Good practice cases in practical applications of agro and forestry side-streams processing

Company Name | Name of the Presenter | e-mail@presenter.de

AGRIFORVALOR will close the research and innovation divide by connecting multi-actors in innovation partnership networks in order to valorise and exploit sidestream biomass resources from agriculture and forestry

→ Turning waste, by-products and residues from agriculture and forestry into a valorised sidestream.

Project LifeCycle: 01.03.2016 - 31.08.2018

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Vision

Connecting a range of stakeholders in order to:

• Achieve new value chains and
• Stimulate biomass sidestream market uptakes into value-added products.

Main Target Groups

Helping Multi-actors in the Biomass Value Chain to Profit from Innovation Partnership Networks...

• Farmers/Foresters:
  – Becoming active partner in the biomass sidestream value chain.
  – Gaining knowledge and receiving support in exploiting R&D&I results and exploring business development.

• (Bio)Industry:
  – Raising awareness of the potential and opportunities of sidestream biomass applications along the chain of 5 Fs: (food, feed, fuel, fine-chemicals, fertiliser).
  – Profiting from new business models based on forestry and agriculture biomass sidestreams.

• Research and Academia:
  – Closing the research and innovation divide through better-directed research and development based on demands identified by practitioners.
Methodology

Setting-up innovation partnership networks managed by
- 3 Biomass Innovation Design Hubs:
  - Spain (Andalucia)
  - Hungary
  - Ireland
- Hub managers coordinate inter and intra hub activities
- Hub steering committees offer tailored innovation support

Added Value

- Learn from good practices and research results
- Profit from innovation partnerships along and across value chains
- Profit from tailored support for exploiting of and idea development for sidestream biomass
- Become active partner in the biomass sidestream value chain
- Become active partner in building a Bioeconomy as part of a Circular Economy

→ Safe and/or make money with biomass sidestreams!
Summary of Findings

• This presentation summarizes the characterisation of current Good Practices (GP) that valorise agricultural and forestry biomass sidestreams in the three project hubs (Andalusia - Spain, Nagyalföld - Hungary and Ireland) and for the wider EU.

• The findings are based on **29 GP identified until October 2016** that valorise biomass sidestreams.

Hub Hungary specifics (1/2)

• The HU hub is a multidisciplinary network of agriculture and forest related experts

• Hungary has a significant potential in the field of agricultural and forest waste and side-streams production. 1-1.2 million m³ forest felling waste and 13.7-18.9 million tonnes of agricultural waste are produced in Hungary annually.

• 85 % of agricultural and food industry waste and biomass comes from plant residues from agricultural plantations and forestry as well as from manure
Hub Hungary specifics (2/2)

**Sidestream potential and practical applications**

- In the HU hub the main focus is laid on energy production from forestry sidestreams.
- As the level of bio-energy is still low, additional support including knowledge transfer and innovation support for new sustainable biomass material is needed to achieve 11% renewable energy production by 2020.
- There is a high biomass sidestream potential for HU not only in the forestry sector and related to energy production but as well as for products with higher values.

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Hub Ireland specifics (1/3)

- The Irish Hub is a collaboration of multidisciplinary experts in Agriculture, Forestry, sidestream valorization, innovation management, technology commercialization and enterprise development.
- An estimated 1.3 million tonnes per annum straw is produced from the cereal sector mainly used in animal bedding and composting.
- Animal by-products amounting to 550,000 tonnes per annum (150,000 Meat and bone meal) is exported, disposed of or used in pet food and leather production. Manure and poultry litters, mainly landspread, represent another significant resource which has potential for generating greater value. Large amounts of residues are also produced from the dairy industry.
- Over 1 million tonnes of sawmill residues are produced in Ireland annually.
Hub Ireland specifics (2/2)

Sidestreams potential and practical applications
- In the Irish hub, the main focus is on forestry biomass side-streams but also having some practical examples of agricultural biomass side-streams.
- Potential is seen in valorising of straw, grass, saw mill residues and animal by-products as well as from dairy production.

