# Designing Local Circular Value Chains

## A Quick Guide for Multi-stakeholder Collaborations

# Colophon

**Title:** Designing Local Circular Value Chains a Quick Guide for multi-stakeholder collaborations

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# Preface

Can you imagine a more sustainable future? We can. But if we want to get there, we and our society really have to change. The way we produce and consume our products now, is taking its toll on our world. Throughout the years our lifestyles have become so much dominated by the consumption of products, that an average person in Europe consumes the weight of almost eight elephants in natural resources a year. The production and use of plastics have a big impact on our environment. Did you know that every minute the amount of one full garbage truck of plastic trash is dumped in sea? Every minute! Also, the production of plastics accounts for twice as much greenhouse gas emissions as airplanes. Not only plastic products have their impact, your favourite shirt took around 2700 litres of water and a lot of land to grow the cotton. The chair you're sitting on, the roads and bridges you cross, the aluminium foil wrapped around your sandwich... Many of the materials and products we buy locally have travelled halfway across the globe, thus leaving a large environmental footprint. We live in a materialised world and all our products have their impact on our environment. The use of resources, the disposal of disregarded goods, co2-emissions during production and transport and many other factors represent a serious ecological and social threat to our planet. So... To secure a sustainable future, we all have to take responsibility in the way we produce, use and consume. We have to move towards a circular economy!

This quick guide is written to inspire designers, policy makers, company owners, employees, educators and students to change the linear economy into a circular economy by collaborating in local value chains. This guide explains the basics of circular economy, value chains and it gives practical tips for you to work with and practical examples to learn from. It is developed within the context of the Biocup project, part of the BIOCAS Interreg project supported by the North Sea Programme of the European Regional Development Fund of the European Union.



# Introduction:
# **The Biocup, a small cup with a big story**

**by Eileen Blackmore**

More and more initiatives are popping up that are aimed at contributing to a sustainable future. One of them is the Biocup, a biodegradable festival cup that tells a bigger story than you might expect from it. Where did this story start? Let's go back to 2013... In 2013 Leeuwarden/ Friesland heard it was nominated as the Capital of Culture 2018. LF2018. The municipality of Leeuwarden, the province of Fryslân and all creative stakeholders got together to organise this enormous project, which would have to result in some lasting changes.

One of the subjects was what LF2018 called 'ecology'. An ecology team worked on a plan on how festivals could contribute to a more sustainable system. One of the team mebers, Eileen Blackmore from House of Design, thought of a way to create sustainable festival tents and reusable festival cups.

Like in most other countries, many festivals in the Netherlands still use single-use disposable cups. These cups usually end up on the ground, creating a big mess. Some cups stay behind after the clean-up, especially when the festival takes place in a natural area. Germany has a long-standing tradition of working with deposits for reusable cups. German festivalgoers  are accustomed to having to pay a deposit and to return their cups to the bar. Up until 2016 this was a rare sight in the Netherlands.

The province of Fryslân was preparing a project for Interreg IV North Sea Region, aimed at developing a regional bioeconomy in the North Sea Region and enhancing the role of the rural areas in establishing bio-economy activities. They wanted to do so by realising Biomass Cascading Alliances (BCA's) for a more sustainable conversion of biomass. The province invited stakeholders to come up with a project proposal. Eileen Blackmore proposed a regional alliance approach to using biomass as a resource for sustainable festival cups; The Biocup! The Biocup became part of a bigger project called BIOCAS, which started in July 2017. BIOCAS aims to stimulate the development of regional circular bio-economies and to turn rural areas into smart specialised regions. The focus lies on integrated and local valorisation of biomass, based on biomass cascading principles. In addition to the Netherlands, Denmark, Germany and Belgium are also involved in the BIOCAS project.

*More information can be found on www.northsearegion.eu/biocas/*

Eileen Blackmore introduced the local value chain methodology, in which local stakeholders from various sectors are brought together to create this sustainable cup. She figured that each of these parties holds an important piece of the puzzle. Together they can form a local value chain that connects all these individual pieces of the puzzle in order to create a  regional circular system. Stakeholders who became partner of the Biocup project are: the Province of Fryslân, NHL Stenden University of Applied Science and Van Hall Larenstein University of Applied Sciences, Limm Recycling from the Netherlands and WorldPerfect from Denmark. Local farmers were also involved, just like Innofest, which helped to test the cup at the festival Welcome to the Village. The first step was to actually create the cup for use on festivals, thus helping to share the story and to next change the behaviour from single use into reuse. The final goal is to also implement the cup in public buildings, schools, universities, municipalities.

During inspiring conversations with many enthusiastic stakeholders who are part of the development of the Biocup, a number of challenges and lessons emerged that are further elaborated on in this guide.

# Act local, think global: **Cultural Sustainability**

**by Rasmus Hørsted Jensen, Worldperfect**

When talking about local value chains, the question is how local is local? When talking about the European Union, one could argue that this is local as well. Therefore, our experience at WorldPerfect has shown us that culture is an essential factor to take into account when talking about value chains and sustainability.

Local is good, but we need sustainable solutions that affect the whole world and therefore we also need to share and broaden the perspective to other countries and cooperate across borders. We need to create solutions that fit every culture and environment in the world. Cultural differences are important to take into account, because we need the solutions to be translated into other cultures.

Creating closed loops in local settings is one thing, but we need the whole world to close the loop. It is important to create standards that are applicable across countries, thus creating possibilities to measure and learn from one country to another. The United Nations have introduced the Sustainable Development Goals as a global lingua franca when talking about sustainable development. However, we need more inspiration from one country to another, from one culture to another, from one human being to another.

A societal view spans across European cultures as well as international differences. The cultural dimension includes descriptions of how to build our world in a way that does not negatively affect future generations (Our common future, 1989) Culture, as a country's unwritten rules as well as its more formal rituals and truths, is the perfect way to advance sustainability as a solution to many of the greatest challenges we face. Culture can also act as a source of inspiration beyond borders, gender, age and religion (Aarhus Sustainability model, 2015).

Our task is to use cultural sustainability as a medium and a tool to understand each other. By describing the various possibilities in, and efforts made by, these countries we can identify sources of inspiration and platforms for innovation where people can meet each other and develop sustainable solutions and ideas. It's about acting locally in a globalised world. We should not view sustainable solutions as being country specific. We need to present these solutions in a way that promotes innovative adaptation within the new country's cultural framework.

Culture is a means for us to understand each other across Europe, therefore cooperation across borders is very important. Culture can also be the means by which we make ourselves understood. Culture, and more specifically cultural sustainability, can give us the language to create global solutions. Solutions that can be "translated" into all languages and cultures through cultural modification and understanding. This is why transnational projects are important, and therefore 'local' is both acting locally with your local value chain and at the same time thinking in a globalised and intercultural world.

Good ideas come in different places at the same time.

**Act local, think global.**



# A tool to make a change: **the local value chain of House of Design**

To explain to you the story of the Biocup and to help you start your own initiative, we use the local value chain as a model (figure 1). The local value chain is a methodology introduced by House of Design's Eileen Blackmore. House of Design develops projects focused on one or two phases from the value chain and connects the remaining to initiate change towards sustainability. A design product is the end product to tell the story, in this case: the Biocup! The starting point of the Biocup project was 'material development' to promote the goals of 'no waste' and 'biodiversity'. The local value chain is used to place the parties and the goals into a working system that immediately provides insight into which phases and associated stakeholders are required to achieve sustainable and social goals with the manufacturing industry as a means. If you are either working for a small or medium enterprise; if you are a student, researcher or teacher at a university; a representative at a governmental institute; a creative entrepreneur or a citizen: this model shows that all can contribute and receive value. In a local value chain, it is important that processes and stakeholders in different phases are situated within a radius of 100 kilometres from one another as much as possible, so that the impact directly relates to the region.

