

eip-agri
AGRICULTURE & INNOVATION



EIP-AGRI Workshop **'Opportunities for Agriculture and Forestry** **in the Circular Economy'**

WORKSHOP REPORT
28-29 OCTOBER 2015

1. Introduction

The European Innovation Partnership for agricultural productivity and sustainability (EIP-AGRI) aims to stimulate innovation and to contribute to the competitiveness and sustainability of European agriculture and forestry sectors. See www.eip-agri.eu.

Agriculture and forestry are Europe’s largest primary bio-based sectors, sectors that produce functionally renewable resources and support a significant share of the EU economy. For the circular economy to work, agriculture and forestry must be part of it, and for these primary sectors to be sustainable in the long term, they need to reflect the principles and activities that are at the core of the circular economy and of the biological systems on which they depend.

As part of the drive towards sustainable growth and jobs, the European Commission presented its [circular economy package](#) on 2 December 2015. The transition towards a circular economy will involve all stages of the value chain, from primary production through to final consumption and waste management. On 28 and 29 October a workshop was held in Naantali, Finland to explore the role of agriculture and forestry in the circular economy, and to identify concrete ways forward as part of this transition.

This report provides an introduction to the circular economy concept in the primary sectors of agriculture and forestry, and describes the discussions and outcomes of the workshop. More information on the workshop, including the agenda and presentations, can be found on the [EIP-AGRI event webpage](#).



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2. Objectives and participants

Objectives and format of the workshop

The purpose of the workshop was to explore the **opportunities of agriculture and forestry in the circular economy**, with objectives to:

- bring together relevant actors to discuss the role of agriculture and forestry in the circular economy;
- identify challenges and opportunities in the transition towards a circular economy; and
- define concrete actions to boost innovation in this transition.

The workshop started with three presentations: to introduce participants to the workshop’s main theme (Ms Tarja Haaranen, Finnish Ministry of Environment / LUKE Natural Resources Institute); to describe the European policy context (Mr Rob Peters, DG Agriculture and Rural Development, European Commission); and to describe the circular economy concept as it relates to agriculture and forestry (Dr Ben Allen, Institute for European Environmental Policy (IEEP)). Throughout the remainder of the workshop seven examples of circular economy in agriculture and forestry were presented ([see references](#)), including a field visit to the Biovakka facility in Vinkkilä, as well as two interactive sessions and a panel discussion to develop ideas and understanding.

Participants

In total 80 participants, representing 24 EU Member States and Norway attended the workshop ([see online participants list](#)). Participants were from a diverse range of backgrounds including NGOs, industry representatives, administrative organisations and farmers and foresters (*Figure 1*).

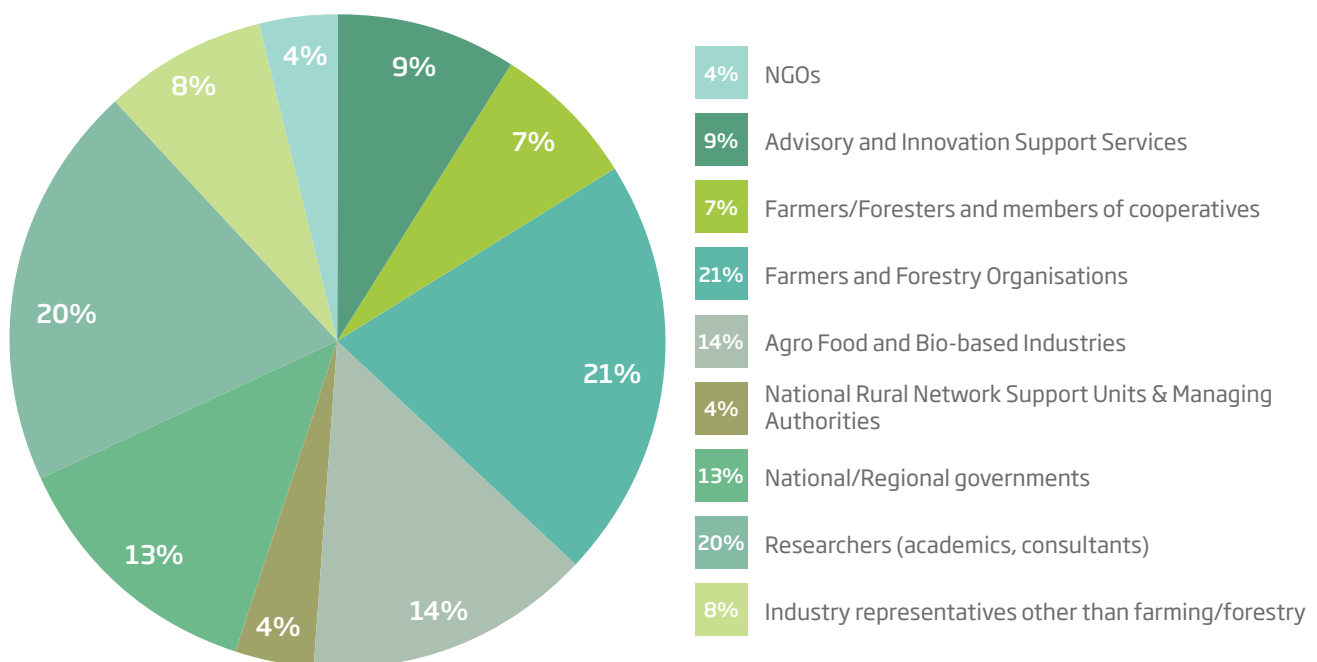


Figure 1: Participants represented at the workshop

3. The circular economy

European policy context

Europe has recognised the risks and the benefits of moving to a more resource-efficient society, as set out in the [Europe 2020 strategy](#) for smart, sustainable and inclusive growth. This strategy sets the overarching framework that gathers together related initiatives to promote a more resource-efficient Europe (*Figure 2*).

Developing the circular economy is one way to deliver this ambition, by transforming Europe into a more competitive and resource-efficient economy, where our reliance on non-renewable resources is reduced and where we can do more with less.



Figure 2: Resource-efficiency in the context of Europe 2020

To aid in the transition to a circular economy, the European Commission has brought together a series of existing policies and tools in a coherent way. This '[Circular Economy Package](#)' includes a range of actions covering the whole value chain, a revised legislative proposal on waste recycling and a review of the fertilisers regulation. All of which contribute to the broader strategic objectives under the Europe 2020 strategy.

For agriculture and forestry there are a number of existing EU policies and tools that already provide support in this area. These include, for example, the measures and tools provided through the Common Agricultural Policy, including rural development programmes and the EIP-AGRI; and research and funding support provided through the [Horizon 2020 programme](#).



Why a 'circular' economy?

