

Report to the Lead Market Initiative Ad hoc Advisory group

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Project acronym: Star-COLIBRI

Project title:

Strategic Targets for 2020 – Collaboration Initiative on Biorefineries

Instrument: Specific Support Action

Thematic Priority: Coordination and support actions



#### **D4.2 – Report to the Lead Market Initiative Ad Hoc Advisory Group**

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<b>Dissemination level</b>		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

# 1. Who are we: what is the Star-COLIBRI project

The Star-COLIBRI project (Strategic Research Targets for 2020 – Collaboration Initiative on Biorefineries) is a Coordination and Support Action funded by the European Commission's 7th Framework Programme for 2 years starting on November 1st 2009. The project involves 5 European Technology Platforms and 5 major European Research organisations.

## **Background: opportunities and challenges around biorefinery research**

Around the globe, current economies are largely dependent on fossil fuels and particularly oil as it provides the basis of most of our energy and chemical feedstocks. However, crude oil reserves are finite and there is an ever-increasing recognition that CO<sub>2</sub> emissions are the principal cause of global warming. The threats that climate change and a limited oil supply represent to our own and future generations therefore require immediate action. At global level, the issue of climate change is primarily dealt through the UN Framework Convention on Climate Change; with the UNFCCC's Kyoto Protocol expiring in 2012. At the EU level the most important elements have been the adoption of the Climate and Energy Package by the European Council in April 2009, as well as the European Strategic Energy Technology Plan (SET Plan) for 2020.

Policy initiatives such as these unfailingly recognise that new generations of technologies have to be developed if we are to reduce the carbon footprint of our economies. The expectation is that advances in the field of biorefineries can be one part of the solution. European cooperation is needed to balance market demand and raw material supply, find new opportunities as well as create awareness for mutual interests. The use of key enabling technologies to maximise the use of European biomass should be encouraged so as to minimise imported biomass. One of the current challenges in Europe is that research in the biorefinery field is highly fragmented and duplication of efforts is rather common.

## **Main objectives**

As a response to these challenges around biorefinery research, Star-COLIBRI's main objectives are the following:

- **Overcome fragmentation and promoting cross-fertilization in the area of biorefineries research**
  - Provide a wiki-portal that facilitates information handling and to collect and exchange information between all relevant biorefinery stakeholders
  - Identify large and small high-impact R&D projects of actual relevance in the area of biorefineries
  - Identify gaps and overlaps in ongoing research efforts to make way for a better use of resources
- **Support innovations by speeding up and facilitating industrial exploitation of research results in the biorefinery field**

- Create critical mass and synergy by initiating and supporting transparent collaborations between on-going biorefinery R&D projects through so-called StarClusters
- Contribute to the development of European and national policy initiatives, including legislation, standardisation, labelling and certification
- Create awareness of new research results and technologies and thereby facilitate the exploitation by European industry
- **Promote coordination in the field of future R&D funding and facilitate the creation of Public-Private Partnerships**
  - Enable collaboration between established trans-national research programmes in the area of biorefineries
  - Produce a Vision 2030 Document and a Strategic Research Roadmap for Biorefineries 2020
  - To facilitate the creation of European Public-Private Partnerships as a form of intensified European cooperation

## 2. Objectives of the report

### 2.1. Star-COLIBRI project: initial objective of the report

*Source: Star-COLIBRI project Description of work*

#### **Task 4.2: Contribute to the development of EU and national policy making via the Lead Market Initiative Liaison Task Force**

The core of this task will be the management of the Lead Market Initiative Liaison Task Force. Star-COLIBRI will contribute to the Lead Market Initiative (mainly on Biobased Products) through the Lead Market Initiative Liaisons Task Force by providing concrete examples of the practical implications of legislation, standardisation, labelling and certification on large-, medium and small enterprises. Additional input will be provided by Task 2.1 from the research side. This information will contribute to better policy making.

