production.

International example

**Residual resource:** Fruit  
**Collaborative partners:** Unknown  
**Contact:** fruitleather.nl





International example

## EcoX

**Residual resource:** Cooking oil

**Collaborative partners:**

Companies, schools, football stadiums, hotels, restaurants (resource suppliers), Mistolin, Sovena (strategic investors)

**Contact:** info@ecox.pt

The Portuguese company EcoX produces cleaning products from recycled cooking oil from both restaurants, hotels, as well as schools, and football stadiums. The method, where a protein enables the production of detergents from cooking oil, has been created and later patented by EcoX.

Back in 2016, Dr. César Henriques identified a protein which makes it possible to fuse cooking oil and water. The unique mixing technology, became the start of EcoX and the production organic and biodegradable cleaning products.

### Sought out companies – now, it's the other way around

To be able to produce detergents, EcoX needed cooking oil. In the beginning, they sought out different collaborative partners themselves, who would be willing to enter into a partnership, where EcoX would receive cooking oil as a residual resource after cooking.

The idea and method quickly became a success, which means that today, EcoX is contacted by companies and institutions, who are interested in the concept, on a daily basis. And rightly so. Because EcoX's products costs around the same as other similar detergents on the market. According to Guilherme Bastos, who is a business developer at EcoX, the customers are choosing the company's products, because of the circular mindset of reuse both the packaging as well as working with waste as a resource, while matching the market price. They primarily sell their detergents in bulk, 20 liters per container.



### The circular collaborations give discounts

The collaboration works the following way: EcoX pays for and are responsible for transportation; in return, they do not pay for the cooking oil. To support a circular collaboration, EcoX offers a discount on their detergents as well as collection for free of used packaging for the companies, who provides cooking oil to EcoX. The packaging is then reused for another sale. Private customers have the opportunity to get a discount on the products as well, when they hand over their empty packaging.



**We collect our empty packaging, clean them, and use them for another sale.**

- Guilherme Bastos, Business Developer at EcoX.

### Future prospects look crystal clear

Today, EcoX collaborates with about 200 strategic partners and have just secured investors Sovena and Mistolin, who work with respectively cooking oil and detergents. This gives EcoX the opportunity to scale up the business going forward.

In the laboratory, EcoX is also researching and experimenting with new materials, so that the company can begin to expand their product portfolio and work with different waste streams.



## Leap

**Leap is a plant-based alternative to leather developed by Beyond leather in Copenhagen.**

Apples are the fourth most consumed fruit in the world, and around 3 million tonnes of apple waste are generated every year. Leap's leather consists of 64% recycled apple waste that Leap receives from collaborative partners in cider and juice production. Leap uses energy efficient methods in the production of the leather and therefore uses 99% less water and 89% less CO2 compared to the production of conventional leather.

**Residual resource:** Apple waste from cider and juice production

**Collaborative partners:** Cider and juice producers (resource suppliers)

**Contact:** explore-leap.com

International example



## UNWASTE

**UNWASTE is a Dutch company that uses leftovers in the form of orange peels and coffee grounds in the production of soap for hands and body.**

By using these residual resources, UNWASTE utilizes the natural citrus scent from orange peels and the coffee grounds' color and ability to scrub in their production of soap bars, hand and body soap, and hand spray.

**Residual resources:** Orange peels, coffee grounds

**Collaborative partners:** Unknown

**Contact:** unwaste.nl/contact





# Textiles

In recent years, textile waste has gained increased awareness, due to the high amounts of textiles that are discarded every year, but just as much because of the potentials of used textiles as a residual resource. Primarily known as a material for clothes and shoes, textiles is also used for duvets, mattresses, blankets, and pillows etc.

Today, there are different possibilities and potentials for textiles to be circulated and reused. Clothes and interior textiles are collected and resold by charity organizations and resale concepts, while other companies transform used workwear, sheets, and old tarpaulins into new products such as shoes, bags, clothes, and furniture.

In the catalogue, you will find several companies that have created a business based on reused textiles, which would otherwise have been discarded. The cases showcase a wide variation of products made from textile waste.



**Residual resource:** Textiles  
Collaborative partners: The Salvation Army, Elis, WHY7 Jeans (resource suppliers), Portuguese production plant (production)  
**Contact:** vaerupcycled.com  
**Open to new partnerships**



## VAER

**The Copenhagen company VAER, formerly known as Wair, designs sneakers of discarded jeans and workwear. VAER upcycles textiles by using them as they are; this means that they don't shred or process the textiles, but retain the fiber at its high value.**

Founder of VAER, Lili Dreyer, has always worked with textiles and redesigned clothes. In her master's thesis she began to dive into textile waste: "I became aware of how much waste there is and realized that we must be able to recycle at a larger scale". From this thought, VAER was born.

### Tests and adjustments defined the direction

Lili started to test the hypotheses and examine, whether it was possible to obtain discarded textiles, but also which amounts were accessible. She contacted different collectors and companies that had a lot of textile waste, and slowly, a network was established.

A key player was Trasborg in Taastrup, who collects and sorts textile waste, which is subsequently sent to large parts of Europe. "They actually gave me 100 kg of textile waste that I began sorting and analyzing". VAER is not using textiles from Trasborg today, but they have been absolutely central in understanding the market for used textiles.

Trasborg also put VAER in contact with the charity organization, Frelsens Hær, who the company collaborates with today. It was due to this encounter, Lili adjusted and began working with jeans in blue, black and white.

### New challenges

The growing team at VAER met challenges in regards to finding a shoe manufacturer that could transform the used textiles into sneakers, since textile production today is largely constituted by standardized forms of work with large rolls of new textiles. For this reason, VAER has now moved their production to Portugal, where they found the only manufacturer that wanted to work with upcycling, because they had experience from previous similar pilot project.

Today, VAER receives discarded workwear trousers and jackets, tablecloths, and jeans from different stakeholders. Frelsens Hær, Elis and WHY7 Jeans are the primary collaborative partners. The one thing that the selected partners have in common, is that they want to sort out and donate the textiles that VAER needs; even though there is no direct financial gain for them. VAER collects the discarded textiles themselves from Frelsens Hær approximately every three months on a cargo bike or in a car, while Elis and WHY7 often deliver the textiles themselves to VAER. Logistically, VAER can sometimes be challenged by the fact that the textiles, which they receive, are not always delivered continuously, since the collaborative partners not always manages to sort out enough textiles.

When VAER considers new collaborative partnerships, it requires that the partner is able to deliver a large batch of the same textile for a continuous flow.

### Even more recycling

VAER have been a part of establishing Textile Remakers Denmark, which is a network for companies working with redesign and repair of used textiles. Here, the companies meet and share their experiences and challenges, they and discuss, among other things, the possibility of establishing a central warehouse. The network is open to more members, accepting companies that work with textile recycling. Furthermore, Lili dreams of expanding their product portfolio at VAER and making upcycling a real solution to the many quantities of textile waste that currently exist.



**We are happy to receive batches of textile waste, but they must be large enough to be used for the construction patterns we work with.**

- Lili Dreyer, founder and CEO at VAER





Additionally, one of their goals is to develop their take-back model, ensuring that VAER sneakers can be optimally recycled after use. For Lili and VAER, it has been motivating to discover what networks and communities can create of value – value that can be difficult to predict in the beginning. Lili's best advice is to gain a good understanding of a waste resource and establish a good dialogue with the related actors. In addition, testing and an open mind, that ideas can be adapted from, are important parameters so that the waste can be used in the best possible way.

## Pleasant

**Pleasant is a Copenhagen clothing brand that redesigns used textiles such as bedding and curtains into shirts and caps.**

With the philosophy that “the best products, you can create, are products made from textiles that already exist”, Pleasant upcycles used bedding and curtains. The production takes place in Asia and Europe, where the textiles are redesigned into colorful shirts and caps, which are sold in the store in Copenhagen and at their webshon. Long term, Pleasant wish to expand its business and exclusively sell products from reused textiles, and thereby contributing even more to the reduction of textile waste.

