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Mechthild Donner, Romane Gohier, Hugo de Vries

► **To cite this version:**

Mechthild Donner, Romane Gohier, Hugo de Vries. A business model typology for valorizing agro-waste and by-products. 4. International Conference on New Business Models, Jul 2019, Berlin, Germany. hal-02791116

HAL Id: hal-02791116

<https://hal.inrae.fr/hal-02791116>

Submitted on 5 Jun 2020

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4th International Conference on New Business Models,
Berlin 1-3 July 2019

A Business Model typology for valorizing agro-waste and by-products

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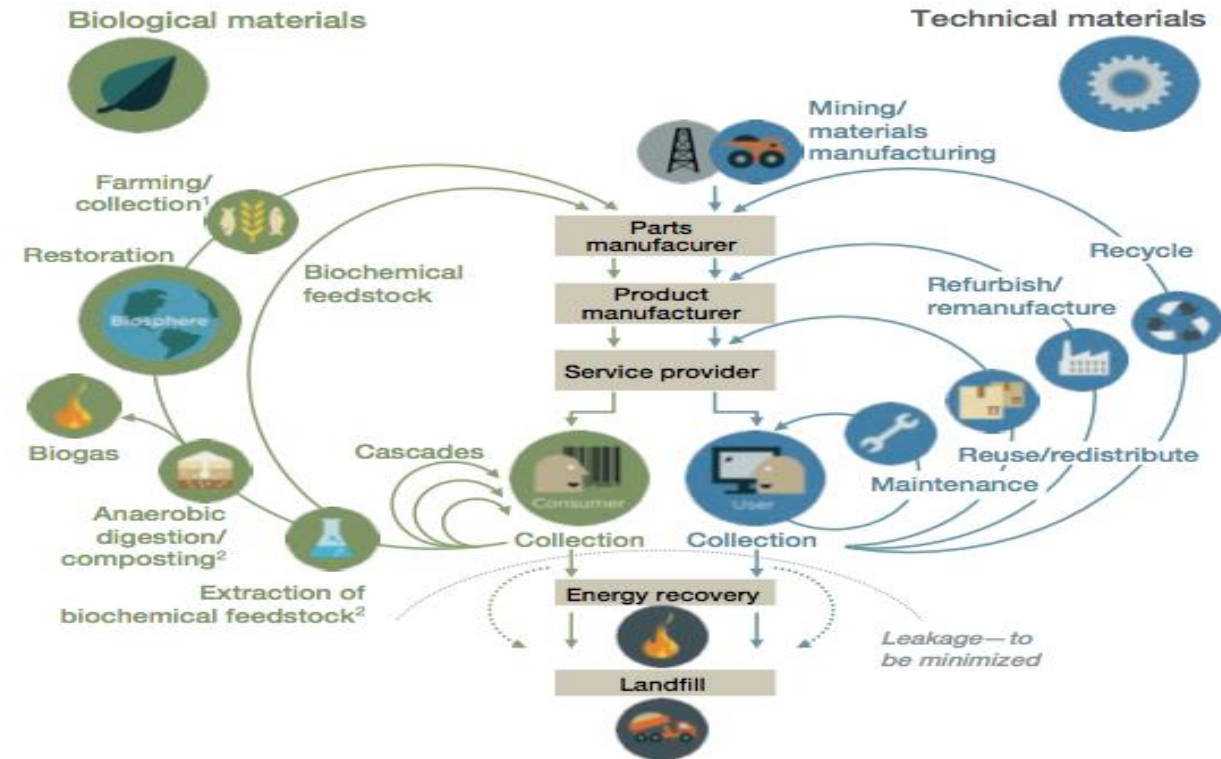


The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688338.



Circular Economy, Bioeconomy, Cascading

- **Circular Economy:** the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized (EC 2015)
- **Bioeconomy:** production of renewable biological resources and conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy (EC 2012)
- **Cascading:** efficient and iterative use of biological resources, winning back the biological nutrients of waste



¹ Hunting and fishing

² Can take both postharvest and postconsumer waste as an input

Source: Ellen MacArthur Foundation circular economy team drawing from Braungart & McDonough and Cradle to Cradle (C2C)

→ **Circular bioeconomy** = develop sustainable and resource-efficient economic systems, via cascading and by using biomass residues to create bio-based products and bioenergy

Circular Business Models – frameworks and typologies

- Ellen MacArthur Foundation (2013): ReSOLVE framework based on the different strategies: *regenerate, share, optimize, loop, virtualize, exchange*
- Bocken et al. (2014): eight archetypes of sustainable business models which are classified in higher order groupings and describe the main type of business model innovation: *technological, social or organizational*
- Lüdeke-Freund et al. (2018): 26 major circular business model types and their characteristics, with 6 major CEBM patterns: *repair & maintenance, reuse & redistribution, refurbishment & remanufacturing, recycling, cascading & repurposing, organic feedstock*

→ How do businesses create value by following circular economy principles?