The conclusions of this Liaisons Task Force will be summarised in D4.2 *Report to the Lead Market Initiative Ad hoc Advisory Group*.

### 2.2. Objective of the report: provide support and input to final meeting of the LMI Ad Hoc Advisory Group

At the time of writing, the Star-COLIBRI project aimed at contributing directly to the Lead Market Initiative at its beginning stages. Since the project started later than expected, the Lead Market Initiative was already at an advanced stage when the report was due, so the consortium agreed

to change the objective of the report to the Ad Hoc Advisory Group. The work was divided into two steps: providing direct contributions to the LMI Financing Paper and then providing support and examples for further implementation of the LMI towards the end of the initiative.

The Star-COLIBRI consortium and their stakeholders were able to provide direct contributions to the LMI Financing paper by providing input and practical examples to the report, through Dirk Carrez from Suschem ETP/ EuropaBio, who was an active member of the LMI Ad Hoc Advisory Group.

As far as the implementation of the LMI is concerned, this report aims at providing feedback on behalf of the Star-COLIBRI project to the last meeting of the Ad Hoc Advisory group taking place in November 2011, taking into account project results<sup>1</sup>, mainly the conclusions of the project's Joint European Vision on Biorefineries 2030 and the Joint European Strategic Research Roadmap 2020 on Biorefineries.<sup>2</sup>

## **3. Implementation of the Lead Market Initiative on Bio-based products**

### **3.1. Building further on the Lead Market Initiative Evaluation**

The bio-based products sector contributes to a number of societal challenges, and its innovative potential can be dramatically improved through the development of demand-side policies, which is why the sector was selected as a Lead Market. In particular, the development of standards would drive other related policy activities that would lead to the expansion of the market. However, the bio-based products sector has come across several hurdles. A number of key recommendations produced under the LMI are still to be implemented and without these being in place the sector's envisaged growth and innovative potential is questionable. The European Commission is currently preparing a number of important policies including the Bio-based Economy Communication and Action Plan that could provide the necessary breakthrough. Industry stakeholders are therefore eager for the European Commission to take up their recommendations and jointly to fulfil the ambitions of Europe 2020.

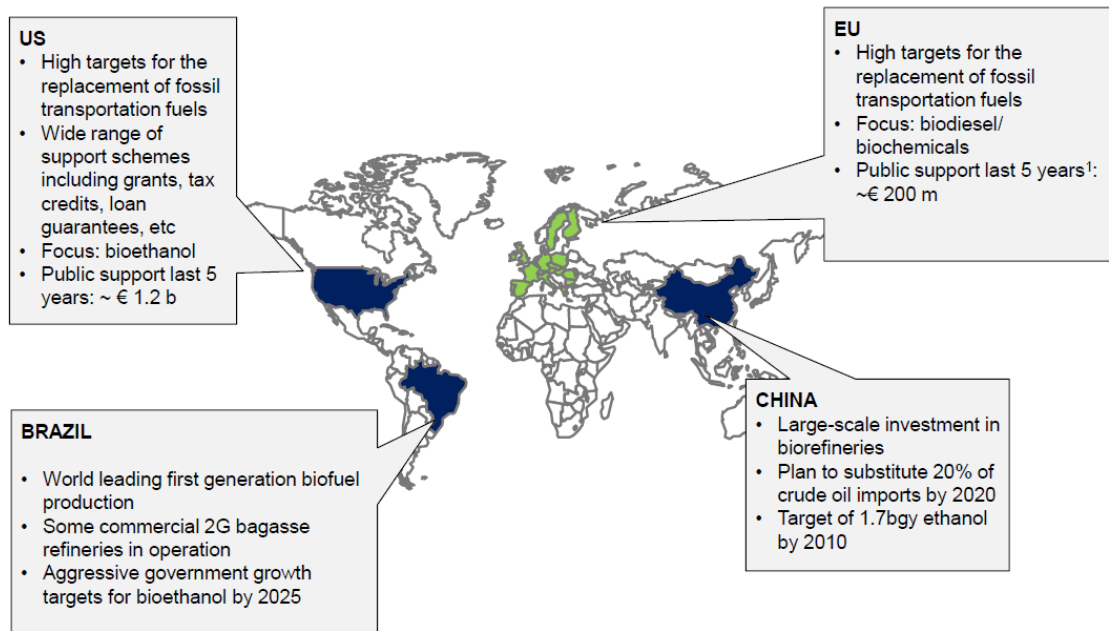
Europe appears to be facing serious competition from other countries in terms of taking the sector forward on the basis of certain key policy interventions. For example, the US is relatively advanced in promoting the uptake of biobased products on a broad scale through advanced procurement policies and public investments in bringing biorefineries to commercial scale.