**Residual resource:** Bedding and curtains

**Collaborative partners:** Thrift stores

**Contact:** pleasant.dk



## Bakano

**Residual resource:** Leather  
**Collaborative partners:** Kirkens Korshær, FORS, individuals (resource suppliers)  
**Contact:** bakano.dk  
**Open to new partnerships**

**The company Bakano in Holbæk works with used leather from discarded sofas and clothes from various suppliers. Bakano produces bags, purses and bespoke products from the leather, that would otherwise have been thrown away. They also perform classic tailoring work, where they repair and extend the life of old leather products.**

Astrid Ågot and Wilmar Nieto are the founders of Bakano. The idea for Bakano came when Wilmar arrived in Denmark from Colombia and was surprised by the large amounts of leather, that are thrown away rather than being reused. With a background as a fashion designer and experience in the production and repair of leather goods, Wilmar knows about leather's durable properties. With this knowledge and the motivation to create positive climate impact, Wilmar and Astrid set out to investigate how used leather could be used to create new products.

### From flea markets to partnerships

To start with, Astrid and Wilmar visited various flea markets and bought used leather products. Eventually, regular people began contacting Bakano in order to donate old leather jackets and discarded leather couches. Most often, people deliver the couches themselves, but Bakano also offer pick-up if the customer lives close to the workshop, and Bakano assesses that it makes sense: “We make a product that we call bags with memories, where the customers themselves deliver the leather resource, and get a personal bag sewn out of it,” explains Astrid.

Today, Bakano also collaborates with Kirkens Korshær, a charity organization and secondhand store, and the waste company FORS, which operates recycling centres near the company.

### Leather from different suppliers

The collaboration with the local Kirkens Korshær, works so that the organization donates the couches and jackets in leather that they have in surplus and cannot sell. The collaboration started when an employee of Kirkens Korshær came to an open house at Bakano. Both parties saw the potential for a meaningful collaboration: “When they have leather in their store in Holbæk, such as jackets, which they can't sell they put it in a bag, and then I come and pick it up,” says Astrid.



**Tonnes of leather is thrown out every year – everything from couches to clothes. So, there is something meaningful in lifting this resource out of the waste wheel.**

- Astrid Ågot, Founder of Bakano



Recently, Bakano itself contacted the waste company FORS, which operates recycling centres in Holbæk, Lejre and Roskilde Municipality. FORS was open to the idea of a collaboration, and today Bakano receives various leather products from one of the local recycling stations.

### Leather with stains and cracks are also valuable resources

When Bakano receives a leather couch or jacket, they are responsible for cutting up the couch and extracting the leather. It is important to examine the leather to assess how it can be used. The design phase is based on the expression and surface of the leather, and Bakano always strives to use as much of the material as possible, even when it has significant traces of wear.

If the leather is stained or cracked, it can be used as lining in bags or hand-painted, so that it has a completely unique look. However, Bakano prefer to receive larger pieces of leather, as this can be used for larger products.

### Future will entail more space and new collaborations

Currently Bakano's workshop is located in Astrid and Wilmar's basement, but they hope to be able to move to larger premises and thus have more space for production and storage, which in the future will also provide an opportunity to establish more collaborations. At the same time, Bakano see opportunities in various forms of collaboration – for example around the couch skeletons that they are left with when the leather is extracted. There is a potential in re-upholstering the couch skeleton and reselling it: “For a long time we have tried to find someone who is interested in buying and reusing the couch skeleton, so that we can use as much as possible of the discarded products” Astrid explains.



## Veras

**The colorful recycling concept Veras, founded in Copenhagen in 2016, is known for its work in combating clothing waste through a circular clothing exchange concept and clothing markets.**

In 2020, Veras established a collaboration with the laundry service, De Forende Dampvaskerier (DFD), who are responsible for washing and renting textiles for public institutions and the hospitality industry. From discarded duvets and laundry bags provided by DFD, Veras designed the collection “The V-cycle Collection” consisting of jackets, vests and bags in various prints and colors. The collection was partly sewn by women from the socio-economic company, Huset Venture, who works to create jobs for people with disabilities.

**Residual resource:** Duvets, laundry bags

**Collaborative partners:** De Forende Dampvaskerier, DFD (resource supplier)

**Contact:** verasvintage.dk







### Residual resource:

Tights

### Collaborative partners:

Det Kollektive klædeskab, Den Kgl. Ballet, fashion stores, warehouses, thrift stores (resource suppliers), public support schemes (facilitator)

Contact: deardenier.com

Open to new partnerships

## Dear Denier

**Dear Denier is a Danish company, founded by Katrine and Frederik Drost Lewinsky in 2012, designing and producing socks and tights. With a take-back scheme and technology to recycle used tights in development, Dear Denier hope to be able to nudge the stagnant niche industry.**

After several years in the industry, Katrine had seen how tights are only used a few times before they break and then are thrown out. With a desire to push the industry in a more sustainable direction, Katrine started Dear Denier and set out to develop new ways of recycling tights and to integrate a scheme for collecting the tights, when a stitch have dropped.

Since then, Katrine's husband, Frederik, has joined, and together they work to develop the project with used tights: "We would like to exclude the need for virgin materials and only work with a closed loop, because we have plenty of material to work with," explains Frederik.

### When the solution is missing, it must be invented

In the production of tights, Dear Denier has a goal of producing with renewable energy and reduce the impact on people and the environment as much as possible, by using recycled materials.

The challenge of recycling tights is the requirement to separate elastane and polyamide, which most often are the main components of tights – as the method for this material disassembly has not yet been found. Therefore, Katrine and Frederik, with support from both Innovationsfonden, Grøn Cirkulær Omstilling og SMV Grøn, and help from scientific research, they have begun the development disassembly methods to separate elastane and polyamide. The project is already running, and the next steps are to explore opportunities to scale the method.

### The incentive to change practices

In relation to the project, Dear Denier has launched a take-back scheme. With the scheme, they collect used tights so the materials can be included in the production of new tights. The scheme works so that the customer, together with their newly purchased tights, receives one pamphlet with information about the scheme. At the same time, all wholesalers are given the opportunity to set up a collection box from Dear Denier, where the customer can hand-in their discarded, and washed, tights. When the box is full, the wholesaler prints a shipping label from Dear Denier's website and sends it to Dear Denier, who then sorts the content.

Additionally Dear Denier collaborates with other companies and institutions, both in Denmark and in countries such as Austria, Germany and Norway. Where Katrine and Frederik initially contacted various companies with the intention of collaborations, they are now regularly contacted by companies who wish to take part in their take-back scheme. Today, Dear Denier's collection boxes are set up, for example, in various second-hand shops, at Det Kollektive Klædeskab and at The Royal Theater in Copenhagen, where everything from tights to active wear are sent to the company.



**” We also have a collection bucket at The Royal Theater for the ballet dancers, who use a lot of nylon products – both tights and active wear. They fill our large collection bin relatively quickly.**

- Frederik Drost Lewinsky, owner of Dear Denier

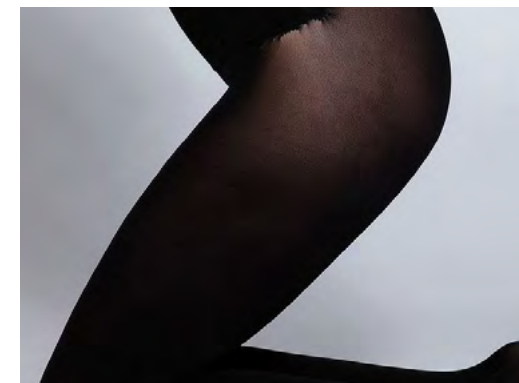
In general, Katrine and Frederik are experiencing a growing awareness and an increased interest in changing the consumer culture around, for example, tights: "There has been full support. They think it's really exciting, and there are many who have not actually been aware of the problem".

Dear Denier also works determined to create awareness about the problem, for example by making Danish championships in the collecting of tights.

