EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR AGRICULTURE AND RURAL DEVELOPMENT

Brussels, 20-21 September 2018

# Report

from

# The Workshop on "Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy (BE) value chains and boosting the development of the Bioeconomy (BE) in rural areas"

Brussels, 20 – 21 September 2018

## Contents

**EXECUTIVE SUMMARY**

In the context of the revision of the EU Bioeconomy Strategy and its Action plan as well as following the Commission Proposal for the CAP post-2020 framework, this workshop aimed at facilitating the dissemination and exchange of best practices and experiences in designing and implementing National Bioeconomy Strategies, successful policy instruments (including through available CAP support), and different successful business models for a deeper integration of primary producers into the Bioeconomy (BE) value chains.

The workshop brought together policy makers at national/regional level, experts and representatives of primary production and bio-based industries. It has made it possible to take stock and learn more about the national policies and their evolution over time, as an enabling framework for the deployment of the Bioeconomy (BE) types of operations.

## Developing BE governance structures at national and regional level.

Many different examples of good practices in the vast area of the Bioeconomy (BE) were presented. They showed interesting insights into different BE governance models and cooperative structures, such as BE clusters or other types of associations created by the BE actors in order to achieve synergies in the value chains, and integrating best the interests of all stakeholders, including primary production. The discussions have also allowed identifying the key cross-cutting issues, which are the basis for designing and implementing a successful BE strategy at national and regional level.

The workshop touched upon key issues on how to better mobilise stakeholders, raising awareness about the potential of the BE and overcoming bottlenecks/barriers in the implementation of the BE strategies and individual BE projects.

All presentations have clearly shown that whatever the chosen business models is, "the Bioeconomy (BE) starts on the fields". Therefore, a successful deployment of the BE could only be done by achieving fully integrated BE value chains with fair distribution of benefits among the partners engaged.

In this process, the physical and institutional/organisational infrastructure is vital to support all stakeholders, including primary producers in building up the integrated value chains. The examples of BE clusters at national/regional level have shown that setting up adequate national/regional structures to support a coherent systemic approach, achieving synergies among the different stakeholders, is a vital step in successfully deploying the BE.

Taking into account that the BE is a very dynamic concept, which evolves over time, having a BE forum at national/regional level strongly contributes to establish a permanent dialogue among all stakeholders (including policy makers) on the strategic priorities of the development of the BE at national/regional and local levels.

**Importance of mobilising local stakeholders and encouraging cooperation structures among primary producers.**

Another important message underlined the key role of local stakeholders in this process, as a pre-condition to develop locally rooted successful BE value chains. Therefore, the role of policy makers at regional/local level as well as of farmers' cooperatives (or other forms of associations) is crucial.

The project examples have clearly evidenced the important role cooperation models of primary producers can play in all aspects of the deployment of the BE, namely:

- ✓ Raising awareness about the opportunities of the BE for primary producers and rural areas;

- ✓ Developing BE strategies at the level of the cooperation structure and implementing them through concrete projects (including engaging into joint ventures with other players like Bio-based industry);

- ✓ Ensuring economies of scale and developing necessary BE physical and non-material infrastructure for integrating into the BE value chains (including facilitating the transfer of BE knowledge to individual farmers).

In this sense, encouraging the development of BE strategies at the cooperative level of the primary production can be very effective as an enabling framework for individual primary producers to better integrate into the BE value chains.

**Opportunities for primary producers under small, medium and large scale BE business models**

The business models from different areas of the BE as well as from different geographical zones have shown many interesting cases on how primary producers can be best integrated and what portfolio of small, medium and big scale business solutions already exist across Europe.

These project examples have evidenced that effective integration of primary production by using any of these business models can provide many benefits and diversify the income streams for primary producers. In this sense, being aware of the existing opportunities under each of these business models is a good pre-condition for primary producers to take the right decision, taking into account their particular situation.

Integrating large scale BE value chains broadly implies two common business cases, namely:

- ✓ a large scale production unit/site with a majority ownership by the primary producers through a cooperation structure (cooperatives or other types of cooperation/association models);

- ✓ a large scale production unit/site owned by the bio-based industries (the integration of the value chain being ensured normally through long-term cooperation contractual relationship with cooperatives of primary producers).

Under the first business model of vertical integration, cooperatives or associations of primary producers are the owners of the R&I labs as well as the production facilities (e.g. a biorefinery). This way they have full control over the supply chain and fully participate in the re-distribution of benefits as well as in the setting up of strategic goals related to the BE. In this case, the benefits for individual primary producers are normally linked with a better and stable price for their biomass, as well as with redistribution of dividends.

In the second case, the value chain is fully organised and structured by the representative of the bio-based industries, having full control over the supply chain of the biomass and the production cycle. The positive side effect of such a model is the good organisation over the whole value chain in terms of logistics, spreading know-how at each stage, including at the level of primary production. For the individual primary producer there are several benefits and an additional value/income stream because of a more stable and better price for the available biomass (including through valorising residues) as well as better prices for biological fertilisers.

Small or medium size business solutions could also integrate BE products into the production portfolio of primary producers. Production of bioenergy at small or medium scale is an example of such production streams.

As evidenced by the presented project cases, small-scale production can have many benefits for the primary production and in some cases be a better solution for transforming the given volume of biomass with positive side effects for the environment and the climate, namely:

- ✓ More efficient production since it is done in a de-centralised way close to the biomass location (e.g. no losses of biomass), while allowing the produced by-products to be further transformed into end products in small or big-scale bio refineries;
- ✓ Production of valuable protein feed as a by-product and efficient transformation allowing extraction of the different valuable components on site (e.g. different types of protein);
- ✓ Fewer costs due to the use of the biological fertilisers directly back to the land (instead of creating supply chains from a centralised production back to the farmers);
- ✓ No GHG emissions due to the decentralised and local first transformation of the biomass, implying little or no transportation of the biomass.

## Supporting circular and sustainable business models

Very interesting ideas on how to sustainably and efficiently mobilise the biomass were presented regarding preserving biodiversity in our ecosystems and having a positive impact on climate change.

Good practices from the project examples evidenced how a burden can be transformed into a business opportunity, for example, by using marginal lands for growing industrial crops or achieving circular BE value chains using waste/residue streams to create valuable bio-based products.

The workshop has evidenced that encouraging the valorisation of marginal/non-productive land for such purposes can bring both economic and environmental benefits for rural areas and primary production alike.

## Ideas for further reflection by policy makers in the context of designing BE types of interventions in future CAP Strategic plans.

Based on the types of issues identified and discussed during the workshop, some conclusions can be also drawn, regarding the potential for focusing of EU financial support under CAP post-2020 for BE types of interventions as part of CAP Strategic Plans.

The project examples have shown that although investment support is important for all types of BE production models, it is of less importance for big scale bio refineries since it is a small portion of the total investment cost. Regulatory and policy stability is a more important pre-condition quoted by project representatives.

However, access to finance remains a horizontal issue important for all types of investments. Therefore, setting up of Financial Instruments (FIs) adapted to the size of the investments (e.g. credit lines/guarantees for small scale investments) remains crucial for streamlining such BE investments.

At the same time, investment grants to finance partially small scale investments (including start-ups in rural areas) could still be an option to incentivise primary producers to integrate BE-types of operations into their main business model of production. The potential focus could be on circular small scale production models.

The good practices presented have shown the importance of enhancing support to all types of cooperation models for primary producers. Taking also into account the importance of increasing the awareness and mobilising the local stakeholders, supporting the deployment of the BE in rural areas through community-led local development types of cooperation models can be very beneficial.

Promoting all types of transfer of knowledge and advisory services on the BE to primary producers is also a key-precondition to increase their capacity to develop BE operations.

Project examples have also shown the benefit of using the option on providing voluntary coupled support for non-food crops as a way to increase the volume of biomass (as per article 30 in the Commission proposal on the future CAP Strategic plans[1]).

On this basis, the workshop has made a valuable contribution in equipping policy makers present with an interesting feedback and food for thought when they design their future CAP Strategic plans or National BE Strategies with the objective to better adapt them to the evolving needs of the BE.

[1] COM(2018) 392 final, published 01/06/2018

# 1. INTRODUCTION

The report follows the structure of the workshop. The first section focuses on key issues at national and regional policy level, related to the design, implementation and review of national/regional BE strategies and their link to other strategies or policy areas (including support through the CAP).

The second section focuses on project examples, illustrating concrete business models for deploying integrated BE value chains and effectively integrating primary producers. The project examples cover small, medium and large scale business solutions.

The thirds section summaries key issues presented, draws the main conclusions and tries to identify paths for further reflection on the most relevant topics related to the integration of primary producers and the deployment of the BE in rural areas.

# 2. NATIONAL STRATEGIES, INTEGRATING PRIMARY PRODUCTION AND DEPLOYING THE BIOECONOMY IN RURAL AREAS

A fully fledged National Bioeconomy Strategy (NBES) is a cross-cutting multi-sectoral policy framework, which aims at finding a comprehensive approach, integrating the different available sectoral policy tools in a consistent way for the benefits of the BE.

This section of the report summaries some key policy issues and messages, presented by the experts from the member states (MSs) at the workshop. They should be considered by any policy maker in the design of a NBES, including actions specifically targeting the integration of primary producers (farmers and forest owners) and promoting the deployment of the BE in rural areas.

## 2.1. The Dutch National Strategy in EU context

Mr Jan van Esch, Ministry of Agriculture, Nature and Food Quality, The Netherlands

Eight pillars of the NBES:

- Using resources within the planetary boundaries;
- Reducing climate change;
- Production for people - create employment, specifically in rural areas;
- Sustainable resource management;
- A stable and predictable legal framework;
- Collaboration in the value chain - promote a circular BE model means no dominations of anyone on the value chain;
- Long-term research and innovation agenda;
- Regional strategy and rural development - regional clusters are the engine of the BE implementation on the ground.

Overall policy approach:

- BE is part of the circular economy strategy;
- Policy is developed together with stakeholders;
- Consistency with policy strategies on climate, food and innovation - integrated approach taking into account Climate, food, innovation strategies and CAP.

Stakeholders' mobilization and BE infrastructure:

- It is stakeholders driven process - stakeholders are motivated and actively participate from the very beginning. The design and implementation of the BE strategy should be market and stakeholders driven;
- Important role for the Regional clusters - regional clusters/regional strategies are the engines of BE development (bottom up approach);
- Innovation in 'top sector approach'- large use of the Public-Private Partnerships (50/50) concept with many clusters supported;
- 1200 companies active in bio-based economy;
- €200 million investment in research and development.

Education and public awareness:

- Organising events to raise public awareness about what agriculture is producing in the BE area is vital (e.g. Dutch Agri Food week);
- It is also important connecting the BE to the education and society, while advertising the added value of the BE as a way to prepare the shift from fossil to bio-based products;
- Using digitalised ways to spread information and knowledge is important since it is a societal shift (e.g. on-line BE courses).

Business and investment support; Support to R&I and development of skills for primary producers:

- Support covers all stages of the BE value chains: from fundamental research, through applied research and pilots/demonstration, until marked introduction;
- All sub-sectors: biomass production; biomass transition, bio-based chemicals/materials and bioenergy;
- Need for one-stop-shop for BE support - in the Netherlands and the EU there are many existing instruments. Therefore, it is difficult for stakeholders to choose the right one. Simplification is needed together with tailored support.

Lessons learnt and key messages

- Market and stakeholder driven process;
- Attention to small scale operations as a very good way to create opportunities for primary producer to integrate into the BE;
- Regional clusters very important engines for BE deployment on the ground;
- Using a BE Manifesto as a way to create a framework, showing the commitment and the engagement of stakeholders as well as the coherence among what are the key issues around which a national BE strategy is built upon;
- Use of good examples from national/EU BE strategies to raise awareness for the potential/benefits of the BE;
- Coherence of policy approach to ensure positive synergies and fully integrated BE value chains;
- Build up a BE strategy taking into account the economic, social and environmental drivers for the deployment of the BE;
- Long term knowledge and Innovation agenda to see what the needs for research and education are and how to match them.