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<sup>1</sup> All public deliverables of the project can be found at : <http://www.star-colibri.eu/publications/projectresults/>

<sup>2</sup> Both documents can be found at: <http://www.star-colibri.eu/publications/star-colibri-publications/>

## Brazil, China and the US are making significant public investments in bringing biorefineries to commercial scale



Dalberg <sup>1</sup>. Estimated funds provided by FP6 and FP7 to biorefinery-related projects, Source: US Department of Energy, EU, World Economic Forum, Bio-economy.net

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Source: Dalberg feasibility study on European biorefinery

Meanwhile, appropriate policies for ensuring industry access to biomass raw materials appear to be relatively developed or favourable in key competing countries. In contrast, as stated by biobased product stakeholders, access to biomass in Europe is in a less favourable position given that the current overarching policy framework supports the use of biomass for the bioenergy sector. It has been noted by stakeholders that there isn't a level playing field for accessing biomass between the bioenergy and bio based product sectors which subsequently hinders the potential growth of bio based products.

Bio-based sector stakeholders have asserted that the entire set of recommendations developed under the LMI have to be swiftly implemented through concrete policy and legislative initiatives, if the full potential of the sector is to be realised.

### Action Plan

The Action Plan for bio-based products is composed of 12 individual actions that make use of the four LMI demand side instruments, namely regulation, public procurement, standardisation and complementary measures. Overall, despite the limited resources dedicated to support the LMI, there has been significant progress with the implementation of Action Plan activities with most actions producing tangible results. In particular, the progress with a concrete agenda to develop industry standards is a welcomed development for improving market conditions and provides a critical link to advancing public procurement and communication efforts. Yet under the LMI, numerous industry recommendations have been produced which remain to be

implemented. This has resulted in calls for further progress and the development of broader EU-level political and financial support to enable the industry to achieve its goals.

### Importance of LMI and implementation of recommendations and action plan

The LMI for biobased products has played a central role in better organising an emerging sector, identifying challenges and instigating the development of a programme to provide responses to the barriers within the market place. Indeed, the Action Plan has delivered to varying extents outputs across all four LMI policy areas (regulation, standardisation, public procurement and complimentary actions) and this has been achieved with limited resources allocated to the LMI overall. In particular, DG Enterprise and Industry has supplied strong policy coordination to support the development of industry standards which has helped to structure the market place and product development. Moreover, the production of standards provides key linkages to enhance other important aspects of demand side policy such as public procurement processes, LCA and product labels. These are important elements for tapping into industry, consumer and government markets. Continued work in this area is fundamental for ensuring that the bio-based products LMI retains its momentum and enhances its chances of sustainability and growth.

It has been noted that EU level governance does provide significant value added for the sector in terms of raising the profile of the industry, generating cohesion, identifying barriers etc. However, limited value added has been realised as a result of the failure to deliver a broad range of critical recommendations. Opportunities have now emerged to successfully position the sector within a number of groundbreaking policies, such as Bio-economy, Common Agricultural Policy and Horizon 2020.