### Help is given to the one who asks

Dear Denier's future plan is to expand and that the project of developing a method for separation elastane and polyamide succeeds. Since the driving force behind the company is to make a difference and contribute to the transition of an otherwise entrenched niche industry.

A piece of advice from Frederik to others who wish to start a similar project, is to investigate the possibilities for financing in the form of funds and financial support. Furthermore, it is important to secure commitment from collaborative partners, and finally you should not be afraid to reach out and ask others for advice.



**” You must be bold enough to reach out and not be afraid to contact people who have knowledge in the field. The worst that can happen is that you get a no.**

- Frederik Drost Lewinsky, owner of Dear Denier



**Residual resource:** Hospital duvets, sheets etc.

**Collaborative partners:** DFD, sewing rooms in Lithuania and Romania

Contact: www.upcy.dk

## UPCY

**At Upcy in Skovlunde, they reuse discarded hospital duvets and sheets from the De Forenede Dampvaskerier (DFD) into jackets and shirts. With this initiative, Upcy works to extend the life of the textiles, while putting focus on responsible consumption and production.**

### 1 tonne of discarded textiles a day

Upcy originated from DFD, which is Scandinavia's largest laundry group with 15 locations throughout Denmark. DFD washes textiles for companies and public institutions such as hospitals and restaurants. In the process DFD discards approx. 1 tonne of textiles daily due to wear and holes. Already 15 years ago DFD came up with the idea for Upcy – to "upcycle" and thus reuse discarded textiles. But due to low demand, the initiative was not implemented - until four years ago, when the idea was finally realized.

Today, Upcy sends 40% of the discarded textiles back as new products to DFD, which DFD can resell to its customers. Through this process, the textiles return in the same loop, so to speak.

### New workflow requires patience

However, the establishment of Upcy was not without challenges. Reorganizing 1,500 employees to think in sorting while setting up logistic sorting systems has been a big challenge, says Peter Bjerg, marketing manager at Upcy: "In the past, you could just throw things in a big pile that ended up in the container. Now they have to sort it. It is a challenge, because there is not always room for it, and the laundries are not designed to store it".

Peter emphasizes the importance of having the management behind you. To communicate the purpose of the project and be persistent in the implementation phase, while showing understanding for the employees who are actually working with it. It is a learning process where systems must be continuously corrected and evaluated. For Upcy, it has been important to start thinking in large productions, as smaller scale does not make sense to either them or customers: "It really is a message – think in big processes".

Read on →



### From waste to new products

At DFD's laundries, the products are sorted and repaired if possible. But when that is no longer possible, the textiles are sorted into 11 categories in terms of materials and colors, after which they are sent on to Upcy. Once Upcy received the textiles, they are sorted and sent to the warehouse. From here, the design of the new products begins, which are sent to sewing studios in Lithuania and Romania. When the products are finished, they are sent back to DFD and on to sales in the same cycle.

### The potential in recycling

There is a growing demand for sustainable solutions, and though it has so far been a more expensive model to reuse the textiles through Upcy, Peter sees great potential in working with waste textiles: "I look at it positively and I sense that it is something that customers also wants". Particularly recycling of textile waste is in high demand, and Upcy and DFD also communicates it wherever they can – for example to guests at hotels that use Upcy's textile products.

Although Upcy aims to use as many textiles from DFD as possible, they also sort out textiles that they cannot use themselves. Besides giving other companies the opportunity to buy the sorted textiles, Upcy has also invested in a company in Sweden that works to break down the textiles and turn them into sewing thread.

### Time consuming, but worth it

Even though it has been a heavy and time-consuming process, Peter and Upcy believes that reuse and recycling of textiles are the way forward. And at the same time, it has a positive effect on the collaboration with the customers who buy the upcycled textile products: "We feel that the collaboration almost becomes a partnership with the customers who choose to join this initiative".

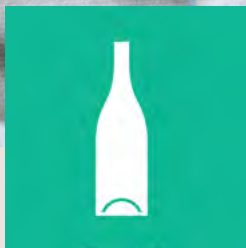
A piece of advice from Peter to others, who wish to join symbiosis collaborations, is: "Consult with someone who has been on this journey before. I think there are a lot of steps that you can skip if you take experience from others who have walked the same path".

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**It's really the same principle across markets. A tablecloth becomes a chef's jacket, a sheet becomes a shirt, aprons become patch aprons and so on.**

- Peter Bjerg, marketing manager at Upcy







# Glass & ceramics

Glass and ceramics are used in many different contexts today. While ceramics in the shape of bricks, tiles, stoneware and clay are widely used in the construction industry, glass is most often used as packaging for food and drinks. Previously, both glass and ceramic waste have primarily been used as mineral wool products for insulation, but today both fractions have several different and interesting potentials for recycling.

On the following pages you can read more about exciting companies that in their own way, work to give glass in different shapes and colors, and ceramics in the form of surplus clay, which would otherwise be wasted, a new life by transforming them into products and combining them with other residual materials, such as porcelain and metal.



## Bettina Schori

**Residual resource:** Glass bottles, cans, glass from frames, metal

**Collaborative partners:** Restaurants, cafes, framing shop, individuals, metal turners (resource suppliers)

**Contact:** schori.dk

**Open to new partnerships**

**Bettina Schori makes artisanal crafts in various waste materials, including glass and metal. She is educated at the Design School in Kolding, and her business Bettina Schori is located in the northwest of Copenhagen.**

"I have always been interested in working with recycling, and I have always liked to mix different materials" tells Bettina Schori. The products are unique and are designed from product to product. For example, she makes vases from old bottles.

### Always looking for recycled materials

Bettina uses many different materials for her production. She obtains the materials by finding and collecting them for example from containers, but she has also have various short-term agreements with restaurants and cafes, where she would come and pick up their used wine bottles.

Bettina previously made things with collected cans, scrap, metal from a metal turner and glass from frames that have broken. Previously she even used another company's packaging.

Bettina have also experienced that individuals contact her about materials they have lying around. Sometimes, she makes products in which a special personal thing is included in the design.



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**If it's a special bottle where I like the color or shape, then there are some cafes that have put them aside for me.**

- Bettina Schori, founder

In general, Bettina is met by a desire and motivation to participate and collect glasses for her. She may encounter skepticism about whether the bottles that are set aside will be picked up, but as long as the bottles are picked up as agreed, the collaboration continues. Bettina believes that the willingness of her collaborators to sort and set aside materials for her is there, but the barrier is often lack of space. Another challenge may be that an employee throws it out because they were not informed about the collaboration.

People are generally good at giving advice on where she can find new resources. They might work in a place where there is an excess of waste resources.

### The process from wine bottle to vase

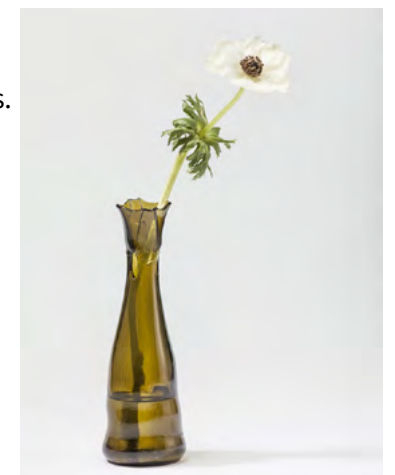
Although Bettina does not pay for the waste resources, it would often be cheaper to buy new materials when you consider the working hours required to be able to produce products from residual materials.

"First the bottles must be soaked so that you can remove the labels, then they are cut and holes are drilled, then I hang them up in iron racks that are welded for the purpose and finally they are heated in the oven," Bettina explains about the process.

The customers of her products are most often interested in both design and recycling. It is clearly a selling point that the products have been redesigned from residual materials, Bettina believes.

### Demand for design classes

There is a growing demand for courses where people can work with waste and produce their own products. Bettina is considering to initiate a class, and in that context, it might make good sense to have more waste resources available.





