



Promoting collaboration  
for sustainable and circular use  
of bioresources across agriculture,  
forestry, and aquaculture



# Circular business models and collaborative arrangements

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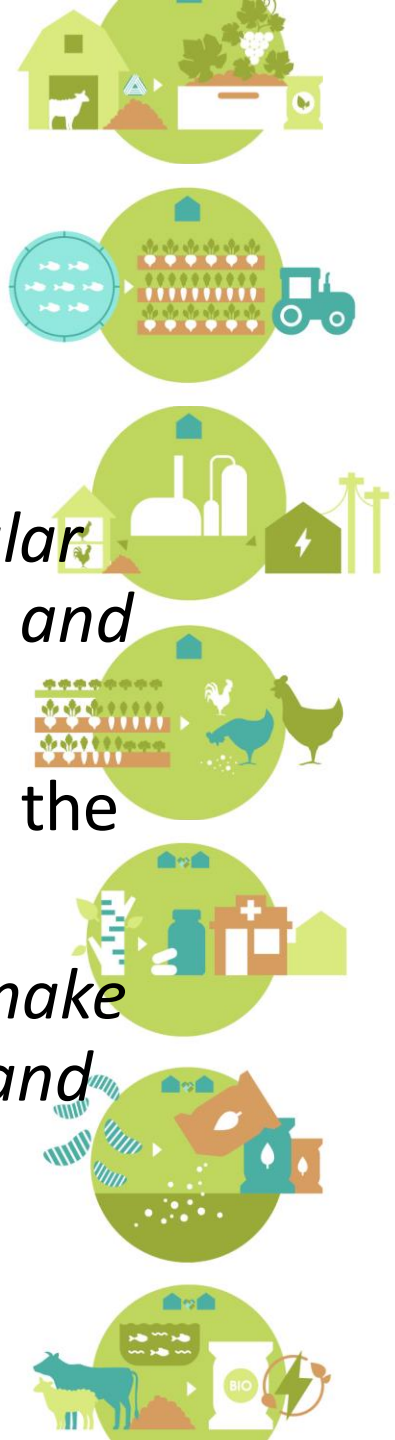
# Circular business models

- The objective of the project:

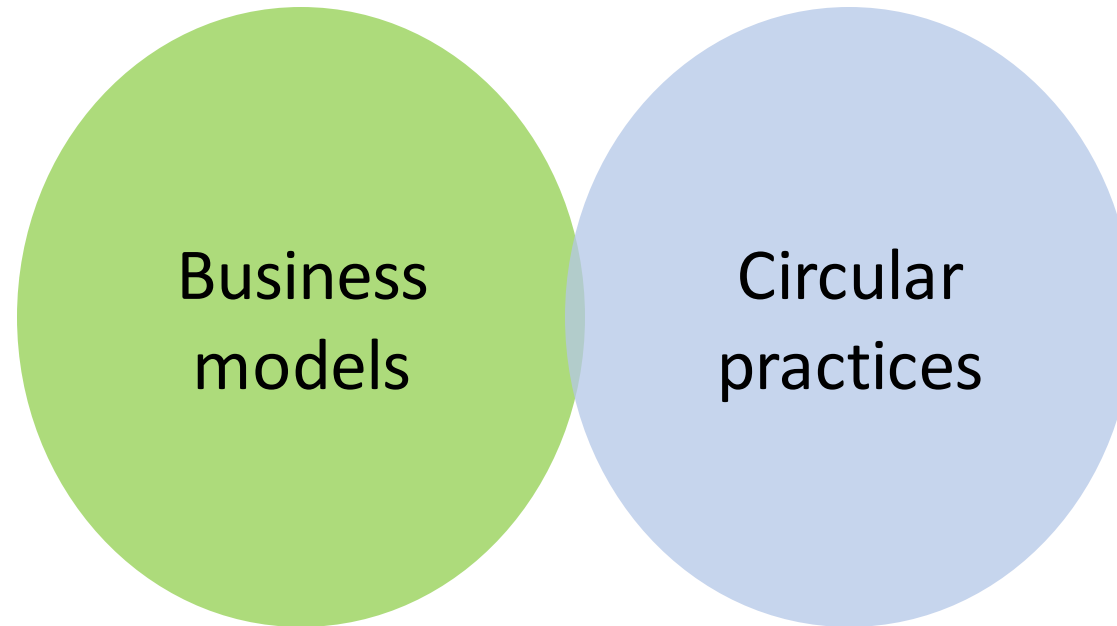
*“to strengthen interdisciplinary knowledge about innovative circular business models, collaborative arrangements, and policies across and between agriculture, forestry, and aquaculture...”*

