SCAR
Standing Committee
on Agricultural Research

White Paper of the Collaborative Working Group “Integrated Biorefineries” of the Standing Committee on Agricultural Research

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In memory of **Stephan Micha**, beloved colleague and “father” of the Collaborative Working Group “Integrated Biorefineries”.

This paper has been written by the members of the CWG Integrated Biorefineries Anna Piterina, Jan van Esch, Philipp von Bothmer, and Stefan Rauschen (group coordinator) based on the discussions and results of the work of the CWG Integrated Biorefineries. It is a group effort of the whole CWG IB and represents the views of its members.

White Paper of the Collaborative Working Group “Integrated Biorefineries”

Executive Summary

The Collaborative Working Group “Integrated Biorefineries” brought together delegates from 14 Member States with an interest in the role of biorefineries in the bioeconomy. Through a series of three meetings in combination with visits to biorefineries and pilot plants the group developed an overview of the activities currently ongoing on Member State and EU level and encountered good examples as well as hurdles and challenges for setting up biorefineries and implementing the bioeconomy.

The group decided to jointly write a White Paper to detail the observations made and to give clear recommendations on how the identified challenges can be met. This report gives some background information on the CWG, the activities undertaken, the points discussed, and summarizes the conclusions drawn and highlights the key recommendations:

1. ***Target funding instruments to capture the complete innovation cycle up to demonstration***

   There is a gap in funding for demonstration activities, at Member State and EU level. For SMEs, it is difficult to get even small amounts of finances for certain activities and investments, despite their innovation potential. Access to finance for demo scale activities (including equipment, CAPEX) must be expanded and made easier.

2. ***Use other instruments to create market opportunities***

   The large amount of R&D spending has built the basis for a technology push but there have been too little activities geared to market creation. Other instruments such as procurement, subsidies, regulation, “Green Deals” must be used to create markets (in a similar way to the BioPrefered Scheme in the USA).

3. ***Involve existing facilities in research programs, give vouchers for access to SMEs***

   A number of open pilot and demonstration facilities are available. The access to these existing installations must be made possible EU-wide, especially with financial means for SMEs. ERA-Nets should involve pilots and demonstration facilities, vouchers for use of pilots and other open access facilities for development should be made available under Horizon 2020.

4. ***Network existing infrastructures***

   The existing infrastructures would benefit from an exchange of knowledge, closer coordination and developing a common voice. Networking of existing infrastructures could be facilitated via a dedicated call under the Infrastructures part of Horizon 2020. This could also lead to the identification and closing of gaps that might exist.

5. ***Embrace different kinds of biorefineries with a regional perspective***

   Biorefineries can come in different shapes and sizes (specialized vs. general; centralized integrated vs. small-scale, mobile) offering a multitude of business and employment opportunities, especially at regional level. All of them should be considered valid options in implementing the bioeconomy and should receive appropriate funding.

Contents

1 Background to the CWG Integrated Biorefineries

The setting up of a CWG Integrated Biorefineries was proposed by Germany on the SCAR Plenary meeting on June 6 2013 and the group was kicked off on 13 November 2013.
The CWG aimed at complementing the activities of the Strategic Working Group “Sustainable Bio-resources for a Growing Bioeconomy” by extending far beyond primary production to technological development, research and innovation, and societal questions in the industrial context of biomass conversion and processing. The CWG comprised the whole value chain from higher value-added farm products in agriculture, forestry, aquaculture and fisheries to an enormous thematic complexity of biomass transformation and product development.

The CWG agreed to consider different kinds of biorefineries which come in different shapes and sizes (specialized vs. general; centralized integrated vs. small-scale, mobile).

Next to its strategic contributions - in the context of Horizon 2020 and the Bio-Based Industries Joint Undertaking - the CWG enabled the Member States and Associated Countries to coordinate their interests and complementary activities. The group addressed the needs that have been recognized by Commission and Member States to work towards better coherence of their measures on European, national and regional levels as well as include industries (e.g. Small and Medium Enterprises, SMEs), research and technology organizations (RTOs), universities and other stakeholders.

The CWG brought together delegates from 14 Member States (AT as observer; BE, DK, ES, FI, FR, IE, IT, NL, NO, PL, SE, UK; DE as coordinator) with a key interest in the role of biorefineries in the bioeconomy and with ongoing funding programmes in this area.
Through a series of meetings in combination with visits to biorefineries and pilot plants and by running a survey amongst the CWG members on existing biorefineries in their countries, the group developed an overview of the activities currently ongoing on Member State and EU level and encountered good and example cases as well as hurdles and challenges.