**Residual resources:**

Porcelain and stoneware

**Collaborative partners:**

WAUW design (resource supplier)

**Contact:** facebook.com/ CLAYground

**Open to new partnerships**

# CLAYground

**CLAYground makes ceramics produced from waste in the neighborhood around Bopa's Plads in Østerbro, Copenhagen. The ceramist, Maria Jakobsen, is the owner of CLAYground and got the idea to work with 100% waste after working in a workshop for a larger, local ceramist.**

When producing porcelain and stoneware, there is usually an excess clay, which does not become part of the end product. "When you are done, there are a lot of clay flakes that have been cut off," says Maria. She continues: "As a workshop assistant, I have had all the flakes that had to go down in a bin, and on to the waste station." According to Maria, it was a pity that the clay was thrown out and wasted, so she got permission to take it for her own production.

**Fixed agreement with local potter**

Now she buys waste clay from WAUW design, which among other things have a large production of exclusive porcelain vases. In order for the clay to be recycled, the off-cuts must be kept separate depending on the type of clay. WAUW design now sorts their waste in different buckets and Maria can pick it up for free. For Maria and CLAYground, it means a lot that WAUW design sets aside time to sort their leftovers in return for having less waste.

Maria picks up the clay on her bike and processes it to be reused. The process is straightforward, but also so timeconsuming, so the larger workshops choose to buy new, fresh clay instead.

**Search of more stoneware**

Maria has set a goal of only using leftovers and using all WAUW design clay waste, but she can no longer keep up when it comes to porcelain clay. On the other hand, she could use more stoneware, and looks forward to increasing the production of stoneware items when the right type of clay in sufficiently large quantities comes around.

One of the commercial channels in which CLAYground sells its products is through the shop 'Den Cirkulære' in Nørrebro. It is a unique collaboration between companies in which they have a joint store for fashion and design created fully or partially by waste. It works such that the members each take care of the store one day a week – and thus can dedicate the rest of the week to their production.

Maria also wants to produce for local retail stores, but is currently limited by her small workshop space. "I have not been lucky enough to find a suitable workplace at a reasonable price here in my neighborhood, and I do not really think it makes sense to rent a larger space to be able to produce more, just to use the increased earnings to pay for rent " she says and continues, "on the other hand, it would of course 'save' some more clay".



**I have set myself the goal of only using residues clay and using all WAUW design clay waste.**

- Maria Jakobsen, owner of CLAYground







# Plastics

Plastic is everywhere. It comes in both hard and soft packaging to pack food so that it does not rotten during transport, or in products such as toothbrushes, garden furniture, toys and car parts, which we use every day. At the same time, there are many different types of plastic with different shapes and properties. World production of plastics has increased exponentially, and recycling has not kept up.

Plastic is both an indispensable and durable material. Not least as a residual resource, where plastic can be recycled into new utensils and furniture, which thereby contributes to reducing the production of new plastic.

On the following pages, you can read more about different companies that use plastic and its many properties as a residual resource in their company. Read how they help divert plastic from being waste to a new resource.



**Residual resource:** LDPE, PDH og PP plastics  
**Collaborative partners:** Ulstrup Plast, schools, pharmacy, companies (resource suppliers) Bæredygtig Bundlinje (facilitator)  
**Contact:** acirculardesignstudio.com  
**Open to new partnerships**

## A Circular Design Studio

**A Circular Design Studio has its production in Skovlunde, just outside Copenhagen, Denmark. The company recycles waste plastic into interiors, installations and works of art, and works by the term that their products must be able to be recycled again after use.**

Andreas Zacho, Creative Director and CEO of A Circular Design Studio, previously taught about plastic pollution. From there, he took the plunge and began to exploit the potential of the waste plastic.

### The first collaboration

One of Andreas' friends contacted Andreas and told him that there was a lot of excess plastic at the pharmacy where he works. Andreas and his friend therefore made a test, which showed that it was quite easy to recycle the excess plastic.



“For the pharmacy, it was really just a matter of adding an extra rubbish bin, and then we could recycle a couple of 100 kilos of plastic a month,” tells Andreas.

Other similar collaborations have subsequently emerged, and it is everything from plastic producers and molders to individuals, who contact Andreas with waste plastic that they would like to get rid of. A Circular Design Studio also participates in the programme Bæredygtig Bundlinje, which focuses on local symbiosis in the cities Herlev and Ballerup, and through this, they are sometimes connected with new companies that have waste plastic they have to dispose of.

### Always testing before setting up the logistics

Before A Circular Design Studio starts a new collaboration, they always test the plastic and the collaboration before scaling. This is done by collecting materials over a few days and checking whether the type of plastic can be used, for example the purity of the collected plastic fraction. Only when the tests are positive, they think of more practical matters such as logistics.

In most cases, A Circular Design Studio is responsible for the transport, but gets the plastic for free. The company, which they receive the plastic from, in turn, saves money on not having the waste collected. In some cases, A Circular Design Studio pays for the waste plastic, but only when it is the best quality and completely clean.

### Handling of the plastic

A Circular Design Studio prefer that the company that produces the plastic washes and sorts it before it is picked up. “It is an extra workflow, and the company that has to get rid of the plastic spends some time setting it up. It is one of the big challenges to get the sender to wash the plastic,” tells Andreas.

That is why A Circular Design Studio also has a partner, who can clean and at the same time grind the plastic for them. However, a minimum of one tonnes must be used at a time. Because it is plastic, on the other hand, there are no greater requirements for how it should be stored, and it can be stored outside as well as inside. Andreas believes that it is important to set up structures in collaborations, if one wants to receive the waste resource continuously.

### Production

Once A Circular Design Studio has picked up the plastic, it is sorted into colors and types, and is then grounded separately. Subsequently, they can make the color mixes they want. They mold in large sheets by heating the plastic and pressing it to a total mass.

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**In 99% of the cases, we pay for the transportation, but not for the product.**

- Andreas Zacho, creative director and CEO in A Circular Design Studio



Their products are milled out of the sheets and polished. In some cases, companies would like to buy products that has been produced with their own waste. Then they deduct the material price, so they get a little discount on the products.

### Greater motivation from companies to enter into symbiosis

Andreas sees a growing potential in recycling plastic. He sees a shift in attitudes towards sustainability, at the same time as it is also becoming more expensive for companies to get rid of their waste, which is also a motivating factor. He also believes that the extended producer responsibility, which will come into effect in 2025, will help boost the industry.

A Circular Design Studio is interested in receiving more waste plastic in the immediate area in and around Copenhagen, and is specifically interested in white plastic, for example lids from milk cartons or packaging used for mushrooms, in plastic types LDPE, PDH and PP.



International example



**Residual resource:** Plastic lids from soda bottles

**Collaborative partners:** Not established partners, but collect waste through collection events

**Contact:** wasteboards.com

## Wasteboard

**WasteBoards designs skateboards from recycled plastic lids from soda bottles. 300 million tonnes of plastic are produced per year, and approx. 8 million per year is estimated to end up in the ocean.**

Wasteboard engages their local community by creating fundraising events, for example festivals, with school classes or corporate events. In this way, they raise awareness of the problem of plastic pollution while collecting waste and make it into new products. Each skateboard is made by hand and the original aesthetics and colors of the waste remain. At present they are produced in Amsterdam, but the vision is to open 'WasteBoard Bakeries' in communities that struggle with plastic waste and where local job opportunities can be created at the same time, for example in cities like Delhi or Rio de Janeiro.



**Residual resources:** PE og PP plastics

**Collaborative partners:** Recycling stations, Foundry (rotational molding) (production), Mads Nørregard, Novo Nordisk, AGF (resource suppliers), Erhvervs-hus Hovedstaden (facilitator)

**Contact:** smallrevolution.dk  
**Open to new partnerships**

## Small Revolution

**Copenhagen based company Small Revolution receives waste plastic from companies and molds it into new products. They collaborate with recycling stations and plastic foundries, among others.**

The founders of Small Revolution Arendse Ekegren Baggesen and Mie Hørglyk Mogensen started out with a completely different focus than plastic. They wanted to create feminine urban spaces in Copenhagen, but in the process they quickly became interested in the potential of recycling waste plastic for outdoor furniture. They decided to explore the possibilities, and started out by visiting recycling stations and production facilities that work with plastic, to gain a greater understanding of plastics.