## 2.2. The Italian strategy (BIT): objectives, priorities and roadmap

Ms Annalisa Zezza -Italian Council for Agricultural Research and Economics (CREA) - Research center for agricultural policies and the BE.

Overall policy approach in the preparation of the Italian BE strategy:

- Integrated process, engaging all stakeholders (including regional/local governments and farmers associations);
- Different strategies to be taken into account (e.g. Smart Specialization strategy- 2 programmes on agri-food and bio-based; Marine Strategy; National Plan on wastes; Green procurement; Research and Innovation plan for the agricultural sector, etc.);
- Identification of main challenges and opportunities for each sector within the BE (agricultural sector and rural areas);
- Identification of objectives and priorities;
- Identification of research and innovation (R & I) needs;
- Identification of supporting actions (i.e. removal of normative constraints for example in waste/ residues legislation) and accompanying measures;
- Establishing of a monitoring framework (performance and sustainability indicators).

Global Vision for the Italian BE Strategy:

- TO MOVE “from sectors to systems”;
- TO CREATE “value from local biodiversity and circularity”;
- TO MOVE FROM “economy to sustainable economy”;
- TO MOVE FROM “ concept to reality”;
- TO PROMOTE “Bioeconomy in the Mediterranean area”.

The Italian Bioeconomy strategy: main objective and priorities

- Improve sustainably the productivity and quality of products of each of the sectors and more efficiently interconnect them, by creating longer and more locally routed value chains, where the actions of public and private stakeholders integrate across all major sectors;
- Exploit national terrestrial/marine biodiversity, ecosystem services and circularity, and regenerate abandoned/marginal lands and former industrial sites;
- Contribute to the growth of BE in the Mediterranean area via PRIMA and BLUEMED initiatives, for a greener and more productive region, a wider social cohesion and political stability in the area;
- Create: i) a wider and more coherent political commitment, ii) more investments in R&I, spin off/start up, education, training, communication, iii) a better coordination between regional, national and EU stakeholders/policies, iv) a better engagement of a public dialogue, and v) tailored market development actions.

Accompanying measures

- Boost **demand-side innovation policy tools** such as standardization, labeling, and public procurement;
- Boost demand for BE products and services and **create a BE marketplace**, to match demand and supply of biomass, technology, and services;
- Promote **education and professional training** for BE specialists, also in partnership with private actors and industrial players;
- Support **corporate social responsibility** proposing a methodological framework for enterprises to highlight the bio-based content and features of BE processes and products.

First Steps in implementing the Italian BE strategy

- On the financial side: aggregation of national and regional funds for financing projects with multiregional/national relevance (FESR: first calls released in October 2018);

- Within the Italian Rural Development Network: focal points on innovation establishing contacts between researchers and agricultural organizations on new needs ( e.g. F&V production and processing and green chemistry);

- Ongoing inventory of research and university programs.

The CAP and the BE:

- Both pillars can play a vital role in a win-win scenario for the deployment of the BE;
- Green growth/sustainable intensification: today thanks to innovation, productivity and sustainability can be win-win opportunities but the CAP "model" impacts on the measures by which farmers will adopt innovation;
- MSs have a crucial role to play in designing the possible measures under CAP to support the BE.

### 2.3. A Bioeconomy Strategy for France

Ms. Nathalie Guesdon, Deputy Head of the Forest-timber,
Horse and Bioeconomy Sub-directorate, Ministry of Agriculture and Food, France

The key aspects of the strategy:

- Producing more bio-resources sustainably and using them;
- Making BE products a market reality;
- Supporting the transition to a high-performance, innovative and sustainable bio-based industry;
- Sharing BE with stakeholders, including society;
- Supporting innovation for a high performance BE;
- Regional dimension of the BE and BE strategies is very important. A good example in the French regional context is the process of building of two regional strategies in Grand Est and Hauts-de-France.

Link between BE implementation and CAP support in the French BE context

The available CAP funds are already used to support the deployment of the BE in France. A reflection has also started on the role of CAP post-2020 support in the area of the BE.

Some examples to illustrate the focus in the typology of interventions supported by the CAP in France:

- Development of new crops or intermediary crops (e.g. flax, hemp, miscanthus):
  - Development of new crops to answer new markets;

    Advantages for farmers: crop diversification, longer rotations, new outlets for farmers;

    French CAP support: specific subsidies for hemp crops (Voluntary Coupled Support).

  - Development of intermediary crops;

    Advantages for farmers: increased production of biomass, combined with environmental benefits due to the soil cover.

- Development of farm methanisation

This is an area of policy support in the development of the BE in France, supporting the production of energy and fertilisers from local material (farm effluent, straw, waste from agri-food).

Advantages for farmers: valorisation of by-products, complementary income

Support measures to enable such investments to take place focus on the access to finance (provision of guarantees for loans), lifting legal and regulatory barriers, and trainings for farmers. As a result, the number of methanisation units has increased over time (from 41 in 2012 to 281 in 2017; objective for 2020 is 1000 units).

- Develop local value chain projects

An example of such value chain is the "creation of a hemp valorisation sector in Essonne « Gatichanvre »". The creation of the value chain implies a cooperation between 90 farmers (1 000 ha of hemp) and the processing industry (hemp de-fibration). Training of community artisans to use hemp in construction (concrete, isolation) are also part of the project.

Advantages: contracts between farmers and processors, creation of local jobs.

Other actions in the area of the BE in France:

- Olympic Games as advertising wood and hemp as basic material for infrastructures;

- Sustainability criteria for biomass and Life Cycle Assessment for biomass production to improve the acceptability of the BE;
- R&I and education.

## Regional/local dimension of the deployment of the BE in France

Mr Jean-Marie CHAUVET, Directeur de la Fondation Jacques de Bohan - Institut de la Bioraffinerie

The French farmers are integrated into the BE value chains in a regional French model, mainly through different forms of associations and cooperatives. A good example in this respect is the French model of bio-refinery, integrating all stakeholders including farmers as owners.

The French Innovation cluster dedicated to the BE (IAR) has been created as a network bringing together the major French BE stakeholders: large and small; public and private, with the aim:

- To support innovation: through partnerships, collaborative projects and many more services;
- To accelerate industrialization of innovative ideas;
- To valorize local biomass in a market and business driven way;
- To enable a supportive policy framework for bio-based industries, in cooperation with local, regional, national and European decision makers.

The French BE cluster is a forum to support innovation in the BE through projects integrating all partners large and small including farmers at local, regional, national and EU level. It encompasses 380 members, and 1.7bn euro of investment in 270 projects since 2005. Twenty people of permanent staff work for the BE cluster, being an association.

Some very good examples of local clusters under the IAR regional cluster are the *bio-refinery of Bazancourt-Pomacle* and its local BE ecosystem, the *experimental site of Terralab*, as well as the *Reims BE Park*.

The site of the bio-refinery of Bazancourt-Pomacle has been set up originally by two farmers' cooperatives (sugar beet and cereal). It started as a sugar refinery but progressively has been transformed into an *integrated BE local ecosystem* with an *Industrial part* (production of sugar, starch, bioethanol, perfumes, cosmetics, etc.), *R&I part (ARD)*, biotech and BE education/technical and business schools so-called (CEBB), Futurol (national project for producing ethanol from lingo-cellulose), as well as start-ups (production of isobutene/ hydrocarbon from sugar via fermentation).

**The case of Terrasolis**: an association gathering the agricultural partners for deciding the strategic targets but also industry and local/ regional authorities, foundation. The vision of Terrasolis is to become an agricultural pole of innovation for the region Grand Est.

Three main objectives

1. **Creating bridges and links** between the different sectors and accompanying the agricultural RD projects and actors of the region Grand Est;

2. **Being a catalyst for territorial projects** for a better implementation of the multi-functionality of the agriculture thanks to innovation;

3. **Promoting a multifunctional agriculture** producing renewable carbon issued from photosynthesis and providing ecosystem services.

Terralab (a tool for deploying the projects carried out by Terrasolis) is an experimental site for developing the crops and agriculture of tomorrow. This way, Terralab is a demonstrator for the multi-functionality of the agriculture.

An open innovation platform for farmers, maximizing the production of renewable carbon and providing ecosystem services:

- Creating added-value for farmers;
- Supplying existing value chains;
- Storing carbon and mitigating the effects of climate change;
- Producing carbon chains for bioproducts (biomaterials, energy, biochemicals, …);
- Improving resilience and autonomy (nitrogen…);
- Recycling and circular economy;
- Reducing environmental fingerprint.

The *Reims BE Park* is another project as a result of the work of the BE Cluster in France. It is situated near the bio-refinery of Bazancourt-Pomacle and will host facilities dedicated to BE as well as support services for the production of bio-based products.

## 2.4. The German Strategy: integrating primary production and deploying the Bioeconomy in rural areas

Dr Wibke Baumgarten Agency for renewable resources/ Federal Ministry of Food and Agriculture, Germany

Focus of the BE Strategic Approach:

- Broader approach and a circular concept to ensure all stakeholders are equally involved and that the BE is considered at all levels from local through national to EU and beyond;
- Two BE strategies for Germany as a starting point: National Policy Strategy on Bioeconomy, BMEL, 2014[2] and National Research Strategy Bioeconomy 2030, BMBF, 2010[3] – foreseen to be merged into one BE strategy during 2019. Status report from November 2016[4].

Consequences:

- Integrative approach with sustainability orientation (environment, climate, nature and animal protection, social standards) taking into account other policy strategies relevant for bioeconomy;
- Global food security first;
- Not limited to non-food uses;
- Food - and feed-chains are the most important parts of the BE;
- Implementation more difficult and complex (complex monitoring, close R&D-funding coordination within and beyond Germany, regulatory policy vs. market effects, etc.).

Bioeconomy Strategy: Fields of action

Cross-cutting issues:

A Coherent policy framework for a sustainable bioeconomy

B Information and societal dialogue

C Education

[2] https://www.bmel.de/SharedDocs/Downloads/EN/Publications/NatPolicyStrategyBioeconomy.pdf?__blob=publicationFile

[3] https://www.bmbf.de/pub/Nationale_Forschungsstrategie_Biooekonomie_2030.pdf

[4] https://www.bmel.de/DE/Landwirtschaft/Biooekonomie/_texte/Fortschrittsbericht_BioOekonomiestrategie.html

Thematic actions:

**D Sustainable production of renewable resources**

E Growing markets, innovative technologies and products

F Processes and value chain networks

**G Land use competition**

H International context

D: Sustainable production of renewable resources

- Sustainable development in agriculture, forestry and fisheries;
- Provision of agricultural raw materials and sustainably higher productivity for the utilised agricultural area;
- Use of the sustainably available potential of wood and adaption of the forests to climate change;
- Tapping aquatic resources on a sustainable basis for food, energy and industry;
- Sustainable production of high-added-value food of animal origin.

G: Land use competition

- Reducing the demand for agriculture and forestry areas originating from building development and transport;
- Defusing competition for land-use between production and renewable raw materials for energy and industry;
- The use of renewable resources must be more strongly concentrated on the most efficient paths of use.

Policy coherence

- Inter-ministerial working group - Ministries for food and agriculture (BMEL), research and education (BMBF), economic affairs (BMWi), environment (BMU), foreign affairs (AA), chancellery and some others (3-4 meetings / year);
- Close cooperation with the National BE Council.

Monitoring of the BE: 3 priority areas

- Resource-basis and sustainability/origin and production of biomass (BMEL: Thünen-Institute and DBFZ);
- Use and development of economic indicators (BMWi);
- Systemic analyses and modelling (BMBF).

Implementation measures

Regulatory policy measures

- Taxes and other incentives for savings of fossil carbon and other finite resources;
- "Rewarding" sustainable production processes- related to soft measures (e.g. sustainability labelling).