At the kick-off meeting on 13 November 2013, the group developed a common understanding of what a biorefinery is and how they can be classified. On the second meeting on 27 February 2014, the members of the group gathered examples of different kinds of biorefineries in their countries, both privately owned and publicly financed ones. In another step, an overview of national programmes with relevance for biorefining was gained through a structured survey, to assess possibilities for cooperation and joint activities. At the third and final meeting on 17 September 2014, the group discussed the conclusions derived from its activities and the recommendations it could make to national funders and the EU Commission.

2 Conclusions from the work of the CWG

The CWG brought together in depth experience in national funding of bioeconomy and biorefinery programs. The common view was that Member States and the EU Commission are spending a lot of money for research but are not getting what they ultimately want – the implementation of the bioeconomy, new business cases, industry taking up bio-based products and materials, new market opportunities, jobs and growth.

The surveys showed that there are already a lot of different activities in biorefining, both in R&D programming and in piloting and demonstration activities, even plants in commercial operation. It became apparent that the approaches and instruments used for funding these activities differ considerably between the Member States programmes. The biorefineries either in commercial operation or in piloting/demonstration phases also exhibit a large diversity of bioresources (reflecting the bioresources most available in the regions), technologies for (pre)treatment and conversion used, and the products developed. The surveys showed both top-down (i.e. developed from scratch) as well as bottom-up (e.g. expanding upon existing processes, like sugar production from sugar beet or biogas generation), large and small scale, and centralized and de-centralized approaches (i.e. either bringing the bio-resources for all treatment and production steps to a central location, or pre-treating bio-resources into an intermediary energy/materials carrier which is then centrally processed into the end product).

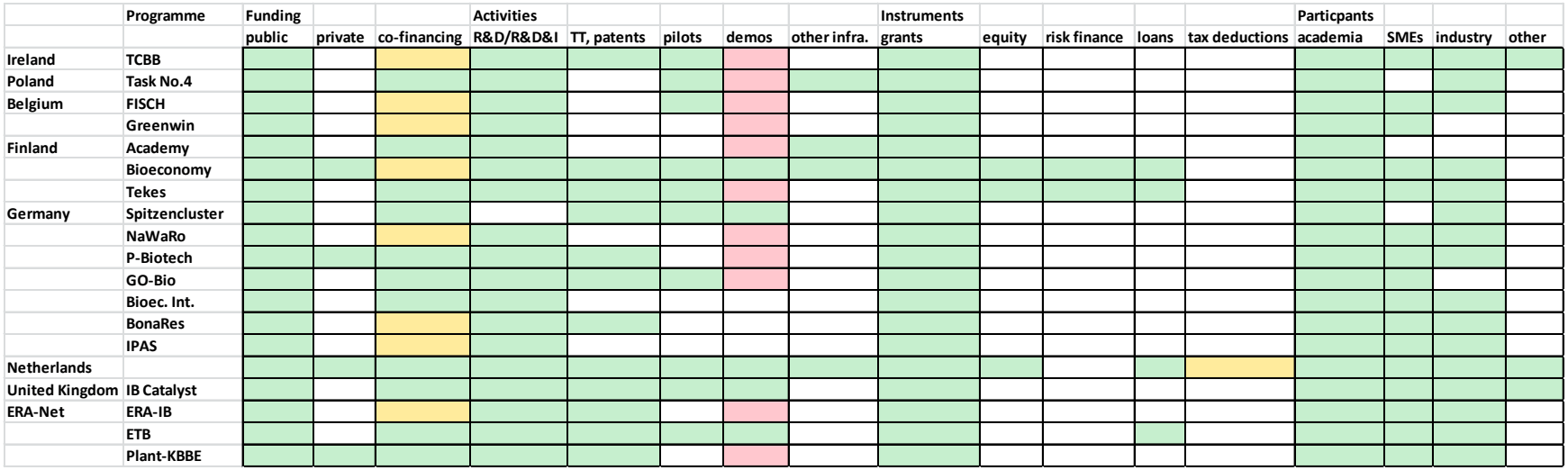
The observations were distilled into three key conclusions.

2.1 Deficient funding for demonstration and scaling up

A survey of selected relevant funding programmes from 7 Member States (Figure 1) revealed that the funding instruments used are heavily geared towards R&D funding, with high reimbursement rates especially for research and technology development via grants for projects. Most of these programmes combine some sort of private funding, mostly as co-financing within projects. The instruments fail however when developments come closer to the market and need to be scaled up, piloted and demonstrated. There is a clear lack of funding opportunities for demonstration under these programmes. This stage requires large investments and is high risk, particularly given the current market conditions and competition from fossil-based industries. The funding instruments are not appropriately targeted to all stages of the innovation cycle.

There are only very few programmes that intrinsically cover the whole innovation chain – owing to the fact that national rules and the ‘spirit’ of the funding programmes often do not allow certain activities to be funded or certain instruments to be used. This differs widely between the Member States, however, making it difficult in many areas to look for possibilities of joint action. Member of the CWG IB felt that this first overview was already very instructive but that a deeper understanding of the relevant administrative and legal issues was needed to fully assess the situation.

