FROM LINEARITY TO CIRCULARITY

A guide on how companies can transition into the circular economy

Based on a **case study** conducted among companies within UN Global Compact Network Sweden

Global Compact Network Sweden

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INTRODUCING THE CIRCULAR ECONOMY

Due to the COVID-19 pandemic, devastation and disruption has struck people and businesses alike. While the world is working desperately to bring us back to normal, we must not forget the global climate emergency that threatens our future. The next 10 years are critical and we must not relax our ambitions to deliver on the Sustainable Development Goals (SDG) of Agenda 2030. As we recover, we should consider this as an opportunity to reevaluate how we conduct business. Instead of going back to normal, let us make a collective recovery that opens up for new ways of tackling the climate crisis. Energy consumption is the biggest contributor to greenhouse gas (GHG) emissions, which makes a transition to renewable energy critical. However, nearly half of GHG emissions stem from industrial production and land management. To fully address the problem, we thus need to rethink how we produce and use goods. This is at the heart of the circular economy. Let us recover better and make a move towards circularity.

This article explores how businesses can transition into the circular economy. A brief introduction to the circular economy is presented to build basic understanding about the concept. Then follows a 4-step guide to how businesses can approach the transition into a circular economy.

Guide overview – 4 steps to approach circularity

1. ENGAGE IN THE CONVERSATION, CHANGE THE RULES
2. BUILD A FOUNDATION OF KNOWLEDGE AND ENGAGE COWORKERS
3. COMMUNICATE AND COLLABORATE WITH CUSTOMERS AND PARTNERS
4. DESIGN THE ELEMENTS OF THE CIRCULAR OFFERING

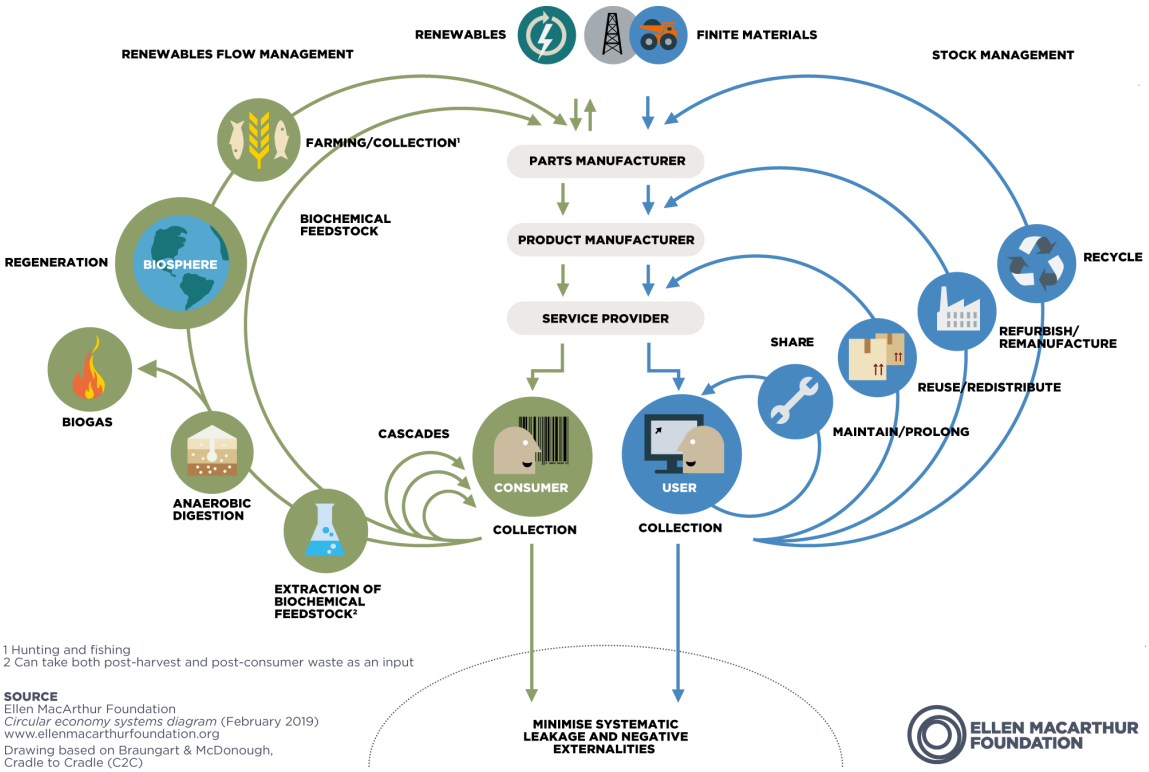
This guide is the product of a master thesis written at Chalmers University of Technology within the division of entrepreneurship and strategy. This article was made possible thanks to the UN Global Compact Network Sweden and its member companies. Findings are based on interviews in which member companies have shared their valuable experiences from their transition into the circular economy.