The European economy today is largely 'linear' in nature. We take a resource, we make a product from it, we use that product and we then dispose of it. When we want or need another product we start the process of take – make – use – dispose all over again. The result is that we are using natural resources and producing waste in a linear way. The continued and increasing demand for products produced in this way is resulting in direct pressure on resources.



Society has relied on this linear approach for decades, meeting the needs of society through increased use of resources. More recently, societal demands for bio-based products have begun to diversify and increase. This is driven in part by changes in consumption patterns. It is also being influenced through proactive ambitions to develop the bio-economy in Europe and to decarbonise our energy system through the expansion of renewable energy generation. This new suite of demands includes conventional products, such as food, feed and fibres, and more novel bio-based products such as bio-plastics, bio-chemicals and new bio-materials.

The agriculture and forestry sectors are relatively unique in that they rely on natural resources and cycles as their primary inputs. Resources such as water, soils, nutrients and biodiversity underpin the functioning of ecosystems and the land that provides the space in which we work. As demands on these resources grow within a linear economy, we risk depleting them beyond sustainable limits, and undermining the future of the primary sectors and the benefits they generate for society.



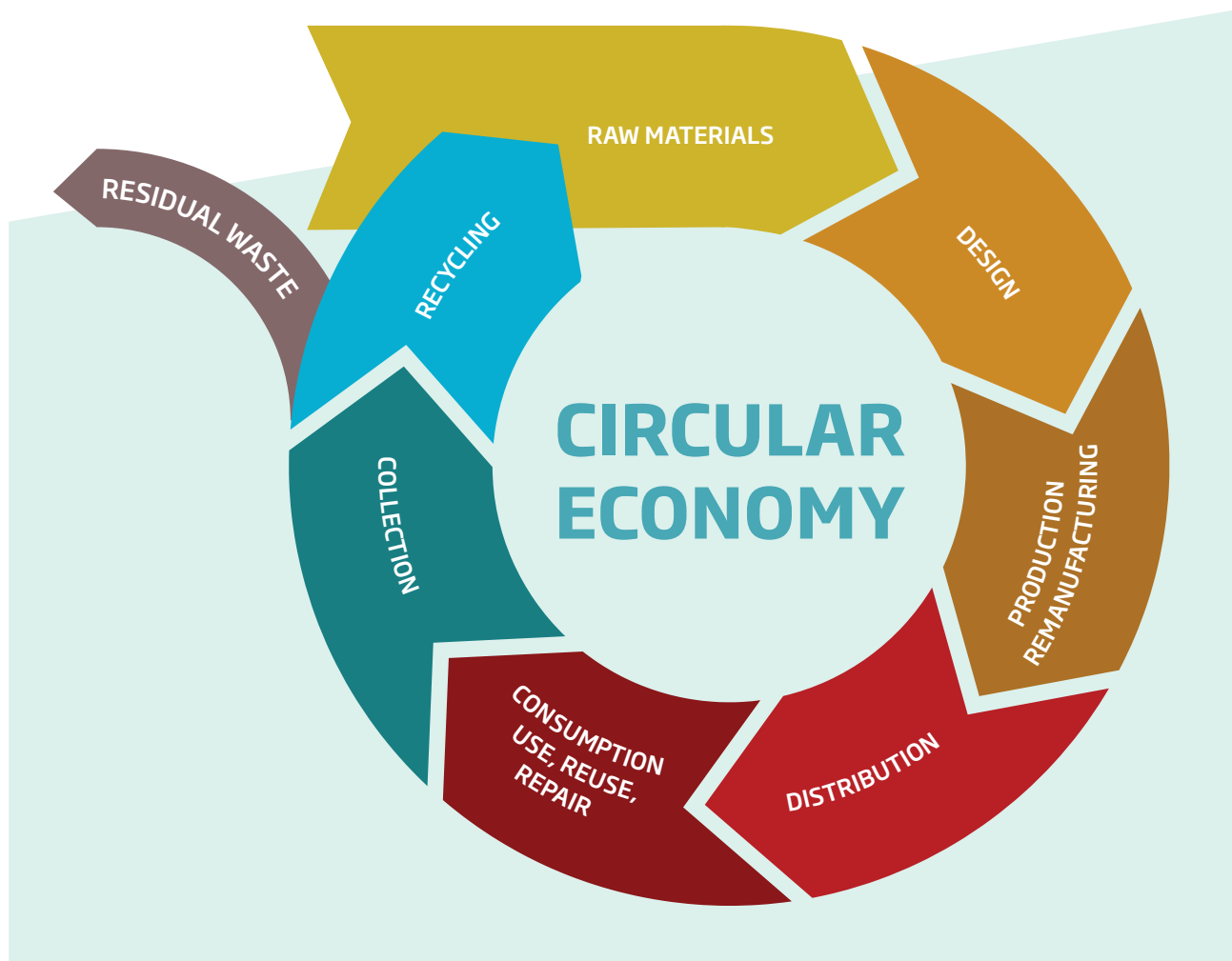
We therefore need to be more **resource-efficient** in the way we use and re-use resources, improving feedback loops and integrating **circular economy** principles. This will make our businesses more economic and more sustainable in the long term, reducing risks linked to external inputs and commodity prices; reducing the pressure on (natural) resources; and opening up new revenue streams through innovation and collaboration between sectors and industry. "Countries that are proactive in moving to a circular economy will get the largest economic benefits" (Tarja Haaranen. Ministry of the Environment, Finland).

The circular economy concept in agriculture and forestry

A circular economy is one in which [resource-efficiency](#) is placed at the centre of economic decision making and practice, ensuring added value and making sure that resources are maintained as long as possible so that they can be re-applied again and again. It is an economy where avoidable wastes are eliminated, demands on resources are minimised, efficiency is improved and costs reduced.

In agriculture and forestry this means:

- the preservation and enhancement of natural capital by balancing renewable resource flows;
- optimising (not maximising) natural resource yields by circulating products, components and materials;
- fostering effectiveness by revealing and designing out wastes and detrimental practices; and
- encouraging interaction between people, understanding our resources and making the most of our unavoidable wastes.