Figure 1: Schematic overview of selected Member States funding programmes with relevance for biorefining/the bioeconomy and their characteristics. Relevant ERA-Net activities were also gathered. Green indicates that the characteristic is present, yellow indicates that they are partially present, red indicated that they are absent (demos are highlighted here although other characteristics/instruments are also lacking in certain programmes).



	Programme	Funding			Activities					Instruments					Particpants			
		public	private	co-financing	R&D/R&D&I	TT, patents	pilots	demos	other infra.	grants	equity	risk finance	loans	tax deductions	academia	SMEs	industry	other
Ireland	TCBB																	
Poland	Task No.4																	
Belgium	FISCH																	
	Greenwin																	
Finland	Academy																	
	Bioeconomy																	
	Tekes																	
Germany	Spitzencluster																	
	NaWaRo																	
	P-Biotech																	
	GO-Bio																	
	Bioec. Int.																	
	BonaRes																	
	IPAS																	
Netherlands																		
United Kingdom	IB Catalyst																	
ERA-Net	ERA-IB																	
	ETB																	
	Plant-KBBE																	

2.2 Pilot and demonstration facilities exist but are not optimally used

There are a number of existing pilot and demonstration facilities that offer their services to academia, SMEs and industry. Amongst them:

- The Bioprocess Pilot Facility in Delft (The Netherlands)[1] (visited by the CWG IB)
- The Bio Base Europe Pilot Plant in Ghent (Belgium)[2]
- ARD Biorefinery at Pomacle-Bazancourt (France) with the BioDémo and BRI facilities[3] (visited by the CWG IB)
- Centre for Process Innovation (CPI), UK[4]

The impression was that these installations offer interesting and valuable services of outstanding quality. However, access to these facilities is often limited and the services provided not always affordable to SMEs or public research institutes, or costs are not covered by existing funding programmes (e.g. access from a company from another country; expenses not an eligible cost item covered under the national programme).

Other installations – like R&D pilot and demonstration plants and even commercially run installations – could also profit from collaboration with more and diverse partners.

2.3 Lack of market-creating activities

While R&D activities have created the potential and basis for a technology push, there is no concurrent market pull that would lead to industry investing in further demonstration or even production plants. This is evidenced by the small number of known plants in commercial operation and also by testimony from industry representatives.

Market-creating activities have been largely neglected by Member States and the EU Commission and need to be ramped up considerably.

There are a number of reasons for the current situation:

- regulations (e.g. renewable energy acts that favour subsidisation of bioenergy thus distorting market prices)
- bio-based products need to compete with well-established fossil-based value chains (i.e. amortized infrastructures; economies of scale; well developed markets and market positions)
- lack of incentives (companies and consumers decide mostly on economic criteria, not because they want to transform the economy into a bio-based one)

As the overview of Member States and EU Commission funding programmes has shown, there are a lot of research activities and opportunities. The economic part of the implementation of the bioeconomy is underdeveloped or even lacking. Examples given by Member States during the meetings (Italy: new rules on the use of plastic bags led to a transition towards bio-degradable materials and an overall decline in the use of these bags; The Netherlands: a deal brokered between the government and the energy industry

[1] http://www.bpf.eu/
[2] http://www.bbeu.org/bio-base-europe-pilot-plant
[3] http://www.eco-innovera.eu/lw_resource/datapool/_items/item_277/3-presentation_bazancourt.pdf
[4] http://www.uk-cpi.com/

led to a reduction of the number of coal fired power plants) show that other instruments exist that could be used to change this situation. The launching of the Bio-Based Industries Joint Undertaking was seen as a good opportunity to change this situation by also creating a market pull.

3 Recommendations to the European Commission and the Member States

3.1 Target funding instruments to the complete innovation cycle up to demonstration

Funding Instruments must address the complete innovation cycle up to demonstration. In ongoing programmes, both at Member State and EU level, demonstration activities are largely underrepresented and underfinanced.
Crucially, ample funding for pilots and demonstrators is missing. This could be remedied by either expanding public funding into these areas (which might require exemptions from state aid rules), making better use of different sources of funding (e.g. European Structural and Investment Funds) or making these kinds of investments more attractive for industry and venture capital by for instance changing depreciation rules or de-risking through loans or loan guarantees.

For SMEs it can difficult to secure even small amounts of finance for certain activities and investments, yet they hold vast innovation potential. Access to finance for equipment must be expanded and made easier (even small amounts count for SMEs).

