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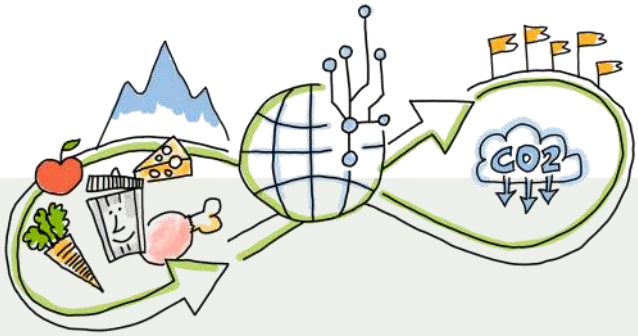

CEFoodCycles

Creating smart and sustainable food cycles through experimentaiton

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Key takeaways

01 Businesses must understand environmental assessments

Enhanced knowledge of Life Cycle Assessment (LCA) helps agri-food businesses evaluate practices, reduce environmental impacts, and meet legal requirements.

02 Generating real-world data for LCA and business model refinement

Data-driven decision-making supports the refinement of LCA methodology, helps integrate digital monitoring systems and improves sustainability tracking and policy recommendations.

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Design and implementation of closed food cycles

This document represents Output 3.1 of the project CEFoodCycle, a participatory tool that brings together key stakeholders from the selected food stream. These tools facilitate networking, the sharing of experience with circular economy practices, and the identification of critical challenges that need to be addressed to develop new circular business solutions.

The CEFoodCycle project encompasses several pilot activities that integrate digital technologies to optimise food waste management and promote sustainability. The selection of pilot activities followed by a set of carefully defined criteria to ensure **regional relevance**, **diversity**, and **practical feasibility**. These criteria supported the identification of pilot initiatives that integrate digital technologies to reduce food waste and promote sustainable resource use across different segments of the agri-food chain.

Each pilot was selected based on its **alignment with local food system challenges and opportunities**. The goal was to demonstrate how circular food cycle solutions could be implemented within specific regional ecosystems, using locally available resources and engaging local actors.

The project ensures **broad territorial representation across the Alpine Space** region, with pilots in Austria, France, Germany, Italy, and Slovenia. This geographic diversity allows the project to test solutions under different environmental, infrastructural, and policy conditions, enabling **comparative analysis** and **transferability** of best practices across borders.

A deliberate effort was made to include a **variety of food sectors**. This sectoral diversity allows the project to explore circular innovations across multiple types of organic waste and evaluate how digital tools can be adapted to different value chains.

Selected pilots had to demonstrate **technical**, **environmental**, **social** and **economic feasibility** within the project timeframe. Pilots were evaluated for their **existing capacity** (infrastructure, partnerships, willingness to innovate), potential to integrate **digital solutions**, and ability to deliver **measurable outcomes**. Additionally, each pilot was assessed for its **scalability and replication potential** regionally and internationally.