- This presentation discusses circular business models. It initiates the discussion on the following RQ:

*“What are the conditions that allow circular business models to make use of bioresources in a sustainable and efficient manner across and between agriculture, forestry, and aquaculture?”*



# Case studies



- The case study approach as a research strategy is used to ask “why” and/or “how” questions when researchers have only limited, or do not have any, control over the studied object and – when the research object cannot be approached without exploring the context it is embedded in (Yin 2003; Thomas 2011).



## Case framing:

- At the core of each case was an enterprise looking for ways to close the bioresource loops

because we are interested in business models.

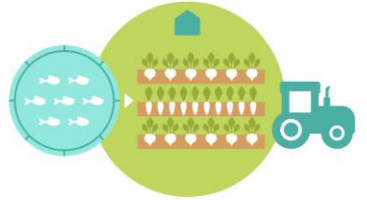
- And a particular closed bio-resource loop

because we want to show how bio-resource loops link into circular business models. We want to discuss cases that have shown that a circular use of bioresources can be a viable business strategy.

# Case selection

When selecting cases we were considering the following factors:

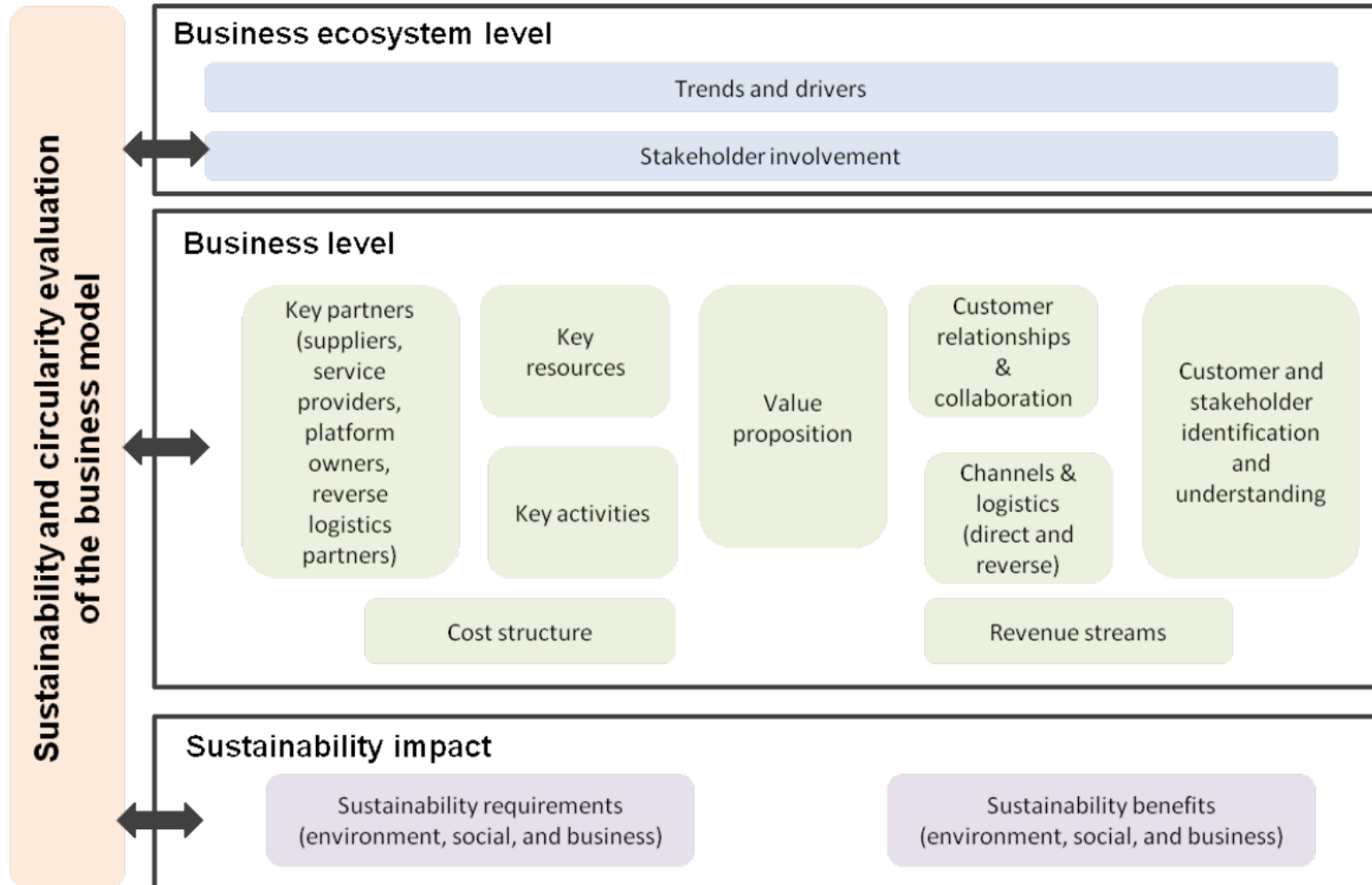
- Scope of the case (the number of actors that are engaged to ensure circular use of bioresources).
- Target markets of the products stemming from the CBI.
- Kinds of bio-resources involved.
- Areas of bioresource utilisation.
- For each country, there has to be at least one **cross-sectoral** case.
- For each country at least one case has to have clear **links with final consumers**.