Currently, the Bio-Based Industries Joint Undertaking is investing significantly in flagship plants, pilots and demonstrators. This is a valuable contribution to overcoming the observed hurdles. Investments should be made where they have the largest leveraging effect, i.e. where a breakthrough outcome and a valid business case can be foreseen that might further attract more investments or motivate more companies to invest on their own, to get the bioeconomy off the ground.
Additionally, the Commission under President Juncker is implementing the European Fund for Strategic Investment (EFSI), which is aimed at mobilising private investment by de-risking through loans and guarantees. The EFSI could be strategically used to strengthen the implementation of the bioeconomy. Recent examples of projects in this area include the construction of a new energy efficient pulp mill at Äänekoski in Finland and a loan to the Spanish company Abengoa that is active in 2nd generation biofuels.

Funding for SMEs should cover a range of activities, investments and sizes of funds, so that SMEs have more possibilities for further business development. These funds should also be targeted to all steps in the innovation cycle in the lifetime of SMEs. The EFSI and the Access to Risk Finance part of Horizon 2020 could be used to strengthen the role of SMEs. Bringing together existing piloting and demonstration facilities and SMEs in targeted calls by the BBI JU or the main part of the Horizon 2020 work programme would also be desirable.

3.2 Use other instruments to create markets

Other instruments such as procurement, subsidies, changes in regulation, “Green Deals” (examples from Italy: plastic bags; The Netherlands: coal fired power plants) must be used to create markets. The large amount of R&D spending has built the basis for a technology push but there have been too little activities

geared to market making and creating a market pull. Horizon 2020 has seen the introduction of Pre-Commercial Procurement (PCP) and Public Procurement of Innovations (PPI) but both have not yet been used to a larger extent and experienced on their implementation and usefulness for stakeholders and the implementation of the bioeconomy are lacking.

Consumer behaviour and choices should also be encouraged to prefer bio-based products and services. Awareness must be raised and consumers informed about the benefits of bio-based products and value chains to make the options offered more attractive despite a potentially higher price.

3.3 Include existing facilities in research programs and give vouchers for access to SMEs

A number of pilot and demonstration facilities are available. The access to these existing installations must be made possible EU-wide, especially with financial means for SMEs. ERA-Nets should involve pilots and demonstration facilities were this makes sense. The programme of the BBI JU could also foresee aditional activities or calls targeted at making better use of the existing facilities.

Vouchers for the use of pilots and other open access facilities for the development of processes and products should be made available under national funding programmes and Horizon 2020, especially for SMEs. This should optimally allow national as well as international access (i.e. SMEs getting national money for services of a pilot/demonstration facility in another country if this is nationally not available).

3.4 Network existing infrastructures

The existing infrastructures would benefit from an exchange of knowledge, closer coordination and developing a common voice. Networking of existing infrastructures could be facilitated via a dedicated call under the Infrastructures part of Horizon 2020 or via the BBI JU. An early version of the 2015 call of the BBI JU did indeed have a CSA project for the networking of infrastructures, to exchange information and assess whether all necessary capacities are available and where gaps exist regarding the current and foreseeable need of the industries. This activity should be performed in order to close potential technical gaps between R&D and piloting/demonstration.

National or regional platforms (e.g. the European bio-based delta with France, Belgium, The Netherlands and Germany) could also deepen the interaction between active players and existing infrastructures to the benefit of all parties concerned.

In the Infrastructures part of the Horizon 2020 Work Programme for 2016/17 there is a topic on Integrated activities for advanced communities (INFRAIA 01-2016-2017) with a focus on "Research infrastructures for research on biomass conversion and biorefinery" under the Energy heading[5]. This could be used by laboratory and pilot-scale installations as well as demonstration plants to create a network between these facilities, to facilitate and organize trans-national access and to perform joint research activities.

[5] https://ec.europa.eu/programmes/horizon2020/en/draft-work-programmes-2016-17 (see 04.infrastructure)

3.5 Embrace different kinds of biorefineries with a regional perspective

Biorefineries can come in different shapes and sizes offering a multitude of business and employment opportunities. All of them should be considered valid options in regionally implementing the bioeconomy and should receive appropriate funding. Different kinds of biorefineries should be taken into account. A differentiation can be made along the following aspects:

1. specialized vs. general: in terms of bio-resources (i.e. only one or a variety of different feedstocks); in terms of products (narrow range or many different products/chemicals);
2. centralized integrated vs. small-scale or mobile (i.e. bringing together different pre-treatment and conversion technologies into one big installation, in combination with other processes like energy generation or water re-use; small transportable or stationary bio-reactors)
3. regional vs. supra-regional/national (i.e. being located at the source of the biomassed used and having a rather limited “catchment area”; or mobilising and using bioresources at a national level or even beyond).