Funding research and innovation

- Federal Ministry of Agriculture with its own research institutes and several funding programmes active in bioeconomy related research areas for many years;
- Federal Ministry for Research and Education launched the National Research Strategy on Bioeconomy 2030 in 2010. Furthermore, other federal ministries and ministries at State (Laender) level are funding R&D projects in the broad field of the BE.

Information and dialogue

- Improving communication for a better understanding of biogenic resources and biomass uses in different pathways (food, feed, fiber, fuel);
- Considering marketability and competitiveness as well as societal acceptance;
- Additionally, realisation of information and explanation-campaigns like "too good for the bin" or to the consumption of sustainably produced and certified food and nonfood products (detergents, oils, varnishes, colors, packaging materials, etc.).

Stakeholder mobilisation, Research, and Development Support:

Mobilisation of stakeholders

Societal dialogue on the BE:

- Measures to inform and to increase acceptance;
- Social science related research;

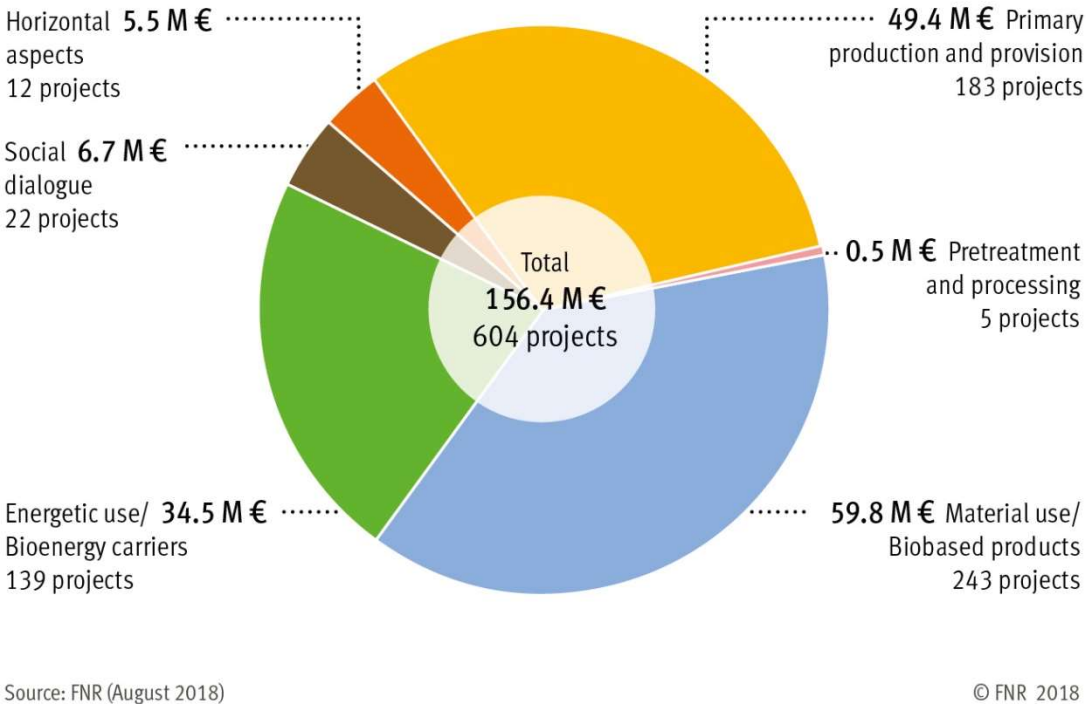
- Strategy development related to the deployment of a sustainable bioeconomy.

The Charter for Wood 2.0 as an example of successful stakeholder mobilization

- Networking, cooperation, joint engagement between stakeholders representing:
  - Clusters related to forestry and wood;
  - Research and education cooperations and networks;
  - Policy actors;
  - Public/governmental sector;
  - Civil society.
- Steering group representing all stakeholders;
- 6 thematic working groups:
  - Building and construction with wood in urban and rural areas;
  - Opportunities for wood in the BE;
  - Material and energy efficiency;
  - Forests and wood as natural resources;
  - Cluster for forests and wood;
  - Forests and wood in society.

Promotion of research, development and demonstration is a high priority (a total of 3650 projects have been supported so far with an overall budget of 990 MEUR);

Currently about 604 projects are running (156.4 MEUR)



National Action Plan on Digitalization in primary production- support for introducing precision in agriculture in forestry as a reply to climate change and other environmental constraints as well as to increase competitiveness.

Conclusions

Germany follows a broad bioeconomy definition and comprehensive policy approach resulting in integrated sustainability goals, food-first paradigm, complexity (i.e. monitoring, R&D, policy measures) which requires close interlinkages with the primary sector and various interactions with its stakeholders.

Involvement of primary sector stakeholders include:

- Inter-ministerial working group (involving various ministry including the BMEL – agriculture and forestry);
- Monitoring includes indicators for biomass production from agriculture and forestry;
- Societal dialogue engages with bioeconomy stakeholders including the primary sector (i.e. Charter for Wood 2.0);
- R&D funding specifically targets production and use of biomass from agriculture, forestry and aquatic systems;
- Digitalisation measures related to agricultural production and involvement of producing sector (i.e. consultation, information, training and education).

## 2.5. The Strategy of Austria: the process towards a new strategy, an action plan and a Bioeconomy cluster

Mr Gottfried Lamers, Federal Ministry for Sustainability and Tourism, Austria.

New BE Strategy is developed on the bases of the existing strategies and should be ready by the end of 2018 (Action plan by mid-2019):

R&D Bioeconomy Strategy 2017

- Focused on research and universities;
- Process of 2 years with intensive stakeholder participation.

Action plan for renewable resources 2015

- Focused on materials and agriculture but from the point of view of bio-based industries and their use of biomass;
- New products and niches (as insulation materials, colours);
- "Hands on" action plan with 32 very precise to-dos.

Key strategic elements:

- Keep focus on R&I;
- Enlarge scope to encompass a part on market integration and a BE-cluster (integrating all existing clusters);
- BE platform for strategic planning and monitoring already set up - 20 experts (from research, enterprises, civil society);
- BE Strategy to contribute achieving milestones under the National Climate & Energy Strategy.

Process of preparation of the New BE strategy:

- **Mission Statement -** detailed order for the strategy from 3 ministers;
- **SWOT Analysis** (based on a compilation of existing studies);
- **Guidelines regarding the sustainability -** SDG compatibility;
- **Goals for the strategy under preparation -** first draft of goals are in public consultation.

Strengths and potentials for the BE in Austria:

- **Traditional strengths**
  - Pulp and paper industry;
  - Wood construction and furniture;
  - Fibbers and wood plastic compounds;
  - Bioenergy (a bit of biogas but mainly biofuels and biomass fuels production)
- **Potentials**
  - Municipal housing sector;
  - Insulation materials;
  - Chemical industry.

Developing the BE in a context of limited resources in Austria:

- **Agriculture -** limited potential for biomass due to loss of arable land and soil degradation;

- More efficient production to maximise biomass mobilisation is not sufficient to compensate for the reduction of arable land;
- Competition for land (increase of organic food production);
- Risk for Biodiversity loss and soil degradation.

- **Forestry -** good but also limited potential for biomass mobilisation
  - Huge reserves (considerable increase of stock);
  - Focus on mobilisation of residues and by-products;
  - Sustainable use and protective function of the forests as a limit for biomass mobilisation in Austria;
  - Biodiversity as a restriction on overuse of forest biomass.
- **Organic waste (focus as a way for additional and sustainable biomass mobilisation)**
  - Residues of agriculture and forestry sector;
  - Waste of the food production industry;
  - Organic waste from consumers - legislation at national level needs to be reviewed/simplified to enable easier mobilisation.

<u>Existing economic incentives for the BE in AT/ Environmental subsidies:</u>

- **Ressource efficiency**
  - Reduction of losses in the (food) industry;
  - Investment in production of new products instead of waste treatment.
- **Production of BE products focused on:**
  - Advanced Biofuels;
  - Investments in direct environmental effects by BE (e.g. hemp-based insulation materials) - need to revise the State Aid rules in order to facilitate the roll out of such support;
  - Use of renewable resources instead of fossil (e. g. investments in production machinery in order to shift towards BE products – as compound cups).
- **Bioenergy**
  - Heat production (process heat) in enterprises;

- District heating;
- Feed in stations of biogas into the gas-grid.

CAP contribution for BE:

- **Current period**
  - Bioeconomy was already a big issue in the SWOT analysis of the programme 2014/2020;
  - A priority was given to bioenergy, mainly in rural areas:
    - Approx. 130 Mio. € were reserved for biomass district heating systems;
    - Approx. 66% of these subsidies are approved already.
- **Future period**
  - Reduction of biomass district heating since enough installations are in operation already (about 2 000 plants);
  - Increase of biogas production from agricultural residues for gas supply;
  - Increase of collection and use of agricultural and forest based residues and waste streams;
  - Education and training for farmers for new crops.

## 2.6. The role of the BIOEAST Initiative in supporting the development of the Bioeconomy in the new Member States

Mr Barna Kovács, Hungarian Permanent Representation to the European Union.

**BE investments/projects are present in the 11 MSs (covered by the BIOEAST Initiative) but a lack of BE strategic thinking at policy level is a general issue to tackle:**

- Latvia is the only MS participating in the BIOEAST Initiative having a National BE Strategy (NBES);
- In the remaining 10 MSs a process on reflection/preparation of a NBES has started.

Some feedback from a BIOEAST survey made among the 11 BIOEAST MSs, on how Commission could help the process of better uptake of BE at national level:

- Information campaign aimed on promotion and explanation of renewed EC Bioeconomy Strategy, oriented on regional (national) stakeholders in cooperation with national contact points for national/regional bioeconomies;

- Part of the materials (summary, infographics, bioeconomy fiche) should be translated into national languages in order to be better understood by all stakeholders (SMEs, enterprisers, larger public, students, etc.);

- The support in promotion of best practices and experiences at national level;

- Research and innovation calls oriented on topics related to BE in the regions with "less mature BE deployment";

- The emphasize and support inclusion of BE topics/themes (in the Strategic plans of the CAP after 2020, Rural Development Programmes, programmes oriented on quality of life or other relevant programmes);

- To ensure a greater involvement of all the Member States and stakeholders at the EU-level bioeconomy processes the Commission should strengthen the bioeconomy policy governance and the cooperation with national policy makers. It is important to provide all stakeholders in all Member States with up-to-date information;

- Cooperation with BioEast would help to develop National BE strategies;

- Information seminars demonstrating both the need and advantages of having efficient BE strategy directed to various BE value chains as well as providing support to build expertise and information based on the experiences and problems from other member states already advanced in bioeconomy;

- To provide help by putting additional focus on bioeconomy in the formulation of policies;

- To extend the emphasis and support the bioeconomy in Rural Development Programmes.

Main drivers below for the BE, solving "food first" issues, should be better taken on board by policy makers at all levels (national/ regional/ local) in the BIOEAST MSs:

- To ensure sustainable yields;

- To have cascading approach for biomass use;

- To secure circularity;

- To sustain the diversity of production systems.

Many barriers in the internal national context not necessary pushing for complex strategic thinking:

- Lack of societal understanding and participation in addressing the real challenges but rather focusing on short-terms issues;
- Traditional knowledge transfer process;
- Applying rather sector-based instead of system-wide (across the board) approach, which leads to parallel processes (e.g. issues of the agro-food sector, treated separately from forestry sector or bio-based industries sector);
- Often missing evidence-based policy-making;
- Aspects of the market driven BE:
  - Mostly short term profit driven, sometimes technology driven, but less strategic governance and strategic thinking involved in the development of BE types of operations - as a result the issue of sustainable BE development in the decisions about investments and uses of the available biomass is rather overtaken by individual interests;
  - Missing macro-regional approach for the sustainability (economic, environmental, societal) - survey among academia, industry and policy makers showed similar results about huge potential of biomass but a lack of policy strategic thinking.

