Critical success factors for circular business models within the agricultural sector

Mechthild Donner, Anne Verniquet, Agnès de Souza, Jan Broeze, Jim Groot, Katrin Kayser, Romane Gohier, Hugo de Vries

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

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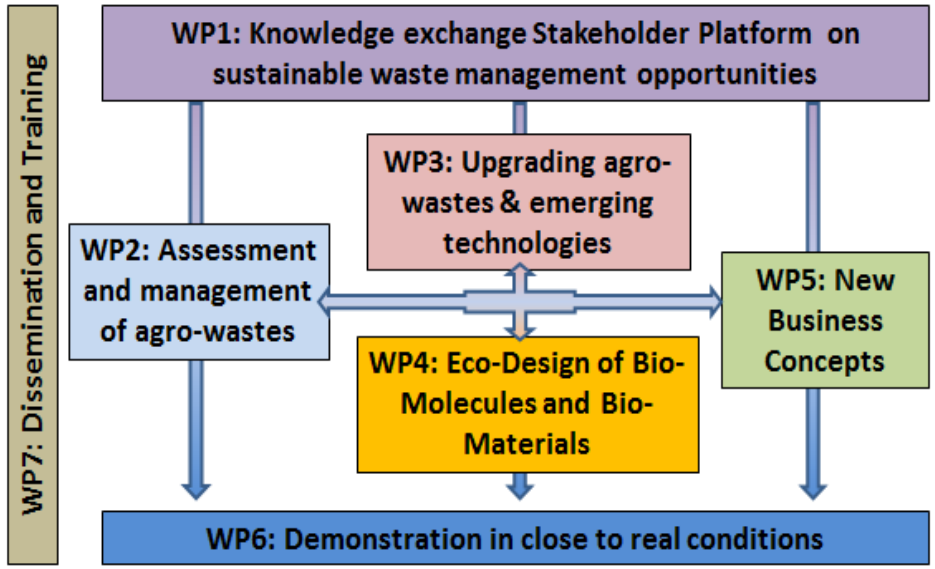
The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688338.

EU H2020 Project NoAW (No Agricultural Waste)

Innovative approaches to turn agricultural waste into ecological and economic assets

- NoAW (2016-2020): a EU-financed project involving 32 international partners, coordinated by INRA (France)
- NoAW develops ***a circular economy approach*** applicable to agricultural wastes on a territorial and seasonal basis
- NoAW investigates the potential of ***agro-waste and by-products*** to be converted into a portfolio of eco-efficient products: bio-energy, bio-fertilizers, bio-packaging and bio-molecules

➢ WP5: *New business concepts for a cross-sector valorization of agro-waste and by-products*



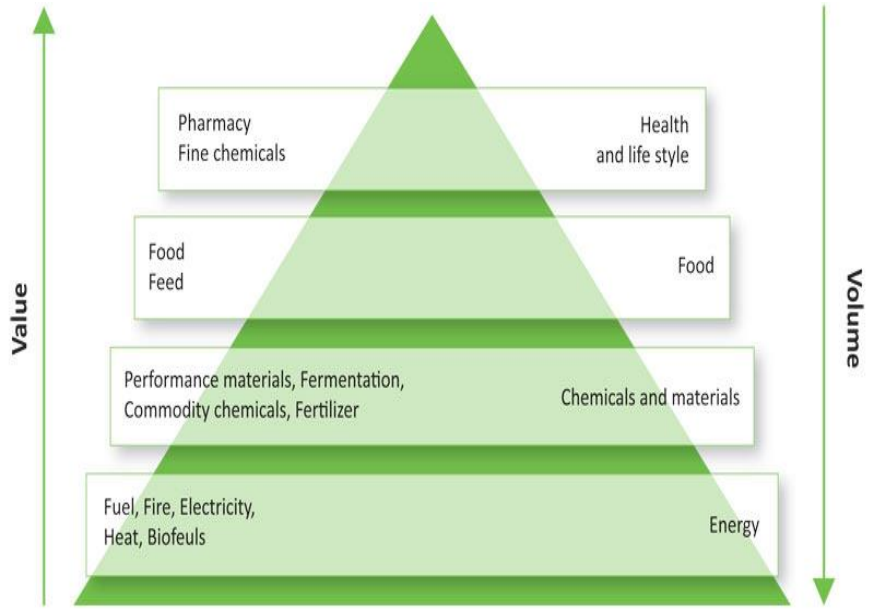
http://noaw2020.eu/

Valorizing agricultural waste and by-products

- Agricultural waste and by-products = plant or animal residues that are not (or not further) processed into food or feed (Gontard et al. 2018)
- Estimated amount of agro-waste annually: 998 million tons (Obi et al. 2016)
- Different valorisation opportunities in alternative sectors leading to new products and applications, with a lower or higher value, depending on volume (Rood et al. 2017)
- Challenging because of heterogeneity of resources, changes in volumes and quality over time

➢ Here, circular business models are meant to find innovative management and marketing solutions for adding value to agricultural waste and by-products

Figure: Value pyramid for biomass valorisation



Source: www.betaprocess.eu/the-value-pyramid

Research question and methodology

Under which conditions can business models for the valorisation of agro-waste and by-products successfully contribute to the transition to a circular economy?

