

# Adding value to farm and forestry produce

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**F**ashion products and cosmetics from milk casein, computer casings derived from wood or decking from meadow grass may sound unlikely. However, such commodities are now being developed in Europe and are examples of an ever-growing range of outputs from the bioeconomy.

## The bioeconomy

The bioeconomy concept represents a vision for future society to become less reliant on fossil resources such as petroleum. That future is approaching faster than many realise.

The bioeconomy seeks to provide energy and added-value products (food, feed, fibres, fuel, industrial fine chemicals and health products) through a sustainable use of our bioresources.

The concept of a thriving bioeconomy is critical, with a predicted 70% increase in world food demand by 2050. This demand will be driven by a predicted world population increase to over 10 billion people in the same period. The EU recognises an urgent need to reduce greenhouse gas emissions, increase resource efficiency and move to a low-carbon economy by 2050.

## Biomass side-streams

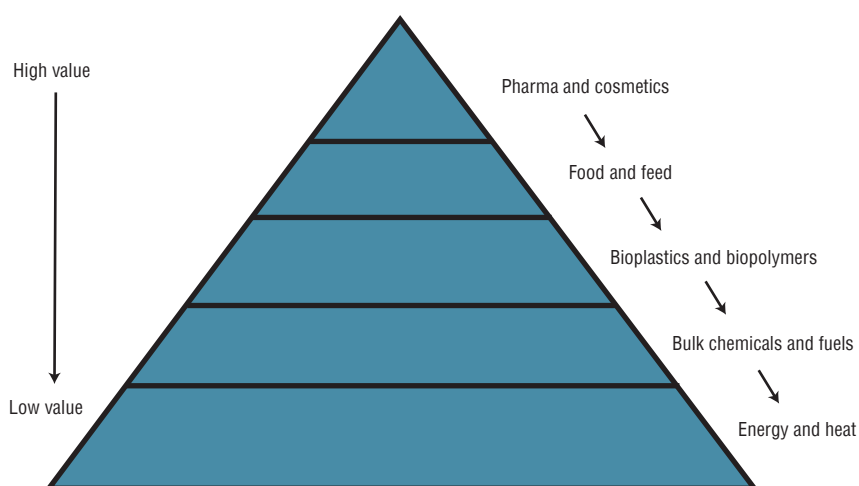
AGRIFORVALOR is an EU Horizon 2020-funded project with a focus on developing the potential of the bioeconomy and bringing added value (valorisation) to biomass side-streams from agriculture and forestry.

Biomass is a renewable resource that has a steady and abundant supply. Side-streams include residues, byproducts and waste. Agricultural biomass covers a range of resources, such as residual stalks, straw, grass, leaves, roots, nut or seed shells and manure from animal husbandry.

Forestry biomass side-streams can include wood chips, bark, sawdust, timber brash (top and branches), as well as mill scrap. Such biomass types are of increasing interest for the production of renewable products, such

**Figure 1**

A cascading approach sequentially exploiting products, initially those of higher values



Source: Peter Westermann, Copenhagen Institute of Technology

as biochemicals and biomaterials.

The EU produces approximately 900 million tonnes of waste paper, food, wood and plant material per year. While much of this is currently in use in industrial applications or for energy generation, it may be possible to use this resource more efficiently and economically using a cascading approach.

This means that high-value products are first extracted from biomass, what remains is then further processed or reused in bulk materials, with the lowest-value materials used for production of biofuels and power (Figure 1).

## The AGRIFORVALOR approach

Agriculture and forestry biomass can be a key resource for the development of regional bioeconomies. The identification of existing and emerging technologies, processes and innovations suitable to create and add value to Irish side-streams is a key challenge.

AGRIFORVALOR will meet this challenge by facilitating engagement between farmers or forest owners and stakeholders from bio-industry, research, academia and innovation agencies in order to bridge the

research and innovation divide and stimulate market uptake of biomass resources into added-value products

Farmers and forest owners will have an important role to play as potential suppliers of side-streams. There may also be future opportunities to become active partners in biomass value chains as well as gaining both knowledge and support in exploiting emerging research and exploring business development.