The BIOEAST Initiative's mission is to assist Central and Eastern European (CEE) countries to operationalize their Vision for 2030 (available at www.bioeast.eu) drawing on their potential and offering opportunities for:

- A sustainable increase of biomass production;
- A circular ("zero waste") processing of the available biomass;
- Viable rural areas to develop an innovative, inclusive, climate-ready and inclusive growth model.

## 2.7. Cooperation models to integrate the primary production in the value chains of the Bioeconomy, the BBI JU project experience

Ms. Paloma Mallorquin, Project Officer, Bio-based Industries Joint Undertaking (BBI JU).

About BBI JU

- Public-Private Partnership (PPP) between the European Commission & Bio-based Industries Consortium (BIC) supporting R&I for bio-based industries;
- Fund R&I projects from technology development to full scale;
- EU body-operates under Horizon2020 rules with total budget of 3.7 billion EUR (975 MEUR of EU Funding).

Main reasons for setting up the BBI JU in the context of the 2012 EU BES:

- De-risk investments;
- Organize the value chains;
- Reach critical mass of this "emerging" sector.

Objectives: Developing sustainable and competitive bio-based industries in Europe, based on advanced biorefineries that source their biomass sustainably by:

- Demonstrating new technologies to fill the gap in value chains;
- Developing business models, integrating all economic actors along the value chain;
- Set-up flagship biorefinery plants, deploying business models & technologies to keep investment in the EU.

Strong cooperation with the regions as important factors in establishing integrated BE value chains:

- Opportunities to "valorise" feedstock: agricultural crops or forestry, marine feedstock, waste from food industry, municipal waste, etc.;
- Regions can help in setting up local value chains to the benefit of local actors (e.g. farmers, industry);
- Regions can use regional and rural development funds and other finances to support and attract investments, creating new jobs and opportunities for their primary sector;
- In cooperation with Bio-based Industries Consortium, cooperation work with regional authorities to promote synergies with BBI JU funding to create a more favourable investment environment for bio-based industries in Europe;
- Connect actors across regions and sectors along new value chains;
- Awareness raising activities on BIC and the BBI JU, mobilization of the SRG;
- Specific topics to support regions;
- Sharing best-practices, exploit complementarity;

- Widening participation strategy.

Some examples of Integration of the primary sector in BBI JU projects:

**AgriChemWhey-Flagship project in Lisheen, Ireland**

- Biomass: food-processing (dairy side streams) residues into bio-based chemicals;
- *New value chain* which encompasses all stakeholders from dairy farmers and processors to LA and PLA producers, and final users of other side streams and residues arising from the process;
- Revitalisation of the rural economy:
  - New life to Lisheen mine (zinc mine end activity in 2016 employing 400 people) transformed into the National Bioeconomy Campus;
  - Regional development, in regions facing industrial transition through the replication the AgriChemWhey model;
  - Dissemination and communication to outreach local communities to present economic growth and employment opportunities.

**Flagship in Sardinia, Italy Project- First 2 Run**

- Biomass: oil crops (cardoon); farming on marginal land/large scale cultivation;
- Processing of cardoon into bio-monomers & esters towards bio-based products, such as bio lubricants, cosmetics & bioplastics → Demonstration of the technological, economic and environmental sustainability at an industrial scale;
- Valorisation of by-and co-products for feed products, added value chemicals, and energy;
- Valorisation of currently unexploited marginal land: (3500 ha) for production of vegetable oil (at least 0.375 ton/ha) to be processed to bio-based products (cascading approach);
- Revitalization of the local economy through:
  - Reindustrialisation: reconversion of a no longer competitive site;
  - Creation of skilled jobs: estimated are 60 new skilled jobs for each kton of produced bioplastics, in the whole value chain, from agriculture to the end life of the final products (incl. municipalities, composting plants).
- The presence of the biorefinery in the area will make the difference by:
  - facilitating the development of entrepreneurial activities in the region;

- activating innovation potential in different areas:

  → primary sector (local crops that supply the biorefinery);

  → secondary sector (agric. vehicles & equipment, logistics, processing of bio-based products);

  → tertiary sector (partnerships with farmer; universities, schools, research institutes and local institutions).

- facilitating the cooperation with local farmers i.e. partnership between NOVAMONT and Coldiretti (Europe's largest farmers' organisation).

- Dissemination of the cardoon to Sardinian farmers, with the idea of offering them a new potential source of income and to make the best use of the specific local conditions.

Challenges for the future in the BBI JU activities:

- Continue raising awareness among the primary sector actors;
- Enable active involvement of the primary sector in the value chains;
- Identify successful cooperation models;
- Task force BBI JU-EC-BIC Integration of primary sector in BE.

## 2.8. Support for primary producers to integrate into the Bioeconomy

Mr. Pekka Pesonen, Secretary General, COPA COGECA.

Some key messages from the COPA COGECA policy statement:

- Integration is the basis for a successful BE deployment. The integration of primary producers in the value chains and sharing the added value will also contribute to rural development;

- Sustainability is the second key issue - mainly environmental aspects as regards the sourcing of biomass; we need to promote the mobilisation and use the local resources;

- Cascading principle to be applied in a market approach not artificially, which could create market distortion;

- The BE could have an important contribution to attract young farmers by mainstreaming innovation in the primary production sector and this way making it more attractive business sector;

- The potential of biomass/BE lies with Central and Eastern European Countries in terms also of setting up cooperation models among farmers in these Member States. This would contribute greatly to an increased role of the primary production into the value chains and achieve overall integrated value chains.

## 3. DIFFERENT BUSINESS MODELS FOR ORGANISING THE BE SUPPLY CHAINS, EFFECTIVELY INTEGRATING PRIMARY PRODUCERS

This section presents very interesting examples, illustrating different business models for organising the BE supply chains with the aim to effectively integrate all stakeholders, including primary producers. This successful integration results in economic, social and environmental benefits. The section encompasses examples of good practices related to big, medium, and small scale production business models.

**Projects presentations**

### 3.1. Integrated Biomass Trade and Logistics Centres: vertical integration with substantial economic benefits for primary producers, rural/ mountain areas.

#### *3.1.1. The contribution of Integrated Biomass Logistic Centres (IBLCs) to foster the BE – AGRO in LOG project*

Mr Fernando Sebastián, Project coordinator CIRCE Foundation (Research Centre for Energy Resources and Consumption)

An **IBLC** is defined as a **business strategy** for **existing agro-industries** to take advantage of **unexploited synergies** in terms of *facilities, seasonality, equipment and staff capabilities and network of contacts* to diversify regular activity both on the input (food and biomass feedstock) and on the output (food, feed, bio-commodities…) sides. Such business models can be implemented by farmers' cooperatives along or in joint venture with the agro-industry.

The main added value of such innovative business model is to give the opportunity to current agro-industries and primary producers to become the drivers for mobilization of residues from crops and food industries for the production of bioenergy and bio-based products.

The implementation of this business model effectively adapts the existing production models of agro-industries and primary production to the modern reality of the BE by integrating residue streams into the overall production cycle.

This way the traditional business cycle is transformed into a new innovative, circular, bio-based production model where all parts of the available biomass (including residues

and waste) are valorised. This normally results in an enlarged portfolio of end-products or bio-products, produced out of residue and waste from the traditional/main production (e.g. pellets for energy, pellets for bioplastics, and other by-products for the bio-chemicals sectors).

As a positive side effect of the transformation, taking place locally, there are environmental benefits and a net contribution to climate change through less GHG emissions.

The implementation of an IBLC business model implies:

- Applying adapted methods of **integrated harvesting** of new feedstock and by-products;
- **Integrated logistics**: collection, pre-treatment and procurement towards the agro-industry.
- **Facilities adaptation** and integration of non-food processes into existing food ones
- Production of new **bio-commodities** and **bio-products**

Major economic benefits from implementing this business model in the three AGROinLOG's demo agro-industries:

- New markets opened for the agro-industries;
- 12 % turnover growth;
- Year-round activity. New and full-time jobs;
- Compared to a new biomass supply business built from scratch:
    - Investment reduction for the new activity;
    - Annual operational costs reduction (> 30,000 €/year);
    - 1-2 M€ saved in the first decade.

Potential bottlenecks to be considered in the implementation:

- Biomass use vs. maintaining soil quality;
- Solid agri-fuels final market price vs. quality;
- Stakeholders' participation. How to avoid burnout;
- Lack of knowledge among the primary sector about the alternative markets possibilities.

Such IBLC business models could be replicated in many agro-industries value chains independently from the type of the biomass used.

### *3.1.2. Logistic and Trade centres for woody and non-woody biomass in (Styria) Austria*

Dr Alfred Kindler, Chamber of Agriculture and Forestry of Styria.

These logistic centres play the role of intermediary between biomass supply and users of the end products in a local/regional context. The implementation of this efficient, circular business model in a decentralised smaller scale allows valorising all biomass streams, including all residues of woody or non-woody biomass (e.g. corn cobs).

It also ensures a better quality of the end- and by-products due to the more professional transformation of the biomass as well as a cost-efficient production because of the sufficient economies of scale.

This model of more efficient allocation of resources can transform the burden of previous waste streams (e.g. residue grass in the region) into valuable end-products (in this case the production of feed pellets for pigs).

The fact that this transformation takes place locally has a positive impact on additional value creations, generating less GHG emission due to the little transportation of the biomass as well as to the huge savings in terms of fuels (replacing previously used fossil-fuels with biomass fuels).

As an illustration of the potential, 1 hectare of corn acreage, transformed in such a centre, is capable of:

- Producing 1.500 kg of corn cobs.
- Replacing 700 litters of fuel oil.
- Saving approx. 2 tons of CO2-emissions.
- Generating 200 times more energy than what‘s being used.

The investment cost of such trade and logistical centres is not very high and can be realised by cooperatives of primary producers. For example in the case of a trade/logistic centre for woody biomass the level of investment is about 120 000 euro.

### 3.2. Examples of other small scale Bioeconomy business models.

#### *3.2.1. Developing sustainable and resources efficient Bioeconomy business models. Are small-scale bio refineries the solutions?*

Prof. Johan Sanders, Emeritus of Wageningen University, Bio-based Economy and Valorisation of plant production chains.

Taking into account that land use for agriculture cannot increase we need to find ways to increase biomass without changing the pattern of land use. A potential lies in the grass biomass.

Small scale production can achieve better results in some cases compared to bigger scale production specifically for perishable crops.

Main advantages of small scale circular model of production:

- Less GHG emissions due to transformation and recycling of minerals on site, less rumen losses since better digestible feed/proteins, and no transportation of the biomass and manure;
- Better resources efficiency and less manure since the useful components of the biomass are separated and transformed at a small scale, leading to 50% increase in animal proteins per hectare as compared with traditional sillaging for dairy cattle.

Examples of efficient small scale circular models of bio refining

The case of sugar beet:

Small scale bio refining means more efficient production process specifically related to immediate use of the minerals, which in a big scale production need to be concentrated at the cost of energy and capital investment to avoid any leakage in the environment. At the same time a stabilised main by-product (the sugar concentrate) could be transformed into sugar either in a small scale or bigger scale bio refinery that can be operational for the whole year if a stable intermediate product is available.

As a result a small scale bio refining in this case would be more cost efficient due mainly to 3 reasons:

- Less energy and less capital needed;
- Minerals immediately back to the field - no cost for concentrating them and transporting them back to the farmers;
- Less transport overall since transformation is done on-site.

The case of corn:

Small scale integrated circular model of production allows producing in parallel main corn oil, corn proteins as well as bioethanol, combined with biogas with mineral fertilisers as residues and CHP used in the fermentation process.

Primary producers need to learn more about the different opportunities for small scale bio-refinery productions. Transfer of knowledge is key.

Policy can provide an enabling framework by financing small scale bio refineries, support cooperation among farmers, support front runners with R&I.

Opportunity for farmers to become equal players!

- More income from same hectare;
- Diversification - more robust income from additional products;
- Forward integration will lead to increased employment;
- Contribution to Paris goals;
- Less costs to get rid of excess manure;
- Improved license to produce;
- Crop residues as sugar beet leaves will become valuable;
- Small scale bio refining better suited for perishable crops!