The bioeconomy is about making best use of the bioresoures that are (regionally) available, which will mean many different approaches will be needed in the diverse landscapes of Europe and the regional contexts (e.g. farming structure, viability of business cases, availability of infrastructure, manpower, knowledge). Also in terms of economic viability in general and current low prices for crude oil, other types of biorefineries (small scale, less intergated with lower investment) may be a more viable option short term, whereas large scale and investment intensive concepts may be a longer term option.

An important aspect connected to this is the logistics of the biomass and the infrastructures and transport modes necessary for the mobilization of the biomass potential in a given region. Regional strategies for the bioeconomy and related aspects have been worked on by the European Regions for Research and Innovation Network (ERRIN) and the European Regions for Innovation in Agriculture, Food and Forestry (ERIAFF). ERRIN and ERIAFF are striving to develop a consensus document as a guideline for implementing regional bioeconomy strategies, into which the recommendations from the CWG and the experiences gathered should feed in.

4 Annex: Activities of the CWG

The CWG held a total of three meetings, two of which in combination with visits to pilot and demonstration facilities and other bioeconomy related institutions (Pomacle-Bazancourt in France; Delft and Wageningen in The Netherlands). It also carried out surveys on national funding programmes with relevance and on biorefinery installations currently operating in the countries. Details on the meetings (based on the minutes prepared by the coordinator and endorsed by the group) and the surveys are presented here for information.

4.1 Kick-Off Meeting on 13 November 2013 in Brussels

At the kick-off, the coordinator explained the rationale and the scope of the CWG as detailed in the fiche adopted by the SCAR plenary on 6 June 2013. The definition of "integrated biorefineries" based on the Biorefineries Roadmap published by the German Federal Government in May 2012 (http://www.bmbf.de/pub/roadmap_biorefineries.pdf) and the Star-COLIBRI project (http://www.star-colibri.eu/publications/star-colibri-publications/) and a draft work plan developed by the coordinator were discussed.
It became apparent that although different concepts and definitions existed for (integrated) biorefineries and their classification, some key issues and views were in common:

1. **Sustainability is important**, embodied in the idea of making best use of resources in the most efficient and sustainable manner, i.e. using bio-resources to the fullest extent possible for a multitude of the most valuable products (food, feed, fibre, fuel, energy, other products; not necessarily in this order).
2. **The regional potential is important**; looking at what bio-resources can be used in a region and developing biorefining concepts and value chains tailored to this potential.
3. **The use of different available technologies and methods** for the primary and secondary refining steps as well as pre-treatment and downstream processing is key to achieving the sustainable use of bio-resources in the circular economy which is at the heart of the bioeconomy.

It was agreed that based on these shared points a common view and understanding could be developed on which the different concepts for biorefining can be further jointly developed (see Figure 3). **The differences between the concepts held an enormous potential** for collaboration and discovering new pathways for the development and implementation of biorefining. MS/AC could learn from each other by sharing their views and experiences and by exploring ways of working collectively together.
The partners of the CWG agreed that the envisaged work plan would be feasible. The work plan was divided into two phases:

- **The Starting phase** to build a common basis and assess status quo, with the kickoff Meeting: (to reach an agreement on definition work plan) and the 1st meeting (to survey biorefineries and current national funding programmes) and the 2nd meeting (to analyse overlaps/gaps/opportunities in the different funding programmes or synergies in existing biorefineries);
- **The Follow-up phase** to build a common basis for future collaboration, with a 3rd meeting (to overview the intended national programmes, open calls, overlaps, possible alignments, potential transnational projects) and the 4th meeting (on CWG results - cooperation in existing programmes, potential for multi-national flagships, ERA-Net strategy, topics for the next Horizon2020 work programme or other options, Report/white paper), and potential follow-up Meetings

For the next meeting data would be collected by the partners on the research programs ongoing in their countries with respect to (integrated) biorefineries and on already existing biorefineries (see survey

below). This information would then be collated and mapped by the group to identify shared priorities, overlaps and gaps.

Figure 3: Biorefinery concepts as discussed by the CWG IB (from the Star-COLIBRI: Joint European Biorefinery Vision for 2030 report).

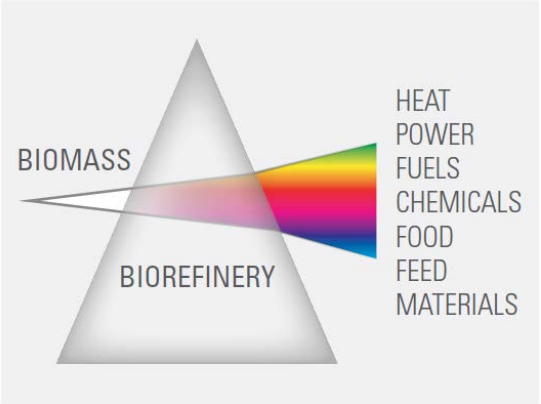


Figure 1: Schematic representation of the biorefinery concept
IEA Bioenergy Task 42 Biorefinery, 2009