Hub Spain (Andalucia) specifics (1/2)
- Hub Spain is an interdisciplinary network of experts for the valorization of biomass side-streams from Andalucia
- Agricultural sector is a key pillar of the Andalusian economy, the forest is the second largest in terms of size in Spain
- Andalusia produces approximately 4.2 mio. tonnes per year of vegetable wastes and by-products, equivalent to 56% of the Spanish volume
- Agricultural waste is mainly used for animal feed, incorporated into the soil or burned
Sidestream potential and practical application

- Main focus is laid on olive biomass sidestream valorization and forest biomass sidestreams (wood chips) with focus on energy production.
- But opportunities can be found as well in the area of valorising sidestreams aiming at achieving a higher value other than energy production.

Overview of good practice cases in practical applications
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ANDALUCIA, Spain

1. Campillos Biogas Plant

- **Company**: GIESA Agroenergia, S.L., Andalusia, Spain
- **Sidestream**: The plant treats the waste generated in a number of farms and food industries in its immediate surroundings
- **Output**: Biogas that is directly supplied to different turkey farms and a feed factory
2. Olive and grape based food, feed, pharmaceuticals and cosmetics

- **Company**: Natac and Oleícola El Tejar, Andalusia
- **Sidestream**: Olive biomass (olive pomace, seeds) and grape biomass (skin, leaves, seeds)
- **Output**: Bioactive compounds, nutraceuticals. The secondary biomass is combusted for the generation of electricity.

3. Forest biomass for energy production

- **Company**: Biomass Centre Lozoyuela, Madrid, Spain
- **Sidestream**: Wood chips
- **Output**: bioenergy for heating of households, swimming pools etc.
4. Eco Heat Target Biomass plant

- **Company:** ENERGETI, Andalusia
- **Sidestream:** Wood chips and pellets are used for combustion in high-tech boilers.
- **Output:** In total 18,000 MWh is generated for heat and thermal use and about 40,800 MWh for electricity.

5. Móstoles District heating

- **Company:** Móstoles District Heating is Spain’s largest and most ambitious biomass-based district heating project.
- **Sidestream:** wood chips from forest energy plantations (eucalyptus)
- **Output:** thermal energy (heat)
6. Improved soil conditioner

- **Company**: TerraCottem, Andalusia
- **Sidestream**: Forest harvest residues
- **Output**: Fertilizer (soil conditioner (mixture of more than 20 components that work in synergy to improve growing conditions and plant growth))

Overview of good practice cases in practical applications

HUNGARY
1. Mushroom-biogas complex

- **Company**: PILZE Nagy, Kecskemét, Hungary
- **Sidestream**: Waste materials of mushroom production (spent mushroom substrate)
- **Output**: From the biogas electricity is generated and supplied to the national grid. The side-product is given back to the fields as a plant fertilizer. And the heat, which is the side-product of the energy conversion, is used in the mushroom drying plant to produce dried mushroom products.

2. Cosmetics from sunflower stems

- **Company**: Helia-D, Budapest
- **Sidestream**: sunflower stem extract.
- **Output**: Cosmetic cream
3. Biofilter from tree bark chips

- **Company:** FOBA company, Budapest
- **Sidestream:** The input of the process consists of wood chips, a primary biomass derived from forestry.
- **Output:** wood chip-based biofilter which can be used for odour decontamination of wastewater treatment plants and meat or vegetable processing factories.

4. Adobe bricks from clay and sawdust

- **Company:** Forrás Téglta, a brickwork factory, Budapest
- **Sidestream:** Earth mixed with water and an organic material such as straw or dung
- **Output:** Adobe brick as a composite material
5. Szakoly biomass energy plant

- **Company**: DMB Zrt, subsidy of Veolia, Hungary
- **Sidestream**: wood chips and sawmill by-products from nearby sawmills.
- **Output**: bioenergy (electricity and fuel)

6. Biomass fired CHP plant - Pannonhalma Archabbey

- **Company**: Pannonhalma, an abbey in Hungary
- **Sidestream**: waste of the botanical garden and viticulture of the abbey itself and furthermore woodchips from the forestry of the region
- **Output**: Bioenergy (heat and electricity)
Overview of good practice cases in practical applications