In many ways, it appears, the LMI in the bio-based products area has delivered success and momentum beyond the scope of the Initiative.

## **3.2. LMI: key recommendations based on Star-COLIBRI project results**

The Star-COLIBRI project consortium fully supports the work of the LMI Ad Hoc Advisory Group on bio-based products, and acknowledges the need for further implementation of the initiative's key recommendations. Therefore, we would like to draw a parallel between 5 key recommendations selected by the Advisory Group, and the Star-COLIBRI project results, bearing in mind a strong biorefinery perspective.

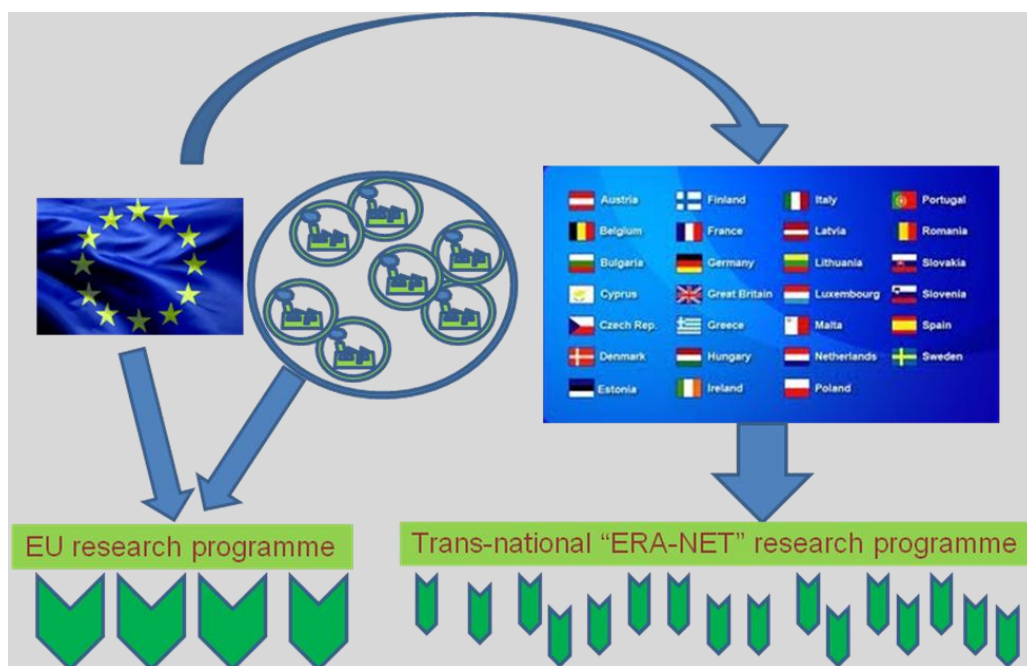
### **1. Development of demonstration projects via public-private partnerships**

A major part of the Star-COLIBRI project was dedicated to determining efficient ways for formal cooperation between stakeholders in the field of biorefinery, where demonstration scale projects

are of key importance. The consortium fully supports the recommendation on setting up demonstration projects via public-private partnerships.

### Set up a Public-Public contractual partnership between the EC and Member States<sup>3</sup>

Our conclusion is that the role of the Member States in a contractual PPP partnership should be to commit to - and to manage - a multi-annual, trans-national funding programme for biorefinery-related research and innovation and that this programme should be managed by relevant national and regional funding organisations on the same principles as an ERA-Net project. The contract would be set up between the European Commission on one hand and the participating Member States on the other (i.e. a public-public partnership). This public-public contractual partnership would be an elegant solution allowing the ERA-Net strategy to play to its fullest potential. The public-public partnership contract should stipulate that the European Commission tops up the national research funding as with the ERA-Net Plus scheme. By doing so, the contract would help to attract as well as to stabilise the national funding while simultaneously reduce the administrative burden of the European Commission.