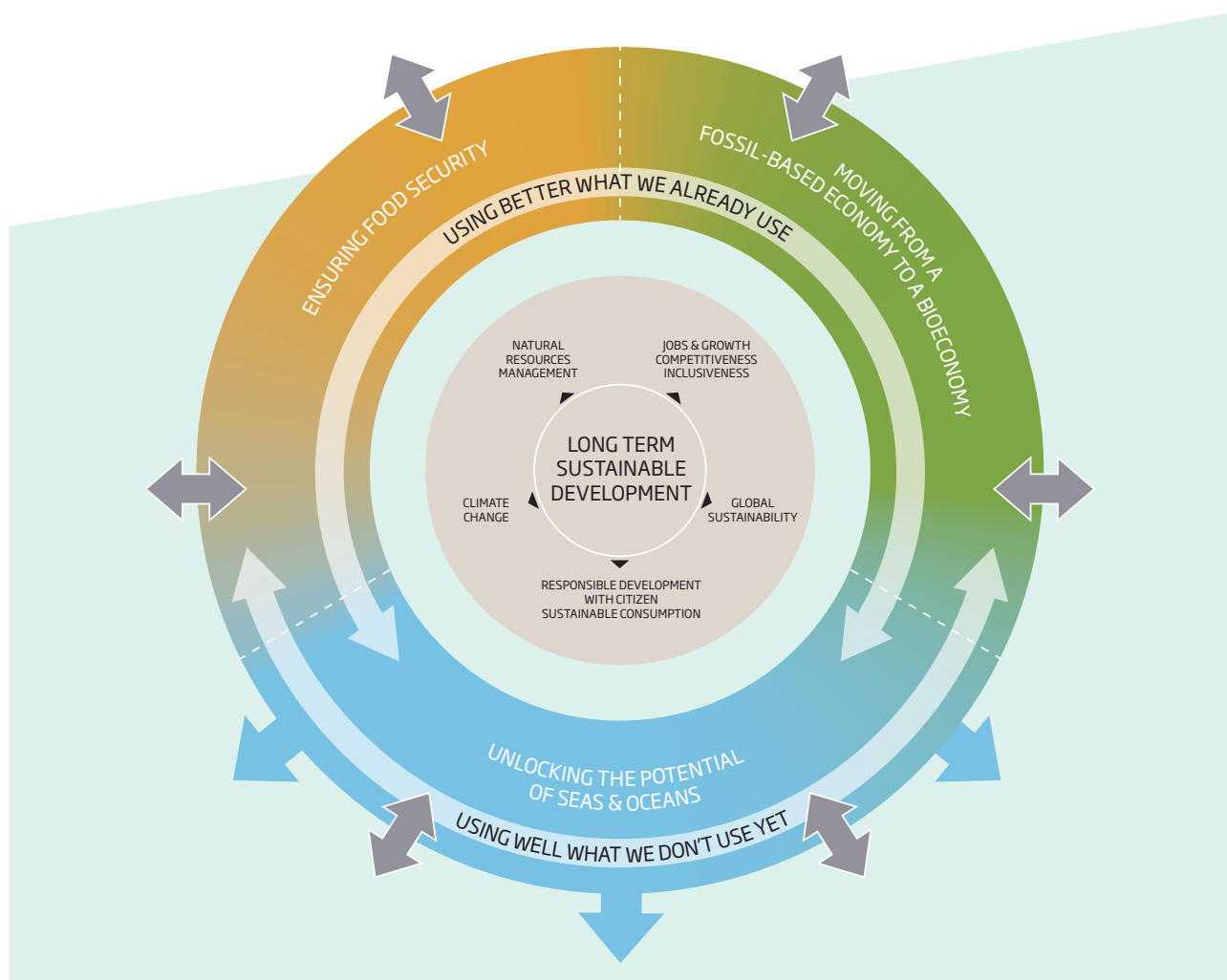
The circular economy involves intrinsic recycling and feedback loops and applies to the whole economy. source diagram: European Commission

Following these principles means making more use of wastes and residual materials as ‘resources’, joining the end of the system to the beginning and creating feedback loops. This can be achieved at a variety of scales, whether on the farm or within the forest, or through connecting a variety of individuals, businesses and sectors to make efficient use of resources over broader geographical areas.

The bio-economy is often confused with the circular economy and is another conceptual term used in the context of resource-efficiency.

The bio-economy focuses on the production and use of renewable biological resources and their conversion into value added products, such as food, feed, bio-based materials and bioenergy. Agriculture and forestry (and also aquaculture, fisheries and other marine biomass) are at the heart of this concept.

Both the circular economy and the bio-economy require innovation and new business models. But unlike the circular economy, the bio-economy is not sustainable by default and can be **linear or circular** in nature depending on the choices made and the approaches taken.



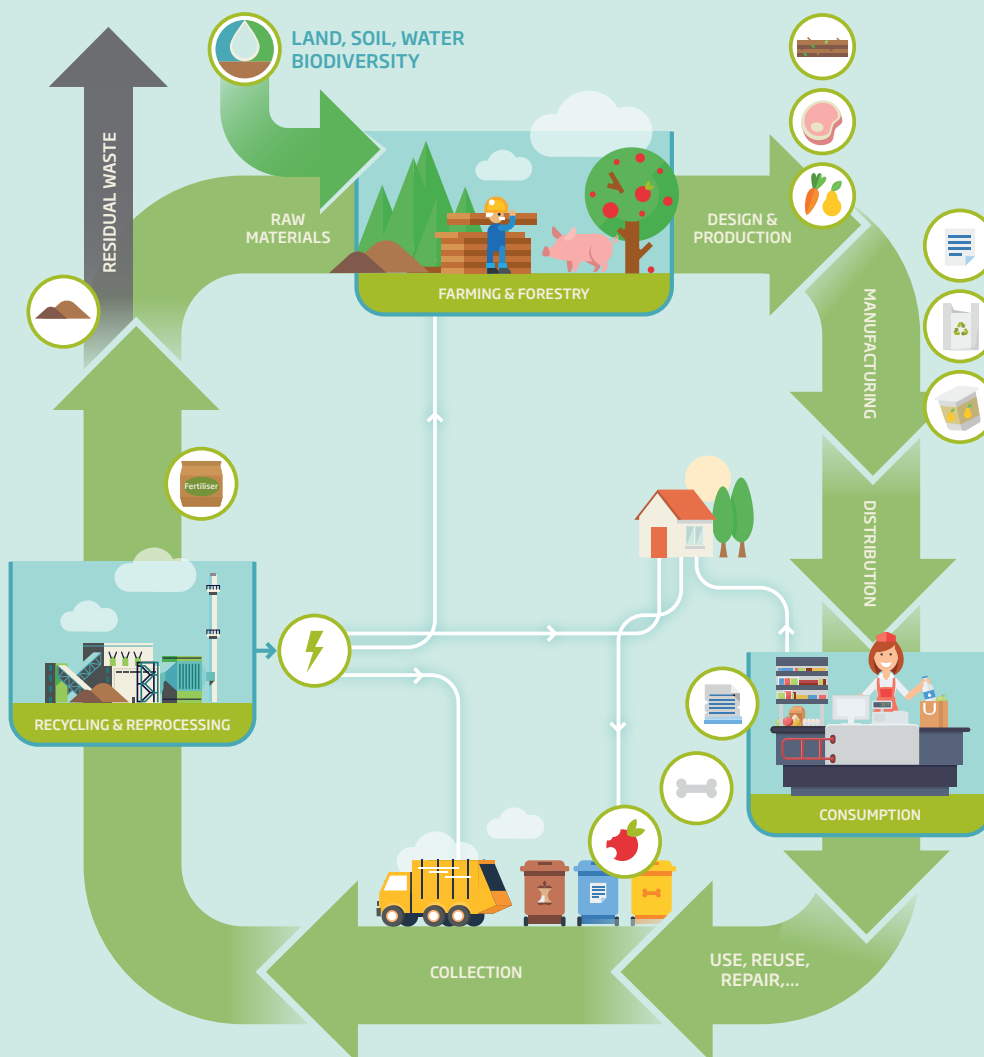
The bio-economy can be both linear and circular. It concerns food, feed, bioenergy and other bio-based products and systems, and is reliant on the primary sectors (e.g. agriculture and forestry).
source diagram: European Commission