HOW IS THE CIRCULAR ECONOMY DIFFERENT?

To answer this question, it is helpful to first consider how value is created in the current economy. Today's economy predominantly creates value based on a linear model with a 'take-make-waste' logic. Resources are taken from the ground and made into products. Once their purpose is served, they are discarded as waste. This intensive resource consumption of the linear model strongly contributes to the climate crisis.[1] The circular economy offers a departure from the linear model as it aims to decouple economic growth from finite resource consumption. It is regenerative and restorative by design and seeks to keep products and related material at their highest value at all times. The fundamental way of achieving this is by circulating materials. Circulation happens within two separate cycles that differentiate between biological and technical materials (see figure on next page).

The **'biological cycle'** (green cycles) represents the flow of biological materials such as food, cotton or wood that can be safely returned to the environment. Central for value extraction in this cycle are *cascades*. Used products or materials are cascaded into different uses as value extraction degrades them over time. Finally, they are returned to the biosphere to serve as nutrients for living systems, such as soil, which provides the economy with renewable resources. An example would be wood that is firstly used as furniture material, then chipboard, and finally firewood before it re-enters the biosphere as ash.

The **'technical cycle'** (blue cycles) represents the flow of technical materials such as metals, synthetic chemicals, and plastics. It is vital that these materials do not become waste. They should instead be reused, remanufactured or recycled so that they may re-enter the economy. As the consumption of technical material should be avoided, the customers of these materials should be regarded as users rather than consumers. **This article will focus on the technical cycle.**



THE CIRCULAR ECONOMY IS BASED ON THREE PRINCIPLES OF ACTION

#1: Design out waste and pollution of economic activity to prevent damage to natural systems and human health. This concerns e.g. the release of toxic substances and GHG, pollution of water, air, and land.

#2: Keep products and materials in use for as long as possible, so that their embedded value from energy, labor and materials is preserved. To allow such value preservation, product design must enable two fundamental things. Firstly, it must enable the reuse, remanufacturing, refurbishing, recycling and/or maintenance of products and their materials so that they may circulate in the economy. To maximize the preservation of embedded value, circulation should happen as close as possible to the user. Meaning that, when possible, maintenance should have a higher priority than outer loops like recycling for example. Even if recycling is an important process of the circular economy, it leads to a high loss of embedded value and should thus be used only when the inner loops are not feasible. Secondly, product design must also improve durability in order to prolong product life and optimize for reuse. Such improvements should increase the number of consecutive cycles and/or time spent within each cycle.

#3: Regenerate natural systems. Non-renewable materials are avoided while renewables are preserved or enhanced. Two examples of this would be to shift from fossil fuel to renewable energy or making sure nutrients are returned to the soil for renewal. Whenever possible, delivering value to customers should be decoupled from material consumption. When materials are needed, they are chosen with careful consideration.

The four loops of the technical cycle

Recycle
Reducing products to their basic materials to enable these to be remade into new products.

Refurbish / Remanufacture
Remanufacturing means to disassemble a product to component level and rebuild it to as-new condition.

Refurbishment is more focused on cosmetic changes, often via repairs rather than disassembly.

Reuse / Redistribute
Products are reused in original form with little or no change.

Maintain / Prolong (& Share)
Keep products and materials in use by prolonging their life by designing for durability and repair. Sharing between users is a way to increase access and usage.

Adapted from Ellen MacArthur Foundation. [2]