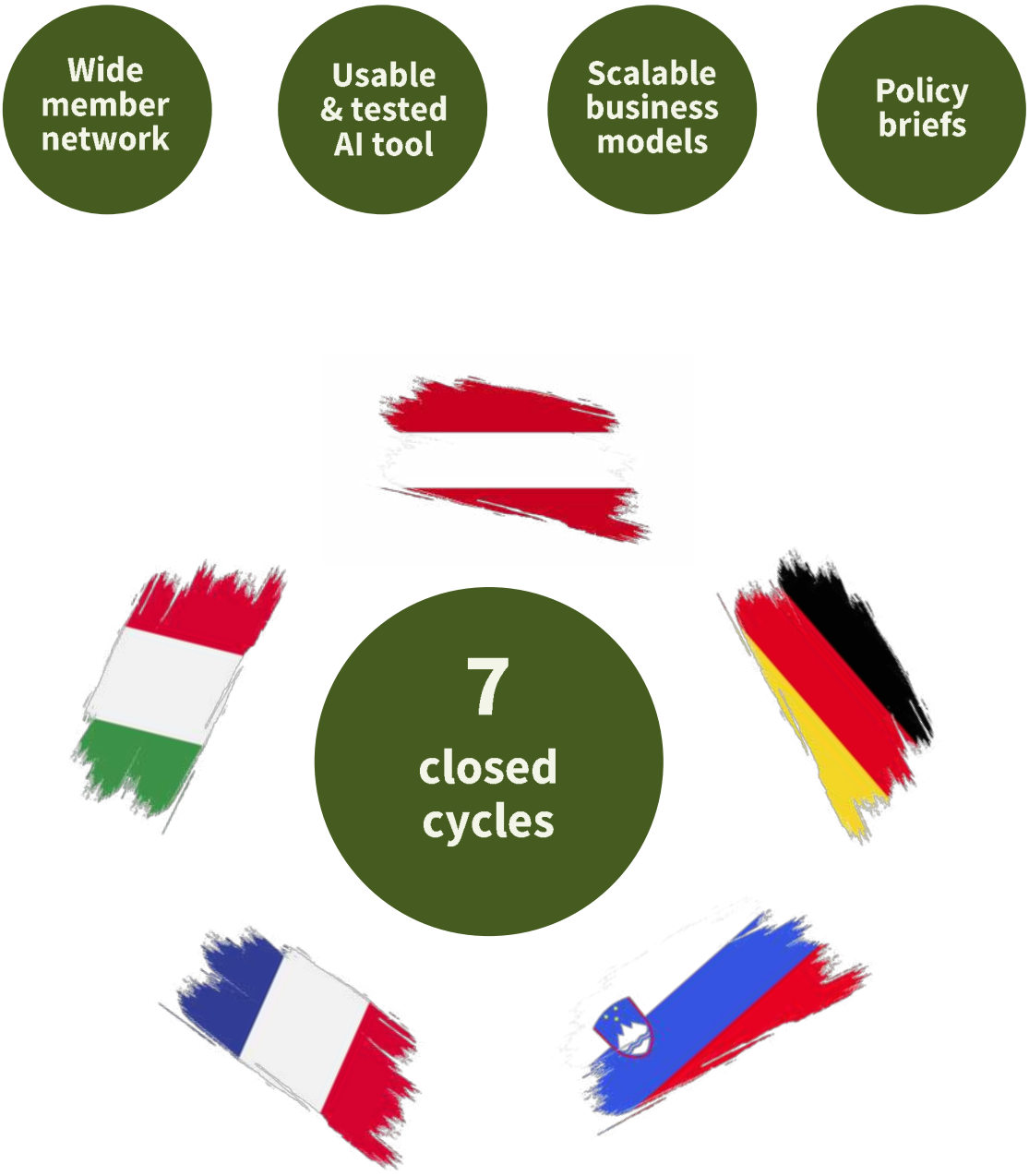
The first two steps in the piloting involve identifying and engaging relevant stakeholders to initiate the process, followed by collaboratively designing closed food cycle pathways based on the specific waste streams they have identified as challenging. Several closed-loop solutions were explored through discussions with stakeholders, project partners, and industry experts. A reassessment of stakeholder involvement was also needed to address gaps in the closed-loop system. Each closed food cycle addressed different target groups. Yet, they will benefit from the compilation of comparative experiences from all Alpine pilots and learn how to optimize the chain to limit waste in the food sector.

The pilots demonstrated that regionally rooted, small-scale circular models are feasible when adapted to local resource flows and existing infrastructure.

After the pilot implementation, their **scalability** was assessed to expand business models across different regions and help shape local and regional policy development.

Insights into *CEFoodCycle* business models for food-waste cycles

When describing the business model of each **CEFoodCycle pilot**, it was essential to include core elements that define **how the pilot creates, delivers, and captures value** within the circular food economy. Below is a structured approach based on the business model canvas. All business models are shaped to incorporate digital tools not as add-ons but as an integral components that enhance economic and ecological feasibility.