➢33 case studies in 12 different countries:

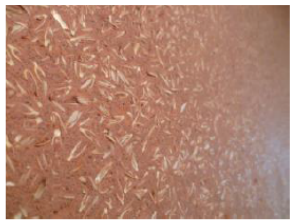
- Mainly in project-partner countries from Europe and Asia
- Companies valorizing agro-waste and by-products
- Three chains: wine, cereals, manure

Semi-structured interviews and elaboration of factsheets for each case

Example factsheet: Association Bâtir en Balles

Association Bâtir en Balles / Marseille, France/
Valorization of grain by-products (husks) / Status: started in 2015 / Initiative leader: Association Bâtir en Balles





ORIGINATION

Key triggers of the initiative at the origin:
- An einkorn farmer started to valorize einkorn husk together with École des Mines d'Alès in 2009 – leading to the creation of the enterprise Archibale in 2013
- At the same time, since 1993, the Association Le Village valorized rice husk
- A meeting between einkorn husk and rice husk actors led to creation of Association Bâtir en Balles in 2015, combing various cereals

Key objectives of the initiative at the origin:
- Create a cooperation between the cereal and the eco-construction sectors
- Inform and train people in using by-products of cereals (rice, einkorn, spelt, buckwheat, barley)

Key historical milestones between origin and today:
- Performance of quality tests for insurances, promotional activities, construction of several houses

KEY IMPACTS (current)

Agro Waste valorized
Until now, mainly rice and spelt husks

CAPEX required / TRI

Job created / typology
-

Other expected impacts
Contribution to local economic development, reduction of environmental impact by waste-valorization, creation of jobs

KEY ACTORS & PARTNERS

Category/Expertise	Motivation / Fears	Responsibility in initiative
M. Loïc Roso and Pierre Delot as chairmen of the association	Foster a new cross-sector cooperation, Fear: be able to get the initiative financed (until now voluntary work)	Initiators and leaders of the initiative
4 other members of the Association		Administrative and advisory support
Farmers, cooperatives, huskers	Waste disposal	Waste delivery
Constructors	By-product valorisation	Eco- construction
Architects, research institutions		Technological support

Example factsheet: Association Bâtir en Balles

ORGANIZATIONAL MODEL

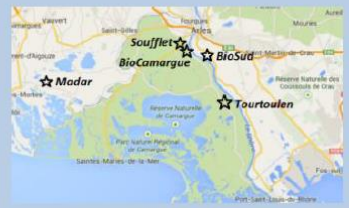
Governance / coordination	The Association works as facilitator between the 2 sectors
Shared infrastructure / financing	Voluntary work until now
Cooperation with Science & technology	Cooperation with research institutes (e.g. Écoles d'Ingénieurs)
Support mechanisms	Difficult to get public financial support as the initiative is not yet considered to be sufficiently mature

KEY SIDE-STREAM VALORIZATION (Agro waste)

Waste typology / Yearly volume / Seasonality	150 tons of einkorn husk 15 000 tons of rice husk
Valorization processes / key technologies	Husking + insulation of houses
Maturity of technologies used / critical size for feasibility	Immature technology for husking
Key outputs and markets	Panels and bricks for insulation or decoration of houses

ILLUSTRATION

Example of cascade of valorization:



SUCCESS & FAILURE FACTORS

Organizational / Spatial (+/-)

Build on existing clusters e.g. of rice farmers / cooperatives in the Camargue

Technical / Logistic (+/-)

Economic / Financial / market (+/-)

Public financial support is difficult to get, particularly compared to the straw chain which is already established

Social / skills (+/-)

High motivation; interest by various actors

Others (+/-)

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Key links: http://www.batirenballes.fr/index.html

H2020 NoAW project
WP 5.1. International benchmark
Author: Mechthild Donner

Results: Critical success factors

The success of circular business models depends on various internal + external factors:

Category	Success factors
(1) technical and logistic	- innovative and proven technologies for agro-waste conversion - optimal in and out logistics adapted to the specificities of agricultural resources (variable, perishable, seasonal)
(2) economic, financial and marketing	- economies of scale for clusters - strong public-private partnerships with long-term contracts - co-investments and/or financial support - open and differentiating communication - price competitiveness of new bio-based products
(3) organisational and spatial	- successful cooperation - geographical proximity of actors - sufficient space with efficient infrastructure (clusters)
(4) institutional and legal	- awareness creation for ecological products among consumers - transparent and traceable production processes
(5) environmental, social and cultural	- acceptance by or even involvement of local stakeholders - creation of local jobs

Most often named: factors from category 2, followed by 3 and 4, then 1 and 5

Conclusion

1. Success factors specific for the agricultural sector:

- innovative technologies for agro-waste conversion
- flexible in and out logistics
- stakeholder acceptance of bio-based products and production processes
- price competitiveness for bio-based products as substitutes

2. The transition from linear chains to closing loops in the agricultural sector let individual business models evolve towards new, dynamic and integrated business models, in which the macro-environment sets the boundary conditions (context-dependent)

3. Examples of circular business model types for agro-waste and by-product valorisation:
biogas plants, upcycling entrepreneurship, environmental biorefineries, support structures, agricultural cooperatives and agroparks (→ *next presentation*)

Thank you very much for your attention!

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