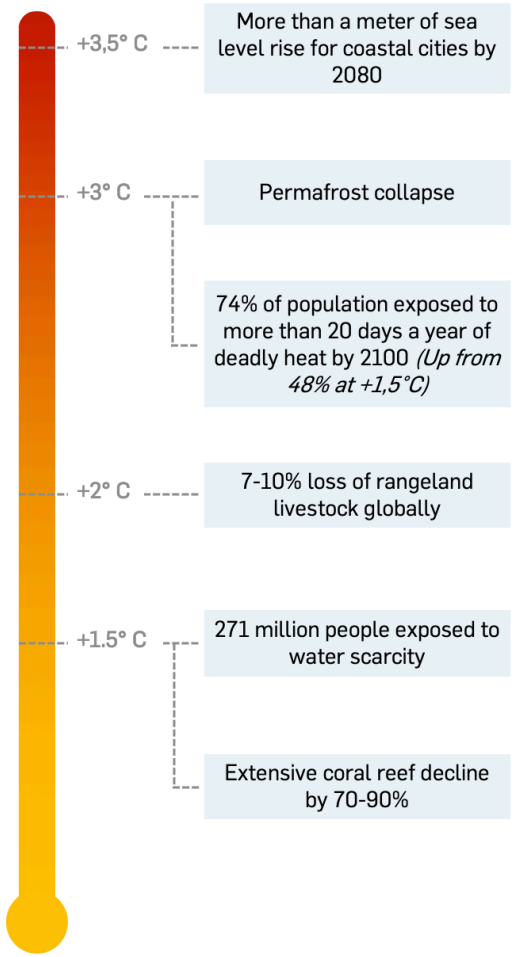
WHY SHOULD WE MAKE THE TRANSITION? - A STICK AND A CARROT

Renewable energy has gotten a lot of attention in recent years, and with good reason. Energy supply and consumption represents 55% of the global GHG emissions, while the remaining 45% comes from the production of goods and management of land. Focusing solely on energy is insufficient to meet climate targets as it leaves out the 45% of emissions that relate to making products, which have proven highly challenging to reduce under current climate actions.[1] In addition to the shift towards renewable energy, a circular economy would transform how goods are produced and used. This could complete the picture of what is needed in order to combat climate change. It could furthermore offer substantial progress towards SDG12 (responsible consumption and production), but also contribute to many other SDGs related to air, water, and biodiversity for example.

THE STICK – If companies continue business as usual, the take-make-waste logic will cause irreversible damage to our planet and everyone living on it. Global warming and intensive resource consumption are taking a heavy toll on the world's biodiversity and natural resources such as arable land, forests, ocean, and freshwater. According to The World Economic Forum, climate change is the threat that, if realized, will cause the most damage to the global economy. [3] Despite this ominous statement, we face the highest level of carbon emission in human history.[4] To reach the target of the Paris Agreement, to limit the increase of global average temperature to well below 2℃ of pre-industrial levels, we would need to cut emissions by half during the next decade. Given current trends however, we are approaching an increase of 1.5℃ before midcentury, while exceeding 3℃ by the end of the century.[5] The climate crisis must be averted, and these projections highlights the need for increased action to secure a better tomorrow.[4]

THE CARROT – The circular economy does not just offer a more effective way to combat climate change, it also opens the door to new business opportunities. With the new value creation of the circular economy follows reduced material cost, increased assets utilization, and a response to growing consumer demand for sustainability. Estimations show that material cost savings could amount to USD 630 billion per year within the EU alone if relevant manufacturing sectors transition into the circular economy.[6] Such cost savings, combined with new revenue streams, can yield significant profits. Offerings based on remanufactured or re-used products can also open up for new customers that have previously been priced out. An example is of how a company selling washing machines decided to offer them as a service instead. By leasing a high performing washing machine, customers saved a third of the cost compared to buying the machine. At the same time, the profits for the company increased by a third as well. New business models based on leasing or renting can also strengthen customer relationships and increase customer satisfaction and loyalty.

Some of the consequences of global warming



Relative to pre-industrial temperature levels

Adapted from Global Commission on Adaptation. [5]

A FOUR-STEP GUIDE TO CIRCULARITY

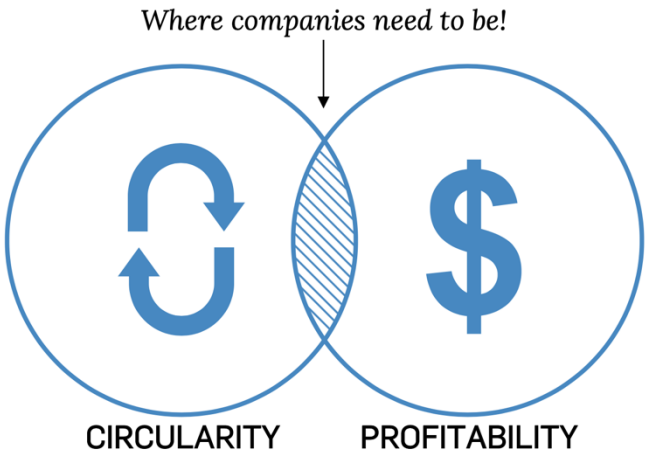
The circular economy is arguably the best solution for companies who want to reduce their environmental impact. However, adoption on a larger scale has yet to happen and it is clear that companies need help and guidance in doing this transition. Transitioning from a linear business model (LBM) to a circular business model (CBM) would require rethinking how value is created. This can be very challenging and it will require substantial effort from companies, governments and consumers. It is by no means impossible however, quite the contrary. To ease the transition, it is important to take a step back and consider what such a process would entail. Becoming circular is not an all-or-nothing type of change. Very few, if any, businesses are entirely circular. In fact, businesses adopt circular principles to a degree and operate along a spectrum with linear and circular endpoints. In other words, it is entirely possible to make smaller incremental steps toward a more sustainable business by increasing the degree of circularity piece by piece.