**Public-Public and Private-Public Partnerships; The role of a trans-national funding programme in creating a European strategy for biorefinery-related research and innovation.**

### Set up a Private-Public contractual partnership with the European Commission as the public body

<sup>3</sup> Source : Star-COLIBRI deliverable 4.4

The second component of the European funding strategy for Biorefinery related research would be to set up a Private-Public partnership, i.e. a contract between the European Commission on one hand and a private consortium on the other. This contract should make special considerations to confidentiality and Intellectual Property Rights. Experiences from Star-COLIBRI show that IPR invoked confidentiality measures constitutes significant obstacles for open and efficient information sharing and uncertainties surrounding them slows down the establishment of new collaborations.

The scheme would contribute to improve the coherence and coordination of research programmes across Europe to overcome fragmentation of the European Research Area (ERA). The scheme would also enable national systems to take on tasks collectively that they would not have been able to tackle independently.

Another tool which supports the idea of developing PPPs in the area of biorefinery is the recently published Dalberg report on biorefinery, which determines the need to establish a dedicated funding platform for demonstration biorefineries, which could be under the new EU PPP frameworks or under the new Horizon 2020 strategy.

LMI/12. Legislation and policies must allow renewable raw materials for industrial use to be available in sufficient quantity of good and guaranteed quality and at competitive price.

We can assume that biomass in Europe will be produced roughly in line with the current patterns of land use. However, we expect an increase in the cultivation of perennial crops (including forestry) which can have a number of positive impacts, such as increasing soil-water retention capacity and reducing erosion. In the short term, the main sources of biomass will continue to be traditional agricultural crops (cereals, potatoes, sugar beet and rapeseed) together with wood and dedicated energy crops, with forestry and agricultural waste also playing a role. After 2020, there will be an increasing use of dedicated lignocellulosic crops, both from farms and short rotation plantations on woodland, assuming that technical and economic hurdles have been overcome by then. With the exception of northern European forests, biomass production areas will continue to be fragmented. Under these circumstances, harvesting and transport costs will become significant factors in the overall value chain.

However, available research suggests that future development of the European biomass sector will be subject to a high degree of uncertainty, mainly depending on crop yields and land availability. Although the extent of yield improvement is not certain, the technical and scientific knowledge which will enable progress is already well established. The key issue for future biomass production in Europe is therefore land availability. The uneven geographical development of agricultural production and demand for both food and feed will influence patterns of global trade in general and the demand for European agricultural exports in particular. In turn this will determine the availability of land to grow biomass as an industrial feedstock. But as food demand puts further pressure on land, availability can be increased by yield improvements, optimisation of biomass production and reduction of losses in the agricultural supply chain. One of the key challenges for Europe is therefore to manage the short- and mid-term constraints on biomass availability without jeopardising long-term sustainability of supply.

The main drivers for biorefinery development are economics, sustainability, climate and government policies. Biorefineries have to compete with oil, and the volatility in the price of oil makes it hard to persuade investors to commit the hundreds of millions of Euros needed for these ventures without robust policies to allow confidence in the market for end products but also to guarantee the supply of the biomass over several decades. To improve the appreciation of biomass as a raw material for non-food products, it is recommended that the sustainability of supply (including environmental, economic and social aspects) be optimised and techniques developed to produce sufficient feedstock from the existing agricultural land area.

European commitment to biofuels allowed the development of first generation biofuels production. To see the more sustainable second generation take hold, policy drivers need to be put in place such as those based on the Renewable Energy Directive (RED), which requires that bioenergy demonstrates a minimum GHG saving compared to fossil equivalents and must not have resulted in the loss of high biodiversity lands, but also tax incentives based upon the reduction of carbon emissions.

Feedstock represents a large fraction of the costs of the refinery. The scale of the refinery will fix the amount of feedstock needed. Production costs are tied to land values and the profitability of alternative crops. Investments will be done only when provision of feedstock can be guaranteed. On the other hand farmers need to be persuaded to use their land for decades. This requires the simultaneous establishment of the complete economic chain.