Agriculture and forestry – moving towards a circular bio-economy

The move towards a more circular economy and the increasing development of the bio-economy brings with it many opportunities for the agriculture and forestry sectors. These include:

- New income streams and jobs by utilising new resources and opening up new markets.
- Diversifying practices and establishing links to new sectors and businesses.
- Reducing exposure to risk from commodity prices or changes in policy, by transitioning to more resource-efficient business models.
- Reducing costs through more sustainable resource use and making more of waste resources.

A circular bio-economy is a system that is underpinned by biological processes and resources, but with stronger links to the wider economy. Feedback loops are an intrinsic part of the bio-economy. Producers and users of resources are more closely connected and they all share in the benefits of resource-efficient activities.



In a circular bio-economy the agriculture and forestry sectors would reflect the natural cycles that they rely on more, increasing the nature of circularity within the system and making links to other sectors and systems in the most resource-efficient manner.

source: EIP-AGRI infographic based on the circular economy infographic and bio-economy diagram from the European Commission

The transition to a circular bio-economy will require action in a variety of different areas. Throughout the workshop in Naantali, we heard many examples from the agriculture and forestry sectors of new initiatives that have taken steps to develop circular activities in practice today.

In the introduction to the workshop we heard about the development of circular economy activities to improve the management of livestock manure in Finland. Nutrient run-off and the eutrophication of watercourses are key challenges facing the Baltic region. Fertilisers are becoming more costly, energy and GHG intensive to produce, and their component resources, such as phosphorus, are becoming increasingly scarce¹. At the same time Finland produces around 20 million tonnes of manure annually, which could be used to produce organic fertilisers. With the manure containing 17,500 tonnes of phosphorus, this is sufficient to cover plant phosphorus needs at the national level.

Partly for these reasons, the process of manure management is relatively well established in Finland, with manure processing facilities, such as the [Biovakka bio-digester plant](#) (Box 1) producing composts and fertilisers, biogas, and clean water.



¹: Phosphate rock has been added to the EU list of 20 [critical raw materials](#)



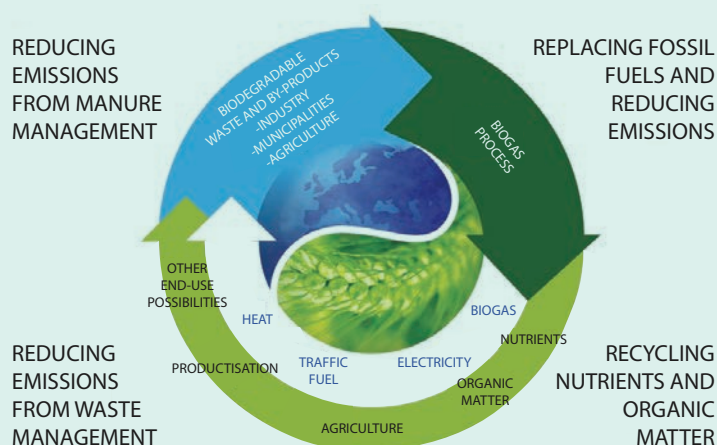
To inspire the workshop participants and show them the potential for circular economy activities in agriculture and forestry, the workshop included a field visit to the Biovokka bio-digester plant in Vehmaa.

Biovokka was established in 2002 by 21 farmers who wanted to find a way to enlarge pig production in the region, and to develop a solution to manage the large quantities of pig manure in an environmentally benign way.

The basis of the present operation is:

- To offer waste management services by processing a variety of organic materials from agriculture, industry and municipalities;
- To produce biogas;
- To produce safe nutrient products; and
- To build a network of biogas plants with nutrient recovery and concentration processes

Two plants are currently in operation. The Vehmaa plant began operating in 2005, with a second plant in Turku being established in 2009.



The two plants take in different waste streams, which are the basis for different outputs. The Biovokka Vehmaa plant, visited during the workshop, accepts by-products from enzyme production, leftovers from mass caterers, food industry by-products and animal manure. These materials are refined into concentrated fertiliser products, heat, electricity and, in the future, bio-methane to be used as transport fuel or for other industrial purposes. Part of the nutrients are used in industrial solutions in addition to agriculture.

Box 1



Bio-digester plants offer an attractive solution to managing animal manure. However, they are not the only option. Taking into account the rural diversity across the EU and the range of potential waste streams arising from agriculture and forestry, **a variety of options are needed** to cater for different situations. In Finland, the development of farm practices to make them better reflect the ecological systems that they rely on (agro-ecological symbiosis) is being used to move farms and enterprises to more profitable, integrated local cooperation based on recycling of manure. Examples include: [The Sybimar Integrated agriculture greenhouse and bioenergy production](#); [Honkajoki Kirkkokallio Agroecological Symbiosis](#); and the [Palopuro Agroecological Symbiosis project](#).

Other examples heard throughout the day focussed on different aspects of the circular economy. Lessons learned from these examples are discussed in the following sections.

4. Evidence from practice

Guided by representatives of three cases, which were presented during the morning session of the workshop, the participants were divided into groups to discuss the characteristics of each case and how it demonstrates the principles of the circular economy.



Tomato Masters and Aqua4C – Combining horticultural production and fish breeding – presented by Johan Vlaemyck (Tomato Masters)



INTEGRASTE - Development of integrated agro-industrial waste management politics maximising materials recovery and energy exploitation – presented by Prof. Michael Kornaros (Uni Patras)



Development of innovative processes for wood ash up-cycling – presented by DI Felix Montecuccoli

The discussion focussed on the key factors that enabled these developments to take place; what barriers they encountered and how they were overcome; and what support tools were needed, or would have helped. The outcomes of the group discussion were presented back in plenary with a brief discussion of the findings (summarised below and supported by the examples from the morning presentations).

What were the key success factors?