GIVING BAKERY SURPLUSES A SECOND LIFE THROUGH SMART RE-DISTRIBUTION

Value propositions: Reducing waste by revalorising surplus baked goods; offering high-quality, sustainable bakery products.

Customer segments: Local consumers; home-delivery clients; out-of-home market in Austria and Germany.

Channels: Bakery shops; home-delivery services; out-of-home market channels.

Customer relationships: Direct engagement through bakery shops; customer education on sustainability practices; feedback mechanisms to improve offerings.

Revenue streams: Sales of revalorised baked goods; potential new product lines from surplus goods.

Key resources: Surplus baked goods; processing facilities; distribution network; skilled workforce.

Key activities: Collecting and processing surplus baked goods; developing new products; marketing and customer education.

Key partnerships: Local suppliers; distribution partners; sustainability organisations.

Cost structure: Costs related to the collection and processing of surplus goods; product development; marketing and customer engagement.

Insights from Italy

LAMORO (Piedmont) / IDM (South Tyrol)

FROM WASTE TO NOURISHMENT: AN INNOVATIVE CIRCULAR APPROACH

Value propositions: Transforming unsellable food into insect larvae for poultry feed; enhancing the nutritional content of eggs; promoting animal welfare; reducing reliance on traditional soymeal.

Customer segments: Local farmers; consumers seeking sustainable egg products; animal feed producers.

Channels: Direct sales to consumers; partnerships with local markets; collaborations with feed producers (face-to-face and online meetings).

Customer relationships: Educational initiatives about sustainable egg production; transparency in supply chain; community engagement.

Revenue streams: Sales of enriched eggs; potential sales of insect meal; collaborations with feed producers.

Key resources: Bugsfarms for insect breeding; unsellable food sources; poultry farms; processing facilities.

Key activities: Breeding black soldier flies; feeding larvae with food waste; integrating insect meal into poultry diets; monitoring egg quality.

Key partnerships: Local food producers; poultry farmers; agricultural organisations; research institutions.

Cost structure: Infrastructure for insect breeding; collection and processing of food waste; integration into poultry farming; marketing and education efforts.

FROM BEAN TO BEAUTY: TURNING COFFEE GROUNDS INTO NATURAL COSMETICS

Value propositions: Transforming spent coffee grounds into sustainable cosmetic products; reducing organic waste while supporting local innovation and brand identity.

Customer segments: Speciality coffee shops and cafés, sustainable cosmetics producers, eco-conscious consumers, local hotels and retailers, tourists.

Channels: Reverse logistics with existing coffee supply routes; design workshops; co-creation labs; concept stores; awareness campaigns.

Customer relationships: Collaborative product design with users and stakeholders; storytelling through packaging; community engagement and education.

Revenue streams: Sales of cosmetic products; potential licensing and regional brand expansion; cost savings from waste diversion.

Key resources: Used coffee grounds; Caroma's production and logistics infrastructure; design and cosmetic labs; catering, retail, academia.

Key activities: Collection of used coffee grounds; R&D of cosmetic products; stakeholder workshops; design and testing of business models; promotional activities.

Key partnerships: Caroma (lead), Uni of Bozen-Bolzano, local cafés and restaurants, cosmetic labs, Circular Food Hub, waste authorities.

Cost structure: Product development and prototyping; logistics and reverse collection systems; stakeholder engagement and co-design; communication and branding.

Insights from Slovenia

E-Institute / BSC Kranj (Gorenjska)

FLYUPCYCLE: CREATING A CLOSED FOOD CYCLE WITH THE STAR OF INSECT FARMING

Value propositions: Transforming organic waste into high-quality insect protein and compost-like residues, reducing food waste, and promoting sustainable supply chains.

Customer segments: Local bakeries, breweries, vegetable cultivators; pet shops, national terrariums, vivariums, research institutes.

Channels: Direct partnerships with producers for waste collection and product distribution; workshops and webinars for stakeholders.

Customer relationships: Collaborative training sessions and capacity building for stakeholders; continuous feedback loops to refine processes.