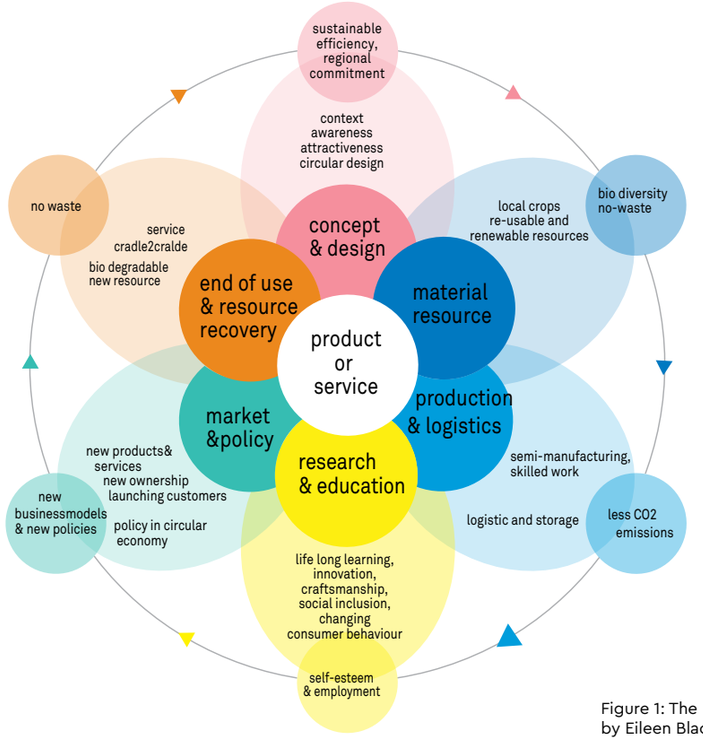



Figure 1: The local value chain of House of Design by Eileen Blackmore – 2018

The local value chain model consists of an inner ring and an outer ring with an explanation in between. In the outer ring are the values we want to influence or the goals we want to reach. The inner ring contains phases for sustainable product development. These are: Concept & Design Development, Material Development, Production & Logistics, Knowledge & Education creation, Market & Policy interaction and Resource Recovery. The local value chain is used to achieve one or more of the goals mentioned in the outer ring, through a circular manufacturing industry. This is done by connecting stakeholders from the inner circles (the phases) around a product or service.

# How to read this guide?

In this guide we will use the phases of the inner ring of House of Design's local value chain as a framework to tell the story of the Biocup and to give tips that you can apply yourself as a stakeholder in a value chain. We construct each chapter as follows: first we explain the phase of the local value chain and present practical tips and considerations, then we will give a practical example of how this phase worked for the Biocup and another inspiring case example.

Do you want to learn more about the local value methodology? The next chapter will explain about sustainable transition, value chains and the three principles we depart from: act local think global, circular and multi-stakeholder.

# Background information:
# Local value chains for sustainable transitions

The chair you're sitting on, the cup your drinking from, the shirt you're wearing, the asphalt you're walking on. Behind each of these products lies a structure of stakeholders that have invested in the product's existence, purpose and use. Each of these chain activities and the stakeholders involved have potential to add more value with regard to sustainability. For example, improving the environmental and social impact of materials used by choosing for fair trade and organic rather than traditional materials. We believe that within the value chain, stakeholders can use their innovative power to find solutions that enable and inspire others towards more sustainable practices. Examples are minimising transport, reducing waste of resources and promoting sustainable lifestyles.

## What is sustainable transition?

Sustainable transition is a popular term and a driver for contemporary political, business, scientific and public agendas. Simply put, sustainable transition describes a fundamental transformation from a current practises towards more sustainable modes of production and consumption (Markard, Raven & Truffer, 2012). A re-imagined, renewed society that is in harmony with itself and its natural surroundings. Sounds great, right? Accomplishing this paradigm shift is quite challenging, we need networks of different stakeholders that act collaboratively. In the case of sustainable consumption and production, this renewed status-quo may appear in the form of a value chain, where different stakeholders work together in different processes towards sustainable practices.

## What is a value chain?

It may take quite a lot of actions by different stakeholders to bring a product from its concept to a tangible object and towards its actual use and beyond. A value chain maps the links between different processes and phases a product goes through. The value chain describes this full scope of processes that organisations and stakeholders go through to add value to the end product (Porter, 1985). It ranges from "primary activities" such as concept design, material supply, production, marketing, distribution, use and support to the final consumer to "support activities" that add an extra value and a competitive advantage to the end product, such as research & development, innovation, product testing and human resource management (Globalvaluechains.org, 2020). The value chain consists of all these little puzzle pieces that together form the realisation, implementation and improvements of a product. Depending on the product, these puzzle piece activities can vary in complexity regarding how they are organised. It may be only one single organisation that contributes, but it may also involve a full range of different organisations and stakeholders that collaborate. It may be organised at a single geographical location or it may be spread out all over the world.

## Act local, think global

Local value chains are beneficial to our society, because they boost the local economy and community. They create opportunities for local start-ups and businesses, leading to more jobs

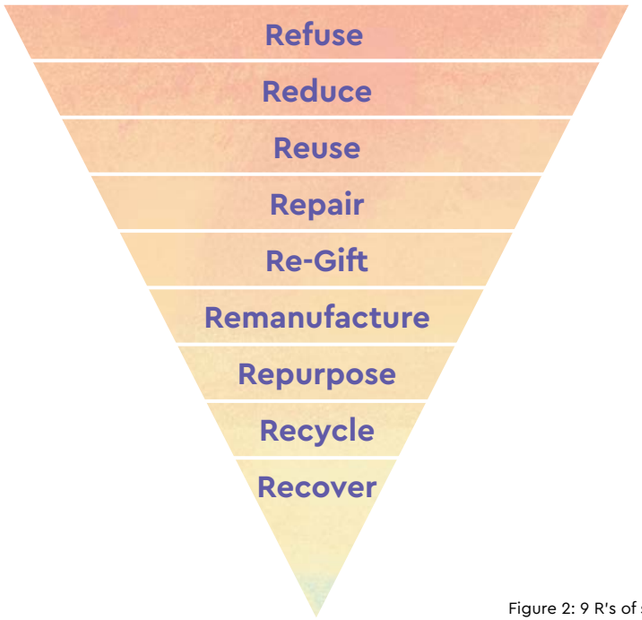



Figure 2: 9 R's of sustainability.

and more equality (The Institute for Local Self-Reliance, 2020). These collaborations encourage innovation, creativity, the local development of new skills and technologies, and they are an incentive for local legislation and public policies (Esteves, Coyne & Moreno, 2013). Local networks and collaborations enable a sharing economy, the closing of (organic) resource cycles and management of logistics for circularity (Circle Economy, 2019). When all activities in the value chain are situated close to each other, you potentially need less transportation and less packaging for transport (Schmitt, Galli, Menozzi, et al., 2017). Note that these benefits are only realised if transportation and packaging are planned efficiently! Local production does not only bring benefits: at this moment local production is often more expensive so local products tend to be less affordable to consumers. However, it can become easier and quicker to distribute and manage the product cycles, because the consumers are closer to the producers and vice versa. Last, but not least, human beings are more concerned of things that happen close to home. If we organise value chains locally, it makes us more aware of our own resources and their value. Though, local

stakeholders should not forget that they are part of a bigger picture: our sustainable development goals, our world. So, again... act local, think global!