So, what can individual companies do? Four major steps companies can take to move towards circularity have been identified, based on input from companies within UN Global Compact Network Sweden. Important to note is that circularity will look different to each company who adopts it. There are simply too many variables and circumstances that differ from company to company for any guide to provide a one-size-fits-all solution. Due to this, the steps presented are more general and are meant to help foster a mindset and act as guidance on how companies can approach circularity.

Each step begins by describing the various problems it intends to address, this will build a deeper understanding of circular economy and help anchor the guide in relatable problems. This is followed by actions companies should take to overcome these problems and challenges. Finally, each step is concluded with a set of self-reflection questions. These questions are intended to provide companies with the right mindset and help them assess their own situation.

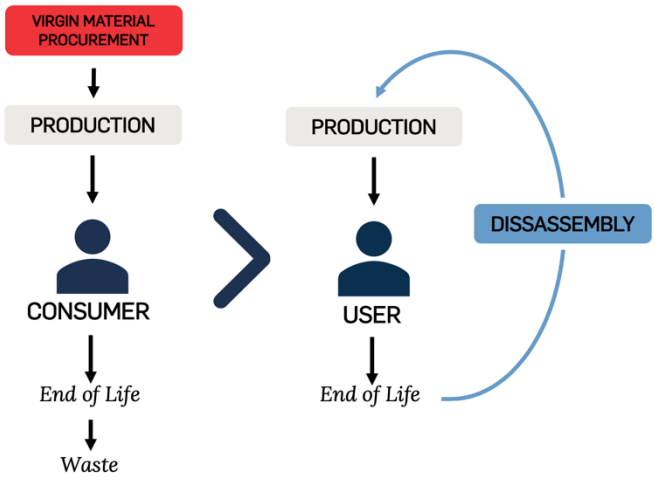
1 ENGAGE IN THE CONVERSATION, CHANGE THE RULES

A recurring sentiment expressed in the interviews was that circular initiatives needed to be not only sustainable but also good for business. This is nothing new or revolutionary, in fact, this is so uncontroversial that the implications often go without scrutiny. The problem is not that actions need to be sustainable ***and*** good for business per se, the problem is that today's business context is not built to support the duality. Decades of optimizing business practices and streamlining supply chains have led to the uncomfortable problem of how much can be sacrificed in order to increase sustainability. Disintegrated supply chains, Just-in-time deliveries, and cost reductions are all examples of business practices not in line with the big-picture perspective needed for a CBM to be successful. The current business context is simply not built to support CBMs.



Increasing this overlap is crucial for the success of circular business models.

It is not enough, and sometimes not even possible, to innovate the business model if it is operating in a context that does not support sustainable business. Increasing the overlap between profitability and sustainability is thus required. If not, a company who invests in a CBM may risk competing at a disadvantage. In a remanufactured offering, for example, virgin material consumption is reduced by disassembling old products and reusing components. In other words, materials are substituted by labor. However, labor is more heavily taxed than material and the circular offering is thus at a disadvantage.



Procuring virgin material can be replaced by disassembling worn-out products and reusing components. Replacing material with labor.

In order to achieve this alignment and thus support CBMs, external pressure is needed. It is absolutely crucial for the rules to change so that they support circular business practices instead of punishing them. This can be in the form of revised legislation or customers demanding sustainability. These are two very different strategies but they both have the same goal, to increase the overlap between what is good for business and what is sustainable. These two options are in no way mutually exclusive, they should be used simultaneously for best effect.

1.1) ADVOCATE FOR CHANGE – Businesses are in dire need of regulation that supports sustainable business. Companies should therefore engage and participate in the discussion with the ultimate goal of changing the rules of the game. Make it clear to the government that supporting regulation is needed. If, for example, all companies are forced to reduce their dependence on virgin material in combination with activities such as refurbishment and disassembly being tax exempt, companies would revise how they operate. In order to make an impact, it is vital for companies and industries to band together. The message is amplified by leveraging industry organizations, sustainability networks or other forms of collaborations.

1.2) INFLUENCE CUSTOMER PERCEPTION – The more people value sustainable aspects, the higher their willingness to pay for circular offerings becomes. This will make it easier to create a profitable circular offering even if regulations are slow to adjust. Companies should therefore work actively to educate and influence customers' perception on sustainability and circulated products to increase the demand. If customers intensely demanded sustainable options like reused products, companies could increase these offerings to capture that value. Marketing is a great tool to educate customers in sustainability in general, and circular offerings in particular.

SELF REFLECTION ON STEP ONE

- In what ways, and to what extent, are we currently participating in the discussion around sustainability and circularity? What legislative changes would support our move to CBM and how can we help push these changes?

- What networks or organizations are we a member of that could help amplify our message? What new forums can we engage ourselves in?

- In what ways, and to what extent, are we currently communicating sustainability to our customers? Is it sufficient to grow the demand for our circular offerings?