Objective and methodology

Objective: identify and characterise different types of business models that valorise agricultural waste and by-products via cascading or closing loops

Methodology:

- 33 international cases studied in the H2020 project NOAW with semi-structured interviews
 - More in-depth studies with on-site visits for a number of selected cases (1/3)
 - Expert interviews for the three chains studied (wine, cereals, manure)
- Analysis according to the type of initiative, resources and transformation processes, value propositions, key partners and customers, organisational models and innovation type

Results

Typology of circular business models for valorising agro-waste and by-products

Upcycling entrepreneurship

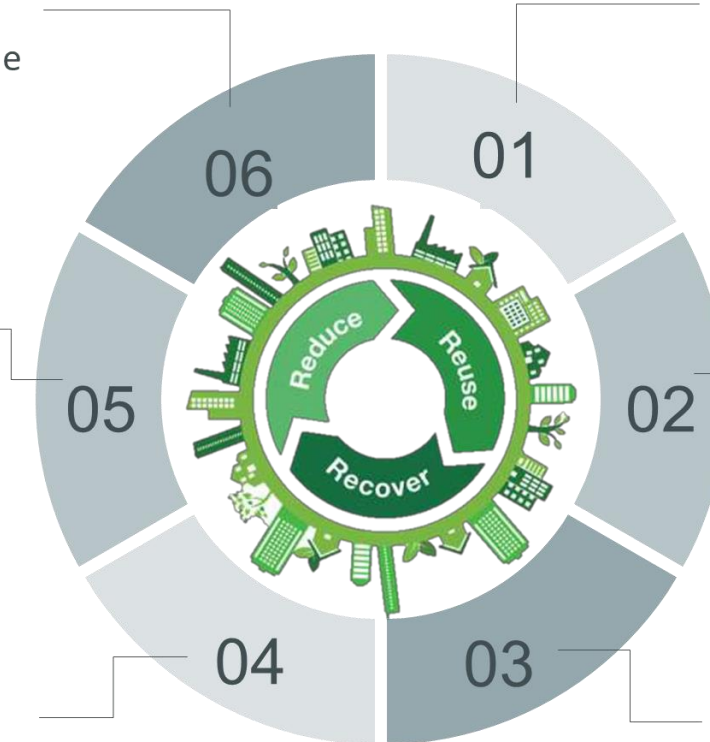
Innovative way of valorisation to convert low-value by-products into high-value materials.

Environmental biorefinery

Integrated bio-based industry, using waste and by-products as inputs to produce chemicals, biofuels, food and feed ingredients, biomaterial and power.

Biogas plant

Bioenergy production from agricultural waste: biogas, heat and digestate.



Agricultural cooperative

Autonomous association of persons united to meet common needs through a jointly owned and democratically-controlled enterprise. The cooperative valorises by-products from its activities.

Support structure

Supports new ways of valorization, enables stakeholders to develop (cross-sector) activities.

Agropark

Spatial cluster of agrifood and related economic activities. The cycles of water and minerals are closed and the use of fossil energy minimized by processing waste and by-products.

Results : example of an agricultural cooperative - Grap'Sud

→ Union of wine cooperatives in the South of France, with 6 production sites and 210 employees

Waste valorized / year:
125 000 tons of grape marcs
270 000 hl of wine lees
600 000 hl of wine most

→ A diversity of new value-added products issued from by-products (B2B and B2C)



Characteristics of cooperatives:

- Specific of a sector
- Able to reach a critical mass of waste and by-products in order to develop viable valorisation paths
- Optimize the interests of its members at a long term

Results : example of a support structure – IBBK Biogas Network

- Promote and support developments in the sector of agro-waste valorization (manure) and facilitate efficient applications (bioenergy, biofertilizers)
- National and global networking and sharing of experience
- Consulting and training courses
- Participation in international research projects



Characteristics of support structures:

- Do not valorize by-products themselves, but participate actively at the implementation of valorization paths
- Coordination, networking, promotion
- Sometimes difficult to capture the created value and to establish a viable business model

Results: other types of circular business models

Biogas plant (ex : Agroenergie Hohenlohe)



- Management and optimization of the biogas plant
- As dependent on feed-in tariffs, innovation and diversification needed
- Stakeholder involvement needed

Upcycling entrepreneurship (ex : INNOVEN)



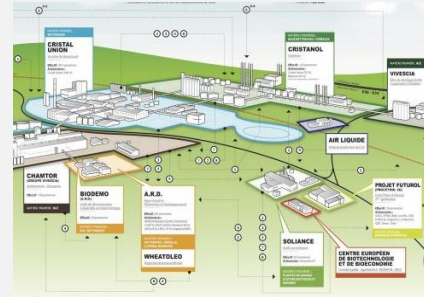
- Agro-waste is converted into high value-added materials
- Eco-design approach, innovative technology
- Securing raw material supply

Agropark (ex : Agriport A7)



- Cluster with synergies for natural resources and logistics management
- Innovative partnerships (datacenter heat used for greenhouses)
- Various sectors & competences

Biorefinery (ex : Pomacle Bazancourt)



- Collaboration strategy of different actors
- Maximization of value added via cascading approach
- Economies of scale, diversification of products

Discussion & conclusion

Typology of Circular Business Models

First proposition of a CBM typology in the domain of agro-waste valorization

Dynamic typology : possibility to move from one type to another according the strategic choices

Complementary CBM which need to be combined in order to maximize the cascades of value

Consequences for the management

Intrinsic characteristics of agro-waste impact the overall BM (secure raw material supply, in and out logistics, flexibility of infrastructure and human resources etc.)

Traditional market constraints (e.g. chemistry markets)

Partly joint strategies with other companies = coopeition

External factors

Sensitivity to climate change

Low attractiveness of rural areas (investments, recruitments)

Uncertainties regarding public policies

Thank you very much for your attention!

mechthild.donner@inra.fr