**In the beginning, I did not know how important partnerships are. My business dies if no one will deliver plastic waste to us. Close relationships and partnerships when it comes to waste are paramount, no matter what residual material you work with.**

- Arendse Ekegren Baggesen, founder of Small Revolution

### Dedicated individuals made it possible

They talked to Erhvervs-hus Hovedstaden, which sent them in the direction of Amager Resource Center. Here they talked to an employee who showed great interest in their project. In addition to giving them insights into plastic and how it is handled in Denmark, she also put them in touch with the recycling stations they work with today.

They contacted several recycling stations and asked if they would store certain types of plastic for them. Since recycling stations already have very established systems for handling waste and plastic, it was far from everyone who was interested in doing things differently. So when they mentioned recycled plastic, there were not many who wanted to help, but there were a few enthusiasts, as Arendse describes them, who were ready to sort differently.

At that time, there was only one plastic foundry that would cooperate with them when they mentioned that they wanted to work with recycled plastic. The reason for this is that, as a starting point, it is more cumbersome and expensive to work with recycling plastic than virgin plastic because you do not know the qualities and strength of the plastic type you receive, and therefore it is not as easy to uniform production as when using virgin plastic.

### In the beginning they paid, now they get paid

Initially, Small Revolution paid recycling stations for their plastic in kilograms. Now they are being paid by companies to receive their waste plastic.

It works like this companies contact Small Revolution. The companies deliver their plastic waste, and in return Small Revolution asks the company to buy products back, made from their own waste. Small Revolution sells both products to individuals and to businesses. Arendse believes that for Small Revolution's customers, it is absolutely essential that the product is produced from waste plastic.

### Samarbejde er en vigtig ingrediens i Small Revolution

Small Revolution has established partnerships with specific recycling stations, which clean and grinds the plastic so that it is ready for molding. It is most often the companies that are responsible for delivering the plastic to the recycling stations. The most important thing when companies supply the plastic is that the types of plastics are sorted. If not, the products cannot be reused after use.

When the plastic has been prepared at the recycling station, it is sent to a foundry in Jutland with which Small Revolution has a collaboration, here it is the recycling station that is responsible for the transport.



The processed plastic is stored at the foundry until it is melted into Small Revolution's design. They use the method of rotational molding, because it makes it possible not to fuse the colors together, but instead shows the individual colors in the product. It shows the history of the plastic, which is processed circularly.

Small Revolution has, among other things, made one-off collaborations with AGF and Rudolf Care, and has recently started a pilot project with Novo Nordisk to recycle plastic from their insulin syringes.

### Future potential for waste

Small Revolution sees a huge potential for waste plastic. They are looking into an expansion using more plastic types such as the PET plastic type. Today they work with the plastic types PE and PP.







**Residual resources:** Plastic, coffee beans

**Collaborative partners:** BKI Kaffe, Carlsberg Bryggeri, Novo Nordisk, Grohe (resource suppliers)

**Contact:** materdesign.com

**Open to new partnerships**

## Mater

**Through a technology that can mix different residual materials, Copenhagen based company Mater creates furniture from partners' residual resources such as plastic and coffee fiber. Furniture that the partners can subsequently buy again: "Give us your waste and in return, we'll give you furniture, which you can use in your interior design" explains founder of Mater, Henrik Marstrand.**

In 2006, Henrik Marstrand founded the furniture company Mater, which is based in Copenhagen. The vision is to create timeless design icons based on a sustainable mindset with a focus on the products' creation and extension of the materials' lifespan.

### The collaboration goes both ways

In the beginning, Henrik worked with newly produced wood due to its durable properties. But when he was contacted by a company that converts old fishing nets into plastic, he decided to give plastic a try. This was the starting point for the work with residual resources, and today, Mater works with many different waste streams, including shells from roasted coffee beans from BKI Kaffe, spent grain from Carlsberg, insulin pens from Novo Nordisk and plastic waste from Grohe's fittings and Carlsberg's kegs.



Mater mainly establishes collaborations with partners who are interested in buying the furniture that Mater designs and produces from the residual resources. Both parties must therefore have an interest in reducing resource consumption.

The partners are responsible for sorting and cleaning the residual resource, while Mater is responsible for collection: "We collect the waste in its purest form, one tonne at a time". As the years have passed, Mater has started to pay a low price for several of the residual resources, primarily because several of the large partners have established their own plants for handling their waste.

Mater has production in Europe and the goal is to produce the furniture as locally on the residual resource as possible and Henrik mentions "We want to move our products to where the waste is".

### Crucial but expensive technology

A couple of years ago, in connection with working with recycling waste products, Henrik became aware of a new technology under development at the Danish Technological Institute. The technology can mix residual resources such as residual fiber and plastic, which together form a material that is ideal for building with. Today, the technology is an established part of the production.

Henrik also points out challenges in establishing and using new technologies; as a company you have to, among other things, work on a large enough scale for the technologies to be usable and good enough in terms of price: "The new technologies are still so green and untested, so our products become a little more expensive for the consumer." explains Henrik.



”**We take some fibers, for example coffee shells and waste plastic, and mix it in a machine at high speed. A moldable dough comes out, which we put in the mold pressing tool, and from this we can squeeze a completely finished item.**

- Henrik Marstrand, founder of Mater

### Taking back textiles

Next, Mater is working to offer companies the opportunity to take back the products they no longer want and recycle them into new products. In addition, several waste streams and their potentials are investigated. Henrik really wants to take in all waste fractions, but there also has to be a priority in relation to where the challenges are greatest. That's why Mater has turned its attention towards textile waste. The goal is to be able to work with everything from clothing companies and workwear from industry to hotels' discarded duvets and sheets, which can be transformed into new furniture and included in the hotels' furniture.

### Waste has gone from being a taboo to a resource

Henrik is pleased that waste has gone from being a taboo to a resource and meaningful business model, which to a much greater extent than before is put into system by larger companies. For Mater, an open and curious study of the waste's potentials has been crucial – helped by a strong backbone.

## Relife Studio

**Relife Studio in Hedensted produces various lamps, vases and pen holders from residual resources such as corrugated cardboard and duct plastic from local companies.**

Corrugated cardboard and channel plastic are two widely used materials, which therefore ensures Relife Studio a continuous reception of the surplus resources that would otherwise be sent to incineration. The resources come primarily from the company HL-repro, and if Relife Studio cannot use the resources, they are forwarded to the ReMida Center in Hedensted, which uses them in their construction games and learning process with children from the local community. Relife Studio is still looking for new partners for their growing design business.

### Residual resources:

Corrugated cardboard and channel plastic

### Collaborative partners:

HL-repro, local companies in Hedensted (resource supplier), the ReMida center (resource purchaser)

**Contact:** relifestudio.dk

## Kobensac

**Kobensac produces bags and washing- and waste bags of tarpaulins from the construction industry. The company's workshop is located at Islands Brygge in Copenhagen, where people on the edge of the labor market transform plastic tarpaulins from construction sites, which are usually thrown away after a few times in use, into checkered bags in various sizes and shapes.**

Because the tarpaulins are used on construction sites, they are durable and therefore very useful for waste sorting bags. When the tarpaulins arrive at Kobensac, they are thoroughly cleaned, after which production begins. The company collaborates with several sewing workshops in Denmark that focus on social responsibility. Kobensac sells their products via their website to individuals and companies and also offers specially sewn bags with a logo on.

### Residual resources:

Tarpaulin

### Collaborative partners:

Construction sites (resource supplier)

**Contact:** kobensac.dk







**Residual resource:** Plastic, tarpaulin

**Collaborative partners:** Viking, Aarhus Municipality (resource suppliers) Aarhus Municipality (facilitator)

**Contact:** grunbag.dk

**Open to new partnerships**

# Grünbag

**Grünbag is a company that designs bags from durable recycled materials – including tarpaulins for trucks and inflatable boats. The company was started by the couple Helen Leergaard and Jens Peter, who both have a background in sustainability, Helen from textiles and design, Jens Peter from the wind turbine industry. Today, they collaborate with large companies about recycled materials for their products.**

From testing with discarded tarpaulins to company The story of the soon iconic green bags, started one day Helen came across a factory in Jutland that, among other things, produces tarpaulins for covering trucks, and she discovered how much was thrown out because the tarpaulin did not fit. Here, she was allowed to use some of the brand new but discarded tarpaulins to make tests - and it became the first Grünbag.