The case of grass:

Mobile small scale bio refining of grass means first of all no transport costs and emission since the first transformation is made on site (e.g. very suitable for mountain areas).

Compared to current grass processing and transformation it means:

- No loss of biomass (current traditional harvesting and sillaging means about 15% loss);
- Better extraction, separation and use of protein components - 50% more added-value since separation of proteins for cattle, pigs and poultry is done on site. As a result less GHG emissions due to transformation on site, less rumen losses since production of better digestible feed/proteins, and no transportation of the biomass and manure.

### *3.2.2. Decentralised green biorefineries to extract protein concentrates from grass and legumes*

Mr Uffe Jørgensen, Senior Scientist, Department of Agroecology, Head of Aarhus University Centre for Circular Bioeconomy, Denmark.

Key Messages:

- Grass can double productivity and halve environmental impacts per ha due to a longer growing season and permanent root system compared with annual crops;
- Extract the high protein content in grass & legumes and feed the fibre to dairy cattle;
- Decentralised processing of grass and legume biomass is optimised to ensure high protein contents and to minimize transport distance of wet grass to no more than 5-10 km, which means no GHG emissions;
- Positive business case for organic production;
- Feeding trials on mono- and polygastric animals are promising;
- Optimal size needs to be further defined but probably quite small.

## 3.3. Examples of circular small/ medium/ big scale Bioeconomy business models.

### *3.3.1. El Tejar- Circular Bioeconomy with resources from the olive trees*

Mr. Francisco De Mora Perez, Oleicola El Tejar s.c.a Spain.

Circular bioeconomy model developed by primary production cooperative, based on valorisation value chains of "alperujo", a solid by-product of the two-phase centrifugation method for olive oil extraction.

As a result, 2 main value chains have been created, namely:

- 50% of pomace olive oil production;
- 50% electricity production from residues and by-products out of the olive production;
- 243 members that service more than 100,000 olive grove farmers.

Economic benefits:

- € 88 million in revenues;
- € 236 million in fixed assets;
- We generate a benefit to our partners of €3-6 per ton of wet olive oil residue,(ALPERUJO) with 70% humidity.

Environmental benefits:

- 4.000.000 TOE not imported;
- 8.000.000 metric tons of CO2 not emitted to the atmosphere;

- €70 Millions in savings from our emission rights.

Due to the more efficient process, savings in water are achieved as well as waste stream.

### *3.3.2. uP_running project: The potential of using biomass from Agrarian Pruning and Plantation Removal (APPR) for bioenergy production*

Ms Adeline Rezeau Deputy Project Coordinator, CIRCE Foundation (Research Centre for Energy Resources and Consumption)

Based on the existing data, there is a huge potential of agro-residues, since more than 121 Mt of agro-residues (dry matter) are generated annually in Europe (mainly straw, but also stalks, litter and prunings).

Having also in mind the focus on waste and residues valorisation under EU legislation, being successful in agro-residues utilization could result in:

- Diversifying the activity of the primary sector;
- Creating value in rural areas;
- Contributing to European strategies for climate change, rural development and the bioeconomy.

Cooperation between primary production (farmers' association `or cooperatives) and biomass experts is key to establish an integrated value chain and transfer the knowledge to the primary producers.

However, there are many barriers to overcome. They are mainly related to the general sceptical perception about this type of biomass today by market actors and stakeholders along the value chain. Primary producers generally regard pruning as a waste, not a resource, while final consumers believe APPR wood is a low quality fuel with unguaranteed sourcing.

The dispersion of the biomass and the low economic value of pruning are other technical barriers to be overcome in establishing of efficient value chains.

Last but not least, the lack of market driven and energy policy incentives are considered as also impeding the use of this type of biomass.

<u>Main advantages of using APPR biomass (being woody biomass by its characteristics):</u>

- Energy content similar to forestry wood (dry basis);
- Produced during agronomic operations;
- Capacity to be utilized locally in rural areas;
- No effect on forestry ecosystems.

Some downsides to be tackled in the setup of the value chains:

- Territorial dispersion;
- Low productivity (1-10 t/ha);
- Not exactly chipped but rather shredded;
- Residue in hands of multiple owners;
- Significant impact of collection and harvesting practices on the APPR biomass quality;
- The dialogue among all the actors of the value chain is crucial.

Nevertheless, there are currently more than 20 existing bigger value chains in Europe identified by uP_running and EuroPruning projects (see the Observatory of the project).. In addition, there are many others of smaller size existing but not documented.

Based on these exiting value chains, 3 main business cases can be singled out related to a small, medium and big scale use of the APPR biomass.

1. Small scale self-consumption in agro-industries and farms (< 500 t/y)
    - Majority of the cases detected;
    - Direct shift from fossil to a renewable and local fuel;
    - High payback period for new equipment. Aggregation/Collaboration between primary producers is needed.

2. Medium scale consumption at local facilities (500-2,000 t/y):
    - Examples: initiatives promoted by local authorities;
    - Prerequisites: involvement of local actors & local acceptance;
    - Primary producers: receive no compensation for APPR (€/t);
    - The incentive for primary producers to join is avoiding disposal costs.

3. Large scale Energy use in CHP or power plants (> 2,000 t/y)
    - Exclusively APPR or as part of the fuel mix;
    - Large plants interested in diversifying biomass suppliers;
    - Complex logistics, with a high amount of actors interacting;
    - Restrained by the level of the feed-in tariff.

Farmers and cooperatives always act as producers in the value chains, but they also can be suppliers, logistic managers and consumers.

Key factors to consider in establishing APPR value chains

- Knowledge transfer to support entrepreneurs decision-making in implementing new value chains;
- Public support and raising awareness;
- Support cooperation models as the only way to establish an efficient and integrated value chain with a fair distribution of benefits (tangibles and intangibles) and positive impact on the environment and climate change;
- Wood from APPR is a relevant renewable energy source, but still not used or largely under-used;
- Setting up APPR value chains requires significant efforts and a change in agronomic practices;
- Many different models exist and depend on local conditions and peculiarities;
- APPR biomass can be cost competitive and adaptable to energy plants or appliances after simple technical adjustments;
- Economic margins are tight and intangible benefits may play a crucial role;
- Interesting synergies can be found with municipal waste managers (e.g. provision of machinery);
- It is fundamental to transfer knowledge and build new capacities for consultants.

Main benefits of valorising APPR biomass:

Economic

- Save time and money for primary producers in pruning residues management;
- Additional and diversified income stream for partners processing and collecting the biomass;
- Savings as a result of lower energy costs.

Environmental

- Avoid risks of fires and diseases;
- Avoid pollution due to open-field burning of prunings.

*The accumulated knowledge of the project is spread through series of courses as well as through the website of the project: http://www.up-running.eu/*

### 3.3.3. *Use of marginal lands for growing industrial crops: turning a burden into an opportunity*

Ms. Efthymia Alexopoulou, Centre for renewable energy sources (CRES), Project Coordinator MAGIC and PANACEA projects.

Industrial crops diversify the income of farmers and the supply of raw material, while supporting the deployment of the BE by generating additional biomass for industrial use (bioenergy, biomaterials, and fine or bulk bio chemicals).

Growing industrial crops on marginal lands (1.350.000 ha marginal surface covers around 28% of total agricultural area of the EU-28 in Europe) can create value avoiding the dilemma of food vs. fuel use of the biomass.

Therefore, the MAGIC project aims to promote the sustainable cultivation of industrial crops on marginal lands. MAGIC is working on marginal lands facing natural constraints according to JRC report, which categorizes the marginal lands on criteria based on climate (low and high temperatures, dryness, wet soils, etc.), soil (unfavorable soil texture, rooting depth, etc.) and terrain (slope).

Specific objectives:

- To develop an up-to-date database (MAGIC-CROPS) of existing resource-efficient industrial crops, which will provide information on their agronomic characteristics, input requirements, yield performance and qualitative traits for innovative bio-based applications;
- To identify, though a multi-actor approach inclusive of stakeholders, the most promising industrial crops suitable for production on European land facing natural constraints;
- To map, characterize and analyse projections of current and future marginal land in Europe facing natural constraints and provide a spatially explicit classification that will serve as a basis for developing sustainable best-practice options for industrial crops in Europe;
- To create new breeding tools and strategies towards better varieties of the selected industrial crops that will be resource-efficient and can be profitably cultivated on marginal land in Europe;
- To identify and improve appropriate agronomic practices with limited input-requirements for the selected resource-efficient industrial crops;
- To develop suitable harvesting strategies and logistics for the selected industrial crops on marginal land so that the performance of the whole biomass supply-chain is optimized;
- To maximize the impact of MAGIC through the provision of objective information regarding all important sustainability aspects (covering environment, society and economy) of the value chains using scientific, transparent and reproducible methodologies;
- To analyse success stories of the selected industrial crops in European regions addressing technical, environmental, economic and social issues and to produce

policy recommendations and best-practice guidelines in order to promote the appropriate sourcing of renewable materials from marginal land at local/regional level;

- To develop, test and disseminate a Decision Support System (DSS) with the active involvement of farmers and other end users (industry & policy makers);
- To disseminate the project results, the database, the maps and the DSS tool to increase farmers' awareness and establish strong links with EIP AGRI.

A user-friendly decision support system (MAGIC-DSS) will be developed to address the information needs of the MAGIC major stakeholders (farmers, industry) but also other interest groups (e.g. consumers, environmentalists).

The MAGIC-DSS will be tested, through a multi-actor approach involving partners, farmers' organisations and relevant interest groups, in a total number of nine national interactive workshops.

### *3.3.4. "Miscanthus: a smart solution to fight erosion and to promote renewable energy production": cooperation project with the municipality of Gembloux*

Mr. Lucas Gossiaux, Valbiom.

ValBiom is a NETWORK of more than 150 members in the Walloon region (primary production, Universities and Research centres, Public administration, Companies Industries Federations, Policy makers).

It stimulates and facilitates the realization of sustainable initiatives integrating the production of biomass and its transformation into energy and materials, in the Walloon Region.

The project demonstrates the anti-erosive properties of dedicated perennial energy crops (e.g. miscanthus) together with their potential to generate additional as biomass to be used for bioenergy production.

The project has been implemented through cooperation between the **City of Gembloux** (organisation of information sessions and provision of subsidies for plantation of *Miscanthus* hedges at "hot spots"), **CIPF** agricultural technical centre (organizes plantations and delivers advice on *Miscanthus* cultivation), **ValBiom** (delivers global information to farmers and identifies a local final user of the biomass for energy production), and **farmers** (commitment to grow miscanthus). The biomass is used for heating of a residence for disabled people.

<u>Key parameters of the project</u>
Investment of the City of Gembloux: 20 000 €; the City estimates 3 € earned in cleaning for 1 € invested in plantation.

Public residence
Fuel bills reduced **by 10 000 € to 15 000 € per year**
**150 tons** of Miscanthus avoiding a **60 000 litter fuel** consumption
**→ 184 tons of $CO_2$ per year avoided**

Farmers
**6 hectares:** 3 hectares already planted and 3 hectares in 2019
**± 1350 €/ha** of gross margin per hectare and per year

1 hectare de miscanthus = 6000 à 8000 litres of mazout

Main advantages of using miscanthus:

- Perennial crop (> 20 years);
- Annual harvest from 2nd or 3rd year;
- Conventional machinery used;
- No fertilization required;
- No herbicides (except year 1 and 2);
- « Zero phyto » technical route exists
- Crop residues form an anti-erosive mulch, therefore no need for maintenance;
- Protects water resources;
- Improve soil carbon content;
- Adapted to CAP requirements: can be planted in ecological focus areas.
- Good calorific value;
- Other value chains: Horticultural mulching; Animal litter; (Biomaterial).

Some downsides to be taken into consideration:
- Low density (130 kg/m3);
- Must be used locally (€);
- Expensive plantation-3000 – 4000 €/ha for 20 years.