2 BUILD A FOUNDATION OF KNOWLEDGE AND ENGAGE COWORKERS

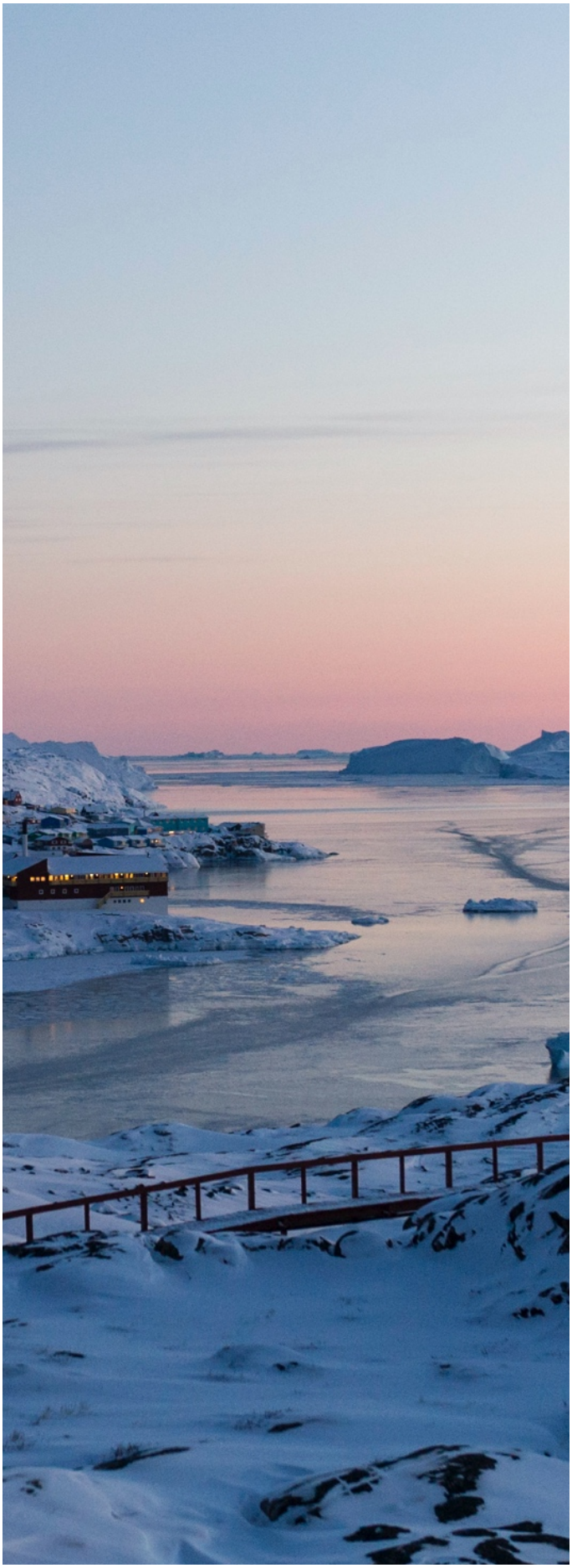
Changing the rules of the game is absolutely crucial for the success of CBMs. However, revolutionary change is likely not around the corner. Companies also need to think about what they can do given current circumstances. Product design is important in a circular offering. So is a system for circulating products and material. However, these are both tangible problems. Changing the design of a product is more often than not a minor problem. Achieving circularity is not about fixing a set of smaller problems one after the other, it is about looking at the bigger picture and solving the problems holistically. This is not contradictory to approaching circularity in smaller incremental steps, it simply highlights the need for deliberate planning and execution.

"COMPANIES NEED TO WORK AS ONE UNIT TOWARD A COMMON GOAL"

The key elements of the circular offering, product design, revenue model, and takeback system, cannot be developed in isolation. How a company's takeback system should look depends on how the product is designed. The same goes for driving revenue, the best way to make money depends on how the product can be designed and what a viable takeback system looks like. These key elements all rely on each other. This means that they need to be developed in tandem, with a continuous back-and-forth between the different elements to make sure they align with each other. In order to do this, companies need to work as one unit toward a common goal.

2.1) MAKE SUSTAINABILITY AN INTEGRAL PART OF THE OVERALL STRATEGY – Sustainability cannot be a side mission, it needs to be integrated in every part of the company. Starting with the strategy and trickling down to every decision and activity. An important aspect of this is that moving towards sustainability and circularity should be deemed a success. In other words, KPIs or other ways of measuring progress need to properly reflect sustainability. If these KPIs are not implemented, companies will be blind to sustainability progress and risks only seeing the short term negative impacts on cost and efficiency. A concrete example of this is purchasing, which is traditionally measured purely on cost. If sustainability is not properly measured, a purchaser who prioritizes sustainability when it does not overlap with profitability risks being seen as a poor performer for increased costs.