There is competition for land and this could compromise food production. Little new land is likely to become available in Europe, apart from abandoned cropland in former eastern European states. The emphasis should be on the suitability of biorefinery crops for land that is only marginal/unsuitable for food production, as well as the development of multi-use crops.<sup>4</sup>

LMI/30. Develop clear and unambiguous European and international standards. The standards will help to verify claims about bio-based products in the future (e.g. bio-degradability, bio-based carbon content, recyclability, and sustainability).

### Sustainability

Solutions need to satisfy sustainability criteria and GHG emission requirements established by government policies. (e.g. the decision to produce biodiesel from rapeseed oil or lignocellulose depends on the Life Cycle Analysis (LCA), which also should take into account the use of co-products). In this context it is also important to evaluate the land-use change impact of growing bioenergy crops, to determine whether they are GHG neutral on the ecosystem scale.

Sustainability comparisons of different biorefinery options must be performed with the newly developed integrated evaluation framework (LCSA). A better understanding of the sustainability aspects of the biorefinery value-chain versus other economic value-chains as well as non-market public goods is needed, which should include systemic impacts over both short and long timescales. Generating and using sustainability-related tools and data should be a priority for public R&D funding at EU and national level.

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<sup>4</sup> Source : Star-COLIBRI Joint European Biorefinery Vision for 2030

Biorefinery sustainability requirements will restrict effective biomass availability, as competing usages (food, feed and fibre) already do. It is also recognised that fulfilling basic sustainability requirements is critical in ensuring the long-term availability of biomass, maintaining an appropriate equilibrium between different biomass uses (with priority for food supply), and reducing environmental impact. Therefore certification schemes need to be developed for different feedstock and process combinations.

Main research requirements in this area include:<sup>5</sup>

- Developing standards and valid sustainability criteria
- Developing an integrated evaluation framework for sustainability assessments
- Collecting reliable data
- Making sustainability comparisons
- Developing certification schemes for different crop-process combinations

**Box 22 of Star-COLIBRI's Research Roadmap to 2020: Main research areas for sustainability assessments**

#### Standardisation of bio-based products

Up to now standardisation agreements on bio based products have not been explicitly considered. However in the framework of the LMI, there exist comprehensive activities for the standardisation of bio-based products. The activities comprise the definition of the demand, and possibilities for bio based products in general as well as pre-standardisation for the areas of biopolymers and bio lubricants (mandate 430). The correspondent working groups have almost finished their activities and those are currently in the process of assessing. In summary the following proposals of the task forces were presented: in mandate 429 a term determination for bio-based products was implemented and the opportunities of unified standards for bio based products was analysed. The proposed term for bio-based products is almost conforming to the definition used in the LMI and in the study.

Because of the high heterogeneity of products, as the different ratio of biomass in single products and the different final utilization (e.g. biodegradable plastics, long life building material), the proposal was not to have a single standard, but to recommend four horizontal overarching standards, which will be specified for the single product groups. Those include:

- Bio based content (on the basis of biogenic carbon as well as on biomass content)
- LCA guidelines (simplified approach in accordance with ISO TC207)
- Sustainability criteria for biomass (in accordance with CEN TC 383)
- Scheme for certification of bio-based products

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<sup>5</sup> Part of priorities within the European Biorefinery Joint Strategic Research Roadmap

Furthermore, the task force has produced a catalogue with general gaps of standardisation, which addresses the core problems for the further development of standardisation (BT/WG 209/TG 2 Report 2010). This catalogue includes the further development of test methods for the determination of the bio-based content of products, further development of common LCA standards and methods, as well as the harmonisation of certification and labelling.