After examining the key success factors in the different groups, discussions turned towards the barriers and challenges that were faced in the different cases and how these were overcome in practice.

Key success factors	Case example
Collaboration and partnerships – developing new ideas, sharing knowledge, working together	Tomato Masters, Agrohub
Proximity to partners	Tomato Masters
Improved knowledge through research - dedicated researchers or staff who provide continuity	Integraste, Millibeter
A solid evidence and knowledge base to make decisions	Integraste
Readily available and proven technology – technological and organisational innovation	Integraste
Low energy costs	Tomato Masters
New markets for innovative use of waste resources	Wood Ash Project, Metsa Fibre
Tailoring activities to specific needs in the local context	Integraste, Agrohub
Ownership of the initiative by local people and businesses	Agrohub

For many of the case examples, **collaboration and partnerships** was one of the most important factors that led to the successful start of the process. For example, the Agrohub initiative operating in Finnish Lapland showed the importance of **fostering collaboration** within and between sectors, particularly in small and remote local communities. In remote areas such as this one, **the ownership of the initiative by local people, farms and businesses** was important for accepting the approach and for its long-term viability. For Tomato Masters, diverse partners helped to bring new ideas and knowledge to the collaboration, such as universities and research institutes, as well as unexpected partners like the aquaculture company (Aqua4C) which are now an integral and successful part of the business. However, setting up partnerships takes effort, “like a marriage, you have to keep investing time and energy in the collaboration every single day” (Johan Vlaemyneck). What helped in this process is **being close to partners**, being open to new suggestions, criticisms and ideas, and continually innovating and improving as you learn.

Improving knowledge through research and innovation was a key aspect of several examples that were presented during the workshop. These include the Integraste project² (Greece) and the Millibeter project (Belgium)³. Having **dedicated researchers** to ensure continuity across different research projects and the importance of building a **solid evidence and knowledge base** were highlighted as necessary elements to define and tackle the technological issues faced when managing multiple waste streams.

With the challenge of managing several different waste streams, the Integraste project demonstrated that having a **readily available and proven technology** (in this case a bio-digester) enabled the project to be implemented quickly. This also makes it possible to look at the next steps of development, which involve scale-up by connecting actors and resource streams. Both **technological and organisational innovation** are therefore important elements in developing circular economy activities at scale.

Economic factors were also mentioned in the discussions. For the Tomato Masters project, the relatively **low energy cost**, which is a result of selling ‘[green certificates](#)’ from combined heat and power (CHP) energy which is produced on-site, and distributed through existing on-site grid infrastructure, has helped to reduce ongoing running costs. **Diversifying income streams** and **developing new products and markets** was a key focus of the Metsa fibre process in Finland, which became more resource-efficient in the pulp and paper production process, and for the Austrian wood ash project.

In the Integraste project it was important for activities to be **tailored to specific needs in the local context**, reflecting environmental concerns that arose from a mixture of different waste streams and variations throughout the year.

²: An EU-funded initiative focussed on new approaches to processing and managing agro-industrial wastes.

³: An initiative developing new approaches, using fly larvae to extract high value lipids, proteins and Chitosan from food and from slaughter house and animal waste.

Key barriers	Case example
Initial set-up and infrastructure costs	Tomato Masters; Integraste
Price competitiveness and profitability of recovered products	Integraste
Long-term continuity of financial and public policy support	Integraste
Coherence between policy areas in relation to using waste resources	Wood Ash Project
Competition for resources (land, materials, etc.)	Tomato Masters; Integraste
The involvement and acceptance of farmers and foresters	Integraste

Financial barriers were identified in both the Integraste and the Tomato Masters cases. **Initial set-up and infrastructure costs** were a major barrier for Tomato Masters. A significant bank loan was required to overcome these costs. **Price competitiveness** between products that are produced following circular-economy principles, compared to products produced using the more conventional and established linear approach was raised as a potential issue in the Integraste discussion. Although this was not discussed in detail in the breakout sessions, it raises the question about initial profitability of new initiatives as they go through the set-up and establishment phases of development. For the Integraste project, on-going costs and the longer-term **continuity of financial and public policy support** (in this case renewable energy support schemes) were also identified as potential barriers.

The question of policy support was raised as a barrier from a different perspective in the wood ash case. What was highlighted was the issue of **coherence** between the desire to develop and adopt new activities, and what is allowed under current policy rules. In Austria, wood ash is considered as a waste product and it is therefore subject to specific rules governing its disposal. The 'waste' status also limits the potential for wood ash to be used as a fertiliser in Austrian forests under sustainable forest management principles.

Competition for resources was identified as a barrier in both the Tomato Masters and Integraste cases. For Tomato Masters, the competition for land resources was a real barrier to finding a site that would allow long-term premises, and space to expand for integrated horticulture activities. This highlights the importance of existing infrastructure and of tailoring projects to local resources and potential.



The final major barrier to be identified in the breakout groups was **the involvement and acceptance of farmers and foresters** in using products that are generated as a result of circular economy principles. This was highlighted particularly in the Integraste case where farmers were concerned about using the end product (bio-digestate) on their fields as a fertiliser, because they didn't know the product and because supply could be variable. They were not necessarily able or willing to pay additional costs for treating waste in this way. In the wood ash case, a similar barrier was encountered, when in some cases farmers or foresters were opposed to using wood ash in road construction. In the Integraste case, a potential solution to overcome this particular barrier was to have primary producers involved at the beginning of the process, engendering trust and commitment. In the words of a participant, "particular attention should be paid to creating a strong '**circular partnership**' among all the actors involved".

What support tools and actions are needed?

In each group the support tools and actions to overcome barriers were identified. These included:

- More **consistent and coherent use of standards** for the use of secondary raw materials.
- **Strengthening the 'circular partnership'** by improving collaboration between actors, for example through the **involvement of mediators, coordinators, facilitators, or an online connection portal**.
- Establishing a stable and **long-term vision and policy framework** that provides coherence between different policy and resource areas.
- Promoting a **more systematic approach to circular economy** within a country or region, which encourages and supports single projects as part of a wider strategy shared among actors, for example through Rural Development Programmes (RDPs).
- **Financial support for emerging circular economy initiatives**, particularly during the start-up phase.
- **Supporting further research into technical and organisational aspects** of new circular economy initiatives, as well as **providing space and facilities** (clusters) where multiple companies can set up innovative collaborations.
- **Disseminating results, sharing knowledge and learning** from other examples at the EU and international levels.



5. Combining value streams and actors at the local level

Combining value streams and key actors was a common theme that came out of the workshop discussions. In the second breakout session, participants were divided into smaller groups and were challenged to develop a hypothetical but realistic circular economy case, based on their understanding of the agriculture and forestry sectors and on what they had learned so far.