Extension of the project
Based on the positive experience of this project, another similar project has been developed and is looking for financing. The scope of the project is to implement an ecological network of 350 ha of *Miscanthus, g*rown in hedges.

This way the project will provide environmental services (water and soil protection). The project is planned to be implemented in an area of maximum 30 km from Wanze (final user of the biomass). BioWanze industry is committed to contract harvests for 15 years.

### *3.3.5. Biogasdoneright: Innovative, sustainable and scalable bio-methane production*

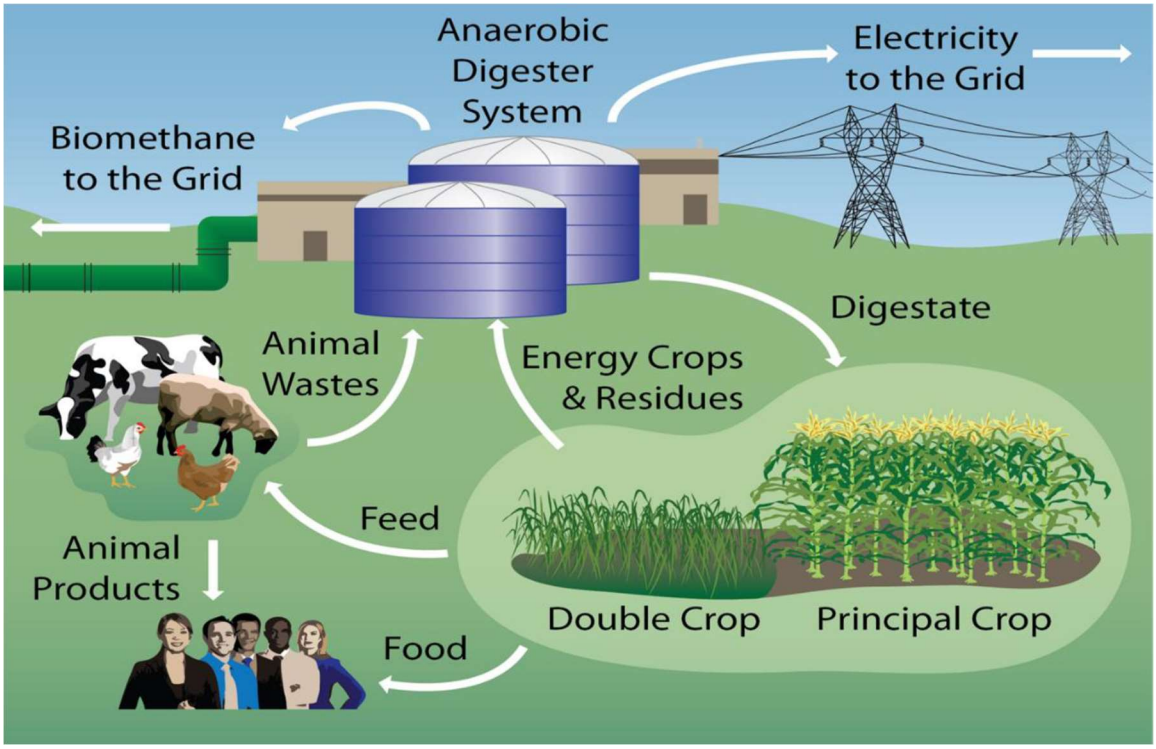
Mr. Piero Gattoni, President Consorzio Italiano Biogas (CIB).

This is a circular business model, where the biogas production (bio digester) is put not at the end but in the centre of the production structure: a biogas plant, when connected with both gas and electricity grids, becomes a small biogas refinery, flexible and decentralized, that produces biomethane, electricity, heat, organic fertilizer.

The biogas production valorises the waste and residue streams of the main agricultural production (animal wastes, energy crops grown as intermediate crops and agricultural residues) as well as supplying back the organic fertilisers, produced out of the by-product of the biogas production (the digestate).

The application of this integrated model of production also implies adaptation of some of the agricultural practices (management practices, introduction of winter cropping, and no tillage/strip tillage) as well as the use of light agricultural equipment to avoid soil compaction.

Biogasdoneright: circular model and rural synergies




As a result, farmers produce around 60% more crops per year on existing cropland by introducing sequential cropping (2 harvests/year), which allows farmers to produce biomass for biogas without compromising existing production of food and animal feed. This way, the "Biogasdoneright" business model circumvents the ‘food versus fuel dilemma’.

As a positive side effect, the Biogasdoneright model also lowers the need for emission-intense chemical fertilisers and increases soil organic carbon, which can result in negative greenhouse gas emissions.

The model also implies several positive environmental impacts as reduced soil erosion, nutrients leaching and improved on-farm biodiversity by keeping agricultural land covered all year round.

This integrated way of production achieves an increased farm turnover as a result of the reduced bio methane production costs by 25% compared to monocrop biogas, mainly due to savings in chemical fertilizers use, fuels savings, better land and fixed cost use.

The successful implementation of this circular business model implies as well creating opportunities for further innovative ways of using the by-products from the biogas production, namely the heat and $CO_2$ (by-product form the biogas purification into bio methane).

This may allow farmers either to integrate other agricultural productions such as greenhouses vegetables (with cogeneration heat recovery) or to achieve further diversification of their business activities by integrating other production lines like algae for food use, medicinal plants, or commercial fertilizers based on the digestate.

Important pre-conditions for the success of the model are the establishment of an effective network of biogas producing farmers to exchange know-how and to share information, effectively integrating a research & innovation lab as well as a good cooperation between the gas grid and the gas operator. The setting up of a monitoring system of the carbon stock of the land is also a good practice as a way to provide technical feedback to the farmers about the status of their land.

### 3.4. Successful business models of large-scale production in the Bioeconomy, integrating primary production: the case of big bio-refineries.

#### *3.4.1. Successful business model in the BE, integrating primary production, the example of FIRST2RUN Project*

Ms. Sara Guerrini, Senior Expert, NOVAMONT.

Key parameters of the FIRST2RUN project:

- Demonstration of technical, economic, environmental sustainability of a high innovative integrated flagship biorefinery in Sardinia, Italy;
- Biomass: oil crops (cardoon); farming on arid and marginal land/ large scale cultivation;
- Processing of cardoon into bio-monomers & esters towards bio-based products, such as biolubricants, cosmetics & bioplastics → Demonstration of the technological, economic and environmental sustainability at an industrial scale;
- Valorization of by-and co-products for feed products, added value chemicals, and energy;
- Valorization of currently unexploited marginal land: (3500 ha) for production of vegetable oil (at least 0.375 ton/ha) to be processed to bio-based products (cascading approach);
- Standardization, certification and dissemination activities and study of social impact of products from renewable resources.

Key features of the business model applied/organisation of the value chain

NOVAMONT is the international leader in the bioplastics sector and in the development of biochemicals and bioproducts obtained from the integration of chemistry, agriculture and the environment.

It promotes a model of the bioeconomy as a factor of territorial regeneration, based on three pillars:

1. Regeneration of De-industrialised Sites

Reindustrialisation of no longer competitive sites thanks to proprietary technologies first in the world in order to create "bioeconomy infrastructure", integrated with the territory and interconnected.

2. Integrated Agricultural Value Chain

Development of low impact value chains through the valorisation of marginal land not in competition with food production, integrated in local areas and connected with the bioeconomy infrastructure.

3. Products Conceived as Solutions

Products and value chains are conceived and designed to provide unique and sustainable solutions for specific environmental and social problems. Elements of a system with broader impacts of the single product.

The process of creation of the value chain

Between 1971 and 2010, the used agricultural land in Italy shrank by 5 million hectares, from almost 18 million hectares to just below 13. In the last 30 years 3 million hectares of cultivated land have been abandoned.

Taking this into account, the establishment of the value chain has been focused on:

- Promotion of oilseed crops with low input requirements and implement their use through information and training courses;
- Developing agronomical sustainable agricultural practices with the aim to restore the soil organic matter;
- Innovative on-the-ground approaches (e.g. trinaseed cardum, agricultural machinery, support and agronomic protocols);
- Contracts with growers and agriculture union (Coldiretti) to support the cultivation of oilseed crops for the biorefinery;
- Contract with growers for the cultivation of oilseed crops for a local innovative value chain: from 2015 agreement among Novamont – Coldiretti – growers and main agriculture stakeholders to implement the cultivation of oilseed crops for bioproducts;
- Support from the industrial partner to the growers in the cultivation of oilseed crops anticipating the cultural costs for the first two years and guarantee an established price for the production (seeds).

Main benefits for the whole system, including primary producers and rural areas

The integrated agricultural value chain interconnected with the bioeconomy infrastructures provides several clear benefits:

- Increase soil fertility

Restoration of organic matter of soils through the identification of dry farming in marginal and abandoned land.

- Added value for the supply chain actors
  - Thanks to the cardoon value chain, marginal rural areas are valorised (oilseed crops which grow on arid land which is unsuitable for traditional crops);
  - New income opportunities are created for farmers working on abandoned or uncultivated land, with negative economic margins and through the stipulation of supply chain contracts for the exploitation of crops;
  - Availability of local production of proteins for animal feed: the oil cake obtained from the extraction is very high in protein and can be used as animal feed.

- Cascading use of resources and development of new innovative products

Use of all crop components to produce a range of products and co-products ranging from biochemicals to animal feed, including energy recovery to fuel the energy requirement of the industrial process.

Numerous chemical intermediates and bioproducts can be obtained from oil seeds of oilseed farming, and are applied in many sectors: bioplastics, biolubricants, cosmetics, plasticizers, etc.

- Benefits for the rural areas
  - Revitalization of the local economy through: reindustrialisation (reconverting of a no longer competitive site) and creation of skilled jobs;
  - Integration with the community and the region: the presence of the biorefinery facilitates the development of entrepreneurial activities from the primary, to the secondary, up to the tertiary sector;
  - Collaboration with local society: signed protocol with municipalities to encourage an environmental awareness and a strong consciousness about the positive effects of the investments in bioeconomy for the territory.

Key lessons learnt:

- Importance of a strong relationship in the territory between innovative industrial models (biorefinery and cascading approach) and the growers and main agriculture stakeholders;
- Improve access to finance for such projects through appropriate mixture of grants and repayable funds;
- Provide ambitious financial instruments to foster new collaborations and value chains across industries and academia, in particular for integrated biorefineries which are capital intensive;
- Improve synergies among the different funding opportunities (FIs, ESIFs, and other EU Funds) for rural development projects;
- Create additional financing instruments such as loans, loan guarantees through EIB.

### *3.4.2. Establishing value chains for agricultural residues: advanced biofuels as novel business opportunities to farmers - The LIGNOFLAG Project*

Dr. Markus Rarbach, Head of Business Line Biofuels & Derivatives, Clariant

Key parameters of the project

- Total investment by Clariant in its first sunliquid plant: 100 million EUR;
- The new facility will be operational in 2020 with an annual production capacity of 50,000 tons of cellulosic bio-ethanol;
- At full capacity, the new plant will process around 250,000 tons of wheat and other cereal straw annually.

Key features of the business model applied/ organisation of the value chain

- Sunliquid® technology platform providing access to 2nd generation sugars and biofuels made from agricultural residues, which could be further transformed into bio-based chemicals;
- Strategic site location in Romania / Dolj County / Craiova / Podari due to several reasons: Strong agricultural region with existing logistic and industrial infrastructure; Gross straw production in direct access of the plant (approx. 1 million tons/ year); little dairy industry/ negligible straw use, Current practice of burning of straw in the field;
- Logistic organisation and structuring of the biomass supply chain since one-stop-shop service provider does not exist in the region. This implies coordination and network of contracts with the participating (approx.) 100 farmers, providing adequate harvesting equipment, as well as straw transport and getting additional partners involved for equipment and logistics.