The goal is to collect 12 cases: 3 from Norway, Lithuania, Estonia and Latvia. In the CIRCLE project, we call these cases “circular business initiatives” (CBI).

- Food waste as insect feed (NO and LT)
- Excess energy to heat fishponds (LV)
- Sells manure as fertilizer (EE); fishpond slurry as fertilizer (LV)
- Processes plant residues into fuel (LT)
- Agricultural and food waste into biogas (NO and LT)
- New products from fruit processing by-products (LV)
- New products from discarded harvest (NO)
- By-catch to produce fishmeal (EE)
- Residual wood to produce lignin (EE)

# Case analysis (1)



To describe the CBI, we adopt sustainable circular business model innovation developed by Antikainen and Valkokari (2016). This approach recognises the multiple layers that enable circular business models.

# Case analysis (2)

## The context

To describe the context we are using the STEEP model. STEEP stands for Social, Technological, Environmental, Economic and Political and it is a simple model to ensure that factors from across multiple domains are considered in analysis.

## Business model

A simplified version of the business model canvas is introduced for the analysis of CBIs. For the case studies, we adopt a framework presented by Bocken et al (2014) that identifies three key categories: value proposition, value creation and delivery, and value capture.

## Sustainability

We illustrate how resources enter the supply chain (are extracted), become products, by-products or waste and later circulate in the socio-technical systems generated to support the resource loops.



# The challenges



Convincing enterprises to join turned out to be more challenging than we anticipated.

Solution: In the future cases have to be identified in the proposal development phase.



Many of the enterprises are not yet operating in real markets. Instead, they are locked in an environment that is created to protect these enterprises.



The enterprises represent very broad set of technical and organisational solutions that can be hard to compare.

**CONTEXT**

# Contextual factors

## Social

- Growing **social awareness** and interest in green solutions
- Gradual emergence of **knowledge centres**
- The size of some countries allows them to take the role of **test markets**.

## Technological

- Overall **technological development** allows the introduction of complex technologies and groundbreaking solutions
- **Mainstreaming of technologies** making them cheaper and more available (hardware, service and know-how are increasingly more available)

## Environmental

- Climate crisis is a major driver for change (yet, mainly **enabled through policies**)

## Economic

- Growing **willingness to invest** in “green solutions”
- **Market disruptions** force enterprises to rethink the way they operate (respondents mention high inflation, war in Ukraine, and general competition)

## Policy

- Waste as a more **prominent political issue**
- National and international **public funds allocated** to facilitate the transition
- **Increased sensitivity** in the legislation allows distinguishing different types of waste/ by-products