The aim of this exercise was to allow participants to experience the process of developing a circular economy case and to experience some of the challenges faced when thinking beyond one particular production cycle, sector or business. They were encouraged to think specifically about which actors exist and how they could be connected to improve circularity, and what type of activities are needed to kick-start this process. The exercise was intended to help develop ideas on how and where EIP-AGRI could provide support, and to inspire participants to play a role themselves. The outcomes of the activities were discussed in plenary.



Connecting actors

Each of the small groups identified a different mix of actors that could be involved in a potential circular economy case. They highlighted that the approach to connecting actors should be flexible enough to involve all actors, and not necessarily follow a set pattern. The waste and resource streams that were identified, such as food waste, manure, crop residues, were particular to each case and involved a range of different processes or end uses and actors to connect the different streams. Some commonalities were seen between the groups, such as the potential to use energy generation (often bio-digesters) to manage and process genuine waste streams. In addition, some new or external actors were identified as being potentially important in the cases, such as tourism and recreational users, or scientists and researchers who are important to facilitate the linkages or who directly benefit from some of the activities.

Participants discussed how links could be made between these different actors. Having a **shared vision** and a **facilitator or coordinator** who could help make connections on the ground and who could relate to different potential actors in the chain was a strong theme in all groups.

Engendering **trust** was identified as being particularly important, both in connecting actors as well as in convincing individuals to adopt new techniques or processes. **Communicating the benefits** of new approaches (for instance new revenue streams or reduced costs) was seen as an important element to convince local actors to take part in new approaches, again often requiring some form of facilitation or leadership.

Developing **new business opportunities** and solutions to tackle environmental challenges (such as waste management) was seen as an important catalyst to get actors to work together in mutually beneficial ways.

Actions to develop the circular bio-economy in agriculture and forestry

After the participants had identified the actors and the ways in which they might be connected, they discussed what initial actions would be needed to get the process started and to develop connections on the ground.

- **Developing a shared vision that is owned by all involved, that is tailored to the local and regional context, and that is profitable and sustainable in the long term.** The vision should identify the initial scope and purpose of the project, such as the scale and overall objectives. It should identify actors and roles, and be communicable.
- Developing and delivering a vision requires **leadership and coordination** as well as constant effort and attention. A facilitator is needed to help set up the process, animate the partnership across a diverse range of actors, generate a common vision, and maintain momentum throughout the initial phases.
- Developing a **feasibility study** to improve understanding of the available resources and potential, to highlight opportunities in a given area or region, so people can make connections, and to highlight the benefits it might generate to those involved. The outputs of the feasibility study were considered important to engage actors and to demonstrate the credibility of the new approach.
- **Connecting actors / networking**, in order to identify the potential links between different actors in the economy. The motivations and needs of each actor should be explored, as well as what they can bring to the economy and how they can benefit. This can be supported by tools such as a '**resource register**' to identify the resources that are being produced and the needs of individuals or businesses, or a **portal** to help different actors connect when they might not meet otherwise.
- **Ensuring that feedback loops are established to primary producers (farmers and foresters)**, who are at the heart of the process but do not always see the benefits of circular activities as they move into new sectors.
- **Building the consortium and formalising the partnership** is the next step in the process to ensure that partners are engaged and take ownership of the initiative, and that any potential risks are shared.
- **Enabling circular economy activities requires initial investment and support to develop new ideas, markets and systems.** This again requires collaboration between actors. As many circular economy activities often involve new and novel approaches or partnerships, there is a need for support during the initial start-up phases of the work. Both financial support, in the form of investments, grants and guarantees, as well as political support, either through policy or local, regional or national administration support were highlighted.
- **Developing enabling conditions within the system**, such as providing clarification or harmonisation of standards that surround new waste resources or on how waste can be treated in different contexts.



6. Looking forward

The 'circular bio-economy' is one where farmers and foresters take a leading role in developing the bio-economy and making it more sustainable by integrating circular activities and natural cycles into existing and new practices. Ensuring that farmers and foresters benefit from these activities is critical to their engagement and to the long-term sustainability of circular bio-economy in practice.

During the workshop, participants were asked what three things would most motivate them to develop more circular economy activities in relation to their particular business. Financial motivations were the most important. This was followed closely by improved resource management and reduced environmental impacts (Figure 3). Interestingly, when asked what benefits circular economy actions could deliver for these sectors, environmental benefits came out most strongly above financial benefits and new business opportunities.

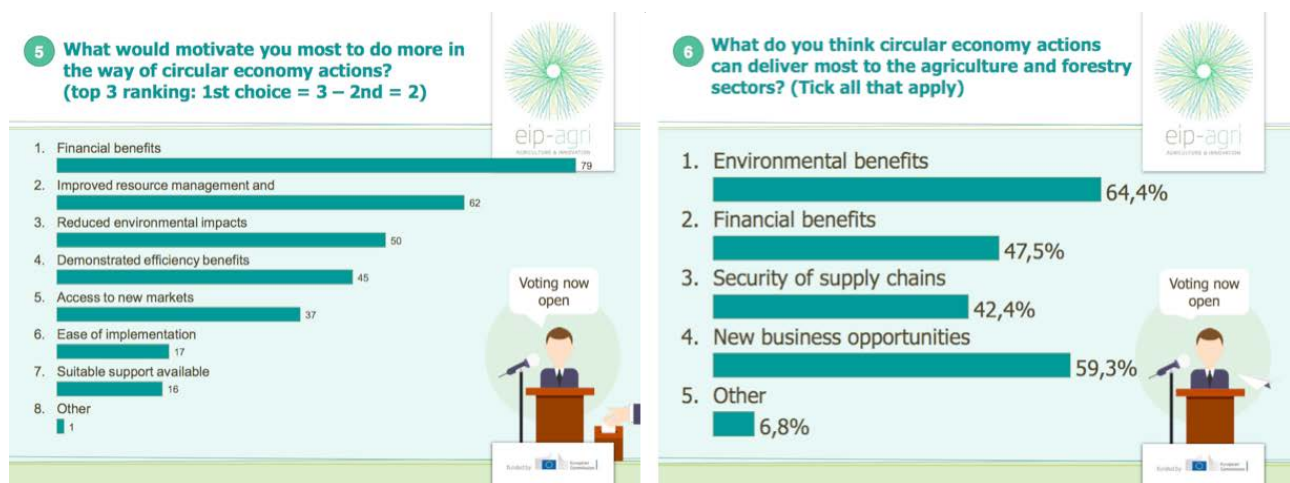
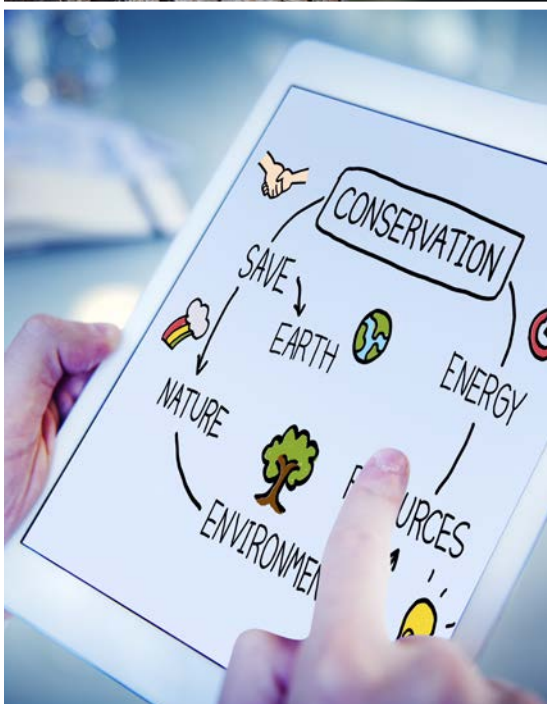