Main benefits/ incentives for primary producers and rural areas

- Construction of the plant will provide a whole range of benefits for the surrounding region of Craiova, allowing farmers to industrially market their straw for the first time. This will create additional value streams and create jobs during and after the construction phase of the plant.

- Biomass collection and storage are non-existent mainly due to a lack of experience in the region, but farmers are willing to sell the straw biomass. Therefore, by organising the collection of the residues, the project transforms the burden for a farmer that was previously mostly burnt in the field into a value stream.

- If residues in Europe were utilized to its full technical potential, up to €15 billion of additional revenues would flow into the rural economy annually and up to 300,000 additional jobs would be created by 2030.

Key lessons learnt

Enabling farmers to become a one-stop-shop for biomass creates mutual benefits and policy has an important role to play:

- Incentivise to mobilize straw;
- Straw collection as such may not be an attractive business in some regions (cost-benefit);
- Create a level playing field (e.g. use in electricity production or biogas is directly incentivised);
- Consider use of abandoned areas for feedstock production bringing this land back into use;
- Enable farmers to harvest and supply straw directly to the biorefinery;
- De-risk investments into equipment for the farmers (break the vicious circle);
- Generate confidence in this new business sector;
- Develop and educate know-how;
- Disseminate best practices (technology, farm logistics, sustainability);
- Foster self-organization on farm level (cooperatives, associations, shared equipment use etc.;
- Support feedstock mobilization regardless of the end use through the CAP in combination with dedicated public funding programmes could address these challenges.

The project receives funding from the European Union's Seventh Framework Program for research, technological development and demonstration under Grant Agreement no. 322386 (SUNLIQUID) and from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation program.

### *3.4.3. Integrating primary producers. The case of AGRANA biorefinery project*

Mr. Johann Marihart, AGRANA group

Key parameters of the project:

- Greenfield project operating since 2008;
- A bioethanol refinery/wheat starch plant combination using a total biomass of 1,2 million tons of cereals per year, shared 50/50 between bio-ethanol and starch;
- Total investment 300 million Euros;

- Total output: 250.000 m3 bioethanol, 250.000 t of A-wheat starch, 50.000 t of vital wheat gluten, 100.000 t of liquid CO2, 100.000 t of wheat bran and 250.000 t of protein feed.

Key features of the business model applied/organisation of the value chain:

- Circular business model between 2 plants (starch and bioethanol factories), making use of 100 % of the raw material by also recovering the CO2 from fermentation (liquefied and substitutes fossil sources);
- Best possible valorisation of the components of the raw materials though two interlinked cascading production lines (carbohydrate and protein cascades);
- Energy provided via a steam pipeline from a municipal waste burning plant in the neighbourhood;
- GMO–free raw material organized by contracts with individual farmers enabling them to plan acreages, seeds and commercial conditions in advance;
- Cereal-wise flexible ethanol part: wheat, corn, barley and triticale are possible;
- The two plants linked by the B- and C-wheat starch stream (by-product of the A-starch production), which is fermented in the bioethanol production. This concept reduced the capex for the wheat starch refining and improved starch quality making it competitive with corn starch used in paper industry;
- Very important “by product” protein cascade: vital wheat gluten (80 % protein), distiller’s grain soluble (35 % protein) and wheat gluten feed (20 % protein) recovered separately for food and animal feed (aqua feed, pet food and cattle feed).

Main benefits/incentives for primary producers and rural areas:

- Each season more than 110.000 ha of cereals are dedicated to the biorefinery. The lower quality wheat (impact of unfavourable climatic conditions) is also taken over and processed. This stabilises the local market and saves the income of affected farmers;
- Multi–contracts offered to primary producers for several types of products combined with sugar beets, starch potatoes, cereals for ethanol and wheat starch. This should support their crop rotation and sustainable soil management;
- During the harvesting period the use of wet corn is maximized to avoid corn drying and thus saving energy;
- GMO-free co-products like high protein animal feed or organic fertilizers are offered to the farmers from the plant at preferential prices. A net positive income effect for farmers from valorising locally their total biomass at good prices (no exports of cereals needed any more) as well as from receiving concentrated protein back to the farm (no or less exports of protein feed needed);
- Regional added value - additional income streams for primary producers created but mainly additional employment since one job in the company creates five jobs outside in the supply chain.

Key lessons learnt

Public support for such projects is positive but it is not the main factor to mitigate the business risks, taking into account the large overall investment needed.

However, the *political stability/certainty* for longer periods than now (at least to match the 20 years payback period of such investments) is a crucial pre-condition to succeed. The experience so far is that regulatory framework changes every 5 years, which has negative impact on the business environment.

## 3.5. Integrating primary producers into the BE value chain and achieving sustainable and circular business models in the forestry sector.

### *3.5.1. Integrating primary producers into the Bioeconomy value chain: The Sodra case*

Mr. Gustav Tibblin, Senior Vice President of Södra.

Key parameters of the production

- Cooperative ownership structure (51 426 members - small forest owners, owning together a total of 2 560 000 hectares);
- Handling 15 million m3 wood annually;
- 3 500 employees;
- 2 billion € turnover;
- Producing pulp, sawn timber, bio energy, turpentine, and methanol production as a by-product of the pulp production.

Key features of the business model applied/organisation of the value chain

- Strong BIOECONOMY vision combining traditional structures with a focus on innovative ideas about uses of the components of the biomass and new end products like textiles, wooden panels, tall oil for biofuels/biodiesel;
- A large cooperative is a good option for business structure ensuring economies of scale in the production.

Main Products portfolio

Case engineered wood:

- Södra re-introduced multi-storey wooden houses in Sweden 18 years ago;
- Positive CO2-effect substituting steel and concrete;

- Light buildings – less foundation;
- Lean on materials – faster construction.

Case textile pulp:

- A ten year innovation history within Södra;
- Sustainable raw material, competing with polyester and cotton;
- Textile pulp is a special quality pulp;
- Strong growth in global demand;
- Södra's production equals to Sweden's need of textiles;
- Same business model as for paper pulps.

Case tall oil diesel:

- A ten year innovation history within Södra;
- 2 percent of the tree is tall oil;
- Tall oil can be refined into tall oil diesel;
- Södra is 25% part of the joint venture Sunpine;
- Sunpine produces 100 000 m3 diesel;
- Increased capacity on stream March 2020.

Main benefits for the whole system, including primary producers and rural areas

Due to the cooperative structure, the biomass supplied by each member of the cooperative (an average of 50 hectares of forest/200-250 m3 of average forest biomass per member supplied) is valorised at good price, while in addition the cooperative distributes a dividend to its members.

Key lessons learnt

- A successful bio economy strategy should be built on local strengths and conditions;
- Advantage should be taken of existing national forestry legislation and voluntary certification schemes;
- Scale and logistics are important element to be competitive on the market;
- Society infrastructure is vital - close work with the society on awareness, education, logistics, environment;
- A cooperative organisation has many advantages and ensures ownership control over the business.

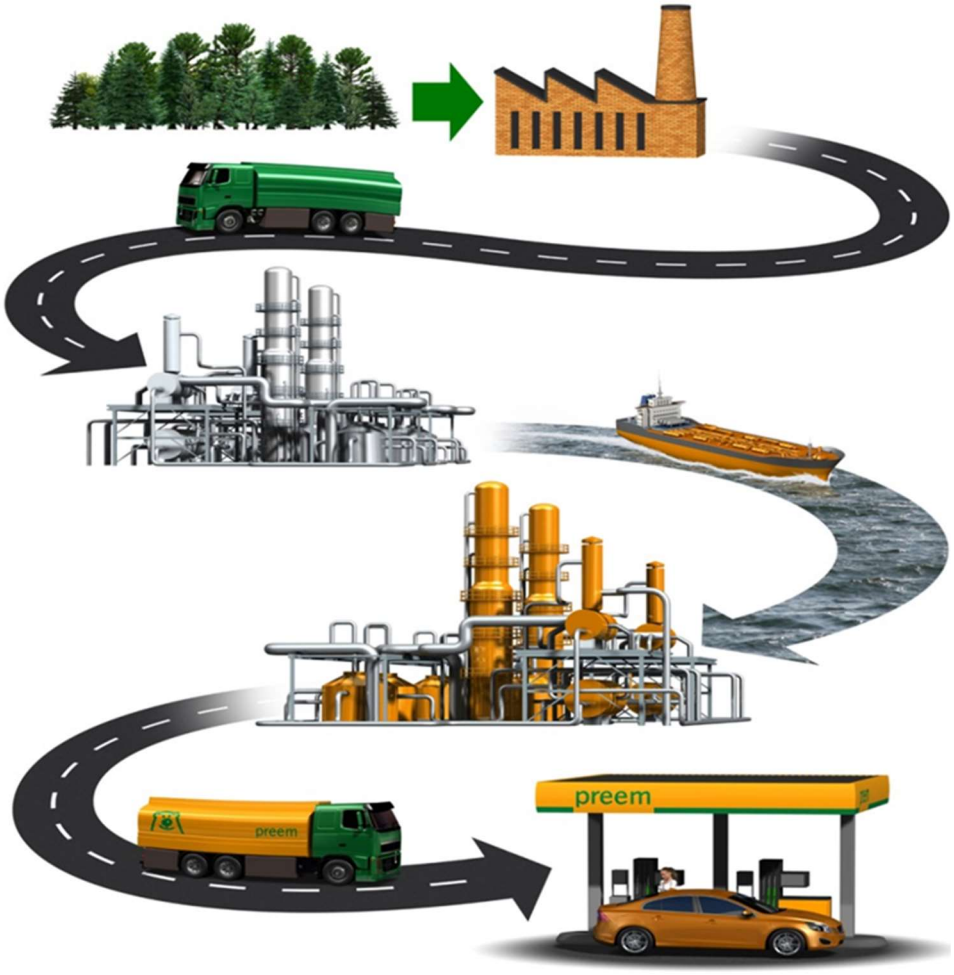
### *3.5.2. Making sustainable bio-fuels from forest biomass*

Mr Jan Wintzell, Director of Business Development, Sveaskog, Sweden.

<u>Key parameters of the production</u>

- Advanced biofuels production through a Joint Venture based on strong and competent owners from a complete and integrated value chain:
    - Sveaskog – Forest owner
    - Södra – Primary industry (cellulose pulp and tall oil as residue)
    - Kiram – Innovator & entrepreneur, having the competence to create the process to transform tall oil into biodiesel
    - Preem – Refinery industry.

- Total investment EUR 50 million;
- Sales > EUR 100 million/year;
- Created > 100 jobs, >50 at plant;
- Produce >1 million liters of crude tall oil diesel.



Key features of the business model applied/ organisation of the value chain

**SunPine Biorefinery – A residue, two raw materials and four products**

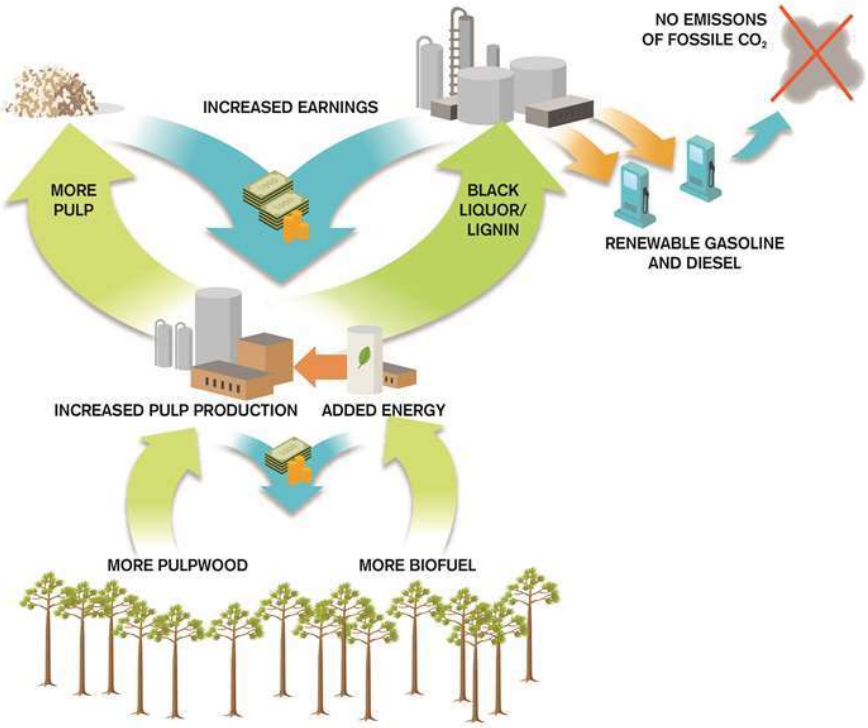

- Sustainable forest management by forest owners - a pre-condition for sustainable biomass mobilisation and a starting point in the creation of a dynamic circular business model, integrating new value chains in the traditional commodities production.