The AGRIFORVALOR project is establishing three biomass innovation design hubs in Ireland, Spain and Hungary. In Ireland, the hub partners include organisations such as the Institute of Technology Tralee (hub manager), the Irish Farmers Association, the Irish Forest and Forest Products Association (IBEC) and Teagasc.

Each hub will support a national network of farmers and forest owners, together with suitable partners and technology stakeholders, to identify opportunities for the development of bio-products and new value chains.

This will be achieved via the sharing of identified innovations and best practice within and across the hubs and providing the follow-up business development supports required.

The Irish hub welcome network is

## Launch of Irish Innovation Design Hub

The Irish Innovation Design Hub will be launched at the Citywest Hotel, Dublin, on Wednesday 23rd November, commencing at 9.30am (registration from 9am).

The morning session will provide an insight into actions of the AGRIFORVALOR project and highlight some best practice examples of bio-energy production in Ireland.

The afternoon session will focus on the bioeconomy, new biomass value chains and opportunities for the production of value-added products from biomass.

This will highlight international best practice from companies which are already developing innovative added-value products, such as platform chemicals and biopolymers, from biomass side-streams across the agriculture and forestry sectors.

**For more information and to gain access to research results, please register on [www.agriforvalor.eu](http://www.agriforvalor.eu) or contact Tom Houlihan, Teagasc, Killarney (087-618 4353) or Barry Caslin, Teagasc, Roscommon (087-137 5070).**

open to all with an interest in adding value to biomass. Individuals can join by registering at <http://agriforvalor.eu/register>. This will provide members with access to the extensive knowledge and expertise base of the EU-wide AGRIFORVALOR team. In addition, members will be notified of all upcoming events and support opportunities.

To date, AGRIFORVALOR has identified 25 good practice examples of valorisation of agricultural and forest biomass side-streams in Europe and beyond. Project partners have also identified 48 examples of state-of-the-art agriculture and forestry biomass side-stream research. These examples, along with future findings, will be accessed via the project website [www.agriforvalor.eu](http://www.agriforvalor.eu), specifically in the project's interactive side-stream value tool.



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Plate 1: ARBOFORM Mouldings from Lignin (source: [www.tecnaro.de](http://www.tecnaro.de)).



Plate 2: Textiles from milk casein (source: [www.qmilk.eu](http://www.qmilk.eu)).

INSET: Plate 3: QMILK Cosmetics from milk casein (source [www.qmilk.eu](http://www.qmilk.eu)).

## Added-value examples from Europe

**Example 1:** Lignin is a major component of wood and can also be extracted from tree bark, sawdust and straw. The German company TECNARO GmbH produces high-quality thermoplastic materials for the plastic processing industry (Schweizer, 2015). For example, the patented and award-winning product ARBOFORM® is based on lignin, a byproduct of the pulp industry, combined with natural additives and natural fibres (e.g. flax, hemp). TECNARO converts this material into mouldings, sections or panels on conventional plastics processing machines in just the same way as a petrochemical thermoplastic material.

ARBOFORM® shows very little shrinkage, allowing precision products to be manufactured which conform stringently with manufacturers tolerances. This allows a range of

commodities such as computer, television, mobile phone or watch casings to be manufactured from wood-based side-streams (Plate 1 above).

**Example 2:** Each year in Germany, almost two million tons of surplus milk is produced which cannot be traded or used as food. The company Qmilch GmbH has developed an innovative process to produce a textile fibre from this milk casein. In extrusion, the casein is kneaded in a continuous process and pressed through a specially shaped spinneret. Since the process temperature is under 100°C, the special properties of milk can be maintained. The main product, a bio-degradable fibre (QMILK®), offers great development potential. This bio-fibre has excellent functional characteristics for clothing, including antibacterial and skin sensory properties (Plates 2 and 3 above). Therefore, it offers considerable potential in areas such as home textiles and textile equipment, as well as in the production medical technology without the addition of chemicals.