Revenue streams: Potential sale of dried larvae as a high-protein alternative for animal feed; potential revenue from compost-like residues as soil enhancers.

Key resources: Bugsfarms for insect breeding; organic waste substrates; skilled personnel for insect farming and waste management.

Key activities: Breeding black soldier flies (waste conversion); engaging stakeholders through workshops; conducting awareness-raising campaigns; developing policy recommendations.

Key partnerships: Local food producers; waste managers; feed manufacturers; technology providers; research organisations.

Cost structure: Technology acquisition and maintenance; logistics; personnel training; stakeholder engagement activities; marketing and awareness campaigns.

UPCYCLING HORECA SECTOR WASTE INTO HIGH-VALUE PRODUCTS

Value propositions: Transforming apple pomace and coffee grounds into biodegradable leather alternatives and natural exfoliants, reducing food waste and introducing eco-innovative products.

Customer segments: Hotels, cafés, wellness and cosmetic producers, designers, and environmentally conscious consumers.

Channels: Design labs, co-creation workshops, awareness campaigns, and direct B2B outreach.

Customer relationships: Collaborative prototyping, stakeholder training, and participatory product development.

Revenue streams: Sale of upcycled materials and cosmetics; potential partnerships and licensing of upcycling processes.

Key resources: Organic waste streams, processing know-how, cosmetic and design expertise, and local stakeholder networks.

Key activities: Waste collection and sorting, product prototyping, awareness-raising, and policy engagement.

Key partnerships: Hotels and cafés, cosmetic companies, research institutions, technology providers, and public sector actors.

Cost structure: Technology and processing costs, stakeholder engagement, training sessions, and communication activities.

Insights from France

CCI NCA & AVITEM (Nice)

EMPOWERING URBAN HOSPITALITY TO CLOSE THE BIO-WASTE

Value propositions: Simplified, sustainable bio-waste sorting and collection service; to help CHRs comply with new waste regulations.

Customer segments: Local CHRs (cafés, hotels, restaurants) in Nice; bio-waste management companies; local government and authorities.

Channels: Face-to-face meetings and sessions; flyers; custom-branded electric cargo bike.

Customer relationships: Education-focused engagement via workshops and training; responsive feedback loop via IDLCASS mockup testing; public awareness campaigns.

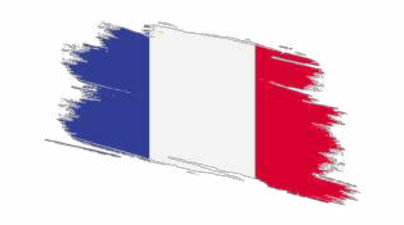
Revenue streams: No direct revenue in pilot phase; potential future income from extended services; savings for CHRs (e.g., reduced waste taxes).

Key resources: Electric cargo bike; branded communication materials; local partnerships (e.g., UMIH, Veolia, Transcan); staff and technical support.

Key activities: Stakeholder coordination; awareness campaigns; customisation and deployment of the cargo bike; development and testing of logistics and communication strategies.

Key partnerships: UMIH (hospitality sector support); Veolia (waste treatment); Transcan (logistics); Métropole Nice Côte d'Azur (policy and incentives); local CHRs.

Cost structure: Pilot coordination and meetings; design and printing of flyers; customizing the cargo bike; personnel and technical coordination; potential subsidies to support CHR participation.



Recommendations

GOING FURTHER: TIPS TO RESHAPE OUR FUTURE

To scale up closed food cycles, future initiatives should:

- Strengthen regional circular hubs that bring together business, research, policy, and civil society.
- Prioritise policy alignment, including incentives and clearer regulatory frameworks.
- Support monitoring and impact evaluation, ensuring that results are quantifiable and communicable to broader audiences.

What was prepared in the CEFoodCycle project that can be useful?

- *Industry-specific LCA guidelines.*
- *Stakeholder network.*
- *AI-driven impact assessments.*
- *Regional business models for AI tool.*
- *Policy recommendations.*

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