Figure 3: Motivations and perceived impacts of the circular economy in agriculture and forestry

Common themes for the circular bio-economy

Many of the points raised during the workshop in relation to the development of new circular economy activities in agriculture and forestry are similar to those faced by any new initiative or business. Some, however, are more unique to the circular economy and reflect a different way of thinking about resources, value chains and the actors involved.

The importance of **connecting actors and building partnerships** emerged as a key theme from the discussions and from the existing cases presented during the workshop. Creating feedback loops in the economy, where a waste becomes a resource, inevitably requires new partnerships between producers, consumers and the public. For the primary sectors this is particularly important. As producers, these sectors are at the beginning of the product supply chain, far removed from the final disposal of important materials that could be recovered and that provide benefits to society. Ensuring that the new loops created in the circular economy **provide benefits to primary producers** will be a key challenge in making it work for these sectors, with the scale of circularity as an important factor to consider.



Developments of circular economy activities, particularly the utilisation of waste resources, **require a different way of thinking about resources**, and importantly about business and processing systems. Waste resources can be provided in relatively constant streams, but waste can also vary considerably in both quantity and quality, which means that circular systems need a greater degree of flexibility, whether this is to respond to intermittent supply of inputs or the heterogeneity of the resource. **New technology** will be important in overcoming some of these challenges and in delivering higher added value from resources.

This variation in resource availability and quality is one of the reasons (amongst others) why energy production was seen as an attractive solution in many of the cases that were heard throughout the day. While the production of energy from biomass and wastes has many benefits to society, particularly in remote areas, energy generation is often the final use of a material stream and therefore limits further circular activities from taking place. To establish a true circular economy in the agriculture and forestry sectors, it will be important to **diversify solutions for waste management and processing** where nutrients, chemicals and fibres can be re-cycled back into the system, to valorise the local context's agro-ecological resources and to promote tourism.

The need for a **catalyst to start developments** in this area was another emerging theme. Catalysts can come in a variety of forms, from a passionate individual with the means and motivation to make a change and engage others, or a coordinator that can help to facilitate change and start new initiatives, through to financial motivations where adopting circular activities leads to economic benefits for those on the ground. Once initiated, the transition to a circular economy will take time and require sustained commitment. For this to work, there will need to be long-term certainty and support, for instance through clear policy direction.

Most notably, each situation and potential circular economy is different, and while there are common success factors, each approach will need to be tailored to specific needs and circumstances, often requiring a different mix of tools and support measures to help them succeed.

Scaling up and repeating good practices

Circular bio-economy activities can operate at a variety of scales, from a single farm holding, up to an entire region or country. The scale at which these activities are developed often depends on the objectives of the approach, the distribution of actors within a given area, and any logistical limitations, such as transport distances, when closing loops.

The majority of initiatives presented during the workshop were either operating at the local farm and forest scale, or were pilot or research initiatives. While some of these activities could be scaled up to cover larger geographical areas or involve a greater range of actors and organisations, others may need to be multiplied in number but remain tailored to the local circumstances and needs of individuals.

For those activities that can be scaled up to broader geographic areas, leadership, collaboration and facilitation, for instance through regional clusters will be important. For those activities that need to remain small, but that need to be multiplied and adapted to different cases, knowledge sharing, communication and demonstration will likely play a more important role.



Improved understanding and emerging research needs

The circular economy is a relatively new conceptual term in the agriculture and forestry sectors. The concept is also fairly complex to describe, often difficult to communicate and easily confused with other concepts, such as the bio-economy. Despite 59% of workshop participants feeling that the term 'circular economy' was useful and clearly defined, it will be important to develop clearer and more practical language when engaging individuals in new approaches.

Beyond improving communication about the circular economy in agriculture and forestry, the workshop highlighted some areas where further work and research is needed to help develop new initiatives, such as:

- understanding how to involve farmers and foresters in the development of these new processes and activities without it becoming an additional burden;
- defining, categorising or standardising secondary raw materials and wastes so that they can be seen as a resource;
- understanding nutrient content from particular waste streams for use as inputs to the primary sectors. This should include the technical and agronomic characteristics (as are being explored through the [INEMAD project](#)), economic and environmental viability; and
- understanding how other by-products of waste management processes can be re-used, such as cleaned waste water from bio-digesting processes.

Facilitation and support

Throughout the workshop the EIP-AGRI team were keen to learn how they could best support the primary sectors in the transition to a circular economy. This report will help to develop further ideas, but a number of emerging needs where EIP-AGRI and its tools could help were identified. These are:

- The development of a catalogue of good practice examples that can be used to stimulate ideas and motivate individuals, and from which others can learn and develop new approaches. This is already happening in some cases with the National Rural Networks (NRNs) and farmer cooperatives that are active in disseminating principles and examples.
- The development of an EIP-AGRI Focus Group on nutrient recycling to develop ideas and practices and stimulate innovation in this area.
- The inclusion of a circular bio-economy research strand for the primary sectors in future Horizon 2020 funding and research calls, involving a call for Thematic Networks on this subject.
- The encouragement of national and regional governments to put more emphasis on circular economy activities (for example during the mid-term review of Rural Development Programmes), including through supporting dedicated EIP Operational Groups.
- Exploring other related approaches, outside of the EIP-AGRI scope, such as the role of LEADER and Local Action Groups to help promote circularity in the primary sectors.