## Why circular?

Modern society has adopted a linear approach: consuming products only once and then dispose them, in other words the 'take-make-waste' economy. A new trend comes up and we ditch our old shirts. Our coffee is finished, and we throw away our cup. Each time we do this, we consume valuable resources and often produce toxic waste, which is not manageable in the long term (Ellen MacArthur Foundation, 2011). So, what does work? If we draw inspiration from nature, we observe that the environment works in a circular way, a system of closed cycles (McDonough & Braungart, 2010). A simple example: trees lose their leaves, these leaves become food for worms, and they turn these leaves into compost to lets the trees grow. No resources are lost in this cycle. This principle of circularity can also be used in our economy. Composting our products is one way, but it's good to realise that not every product can be designed in a compostable way. What we can do is redesign our products based on organic resources, maximise their reusability and reduce the amount of resources we use for the materials. We can focus on value retention by keeping our materials in circulation and using them as optimally as possible during their life span (Jonker, Kothman, Faber & Montenegro Navarro, 2018). For example, by reusing products or components of products, thus retaining the original value and functionality of the materials used. Or by recycling, whereas the goods of today become the resources of tomorrow.

## Why multi-stakeholder?

What do a farmer, an entrepreneur, a researcher, a creative and a governmental representative have in common? A great deal! Every single stakeholder can give a valuable contribution to the value chain. When different stakeholders collaborate, share information, build collective agendas, create meanings and jointly innovate, they can move faster towards sustainable practices (Späth & Rohracher, 2012). For a sustainable future, we're in it together. To really change, we have to join our efforts by creating networks and clusters of collaborating organisations. Together we can create value for a sustainable future!

# Concept and design development

Concept and design development refers to the creative phase for devising new ideas and designs for products. Before we start making a new product, we need a well-thought out concept of what the product will look like, how it will be used, what the interaction is with the user, the impact on the public and what its sustainable contribution to society will be. Note that more than 80 percent of the environmental impact of a product is determined by its design (Dutch Ministry of Infrastructure and Environment, 2014). So, by smart designing and producing products, we can manage their impact on waste and pollution. In the Concept and design development there is a whole range of choices to take into account.

## Tips and choices to consider

- Reflect. What do you want to change? A reflection on a current situation can initiate the process and can also motivate the choices you make. For example the single-use approach for certain products.
- What material do you use? The kind of material and its suitability; the use of resources and their origin; the material's devaluation after reuse and recycling; the option of environmentally friendly materials.
- What will the shape of the product be? Its weight, the possibility of reconstructing its individual components and how useful they are for other appliances; its lifespan.
- How will we produce the products? The equipment required for production; the new knowledge and techniques that are needed; options for local production and craftsmanship.
- Design to share. How can you design a product that stays in the system? What will the logistics around the product use be? How to distribute the product and take it back to clean? How can we encourage a sharing economy?
- Design for culture. The psychology behind the concept design: the meaning of the product and its cultural connotations. Design or a good concept brings the possibility of nudging users towards a certain behaviour. How can you make sustainable practices like reuse and recycling easier and more fun? For example, by making them beautiful or by storytelling so that people want to keep them.
- Start with prototypes! In Concept and Design Development it is important to start with prototypes, or a smaller circulation of products so the concept and design can be tested and experimented with.

# Concept and Design Development in practice: the Biocup

**Collaboration:** House of Design and Province of Fryslân connecting the different stakeholders.


## Challenge

In the Netherlands, it is still quite usual to use drinking cups only once and then throw them away. This happens on a large scale at festivals, but also in schools and many offices. To change this habit and to introduce an alternative to single-use cups, social designer Eileen Blackmore of House of Design initiated a project to develop a re-usable and biodegradable cup. She was involved in this at the European Capital of Culture Leeuwarden, Friesland 2018 and was asked to look at the options for making festivals more sustainable. Oerol, Into the Great Wide Open, MadNes. All are some examples of festivals in Friesland that take place on islands. Therefore, there is a risk that plastic cups end up in the sea and become part of a larger problem: the plastic soup.

## Solution

House of Design (HoD) was motivated to develop a cup that would be bio-degradable and dissolve in sea water (vegetable soup!) and which would be reusable. Based on these design principles, Eileen (HoD) came up with the idea of the Biocup. To make the realisation of the Biocup happen she started a search for different stakeholders to work out her concept. House of Design is a social design company, and the owner Eileen mainly works as a concept developer, a connector, a link with other stakeholders in the value chain so that these stakeholders can work together towards sustainability-related change. For the Biocup project, her first step was to find a producer for the concept and design she had in mind. This turned out to be LIMM recycling, a Frisian company that specialises in circular entrepreneurship and the recycling of coffee cups.

A stakeholder that wanted to put the idea of the biodegradable and reusable cup into practice and be the owner of the product. To make an informed choice with regard to materials, HoD involved Van Hall Larenstein University of Applied Sciences in the project as well as NHL Stenden University of Applied Sciences to provide support in the further development of the Biocup. For example, students of the Frisian Design Factory designed a handy cup holder, in which festivalgoers could easily carry the cup to stimulate reuse. Applied researchers from the Frisian Design Factory, HoD, sustainability consultants from the Danish WorldPerfect and LIMM tested the cup at Welcome to the Village festival, so that the first prototypes could be checked and then improved. Concept and design development is an iterative process and, based on the tests, LIMM recycling improved the design.



# Concept and Design Development in practice: Trashbag

**Collaboration:** WorldPerfect, the Sailing World Championships, Danish Deposit System, E.ON, We:Re, Big Design and the Municipality of Aarhus


## Challenge

In the summer of 2018, Aarhus hosted one of the largest sports events ever held in Denmark; the Sailing World Championships with all 10 Olympic sailing classes.

The national coach Peter Hansen had made clear that there was a need for a system for dealing with waste at sea, both during training sessions and competitions. Much of the waste produced at sea ends up in the bottom of the coach's boat where it easily gets blown overboard and into the sea. There is not much space on the coach's boats so it was important to develop a system that could be easily integrated into the boat.

## Solution

A waste sorting bag that can be directly attached to the coach's boat. The bag contains three compartments for three different types of waste. This makes sorting waste easy as you place the litter in the correct compartment straight away, and it also eliminates the risk of the litter blowing overboard.

The sorting compartments are designed to be flexible so that they can easily be adapted to suit other events and waste types. In Aarhus we collected bottle deposits with the Danish Deposit System, food waste for biogas with E.ON and plastic, trash and hazardous waste. The Climate Secretariat at the Municipality of Aarhus also supports the bag.

The bags were handed out to 200 coaches from as many different countries around the world as possible during the World Championships. Our hope was that the bag and concept would be "brought home" to the participating nations after the championships so that the project would have an international perspective and influence waste sorting in their home countries.