# Factors enabling the CBI

- Social**
  - **Excitement** about being a part of the transition (being a groundbreaking enterprise)
  - **Support in communities and networks** allows to sell the product. However, even more importantly, it often provides access to waste needed by the initiative
  - **Openness** to innovations (willingness to rethink the general way of doing things)
  - More **transparency** and attention to practices within companies
- Techno-logical**
  - **Access to technologies and consultations** allowing linking together complex solutions
  - Some **solutions are well established** already (e.g. production of biogas), which makes it much easier to engage with the practice (due to the accumulation of knowledge and established support systems)
  - For well-established solutions – **technologies are getting cheaper**
- Environmental**
  - **Unique surrounding ecosystems**
  - Shifts in climate/ **disruptions** caused by the climate crisis

# Factors enabling the CBI

- Economic**
- **Potential profits** linked to the new practices introduced by the enterprise
  - The **supply chain supports change**/ contracts states that change needs to take place
  - Ability to commercially **test small amounts** of new products
  - Being the **only enterprise with a particular solution** for a particular type of waste
  - Access to **R&D project funding** (in-house, from partners and public actors)
  - Tradeoff between upscaling and sensitivity towards best solutions for particular types of waste
- Political**
- **Financial instruments** supporting setting up particular solutions (consultations on elements of these instruments)
  - **Subsidies** for organic farming
  - **Support to innovative solutions**

# Barriers enterprises face

## Social

- **Disputes** with neighbours
- **Low social acceptance** of the innovation
- **Lack of infrastructure** for cutting-edge innovations
- **Price sensitivity** of consumers

## Technological

- Lack of **localized solutions**
- **Production remains expensive**
- **Competition** hampers information exchange
- Risks related to strong interdependency between technologies
- Technologies outpace regulations

## Environmental

- Fluctuations in **waste streams**
- Emerging support systems can push forward solutions that might cause harm to the environment
- Some solutions are **expensive in the European climate**

## Economic

- **Instability** of global markets
- Final product too **expensive**
- **Lack of raw materials** to upscale the production
- Technologies and logistics can still be **expensive**
- Difficulties in **accessing loans**

## Policy

- Lack of support for **circular start-ups**
- No support measures helping institutions to **distinguish themselves** from competitors
- **Licensing** can be costly

# CIRCULAR BUSINESS INITIATIVES

# Reasoning behind CBI

*«Even though circularity and resource-saving are solutions that we have been adopting... introducing these practices is not our principal objective... The company's main objective is to develop novel food products from processed berries and to increase our annual turnover up to two million EUR.»*

- Shifts in the potential value of waste

*“Costs of alternative fertiliser grew, and we saw that we had something to offer this market”;*

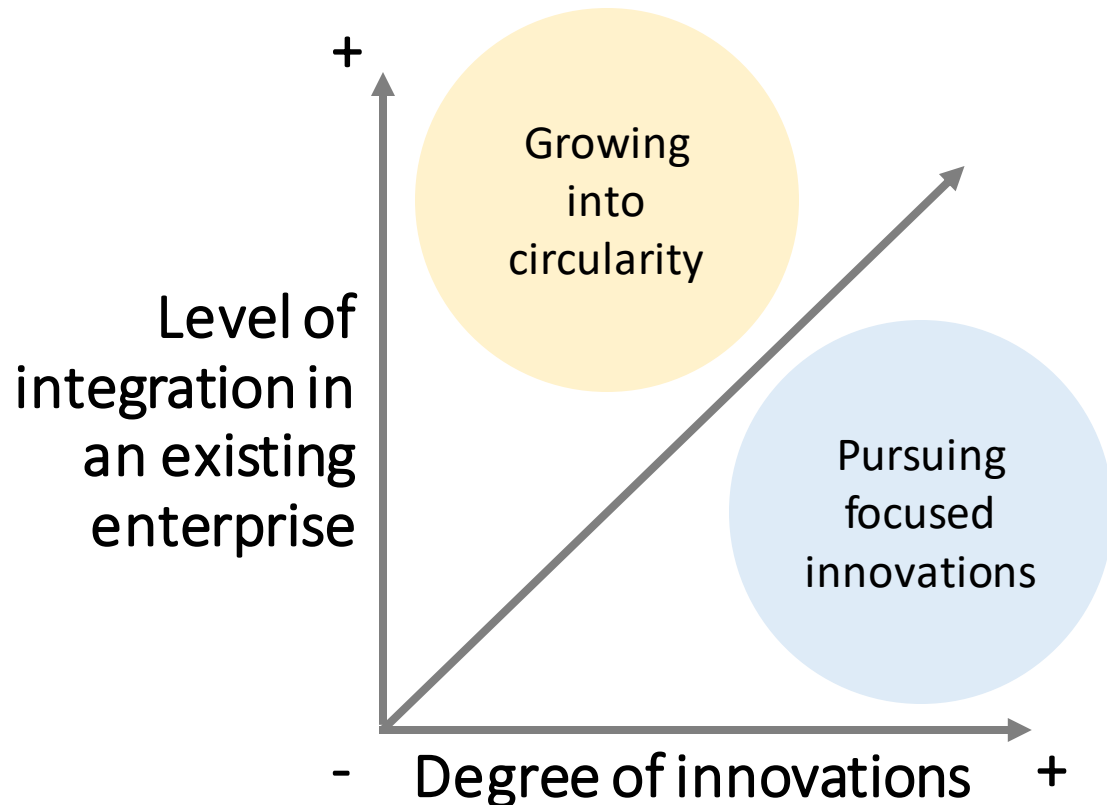
- Future costs are perceived as an investment that might eliminate these costs