Since then, there has been momentum, and today it is no longer themselves, who reach out to partners, but instead companies that contact Grünbag. But even though they have several collaborations today and a successful brand, it has taken time to achieve, says Jens: "It takes time to make a brand; you go through the first years, without making money. You have to start it yourself and you have to be prepared for that".

One of Grünbag's partners that provides resources is Viking, which produces life jackets and lifeboats, among other things. The collaboration arose when Viking contacted Grünbag to find out if they were interested in unused lifeboats, as these must be replaced often due to certain rules.



The collaboration has been a success, where Viking today is a large customer for the "ocean collection", for which they also supply the material.

Another collaboration arose when Aarhus Municipality contacted Grünbag in connection with Aarhus as Capital of Culture in Europe in 2017, where many advertising banners were to be thrown away. Grünbag has used the advertising banners to produce bags.

## Open to new partners with residual materials

For Grünbag, it is important that the materials they use are durable and have a long life. In many cases, they use surplus materials that have never been used. Typically, their partners have a container where materials are thrown out, which Grünbag is responsible for retrieving. This process costs a little, but in return they often get the material for free or buy it cheap. With Viking, the agreement is that Viking cuts up the used boats which are sold to Grünbag, who is responsible for picking up and transporting them. This is followed by a new extraction process, where the pieces must be cut and made ready. Although it has added a task for their partner Viking to have to cut the material, Jens says that Viking is happy with the collaboration: "They can use the good story and it's a nice bag".



One of the challenges Grünbag has struggled with over time has been to establish a fixed framework for their production and materials. Since the company uses residual materials, it can be more difficult to count on certain colors and materials and, as Jens says, it is "a puzzle to make the logistics work". But even though there may be an imbalance between customers' orders and available materials, Jens does not consider it a big problem. Although they get a lot of materials through Viking, Grünbag is always open to talk to potential new partners – however, there are a number of things to keep track of, for example how durable the material is, how much and how often the material is in surplus. "We would very much like to talk to new partners and hear what material they are using. Maybe just try it out. So, we can see if we can think it into an existing or new design". Grünbag tests new materials themselves, and it is a long process from new contacts to real products. But as a basic rule, the material must be durable, and large enough to be cut into.

## Sustainability sells

Jens senses that their customers care a lot about the sustainable considerations that lies in Grünbag's project, which in addition to the very basic concept for the company and the bags, is also a story that they do a lot to convey. Climate, environment, and sustainability are something customers demand, and currently there has been an increase in special agreements with companies that want specially designed products. An example is Soundbox, for whom Grünbag has produced special bags for their speakers.

**” Have patience, nothing is handed to you. And then remember to get materials and products tested thoroughly; one has to think long term.**

- Jens Peter Leergaard, founder and co-owner of Grünbag





# Metals

Metal is commonly used in products and packaging used by Danish households and various industries. It can be anything from the bike, the can of mackerel to the train tracks across the country and the pipes in the house. Much of the metal that the municipalities collect today from Danish households becomes new metal. It saves resources when we recycle metals instead of producing new ones.

Just as there are countless ways to use metal, there are just as many ways to use it as a resource. An old metal pipe can, for example, be included as a sub-element in a new lamp or a waste bin or be included as a new building material. In this catalogue, a number of exciting companies, who work with metal as a residual resource, have been mapped in order to show the diverse potentials of metal.



**Residual resources:** Metal and plastic  
**Collaborative partners:** Rethink Event, VENTI A/S, Stoko Plast A/S, THE UPCYCL  
**Contact:** rethinkevent.dk and theupcycl.com  
**Open to new partnerships**

## Waste Inn

**Under the Do Not Waste It concept, Rethink Event has created the waste sorting system 'Waste Inn' made by the residual resources metal from VENTI A/S and plastic Stoko Plast A/S. The collaboration has been made possible by THE UPCYCL, which helps residual resources from industrial production become new products. The waste sorting system is sold to venues throughout Denmark and is supposed to ensure more sorting of waste from events in order to increase the recycling of the waste.**



**We want people to sort their waste, so that the materials can get a new purpose. Therefore, it really makes good sense that a waste bin for that exact purpose is made by waste materials.**

- Sofie Randel, founder of Rethink Event

The need for better sorting solutions stems from Rethink Events' 25 years of experience with event design and waste sorting for larger events. Sofie Randel is in charge of the agency, which focuses on sustainability. 'Waste Inn' and the other solutions in the Don't Waste It concept can be adjusted depending on the source of the waste and the event for which it is used. Rethink Events' experience shows that waste is sorted better if the waste system is targeted at the waste that the user has in its hand.

In 2020, Rethink Event entered a partnership with the football club AGF and Ceres Arena, which became the first fully waste-sorting stadium. Since then, they have been contacted by the City of Copenhagen to develop sorting systems for the European Football Championship in 2021 and the upcoming Tour de France.

### Green matchmaker found available leftovers

With sustainability as the focal point of Rethink Event, it was clear that 'Waste Inn' should both increase waste recycling from events and at the same time be a more circular product in itself. Therefore, it was obvious to make it from scrap materials from other companies. As a member of THE UPCYCL, Rethink Event has access to purchase more than 150 different New Waste scrap materials from industrial companies. New Waste is a concept that covers continuous cut offs, 2nd sorting or materials that have small optical defects, which means that they cannot be used in the original production – but are perfect in new projects.

For 'Waste Inn', THE UPCYCL found galvanized steel sheets at VENTI A/S and acrylic at Stoko Plast A/S. The sorting bucket is made of residual cutters from ventilation systems, which VENTI A/S produces, and the insert is made of cut offs from sunshades, which Stoko Plast A/S produces. Today, 'Waste Inn' is produced by 75% residual resources.

### Ready to change

Rethink Event buys the residual resources through THE UPCYCL for between 10-20% of the wholesale price of the materials. The founder and CEO of THE UPCYCL, Rikke Ullersted, says that all collaborations they facilitate are different, but in this case VENTI A/S has both the experience, the machines and the opportunity to cut the materials, which Rethink Event pays for. THE UPCYCL takes care of shipping the materials from Stoko Plast A/S to a company that laser cuts them. When the materials have been processed, they are transported to the customer, which Rethink Event itself takes care of and pays for. "It may sound simple", Rikke comments, "but it is far from it. Everything from finding the right materials, the right partners and the right combination requires a lot of match-making, and that's why these companies need THE UPCYCL to help with the process".



METALS



For Rethink Event, it has been ideal to combine previous experiences with a concept where partnerships and commitment become the cornerstone for increasing the recycling of waste materials. And that is precisely where Sofie sees the value in her project. In the process of assembling Don't Waste Its products, for example, Sofie saw how an old collaborator in the culture industry needed work during COVID-19 and asked if they would help assemble the products.

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**The climate challenges must be solved now, and they must be solved in partnerships. And you get further, much faster and have far more fun if you all have a desire to contribute.**

- Sofie Randel, founder of Rethink Event

It has been an ongoing design and coordination process, where a continuous dialogue between the various companies, designers and those who assemble the products has been necessary. But there has also been a common commitment in regards to the project, says Sofie: “When we develop in a more sustainable direction, we have to work curiously and innovatively. The project has largely been driven by motivation and a desire to use the competencies to create something new and better, together”.