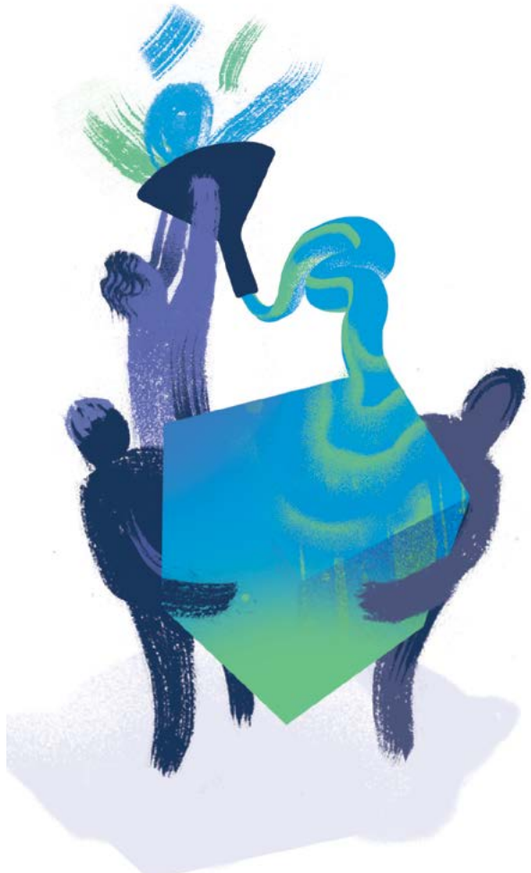
The bag was produced in collaboration with We:Re and is designed by Big Design. The materials used are surplus tarpaulins from manufacturing and used lorry straps.

The waste sorting bag has been designed based on background research where individuals from the sailing world were invited to share their knowledge and ideas. Coaches, athletes and officials from the sailing community were interviewed, and we researched and developed a needs assessment analysis.

## How to do this yourself?

Remember to get in touch with the target groups for your innovation. They can guide you in the right direction. You need to use innovation as a tool to make your solution and product as sustainable as possible. At the same time, it is a good idea to involve other people to help you see the product and process with their eyes and thereby produce new ideas for the final product.

# Material development



In the local value chain, material development indicates the phases that relate to the whole process of a material's life span: from the origin of resources to the materialisation of resources and their recovery.

## Tips and choices to consider

- Start with the origin. What resources are you using? What is the origin of these resources? Can you take local renewable resources and waste as the starting points for new materials? Plants, for example, have a great deal of potential to be transformed into material via more or less complex processes.

- A continuous stream. Ensure that you do not lose your resource flow during production and check whether there is a continuous stream of resources available.

- Biocascading. The Biocascade methodology considers bio-waste as a resource that can be used for both high-value products and low-value products, ensuring the optimum use of biomass. Biocascading is following a hierarchy or "cascade" from high to low value, where the waste from one process is the starting material for the next (Madeddu, Roda-Serrat, Christensen, El-Houri & Errico, 2020). The methodology can help to use all biomass resources in a valuable way.

- Check the sustainability of your resources. If you use local crops to produce your material, the way you grow and cultivate them forms an important aspect of sustainability. For example, by promoting biodiversity, preserving the landscape, managing soil and groundwater well, and using crop rotation to prevent soil erosion. When new material applications arise, new markets are also created for farmers through the growing of crops for food, feed and products.

- Do not compete too much with other uses. Food, feed, fuel or fibre? In some cases, the resources used to develop your material are also used for other purposes. Make sure that you do not compete too much and take an ethical decision.

- Can you use rest streams? Even more desirable is to use rest streams for material development: organic rest streams, non-organic waste or even sewage sludge. In the process of materialization, it is necessary to consider what resources you use paying close attention to their value.

- Use sustainable additives. Materials are often constructed from different components, so take close look to these single components and for example be sure that you do not include any harmful additives.

- Work closely together with R&D. Each material asks for a different process, some circular material development methods are still in their infancy, so we recommend working closely with a research & development department or a university.

- Conduct a Life Cycle Analysis to evaluate different resources. Life Cycle Analysis (LCA) is a method for assessing the environmental impact of the whole life cycle of a product: from production of the resources to the use of the product, but also what happens after the use.

- Think about future applications. While developing the material, look far ahead. Since the local value chain considers a circular approach, the material life end will be the beginning of a new life: either through reusing, recycling or composting. Take a few steps forward and think about future applications of used materials, about the material devaluing and options for recycling.

- Collaborate. Discuss with the other stakeholders how you can keep the materials in a closed cycle so material recovery can be managed. This may result in a form of shared ownership and collaborative logistics.

# Material development in practice: the Biocup

**Collaboration:** LIMM Recycling, House of Design, Van Hall Larenstein University of Applied Sciences.

On this image you can see the granulate of the material being used for the Biocup.

## Challenge

The aim of the Biocup was to use renewable material that was strong enough for intensive reuse and was biodegradable at the same time, in case it accidentally ended up in nature or in the sea. Also, LIMM Recycling and House of Design did not want to use harmful additives. Their preference was to use a local material, preferably obtained from waste streams.

## Solution

PHA which stands for Polyhydroxyalkanoates seemed a good option. This material is a bioplastic produced in nature through bacterial fermentation. Imagine bacteria eating sugars, which they convert to plastics that you can extract from their "bellies". PHA is still rarely used for the application of consumer products, such as drinking cups and cutlery and it turned out that PHA is not yet widely produced in Europe.

That is why the material for the Biocup was imported from Asia. This is debatable: the aim of the local value chain is to develop and produce everything locally, and transporting plastic from afar brings with it a bigger CO2 footprint. Nevertheless, the production of PHA in the Netherlands is still in its infancy, primarily focusing on research and development. Van Hall Larenstein University of Applied Sciences helped to evaluate various resource options with what is known as a Life Cycle Analysis. LCA is a method for assessing the environmental impact of the whole life cycle of the cup: from production of the resources to the use of the cup, but also what happens after the cup is used. Do you want to know what the researchers found out? Check table 1 for the overview of different resource options. Product reuse plays an important role in this assessment and that makes sense: the more often a cup is reused, the more sustainable the product. The outcome of the assessment was that plastic produced from residual flows and even sewage would be the most sustainable (yes, these bacteria eat everything!). However, developments have not yet reached the stage where such plastic products can be made for consumption (food-standard) purposes. Van Hall Larenstein also included the option of Dutch sugar beets in their assessment. Sugar beet and then sugar cane seemed the best resources in the transition towards wastewater. Plastic made from sugar beets is already a realistic local option. The Suikerunie (Sugar company) is already experimenting with biobased products, but not yet with a type of plastic that could be used for the Biocup. If the government were to introduce a policy for discouraging the use of regular plastic, the demand for these kinds of alternatives to oil-based plastic could be promoted to scale up local production.





**Cradle to Factory gate -** Total Life Emissions of 1 kg produced polymer – average numbers (PHA = polyhydroxyalkanoate, PP = polypropylene, PET = polycarbonate, PS = polystyrene)

| Polymer type | | Climate Change | Climate Change with iLUC* | Acidification | Land occupation | Fossil energy use | Water use |
|---|---|---|---|---|---|---|---|
| | Subtype | Kg $CO_2$-eq | Kg $CO_2$-eq | Kg $SO_2$-eq | $M^2a$ | MJ | $M^3$ |
| **PHA** | | | | | | | |
| | Corn/maize | -0.10 | 1.90 | 0.03 | 4.9 | 39 | 0.64 |
| | Cassava | 25.4 | 26.4 | 0.49 | 2.4 | 7.7 | 0.06 |
| | Sugercane | 1.07 | 2.12 | -0.6 | 2.6 | -9.7 | 1.2 |
| | Suger Beet | 2.18 | 2.15 | 0.012 | -0.1 | 14.1 | -0.20 |
| | Wastewater | -0.19 | -0.87 | -0.03 | -1.7 | 11 | -0.10 |
| **Average PHA** | | **0.74 (5.67)#** | **1.32 (6.34)#** | **-0.01 (0.90)#** | **1.4 (1.6)#** | **14 (12.4)#** | **0.4 (0.3)#** |
| Fossil | | | | | | | |
| **PP** | | 2.7 | | 0.03 | 0.003 | 74 | 0.02 |
| **PET** | | 3.9 | | 0.03 | 0.7 | 77 | 0.04 |
| **PC** | | 6.4 | | 0.04 | 0.010 | 106 | 0.006 |
| **PS** | | 3.5 | | 0.01 | -0.007 | 84 | 0.006 |
| **Average Fossil** | | **4.3** | | **0.03** | **0.2** | **86** | **0.02** |