*We were not fully compliant with state regulations, and we knew that at some point we would start to get fined for this.*

- Reducing dependency on surrounding actors
- Developing unique/new models to deal with waste
- Searching for new products that would increase competitiveness



# Two types of circular business models



The cases revealed two types of enterprises:

- enterprises slowly growing into circular practices (typically not so dependent on the income generated by circular practices and less ambitious about the solution introduced)
- enterprises established to provide circular products/ services (very dependent on the income and fully convinced about the market potential of these practices).

# Value creation

Most of the enterprises engaged in circularity quite pragmatically – perceiving the given practice through the benefits circular resource use could bring to the enterprise. The perspective on what is the best way the enterprise could create value from closed resource loops differed.

**Creating new products**

**Reducing costs**

**Optimising the use of resources**

**Engaging regulations**

# Value Capture (1)

While there are different ways enterprises are trying to benefit from the circular use of bioresources, the principles that allow them to do so and the issues that they encounter are somewhat similar across cases and across the four partner countries.



# Value Capture (2)

## **Coordinating efforts**

Engaging in the circular use of bioresources requires rethinking links the enterprise has both upstream and downstream of the supply chain. In practice, this means that the founders of the CBI are surrounded by a diverse set of actors.

## **Organisational structure**

In several cases, it has been observed that CBIs are trying to identify the best legal or organisational solution for the envisioned activity. Identifying the best legal and organisational form seems to have an impact on the perceived and real opportunities of CBIs.

## **Availability of knowledge**

All four considered national contexts have at least some general support structures (such as financial support, access to at least some well-established example cases, informative support, etc.) in place to facilitate bioresource-related innovations.

## **Steady resource flow**

Once the investments are made, the enterprises must work to justify them. This means ensuring that the technological solutions are working to their full capacity. Without such an effort a company might struggle to cover the initial investment.

## **Developing tech/ infrastructure**

In general, case studies demonstrate that novel technologies and novel entrepreneurial forms are an important prerequisite for closing the bioresource loops.

## **Multifunctionality**

Many of the cases have found multiple income sources from different activities that they link to the closed bioresource loops.

# Value proposition (1)



The role of the circular use of bioresources differs from one case to the next and is strongly linked to the overall strategic significance of the circularity in the CBI. The significance of these practices is linked to the target groups the enterprises are working with and the perceptions of the optimal strategy to monetise their practices.

# Value proposition (2)

Enterprises considered in the cases were not making circularity as their selling point. This might suggest, that there is no current market for these products.

## **Benefiting internally**

- cutting costs or future costs
- exploring future business opportunities

## **Providing services (B2B)**

- offering a possibility to deal with leftovers
- providing consultations on novel solutions

## **Selling products (B2B)**

- circular use of products does not affected the price

## **Products to consumers**

- most of the cases does not communicate to consumers circular production practices

# Conclusions



- Few truly innovative solutions. The system tends to favour the replication of existing solutions.
- There are tradeoffs between the efficiency of loop closing and the sensitivity towards local needs
- Economic motivation prevail. However, future prospects tend to introduce other arguments in the mix.
- Existing solutions often benefit from strong networks willing to support the emerging solution.

# Thanks!

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