2.2) COMMUNICATE AND EDUCATE INTERNALLY – Make it clear to everyone how much this matters. If employees can't see the value in an effort or relate it to something tangible, it might be discarded as something that simply wastes their time. This is common for an initiative like a CBM, due to its novel nature and sharp contrast to a LBM. When everyone understands the concepts and can relate to what the



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initiatives aim to achieve; circular ideas and solutions can begin to grow organically within the company. Workshops, cross-functional teams, educational material, use whatever is at disposal to get the word out internally. This is also a good time to secure competencies that will be needed later – circular design expertise and a communicator meant to act as the link between the design team and customers.

It is crucial that this is supported by a devoted team of top management. Successfully aligning the entire company behind the initiative can be very challenging and employees need to be confident that their efforts are fully supported. If the initiative is properly spearheaded by top management, employees will become more engaged and internalize it more easily.

SELF REFLECTION ON STEP TWO

- Is top management supportive of sustainable initiatives while providing a clear agenda for circularity?

- Is sustainability considered a nice-to-have or a must-have within our company? Is it an explicit part of our strategy?

- How is increased circularity, i.e. decreased dependence on virgin material, reflected in the company's measurements and follow-ups? Are central functions such as purchasing incentivized into sustainable actions?

- Have we built a foundation of dispersed knowledge about the circular economy inside our company? Do people understand the benefits of the circular economy and why the linear economy is problematic?

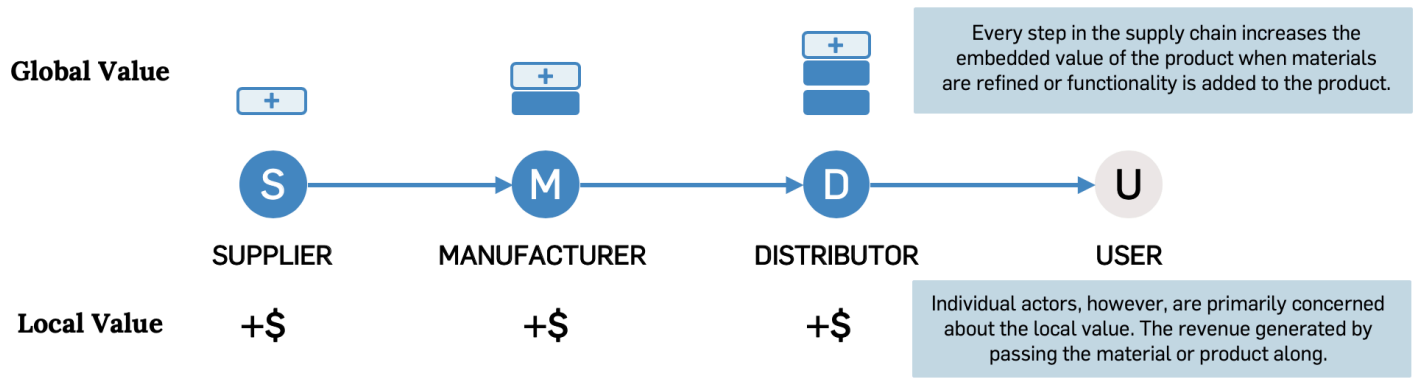
- Do we currently have circular design expertise?

- Do we currently have a role capable of being the link between the development team and customers?

3 COMMUNICATE AND COLLABORATE WITH CUSTOMERS AND PARTNERS

A company cannot single handedly transition to a CBM. Circulating products or even simply using more recycled material (or secondary material as it is also called) in productions impacts other actors. These actors must collaborate and support the circular offering, which is easier said than done.
Typically, a product goes through multiple steps in a supply chain where each step adds value to the final product. For every step, the product is refined and functionality is added and the value of the product is increased. This is referred to as the ***'global value'***, or embedded value, of the product.

Each step is performed by companies who make a profit when the product or component leaves their facilities. The company thus seeks to maximize this profit, or in other words their ***'local value'***. No company in the supply chain is concerned about the chain as a whole, that would be counterproductive for their own business. This is integral to how business today is conducted, but this structure is incompatible with circular economy. It is very challenging to split up the value creation and capture in discrete steps



where they all provide value to the individual company. Actors throughout the supply chain need to find ways of prioritizing the global value. To successfully do that would require the supply chain to become tighter and actors to align their incentives. In other words, it would require the supply chain to integrate instead of disintegrate, going against a decades long idea of what is good for business. A company with the financial resources required could acquire actors throughout the supply chain to fix this problem. However, for most companies this is not a viable option and collaboration is instead crucial.

3.1) START A DIALOGUE EARLY WITH KEY BUSINESS PARTNERS – Moving towards circularity needs to be a joint effort, the earlier partners understand the implications the better. By notifying them, they have the opportunity to prepare for the shift and on their end find a way to make it work for them. Encourage them to consider new activities that add value and are in line with a circular offering. When the time comes to move forward with the initiative, the groundwork has been laid for a constructive collaboration. This will enable all actors to successfully divide tasks, activities and profits between themselves to further the circular agenda.