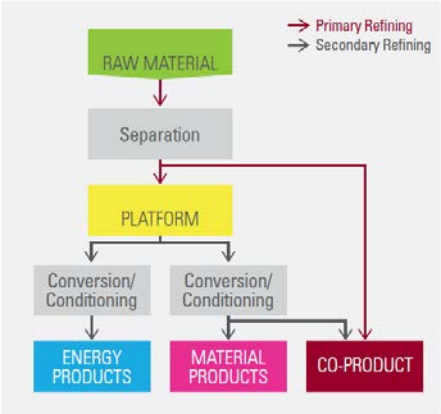


Figure 2: The different components within the Biorefinery Concept (According to IEA Task 42 Biorefinery systematics, 2009; adapted and modified by German Agency of Renewable Resources (FNR)[3])

Survey on biorefineries for the Collaborative Working Group Integrated Biorefineries

As agreed at the kick-off meeting, MS/AC are asked to give an overview of the **biorefineries** established in their territories. A biorefinery can be defined as an installation in which all steps in the conversion of biomass to a final product are performed, be it at pilot, demonstration or commercial scale, also encompassing those facilities where research on biorefining is being carried out.
The CWG in its first meeting found that while some members defined a biorefinery in the above sense as a co-localized plant, where all steps are performed at the same installation, others considered a de-centralized implementation of the different steps as a biorefinery. Then again, for some MS/AC a biorefinery needs to encompass all conversion steps towards the product, while for others this was not a defining characteristic.
It was found that shared among the different definitions where common characteristics of the “biorefinery concept”: the sustainable use of biomass to its fullest potential, the creation of high value products, a cascading use where sensible, the leveraging of the potential of regions where biomass is available.

This survey therefore intends to grasp the diversity of the different views and to obtain a comprehensive as possible overview of existing biorefineries at MS/AC level.
It seems clear that this will be a demanding task and will probably not be achievable in the first run of this survey. It is therefore vital that the first data are evaluated and discussed within the group to reach better results following an iterative process.

If you cannot fill out all the questions or all aspects, this is not a problem. It will help nonetheless in creating an overview of the installations and will help refine (no pun intended) the survey.

Biorefineries Survey for MS/AC:

Name of the installation:

Location:

co-localized refinery ☐ decentralized ☐ (if yes, please indicate the connected installations)
connected installations:

Ownership: public ☐ private ☐ public-private partnership ☐

Name of owner(s) and share(s) of ownership:

Kinds of biomass used (with amounts p.a.):

predominantly: regional ☐ non-regional ☐ (if yes, please indicate source)
source:

Pretreatment/conditioning/separation used:

Primary refining used:

Platform(s):

Secondary refining used:

Intermediates/precursors:

Products (with amounts p.a.):

Research:

possible: yes ☐ no ☐
international cooperation: yes ☐ no ☐
list of partners/projects

Product marketing (e.g. labelling, own brand, advertisement):

Jobs:

Primary on site:
Secondary (supply, services, logistics etc.):

4.2 2nd Meeting back-to-back with the SWG SBGB in Paris on 27 February 2014

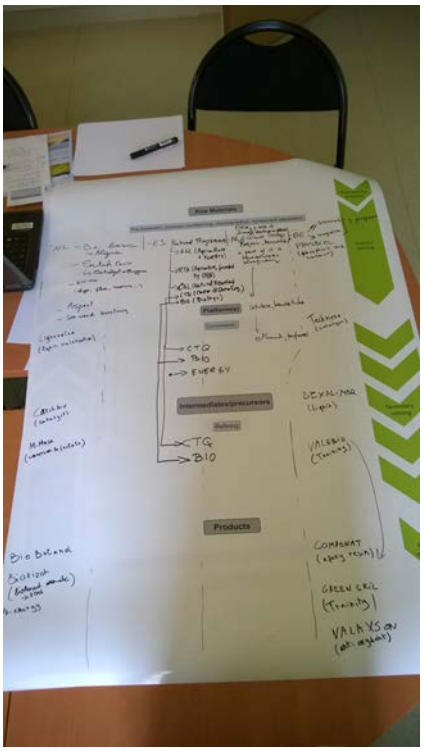
The meeting was organized back-to-back with the SWG SBGB (meeting held on 25 February) and the joint visit to the biorefinery at Pomacle-Bazancourt on 26 February.
Points highlighted as especially interesting were the **integration of agricultural industries**, science institutions/installations and SMEs/innovators at a single site; the size of the installation, the acreage devoted to the production of biomass for it and the **large investment undertaken**; the fact that it was **farmers who took the lead and invested their money**; the **open innovation** environment at the plant, with shared infrastructures for research and scale-up.
It was also discussed whether the Pomacle-Bazancourt site could serve as a model, given its unique history and ownership structure, its large size (which is also needed from a pure economic perspective) and the overall agricultural structure and availability of bio-resources. One further point of discussion was that the products from the biorefinery were competing on existing markets and served as a hedging of risks for agricultural producers, and there were not as yet new markets being opened with new products.
The coordinator gave a brief presentation of the results from the biorefineries survey filled out by the delegations since the last meeting. The survey was felt to be useful for a first exploration. The implementation of a map (interactive; web-based; either administrated or open for data input by users) was discussed as a good way of gathering all these different kinds of data and also to better categorize into commercial/pilot and demo/research facilities. More generally, it was felt that research needs should be a stronger focus in the survey, meaning both **major achievements but also remaining bottlenecks** that make more research and development necessary. “Dead ends” in development should also be considered as to avoid funding of ideas and approaches that have already been shown by others not to work. Since these are not necessarily reported this would require a change in reporting style, however. Data should more generally cover lessons learnt, both good and bad.