## Wallpipe

**The design company WallPipe in Randers produces lamps, tables, and various home interiors from used water pipes and materials such as wood and leather.**

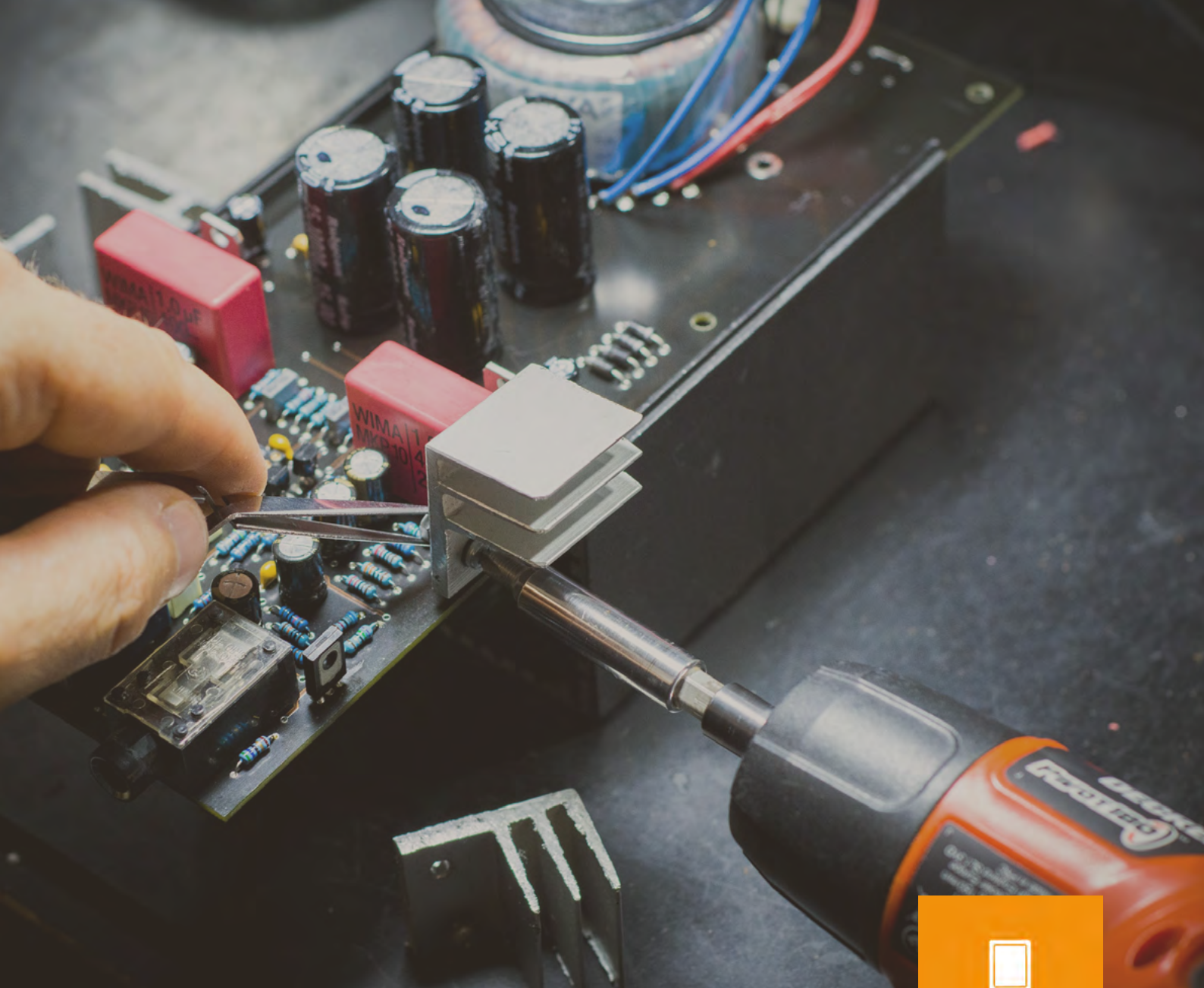
In collaboration with Randers Municipality and the municipal recycling station, WallPipe collects used water pipes through an assigned container. The water pipes therefore come from private households, while WallPipe's stadium lamps are delivered through a collaboration with Randers FC and Vejle Boldklub. In addition, WallPipe's wooden tables are produced from scaffolding from the construction industry.

Today, the company sells to both individuals and companies – an example is the company's wall lamps made by water pipes used in hotels. WallPipe is constantly looking to expand its product portfolio and enter into new symbiosis collaborations.

**Residual resources:** Water pipes and metal, floorboards, old lamps  
**Collaborative partners:** Randers FC, Vejle Boldklub, Randers Municipality, the construction industry (resource supplier)  
**Contact:** wallpipestore.dk



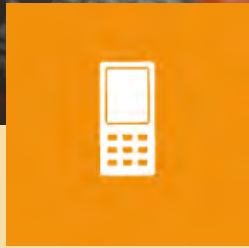




# Electronics

The technological development and increasing consumption of electronic equipment, such as computers, mobile phones, lights, home appliances, and toys, mean that electronic waste is the fastest growing waste fraction today.

Electronic equipment contains valuable resources such as copper, aluminum and plastic, that can be used in new products. In addition, used equipment can often be disassembled and included as components in products of different companies and industries. A lot of electronics equipment has long durability and unique potential for recirculating its resources. In this catalogue you can, for example, read about the company Fischer Lighting, which collects used light fixtures and converts them into LEDs, as a new product.



**Residual resource:** Light fixtures

**Collaborative partners:** Demolition companies, Netto (resource supplier), Upcycling Forum (facilitator)

**Contact:** fischer-lighting.com

**Open to new partnerships**



”

**It requires a little extra time for the sender, but in return they save the costs of having to throw things away; so really, it's a win-win situation.**

- Lars Elmvang, partner and strategic director in Fischer Lighting

It does not always make financial sense for Fischer Lighting to repair or pick up light fixtures. It depends first and foremost on the quantity and the light fixtures models. For the models that Fischer Lighting has already developed solutions for, they can take quantities as low as 10-20 units. On the other hand, they should preferably have quantities of more than 100 units before it makes sense to receive new models for which they have not yet developed solutions. The most important thing is that there is a potential in selling the models that Fischer Lighting takes back: “We have a list of the models we most want”.

An example of lamps that are being redesigned are some of Netto’s lamps, which Fischer Lighting sells many of today. They call the redesigned lamp for Judd.

**The future looks bright**

Lars has no doubt that the potential is big for Fischer Lighting, and as of January 1, 2022, Fischer Lighting has started up abroad via a Swedish partner, which is now negotiating their solution in Sweden.

## Fischer Lighting

**Danish Fischer Lighting repairs and redesigns old light fixtures for LED and develops new light fixtures from the used light fixtures. The company both takes out and repairs the light fixtures on site and picks them up for redesign and resale.**

The idea occurred when Fischer Lighting prepared energy screenings for several customers. They found that certain lamps could not use new LED lighting in the old light fixtures, and therefore they came up with the idea of upgrading the existing light fixtures and thereby conserving the many resources that was already in the product.

In 2015, Fischer Lighting participated in the project Nye Grønne Forretningsmodeller, which was run by the Danish Business Authority and Deloitte; “We were selected as one of three companies in the capital that would get a million Danish kroner to implement a business plan,” Lars Elmvang, partner and strategic director of Fischer Lighting, says. This gave the company the opportunity to start with the new business model.

**How are the light fixtures obtained?**

Fischer Lighting collaborates with, among others, demolition companies and Upcycling Forum, which helps to contact companies with larger batches of light fixtures that can be repaired or redesigned.

The quality of the light fixtures determines whether Fischer Lighting pays for them. If Fischer Lighting does not pay, the sender in return saves money on disposal, while Fischer Lighting pays for transport and for the light fixtures to be packed neatly

**Light fixtures from renovations and demolitions get new life**

The process of redesigning the light fixtures has been outsourced to companies that employ socially disadvantaged. At the same time as the resources are taken care of, inclusive jobs are created in Denmark, and this gives Fischer Lighting the opportunity to also support social sustainability.







# Other

Other waste is anything that does not belong to a specific category or waste fraction and is most often included in residual waste and sent to incineration. Residual waste consists of many things, for example nappies, crumpled paper or cardboard and similar waste that has become wet, and which is considered to have little or no value.