3.2) FIND SUITABLE CUSTOMERS FOR A PILOT PROJECT – The circular offering won't be perfect on the first try, far from it. Finding customers willing to provide feedback and help develop the offering is crucial for success. It is common for a tradeoff to exist between product functionality and the possibility to circulate products. The only way to make correct choices in this tradeoff is by communicating with consumers. By fully understanding what consumers value, it is possible to compromise on the parts that are least valued and leave the rest intact.

SELF REFLECTION ON STEP THREE

- How does materials, products and components flow from suppliers to customers currently? A rough understanding is sufficient.

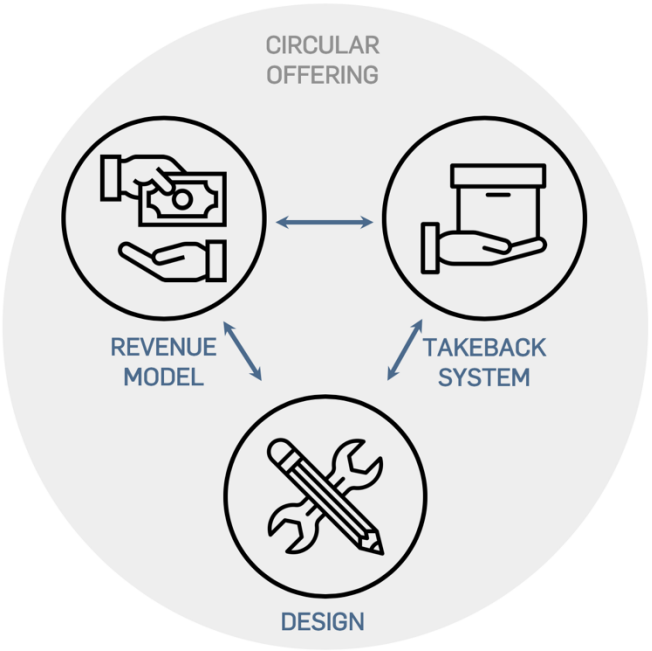
- Which of our business partners would be most impacted if we launched a circular offering?

- Have we shared our desire to launch a circular offering with these partners? Are we jointly considering the new activities required by the offering and how these can be divided to benefit and engage all partners?

- Are there any of our current customers who might be willing to initiate a pilot project?

4 DESIGN THE ELEMENTS OF THE CIRCULAR OFFERING

The three previous steps have been taken in order to prepare for or facilitate this step. This is where things start to get tangible. In general, three elements of the offering need to be developed in parallel. These are: 1) product (re)design, 2) material takeback system and 3) a revenue model. These elements are dependent on each other which is why they need to be developed in tandem.



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There is no one-size-fits-all solution. Which option is the best for a given scenario depends on a multitude of variables. This is a big part of why it is so inherently difficult to create this type of offering. This is also reflected in the steps outlined below. Instead of suggesting concrete actions, this guide highlights vital considerations and aspects for companies while

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they themselves must determine which specific action is most beneficial for them. The core question that needs to guide every decision is:

How can we as a company, most efficiently, reduce our dependence on virgin material?

This is the goal, and it should influence every decision made. Revisiting and reevaluating this question can help guide your efforts. Each of the three sections below are merely tools and means to reach this stated goal – to reduce the dependency on virgin material.

4.1) PRODUCT (RE)DESIGN – In order to circulate a product or material from a product, the product design needs to support it. In other words, it needs to be built in a way that makes disassembly and repair easy. A couple of considerations are of importance here. Firstly, which functionalities and product properties are most important to customers? This is where the pilot project and customers recruited in the previous step are tremendously valuable. By knowing which functionalities are important makes it apparent where tradeoffs can be made. Secondly, depending on the nature of the product, which design choices are the most suitable in order to reduce the dependence on virgin material? Circular design expertise and close collaboration with the team working on the takeback system makes this a lot easier.

4.2) TAKEBACK SYSTEM – Establishing a system for returning products is a major undertaking and especially challenging is maintaining efficiency. This is because the flow of products is based on end-user consumption, which varies heavily, as opposed to a linear system. Another complicating factor is the quality of returns. In a LBM, the quality of material is guaranteed by the supplier. This is not the case for products being returned, where both quality and quantity are inherently uncertain which makes planning challenging. An added dynamic is the fact that return logistics is in a many-to-one format. All users returning products or materials are driven by different needs or prioritizations which need to be taken into consideration when building the takeback system. Some might value convenience, others price

or sustainable collaborations. This should be taken into consideration when incentivizing customers to return their worn-out products.