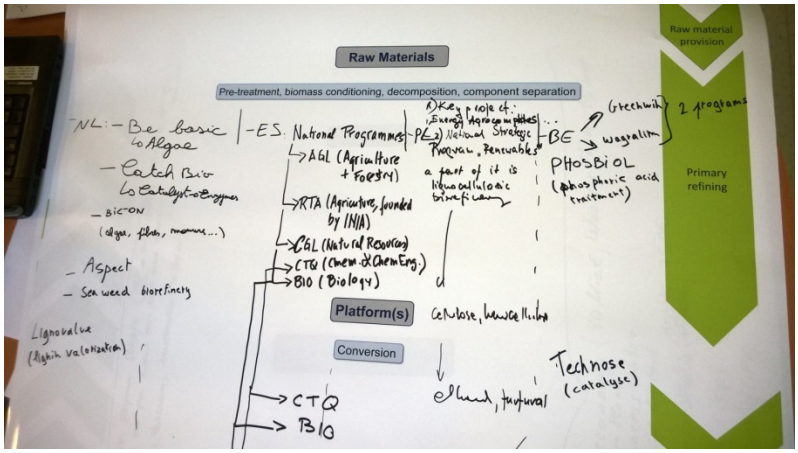
The discussion at the meeting revolved around good examples; use of **different instruments in research programming** (such as thematic focus areas, procurement); the difficulty to assign these to certain steps of the process chains or to certain areas within them; research programmes spanning **whole value/process chains**; structures of the programmes and the way that they are administrated being quite different; differences in the nature of programmes (e.g. no specific one for biorefining, but different national ones with relevance; regional programmes covering whole value chains; broad knowledge sectors, challenge driven programmes); **different MS priorities**; **different sources of money** (public hand vs. private sector; national/H2020/Interreg/structural funds) and **different ways of spending** it (e.g. loans; subsidies; tax reductions; equity/risk finance; market support; research grants; commercialization and technology transfer projects; infrastructure support; demo plants; Public-Private Partnerships; clusters).
The biorefining process chains (3 stages: raw materials; processes; products) differed substantially between the MS/AC, with **many different strategies and underlying motivations and drivers**, and also **different responsible ministries and agencies**.

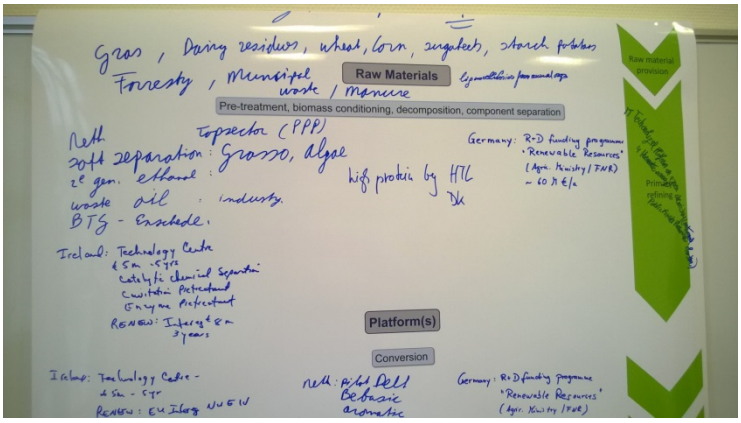
It became apparent that not all relevant information on funding programmes was available, nor were all responsible people present (since many different ministries/agencies are involved at MS/AC level, both nationally and regionally). Therefore, a more targeted overview of funding programmes, with regards to content and structure, the different financial instruments used, the sources of funding and the administration procedures would need some “homework” on the part of the delegations. A dedicated workshop was discussed as a useful option to deepen the discussion on potential future collaboration on biorefining programmes.