# Numbers represent averages without cassave. Numbers between brackets include cassava
* iLUC=indirect land use change which is associated with the use of land for agriculture and conversion of land and forests

This table shows the life cycle impact of producing the polymer up to when it leaves the factory. On average, PHA emits fewer greenhouse gases (0.74 – 1.32 vs. 4.3 kg CO2-eq), has lower acidification (-0.01 vs. 0.03 kg SO2-eq) and fossil energy use (11 vs. 86 MJ) compared to average fossil. On the contrary, production of PHA from crops is related to the use of land and water for growing crops. Within these parameters, corn requires the most land compared to the other subtypes, and wastewater scores lowest in all impact categories. For the fossil types, the highest impact was mostly related to the production of PC and PET, whereas PP scored lower on climate change, land occupation and fossil energy use compared to the other fossil subtypes (De Wolff & De Vries, 2020).

# Material Development in practice: the Frisian Sweater

**Collaboration:** It Erfskip ('heritage' in Frisian) and Loop. a life connecting the different stakeholders.

## Challenge

We all want to wear clothes that look and feel good, but we sometimes forget the impact of the resources that are needed to create them. Fossil and natural resources are becoming scarcer and increasing the demand for waste material and renewable raw materials.

So, looking at possible natural resources in the province of Friesland, It Erfskip saw a possible solution in flax.

In the province of Friesland, the fields are green, with green grass for the cows and the cows only. This results in an area with hardly any biodiversity, without insects, and a safe place for the migrating birds that land in the fields every year. Without bees or birds, we cannot live. Bees are needed to fertilise our crops and the migrating birds eat the crops in Africa if they arrive too soon because they skip thepit-stop in the Netherlands.

Flax used to colour the fields blue in former times and is a suitable rotation crop to help the biodiversity. So how can we enhance the demand for flax in the area? This was the first challenge.

Another challenge was how to use the enormous amount of textile waste due to our consumption economy as another possible resource. The last and most difficult challenge was how to produce the sweater regionally, preferably within Europe. The goals were to boost the biodiversity in the area, reduce waste, promote Frisian heritage, enhance the local production industry, develop a demand for flax, and develop a final product that could be used in the area as a best practice model for other designers and producers.

The goals were to boost the biodiversity in the area, reduce waste, promote Frisian heritage, enhance the local maker industry, develop a demand for flax and develop a final product that could be used in the area as a best practice model for other designers and producers.

## Solution

In 2017, It Erfskip wanted to create a garment made from both resources, flax and textile waste, as an example of circularity, to inspire producers of clothing as well as all stakeholders across the value chain. They met the company Loop.a life, which develops circular knitwear made from waste from wool clothing, and a plan was devised. How to make a sweater and cardigan family from from both flax and repurposed wool from old sweaters of the Frisian people. Friesland would be European Capital of Culture in 2018 and this could be a great stepping stone for promoting the sweater.



Photographer: Tryntsje Nauta.

To make it a real icon of the region, It Erfskip wanted to link the design to the heritage of Friesland as an aesthetic element. Together with the designer Berber Soepboer, they developed a cross line pattern that reflects the cross shawl of the historical costume as well as the crossed sheaves of flax set out to dry on the field.

The value chain stakeholders started with:

**Concept and design:** It Erfskip

**Production and logistics:** Loop.a life (spinning in France and knitting in Portugal)

**Material:** Vlasmuseum Ee, Omrin (recycling company), Leger des Heils (Salvation Army)

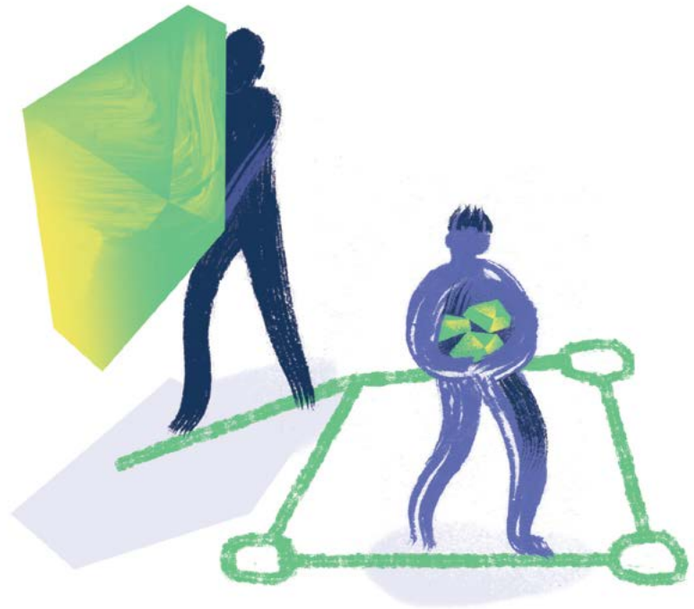
**Research and Education:** Friesland College/ NHL Stenden

**Market and Policy:** municipality of Leeuwarden, province of Fryslân, crowdfunding

**Resource recovery/end of use:** Omrin

A collection of a sweater and cardigan was developed in a series of 2018 pieces.

A sweater and cardigan collection was developed in a series of 2018 pieces. The result is that many Frisians see the quality of flax and reusing textiles. Farmers are willing to grow flax, vocational education is developing a circular textile lab to be able to work with recycled textiles as well as virgin material. In the north of the Netherlands, a few initiatives are co-operating to set up a spinning and weaving facility to be able to produce circular textiles in the north.... to be continued!



# Production and logistics

With production & logistics we mean the process of transforming tangible input such as materials, and intangible components such as concepts into the actual product and creating logistics and infrastructures around it.

## Tips and choices to consider

- Organise production locally. Due to our high consumption behaviour and our high demand for cheap products, a great deal of production is outsourced to distant low-wage countries. Organising production locally will make it easier to communicate, connect and exchange information for faster development of new products.

- Know the characteristics of your materials. Is it recyclable? How will you organise recycling? Is it biodegradable? In what circumstances will it degrade and how fast? Where will it end up? Always question what happens to your products afterwards.

- Look for like-minded companies to work with. Partnerships or collective business models for products can help to keep these products in a closed system and to organise logistics around them. Designs may ask for the options of repair, re-composition or recycling, whereby (components of) products follow a cyclic journey and return to production as input.

- Attract new talents. Companies and projects involved in a local value chain attract new talents and crafts other than those needed for 'linear' production since circular products often call for different production approaches. For example, the use of new materials may require more complex and slower production processes.

- Involve applied education. Applied education may be an interesting partner to engage in these activities because of their hands-on approach and maker culture. They are also educating the producers of tomorrow. When the demand for circular products grows, it becomes more and more attractive to invest in and stimulate the development of expertise among local makers.

- Experiment and test. Before upscaling to larger production, experimentation with smaller samples helps to absorb failures early on and learn what and how to improve. 3D printing can help to make the first and following prototypes.

- Map the locals. To produce locally, it helps to map the existing local craftsmen, manufactures and producers to explore possible collaborations and to stimulate the local economy.