Which design strategy is most viable has implications on how the takeback scheme should be structured. If the product is designed for reuse and refurbishment, the takeback system would need to revolve around carefully planned logistics and close relations with customers. If, on the other hand, the product is better suited for recycling, the takeback system should instead be built to efficiently source secondary material from multiple actors. The latter might be easier than the former, making it an easier place to start. In other words, it might be a viable option to single out one component on the product and replace that with recycled materials. Returning a company's own products and sourcing secondary material is not mutually exclusive and can in fact complement each other. They do however require somewhat different activities and capabilities.

Regardless of which alternative, the key is to start small. Move away from the idea that it is all or nothing. By cementing the idea that circularity is not a binary concept makes it more approachable. Start small with one customer or one component and utilize whatever channels that already exist. Utilizing a channel for insurance returns, for example, could make scaling up a lot easier.

4.3) REVENUE MODEL – In a way, the revenue model is more of a supporting element than a primary one. A business model does not become circular per default simply because customers pay for performance instead of a physical product. The revenue model should instead be designed to achieve two things. Firstly it needs to decouple the revenue from the dependence on virgin material and secondly, it needs to support the takeback system.

It is vital to understand what the customers value in order to make the correct choices. Product functionality is, in general, prioritized above sustainability but the problem is that each customer is unique and value different things. There is no universal customer with an easy to read set of values, pain points and priorities. To make correct tradeoffs, it is important to understand what customers value. Both in terms of the offering but also how they want to return products. This can be challenging, especially for a product company aiming to provide a service.

A popular revenue model is to offer products as a service instead of selling them. Meaning that you maintain ownership of the product and instead sell the performance or rent it out. This is a good option because it enables product returns and decouples revenue from consumption of virgin material. To ease into it, companies can make use of a financial partner to mitigate the cash flow challenges that a service offering entails. The financial partner would take over the monthly payments and pay the company upfront, which would allow companies to maintain their current financial structure.

Products as a service is not always viable however, some products do not make sense to offer as a service. An alternative is to sell the product as usual but also charge customers for services, such as designing the product or project management during development. A credit system can also be used to, at least, incentivize customers to return the products.

SELF REFLECTION ON STEP FOUR

4.1 PRODUCT (RE)DESIGN

• Do we understand what product functionality is required to make our circular offer attractive?

• While preserving vital functionality, how can we (re)design our product to reduce its virgin material dependency? What inputs can we replace with secondary materials?

• Have we found the proper balance between product functionality and circularity? Are we verifying this based on ongoing dialogue and testing with customers?

4.2 TAKEBACK SYSTEM

• Which takeback strategy would best support our product (re)design? Are our products to be reused or recycled at their end-of-life?

• Have we verified this based on customer input?

4.3 REVENUE MODEL

• Does the way we charge for our offering reduce virgin material consumption? How can we drive revenue based on value-added services as opposed to pure product sales?

• Does our revenue model support our takeback strategy?

GENERAL QUESTIONS ON STEP FOUR

• Have we planned for the architecture of our circular offer so that the 1) (re)design, 2) takeback system, and 3) revenue model will function harmoniously together? Are we developing these three elements in parallel to assure their fit?

• How do coworkers collaborate cross-functionally today? How do these ways of working align with the need to develop all the elements in tandem?

NOW IS THE TIME TO ACT

Transitioning into a circular business model might seem like a daunting task. It might feel like this is not the time to make the move. However, it is unlikely such a time ever will materialize. The wait-and-see approach will likely end up in the realization that it is too late. Too late to reverse course and avoid the dire consequences of climate change. While the best time to act was yesterday, the second-best time to act is right now. Start small, celebrate even the tiniest of progress and move forward. When the circular mindset permeates everyday life, we can preserve our natural resources rather than consuming them. Even if we cannot fully undo the damages caused by our intensive resource consumption, we do have the chance to prevent causing even more harm. After reading this, you are hopefully eager to learn more. Below is a list of resources, this is an excellent place to start. Don't stop there though, find others who feel the same, share ideas and collaborate to reach even further. This journey is easier if done together.

ADDITIONAL RESOURCES

1. *Ellen Macarthur Foundation – The circular economy learning hub*
2. *Ellen Macarthur Foundation – How to contribute within your business*
3. *Ellen Macarthur Foundation – An introduction to circular design*
4. *The circular design guide*
5. *Master Thesis – From linearity to circularity*

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We are two Swedish students who recently graduated from Chalmers University of Technology, with a master's degree in Management and Economics of Innovation. This article is based on our master thesis we wrote during the spring of 2020 (which you can find a link to under resources). We chose this topic because we truly believe this is the best option for businesses in the future and we hope this can inspire more companies to adopt a circular mindset. If you have any thoughts or comments on this article, feel free to reach out to us on LinkedIn (Click our names!).