For the classification of the activities in mandate 430 to bio polymers and bio lubricants between the following levels of standardisation on European level has to be distinguished:

- (Full) European Standard (EN)
- Technical Specification (CEN/TS)
- Technical Report (CEN/TR)
- CEN Workshop Agreement (CWA)

Within the task force for bio-polymers the technical report was elaborated which will be permitted and published this year. This report contains the term definition and a unified method for the determination of the carbon content. For bio lubricants a technical report was submitted, too.

According to this specification a lubricant has to have the following properties to be classified as a bio lubricant.

- Renewable raw materials (RRM, bio-based, biogenic):  $\geq 25\%$
- Bio degradability:  $\geq 60\%$  according to OECD 301 for Oil  $\geq 50\%$  according to OECD 301 for lubrication grease
- Toxicity: no labelling requirement according to 1999/45/EC through testing according to OECD 201, 202, 203: LD50 > 100 mg/l
- Technical performance: suitable for application

For some product groups some progress can be seen. The results until now should be classified as minimum requirements, which are currently mainly fulfilled by existing bio based products and processes and serve to support a better market penetration.

Identical criteria and standards between standardisation, certification and labelling are not stringently necessary, but have advantages for harmonisation and communication. The workforce for general standardisation within mandate 429 is criticising the plurality of certifications and labels – for bio-based products not only the certification of bio-content is interesting, but a variety of raw material independent certifications is relevant. Up to now it is not clear which certificate is suitable for which product and which recommendations for which products result. The task force therefore proposes comprehensive investigations for the identification of uniform schemes for the certification of bio-based products as well as for the harmonisation between certification and labelling. Results can be to determine which information is necessary for labelling and what impact the labelling information may actually have.

FIN/9. Develop incentives (taxation or state aid measures, grants) to support the development of new, sustainable bio-based products' production processes, complementary to the ones proposed in the Commission's report "Taking bio-based from promise to market" which are focussing on the bio-based products themselves.

The Star-COLIBRI consortium supports incentives which support the development of bio-based products and biorefineries. Some examples of potential incentives are highlighted in our report on transnational research funding.

#### Funding to research and innovation of non-energy production could be increased<sup>6</sup>

One of the conclusions of Star-COLIBRI is that research on biofuels and bio-energy production is receiving proportionally more funding than non-energy products derived from the biorefinery process. This is also the case in the joint call between ERA-Net Bioenergy and Woodwisdom and its topic on "*Advanced biofuels and biorefineries*". Until 2020 we also have European initiatives such as the European Industrial Bioenergy Initiative (EIBI) and the NER300 scheme which sets aside 300 million rights to emit one tonne of carbon dioxide in the New Entrants' Reserve of the European Emissions Trading Scheme. The money raised - which could be as much as 4.5 bn EUR – will be used for subsidising installations of innovative renewable energy technology and carbon capture and storage.

To strengthen the biorefinery sector in Europe, it would make good sense to increase the funding of research on non-energy products (chemicals, materials, fibres, feed and food) to a level comparable with the funding of energy products. Having said this, we would like to underline that we do not propose a decrease of the funding of research related to energy products.

#### Trans-national funding initiatives must reflect that different geographical regions demand different biorefinery concepts

In contrast to petroleum-based refineries, the viability of biorefinery facilities will depend foremost on the availability of biomass. Because of the inefficiencies inherent in transporting bulky low-density biomass over long distances, biomass logistics is a crucial aspect and influences the entire biorefinery value chain. As a consequence, there will not be one but several biorefinery types in Europe, with a predominance of certain types according to the geographical biomass location. This will also influence the national and regional funding

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<sup>6</sup> Source : Star-Colibri deliverable 4.4

requirements for research and innovation as well as the location of demonstrators. This has to be considered in setting up trans-national call topics so that shifting geographical conditions are not being unintentionally discriminated against in the Call description. Certainly this can be taken into consideration when the Specific National Rules are defined. However, it is also important that the evaluation and selection process be representative as well. The experts used must represent the geographical area covered in the joint call and they must be provided with appropriate instructions.