# Production and logistics in practice: the Biocup

**Collaboration:** LIMM Recycling, Province of Fryslân, H&P Moulding.

## Challenge

There were a number of challenges regarding the production of the Biocup. First of all, it is quite expensive to develop a mould, specifically because of the type of biodegradable plastic. Moreover, it was a new experience for LIMM to use PHA. The production process and the hardening of regular, oil-based plastic cups takes very little

time. The PHA on the other hand looks a little like milk: it is very liquid and therefore, it takes about 20 to 30 seconds to harden. So, the properties of the material are very good, but the production process is really intense and slow. Lastly, the objective of the Biocup is to use it as often as possible and thus create a shared use for different festivals.

## Solution

TTo develop a mould, the Province of Fryslân assisted with financing within the BIOCAS project. In total, two moulds have been developed to make the batch from the first prototype and the batch of the second version. Before making these mouldings, LIMM made prototype cups with a 3D printer to decide how the design should look like. They started with a first batch of 800 cups that they tested at the Welcome to the Village festival via Innofest. Based on the feedback of users they developed the design and produced an improved version of the Biocup. To re-use the Biocup, LIMM retains ownership rights to the cup and organises logistics around the cup to collect them back after their use at the festivals. The idea of the business model is that the festival organiser hires out the cups for a fee and pays for the cups that are not returned. The purpose, of course, is to re-use the Biocup as many times as possible. But when it is damaged or breaks, LIMM Recycling – as their name already implies – will recycle the material and make new products from it. Legislation does not allow recycling for new cups, so a new challenge arises: what to make out of the recycled material? LIMM has tested the Biocups for about 2 years now and the lifecycle of this material is very long, so the need for recycling has not arisen yet.





# Production and logistics in practice: Recyclable coffee cups

## Challenge

10 years ago, Lenze and Ina Leunge saw rubbish containers overflowing with cups at company premises. At the same time, there was a change in the law where the government made a strong recommendation that companies using over 500 disposables a week should recycle these used disposables. This was seen by Lenze and Ina Leunge as an opportunity to start a delivery, return and recycle system for disposables, and in this way their company LIMM Recycling was founded.

## Solution

LIMM delivers, returns and recycles disposables 100%. Our business model is selling FSC certified cups made in Europe, mostly in the Netherlands, from wood that is obtained from production forests within Europe.

Clients of LIMM use a specially designed collection system, consisting of a metal container and a carton collection box for collecting used cups. LIMM returns these collection boxes filled with used cups using buses driven on biogas.

When the cups are returned, they are sorted by hand and all dirt is removed from the cups. After this the cups and collection boxes are 100% recycled into new paper products. All this is done within the Netherlands to boost the local and national economy.

A part of the production and recycling is done by people who are distanced from the labour market. Within the Social return on investment (SROI) policy, LIMM helps these people obtain a well-earned placement.

LIMM arranges free inventory management for its clients. This relieves the burden on the client and also makes it possible for LIMM to drive its routes as efficiently as possible to reduce CO2 emission.

In the past, the recycling system of LIMM has been awarded the prizes "Most Sustainable Coffee cup" and "Most Sustainable Company".

## How to do this yourself?

IIf you want to be sustainable as a company, you have to work as locally as possible. Look at what you can find in your own region and country, even if this means that you may have to pay a little extra to make your products.

# Knowledge and education creation

This phase is about developing knowledge and education, so that students and employees of universities as well as citizens, industries and governments can learn from each other. It is about sharing knowledge, developing new curricula, (re)educating people and finding creative and inclusive ways to share and learn.

## Tips and choices to consider:

- Work together with local universities. Working together with local universities will help you to gain more input for your product. Student's Students often have a different and fresh perspective on things, and they become enthusiast of about working with real-life cases. ▪ Educate local people. If we do not educate our local people, we still need other countries to create and maintain our products, resulting in a higher CO2 footprint.

- Combine old and new knowledge. KThe knowledge of craftsmen can be combined with new knowledge in the field of sustainable processes, digital production and newly developed renewable materials.

- Social inclusion. Creating new jobs for craftsmanship and manufacturing creates possibilities for, for instance, in the (re)integration of people that returning to professional life and refugees.

- Raise the awareness and share. How can you create a higher stakeholder involvement for activities such as product return, longer use, subscription and other circular approaches? Raise awareness and share knowledge about what which materials do compost and what which do not. It can may be expensive and innon-secure to implement new products and practices and the demand might still be in an emerging state, so communication is important.

- Organizse projects around practice. Initiate and organizse (international) educational projects in which you stimulate the ingenuity of students by introducing (circular) expertise and multidisciplinary work. In these projects, educators work closely together closely with other stakeholders to develop new educational methods or disseminate information about the project.

- Work in a multidisciplinary way. All perspectives are valuable for the creation of new knowledge and practices. Cross boundaries to understand and support each other.

- Be creative in your dissemination. A classical report might not reach a wide audience. Therefore, it can help to be creative in how you disseminate information about what you do. Make a documentary, a comic, a visualisation, a handbook or organise an interactive conference.

- Think globally. Working together in an international context – for example, European-wise within an EU Interreg project – will help you to exchange and develop new knowledge, to inspire stakeholders from other countries and/or to be inspired by others.

# Knowledge and education creation in practice: the Biocup

**Collaboration:** Rolling Pictures (student start-up filmmakers), NHL Stenden University of Applied Sciences, House of Design, Van Hall Larenstein University of Applied Sciences, LIMM Recycling, WorldPerfect.

## Challenge

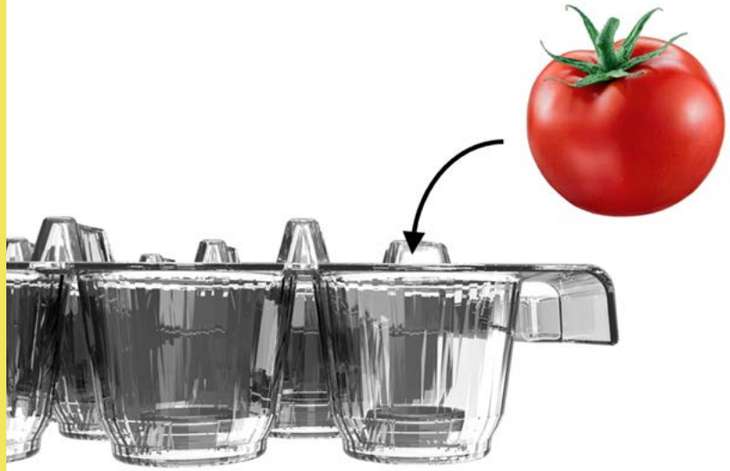
The development of the reusable and biodegradable Biocup requires the implementation of new knowledge but also creates new knowledge and experiences (for example about the application of PHA for consumer products). Therefore, the aim was to share these new learning experiences to inspire more people and let them learn about a circular approach to product development.

## Solution

The Biocup was developed in close collaboration with the knowledge institutions NHL Stenden and Van Hall Larenstein Universities of Applied Sciences. On the one hand, to make supported choices about materials and to evaluate the product: Van Hall Larenstein conducted a Life Cycle Assessment (see material development for more information) and NHL Stenden conducted tests to improve the Biocup's design. On the other hand, to involve future professionals in the development of a circular product. For example, students from both NHL Stenden and Van Hall Larenstein contributed to the development of the Biocup, as it became part of their education as a project. For example, students of the Frisian Design Factory conducted a project on how LIMM Recycling could motivate users to reuse the cup and how to express the value of it. To disseminate the learnings and to share the story about the Biocup, NHL Stenden and HoD made a documentary in collaboration with start-up video students of the bachelor Communication and Multimedia Design. Also, the handbook you are reading now is an example of what we have learned to share with a wider audience.

# Knowledge and education creation in practice: Circular Design Lab

**Collaboration:** NHL Stenden University of Applied Sciences, Restaurant De Dining (Vlieland), Windesheim University of Applied Sciences.