An evolving business model

- First step: Decision to build up a joint venture to produce biodiesel out of tall oil - a step forward in the valorisation of the different components/residues of the forest biomass;

- Second step: On the basis of the experience from biodiesel production and as of result of R&I activities many new value streams are created using the tall oil as raw material, resulting in the production of rosin (in partnership with Lawfter company), crude sulphate turpentine (for perfumes industry), and bio-oil;

- Third step: A fully-fledged forest based Biorefinery! From bulk and commodities to high value specialities - further valorisation of components of the biomass by isolating the lignin stream from the pulp production and turning it into another biofuel. As a result, more cellulose could also be produced and more value created.




Main benefits for the whole system, including primary producers and rural areas

- Sustainable value creation for all partners in the value chain, including forest owners;
- Better use/valorisation of all components of the forest biomass (including residues) by creating new innovative uses/end products of the existing volume of the biomass;
- Positive impact on GHG emissions due to keeping the carbon sink function of the forest, combined with no GHG emissions from existing productions;
- Clear contribution to decarbonisation by replacement of fossil based fuels with biofuels.

Key lessons learnt

- Taking a good idea to great innovation and successful business
- Clear and stable rules and regulations is key - National and EU (e.g. RED II, Annex IX);
- Triple Helix – From R&D to innovation;
- Strong, committed and competent owners;
- Financing & speedy processes;
- Commercial approach from start – Business;
- Patience;
- Evolutionary business model - starting with bulk products and scale, and then evolving to higher value products.

On the right track:

- Get the basic right;
- Managed forests and wood products mitigates climate change – Captures CO2;
- Limit restrictions to market forces – e.g. Detrimental Cascading principles.

Challenges:

- Complexity and time restricts applications for EU funding
- Availability of risk capital and funding – from R&D to commercialisation
- Permits and licencing processes – time consuming and uncertain

Therefore, the big challenge is to build up the integrated value chain to make possible the quick commercialisation of research.

### *3.5.3. Polish Wooden Houses: living in harmony with nature*

Mr. Andrzej Schleser, Senior Expert, Directorate General of the State Forests.

Key identified challenges/ needs in order to successfully promote wooden constructions and organise an integrated value chain

Investors and clients alike do not consider wooden construction as a viable housing alternative in Poland. Therefore, State forests decided to implement this project to stimulate the development of energy-saving wooden constructions in Poland.

The pilot construction of wooden buildings through the project in rural areas raised awareness about the potential and attracted the interest of investors and construction companies to cooperate in building of this value chain.

An assessment of all barriers for building up the value chain has been carried out:

- Lack of know-how and standards

Know-how for building modern wooden houses has been either lost or non-existent in the whole value chain (including building companies, architects, designers, supervision and other standards). The traditions in wood construction have been lost.

- Economic vs Ecological aspect of the production:

The price is the main driver on the market; ecological aspects are not promoted or integrated in the composition of the price.

- Availability of good quality structural wood:

Quality of wood vs price is another issue, since no market for quality wood adapted to the needs for a good wooden construction.

- State support
  - Support deployment of know-how and technology in building wooden houses;
  - Improve access to finance, including credit line for energy efficiency housing;
  - Purchasing systems to include;
  - Programmes dedicated to provide more social type housing;
  - Guidance for wooden buildings;
  - Cooperation with stakeholders in the value chain;

Main benefits for the whole system, including primary producers and rural areas
The construction of wooden houses is an environmentally and climate change friendly way to reply to the housing needs in Poland.

Key lessons learnt/ barriers for developing

Changing technology in such a large organization as the State Forests involves the launching of a series of processes requiring time and effort. The first experiences show that it is necessary to launch a coherent training system for all entities involved in the project - SF employees, contractors, architects and designers, etc. and develop standards for projects, quality monitoring procedures, etc. These experiences can and should be used by other entities, especially from the public sector.

The potential of the Polish wooden construction sector is still underestimated in Poland, and already today it has enormous possibilities, especially in the field of prefabrication of buildings in the wooden frame technology.

The wooden construction sector needs integration of activities for the development of the whole industry by the state, science and other entities related to construction.

The State Forests through their investments and promotional activities can, with their potential, support and develop efforts to develop modern, energy-saving wooden construction in Poland.

The most difficult barrier to overcome is the mental barrier and habits resulting from the application of fixed, traditional solutions in construction, which is why it is extremely important to create conditions for the development of the industry that will ensure consistent and stable development. One of the key tools for achieving success will be the creation of a financing program for energy-efficient wooden buildings.

Need to develop standards for project quality monitoring as well as training programmes for builders and architects.

## 4. KEY MESSAGES AND MAIN CONCLUSIONS FROM THE WORKSHOP

On the basis of all presentations and interventions by participants, this section draws the main conclusions and tries to identify paths for further reflection on the most relevant topics related to the integration of primary producers and the deployment of the BE in rural areas.

- The role of BE infrastructure and governance models to support the deployment of the BE in rural areas, effectively integrating primary producers

All presentations have clearly shown that whatever the chosen business models is, a successful deployment of the BE could only be done by achieving fully integrated BE value chains with fair distribution of benefits among the partners engaged.

In this process the physical, institutional and organisational infrastructure is vital to support all stakeholders, including primary producers in building up an integrated value chain.

The examples of BE clusters at national and regional level have shown with no doubt that setting up adequate national and regional structures to support a coherent systemic approach, achieving synergies among the different stakeholders, is vital step in successfully deploying the BE.

Taking also into account that the BE is a very dynamic concept, which evolves over time, having a BE forum at national and regional level strongly contributes in establishing a permanent dialogue among all stakeholders (including policy makers) on the strategic priorities of the development of the BE at national, regional and local levels.

Presentation from MSs representatives, industry and primary production alike have stressed as well the importance of an integrated institutional approach in designing, implementing and monitoring the NBESs. In this sense, setting up of dynamic BE structures to support the exchange of information (e.g. BE clusters or other forms of organisation bound by a BE Manifesto) can provide a valuable feedback for policy makers in the design of the NBESs.

Underlining the key role of local stakeholders in this process was another important message as a pre-condition to develop locally rooted successful BE value chains. Therefore, the role of policy makers at regional, local, as well as of farmers' cooperatives (or other forms of associations) is crucial.

The project examples have clearly evidenced the important role cooperation models of primary producers can play in all aspects of the deployment of the BE, namely:

- Raising awareness about the opportunities of the BE for primary producers and rural areas;

- Developing BE strategies at the level of the cooperation structure and implementing them through concrete projects (including engaging into joint ventures with other players like Bio-based industry);

- Ensuring economies of scale and developing necessary BE physical and non-material infrastructure for integrating into the BE value chains. This may comprise, for example, the setting up of R&I labs owned by the cooperatives as well as any training or advisory activities to facilitate the transfer of BE knowledge to individual farmers.

- Types of existing business models and their specific way of integrating primary producers

Large scale value chains of BE production

Under this business model, there have been broadly two business cases presented, namely:

- a large scale BE value chain encompassing a production unit/site with a majority ownership by the primary producers through a cooperation structure (cooperatives or other types of cooperation/ association models);

- a large scale value chain with production unit/site owned by the bio-based industries (the integration of the value chain being ensured normally though long-term cooperation contractual relationship with cooperatives of primary producers).

Under the first business model of vertical integration, cooperatives or associations of primary producers are the owners of the R&I labs as well as the production facilities (e.g. a biorefinery). This way, they have full control over the supply chain and fully participate in the re-distribution of benefits as well as in the setting up of strategic goals related to the BE. In this case, the benefits for individual primary producers are normally linked with a better and stable price for their biomass, as well as with redistribution of dividends.

In the second case, the value chain is fully organised and structured by the representative of the bio-based industries, having full control over the supply chain of the biomass and the production cycle. The positive side effect of such a model is the good organisation over the whole value chain in terms of logistics, spreading know-how at each stage, including at the level of primary production.

For primary producers this normally encompasses adapted agricultural practices, harvesting and storage techniques in order to maximise the volume and value of the biomass production. For the individual primary producer there are several benefits and additional value/income stream because of more stable and better price for the available biomass (including through valorising residues) as well as better prices for biological fertilisers.

- Small/ Medium scale solutions for integrating BE types of production into the core business models of primary producers

This business approach normally integrates into the production portfolio of primary producers, BE products as well. Production of bioenergy at small or medium scale is an example of such production streams.

As evidenced by the presented project cases, small-scale production can have many benefits for the primary production and in some cases be a better solution for transforming the biomass with positive side effects for the environment and the climate, namely:

- More efficient production since done in a de-centralised way close to the biomass location (e.g. no losses of biomass), while allowing the produced by-products to be further transformed into end products in small- or big-scale bio refineries;
- Production of valuable protein feed as a by-product and efficient transformation allowing extraction of the different valuable components on site (e.g. different types of protein);
- Fewer costs due to the use of the biological fertilisers directly back to the land (instead of creating supply chains from a centralised production back to the farmers);
- No GHG emissions due to the decentralised and local first transformation of the biomass, implying little or no transportation of the biomass.

- Supporting circular and sustainable business models

Very interesting ideas on how to sustainably and efficiently mobilise the biomass were presented when preserving biodiversity in our ecosystems and having a positive impact on climate change.

Good practices from the project examples evidenced how a burden can be transformed into a business opportunity, for example, by using marginal lands for growing industrial crops or achieving circular BE value chains using waste/residue streams to create valuable bio-based products.

The workshop has evidenced that encouraging the valorisation of marginal/non-productive land for such purposes can bring both economic and environmental benefits for rural areas and primary production alike.

- Ideas for further reflection by policy makers in the context of designing BE types of interventions in future CAP Strategic plans.

Based on the types of issues identified and discussed during the workshop, some conclusions can be also drawn in the context of a future reflection, regarding the potential for focusing of EU financial support under CAP post-2020 for BE types of interventions as part of CAP Strategic Plans.

The project examples have shown that although investment support is important for all types of BE production models, it is of less importance for big scale bio refineries since it is a small portion of the total investment cost. Regulatory and policy stability is a more important pre-condition quoted by project representatives.

However, access to finance remains a horizontal issue important for all types of investments. Therefore, setting up of Financial Instruments (FIs) adapted to the size of the investments (e.g. credit lines/guarantees for small scale investments) remains crucial for streamlining such BE investments.

At the same time, investment grants to finance partially small scale investments (including start-ups in rural areas) could still be an option to incentivise primary producers to integrate BE-types of operations into their main business model of production. The potential focus could be on circular small scale production models.

The good practices presented have also shown the importance of enhancing support to all types of cooperation models for primary producers. Taking into account the importance of increasing the awareness and mobilising the local stakeholders, supporting the deployment of the BE in rural areas through community-led local development types of cooperation models can be very beneficial.

Promoting all types of transfer of knowledge and advisory services on the BE to primary producers is also a key precondition to increase their capacity to develop BE operations.

Project examples have also shown the benefit of using the option on providing voluntary coupled support for non-food crops as a way to increase the volume of biomass (as per article 30 in the Commission proposal on the future CAP Strategic plans[5]).

[5] COM(2018) 392 final, published 01/06/2018