In recent years, waste has gone from being disgusting and taboo to now being considered a usable resource and business model. New technologies have enabled new forms of recycling and saving resources for the benefit of the environment and people.

In this catalogue you can read about different companies that work with residual resources in different ways. Several of the companies have taken part in developing new ways of using different residual resources that were previously only considered as waste.

## Bygaard

**In a farm on Refshaleøen in Copenhagen, the company Bygaard grows organic mushrooms in small containers all year round. Bygaard uses FSC-certified sawdust, organic straw and other residual resources that they receive from agriculture to grow mushrooms such as shiitake, emperor hats and oyster hats.**

Using the residual resources, Bygaard produces 80-100 kg mushrooms per container over a period of three weeks, after which they are ready to be harvested. Bygaard sells the mushrooms via their website to various restaurants and private households in Copenhagen and delivers them either on their own cargo bike or with the help of the car-sharing organisation Letsgo and the bicycle service By-Expressen.

**Residual resource:** Sawdust, straw residues and other agricultural residual resources  
**Collaborative partners:** Not specified partners from agriculture  
**Contact:** bygaard.dk

## TagTomat

**In TagTomat's store in Nørrebro in Copenhagen, urban farmer and architect, Mads Boserup Lauritsen, sells residual products from the food and furniture industry.**

Everything from mushroom boxes, with mushrooms grown on recycled milk cartons from the coffee chain The Coffee Collective, to residual straw from grain production or wrapping of recycled cardboard for large plant boxes of 1,000-liter plastic tanks from various companies in the food industry.

TagTomat had its start in 2011, when Mads started growing vegetables in self-watering plant boxes on the roof of a shed, in his backyard in Nørrebro. The plant box developed into a workshop for the residents in the local community, which resulted in 20 plant boxes being installed on the shed. Later, sidewalks, backyards, and spaces between the houses in the local neighborhood were also included and installed with used pallet tanks converted into plant boxes with flowers, herbs and bushes. Since then, several sidewalk gardens, plant box workshops, teaching and lectures as well as the TagTomat store have been added.

**Residual resource:** Wood, milk cartons, plastic  
**Collaborative partners:** Coffee Collective and companies in the furniture and food (resource supplier)  
**Contact:** tagtomat.dk

## The Upcycle (nl)

**The Upcycle in Amsterdam sees waste as the source of creativity and as an important resource that can contribute to a circular society.**

The company uses various used materials such as old car tires and wood, small textile remnants from clothing production, orange peels and scraps from coffee brewing from cafes, old books and paper in their production of new belts, bird boxes, clothes, soap, candles and notebooks. The team behind The Upcycle consists of designers, engineers and business people who, in addition to collecting and transforming the various materials used into new products, also hold workshops on recycling various surplus materials.

International example

**Residual resource:** Tires, wood, textiles, food waste, books  
**Collaborative partners:** Cafes, restaurants and various local businesses  
**Contact:** theupcycle.nl



# How to get started

As the 40 cases illustrate, there are many opportunities to turn residual resources into valuable new products instead of turning them into waste. The cases also show that there are different ways of entering into a collaboration, and that the road to a collaboration varies from case to case.

If you would like to find out how your residual resources can become new products in another company, here are some tips to get you started:

## 1 CREATE AN OVERVIEW OF YOUR RESIDUAL RESOURCES

Create an overview of your company's residual resources. Look in your waste – are there any resources, for example in your food waste or plastic, that can be turned into something new? Is there a residual resource, that you create on a regular basis?



## 2 FIND COLLABORATIVE PARTNERS

### 🔍 SEEK OUT KNOWLEDGE

Investigate whether there are opportunities for you to contribute to an existing symbiosis with one or more of your residual resources. You can explore this by googling the options. Another option is to seek out knowledge about your resources by contacting people, who are involved in symbioses, and getting inspiration and information from them.

### 🔍 SEEK OUT NETWORKS

It is also an opportunity to seek out networks where others who work or want to collaborate on resources are. A network can be found by contacting people from other companies, the municipality or educational institutions. Those you talk to or network with might introduce you to potential people with whom you can collaborate.

## 3 TEST YOUR RESIDUAL RESOURCE WITH THE COLLABORATIVE PARTNER

Once you have researched the possibilities of your residual resources, start out simple. Get in touch with potential partners. Experiment with options for exchange, logistics and small-scale product development, so you can adjust on an ongoing basis. Is there a need for external help, for example a partner to handle logistics or technology, or does the collaboration require an extra activity for example, handling of food that requires new processes?

## 4 EXAMINE BUSINESS MODEL AND LOGISTICS

Talk to your symbiosis partner about the business model. You need to find a solution that works for both of you. For example, does your partner get your residual resource for free and do they arrange transport themselves? At the same time, you must train your employees in how to handle the resource so that it is not damaged or contaminated before it arrives to and is used by your partner.

## 5 ESTABLISH THE COLLABORATION

It may be an idea to get something in writing. But to start with, it is recommended to focus more on getting started, than on paperwork.

## 6 COMMUNICATE YOUR RESULTS AND COLLABORATION

Talk to your business partner about how you can communicate your symbiosis collaboration to your customers. Continuously share your results and experiences from the collaboration.

## 7 CONTRIBUTION TO THE MANAGEMENT AND DEVELOPMENT

Actively contribute to the collaboration. It is a good idea to meet a few times a year with your collaboration partner that receives your resource. At the meetings you can talk about how things are going in the companies; have you or your partner experienced growth and can take in more resources? Are there any new companies you can include in the collaboration so that your partner can get enough resources in? Have you experienced any challenges in collecting and separating your residual resource which has meant that you have sent fewer residual resources in a period of time? And much more. In this way, you meet as partners in a collaboration that you are both long-term invested in.

On the platform [circularcph.cphsolutionslab.dk](http://circularcph.cphsolutionslab.dk) you can find information and get inspiration about circular economy in Copenhagen Municipality. You can find contact information on relevant employees under the contact tab.





# Learn more about symbiosis

If you want to read more, you can find links to a number of publications and in-depth information about working with symbiosis here. The publications are mainly based on industrial symbiosis, which has been the subject of more academic and practical research than urban symbiosis, which in contrast exist on a smaller scale and in a different field between urban development and innovation. The publications remain relevant, since there are commonalities between establishing, facilitating and operating industrial and urban symbioses.

## **Test laboratory in Sydhavn Recycling Center**

Sydhavn Recycling Center offers a number of activities and a community that supports reuse and recycling of materials and items delivered to the recycling center. At the center's test laboratory, entrepreneurs are working to find ways to reuse and recycle residual resources such as wood and textiles.

<https://bit.ly/labsydhavn>

## **Guide for industrial symbiosis facilitators (2021)**

This guide describes how to start, manage and develop an industrial symbiosis. The guide contains tools, concrete examples and knowledge about industrial symbiosis in order to support both current and future actors in facilitating and establishing industrial symbiosis and symbiosis networks.

<https://bit.ly/isguide>

## **Re-using resources in cities: a Dutch case-study (2016)**

The case study examines an initiative in Rotterdam that focuses on optimizing the use of resources in the city. The study looks at opportunities to convert waste heat into energy and recycle wastewater from industrial processes in an urban context, among other things, by involving local authorities and focusing on dialogue and learning.

<https://bit.ly/recitynl>

## **Water symbioses – Kalundborg (2015)**

The report examines the use of secondary water in industrial symbiosis and the potential for more optimal utilization of the water resource. The report focuses on facilitation and organization and identifies the enablers and barriers that are present when resources are viewed in new ways.

<https://bit.ly/vandsym>

## **Industrial symbioses (2014)**

The report takes a closer look at the framework of industrial symbiosis and the benefits of working with symbiosis. The report is based on the Kalundborg Symbiosis and reviews experiences with the establishment and operation of the symbiosis.

<https://bit.ly/indsym2014>





[www.transition.nu](http://www.transition.nu)