## Challenge

The Dutch island of Vlieland is a nature reserve and tourist destination in the Dutch Wadden area. The island wants to reduce the use of single use plastics, and some of the restaurants on the island are already advanced in this topic.

Most products for the island have to be transported over the Wadden Sea, and the plastic waste is transported back to the mainland unsorted, which means a large portion ends up being incinerated; not really a circular solution. On the terrace and in the restaurant area, The Dining restaurant has already abolished single use plastics completely. However, 'behind the counter', they are looking for solutions for their plastic waste in the kitchen operations. In the kitchen, plastics cannot be avoided altogether, so they are looking for reusable options. One of the categories that was hard to change was the packaging of fruits and vegetables. The challenge was to design a reusable packaging solution for tomatoes that have to be transported to the island.

## Solution

The Circular Design Lab of NHL Stenden (Leeuwarden) was already working on several projects to reduce single use plastics on Vlieland. Anouschka Gort, an industrial design student from Windesheim University was working in the Circular Design Lab and took up the challenge of The Dining as her graduation project.

In her research, she found that when the restaurant owner orders a small quantity of tomatoes these are delivered in plastic flow packaging. Many restaurant owners use tomatoes, so therefore the design work focused on making an alternative packaging for the tomatoes. Plenty of ideas were developed in the ideation phase of the project, but eventually the decision was to make a tray instead of using packaging. The tray has pins, on which the next tray with tomatoes can be placed. When the tray is turned around, the cups of the tray fall into the cups of the other tray. Thus, the transportation volume is minimised during the return transport to the mainland. The principle of the pins was tested by making prototypes. The final tray will be made from bio-PET with 30% of the material consisting of renewable sources. The process of recycling bio-PET or PET in general is very efficient, so the old tray can easily be recycled and re-processed into a new tray. This way, it will be possible to close the loop and make the tray fully circular.

The student was guided by the experts of the Circular Design Lab and worked together closely with the company and other stakeholders on the island. New knowledge on circular solutions was thereby created, and at the same time the education of the university was enriched by this innovative design process.

## How to do this yourself

The circular design approach used in this project is available from NHL Stenden and is very practical and applicable. Also, an important lesson learned was that although these projects are always complex and involve all players in the supply chain, it is important to start with 'front runners' in the process (in this case, the restaurant) to keep the solutions inspired and practical at the same time.

http://circulardesigneurope.eu/

# Market and policy interaction

When we change the way we produce, consume and organise, we also have to change our policies and legislation. The market influences our policy and vice versa. Together we can develop strategies and targets that help the different stakeholders to bring their products to the market and to think long-term..

## Tips and choices to consider

- Support local communities. It is important to actively support local communities so stakeholders can share their knowledge and ideas; extend their network and spread the practice. For example, by facilitating subsidies or formulating public tenders to overcome financial barriers so that local, stable jobs can be created.

- Follow both a bottom up and a top down approach. We need bottom up input and initiatives from creatives, businesses, educators, researchers and all citizens to innovate our policies and to understand what society needs to move a step forward on sustainable practices. And we need top down decision-makers that introduce new laws, taxes and regulations to promote sustainable practices and discourage unsustainable ones. Some cases require clearer rules on how to best stimulate the safe reuse of waste streams such as sewage sludge and recycled waste in our local areas.

- Organise infrastructures and services. To keep the products in the system, protect the value of resources and to design infrastructures for re-use, re-cycling, sharing, maintenance, repair and refurbishing. Only one local organisation can do this by creating a service for recollecting products, but it could also be a community of organisations or members. Other cases require adaptation to our infrastructures that are managed by local government such as waste management.

- Be transparent. Products developed in local value chains will initially cost more than standard products because of the local production (higher wages), smaller circulation and development costs. Be transparent about this background to justify the higher price and also to contribute in raising awareness about sustainability. For example, by creating a product label with the origin of the raw materials, the location where the product was made, how the price was determined and/or what the benefits are for people and the environment.

- Experiment in real-life. Before implementing on a big scale, experimentation is important. Festivals and events can provide an interesting place to use as a living lab for experimenting with or introducing alternative practices and policies.

- Be/search for a launching customer. To stimulate the development of local value chains and to raise potential of as yet immature markets, governmental organisations and bigger companies can act as launching customers and function as a case-example in the first steps of implementation. Although the awareness in our society is growing and the demand for circular products is increasing as well, there is still risk involved in launching a new product.

- Purchasing policy. As a government, think about how you can make your purchasing policy circular and more local. Offer local start-ups a chance and influence regional purchasing with permits.

- Standardise. Different materials call for different treatments, ways to recollect and recycled. By standardising and communicating about different material types (e.g. plastics) systems can be restructured and optimised.

- Start a lobby. Changemaking companies and other like-minded stakeholders can unite into organised groups to influence the actions, policies and decisions of government officials.

# Market and policy interaction in practice: the Biocup

**Collaboration:** LIMM Recycling, Province of Fryslân, Welcome to the Village festival


## Challenge

In the sustainability market in particular, there is an important influence from politics and governments on market forces. In the Netherlands, there is not yet specific legislation regarding the use of biobased plastics as an alternative to regular fossil-fuelled plastic. For this reason, it is still relatively expensive to develop biobased plastic products. Also, it is a challenge to find customers in order to build a business model around the Biocup. Fortunately, more and more festivals such as the Welcome to the Village festival are choosing reusable cups. Increasing numbers of consumers and event organisers other than for festivals are also increasingly seeing the importance of reuse and the use of biobased materials.

## Potential solutions

LIMM Recycling is a Dutch frontrunner in using biobased plastics for consumer products. They want to inspire other companies to follow and to bring the production of PHA to the European market. Companies as well as customers are becoming more and more in favour of re-use, recycling and using biodegradable plastics. However, to further accelerate this transition, there is a great deal the government can do. SMEs such as LIMM sometimes find it hard to enter into big European projects because of the co-financing requirements. However, European projects can be very interesting for SMEs: it is an opportunity to broaden your network, develop new exciting projects and/or products and to gain new knowledge. European, national or regional subsidies can help SMEs in their quest for new sustainable solutions. Sometimes it helps if a local government can fund a small part of the co-financing for the SME, such as the province of Fryslân did for LIMM in the BIOCAS project. Another way the government can contribute is through legislation. The Dutch government, for instance, has already introduced a tax on plastic bags and within the space of a few months', the use of bags has decreased by 40%. A CO2 tax can create a situation where biobased plastics become cheaper than oil-based materials so the production and market of biopolymers will receive a boost. There is still a lot to do here, however.

# Resource recovery

Waste = resource. You might have heard or read this short sentence before and it concisely summarises what resource recovery is about. The activities of resource recovery are about converting waste into opportunities. One objective of local value chains is to keep products in use as long as possible and to minimise waste. But at a certain point, products might reach their end of life, be irreparably broken or, for whatever reason, lose their function. This does not mean that the material of these products loses its value. It does mean that we as a society have to prevent ourselves from wasting value.

## Tips and choices to consider

- Waste as a starting point. Plastic, paper, aluminium, glass, metal, Styrofoam, tin-plate, paper. There are so many waste opportunities. In the ideal situation resource recovery will be the starting point of your product development. For example, following a cradle to cradle philosophy, where the end of one product becomes a new beginning (cradle) for the next. For more information, see: www.mbdc.com/

- Organise ownership. It can be quite a challenge to keep our resources in a closed loop and again, we need all stakeholders in the value chain to put some muscle into it! A lot of materials are recyclable but without specific measures they often end up in the incinerator or as landfill. Therefore, it is important to take the end of life into account in the development process and to think about the ownership of the product material(s) after its use.