It was also discussed that a collaboration and an alignment between MS/AC activities would only be half of the story: with the JTI BBI setting the agenda for research, development and demonstration projects on biorefining within the context of Horizon 2020, it was also **deemed important to also liaise with the JTI** to assess whether an alignment of activities can be achieved here for the benefit of the successful implementation of the bioeconomy.

Figure 4: Photos taken from the group work relating Member States funding programmes to the different steps.







4.3 3rd Meeting on 18 September 2014 in The Hague

The meeting started on 17 September with a visit to the Biotech Campus Delft, a tomato producer implementing a diversity of bioeconomy-related measures and the University of Wageningen Research Centre (including the AlgaeParc). The Bioprocess Pilot Facility's (BPF) business model, i.e. providing "**open access**" against payment, was regarded as a **useful model to facilitate access of interested companies** (especially SME) to the required infrastructure and to promote research and investments in this field. The talk by the Dutch SCAR representative at the Bioeconomy Stakeholders' Conference in Torino on 8 October 2014 was presented, discussed and some key messages emphasizing **the necessity to target instruments to cover the whole chain from supply to the market** were suggested to be added.
The clear message based on the information collected on biorefineries and related research and development programs was that in **most MS/AC programmes demonstration activities are either completely lacking or underrepresented**. Moreover, in cases where demo plants are built or planned they are mostly erected overseas. This is most likely mainly due to the available subsidies in the US.

It was discussed that **bringing together all European biorefineries in a meeting** to present and discuss the various structures and business models, but also parallels and gaps in order to identify the most suitable model(s) could be a fruitful endeavor. It was again noted that **demonstration activities seem to be underinvested in the EU**, although there are various instruments in place to facilitate such activities (e.g. the use of funding from structural funds). However, one of the main problems is that the proper use of such funds on top of other programmes is still unclear. Hence, **guidance and advice** would be highly appreciated and considered very helpful. In order to make the best use of the already existing pilot plants, it was noted that the **infrastructure instruments in Horizon 2020 could be used to facilitate networking** between existing plants. **Guarantees from the EIB** to finance demo plants were also mentioned. The respective financial instruments are provided by the risk sharing finance facility (RSFF). It was discussed that the (financial) risk for companies up to the level of demonstration activities is quite high. Thus, one should think about a reimbursement rate of 100% for such activities, thereby making investments in this area more attractive. As an additional measure **a system of EU COM financed "vouchers"** was proposed (each probably worth € 300.000-400.000) which could be used to pay for (open access) biorefinery plants in order to bridge the gap from research to large scale.
The necessity to **concentrate also on the demand side** was highlighted: in order to strengthen the bioeconomy, **a market would have to be created or at least stimulated**. As long as the new bio-based products are not cheaper and/or better than the competing fossil based ones there have to be other incentives for consumers and the industry. An increased demand will then create a market pull which in turn will foster the respective investments in research and demonstration. Those incentives could be financial support from national (e.g. state subsidies) and/or EU sources. Another form of incentives implemented in The Netherlands and given as an example are the "green deals" between states and the industry. The definition of standards (e.g. regarding sustainability) would not cost the states money but would impose the need to shift the economy more towards a more bio-based one.

In summary the common position of the attendees was that there is **no lack in funding models for research**. However, the **funding instruments need to be targeted to cover the whole chain up to the market**. Bridging the gap to the market is still a major hurdle, and solutions to overcome this obstacle are urgently needed. One approach would be to **make better use of already existing pilot plants**. Nevertheless, the mere existence of such plants is not sufficient as long as i) the costs for using them are **not reimbursed by 100%** and ii) there is **no actual market for the end products**.

R&D Funding Programme Survey for MS/AC:

Name of the programme/funding activity: [specify]
Contact person details:
[name and address]

Thematic content:
[the thematic scope programme/activity]

Funding sources:
☐public: [name of the funding institution/agency]
☐PPP: [name of the private partner or the kind of private partner necessary]

What activities are funded (all that apply, underline if necessary):
☐R&D/R&D&I
☐Technology transfer, patenting, licensing
☐Creation and testing of pilots
☐Construction and maintenance of demonstrators
☐Construction and maintenance of other infrastructure
☐Other, please specify:

How are activities funded (all that apply):
☐Grants for projects
☐Equity
☐Risk finance
☐Loans
☐Tax deductions
☐Other, please specify:
Who can take part (all that apply):
☐Academia
☐SMEs
☐Industry
☐Other, please specify:

What is the duration of the programme/instrument: [please give the runtime of the programme]
What is the amount of money?
Total: [please provide an amount] [in €]
Per project: [please provide an amount] [in €]
What is the rate of financing: [please give a number] [in %]
Is co-financing necessary? ☐yes [please give a number] [in %] ☐no
Where is co-financing coming from?

Are there any prerequisites?
[any special requirements that projects or applicants need to address]