Ireland

1. Biofuel from whey

- **Company**: Carbery Milk Products Cork, Ireland
- **Sidestream**: Whey
- **Output**: Ethanol
- Ireland is the only ethanol-consuming country in Europe not using sugar cane based ethanol imported from Brazil.
2. Biogas and fertilizers from chicken manure

- **Company**: BHSL, Ireland
- Since 2006 the company has been developing its range of products, overcoming the many and diverse difficulties in reliably processing manure as a fuel, using Fluidised Bed Combustion (FBC) technology, converting the manure into thermal energy. BHSL is manufacturing and running the plant on remote control
- **Sidestream**: Poultry litter
- **Output**: heat, energy and fertilizer

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3. Wood pellets from sawdust -

- **Company**: Laois sawmill, Portlaois, Ireland
- **Sidestream**: Sawdust and other waste residues.
- **Output**: Energy needed for drying the feedstock and for the pelletizing process is generated by combustion of wood waste which are less suited for pelletizing.
4. Low smoke fuels from sawmill residues

- **Company**: CPL Fuels, Portlaoise Ireland,
- **Sidestreams**: Brash, bark, woodchip, sawdust, any other sawmill residues and woody biomass sidestreams such as olive stones
- **Output**: The smokeless coal is a mixture of fossil coal and a minimum of 50% torrefied wood

5. Wood chips to Climate Control

- **Company**: Astellas Ireland Co. Limited, part of the Japanese pharma company Astellas Inc., South Kerry, Ireland
- **Sidestream**: Wood chips
- **Output**: carbon-neutral bio-fuel
6. Micro CHP units for heat & electricity from forest residues (wood pellets)

- **Company**: Auxentios Energy, Beaufort, Ireland
- **Sidestream**: Torrefied wood pellets
- **Output**: Thermal and electrical energy

Overview of good practice cases in practical applications

wider EU
1. Paper from tomato and pepper fibres

- **Company**: Schut Paper, Heelsum, The Netherlands
- **Sidestreams**: Tomato and pepper crops
- **Output**: Paper

2. Energy from whey

- **Company**: Monte Ziego, cheese factory, Teningen, Germany
- **Sidestream**: Whey
- **Output**: Biogas with an above average methane content of 65%
3. Table ware from sugar cane stems

- **Company**: Pacovis AG, Switzerland offering food packaging and tableware
- **Sidestream**: residues from sugar cane production
- **Output**: Table ware - light, stable and water resistant

4. Olive leaf based leather tanning

- **Company**: Wet-green GmbH, Reutlingen, Germany
- **Sidestream**: Olive leaves
- **Output**: biologically degradable premium leather
5. Textile and biopolymers from waste milk and casein

- **Companies**: Qmilch IP GmbH, Qmilch Holding GmbH & Qmilch Deutschland GmbH
- **Sidestream**: casein
- **Output**: Textile fibres, biopolymers

6. Bioplastics from grass

- **Company**: Biowert, Germany / Switzerland
- **Sidestream**: Meadow grass
- **Output**: biopolymers for Bioplastics, bio-energy, bio-fertilizer etc.
7. Bio-oil, biogas and biochar from sidestreams

- **Company**: ETIA/Biogreen, France
- **Sidestream**: wood, straw, cereal waste, plastic waste, tires, sewage sludge, digestate
- **Output**: Bio-oil, biogas and biochar

8. Biopolymers from lignin fibres

- **Company**: TECNARO GmbH, Ilsfeld-Auenstein, Germany
- **Sidestream**: Lignin, available in large amounts as by-product from different kind of industrial processes, e.g. the paper industries and wood processing industries
- **Output**: Arboform® a granulat for producing toys, furniture, office items etc.
9. Sweetener from wood

- **Company**: Danisco active in the food sector, Denmark
- **Sidestream**: hard wood based xylan, predominantly from birch and beech
- **Output**: Xivia, a naturally occurring sweetener

**Local Contact**

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