- Create a circular business model. For example, you can organise this on a small scale and as a production company or design agency, keep the ownership of products and associated logistics, creating a circular business model around it.

- Find owners in your network. Another option is to find possible owners or developers in your network who use the resources of your product for composting, fertilisation or recycling. For example, with PHA, you can wash it, grind it into small pieces, process it and make new products, such as flower boxes or building material out of it. Always try and keep it in the loop as long as possible.

- Create a community. You can also organise shared ownership on a medium scale, by creating communities of stakeholders that exchange materials or communities of recycling centres.

- Change policies and regulations. Challenging, but important: governmental policy and regulation enable changes in society, for example improving the waste infrastructure and encouraging separation of resources and waste collection and recycling (Purnell, 2019).

- Rethink the value of waste. We have to find ways to reframe our cultural meaning of waste, see waste as a positive thing; something you want to keep or -if possible- compost, or for create something new.

# Resource Recovery in practice: the Biocup

**Collaboration:** LIMM Recycling, House of Design NHL Stenden University of Applied Sciences.

## Challenge

The aim of the Biocup is to keep the cups in the system for as long as possible and to avoid the loss of cups and valuable material. For this reason, LIMM remains the owner

of the cups and collects them again after use. However, there will be a point in the future where cups will be damaged or come to the end of their useful life. What do we do with the material after that?

## Solution

TThe good thing about PHA is that it can be made from all kinds of residues, such as garden waste, and any kinds of organic waste material, even sewage. The only problem is, in terms of testing on consumers, these kinds of bioplastics are not yet food-approved. However, in the future LIMM hopes to take "resource recovery" as the starting point for their products. For the time being, LIMM Recycling can still use the cups they have for some years now. At the moment there are not yet sufficient infrastructures for separating all different kinds of plastics, although waste processing stations and universities such as NHL Stenden are working on that (Research Group for Circular Plastics). Therefore, two options remain: recycling and composting. If cups break, LIMM will recycle them by melting the plastic as a resource for making other products. The recycling of cups for new cups is unfortunately not yet allowed, due to the "food proof" laws. Together with House of Design they will design a new product so old cups will receive a new life. However, the recycling process cannot be repeated indefinitely because plastics become weaker when they are recycled. If recycling is no longer possible, you can always compost the bioplastics. Give it back to the earth so the cycle continues in a biological sense. LIMM Recycling is investigating how long it takes for the Biocup to dissolve in sea water, by conducting experiments in a saltwater aquarium. It takes quite some months before the Biocup disappears completely.



# Resource Recovery in practice: PlateMate

**Collaboration:** WorldPerfect, NorthSide Festival, H. C Bauer, Dencker and The Danish Environmental Protection Agency.


## Challenge

Festivals are major consumers of plastic packaging because these are often temporary spaces where guests consume large amounts of food and drink in a short space of time. For the past several years, the waste at the NorthSide Festival has been sorted into different categories both frontstage and backstage.

The festival has the aim of developing this work year by year to increase the sus-tainability. One of the challenges in 2017 was to create a closed loop for the plastic waste – more precisely the beer beakers – so that the plastic waste could be recycled for the purpose of returning it to the NorthSide Festival.

## Solution

PlateMate is the solution to this challenge. Plate-Mate is a plate that is designed based on the plastic consumption at festivals and the eating behaviour of festival guests. The idea behind the design itself is that it must solve a well-known festival challenge –

namely to help the festival guest keep both the plate and drink beakers and at the same time have a hand free to eat with. Throughout the project, we have involved users in the design process and conducted prototype tests to ensure that the design fits the needs of the target group.

Behind the physical plate design is a concept that challenges our existing understanding of disposable service. PlateMate is made from 100% recycled plastic from NorthSide Festival 2017. The plastic that is thrown out at festivals often has a high value, having been used only once. Often, the plastic is simply sent for incineration or downcycled. With the design solution PlateMate, we have created a closed circuit at NorthSide, where the food-approved plastic – the beer beakers - is collected, processed, transformed and returned to the festival the following year as PlateMate. After that, it can be used year after year without having to be remelted, which reduces material and energy consumption.

## How to do it yourself

It is very important to get the stakeholders to talk together, because you need to make a closed loop for every waste type. So, talk to people within the reuse industry because they can help you and guide you regarding reuse of the different materials. But remember to have very few different waste types, because the materials need to be as similar as possible.

# Everyone can start the change!

Whether you are an entrepreneur, a designer, a policymaker, a scientist, a teacher, a student, a festival organiser, a consultant or a citizen: from every perspective you can contribute to a more sustainable future for consumption and production. And from every perspective you can give and receive value in terms of local value chains. This is what we believe and want to share with you with our local, circular and multi-stakeholder approach. As we have shown in this quick guide, it takes a wide range of intertwined activities and a lot of stakeholders to collaboratively act and move forward. Remember that you too can be a link. Connecting for collaborative action can be quite challenging, however. So, we conclude this handbook with specific tips for everyone who wants to contribute:

**Connect and create a community.**
To really make a change, we need all stakeholders in the value chain to collaborate. Therefore, making connections and maintaining relationships are important so local communities can have a big impact. Even if you are not responsible for the actual production, practices or policies, you are valuable. Everyone can be an initiator and connect the people and actions.

**Use common language.**
To capture the opportunities for collaboration between different disciplines and backgrounds it helps to speak in a language that we all understand. Avoid jargon and language typical of your profession. Try to bridge language barriers with clear language that can be understood by everyone. This also helps you to set up clear deliverables and create commitment (Bilal, 2016).

**Think in opportunities.**
OOf course, sustainable practices and actions are challenging. But it will give you more energy to think positively, to see the opportunities. Often, these opportunities are closer to you than you think. Be creative, look around you and see how you can connect and act.

**Make room for long-term development.**
It takes time to change and to implement new practices and policies. It takes time to close our cycle of production and consumption or to manage the network. Although we need short-term goals to make our steps visible and motivate ourselves, the desired outcome is still on the horizon. Therefore, it's important to stick to the long-term and stay patient.

**Step by step innovation.**
Start with small steps and like-minded people to colla-bo-rate with. Evolve in little steps to achieve a broader impact every time.

**Share your story.**
People learn from good examples. So, do not be shy to step up and inspire other stakeholders to move forward. Share your experience in and beyond your network. It also works the other way around: learn by sharing your story. For example, with other generations to gain fresh and out-of-the-box perspectives.

**Look for different opinions!**
Learn from feedback and be open to other opinions, feedback and philosophies. By starting a dialogue and evaluating things with people from different sectors, you learn a lot and others learn from you.

**Act!**
It's that simple. Just act. Bring your ideas into practice. Every little step is part of one bigger step to a sustainable future. By acting now, you can be the frontrunner, agent for change and/or hero (whatever term suits you best). Act locally but connect globally: to inspire European or other international networks.

## Want to learn more?

**About the local value chain by House of Design:**
www.houseofdesign.nl

Tools for circular design:

www.circulardesignguide.com/methods

www.circulardesigneurope.eu

www.ellenmacarthurfoundation.org

**A guide to conducting Life Cycle Analyses:**
Henrikke Bauman, The Hitch Hiker's Guide to LCA. An Orientation in Life Cycle Assessment Methodology and Applications. Lund, Sweden: Studentlitteratur AB.

**A guide to develop a business plan for farms and rural businesses:**
fyi.extension.wisc.edu/foodsystemstoolkit/building-a-sustainable-business

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