7. References

Presentations 28 October

- [The circular economy in Agriculture and Forestry in Finland - Ms Tarja Haaranen](#)
- [The European Policy context - Mr Rob Peters](#)
- [Role of agriculture and forestry in the circular economy - Dr Ben Allen](#)
- [Tomato Masters and Aqua4C – Combining horticultural production and fish breeding in Belgium Mr Johan Vlaemynck](#)
- [INTEGRASTE - Development of integrated agro-industrial waste management politics maximizing materials recovery and energy exploitation in Western Greece - Prof Michael Kornaros](#)
- [Development of innovative processes for wood ash upcycling in Austria –Mr Felix Montecuccoli - Project abstract](#)
- [BIOvakka – Nutrient recovery and closing loops with biogas technology in Western Finland Ms Teija Paavola](#)

Presentations 29 October

- [Bioconversion of organic waste streams such as hen and swine manure, waste of fish, coffee, vegetables and fruit by black soldier fly \(Hermetia\) in Belgium - Ms Nouchka De Craene](#)
- [AgroHubs in Lapland, local networks in which waste and side streams are recycled / used as a source of local energy production - Mr Keijo Siitonen](#)
- [Metsä Fibre bioproduct mill in Central Finland - Mr Niklas von Weymarn](#)
- [EIP-AGRI: boosting innovation for the circular economy - Mr Fabio Cossu](#)

Workshop documents

- [Participants list](#)
- [Final programme](#)
- [CVs of the speakers](#)

More information

- [European Commission's circular economy package \(release 2 december 2015\)](#)
- [Press release: European Commission's circular economy package](#)
- [EC Publication: The circular economy - connecting, creating and conserving value](#)

8. Case studies

During the workshop six cases that deal with the circular economy were presented and discussed.

Tomato Masters and Aqua4C



Contact	Mr Johan Vlaemyneck, Manager of Tomato Masters
Topic	Combining horticultural production and fish breeding in Belgium
Description	Tanks for growing fish use water captured from the greenhouse roofs. The water used by the fish farm is recycled after advanced filtering and post-treatment with UV sterilisation. Separated waste water is used to irrigate the tomato greenhouses. The surplus electricity by the CHP plant is used for the tomato greenhouses to run the pumps, aerators, lighting and other electrical equipment. The surplus heat is used to keep the temperature in the fish tanks at 27° Celsius. Research on composting of organic substrate, plant residues and tomato waste is ongoing.
Information	Tomato Masters and Aqua4C

INTEGRASTE



Contact	Prof Michael Kornaros, University of Patras
Topic	Development of integrated agro-industrial waste management, maximising materials recovery and energy exploitation in Western Greece
Description	Use of agro-industrial waste in Western Greece comes from many sources like olive mill waste, cheese whey, manure, slaughterhouse waste etc. The disposal causes serious environmental problems while re-use is difficult since many of the industries are small-scale family type businesses that cannot afford to process the waste themselves. Connection to central waste treatment facilities is difficult. The experimental pilot plant for central anaerobic co-digestion tries out, at local scale, different treatment methods to produce electricity, thermal energy, compost and liquid digestate for e.g. irrigation and use as liquid fertiliser.
Information	INTEGRASTE

Wood ash recycling



Contact	DI Felix Montecuccoli, President of Austrian Land and Forest Owners
Topic	Development of innovative processes for wood ash upcycling in Austria
Description	The project investigates new innovative processes for wood ash utilisation. The amount of wood ash produced and disposed offers opportunities for re-use in short rotation coppice field, forest fertilisation, agricultural and forest road construction as well as conventional road construction. Apart from the technical and environmental evaluation of the wood ash recycling processes, also the economic feasibility of the processes compared to disposal in a landfill is investigated. To be able to use and transport wood ash, proposals for necessary changes in legislation will be prepared (e.g. wood ash is legally considered as waste, which hampers its use).
Information	Wood Ash Recycling

MILLIBETER



Contact	Ms Nouchka De Craene, lead biologist in the R&D department
Topic	Bioconversion of organic waste streams by black soldier fly (<i>Hermetia illucens</i>) in Belgium
Description	Millibeter is a company experimenting and researching the bioconversion of organic side streams such as hen and swine manure, supermarket waste, slaughterhouse and fish offal, vegetables and fruit by the black soldier fly (<i>Hermetia illucens</i>). The black soldier fly larva consumes these side streams and converts it into larval biomass, which contains +/- 5% chitin, 40+% protein and 30+% fat. This biomass can be used as a high protein, high energy animal feed. The raw materials can also be valorised in other industries such as manufacturing of detergents, glues, coatings, cosmetics and flocculants. The composted waste is filtered and used as high quality fertiliser.
Information	Millibeter

AGROHUB Lapland

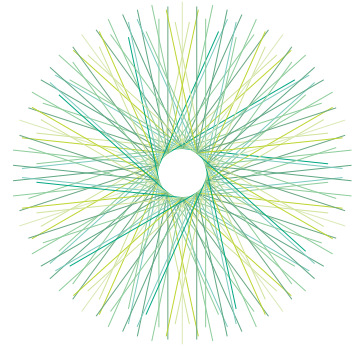


Contact	Mr Keijo Siitonen
Topic	AgroHubs in Lapland, local networks in which waste and side streams are recycled / used as a source of local energy production
Description	Pro Agria Lappi combines social innovation with enhancing the green economy approach. Keeping in mind the particular conditions of Lapland (a sparsely populated region with long distances and harsh winter conditions), different local stakeholders are connected to form a so called AgroHub. This is a network in which waste and side streams (such as wood chips) are recycled or used as a source of local energy production. Field work and different studies are done in rural areas to create awareness and to accelerate development based on sustainable and efficient use of natural resources and energy.
Information	AgroHubs Lapland

Metsä Fibre bioproduct mill



Contact	Mr Niklas von Weymarn, Vice President Research of Metsä Fibre
Topic	Metsä Fibre bioproduct mill in Central Finland
Description	Stimulated by developments in European and Asian markets, Metsä Fibre is currently constructing the Äänekoski bioproduct mill with pulp as the main product. Being the forest sector's biggest investment ever in Finland, the new mill aims at utilising raw materials and side streams to 100 per cent. Goal is to sustainably process wood into bio-materials, bio-energy, bio-chemicals and fertilisers with great resource-efficiency. The mill will not use any fossil fuels. Annual pulp production will be 1.3 million tonnes instead of the current 0.5 million tonnes. Metsä Fibre is currently developing the 'business ecosystem' being the cooperation with both large companies and SMEs to develop the integrated production of new bioproducts.
Information	Metsa Fibre



eip-agri
AGRICULTURE & INNOVATION



The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs launched by the European Commission in a bid to promote rapid modernisation by stepping up innovation efforts.

The **EIP-AGRI** aims to catalyse the innovation process in the **agricultural and forestry sectors** by bringing **research and practice closer together** – in research and innovation projects as well as through the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI:

- the EU Research and Innovation framework, Horizon 2020
- the EU Rural Development Policy

funded by  European Commission



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